UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD
Before Administrative Judges:
Ivan W. Smith, Chairman
Dr. Walter H. Jordan
Dr. Linda W. Little

SERVED JUL 28 1982

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

PARTIAL INITIAL DECISION

(Reopened Proceeding)

July 27, 1982

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NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD
Before Administrative Judge Gary Milhollin
Acting as Special Master

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

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Appearances

Licensee, General Public Utilities Nuclear Corporation:
George F. Trowbridge, Ernest L. Blake, Jr., Bonnie S. Gottlieb, Deborah B. Bauser, Esquires, Shaw, Pittman, Potts & Trowbridge

Nuclear Regulatory Commission Staff:
Jack R. Goldberg, Lucinda Low Swartz, Mary E. Wagner, Daniel T. Swanson, Esquires.

Commonwealth of Pennsylvania:
Robert W. Adler, Esquire

Three Mile Island Alert, Inc.:
Ms. Louise Bradford, Ms. Joanne Doroshow, John Clewett, Esquire

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I. BACKGROUND AND INTRODUCTION

2029. In its August 9, 1979 Order and Notice of Hearing, the Commission directed that Three Mile Island Unit 1 (TMI-1) remain shut down until a hearing can be conducted by this Atomic Safety and Licensing Board to determine whether there is reasonable assurance that the facility can be operated without endangering the health and safety of the public in view of the March 28, 1979 accident at TMI Unit 2. 10 NRC 141. Following the mandated hearing the Board issued two partial initial decisions (PIDs) favoring the restart of TMI-1 subject to certain conditions. However, in the PID of August 27, 1981 (LBP-81-32, 14 NRC 381, 402-03) and again in the PID of December 14, 1981 (LBP-81-59, 14 NRC 1211,

1707-11, we retained jurisdiction over issues pertaining to the quality of Licensee's management and its operating personnel because there had been cheating on an NRC operators' licensing examination. This partial initial decision disposes of that matter and related issues. It is the concluding portion of the Board's initial decision in this proceeding.[226/]

2030. Immediately prior to issuing the partial initial decision of August 27, 1981 we had received several notifications from the NRC Staff providing the results of an investigation by the Office of Inspection and Enforcement (OIE) into allegations of cheating by two TMI-1 shift supervisors on the April 1981 NRC Senior Reactor Operator examinations. The reports also raised questions concerning the adequacy of the proctoring of NRC-administered examinations. We noted that the OIE investigations raised questions affecting the issues decided in the August 27 PID, but we nevertheless issued that decision so that, inter alia, the Commission could monitor further developments in the context of their relevance to this proceeding. 14 NRC at 405.

226/ The Board had also retained jurisdiction to consider motions by intervenors Union of Concerned Scientists and Steven Sholly to reopen the record of some facility modification, design and procedures issues. 14 NRC at 1222. The Board denied the motions in its order of April 26, 1982. Also carried over from the earlier partial initial decisions was the Board's consideration of how to implement the terms and conditions upon which it found that the TMI-1 may be restarted. 14 NRC at 1420. On April 5, 1982 the Board issued an order modifying and approving an implementation plan proposed by the NRC Staff. The cheating issues decided here are the only items remaining within this Board's jurisdiction.

2031. Later the Licensee also brought to the Board's attention its own concern about "several cases of strong parallelism" in answers on some Licensee-administered examinations and suggested that the Board might therefore wish to reopen the evidentiary record.227/

2032. On October 2, 1981 we reopened the evidentiary record to inquire into the matter and appointed Administrative Judge Gary L. Milhollin Special Master to preside over the hearing pursuant to 10 CFR 2.722(a)(2). Judge Milhollin was assigned the authority to inquire into twelve specific issues under the following broad issue:

> . . . the effect of the information on cheating in the NRC April examination on the management issues considered or left open in the Partial Initial Decision, recognizing that, depending on the facts, the possible nexus of the cheating incident in the NRC examination goes beyond the cheating by two particular individuals and may involve the issues of Licensee's management integrity, the quality of its operating personnel, its ability to staff the facility adequately, its training and testing program, and the NRC process by which the operators would be tested and licensed.228/

2033. Pursuant to the Board's directions, Judge Milhollin conducted an extensive evidentiary hearing in the reopened proceeding. On April 28, 1982 he submitted his Special Master's report to the Board. He has thoroughly explained the procedural background of the reopened

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227/ Licensee's September 8, 1981 response to a Board order relative to the cheating investigation.

228/ Unpublished memorandum and order of October 14, 1981, at 2.

proceeding and the particular issues considered by him and we will not restate them here.

2034. In this decision we adopt the evidentiary record made in the proceeding before Judge Milhollin as a part of the evidentiary record of the main proceeding. We also adopt major portions of his report as our own decision. The Board selected Judge Milhollin to be the Special Master in the reopened proceeding because of our informed confidence in his ability and fairness. Judge Milhollin is a Professor of Law at the University of Wisconsin Law School. We believe that his familiarity with education and examinations at a high academic level affords him special insight into the issues of cheating on the NRC and company-administered operator examinations and with the associated training programs. His report is thorough, well-reasoned and carefully documented. It reflects the care and thoroughness with which he conducted the hearing and weighed the evidence. We have evaluated it against our own review of the entire evidentiary record of the reopened proceeding and in light of the proposed findings submitted to him by the parties. We have also carefully considered the comments on his report made to us by the parties. His report is entitled to great weight. Accordingly we have organized our decision in the same manner so that a precise comparison can be made.

2035. In deciding how much weight to be afforded to the Report we have been guided by the overriding principle that this Board alone is authorized by statute, regulation and the notice of hearing to render the

initial decision in this proceeding. Moreover, we must render this decision upon our own understanding of the reliable, probative and substantial evidence of record. We do not sit as a review board with respect to the Special Master's report, but as the initial decider. The regulations under which a Special Master may be appointed in NRC proceedings specifies that the reports are advisory only. 10 CFR 2.722(a)(3).

2036. There is a subtle and sensitive relationship between the Board with its responsibility as the initial decision maker, and the Special Master as the official who received the evidence. We have identified the need for and have employed guidelines for considering the advice to the Board embodied in the Special Master's Report. Witness credibility depends most often on the substantive content of the witness' testimony, the witness' qualifications, perceived self-interest biases, and opportunity to be informed, or other objective standards. Sometimes, however, Judge Milhollin has judged credibility in part by his observation of the demeanor of the witnesses at the hearing. This reopened proceeding is unusual in NRC hearings in that it concerns suspicions of ordinary human deceit. Fortunately Judge Milhollin has very carefully noted when witnesses' demeanor is important to his conclusions. While of course we would afford some special weight to Judge Milhollin's direct observations of witness demeanor, where his conclusions are materially affected by witness demeanor, we have given especially careful consideration as to whether or not other, more objective credibility criteria are consistent with his conclusions.

2037. The Board has independently arrived at its own factual conclusions notwithstanding some conclusions to the contrary by Judge Milhollin because, as noted above, it is simply our job to do so. Moreover, some of the inferences and conclusions depend upon the judgment and the ethical orientation and expectations of the fact finders. This is particularly true where the issue is whether the evidence points to "cooperation" (Judge Milhollin's euphemism for bilateral cheating). Where judgment is material to a particular conclusion, we rely upon our collegial consensus. Nevertheless we have considered Judge Milhollin's conclusions as informed advice to us.

2038. We deem the results of the reopened proceeding and its effect upon the balance of our initial decisions to be matters entirely within our province _vis-a-vis_ the jurisdiction delegated to Judge Milhollin. In our findings and conclusions of fact below, sometimes we specifically adopt or reject Judge Milhollin's findings, but on some occasions we have made our own findings directly from the evidentiary record without regard to Judge Milhollin's findings. Most of the company personnel involved in the proceeding are referred to by letter designations to protect their privacy.

II. SUMMARY OF DECISION

A. Extent and Consequences of Cheating

2039. Four cheaters have been positively identified. O and W are shift supervisors whose cheating on the April 1981 NRC operators license examination gave rise to the need to reopen the record. We find also that G and H, non-supervisory licensed reactor operators, cheated on company-administered requalification examinations. In addition, the plant operating engineer, Mr. Shipman, admitted that he spontaneously provided an answer to an unidentified NRC examination candidate during the April 1981 exams. It is probable but not conclusive that yet another candidate may have duped WW, a shift technical advisor, into providing information useful on a company-administered examination.

2040. We also find that GG, a shift foreman, probably aided his supervisor, W, on a company exam. Mr. U, also a shift foreman, escapes censure and sanction for attempting to facilitate cheating because too many doubts surrounded the several episodes involving him. A shift technical advisor, MM, had answers suspiciously parallel to those of GG and W on one examination but the Board has not found him culpable. Mr. Husted, a licensed operator training officer, was also accused of attempting to cheat but we conclude that those charges were unsupported. And finally, in an episode without direct relevance to this proceeding, we find that VV, who was at one time Unit 2 supervisor, cheated by turning in O's work

as his own in a requalification quiz in 1979, and that the TMI Station Manager, Gary Miller, falsely certified VV for license renewal despite VV's cheating.

2041. Any cheating with respect to reactor operator licensing is, of course, too much. But our warrant is to determine whether the cheating presents a threat to the public health and safety, not to sit in ethical judgment on those involved. Thus our central concern is what assurance is there that the problem has been bounded and what are the consequences of the identified cheating. Unless it were possible to know from an independent source the total extent of cheating expected to be found it would not be possible to determine whether the reopened proceeding exposed all of it. We cannot, therefore, conclude with certainty that all possible cheating has been revealed. However we are comfortable with the results of the inquiries and believe that it is probable that almost all, perhaps all, of the cheating of any important relevance to this proceeding has been identified.

2042. We based this opinion on two sets of circumstances. First, the hearing itself was a form of investigation. Two very active intervening parties had interests adverse to the Licensee. The Commonwealth of Pennsylvania was also very active and objective. The NRC Staff exercised its responsibilities. These parties and the Special Master have all collectively analyzed and reanalyzed the written answers to the relevant NRC and company-administered examinations. In addition, outside

consultants employed by the Staff and the Licensee have reviewed the respective answers. Although we criticize some aspects of the Licensee's investigation, we believe that Licensee sincerely tried to uncover and report every instance of cheating. The Board itself has searched the answers for additional evidence of cheating. We believe that every suspicious parallelism has been identified and the respective authors confronted. Only a few parallelisms remain unexplained. All others have either been explained by memorization of common training materials, such as the case with S and Y, or by cheating.

2043. The second indicator of thoroughness is the testimony of the operators. They testified under a sequestration order, i.e., they were excluded from the hearing room when not testifying and not permitted to share information with other witnesses. As we would fully expect, the company witnesses generally did not point accusing fingers at each other. What is significant, however, is that the witnesses were willing to recount "rumors" about cheating or, as in the case of U, offers of aid in cheating. This "rumor" testimony became repetitive and was finite. The rumors were pursued by the litigating parties and Judge Milhollin. Thus we believe that the examination candidates themselves reported as "rumors" most or all of the cheating that was obvious enough to be observed. Our attention has been drawn to the cheaters. But the point too easily overlooked in this proceeding is that some thirty to forty licensed members of the TMI-1 operating staff did not cheat, even though they easily could have -- particularly on the company-administered

requalification exams. We have not adopted the Special Master's finding (Report at ¶ 325) that the ". . . overall integrity of the operations staff has been found to be inadequate." To the contrary, our overall impression is that, as a group, they have performed well under very demoralizing and stressful circumstances.

2044. The intervening Aamodt family suggested that a search for parallelisms would not reveal all instances of cooperation in that the candidates may merely have exchanged the ideas underlying the answers, therefore more cheating must have occurred. This tends to be a philosophical argument which we have not accepted. There is no warrant to assume that the candidates cheated simply because the opportunity existed. In the case of the company-administered examinations the better assumption is that rational candidates would use the qualification exams as a preliminary test of their ability to pass the NRC operators licensing examinations. Their jobs depended upon it. This reasoning would not prevail with respect to the NRC examinations however. But as a result of the cheating on the April 1981 NRC licensing examination, each of the candidates were reexamined in October 1981 under the most strict and reliable testing procedures ever employed by the NRC.

2045. We see no safety consequences resulting from the cheating episodes. The results of the October 1981 NRC licensing reexamination have not been received into evidence although they were served upon the Board and parties. It appears that enough candidates to staff the plant

have survived, but we have not, for want of information, analyzed all aspects of present staffing plans. It is sufficient that Licensee's management has reconfirmed its commitment to abide by License Condition 9 imposed by the Board in its first Partial Initial Decision. Licensee Proposed Finding ¶ 408. Condition 9 details the staffing requirements for TMI-1. See 14 NRC at 580-81. We expect that condition to be enforced, and if it is, there will be no adverse operating safety consequence flowing from the actions of those candidates who cheated on the examinations.

B. Management's Involvement in Cheating

2046. The Special Master concluded that Michael Ross, TMI-1 Manager of Operations, deliberately prevented proctoring during the April 1981 NRC licensing examinations. He also found that Mr. Ross improperly and in bad faith induced or attempted to induce the NRC licensing examiner to broaden the answer keys on that exam so that he, Ross, and other test candidates could unfairly attain enhanced scores. The Board, however, comes to the opposite conclusion. We find that the accusation that Mr. Ross impeded proctoring was incredible and that the accusor's testimony on that issue was unreliably ambiguous. There were two examination questions giving rise to the charge that the respective answer keys were improperly broadened. Our own analysis of the changes proposed by Mr. Ross convinced us that, on one question, the change was arguably correct and, on the other, the proposed change, although not literally

correct, was not unconscionable and could not be attributed to bad faith. Mr. Ross was the highest-level member of TMI-1 management whose ethical conduct was questioned, and we conclude that all of the charges against him were unfounded.

2047. Mr. Shipman, the plant operating engineer, came forward with information that, during the April 1981 NRC examination, he spontaneously provided a short answer to one of the candidates. Mr. Shipman is an important member of the TMI-1 management. He has been reprimanded by Licensee for his role in that episode. Neither Judge Milhollin nor the Board regarded Mr. Shipman's intent to be cheating. However we find that his testimony denying that he recalls the identity of the involved test candidate is probably not truthful, but the inference that he is untruthful is not so persuasive as to warrant additional sanctions against him. It was also significant that as a result of this incident there remains an unidentified cheater on the TMI-1 operating staff. And it is particularly noteworthy that the cheater apparently felt free to ask a member of management to assist him on the examination. As a result the Board was especially concerned as to whether there was evidence that Licensee's management condoned or aided cheating. There were also rumors that U, a shift foreman, was stationed by management to aid the candidates in the April 1981 NRC examinations, but the Board's conclusion is that if U in fact did offer aid on that examination, it was his own undertaking. We find no evidence that Licensee's management encouraged or condoned cheating on the relevant NRC or company-administered examinations.

2048. A possibly serious reflection on the integrity of Licensee's management centered around an episode without direct relevance to the cheating related to the reopened proceeding. In 1979 Mr. John Herbein was a Metropolitan Edison Company vice president, Mr. Gary Miller was the Three Mile Island Station manager, and VV was the Supervisor of Operations for Unit 2. We found that in 1979 VV tried to pass his operator's license requalification test by submitting the work of O as his own. With definite knowledge that this was the case, Mr. Miller, with the informed assent of Mr. Herbein, certified to the NRC's Operator Licensing Branch in August 1979 that VV had requalified as a reactor operator. This certification was based in part upon the score achieved by VV with O's assistance. We have concluded that this certification is a false material statement, and that Mr. Miller's testimony does not satisfactorily explain his actions. The Board has recommended an investigation.

2049. Subsequently Mr. Herbein became the Vice President of the General Public Utility Nuclear Corporation's Nuclear Assurance Division but recently was transferred from GPU Nuclear to a non-nuclear assignment. Mr. Miller is now the GPU Nuclear Director of Startup and Testing and the Board has imposed a condition limiting his activity at TMI-1 until the matter can be resolved. VV no longer performs licensed activities and has not held a Unit 1 license during the times relevant to this proceeding.

2050. The information concerning VV and his certification to the NRC was first brought to the attention of the NRC at the direction of Robert Arnold, President of GPU Nuclear Corporation. We believe that it is representative of the Licensee's efforts to make a full disclosure on all matters of possible relevance to the cheating incidents. We have also found that Licensee's handling of the matter with respect to VV was satisfactory. However, there was no evidence presented as to whether the Licensee has taken, intends to take, or should take any personnel action against any other employee involved in the certification incident.

2051. The reopened proceeding produced no other evidence of management involvement in cheating.

C. Licensee's Response to the Cheating

2052. Licensee responded to the cheating revelations by investigating the circumstances surrounding the cheating on the NRC examinations, investigating its own company-administered examinations, disciplining errant employees, meeting with and explaining to employees the company's policy on training and testing integrity, upgrading its procedure for certifying license candidates to the NRC and by participating in this proceeding. The Licensee also has made major changes in its company training and testing program, a response which we discuss separately below.

2053. In its investigation of the cheating incident the Licensee concentrated on possible cheating on its own initial qualification and requalification examinations. We have evaluated this investigation as to whether it was well conceived, whether it was pursued with sufficient resources and good intentions, whether it was properly executed, and whether it was successful. In general we believe the Licensee conducted an adequate investigation.

2054. Licensee employed two technical consultants from Pennsylvania State University, Harrisburg Campus, to analyze for suspicious parallelisms the answers given on its company-administered examinations. Licensee assigned a company attorney, Mr. John Wilson, and his associate to investigate the parallelisms identified by the technical consultants. The investigation also involved the very active participation of GPU Nuclear President Robert Arnold, GPU Nuclear Vice President for TMI-1 Henry Hukill, and GPU Nuclear Vice President Richard Wilson. The participation of these high-ranking officials imparted prestige and force to the inquiry, and we assume that it demonstrated to the operating staff of TMI-1 the fact that management regarded the matter to be important. We found no evidence that Licensee stinted on the resources expended in the investigation. In general we concluded that the investigation was well designed and had sufficient resources allocated to it. However, we faulted the Licensee for not having a single official or clearinghouse responsible for overseeing the thoroughness of the inquiry.

2055. We are also critical of the execution of the company investigation, particularly the inquiry by the attorney, John Wilson. He was naively convinced that G and H did not cheat, he was insufficiently formal in his interviewing of the candidates, he did not employ technical assistance in assessing the explanations given by suspected cheaters. Apparently because of insufficient direction, some investigatory leads were not pursued. We also criticize the Licensee for deferring to and relying upon the NRC to investigate some of the leads, because we believe that the Licensee had its own responsibility to explore every promising lead. However, we recognize that time was limited. After the hearing began a sequestration order was in effect, and no further investigation of company personnel was feasible. Moreover, we recognize that not all possible leads could be pursued nor their significance promptly appreciated. Our criticism has had the benefit of looking back over a very large evidentiary record where weaknesses have been highlighted by the parties and the Special Master.

2056. Our major criticism of the execution of Licensee's plan of investigation was that higher-ranking company officials uncritically accepted the results of the investigation by the attorneys. We believe that a competent technical reviewer would not have been convinced by G and H that they did not cooperate on the company-administered examinations. However, we cannot find that Licensee's investigation was unsuccessful. After a thorough scrutiny by the parties at the proceeding, Judge Milhollin, and after our own review, only a few additional

suspicious parallelisms were identified beyond those disclosed by the Licensee's Penn State technical consultants.

2057. Licensee also responded to cheating by taking appropriate personnel action. It requested and received the resignations of O and W; placed a letter of reprimand in Mr. Shipman's personnel file; removed VV from supervisory and licensed duties in an action that has functionally demoted him. Licensee took the position at the hearing that G and H did not cheat and, while we question the logic of that stand, we do not question its sincerity. Therefore Licensee has taken no action adverse to G and H, a matter which we address below under our discussion of remedies. In instances where the Board itself finds the evidence inconclusive as to a particular employee, such as in the case of U, we cannot fault Licensee's management for not taking personnel action. In general we have concluded that where Licensee has seen the need and the justification for personnel action, it has taken it. However, as we have noted elsewhere in this decision, the record is silent as to whether the Licensee has taken or should take any personnel action as a result of the improper certification of VV's requalification to the NRC in August 1979.

2058. Either Mr. Arnold or Mr. Hukill, sometimes both, have met with all members of the TMI-1 operating staff, all together, by shift, and individually, in a discussion of cheating, and by written directions management has attempted to explain why, over the resistance of the

operators, objective written assurance of operator competence is essential. Widespread resentment toward the need for reexaminations of TMI operators prevailed. The Board has no way of knowing whether this resentment continues. If Licensee continues to monitor the situation, we can think of no further helpful efforts, except as we note below, to bring this aspect of the proceeding to a fair and prompt conclusion.

2059. Licensee had in its possession sufficient evidence that O and W, and in our view, VV, should not have been recertified for licensing and concedes that it can be legitimately criticized for not having a formal process and a written procedure for operator qualification certification. The Board finds that the Licensee was negligent in its operators license certification procedures. Licensee has now committed itself to establish such a procedure, including a written statement from the training department, which we believe will foreclose the certification of technically incompetent candidates, and those known to be ethically unqualified, for operator licenses. This conclusion depends, of course, upon our confidence that the present management of TMI-1 would carefully follow its formal certification procedures.

2060. It is also the Board's view that the Licensee has cooperated fully in the reopened proceeding. While we disagree with the Licensee in several areas, in general Licensee has recognized and candidly conceded the weakness of some of its programs, particularly in training. It readily produced its employees for examination by the parties, and we

could discern no reluctance to come forward with all relevant information. In fact, the episode involving the requalification certification of VV arguably need not have been revealed by Licensee in this proceeding because it is only indirectly related to its subject matter. We have discounted the allegation that company management attempted to interfere with the NRC investigation by seeking to be present during employee interviews. We found, rather, that management had a legitimate purpose in trying to be present; the company's legitimate purpose and the NRC's purposes conflicted, but the matter was appropriately resolved.

D. Management's Responsibility for Cheating; Training and Testing Program

2061. The reopened proceeding was not intended to relitigate the substantive quality of the Licensee's training program, *i.e.*, the course content, nor has the evidence brought its adequacy into question. The official NRC operators licensing exam continues to be the principal test of operator competence and the adequacy of the company's operator training program.

2062. The reopened proceeding was concerned first with the adequacy of the company's attitude and administrative procedures to guard against cheating, and, second, a closely related subissue -- whether the instruction methods were a contributor to the cheating.

2063. The evidence is undisputed and Licensee admits that the Licensee's past testing procedures were loose; there were no established procedures to assure that exams and quizzes were administered properly. It was not clear to the operators that cooperation on quizzes was not acceptable. No specific instruction not to cheat was given. Proctoring was uneven, frequently very poor. The use of unproctored, take-home exams permitted cooperation. Sometimes instructions were unclear as to whether quizzes were to be open or closed-book. Some quizzes actually were answered as a group effort in that the concept of working as a crew was encouraged. Licensee has made an unusually open and candid acknowledgment of its responsibility and fault for the cheating on the examinations. Management simply did not think to institute procedures and other administrative safeguards for guarding against cheating on exams. Moreover, Licensee was culpably negligent in failing to instill in its operating staff a sense of respect for its training and testing program. This admission is not only forced by the facts, but, in our view, the admission itself is a necessary foundation for any confidence that the TMI training and testing program will be brought to an acceptable quality.

2064. Mr. Hukill, Vice President of TMI-1, stated the reaction of company management rather well in his testimony. He admits to feeling somewhat naive, and in view of his position as the senior person at TMI-1, he accepts the responsibility for the cheating. He explained that, as a graduate of the Naval Academy and after many years on active Navy duty, mostly with nuclear power and submarines, an understanding of the absolute need for total honesty and trustworthiness has been ingrained in him; that in the Navy the safety of the ship and crew depended upon honesty and integrity. Mr. Hukill came to TMI-1 assuming that the people there were trustworthy. Hukill, ff. Tr. 23,913, at 2-4.

2065. Mr. Arnold, President of GPU Nuclear, points out that his management must and does inherently rely on the honesty of others, and that he has assumed a basic honesty in his operators, an assumption which, despite the cheating events, has been justified by his experience, and which prevails today. Arnold, ff. Tr. 23,580, at 4.

2066. The Board recognizes that trust in the integrity of others is an essential part of every complex undertaking in our society, but we also believe that Licensee correctly understands that its management was naive and negligent in not guarding against cheating in its training and testing program. We also recognize that trustworthy persons tend to be more trusting of others, and we make no conclusions of bad faith or inherent incompetence in upper-level TMI-1 management from the cheating episodes.

2067. Operator requalification and testing was required by Short Term Item 1(e) of the Commission's August 9, 1979 notice of hearing in this proceeding. 10 NRC at 144. Satisfactory retraining and testing was an essential predicate to the Board's conclusion that the TMI-1 can be restarted without unreasonable risk. In our decision below, we score the Licensee severely for suggesting that it never represented to the Board that consideration had been given to establishing procedures against cheating, thus there is no unfulfilled promise to establish testing administrative procedures. We find that the assurance of testing integrity had been implicit if not explicit during the main hearing.

2068. The Board is now satisfied that the administrative procedures now in place, as supplemented by an additional Board-imposed requirement, are well designed to protect the integrity of the company-administered examinations. They must be enforced, however; thus we are not satisfied that the new procedures alone are adequate. Therefore, we impose an additional condition on restart of TMI-1 which requires an independent auditing of the requalification and testing program during a two-year "probationary" period; internal auditing procedures at the point of training delivery; and the establishment of criteria for the qualifications of training instructors.

2069. The latter condition, criteria for instructor qualifications, goes beyond the safeguards against cheating or other defeats of the training examination, but goes directly to the quality of the

training instruction. This additional remedy, while not directly related to cheating, is nevertheless within our preserved jurisdiction because the evidence indicated that weaknesses related to the quality of instruction, the expectations of the instructors and the accuracy of grading contributored to disrespect for the examinations. Moreover the failure of the training staff to follow through on reliable and trusted examinations is in itself an indicator of instructor incompetence. Further, the evidence pointed to the importance of the training personnel in the certification of candidates and in the review of the NRC operator's license examination questions and answers.

2070. As we explain in detail in arriving at the ultimate conclusion in this proceeding, there was a failure to fix precisely within the company the responsibility for preserving the integrity of the training and testing program, and in particular, there was a failure to extend quality assurance and quality control concepts to the training program.

2071. Finally, to bolster Licensee's resolve to correct its training and testing program, and to assure that the lesson learned from the cheating episodes lingers long in management's memory, we suggest the imposition of a monetary penalty principally as a result of Licensee's negligence in failing to safeguard the integrity of its training and testing program.

E. The NRC Examination

2072. The NRC Staff concedes that the Staff was lax and that its procedures were inadequate during the April 1981 NRC operator licensing examinations. New procedures which cover proctoring and grading are in effect, and were employed during the October 1981 reexamination of the TMI-1 control room operators. These procedures are sufficient to assure the integrity of the administration of the operator license exams.

2073. We preserved jurisdiction over the substantive content of the NRC examinations only to the extent that the questions are amenable to cheating or other evasive devices. Accordingly the parties did not litigate the substantive adequacy of the NRC examinations, and our conclusion expressed in the August 27, 1981 PID that the NRC examinations are the basic assurance of operator competency remains undisturbed. We believe, however, that greater assurance of the quality of the Licensee's training is required to comply with the Commission's regulations.

2074. In reviewing some of the NRC examination questions to determine their amenability to cheating, the Special Master and members of the Board could not help but note problems with their substantive content. We once had jurisdiction over whether the NRC reexamination was a sufficient assurance of public health and safety, and even though jurisdiction has now passed, the Board feels it is appropriate to pass along our concerns and to note that the Special Master has perceived problems with the

exams. This we have done in our findings. We do not, however, adopt the Special Master's conclusions nor do we arrive at any factual conclusions as to the substantive adequacy of the operator licensing exams.

2075. The Special Master was concerned that the exam answer keys conformed to training information, not necessarily plant information; answer keys sometimes were obsolete; and that questions called for very specific design information which would require excessive memorization. Some of the operators who testified complained that the questions did not fairly test their ability to operate the plant.

2076. While we tread lightly in this area because the record on the subject is far from complete, the Board would like to lend its support to the Staff's efforts to reevaluate the entire examination process, not just the written portion.

2077. The failure of the utility in this case to safeguard the integrity of its training and testing process highlights the need for the NRC to have an operator licensing program which is the best possible test of operator competence and the adequacy of the utility's training programs. It is also important that the control room operators themselves have a high respect for the relevance of the examination to actual plant operations and conditions.

F. The Staff's Investigations of Cheating

2078. The NRC Staff conducted four investigations into the cheating events. In general we found that the Staff's investigating response was thorough and adequate. In several instances the Board would have approached the investigation differently, however. The Staff should have interviewed specifically the eight persons who were the only possible exam candidates who could have sought an answer from Mr. Shipman. One OIE investigator concluded that Mr. Husted tried without success to seek an answer from P during the NRC examinations. Since the effort was unsuccessful, OIE decided not to include the matter in its written report of the investigation. As it turned out the Board found that Mr. Husted did not solicit the answer, so the omission would not have affected the outcome. Nevertheless, a perceived unsuccessful cheating effort was clearly relevant to the reopened proceeding.

2079. We have also expressed some concern that the investigating staff accepted without full inquiry the Licensee's opinion on cheating on company-administered exams. This is the opposite side of the coin from faulting Licensee for leaving it to the NRC Staff to investigate certain areas involving Licensee's employees. Each organization had an independent responsibility to make a thorough inquiry.

2080. On the other hand we also recognize that the NRC Staff did not have time or resources to follow every lead. Because of the hearing and the sequestration order, the Staff, as was the case with Licensee, could no longer investigate. The significance of certain episodes may

not have become apparent until later. In sum, we recognize that our criticism of the Staff investigation is influenced by hindsight, and we have no basis to question its results.

G. Overall Conclusions

2081. The Board has reviewed its partial initial decision on management issues which included our conclusions on the Licensee's training program to determine whether the Board itself was naive in believing evidence that Licensee had an adequate program. We were convinced, and remain convinced by a blue ribbon panel of experts that the operator requalification program was well-conceived. Licensee had recruited a management staff with outstanding professional credentials and experience to administer the program. Management was unstinting in the resources devoted to the training program and a rational implementation plan was in place.

2082. Our conclusion is that the integrity of the Licensee's training and testing program failed because there was not a clear appreciation of which portion of Licensee's management had the responsiblity to safeguard the program and because there was a failure to apply the principals of quality assurance and quality control to the testing and instruction process.

2083. We concluded in our management partial initial decision that Licensee had a sound organizational approach to the training function _vis-a-vis_ the operational function. The line managers of Unit 1 were to

be relieved of all unnecessary duties, including responsibility for training, so that they could concentrate on their operational responsibilities. Training was placed in a corporate-level division under John Herbein, Vice President for Nuclear Assurance. Training responsibility was also at the corporate level in the Training and Education Department within the Nuclear Assurance Division. The Nuclear Assurance Division, which also houses the Quality Assurance, Nuclear Safety Assessment, and Emergency Planning Departments, was to have provided independent off-site and on-site assurance that its respective functions maintained the expected quality -- with the appropriate input of the line managers.

2084. The Board has concluded that the cognizant officials in the Nuclear Assurance Division failed to recognize that training is an activity which must comport to the concepts of operational safety quality control as set out in Appendix B to Part 50. For example, we cited with some concern the fact that the Director of Training in establishing new procedures to safeguard the integrity of the training examinations, even now has failed to include a provision for sampling or auditing test answers for evidence of collusion -- a step found necessary by the NRC Staff to assure the reliability of its licensing examinations.

2085. We note in our conclusion below, however, that despite the failure in the quality assurance of the examination process, we have not found that the TMI-1 operators are incompetent. Most were already licensed before the hearing began, and have since had to prepare for two additional NRC licensing examinations. Although we have found weaknesses in the quality of instruction, we have not found that the instructors

failed to instruct or that the students failed to learn. The operators have been repeatedly exposed to appropriate course material. Having also found that the operators have been reexamined by the NRC under appropriately controlled conditions, and that the Board-imposed condition for staffing the unit will be met, the Board rejected the demand by Union of Concerned Scientists that restart authorization be withdrawn.

2086. Although the Board believes that the Licensee is capable of and intends to correct the problems revealed in the reopened proceeding, we impose, or recommend the imposition, of a $100,000 monetary penalty for the negligent failure of Licensee to safeguard the integrity of the examination process, because it failed to instill an attitude of respect for the company and NRC-administered examinations, because it failed to assure the quality of training instruction, and because of negligence in the certification of candidates for NRC operator licenses.

2087. The Board could not walk away from the cheating by G and H, and we believe that the record demands a further investigation of the circumstances surrounding the certification of VV in 1979. However, we acknowledge that we are terminating our part of this proceeding without bringing every miscreant to justice, and without resolving every uncertainty. There are individual due process considerations for allowing matters to rest as they are, and we have no confidence that further inquiry will produce a more reliable record than that made in the hearing before Judge Milhollin.

2088. Moreover, we are concerned that further proceedings would be disruptive. The restart proceeding was necessary in the broader public interest, but the effect of the Notice of Hearing was to revoke the existing operators' licenses of the TMI-1 control room staff without due process. The large honest majority of the operators were denied the fruits of passing the first NRC reexamination by the need for the second reexamination in October 1981; and they were held up to public derision by no failure of their own to safeguard the integrity of the NRC and company-administered examinations. With substantial justification, they have become embittered about these events. They should now be permitted to return to the important matter of preparing the unit for operation without further distractions.

2089. Finally, the Board concludes that the issues in the reopened proceeding have been resolved in favor of restarting TMI-1, and our conclusions to that effect in the first two partial initial decisions remain undisturbed.

III. FINDINGS OF FACT AND DISCUSSION OF THE REPORT

A. The Extent of Cheating

O and W

(Report at ¶¶ 10-25)

2090. O and W were shift supervisors who cheated on the April 1981 NRC's operator examinations. O's denials at the hearing were incredible. W acknowledged his involvement. It was their cheating which initially

required the record to be reopened. Judge Milhollin explains how very important shift supervisors are to the safe operation of the facility; that they are in charge of the reactor when on shift. Report at ¶ 10. In addition, if it is on an evening or night shift, it is likely that the shift supervisor would be the senior utility official at the facility. In the event of an emergency the shift supervisor becomes the facility Emergency Director with the responsibility to initiate immediately and unilaterally emergency actions and to make protective action recommendations. See December 14 PID, 14 NRC at 1469.

2091. Not only did O and W cheat, but they cheated extensively -- on company-alministered exams, and on both the Reactor Operator (RO) and Senior Reactor Operator (SRO) examinations administered by the NRC in April 1981. Most of their answers on the NRC examinations were identical or nearly so. Report at ¶¶ 11, 12.

2092. Although O and W resigned as a result of their misconduct, their role in these episodes has not been mooted by their departure as Licensee and the Staff state. Judge Milhollin concludes that their blatant cheating was probably observed by others, although in fairness, he does not impute such knowledge to other particular candidates. Id. at ¶ 24. He also notes that their conduct could not build respect for the licensing requirements among the operators they supervised. Id. at ¶ 14. Judge Milhollin's major conclusions with respect to O and W are reasonable and fair. We adopt them.

2093. We do not, however, endorse Judge Milhollin's recommendation (Report at ¶ 310) that O and W should be referred for criminal prosecution. Judge Milhollin's recommendation is an appropriate one for him to make in that, as a citizen well informed in the facts, he has been offended by what he perceives to be criminal conduct in a serious safety matter. We note however that his recommendation depends largely upon the "unrepentant" attitudes of O and W (an attitude which, by the way, we did not sense in W's testimony). Id. Our only jurisdiction and official interest in this proceeding is the safe operation of TMI-1, not the rehabilitation of O and W who are no longer employees of the Licensee. There is no record basis upon which we can determine that a deterring effect upon those still employed at TMI-1 would be realized by the prosecution of O and W, over and above the deterrent flowing from the fact that O and W were separated from their employment in disgrace. To the contrary, there may be a positive and needed benefit to employee morale at TMI in putting the O and W incident into history, but here again we have nothing but subjective surmise for that assumption.

2094. The Commission does not need our advice on whether to seek the prosecution of O and W; it is a policy and ethical consideration. In any event, because of considerations of compassion alone, this Board may not have been able to arrive at a collegial recommendation, and we have not attempted to do so.

2095. We note also that the Office of Inspector and Auditor, the cognizant NRC component, has already discussed this matter with the Department of Justice. The Department is not interested in a criminal

prosecution absent something major of a conspiratorial nature. Tr. 25,345-46. There is no evidence of any conspiracy in the events surrounding O and W beyond the cooperation between them.

G and H

(Report at ¶¶ 26-77)

2096. G and H are control room operators. Licensee's consultant, Mr. Trunk of Pennsylvania State University and his colleague, discovered many identical or nearly identical answers to questions given on company-administered weekly quizzes. Some of the questions pertained to training and testing required by Item 1(e) of the Commission's hearing order relating to "lessons learned" from the accident. 10 NRC at 144. The only credible explanation to many of these similar or identical answers is cooperation. Other similarities were noted during the hearing. In its own evaluation of the record, the Board itself identified an additional similarity suggesting cheating as we discuss at ¶ 2104 n.229 below.

2097. Judge Milhollin concludes on the basis of five sets of nearly identical responses that impermissible cooperation must have taken place between G and H. As to four of these sets the Board agrees.

2098. The first set related to "human factors, operational safety". Report at ¶¶ 33-37. The similarities suggested cooperation as Judge Milhollin completely explains. But, to be fair, Judge Milhollin cast around seeking whether there is another possible explanation for the

similarities (i.e., memorization from common-source answer keys) but could find none. Report at ¶ 37 citing G at Tr. 25,750. Licensee disparages this effort in its Comments and argues that, since the testimony by G evaluated by Judge Milhollin is not reliable, he should not have ruled out common memorization of the identical answers. Comments at ¶ 9. Licensee's analysis does not address Judge Milhollin's reasoning. Licensee seems to be arguing that if Judge Milhollin could not find a benign cause for the answer similarities in the cited testimony, and if that testimony is unreliable, he therefore must not rule out a benign cause, and must infer a benign cause. Id.

2099. We cannot accept Licensee's argument. Judge Milhollin simply looked at the only place known to him for possible common-source memorization and found nothing to negate his finding of improper cooperation. Licensee goes on to suggest that the better conclusion is that G and H had the identical answers drummed into them from the training lesson plan, but the citation to John Wilson's testimony (Tr. 24,514-15) does not support that thesis. We adopt Judge Milhollin's conclusion that G and H cooperated on their "human factors, operational safety" answers.

2100. Another set of nearly identical answers analyzed by Judge Milhollin were G's and H's responses to a requirement to discuss the contributors to the generation of hydrogen gas following a LOCA. Report at ¶¶ 44-48. G and H gave identical incomplete and incorrect answers on two quizzes in that they failed to explain that hydrogen gas is generated by two reactions; one involving aluminum and sodium hydroxide, the other

zirconium and water. Judge Milhollin's analysis is logical and complete. He concludes that they cooperated.

2101. Licensee's explanation (Proposed Findings at ¶¶ 64-68) depends upon a weak chain of improbable circumstances: that G had a tendency not to write complete answers; that when the instructor wrote the missing partial answer, "NaOH" (sodium hydroxide) on their papers in grading the first exam both G and H then incorrectly assumed that "NaOH" was the complete correct answer when faced with the same question on the second exam; that frequent study sessions together reinforced their independently arrived-at misconceptions. Id. We adopt Judge Milhollin's conclusion that G and H cooperated on the hydrogen generation answers.

2102. The third set of nearly identical answers leading Judge Milhollin to the conclusion that G and H cooperated responded to a question requiring a list of process lines which are isolated on a reactor trip. Report at ¶¶ 49-52. The similarities and identical order of listing in G and H's answers are quite striking:

G	H
MUV-3 letdown	MUV-3 letdown
WDG-V 3,4	WDG-V-3,4 Gas
WDL-V-304,303	WDL-V-303,304 (illegible)
WDL-V 534, 535	WDL-J-584, 534 R.B. Sump
AHV 1A,B,C,D	AHV-1A,1B,1C,1D R.B. Purge
CAV 1,2,3,13	CA-V-1,2,3,13
CAV 4 A/B, 5 A/B	CA-V-4 A/B, 5 A/B
CAV 189	CA-V-189
CFV 19 A/B, 20 A/B	CF-V-19 A/B Sample, 20 A/B (illegible)
CFV-2A,2B	CF-V-2A/2B sample
Licensee Ex. 66E.	Licensee Ex. 66F.

2103. These answers did not appear in that order in any written materials nor were they taught in that order during training. G testified that in fact he had not memorized the answer from an outside source but that he and H, studying together, organized the items on the list in the order of importance then both memorized their work. Tr. 25,765. Competent witnesses corroborated that the list was in the order of importance except for one item. Therefore G's testimony was a logical and benign explanation for the identical order of listing by both candidates. The trouble is, however, that H could not match G's explanation when, under the sequestration order, he later testified. At first he simply could not remember. Tr. 25,898. Then he suggested that the process lines were listed more by system than by importance. Tr. 25,937. He had no memory of why he memorized the list in the sequence given in the exam answers. Id. Judge Milhollin concludes that if H had in fact studied with G, and if they had analyzed and rearranged the items in the sequence used by both of them in the exam, then memorized that exact sequence, H should have been able to remember those events and to explain them. We agree. The compelled conclusion is that they cooperated during the exam.

2104. The Bernoulli's equation answers are the fourth set of nearly identical responses which the Board finds clearly establish cooperation between G and H. See Report ¶¶ 58-66. Again, a visual examination of the answers as written by them on the exam demonstrates the remarkable similarity in the responses, even to some spacing and punctuation.

G

> Bernellis [sic] equation is the general energy equation, it states that the total internal energy of a system is equal to the gravitational potential energy plus total kinetic energy of the system plus the system internal energy.

Licensee Ex. 66A.229/

H

> Bernoulli's equation is the general energy equation, it states that the total internal energy of a system is equal to the gravitational potential energy of the system plus the total kinetic energy of the system plus the system internal energy. We can use it to calculate flow by references to points in system and determine energy differences (work).

Licensee Ex. 66B.229/

2105. The last sentence in H's answer responds to the second part of the question. G's answer is incomplete. Judge Milhollin has made a very careful analysis of these similarities and concludes, as does the Board, that cooperation seems to be the only explanation.

2106. Licensee urges the Board to read with particular attention its proposed findings on the Bernoulli's equation issue at ¶¶ 70-83. We have done this, but, even accepting Licensee's version of the evidence, we remain unconvinced that the nearly identical answers are from common-source memorization. After a careful search, no training material

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229/ Judge Milhollin and the parties may have overlooked an additional significant similarity. In the first sentence of both responses, the word "equation" is followed by a comma. The correct and commonly understood punctuation is either a period or a semi-colon. In looking at the relevant exhibits we were frequently struck by non-substantive similarities in punctuation and spacing. *Compare* Licensee Exhibits 66A *with* 66B; 66C *with* 66D; 66E *with* 66F; and 66G *with* 66H.

could be found to explain the answers. Licensee Proposed Finding ¶ 72. G was sure he had memorized "cold" the answer from material common to him and H but couldn't remember the source. Licensee Proposed Finding ¶ 76. H however, could not remember studying with G, but became increasingly positive that the answer was on a blackboard during training. Licensee Proposed Finding ¶ 78.

2107. Licensee's witness Trunk suggested that other answers appearing on the same answer sheet were not copied, therefore the Bernoulli's equation probably was not copied. Licensee Proposed Finding ¶ 81. We demur. There is no suggestion that G and H are compulsive copiers. They would copy only where necessary.

2108. Mr. Trunk also believes that, if G had copied from H, he, G, would have copied the last sentence; that H understands the Bernoulli's concept and would have no need to copy from G. G could not duplicate or explain his Bernoulli's answer when he testified. Tr. 25,773. G also misspelled "Bernoulli's" in his answer. Mr. Trunk's analysis persuades us only that H did not copy from G. The fact that G did not copy perfectly or completely does not obviate the remaining unexplained similarities in the answers. We conclude that G and H cooperated on the Bernoulli's equation answers.

2109. We disagree with Judge Milhollin, however, as to the firmness of his conclusion with respect to the responses to the question "[W]here are the new [TMI-1] radiation monitors located?" Report at ¶ 53 and ¶ 54. Both operators answered that the monitors are located in the

control room -- an answer deemed to be wrong in that the monitors are said to be in other portions of the plant. Id. at ¶ 53. Arguably, if a radiation monitor consists of both the sensor and the read-out instrumentation, the "control-room" answers would be partially correct. If correct, the indication of cooperation has less force. Also it may be that the candidates were thinking only of the read-out mechanism in providing the response. On the other hand "control room" alone could not be the entire correct answer. The fact that both of them, and apparently no other candidates, listed only the "control room" for the location of the radiation monitors does suggest cooperation, but standing alone the answers are not conclusive evidence of cheating.

2110. Judge Milhollin found that other nearly identical responses, while not conclusive, strongly suggest cooperation. These are the responses relating to "forced balance Rosemont" (Report at ¶¶ 40-43) and the listing of the radiation monitors and associated valves (id. at ¶¶ 55-57). We agree with his assessment that these responses suggest cooperation.

2111. Yet another set of nearly identical responses, those relating to natural circulation (id. at ¶¶ 29-32), while not found by Judge Milhollin to be conclusive of cheating, leaves him uncertain. Standing alone these similarities suggest cooperation. But Licensee points out in its Reply to Findings (¶ 70) that S and Y, whose integrity have not been questioned, also gave answers virtually identical to those given by G and H on the natural circulation question. Judge Milhollin did not discuss these additional similarities, which lead us to the conclusion that the

nearly identical responses by G, H, S, and Y can all be better explained by memorization of common training materials.

2112. Judge Milhollin continued his analysis by noting that, in many tests with many participants, G and H were alone in the number of parallelisms and that their responses were exceptions to the pattern of varied answers on the tests. He also noted that the sheer number of similar answers is striking and he listed some similarities which were not specifically analyzed, for example, the similarities noted when comparing Licensee Exhibits 66C and 66D. Report at ¶ 74.

2113. Judge Milhollin did not lightly arrive at the conclusion that G and H cooperated on the weekly exams. He pondered the suggestion that they had each memorized the same answers to all of the respective questions (id. at ¶ 75), or that they could have independently copied their answers from lesson materials (id. at ¶ 76), and, after a thoughtful analysis, he is unable to accept such explanations.

2114. Judge Milhollin and the Board noted a common thread running through the proffered explanations for the many similarities in G's and H's answers. They state that they studied together frequently and they memorized the same study or training materials. Not only could these materials not be produced when there was a very strong incentive to produce them, but frequently they cannot even be identified. So, we have on one hand memories that are said to permit very precise and detailed recall of commonly studied materials, but those same memories could not

recall the identity of these materials. In their cumulative totality, these explanations are incredible.

2115. Licensee's consultants, Mr. Trunk, and Mr. John Wilson, an attorney retained by Licensee to investigate the similarities identified by Mr. Trunk, initially believed from the objective evidence that the parallelisms in G and H's responses may well have been the result of cooperation. Licensee reply findings ¶¶ 48-50. During Mr. John Wilson's investigation, G and H convinced him that they were truthful in their denials. We have considered Mr. Wilson's reasons and find them unpersuasive for the reasons set out above. We discuss Mr. Wilson's role in greater detail in ¶ 2250 below. We have depended instead upon our own direct examination of the suspected responses, and G and H's explanations of them. Judge Milhollin correctly remained unconvinced. We adopt his conclusion that some sets of responses independently established cooperation, others strongly suggested cooperation and that the pattern established by all of them also establishes cooperation. There is, however, one possible explanation for the similarities not addressed by Judge Milhollin. Perhaps either G or H copied from the other in every instance without the other knowing it. The extent and the details of the similarities render this explanation too improbable to accept.

Conclusions: G and H

2116. Judge Milhollin concludes that the Licensee should be prohibited from using G and H to operate TMI-1. Report at ¶ 311. This view is shared by the Commonwealth of Pennsylvania. The intervenors

believe that the Licensee is simply not qualified to operate the plant, in part, because of G and H. As we have discussed below, G and H were not parties to this proceeding and they have not been provided a hearing on their licensed status. We have no authority to penalize them without due notice and a full hearing. Judge Milhollin's sanction would be the equivalent to a license revocation, and it would appear to be for life. Even if we had the authority, such severe punishment would be inappropriate. It is true, as Licensee states, that we can recommend to the Commission that a separate action be brought against the licenses of G and H. Licensee would, in that event, remove them from licensed duties until the matter is resolved. Licensee Comments ¶ 26. Such a proceeding might add yet one more disruption and distraction to the important safety business of preparing the unit for eventual restart, if such be permitted. There is a public interest in concluding this proceeding and its related aspects. All parties are entitled to a final conclusion without unnecessary further delay.

2117. We have also given consideration to requiring the Licensee to design and impose its own administrative remedy to assure that G and H (and others in the operating staff) understand by appropriate discipline that G's and H's cheating in particular is intolerable and unrewarding. But given the fact that the Licensee continues to maintain that G and H did not cheat, we have no confidence that Licensee can proceed in an acceptable manner.

2118. We have however fashioned a remedy which is within our jurisdiction which we propose after considering several mitigating factors.

As we discuss below, we hold the Licensee accountable for permitting an undisciplined training and examination environment. While G and H cheated on their own volition, we believe that there should have been a clear and emphatically enforced policy of requiring absolute honesty on every examination. Also, we recognize that the examinations were administered by the company, not the NRC. They were semi-official in that they were required by the Commission's hearing order and regulations, but we cannot discern that the official importance of the examinations was ever effectively impressed upon the operators.

2119. The Board has examined the answers to the quizzes involved in the G and H incidents. The proportion of answers produced by cheating is relatively small. We do not believe that the overall results demonstrate a poor understanding of the course material. We have, then, a question of ethics, not of competence. G and H have passed their NRC examinations under properly monitored conditions.

2120. The Board therefore proposes that G and H voluntarily accept a two-week suspension without pay in lieu of an action against their licenses. The suspension may be at any time G, H and the Licensee deems best. Two weeks is not the result of an exact mathematical calculation; it is the product of our collegial judgment. It is a remedy which is within our jurisdiction and is appropriate because it is fair, final, simple, and responsive to the G and H cheating episodes. In terms of the very large numbers often associated with nuclear power plants, two weeks' pay for a reactor operator does not seem to be very important. But, as to G and H, and, we regret, their families, the effect will be

felt and remembered. Moreover, this action will have an adverse effect on their careers. A portion of the monetary penalty imposed by the Board upon the Licensee is directly attributable to their actions.

2121. Accordingly, the Board recommends to the Commission that, in accordance with 10 CFR Part 2, Subpart B, and 10 CFR 55.40, a proceeding be initiated to consider the modification or suspension of the operators' licenses of G and H.[230/] If, during the Commission's immediate effectiveness review, the Licensee reports to the Commission that G, H, and the Licensee accept the Board's proposal, this recommendation should be considered void.

S and Y

(Report at ¶¶ 78-81)

2122. Judge Milhollin correctly concludes that very similar answers on quizzes by operators S and Y are attributable to virtually verbatim similarities to training materials, not to cheating.

230/ Section 55.40 also provides for license revocation. We have intentionally not included revocation in our recommendation. We recognize, however, that both the initiation and the results of any such action are beyond our jurisdiction.

GG, W and MM

(Report at ¶¶ 82-93)

2123. GG is a control room shift foreman, W was a shift supervisor who, as we noted above, resigned after cheating. MM is a shift technical advisor.

2124. On a December 1980 quiz, Lessons Learned Question 1 asked: "List two (2) major areas of weakness noted by the Lessons Learned Task Force." On the same quiz, Lessons Learned Question 2 asked: "The most important lesson learned fell into the general area of operational safety. What was the primary deficiency in this area?"

First Question

2125. MM, W, and GG answered:

MM: Non safety related systems affecting safety systems operator action compounding the challange (sic) to safety systems.

Licensee Ex. 66K.

W: Non Safety related systems affecting Safety related systems (Challanges (sic) the system) and operator action which compounded the challanges (sic) to the safety system.

Licensee Ex. 66L.

GG: Non safety related systems affecting safety related systems (challanges (sic) the system)
- and -
Operator actions which compounded the challanges (sic) to the safety system.

Licensee Ex. 66M.

Second Question

2126. MM, W, and GG answered:

MM: Operator training inadequate.

Licensee Ex. 66K.

W: Operator training allowing actions which challanged (sic) the automatic actions of the safety related systems.

Licensee Ex. 66L.

GG: Operator training allowing actions which challanged (sic) the automatic actions of the safety related systems.

Licensee Ex. 66M.

2127. Judge Milhollin notes that all three answered "Lessons Learned" Question 1 with the same unnaturally stilted and abstract language and with the same mispelling of the word "challenge". Report at ¶¶ 82, 83, 89. In addition, as can be seen, W and GG employed the same misspelling and identical language in their responses to Lessons Learned Question 2 on the same quiz. Id. at ¶¶ 83, 90.

MM

2128. Judge Milhollin concludes that MM either must have "cooperated" or that he had copied the same training material with respect to the first question. Id. at ¶¶ 91, 92. This latter alternative we view to be a weak exculpation of MM by Judge Milhollin.[231/] We agree with Judge Milhollin that MM's answer to the second question does not indicate cheating.

2129. It is not clear from the Report how the possibility of copying the same training material can exculpate MM but not GG and W on the same question. Common training material was never identified during the investigations. The incentive to locate any such material was very great. If it had been used by three of the candidates, it seems that

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231/ Exoneration of MM is a view which is apparently shared by the intervening parties in that the Commonwealth accepts the Licensee's expert testimony to that effect (Commonwealth proposed findings at ¶ 44) and TMIA discusses the identical answers by GG and W but does not urge a finding with respect to MM (TMIA proposed findings at ¶¶ 106-14). The Aamodts were silent on MM in their proposed finding before the Special Master, but in their Comments (at 16) without explanation they include MM in their proposed list of cheating personnel.

evidence to the effect should have been discovered, or at the least, there should have been a specific identification of such materials.

2130. MM did not testify and was not present during the evidentiary sessions. In response to the Board's invitation to comment extended to all personnel named in the Special Master's Report, MM stated that [as a shift technical advisor] he was not required to take the exam in question, that he did so solely to evaluate his knowledge of the material covered. His answer was not graded. He also comments that the language of his answer which appears to Judge Milhollin (and to the Board) to be unnaturally stilted should be viewed in the context of the question, which requires a "list" of two concepts. Now that he has pointed it out, we can see that MM's answer format as it is spaced, is not so stilted and unnatural when viewed as a list. MM also suggests that the fact that his answer varies from the instructor's answer key should not be taken as an indication of cheating if the answer is nevertheless correct. We agree.

2131. He also argues that the instructor must have used information from NUREG-0578 and NUREG-0585, then outlined it on the board during class, from which MM recalled the words during the quiz soon after. From this latter explanation we infer that MM is stating that at the time of the quiz he remembered language verbatim from a source that today he cannot recall. This is understandable; yet the marked parallelisms among the answers by MM, GG and W on the first question still leaves us troubled with respect to MM.

2132. Nevertheless, considering MM's lack of motive to cheat, his explanation about the "list" format and spacing of his answer, his arguable, if not strongly convincing explanation for the source of the answer, and the fact that this is a single, short episode, we do not find that MM cheated on the December 1980 quiz.232/ This is not the total exoneration to which MM might have been entitled after a full hearing with his participation. The evidence simply isn't there to overcome all the implications of the very similar answers. It would be exceedingly unfair to MM, and possibly a factual mistake, if his status or reputation were to be affected by our uncertain conclusion.

GG and W

2133. The answers by GG and W on the first question were longer with more identical points. The spacing does not suggest a listing of ideas. Moreover, their answers to the second question were also identical and contained the same misspelling. It may be that one of them imperfectly memorized parts of the answers from the same source used by MM if his account is to be believed, but we are not persuaded one way or another that there was a common source during training. The evidence is

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232/ This finding is made partly upon MM's argument concerning the significance of evidence of record, partly upon MM's factual statements not in evidence and partly upon our own analysis. We see no prejudice to any party in this approach. Contrary to the intervenors' general complaints, their right to due process is not compromised in that none of them had urged a finding of impropriety against MM before the Special Master. Our only alternative was to reopen the record to take evidence from MM because he had no other opportunity to confront the evidence against him. Such a course seems unlikely to improve the record or to materially affect our decision. Considering the time and resources required to reopen an evidentiary record, and with no apparent possibility of a different result, reopening is not warranted.

convincing that even if there were an unrecalled common training source from which either GG or W memorized answers, the many identical points in their answer establish cooperation. We adopt Judge Milhollin's conclusion to that effect.

2134. An inference, albeit weak, to be drawn from these responses and the testimony is that W, a known cheater, copied from GG. However, in view of the extent of the similarities, we also conclude that GG permitted W to copy or at least knew that he copied. This conclusion troubles us, and presents a difficult choice. We cannot, of course, be perceived to, nor do we condone cooperation by GG. The matter is important. For example, as shift foreman, GG might briefly serve as the Emergency Director if, at the outset of an emergency, the shift supervisor is elsewhere in the plant.

2135. On the other hand to disqualify him from licensed duties is a very severe sanction -- one that is not warranted when all of the circumstances are considered. Our finding raises a question of GG's ethics, not his competence. As to his ethics, his conduct in permitting W to copy must be viewed in light of the fact that (1) W was his supervisor, (2) this was a company-administered examination, (3) there was inappropriate informality and inadequate proctoring during the examinations, and (4) there was a broad attitude of disrespect for the examination process. From these circumstances we conclude that GG was placed in a very difficult situation by his employer. It is very understandable why he would not prevent W from copying. We would not make the same finding on an NRC licensing examination.

2136. We have reviewed the transcript of GG's testimony and do not fully share Judge Milhollin's opinion that GG's credibility is undermined. Report at ¶ 93; <u>see</u> Tr. 25,683-720. While we might wish that GG had directly acknowledged W's copying, considering his acknowledgment that W "might" have copied, we will not find him ethically disqualified for lack of candor. He was in a very difficult situation during the examination, as we noted, and again during the hearing.

2137. One point remains unresolved. Although we did not find that MM cooperated, neither did we find that his explanation was convincing. Assuming <u>arguendo</u> that there was cooperation involving MM, GG, and W, and having found that W copied, is there any assurance that GG did not copy from MM? It is more likely that GG would have been the original author of the nearly identical answers common to GG and MM, because MM's answer is the shortest and the similarities in GG's and W's answers continue beyond MM's shorter answer into the second question. We recognize that this analysis is tenuous, but it is the best we can make from the record before us.

<u>Conclusion: MM and GG</u>

2138. We impose no sanction on MM or GG.

Mr. Shipman at the Coffee Machine

(Report at ¶¶ 94-100)

2139. Mr. Henry Shipman, the plant operating engineer, is a principal assistant to the TMI-1 manager of operations, Michael Ross, who in turn is the senior operating official. According to his statement and testimony, Mr. Shipman took a company-administered mock exam and both the NRC RO and SRO examinations in April 1981. During one of the exams -- his memory is uncertain as to which -- he took a break near the coffee machine in the hallway. He was approached by a presumed license candidate who asked him the answer to an exam question, or possibly a question only related to an exam question. Mr. Shipman spontaneously provided the brief answer but shortly afterward began to worry that this assistance was improper. He did nothing about it, however, until after the reopened hearing on cheating began, then he voluntarily reported the incident, but not the identity of the questioner, to Mr. Hukill, TMI-1 Vice President.

2140. He then became the object of intense inquiry, first by Mr. Hukill, then by the NRC investigators, followed by further inquiry by GPU Nuclear President Robert Arnold. Finally he appeared at Judge Milhollin's hearing where he again underwent intense examination, and, incidentally, waived his right to confidentiality.

2141. While he freely admits his poor judgment in supplying the answer, he has steadfastly maintained that he does not remember who asked the question. He convinced Mr. Hukill that he can't remember and he later convinced Mr. Arnold, who placed a letter of reprimand in his file

for supplying the answer. Mr. Shipman could not convince the NRC investigators or Judge Milhollin that he cannot remember. The Commonwealth of Pennsylvania urges a finding that there is no hard evidence that Mr. Shipman is lying, as does the Licensee.

2142. Mr. Shipman's voluntary report and his testimony is the only evidence that he acted improperly. Without it there is no corpus delicti. Nor is there any evidence that he does remember who approached him except for the implication that he should remember. Can we "convict" him on his own uncorroborated admission but fail to accept his word about the identity of the other person? Perhaps. His admission that he supplied the answer is against his interest and therefore very believable. His statement that he does not remember the questioner is not as believable, but not totally incredible. His denials could be said to be also against his interests because he must know that his denials are doubted and are causing him trouble. On the other hand, his denials are consistent with a natural reluctance to inform. Also, having first denied to Mr. Hukill that he remembers who asked about the question, he could not later admit such knowledge without admitting to having lied initially. Perhaps his initial denial was spontaneous; it is a natural reaction. Thereafter, he would feel trapped into that position.

2143. We share Judge Milhollin's reluctance to accept Mr. Shipman's testimony concerning his memory of the events but for somewhat different reasons. Mr. Shipman first declined to accept and to sign the NRC investigators' version of their interview with him, because, in the interest of accuracy, he preferred to write out his own version later. Staff

Ex. 28, at 5, and at Enclosure 3. In his written statement he was definite that the question was asked during the NRC examination and that the question asked was one he presumed to be on that exam. Staff Ex. 28, Enclosure 3. Licensee, however, points to Mr. Shipman's hearing testimony that he was uncertain about which exam and whether the question was on the exam. Licensee Comments at ¶ 36. The significance of any weakness in Mr. Shipman's memory, as possibly reflected in his testimony, is that it makes his asserted inability to remember the questioner more plausible. It is, of course, possible that on later reflection Mr. Shipman lost confidence in the accuracy of his earlier written statement and tempered his testimony accordingly. The record is very confusing as to exactly what he does and does not remember, except that he consistently states that he remembers nothing whatever about the questioner.

2144. The Board has evaluated the record and the Report from all these angles. Although we do not adopt all of Judge Milhollin's analyses of this factual issue, his conclusion that Mr. Shipman is not truthful in his denial is probably the best inference to be drawn. But this inference is not so convincing that we are willing to recommend Mr. Shipman's removal or suspension on that basis. The severity of any sanction should also reflect the fact that Mr. Shipman volunteered the very information now bringing about the sanction. There is a public interest in encouraging such disclosures. If he were to be severely penalized for not disclosing enough, any disclosure whatever would be discouraged.

2145. Judge Milhollin concludes and recommends that Licensee should not be permitted to use Mr. Shipman in operating TMI-1 until he names the unidentified questioner or until he gives a credible reason why he cannot name him. Report at ¶ 314. Neither will ever happen. Intervenor TMIA, for example, would, without further ado, simply remove Mr. Shipman's license permanently. TMIA Comments at 10. The difficulty with either sanction is that it assumes that the evidence beyond doubt is conclusive that Mr. Shipman does remember his questioner, a conclusion which we have found is not free from doubt. The letter of reprimand and our own stated suspicions about his candor are appropriate sanctions.

2146. The Commonwealth points out that a more important concern is that there is an uncaught cheater who is more culpable than Mr. Shipman in that Mr. Shipman acted without premeditation and admitted his participation. Of even greater importance is the fact that the unknown cheater felt free to approach a member of middle management for assistance in cheating on what may have been an official NRC licensing examination. The major remaining significance of this episode is whether the Licensee and the NRC Staff adequately investigated this incident which is also the subject of Judge Milhollin's report as we discuss below.

Conclusion: Mr. Shipman

2147. We impose no additional sanction upon Mr. Shipman.

P and Mr. Husted in the Unproctored Room

(Report at ¶¶ 101-111)

2148. P is a TMI-1 shift supervisor and Mr. Husted is a licensed operator instructor. They took the April 1981 NRC examinations together in a frequently unproctored room with no other candidates present. During an interview by NRC investigators Messrs. Ward and Baci, P expressed anger about the fact that the NRC examiner, by not proctoring, made him "vulnerable to any allegation of cheating" in that it "removed a potential witness to his [P's] honesty" and that it put P in a position where he could be solicited. Mr. Ward became suspicious because of P's anger (or perhaps by the force of his anger) and tricked P by pretending untruthfully that he, Ward, knew that Mr. Husted had solicited P. Whereupon, according to Ward, P was startled and admitted that Mr. Husted had one time in fact solicited P for an answer but that P did not provide the answer.

2149. At the hearing P denied any such admission. P gave another account of the interview in which he offered the explanation that confusion between questions from both Messrs. Ward and Baci must be the explanation for Mr. Ward's belief. But in testimony which convinced Judge Milhollin, Mr. Ward stated that P had unmistakably admitted that Mr. Husted had solicited the answer. Judge Milhollin concludes that Mr. Husted did solicit the answer and that P has denied it untruthfully. The Board, however, finds that there is insufficient evidence to support these conclusions.

2150. Judge Milhollin's analysis and conclusions depend heavily upon witness demeanor. As we noted at the outset, while we give due consideration to Judge Milhollin's observations of witness demeanor, we believe that it is our particular duty as the primary triers of the fact to examine carefully whether the objective indicia of witness credibility is consistent with inferences drawn from demeanor.

2151. We begin our analysis of this episode by observing that we draw no inferences whatever unfavorable to P or to Mr. Husted because P was angered by the lack of NRC proctoring during the exam. We would call it justified indignation. This is not to say that Mr. Ward should not have used P's anger as a clue suggesting further inquiry. But investigators' leads and permissible adjudicative inferences are vastly dissimilar. We wonder, however, whether Mr. Ward's view that P was inappropriately angered may not have colored Mr. Ward's interpretation of the disputed meaning of P's remarks during the OIE interview.

2152. Despite the fact that Mr. Ward admits that he misled P during the OIE interview (a time-honored investigative technique), we accept Judge Milhollin's judgment that Mr. Ward is a truthful and sincere witness. He has no reason not to be, nor is there any evidence to the contrary.

2153. Judge Milhollin stated at ¶ 111, "[M]r. Baci, who also testified, was present when the admission occurred" but he did not explain the significance of this observation. Mr. Baci, on the witness stand with Mr. Ward, remained silent when Mr. Ward testified on this point. When a

member of a panel of witnesses remains silent during oral examination it is sometimes understood by prior stipulation that the silent witness agrees or does not disagree with the speaking witness. We are aware of no such understanding in this instance, and we assign no evidentiary weight to Mr. Baci's silence.

2154. Moreover neither Mr. Ward nor Mr. Baci has notes taken contemporaneously with or soon after the disputed interview and the "admission" by P, for reasons irrelevant to the specific issue, was never included in the investigators' official report. Thus there is no independent corroboration of Mr. Ward's testimony, which depends entirely upon his memory and his interpretation of the events.

2155. We also note the undisputed fact that P was questioned by both investigators during the same interview. This gives some credence to P's opinion that Mr. Ward did not understand that P's response was to Mr. Baci on a different question, not to Ward. While P's explanation does not seem very logical to us, it demonstrates the potential for confusion where two investigators interrogate at once. In any event, it is not necessary for P to explain how Ward came to Ward's conclusions.

2156. Finally we are particularly struck by Mr. Ward's recollection of the nature of the question Mr. Husted is said to have put to P. Mr. Ward testified that P said the question was ". . . more like what a certain concept was, well, what in hell does this mean or words to that effect." Tr. 25,463. If this is so, one inference is that Mr. Husted was asking for clarification of a question when, it must be recalled,

there was no NRC examiner present to clarify it for him. While this would not be a good thing for Mr. Husted to do, it is not the same as seeking the answer. Another equally reasonable explanation of Husted's remark, if in fact it was made, is that ". . . what in hell does this mean . . .?" was nothing more than rhetorical grumbling. Accordingly, as to P we find that Mr. Ward's accusations are not sufficiently supported by reliable evidence.

2157. As to Mr. Husted, Mr. Ward's testimony lacks any probative value whatever. Even according to Mr. Ward's disputed account of the interview, P could not remember very well what Husted had asked him, and Ward himself could not remember very well what P had told him. Tr. 25,463-64. Moreover, as we noted above, whatever it was that Mr. Ward remembered about whatever it was that P remembered about Mr. Husted's question, it is as susceptible to a benign inference as it is to one of cheating. Added to all of this uncertainty is the fact that because of the sequestration order, Mr. Husted himself was not present to hear and to confront Mr. Ward's hearsay testimony.[233/] Thus we leave the subject of Mr. Ward's accusations with the slate wiped clean for P and Mr. Husted.

2158. Having found that the charges leveled against P and Mr. Husted by Mr. Ward are unsupported, there should be no need to assess the credibility of either in denying those charges. But Judge Milhollin

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233/ However, Mr. Husted was informed of Mr. Ward's testimony (Tr. 26,910; 26,948) and was permitted to address the basic allegation.

points to other areas of asserted misconduct by each of them as support for his conclusions that P and Mr. Husted untruthfully denied Ward's charges. Therefore a subissue arises as to whether either should be found to be ethically unqualified to perform licensed duties.

2159. P is found to be untruthful by Judge Milhollin because he testified that he had not seen operators cooperate on weekly quizzes, when in fact OO testified that OO, P and Q discussed a math problem on a weekly quiz. OO was quite clear on this point. Tr. 25,975-76; 25,995-96. Judge Milhollin found OO's testimony to be credible, observing that OO incriminated himself by the testimony. Report at ¶ 106. However in view of OO's disinclination to call "cooperation" on weekly quizzes "cheating" (Tr. 25,968-74), and in view of testimony by OO and others concerning the uncertain rules pertaining to the weekly quizzes and their informality, we cannot find that P's conduct, based upon the single allegation by OO should disqualify him from licensed duties.

2160. As to whether, as found by Judge Milhollin, P untruthfully denied observing cooperation on the weekly quizzes, we find that he did not. Report at ¶ 106. It is possible that P did not recall the single event referred to by OO and cited in the Report as evidence of P's untruthfulness or that P did not regard the episode as cheating. In fact P was never asked about the incident with OO. P was asked, in the testimony relied upon by Judge Milhollin, a general question of whether he had ever seen candidates cooperate on weekly quizzes. He replied that he had seen them ask clarifying questions about the questions but not about the answers and then only when proctors were not available for that

purpose. Tr. 26,701-02. This is consistent with OO's testimony. Tr. 26,995-96. There is no evidence that P lied about the incident with OO, P and Q.

2161. Judge Milhollin also found that P was not believable in his testimony as to whether he became angry during the examination or whether it was during the OIE interview. Report at ¶¶ 107-08. To arrive at the conclusion that P is untruthful in this regard requires, in our view, too fine an analysis of too few facts. Moreover we cannot discern from the stated context of this subissue that P had a motive to be untruthful.

Conclusion: P

2162. The Board reaches no conclusion unfavorable to P.

Mr. Husted's Refusal to Cooperate with NRC

(Report at ¶¶ 109-10)

2163. Judge Milhollin found that Mr. Husted refused to cooperate with NRC investigators during an interview on July 29, 1981. He also found that Mr. Husted, as conceded by Licensee, testified about the matter in less than serious and in a flippant manner. Report at ¶ 109.

2164. In a subsequent interview by NRC investigators, Mr. Husted provided a small amount of information concerning rumors about passing papers during an examination. He claimed that he remembered the

information after the first interview. Judge Milhollin concludes that Mr. Husted is not a credible witness. This is a finding based in part upon Judge Milhollin's observations of Mr. Husted's demeanor.

2165. The Board has carefully read Mr. Husted's testimony in which he attempted to explain his first refusal to answer the questions of the NRC examiners and his claim that he later remembered some information. Tr. 26,910-37. His testimony is incredible and the transcript of it is consistent with Judge Milhollin's findings as to his demeanor. We note in particular that his explanation that, because he didn't <u>have</u> any information to provide, he first told the NRC investigators that he did not <u>want</u> to answer their question is simply not believable. Tr. 26,928-29. See Report at ¶ 110. To his credit, however, he did candidly admit that he had first refused to answer because in part he ". . . did not like the way the investigation was conducted." Tr. 26,929. We conclude that Mr. Husted refused to cooperate with the NRC investigators. Moreover, later when he provided some information, he continued to withhold information within his knowledge; and he provided an incredibly inconsistent account of his reasons during the hearing.[234/]

2166. The situation with Mr. Husted presents much the same dilemma as that involving Mr. Shipman, except that we perceived a sense of seriousness and regret in Mr. Shipman's testimony. We found above that there

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234/ The Commonwealth of Pennsylvania submitted proposed findings on this subissue which we consider to be an excellent factual analysis of Mr. Husted's statements and testimony. Commonwealth Proposed Findings ¶¶ 15-23.

is no reliable evidence that Mr. Husted himself cheated. He could have denied from the outset that he had any information whatever about cheating, and he probably would have escaped censure. But he came forward voluntarily with some information. By first refusing to answer fully the NRC examiners' question he raised suspicions where perhaps none would have arisen otherwise. His testimony on the matter was not only unbelievable, but it gave the sense that he didn't care whether he was believed or not.

2167. These factors are not exactly quantifiable but they add up to a conclusion that, if Mr. Husted is representative of the TMI-1 training department, his attitude may be a partial explanation of why there was disrespect for the training program and the examinations. We would have expected Mr. Husted to shoulder at least part of the responsibility for the need perceived by O, W, G and H to cheat. We would expect him to be gravely concerned about the damage to his co-workers, his employer and the public's confidence in the operation of the unit caused by the cheating episodes and failure of his own training department to create a serious and organized environment during the training and quizzes. As a licensed operator instructor Mr. Husted may have the ability to impart accurate technical knowledge to his charges -- the record is silent on this. But, from our evaluation of his contribution to the investigation and the reopened hearing, we question whether he is able, or if able, willing, to impart a sense of seriousness and responsibility to the TMI-1 operators.

Conclusion: Mr. Husted

2168. Our dissatisfaction with Mr. Husted's conduct during the investigation and his testimony is not related to his status as a licensed reactor operator. An action against his license would be inappropriate in that it would not be responsive to the problem, which we have found to be one of attitude. We have no evidence that the attitude we criticize is manifested in his performance as a teacher but, as noted above, we fear that such is the case. But there is also the widely held view in the field of education that the attitude of a teacher is irrelevant to his or her competence. Mr. Husted does not have to love and respect the NRC to do his duties. Yet our doubts persist about his competence to instill a sense of seriousness about the important need for integrity, discipline and public confidence in the TMI training program. Below ¶ 2347, infra, we require changes to be made in the Licensee's training program including the establishment of criteria for qualifications of training instructors, and the auditing of training at the point of delivery. We recommend that the qualifications and delivery performance of Mr. Husted receive particular attention during the forthcoming review of the TMI training program. We impose no direct sanction on Mr. Husted.

U in Mr. Husted's Office

(Report at ¶¶ 112-22)

The Telephone Call [by U] to KK

(Report at ¶¶ 123-29)

Rumors about U

(Report at ¶¶ 130-32)

2169. U is a control room shift foreman. Either he has an unlucky affinity for situations having an aura of cheating, or he was involved in cheating episodes. By an exhaustive analysis of several factual situations, Judge Milhollin concluded that U probably made himself available near the examination rooms during the April 1981 NRC examinations to assist candidates, and that he in fact offered by implication to assist at least one of the candidates. However, troubled by substantial doubts, Judge Milhollin recommends no action. It is clear to us that Judge Milhollin wrestled long and hard with the evidence before arriving at his conclusions. The Board itself has difficulty, because, standing alone, some of the incidents relied upon by Judge Milhollin would not be sufficient to convince us, but together they suggest aid in cheating.

2170. By way of background, in April 1981 the RO and the SRO examinations were each administered twice over four days. The "A" RO and SRO set was followed by the "B" set. U had taken the "A" set on April 21 and 22. The first incident involving U was his appearance in one of the examination rooms on April 23 in the morning before the "B" set began. He had conversations with the "B" set candidates to whom information on the "A" set questions would be helpful. U admits that he "may have" told

the candidates what categories of subject matter were covered in the "A" set. Tr. 26,879. The record does not disclose whether candidates were instructed not to discuss the examination material. There should be but there is not, some form of sequestration in these situations. As to U, whether or not he was instructed not to discuss the examination questions, he should have known that it was implicitly not permitted. His judgment in so doing was very poor.

2171. Four operators, some credible, some not very credible, testified that they heard rumors following the April 1981 examinations that someone had been available near the examination rooms to help the candidates. Two witnesses identified U as the subject of the rumors. One credible witness, OO, heard the rumor before the examination. KK reported the rumor to be that the person was there to help the candidates with the knowledge of someone higher up in the company. Staff Ex. 27, at 30.

2172. Rumors, of course, are notoriously unreliable and ". . . are the worst type of hearsay."[235/] They can be malicious and inaccurate in their genesis and in their repetition. They can derive from a single source but spread to seem like common knowledge, and they cannot be tested by confrontation.

235/ United States v. Mandel, 591 F.2d 1347, 1369 (4th Cir. 1979); cert. denied, 100 S. Ct. 1647, 445 U.S. 961; 64 L. Ed. 236 (1980).

2173. Nevertheless, we believe that Judge Milhollin prudently evaluated the rumors. Even those witnesses whose credibility is doubted, O and W, are credible in their testimony recounting the rumors. The rumors do not further the interest of any participant, thus they are more believable than a rumor which would advance the interest of the originators or the communicators. Mr. OO's version of the rumor was reliably predictive in that he heard in advance that the assistance would come from someone placed in Mr. Husted's office. And indeed, as Judge Milhollin discusses at length, Mr. U remained in the vicinity of that office during the two-day "B" exams. Finally, it is possible that the witnesses who recounted the "rumors" were in fact testifying about more direct experiences than they admitted. There has been a very strong reluctance on the part of those involved to testify against their co-workers. By recounting "rumors" they are spared this unpleasantness while at the same time assuaging any feeling of guilt about not being forthright. We concede however, that much of the foregoing analysis is speculation. We approach the "rumor" testimony with caution and give it independent weight only as it relates to Licensee's response to the rumors. We give the rumor testimony no weight whatever insofar as it would tend to incriminate U.

2174. Consistent with the rumors, U in fact was headquartered in Mr. Husted's office in the vicinity of the exa[illegible]ion room during the "B" examinations by prior arrangement with Mr. H[illegible] who was then taking the exams. U testified that his sole purpose there was to study, but Judge Milhollin doesn't believe him. Judge Milhollin's discussion is

reasonable. Report at ¶¶ 115, 119-20. The Board, however, remains uncertain.

2175. Much is made of the fact that U claimed to have used Mr. Husted's office to study for the next exam on the very day following a grueling two-day session taking the NRC licensing examinations. The next exam was scheduled for some time in the relatively distant future -- four or six months later. As unlikely as such diligence might seem, the evidence was unrefuted that U and others were assigned by management to study on those two days. Judge Milhollin recognizes that U was assigned to study (at ¶ 115), but does not discuss why, in view of that fact, it was improbable that U actually intended to study. The record does not disclose what else U could have done to justify his wages on the days in question. Moreover, although it was the only time before or after the episode that U had used Mr. Husted's office to study, it was also a rare occasion that Mr. Husted's office was available for that purpose. He was absent taking the examinations.

2176. To the Board, the evidence on the use of Mr. Husted's office during the "B" exams falls roughly equal on both sides of the subissue. It was a good place to study and a good place from which assistance on the exam could be given. There were other places to study. U spent a lot of time not studying during the relevant period, but his assignment was to study. We can't decide this subissue.

2177. Mr. OO testified that U approached him outside the examination room with an unspoken but implicit offer to help. This testimony is found by Judge Milhollin to be credible, based in part upon his

observations of OO's demeanor. Id. at ¶¶ 118, 121. This may be a reasonable conclusion for Judge Milhollin to reach. For the Board, however, OO's subjective interpretation of U's unstated purpose in approaching OO is too far removed from our ken to be the basis for a reliable conclusion.

2178. U himself testified that he may have unknowingly provided someone with a short answer during the examination, that providing a short answer would not in his view be cheating, and that it is "not unlikely" that an exam-taker could have received an answer while U and others were in the hallway outside the examination room. Report at ¶ 117, citing Tr. 26,837-38; Tr. 26,862-63; Tr. 26,874-75.

The Telephone Call [by U] to KK

(Report at ¶¶ 123-29)

2179. The evidence is persuasive that a person identifying himself as "U" called KK, a shift technical advisor, on April 23, during the "B" examinations, and asked KK the answer to an easy question which was not on the "B" examination. KK, knowing that the "B" examination was in progress, but not knowing that the question was not on the exam, queried "U" if he was taking the exam. Whereupon "U" replied that he was not, but that he was helping O who was taking his exam. KK then told "U" that he would not, therefore, answer the question until after the examination. KK did not identify "U's" voice, but his memory of the question and the conversation is definite and is reliably corroborated. See Report at ¶ 123.

2180. U's testimony on this episode was rather like his other testimony which Judge Milhollin referred to as "non-denial". E.g., id. at ¶ 122. He admits that he could have called KK and that he may have stated that the call was about a test question but it would have been on another and unrelated test. Tr. 26,483-84; Staff Ex. 27, at 37-38; Report at ¶ 124. But U asserts that he did not call for the answer to the question remembered by KK nor to help anyone in that no such help was required because the answer was easy.

2181. Judge Milhollin's analysis and the supporting evidence convinces the Board that the person claiming to be "U" who called KK was in fact U, that the easy question asked was not on the exam in progress, that U did state that he was asking in order to help O take the exam in progress, and that U accepted, without counter explanation, KK's explanation that he could not provide the answer because of KK's stated assumption that the question was on the exam. See Report at ¶¶ 124-29; Staff Ex. 27, Enclosure 8, at 3-7.

2182. Judge Milhollin's understanding becomes uncertain at this point accurately calling the entire affair a mystery. Id. at ¶ 129. He speculates that U could have been "testing" KK before asking the "real" question. Id. We agree that the purpose of U's phone call is unclear. U is the only person, with the possible exception of O, who can provide the solution to this mystery. Although afforded the opportunity, U has not disclosed his purpose. Therefore Judge Milhollin's inference that U was testing KK before the "real" question is not unfair.

2183. Judge Milhollin concludes that the evidence is not sufficient to establish that U was recruited to offer assistance to the test-takers by management or by fellow employees. Id. at ¶ 122. Our own review of the evidence fails to discover any evidence that U was encouraged to perform this role by others.

2184. Intervenor TMIA recognizes this state of the evidence but comments (at 5) that the evidence does not appear to preclude the possibility that Mr. U on his own may have stationed himself to render assistance to the exam candidates. This is an inviting conjecture with some evidentiary support. U seemed to be ubiquitous around the examination room during the "B" test. His own testimony reveals that he may have aided the "B" candidates with "A" examination information, that he may have "unknowingly" provided a "B" candidate with a short answer in the hallway, and that during the "B" exam he may have called KK about a question, albeit on another test. Here again we are faced with a dilemma where the principal hard evidence against a suspected malfeasant is his own testimony. Thus again we are concerned and hesitant about selecting testimony which inculpates the witness while rejecting the testimony that exculpates him. U has consistently denied knowingly aiding the exam candidates. We recognize that U, and perhaps other witnesses, may have vaguely admitted facts consistent with suspicions of improper conduct as a precaution against a perjury charge if later that conduct is proved. But absent some reliable external evidence of U's misconduct it would be unfair to infer that his admissions were precautionary.

2185. This is yet another aspect of the suspicion and confusion that swirls about U. Judge Milhollin prefers to give U the benefit of the doubt and recommends that no sanction be imposed. Report at ¶ 319. On some sub-issues we have made conclusions more favorable to U and on others less favorable to him than has Judge Milhollin, but, in sum, we come to the same result. We too reluctantly give U the benefit of the doubt.

[Other] Rumors about U

(Report at ¶¶ 130-32)

2186. Judge Milhollin has correctly declined to find that U used notes written on his hand and crib sheets during NRC and company-administered examinations. Rumors to this effect had circulated among the wives of some of the TMI employees.

2187. Conclusion: U. The Board imposes no sanction on U.

The Telephone Call to WW

(Report at ¶¶ 133-34)

2188. WW is a shift technical advisor who received a phone call during a company-administered exam requesting information which, as he later learned, would have been useful on that exam. He could not

identify the caller. Judge Milhollin's analysis of the incident is substantially correct except he concludes with certainty that the call was cheating in that the question asked was in fact on the exam. Since the information requested was only a portion of the needed answer, and the information could have been requested for other reasons, that conclusion, while probably correct, is not inevitable.

2189. We agree with Judge Milhollin that there may be another uncaught cheater in the plant, but unlike the case with Mr. Shipman, the caller to WW may be one of the cheaters already identified in the reopened proceeding. Judge Milhollin does not comment on WW's role in this episode. WW should be admonished for carelessness and censured for not coming forth with the information early in the NRC investigation. On the other hand we recognize that he did volunteer the information. No other sanction is called for.

<u>VV and O in 1979</u>

(Report at ¶ 135)

2190. It is not clear from Judge Milhollin's brief discussion (at ¶ 135) of the incident involving VV and O in 1979 that the episode does not have direct relevance to the TMI-1 examination and testing procedures and the TMI-1 operators. The incident involved TMI-2 employees before the period encompassed by the reopened proceeding. It is only relevant to the competency of GPU Nuclear's management as Judge Milhollin discusses in ¶¶ 220-37 of his report.

B. Management's Involvement in Cheating

(Report at ¶¶ 136-83)

2191. In this section the Special Master evaluates four issues pertaining to whether Licensee's management was itself involved in cheating. One issue pertains to the definition of management (Report at ¶¶ 181-83), and another relates to a totally incredible allegation of cheating on a Radiation Work Permit test in April 1979 (id. at ¶¶ 179-80). Of special importance are allegations, which we find to be baseless, that the TMI-1 Manager of Plant Operations successfully schemed to prevent proctoring during the April 1981 NRC examinations, and at the same time, improperly influenced the examination answer keys.

Keeping the Proctor Away From the Examination Room

(Report at ¶¶ 137-52)

Broadening the Answer Keys

(Report at ¶¶ 153-78)

2192. Michael J. Ross, Manager of Plant Operations, reviews and schedules all operations and directs the activities of about 110 operating personnel consisting of the shift operating staff, the radwaste group and several operations engineers. We commented in the "management" PID that he may be the most important person of the TMI-1 operating team with respect to public health and safety. He had testified before the Board five times over many days on a wide variety of design, procedures and operator training issues. As we noted in the partial initial decision, we were favorably impressed by his testimony. August 27 PID ¶ 155,

14 NRC at 416, 439-41. The allegations against him have the most serious implications of the entire inquiry on cheating.

2193. YY, a former employee of TMI-1, accused Mr. Ross of purposely keeping the proctor away from the examination room during the April 1981 NRC licensing examinations. He also accused Mr. Ross of improperly influencing the answer keys on that exam so that the candidates would be scored more liberally. Judge Milhollin concluded that those charges were substantiated. In addition to YY's testimony Judge Milhollin depended upon his analysis of eleven questions and answers on the examination and his conclusion that Mr. Ross' denials were incredible.

2194. The Licensee was shocked by Judge Milhollin's conclusion and immediately (April 30, 1982) moved the Board to reopen the record so that we could hear directly from Mr. Ross. The motion had merit, but we believed that reopening might not be required because, as it happened, the Board had already evaluated Judge Milhollin's findings on Mr. Ross, examined the evidence on its own, and had arrived at a tentative conclusion opposite to that of Judge Milhollin.[236/]

2195. After a Board conference with the participating parties, Licensee withdrew without prejudice its motion to reopen and the Board

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236/ We had proceeded to a tentative conclusion before receiving party comments because no party had urged the findings made by Judge Milhollin during the reopened proceeding. We had an advance draft of that portion of the Special Master's Report.

served for party comment a draft of its tentative finding on the Ross issues.[237/] As a result of the party comments, our conclusion that Mr. Ross did not act improperly in the enisodes involved in Judge Milhollin's report has been reinforced.

2196. By way of background, it is an established practice that NRC operator licensing examiners review the test questions and proposed answer keys with knowledgeable utility officials soon after the examinations are underway so that the validity of the questions and answers to a particular plant may be ascertained. To preserve the integrity of the exam this is not done before the examination, but it must be done soon after it begins to afford a timely opportunity to modify questions that are plant specific. The company representative reviewing the NRC examination normally would not be a license candidate.

2197. On April 23 and 24, 1981, Mr. Ross, and two licensed company training officials, Messrs. Boltz and Brown, were called upon by NRC licensing examiner Bruce Wilson to review with him the questions then being presented in the "B" examinations and the answer keys to both the "A" and "B" sets. Unfortunately an unusual situation prevailed then at TMI in that all licensed officials including Messrs. Ross, Boltz, and Brown were required by Commission order to be re-licensed. Mr. Ross and his two colleagues had just taken the "A" set of examinations during the preceding two days, but were the best qualified to evaluate the answer keys to both the "A" and "B" sets and the questions for the "B" set.

237/ Unpublished Memorandum and Order Regarding Licensee's Motion to Reopen, May 5, 1982.

They had not, of course, seen the "A" set questions or answer key before they took that exam.

2198. This was not a situation of Mr. Ross' making; he did not seek the opportunity. No one asserts that he should not have rendered any assistance to Mr. Wilson. No accusations have been made directly against Messrs. Boltz and Brown. In this instance however, the procedure meant that the three company officials had an interested voice in the formation of the questions and answer keys and it meant that the examiner, while reviewing the test material with them, was not able to attend to his proctoring responsibilities. Thus a plausible background exists for the allegations made against Mr. Ross by his sole accuser, YY.

2199. YY was formerly employed at TMI-1 as a part of the operating shift during a period which embraced the April 1981 NRC exams. In September 1981 he reported to the NRC inspectors and later testified that Mr. Ross had implied that he, Ross, had deliberately distracted the NRC examiner so that the candidates could cheat, and that Mr. Ross had convinced the NRC examiner to expand improperly the answer keys so that scoring would be unfairly liberal. YY also stated that Mr. Ross is the type of person who would purposely do such a thing. Without YY's testimony there would be no direct evidence against Mr. Ross, but Judge Milhollin's analysis includes his findings relative to other circumstances surrounding the episodes. He concludes that Mr. Ross did act to prevent proctoring and that Ross in bad faith brought about an improper expansion of the answer keys. We disagree with both conclusions.

2200. The basic allegation against Mr. Ross is founded on YY's inference drawn from a statement attributed by him to Ross. According to YY, Ross said that he, Ross:

> had gotten the NRC to expand the answer keys so as to give the examinees more latitude in their answers and also that he had kept the proctor out of the room for a very long period of time. The inference I [YY] drew was that by both actions he made it easier for the people taking the test.

YY's statement to NRC, Staff Ex. 27, Enclosure 1.

2201. The statement even as recalled by YY is equivocal. It is subject to a completely benign inference in that it could mean that Mr. Ross influenced the NRC to expand the answer keys accurately to fairly provide more latitude and that this process took a very long time. As equivocal as the statement is, YY equivocated even more in explaining the conversation from which the statement derived. He explained to the NRC investigators that while he believed that Ross had admitted deliberately facilitating cheating, it was also "possible that he could have been bragging." Id. It is clear from a review of YY's statements and the later testimony that when he and others use the term "bragging", or such, they are referring to untruthful bragging in the sense that Ross may have claimed to have facilitated cheating when in fact he had not.

2202. At the hearing YY testified that while he does not regard Ross' alleged incriminating statement as untruthful bragging, others might have regarded the statement as untrue. He testified that he had therefore clarified his statement to state also that Ross "could have been bragging." Tr. 26,015-16.

2203. Also in his testimony YY repeated his general allegation that he believed Mr. Ross would have acted and did act deliberately to facilitate cheating. Tr. 26,011, 26,015-16. However, in other portions of his testimony, he seems to state that any unfair advantage to the test candidates was an incidental result of normal procedures. He stated:

> Q . . . . Do you have any first-hand knowledge of Mr. Ross expanding the answer key to any NRC exam in order to give the examinees an unfair advantage in passing the exam?
>
> A In my statement I said and I still feel that Mr. Ross expanded the answer key under normal procedures. It was explained to me that that is a normal procedure, but I feel he also expanded the answer key and in doing that act of expansion he was able to facilitate keeping the proctor from the room for a long period of time; and that keeping the proctor from the room I understand is a normal thing, but I feel that since the proctor was out of the room, that the examinees might have had an unfair advantage which they would not have if the proctor was in the room all the time.

Tr. 26,022.

2204. In his testimony YY also explained that he did not report the reputed conversation until some five months later. Tr. 26,024-25. He stated that at the time he had been bothered because of the type of conversation, but that he had more or less become calloused by that type of conversation. Tr. 26,024. And as he further explained, the type of conversation to which he referred did not involve cheating, but

bragging.[238/] The clear meaning of YY's testimony is that, at the time the statement was made, he did not believe that Mr. Ross was admitting that he facilitated cheating. It was not until YY learned that O and W were fired for cheating, five months later, that YY may have decided that Ross had admitted to improper actions. Tr. 26,024-25.

2205. In sum: YY heard Mr. Ross make a statement, which even according to YY's recounting of it, as cited above, was not an admission of misconduct. Any sinister meaning depended upon YY's interpretation. The worst implication of YY's testimony is that YY believed that Ross' statement truthfully implied cheating but that others could reasonably have inferred untruthful bragging. Even YY did not think the reputed statement was an admission of cheating when made. He possibly came to that opinion five months later. Even then, it is not clear from his testimony, one way or the other, whether YY finally believed that Mr. Ross deliberately facilitated cheating. YY's allegations were

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238/ "Q You said, I think, earlier that you had become I think you said callous towards conversations involving cheating. Is that correct or is that not correct?

"A No, that is not correct. My statement was that I had become callcused to certain types of conversation in the shift supervisor's office, and I think that statement was referring to the bragging that Mr. Ross did or the conversations that he had, the type of conversations that he had. He was a big talker." Tr. 26,030.

probably honestly made; there is no evidence of malice.[239/] But his testimony and perceptions of the meaning of the conversation attributed to Ross are too subjective, internally contradictory, and unreliable to be accepted by the Board.

2206. Others, GG, KK, and RR, recalled statements by Ross (which could have been the basis of YY's inferences), to the effect that the candidates were not to worry in that they did all right on the exam and that he, Ross, ". . . took care of that job". See Staff Ex. 27, at 24, 26-27; Report at ¶¶ 143-44. Those witnesses inferred from Ross' comments that he had fairly broadened the answer keys, and that, apparently by joking, he was seeking to cheer his crew. Id. This would have been a very understandable message from Ross to his crew after months of training and a week of examinations. It does not indicate to the Board an improper motive. The views of GG, KK and RR seem more reasonable to the Board than the inferences drawn by YY.

2207. Mr. Ross denied that he deliberately hindered proctoring or that he improperly influenced the answer keys. He stated however, that he could have made some statements which the Board believes are those remembered as benign by GG, KK, and RR, and which also could have been

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239/ After considering the Aamodt family's comments on the Board's draft findings on this issue, we have deleted language which implied that YY may have been motivated to make his charges "to get even" because, in his view, O and W were unfairly treated. We still do not know why YY waited to express his concerns, but it is equally possible that the seriousness of the incident with O and W caused him to reassess his understanding of Mr. Ross' alleged statement.

the remarks overheard by YY.[240/] His testimony did not persuade Judge Milhollin. It is true that his testimony was sometimes uncertain on the matter. It could hardly be otherwise. Mr. Ross had to defend himself against YY's accusations without even knowing who made the accusations or why he made them. YY testified after Mr. Ross testified.[241/] To meet the charges completely, he had to postulate their bases. This is, of course, a due process consideration. But its immediate significance is that Mr. Ross' defense testimony must be measured in light of the fact that he has not been confronted with all the specifics of the accusations. Mr. Ross did however know the essence of the charges against him. He was provided an excised copy of YY's initial statement to the NRC. The statement was similar to his testimony.

240/ In commenting on our draft findings, the Aamodt family stated that "the board concedes that Ross's testimony supported YY's description of the conversations concerning broadening of the answer keys." The Aamodts are flatly wrong; we made no such concession. In fact, Ross categorically denied the charge and could not even remember the conversation recounted by YY. He told the NRC investigators: "that it was possible that he discussed the review of the answer keys with a number of people since everyone was very interested in this and since suggesting necessary changes to the answers was the purpose of the review. He allowed as how he might have commented about how long the reviews had taken but stated that this would have been an observation and not a description of an attempt on his part to distract the proctor." Staff Ex. 27, at 12-13.

241/ While many company witnesses were assigned code letters to protect their identities from the public, they knew each other's actual identity even though sequestered as witnesses. In YY's case, however, the code letters were used to protect his identity from Licensee's personnel, including Mr. Ross. See Tr. 24,215; 24,217; 26,011-12. To this day, Mr. Ross may not know the full details of the charges against him or who made them.

2208. In our tentative draft findings on the Ross issues we noted our belief that some of Mr. Ross' testimony about time lapses seemed to be inaccurate in the direction of exoneration. This is a circumstance which we attribute to faulty recollection and a natural tendency to honestly recall events favoring one's own point of view. Other portions of his testimony we believed to be incredible but honestly rendered. As we noted in the draft, we were left particularly uncertain as to why Mr. Ross testified that he had never learned whether the changes in the answer keys were ever adopted, and that he did not know that one of the two examination rooms had been left unproctored during the answer key review.

2209. Licensee has now directed us to portions of Mr. Ross' testimony where he acknowledges that he had requested the changes, did not know for a fact that they were made (Tr. 24,161), but assumed that some were made (Tr. 24,334). The Board had incorrectly stated in the draft that Mr. Ross had stated to the candidates that changes were made, when in fact his statement was only that the key "was going to be fair". Tr. 24,180. As to the proctoring testimony, the Board had overlooked the fact that a <u>third</u> NRC official had been available for proctoring during the "A" exams. Thus, Mr. Ross would not have assumed that the room was necessarily unproctored when the examiner, Mr. Wilson, was busy with the answer key review. Neither the testimony on the answer key changes, nor on the proctoring is incredible, particularly when considered in the light of Mr. Ross' tendency to limit his testimony to his definite knowledge.

2210. Considering YY's accusations against Mr. Ross, and considering the inherent opportunity to adversely affect the validity of the examinations made possible by company review of NRC answer keys, Judge Milhollin very commendably analyzed a sampling of the April 1981 NRC operator exam questions. Report at ¶¶ 153-78. From the "A" exams he selected eleven questions where answer-key changes were made at the suggestion of the company reviewers and one where an attempt to change the answer key was rejected by the NRC examiner.

2211. As to nine of the examples Judge Milhollin correctly found that the changes were appropriately made in the direction of accuracy. As to one question, E.3 (the sixth analyzed by him), he found that the NRC examiner came to the exam with insufficient data. He therefore accepted answer data from the reviewers and an answer-key change. While Judge Milhollin does not question the change, he is unsettled by doubts about the accuracy of the supplied information. This question however is not used by Judge Milhollin as an example of improper efforts by Mr. Ross and the other company reviewers. Report at ¶ 169. We agree with this conclusion also.

2212. One of the two remaining questions analyzed by Judge Milhollin, question B.5.a on the "A" RO exam, asked:

> a. What is the purpose of the #1 seal bypass line? Include how opening this line affects the #1 seal.

Staff Ex. 33.

2213. The Staff's answer key to B.5.a originally stated:

> Lowers the pressure in the #1 seal area, offers lower head resistance to pump injection water, allows more injection flow to be diverted up shaft through the seal and past radial bearing. This prevents binding and contact of seal faces.

Staff Ex. 33 (at Exam B answers).

2214. The company reviewers apparently brought about several changes on the answer key. The first sentence was modified to delete "through the seal and" and to add at the end "for adequate cooling". Over the top of the first sentence was added "lower seal #1 Δ P". The entire second sentence was struck. The answer key as changed, then, was in the following form:

> [lowers seal #1 Δ P]
> Lowers the pressure in the #1 seal area, offers lower head resistance to pump injection water, allows more injection flow to be diverted up shaft ~~through the seal and~~ past radial bearing. [for adequate cooling.] ~~This prevents binding and contact of seal faces~~.

Id.

2215. Contrary to Licensee's analysis of Judge Milhollin's reasoning (Licensee Comments at ¶ 63), he did recognize that the added language "for adequate cooling" was intended to be a response to the first part of the question, i.e., the purpose of the #1 seal by-pass line is to cool the radial bearing. Report at ¶ 156. Judge Milhollin, however, failed to give credit to the company reviewers for recommending this clarifying

change. In fact all but one of the operators indicated the bearing-cooling effect in their answers. See Licensee Comments at n.2.

2216. However, once the NRC examiner agreed to drop the answer "This prevents binding and contact of seal faces" the answer key no longer seemed to satisfy the second question, "Include how opening this line affects the seal." This factor is central to Judge Milhollin's conclusion that the change was improper. This too was the basis for the Board's earlier tentative finding that that change to the answer key to question B.5.a was clearly improper.

2217. But, as we now know from Licensee's comments, both Judge Milhollin and the Board failed to note and to account for the phrase "lower seal #1 Δ P" inserted over the answer key. Therein may be found the solution to this puzzle, according to Licensee.

2218. Judge Milhollin found that eight candidates answered the second portion of this question as the Staff would have the answer but for Mr. Ross' intervention. But in Licensee's view, the answers provided by six of them suggest that opening the line could cause rather than prevent binding and contact of seal faces. These answers also suggest that this potential damage would occur by lowering the Δ P, or equalizing the pressure on the seal, thereby producing the potential for excessive wear on the #1 seal (along with the #2 seal). Licensee Comments at ¶ 65.

2219. Surely, as suggested by Licensee, opening of a bypass line on one side of a seal can lower the Δ P across the seal, hence reducing water flow through the seal. And if this water flow becomes low enough, it is possible to overheat, wear, and fail the seal. This scenario, as Licensee states, was described by some of the license candidates in their exams. See Licensee Comments at ¶ 63.

2220. Although we cannot find from this record which answer is correct, we do find the change apparently recommended by the company reviewers is just as likely to be correct as the Staff's original answer. We therefore do not find that the change was incorrect or improper.

2221. The remaining question sampled, Question C.2.b (the fourth analyzed by Judge Milhollin), noted that pH control is important to minimize corrosion of primary and secondary components and that primary pH can vary from 4.6 to 8.5. Candidates were directed to: "Describe the competing effects that determine primary pH and cause it to vary in this manner." Emphasis added. The answer key required as a part of the answer: "Boric acid and lithium hydroxide concentrations compete." Report at ¶ 161. The reviewers argued for a change which would permit reporting only the manner of controlling pH with lithium hydroxide without reference to boric acid. Mr. Wilson refused to change. The candidates were about evenly split on including boric acid in their answers. See Licensee Comments at n.5 and n.6. Mr. Ross gave the partial answer, but another reviewer, Mr. Boltz, gave the full and correct answer. Id.

2222. Judge Milhollin finds that Mr. Ross and Mr. Boltz improperly argued for the change. Report at ¶ 166. We agree that the proposed change was properly rejected but we cannot find that the attempt was unconscionable in view of the difference between the chemistry lectures in training (the complete and correct answer) and actual plant practice.

2223. In reviewing the answers it is obvious that the candidates who did not include boric acid (and, for that matter, even those who did) recognize that primary pH is controlled by lithium hydroxide, not by boric acid. It is understandable why only lithium hydroxide would come to mind to some of them even though the competing effects are called for. It is clear however that the answer based upon actual plant practice would not respond literally to the question, which incidentally was inartfully worded in that it called for competing effects.

2224. Mr. Ross' and his colleagues' successful effort to change the seal-face question (B.5.a) and their attempt to change the primary pH question (C.2.b) are the basis for Judge Milhollin's conclusion that they acted in bad faith. Report at ¶ 177. The essential issue is not whether the changes recommended by Mr. Ross and the company reviewers were correct, but whether they were made in good faith. We were persuaded before, when we believed that the changes in the answer key to question B.5.a were clearly incorrect, that they were nevertheless made in good faith. Now that we have concluded that either explanation of the effect on the seal face is rational, there is even greater reason to conclude that the changes were suggested in good faith.

Conclusions: Mr. Ross

2225. We conclude that YY's accusations against Mr. Ross are incredible, an analysis of the two questions cited by Judge Milhollin leads us to the conclusion that the change recommendations were made in good faith, and there is no aspect of Mr. Ross' testimony bringing his candor into question. All of the charges made against him are unfounded. No misconduct may be imputed to the Licensee.

Radiation Work Permits: Harry E. Williams, Jr.

(Report at ¶ 179)

2226. Judge Milhollin correctly refused to accept the incredible testimony of the Aamodts' witness on Issue 6 (alleged cheating in a radiation work permit test in April 1979). No other evidence was presented in support of the issue, which is, therefore, resolved in favor of Licensee.

The Definition of "Management"

(Report at ¶¶ 181-183)

2227. Judge Milhollin explains that there is little value in choosing between Licensee's definition of management ("exempt [non-union] employees") and the Staff's definition (those who control the actions of more than one shift). We agree. We do not, however, adopt the portions of Judge Milhollin's analysis where he summarizes his findings as to the cheaters at TMI in that we depend on our own particular conclusions on

the named individuals. It should be noted again that VV, who is said by Judge Milhollin to be a link between upper management and the operations staff (at ¶ 183), was not a member of TMI-1 management at any time relevant to this proceeding.

C. The Licensee's Response to the Cheating
(Report at ¶¶ 184-237)

2228. The Licensee's management responded to three different types of cheating. First, the cheating on the NRC examination in April 1981; second, the cheating on the weekly quizzes; third, the cheating by VV and O in 1979. In general Judge Milhollin gives the Licensee poor marks. We agree in some instances and in others we disagree. The first situation evaluated by Judge Milhollin relates to Licensee's reaction to the NRC investigation of the O and W cheating episodes.

Management Constraint on the NRC Investigation
(Report at ¶¶ 185-88)

2229. When the similarities on O's and W's NRC examination answers were discovered, the NRC's Office of Inspection and Enforcement (OIE) began the first investigation with which this reopened proceeding is concerned. O and W were interviewed by OIE investigators in Bethesda. GPU Nuclear President Arnold directed TMI-1 Vice President Hukill to make a management official available for the OIE interview if requested by either employee. O and W did elect to have a company representative sit in on their interviews. At the outset there was a confrontation between

Mr. Hukill and OIE investigator, Mr. Baci, who wanted to interview O and W without management's presence. The matter was temporarily resolved when Mr. Arnold phoned OIE Director Stello who directed the investigators to permit the interviews in that investigation to proceed under the condition that the company personnel be advised that, at their option, a company representative could be present. Several employees in addition to O and W were interviewed with management present.

2230. By the time the second investigation began (the one concerning YY's allegations against Mr. Ross), Mr. Stello, having received legal advice, decided that a company representative need not be and should not be present. Mr. Arnold also had been advised by counsel that he may not require that a company representative be present. As a result, the remaining investigations proceeded without incident between the Licensee and OIE, and without management presence during NRC interviews. The NRC Staff believes that the company presence during the first interviews was inhibiting but that the overall effectiveness of the investigation of O and W was not affected. Since the evidence gathered against O and W was strong, we have to agree. The Staff does not believe that the company was motivated by a desire to constrain OIE. The Licensee states that the company did not intend to constrain the NRC's investigation, nor were its employees inhibited by management presence. Licensee points to a previous NRC practice of allowing company representatives to be present during on-site OIE interviews with utility personnel as an indication that it initially proceeded in good faith.

2231. Judge Milhollin concludes that this action by Licensee's management was improper, but he does not find that the NRC investigation actually was constrained, other than that there was a "burden on the flow of information". Report at ¶ 188. In the Board's view, this episode has received more attention than it warrants. It seems to be a situation where the regulatory scheme worked as intended. The regulated utility had different perspectives and responsibilities than those of the NRC. After the initial confrontation, the participants acted without friction.

2232. From the Licensee's point of view, Judge Milhollin recognized that Mr. Hukill's avowed purpose of making sure that his people were treated fairly was legitimate. We agree, but with some reservations in that this is not the Licensee's highest function. Conflicts of interest could interfere with that effort and the public had an interest in an unrestrained flow of information. We were more persuaded by Mr. Hukill's other reason for wishing to be present or represented. He explained that ". . . by attending, I would gain first-hand knowledge of the scope of the problem with which I was faced as Vice President of TMI-1." Hukill, ff. Tr. 23,913, at 9. Were it not for the possible inhibiting effect, it would be management's duty to be present at interviews to learn both the "scope" and the details of its problem. To meet its responsibilities to the public, the NRC, its ratepayers, owners and employees, management should have made every reasonable effort to stay on top of the NRC investigation.

2233. Licensee offers some examples of why it believes that Mr. Hukill was prudent in not wanting to rely upon the recollections and records of the OIE investigators to satisfy management's need to be informed. Licensee proposed finding ¶ 292. We have not paused to analyze these examples; it is unnecessary to do so to resolve this issue. A patent example comes to mind from our own evaluation of the incident with P and Mr. Husted. OIE investigator Ward believed that Mr. Husted solicited P for an examination answer (¶ 2148, supra), but because the alleged solicitation was thought to be unsuccessful, Mr. Ward and OIE management decided not to include the episode in the final OIE report. We have found of course that the evidence does not support that accusation against Mr. Husted. But Mr. Ward's opinion that Mr. Husted did solicit remains as a demonstration of the kind of information that Mr. Hukill should have had if Licensee's management were to be able to conduct the inquiry it is now faulted for not conducting.

2234. The NRC Staff's intuition that it should interview the company employees without management's presence was sound, and it correctly enforced this right after first faltering. The Board concludes that the incident is without important significance in this reopened proceeding.

Management's Dealings with O and W

(Report at ¶¶ 189-90)

2235. Judge Milhollin faults Licensee's management for not pursuing with O and W the reasons why they cheated. Mr. Arnold's position was

that such inquiry would not have been productive in that Licensee would have to explore every potential reason for cheating regardless of the reasons given by O and W. We believe that Licensee passed up an opportunity to explore with O and W possible weaknesses in the training and examination programs, and to spotlight particular morale problems. Licensee admits that in retrospect Mr. Arnold probably should have asked them why they cheated. Comments at ¶ 95.

2236. Judge Milhollin concludes that the reason management did not need to ask was because it knew that the cheating was caused by disrespect for the NRC examination. Report at ¶ 190. Licensee, for reasons that are not apparent to the Board, seems stung by that conclusion. Comments at ¶ 95. On the other hand neither do we understand why Judge Milhollin selected that reason from among many possible reasons, and why he imputed that knowledge to Licensee. Our conclusion is merely that Licensee's decision not to pursue the matter was one of many judgments that had to be made and this one turned out wrong. In any event, O and W were examined thoroughly during the reopened hearing on the issue.

<u>Management's Meeting With Employees</u>

(Report at ¶ 191)

2237. After the discovery of the O and W cheating incident, Mr. Arnold, then Mr. Hukill, met with the TMI-1 operations staff. There were several meetings, first with the entire staff, then by shift, then with each member of the staff. We are satisfied that the company made clear its attitude that cheating will not be tolerated and that this

message was clearly understood. E.g., Tr. 25,701 (GG). Management also explained that despite resistance by the operators, written examinations were required by the company and by the NRC as objective measures of their competence.

2238. Mr. Hukill explored with each operator whether he had cheated on any of the examinations and whether he knew of any other involved person. Licensee believes that the only example of additional cheating developed by these interviews was the incident reported by Mr. Shipman, which, as we noted above, remains unresolved. Judge Milhollin, however, finds that OO reported that "cheating on exams in [the] past has been commonplace and accepted." The cited evidence (TMIA Ex. 60) is Mr. Hukill's notes in which he recorded that OO stated that OO did not cheat nor does he know anyone who did, but that he heard "all kinds of rumors" that cheating on exams had been commonplace and accepted. Id. It is not clear what if anything was done about OO's report of rumors, as we discuss below at ¶ 2261.

2239. Of particular significance is the fact that management learned that the operators resented the reexamination requirement imposed upon them when other operators around the country are free from such requirements. Hukill, ff. Tr. 23,913, at 12.

2240. Judge Milhollin reached no conclusion about management's meeting with its employees. Our review of the evidence indicates that Licensee took appropriate actions to meet with its operators, both to receive information and to impart company policy on the need for the

examinations and honesty. However, the record does not reflect what, if anything, management has accomplished in bringing about employee acceptance of the NRC's responsibility to ascertain by objective means that the TMI-1 operators are qualified.

Management's Response to the Shipman Incident

(Report at ¶¶ 192-95)

2241. The unidentified person who asked Mr. Shipman for an answer to an exam question was probably one of eight candidates in the smokers' room during the "A" exams in April 1981. See ¶ 2139, supra. While each of them was questioned in general by Mr. Hukill as to whether he cheated or knew of cheating, they were not interviewed concerning the particular incident with Mr. Shipman. Judge Milhollin explains why this would have been easy and useful and we agree. Licensee admits that the eight candidates should have been asked specifically about the incident. Comments at ¶ 98.

2242. We do not adopt the inference drawn by Judge Milhollin that "If the Licensee had been trying to find Mr. Shipman's questioner, such a step would have been strange to omit." Report at ¶ 193. We find no evidence that Licensee failed to conduct the interviews because it was deliberately not trying to identify cheaters.

Management's Response to Rumors about U

(Report at ¶¶ 196-99)

2243. The rumors that someone, perhaps U, was stationed outside the examination rooms to help the candidates cheat were very serious -- particularly that aspect of the rumor that management had stationed such a person there for that purpose. ¶ 2171 , supra. The Licensee did not investigate this rumor because the OIE investigators interviewed U on the subject. Wilson, ff. Tr. 24,478, at 14. Judge Milhollin lists several reasons why this omission was important and what more could have been done in this regard. Report at ¶ 198.[242/]

2244. Licensee explains this failure by stating that Mr. Arnold had decided to ensure that there would be no actual or perceived interference with the NRC investigations, and therefore Licensee would not investigate a particular matter until the NRC had completed their [respective] investigation. Licensee Comments at ¶ 100, citing Arnold, ff. Tr. 23,590, at 5, and Tr. 24,607 (Wilson). Since this rumor had implications of potential management involvement in cheating, Licensee argues that the matter was particularly appropriate for the NRC pursuit and particularly inappropriate for management itself to pursue. Comments at ¶ 101.

242/ In addition it appears that Mr. Hukill, during his program of interviewing each operator, overlooked asking U about the rumors that he used crib sheets. Tr. 24,079.

2245. Mr. Arnold's judgment to defer any investigation on a particular matter until the NRC had completed that aspect of the inquiry, was made in the context of the company interference perceived when management tried to be present during the OIE interviews of O and W. Arnold, ff. Tr. 23,590, at 5. It is a rational decision with which we do not disagree.

2246. The decision by Licensee's investigating attorney, John Wilson, not to investigate this rumor or even confront U with it because OIE did so was a very bad reflection on his judgment. And it is imputable to Licensee. Mr. Arnold's stated policy clearly was to investigate particular matters <u>after</u> the NRC, not <u>instead</u> of the NRC. We do not accept, in fact, we flatly reject Licensee counsel's argument that management involvement in the rumor was a justification for leaving the matter to the NRC for investigation. In our view, the higher the management alleged to be involved, the greater was Licensee's overall corporate responsibility independently to inform itself. Licensee deserves Judge Milhollin's strong rebuke on this failure. However, Licensee does not deserve the implication that it knowingly selected for investigation only matters unlikely to implicate management. Report at ¶¶ 199.

Management's Response to Cheating on Weekly Quizzes

(Report at ¶¶ 200-37)

2247. Licensee determined that one appropriate area for its investigation would be to review those exams and weekly quizzes required for initial qualification or requalification for NRC operating

licenses.[243/] See Licensee Proposed Finding ¶ 243; Tr. 24,495, 24,587-88 (Wilson). We find no fault with this approach. The material reviewed was voluminous and was the most important body of test information outside the NRC's own licensing examinations.

2248. Licensee selected Mr. Edward V. Trunk, an assistant professor of engineering at Pennsylvania State University, who was assisted by a colleague, Donald Miller, to evaluate the questions and answers on the company exams. As Judge Milhollin and the Board finds, Messrs. Trunk and Miller identified many sets of suspicious parallelisms. In our view their work was thorough and competent. The material they reviewed was made available for examination by Judge Milhollin, the Board and the parties. Thus it has been carefully reviewed by many separate individuals seeking parallelisms in the answers. Although a few, less obvious, additional similarities were found, Messrs. Trunk and Miller appear to have identified most of them. Their assignment stopped at that point.

2249. Licensee assigned their attorney, John Wilson, to investigate the parallelisms identified by Mr. Trunk and Mr. Miller. He was also assigned certain other tasks in Licensee's investigation of the cheating incidents. He was assisted by an associate, Mr. Lloyd. Judge Milhollin criticizes Mr. Wilson's work very severely as he analyzes Mr. Wilson's opinion on the parallelisms identified with respect to G and H; and MM, GG, and W.

243/ The "Kelly" exams, Category T make-up quizzes, ATTS exams not previously reviewed by the NRC, "Kelly" non-Category T make-up quizzes and a 1979 mock NRC exam were chosen for review.

2250. We begin our decision on this portion of Judge Milhollin's Report with a somewhat different approach to the issue compared to that of Judge Milhollin and the commenting parties. First, while we believe that Mr. Wilson was naive in accepting the denials of some of the candidates, too much has been made of his opinions, whether correct or not. It is not clear from the record whether he was presented as an expert on whether the parallelisms indicated cheating, or merely to explain factually Licensee's approach in investigating the parallelisms. His opinions on cheating have little value. He is not an expert in this field, and even if he were, it is for Judge Milhollin and the Board to arrive at their own respective opinions on these issues. This we have done after a direct examination of the evidence, including the testimony of those whose denials Mr. Wilson accepted. There was, however, some utility in presenting Mr. Wilson's opinions and their underlying logic. It permitted a testing of his, thus Licensee's, reasoning during the hearing.

a. G and H

(Report at ¶¶ 202-15)

2251. Judge Milhollin's analysis of why he believes Mr. Wilson performed poorly in his investigation of G's and H's parallel answers necessarily tracks very closely Judge Milhollin's and the Board's reasoning in concluding that G and H cooperated. See Report at ¶¶ 26-77 and ¶ 2096 , supra. There is no need to repeat our analysis here. We depart from Judge Milhollin's analysis of Mr. Wilson's performance on several points however.

2252. Although we agree that Mr. Wilson unreasonably allowed G and H to convince him that the many parallelisms were not the result of cheating, we attribute this to naivete and to a possibly unconscious loyalty to the company and employees, i.e., a natural inclination to believe in their honesty. It is true, as Judge Milhollin observes, that Mr. Wilson presented considerable information which tended to show the absence of cheating, and none, that we can identify that showed the presence of cheating. Report at ¶ 213. This circumstance we believe can be explained, in part, by the nature of the evidence possibly available in either direction. Common training materials, for example, to explain honest parallelisms are producible. Other than the parallelisms, and perhaps an observing witness, what kind of evidence tending to establish cheating by G and H could Mr. Wilson have found? Judge Milhollin, however, points to areas where Mr. Wilson could have but failed to inquire concerning circumstances conducive to cheating. One comes away from an appraisal of Mr. Wilson's investigation of G and H with the impression that he worked harder in developing exculpatory information than he did in developing evidence of cheating. See Report at ¶¶ 213-14.

2253. Judge Milhollin finds (at ¶ 210) that Mr. Wilson misrepresented statements by G and H on the very similar Bernoulli's equation answers. See ¶ 2104 , supra. G and H had testified in a manner contradicting each other. Mr. Wilson's prepared testimony failed to reveal any contradiction where he recounted his earlier interviews with G and H. Wilson, ff. Tr. 24,478, at 8. Licensee takes strong issue with Judge Milhollin's findings concerning Mr. Wilson's candor. Comments at ¶ 110. Licensee's counsel argues that perhaps G and H ". . . provided subtly

different answers earlier, during the Wilson interview." Id. In view of our own findings that the testimony by G and H on the Bernoulli's equation was incredible, we believe that it is reasonably possible that G or H did in fact provide information to Mr. Wilson which differed from their later testimony before Judge Milhollin. Also, it is possible that Mr. Wilson did not notice the contradictions. Accordingly, we do not find that Mr. Wilson misrepresented G's and H's explanation. Licensee cannot have it both ways, however. If G and H gave differing explanations to Mr. Wilson and to Judge Milhollin, it is an additional reflection upon their credibility.

b. S and Y
(Report at ¶ 216)

2254. Judge Milhollin finds that Mr. Wilson's methods and conclusions with respect to the parallelisms on S's and Y's answers were reasonable. We agree. This is not in dispute.

c. GG, W, and MM
(Report at ¶¶ 217-19)

2255. We came to about the same conclusions as did Mr. Wilson in the evaluations of the similarities among the answers of MM, GG and W. ¶ 2134, supra. Both the Board and Mr. Wilson concluded from uncertain evidence that W probably copied from GG. Judge Milhollin, however, found that the evidence suggests that GG copied from W, but found that, standing alone, the evidence would not support that conclusion. Neither the

Board, Judge Milhollin nor Mr. Wilson reached any conclusion adverse to MM.

2256. It is not, therefore, Mr. Wilson's conclusions regarding MM, GG and W which bring about Judge Milhollin's criticism, but rather the adequacy of Mr. Wilson's investigation of the parallelisms. We agree with Judge Milhollin. In addition, we note that Mr. Wilson did not interview W because by that time he was no longer employed by Licensee. Wilson, ff. Tr. 24,478, at 12. We believe that he should have at least attempted to interview W nevertheless. As we found in our discussion of the incident, in view of the very strong and frequent parallelisms between GG's and W's answers, it must be concluded that GG knowingly condoned copying by W. Mr. Wilson simply accepted GG's statement that "W may have looked at his (GG's) exam without his (GG's) knowing." _Id_. at 12. Here we believe that Mr. Wilson was too easily convinced. If he had followed through with an interview of W, he might have been disabused of that naive conclusion.

Mr. Wilson's Performance Imputed to Licensee

2257. At this point in our initial decision we depart from the organization followed in the Special Master's Report. Here we note and summarize some of the additional deficiencies we believed to exist in Mr. Wilson's investigation and the significance of Mr. Wilson's performance to this proceeding.

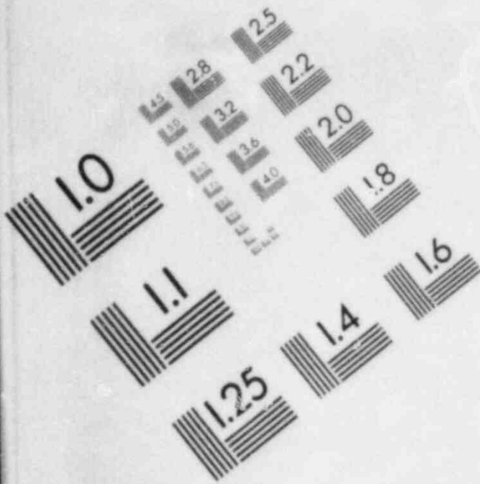
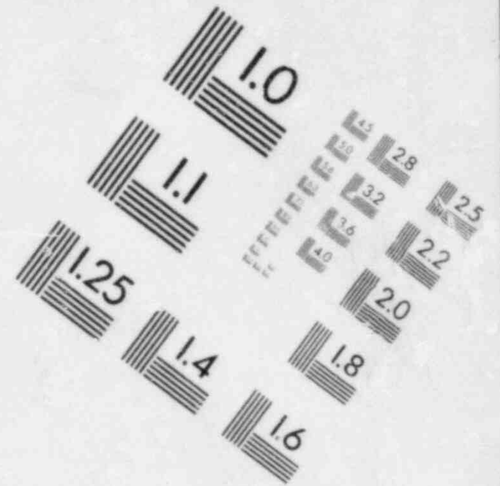
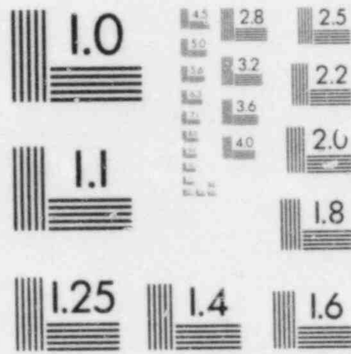
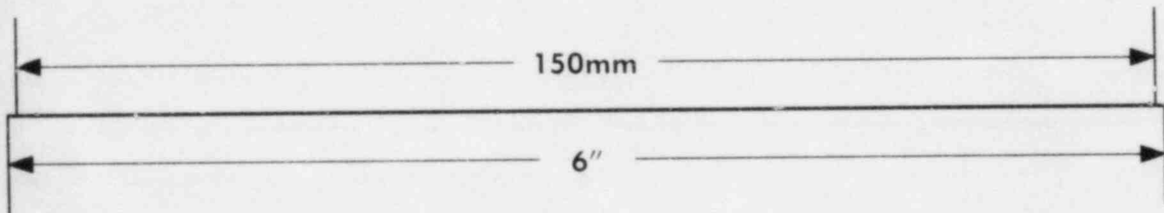
2258. The scope of Mr. Wilson's assignment is not clearly set out in any one place. His testimony emphasizes the investigation of the parallelisms noted by Mr. Trunk and his colleague. Wilson, ff. Tr. 24,784, at 1. He also reported his investigation of two other sets of rumors. The first was the one about U having been placed near the examination room to aid the NRC license candidates (id. at 13-15), as to which we have criticized him for not even questioning U about the matter.

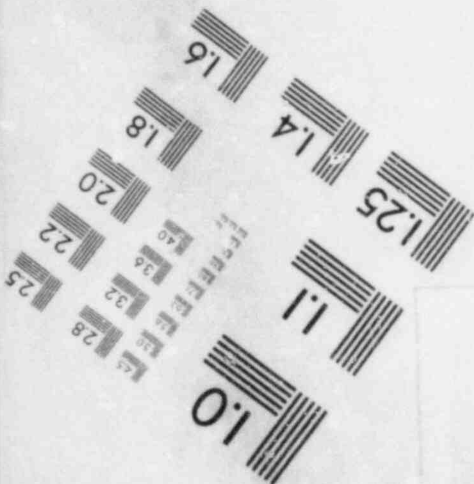
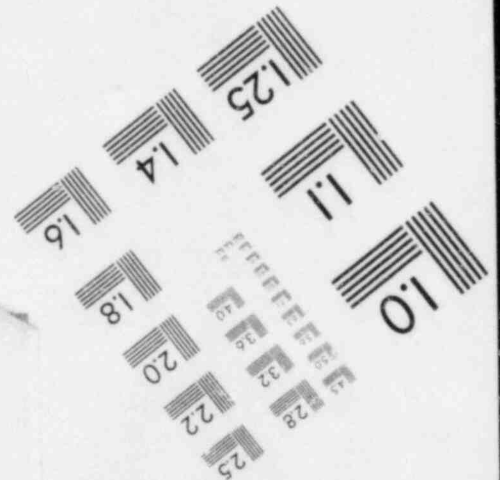
2259. His other assignments relate to those rumors among employees' wives to the effect that U had written notes on his hand and had used crib sheets in the April 1981 NRC examination. Id. at 15-17. As to this assignment, it appears that Mr. Wilson was very diligent. Along with Mr. Arnold, he optimistically tried to trace the source of these rumors. Id.

2260. Other portions of Mr. Wilson's testimony indicate that much of his time must have been spent in assisting the NRC investigators arrange for interviews with the TMI-1 employees. Id. at 18-19. Apparently in recognition that we might perceive John Wilson's investigation as too limited, Licensee argues that it was reasonable in scope because other meetings and interviews were being conducted by Messrs. Arnold, Hukill, Herbein and Richard Wilson. Licensee Comments at ¶ 103.

2261. This we believe may be an indication that Licensee had a rather unstructured approach to the investigation, which in turn may explain why, when on October 12, 1981, OO reported to Mr. Hukill that OO

IMAGE EVALUATION TEST TARGET (MT-3)

had heard rumors that cheating had been commonplace and accepted (TMIA Ex. 60), no company official recognized the responsibility to investigate the matter further. This was the second time that Mr. Hukill had heard about OO's rumors. The first account he sent to Mr. John Wilson on July 30, 1981. TMIA Ex. 58. Mr. Wilson did nothing about the rumors. Mr. Hukill himself did not know whether Mr. Wilson or any other part of the company investigated OO's report. Tr. 23,925. Mr. Hukill regarded himself only as an observer, apparently because the NRC was in the first instance conducting an interview of OO. Id. It seems that the rumors heard by OO fell into the cracks during the company investigation. Fortunately OO was available to testify.

2262. On the subject of Mr. Wilson's investigation of the weekly quizzes, the Board agrees with the Commonwealth of Pennsylvania (Proposed Findings at ¶ 73.4), that there were several other important defects in Mr. Wilson's approach to the investigation. He simply accepted the oral denials of the suspected operators. Tr. 24,553 (Wilson). He should have taken their affidavits, or perhaps even have deposed them. That way, for example, any contradictions in the testimony by G and H would have been memorialized for careful analysis. Moreover, there is a greater incentive for truthfulness in statements under oath.

2263. In assessing the credibility of the suspected operators he did not evaluate their academic backgrounds. Tr. 24,626 (Wilson). He did not avail himself of Mr. Trunk or GPU technical personnel to determine whether the explanations given by the operators were technically credible. Tr. 24,599 (Wilson).

2264. And the most important criticism of all, also leveled by the Commonwealth, is that members of upper GPU management did not substantively review the results of Mr. Wilson's evaluation of the parallelisms. Commonwealth Proposed Finding ¶ 73.4, citing Tr. 23,955-56 (Hukill) and Tr. 23,880 (Arnold).

2265. Mr. Wilson indicated that he had spent virtually all of his time since the discovery of cheating to the time of his testimony at the hearing working on the investigation. Wilson, ff. Tr. 24,484, at 3. It is very likely that he did not have time to do all of the things we and Judge Milhollin believe that he should have done, but his testimony does not even acknowledge that more should have been done.

2266. Mr. Wilson's testimony does not give the impression of impartiality. Perhaps it would have been better if Licensee had employed a totally independent investigator to coordinate its inquiry, but we do not second-guess management on that account. After many years of legal service with Licensee, Mr. Wilson was already familiar with the TMI operations and personnel. As an attorney he was probably as well trained as anyone then available to interview Licensee's employees. Licensee could scarcely afford to waste time in organizing its investigation. Turning to Mr. Wilson is understandable. We conclude however, that Licensee was culpable in its uncritical acceptance of Mr. Wilson's work when there are so many indications of its inadequacy.

Conclusions on Licensee's Investigation

2267. It is very difficult to assess whether Licensee's investigation of the cheating incidents was adequate. For want of better standards we have evaluated the investigation with the traditional tests of whether the undertaking was well conceived and designed, whether sufficient resources were devoted to it, whether it was well executed, and whether it had good results.

2268. We find some fault with the concept and design of Licensee's investigation. Selecting Mr. Trunk and assigning an attorney full time to the inquiry was sound. The active participation of Mr. Arnold and Mr. Hukill lent the investigation useful prestige. We have noted however that there did not appear to be an overall coordinator or clearing house for information thereby allowing leads to go undeveloped, such as Mr. OO's report of rumors. On balance, however, we give a passing grade on the plan of investigation.

2269. There is no evidence that Licensee stinted in the resources allocated to the investigation. Both Mr. Trunk and Mr. John Wilson had assistance available to them. Mr. Richard Wilson, GPU Nuclear Vice President for Technical Functions, also participated in the investigation. Mr. Hukill invested a large amount of his time in meeting with the operating staff. Mr. Arnold was deeply involved even to the point where he interviewed employees about rumors among their wives. The very active participation of Messrs. Arnold and Hukill was also a very valuable contribution because it demonstrated to the operating staff that the highest

level of Licensee's management was determined to correct the problem. We give a high grade on the resources committed and good intentions of Licensee management in the investigation.

2270. With respect to execution, our attention was naturally drawn to those areas where we would have proceeded differently. But the Board has had the benefit of a very large distillation process in that the parties and Judge Milhollin have spotlighted for us areas of deficiency. In the few months between the first revelations of cheating until the hearing began, Licensee had to make many decisions and there was no procedural manual to guide the investigators. We agree that every conceivable lead could not be followed. By the time the hearing began, with the sequestration order in effect, no further investigation by Licensee or the Staff was possible. The investigation did not go far enough in several areas, particularly where Licensee yielded to the NRC Staff some of its responsibilities. We also believe that there may have been a failure on the part of Mr. Arnold or Mr. Hukill to see the investigation through to the very end. A thorough evaluation of Mr. John Wilson's work, we believe, could have changed Licensee's positions as to G and H. As to execution of the investigation, we score Licensee somewhere on the border between failing and passing.

2271. One cannot measure the success of an investigation unless the expected results are known. We do not know if Licensee's investigation turned up all possible instances of cheating on company-administered exams, but we cannot infer that it was an unsuccessful inquiry. After intense scrutiny of the weekly examination papers and after thorough

questioning under liberal cro^{ss}-examination by intervenors and the Commonwealth, and after Judge Milhollin's own very careful inquiries, little was discovered in the way of concrete evidence of cheating beyond that disclosed by Licensee's own inqui   s. Measuring Licensee's investigation by its results may not be sufficiently reliable to pronounce it successful, but neither can Licensee be failed on that basis. The Board concludes that the Licensee conducted an adequate investigation into the cheating incidents.

Management's Response to Cheating by VV and O in 1979

(Report at ¶¶ 220-37)

2272. VV was the supervisor of operations at TMI-2 as of July 1979 and until he was relieved of that assignment shortly thereafter. O is the person discussed throughout this proceeding as one of the cheaters on the April 1981 NRC licensing examination. The events involved in this incident do not directly relate to the reasons for reopening the evidentiary hearing. The matter is significant in that it relates to management's general response to cheating and the conduct of Gary Miller, who was then TMI station manager and who is now GPU Nuclear's start-up and test director.

2273. In August 1977, VV who then held a TMI-1 operator license, passed a cross-licensing exam for Unit 2 with an overall grade of 70%. Because of an NRC-required administrative procedure (Administrative Procedure 1006, TMIA Ex. 65) he had to participate in a special portion of

the next company requalification program known as Fundamentals and System Review (FSR) in two areas where he scored less than 80%.244/ On his TMI-1 operator's requalification exam in February 1978 he passed, but this time he failed to score the needed 80% on three areas. One weak area was also a weak area on the cross-licensing exam, so he had to train in four FSR sections.

2274. He didn't attend FSR classes and therefore was given closed-book take home exams which he didn't return. Because of a grace period, it wasn't until July 1, 1979 that he finally faced suspension from licensed duties. By then he was desperate. On the evening of July 1, 1979 he was faced with an absolute deadline, and he was also faced with vacation plans beginning the next day. After work VV induced O to help him. VV (or someone on his behalf) turned in O's work, in O's handwriting, as part of VV's own work. The training department detected the handwriting differences. O was absolved, VV was said to be disciplined for his conduct, and VV was later recertified to the NRC for his license renewal based in part, as we find, upon work done for him by O. The incident raised three issues: Did Licensee deal correctly with O; with VV; and with the NRC in recertifying VV?

244/ Under current grading criteria an overall grade of 70% is not enough. The candidate must achieve 70% in each area and 80% overall. See PID ¶ 268, 14 NRC at 476, citing NUREG-0660, Task I.A.3.

Excusing O

(Report at ¶¶ 223-27)

2275. O denied that he knew that the work he did for VV was to aid him improperly on an exam. Mr. Miller, who took charge of the investigation, stated that he believed O and therefore took no action except to warn O not to do it again. O is no longer employed by Licensee; thus the only issue involving him is whether Mr. Miller was too easily convinced by O; or whether he was convinced at all -- possibly he only stated that he was convinced. Judge Milhollin believes that Mr. Miller was correct in not imposing a greater sanction on O because O's status as VV's subordinate made it difficult for O to refuse to help. Report at ¶ 236. But Judge Milhollin implies that Mr. Miller should have admitted that was the reason, and he should not have advanced a theory that he believed O's lack of knowledge. Id. at ¶ 227.

2276. After evaluating the testimony and the exhibits, we believe that Mr. Miller was probably too easily convinced by O, but we cannot find from the record that Mr. Miller knew that O was deceiving him. Given the benefit of now knowing about O's willingness to cheat, and after a very thorough study of the circumstances, we can rather easily arrive at the conclusion that O must have known he was improperly helping VV. But considering the pressures on Mr. Miller in the months following the accident, O's excellent reputation and Mr. Miller's presumed concentration on VV's misconduct, we cannot find that he knew that O knowingly aided VV to cheat. Also, we are unwilling to infer what Miller's state of mind was about what O's state of mind was about VV's motives.

Sanctions Against VV

2277. After the training department graded VV's (and O's) work and noted the handwriting differences, VV was nevertheless given credit for O's help in his grade. But he failed to achieve 80% on two sections even with O's help. Therefore, VV was relieved of licensed duties and assigned to an requalification program with the thought of requalifying him for licensed duties.

2278. In the meantime, Mr. Miller confronted VV with the handwriting differences. VV readily admitted that O's input was not VV's own work, but stated that he had not tried to deceive the training department. Mr. Miller accepted VV's account based in part upon the fact that the instruction for the make-up exams did not expressly prohibit help (Miller, ff. Tr. 24,358, at 5), and in part upon VV's explanation that he believed that understanding the subject matter, not handwriting, was the significant factor. Tr. 24,396 (Miller). Licensee would have us find that Mr. Miller also acted on the belief that VV would have copied O's work into his own handwriting if he had been trying to deceive. Licensee Proposed Finding ¶ 312. However, Mr. Miller did not say this in his testimony. See e.g., Tr. 24,396. An equally likely explanation is that VV, eager to go on vacation, simply took a chance. The latter explanation would be consistent with VV's known impatience with training assignments.

2279. We conclude that VV's statement that he didn't know that he couldn't turn in another's work as his own is incredible. Mr. Miller

should not have accepted that account. But we recognize that Mr. Miller correctly concluded that, in any event, VV should have known that he had violated training policy. Mr. Miller's conclusion was that VV's poor judgment in this incident and VV's general lack of regard for the training program required a penalty. He recommended a one-week suspension without pay and recommended that a letter describing the situation be placed in VV's personnel file.

2280. Met Ed Vice President Herbein would have increased the suspension to two weeks, but Mr. Arnold decided instead that VV should be relieved as TMI-2 operations supervisor. It is the adequacy or inadequacy of Mr. Arnold's action that gives rise to the subissue of whether Licensee took effective action to discourage cheating.

2281. When the matter came to Mr. Arnold's attention he did not regard the episode as cheating, and did not recognize then that VV's deception involved his licensing requalification assignment. Tr. 23,707-08 (Arnold). Nevertheless Mr. Arnold regarded the incident as one more manifestation of VV's poor judgment and a part of "the total spectrum of concerns" about VV's performance as a manager. Tr. 23,710 (Arnold). Mr. Arnold decided that VV did not have the talents of a manager, and insisted that he be removed from supervisory duties. As a consequence VV was assigned to an _ad hoc_ group gathering information about the accident at Unit 2 and today he holds a staff position involving liaison with outside organizations in research and development. This action was never discussed between Mr. Arnold and VV, but Arnold believes that it was widely recognized as an action unfavorable to VV's career. Tr. 23,772.

VV was never told that his reassignment was punitive. Tr. 23,775-76 (Arnold). Mr. Miller, however, made it clear to VV that his conduct was unacceptable. Tr. 23,396 (Miller).

2282. VV did not receive a salary reduction, but the two positions counterpart to VV's previous position, the present operations managers of the TMI units, have each received salary increases at a much higher rate than VV has. Licensee Ex. 81A. Yet VV regarded his transfer as a lateral one, or at least professes that is the case. Tr. 26,642 (VV). VV did not regard his treatment as punitive and believes that the majority of his co-workers do not even know about the incident nor does he want them to know. Tr. 26,675 (VV). Some of the operators who testified on the subject did not believe that VV was demoted. Report at ¶ 232.

2283. Judge Milhollin concludes that Mr. Arnold's handling of the VV episode was deficient. Report at ¶ 237. First he finds that VV's reassignment was motivated by other indiscretions, not the training episode. We disagree. Mr. Arnold made it clear, and the general tenor of his testimony was that while there were previous problems with VV's performance as a manager, the episode on the training exam was the triggering event. E.g., Tr. 23,732. There were no other examples of poor performance by VV identified which at the time could have been the immediate cause of his reassignment.

2284. Judge Milhollin does not believe that VV's reassignment was in fact a demotion, or sufficiently punitive to be a deterrent. Report at ¶¶ 236-37. To this we would demur. In most success-oriented

hierarchies, removing a management person from a direct in-line operations position to a non-supervisory supporting staff position would be regarded as an adverse action. Certainly Mr. Arnold, with his Navy background, would regard VV's reassignment as a move out of a more promising career track. The fact that VV believes it was not a demotion, or says so, may simply be a manifestation of his own career aspirations. Or it may be that he does not want to accept or admit the significance of his transfer. Under the circumstances, it is likely that most of VV's peers in middle management saw his reassignment as a demotion, or at least as an impediment to advancement.

2285. Moreover we believe that Mr. Arnold's stated approach correctly minimized the question of whether VV was being punished. VV was by all accounts technically extremely competent. In fact when he finally focused on his training assignment he scored 99.8% on written exams. Mr. Arnold repeatedly praised VV's technical skills, He said that VV had "a sense for the plant, a feel for it." He was "comfortable with machinery, and how it works and how it interacts in a dynamic way." Tr. 23,757. He had performed well as a Senior Reactor Operator at TMI. VV had worked long and hard in the recovery of TMI-2 following the accident (Tr. 25,096 (Boger)), a fact which may have been a contributor to the problem VV faced in July 1979. His training delinquencies began before the accident, however.

2286. His skills and experience were sorely needed at TMI. VV was not, however, a very good manager. E.g., Tr. 23,742 (Arnold). We infer that Judge Milhollin and intervenor TMIA believe that VV's reassignment

should have been called a demotion, and that the demotion should have been specifically made known to VV and to the entire operations staff. Report at ¶¶ 236-37, 335. These actions, of course, would have humiliated VV. We have rarely seen competent managers attempt to solve their personnel problems in this manner, either in government, industry, commerce or academia. Moreover, a humiliation would have been very destructive, we believe, to VV's effectiveness, particularly in his ability to work with others. It would not have made a contribution to safety. In sum, we view Mr. Arnold's reassignment of VV to be an appropriate reallocation of company personnel resources. He prudently matched VV's abilities to the right job for him, or at least he corrected a mismatch. We do not find that VV's reassignment was an inadequate remedy to the problem.

Certifying VV to the NRC in 1979

(Report at ¶¶ 233-37)

2287. On August 3, 1979 Gary Miller, the TMI Station Manager, certified to Paul Collins, Chief of the NRC Operator Licensing Branch, that VV had satisfactorily completed the 1978-79 requalification program. TMIA Ex. 74. This certification is the center of an important issue as to whether Mr. Miller had certified VV to the NRC for license renewal knowing that O's improper assistance contributed to the completion of the requalification program by VV. We conclude below that he did and that there is reasonable cause to inquire further whether Mr. Miller, thus the Licensee, has made a false material statement in connection with the recertification of VV.

2288. The episode must be viewed against the background of the Commission operator's license regulations and the NRC-imposed administrative procedure for operator requalification. The Introduction to Appendix A to 10 CFR Part 55, Requalification Programs for Licensed Operators of Production and Utilization Facilities, provides in pertinent part:

> . . . Section 55.33 of 10 CFR requires that each licensed individual demonstrate his continued competence every two years in order for his license to be renewed. Competence may be demonstrated, in lieu of reexamination, by satisfactory completion of a requalification program which has been reviewed and approved by the Commission.

2289. Appendix A to Part 55 also contains the details of the Requalification Program Requirements which, in pertinent part, include:

> 4. <u>Evaluation</u>. The requalification program shall include:
>
> a. Annual written examinations which determine areas in which retraining is needed to upgrade licensed operator and senior operator knowledge.
>
> b. Written examinations which determine licensed operator's and senior operators' knowledge of subjects covered in the requalification program and provide a basis for evaluating their knowledge of abnormal and emergency procedures.
>
> c. Systematic observation and evaluation of the performance and competency of licensed operators and senior operators by supervisors and/or training staff members . . . .
>
> d. Simulation of emergency or abnormal conditions that may be accomplished by using the control panel of the facility involved or by using a simulator. . . .
>
> e. Provisions for each licensed operator and senior operator to participate in an accelerated requalification program where performance evaluations conducted pursuant to paragraphs 4a through 4d clearly indicate the need.

2290. To comply with Part 55 (and Part 50), Licensee has its Administrative Procedure (AP) # 1006, Operator Requalification Program. TMIA Ex. 65. AP # 1006 tracks Appendix A to Part 55 very closely, and is not, as might be inferred from Licensee's Proposed Findings, a voluntary company program.

2291. Section 2.4 of AP # 1006 provides for an annual written evaluation examination. It also calls for an annual oral evaluation, not relevant to the issue now before us.[245/] The written examination simulates the normal NRC examination, and the results are used to identify specific Fundamentals and System Review (FSR) Program topics to be covered by the licensed operator during the subsequent annual requalification cycle. TMIA Ex. 65, at 10.0-11.0. If the operator scores less than 80% on any section of the annual written examinations, he is required to attend the respective FSR program. Id. at 12.0. In addition, if he scores below 80% in two or more sections in the annual written examinations he must be given an oral examination and evaluation by a qualified person.

245/ The annual oral evaluation examination covers eight areas of plant procedures. TMIA Ex. 65, at 12.0. An unsatisfactory oral evaluation requires a discussion of deficiencies between the operator and a suitably qualified person, and a second oral examination. If the second oral performance is again unsatisfactory the operator is relieved of responsibilities and placed into an accelerated requalification program. Id. at 12.0. It should be noted that the procedure does not call for the operator to be assigned to the FSR program for deficiencies on the annual oral evaluation. We make this point to clarify that the questioned quizzes are not a part of the annual requalification oral evaluation, nor does Licensee or Mr. Miller assert that such is the case.

2292. VV took the 1977/1978 written requalification examination in March 1978 and received less than 80% in:

Section A: Principles of Reactor Theory
Section E: Safety and Emergency Systems
Section G: Radiation Control
Section H: Fuel Handling and Core Parameters

TMIA Ex. 66, 74. As a result VV was required, or should have been required, to attend FSR lectures and to receive a grade of 80% on each topic. AP # 1006, at 7.0, requires that "Performance on FSR assignments will be determined through written evaluation quizzes." TMIA Ex. 65, at 7.0. Moreover the procedure provided then that the quizzes be given, either closed or open book, but ". . . as classroom or on-shift quizzes." Id. There is no provision for take-home quizzes in the requalification program.

2293. On July 10, 1979 Mr. Zechman, Supervisor of Training, reviewed with Mr. Miller the status of VV's training deficiencies. TMIA Ex. 66. VV could not attend the FSR lectures in January 1979; he was sent take-home FSR assignment packages covering the four areas of deficiencies which he didn't return; he received a second set in March 1979 which were not returned timely. Finally he submitted the completed FSR assignments on July 1 or 2, 1979. But Mr. Zechman noted and reported to Mr. Miller that the answers to Sections A and H were written by someone other than VV. Id. That, of course, was O's contribution. Mr. Zechman also informed Mr. Miller that AP # 1006 requires written quizzes to satisfy the FSR program. Id.

2294. Despite the fact that Mr. Zechman knew that the work on Section A, Principles of Reactor Theory, was not all VV's work, and despite the fact that Mr. Miller knew directly from O and VV that O had helped VV on Section A, the Training Department assigned VV a passing score of 89.1% on that section. TMIA Ex. 70. That exact score, 89.1%, is very significant, as will be seen below.

2295. Since even with O's help, VV did not attain 80% on Section H, Fuel Handling and Core Parameters, VV was assigned to the accelerated requalification program on that section, and on Section E. TMIA Ex. 72, 74. An important point to remember is that VV was not assigned to the accelerated requalification program on Section A. Not only does the initial FSR program require that satisfaction of the FSR topics be demonstrated by a written quiz, it requires that the operator be assigned to the accelerated requalification program where the candidate fails to score at least 80% on a given topic in the FSR. TMIA Ex. 65, at 12.0.

2296. On August 3, 1979 Mr. Miller wrote to Mr. Collins of the NRC that on retesting, VV had received <u>89.1% on Section A</u>, 80.5% on Section G, and, as a result of the accelerated requalification program, a score of 99.8% on the other two sections, E and H. TMIA Ex. 74. These would have been satisfactory scores on all four areas of weakness. The letter did not mention the incident involving O's help to VV. The August 3 letter was, we conclude, a false material statement to the NRC. It was the basis for VV's operator's license renewal.

2297. We have, of course, very carefully considered Mr. Miller's explanation of his August 3 certification to the NRC. He testified before the Special Master and, at the Board's invitation, his legal counsel submitted comments on the Special Master's Report.

2298. First, Mr. Miller makes the general statement that since he, Miller, did not regard VV's use of O's work as "cheating" he did not try to conceal cheating from the NRC.[246/] *E.g.*, Miller Comments at 10.

2299. Second, Mr. Miller states he knew that Section A had been answered in part by O, but that he, Miller, had told the Training Department to have VV retested on Section A material. Miller Comments at 14. He testified that he had sent a formal memo to the Training Department requiring them to reexamine VV. But since the memo was not produced as evidence, we cannot determine Mr. Miller's specific instructions to the Training Department. Tr. 24,434 (Miller).

2300. Mr. Miller stated on several occasions that the Training Department *orally* reexamined VV. Tr. 24,415; 24,419; Tr. 24,434-35. No documentation or corroboration of this fact was ever produced at the hearing. Appendix A to Part 55, Requalification Program Requirements, Item 5, requires that records be kept for a period of two years

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246/ In addition, neither Mr. Arnold nor Licensee's counsel in their pleadings has acknowledged that VV's conduct constituted cheating. While this is disturbing, it is immaterial to the issue of why Mr. Miller certified a false score to the NRC.

following the date of the recorded event to document the required participation of the licensed operator. The evidentiary record does not reveal who orally examined VV, or when, or whether the results were given to Mr. Miller orally or in writing. More than two years have passed from the asserted event until the beginning of the hearing, but other documents recording the VV-O episode survived. We would have expected some record of VV's oral examination. It was an important matter.

2301. Mr. Miller stated that, in a memorandum prepared by Mr. Zechman, Supervisor of Training, at Miller's direction, VV was told that he would have to be reexamined on the section that "he had passed" but was in "another's handwriting". Miller, ff. Tr. 24,358, at 2. But the July 11, 1979 memorandum referred to by Mr. Miller does not indicate that VV was to be reexamined orally. To the contrary, Mr. Zechman made a specific request to VV that he, VV, "re-do FSR assignment for Category A" and he attached a copy of that exam for VV's use. Staff Ex. 26, Enclosure 1, at 7. As we noted above the FSR (Fundamentals and System Review) program requires written evaluation quizzes. TMIA Ex. 65, AP # 1006, at 6.[247/] Moreover, only the day before Mr. Zechman had informed Mr. Miller that the FSR procedure requires written quizzes. TMIA Ex. 66. It would be absurd to infer that VV was again provided his FSR Section A quiz for take-home oral compliance.

247/ Here again the episode presents a disturbing aspect of the handling of VV. From Mr. Zechman's memo we infer that VV would again be trusted to requalify on Section A by another unauthorized take-home exam.

2302. Mr. Miller testified further that as a result of the "oral" examination of VV, the Training Department determined that he had adequate knowledge of Section A. Tr. 24,415; 24,419; 24,434-35. At the hearing when VV was examined on the training consequences of having used O's work, he reported only having passed a proctored examination, and does not mention the oral exam referred to by Mr. Miller. Tr. 26,641, 26,665.

2303. The Board has read and reread Mr. Miller's testimony and comments to learn how it happened that the August 3 letter to the NRC contained the exact grade of 89.1% on Section A, when he makes no claim that 89.1% was coincidentally the grade received by VV on his "oral" examination. To this day neither Mr. Miller, his counsel, nor Licensee has directly commented upon the false statement to the NRC that VV had attained 89.1% on Section A. The matter remains unexplained. It is not disputed by Mr. Miller nor Licensee, that the only source for the 89.1% score was the grade given on work submitted by VV with O's input.

2304. Mr. Miller now states, through counsel, that the August 3 letter was not accurate and that, in retrospect, it should not have "suggested" that VV had passed Section A. Comments at 14-15. The August 3 letter did not "suggest" that VV had passed with 89.1%; the letter stated in definite language that he had attained that score. See TMIA Ex. 74. Moreover, the statement by Mr. Miller's counsel (Comments at 13) that the sole purpose of the August 3 letter was to certify that VV attained a satisfactory rating on his accelerated retraining tests (only Sections E and H) is simply not in accord with the express

language of the letter. Furthermore, if that had been the sole purpose of the letter, it would then not account for the two other Section weaknesses in VV's FSR reexaminations. That therefore would be a false certification as to his complete requalification.

2305. There is no doubt that Mr. Miller and other officials knew that VV's use of O's work was a matter of material relevance to his requalification and license renewal. On July 3, 1979, the day after VV's FSR exams were received by the Training Department, Mr. Miller sent a confidential memo to Mr. John Herbein, Met Ed Vice President. Mr. Miller noted that VV had submitted work not in his handwriting on the FSR quizzes and reported that "There will be problems", but "we need his license" and "If the exam which is not in proper hand script develops to a problem I will have an additional problem and will get to you." TMIA Ex. 62. Mr. Miller again reported to Mr. Herbein on July 27, 1979 that the "handwriting on two of the examinations did not appear to be [VV's]." TMIA Ex. 71. Before Mr. Miller sent the August 3, 1979 letter to the NRC certifying VV with a score of 89.1% on Section A, a draft of the letter was circulated to everyone on the distribution list, including Mr. Herbein. According to Mr. Miller, these persons were specifically aware of the facts and did not disagree with the content of the letter. Tr. 24,440 (Miller); TMIA Ex. 73, 74.

2306. From the foregoing evidence the Board concludes that Mr. Miller, with Mr. Herbein's knowledge and assent, falsely certified to the NRC that VV had attained a score of 89.1% on Section A, Principles of Reactor Theory, when in fact each of them knew that VV had not

attained that score. This was a material certification upon which the NRC acted in renewing VV's operator's license.

2307. In addition there were other aspects of the August 3, 1979 certification which raise questions about how accurate and complete Mr. Miller's representations were. Putting aside for the moment the ethical considerations raised by O's assistance to VV, the certification letter did not reveal the fact that, contrary to the requirement of AP # 1006, VV had not been assigned to the accelerated requalification program on Section A. TMIA Ex. 65, at 12.0. His test results on Section A of the FSR, considering O's help, should have been deemed a failure requiring accelerated requalification training. Nor did the letter reveal that the scores on Sections A and H were achieved on take-home quizzes, also contrary to AP # 1006 requirements. Id. at 7.0.

2308. The NRC Staff takes a surprisingly mild position on the August 1979 certification issue. First they assert that VV should not have been certified because, under 10 CFR 55.10(a)(6), part of the certification is that the applicant for whom the license is sought has a need for the license in the performance of his duties. In that Staff believes that Licensee planned to relieve VV of his licensed duties at the time the certification was made, Staff's position is that he should not have been certified on that account. Staff Proposed Finding ¶ 154. We agree with Licensee's point that at the time it was prudent to maintain extra licensed personnel to account for attrition and illnesses and that Licensee's intent then was to remove VV from supervisory, not licensed duties. Licensee Proposed Finding ¶ 317.

2309. The second point made by the Staff is that, according to Staff, while Licensee was not required to bring the VV-0 incident to the NRC's attention, information on the cheating incident might have been helpful. Staff Proposed Finding ¶ 154, citing Crocker at Tr. 25,102. For only these two identified reasons, Staff states that Licensee was in error to certify VV for license renewal. The Staff makes no recommendation as a consequence of that certification incident. More importantly, at no place in the Staff's testimony or in the proposed findings and comments before us does the Staff discuss the untrue representation in the August 3, 1979 letter to Mr. Collins. We do not understand this silence.

2310. We now come to the question of remedy and jurisdiction. The episode itself has an indirect relevance to our jurisdiction in the proceeding. It does not relate to the April 1981 NRC exams which caused the evidentiary record to be reopened, but it relates to the competence of Licensee's management, Licensee's certification procedures, and Licensee's policies to deter cheating. The latter are within our jurisdiction.

2311. However, the remedies we propose will require continued Staff activity and Commission attention after jurisdiction passes from this Board. We probably do not have the jurisdiction to enforce all of the remedies except for one specific condition we impose below. Carolina Power and Light Company (Shearon Harris, Units 1, 2, 3, and 4) CLI-80-12, 11 NRC 514 (1980). Therefore we approach the matter by making recommendations rather than ordering relief.

2312. We recommend that the Commission direct the Staff to conduct an investigation into the circumstances surrounding the August 3, 1979 certification. The Commission should satisfy itself that this will be an aggressive investigation. Office of Inspection and Enforcement did not pursue this matter, but we recognize that it would have been very difficult, probably even inappropriate for OIE to investigate the episode during the pendency of the reopened adjudicative proceeding. We are somewhat disconcerted however, because no component of the NRC Staff protested in this proceeding the false information in the certification to the NRC Operator Licensing Branch. Perhaps the Office of Inspector and Auditor should be enlisted to participate in any such investigation.

2313. The investigation should inquire into all of the uncertainties mentioned in the foregoing discussion of the certification for VV's renewal. In particular the investigation should develop all aspects of Mr. Miller's representation that VV was certified based upon an oral examination by the Training Department. All concerned should be reinterviewed, including VV, the persons who administered the test, and Mr. Miller. Records of any such oral testing should be produced, or the absence of such records ascertained and explained. The investigation should disclose VV's response to Mr. Zechman's memo of July 11, 1979 assigning him to "re-do FSR assignment for Category A". What did VV do with the exam Mr. Zechman attached to his memo for VV's use?

2314. All of the persons who were consulted in advance by Mr. Miller about this August 3 letter should be interviewed. These

appear to be Messrs. Beers, Herbein, Lawyer, VV, and Zechman. TMIA Ex. 74; Tr. 24,440 (Miller). A determination should be made whether there was agreement among some or all of them to represent knowingly to the NRC that VV had attained an 89.1% score on Section A, or to make any other inaccurate representation to the NRC. The investigation should also reveal whether the Licensee has taken or intends to take any additional personnel action as a result of the certification incident and a full statement as to Licensee's position of the entire matter should be reported.

2315. Intervenor TMIA urges the Board to find that all of the individuals who were involved in approving the August 1979 letter to the NRC should be found to be incompetent and that we should recommend that each be referred by the Commission for criminal prosecution. TMIA Comments at 6, 7. Judge Milhollin made no final conclusion or recommendation with respect to the certification of VV's renewal application.

2316. We can make no recommendation about the broader implications of the recommended investigation because we cannot predict its results. Mr. Herbein is no longer employed by GPU Nuclear and is beyond our jurisdiction. Messrs. Zechman, Beers and Lawyer are involved only to the extent that Mr. Miller states that they knew and approved of his action (Tr. 24,440 (Miller)), and of course these individuals have not been given any opportunity to explain their role. Mr. Miller is indirectly connected to our jurisdiction because as Director of Start-up and Testing for GPU Nuclear, he presumably would participate in any restart of TMI-1.

2317. In the August 27, 1981 Partial Initial Decision on Management Issues, the Board noted that Mr. Miller (and Mr. Herbein) were the focus of various inquiries into alleged failures to disclose information following the TMI-2 accident. We made no findings then, but we explained that one of the reasons that we had not conducted our own inquiry into the information-flow allegations is because ". . . it appears to us that Mr. Miller is now in more of a support role rather than a role involving direct decision-making of line operating authority over the operation of TMI-1." 14 NRC at 545. We noted also that he would be connected only temporarily to any restart of Unit 1 when Licensee would be focusing all of its official and technical talent on the safe operation of the Unit. Id. Finally we noted that no questions had been raised about Mr. Miller's technical competence in our main proceeding and in connection with the information flow investigations. Id.

2318. Now we believe that the evidence produced in the reopened proceeding raises questions about Mr. Miller's ethical judgment and that we must address the matter. We make no finding against Mr. Miller directly. He should be given the opportunity to explain the questions raised by the Board during any investigation and in any forum that the Commission should determine to be appropriate. Our findings with respect to Mr. Miller are findings against only the Licensee as a party to this proceeding.

2319. Pending further resolution of the matter, the Board, within its jurisdiction, imposes an additional condition for the restart of TMI-1. In the interest of safety, we would not deprive Licensee of any

available talent, including Mr. Miller's, in the start-up and testing of TMI-1. However, in view of our findings concerning his ethical judgment, we condition any restart of TMI-1 with the requirement that any participation by Mr. Miller in the start-up, testing or operation of Unit 1 must be under the direct supervision of an appropriately qualified Licensee official. We also direct the Licensee to preserve all records pertaining to the investigation recommended by the Board until further order of this Board. the Appeal Board, or the Commission.

2320. We conclude this discussion of the VV-O episode with the observation that the matter was first brought to the attention of the NRC at the instance of GPU Nuclear President Robert Arnold. We have found no evidence that there was any improper conduct at any level higher than Mr. Herbein's level. We also note that VV's Unit 1 license was voided some time ago; that Licensee does not plan to recertify VV for Unit 2 licensing, and that at no time relevant to this proceeding has VV been a member of the operations staff of Unit 1 or in a line of authority with respect to Unit 1. See, e.g., Licensee Proposed Finding ¶ 320.

D. The Licensee's Training and Testing Program

(Report at ¶¶ 238-51)

2321. In the main proceeding the Board heard extensive evidence on the Licensee's training and testing program. See August 27 PID, 14 NRC at 441-78; Report at ¶¶ 238-39. Testing procedures were at issue and were especially the subject of certain contentions raised by Intervenor

Aamodt. See for example August 27 PID, 14 NRC at 446-52, 460-64, 470-71. In addition the validity of certain of Licensee's testing procedures was the subject of questioning by the Board as we discuss below. On the basis of evidence presented by members of Licensee's management, Licensee's consultants, and the NRC Staff, we found that the Operator Accelerated Retraining Program had served adequately as an independent training and testing function, satisfying the requirement of Commission Order item 1(e) and that the Licensee had satisfied the requirements and retesting which the Commission had set down in its Orders of August 9, 1979 and March 6, 1980. August 27 PID, 14 NRC at 473-74, 478-79. In reaching this finding we also relied on the adequacy of the NRC operator examination as a final, independent, and accurate measure of the capability of an operator and a measure, in turn, of the quality of Licensee's training program. Id. at 454-55, 476-78.

2322. The disclosure of cheating on the April 1981 NRC examinations led us to retain jurisdiction to consider further the effect of the cheating investigation on portions of our August 27 PID, among them, the Licensee's training and testing program. Id. at 403.

2323. The validity of certain of Licensee's testing procedures was questioned by the NRC Staff in late 1980. On December 1, 1980, Paul Collins, Chief, Operator Licensing Branch, notified Mr. Hukill of deficiencies in Licensee's licensed operator qualification and requalification training program. Among specific deficiencies cited was inappropriate utilization of open-book quizzes, and the Board was particularly interested in whether this deficiency had been corrected. Tr. 12,599

(Little); see also Tr. 12,598-99 (Little, Gardner, Long) and Tr. 12,608-10 (Little, Kelly). On February 13, 1981, Dr. Robert Long, then Director of Training and Education of GPU's Nuclear Assurance Division located in Parsippany, reported to the Board that the deficiency in test administration had been corrected by changes in the relevant plant procedure:

> DR. LITTLE: Maybe Mr. Blake is going to address this, but I would like to have someone address the question I raised yesterday about the open-book examination, and whether that had been taken care of.
>
> CHAIRMAN SMITH: Are you going to do it now?
>
> DR. LONG: Yes, sir.
>
> The question you asked was about the December 1 letter from Mr. Collins of the NRC to Mr. Hukill. That was a letter commenting on the revised licensed operator qualification and requalification training program which had been submitted to the Commission for their approval. One of the concerns was that in that procedure, which is a plant procedure 1006, as submitted to the Commission allowed for -- the wording specifically was "The quizzes may be administered in either the closed-book or open-book format."
>
> The Commission directed us that open-book was not satisfactory. The procedure has been changed. I believe the letter is going in today. It was due around February 15. The procedure now reads: "The quizzes shall be administered in the closed-book format."
>
> DR. LITTLE: Thank you.

Tr. 12,740. Evidently, actual implementation of the revised procedure was less than adequate as late as July 1981. Report at ¶ 250. The correction consisted of the changed language in Administrative Procedure (AP) 1006 and a notation on the front sheet of the test that it was to be taken "closed-book". In fact, the cheating incident and the reopened proceeding flowing from it appear to have been the first stimulus

sufficient to cause Licensee to pull back the "paper curtain" and actually view its training and testing program at its point of delivery.

2324. Licensee now admits that its past training administrative practices were very loose, especially insofar as administration of quizzes during the regular cyclical training program for licensed operators. It was not clear to the operators that cooperation on quizzes was not acceptable. No specific instruction not to cheat was given. The use of unproctored, take-home exams permitted cooperation. Sometimes instructions were unclear as to whether quizzes were to be open or closed book. Some quizzes actually were answered as a group effort in that the crew concept was encouraged. Licensee Proposed Findings ¶¶ 220-333; Comment ¶ 130. We adopt wholeheartedly Licensee's Proposed Finding ¶ 333: "Overall, it is clear that Licensee did not give sufficient attention to preserving the integrity of its training and testing program." See also Licensee Reply Finding ¶ 17.

2325. Licensee not only admitted, but emphasized, its failure to identify this area of weakness in its training program. Licensee Proposed Findings ¶¶ 231-240, 326-28. However, going a step beyond mea culpa, the Licensee then takes what the Board considers a perilous position, that the "Licensee never stated, nor intended to suggest to the Board . . . that prior to the discovery of cheating on the NRC examinations, consideration had been given to establishing procedures against cheating on examinations," and consequently, "it is not reasonable to attribute to Licensee's efforts [on training and testing] in these regards, as the Special Master does, an unfulfilled promise to establish testing

administrative procedures." Licensee Comment ¶ 130. Not only does the Special Master regard the testing deficiencies as an unfulfilled promise to establish testing administrative procedures, so does the Board, particularly in view of the assurances we received earlier. See for example, Tr. 12,598-99; 12,740. The assurances of testing integrity were implicit, if not explicit. Further, we were under the distinct impression that administrative procedures for testing were not only to be devised but to be implemented, based on the presentations made by Licensee's management. On the basis of Licensee's Comment ¶ 130 the Board is forced to conclude that we did not see what we thought we were seeing, and that Licensee's training and testing program was best described as the opposite of esse quam videri (to be, rather than to seem).

2326. Licensee's narrow interpretation of what it actually promised to do in regard to testing raises questions as to how far Licensing Boards must go in eliciting information from witnesses. Surely after being told that the examinations were closed-book, the Board should not have had to lower the level of the proceeding and embark, sua sponte, on a question- path such as "Does this mean the tests were proctored? Was the proctor actually proctoring or just present? Did 'closed-book' mean exactly that and there was no prohibition against oral cooperation?" Or should we have declined to accept the testimony of the Director of Training that examinations were given under appropriate conditions until he proved that he knew in fact that this was the case? If this is the pattern which must be followed, licensing proceedings will go on ad infinitum. If the Licensee relies on Licensing Board proceedings to

ferret out deficiencies at this level of detail, there is indeed a serious void in the licensing process.

2327. Furthermore, Licensee has a self-interest in the first instance to assure that the operators entrusted with sophisticated and costly nuclear power plant investment are adequately qualified to do so and to realize that the operator's passing the NRC exam on one or two occasions is only a minimum requirement, not a guarantee of continued satisfactory performance. If the Licensee does not itself exercise the requisite quality control, quality assurance and feed-back mechanisms to assure high-quality training and testing, it is beyond the power of regulators and regulations to put an appropriate program in place.

2328. In its proposed findings Licensee has accurately captured our view of the most critical aspects of the cheating issue. We adopt Licensee's Proposed Findings ¶¶ 230-31, 235 in part or _in toto_, below.

> While we are satisfied that Licensee management did not directly know of or encourage cheating, nor were they involved in any manner in the cheating incidents . . ., the question of management's negligent failure to prevent this misconduct is a much more difficult question to resolve. . . . there were serious shortcomings in Licensee's administrative practices . . . . we have made an effort to understand whether management held an attitude about integrity on the job, or about getting something done at whatever cost -- _e.g._, exams -- which could have played a part in the cheating which has occurred.
>
> We consider the matter of management attitude and ethics perhaps to be of the most vital importance in our resolution of the facts of this case. As we stated in the PID, in considering whether Licensee's organization is qualified to operate TMI-1, the attitude of management towards the responsibility which would be entrusted to it was of major concern to us. [14 NRC at 428-32.] With respect to exam cheating, we have no doubt that specific

procedures can be written and instituted at TMI-1 to minimize the likelihood of any such incidents in the future. [Citation omitted.] This is a fairly easy task to perform and to evaluate. More difficult to assess is whether management has a properly serious attitude about the subject, has inculcated its staff with a fundamental understanding of its responsibilities in this regard, and has established adequate lines of communication with its staff members to "reach" them on this subject. Generally, then, we have considered whether Licensee's management has provided us with not only direct assurances, but with more subtle indications of its ability to properly manage a nuclear power plant. In making our evaluation, we take into consideration the Special Master's impressions of the witnesses, as well as Licensee management's written and oral testimony, the Staff's views on this subject, and the opinions of Licensee's employees, particularly its operators.

. . . [I]n retrospect, Mr. Arnold recognizes that management's failure to explicitly enunciate its policy on cheating or to establish and enforce the necessary safeguards, [citation omitted], were important deficiencies, given the consequences of this failure. Tr. 23,630-34 (Arnold). Mr. Arnold attributes these deficiencies to the trust management placed in the TMI-1 operators and the consequent failure to adequately acknowledge that when you take any group of individuals in the aggregate you have got to expect there are going to be some occasions of falling short. Thus, management failed to be sufficiently sensitive to the need to express the trust that it placed in its operators, and to safeguard that trust. Tr. 23,632-33 (Arnold). In addition, with the complete restructuring of the training program and department following the TMI-2 accident, management's major focus was on the quality and scope of training.

Instituting exam procedures was simply overlooked. Tr. 23,633 (Arnold); see also Long, ff. Tr. 24,921, at 3.

2329. In the reopened proceeding, issue 9 concerned:

> The adequacy of Licensee's plans for improving the administration of future Licensee qualification examinations for licensed operators and candidates for operator licenses, including the need for independent administration and grading of such examinations.

2330. The Licensee has implemented a procedure applicable to the administration of all examinations by the Licensee or its contractors which provides for: (1) security against advanced leaking of the questions; (2) a clear indication of the ground rules for the exam, e.g., open or closed-book and a certification by the student that the work is his own; (3) procedure to avoid crib materials, to avoid close seating and for recording seating charts for major exams; (4) tests to be 100% proctored; (5) rules for leaving the examination room and; (6) reporting of student misconduct to appropriate authority. Long, ff. Tr. 24,921, at 25-26. See also Report at ¶ 250; Licensee Proposed Findings ¶¶ 347-49.

2331. While these procedures are appropriate, and should at least make cheating very difficult, the Board believes that Licensee has overlooked an additional and desirable safeguard against undetected cheating. Depending upon the examination and its importance, the Training Department should review a significant sampling of the examination answers for unexplained parallelisms. The NRC Staff has added such a step to its licensing procedures. ¶ 2361 , infra. Therefore we will

require as a part of our finding that the Licensee's examination procedures are now adequate, a step which requires a sampling of examination answers for evidence of cheating, using a review process approved by the NRC Staff.

2332. As does the Special Master, we view these new procedures with Licensee's past record in mind. Report at ¶ 250. Licensee's view, on the other hand, is that Licensee has fully learned its lesson and that the procedures which have been instituted will be fully complied with by the training staff. Licensee Proposed Finding ¶ 349. Further, Licensee's view is that it is neither necessary nor desirable to utilize independent consultants to conduct qualification exams at TMI-1, either as a substantive check on training or as an administrative check on adequacy of Licensee's testing procedures. Licensee's Proposed Finding ¶ 351. Licensee advocates reliance on its improved administrative process, its instructors, and finally on the NRC exam for valid verification of operator qualifications. Licensee Proposed Findings ¶¶ 353-54. Reliance on instructors leads us to the questions of quality assurance and quality control over the delivery of instruction at TMI-1.

2333. We fully recognize that quality of instruction was not directly an issue in the reopened proceeding, and consequently, that we have preserved limited jurisdiction in this area. Both Licensee and Staff challenge the emphasis given by the Special Master to this topic. Licensee's Comments ¶¶ 132-33; Staff Comments ¶¶ 8-13. See also Tr. 24,750-52.

2334. As pointed out by the Special Master (Report at ¶ 242), because memorization was an issue with respect to cheating there was considerable evidence on the method of instruction used in the Licensee's training program. Consequently, going beyond test administration and certification procedures, the Special Master found that the Licensee's training program was "weak in content and ineffective in its method of instruction." Our examination of the course content indicates to us that it is in compliance with 10 CFR 55. On the other hand, we agree with the Special Master that evidence presented in the reopened proceeding raises doubts about the quality of instruction (including delivery of instructional material, composition of examinations, and grading). Report at ¶¶ 242-51. Licensee does not admit deficiency in this area, with the exception of the Category T examination series discussed below.

2335. We begin our discussion of the quality of instruction at TMI with two observations:

(1) To date, Licensee's candidate performance level on the NRC operator licensing examinations has been satisfactory to the NRC Staff. Boger, ff. Tr. 25,480, at 2-3. Consequently, the Staff was, and is now, satisfied with the adequacy of Licensee's training program. Staff Proposed Findings ¶¶ 157-160; Staff Comment ¶ 12.

(2) This Board has previously reviewed and found adequate the training and testing program at TMI-1. 14 NRC 381 (1981), ¶ 165. We based this finding in large part on course outlines, Staff testimony, and opinion of expert witnesses who professed their knowledge of the Licensee's training program. Id. We specifically found that successful completion of the NRC examinations, coupled with training to allow

success on those examinations, was indicative of a capable licensed operator. Id. at ¶ 272.

2336. Based on the post-TMI-2 attention given to training one would anticipate a model program at TMI-1. Licensee has indicated that one of the reasons that it overlooked instituting exam procedures was because "with the complete restructuring of the training program and department following the TMI-2 accident, management's major focus was on the quality and scope of training" involving "major organizational and staffing changes" and "development of completely new programs for new and requalifying ROs and SROs." Licensee Proposed Findings ¶¶ 235, 326-27. GPU Nuclear's former Director of the Training and Education Department, Dr. Long, testified as to the adequacy of the methods of instruction. Licensee Proposed Finding ¶ 335.

2337. However, the record of the reopened proceeding has provided several indications of weakness in the quality of the instruction at TMI-1, such that we no longer have the assurance that there was sufficient quality control over the training and testing process. As noted below, however, we do not find that there was a failure of instruction -- only that there were significant weaknesses which should be examined and their correction assured. The evidence suggests that the operators had reason to lack confidence in their preparation for the NRC examination because of confusion by instructors, as well as operators, as to what test answers were correct and/or acceptable (correct and acceptable were not necessarily synonymous). See, for example, Tr. 24,757; 24,766; 24,773-77; 24,782-85; 24,788-90 (Brown).

2338. Professor Trunk noticed inconsistency in grading on Licensee-administered tests, not only from test to test but within an individual's test session, leading to confusion by operators as to whether a given answer was acceptable or not. Tr. 24,516 (Wilson). Inconsistency in grading and lack of clarity as to answers expected is highlighted in the Special Master's examination of Nelson Brown, Supervisor, Licensed Operator Training at TMI-1, explaining how the Category T makeup examination taken by Mr. Ross and graded by Mr. Boltz was regraded by Mr. Brown, resulting in a change of score from 76.6 to 90.7. We will not repeat the convoluted rationale given by Mr. Brown for the changes; the answers given on redirect and cross-examination defy summarization. Tr. 24,660-75 (Brown, Milhollin); Tr. 24,773-77 (Brown, Blake). For specific examples, see Tr. 24,661-63 (Brown on acceptability of the answers "absorption of H_2" and "RC Coolant" to a question about how hydrogen is removed from the reactor building); Tr. 24,663-68 (Brown regarding acceptable answers to a question on "lessons learned" and the dependence of the answers on the opinion of the grader, e.g., Brown, Boltz, or a contractor); Tr. 24,757-58 (regarding Brown's change in opinion about answers to this same question); and Tr. 24,776-77 (Brown explains how grading should be consistent with what was taught in the classroom).

2339. Since nuclear reactors are inanimate objects which operate according to natural laws, it would seem to follow that composing objective and unambiguous examination questions would be a relatively straightforward task in the hands of a competent instructor. For example, the natural laws governing pressure, volume, and temperature

relationships in fluids are well-established, and further, for a given fluid, they operate without any known exceptions. Whether or not an instructor wants or "is looking for" a given answer is irrelevant; the relevant point is that training, and the testing which measures the training, must comport with reality.248/

2340. One of the responsibilities of an instructor is to impress on the students the significance of important concepts and to test them in a manner which will indicate whether they have fully understood these concepts. Licensee does admit to shortcomings in these areas in relation to the Category T tests, the special audit examinations covering lessons learned from the TMI-2 accident. See August 14 PID, 14 NRC 454-55. Accordingly, we adopt verbatim (with citations omitted) Licensee's Proposed Findings ¶¶ 343-45, which detail serious criticisms of the administration of these tests:

> The first two rounds of Category T makeup tests included questions which are both identical and substantially similar. . . . In addition, the control room staff apparently were not aware of the significance of the Category T section, which was, during the first round of the make-up quizzes, administered simply as a portion of a weekly quiz. . . . Thus, four operators failed Category T three times. . . . Moreover, round 2 of the Category T was given as a nonproctored, closed book, take-home test. . . .
>
> We were somewhat relieved to hear from Mr. Newton that when he realized that some operators were

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248/ We are reminded here of T. H. Huxley's comments on the rules of the game: "The chess-board is the world, the pieces are the phenomena of the universe, the rules of the game are what we call the laws of Nature. The player on the other side is hidden from us. We know that his play is always fair, just, and patient. But also we know, to our cost, that he never overlooks a mistake, or makes the smallest allowance for ignorance." Lay Sermons.

> not grasping the Category T subject matter or placing sufficient importance on it, he required in July, 1981, that the test be formally administered and that the content of the test be substantially changed. . . . In addition, a fourth Category T makeup quiz was administered in November, 1981, after the discovery of cheating on the April, 1981 NRC examinations and the concerns about collusion on the Category T makeup tests were raised through Mr. Trunk's investigations. . . .
>
> The fourth Category T quiz was taken by all operators who did not pass the Category T portion of the Kelly exam, or who did not take the Kelly exam. . . . The fourth makeup was preceded by a fairly short, but comprehensive review session. . . . From our review of the examination (along with the fifth makeup test administered to the one individual who failed to achieve 90 percent on the fourth makeup), as well as our understanding that Licensee's new exam administrative procedures were utilized and that the Staff approved of the exam, we are satisfied that the operators were sufficiently tested on this subject matter, given the thorough and conceptual nature of the test. . . . Nevertheless, we find it highly inappropriate that Licensee waited until such a late juncture -- at least until July, 1981, and not until November, 1981 for many of the operators -- to properly test operators on this material. Moreover, the repetition on the first two makeup tests of what appear to be less important Category T-related issues . . . , most assuredly encourages memorization, rather than understanding, of the subject matter. It also results in individuals focusing on passing the exam, rather than increasing their grasp of the subject matter, *i.e.*, coaching.

2341. Licensee's candid admission of the shortcomings on the Category T examination has been reassuring. Even without these admissions, however, the Board would be forced to the conclusion that the reopened proceeding demonstrated areas of significant weakness in the quality of instruction. The reach of this finding should be well understood

however. There has been no systematic evaluation of the instructors' qualifications nor their methods. We have been reassured by, among other things, the fact that the operators as a group fared well on the October 1981 NRC examination. Moreover, the value of the instructors' command of the technical subject matter and their innate abilities to impart that knowledge on a one on one basis has not been examined. We do not find therefore that there has been a failure of instruction; only that weaknesses have been identified which should be pursued.

2342. Licensee asserts that the Special Master failed to consider a great deal of evidence in his analysis of Licensee's training program, including the opinions of Dr. Long, Mr. Newton, and Mr. Boger. Licensee Comment ¶ 145. The Board stresses that it did not rely primarily on the Special Master's Report in reaching its conclusions on the quality of instruction at TMI-1. As we indicated above we relied on the evidence of record relevant to the actual point of delivery, specifically the testimony of the instructors and examinees and the examination papers in evidence. With such first hand evidence the Board was able to reach its own conclusions without relying solely on the opinions of others.

2343. Licensee's stance is that the instruction has improved and that, anyway, most of the operators believe the training program is acceptable. Licensee Proposed Findings ¶¶ 339-41. We hold that another criterion is the relevant one -- is the instruction adequate to prepare the operators to operate the plant safely?

2344. To answer this affirmatively, as required by the Commission's original order in this case, we find it necessary to impose remedies to provide the requisite "Quality assurance", as detailed below.

2345. These remedies are directed toward the Licensee which has the first responsibility for assuring operator competence. Licensee believes that "it is the Staff's intention to have periodic NRC requalifying exams when the staffing resources of the Operator Licensing Branch of NRR so allows." Licensee Proposed Finding ¶ 354. However the Staff in plain language has put the Board and the parties on notice that its role in auditing operator training and testing will not go beyond the usual regulatory requirements (see 10 CFR 55.20 and Appendix A(5) to Part 55), i.e., auditability of the Licensee's requalification program and the administration of the NRC examination:

> The Staff has not reviewed the Licensee's plans for improving the administration of its future qualification examinations, nor has it required such plans to be submitted. It does not plan to evaluate the Licensee's future qualification plans. However, the Staff will evaluate the performance level of license candidates on NRC examinations. As in the past, the NRC will withdraw its acceptance of facility certification of candidates if the performance level is not satisfactory. In order to determine whether the performance level is satisfactory, the Staff compares the latest performance of the Licensee's candidates with the perceived industry norm and with their previous record to determine if the certification process effectiveness has changed. It should be noted that, to date, the Licensee's candidate performance level has been satisfactory to NRC. Boger, ff. Tr. 25,480, at 2-3.

Staff Proposed Finding ¶ 159.

2346. The Board does not fully understand the Staff's position. Part 55 requires more than NRC licensing examinations to assure that

operators are competent. Applications for initial licenses and for license renewal both require a representation that the candidate has been successfully trained by the utility and has already learned to operate the controls in a competent and safe manner. 10 CFR 55.10(a)(6); 55.33(4); and Appendix A. Thus, as in many areas of nuclear safety, the regulatory scheme requires redundancy in safety. In this instance, both reliable utility training and testing and NRC examinations are expected to assure operator competence. Without periodic actual auditing of the Licensee's training and examination program, we cannot determine how the NRC Staff can be assured that the Licensee has met its training and testing obligations.

2347. We now set forth our remedies. The Special Master reached the conclusion that the Licensee's training program was an inadequate response to the Commission's Order of August 9, 1979. Report at ¶ 251. Should we find the program totally inadequate based on what we now know about the way it was administered, our remedies could include setting conditions which must be satisfied before restart. The extreme remedy, short of denying restart, would be a complete revamping of the training and testing program under the direct supervision of NRC Staff members who are capable of providing constructive criticism of the program, to be followed by retraining and retesting of the operators. On the other hand, we believe that the TMI-1 operators have already been exercised in too many tests because of factors beyond their control, i.e., inept test administration by both Licensee management and the NRC license examiners. Regardless of the past history of training and testing at TMI-1, we are charged with assuring that operation of this plant is not inimical to the public health and safety. Consequently we impose the following

conditions on TMI-1 to be satisfied within the first two years after any restart authorization:

(1) There shall be a two-year probationary period during which the Licensee's qualification and requalification testing and training program shall be subjected to an in-depth audit by independent auditors, approved by the Director of NRR, such auditors to have had no role in the TMI-1 restart proceedings.

(2) Licensee shall establish criteria for qualifications of training instructors to ensure a high level of competence in instruction, including knowledge of subjects taught, skill in presentation of knowledge, and preparation, administration, and evaluation of examinations.

(3) Licensee shall develop and implement an internal auditing procedure, based on unscheduled ("surprise") direct observation of the training and testing program at the point of delivery, such audits to be conducted by the Manager of Training and the Supervisor of Operator Training and not delegated.

(4) Licensee shall develop and implement a procedure for routine sampling and review of examination answers for evidence of cheating, using a review process approved by the NRC Staff.

E. The Licensee's System for Certifying Candidates

(Report at ¶¶ 252-59)

2348. Issue 12 considered:

> The sufficiency of management criteria and procedures for certification of operator license candidates to the NRC with respect to the integrity of such candidates and the sufficiency of the procedures with respect to the competence of such candidates.

2349. Commission regulations, 10 CFR 55.10 and 55.33, require the Licensee's certification of competency of operator candidates seeking to obtain or renew licenses. As of the April 1981 NRC examination, Licensee had no specific written certification procedure but relied on a meeting of management and training personnel during which candidates were evaluated according to performance on the Associated Technical Training Services (ATTS) requalification examination, during the training program, and on the job. Report at ¶ 253. The subjective evaluation by Mr. Ross of the operators' integrity and attitude was relied on. Licensee Proposed Finding ¶¶ 359-62. The candidates themselves were not interviewed. Id. The administrative procedures in effect during the ATTS examination were not adequate to prevent or to detect cheating. Report at ¶ 254. Poor performance on the ATTS examination was not a barrier to certification. Id. at ¶ 255. Evaluation of performance during training rested in turn on the sometimes perfunctory review of quizzes by the instructor. Id.

2350. Mr. Hukill admitted that Licensee "can be legitimately criticized for not formalizing our certification process by establishing a written certification procedure" but that he intended to establish such a procedure. Report at ¶ 258; Licensee Proposed Finding ¶ 364. The procedure would include signed statements from training personnel that operator candidates had indeed completed their training requirements. Report at ¶ 258. We believe that, if properly implemented, a formal certification procedure including such signed statements, founded on the trainer's evaluation of candidates by means of properly administered and graded examinations, will enhance the credibility of Licensee's certification process. We note further, our belief that as part of the certification process the senior management official charged with signing the certification to the NRC is obligated to review the candidate's personnel file and to take into consideration any information reflecting on the candidate's integrity and attitude.

2351. Such steps, when implemented, should eliminate the possibility of certifying candidates for the NRC examination who have cheated on internal examinations on one or more occasions. We agree with the Special Master (Report at ¶ 259) that Licensee had in its possession ample evidence that O and W, particularly O, should not have been certified for the April 1981 NRC examinations. The certification which permitted them to sit for the examinations was another essential link in the chain of events which ultimately resulted in this reopened proceeding. The certification process, therefore, is one of the critical control points for safeguarding the overall integrity of training and testing of

the operators of nuclear power plants. In the case of O and W, had the steps we described above been taken this link in the chain of events would have been broken. We doubt whether even the upgraded certification procedures would have avoided the improper certification for VV's license renewal in August 1979 because it was with full knowledge that VV had not properly passed his requalification testing that the TMI station manager certified VV to the NRC. We trust, however, that the VV incident was an anomaly and that the present management of TMI-1 would not condone the procedure involved in that incident.

F. The NRC Examination

(Report at ¶¶ 260-87)

2352. Issue 10 considered:

> The adequacy of the administration of NRC licensing examinations for TMI-1 personnel, including proctoring, grading, and safeguarding the integrity of examination materials; the adequacy of the Staff's review of the administration of Licensee's Category T examinations; and the adequacy of the Staff's plan for retesting operators and monitoring its NRC examinations to assure proper adherence to NRC testing requirements in order to assure that the purposes of the NRC examinations, because of the nature of the questions, cannot be defeated by cheating, the use of crib sheets, undue coaching or other evasive devices.

2353. The NRC Staff presented an array of witnesses best qualified to testify about the NRC examinations in issue and the Staff operator licensing procedures. The witnesses from the Operator Licensing Branch of NRR were Paul F. Collins, Chief of the Branch (ff. Tr. 25,109);

Bruce A. Wilson, Section Leader, Power and Research Reactor Group (ff. Tr. 25,481); and Bruce A. Boger, reactor engineer (ff. Tr. 25,480).

Proctoring and Grading

(Report at ¶¶ 260-68)

2354. The Special Master concluded that in regard to the April 1981 NRC-administered operator licensing examinations at TMI-1, the Staff was lax and its procedures were inadequate. Report at ¶ 339. The Staff does not challenge that conclusion (Staff Comment ¶ 16) nor does any other party. Neither does this Board. Consequently, the Board does not here recite all of the details of the admitted deficiencies which are described at length in the Special Master's Report (at ¶¶ 260-68) and the proposed findings of the Staff (¶¶ 163-78) and Licensee (¶¶ 381-395).

2355. Despite its admission of lax and inadequate test administration of the April 1981 examinations, the Staff would have us find that the administration was in full compliance with the governing standard, Operator Licensing Branch Standard ES-201, paragraph F. Staff Ex. 29, at 3; Staff Proposed Finding ¶ 163. This standard states:

> The examiner should make use of available facilities, in the manner he considers most satisfactory, to ensure the integrity of the examination. Use of facility proctors is permitted when circumstances require but should be avoided if possible. It is desirable that the examiner oversee the examination personally.

The Staff evidently is of the opinion that compliance with this standard could be met by having at least one NRC representative present at all

times in the training building while the exams are being conducted. Staff Proposed Finding ¶ 166.

2356. The Staff points to the need for the examiners to spend time with members of Licensee's staff, <u>during the course of the written examination</u> in review of the examination, in compliance with another requirement of ES-201:

> At some time during the course of the written examination, the examiner should have a cognizant member of the facility staff review the examination so that any possible inappropriate questions may be discussed, and to ensure that all answers deemed correct are currently valid.

Staff Ex. 29, at 3. Staff's objectives in this review are to ensure that questions are clear, understandable, and germane to the particular facility and to ensure the current validity of the answers on NRC's answer key. <u>Id</u>.; Tr. 25,498-99 (Wilson); Staff Proposed Finding ¶ 167. Staff would also have us find that the Staff's review was in accordance with the applicable procedures. Staff Proposed Finding ¶ 170. As pointed out by Licensee (Proposed Finding ¶ 391), the proctoring situation at TMI-1 in April 1981 apparently was typical, except for the unusually large number of examinees. Tr. 25,511 (Wilson). Licensee's consultant, Mr. Kelly, a former NRC examiner, indicated that the Staff considered the proctor's primary function to be answering questions about the exam, rather than safeguarding against cheating. Tr. 24,898-99 (Kelly).

2357. We find that the review engaged in during the April 1981 examinations at TMI-1 was in literal compliance with ES-201. However, we do not believe that it was ever intended that compliance with the review

portion of ES-201 would excuse such marginal compliance with the portion cited in ¶ 2355 , supra. Only by the most liberal interpretation of this language could the Board find full compliance with ES-201 by the Staff in its safeguarding of the integrity of the April 1981 TMI-1 examinations. We decline to do so; the facts of the matter speak for themselves.

2358. We adopt that portion of Licensee's Proposed Finding ¶ 392 which states:

> Certainly the cheating which took place on the April, 1981 exams at TMI enunciated what should have been apparent to the Staff before; namely, that the risk associated with partial proctoring of examinations upon which the Staff places such significance is too great to ignore.

2359. The newly revised ES-201 (Rev. 3) sets forth proctoring requirements explicitly and, in contrast to the original, leaves little to the discretion of the examiner. Staff Ex. 30, at 15-16. We find that the new examination procedures, which were utilized for the October 1981 examination at TMI-1, should be adequate to safeguard the integrity of the administration of the examination, i.e., prevention of cheating. Apart from the administrative aspects, we still have certain reservations, addressed below about the review procedure and its potential for violating the integrity of the grading of the examination. We also have reservations about whether the repetition of questions from one license exam to another can effectively defeat the purpose (and thereby the integrity and validity) of the NRC operator licensing examinations. These reservations, likewise, are discussed below.

2360. As summarized in the Report at ¶ 267, the Staff's grading of the April 1981 NRC examinations was at issue, as well. In fact, the cheating by O and W was not discovered by a member of the Staff but by one of its consultants, Mr. Monte Davis. Staff Ex. 24; Collins, ff. Tr. 25,109. at 5. While Mr. Davis found numerous and obvious similarities in the SRO "B" papers of O and W (Staff Ex. 24), Mr. Collins did not detect the same type of similarities when he graded the RO "B" papers, giving as one reason the large number (17) of examinations. Collins, ff. Tr. 25,109, at 5.

2361. New procedures will require a new form of grading to check for copying. Specifically, an NRC reviewer "must review in detail the answers and grades assigned for at least one question in 50% of the categories for 50% of the applicants." Staff Ex. 25; Report at ¶ 268. We do not know the basis for arriving at this auditing procedure, nor whether it will result in a valid sample. We recommend that the grading process be scrutinized by professionals trained in test design and administration. In the instant proceeding, we find that the new grading procedure was an improvement over the previous grading procedure and that it was adequate for the October 1981 examinations.

2362. Finally, we cannot help but recall the testimony of Staff (and Licensee) witnesses on Aamodt Contention 2 which led us earlier to rule against the Aamodts and in favor of the Staff on the adequacy of the NRC's licensed operator testing. 14 NRC at 476-77. The reopened proceeding afforded insights into the Staff's implementation of 10 CFR Part 55 which lead us now to have certain reservations about licensed operator

testing, even in view of the changes which have been made since July 1981. While we recognize that our jurisdiction in this area has passed, we cannot in good conscience dismiss the subject without bringing certain matters to the Commission's attention. We do this in the following section.

Content of the NRC Examination

(Report at ¶¶ 269-81)

2363. In accordance with the Board's ruling, the substantive content of the NRC examinations was not an issue in this proceeding:

> The Board will not permit a relitigation as to whether the substance of the NRC operators' license examinations are technically adequate to assure that operators are qualified to operate the plant without endangering the health and safety of the public.

Unpublished memorandum and order of October 14, 1981, at 5. The issue to be examined was the nature of the questions on the written examination, i.e., whether they were amenable to cheating or other devices which could defeat the purpose of the examination. Collateral issues related to whether the questions were framed in such a way that they necessitated broad, rather than specific, answers ("broadening the answer keys"), or whether they were so inartfully framed that they undermined the examination's credibility with the operators. Report at ¶ 269.

2364. In line with the Board's ruling, the Staff did not present evidence on the adequacy of the substantive content of the NRC examinations. Staff Comment ¶ 18. The Staff was justified in not presenting such evidence and incidentally, further justified in its observation that

the Special Master had not taken into account in his criticism of the content of the examination the fact that the examination includes not only the written portion but an oral portion more oriented to evaluating problem-solving and analytical ability of the examinee. Staff Comments ¶¶ 19-20.

2365. In connection with the litigation of the specific issues in this reopened proceeding, NRC written examinations, answer keys, and answers were subjected to intense scrutiny. The Special Master perceived problems with the substance: (1) that keys for answers to questions were conformed to the information taught in training, rather than to the actual plant design. (2) that answer keys sometimes reflected obsolete or incomplete information, and (3) that the questions called for very specific design information which would require extensive memorization of, not just factual information but specific phrases. Report at ¶¶ 270-79.

2366. The portion of the Special Master's Report on the substantive quality of the NRC examination has gone well beyond the jurisdiction delegated to him and our own jurisdiction. Nevertheless, in reviewing the evidence on which the Special Master relied, the Board is also concerned about the substance of the examinations. The evidence on substance, though uninvited, accompanied the evidence on the nature of the examination. It now lies before us and we cannot walk away from it.

2367. Memory plays an important part in passing tests or in operating a nuclear power plant. However there is a difference between

questions which challenge the operator's memory as to how a plant is designed and built and questions which require an exact phrase by phrase answer based on training material. With respect to the twelve questions and answers that were put into the record, the Special Master concluded that the information sought was so detailed that no operator could have supplied it without memorization. Report at ¶ 278. We are not in a position to judge whether the questions asked for information that was beyond a competent operator's knowledge; however, it appears that graders expected the answers to correspond very closely to the answer key. It also appears that the wording of the answer was unduly emphasized; that in order to pass the NRC tests the operators had to memorize phrases from procedures or training material.

2368. For example, we are concerned with the grading of Question F.5.c which asked "Under what conditions may HPI be throttled after ESAS initiation during a LOCA?" The answer key properly included the condition ". . . action is necessary to prevent pressurizer from going off scale high." Operators who answered "to prevent RCS from going solid" were marked wrong. This is clearly a case where rote memorization of a procedure is required.

2369. In addition to his own observations on memorization, the Special Master has cited the opinion of a number of operators that word-for-word memorization of procedures was required to pass the exams. Report at ¶ 278. Many of those operators were of the opinion that the NRC exams were not a fair test of their ability to operate the plant.

2370. In looking for amenability of the examinations to cheating, one cannot fail to see, as well, their substantive content. We tread lightly in this area, however, because (1) we question our jurisdiction on this issue, (2) the parties had no opportunity to address it, and (3) we sense that the problems we glimpse may be generic rather than specific to the TMI-1 examinations.

2371. In its comment at ¶ 18, n.5, the Staff states:

> Additional analysis is being done by the Staff to further ensure, and maintain continual assurance, that the content of the NRC examination is valid. However, the studies that are underway are considering the entire examination process, not just the written examination in isolation. Therefore, the Staff has begun efforts to validate the examination content and process. These studies include a formal content analysis of the written examination questions to identify required cognitive functions and to classify questions by function. The staff is also considering a computer-assisted, automated system for written examination preparation. This system will allow the written examination to include a mix of questions that test for the skills and knowledge that the validity studies show should be included in the written portion of the examination. Other skills and knowledge will be covered in the operational portions, as they are currently.

2372. We strongly recommend that the Commission give high priority to the Staff's efforts to validate the NRC operators' examinations and to provide for whatever oversight is required to establish the credibility of these examinations with the operators who sit for them, the licensees which rely on this examination as the final control point in insuring operator competence, and the public whose health and safety are at risk.

The Review Process

(Report at ¶¶ 276-77, 285-86)

2373. The Special Master was especially concerned with the reliance by the Staff on the Licensee for answers to examination questions and he ultimately concluded that the degree of reliance was unacceptable and hence the content of the examination was inadequate. Report at ¶ 285.

2374. Here, his basis for undue reliance is an analysis of the twelve questions previously cited in connection with broadening of the answer keys. Report at ¶ 270-77. In some instances the NRC examiner framed questions to which he himself did not know the answers. We do not condemn that action entirely. We note however that some questions were not well framed, so that answers not anticipated by the examiner were deemed acceptable. We are particularly concerned with the Special Master's finding that some questions were based on unreliable or non-current information from the Licensee. Report at ¶ 277. It is by no means apparent that the fault lies entirely with the Licensee, since in some cases the examiner had misinterpreted the information supplied to him. Id.

2375. We do not share the Special Master's concern that the questions are too specific to the design of the particular plant. Report at ¶ 275. The site-specific nature of operator examinations is emphasized in Sections 55.20 through 55.23 of 10 CFR. However, we do agree that "to grade such questions accurately, the NRC examiner must have reliable, specific information about the design, and he must understand that

material." It appears to us that the NRC examiners have not become thoroughly familiar with the design and procedures before making out the exam questions. To do so would require a large commitment on the part of the examiners and a considerable increase in Staff personnel. The inadequacies in staffing levels have been admitted by the NRC Staff. Report at ¶ 286.

2376. The issue of whether the scope of examinations should be broader than set forth in Section 55.20 is beyond our jurisdiction. Since the questions must be site-specific and design related, the examiner must rely to some extent on information provided by the Licensee. The Licensee is in the best position to provide current information reflecting modifications in plant design and operating procedures and to challenge the questions framed by the examiner if they appear to be based on misinterpretation. The crux of the matter is whether the existing examination preparation and review process presents a potential for compromising the independence, integrity, and validity of the NRC examination. The current review procedure does not, as one might reasonably expect, occur <u>before</u> the examination is administered, which would allow the examiner to verify any changes to questions or answer keys and to make carefully considered corrections, if necessary. The review process occurs <u>concurrently</u> with the exam administration, leading to "fixes" while the examinees are trying to answer the questions. We realize that the April 1981 TMI-1 examinations were unique in that all the TMI-1 operators had to take the exam, leaving no "disinterested" operator to review the examination beforehand. However, the concurrent review

process, as outlined in ES-201, is the standard, not the exception. Staff Ex. 29.

2377. We do not have jurisdiction over formulation of generic Staff procedures for administering the examinations. We are obliged to point out to the Commission, however, the broader implications of the existing review process, as illustrated in this reopened proceeding. To evaluate a licensee's operator qualification program and the competence of the individual operator, the Staff relies primarily on the performance of the operators on the NRC license examination. Boger, ff. Tr. 25,480, at 3. Conversely, a licensee, with some justification, concludes that its operators are competent and its training program is adequate if the overall performance on the examination is satisfactory. See, for example, Licensee's Proposed Finding ¶ 381 and Staff's Proposed Finding ¶ 204. In essence, then, the NRC examination is to serve as an independent and external audit of operator competency. In the chain of events stretching from the operator's training to his actual operation of the plant, the NRC examination is the final link and the last control point. This control point affects not only the licensing of those individuals who take the examination, but it operates as a major "feedback control" to the Licensee's training program. Wherever the examination process is neither independent nor external, its audit value is impaired and there is the potential for abuse and for diminished credibility.

G. The NRC Staff's Response to the Cheating

(Report at ¶¶ 288-302)

2378. Issue 2 was:

> The adequacy of the Staff's investigation of, and NRC response to, the cheating incident and rumors of cheating in the April 1981 NRC examinations.

2379. The NRC Staff's response consisted of (1) making four investigations, (2) voiding the April 1981 TMI-1 examinations, (3) revising its procedures for proctoring and grading, and (4) administering new examinations under the revised procedures in October 1981. Report at ¶ 288.

2380. The first investigation was begun by the OIA, but OIA's role was terminated by Chairman Palladino and the investigation was transferred to OIE, which conducted three investigations. Report at ¶ 289. The investigation by the Staff of O and W led to their admission of guilt and their termination from licensed duties at TMI. Report at ¶ 289. The Special Master found that the Staff did a thorough and effective job in the investigation of O and W. Report at ¶¶ 289, 298, 341. We concur, and no party disagrees.

2381. The OIA investigation and the first OIE investigation concerned cheating by O and W, and whether cheating was limited to O and W. Report at ¶¶ 289-90. The second investigation investigated allegations by YY concerning Michael Ross (Report at ¶¶ 142, 292); a purported telephone call from U to KK during the April 1981 NRC examination (Report

at ¶ 292); a rumor that U was stationed near the examination room to aid examinees (id. at ¶ 293), and a statement by P suggesting solicitation of an answer by Mr. Husted. Id. at ¶ 294. The third investigation concerned two events discovered by the Licensee: a purported telephone call to WW during the Kelly examination and Mr. Shipman's admission of giving an answer to another operator at the coffee stand. Id. at ¶ 295.

2382. In reference to the allegations about a telephone call made to KK, the Special Master concluded that the Staff did a thorough job of investigation. Report at ¶ 298. However, the Commonwealth disagreed. Commonwealth Proposed Finding ¶ 64. Consequently, we reviewed the documentation of the investigation. Staff Ex. 27. We concur with the Special Master that this investigation was adequate considering the elusive nature of the evidence and the fact that the question asked was not on the examination in progress at the time.

2383. The Special Master found that the Staff's investigation of the other allegation made by Mr. KK -- that someone was stationed in the hall to assist examinees -- was uneven (Report at ¶¶ 288-89), although he admits "Given the limits on the Staff's resources, these steps may not have seemed worthwhile at the time of the Staff's investigation." Id. at ¶ 299.

2384. In our review of the phone call incident a discrepancy was noted. The Commonwealth (Proposed Finding ¶ 64) stated that "More astoundingly, the Staff failed to interview Mr. O regarding his potential involvement in the Mr. J phone call. Tr. 26,258-59 (O)." Actually, O's

testimony was somewhat confused at that point. Tr. 26,258-62. Later he noted that he was phoned by an NRC inspector in regard to this allegation (Tr. 26,272), and Staff Ex. 27, at 43, reports the content of this telephone interview. Therefore, the Staff did indeed interview O on this subject.

2385. On our own review of Staff Ex. 27, we also find adequate the Staff's investigation into allegations that someone was stationed near the exam room to provide assistance. The Staff interviewed and reinterviewed those Licensee personnel who would have been in a position to have answers on this subject and was unable to elicit evidence which would with certainty substantiate this allegation. Again, the nature of the evidence sought was at best elusive, based on memory of conversations, rather than on tangible documents.

2386. In regard to the Shipman incident, i.e., Mr. Shipman's admission that he provided an answer to another operator during the NRC exam while at the coffee table, we concur with the Special Master that the Staff investigation was inadequate. In this case, the Licensee during its investigations into cheating yielded the information on the Shipman incident and Licensee promptly made this information available to the Staff. Staff Ex. 28. The Commonwealth, the findings of which we adopt in part, asserts that the Staff's response was inadequate. As the Commonwealth put it:

> The staff's investigation of this incident is detailed in the October 28, 1981 Report of Investigation. Staff Ex. 28. Essentially, the Staff's position regarding this incident is as follows:

> Beyond FF's acknowledgement of his misconduct, he maintained that he was unable to recall either the identity of the other individual or the specific question he was asked. Lacking any logical leads, the NRC plans no further investigative action in this matter.

Staff Ex. 28, at 8.

The Board views this attitude as completely unacceptable. There were only 8 individuals in the room opposite Mr. Shipman's during the April 1981 NRC exam. Lic. Ex. 83. The Staff's basis for not interviewing these individuals is that 5 of these individuals had been interviewed previously, and made general denials of cheating. Tr. 25,371-72 (Ward) (referring to "time constraints" and "cost-benefit" principles in terms of investigation time). Tr. 25,362 (Baci). Again, the Board does not agree that general questions on cheating are a substitute for a probe of specific circumstances. Nor does the Board believe that 5 out of 8 is sufficient when there is a very high probability that one of the 8 individuals actually cheated, as is the case here.

. . . .

Commonwealth Proposed Findings ¶¶ 61-62.

2387. We do not agree with the Staff that since OIE had already interviewed, in a general fashion, five of the eight operators, getting negative answers, that it would have been unproductive to ask each of all eight specifically whether he knew of the Shipman incident. Staff Comment ¶ 28. Nor do we buy the argument that one cannot interview every individual who might have knowledge of the event (id., and Staff Proposed Finding ¶ 95) when the total population size is only eight and when there is only one very specific question to be asked. Clearly, in view of the consequences which have flowed from the incident -- for example, the hearing time required, the preparation of findings and comments, the sense of a question left unanswered -- it would have been cost-effective to have completed the investigation when the time was ripe.

2388. Concerning the Shipman incident, it is the Licensee's view of the Staff's response which gives us the greatest pause, as it adds a new and, to us, distorted, perspective to explain the Staff's lack of diligence. We quote the Licensee's reply to Commonwealth's Proposed Findings ¶¶ 61-63:

> The Commonwealth faults OIE for investigating only five of the eight individuals who took the April, 1981 NRC exam in the room opposite Mr. Shipman. PA PF 61-63. We would aagree, perhaps, that had Mr. Hukill not interviewed all TMI-1 operations staff members with respect to their knowledge of cheating, OIE could be faulted for not using its resources to interview the remaining three individuals. However, OIE clearly knew of Mr. Hukill's interviews prior to the commencement of its third investigation. Staff Ex. 28, at 2 (Licensee requested that OIE refrain from conducting its investigation until the Hukill interviews were completed; OIE agreed). We do not consider it to have been unreasonable for OIE to reply on the information Mr. Hukill gleaned from his interviews. . . .

Licensee Reply Finding ¶ 81.

2389. As we indicated above, we commend the Licensee's conducting its own investigation of the incident and giving the results to OIE. We entertain doubt as to the propriety of OIE's agreeing to wait for the completion of the Hukill interviews before starting its own. If, indeed, as Licensee implies, OIE relied on the information gained by Mr. Hukill's interviews we have no doubt that such reliance, if not coupled with a full and independent investigation by OIE, constituted an inadequate response.

2390. Continuing with his findings on the adequacy of the Staff's investigation, the Special Master concluded that Mr. Husted did indeed solicit an answer from Mr. P in the unproctored exam room. Report at

¶ 316. The Board did not find convincing the evidence that this solicitation occurred. ¶ 2157 , supra. We could understand the Staff abandoning this issue on the basis that the investigators concluded that Mr. Husted merely made a rhetorical exclamation, not a solicitation. The Staff Comments ¶¶ 30-32 on the Report reflect this view. However, the Staff's proposed findings represent, to us, the Staff's attitude at a time closer to the actual investigation. It is the Staff's response to the potential cheating here that the Board finds peculiar. We cannot state it any better than did the Staff itself in its Proposed Finding ¶ 97:

> Mr. Ward [OIE investigator] was questioned extensively [during the hearing] on the subject of Mr. P's alleged statement to Mr. Ward that while Messrs. P and Husted were taking the April 1981 NRC SRO examination, Mr. Husted had solicited an answer to an examination question. Mr. Ward said that Mr. Husted's act did not constitute cheating because Mr. Husted did not receive an answer to his question. Tr. 25,415 (Ward). In addition, it was different from other incidents in that it did not raise the possibility of a conspiracy. Tr. 25,415-16 (Ward). The Director of OIE agreed that the alleged act did not fit into OIE's definition of cheating, for the purpose of the investigation. Tr. 25,418 (Ward). Mr. Ward also stated that the alleged solicitation was not directly relevant to the main thrust of the second OIE investigation, which concerned management involvement in cheating. Thus, since the writeup of the interview with Mr. P was intended to focus the facts upon the primary issue under investigation, Mr. Ward did not include Mr. P's alleged solicitation in that writeup. Tr. 25,417-18 (Ward).

2391. We disagree with the Staff and we find the response to the incident involving Mr. P and Mr. Husted to be woefully inadequate if the lack of follow-up was dictated by the considerations stated in Staff's Proposed Finding ¶ 97. We adopt in full the Special Master's statements (Report at ¶ 300), i.e., that "there is no ethical or moral difference

between an attempted solicitation and a successful one," that relevancy of the incident was not determined by which investigation was underway, and that there should have been a follow-up if the Staff had reason to believe the solicitation occurred.

2392. The adequacy of the Staff's response to the Trunk Reports was faulted by the Special Master, who concluded that the Staff's response was not to read them but to simply accept Mr. John Wilson's views regarding their significance, views which the Special Master found to lack basis. He found that the Staff should have pursued evidence in the Trunk Reports suggesting cooperation by certain examinees on Licensee-administered quizzes. Report at ¶¶ 297, 302. Staff disagreed and claimed that the evidence did not support a finding that OIE failed to review the Trunk Reports. Staff Comment ¶ 33; Staff Proposed Finding ¶ 74; Ward, ff. Tr. 25,274, at 4. Staff witness Ward tacitly acknowledged the Staff's reliance on the views of Mr. John Wilson, Licensee's counsel, and explained Staff's decision not to pursue the matter further. Ward, ff. Tr. 25,274, at 4; Tr. 25,337-38 (Ward, Clewett). The Board believes that since the Staff had the Trunk Reports at hand, it was inappropriate for the Staff to rely not on Professor Trunk's first hand opinion and analysis, but on the analysis of Licensee's counsel. Elsewhere in our decision, the Board gives its own reasons for declining to attribute weight to Mr. Wilson's views.

2393. Because we have made our own analysis of the Trunk Reports, the Staff's failure to conduct an independent investigation of this matter has no bearing on our findings on the major issues in this

proceeding. In essence the hearings themselves constituted completion of the investigation. It is arguable that the Staff's response reflects unfavorably on Staff attitude. We would have been more favorably impressed with the Staff's response had it rested with a position that the Staff accepted the Trunk Report on its own merits and did not investigate further because of more pressing priorities and a lack of resources. Tr. 25,337-38 (Ward); Tr. 25,344 (Ward). Because we do recognize the time and resource restraints on the Staff, we find the extent of Staff's response to the Trunk Reports marginally adequate.

2394. We have previously analyzed in some detail (¶ 2169-86) the lack of definitive evidence as to whether or not U was involved in cheating and we concluded that U must be given the benefit of the doubt. The Special Master conceded that followup of rumors about U may not have seemed worthwhile to the Staff. Report at ¶ 299. Considering the elusive nature of the rumors surrounding U, we find the Staff's response was adequate and appropriate, considering the Staff's priorities, resources, and time constraints.

IV. CONCLUSIONS, RECOMMENDATIONS AND REMEDIES

2395. The Special Master reported his conclusions and recommendations with respect to individuals, the corporate Licensee and the performance of the NRC Staff at ¶¶ 303-44 of his Report. The Board however has explained its particular conclusions in each of these categories in the respective context of our findings of facts and the summaries of the decision above. Therefore we depart from tracking the Special Master's

Report at this point and arrive at our own overall conclusions. We must consider the general effect this reopened proceeding has had upon the original mandate to this Board to determine whether the various short and long-term actions set out in the notice of hearing are necessary and sufficient to provide reasonable assurance that Unit 1 can be operated without endangering the health and safety of the public. 10 NRC at 148.

A. Management's Responsibility

2396. The Board has taken Mr. Hukill, GPU Nuclear Vice President for TMI-1, at his word when he admits to being naive with respect to cheating. Moreover we have found that Licensee's chief investigator, John Wilson, was naive in his conclusions concerning cheating by G and H and we believe that management, in turn, was naive in accepting those conclusions. Now it is our turn to consider whether the Board itself was naive in concluding in the management partial initial decision:

> On the basis of the extensive record developed on training, the Board finds that Licensee has in place at TMI-1 a comprehensive and acceptable training program. Since the accident, Licensee has substantially augmented its training department and headed it with professional educators who have backgrounds in nuclear training. Licensee's programs have been reviewed by NRC and by highly qualified independent consultants. The TMI-1 licensed operators have been trained, retrained, audited and reaudited by Licensee's training personnel and independent consultants. The operators have been exposed to training in the areas they should master before operating the plant.
>
> . . . . .
>
> The Board generally finds Licensee's training adequate and specifically finds Licensee has complied with the Commission's August 9, 1979 and

> March 6, 1980 Orders insofar as they relate to training. . . .

August 27, 1981 PID ¶ 276, 14 NRC at 475.

2397. The Board was treated to a dazzling display of credentials in Licensee's case on its training program. Licensee employed a committee of nationally eminent experts to evaluate its Operator Accelerated Retraining Program (OARP). Dr. Julien N. Christensen is renowned for his work in research and education in human factors engineering. Id. at 462-63. Dr. Eric Gardner is widely respected as an expert in educational psychology with special expertise in educational psychological measurement, psychometrics, test construction and curriculum and program evaluation. Dr. William Kimel, Dean of the University of Missouri College of Engineering, represented nuclear engineering on the committee. Practical experience was represented by the manager of technical training for Duke Power, Richard Marzec, and Dr. Robert Uhrig, Vice President for Advanced Systems and Technology for Florida Power and Light. Id. at 453. Also involved in the construction of the training program curriculum were Babcock and Wilcox, Gilbert Associates and NUS Corporation. To consult and aid in the execution of its training program, Licensee retained PQS Corporation, headed by Frank Kelly, with experience including service as chief of AEC Operator Licensing Branch. Id. at 460.

2398. We were also impressed with the credentials and experience of Dr. Robert Long who was then Director of corporate Training and Education for GPU Nuclear with the Nuclear Assurance Division. His background included both nuclear engineering and education. He had been a long-time

member of the Nuclear Engineering Department at the University of New Mexico where he served also as Department Chairman and Assistant Dean of the College of Engineering. Id. at 450. Similarly the Manager of Training at TMI-1 was Dr. Ronald A. Knief with a doctorate in nuclear engineering who also has experience in education at both the university and non-university levels. Id. at 444. Finally, the Supervisor of Operator Training at TMI-1 is Samuel Newton, a Naval Academy graduate with a masters degree from the Naval Post Graduate School. He had twelve years experience in the Navy's nuclear program. He supervises the thirteen licensed operator instructors. Id. at 445.

2399. After again evaluating our partial initial decision on Licensee's training program in light of the developments in the reopened proceeding, we remain convinced that the evidence supported the conclusion that Licensee's training program was well designed to train qualified operators and that there was a rational plan to implement the program. As we noted above, on the one occasion when the integrity of the examination procedures was questioned, the Board reasonably inferred that suitable action would be taken, i.e., requalification tests would be "closed-book".

2400. We remain satisfied that Licensee was unstinting in the resources devoted to the training program. It cannot be faulted in the selection of the advice it sought for its training program, the credentials of its training managers or on the general design of its training program. The cheating episodes are not a reflection on upper-level management's competence, good intentions and efforts.

2401. Where, then did the program fail? Although the reopened proceeding did not cover the issue directly or fully, we believe that the answer is apparent from the record of the reopened and main proceedings. Our summary conclusion is that the integrity of Licensee's training and testing program failed because there was not a clear appreciation of which personnel or which component of Licensee's management had responsibility for the integrity of the program; and because there was a failure to apply the principles of quality assurance and quality control to the instruction and examination process.

2402. Mr. Hukill came to the hearing and accepted responsibility for the cheating of his operators and responsibility for seeing that examination administrative safeguards are in place. Hukill, ff. Tr. 25,913, at 2-5, 16. As the senior management person at the Unit, Mr. Hukill is responsible for its safe operation and is ultimately responsible for the competence of his operators and their discipline. He did well not to quibble about the details of his responsibility. The TMI-1 manager of operations, Michael Ross, also accepts responsibility for the cheating by his operators. Ross, ff. Tr. 24,127, at 5-6. But the fact is, it was the Division of Nuclear Assurance under its Vice President, John Herbein, and the Training and Education Department within that Division, under Dr. Long, which have the responsibility for preserving the integrity of the company's training program. 14 NRC at 443.

2403. In our management partial initial decision we notec with approval that Mr. Hukill as Vice President of Unit 1 would be relieved of all but minimum responsibilities not directly associated w th the opera-

tion and maintenance of the unit so that he could devote full attention to those functions. We noted in that context that Nuclear Assurance would handle training for him. Id. at 415. The Division of Nuclear Assurance was to have been an independent division with the "same strength and status as operations would have; not a collateral duty for people who also have line responsibility." Id. at 406 citing Arnold at Tr. 11,438-40.

2404. As we understood Licensee's plan of organizing GPU Nuclear, the concept of placing training in the corporate Nuclear Assurance Division, which also houses Quality Assurance, Nuclear Safety Assessment, and Emergency Planning, was to provide independent quality assurance concepts to the training function in addition to relieving line management personnel of the reponsibility for training.

2405. Quality Assurance programs, as required by Appendix B to Part 50, extend to operational safety quality as well as to machinery and structures. Training and verification of training of personnel whose activities affect quality is covered by Section II of Appendix B.

2406. Dr. Long has succeeded Mr. Herbein as Vice President of Nuclear Assurance.[249/] While Dr. Long acknowledges that the omission of instructions leading to cheating was a mistake, he is "reluctant to be too self-critical on this subject because of the implicit

249/ Letter dated March 11, 1982 from Licensee's counsel Blake to the Appeal Board.

understanding . . . that cheating is totally unacceptable behavior . . . ." [Underlining in testimony.] Long, ff. Tr. 24,925, at 3. He likens the problem to a factory, where ". . . one probably does not tell factory workers not to steal parts from the assembly line." Id. But neither does one allow one's factory to be stolen. This is where quality assurance and quality control come into play.

2407. The Board could not determine from Dr. Long's testimony that he fully understands that his Training Department failed in its responsibility and that the failure was the principal and proximate cause of the breakdown in the integrity of the training and testing program. For example, as we noted above, the Training Department failed to include in its list of examination safeguards a provision for a post-examination sampling of answers for evidence of cheating -- a measure which the NRC Staff has found necessary for its own examination integrity. Moreover the failure of the Training Department to assure the quality of its program extends also to a failure to assure the quality of the instruction.

2408. The Union of Concerned Scientists (UCS), in its post-hearing participation has led the Board through the management partial initial decision, and particularly through the partial initial decision on plant design and procedures where UCS was a very active party. 14 NRC 1211 (December 1981). UCS points out the many instances where the Board found that safety depends upon correct operator procedures and training and reminds us that we preserved jurisdiction because:

> The issues of Licensee's management integrity, the quality of its operating personnel, its ability

> to staff the facility adequately, its training and testing program, and the NRC process by which the operators would be tested and licensed, are all important issues considered in this partial initial decision.

14 NRC at 1708.

2409. UCS concludes that the reopened proceeding under the Special Master demonstrated that the TMI-1 operating staff is incompetent, that the operators cannot be relied upon to follow procedures essential to safe operations, and that the Board should immediately withdraw its restart authorization. UCS Comments, May 18, 1982, passim.

2410. Our answer to UCS is that we have not found the TMI-1 operators to be incompetent. Most of them were already licensed. Unlike operators at other nuclear plants, they have had to take two additional initial NRC operators license examinations. These have required a great amount of additional studying. We have reaffirmed that their training has included the best possible course content. Our major finding, it must be recalled, is that there was a failure of quality assurance of the integrity of the examination and quality assurance of the instruction. Although we are concerned about weaknesses in the quality of instruction, and have imposed conditions directed to that concern, we have not found that the instructors have failed to instruct. Nor have we found that the students failed to learn. Whatever the quality of instruction methods,

the intense and repeated exposure to the course material necessarily must contribute to the competence of the operators. Finally, it must also be recalled that a major concern of the Board in preserving jurisdiction was doubt about whether the Licensee would be able to meet its staffing commitments for Unit 1. We have found that the operators have been reexamined by the NRC under suitably controlled circumstances and we have reaffirmed that Condition 9 for the staffing of Unit 1 will and must be met. 14 NRC at 580-81.

B. Sanctions

2411. The Board imposes a $100,000 monetary penalty upon the Licensee because its management negligently failed to safeguard the integrity of its examination process, because it failed to instill an attitude of respect for the company and NRC examinations process, because it failed to assure the quality of training instruction and because of negligence in the procedures for certification of candidates for the NRC licensing examinations. We cannot find from the original Notice of Hearing, 10 NRC 141, that the Commission anticipated a monetary penalty. However we do not read the Notice as foreclosing that remedy. We believe that such a penalty is desirable, thus necessary, in the long term to provide reasonable assurance that the Unit can be operated without endangering the public health and safety and payment of the penalty should be required. Id. at 148.

2412. If we were not convinced that the Licensee is capable of correcting and intends to correct the problems revealed by this reopened proceeding, with or without the penalty, we could not, as we do, conclude this proceeding in favor of restart. A penalty will be long remembered, however, and will emphasize the importance of the corrective administrative procedures to those charged with implementing them and with those charged with obedience to them. It will, we believe, remind those who, either by omission or commission, have created these problems, GG and Mr. Shipman, Dr. Long, G and H, for example, of the damage these episodes have caused their colleagues on the operating staff and their employer, and the erosion of the public confidence in their competence and integrity. The amount, $100,000, is not the result of mathematical calculation nor was it arrived at with the Commission's guidelines on Civil Penalties. This is a remedial, symbolic penalty intended to attract the attention of all interested parties.

2413. We recognize that the Licensee was not notified that a penalty might be assessed and has had no opportunity to address it. As noted, we find that it is a long-term remedial action. Therefore, it need not be imposed before restart. Whether it is appropriate and whether we have jurisdiction to impose it may, therefore, be the subject of the regular appellate process. If our jurisdiction should be found wanting, this action should be regarded as the Board's recommendation.

2414. With the exception of G and H, the Board has not imposed or recommended sanctions against any company personnel. There are several reasons for this. As we noted above in our recommendation that G and H accept a voluntary suspension, no individual member of Licensee's organization has been a party to this proceeding. None have had notice of possible penalties, and because of the sequestration order, they have not even had the opportunity to confront the evidence adduced against them. We have no authority to sanction any individual without a further proceeding. But where the evidence has been reliable and definite, and where the malfeasance has been substantial we have, in fact, recommended further procedures or sanctions, as in the case with G and H. And of course the Board could not ignore the question raised by the certification of VV to the NRC in August 1979.

2415. However, where the evidence has been uncertain (as with U) or where we have found the conduct not to be shocking, as with GG and Mr. Shipman, the Board has decided to let matters rest without further action, even though perfect justice might have required further redress. Also we are permitting the inquiry to end without further attempting to identify the persons who cheated by receiving answers from Mr. Shipman and WW. The Board believes this to be the wisest course, because we have no expectation that subsequent investigations or inquiries would improve upon the record made before Judge Milhollin. We also believe that it is time for the cheating inquiries to come to an end.

2416. The TMI-1 manager of operations testified that the operators are bitter about the repeated need to take the NRC examinations. Ross, ff. Tr. 24,127, at 5. And, as P testified, test candidates were rightfully annoyed that the failure to proctor the NRC examination created a situation in which their integrity could be challenged. Doubtless the TMI-1 operators have been the subject of community derision, and, according to O and W, even threats because of the cheating disclosures.

2417. There is no evidence whatever that the large majority of the TMI-1 operators lacked competence and integrity. They have good cause to be unhappy with their treatment. Although the Commission appropriately acted in the broader public interst, the effect of the Notice of Hearing in this case was to void the full-power operator licenses of all the TMI-1 control room staff without the scarcest element of due process. The need to take the second NRC reexamination in October 1981 wiped out the benefits fairly earned by the honest candidates who passed the April reexamination. The entire proceeding with respect to examination integrity, although necessary, has been demoralizing, unfair to the honest operators, and, we are concerned, it may have been a distraction from their duties as control room operators.

2418. Therefore the Board has selected sanctions which were intended to be definite, final and appropriate in the context of the present evidentiary record.

V. RECOMMENDATIONS, PENALTY, AND CONDITIONS

2419. The Board recommends that:

(1) A proceeding be initiated pursuant to 10 CFR Part 2, subpart B, and 10 CFR 55.40 to consider the modification or suspension of the operators' licenses of G and H unless during the Commission's immediate effectiveness review, the Licensee reports that G, H and the Licensee accept the Board's proposal that G and H voluntarily receive a two-week suspension without pay.

(2) The Commission direct the NRC Staff to conduct an investigation into the August 3, 1979 certification of VV to the NRC for operator's license renewal in accordance with the Board's discussion at ¶ 2313-14, *supra*.

(3) If it should be decided on review that the Board lacks jurisdiction to impose a monetary penalty on the Licensee, a penalty in the amount of $100,000 should be imposed by the Commission on the Licensee for negligent failure to safeguard the integrity of its examination process, failure to instill an attitude of respect for the company and NRC-administered examinations, failure to assure the quality of training instruction and negligence in the procedures for the certification of candidates for the NRC licensing examinations.

2420. The Board imposes on the Licensee a monetary penalty in the amount of $100,000 as a long-term remedy to provide reasonable assurance

that TMI-1 can be operated without endangering the public health and safety.

2421. The Board imposes the following conditions on the restart of TMI-1:

(1) There shall be a two-year probationary period during which the Licensee's qualification and requalification testing and training program shall be subjected to an in-depth audit by independent auditors, approved by the Director of NRR, such auditors to have had no role in the TMI-1 restart proceedings.

(2) Licensee shall establish criteria for qualifications of training instructors to ensure a high level of competence in instruction, including knowledge of subjects taught, skill in presentation of knowledge, and preparation, administration, and evaluation of examinations.

(3) Licensee shall develop and implement an internal auditing procedure, based on unscheduled ("surprise") direct observation of the training and testing program at the point of delivery, such audits to be conducted by the Manager of Training and the Supervisor of Operator Training and not delegated.

(4) Licensee shall develop and implement a procedure for routine sampling and review of examination answers for evidence of cheating, using a review process approved by the NRC Staff.

2422. The Board directs the Licensee to preserve all records pertaining to the investigation recommended at ¶¶ 2312-14, *supra*.

VI. CONCLUSIONS OF LAW

2423. The Board concludes that in consideration of the findings, recommendations, and conditions set out above, the issues in the proceeding reopened by the Board's Order of September 14, 1981 have been resolved in favor of restarting Three Mile Island Unit 1 and that the conclusions of the Partial Initial Decisions of August 27, 1981, 14 NRC 381, and December 14, 1981, 14 NRC 1211, remain in effect.

VII. EFFECTIVENESS AND APPEALABILITY

2424. By Order of March 10, 1982 the Commission announced that it will not make any decisions regarding immediate effectiveness of the Board's partial initial decisions of August 27, 1981 and December 14, 1981 until the Board has rendered this decision. The parties were invited to file comments on whether this decision should be made immediately effective if it is favorable to restart. Our conclusions are favorable to restart. The Commission's Order provided that comments should be filed within fourteen (14) days after service of the Board's decision and that reply comments should be filed within seven (7) days after service of the initial comments.

2425. Within ten days after service of this Partial Initial Decision, any party may take an appeal to the Appeal Board by filing exceptions to all or portions of the decision. A brief in support of the exceptions shall be filed within thirty days thereafter or within forty days in the case of the Staff. 10 CFR 2.762. Any request to modify the time period set out in Section 2.762 should be made to the Appeal Board designated to hear the initial appeals.

THE ATOMIC SAFETY AND
LICENSING BOARD

Walter H. Jordan
ADMINISTRATIVE JUDGE

Linda W. Little
ADMINISTRATIVE JUDGE

Ivan W. Smith, Chairman
ADMINISTRATIVE LAW JUDGE