UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

UNION OF CONCERNED SCIENTISTS COMMENTS
ON REPORT OF THE SPECIAL MASTER

Although the Union of Concerned Scientists did not participate in the cheating hearings themselves, the scope and nature of the Special Master's findings raise fundamental questions which undermine many of the original findings of the Board in the PID of December 14, 1981. Therefore, UCS has an interest which is directly affected by the Special Master's Report. We therefore offer the following comments in support of the proposition that the Board should adopt the Special Master's Report and should reconsider and withdraw portions of its PID of December 14, 1981, in light of that Report.

As we will discuss below, the Board at many points in the PID relied on post-TMI procedures and operator training to resolve issues on which UCS had called for changes in design in addition to the training and procedures. The Board noted this generally:

> In Part II above we have made many determinations favoring restart dependent upon improvements in the TMI-1 machinery. However it can be readily observed that our determinations also depend very heavily upon correct operator procedures essential to safety. Operators whose competence has been ensured by appropriate training which has been verified by NRC and company-administered examinations are an indispensable element of nuclear safety despite the many improvements in plant design. (PID, paragraph 2017, emphasis added)

In addition, at some points in the PID where operational action was heavily relied upon to ensure the protection of public health and safety, the Board explicitly noted that the outcome of the cheating hearings could affect its decision. In particular, with respect to the Board's crucial reliance on the so-called bleed-and-feed mode of core cooling, the Board stated:

> We do not disagree with the UCS claim (proposed finding ¶ 35) that extensive training and well-conceived procedures are required when the feed-and-bleed cooling mode is relied upon to dissipate the heat from the core, but the complete record as it stands to day supports the conclusion that these procedures and training can be provided. However, we have reopened the record in this proceeding to inquire into the signigicance of the test cheating disclosures on the effectiveness of operator training. (PID, paragraph 625, emphasis added)

Likewise, in rejecting the Sholly contention that the procedures governing ECCS should be changed to avoid premature operator defeat, the Board found that the TMI-1 operators have been provided with specific instructions and training on the criteria for termination of ECCS. It further stated:

"However, this finding underscores the safety importance of the reopened proceeding on the issue of cheating on operators tests and the reliability of the operator testing." (PID, paragraph 747).

There are, in addition, numerous other parts of the PID where the Board did not explicitly refer to the pending cheating pr cedures but which are nonetheless affected by the Special Mas .'s findings. They will be treated below. The above are offered simply as the clearest examples of Board findings which are obviously called in to question now in order to establish the relationship between the issues pressed by UCS and the Special Master's Report.

The issues before the Special Master were broad. (See PID, paragraph 2014). The Board reserved jurisdiction over those issues, observing:

> 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 decision. (PID, paragraph 2012, emphasis added)

In addition to finding that many individuals cheated on a variety of tests administered by NRC and GPU, the Special Master's Report contains findings which compel the conclusion that the post-TMI program of operator training relied upon so heavily to prevent another accident and to

ensure that future accidents are controlled, cannot provide the needed confidence that the TMI-2 lessons have been learned. In their totality, his findings portray a training and testing program which was incompetently administered by both GPU and the NRC, for which the TMI operators showed disdain, the content of which bore little relationship to the skills needed to safely operate a reactor. (See e.g., PID, paragraph 251, 287) Moreover, both NRC and GPU have responded to this situation largely by retreating to their trenches and proposing to do the minimum possible. It is apparent that the promises of neither can be relied upon as a basis for authorizing restart of this plant.

The OARP and ATTS examination were "management's principal response to the deficiencies in training which had been revealed by the accident at TMI-2." (Special Master's Report, hereinafter "SMR", at paragraph 328). These programs constituted the Commission's fundamental effort to meet the post-TMI-2 findings of such investigations as the Presidential Commission, which were paraphrased by the Special Master as follows:

> The Kemeny Commission found the operator training was greatly deficient; that the depth of understanding was far too shallow. It also found that the branch of NRC that minitored operator training was "weak and understaffed," and that NRC limited itself to "giving routine exams." It concluded that no quantity of "fixes" would cure the basic problem, which it found to be the attitude of the people who were involved.

> Because the cheating incident occurred after the Staff has responded to the Kemeny Commission and promised to improve, what does the possibility of laxity in the Staff's procedures indicate about the Staff's attitude? (SMR at paragraph 282)

The Special Master's findings are that operator training at TMI-1 is still deficient, even in the precise particulars singled out by the Kemeny Commission. That is, it is shallow in that it concentrates on questions of particular plant design which have nothing to do with an operator's ability to solve either a foreseen or unforeseen problem, (SMR, paragraphs 247, 248, 287) it encourages, indeed requires, memorization without either training or testing for understanding (SMR paragraphs 249, 251)--indeed, even after an operator had shown himself to lack understanding of an area by failing to get a passing grade, the make-up instruction simply force-fed him more rote memorization (SMR paragraph 251)--, and the program and its lax administration have engendered a pervasive attitude of disrespect among GPU personnel who did not take seriously either the licensee's obligation to teach the subjects required by the Commission nor their obligation to learn them. (SMR paragraph 246) The NRC is still grossly understaffed three years after the above-quoted observations of the Kemeny Commission, (SMR, paragraph 286) and is obviously still giving or sanctioning "routine" exams of little value in measuring operator competence.

Finally, the "attitude" of the people involved, cited by the Kemeny Commission as the core of the problem, has not been cured. The Licensee, while ready enough with soothing assurances that it will not repeat its past mistakes, displayed an attitude throughout these proceedings that precludes confidence that those assurances can be relied upon for so crucial a finding as that the training and testing program provides assurance of operator competence. Management must have known of the widespread disdain toward the NRC exam (SMR, paragraph 328) yet permitted it to continue. Management still continued to deny that the "looseness"* of its administration of the program might account for the fact that the operators did not even know that they were supposed to do their own work on the make-up exams (SMR, paragraph 329), the entire operations staff was deeply compromised by the cheating, (SMR, paragraph 325) the key management person responsible for assuring health and safety at TMI-1, Mr. Ross himself improperly expanded the answer key and kept the proctor out of the room. (SMR, paragraphs 137-178). It should be noted in this connection that even if the Licensing Board's version of the Ross incident is accepted over the Special Master's version, it still portrays the highest level man inside the plant as "untruthfully bragging" to the men under his supervision that he had "taken care" of their problems with the exam.

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*"Looseness," the word often used by the Special Master does not fully convey the seriousness of a situation so remote from real testing that, for the crucial make-up exam, the operators did not even know whether they were supposed to do their own work. (SMR, paragraph 329)

Whether this bragging was truthful or not (and we believe that the Special Master's findings are a far more credible construction of the events considering the whole of the record), it hardly displays an attitude that would encourage respect for the training and examination program. Indeed, it is entirely consistent with the findings of widespread disrespect in the men who serve under Ross.

Perhaps most damning is the Licensee's attitude toward these hearings. The Wilson investigation was the Licensee's response to the allegations of cheating on the weekly quizzes. (SMR, paragraph 334) Mr. Wilson, a GPU employee, was presented by the Licensee at the hearings as an impartial investigator (Id.). However, far from presenting an impartial investigation, he was an apologist for the company and for the individual cheaters. He presented only that evidence which supported GPU's position. (Id.) His testimony was "misleading" (Id.) and his "investigation" clearly an exercise in fitting the facts to a predetermined conclusion. Those facts which did not support this conclusion were either ignored or twisted. (SMR paragraphs 201-219, 334) The fact that GPU could present the Wilson testimony as a thorough and impartial investigation, and stand behind it even today, is perhaps the strongest evidence that its current assurances cannot be relied upon. It must be remembered that this is not the first time that GPU has provided assurances that its training and testing program would be improved to overcome

inadequacies. (SMR paragraph 250) Those assurances were not met. (Id.) Moreover, even if one were to make the leap of faith and accept GPU's assurances, they are little more than cosmetic. While the Licensee has proposed the belated adoption of some basic measures to "police" the exams such as proctoring, telling examiners whether the test is open or closed book, etc. (SMR, paragraph 250), it has not directed itself at all to the underlying flaw in the program. That flaw is that the program is related only tangentially at best to the skills necessary to safely operate a nuclear plant in the light of the lessons of TMI-2. (SMR, paragraphs 251, 287 ff.) Even if successfully policed and passed, the program can be viewed only as certification of an operator's ability to memorize certain rote facts like an automaton.

The last line of defense is the NRC Staff. If the Licensee's assurances, taken in the light of its performance to date, do not provide a basis for the findings necessary for restart, the Board might look to the Staff. It is manifest, however, that the Staff's policy and practices cannot provide the confidence that is lacking from GPU.

For one thing, the Staff has throughout the other portions of the proceeding supported the adequacy of the Licensee's program. To the degree that the program is substantively deficient, as the Special Master documented (SMR, paragraphs 238-251, 284, 287), the Staff must be held accountable for

approving it. Indeed, the Staff prepared the questions which were so narrow and irrelevant. The Staff apparently is still unable to understand these basic flaws in the training and testing program.

The Special Master found that the administration, grading and content of the NRC exams was inadequate. (SMR paragraph 285) As to the administration of the tests, the Staff was simply unaware that the same questions were used week after week in make-up exams. (SMR, paragraph 281) It decided deliberately to allow GPU to administer the Catagory T tests--those specifically directed toward the TMI-2 accident--and made no review of the way the penultimate make-up was administered (3-4 hours of intense cramming, followed directly by a test on the covered subjects). (SMR, paragraph 281)

Perhaps most disturbing in its implications for the future was the testimony of Mr. Collins, NRC's Chief of the Operator Licensing Branch. Despite everything that has emerged during this proceeding, and the Special Master's explicit finding to the contrary (SMR, paragraph 266), Mr. Collins quite incredibly continues to assert that nothing has indicated any "laxness" on the Staff's part during the April 1981 exams. (Id.) Mr. Collins, who himself graded the RO exams, never detected the "obvious" cheating. (SMR, paragraph 267) Under oath during the hearing, Mr. Collins professed not

to know even at that date that the April exam had been substantially unproctored. (SMR, paragraph 283) This ignorance on the part of the man in charge of operator training is truly remarkable given that any moderately interested reader of the popular press knows about the lack of proctoring. Mr. Collins is either inexplicably casual about his duties or not forthright, or both. In either case, the NRC Staff cannot be relied upon to ensure that GPU's training and testing program meets the Commission's Order or the lessons learned. (SMR, paragraphs 281-285)

This conclusion is further reinforced by the fact that the Staff states that it is to this date understaffed. (SMR paragraph 286) This requires the Staff to continue to rely heavily on licensees. (SMR, paragraphs 286-287) The Staff relied on GPU not only to provide answers to the test questions, and to administer the Category T exams, but also heavily relied upon Licensee's investigation of cheating allegations. (See SMR, paragraphs 298-302) It allowed management to sit in on interviews when it was clear even to the Staff that this was impeding the investigation. (SMR, paragraph 298). It dropped many leads during the investigation for insufficient reason. (SMR, paragraphs 299-302) It never even read the crucial Trunk reports but simply accepted without review the now-discredited exculpatory interpretations of GPU's Wilson on all counts. This

record establishes beyond doubt that the Staff does not have the resources and/or ability to serve as an independent check on the practices of GPU. Moreover, it is clear that the "attitude" of the NRC identified by the Kemeny commission, whether traceable to lack of resources, to lack of independence or to ineptitude, is still present.

In the light of this record, UCS believes that the Board must conclude, as did the Special Master, that the Commission's post-TMI-2 order with respect to operator training and testing has not been met. (SMR, paragraph 251) This alone precludes restart.

In addition, the Board should review and withdraw its favorable findings in the PID on other issues intimately related to the efficacy of operator training. These include the following:

1. In connection with UCS Contentions 1 and 2, the Board held that while voiding sufficient to interrupt natural circulation is credible, the "equipment, procedures and training" to ensure that the "core will never be uncovered, as it was in TMI-2," provide the necessary assurance of protection of public health. (PID, paragraphs 617-618, emphasis added.) On the record today, the Board cannot reasonably find that the training and procedures make core uncovery an unbelievable event.

2. Related to the above, the Board "did not disagree" with UCS that "extensive training and well-conceived procedures are required when the feed-and-bleed cooling mode is relied upon to dissipate the heat from the core. . . ." (PID, paragraph 625) While finding that "the complete record as it stands today supports the conclusion that these procedures and training can be provided," the Board noted that it has reopened the record "to inquire into the significance of the cheating disclosure in the effectiveness of operator training." (Id.)

The record could not now be clearer that operator training at TMI-1 is deeply compromised. Hence, the record today does not support the conclusion that the necessary training for bleed-and-feed has been or can be provided.

The Board found that bleed-and-feed is a necessary back-up to emergency feedwater as a means of removing decay heat. (PID, paragraph 624) Emergency feedwater itself is not sufficiently reliable. (PID, paragraph 1050) In addition, bleed-and-feed has been relied upon to compensate for unreliability in the non-safety equipment needed to maintain natural circulation (pressurizer heaters, UCS Contention 3, PID paragraphs 752, 755). The Staff relies on bleed-and-feed to meet requirements of 10 CFR 50.46 for certain small break LOCA's. (PID, paragraph 948) Indeed, bleed-and-feed assumed critical importance in this case and in the Board's decision. In light of the findings of

of the Special Master, it is more clear than ever that this reliance was misplaced.

The Board found that GDC 34 and 35 require reliable, redundant systems for removing decay heat from the core. (PID, paragraph 622) Those GDC were found by the Board to be met by "The emergency feedwater system, when backed up by the feed-and-bleed mode of HPI. . . ." (PID, paragraph 624, emphasis added) That finding must now be withdrawn. On the basis of the record, GDC 34 and 35 are not met for TMI-1.

3. On the issue of detection of inadequate core cooling, (PID, paragraph 630 ff.), the Board authorized restart without either a core water level measurement system or any commitment by GPU toward obtaining one, on the basis that current instrumentation can be combined with new procedures and training "to assure that the operators will recognize and respond to reactor coolant conditions approaching and following saturation." (PID, paragraph 641, 647. See 640-642 generally)

The Board found that in order to avoid onset of inadequate core cooling, the Licensee has taken specific (and presumably adequate) steps to ensure that the operators understand the requirements for core cooling. (PID, paragraph 651)

These findings are now unjustified, particularly in light of the Special Master's findings to the effect that the training program focussed on rote memorization rather than the sort of conceptual understanding that is crucial to

ensuring that an operator will diagnose and properly respond to an event so unusual as to threaten inadequate cooling.* (SMR, paragraphs 242-248, 249, 251, 287) As the Special Master found, the examination may not in fact measure [the operators'] ability to operate the reactor safely." (SMR, paragraph 287) In this respect, his ultimate finding is not strong enough. Based on the evidence, the exam "does" not measure that ability. The Board cannot allow the conclusion to stand that current procedures "assure" that the operators will avoid inadequate core cooling. (PID, paragraph 653)

4. In connection with UCS's position that the safety systems should be designed to prevent premature operator termination, Contention 10, the Board adopted GPU's argument that such a design would impede the operator's ability to cope with unforeseen events. (PID, paragraph 743) In so doing, the Board "again note[d] the importance of operator training." (PID, paragraph 744) It summarized its resolution of the issues as follows:

> The Board recognizes that the UCS position, in light of the specific instance of TMI-2 accident, has merit. The Licensee has written procedures to assure that the safety functions will proceed to completion without unwarranted operator interference. The Licensee strongly opposes a design which removes operator intervention under any and all circumstances. Their position also has merit. Upon the record of this hearing Licensee and Staff prevail. However, we also note the extreme importance of adequate procedures and thorough training of the operators. (PID, paragraph 746, emphasis added)

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*Of course, it failed markedly even at the memorization level. As an example, H could not on the stand state the conditions for natural circulation, surely a crucial post-TMI-2 concept. (SMR, paragraph 31, 242)

In light of the Special Master's findings, again particularly to the effect that the training and testing program did not guage the operator's ability to solve either a "foreseen" or an "unforeseen" event (E.g., SMR, paragraph 287), the Board must withdraw its findings on this contention. In addition, the Board should re-assess that portion of the evidence where UCS balanced the safety advantages of the two positions, and particularly our explanation of the reasons why it is unreasonable to expect operators to properly diagnose and respond to events which have not been foreseen by the designers, constructors or reviewers of the plant. (UCS PF 276-285, Tr. 6423-6, 6463-4, Pollard)

In its resolution of the related Sholly contention, the Board "underscore[d] the safety importance of the reopened proceeding on the issue of cheating on operators tests and the reliability of the operator testing." (PID, paragraph 747) This observation applies with equal force to its resolution of the UCS Contention 10.

5. UCS Contention 3 called for the installation of safety-grade pressurizer heaters. (PID, paragraph 748 ff.) The Board held that the meaintenance of conditions for natural circulation was unnecessary since core cooling can be accomplished using bleed-and-feed or by cooling down with a "solid system" and controlling pressure with the HPI system. (PID, paragraphs 752-754) We have pointed out above that

the Special Master's findings fatally undermine reliance on bleed-and-feed.

Reliance on cooldown in a water-solid condition is at least equally risky. (See generally UCS PF 63-70) Such maneuvers have not only not yet been demonstrated (PID, paragraph 755), but the record is beyond dispute that it is extremely difficult to control RCS pressure in the solid mode while making any changes whatever to the plant conditions. (TR. 8183, Pollard) Very small temperature changes result in large pressure fluctuations. (Id., see also TR 8060, 8083-5, Brazill) There is a risk of flashing to steam in the RCS, thus interrupting natural circulation, or challenging the PORV and/or safety valves. At low temperatures there is a real risk of exceeding the limits on the reactor vessel. (TR. 8183, pollard) No example has been offered on this record, despite inquiry, of any case where a commercial plant has been taken from hot to cold shutdown in a water-solid state throughout. (TR. 8187, Pollard; TR. 8055-6, Bazill and Keaten; TR. 8726-7, Jensen)

These circumstances demand that the record provide strong evidence of the operator's understanding and high level of competence. It manifestly does not. Therefore, the Board should withdraw its findings on Contention 3 and find in favor of UCS.

6. UCS Contention 5 called for a safety-grade PORV. (PID, paragraph 744 ff.) This raises at least two questions. First, the Board held that, despite UCS's evidence, the PORV is not relied upon to provide protection against overpressure of the vessel at low temperature operation, but is a back-up to operator action. (PID, paragraph 790) The efficacy of relying on the operators to perform this critical function should be re-assessed. (See UCS PF 198-207) Since pressure vessel rupture is an accident beyond the capability of ECCS to mitigate, it is extremely important to avoid. (Pollard, ff. TR. 9027 at 5-10, 5-11) The PORV should be safety-grade even if this function is considered alone.

Second, the Board rejected UCS's argument that if bleed-and-feed is to be relied upon, the PORV should be safety-grade to perform the bleeding function. While the Board relies on the safety valves to perform the bleeding function--a finding which UCS believes to be erroneous given inter alia, that the safety valves are not qualified for this function (UCS PF 210, 211) and that the operators are taught to use the PORV (UCS PF 208, 214)--the Board in any case notes "the importance to safety of the feed-and-bleed mode using the safety mode using the safety valves." (PID, paragraph 791) Thus, the bleed-and-feed mode, for which "extensive" and "well-conceived" procedures and training is required, is again critical at this point in the decision.

7. The Board should re-assess its denial of the Union of Concerned Scientists Motion to Reopen the Record . . . of September 10, 1981. The Board summarily dismissed UCS's arguments that a differing "technical basis" for the testimony of the Martin Report authors could be found in the fact that they, in contrast to the staff witnesses, made their recommendations on the basis of a detailed investigation of the TMI-2 accident and judged that accident in the light of many years of collective experience evaluating the relationship between equipment failures and operator behavior. (See "Union of Concerned Scientists Comments Subsequent to Preliminary Hearing of March 18, 1982, Concerning the "Martin Report", March 26, 1982, hereinafter "UCS Comments")

In the context of the Special Master's broad indictment of the TMI-1 training and testing program, the Board should review the UCS Comments and other filings on this issue and reconsider its ruling, focussing on the extent to which the Martin Report recommendations which agreed with UCS were grounded time and again in the principle that the plant should be designed to minimize the demands on operators, particularly in the midst of an accident. See, e.g. UCS Comments at 9-10 regarding the danger of solid-water operation; 12-13 regarding need to make the PORV safety grade; 13-14 regarding an ESFAS "lock-in" procedure to allow the operator to objectively review his situation and prevent erroneous response; 15-16, if instrumentation is beneficial to operators,

it should be safety-grade so it can be relied on.

The current circumstances argue strongly for making the operator's task as clear, unambiguous and simple as possible.

Conclusion

UCS has not reviewed the entire PID, but only those portions dealing directly with the issues which it pursued. Therefore, UCS has not identified all places at which the PID's conclusions are significantly dependent upon a finding, implicit or explicit, that operator training and new procedures satisfactorily address the issues in this proceeding. We believe that that task is the Board's. However, based upon the review that UCS has done and the arguments made above, the Board should immediately withdraw its authorization of the restart of TMI-1.

By _____
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Dated: May 18, 1982

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CERTIFICATE OF SERVICE

I hereby certify that on the 18th day of May, 1982, a copy for the UNION OF CONCERNED SCIENTISTS COMMENTS ON REPORT OF THE SPECIAL MASTER was mailed first class, postage pre-paid (unless otherwise noted), to the following:

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