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APR -5 110:18UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSIONBEFORE THE COMMISSION

In the Matter of)
)
METROPOLITAN EDISON COMPANY)
)
(Three Mile Island Nuclear)
Station, Unit No. 1))

Docket No. 50-289
(Restart)UNION OF CONCERNED SCIENTISTS'
REPLY BRIEF ON REVIEW OF ALAB-729 AND ALAB-7441. Environmental Qualification of Safety Equipment

The core of both the Staff and GPU's arguments is that the Commission need not either by certification or litigation resolve the question of whether TMI-1 can be safely operated despite having equipment unqualified to survive an accident environment because the entire matter is being dealt with "generically." E.g., NRC Staff's Brief Concerning the Commission's Review of Specific Design Issues in ALAB-729, March 19, 1984, p. 12 (hereinafter "Staff Brief"); Licensee's Brief on Review of ALAB-729 and ALAB-744, March 19, 1984, pp. 17, 20-22 (hereinafter "GPU Brief").

As UCS argues in our main brief, this disregards the fact that the environmental qualification issue has two dimensions, one generic and one plant-specific. This distinction has always been recognized by the Commission and also by the Court of Appeals in UCS v. NRC, 711 F.2d 370 (D.C. Cir. 1983). The NRC is not free to license plants on the grounds that their safety problems are not unique. See UCS Brief on the Commission's Review of ALAB-729, March 19, 1984, p. 4-6 (hereinafter "UCS Brief").

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Indeed, the GPU and Staff position is in all essential elements the same as the Staff's long-discredited position on the so-called "unresolved safety problems" described and overturned by the Appeal Board first in Gulf States Utilities Co. (River Bend, Units 1 and 2), ALAB-444, 6 NRC 760 (1977). The NRC used to routinely grant construction permits and operating licenses to new plants without even disclosing in its safety evaluations that the plant in question was subject to an unresolved generic safety problem. (In fact, the list of unresolved safety problems was itself kept secret by NRC for years.) In the River Bend case, supra, the Appeal Board categorically rejected the remarkable argument that simply because a safety problem applies to more than one plant and is therefore part of a generic program, that problem can be disregarded in individual construction permit cases.

This doctrine was applied to operating license cases in Virginia Electric and Power Co. (North Anna Nuclear Power Station, Units 1 and 2), ALAB-491, 8 NRC 245 (1978). The Appeal Board held therein:

Of course, these 'unresolved' issues cannot be disregarded in individual licensing proceedings simply because they also have generic applicability; rather, for an applicant to succeed, there must be some explanation why construction or operation can proceed even though an overall solution has not been found.

In River Bend, we said that such explanations should appear in the Safety Evaluation Report for the facility. We also described generally the type of reason which would be sufficient to let construction to [sic] go on in the face of an unresolved generic question. Where operation of a facility is involved, similar analysis is necessary; but, as to certain issues, the justification for giving an applicant the green light can obviously be more difficult to come by. For example, the reason often given for allowing construction activity is that there is still time to find a solution and build it into the plant's design. At the operating license stage, that reason is not available. But there may be one or more other justifications for permitting the plant to operate. The most common are that a solution satisfactory for the particular facility has been implemented; a restriction on the level or nature of operation adequate to eliminate the problem has been imposed; or the safety issue does not arise until the later years of plant operation.
Id. at 248, emphasis added.

The same principle applies here. The NRC may not use the label "generic" as a shield to avoid the plant-specific dimensions of a safety problem. Indeed, the circumstances here are more compelling than in the River Bend and North Anna cases. Here, the factual evidence of record demonstrates that much safety equipment in TMI-1 is unqualified and the record patently contains no evidence supporting a finding of "interim" safety nonetheless.

Nor does the fact that the Court in UCS v. NRC permitted NRC to determine in the first instance whether the plant-specific safety determinations may be made by rulemaking or adjudication alter these principles when NRC has done neither. The question here is whether, in the face of a safety issue fairly raised in a hearing, a plant can be permitted to go into operation when there has been no lawful determination in any context that it is sufficiently safe.

There are several other points requiring some rebuttal. First, both GPU and the Staff attempt to make much of the fact that UCS withdrew its sponsorship of Contention 12; to what effect is unclear. UCS successfully moved the ASLB to accept the Contention, did extensive cross examination and filed detailed and exhaustive findings of fact on this issue. GPU claims that the Board, when it adopted the Contention, limited the scope of the issue. GPU Brief, p. 18-19. The only limitation placed in this issue by the Board, as GPU well knows, was its limitation to safety equipment in the containment and auxiliary buildings. In addition, the Board's second question in connection with UCS Contention 12 covered virtually all of the ground contained in the contention:

2. Which items of Regulatory Guide 1.89 [the Reg. Guide implementing GDC 4 at the time the question was formulated] have been grandfathered with respect to TMI-1? Explain any justification for allowing restart without compliance with the grandfathered items.

Emphasis added.

This central question -- the safety justification for operating with unqualified equipment -- was never answered by GPU or the Staff. It is disingenuous of GPU to imply that some "limitation" of the issues by the Board redounds to their benefit.

The only significant limitation was the one unilaterally imposed by the Staff and unequivocally rejected by the ASIB. The Staff presented evidence only on the qualification of equipment to survive a design basis small break LOCA, with 1% fuel failure. The ASIB had the following to say on that subject:

1154. We have not been able to discern why the Staff approached BQ/UCS-12 with an analysis of a design basis small-break LOCA with its assumption of one percent failed fuel. When this very narrow testimony was presented, we questioned counsel about the Staff's rationale for its change of position since the earlier testimony, but our efforts were not productive. Tr. 21,885-92. The Staff's proposed findings are no more helpful. Nowhere has the Staff explained how it uses the Board's superfluous agreement that the Staff may limit its analysis and testimony to accidents that are clear and close analogs to the TMI-2 accident (Staff proposed finding Paragraph 6) to justify an analysis of a design basis LOCA with an assumption of only one percent failed fuel.

1155. The analysis by the Staff's witness of a design basis small-break LOCA with its assumption of one percent failed fuel is not one of the "clear and close analogs to the TMI-2 event..." promised by the Staff (Tr. 19,487). The Staff's claim that it presented such an analysis (proposed findings Paragraphs 6 and 7) is unfounded. The design basis small-break LOCA does not envelope the TMI-2 accident. The Staff's analysis has been useless to the Board in deciding our questions on UCS Contention 12. It added nothing to our understanding of the ability of the safety equipment in TMI-1 at restart to withstand the harsh environment of a TMI-2 type accident or in accord with the criteria of Regulatory Guide 1.89.

1156. In our view the Staff has defaulted and the decision must rely chiefly on Licensee's testimony and argument.
14 NRC 1211, 1402, footnotes omitted, emphasis added.

We are amazed by GPU's argument that there is evidence of record to support a finding that the plant can be safely operated and that the Licensing Board made "substantive findings" on that evidence. GPU Brief at 16. As we

noted in our main brief, the Staff was found to have "defaulted" on the issue and GPU's evidence was found by the Board insufficient even for a "qualitative judgement of the risk of allowing interim operation..." 14 NRC at 1402, 1403. In addition, GPU's testimony that 95% of equipment was qualified was demonstrably false. See UCS Brief, n.1 at 3.

In fact, The Board found:

1181. We have not addressed each of the UCS proposed findings because we believe that they have prevailed to the extent that UCS has demonstrated that all of the safety equipment at TMI-1 will not meet all the criteria of Regulatory Guide 1.89 at the time of restart.

Id. at 1409, emphasis added.

That is the pertinent "substantive finding" that the Board made.

It is regrettable that the Board's failure to address UCS's proposed findings in detail in favor of a general finding that we "prevailed" has had the consequence that for both the Appeal Board and the Commission, this issue has been presented in largely abstract terms. UCS's Proposed Findings of Fact and Rulings of Law on UCS Contention 12, July 13, 1981, analyze the record in detail and we urge the Commission to read them. They demonstrate, inter alia, that not only did the Staff make no attempt whatever to determine whether the equipment in TMI-1 can withstand the accident environment which occurred during the TMI-2 accident (Tr. 21,913-21,916), it had not even evaluated the environmental qualification of equipment installed or modified as a direct result of the TMI-2 accident. This includes such components as position indication for the PORV and safety valves and instrumentation for automatic EFW initiation. See UCS Proposed Findings of Fact and Rulings of Law on UCS Contention 12, para. 669, p. 269-270. Nor does the Staff have any specific plans to review such equipment. Id. at para. 670, p. 270. There are many other specific deficiencies treated in UCS's proposed findings. This is scarcely an abstract issue.

In this connection, we draw to the Commission's attention a serious misrepresentation by GPU, which states in its brief:

On a more general level the Licensing Board observed that Licensee, from the evidence it presented, was making good progress in complying with IE Bulletin 79-01B and Commission Order CLI-80-21. Id. at 1400. GPU Brief, p. 12.

The ASLB never made any "observation" that GPU had made "good progress." On the contrary, at the cited page, 14 NRC 1400, the Board simply described GPU witness Braulke's (inaccurate) evidence that 95% of the equipment was qualified and stated:

It appeared that the Licensee was making good progress in complying with IE Bulletin 79-01B and Commission Order CLI-80-21. We turned to the Staff witnesses for verification. Emphasis added.

The Board then proceeded to find that the Staff "defaulted" in supplying any "verification" (14 NRC at 1402) and concluded that Braulke's testimony itself was insufficient to support even a "qualitative judgement of the risk of allowing interim operation..." Id. at 1403. GPU does not cite this crucial section of the decision. The failure of the evidentiary record to support a safety judgment is precisely what made it necessary for the ASLB to seek refuge in the Commission's "generic" treatment of the issue, as a substitute for a factual finding favorable to GPU. See Id. at 1403. To suggest to the Commission that the ASLB found "reasonable progress" is a gross misrepresentation of the truth.

Both the Staff and GPU argue that TMI-1 should not be treated "differently" than other reactors, citing CLI-81-3, 13 NRC 291 (1981). E.g., Staff Brief, p. 4. Of course, that decision dealt only with NUREG-0737 "lessons learned" compliance deadlines, and is, therefore, not directly on point. Moreover, the Commission "emphasized" that it "expects the Board to find to the contrary when the record so dictates." Id. at 295-6. Perhaps most

importantly, UCS is not asking the Commission to treat this plant differently than other reactors. No plant should be permitted to operate without either a) complying with environmental qualification requirements, or b) providing plant-specific data justifying a conclusion that interim operation pending qualification would not pose undue risk. The Commission has always accepted this principle. It is the underlying principle of CLI-80-21. GPU cannot be heard to complain that it is being treated "differently" when it has never rebutted the factual record in this case that substantial safety equipment in TMI-1 is not qualified.

Another misstatement by GPU and the Staff requires correction. Both state that the generic rulemaking and environmental qualification "subsumed" the TMI-2 lesson learned. The Staff states that the rulemaking "considered the implications, of that accident in its determinations regarding the radiation source term appropriate for equipment qualification purposes." Staff Brief at 11. See also GPU Brief, n.12 at 11. In fact, in developing the rule the Commission expressly excluded the TMI-2 "lessons learned" and stated that they would be considered separately.^{1/}

Finally, the Staff notes that "at least one" piece of equipment has not been shown to be qualified -- the Bailey E/P Converters for the EFW flow control valves. The Staff claims that it is still "reviewing" the licensee's justification for these components. Staff Brief at 13.

For one thing, we find it extremely difficult to believe that only one piece of equipment remains unqualified. As noted in our main brief, as of the last published review, the majority of the equipment items requiring qualifi-

^{1/} "These positions were developed prior to the Three Mile Island Unit 2 event. Any recommendations resulting from the staff's review of that event will be provided later." NUREG-0588, at iii, December 1979. See also, CLI-80-21, 11 NRC 707, 716 (1980).

cation had not been demonstrated to be qualified. UCS Brief, n.1 at 3. Since then, meetings between the Staff and GPU have taken place and information has been exchanged, but as yet, no evaluation has been published. See also Staff Brief, n.8 at 13. Nor, of course, has this material been subject to questioning. Based on past history, we would be astonished if, in fact, only one piece of unqualified equipment remained.

Even more important, the Staff is at best disingenuous when it states that GPU's justification for these components is still "under review." We have just learned that the Staff unequivocally rejected GPU's specious "justification" before filing its brief, for the same reasons we pointed out in UCS Brief, pp. 8-9.

On March 8, 1984, Mr. James Van Vliet, NRC's Project Manager for TMI-1, noted that GPU's proffered justification for continued operation with unqualified components in the EFW systems relied "upon a probability argument based on low probability of events, which is made even lower by the ISI program and then as a third justification, I guess, you discuss feed and bleed." Transcript of Meeting with GPU on TMI-1 Environmental Qualification, March 8, 1984, p. 5. Mr. Van Vliet rejected GPU's claim of justification for continued operation (JCO) as follows:

We have not in the course of environmental qualification programs accepted probability [as] an argument for JCO's.
Id. at 5.

And I think what we would have to say is simply what I said and what Walt [Jensen] said, we can't give you credit, design basis credit for feed and bleed at this point and we have to reject it.
Id. at 12

Just to summarize where we are right now with respect to the [UCS Show Cause] petition, and also we need - I think I want to point out at the present time for reasons we explained earlier, we cannot accept the JCOs on your E/P converters.
Id. at 177, emphasis added.

The Staff also seriously misleads the Commission by implying that the "Staff's review to date" forms the basis for the remainder of its statement that "it appears that test data is not available to demonstrate the qualification of at least one component, namely the Bailey E/P Converters for the EFW flow control valves." Staff Brief at 13.

A more truthful statement would be that GPU has identified at least one component for which qualification has not been demonstrated and GPU's justification for continued operation for that component is unacceptable. (In UCS's view, the fact that GPU advanced a low probability argument and reliance on feed and bleed as justification for continued operation demonstrates its intransigence or ignorance of the Commission's criteria for acceptable JCOs and the Appeal Board's ruling on the viability of feed and bleed in this proceeding. See ALAB 729, 17 NRC 814, at 852.)

In reality, the Staff's review of the status of environmental qualification at TMI-1 is in an embryonic stage, as a perusal of the transcript of the March 8, 1984 meeting on TMI-1 environmental qualification confirms.

2. Emergency Feedwater Reliability

GPU's brief attempts to sow confusion concerning the origin of the Board's analysis of EFW reliability and of the system's failure rate and fundamentally hinges its appeal on the familiar refrain that it should not be treated "differently" than other plants.

The ASIB's concern about the reliability of the TMI-1 EFW system stems directly from the TMI-2 accident. The unavailability on demand of the EFW system was a potential contributor to the severity of the accident. 14 NRC at 1355. The Board noted that "[t]he NRC Staff (IE) considered that improvements in plant procedures and technical specifications were an immediate need in order to limit the possibility of a similar occurrence..." Id. at 1356.

The Board went on to note that the TMI-1 EFW system was not safety-grade, the overall system did not meet the single failure criterion, "and a high degree of reliability could not be anticipated." Id. The Board observed correctly that, while it made no judgment about the adequacy of the original design, "our task is to decide whether the requirements of the Commission's orders have been met and whether the improved EFW reliability is adequate to protect the health and safety of the public." Id. It noted that the adequacy of the EFW design was challenged by UCS and is the "thrust" of Board Question 6. Id.

GPU is extremely critical of the Board's use of the Staff's historic data for failure of safety-grade EFW systems of 1 in 25 reactor years. Id. at 1356-1357. GPU Brief p. 32ff. GPU's criticism is based in a fundamental misconstruction of the use to which the Board put this data. Since, as noted above, the original TMI-1 EFW system was not safety-grade, but will be in the "long-term" (i.e. the first refueling outage after restart), the ASIB felt that the adequacy of the future system should fairly be judged by comparison with the historic failure rates of safety-grade EFW systems. Id. at 1356-1357. Thus, using safety-grade systems for comparison (when TMI-1 will not be safety-grade at restart) is generous to TMI-1.

The high historic failure rate for safety-grade EFW systems -- 1 failure in 25 reactor-years -- and the high rate of challenge to EFW systems (Id. at 1357), led the ASIB to look further for assurance that the TMI-1 system will be sufficiently reliable to perform its vital safety functions. Therefore, the Board specifically sought a plant-specific quantitative failure analysis for TMI-1:

We knew that the licensee proposed upgrading the EFW system to safety-grade but in view of the past record with 'safety-grade' EFW systems at other plants, we felt compelled to examine the reliability of the system.
Id. at 1358.

Thus, the ASLB used this data in a correct and prudent manner, not as a basis for a conclusion on the TMI-1 EFW system, but as a reason to inquire in greater depth about the reliability of the TMI-1 system.^{2/} GPU deliberately chose not to present a failure rate analysis of the TMI-1 EFW system, despite being given more than ample opportunity by the ASLB. Licensee performed no evaluation of the probability of loss of main feedwater at TMI-1. The generic data for five B&W plants over a two year period (i.e. 10 unit-years) showed a loss of main feedwater frequency of 0.3 per plant-year. GPU estimated that the uncertainty attached to this frequency is less than a factor of 10. Tr. 16,618-20, Keaten. This is a high rate of demand for EFW.

GPU also made no attempt to estimate the probability of failure of the EFW system or the probability of failure of all decay heat removal systems at TMI-1. Tr. 16,629, Keaten. Instead, GPU's strategy was, and continues to be, to put forward the most generalized and unsupported assertions of reliability while sniping at hard data which indicate to the contrary.

GPU claims, for example, that if success criteria other than those employed in the Staff quantitative analysis were used, the results would be better because operator action could be credited. How do we know that accounting for operator action and misaction would not make the results worse? Adding another variable to the analysis does not by itself aid GPU, when no analysis of its effect has been done. Sheer speculation cannot substitute for facts.

^{2/} GPU claims that the historic failure rate data are not applicable to TMI-1 because half of the eight failures were during start-up operations and the TMI-1 EFW is not "normally" used for startup or shutdown. GPU Brief p. 32 The implication that the TMI-1 failure rate would be much lower for this reason is unwarranted. Use of an EFW system for normal startup can allow discovery of problems that might be undetected at TMI-1. Tr. 16,663-6, Keaten. See also Tr. 16,654-5, 16,659-61, regarding the significance of failure during tests.

GPU suggests also that we should rely on greatly improved operator training. GPU Brief, p. 35 and n. 24. Considering the documented ineptness of GPU's post-TMI training program as remarked by both the Special Master and the ASLB, reliance on this to significantly improve the quantitative failure rate of EFW would be absurd. The Special Master found, inter alia, "[f]rom this pattern one must conclude that the training department did not take seriously the Licensee's obligation to teach the subjects required by the Commission's Order and that the operators did not take seriously their obligation to learn it." 15 NRC 918, 1017 (1982). The Licensing Board, in its decision after the cheating hearings, stated "... the Board is forced to conclude that we did not see what we thought we were seeing, and that the Licensee's training and testing program was best described as the opposite of esse quam videri (to be, rather than to seem)." 16 NRC 281, 357 (1982).

In the same vein, GPU argues that in drawing conclusions about the comparative risks of plants, "consideration needs to be given to the integrated response of all plant systems..." GPU Brief p. 37. However, no integrated reliability study has been done for TMI-1, by either the Staff or GPU, nor is there any reason whatever to believe that such a study would show TMI-1 to be safer than current data indicate either on a comparative or absolute basis. It is always possible to argue for more general study; that is no reason in itself to disbelieve the results of the EFW failure analysis. Moreover, studies done in other plants have identified potential common mode failures for B&W plants that could constrain the ability of the plant to deal with loss of feedwater. See UCS Proposed Findings of Fact, paras. 435-440, pp. 180-191. Thus, consideration of "integrated response" is not likely to benefit GPU's case.

One of the lowest points in this proceeding occurred when the Staff tried to discredit its own TMI-1 EFW eliability analysis. See UCS Brief at 16-17. Now GPU suggests that the hard data on EFW reliability should be disregarded in favor of the Staff witness's "judgment" that the probability of core damage at TMI-1 is less or the same as for "other plants." GPU Brief at 37-38. The Staff witness was not remotely qualified to offer such a sweeping judgment. See UCS Reply Findings on Board Questions 2 and 6, July 27, 1981, paras. 105-108.

GPU also claims that the failure analysis placed "some bias" against the B&W design. GPU Brief, p. 36. The problem is not with the analysis, but with the B&W design. The fact is that B&W steam generators have a much smaller inventory than other FWRs and thus dry out much more quickly, in about five minutes, as compared with twenty. This is not a "bias"; it is a recognition of a physical difference between the plants.

GPU also mounts an attack on the ASIB's use of quantitative analysis, claiming a distinction between this and the St. Lucie case and arguing that some "unique" circumstance is required to justify quantitative analysis. GPU Brief, pp. 30-31. That is, GPU argues that unless the TMI-1 EFW can be shown in advance to have a higher rate of challenge or failure than other EFW systems in other plants, no quantitative assessment should be done, nor should loss of EFW be considered a design-basis event for TMI-1.

This argument fatally misconstrues ALAB-603 and the Commission's decision in the St. Lucie matter, CLI-81-12, June 15, 1981. GPU is simply wrong in asserting that it is necessary to find, a priori, some "unique circumstance" present at TMI-1 in order to review the reliability of the emergency feedwater system. It confuses the evidence on the record which led to a finding in St. Lucie of the unreliability of off-site and on-site power with a "special situation" justifying the review in the first place.

In fact, the Appeal Board in ALAB-603 found that total loss of power at St. Lucie had a probability of 10^{-4} to 10^{-5} per year, considering the probability of loss of offsite power and the probability of failure of both diesel generators. 12 NRC 30 at 45. It is, of course, true that this finding was based on the St. Lucie factual situation, as any record finding is, but this is no different than the TMI-1 case, where the reliability assessment produced by the Staff was based on the particular design of the EFW system.

The Appeal Board fully recognized that its St. Lucie finding might have implications beyond that plant. It stated:

Our finding that station blackout should be considered as a design basis event for St. Lucie Unit 2 manifestly could be applied equally to Unit 1, already in operation at that site. By a parity of reasoning, this result may well also obtain at other nuclear plants on applicant's system if not at most power reactors. Our jurisdiction, however, is limited to the matter before us - licensing construction of St. Lucie 2. Beyond that, we can only alert the Commission to our concerns.
ALAB-603, 12 NRC 30, 32, emphasis added.

Thus, the finding that compelled consideration of station blackout as a design basis event was simply the finding based upon the record of a relatively high probability of occurrence of the event, irregardless of whether such a high probability was "unique" to St. Lucie. As the Commission noted in reviewing ALAB-603 and leaving it undisturbed:

The Appeal Board finding relevant to this review was that the probability of total loss of on-site and off-site AC power - station blackout - was sufficiently high that protecting the plant against such an occurrence was warranted.
CLI-81-12, June 15, 1981, Sl. op. at 2.

By contrast, GPU would have the Commission rule that loss of EFW need not be considered at TMI-1, even though it has a higher probability than station blackout at St. Lucie, because no showing has been made that TMI-1 is "unique" in this respect. Such a standard would supplant the NRC's duty to ensure the safety of the plants it licenses and permits to operate with a general maxim

that a plant shall be licensed unless it can be shown that it suffers from "unique" safety problems. This proposition is completely at odds with NRC's responsibility and finds no support in either ALAB-603 or CLI-81-12.

GPU claims likewise that some special circumstance need be shown in order to justify reliance on quantitative estimates of the reliability of the TMI-1 EFW system. The argument apparently is that, while the reassuring qualitative judgments of EFW reliability contained in GPU and Staff testimony can be relied upon, the quantitative reliability assessment cannot be used unless B&W plants are worse than other PWRs.

We see no logical support whatever for such a curious position. Both the qualitative judgments and the quantitative assessment are directed toward the same question: Is the TMI-1 EFW system sufficiently reliable or should failure of EFW be considered in deciding whether to permit TMI-1 to operate? There is no inherent reason that we can perceive why the former should be considered but not the latter. Nor is there any precedent or logical reason why an additional threshold of "uniqueness" should be established in order for the Commission to consider and rely upon the quantitative reliability assessment.

Finally, GPU states that the Board cited "with approval" Staff testimony that the TMI-1 EFW system at restart will be comparable with some other operating plants and about equal to industry average. GPU Brief, p. 27. The Board indicated no such "approval," it simply described the witness's opinion. 14 NRC at 1372. Moreover, at the time of the hearing, the Staff witnesses believed that the EFW system was essentially seismically qualified, based on GPU's representations. See App. Tr. 325, Lic. Ex. 15. It was learned only later that the system is not seismically qualified. App. Tr. 345. In addition, in the years since the testimony was given, all other operating

reactors have had at least one refueling outage and thus, most EFW systems should be fully safety-grade by now. These developments adversely affect TMI-1 in comparison with other plants.

The Staff's position on the issue of EFW reliability can be briefly summarized: 1) at restart the EFW system will be safety-grade for small break LOCA and loss of main feedwater accidents (but not other design basis accidents) and thus is sufficiently reliable, and 2) feed and bleed provides "further, though not required assurance of the protection of public health and safety until restoration of feedwater" Staff Brief, p. 17.

The former is nothing more than a syllogism. In the face of data showing B&W EFW systems are challenged at a relatively high rate, failure data for safety-grade systems "not...indicative of high reliability (14 NRC at 1356-7), and a plant-specific failure mode analysis showing that after it is fully safety-grade, the TMI-1 EFW is expected to have a failure probability of 1.5×10^{-4} per year (Id. at 1370), it is not sufficient to fall back on the bald assertion that the system is adequately reliable.

As to the Staff's attempt to resuscitate feed and bleed, albeit coyly couched as "unnecessary," we are frankly astonished. First of all, when the Staff argues that it "does not believe that it is necessary...to rely on feed and bleed as a backup" to EFW (Staff Brief, p. 17, emphasis in original), the Staff deliberately ignores its own testimony and the Appeal Board's findings based on that testimony.

The Staff position during this proceeding was that feed and bleed is necessary to meet NRC rules pending full upgrade of the EFW system to safety grade.

Until EFW system upgrading at TMI-1 is completed, the Staff is relying on the feed and bleed mode of core cooling to protect against events for which the EFW system is not fully safety grade.

NRC Staff Proposed Findings, para. 435, emphasis added.

Based on our consideration of the evidence on the record of this proceeding, we find that although the EFW system at TMI-1 will not be safety-grade at the planned time of restart, it will have been upgraded to significantly improve its reliability, that operator action within about 20 minutes to actuate the safety-grade HPI pumps and initiate feed and bleed cooling can protect against failures of both the main and emergency feedwater systems, that feed and bleed cooling can be continued until feedwater is restored and thus there is reasonable assurance that the public health and safety will be adequately protected against feedwater transients if TMI-1 is allowed to restart prior to full upgrading of the EFW system to safety-grade.

NRC Staff Proposed Findings, para. 441, emphasis added.

The Appeal Board, relying on the Staff's testimony and UCS Proposed Findings on Reopened Hearing (April 10, 1983), found as follows:

We consider the EFW system sufficiently reliable for events within the limited scope of this proceeding. However, the staff has indicated that feed and bleed is relied upon for those events for which the EFW system is not fully safety-grade, such as main steam line break. Furthermore, the staff testified that the EFW system function following a safe shutdown earthquake has not been demonstrated since portions of the system piping and controls are not Seismic Category 1. While these events (such as a main steam line break and a severe earthquake) are outside our purview, it is necessary to note our concerns over the possible reliance upon feed and bleed. If the staff wishes to rely on feed and bleed, regardless of whether the event postulated is within the scope of the restart proceeding, then it should promptly complete its analysis of the feed and bleed process to assure its viability. 17 NRC 855, emphasis added, footnotes omitted.

The Staff, in its zeal to convince a majority of the Commission to vote for restart without considering the risk to public health and safety, apparently hopes the Commission will overlook the facts that:

1. The TMI-1 EFW system is not safety-grade for all design basis accidents, such as main steam line break and a severe earthquake;
2. Feed and bleed is relied upon by the Staff to protect public health and safety against those design basis accidents for which EFW is not safety-grade; and
3. Feed and bleed has not been shown to be a viable method of providing adequate core cooling for TMI-1.

These facts contributed to the Appeal Board's finding that the evidentiary record in this proceeding is inadequate to determine "whether there is reasonable assurance that Three Mile Island Unit No. 1 can be operated without endangering the health and safety of the public." 17 NRC at 823, 895. It was left to the Commission to make that determination "after examining all systems and considering information within and outside this record...." Id., emphasis added.

In contrast, the Commission is improperly focussing primarily on the question of whether information and issues were properly excluded from this record while apparently ignoring the excluded information which shows that TMI-1, in its present condition, cannot be operated without undue risk to public health and safety.

We return now to the Staff's positions that, for small break loss of coolant accidents and main feedwater transients, "feed and bleed should be considered to provide further, though not required, assurance of the protection of the public health and safety until restoration of feedwater" and that "the feed and bleed core cooling system has been shown analytically to be effective for a period of several hours following a postulated loss of all feedwater." Staff Brief, p. 17.

Here again, the Staff apparently hopes the Commission will overlook the fact that the Appeal Board reviewed the Staff's assertion that feed and bleed "has been shown analytically to be effective" and found that assertion to be without merit.

The conclusions of these analyses lend some support for the position that feed and bleed can provide adequate core cooling at TMI-1. However, because of the uncertainties involved in the analyses and the failure of the staff witnesses to adequately address those uncertainties in their testimony, we are unprepared to state conclusively that feed and bleed will successfully provide core cooling at TMI-1. As noted by UCS, staff witness Sheron testified at the reopened hearing

that the adequacy of feed and bleed is within the range of experimental uncertainty. Additional investigation of the uncertainties inherent in the analyses would be needed before a definitive statement on the viability of feed and bleed cooling could be made.

17 NRC 852, emphasis added.

Furthermore, less than two weeks before filing its brief, the Staff summarized, for GPU, the reasons why the Staff presently can give no credit for feed and bleed. James Van Vliet, NRC's project manager for TMI-1, and Walton Jensen, one of the principal Staff witnesses in the reopened hearings who tried (and failed) to convince the Appeal Board that feed and bleed cooling has been analytically demonstrated for TMI-1, told GPU the following:

MR VAN VLIET: As far as feed and bleed goes, I think that our position has been, and of course you can check the record on this, it has been that we think we have analytically demonstrated that there is a high probability that feed and bleed would work but as I understand it we have never looked at feed and bleed as it relates to a specific plant, to the kind of depth that we would have to to give it credit for design basis accidents.

Now as far as what might be required for us to consider design basis credit for feed and bleed, I will ask Walt Jensen to expound on it a little bit and Walt can explain some of the kinds of things we need to look at.

MR. JENSEN: As Jim said, we have seen analysis for our feed and bleed for several hours after a loss of feedwater event and it seems as though it will work for the period of time that we have looked at it. But before we can give credit for it as a system that could mitigate design basis events, we would have to have a good bit of additional information such as we would have for any such system, ECES system or any kind of engineered safety feature.

I have got a list of some things that we have thought about if I can read it.

One thing that needs to be defined is the time period we are talking about. How long would you need to be in feed and bleed? We need to develop a design basis, in other words, for the system. What is the design basis for it in terms of time?

You would go on loss of feedwater, I guess, and how long would you have to stay on feed and bleed before you could switch to another system such as DHR [Decay Heat Removal]? Or would you assume that other equipment would be available after some period of time, so you would have to be -- so you would not be on bleed and feed then.

And we would like to see some complete analysis over this period of time for the reactor system and the containment system such as the system pressure and the temperatures throughout the primary loop and the void fractions that might occur in the head and other places, pressurizer, hot leg.

MR. MA[U]S: Are we going to get a transcript of this so we don't have to take detailed notes?

MR. VAN VLIET: It is up to you.

MR. MAUS: All right.

MR. JENSEN: That would probably be a help.

The flow is going into the system from the safety injection pumps and the flow is going through the PORV and safety valves.

We would also like to see analysis of the containment temperature and pressure and I guess the one problem that comes to mind is the brittle fracture limits from Appendix G on the supporting thermal stress evaluation for the reactor vessel, the types of operator action that might be required to keep the limits from being exceeded and does he have to control the PORV safety injection pumps or what kind of instrumentation would he rely on to do this?

Can this instrumentation really tell what he really needs to know about temperatures within the reactor vessel?

And then we need to look at other equipment that would be needed to function during the feed and bleed process and we need to have justification that this equipment can operate for whatever period of time it is supposed to operate.

And the high pressure injection pumps, can they operate for the required number of hours? The safety valves, the PORVs, would they be damaged in feed and bleed in this time?

And then we need to be sure that this equipment is designed to appropriate standards for safety-related equipment including redundancies, seismic qualification, environmental qualification and emergency power requirements?

Next after the period of feed and bleed, the reactor core still needs to be cooled and I do not know what you would do, whether you would go on RHR or DHR. In any case, you would need to look at that equipment and be sure that equipment would still be available and we would look on that as part of this feed and bleed system which would also meet safety related standards.

That would include redundancy, seismic, emergency power. One thought we had about the DHR system is the fact that it has a single drop line with a valve set which might be prone to single failure.

And then we need to look at the operator, to list all of the operator actions that are necessary during the feed and bleed process and post-feed and bleed recovery, justify that the plant procedures exist for feed and bleed operation and post-feed and bleed operation, justify that operators have been adequately trained in these procedures.

Next we need to look at experimental verification that -- for the feed and bleed cooling process, provide experimental data justifying the discharge model for the safety valves and/or the PORV and then verify to do a computer code adequately for the experimental data.

That is the list that we came up with.

MR. VAN VLIET: I might add that the list was really put together in about a 24-hour period and the final review may or may not have more things, listings, we just don't know but certainly I hope that gives you a feeling for the things we would need to look at.

* * *

MR. VAN VLIET: I believe if we had to write an evaluation today, and of course one of the aspects of that is the [UCS Show Cause] petition [Concerning EFW], that we would have to only respond to what you have on paper here and that of course is your reliance on feed and bleed.

And I think what we would have to say is simply what I said and what Walt said, we can't give you credit, design basis credit for feed and bleed at this point and we have to reject it.

Transcript of Staff Meeting with GPU on TMI-1 Environmental Qualification, March 8, 1984, pp. 6-10, 12, emphasis added.^{3/}

^{3/} UCS wishes to bring to the Commission's attention the fact that Walton Jensen was one of the Staff's principal witnesses before the Appeal Board in the reopened hearings and testified, under oath, to the effect that much of the information he sought from GPU in the March 8, 1984, meeting was already known or was unimportant in assessing the viability of feed and bleed. See, for example, Sheron and Jensen, ff. App. Tr. 83, at 40, regarding the alleged unimportance of experimental discharge data for the safety valves, and App. Tr. 194-199, 210-211 (Jensen) regarding whether the HPI pumps would be capable of performing as required during feed and bleed -- Question by counsel for GPU: "Mr. Jensen, just to get to the bottom line of Mr. Pollard's questioning about the HPI pump capability, does the use of the HPI pumps for system makeup for extended periods of time during normal operation of the plant give you confidence in the HPI

Thus, contemporaneously with its assurances to the Commission that feed and bleed can be relied upon as a backup to EFW, the Staff is telling GPU that feed and bleed cannot be relied upon because the Staff:

1. Has "never looked at feed and bleed" for a specific plant,
2. Does not know "how long you need to be in feed and bleed,"
3. Needs an analysis specific to TMI-1 of containment and primary system temperature and pressure, void fractions in the reactor vessel head, pressurizer, hot leg and "other places,"
4. Is concerned about the potential for exceeding the brittle fracture limits of the reactor pressure vessel during feed and bleed and whether the existing instrumentation is adequate to tell the operator "what he really needs to know,"
5. Does not know whether the high pressure injection pumps can operate for the required number of hours and whether the PORV and pressurizer safety valves will be damaged by feed and bleed operations,
6. Does not know whether the equipment needed for feed and bleed meets NRC regulations concerning redundancy, seismic and environmental qualification, and emergency power supplies,

(Footnote Continued)

pump capability for feed and bleed conditions?" Answer (WITNESS JENSEN): "Yes, it would. It would show the pump could operate for a long period of time with flows not much different from what it would have in feed and bleed operations." Counsel for GPU "Fine, that is all I have." App. Tr. 210-211. Other examples of Mr. Jensen's propensity to say whatever he thought was necessary to extract a decision favorable to restart from the Licensing and Appeal Board abound. Fortunately, UCS cross-examination was often able to establish that Mr. Jensen had no factual basis for his testimony. In the case of the above aspects of his testimony on the viability of feed and bleed, we had to await the transcript of the March 8, 1984, meeting for him to acknowledge the lack of a factual basis for his testimony. See also, Staff Counsel Cutchin's successful objection to UCS's attempt to establish that feed and bleed could threaten the reactor vessel brittle fracture limits. He claimed the issue was not relevant, in contrast to the Staff's current position. App. Tr. 300.

7. Is concerned that the Decay Heat Removal System is prone to a single failure,
8. Does not know whether plant procedures and operator training are adequate for feed and bleed operations and post-feed and bleed recovery, and
9. Has neither experimental data for the discharge characteristics of the TMI-1 PORV and safety valves nor, of course, a computer analysis of feed and bleed utilizing experimental data for the TMI valves.

In sum, while the Staff Brief appears designed to lead the Commission to overlook the fact that although feed and bleed is necessary for design basis accidents, the Staff is in no position to vouch for its viability as a backup to EFW, not even as an allegedly "unnecessary" backup to EFW for small-break LOCAs and main feedwater transients.

3. PORV

With regard to the use of the PORV for depressurization during low temperature operations, the argument is reasserted that the PORV is not needed because the operator would have more than ten (10) minutes to terminate the cause of the overpressurization. The Staff asserts that this is true whether or not a steam bubble is maintained in the pressurizer. Staff Brief, p. 23. This assertion is false and not in accord with the record. It appears to be based solely on the Appeal Board's sanguine, but utterly unsupported observation that "[i]f an overpressurization event were to occur during a cold shutdown condition with no bubble in the pressurizer, the PORV also should only serve a secondary safety function as a backup to operator actions (e.g., shutoff HPI and increase letdown flow) to terminate the event." 17 NRC at 864, emphasis added, footnote omitted.

The problem is that the evidence in the record is to the contrary and the Appeal Board made no attempt whatever to reconcile its observations with the record.

For one thing, even GPU's witness conceded that it is probable that when there is not a bubble in the pressurizer, the operator does not have ten (10) minutes to act to prevent overpressurizing the reactor vessel. Tr. 8976, Jones. There was no evidence contradicting this. As Mr. Pollard testified:

Another good illustration was the technical specification which Mr. Jones [GPU's witness] just finished reading, which says, in effect, that the PORV may not be taken out of service unless specified conditions are met. That is that you either had a bubble in the pressurizer or the high pressure injection pump breakers were locked out or the injection valves were locked closed.

I think this quite well illustrates that the protection against overpressure when you are cold is the PORV. It is true the operator should try to make sure that nothing happens in the plant that would cause an overpressure condition, but if something did happen, it is the PORV that is going to limit that pressure rise.
Tr. 9032-9033, Pollard.

The operator is instructed in the TMI-1 procedures to use the PORV for depressurization under normal and transient conditions. Tr. 9033 ff, Pollard. To refer to the PORV as a "backup" is incorrect. It is the sole protection against overpressurization. It is only a backup in the same sense that the emergency core cooling system (ECCS) is a backup to a loss of coolant accident. That is, if the primary system, despite its high quality, has a rupture, the ECCS must deal with it. So too, the PORV "is only a backup in the sense that if the operator makes a mistake and causes an event which results in increasing pressure, the PORV is there to terminate it." Tr. 9031-9032, Pollard.

Both GPU and the Staff also assert that during inadequate core cooling conditions, the depressurization functions of the PORV are less significant than depressurizing with the operative steam generator. E.g. GPU Brief, p. 45. As we have pointed out repeatedly, the TMI-1 procedures require use of

both the steam generator and the PORV; the operator is directed to use the PORV to maintain RCS pressure within 50 psi of steam generator pressure. Lic. Ex. 48 at 26.0-27.0. Moreover, after depressurization, the operator is directed to use the PORV to control RCS pressure below 150 psig. Lic. Ex. 48 at 28.0.

In addition, the Staff and GPU totally overlook the fact that there is no safety-grade means of depressurization even using the operative steam generator. Neither the atmospheric dump valves nor the turbine by-pass valves are safety-grade as this record clearly establishes, e.g. Tr. 16,557-59, Keaten. Thus, there is no way to depressurize through the steam generators without the use of non-safety grade equipment. Finally, as even the Staff testified, one function of the PORV is to give the operator a means of depressurizing the primary system that is independent of the steam generators. Jensen, ff. Tr. 8821, at 3.

In belatedly claiming that the use of the PORV during low temperature operations is not within the scope of this proceeding, the Staff raises an objection which it never raised during the hearing. Staff Brief, pp. 22-23. The Staff did not object to the UCS testimony nor attempt to have the pertinent sections stricken. It cannot be heard now to raise a last minute objection after four years of litigation, particularly when the result would be to prevent consideration of evidence clearly establishing a vital safety function of the PORV. To ignore this issue after the evidence is in would confirm that the scope of this proceeding was manipulated to deliberately exclude the "bad news" while including the good.

Moreover, the Staff's "nexus" argument distorts the thrust of the UCS contention and the basis upon which it was argued to and accepted by the ASLB. As UCS has emphasized from the outset of this proceeding, one of the primary lessons learned from the TMI-2 accident is that previous safety analyses did

not properly recognize the manner in which systems then considered to be unrelated to safety may in fact be called upon to mitigate accidents. UCS believes that systems used in accident prevention and mitigation are important to safety, within the meaning of NRC's rules, should be classified as safety-grade, and upgraded to meet the pertinent Commission rules for safety-grade systems (redundancy, diversity, quality assurance, testability, etc.) so that they are sufficiently reliable to perform their accident-mitigation and/or prevention functions. The PORV is one of these.

While there was vigorous dispute on the merits among the parties as to whether the PORV does perform functions important to safety, there was no dispute that there is a clear connection between this issue and the TMI-2 accident. No party objected to the admission of UCS Contention 5. LBP-79-34, 10 NRC 828, 836. It was not claimed by any party that the lessons learned from TMI-2 could be limited mechanistically to small-break LOCAs or loss of feedwater events.

In support of the view that the lessons learned from the TMI-2 accident encompass this issue, UCS's testimony cited the NRC's original "Lessons Learned" evaluation, NUREG-0578:

Several nonsafety systems were used at various times in the mitigation of the accident in ways not considered in the safety analysis; for example, long-term maintenance of core flow and cooling with the steam generators and the reactor coolant pumps. The present classification system does not adequately recognize either of these kinds of effects that non-safety systems can have on the safety of the plant. Thus requirements for nonsafety systems may be needed to reduce the frequency of occurrence of events that initiate or adversely affect transients and accidents, and other requirements may be needed to improve the current capability for use of nonsafety systems during transient or accident situations.
Id., p. 18, emphasis added.

The relatively high frequency of AOOs [Abnormal Operational Occurrences] places a reliability demand on the operation of the PORVs and associated equipment that is higher than originally envisioned. Also, the operation of some components and systems provided for emergency core cooling have been challenged more times than was previously expected as a

result of AOCs. Therefore, there is a need to consider the upgrading of the PORVs, block valves, and the associated control and power equipment to a safety-grade classification to achieve greater valve reliability and to minimize the number of challenges to the operation of the emergency core cooling components and systems. However, the merits and degree of upgrading of all pressure-relief equipment associated with the pressurizer requires further evaluation, which should be accomplished on a longer term basis.
Id., pp. A-3 and A-4, emphasis added. Pollard, ff. Tr. 9027 at 5-15, 5-16.

The TMI-1 accident, thus, directly raised the question of whether systems previously considered unrelated to safety do, in fact, perform safety functions. That is the "nexus" for this contention. UCS argued and presented evidence to demonstrate that the PORV is a component which does perform vital safety functions. No party objected to any of this evidence. Belated efforts after the record has been made, to look at only some of these safety functions while ignoring others, are inexcusable. If the next accident involves an overpressurization event, one can only imagine the recriminations that would follow.

There is a good reason why the Staff urges the Commission to rule this issue to be beyond the scope; the Staff's substantive position on the use of the PORV for depressurization during low pressure operation is indecipherable. Pages 23 and 24 of the Staff's brief can only be read as admitting that the Appeal Board was wrong in finding that the PORV is only a backup to operator action:

 Their conclusion may be correct depending on the particular circumstances involved (e.g., depending on the reliability of the alarms). The record, however, contains no such details.

Having admitted that the record does not support a finding that the PORV is only a "backup", the Staff then seeks to have the Commission accept other "reasons" why the PORV need not be safety grade, while in the same breath conceding that these new "reasons" are also not part of the record. Staff Brief, p. 24 and n. 17. An astonishing footnote follows, containing a

soliloquy supported neither by record citation nor citation of any kind whatever, nor even any attribution. The claim is made that "the Staff believes that vessel failure will not result" from unmitigated vessel overpressurization. This unsupported "belief" on the part of the Staff's lawyers (no technical Staff document nor published technical opinion of any kind is cited) has no status in this proceeding and is entitled to no consideration. The Staff is well aware of this. Thus, its new "reasons" are apparently intended as a signal to the Commissioners that they need not really worry about this issue and can seek some way to avoid the merits.

UCS is aware of no documentation supporting the Staff's new belief and we consider this transparent ploy to be highly unethical. Indeed, we believe that the Staff has provided no citations to support its belief precisely to prevent UCS from mounting a rebuttal to anything cited. This is particularly egregious considering that UCS attempted during the reopened proceeding to explore the question of potential vessel overpressurization and were prevented from doing so because the Appeal Board sustained Staff attorney Cutchin's objection that the issue "has nothing whatsoever to do with the issues within this proceeding." App. Tr. 300. The Commission may not lawfully rely on the Staff's "belief" either implicitly or explicitly. See SAPL v. Costle, 572 F.2d 872 (1st Cir. 1978).

In summary, the evidence of record compels a finding that the PORV should be safety-grade. No amount of legalistic pettifoggery can obscure this fact.

4. Systems Interaction

In essence, both GPU and the Staff argue that, on this issue, no progress is reasonable progress. UCS sees no need to reply.

5. Main Steam Line Rupture Detection System (MSLRDS)

This issue first arose because it became apparent that failure of the non-safety grade MSIRDS could shut off all feedwater (both main and emergency) to both steam generators. The ASLB "resolved" the issue by directing GPU to propose a solution. Rather than upgrade the system to safety-grade prior to restart, GPU proposed the short-term expediency of disconnecting the signal between the EFW system and the non-safety grade MSIRDS. GPU apparently hopes thereby to consign the remaining safety hazards associated with the non-safety grade MSIRDS to that vast universe "beyond the scope of the proceeding."

Prime among those hazards is the potential for overpressurizing the containment following a main steam line break inside containment if the non-safety grade MSIRDS fails to shut off main feedwater to the affected steam generator. Neither GPU nor the Staff denies the existence or the seriousness of this problem. Nor do they deny that making the system safety-grade would prevent it. They simply wish the Commission would disregard the issue.

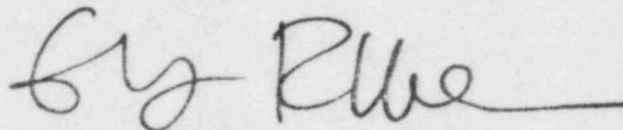
Frankly, it never occurred to UCS that GPU would hit upon a short term "solution" so manifestly inadequate. The Appeal Board recognized the "concern for overpressurization of the containment" and stated: "Prior to acceptance of [the GPU] proposal, we recommend that the potential for containment overpressurization as a result of MSIRDS failure be evaluated." 17 NRC at 834. It has not been.

It should be emphasized that the Commission did not take review of whether this issue is within the scope of the proceeding. We therefore assume that it wishes to address the merits. On the merits it is not subject to serious dispute that the TMI-1 MSIRDS poses a serious safety hazard.

CONCLUSION

For the above-stated reasons as well as those treated in UCS's main brief, the Commission should find that the operation of TMI-1 would pose undue risk to the public health and safety.

Respectfully Submitted,

A handwritten signature in dark ink, appearing to read "Ellyn R. Weiss", with a long horizontal flourish extending to the right.

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Dated: April 3, 1984

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In the Matter of)
)
METROPOLITAN EDISON COMPANY)
)
(Three Mile Island Nuclear)
Station, Unit No. 1))

Docket No. 50-289
(Restart)

CERTIFICATE OF SERVICE

I hereby certify that copies of "UNION OF CONCERNED SCIENTISTS' REPLY BRIEF ON REVIEW OF ALAB-729 and ALAB-744" have been served on the following persons by deposit in the United States mail, first class postage prepaid, this 3rd day of April 1984, except as indicated by an asterisk.

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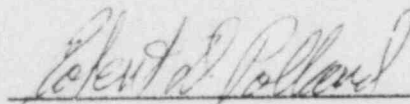
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