

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

Docket No. 50-289
Restart

UNION OF CONCERNED SCIENTISTS
REPLY FINDINGS ON
BOARD QUESTIONS 2 AND 6



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BOARD QUESTION 6

Reply to Licensee's Proposed Findings, Paragraph Nos. 432-442, 450, and 463

78. In a Procrustean effort to tailor the holding in the St. Lucie case to fit its arguments, the Licensee claims that some "unique circumstance" (LPF, para. 439) or "special situation" (LPF, para. 450) must be demonstrated as a precondition for applying a quantitative assessment of the reliability of the TMI-1 emergency feedwater system. That is, the Licensee 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, a quantitative assessment should not be "required", nor should loss of EFW be considered a design basis event for TMI-1. (LPF, para, 450)

79. The Licensee's argument fatally misconstrues ALAB 603 and the Commission's decision in the St. Lucie matter, CLI-81, 12, June 15, 1981. The Licensee 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 or to find that loss of EFW should be a design basis event. 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.

80. 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.* (12NRC 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.

81. 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.)

82. 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

* The diesel generator failure rate is a generic one, (12 NRC 46-48). This is hardly an "unusual circumstance" as Licensee states. (LPF, para. 439)

was sufficiently high that protecting the plant against such an occurrence was warranted.

(CLI-81-12, June 15, 1981, Sl.op. at 2.)

83. By contrast, the Licensee would have this Board hold 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. We have previously rejected similar arguments which would, in effect, supplant the NRC's duty to ensure the safety of the plants it licenses and permits to operate with a general standard 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.

84. Moreover, the Licensee claims that some "special circumstance" need be shown in order to justify the Board's reliance on the quantitative estimate of the reliability of the TMI-1 EFW system. (LPF, para. 450, 463) The argument apparently is that, while the reassuring qualitative judgments of EFW reliability contained in the Licensee's testimony can be relied upon, the quantitative reliability assessments of the Staff cannot be used unless B&W plants are worse than other PWR's. (LPF, para. 463)

85. We can find 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 accepted by this Board but not the latter. Nor is there any precedent or logical reason why an additional threshold of "uniqueness" should be established in order for this Board to consider and rely upon the quantitative reliability assessment.

Reply to Licensee's Proposed Findings, Paragraph No. 395

86. The Licensee alleges that the modifications to the TMI-1 EFW include the installation of a safety-grade auto-start for the EFW pumps prior to restart. The record does not support a finding that these initiation circuits will be safety grade prior to restart.

87. In describing the modifications completed prior to restart, auto-start of the EFW pumps is referred to as control grade. (Lic. Ex. 15, at 6) The Restart Report specifically states that the "main feed pump differential pressure sensing equipment is control grade." (Lic. Ex. 1, at 2.1.-21, Am. 22) During cross-examination, UCS questioned Licensee's witnesses on whether the Restart Report accurately described the EFW modifications that would be completed after restart. (Tr. 5823-25), Copodanno and Lanese) At that time, the witnesses testified that the Restart Report, Amendment 22, was incorrect. One witness testified that "I believe we have safety grade components available and they will be installed for this auto initiation." (Tr. 5823-24, Copodanno) The other witness testified that it was his "understanding" that the auto-start function would be safety grade. (Tr. 5825, Lanese) Since that testimony

was given, the Restart Report has been amended three times and was finally introduced into evidence. It currently indicates, contrary to the testimony of the witnesses, that the circuitry for auto start of the pumps is not safety-grade. (Lic. Ex. 1, at 2.1.-21, Am. 22 and 2.1-45, Am. 23)

88. In addition, there has been no evidence produced on this record which demonstrates that starting the EFW pumps on only loss of all four reactor coolant pumps or loss of both main feedwater pumps is sufficient to protect public health and safety. The circuits to initiate EFW operation in the event of either low steam generator level or low differential pressure between the main steam and feedwater lines at either steam generator, have not been and will not be installed prior to restart. (Lic. Ex. 1, at 2.1-45, Am. 23; Tr. 5825, Lanese) Thus, EFW will not be automatically initiated, even if there is inadequate main feedwater flow, if at least one main feedwater pump and one reactor coolant pump are in operation (or sensed as being in operation).

89. Finally, even assuming the above deficiencies were cured, the Licensee's proposed finding cannot be given much consideration in our decision. The EFW function of delivering water to at least one steam generator is not accomplished simply by starting the pumps. The EFW flow

control valves, EFV 30A and 30B, must be opened and regulated. (Tr. 5710, Lanese) These valves remain controlled by the integrated control system (ICS) which is not safety grade. The Licensee's proposed finding equates starting the EFW pumps with accomplishing the EFW function, a patently false and misleading proposition. The EFW system can be classified as "important to safety" or as "safety grade" only if control of the EFW flow control valves is disconnected from the ICS and transferred to the reactor operator. (Tr. 5711, Lanese)

Reply to Licensee's Proposed Finding, Paragraph No. 396

90. The proposed finding contradicts itself with regard to the environmental qualification of EFW flow indication. Only the latter part of the proposed finding is correct - the environmental qualification of the flow indication has not yet been established. (Staff Ex. 14, at 39)

91. The Board observes that this proposed finding, as well as item 2.1.7.b in NUREG-0578, is inconsistent with the Staff's position on UCS Contention 12. In response to UCS Contention 12, the Staff took the position, contrary to the requirements of GDC-4, that environmental qualification of equipment was required only for a small-break LOCA and not for other design basis accidents in order to permit

restart. Qualifying only the EFW flow indicators to withstand the environment caused by a high energy line break in the intermediate building may result in having qualified flow transmitters in a system incapable of producing any flow when subjected to that environment.

Reply to Licensee's Proposed Findings, Paragraph No. 404 and 406

92. The TMI-1 emergency feedwater system will not be safety-grade for a loss of main feedwater transient at the time of restart, contrary to the Licensee's assertion.

93. The EFW pump start circuits are control grade and the EFW flow control valves are operated by the control grade ICS. (See reply to Licensee's proposed finding 395, supra) Furthermore, the EFW system "may not be fully safety-grade with respect to seismic qualification." (Lic. Proposed Findings, para. 406)

94. Finally, the Staff testified, in response to cross-examination by the Licensee, that the EFW system will not be safety-grade at restart. (Tr. 17,015, Wermiel)

Reply to Licensee's Proposed Findings, Paragraph No. 405

95. The Licensee cites only one part of the answers given by its witnesses, Lanese and Capodanno, as support for the

assertion that no single failure in the ICS will cause loss of both main and emergency feedwater. First of all, the only failures considered were loss of electrical power. With regard to the effect of failures of components within the ICS, the witnesses "really do not know the answer."

(Tr. 5718, Capodanno; Tr. 5719, Lanese) "I cannot address the single failure of the ICS." (Tr. 5731, Lanese) Considering the complete testimony of Licensee's witnesses on this subject, we reject as unreliable the statement of Mr. Lanese cited by the Licensee.

96. The testimony of Joyner cited by Licensee (Tr. 7038-40) is also rejected as unreliable. If the ICS was as reliable as Licensee would have us believe, there would be no need for the Licensee's long term plans to install a safety-grade, single-failure-proof design with EFW flow control independent of ICS. (Lic. Proposed Findings, Paragraph 402) Furthermore, Staff testimony was that a failure in the ICS could prevent opening both EFW flow control valves. (Tr. 17,069-70, Curry)

Reply to Licensee's Proposed Finding, Paragraph No. 436

97. Footnote 137 asserts that loss of offsite power is not expected to occur during the life of the plant. The Board need not determine the validity of that assertion because the Commission regulations (10 CFR Part 50, Appendix A) require that loss of offsite be postulated as an anticipated operational

occurrence and Licensee has shown no special circumstances to justify its attack on the regulations.

Reply to Licensee's Proposed Findings, Paragraph No. 441

98. The proposed finding is primarily an abstract discussion which ignores an important factor. If the consequences of "secondary system upsets" are more severe, as the Licensee acknowledges, the reliability of EFW which is acceptable cannot be judged solely on the frequency of such "upsets."

Reply to Licensee's Proposed Findings, Paragraph Nos. 444 and 449

99. The proposed findings make it appear to be entirely a virtue that the TMI-1 EFW system is not used for normal operations. The Licensee would have the Board ignore the fact that use of an EFW system for startups could lead to discovery of failure modes that might be undetected at TMI-1. (Tr. 16,663-16,666, Keaten. See also Tr. 16,654-5, 16,659-61, regarding the significance of failures during tests.)

Reply to Licensee's Proposed Findings, Paragraph No. 448

100. The Licensee ignores the fact that at least some of the failures detected by testing are relevant to determining the probability that EFW will fail upon demand. (Tr. 16,650-66, Keaten) The Licensee cites a sentence which its own witness

acknowledged was not accurate: "I probably would have worded it differently, to be honest about it." (Tr. 16,662, Keaten) We, therefore, reject the proposed finding because the data does tell us something about the probability that the TMI-1 EFW system will fail if it is called upon or demanded. Furthermore, the requirement of 10 CFR Part 50, Appendix A, to consider loss of offsite power and loss of main feedwater as anticipated operational occurrences establishes the minimum demand frequency for EFW.

Reply to Licensee's Proposed Findings, Paragraph No. 457

101. The proposed finding is an attempt to downplay the significance of the low reliability of the TMI-1 EFW system by selectively citing the record.

102. The record does support the statements that consideration needs to be given to the integrated response of all plant systems. However, the record also indicates that no such integrated reliability assessment has been undertaken by either the Licensee or the Staff. (See UCS Proposed Findings on Board Question 6, particularly paragraphs 388, 389, 396, 403, 404, 405, 432, 433, 436, 437, and 450)

Reply to Licensee's Proposed Findings, Paragraph No. 458

103. The Board can give little or no weight to the proposed finding.

104. The lesser of the problems with the proposed finding is that it misrepresents the testimony. The witness did not offer a judgement on a particular core melt sequence at all other operating plants. His testimony referred to "other plants" and to "other sequences in all operating plants that I am aware of." (Tr. 17,090, Curry, emphasis added) The Licensee made no attempt to inquire into the specific core melt sequences or the particular plants to which the witness referred.

105. More importantly, the Board can give little or no weight to the sweeping "judgement" of a witness with so little relevant professional qualification. Mr. Curry is a relative newcomer to the field of probabilistic analyses. His B.S. in nuclear engineering was awarded in 1974. He then spent two years as a project manager for two construction permit dockets, which involved little or no detailed analyses of nuclear plant systems since such details are not available at the construction permit stage. The next two years were spent earning a M.S. in chemical engineering - a field totally

unrelated to the testimony cited by Licensee. Then he was assigned to NRC's Division of Systems and Reliability Research in March 1978. His first year was spent developing and reviewing a computer model for radioactive isotope migration - which is also totally unrelated to the testimony cited by the Licensee.

106. Mr. Curry's only arguably relevant professional experience was in the two years prior to his testimony when his responsibilities included the analysis of "several" EFW designs, the "management" of the Reactor Safety Study Methodology Applications Program and "participation" in the IREP program. Mr. Curry was unable to specify, not even approximately, how much time was devoted to each of those endeavors.

107. Furthermore, the witness testified that he was "somewhat", but not "fully" familiar with the criticisms of the Reactor Safety Study by the Risk Assessment Review Group. (Professional Qualifications, James J. Curry, ff. Tr. 16,718; Tr. 16,959-62, Curry)

108. We decline to adopt the sweeping, judgmental testimony of a witness with so little relevant training and experience.

Reply to Licensee's Proposed Findings, Paragraph No. 459

109. The Board (Dr. Jordan) specifically inquired whether the B&W analysis showed an order of magnitude improvement

in reliability for the TMI-1 EFW system when comparing the 5 minutes and 30 minutes reliability analyses. (Tr. 17,076) The Staff responded that the B&W analysis did not in any case predict reliabilities as high as the best Westinghouse associated reliabilities. (Tr. 17,076, Curry) The Staff itself performed no analysis of the longer time intervals. (Tr. 17,077, Curry)

Reply to Licensee's Proposed Findings, Paragraph No. 463

110. The Licensee urges the Board to find that "there is no reason to suspect that EFW systems at B&W plants are less reliable than at other plants." Such a finding is not supported by the record.

111. The Staff testimony cited by Licensee contained an important exception which the Licensee ignores - the interaction of the ICS with the EFW system. (Tr. 17,069, Curry)

112. Contrary to the assertion of the Staff (Tr. 17,078, Curry), the proposed EFW system for restart places the health and safety of the public on the hope of operator recovery from EFW failures caused by the ICS. (See UCS Proposed Findings, paras. 425-431)

113. The Licensee also urges the Board to find that "many other PWRs do not have the back-up feed-and-bleed cooling capability which exists at TMI-1." The actual testimony

cited compared B&W plants and Westinghouse plants, not TMI-1 and other PWRs. In addition the witness referred to "some", not "many", plants.

114. More importantly, feed-and-bleed has not been demonstrated to be an adequate method of decay heat removal. (See, UCS Proposed Findings, paras. 432-434) Furthermore, lack of feed and bleed capability only means the HPI discharge pressure is less than the RCS safety valve set point. If the PORV can be opened, a feed and bleed mode can be established even in those plants classified as not having feed and bleed capability.

BOARD QUESTION 2

Reply to Licensee's Proposed Findings, Paragraph No. 520

115. The Licensee here focuses exceedingly narrowly on the undated NTCL items. (Tr. 21, 325-9, Jacobs) It ignores the more pertinent previous testimony that, with respect to all dated requirements in NUREG-0737, the Staff made absolutely no evaluation of whether these should be requisites to restart at TMI-1 on the basis of their safety significance for TMI-1. The few 0737 items listed by the Staff as "required" for restart appear on the list solely because the current date in 0737 falls before the projected TMI-1 restart date. If the 0737 dates slip beyond restart, these items will not be "required" for restart. (Tr. 21, 317-21, 321, Silver.) There has been no plant-specific evaluation of the safety of TMI-1 in its restart condition. (Tr. 21, 117-119, Silver)

Reply to Licensee's Proposed Findings, Paragraph No. 521

116. To the extent that this paragraph implies that the criterion for determining what safety improvements should be required for TMI-1 restart was those of greatest safety significance, it is misleading. All of the cited testimony by Silver and Ross in essence amounts to asserting that the original selection of short-term items and NUREG-0694 items was based on selecting those with greatest safety significance. Silver

reasons from this that, since other plants are still operating, there could be no item vital to TMI-1 restart beyond the short-term items. (Tr. 21, 045, 21, 118-9, Silver)

117. The entire argument is bootstrapped on the premise that the short-term items and the 0694 items dated prior to restart represent those of highest safety significance. In fact, the 0694 items were derived from the so-called Action Plan, NUREG-0660. The priority rankings were based on a 210 point system, only 100 of which were assigned for the safety significance of any particular item. The remaining 110 points involved the cost of implementation, the time required, and whether the item involved hardware or human element improvements. As to the short-term order items of August 9, 1979, they were determined prior to the completion of the major TMI-2 investigations and the development of the Action Plan. It cannot be claimed that, at that time, the Commission was in a position to decide or did decide on the merits that these items are the only items "vital" to restart. (UCS Proposed Findings, Paras. 599-606.)

Reply to Licensee's Proposed Findings, Paragraph No. 526

118. The progress which the Staff has or has not made toward evaluating compliance of other reactors with the NUREG-0737 deadlines can have no possible bearing on the Board's resolution of the issues before it. Moreover, the fact that Staff witness Jacobs knew of no case where the Staff has imposed NUREG-0737-

related license conditions on other plants is not surprising since neither he nor Mr. Silver knew or had even given apparent consideration to how or whether the Staff would enforce the 0737 deadlines on TMI-1. (Tr. 21, 442-3, 21, 260-3)

-Reply to Licensee's Proposed Findings, Paragraph No. 527

119. The Licensee submitted an analysis purportedly in response to Items II.K.2.14/II.K.3.7, although it could hardly be characterized as "the requested analysis." The Licensee has not yet shown compliance with these items. (St. Ex. 12 at II.k.2.14-1 to 3)

120. The Licensee then makes the remarkable argument that it is being "discriminated against" by the Staff since it merely submitted the same generic analysis as all B&W plants, and all others are operating without restriction. For one thing, the Licensee was not forced to submit a B&W generic analysis in response to these requirements, but, having done so, it can hardly claim an excuse for the deficiencies in the analysis by pointing to the fact that they are generic.

121. Moreover, Licensee seems to assume that the appropriate response to a finding that several plants have not shown compliance with these items is to ignore the failure of TMI-1 to meet the requirement. On the contrary, the appropriate response in such a situation would be for the Staff to enforce the requirement against other non-complying facilities. This Board, however,

only has jurisdiction to deal with the case before it. We decline to adopt the novel view that enforcing the requirements in the case before us is "discrimination."

122. Finally, the Licensee quotes Staff testimony to the effect that submission of the required information "will not affect the safe operation of the plant." This misses the pertinent point by a wide mark. The assurance of safe operation inheres in the finding that less than 5% of all overpressure transients will result in opening the PORV. (Items II.K.2.14 and II.K.3.7, Staff Ex. 12) While the submission of any piece of paper will obviously not by itself affect plant safety, the submission in accordance with II.K.2.14 and II.K.3.7 is required to document that the plant can safely operate, or conversely that additional changes in the plant are required in order to meet the goal that the PORV will open in less than 5% of overpressure transients. In the absence of the required analysis, the finding cannot be made that the goal required for safe operation has been achieved.

Reply to Licensee's Proposed Findings, Paragraph No. 528

123. Licensee here makes a similar argument to that discussed directly above, this time with respect to 0737 Item II.K.3.2. We reject it for the same reasons: while submittal of the required information will obviously not itself affect plant safety, it is necessary to document plant safety.

Reply to Licensee's Proposed Findings, Paragraph Nos. 535 and 536

The Licensee presumably means to cite Tr. 21, 288-9 (rather than Tr. 21, 188-9) in support of the position that the Staff would take some enforcement action to "assure that we would be satisfied that our overall conclusion would in fact be substantiated." However, the testimony by the witness Silver amounted to little more than a generalized platitude that the Staff would do its duty, elicited after rather pointed questioning by the Board. In view of the fact that the witnesses had given virtually no thought to how the Staff might enforce the 0737 deadline (Tr. 21, 442-3, 21, 260-3) and in view of the fact that previous licensee commitments have already been waived as the 0737 deadlines were extended. (Tr. 21, 284-5, Silver), we can place no weight on such platitudes. They hardly amount to a basis for "assurance" that commitments to implement the long-term modifications will be enforced.

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

The undersigned hereby certifies that copies of "Union of Concerned Scientists Reply Findings on Board Questions 2 and 6" have been mailed postage pre-paid this 27th day of July, 1981, to the parties listed below.

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