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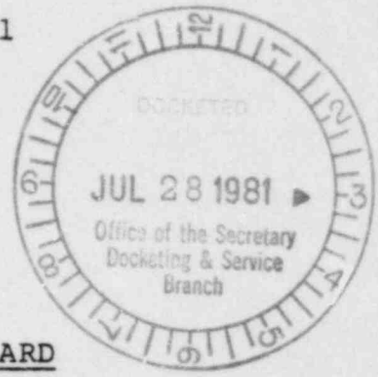

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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)	)	
	)	

PART TWO OF

LICENSEE'S REPLY TO THE
PROPOSED FINDINGS OF FACT AND CONCLUSIONS OF LAW
ON PLANT DESIGN AND PROCEDURES ISSUES
FILED BY OTHER PARTIES

SHAW, PITTMAN, POTTS & TROWBRIDGE

George F. Trowbridge
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L. Connection of Pressurizer Heaters to Diesels

164. Proposed findings of fact on UCS Contention No. 4 were filed by Licensee, UCS, the Commonwealth of Pennsylvania, and the NRC Staff. The Board observes that in most cases the parties were able to anticipate and respond to, in their initial proposed findings on this contention, the fundamental positions which have been asserted by the other parties in proposed findings.

165. The UCS introduction identifying the written, direct testimony presented by the parties overlooks a second piece of Licensee testimony -- Hartman and Torcivia, ff. Tr. 16,493.

166. UCS contends that "Regulatory Guide 1.75 considers and rejects the protection of Class 1E circuits from faults in the non-Class 1E circuits using breaker or fuse coordination because the main breakers are in series with the fault and could experience momentary currents above their setpoints." UCS PF 80. Actually, the Guide recognizes that proper coordination between the distribution and main feeder breakers with the main bus breaker would preclude tripping of the main bus breaker, but takes the position, for the reason stated by UCS, that "it is prudent to preclude the use of interrupting devices actuated only by fault current." Licensee PF 153.C; UCS Ex. 29 at 1.75-2.

167. UCS proceeds to assert that "[t]hus, the fault could affect the entire circuit at the same time." UCS PF 80. Later, UCS states: "As noted above, the effects of a fault can be felt on the entire circuit at once." UCS PF 82. These proposed findings ignore evidence of the "time setting" features of Licensee's design, whereby the distribution and main feeder breakers are set to trip within approximately 0.2 seconds, while the main bus breakers would not trip for up to 15 seconds and would not trip at all upon the opening of the downstream breakers. Licensee PF 144-146, 153.

168. UCS witness Pollard never identified, in any of his testimony at the hearing, a design for a circuit breaker which is only tripped open by a signal other than one derived from the fault current or its effects. Cf. UCS PF 81. The second sentence in UCS proposed finding 81, which implies that a circuit breaker can be so designed, is not supported by any of the cited evidence.

169. The Board has addressed the technical acceptability of the isolation devices in question. See Licensee PF 153. UCS contends that, in the past, coordinated breakers have failed to work as intended to protect emergency power supplies. UCS PF 82. There is no basis for this proposed finding, however, in the cited UCS testimony. Mr. Pollard there refers to "tripping of the equivalent of the main breaker," and does not refer to emergency power supplies. Tr. 9652 (Pollard). The additional proposed finding (in UCS PF 82), that the

accuracy and reliability of devices which operate on fault current are not high, represents only the opinion of Mr. Pollard, unsupported by any facts provided for the record. See Tr. 9652 (Pollard).

170. The wording of UCS proposed finding 83 could be read to stand for the proposition that at TMI-1 the main feeder circuit breakers are the only isolation devices between the pressurizer heaters and the safety-related buses. The Board assumes UCS did not intend such an interpretation which, of course, is amply contradicted by the record. See Licensee PF 143.

171. UCS proposed findings 88 to 92 essentially take issue with the clear language of Regulatory Guide 1 75, which UCS elsewhere would have us follow literally, and argues that an ESF (accident) signal is not a sufficient supplemental trip signal since a fault in the pressurizer heater could occur under circumstances (e.g., loss of off-site power only; or a combined loss of off-site power and LOCA following completion of the ESF function) where no accident signal might occur. As we have already noted, UCS is attempting to read into the Guide a limitation (which does not exist) on the acceptability of an accident signal as a supplemental isolation signal. See Licensee PF 149. Regulatory Guide 1.75 clearly supports the Staff position that the requirement for a supplemental trip signal, over and above the fault current and undervoltage trip signals already provided, is concerned with accident conditions

under which safety loads are being added to the emergency power supply. Thus, section C.1 of the Guide explains the acceptability of an accident signal as a supplemental trip signal "since the downstream circuits would already be isolated from their respective power sources under accident conditions and could pose no threat to these sources." (Emphasis supplied). UCS Ex. 29.

172. The Board observes that the second sentence of UCS proposed finding 97 would more accurately reflect the testimony of Licensee witness Torcivia if it included the underlined words and stated as follows: In addition, Licensee takes no credit in its single failure analysis for the distribution breakers because of their location in an area of the plant that is not seismically qualified.

173. UCS states that Licensee acknowledges that a fault in the non-safety-grade pressurizer heater circuits could result in loss of the safety-grade power supply bus to which the heaters are connected. UCS PF 99. See also, UCS PF 102. The Licensee testimony which UCS cites, however, makes it clear that this is so only after a single failure of a safety-grade breaker is assumed, as well as the failure of the associated distribution breaker. Tr. 9120 (Torcivia).

174. UCS proposed findings of fact 103 to 108 would have the Board draw an inference -- from the Staff's determination (based upon prudence, and not any requirement) to preclude the simultaneous connection of both heater groups -- that the

Staff believes Licensee's breaker design is inadequate to protect the emergency power supplies. The Staff witness declined to so testify during the UCS cross-examination, and the Board, rather than drawing inferences, finds on the basis of the evidence that the Staff proposal, accepted by Licensee, was merely moving in a conservative direction to provide added protection beyond what is required. See Tr. 9818-19 (Fitzpatrick) (no interaction of concern has been identified).

175. UCS describes as the Staff's position that the provisions of Regulatory Guide 1.75 do not apply "following the transient associated with starting and loading the diesel," UCS PF 108, or "after the automatic loading of the diesel generator was completed." UCS PF 110. Somehow, UCS believes this constitutes a "tacit recognition that the TMI-1 design does not provide an acceptable isolation device." UCS PF 108. The Board cannot see how such a conclusion follows at all. In any case, a more thorough reading of the record shows that the Staff witness testified that non-safety loads may be reconnected to the diesel generator when the plant stabilizes. Tr. 9712-18 (Fitzpatrick). The witness explicitly declined to accept, during cross-examination, the UCS characterization of his testimony defining "stabilization" as beginning when the automatic loading sequence of the diesel generators was completed. See Tr. 9715 (Fitzpatrick). Yet, UCS still attributes this definition to the witness in UCS proposed findings 111, 113 and 142. Mr. Fitzpatrick testified that

"stabilization" has many factors to it. Id. From the standpoint of the Staff's Power Systems Branch (i.e., in terms of the electrical supply), the stabilization is when the diesel has hit steady state loading associated with the automatic loading sequence; but that the operator must also decide whether the plant systems are stabilized to the point where non-safety loads can be added. Tr. 9712, 15 (Fitzpatrick).

> That [completion of the diesel's loading sequence, Tr. 9715] does not allow anyone that soon after the event to start loading nonsafety loads on the buses.

Tr. 9716 (Fitzpatrick). Licensee agrees that non-safety loads should not be added until the electrical demands of safety systems have been stabilized, but does not believe, as suggested by the Staff, that a license condition to this effect is necessary.[40] See Staff PF 236. UCS witness Pollard appears to agree that it is acceptable to add non-safety loads to the on-site power supplies "where the situation has been stabilized." See Tr. 9695 (Pollard).[41]

176. UCS contends that "nothing in this record remotely suggests that it is acceptable to interrupt the

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40 The Board also declines to adopt the Commonwealth's proposed condition, PA PF 78, because the issue of the adequacy of procedures for adding nonessential loads was not encompassed by the contention litigated. Further, the absence of evidence on the question of procedure adequacy cannot by itself now be the basis for a license condition.

41 In the testimony cited in UCS proposed findings 114 and 136, the witness limited the observation to his experience -- a limitation omitted from the UCS proposed findings.

operation of ECCS, for example, for some unknown period of time." The Board is aware, however, of considerable evidence in the record, in the form of Babcock & Wilcox small-break LOCA analyses, which show that for loss of all feedwater events with and without accompanying small-break LOCAs, actuation of HPI within 20 minutes assures adequate core cooling. See Licensee PF 345-353.

177. While it is true, as UCS proposed finding 143 asserts, that Licensee's witnesses did not know of any previous cases where an isolation device like the one proposed here has been used to protect the emergency power supply from non-safety-grade loads, the record also shows that TMI-1 is unique only in having added the undervoltage trip. Other operating reactors use the same combination of fault current and accident signal trips as does TMI-1. Tr. 9732 (Fitzpatrick).

M. Additional LOCA Analysis

178. Only Licensee and the NRC Staff filed proposed findings of fact on former UCS Contention 8 and the Board's question regarding the former contention. The Licensee and Staff proposed findings are in general agreement, although we note that the Staff proposes a finding that "[u]ntil EFW [emergency feedwater] is restored, there are certain scenarios where the Staff relies on the feed and bleed mode to meet 10 C.F.R. § 50.46, and for those very small breaks without EFW, the Staff depends on the operator to manually mitigate HPI "

Staff PF 65. While the Staff here assumes that emergency feedwater is unavailable, elsewhere the Staff takes the position, with which Licensee agrees, that the TMI-1 EFW system, at the time of restart, will be safety-grade for a small-break loss-of-coolant accident. Tr. 6200-01 (Wermeil); Licensee PF 406.

N. Systems Classification and Interaction

179. Proposed findings of fact on UCS Contention No. 14 were submitted by Licensee, UCS, the Commonwealth of Pennsylvania, and the NRC Staff. The Board limited UCS Contention 14, which is extremely general in nature, to the "core cooling system." Licensee PF 360 and n.114. In the contention UCS challenges, as a general matter, the classification as "non-safety-related" of systems and components which UCS contends can have an adverse effect on the integrity of the core. The relief sought is that "[a]ll systems and components which can either cause or aggravate an accident or can be called upon to mitigate an accident must be identified and classified as components important to safety and required to meet all safety-grade design criteria." While certain systems and components were discussed in the litigation of UCS Contention 14 as examples or illustrations of the points being made on the classification scheme, the contention itself, and the testimony presented by the parties, was not aimed at any particular system and component or the modification thereof. Because the

proposed findings of fact by the Commonwealth, unlike those of the other parties, focus not on the larger issue raised in the contention, but instead on the adequacy of power supplies to the pressurizer level instrumentation[42] -- a subject which the Commonwealth did not even attempt to link to the classification question raised by UCS -- the Board will address the Commonwealth's proposed findings separately, and before we discuss those which address UCS Contention 14.

180. The Commonwealth is concerned that a single failure in the ICS/NNI power supply system could result in loss of power to all three pressurizer level instruments at TMI-1. The Commonwealth notes that pressurizer level indication will be used in conjunction with the pressurizer heaters to maintain pressure control for the reactor coolant system during the natural circulation mode of operation.[43] The Commonwealth compares the NRC Staff's position on the reliability of power

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42 The Commonwealth even entitled this portion of its proposed findings: "Pressurizer Level Instrumentation," a description which has not been applied previously to UCS Contention 14 by anyone in this proceeding. Pressurizer level instrumentation is nowhere mentioned in the contention.

43 To the extent that the Commonwealth implies here that the pressurizer heaters are required for natural circulation, which is the issue raised by UCS Contention No. 3, the Board rejects such proposed findings (PA PF 223, 225) for the reasons stated in our findings of fact on UCS Contention No. 3, which the Commonwealth has not addressed in proposed findings. See Licensee PF 133-138. The record further indicates that, while it may be desirable for other reasons, pressurizer level instrumentation is not required for safe operation of the plant. Tr. 7650-52, 7813 (Keaten).

supplies to the pressurizer heaters, PORV, and PORV block valve, with the Staff's position on pressurizer level instrumentation power supplies, and argues that the Staff is not justified in distinguishing among these components and not requiring redundant on-site power supplies for the pressurizer level instrumentation. See, generally, PA PF 218-235.

181. The Commonwealth concludes with the following remedy request:

> The Board therefore directs that, prior to escalation above 5% power, the pressurizer level instrumentation shall be upgraded such that power can be supplied from redundant vital power supplies. The design should also assure that failure of the ICS/NNI power supply would not cause a loss of all pressurizer level instruments.

PA PF 234. The Board need not address the arguments advanced in the Commonwealth's proposed findings of fact on UCS Contention 14 because Licensee, in its reply to these proposed findings of fact by the Commonwealth, explicitly informed the Board that Licensee does not object to the relief requested by the Commonwealth. See letter to the Board from counsel for Licensee, July 27, 1981, transmitting "Part Two of Licensee's Reply to the Proposed Findings of Fact and Conclusions of Law on Plant Design and Procedures Issues filed by Other Parties." The Board therefore adopts Commonwealth proposed finding of fact 234, although we do not find that the modification is necessary. See n.43, supra.

182. UCS proposed finding 475, like the cited testimony of UCS witness Pollard, refers to the "requirements

[which] are set forth in the General Design Criteria of Appendix A to 10 CFR Part 50, industry standards such as IEEE Std 279, which are incorporated in 10 CFR § 50.55a, and other sections of 10 CFR Part 50," without any effort to determine which requirements apply to this facility. The Board has already found, for example, that the provision of 10 C.F.R. § 50.55a which incorporates IEEE Std 279 on its face does not apply to TMI-1. See Licensee PF 102.

183. In its proposed findings, UCS quotes from the introduction to the General Design Criteria -- which defines "structures, systems, and components important to safety" [emphasis added] as those "structures, systems, and components that provide reasonable assurance that the facility can be operated without undue risk to the health and safety of the public" -- and then repeats the argument of UCS witness Pollard that this language "indicates . . . that commission policy has been to apply the requirements of the GDC to systems variously referred to as safety-related, safety-grade or important to safety." UCS PF 476 and 477. The language clearly does not so "indicate." In fact, as the Board has already observed, General Design Criterion 1 introduces the concept of different quality levels for plant features with differing safety roles and varying degrees of importance to safety. See Licensee PF 365. UCS never attempts to explain how the General Design Criteria support the UCS position, other than this obviously misplaced reliance upon a paragraph from the introduction to the criteria.

184. The excerpt from NUREG-0585 quoted in UCS proposed finding 485 does not constitute a "concession" by the Lessons Learned Task Force to the cited position taken in the UCS testimony. The Task Force position is that equipment interactions should be studied further because there has not been a comprehensive and systematic demonstration that failure of non-safety-grade equipment or structures will not initiate or aggravate an accident. The UCS position, expressed in its Contention 14, is that the TMI-2 accident has already demonstrated the negative of the question.

185. UCS cites to Mr. Pollard's testimony, which in turn quotes an NRC Staff interrogatory answer which states that:

> The Staff agrees that some systems and components presently classified as non-safety related can have an effect on the core because they can directly or indirectly affect temperature, pressure, flow and/or reactivity.

UCS PF 485; Pollard, ff. Tr. 8091, at 14-8. It is not clear what significance UCS would have the Board attach to this statement. It certainly does not represent Staff agreement to the statement in UCS Contention 14 that such systems and component can have an adverse effect on the integrity of the core, which UCS witness Pollard defined as any effect which causes the limits of the ECCS criteria to be exceeded. See Staff PF 195. In fact, the Staff witness at the hearing testified that it has not been established that non-safety systems alone can

have an adverse effect on the integrity of the core. Conran, ff. Tr. 8372, at 7.

186. In its proposed finding 490, UCS attributes statements to the Staff, and characterizes the record as "quite clear" that a systems interaction study recommended by the Advisory Committee on Reactor Safeguards will not be performed at all. Yet, UCS provides the Board and the parties with not one citation to this allegedly quite clear record. UCS proposed finding 490 is rejected in its entirety for the reasons stated in paragraph 1, supra.

187. Here, as in its proposed findings on other issues, UCS remarks on the length of cross-examination of its witness by other parties. See UCS PF 492. It appears, though it is not stated, that UCS would have the Board imply some agreement by the parties in the testimony by UCS witness Pollard. There is no basis either in law or in fact for such an inference.[44] The parties did not limit their evidentiary opposition to the UCS contentions merely to the cross-examination of Mr. Pollard. The direct testimony addressed the UCS positions learned during the discovery process, and in each instance when Mr. Pollard testified, Licensee's witnesses presented oral testimony in rebuttal. Just as we draw no negative inferences from the UCS failure to present direct testimony on

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44 Another inference which could be drawn is that the parties did not consider the testimony worthy of extensive cross-examination.

some of its contentions, we draw no inferences from the extent of the cross-examination of Mr. Pollard on UCS Contention 14, especially where that testimony largely was a summary and repetition of his testimony on other contentions. Licensee's incentive to pursue its case concisely is clear and understandable to the Board.

188. UCS proposed findings 493 through 500 attack the qualifications of Mr. Conran, the Staff witness on UCS Contention 14, on grounds which are surprising in view of the qualifications of UCS witness Pollard. Mr. Pollard, with a degree in electrical engineering, served on the AEC Staff from 1969 to 1974 principally as an instrumentation reviewer. Then for one and one-half years Mr. Pollard was a project manager with the NRC Staff where, in his own words, he became responsible for planning and coordinating license application reviews. Compare Robert D. Pollard Qualifications, ff. Tr. 8091, with UCS PF 495. We know that Mr. Pollard has never designed a reactor protection system, or any other electrical or mechanical system. Compare Tr. 6467-68 (Pollard), with UCS PF 500 (noting that Mr. Conran has not designed safety systems). Mr. Pollard obviously has not been managing any NRC projects or reviewing plant designs for the Staff since he resigned in February, 1976. Mr. Pollard did not advance any explanation of his duties with the Union of Concerned Scientists, but it is fair to assume that he has been on the "outside looking in" on the developments -- in design, analyses, training, the application of regulatory criteria, and the study of the TMI-2

accident -- within the Staff and the industry. This is reflected in much of Mr. Pollard's testimony, which often consists not of a fresh and sound technical analysis of the lessons learned from the TMI-2 accident, but a stringing together, as in a shallow legal argument, of selected words from electrical standards, regulatory guides, standard review plans, and, where it is convenient, from the Staff's lessons learned reports. Mr. Pollard brings nothing new to the dialogue or specific to TMI-1 -- only a textbook familiarity with Staff review documents and processes gained from dated experience, and a reading of the literature which has emerged from the accident. Mr. Conran, in contrast, was a member of the Staff's Lessons Learned Task Force[45] and works on the systems interaction issue. It was, in fact, his broad experience, which UCS criticizes, which made Mr. Conran a valuable member of the Task Force and uniquely qualified him to become involved in all of the issues raised by the TMI-2 accident. Tr. 8354-56 (Conran). The Board sees no evidence which reveals that Mr. Pollard might be considered to be any more "expert" in the systems interaction issue. Cf. UCS PF 500.

189. The Board is also aware that the preparation of Mr. Conran's testimony was not a solo effort, that he consulted

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45 UCS asserts that as a member of the Task Force, Mr. Conran "was not assigned to any of the subgroups with responsibility for particular substantive safety issues." UCS PF 497. Mr. Conran testified, however, that the "systems interaction" issue is one that he was most concerned with and to which he most contributed, including assistance in the formulation of the Task Force's conclusions. Tr. 8348-50 (Conran).

with senior technical and management personnel throughout the Staff, and that his testimony (including the definitions presented) was officially endorsed by Dr. Ross, who has also testified in this hearing. Tr. 8317-18 (Conran).

190. UCS asserts that other Staff witnesses used the terms "important to safety" and "safety grade" in a manner which conforms to UCS's use of the terms rather than Mr. Conran's. UCS PF 502. The record shows, however, that in the instances where the Staff witnesses used the terms differently, the issue being addressed did not require careful definitional distinctions, and the witness was not intending to establish or confirm any definition of the phrase "important to safety" which is different than Mr. Conran's. Tr. 8524 (Conran). Here, it is because of the use of the terms "non-safety-related," "nonsafety systems," "important to safety" and "safety-grade" in UCS Contention No. 14, accompanied by the assertion that the classification "important to safety" dictates the satisfaction of all "safety-grade" design criteria, which required the careful use of terms.[46] See Licensee PF 361. It is not a "post hoc construct" that, in order to help the Board resolve a contention, the Staff carefully recorded these definitions, more precisely than they had been

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46 UCS points out that other Staff witnesses at this hearing were directed to use Mr. Conran's definitions. UCS PF 501 and 510. UCS neglects to report that Staff members were instructed to use these definitions in all of their licensing and hearing work. Tr. 8318-19 (Conran). This undoubtedly is because Staff management judged that Mr. Conran's testimony accurately reflects present and past regulatory practice.

in the past. Cf. UCS PF 503 and 510. The fact is that the nuclear power plants in operation today generally have been licensed in accordance with the classification scheme described by the Staff witness. Tr. 8410 (Conran).

191. In its discussion of Staff witness Conran's use of Regulatory Guide 1.29, UCS PF 511-513, and elsewhere (UCS PF 514), UCS reveals its inability to comprehend the fundamental concept that a system or component may have to be "safety-grade" for one function, but not for another. For example, the record is clear that the PORV is and must be safety-grade for its role as a part of the reactor coolant pressure boundary, and that it is not safety-grade for its pressure relief function.[47] See Tr. 8537-38 (Conran); Licensee PF 168. The interpretation of General Design Criterion 2 provided by the Staff witness, which makes eminent sense, is that structures, systems and components

> important to safety shall be designed to withstand the effects of natural phenomena

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47 UCS proposed finding 515 thus totally misrepresents the facts and the testimony of the witness when UCS states that there is equipment listed or covered by listings in Reg. Guide 1.29 which is not safety-grade for TMI-1, implying that Mr. Conran is therefore in error when he testified that his definitions had been applied in the licensing of TMI-1. UCS cites two examples: the PORV and the emergency feedwater system. In the testimony cited by UCS, Mr. Conran specifically said that while the PORV is not listed explicitly in Reg. Guide 1.29, it would be included in components that comprise the reactor coolant pressure boundary, and that it is safety-grade for that purpose. Tr. 8537-38 (Conran). As to the emergency feedwater system, the Staff witness explained that while it now is listed in the Guide, that is a new position by the Staff which does not reflect requirements at the time TMI-1 was licensed. Tr. 8542 (Conran).

> without loss of capability to perform their critical or design safety functions, meaning to the extent that a system -- structure, system, or component that belongs to the broader class, "important to safety," has a specific design safety mission; it should retain that capability to perform that safety mission in the event of these natural phenomena.

Tr. 8533-34 (Conran). Regulatory Guide 1.29 identifies those structures, systems and components that must remain functional in the event of a safe shutdown earthquake. Conran, ff. Tr. 8372, at 6; Tr. 8536 (Conran). All structures, systems and components that are safety-grade are seismically qualified, and conversely, all structures, systems and components which are required to be seismically qualified are safety-grade. Tr. 8536 (Conran). Consequently, one should not conclude, as UCS does, that the listing of equipment in Regulatory Guide 1.29 is a listing of equipment "important to safety." Cf. UCS PF 513. The Guide is precisely consistent with Mr. Conran's definitions. Tr. 8495 (Conran).

192. UCS contends that "Mr. Conran challenges UCS's assertion that when a system is determined to be 'important to safety,' it has been required to meet the applicable GDC which form the definition of 'safety-grade.'" UCS PF 504.[48] The Staff witness testified, however, that the General Design Criteria cover and apply to more than safety-grade structures,

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48 UCS, however, did not provide the Board with an identification of those GDC. See Pollard, ff. 8091. Cf. UCS PF 517.

systems and components. Tr. 8415-16 (Conran). This is clear from the regulations themselves. See, e.g., GDC-17. The Staff's position is not as UCS characterizes it, and it does not render ". . . the phrase 'important to safety' virtually meaningless as a regulatory concept since no regulatory consequences whatever flow from it." See UCS PF 514. The Staff's position is that there are systems and components which are "important to safety" and to which some of the General Design Criteria apply, even if they do not have an explicit, critical safety function to perform in the context of accident response, and therefore are not "safety-grade." Compliance with the GDC for those systems and components nevertheless is considered important to safety in providing reasonable assurance that the facility can be operated without undue risk to the health and safety of the public. The Staff witness provided and explained examples of such systems and components -- condensate and feedwater systems, waste management systems, radioactive effluent processing and control systems -- and the applicable GDC. Tr. 8484-88 (Conran).

193. UCS decries the absence of "prudence criteria" for the Staff's decisions to require the upgrading of some systems and components to less than fully safety-grade design criteria. UCS PF 507, 520-525. These proposed findings focus uniquely on the testimony of one Staff witness, when the evidentiary record includes a vast amount of testimony, in response to Board Question 2 and the former UCS Contention No.

13, which explains in detail the Staff's decision-making processes. See Licensee PF 484-550.

194. In an attempt to summarize the testimony of Staff witness Conran on the TMI-2 accident, UCS has distorted it. See UCS PF 518. The cited testimony states as follows:

> The severe effects produced in the TMI-2 accident (e.g., serious core damage; voiding in the primary coolant and hydrogen gas generation which may have blocked natural circulation; dispersal of large amounts of radioactive fission products in the primary coolant; etc.) did not result from non-safety system or component failure alone. If operator action had not interfered with the proper functioning of the installed safety systems to their design capability, the safety systems could have accommodated the effects of the non-safety component failures that occurred, and still have prevented the serious core damage and other outside-design-basis effects that resulted. And if the core damage and other outside design-basis effects which occurred had been prevented, it would not have been necessary to call upon non-safety components to assist in accident mitigation and recovery (e.g., long term maintenance of core flow and cooling with RCP's and steam generators).

Conran, ff. Tr. 8372, at 11. While UCS is correct (UCS PF 519) that the reactor coolant pumps were used for 1 hour and 40 minutes into the TMI-2 accident, it ignores the fact that High Pressure Injection (i.e., a safety system operation) was terminated early in the accident. See UCS Ex. 1.

195. The Staff described its long-term plans and programs for evaluating possible safety effects of non-safety systems or components generally, and for reassessing the appropriateness of current non-safety classifications, in view of

the lessons learned from the TMI-2 accident. Conran, ff. Tr. 8372, at 14, 15; Licensee PF 375. UCS attributes to the Staff witness an identification of Recommendation 9 of NUREG-0585 as the only one (of the long-term actions) specifically addressed to systems interaction. UCS PF 525. This simply does not even closely resemble the testimony given, where Mr. Conran merely identified NUREG-0585 as the source of that one long-term action, in response to a question by Administrative Judge Jordan. Tr. 8678 (Conran). The witness did not disown the other long-term actions as UCS suggests.

196. UCS is mystified (see UCS PF 532) by its own characterization of Licensee's testimony on UCS Contention 14. This is understandable, because the UCS description bears only an occasional resemblance to the testimony presented.

197. Citing two transcript pages, UCS proposes that this Board find that "[t]he [TMI-2] accident has caused no change in the Licensee's thinking with regard to potential systems interactions."[49] UCS PF 529. Licensee's approach to the safety implications of the TMI-2 accident is termed "narrow" by UCS. UCS PF 531. In fact, that is precisely the correct word to describe the UCS approach. UCS fixates upon hardware and design modifications as a response to the accident

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49 Licensee witness Keaten actually testified here that his view today is that at the time of the accident TMI-2 had safety-grade systems which were fully capable of preventing core damage. Tr. 7703 (Keaten).

-- a singularly conspicuous exception to the broader approach recommended by every knowledgeable and responsible organization which has studied the TMI-2 accident. UCS conveniently forgets what this record makes clear -- Licensee has undertaken and will continue to undertake improvements to, and additions of, equipment and components at TMI-1. UCS, however, perhaps because of the experience of its only witness, appears unable to appreciate the human elements of the accident and the lessons learned therefrom, even though UCS never contended that proper operator usage of available safety systems would not have prevented the damage which occurred at TMI-2.

198. Thus, when UCS speaks of "potential systems interactions," it speaks only of hardware. UCS is unable or unwilling to acknowledge the substantial response Licensee has made to the human-machine interaction "lessons learned" in the form of improved and new plant procedures, human factors engineering reviews of the control room design, operator training and management capability. This Board has heard the entire record and is aware of the depth and breadth of Licensee's approach to the safety implications of the TMI-2 accident. The picture UCS would paint, on the basis of extremely limited testimony, of a Licensee with "blinders on" (see UCS PF 530), instead serves only to expose the insular approach to the accident which is reflected in the UCS contentions and testimony.

199. Returning to the UCS description of cited Licensee testimony, Licensee witness Keaten did not testify, as

UCS asserts, that "it is 'absolutely acceptable' for the failure of non-safety systems to cause challenges to safety systems without even knowing the acceptable frequency of such challenges." See UCS PF 529. Mr. Keaten testified that: (1) it is absolutely acceptable for the failure of a non-safety system to cause a challenge to a safety system because it is the function of safety systems to mitigate such a failure; (2) that some consideration should be given to the probability or frequency of such failures; and (3) that he did not at that moment have a general quantitative estimate of the frequency of such failures which would be acceptable. Tr. 7582-83 (Keaten).

200. UCS is incomplete in its description of Licensee's testimony on the importance of emergency feedwater reliability as a lesson learned from the TMI-2 accident. See UCS PF 530 and 531. It is clear that Licensee has undertaken a host of actions to improve the reliability of the TMI-1 emergency feedwater system since the TMI-2 accident Licensee PF 395-403. Licensee witness Keaten was simply pointing out the uncontroverted fact that inadequate primary system inventory caused the damage at TMI-2, and that analyses (by Licensee and others) have shown that the absence of emergency feedwater for a short time at the beginning of the accident had no significant effect on its outcome. See Licensee PF 274.

201. The Board declines to draw the implication, suggested by UCS, that because witness Keaten was not employed by Licensee at the time TMI-1 was licensed and therefore could

not testify as to which GDC were applied to particular pieces of equipment, then somehow his testimony on the design process and the general philosophy which underlies the safety classification scheme is weakened in any way. See UCS 534.

202. On the use of non-safety-grade instrumentation, the record is clear and uncontroverted that pressurizer level instrumentation need not be fully safety-grade. Tr. 7579-83, 7649-53, 7807-13, 7866-72 (Keaten). Cf. UCS PF 536 and 538. The only "suggestions" that the TMI-2 operators did not believe the in-core thermocouple readings because they were not safety-grade were made by the UCS interrogators, and not by Licensee's witness, as the testimony UCS cited demonstrates. See UCS PF 537. UCS proposed finding 539 confusingly combines testimony on pressurizer level instrumentation with testimony on the in-core thermocouples. UCS proposed finding 540 cannot be drawn from the preceding proposed findings, which fail to distinguish adequately between transients, accidents, and normal control functions.

203. The UCS concluding proposed findings of fact on its Contention 14 (UCS PF 541-549) fail because of the infirmities discussed above, and require only two other comments. First, UCS displays confusion as to the remedy it seeks as a restart requirement: completion of a systems interaction study or a commitment to perform one. Second, UCS cites to an Appeal Board holding on unresolved safety issues and attempts to apply it to this contention. The Board's findings on its own Ques-

tion No. 3, however, thoroughly explored this issue as to TMI-1. See Licensee PF 539-544. As we have noted, the IREP studies performed to date have not discovered any potential failure mode that has not been addressed in the modifications being undertaken at TMI-1. Licensee PF 543.

204. UCS proposed findings 512, 528 and 530 are rejected because the entire proposed finding, or important portions thereof, are followed by no citation to the evidentiary record. See paragraph 1, supra.

O. Emergency Feedwater Reliability

205. Proposed findings of fact on Board Question No. 6 were filed by Licensee, UCS, the Commonwealth of Pennsylvania and the NRC Staff. A very large evidentiary record was compiled on this Board question, and the proposed findings of the parties vary somewhat in their level of comprehensiveness and in the issues upon which they focus.

206. The Commonwealth, in its proposed findings, briefly describes the TMI-1 emergency feedwater system's functions and the status of the effort to upgrade the system to fully safety-grade, and concludes that the general approach of making certain EFW improvements prior to restart, with a fully safety-grade upgrade sometime subsequent to restart, is acceptable. PA PF 171-189. The Commonwealth then proceeds to address what it perceives to be deficiencies in two areas: condensate storage tank alarms and steam generator isolation. PA PF 190-215. We will return to these concerns.

207. Following only the briefest description of decay heat removal methods at TMI-1, UCS PF 386-387, UCS immediately begins a search for quantitative estimates of the reliability of decay heat removal systems at TMI-1. See UCS PF 388. In doing so, UCS presumes at the outset, and throughout all of its proposed findings, what it does not even attempt to establish from the evidentiary record -- that numerical reliability estimates are necessary in order for the Board to pass upon the reliability of emergency feedwater at TMI-1. The Board did not begin its inquiry with such a presumption. Indeed, whether or not such a quantitative assessment should be undertaken, in the wake of the Atomic Safety and Licensing Appeal Board's decision in Florida Power and Light Company (St. Lucie Nuclear Power Plant, Unit No. 2), ALAB-603, 12 N.R.C. 30 (1980), was but one of the issues we posed in Board Question No. 6.

208. There is no regulatory requirement in this agency that emergency (or auxiliary) feedwater systems (or entire decay heat removal systems) -- whether at TMI-1, other operating reactors, or at plants now under construction -- must have their reliability estimated quantitatively; and there is no numerical standard against which they should be judged. The Appeal Board's decision in St. Lucie, ALAB-603, supra, upon which UCS relies, did not establish to the contrary. UCS ignores the limited reach of that decision. See UCS PF 462-467. The Appeal Board embarked upon its consideration of

quantitative assessments of the reliability of the electric power systems at St. Lucie because the underlying evidentiary record with respect to that plant revealed certain unique circumstances: (1) that the peninsular shape of Florida limited the utility's ability to interconnect its system with those of other utilities such that off-site power might be less assured than for utilities interconnected with multiple grids; and (2) actual operating experience which tended to confirm that this is the case. ALAB-603, supra, 12 N.R.C. at 31-34; Licensee PF 433. The Appeal Board subsequently confirmed, on December 22, 1980, that in ALAB-603 it was not establishing the threshold probabilities in section 2.2.3 of the Standard Review Plan as guidelines to be used generically in the determination of design basis events to govern plant design and operation. See Licensee PF 437 and 438.

209. Subsequent to the filing of proposed findings of fact on Board Question 6, the Commission issued its decision on review of ALAB-603, in the form of a Memorandum and Order. Florida Power & Light Company (St. Lucie Nuclear Power Plant, Unit No. 2), CLI-81-12, 13 N.R.C. ____ (June 15, 1981). The Commission there held "that ALAB-603 does not establish generic guidelines for determining the design basis events for plant design and operation . . .", slip op. at 2, and that "ALAB-603 does not establish any single numerical threshold for the mandatory consideration of accident sequences." Slip op. at 6. The Commission further stated that since the Appeal Board's

judgment was based upon the entire record of the St. Lucie proceeding, ". . . the probability values calculated for that particular event [station blackout at St. Lucie] should not be interpreted as establishing a generic numerical threshold to be used for future consideration of accident sequences." Id. That generic issue, the Commission advised, is to be resolved through the Commission's plan for developing a safety goal. Id.

210. The Commission also advised that "the pendency of the safety goal matter should not inhibit the boards from examining closely any accident sequence which in their judgment poses an unacceptable risk to the public health and safety," and that "[p]robabilistic or numerical calculations may be used in such an examination and boards have a responsibility to mandate whatever mitigative actions they deem necessary to protect adequately the public health and safety when such actions are supported by the record." Id. at 6, 7.

211. We return, then, to the question of whether this record supports the need for the quantitative showing UCS would require. See UCS PF 470. Unlike the situation at St. Lucie, we have no disturbing operating history at TMI-1 to warrant unique consideration. To the contrary, there have been no failures of the EFW system on demand, and there have been no total loss of main feedwater events (other than required tests) which would challenge the system.[50] Licensee PF 461. Looking

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50 There are sound technical reasons why the Board should not attempt to do what the Appeal Board in St. Lucie wisely
(Continued next page)

beyond TMI-1 to B&W plants generally, we have learned from the Staff that there is no basic difference between B&W plants and other PWRs in protecting against a loss of main feedwater transient, Tr. 17,064 (Wermeil), and that operating history shows the arrival rate or frequency of feedwater transients not to be dependent upon whether the nuclear steam supply system is designed by Babcock & Wilcox, Combustion Engineering or Westinghouse. Tr. 15,769-70 (D. Ross).

212. Because the Staff's early evaluation of the TMI-2 accident led it to be concerned that B&W-designed reactors appear to be unusually sensitive to secondary system transients and therefore to rely more heavily than other PWRs on the reliability and performance characteristics of the emergency feedwater system,[51] the Board has explored with great care and thoroughness the adequacy of the Staff's recommended modifications to that system. We know the performance requirements for the system from the detailed examination conducted of

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(continued)
avoided -- applying generic failure or availability experience. EFW systems at other plants have diverse designs, different uses for emergency (or auxiliary) feedwater, and varying qualities of maintenance. See Licensee PF 442-444. The absence of what some might view as a statistically inadequate operating experience data base at TMI-1 is no justification for blindly applying inapplicable and only slightly more statistically significant data from other plants.

51 This concern by the Staff went to the dynamics of the primary system response to a secondary system upset, and not to the frequency of secondary system upsets. See Licensee PF 441.

B&W's analyses, not now challenged by any party, of: a loss of all feedwater without a small-break LOCA; a small-break LOCA with a loss of main feedwater; a small-break LOCA with a loss of all feedwater; a small-break LOCA with a loss of all feedwater and a subsequent PORV failure; a PORV failure followed by a loss of all feedwater; and other accident sequences. Each of these analyses shows that the core will be adequately cooled. See Licensee PF 342-355 (BQ UCS-8).

213. We know the performance capabilities of the TMI-1 EFW system from the detailed evidence presented by Licensee and the Staff in November, 1980, in response to Board Question 6. See, e.g., Lic. Ex. 15 (which describes the TMI-1 EFW system and its capabilities as it existed prior to recent modifications, the modifications being made to the system prior to plant restart, and the long-term modifications). UCS, in its proposed findings, virtually ignores this entire record -- the review of which requires some recognition of the many hardware and procedural modifications being made and some understanding of their operational significance -- in favor of number manipulations and repetitive findings on what one given witness (there were many) did not know about a General Design Criterion, IEEE standard or Standard Review Plan section, and on what the record lacks. The record, by any objective standard, is complete.[52]

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52 We note that only Licensee's proposed findings of fact address all of the questions raised by the Board under the
(Continued next page)

214. The Staff provided the Board with a detailed discussion of the evaluation of the Staff's criteria related to the EFW system, and of the manner in which system reliability has been improved as a result of the implementation of these criteria at TMI-1. See, generally, Wermeil and Curry, ff. Tr. 16,718, at 1-30; Tr. 16,719 (Wermeil). The selection of the modifications being made with respect to the EFW system is the product of diverse evaluation techniques and reviewing groups. Licensee re-evaluated the system design and operation after the TMI-2 accident in order to determine where upgrades in the timeliness and reliability of the system could be made. Wermeil and Curry, ff. Tr. 16,718, at 3. The Staff's TMI-2 Lessons Learned Task Force review and Bulletins and Orders Task Force review of operating B&W plants led to additional short-term recommendations. Id. at 5. At the direction of the Staff, B&W performed on Licensee's behalf a fault-tree probabilistic analysis of the TMI-1 EFW system in order to identify design and procedural improvements to the reliability of the system. Licensee PF 459 and 460. The B&O Task Force also compared the system against the current Standard Review Plan criteria in order to provide further insight into possible areas for improvement. Wermeil and Curry, ff. Tr. 16,718 at 11. This multi-disciplined review effort has been substantially more detailed and exhaustive than the Staff's standard

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(continued)
heading of its Question No. 6, and cover the entire responsive record comprehensively.

deterministic evaluation against the acceptance criteria of the Standard Review Plan. Id. at 12.

215. There is no unacceptable risk, then, to the health and safety of the public with respect to the reliability of the emergency feedwater system at TMI-1. Witnesses for both the Staff and Licensee testified that the TMI-1 EFW system will be safety-grade at the time of restart for the two accident sequences most germane to this proceeding: loss-of-main-feedwater events and small-break loss of coolant accidents. Tr. 6082, 6200-01 (Wermeil); Tr. 5691, 5780 (Lanese). No sound reason is advanced by UCS for not relying on those criteria. UCS totally abuses and misuses the Staff's numerical reliability estimates, and thereby ignores the guidance of the witness who performed the analysis. What UCS repeatedly calls the "probability of EFW failure" is no such thing. Compare UCS PF 412-424, with Licensee PF 452-457.

216. The Staff witnesses testified that if the Staff had used a sounder and more realistic mission success criterion -- such as the capability of the EFW system to deliver minimum feedwater flow for mitigating a transient -- the upgraded TMI-1 EFW system would have looked very similar to the Westinghouse plants. Tr. 17,080 (Wermeil); Tr. 17,068, 17,055 (Curry). The Staff witness who prepared the Staff's reliability estimate for the TMI-1 EFW system testified that, based on his analysis and familiarity with reliability analyses of other plants, the probability of core damage at TMI-1 is less than or certainly

no greater than in all other operating plants, and that it is not inconsistent with the numerical safety goals now under consideration by the Commission. Tr. 17,089-92 (Curry).

217. While in our view this resolves Board Question 6, we turn now to some of the more serious UCS proposed findings which we have considered and rejected, and which have not been repeated by UCS in its findings on other issues. UCS takes the fact that the TMI-1 EFW system can adequately remove decay heat with only one motor-driven EFW pump (a loss of both the turbine-driven and one motor driven pump), a situation beyond the single failure criterion, and argues that a NUREG-0578 "requirement" is not met because a relief valve might lift. See UCS PF 391-393; Keaten et al., ff. Tr. 16,552, at 7; Capodanno et al., ff. Tr. 5642, at 8, 9. There is no evidence that the NUREG-0578 recommendation contemplates multiple failures.

218. The testimony cited in UCS proposed finding 395 does not stand for the proposition that the ICS does not control steam generator level high enough for adequate heat removal in the two-phase mode of natural circulation.

219. UCS proposed finding 403 is rejected because the Board will not base its decisions on inferences drawn from the lack of knowledge of a given witness or witnesses. Qualification testing of safety valves and the PORV had been the subject of testimony presented by others (BQ UCS-6).

220. Contrary to the implications of UCS proposed finding 404, the witness testified that Licensee had performed

extensive testing of the HPI pumps, and that the pumps are designed for discharge pressure well above 2500 psig. Tr. 16,582-83 (Colitz, M. Ross).

221. Citing to no record evidence, UCS mathematics has converted an EFW demand rate of 0.3 per year per plant (a figure not specific to TMI-1) to a demand rate of "perhaps once a year or within that range." See UCS PF 416.

222. We reject the UCS suggestion that the restart requirements are based on practicality and expediency. See UCS PF 450-461. There is nothing expedient about the restart schedule. A shutdown of 2.5 to 3 years can hardly be viewed to be a bow toward expediency at the sacrifice of safety. See Board Question No. 2 for our findings on the short versus long-term requirements.

223. Again, UCS attempts to propose a concluding finding on cold shutdown at TMI-1 without having established support for it elsewhere on the basis of the record. See UCS PF 470.

224. UCS proposed finding 444 omits Licensee's testimony that the system meets GDC 20, even though it is not applicable. Tr. 5814 (Lanese).

225. UCS proposed findings 392 and 444 are rejected because they rely, in whole or in part, on citations to documents not in evidence. See paragraph 2, supra.

226. The Board declines to impose the restrictions suggested by the Commonwealth in its proposed findings 205 and

206 on the power supply to the condensate storage tank alarms. These instruments are now designed to alarm on loss of power, Staff Ex. 14 at 13, so that operation until they are safety-grade is acceptable.

227. While we recommend that the Staff pursue the issue of simultaneous steam generator isolation raised by the Commonwealth, the Board does not adopt Commonwealth proposed findings 214 and 215, because the record is not sufficiently clear to warrant the imposition of a condition. We must observe that the Commonwealth never called this concern to our attention at the hearing.

P. Accident Design Bases

228. Proposed findings of fact on Board Question/UCS Contention No. 13 were filed by Licensee, UCS and the NRC Staff.[53] Though UCS had been designated "lead intervenor" on its Contention No. 13, UCS abruptly abandoned its contention by letter dated January 5, 1981, shortly before the evidentiary hearing on the contention. See fn. 148 to Licensee PF on BQ/UCS Contention No. 13. UCS presented no testimony challenging the adequacy of the Staff's methodology for determining

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53 ANGRY, the only intervenor with an interest remaining in UCS Contention No. 13 at the time it was heard, did not file proposed findings of fact and conclusions of law on the contention. Consequently, the Board determines that ANGRY is in default with respect to BQ/UCS Contention No. 13. See paragraph 3, supra.

which accidents should be included in the design basis envelope, nor did UCS even appear at the hearing to participate in the cross-examination of the Staff and Licensee witnesses who testified on the issue.[54] Nonetheless, UCS, in its proposed findings, repeatedly criticizes the record and would now have the Board conclude that there is insufficient evidence in the record upon which to base a finding that the short and long-term actions recommended by the Staff provide sufficient protection against event sequences with a nexus to the TMI-2 accident. See, e.g., UCS PF 330, 352, 356-360, 364-367, 379. As we have discussed previously (see paragraph 22, supra), it is incumbent upon intervenors to assist the Board in the development of a full record. Therefore, where -- as here -- an intervenor who has made no attempt to develop evidence in support of its position alleges for the first time in its proposed findings that the record on an issue is incomplete, the Board turns a deaf ear to the allegations. The Board particularly unreceptive to such allegations with respect to this contention, in light of our early admonition to UCS:

> [W]e recognize that Robert D. Pollard is the technical advisor to the Union of Concerned Scientists and that UCS has other people with expertise in the field of nuclear safety. UCS can better specify its concerns. * * * The sooner UCS specifies the areas or

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54 Given the procedural history of this contention, it is particularly disingenuous of UCS to seek a Board finding that "UCS has prevailed on its Contention No. 13." UCS PF 378 (emphasis supplied).

> sequences that must be addressed by licensee and staff [in UCS Contention No. 13], the greater will be the showing required in response to that specificity.

First Special Preharing Conference Order, LBP-79-34, 10 N.R.C. 828, 837 (1979). UCS rested on its Motion For Summary Disposition (filed August 5, 1980) as its further specification of its Contention No. 13. That document included only the broadest of conclusory allegations about the Staff's accident classification methodology, and by no means sufficed to put the Board and the other parties on notice of the particular concerns on which UCS now asserts the record is incomplete.

229. The Board summarily rejects those UCS proposed findings of fact on BQ/UCS Contention No. 13 which include no citations to the evidentiary record or include important passages which are not followed by record citations, and cannot fairly be viewed as a summary of, or logical inferences from, other findings which are supported by exact citations to the record. We therefore reject UCS proposed findings 328, 335, 356, 358 and 374 because they do not conform to 10 C.F.R. §2.754(c). See paragraph 1, supra.

230. Further, UCS has made extensive use of documents which were not introduced into evidence. UCS quotes directly from the Commission's January 19, 1979 Policy Statement on WASH-1400, not in evidence, as the sole citation in support of UCS proposed finding 323. UCS proposed finding 324 rests upon the Staff's answers to two UCS interrogatories and

the Union of Concerned Scientists Motion For Summary Disposition of UCS Contention No. 13 -- neither of which were entered in evidence -- along with other evidence which is in the record. UCS employs the texts of NUREG-0578 and NUREG-0585, neither of which are in evidence, as the only citations in support of UCS proposed finding 326. In proposed finding 339, UCS refers to the embodiment of the single failure criterion in the Standard Review Plan, though UCS cites no testimony to that effect, and the Standard Review Plan is not in evidence.[55]

231. The Board has already explained in detail why a licensing board may not base its decision on factual material which has not been introduced into evidence. See paragraphs 2, 77-81, supra. We therefore reject UCS proposed findings 323 and 326 because they cite only to material which is not in evidence, and consider UCS proposed findings 324 and 339 only to the extent that they are supported by the record evidence cited.

232. We have previously observed that UCS, in its Contention No. 13, mounted a frontal attack on the Staff's methodology for determining which accidents fall within the

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55 The Board notes that portions of the Standard Review Plan were admitted into evidence in this proceeding. See, UCS Ex. 9, UCS Ex. 23-26. However, UCS did not cite to any of these exhibits in its proposed findings on BQ/UCS Contention No. 13, and -- in any event -- our review of those exhibits reveals no references to the single failure criterion.

design basis. See Licensee PF 484. Similarly, UCS's proposed findings on BQ/UCS Contention No. 13 -- taken as a whole -- constitute a generic indictment of the design and licensing process employed in the review of all commercial nuclear power plants. Though UCS's ultimate proposed findings and requests for relief are framed with respect to TMI-1, UCS has not attempted to demonstrate through its proposed findings that TMI-1 is unique, among pressurized water reactors, either in the manner in which the Staff determined the design basis of the plant, or in the plant's capability to provide protection against "Class 9" accidents. Thus, were we to adopt UCS's proposed findings on this issue, we would be at least implicitly passing on every other operating reactor in the nation. With this in mind, we turn to address the merits of those proposed findings which are supported by citations to the record in this proceeding.

233. UCS's proposed findings basically consist of criticism of (1) the Staff licensing review methodology and (2) the Staff assessment of the post-TMI-2 "fixes." As to the first, UCS is obsessed with numbers; as to the second, UCS is biased toward hardware. These themes pervade UCS's proposed findings.

234. UCS would have the Board find "an inherent evidentiary weakness" in the Staff's testimony on its methodology for classifying accidents, which UCS characterizes as a "post hoc effort at rationaliz[ation], for the purposes of this

litigation." UCS PF 325. However, UCS cites no law which would support such a proposition. In any event, in the present circumstances, it is not "post hoc rationalization" for the Staff -- in order to assist the Board in the resolution of a contention -- to reflect and carefully and clearly document, in witness Check's words (quoted by UCS) "what it is we [the Staff] do and how we do it." Tr. 11,192 (Check).

235. In light of the nature of our disposition of UCS proposed finding 326, in paragraph 231, supra, we have not extensively examined UCS's allegation that the Staff has ignored specified recommendations of the Lessons Learned Task Force relating to the classification of accidents. We have nonetheless observed, however, that -- as to at least one of the recommendations which UCS cites -- UCS's allegation is directly contradicted by evidence in the record. Contrary to UCS's assertion that the Staff has ignored a Task Force recommendation "[t]hat the use of probabilistic analysis to supplement the 'deterministic' analysis normally done in the past be implemented," the Staff witnesses testified that there is a continuing increase in the employment of probabilistic risk analysis to augment the Staff's traditional deterministic methodology, and the Staff plans to broaden its use of quantitative risk assessment techniques in the future. See Licensee PF 508-510. Thus, while the Staff has not, as UCS suggests, "turned a blind eye" to that recommendation, UCS "turned a blind eye" to the record in drafting its proposed findings.

236. In addition to criticizing the lack of probability numbers for the occurrence of individual accident sequences, UCS also castigates the Staff for the lack of a definitive numerical criterion to be applied to classify any given sequence as "credible" or "incredible" and decries the lack of evidence in the record on "the definition of 'credible' for the purposes of design." UCS PF 329, 330. As we pointed out in paragraph 228, supra, the situation is one of UCS's making. Nonetheless, even if UCS had participated in the hearings on BQ/UCS Contention No. 13, and had developed a record on the lack of a "bright line" numerical criterion for the classification of accidents, we might still have felt constrained to circumscribe our findings on the subject in light of the Commission's ongoing work on the development of an overall safety goal, which is the subject of testimony in this proceeding, is a closely related issue, and is expected to have a great effect on the regulatory process as a whole. See Licensee PF 510. In any event, we do not believe that the Commission intended this Board to define "credible" for purposes of the licensing process; the issue, so broadly framed, is simply not within the scope of this proceeding.

237. UCS repeatedly equates "credible" accidents with accidents "within the design basis." See, e.g., UCS PF 321, 330. In fact, as even UCS acknowledges in its proposed findings, a determination of whether or not a particular sequence should be included in the design basis depends on the

consequences attendant to the sequence, as well as on the probability of the sequence. UCS PF 321. See also, UCS PF 335 (emphasizing element of probability, ignoring element of consequences).

238. Similarly, UCS marshals the evidence supporting the point that the Staff has no numerical criterion to classify particular sequences as "credible" or "incredible," but would have the Board draw from that evidence a finding that there are absolutely "no criteria" and that there exists a "total absence of regulatory criteria."[56] Compare, e.g., UCS PF 329 with UCS PF 330. The Board refuses to endorse UCS's skewed equation of a lack of numerical criteria with a lack of any criteria, and harbors doubts about what would seem to be the premise underlying much of UCS's argument -- that quantification equals safety.

239. UCS's proposed findings imply inherent value in the generation of probability numbers, through probabilistic risk assessment, fault tree analysis, event tree analysis or some combination of these methods. However, there is no record in this proceeding to support a finding that the generation of

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56 This UCS proposed finding conflicts with UCS proposed finding 331, which acknowledges the existence of qualitative criteria used by the Staff in determining whether a particular sequence is credible or not credible. However, contrary to UCS's assertions in proposed findings 331 and 339, the single failure criterion was not "[t]he only example [of a qualitative criterion] which the Staff witnesses could point to"; rather, the Staff testified that it was "one of the aids" that they use. Tr. 11,203 (Check) (emphasis supplied).

probability numbers, through any of these methodologies, is the panacea that UCS suggests. In fact, conspicuously absent from UCS's proposed findings is any attempt to address the Staff's reservations about the use of probabilistic techniques. See Licensee PF 513.[57]

240. In proposed findings 331, 333 and 334, UCS briefly summarizes the history of the single failure criterion, in the context of Staff testimony that it is one of the qualitative criteria used in determining whether a particular event is credible or not credible. However, UCS's proposed findings do not reflect the Staff's testimony that the Staff has a more mature view of the single failure criterion today than it did some years ago, that the Staff is re-examining its use of the single failure criterion, and that the Staff does not apply the single failure criterion blindly. Tr. 11,204-05 (Rosenthal).

241. Further, in criticizing Staff use of the single failure criterion, in proposed findings 339 through 341, UCS neglects to note that the Staff has begun to extend its consideration of failure sequences to include events not previously considered to be design basis events, so that the Staff now explicitly considers a much wider range of event sequences than were considered prior to the TMI-2 accident -- some involving

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57 In proposed finding 324, UCS oversimplifies the statements of Staff counsel to the point of distorting them. Contrary to the implication by UCS, the Staff's decision not to rely on probability numbers is not based primarily on the lack of such numbers, but on a number of factors. See License PF 513.

multiple failures and some involving systems not traditionally considered safety systems. Licensee PF 511.

242. In proposed finding 337, UCS asserts that the Staff testified that it does not use any probability numbers from WASH-1400. This is gross distortion of the Staff's testimony on its use of WASH-1400. In response to a request for an explanation of how WASH-1400 is used generally by the Staff, and how it was used in this case, Staff witness Rosenthal explained:

> Generally, we have been advised that we may use * * * the work in WASH-1400 for relative assessments but not for absolute assessments; * * * we use those elements of the data base that were collected, when there is confidence that the numerical values in the data base are well-founded.
>
> We did in our testimony refer to WASH-1400 as a milestone in evaluation technique, but we do not use any of the numerical values of the study [in our testimony].

Tr. 11,160-61 (Rosenthal). Thus, a careful reading of the Staff's testimony would go a long way toward answering the rhetorical question which UCS poses in its proposed finding 337: "[W]here did the Staff obtain its 'implicit' understanding of probabilities?"

243. UCS asserts that the Staff excludes core melt and containment failure accidents from the design basis because they involve multiple failures. UCS PF 343. However, the Staff further testified that "[o]ne does not stop merely because it [a particular sequence] is more severe in terms of

equipment failure than the analyses previously performed." Tr. 11,247 (Rosenthal). Having determined that a particular accident is "beyond the design basis," the Staff nevertheless reviews the event, step by step, in order to appreciate the systems involved and consider a variety of "fixes." Tr. 11,246-47 (Rosenthal).

244. In summarizing its case challenging the Staff's methodology for classifying accidents, UCS concedes that the Staff's classification of the TMI-2 accident as a "Class 9" accident is "[p]erhaps the only hard evidence in this case" which supports UCS's position. UCS PF 375. We have previously discussed UCS's simplistic reliance on the classification of the TMI-2 accident as a basis for its contention, as well as the rather equivocal nature of that classification, see Licensee PF 488-489, and do not accord significant weight to that "evidence."

245. UCS proposed findings 347 through 354 generally discuss the issues litigated under Board Question 2. We therefore address those proposed findings in our consideration of UCS's proposed findings on Board Question 2, infra, at paragraphs 263 through 265.

246. In the latter part of UCS's proposed findings, UCS attacks the sufficiency of the Staff recommendations to provide adequate protection against event sequences with a nexus to the TMI-2 accident. See UCS PF 355-373.[58] These

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58 UCS apparently concedes that the Staff has, through the event trees included in Staff Exhibit 3, identified all the accident sequences with a nexus to the TMI-2 accident.

proposed findings evidence a marked bias in favor of hardware modifications -- and against "fixes" such as increased surveillance and testing of equipment, improved plant procedures and improved operator training -- in virtually every instance. See, e.g., UCS PF 355-357, 361, 362, 364. The Board rejects this general bias, but addresses UCS's few specific allegations related to this subject, infra, in paragraphs 248 and 251.

247. UCS first notes, without reference to the record in this proceeding, that -- for accidents within the design basis -- "the assumption has presumably been that if operator action or procedures fail, there are engineered plant safety systems to mitigate such events." UCS PF 355. UCS then implies that there are no safety systems to mitigate accidents beyond the design basis. UCS PF 356. This assertion, unsupported by any citation to the record, is plainly controverted by much evidence in this proceeding. See Licensee PF 489-496.

248. Contrary to UCS's allegations in proposed finding 357, the Staff has not, in its event trees, equated the probability of operator error with mechanically induced failure. Manifestly, since the Staff declined to ascribe any particular probability to operator errors [See Tr. 11,235 (Rosenthal), cited in UCS PF 357], the Staff could not have equated the probability of operator error with mechanically induced failure. The Staff witnesses testified to nothing more than the fact that the graphic representation of a particular system failure on an event tree is the same whether that system

failure is attributable to operator error or mechanical failure. Tr. 11,236 (Rosenthal). Moreover, contrary to UCS's further assertion, this Board has heard evidence on the likelihood and consequences of operator action and inaction. See, e.g., Koppe, ff. Tr. 13,335 (particularly at 29-33).

249. UCS proposed finding 358 is a variation on a recurrent UCS theme. UCS chides the Staff for not "having probability numbers or actual calculations" to quantify the improvement associated with each of the proposed modifications included in Staff Exhibit 3. See also, UCS PF 356, 364, 375. In assessing the import of such numbers, the Board is mindful that quantification does not equal safety. See paragraph 238, supra. Moreover, putting aside the question of the precise degree of improvement associated with each individual improvement, it clearly is the collective record in this proceeding that Licensee has made many significant improvements since the TMI-2 accident.

250. In proposed finding 358, UCS suggests that the record before the Board is incomplete on "the potential risks associated with even what is presumed to be an improvement." It is clearly too late to challenge proposed modifications as risk-inducers -- particularly in such an across-the-board fashion -- for the first time in proposed findings. We note further that UCS's assertion that "[t]he issue of the 'potential risks associated with even what is presumed to be an improvement' has not been addressed at all in this proceeding

by either the Staff or the Licensee" indicates UCS's obliviousness to the extensive record on human factors engineering and control room design generally and, more specifically, Licensee's concerns about the Staff's proposed requirement for installation of reactor water level indication. See, Licensee PF 64, 65, 69, 72.

251. UCS takes particular issue with modifications which UCS claims cannot be considered "hardware" changes but which are rather in the "human regime." UCS PF 361, 362. The only possible significance of UCS's exception to the semantics is the implication that changes "in the human regime" might be additional risk-inducers. However, the unequivocal Staff testimony, cited by UCS, is that the Staff recommended changes are improvements, though not quantified. Moreover, UCS certainly did not oppose as "risk-inducers" any of the examples of "human regime" modifications that it lists in proposed findings 361 and 362. Indeed, UCS concedes that the "direct indication of valve position," listed in proposed finding 361, "provides more accurate information to the plant operator."

252. UCS misstates Licensee's position on the installation of instrumentation for the detection of inadequate core cooling. See UCS PF 363. Licensee has taken numerous actions, including the installation of additional instrumentation, to assure that operators have indication of the approach to inadequate core cooling and the necessary guidance to take appropriate action to enhance core cooling during such

an approach or if an inadequate core cooling condition occurs. Licensee has opposed only the installation of reactor vessel water level instrumentation. See, Licensee PF, section II.B.

253. UCS criticizes the Staff for proposing no hardware modifications to the post-accident radioactivity removal (PARR) and post-accident heat removal (PAHR) systems as a result of the TMI-2 accident. UCS PF 360. The short answer is that the failure of those functions has no nexus to the TMI-2 accident; the containment performed its intended function. See Tr. 11,065 (Levy). In the absence of evidence of such a nexus, there is no express need for a Board finding that the capabilities or reliabilities of the PARR and PAHR functions have been improved. Nevertheless, as UCS proposed finding 360 concedes, the Staff has proposed procedural changes and operator training to enhance the PARR and PAHR functions.

254. UCS's proposed finding 368 distorts Licensee's position on the improvement to emergency feedwater (EFW) reliability associated with the conversion of the EFW system to fully safety grade. The essence of Licensee's testimony on this subject was that the most significant improvements to EFW reliability will be achieved prior to restart (through the upgrading of the EFW system to safety-grade for small-break LOCAs and loss of main feedwater transients); the post-restart modifications will not significantly improve EFW reliability (over and above what it will be at restart), since the post-restart modifications for conversion to a fully safety-grade

system will principally involve the environmental qualification of equipment for relatively improbable, non-LOCA events. See Licensee PF 417. Dr. Levy's statements, quoted by UCS, were similarly addressed to the improvement in EFW reliability at restart.[59] Thus, contrary to UCS's assertion, there is no inconsistency in Licensee's testimony on this matter.

255. UCS proposes a laundry list of "examples of recommendations [listed in Staff Exhibit 3] which have since been eliminated as requirements,[60] examples of recommendations

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59 Though UCS, in its proposed findings, refers to Licensee's witness as "Mr. Levy," Salomon Levy received a Ph.D. from the University of California at Berkeley. Dr. Levy is now president of a consulting firm, and has served as an independent engineering consultant to, inter alia, several power utilities, national laboratories, the Electric Power Research Institute, the NRC Research Division, and several power equipment manufacturers. Dr. Levy served as both co-chairman and a member of the Industry Advisory Committee at TMI-2 immediately after the accident, and later was hired as a consultant to the President's Commission. He has extensive background in pressurized water reactors. In the course of his extended tenure at General Electric, he was responsible for the generation of risk evaluations for every reactor considered for offering. Thus, Dr. Levy was associated with probabilistic techniques even before WASH-1400 was issued. See Statement of Professional Qualifications, ff. Tr. 11,049; Tr. 11,141-46 (Levy). Recognizing Dr. Levy's distinguished background and extensive, broad-based experience, we are not inclined to dismiss his probability estimates out of hand as unreliable, as UCS urges. UCS PF 368. Rather, we accord the estimates the weight which we believe they deserve, mindful of the qualifications which Dr. Levy himself candidly attached to them.

60 UCS apparently misperceives the significance of the exclusion of items from NUREG-0737. Contrary to the implication of UCS proposed findings 364, 366, 369, 370 and 371, the fact than an Action Plan element is not included in NUREG-0737 does not, per se, mean that it will not be required; rather, NUREG-0737 includes only those Action Plan items which the Commission had already approved at the time NUREG-0737 was
(Continued next page)

which bear no obvious relationship to the event for which they are proposed as mitigating measures, and recommendations which will not have any short-term benefit." See, UCS PF 364, 366, 367, 369-373. In evaluating UCS's laundry list, we are mindful that we did not intend BQ/UCS Contention No. 13 to provide intervenors with the opportunity to inject new issues into the hearing at the proposed findings stage. See generally, paragraphs 267, 268, infra.

256. Contrary to UCS's assertion in proposed finding 364, item 1 on Table 16 of Staff Exhibit 3 -- review of operating experience -- does appear, in part, in NUREG-0737. Further, the item is applicable to TMI-1. See, Ross, ff. Tr. 15,555, Tables 1 and 2. The NUREG-0737 SER (Staff Exhibit 12), Enclosure 1, which lists items required prior to restart, includes Action Plan item I.C.5 (review of operating experience), and references the Staff's evaluation in SER Supplement 2 (Staff Exhibit 13). The Staff there states that Licensee's procedures make adequate provision for the collection, evaluation and dissemination of operating experience. The Staff considers the item resolved. Staff Ex. 13 at 5-6. Similarly, UCS asserts that item 2 of Table 16 (operational quality assurance program) is an area of incomplete Staff review,

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(continued)
published. See generally, 46 Fed. Reg. 26491, 26492 (May 13, 1981). Moreover, the fact that an item may not be required does not mean that License or the Staff will ignore it.

citing Staff Exhibit 13. UCS PF 364. UCS has failed to note the Staff's conclusion, in Supplement 3 to the SER, that Licensee's quality assurance list is acceptable for restart, and that Licensee is in full compliance. Staff Ex. 14 at 23.

257. UCS proposed findings 364 and 366 allege that item 11 (onsite safety engineering group) of Table 16, Staff Exhibit 3, has been omitted from NUREG-0737, and is therefore no longer a requirement. In fact, Action Plan item I.B.1.2 (including the requirement for an onsite safety engineering group) is included in NUREG-0737, though as a requirement for operating license applicants only. See, Ross, ff. Tr. 15,555, Table 1 (showing item I.B.1.2 as an NTOL/Order item). In any event, the Board has evidence of Licensee's implementation of this item. See, e.g., Staff Ex. 4, at 19-21 (finding that Licensee's Independent Onsite Safety Review Group -- IOSRG -- will satisfy requirements for independent, full-time safety engineering staff located on site, and that Licensee is making acceptable provisions for safety review and operational advice).

258. IREP and systems interaction (the resolution of the generic safety issue) are discussed in UCS proposed finding 365 and included on UCS's laundry list in UCS proposed finding 371. These are also items on which a record has been fully developed. See, Licensee PF 539-544 and paragraph 269, infra. The Board therefore accords to those programs the weight which we believe they deserve on the basis of the evidentiary record

before us; we need not rely on their inclusion in or exclusion from NUREG-0737 as determinative of the contribution they will make to the safety of TMI-1.

259. UCS proposed findings 366, 367 and 372 list items which, according to UCS, "bear no obvious relationship to the event for which they are proposed as mitigating measures." UCS PF 370. The items which UCS so characterizes, consonant with its apparent bias, see paragraph 246, supra, are generally non-hardware modifications. Relative to particularized hardware modifications, such items often do bear a less obvious relationship to any particular function of a nuclear plant; however, that does not in any way diminish the importance of the contribution such improvements can make to plant safety. Moreover, at the hearing, the Board did explore how certain items included on one table of Staff Exhibit 3 are related to the function with which the Staff associated them. See, Tr. 11,270-74 (Administrative Judge Little, Rosenthal). Had UCS chosen to attend the evidentiary hearings on BQ/UCS Contention No. 13, it could have attempted to develop a record affirmatively demonstrating a lack of relationship between the items it questions and the functions for which they are proposed as mitigating measures. However, we decline to infer, at this late stage -- as UCS would have us do -- that, had UCS attended the hearings on this issue and asked the Staff witnesses to establish the relationship between particular items and the functions with which the Staff associated them, the Staff would have been unable to do so. See paragraph 228, supra.

260. In proposed findings 361, 365 and 373, UCS lists items which, it asserts, "will not have any short-term benefit." UCS PF 370. While it is not at all apparent to the Board that the listed items will have no value whatsoever until they are completed -- and UCS points to no evidence to support its assertion -- we note that, in any event, though we have focused heavily on short-term modifications in this proceeding, we have not hesitated to credit Licensee for long-term measures, as appropriate. Further, to the extent that these cited proposed findings can be read to allege that the listed items should be completed prior to restart of TMI-1, we expressly reject that suggestion. See paragraph 255, supra.

Q. Staff Review and Recommendations

261. Proposed findings of fact on Board Question No. 2 were filed by Licensee, UCS and the NRC Staff. UCS did not even appear at the hearing on Board Question 2, which explores the sufficiency of the totality of the Staff's proposed requirements for TMI-1, to participate in cross-examination of the Staff witnesses who presented testimony on this issue. Now, however, UCS would have the Board conclude that there is insufficient evidence in the record upon which to base a finding favorable to the Staff and Licensee on Board Question 2. See, e.g., UCS PF 560, 586, 596, 630. As we have discussed previously (see paragraph 22, supra), it is incumbent upon intervenors to assist the Board in developing a full

record. Therefore, where, as here, an intervenor alleges that the record is incomplete, but has made no attempt to develop evidence in support of its position (or relies upon extra-record material), the Board must give little weight to such proposed findings.

262. Staff proposed findings 424 and 428 state that those NUREG-0694 items which were required to be implemented by operating license applicants must be completed by Licensee prior to restart. The Staff here has apparently overlooked its later testimony that only certain of these NTOL items need be completed prior to restart. See Licensee PF 519, 520; see also, paragraph 274, infra.

263. UCS notes, in its proposed finding 347, that Board Question 2 and the consideration of beyond-design-basis accidents (the subject of former UCS Contention 13) are "intimately related." UCS, in its proposed findings on former UCS Contention No. 13,[61] has taken issue with the manner in which the Staff determined the actions which would be required by licensees in the wake of the TMI-2 accident. See, generally, UCS PF 346-354. The Board notes, initially, that Staff witness Check's testimony quoted in UCS proposed finding

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61 However, nowhere in its findings on either former UCS Contention 13 or Board Question 2 does UCS attempt to make an affirmative showing that the proposed modifications are inadequate to prevent or mitigate postulated accident sequences or that specific additional modifications are necessary for this purpose.

346 did not pertain to the TMI Action Plan per se, but rather was an explanation of how the Staff's lessons learned recommendations were determined. Tr. 11,179-81 (Check). As we have previously found, the Staff's own recommendations were but one of many components of the Action Plan. Licensee PF 517, n.162.

264. UCS, in its proposed findings 350 to 352, takes issue with the adequacy of the "process" by which the Action Plan was developed, asserting that a systematic evaluation of the TMI-2 accident, and scenarios with a close nexus thereto,[62] have not been performed. The Board agrees with the Staff that the diverse investigations of the TMI-2 accident, many of which were performed by groups independent of the NRC, have resulted in the identification of the important TMI-2 related corrective measures. Ross, ff. Tr. 15,555, at 5. As to UCS's suggestion in its proposed finding 352 that the recommendations contained in the Action Plan should have been reviewed by the various investigatory groups, the Board observes, as an historical matter, that several of these independent groups were disbanded by the time that the Action Plan was formulated. Further, drafts of the Action Plan were reviewed and commented upon by the ACRS, among others. Id. at 4.

265. UCS proposed findings 352 and 353 claim that no evidence was presented on alternative recommendations which may

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62 See, Licensee PF 498-505, and paragraphs 246-260, supra, discussing the Staff's evaluation of accident scenarios having a nexus to TMI-2.

have been considered or upon disagreements regarding the recommendations contained in the Action Plan. While we agree that no testimony was presented on these issues, the Board also notes that UCS failed to pursue its interest in this subject. Further, the Board was not seeking, through its Question No. 2, a diary of the vast effort which went into the development of the TMI Action Plan; although we have learned a great deal here about why certain alternatives were not recommended. UCS, in its proposed finding 354, also castigates Licensee for failing to present any testimony on Board Question 2 and for failing to cross-examine the Staff's witnesses as to the sufficiency of the proposed requirements. Suffice it to say that any such disapproval can be equally extended to UCS.[63] See also, paragraph 261, supra.

266. We turn now to UCS's findings on Board Question 2, which assert that the actions which the Staff has recommended be required prior to restart are insufficient because, among other reasons, the Staff has failed to recommend that certain other items contained within the Action Plan,[64]

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63 In this respect, the Board would further note that Licensee, in its proposed findings, has questioned the necessity of only those actions upon which it cross-examined the Staff, unlike UCS's practice of proposing findings on subjects for which there is no record support. Compare Licensee PF 527, 528, with UCS PF 353, 586.

64 The Action Plan (NUREG-0660), which is heavily relied upon by UCS in its proposed findings, is not a part of the record in this proceeding.

but not yet approved for implementation by the Commission, be required of Licensee. See, generally, UCS PF 561-596.

267. The Board must observe, prior to addressing these UCS proposals, that to a great extent UCS has abused the hearing process here and taken unfair advantage of the general nature of Board Question 2. Over one year of this proceeding was devoted to an identification of the issues to be tried, the pursuit of discovery on those issues, and preparation for trial on them. The Board required intervenors who wished to challenge the sufficiency of the Staff's recommended short and long-term actions to advance specific contentions to that effect, and the Board rejected those which were too broad. See First Special Prehearing Conference Order, LBP-79-34, 10 N.R.C. 828 (1979), at: 837 (UCS Contention 13 found to be too broad. "The sooner UCS specifies the areas or sequences that must be addressed by licensee and staff, the greater will be the showing required in response to that specificity."); 837-838 (rejecting UCS Contention 15 because, as a "catch all contention" it lacks specificity); 838-839 (rejecting UCS Contentions 16, 17 and 18 because, inter alia, they are too vague and broad). Later, the Board required further specificity even as to some of the contentions admitted for purposes of discovery. See Memorandum and Order Requiring Further Specification of Contentions, June 23, 1980. As we noted in that first prehearing conference order, "[t]he specificity of the contention will necessarily shape the specificity of the evidence produced in response." 10 N.R.C. at 832.

268. The Board's Question No. 2 was not intended to provide intervenors, or any other hearing participant, with the opportunity to advance new contentions at the proposed findings stage asserting that one or more specific short or long-term actions should be required in addition to those recommended by the Staff. The hearing was intended to litigate such proposals. This Board question, as it states, was aimed at reviewing the sufficiency of the recommendations as a totality. Consequently, our consideration of the UCS proposed findings is heavily tempered by the UCS attempt, at the post-hearing stage, to inject new issues.

269. UCS proposed findings 567 through 583 deal with Item II.C recommendations contained in the Action Plan, which concern the IREP program and recommendations for systems interaction studies. As has been discussed previously, the Staff has not yet issued requirements that licensees perform IREP/systems interactions studies. See Licensee PF 542. UCS faults the Staff for not requiring that such a study be performed at TMI-1 prior to restart solely because the Staff has not yet decided upon the proper methodology and criteria. UCS PF 582. However, as UCS itself points out, the IREP methodology was inadequate to detect the type of failures which resulted in the Cyrstal River-3 and Rancho Seco transients. UCS PF 577 and 578; see also, Licensee PF 539. The Board sees no point in requiring Licensee to perform a systems interaction study when the methodology for such studies is obviously not

yet sufficiently defined. In this regard, we note that the ACRS, which, like this Board, is concerned about the possible implications of interactions between safety systems and non-safety systems, has also found that the performance of an IREP-type study need not be a pre-condition for restart. Staff Ex. 14 at 54 and C-2. Further, the Board has been presented with testimony that the Staff is actively working on this subject and anticipates that a program will be developed by the fall of 1982, at which time all licensees will be required to conduct IREP-type studies. Tr. 15,629-30 (Ross).

270. UCS proposed finding 580 states that, on the basis of the studies conducted to date, the Staff has identified three potential common mode linkages which could constrain a plant's ability to deal with a loss of feedwater and alleges that only one of these problems has been corrected at TMI-1. Staff witness Rowsome identified these three potential failures as a loss-of-offsite power, emergency feedwater autostart compromised due to the loss of an NNI bus, and failures of the steamline break detection system. Mr. Rowsome then testified that Licensee is in compliance with the loss-of-offsite power design and that plans were underway to address the other two areas. Tr. 16,920-22 (Rowsome). With respect to these last two potential problems, the Board has been presented evidence that the emergency feedwater safety-grade pump auto initiation will be independent of ICS/NNI at restart and, as part of the long-term actions, the Main Steam Rupture Detection System will

be upgraded to safety-grade. See Licensee PF 395 and 402. Therefore, in that these areas will be or have been corrected, the Board does not view these potential failures as sufficiently significant to alter our previous finding that systems interaction studies need not be performed prior to restart.

271. UCS proposed findings 584 and 586 assert that Action Plan items II.E.2.1, II.E.2.2 and II.E.2.3, which deal with the reliability of the emergency core cooling system and which are not currently being required to be implemented by the Staff, should be required to be performed by Licensee prior to restart. UCS criticizes the Staff for failing to provide any basis for not requiring the implementation of these items, relying upon a statement from NUREG-0578 that ECCS initiation may exceed its accepted design basis. Here UCS is again relying upon a document which is not a part of the record in this hearing; further, UCS conducted no cross-examination of the Staff to determine why these items were not being required. The Board has received no evidence in support of UCS's position; therefore, we decline to adopt UCS's suggestion that these items be required prior to restart.

272. Similarly, in its proposed findings 587 to 596, UCS would require that Action Plan items II.E.3.2, II.E.3.3, II.E.3.4 and II.E.3.5, regarding the decay heat removal systems and the ability to achieve safe shutdown, be completed prior to restart. UCS alleges that the Staff provided no basis for not requiring these actions prior to restart (UCS PF 596); as with

the items discussed in paragraph 271, supra, UCS made no attempt to solicit this information or develop a record in support of its position that these items are necessary. Within the context of item II.E.3.5, UCS raises the issue of cold shutdown capability. The Board is aware that Licensee has been required, pursuant to IE Bulletin 79-01B, to provide the Staff with available information on one environmentally qualified path to achieve cold shutdown. Lic. Ex. 53.

273. In further support of its position that certain Action Plan items which have not yet been required for implementation by the Staff are necessary to assure the public health and safety, UCS relies upon Table B-1 of NUREG-0660 which contains a priority ranking of the Action Plan items. UCS PF 598-600. The Board notes that UCS here is relying on extra-record material, in that NUREG-0660 is not a part of the record in this proceeding, and, further, UCS made no attempt to cross-examine the Staff witnesses on any alleged discrepancies between the NUREG-0660 rankings and the Staff's position that the most safety significant items are being required prior to restart. The Board, therefore, will not base its decision as to whether the restart requirements are sufficient to provide adequate protection of the public health and safety upon this non-record ranking.

274. UCS proposed finding 602 summarizes its view that, in light of the fact that several of the original Action Plan items have not yet been approved for implementation, there

is no basis to support the Staff's finding that the most safety significant items are being required prior to restart. The Board rejects this view on the basis of the Staff's undisputed testimony regarding the genesis of the required actions. As explained by Dr. Ross, after the entire Action Plan was developed, the Staff identified those items which were known to have a significant safety improvement potential and required that these be implemented by applicants for new operating licenses and by Licensee. Ross, ff. Tr. 15,555, at 8, 10. Following the issuance by the Commission of CLI-81-3 (March 23, 1981), which directed that TMI-1 be treated as an operating reactor rather than an NTOL unless the record dictated to the contrary,[65] the Staff reviewed its recommended restart requirements and determined that based on their safety significance, five of the NTOL requirements would remain as pre-restart actions.[66] Tr. 21,325-29 (Jacobs, Silver); see also, Licensee PF 519-521. Therefore, the Board finds that the Staff has, indeed, considered the safety significance of the actions which have been recommended as restart requirements. See also paragraph 279, infra.

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65 The Board notes that UCS, while criticizing the Staff for not including certain items as pre-restart requirements, has not argued that there is anything unique about TMI-1 which would require the imposition of these items.

66 There are a total of 48 NTOL items, 30 of which are encompassed by the short-term Order items. Ross, ff. Tr. 15,555, at 9 and Table 2; see also, Licensee PF 519.

275. UCS likens the fact that the Staff has not yet implemented all of the Action Plan items to its previous treatment of unresolved safety issues, alleging that the identification of programs to resolve these "safety problems" is inadequate and that the Staff must demonstrate why TMI-1 can be safely operated pending resolution of these issues. UCS PF 621, 622. UCS here relies on its earlier discussion (UCS PF 544-546) of the Appeal Board decision in Virginia Electric and Power Company (North Anna Nuclear Power Station, Units 1 and 2), ALAB-491, 8 N.R.C. 245 (1978). That decision related to the need for Staff consideration, in an initial operating license proceeding, of the specific unresolved safety issues identified in either the reports of the ACRS to the Commission or in the Staff's "Task Action Plans." 8 N.R.C. at 247, 248. With one exception,[67] the Board has received no evidence which would cause us to elevate the not-yet-implemented Action Plan items to the status of an unresolved safety issue, as identified by the ACRS or the Staff. See paragraphs 271-273, supra. Therefore, the Board will not require, as UCS suggests, that the Staff evaluate and explain the manner in which each Action Plan item, not yet approved for implementation by the Commission, is being addressed at TMI-1.

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67 Systems interaction studies are the subject of Task Action issue A-17. See Tr. 15,625 (D. Ross). However, as the Board has previously stated, the status of the IREP/systems interaction issue has been thoroughly explored and found acceptable. See paragraph 207, supra

276. UCS also takes issue with the Staff regarding certain Action Plan items which have been approved for implementation by NUREG-0737 but which are not being recommended as restart requirements or whose implementation dates have been delayed by NUREG-0737. See, generally, UCS PF 608-620, and 624-628. As the Board has previously held (see paragraph 274, supra), we believe that the Staff has properly identified those items which are necessary and sufficient to permit restart. Therefore, while we will not deal at length with this subject, the Board will address certain misconceptions contained within UCS's proposed findings.

277. UCS proposed findings 612 to 614 discuss the Staff's "interim" approach for ensuring the adequacy of emergency procedures until the revised procedures required by Action Plan item I.C.1 (i.e., the ATOG program being implemented by Licensee[68]) are in place. Initially, the Board notes that the discussion by Dr. Ross of deficiencies found during Staff reviews, as cited in UCS proposed finding 613, applies to reviews conducted at certain NTOL facilities, not at TMI-1. Tr. 15,732-33 (D. Ross).

278. UCS proposed finding 614 states that only a cursory review has been conducted of four selected emergency procedures and that no subsequent revisions are being reviewed.

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68 This program was the subject of Board Question No. 11. UCS did not participate in any way in the litigation of that question.

At the time of Mr. Capra's appearance, he testified that, pursuant to the NTOL item I.C.8, four emergency procedures would be subject to detailed Staff review. Tr. 15,588 (Capra). However, as subsequently documented, the Staff has reviewed thirty-five operating procedures, including ten emergency procedures, and has requested Licensee to undertake certain revisions to these procedures. Further, the Staff will verify that these revisions have been incorporated prior to restart. Staff Ex. 11 at 3. The Board also finds that UCS's reliance on Mr. Wermiel's testimony, as support for its statement that only a cursory review of procedures had been conducted, is misplaced. Mr. Wermiel, at the transcript pages cited, was discussing only a portion of a procedure relating to the transfer of water sources, and was not speaking generally of the overall review of emergency procedures. Tr. 16,771-75 (Wermiel).

279. UCS finds fault with the deferral by NUREG-0737 of the original implementation dates for certain Action Plan items, alleging that the Staff has failed to appropriately consider the safety implications of such deferrals. See UCS PF 615-621. Further, in its proposed findings 626 to 628, UCS claims that all implementation deadlines are subject to being amended. With respect to the latter point, the Board observes that Staff witness Silver testified that those items which are vital to safety have been imposed as restart requirements and are not subject to deferral, but that the dated items in NUREG-

0737 are subject to amendment, upon a showing of good cause. Tr. 21,045-49 (Silver); see also, Licensee PF 523. As to the first assertion, the Board has previously concurred with the Staff that the most safety significant items are being required prior to restart. See paragraph 274, supra. Additionally, in that the short-term actions (i.e., the pre-restart requirements) are deemed to have enhanced the margin of safety, the Board believes it is appropriate for the Staff to take into account the feasibility and practicality of implementing the long-term modifications, thereby resulting in a gradual, but deliberate, improvement in the safety of all operating reactors. Ross, ff. Tr. 15,555 at 9; Tr. 15,681-82 (D. Ross); see also, Licensee PF 529. Indeed, this fact has been recognized by the Commission in its Revised Statement of Policy, which states: "In scheduling the remaining [long-term] improvements, the availability of both NRC and industry resources was considered, as well as the safety significance of the action." 45 Fed. Reg. 85236 at 85237 (1980).

280. UCS proposed finding 619 lists several Action Plan items which UCS contends are not being proposed as restart requirements due to procurement delays.[69] The Board observes that the testimony cited by UCS consists of a status report on

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69 The Board sees little applicability of several of these items (i.e., containment isolation, radiation monitoring and iodine monitoring) to the subject matter of the UCS contentions admitted in this proceeding.

the progress being made with respect to the long-term (Category B) actions required under the Action Plan items. See, generally, Tr. 15,590-615 (D. Ross, Capra). In other words, these actions are dated items not encompassed within those short-term actions which the Staff deemed necessary for restart, and which have never been considered to be restart requirements. The "safety significance" of these items as claimed by UCS in proposed finding 620 is based upon non-record material, and therefore will not be relied upon by the Board.

281. UCS proposed finding 624 states that the Staff has done no plant-specific analysis of TMI-1 to determine whether the plant is safe enough restart. UCS here is misinterpreting Staff witness Silver's testimony; Mr. Silver stated that, while an item-by-item review was not performed, the Staff's collective judgment, as documented in Staff Exhibit 14, is that TMI-1 is safe to operate and, further, that by determining those actions which are necessary prior to restart, the Staff has made a finding that TMI-1 is safe to restart. Tr. 21,118-19 (Silver). UCS also cites Staff witness Jacobs' testimony as support for this statement. The Board notes, however, that at the page referred to, Mr. Jacobs was testifying that the individual project managers would be involved in any decision to shut down a plant for failure to meet a NUREG-0737 deadline; he was not discussing the subject at issue in UCS proposed finding 624. See Tr. 21,154 (Jacobs).

282. UCS proposed finding 625 -- which characterize the Staff's position to be that if other plants can be operated

with defects similar to those UCS alleges exist at TMI-1, then TMI-1 can be allowed to restart -- overlooks Staff testimony that, at this time, all plants are safe enough to operate in their present configuration. Tr. 21,118 (Silver); see also, Tr. 15,956 (D. Ross).

283. UCS would also have the Board express suprise that the Staff is recommending that certain NUREG-0737 long-term items be required prior to restart. UCS PF 626. The Board, however, considers this proposal by the Staff as proper in view of the Commission's statement in its March 23, 1981 Order (CLI-81-3) that TMI-1 be treated as any other operating reactor. The implementation date for these additional items, as currently specified in NUREG-0737, would fall due prior to the projected restart; therefore, if other operating reactors are required to implement these items, the same should be true for Licensee. Tr. 21,320 (Silver); Staff Ex. 12, cover letter; but, see, Licensee PF 527, 528.

284. UCS proposed finding 628 alleges that the Staff has not followed its professed policy of requiring a justification prior to extending the deadline for completion of proposed requirements, citing as an example the installation of reactor coolant system high point vents. The implementation date for this item (which has never been a short-term item) was extended generally by NUREG-0737 until July 1, 1982; Licensee has committed to install these vents in accordance with the NUREG-0737 schedule. Staff Ex. 14 at 51-53. Although Licensee

originally stated that this item would be completed prior to restart (see Staff Ex. 1 at C8-62), absent any showing that there is a unique need at TMI-1 for these vents prior to restart, the Board finds no basis upon which to criticize the Staff for allowing Licensee to implement this item on a schedule consistent with other operating reactors.

285. Based upon the foregoing, the Board rejects UCS's argument that the methods employed by the Staff were inadequate to determine those items which are necessary and sufficient to allow restart and long-term operation of TMI-1. Rather, the Board finds that the Staff has taken appropriate action to assure that those actions which are the most safety significant will be required prior to restart and that the completion of the long-term items will provide a gradually increasing level of safety above that required for restart.

R. Equipment Qualification

286. Proposed findings of fact on the Board Question/ former UCS Contention 12, and the additional Board questions regarding the former contention, were submitted by Licensee, UCS, the Commonwealth of Pennsylvania, and the NRC Staff. The Commonwealth and the Staff have recommended additional conditions for restart, whereas UCS apparently would deny plant restart altogether.

287. Apparently by way of background and introduction, UCS observes that if the review deadlines for the IE

Bulletin 79-01B program had been met, it would have permitted completion of the review well before the conclusion of the TMI-1 restart hearing. UCS PF 633. The Board is perplexed at how such a finding assists in deciding the issue here, but we note that if the Staff had filed complete testimony on the schedule set by the Board (September 15, 1980), UCS would not have had the use of virtually any product of the Bulletin program.

288. UCS complains about not being notified in advance about the scope of the Staff's "second-round" testimony here, and refers to Staff "gamesmanship" in this regard. UCS PF 635-639. Staff counsel, at the April 21, 1981 hearing session (on emergency planning issues), informed the Board of the status of Staff preparation of its additional testimony on this subject, and elected to discuss scope as well as schedule. The Board expressed its belief that it was appropriate to limit the testimony to a close nexus to the accident. Tr. 19,488. The Board's expression of interest in whether the Staff had informed UCS of its plans occurred before the Board was reminded that USC had withdrawn its Contention No. 12. Id. Cf. UCS PF 636.

289. First, we observe that the Staff's provision to the Board of information on the scope of its testimony was entirely gratuitous. Parties here, including the NRC Staff, are free to present their cases in any way they see fit. Neither UCS, nor any other party, was required or obliged to

consult in advance with the Board and other parties on the scope of direct testimony. Arguments on the irrelevancy of testimony are ripe when the offer is made. Arguments on the inadequate scope of the testimony are appropriate in proposed findings. But UCS had no right "to argue in advance to the Board that the scope of the Staff's testimony was [or would be] unreasonably restricted." See UCS PF 638.

290. Second, the Staff's communication to the Board was on the record, and not ex parte. The Board repeatedly advised parties who chose not to attend portions of the hearing that it was their obligation to attempt to stay informed of developments at the hearing.

291. Third, in spite of the fact that UCS would now like to have its actions appear stronger than its words, UCS withdrew its Contention No. 12 on July 31, 1980, even though UCS was well aware that it was under no obligation to present direct testimony in support of the contention. The Board and the parties thereafter were justified in treating UCS no differently than other parties "interested" in a Board question. In hindsight, we now must question UCS representations of its "interest" in the three contentions (6, 8 and 12) it withdrew and asked us to pursue, since UCS did not even care enough about our resolution of its former Contentions 6 and 8 to propose findings to the Board.

292. UCS begins its discussion of the evidentiary record by acknowledging what it terms to be an "undisputed

fact" -- that "[t]here has been no demonstration on this record that safety-related equipment in TMI-1 is environmentally qualified in accordance with General Design Criterion 4." UCS PF 640. If this is undisputed here it is for good reason. No such "demonstration" is called for in this proceeding. Cf. UCS PF 649 and 685. When the Board admitted, and limited, UCS Contention 12, it held that " . . . the contention is too broad in that its reference to GDC-4 would extend to structures, systems, and components without further limitation." LBP-79-34, 10 N.R.C. 828, 837 (1979). The Board, then, held from the beginning that this issue did not involve a complete review of TMI-1 compliance with GDC 4. Cf. UCS PF 649. Clearly, Licensee and the Staff were not called upon to make the demonstration which USC boldly proclaims to be undisputedly missing. The Board need not, contrary to what UCS suggests, go any further than the limitation it placed on the issue in 1979 to decide that UCS does not "perforce prevail."[70] See UCS PF 640 and 652.

293. In any case, the Staff's Safety Evaluation Report on the Environmental Qualification of Safety-Related Electrical Equipment at TMI-1 (UCS Ex. 40), issued pursuant to IE Bulletin 79-01B, nowhere concludes that TMI-1 is not in

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70 In this regard, the Board's position on high energy line breaks and main staem line breaks is entirely consistent with all of its previous rulings on the scope of this proceeding. Cf. UCS PF 641, 649, 655, 671, 672.

compliance with GDC 4. Cf. UCS PF 640. The fact that the Staff seeks additional documentation does not represent a conclusion that a piece of equipment has been demonstrated not to be qualified. The stated purpose of the re-evaluation program under IE Bulletin 79-01B is to ensure compliance with the criteria (GDC 1 and 4). UCS Ex. 40, SER at 1.

294. Consideration of the UCS challenge to the scope of the Staff's testimony requires greater care than UCS applied in describing the radiation environment assumed in various Staff reviews. The special review (see Licensee PF 576) which the Staff performed for this hearing considered a small-break LOCA with 1% fuel failure. See UCS PF 641. No one claims, as UCS repeatedly asserts, that fuel failure beyond 1% is "not possible." See UCS PF 645. The equipment qualification review for LOCAs at TMI-1 which the Staff is conducting as a part of the IE Bulletin 79-01B program considers the release from the core of 100% of the noble gases, 50% of the halogens, and 1% of the solids. Braulke-1, ff. Tr. 6802, at 7, 8; Tr. 22,133-38 (Rosztoczy). See also, Licensee PF 561. The release assumptions for the 79-01B review are precisely the same as the assumptions employed by the Staff in the plant shielding review. See Staff Ex. 14 at B-12 to B-14. Cf. UCS PF 643. The record is also uncontroverted that as to radiation levels (and every other parameter except flooding) the TMI-2 accident environment inside containment was less severe than for the design basis loss-of-coolant accident. Braulke-1, ff. Tr.

6802, at 5, 6 and Table 3; Licensee PF 553. Cf. UCS PF 715 (No evidence presented on environmental conditions at TMI-2 except for flooding). Consequently, the Staff's review of environmental qualification of equipment for LOCAs under IE Bulletin 79-01B, will include the accident environment which occurred at TMI-2. Cf. UCS PF 668 and 715.

295. While General Design Criterion 4 requires qualification for the environmental conditions associated with postulated accidents, including loss-of-coolant accidents -- those are LOCAs as defined by the Commission's regulations (i.e., design-basis LOCAs). To the extent that UCS seeks to have the design basis redefined (see UCS PF 646), that is the subject of former UCS Contention No. 13, and the Staff was not required to have assumed that the Board and the Commission will redefine the design basis for this and other operating reactors.

296. To the extent that UCS seeks to require, as a condition of restart, the completion of the IE Bulletin 79-01B review of design basis LOCAs (which, as we note above, will bound the TMI-2 accident except as to flooding), UCS is quarreling before this Board, as it has with the Commission in the past, with the June 30, 1982 date set by the Commission for the completion of that demonstration.[71] Compare UCS PF 645 and 655

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71 Thus, this is a long-term action only in the sense that the Commission has already established a completion date which is beyond the projected restart date for TMI-1. It is not a long-term requirement in the context of the Commission's Order (Continued next page)

with Petition for Emergency and Remedial Action, CLI-80-21, 11 N.R.C. 707, 714-715 (1980), and Licensee PF 565. That schedule was established by the Commission after the TMI-2 accident.

297. UCS breaks new ground in its proposed findings on this issue when it cites to Mr. Pollard in his role as a technical interrogator for a suggested factual finding on what a logical scope of the inquiry should be here in light of the TMI-2 accident. See UCS PF 654. Obviously, such observations from counsel table are not evidentiary. Further, the Board does not believe that mere argument in support of a position of a party, unsupported by any evidence of record, has any place in this Board's decision -- whether it comes from counsel or a technical interrogator. See UCS PF 653 and 654.

298. The Board notes in UCS proposed finding 656 what has become a persistent pattern of inconsistency on the part of UCS. See also, UCS PF 668. While unhappy with the scope of the Staff's review throughout the proceeding, UCS draws sweepingly negative inferences about Licensee whenever the Staff review results in less than a ringing endorsement, and negative inferences about the Staff whenever it agrees with

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(continued)
and Notice of Hearing in this proceeding, however, and there is no requirement that reasonable progress be determined. Cf. UCS PF 647-650. Further, item II.B.2 of NUREG-0737, as its title indicates, is not equivalent to the 79-01B program since the 0737 item is aimed only at shielding and limited areas. See UCS PF 651. The record shows, in any event, that the completion date for the item is June 30, 1982. Ross, ff. Tr. 15,555, Table 2.

Licensee. The fact that the Staff is recommending the evaluation of test results, and other conditions, should be commended. The conclusions UCS would then have the Board draw from this Staff effort are entirely speculative and unsupported by the cited evidence. See UCS PF 657. In particular, the disagreement between Licensee and the Staff on radiation levels in the Auxiliary Building is not still unresolved, UCS PF 657 and 715, in that the Staff's written testimony clearly states that its review proceeded by using the Staff's value. Rosztoczy, ff. Tr. 21,867 at 3, 4.

299. If it is UCS's intent, with the incomplete citation which concludes its proposed finding 658, to attribute the last two sentences to the Commission, the reference is inaccurate. Further, it does not follow, as UCS apparently would have us infer, that just because a plant was deemed to meet a standard which the Commission now has concluded by itself cannot serve as the standard against which qualification is to be judged (11 N.R.C. at 711), then equipment inside that plant should be assumed to be environmentally unqualified. See UCS PF 658.

300. UCS contends that there is "no indication on this record" that the Staff has made, in its IE Bulletin 79-01B review, a "technical judgment" regarding continued operation of TMI-1. UCS PF 660. The very document cited by UCS, however -- the Staff's SER pursuant to IE Bulletin 79-01B -- concluded, in what appears to be a "technical judgment," that there is rea-

sonable assurance of safe operation of TMI-1 pending completion of the corrective actions by June 30, 1982. UCS Ex. 40 at 11.

301. Citing no evidence, UCS would have the Board find that "the Staff and Licensee seem to view meeting the June 30, 1982 deadline as their only obligation." UCS PF 660. The record is clear, however, that in addition to the substantial review effort undertaken by the Staff and Licensee, Licensee has filed Licensee Event Reports pursuant to IE Bulletin 79-01B, begun replacement programs, and relocated equipment. Braukle, ff. Tr. 6802; Tr. 6820-21, 6828-32 (Braulke); UCS Ex. 40 at 7, 8.

302. UCS asserts that the Staff has not reviewed the qualification of equipment added or modified by the TMI-2 "lessons learned." UCS PF 669 and 670. The record indicates, however, that the Staff is imposing environmental qualification requirements with respect to such modifications, and that it is obtaining and reviewing information on the satisfaction of those requirements, whether or not it is done as a part of the formal IE Bulletin 79-01B program. See: Safety and Relief Valve Position, Staff Ex. 1 at C8-11 to 13; Inadequate Core Cooling Instrumentation/Saturation Meter, Staff Ex. 1 at C8-16 to 19; Dedicated Penetrations for External Recombiners, Staff Ex. 1 at C8-26, 27; Automatic EFW Initiation, Staff Ex. 1 at C8-34 to 37; EFW Flow Indication to Steam Generators, Staff Ex. 1 at C8-38 to 40, Staff. Ex. 14 at 38, 39; Increased Range of Radiation Monitoring, Staff Ex. 1 at C8-42 to 45, Staff Ex. 14

at 40-41 and B-34 to 36; RCS Venting, Staff Ex. 1 at C8-60 to 63, Staff Ex. 14 at 52-53 and B-7 to 10; Containment Pressure Indication, Staff Ex. 14 at 51 and B-37; Containment Water Level, Staff Ex. 14 at 51-52 and B-38, 39; Containment Hydrogen Indication, Staff Ex. 14 at 52 and B-49; Anticipatory Reactor Trip, Staff Ex. 1 at C2-12 to 14.

303. In UCS proposed findings 671 and 672, UCS announces what it considers to be yet another omission in the record. Information on the qualification of display instrumentation used in the plant LOCA procedures may be found throughout Licensee's Restart Report. See, generally, Lic. Ex. 1, Chapter 2.

304. If the Board takes official notice, as UCS suggests (UCS PF 674), of the fact that chemical spray was actuated during the TMI-2 accident, then it may also take notice that it was actuated only as a result of a pressure spike following a hydrogen burn some 9 hours and 50 minutes into the accident. There is no evidence in the record to contradict Licensee's analysis that the building pressures associated with a small-break LOCA do not reach the spray actuation setpoint. Rosztoczy, ff. Tr. 21,867, May 18, 1981 attachment, at 2.

305. Licensee has not, as UCS contends, identified the wrong components (reactor coolant inlet temperature RTDs) as inputs to the new saturation meter. See UCS PF 676. The reactor coolant outlet temperature is, as UCS points out,

obviously the input to the saturation meter. Id.; Lic. Ex. 1, § 2.1.1.6.3.3 and Chart C-302-650. The record shows that the reactor coolant outlet temperature RTDs are qualified. Rosztoczy, ff. Tr. 21,867, page 10 (of 17) in attachment dated May 18, 1981; Staff Ex. 16. UCS apparently selected the inlet temperature worksheet for attention because of what must be a clerical error in the entry, "Service." See UCS Ex. 39 at 72.

306. UCS asserts that the list of equipment Licensee provided to the Staff in connection with the preparation of Dr. Rosztoczy's testimony is clearly incomplete because it did not include the in-core thermocouples. UCS PF 679. Licensee identified as essential systems and components "those Class IE electrical items, located in a SBLOCA harsh environment that are required to bring the plant to a safe shutdown." Rosztoczy, ff. Tr. 21,867, ff. attached May 18, 1981 letter, at 1. The references to in-core thermocouples which UCS cites from the TMI-1 small-break LOCA procedure are for: (a) advising the operators that the accident has degraded beyond the design basis into an inadequate core cooling situation; or (b) advising the operators of an additional means (beyond the saturation meter) for determining that HPI may be throttled because of 50° F subcooling, in which case the accident already has been mitigated.

307. UCS proposed finding 680 fails because no witness ever agreed with the UCS postulation, now cited as [illegible] without any record citation (see UCS PF 680, third sentence)

that the pressure switches must be operable before a valve inside containment can be opened to enable decay heat removal pumps to mitigate a small-break LOCA. The cross-examination was based upon a hypothetical never proved.

308. The UCS speculation (see last sentence of UCS PF 683) does not establish that the pressure switches in question are required to bring the plant to a safe shutdown in a small-break LOCA. In addition, the "deficiencies" cited by UCS are in the documentation to date. See UCS PF 684. Further, UCS ignores the time available to restore emergency feedwater if it is lost, and the EFW system's capability in the face of a two-hour station "blackout." See Licensee PF 333-355 (B&W small-break LOCA analyses), and 399 (on emergency feedwater reliability).

309. UCS proposed finding 687 continues to confuse postulates advanced by the UCS interrogator with the testimony actually given by the witnesses. The witness testified that the period of time equipment must operate in a small-break LOCA harsh environment varied with individual pieces of equipment, and there was no generic number such as UCS sought. Tr. 21,956-57 (LaGrange). The Staff witness explained that the 20.5-hour period is the time period for returning to the original containment temperature (ambient). Id. Cf. UCS PF 700. The record shows that Licensee considered a 180-day period for radiation levels. Rosztoczy, ff. Tr. 21,967, ff. May 18, 1981 letter attached at 3, and ff. June 5, 1981 letter

attached at 2 (AlO). Further, the Staff witness testified that Licensee's information on an environmentally qualified path to cold shutdown has been received and presently is being reviewed by the Staff. Tr. 21,947 (Rosztoczy). Cf. UCS PF 687 and 688.

310. UCS proposed finding 689 advances what is suggested to be a discrepancy between Licensee's calculated pressure (asserted to be 30 psig) and the Staff's accident profile (25.9 psig). Component List Note 7 (attached to the May 18, 1981 letter ff. Rosztoczy, ff. Tr. 21,867) is cited by UCS for Licensee's calculation, whereas the note obviously reflects only a qualification goal. Cf. UCS PF 690. It is clearly stated that Licensee's analysis shows a reactor building peak pressure of less than 30 psig, and that chemical spray will not be initiated. Rosztoczy, ff. Tr. 21,867, ff. May 18, 1981 letter attached at 2.

311. In connection with the fan coolers, UCS PF 691-694, Licensee's submission to the Staff states as follows:

> The analysis has considered the worst single failure in addition to the loss of offsite power which results in a loss of Main Feedwater. The worst single failure is the loss of one emergency diesel generator. This results in only one reactor building fan coil unit being available for cooling.

Rosztoczy, ff. Tr. 21,867, ff. attached May 1, 1981 letter at 1 (emphasis added). The profile UCS presented to the Staff witnesses during cross-examination, then, clearly was not the one used here. Neither does UCS cite any evidence to support the

implication that there are no other methods for pressure control.

312. Contrary to the UCS assertion, the Staff does not have a "clear and unambiguous requirement that an environmentally qualified path to cold shutdown must be provided" at TMI-1. See UCS PF 699 and 700. IE Bulletin 79-01B, Supplement No. 3, issued October 24, 1980 (UCS Ex. 37) was "clarified" by Generic Letter 81-05, dated January 19, 1981, from the Staff's Director of its Division of Licensing. Lic. Ex. 53. The Staff there informed licensees that Supplement 3 to the Bulletin only requires the submission of "the presently available information for one path to achieve the cold shutdown conditions." Id. at 1.

> This Bulletin requirement was not intended to invoke a change in the licensing basis of the plant. Plants licensed to a hot "safe shutdown" condition are only required by Reference (a) [Order for Modification of License . . ., October 24, 1980] to qualify the equipment necessary to achieve a hot shutdown (i.e., plant specific safety-related equipment).

Id. The Staff makes it clear that Supplement 3 to IE Bulletin 79-01B "represents an enveloping staff position to be implemented on a case-by-case basis," and that Regulatory Guide 1.139 will be the vehicle for implementation plans for cold shutdown requirements, including environmental qualification. Id. The Staff has not applied Regulatory Guide 1.139 to TMI-1. Tr. 8079-82 (Silver).

313. UCS proposed finding 702 cites to portions of proposed UCS Exhibit 39 to argue that equipment needed to

mitigate a small-break LOCA has not been demonstrated to be qualified for ambient conditions. These work sheets were not a part of Licensee's submission to the Staff for this proceeding (Staff Ex. 16) because this equipment is not in a harsh environment for a small-break LOCA. UCS extracted these work sheets from Licensee's IE Bulletin 79-01B filing, where they were included because the equipment is in a harsh environment for an accident or accidents other than a small-break LOCA/loss of main feedwater event. The qualification method and other information for ambient condition qualification is not found on these sheets because the Bulletin does not request it -- the Bulletin is aimed at harsh environments. No witness testified as to the meaning of the information on these work sheets or of the omissions. This is pure argument by UCS, and the Board rejects the cited portions of UCS Exhibit 39 because they are irrelevant to the scope of the issue as we have defined it, and because, without the benefit of a witness to explain the material, it is unreliable. In any case, if the equipment is in an ambient environment during a small-break LOCA, the Board cannot appreciate why it might fail coincident with the accident.

314. The Staff did inquire of Licensee concerning the change in the calculated flood level at TMI-1. See Rosztoczy, ff. Tr. 21,867, ff. attached June 5, 1981 letter, at 5 (Q8). See also, Croneberger, ff. Tr. 16,252.[72] Cf. UCS PF

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72 UCS did not appear to cross-examine this witness.

704. Unlike the UCS recitation of it, Mr. Croneberger's testimony states that the transmitters for the steam generator and pressurizer level instruments are utilized to achieve safe shutdown and assist in maintaining natural circulation. See UCS PF 706.

315. UCS speculates that the operators at TMI-2 determined that it was unsafe to go into the recirculation mode. UCS PF 709. No supportive evidence is cited. In fact, the evidence is directly to the contrary. Tr. 7571-73 (Keaten). Cf. PA PF 29 and 30.

316. UCS is "troubled" by an issue it raised at the hearing in an effort to undermine the credibility of Licensee's submissions to the Staff. UCS PF 710-712. UCS asserts that the Conax connectors discussed in the Staff testimony here should have been identified by Licensee in 1977 in response to IE Bulletin 77-05A. UCS totally misreads the bulletins in question (which UCS did not offer) and therefore Licensee's response. IE Bulletin 77-05 sought information on "pin and socket type" connectors in "systems that are located inside containment, are subject to a LOCA environment and are required to be operable during a LOCA." Lic. Ex. 54. The bulletin was inspired by tests of such connectors. Id. IE Bulletin 79-05A, which, by its terms, is to be read together with the original document, only expands the scope of the information request spatially -- to safety systems outside containment -- and not to other types of connectors. See Lic. Ex. 55. Consequently,

there is no reason why Licensee should have responded to the bulletin by identifying the Conax connectors. This situation does not, "unhappily," fairly represent the state of the record. See UCS PF 713. Unhappily, it represents fairly the persistent attempt by UCS to obfuscate the record and burden the Board with superficially dramatic, but woefully unsupported proposed findings.

317. No evidence is cited in support of the UCS statement that "[c]old shutdown is a necessary end-point for a SBLOCA as well as all other accidents." See UCS PF 714.

318. UCS proposed findings 670, 680 and 683 are rejected because they lack citations to the record. UCS proposed finding 679 is rejected because it cites to a document not in evidence. See paragraphs 1 and 2, supra. Further, each UCS proposed finding on High Energy Line Breaks is rejected as inconsistent with our rulings on the scope of this issue.

319. In sum, UCS is attempting to challenge, before this Board, actions which the Commission has already taken with respect to qualification criteria, implementation schedules, and continued operation of licensed plants; and to expand the issue to what we said in the beginning it was not -- an entire review of Licensee's compliance with GDC 4.

320. The Staff, in its proposed finding 21, has altered significantly the proposed restart conditions recommended by its witness. See Rosztoczy, ff. Tr. 21,867, at 6, 7. In particular, where the witness recommended the submission of

evaluations prior to exceeding 5% power, the Staff now proposes the replacement of equipment prior to exceeding 5% power -- not if the equipment is shown by the evaluation to be unqualified -- but if there is not yet an adequate (to the Staff) demonstration of qualification after the evaluation is performed. Aside from the obvious prejudice to Licensee of these post-hearing amendments to the offered testimony, the Staff is attempting to advance, for this one licensee, the June 30, 1982, deadline set by the Commission in CLI-80-21, supra. This is not an LER situation where equipment found to be defective is to be replaced immediately. Neither do we have any explanation, if the inadequacy turns out to be documentary, of the "technical judgment" called for by the Commission. The Board rejects the amendments to the Staff's proposed conditions. If the Commission disagrees, we recommend at the least that Licensee be provided with the opportunity, if it should become necessary, to justify interim operation. The same recommendation is made with respect to the Commonwealth's proposed conditions. See PA PF 34. While it may be prudent for the Staff to check on Licensee's flood level calculations at some point in the IE Bulletin 79-01B program, the Commonwealth's

proposed findings do not make a case for the necessity of a condition on restart to that effect.

Respectfully submitted,

SHAW, PITTMAN, POTTS & TROWBRIDGE

Thomas A. Baxter

George F. Trowbridge
Thomas A. Baxter
Delissa A. Ridgway

Counsel for Licensee

1800 M Street, N.W.
Washington, D.C. 20036

(202) 822-1000

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