

LIC 7/13/81

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))	

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

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I. INTRODUCTION

Pursuant to the schedule established by the Board in its Memorandum and Order of June 9, 1981, Licensee herein submits its reply to the proposed findings of fact and conclusions of law on plant design and procedures issues filed by the other parties on June 1, 1981. Licensee has not attempted to respond to each proposed finding and conclusion with which Licensee disagrees. Nor is the Board required to address expressly each and every individual finding proposed by every party. See Public Service Company of New Hampshire, et al. (Seabrook Station, Units 1 and 2), ALAB-422, 6 N.R.C. 33, 41

(1977), and cases cited therein. Where the disagreements are plain, and the positions are accompanied by accurate citations to the record, for example, we have not repeated our position, but rely upon Licensee's Proposed Findings of Fact and Conclusions of Law on Plant Design and Procedures Issues in the Form of a Partial Initial Decision.

Licensee's reply is set forth in the form of a section of a partial initial decision on plant design and procedures issues, in which the Board addresses the proposed findings of fact and conclusions of law filed by the parties. Proposed findings of fact are cited as "[proposing party] PF [paragraph number]" -- for example, "Staff PF 95."

II. MINIMUM STANDARDS APPLIED IN
THE BOARD'S CONSIDERATION OF THE
PARTIES' PROPOSED FINDINGS;
DETERMINATIONS OF DEFAULT

1. Because the Board's review of the parties' proposed findings has uncovered some material defects of a generic nature, it is appropriate to identify them at the outset. The Commission's Rules of Practice, at 10 C.F.R. § 2.754(c), provide that proposed findings of fact shall be confined to the material issues of fact presented on the record, with exact citations to the transcript of record and exhibits in support of each proposed finding. Consequently, the Board will reject proposed findings which do not conform to

10 C.F.R. § 2.754(c), except where a party is summarizing, or drawing a logical inference from, other findings which are supported by exact citations to the record.

2. We will also have occasion to observe below that some parties have cited to documents which were not introduced into evidence. It is clear that a licensing board may not base a decision on factual material which has not been introduced into evidence. Tennessee Valley Authority (Hartsville Nuclear Plant, Units 1A, 2A, 1B and 2B), ALAB-463, 7 N.R.C. 341, 351-352 (1978), citing section 7(d) of the Administrative Procedure Act, 5 U.S.C. § 556(e). This is not a technicality. It goes to the very heart of due process and the achievement of a fair hearing. The Atomic Safety and Licensing Appeal Board stated:

This rule is both traditional and just. It would have been unfair to the parties on the opposite side of the case for the Licensing Board to have given probative weight to extra record material because that would have deprived them of an opportunity to impeach it by cross-examination or to rebut it with other evidence.

Hartsville, ALAB-463, supra, 7 N.R.C. at 352 (1978). Indeed, the entire purpose of this hearing would be undermined if the Board were to consider proposed findings based upon extra-record material. We need not have labored long and hard to compile an evidentiary record if the parties are to be free to go outside of it at the proposed findings stage. Consequently, the Board will emphatically reject each and every proposed

finding which is supported solely by citation to a document which is not in evidence.

3. Proposed findings of fact and conclusions of law were not filed by two intervenors which had raised contentions on plant design and procedures issues which were the subject of evidence presented at the hearing: Anti-Nuclear Group Representing York (ANGRY) and the Environmental Coalition on Nuclear Power (ECNP). The Board has admonished the parties on numerous occasions that a failure to file proposed findings, which the Board directed all parties and participants pursuant to 10 C.F.R. § 2.715(c) to do, would be deemed a default by that participant as to issues upon which no proposed findings have been filed, pursuant to 10 C.F.R. § 2.754(b). See, e.g., Memorandum and Order on Schedule and Format for Proposed Findings, dated April 22, 1981, at 2; Memorandum and Order on Prehearing Conference of May 13, 1980, dated May 22, 1980, at 12. Consequently, the Board determines that ANGRY is in default with respect to its contentions V(B), V(C) and V(D), and that ECNP is in default with respect to its contentions 1a, 1c, 1d and 1e.

4. While Mr. Sholly filed proposed findings of fact and conclusions of law on plant design and procedures issues, he did not address therein his contentions 3 and 5. Therefore, the Board determines that intervenor Sholly is in default with respect to Sholly Contentions 3 and 5.

5. With respect to Board questions, we view a party's failure to file proposed findings as an abandonment of

any interest by that party (or by a participant pursuant to 10 C.F.R. § 2.715(c)) in the outcome of our deliberations on that question. This is especially so in the case of intervenor Union of Concerned Scientists (UCS), where UCS abandoned contentions which were then retained, at the request of UCS, as Board questions. See Board Question UCS-6 (Valve Testing), and Board Question UCS-8 (Additional LOCA Analysis).

6. The Commonwealth of Pennsylvania, a participant under 10 C.F.R. § 2.715(c), filed proposed findings of fact only as to the following plant design and procedures issues: Detection of Inadequate Core Cooling; Abnormal Transient Operating Guidelines (BQ 11); Connection of Pressurizer Heaters to Diesels (UCS-4); Computer (Sholly-13; ECNP-1a); Systems Classification and Interaction (UCS-14); and Emergency Feedwater Reliability (BQ 6). The Commonwealth also proposed findings of fact and conclusions of law on the general subjects of burden of proof and standards of compliance. While we respect the Commonwealth's decision to advise the Commission, through proposed findings, on only selected issues, the Board's directive to file proposed findings was aimed explicitly at all parties and participants pursuant to 10 C.F.R. § 2.715(c). Consequently, the Board cannot view a failure to propose findings of fact on an issue or issues any differently for the Commonwealth, or any other section 2.715(c) participant, than it has for section 2.714 parties.

7. Finally, we also note that only Licensee and the NRC Staff filed proposed findings on the following plant design

and procedures issues: In-Plant Instrument Ranges (Sholly-5; ECNP-1d); Safety System Status Panel (BQ UCS-9; ECNP-1c); Additional LOCA Analysis (BQ UCS-8; ECNP-1e); Valve Testing (BQ UCS-6); and Board Questions 1, 3, 5 and 7.

8. Any proposed findings of fact and conclusions of law submitted by the parties and section 2.715(c) participants which are not incorporated directly or inferentially into this Partial Initial Decision are herewith rejected as being unsupportable in law or in fact, or as being unnecessary to the Board's decisionmaking.

III. BURDEN OF PROOF AND STANDARDS OF COMPLIANCE

9. The Commonwealth of Pennsylvania has proposed findings of fact and conclusions of law on the general subject of "Burden of Proof and Standards of Compliance." See PA PF 1-17. UCS has adopted paragraphs 1 to 13 of the Commonwealth's proposed findings. See letter to the Board, dated June 12, 1981, from counsel for UCS. The Board notes at the outset that it finds little utility in addressing such issues in the abstract, as the Commonwealth and UCS propose. It would be much more fruitful to address such concepts as they apply to a particular dispute among the parties, and not in a solely academic context.

10. In any case, Licensee has not contended, at any point in this proceeding, that Licensee does not bear the

burden of proof, even though there is no precedent in NRC case law for this restart proceeding. The Commission's August 9, 1979 Order and Notice of Hearing applies to Licensee the burden of meeting the "reasonable assurance" standard -- i.e., that there is reasonable assurance that the Three Mile Island Unit 1 facility can be operated (as to the "short-term actions"; can be operated for the long term as to the "long-term actions") without endangering the health and safety of the public. See CL-79-8, 10 N.R.C. 141, 148 (1979).

11. Commission proceedings are subject to the provisions of the Administrative Procedure Act. 42 U.S.C. § 2231; Commonwealth Edison Company (Zion Station, Units 1 and 2), ALAB-616, 12 N.R.C. ___, slip op. at 3 (October 2, 1980). In adjudicatory proceedings subject to the Administrative Procedure Act, the proponent of a rule or order has to satisfy a "preponderance of the evidence" standard in order to meet its burden of persuasion. Steadman v. Securities and Exchange Commission, __ U.S. ___, 101 S.Ct. 999, 1009 (1981). Therefore, Licensee's burden of proof here, or ultimate burden of persuasion, is met by convincing the Board by a preponderance of the evidence that the reasonable assurance standard has been met on the issues presented in this case. Zion, ALAB-616, supra, slip op. at 3; Tennessee Valley Authority (Hartsville Nuclear Plant, Units 1A, 2A, 1B and 2B), ALAB-463, 7 N.R.C. 341, 360 (1978); and cases cited therein.

12. Paragraphs 4 through 17 of the Commonwealth's proposed findings express concern with the process of

determining that Licensee has demonstrated reasonable progress toward the completion of the long-term actions which will be required, by the Commission after review of our Initial Decision, for the long-term operation of TMI-1. Because of the general nature of these proposed findings, which are not aimed at any particular long-term requirement, the Board has difficulty appreciating what the Commonwealth's concern really is.

13. One issue raised is a proposal that the Board should reject, as evidence of reasonable progress, a commitment by Licensee to take future action on a long-term requirement where the commitment is not accompanied by evidence of "substantive progress" and "concrete action, such as the development of an acceptable design or the placement of the necessary purchase orders to comply with the particular item." PA PF 5 and 6. The Commission's Order and Notice of Hearing, however, requires reasonable progress, and not substantive progress as the Commonwealth suggests. The concept of "reasonable" progress inherently involves a consideration of the circumstances surrounding a particular long-term action, and the Board cannot specify a generic standard which would be appropriate for all long-term actions.¹ We cannot rule out the possibility that a commitment alone may be reasonable progress in the circumstances surrounding some long-term action.

1 The Commonwealth's proposed standard itself illustrates this difficulty. It was obviously written with hardware modifications in mind, whereas many of the long-term actions are directed at studies, procedural development and training.

14. We agree with the Commonwealth's observation that the Board must have some evidence on the record on which to reach a finding of reasonable progress. See PA PF 6. Licensee's Restart Report and the Staff's several safety evaluation reports and supplements, as well as the testimony provided in response to Board questions and intervenor contentions have provided us with a record adequate for that purpose. Where the Board was not satisfied with the evidence offered, we did not hesitate to ask the questions necessary to complete the record, whether or not the issue was contested.² See, e.g., Board Questions 6 and 11. See also, Licensee PF 531 and 532.

15. Next, the Commonwealth appears to be concerned that the Staff will not in fact require completion of the long-term actions as soon as practicable, and criticizes the Staff for not taking a position at the hearing on the precise legal enforcement tool it will employ to assure completion of the long-term actions -- i.e., whether license conditions should be imposed prior to restart, or whether other enforcement mechanisms will be used.³ The Commonwealth proposes that

2 Criticizing the Staff's method of judging reasonable progress toward compliance with NUREG-0737 items, the Commonwealth attributes to Staff witness Silver testimony that he believes all NUREG-0737 deadlines may be amended without compromising safety. PA PF 12. What Mr. Silver said is that NUREG-0737 items which are important to safety, or vital to restart, have already been imposed, and that each remaining dated requirement is potentially amendable for good cause, on its own merits. Tr. 21,045-46 (Silver).

3 The Commonwealth misstates the Staff's position in the following proposed findings:

the Board direct the Staff to certify to the Commission, prior to restart, the Staff's recommendations regarding necessary license conditions as to the long-term requirements and NUREG-C737 items. PA PF 9.

16. We believe the Commonwealth misapprehends this Board's role vis-a-vis the long-term operation of TMI-1. It is not at all clear that we have the authority to direct the Staff as the Commonwealth proposes. In its proposed finding 8, the Commonwealth quotes part of a paragraph from the Commission's Order and Notice of Hearing (slip op. at 13). The Commonwealth then expresses puzzlement, in light of the authority delegated to the Board by the Commission, that the Staff would elect to wait until after the Board's decision to determine what items were appropriate for license conditions. PA PF 9.

17. The cited paragraph from the Commission's Order states as follows:

Satisfactory completion of the required actions will be determined by the Director of Nuclear Reactor Regulation. However, prior

(continued)

"The Staff's position is that, for significant items, a license condition should be imposed prior to restart. For other items, the Staff believes that other enforcement actions, such as a show cause order, would be sufficient. Tr. 21,260-63 (Silver)."

PA PF 7. What Mr. Silver said is that significant items would be considered for license conditions, and that the method of enforcing requirements should be analogous to actions taken with respect to other operating reactors. Tr. 21,262 (Silver).

to issuing its decision the Board shall have authority to require staff to inform it of the detailed steps staff believes necessary to implement actions the Board may require and to approve or disapprove of the adequacy of such measures. With respect to any uncompleted items the Board shall have authority similar to that provided in 10 CFR 50.57(b) to take such actions or to impose such limitations or conditions as it believes necessary to protect the public health and safety: Provided, that, as provided elsewhere in this order, restart shall not be permitted until satisfactory completion of all uncompleted short-term actions. Any affirmative determination by the Director will be based upon his finding that the actions specified by the Board, or by the Commission on review, have been taken, that the specified implementing procedures employed are appropriate, that the licensee satisfies the financial qualification criteria imposed on an applicant for an operating license, and that there is reasonable assurance that the facility can safely resume operation.

CLI-79-8, 10 N.R.C. 141, 148-149 (1979). In the Board's view, the Commission here is authorizing (and not directing) us to inquire into, and to approve or disapprove of the adequacy of, the measures the Staff believes necessary to complete as yet uncompleted (prior to the issuance of this decision) actions the Board may require as a prerequisite to plant restart. In other words, we believe that, taken as a whole, this paragraph from the Commission's Order is addressing the "short-term actions" determined by the Board to be necessary and sufficient to provide reasonable assurance that TMI-1 can be operated without endangering the health and safety of the public, and which should be required before resumption of operation should be permitted.

18. Whether or not the Board has the authority, we do not believe the Commission intended that the Board should attempt to codify in this decision, or to force the Staff to do so prior to restart, a detailed enforcement scheme for the long-term requirements we recommend to the Commission and for the entire TMI Action Plan (NUREG-0737). The Commission has expressly indicated its intent to retain its flexibility to modify long-term requirements, on a case-by-case basis, where developments so warrant. See, in this docket, CLI-81-3, 13 N.R.C. ___, slip op. at 7, 8 (March 23, 1981). This does not translate solely into schedule delays for implementation of the long-term requirements, as the Commonwealth implies. Just as the TMI Action Plan and the original TMI-2 lessons learned have been "clarified" over time on the basis of new and more complete information, there should continue to be the flexibility, with respect to TMI-1 just as with all operating reactors, for the Commission and the Staff to adjust requirements on the basis of new regulations, research studies and engineering analyses. The Board perceives no basis for the presumption, which implicitly underlies the Commonwealth's proposed findings, that the Commission and the Staff will be less than diligent in their enforcement of the long-term requirements. If anything, the record leads us to suspect that TMI-1 may continue to be singled out for special attention, as it has in the past. The Commission and the NRC Staff have a more than adequate arsenal of enforcement tools to ensure the implementation of the long-term actions recommended by the Board and

accepted by the Commission. We explored this issue thoroughly in Board Question 2.⁴ See Licensee PF 533-536. For all of these reasons, we do not believe that the long-term safe operation of TMI-1 would be enhanced if the Board embarked upon the essentially "inspection and enforcement" effort proposed by the Commonwealth for the long-term actions.

19. The general question, raised in proposed findings by the Commonwealth, Mr. Sholly and several other parties, of when commitments by a licensee (or applicant) should be converted into license technical specifications has been addressed on several occasions by the Commission's adjudicatory boards. In Portland General Electric Company, et al. (Trojan Nuclear Plant), ALAB-531, 9 N.R.C. 263 (1979), the Atomic Safety and Licensing Appeal Board affirmed a licensing board's refusal to require technical specifications suggested by the State of Oregon. The Appeal Board reviewed the function served by technical specifications and the standard which governs the determination whether one is required with respect

4 Where the Commonwealth questions how the Staff's approach provides reasonable assurance that TMI-1 can be operated in the long-term without endangering the health and safety of the public, PA PF 13, the Commonwealth ignores the lengthy testimony of Staff witnesses Ross and Capra in response to Board Question 2. See Licensee PF 516-536. Contrary to the Commonwealth's proposed finding 15, the Staff did not testify that there was no TMI-1 specific review of NUREG-0737 to determine if special treatment was warranted. Mr. Silver testified that no documented, formal analysis was made, although the Staff did make a subjective judgment. Tr. 21,118 (Silver).

to some particular aspect of the design or operation of a facility (or some component thereof). Following a discussion of the genesis of the term "technical specifications" in section 182a of the Atomic Energy Act, 42 U.S.C. § 2232(a), and the Commission's implementing regulation, 10 C.F.R. § 50.36, the Appeal Board stated:

From the foregoing it seems quite apparent that there is neither a statutory nor a regulatory requirement that every operational detail set forth in an applicant's safety analysis report (or equivalent) be subject to a technical specification, to be included in the license as an absolute condition of operation which is legally binding upon the licensee unless and until changed with specific Commission approval. Rather, as best we can discern it, the contemplation of both the Act and the regulations is that technical specifications are to be reserved for those matters as to which the imposition of rigid conditions or limitations upon reactor operation is deemed necessary to obviate the possibility of an abnormal situation or event giving rise to an immediate threat to the public health and safety.

9 N.R.C. at 273 (footnote omitted). The Appeal Board found that none of the utility's commitments at issue had been shown "to have such an immediate bearing upon the protection of the public health and safety that it must be made the subject of a rigid operational limitation in the form of a technical specification." Id. at 278. The Appeal Board found that, with regard to each commitment, the fulfillment of the requirements of 10 C.F.R. § 50.59, with the attendant Staff monitoring, would provide ample safety protection. Id. at 273-274, 278. See also, Commonwealth Edison Company (Zion Station, Units 1 and 2), ALAB-616, 12 N.R.C. ___, slip op. at 4-8 (October 2,

1980); Houston Lighting and Power Company (Allens Creek Nuclear Generating Station, Unit 1), ALAB-582, 11 N.R.C. 239, 277

(1980); Virginia Electric and Power Company (North Anna Nuclear Power Station, Units 1 and 2), ALAB-578, 11 N.R.C. 189, 217-218

(1980). We believe these principles are especially appropriate in this unique proceeding where Licensee's Restart Report, unlike a final safety analysis report, includes many long-term commitments and plans.

20. In addition, the Board is aware that the Commission is considering establishing a new standard for determining which safety requirements must be reflected in technical specifications and which should be placed in other categories. See advance notice of proposed rulemaking, 10 C.F.R. Part 50, "Domestic Licensing of Production and Utilization Facilities; Technical Specifications for Nuclear Power Reactors," 45 Fed. Reg. 45916, et seq. (July 8, 1980). In its description of the current problem, the Commission states:

. . . the substantial growth in both the number of items, and in the detail of the requirements contained in technical specifications that has taken place since the STS [Standard Technical Specifications] were instituted, indicates that more precise definitions of the existing categories of technical specifications contained in § 50.36 may need to be considered. The Commission is concerned that the increased volume of technical specifications may be decreasing the effectiveness of these specifications to focus the attention of licensees on matters of more immediate importance to safe operation of the facility.

While each of the requirements in today's technical specifications plays a role in protecting public health and safety, some requirements have greater immediate importance than others in that they

relate more directly to facility operation. These are the requirements that pertain to items which the facility operator must be aware of and which he must control to operate the facility in a safe manner. To a large extent, the relative importance of these requirements, as distinguished from those related to long term effects or concerns, has been diminished by the increase in the total volume of technical specification requirements.

Moreover, the increased volume and detail of technical specifications and the resultant increase in the number of proposed change requests that must be processed, has increased the paperwork burden for both licensees and the NRC staff. This is because § 50.36 requires that technical specifications be included in each operating license; and thus, any proposed change, regardless of its importance to safety, must be processed as a license amendment. For changes involving matters of lesser importance to safety, the processing of a license amendment with the associated increased paperwork has had no significant benefit with regard to protecting the public health and safety.

45 Fed. Reg. at 45916-17 (1980).

21. Proposals by the parties, then, that this Board should impose license technical specifications for TMI-1 must be considered against the standards described by the Appeal Board, and with a careful eye toward the concerns already voiced by the Commission with respect to the growth in the number of technical specifications related to long-term effects or concerns and which do not pertain to items which the facility operator must be aware of and which he or she must control to operate the facility in a safe manner.

IV. PROPOSED FINDINGS OF FACT

A. Natural and Forced Circulation

22. Proposed findings of fact on UCS Contentions 1 and 2 were filed by Licensee, UCS and the NRC Staff. While UCS

presented no testimony in support of these contentions, it suggests now, without alluding to the implications to be drawn, that no evidence was presented as to certain matters presumably related to its contentions. See UCS PF 4. No citations to the record are provided, and apparently UCS failed to ask the witnesses of Licensee and the Staff for the information UCS now asserts is missing, even though extensive cross-examination was conducted. Intervenors, like other parties, have a duty to assist the Board in compiling a complete record on which to decide the contentions which the intervenors have raised. Consequently, the Board does not favor proposed findings, such as this one by UCS, which allege that there are voids in the record, which cite to nothing, which give no indication that cross-examination was utilized in an attempt to elicit the information, and which draw no conclusions.

23. In any case, UCS is wrong when it asserts, in its proposed finding 4, that "[n]o evidence was presented by the Licensee or Staff to define the 'limited' extent of uncovering and/or time for which steam cooling of the uncovered fuel would be adequate." See Lic. Ex. 4 at 2-5 and Fig. 4.

24. UCS also complains that "[n]o evidence was presented by the Licensee or Staff to describe the extent of core damage, such as fuel rod swelling, for which adequate core cooling would be maintained, following a period of core uncovering, simply by recovering the core and without forced circulation of the coolant." UCS PF 4. The Board sees no

reason why such evidence is called for, however, in view of the uncontradicted evidence presented that core damage does not occur as a result of small-break, loss-of-coolant accidents. See Jones and Broughton, ff. Tr. 5038, at 2, 5-8. See, generally, Licensee PF 340-355. By virtue of its failure even to file proposed findings on the Board questions relating to former UCS Contention 8, UCS must be viewed as not challenging the adequacy of B&W's small-break LOCA analyses.

25. UCS cites Staff witness Jensen for the proposition that the secondary water level must be higher than the primary water level in the steam generators in order to provide a condensing surface for the steam in the reactor coolant system. See UCS PF 12 and 28. Mr. Jensen continued to testify, however, that emergency feedwater enters the steam generator at a very high point which is close to the top of the tube sheet, so that even though the "still" water level on the secondary side could be below the primary level, there would still be a heat transfer surface available by the difference between the elevation of the emergency feedwater entry point and the level of the primary system. Tr. 4933-34 (Jensen).

26. Discussing the feed-and-bleed cooling mode for removing heat from the reactor coolant system, UCS notes that two HPI pumps are needed for some break sizes to assure adequate core cooling. UCS PF 14. This assumes, however, that there is a loss of all main and emergency feedwater, which is the only situation in which resort to feed-and-bleed cooling would occur. See Licensee PF 346, 353 and 411.

27. UCS proposes a finding that "[l]iquid natural circulation did not become established during the TMI-2 accident because steam or a mixture of steam and hydrogen was trapped in the 180° bend of the reactor coolant system hot legs at the top of the steam generators." UCS PF 16. The phrase "during the TMI-2 accident" is too broad here, however, and the testimony cited (Tr. 4616-17 (Jones)), was directed only at the specific time frame 13 to 14 hours into the accident. Tr. 4625 (Jones). Mr. Jones specifically refused to say that some form of natural circulation was never established during the early phases of the accident.⁵ Id. Consequently, UCS proposed finding 17, which cites to no evidence, must fail as a summary finding because of the inaccuracies in proposed finding 16. In fact, there is evidence that some circulation did occur. See Tr. 5426-27 (Johnston).

28. In its proposed finding 18, UCS contends that "[u]nder the conditions that prevailed from approximately 4 to 16 hours after the start of the accident, the only way to get natural circulation started was to start a reactor coolant pump." The only evidence cited is Tr. 4617 (Jones). What Mr. Jones actually stated was that during the period around 14 hours into the accident when the operator was overfeeding HPI in order to pressurize the system a steam or steam-hydrogen gas

⁵ Of course, it is certain that natural circulation was established eventually at TMI-2. Keuten and Jones, ff. Tr. 4588, at 9.

block was trapped in the 180° bend in the top of the hot leg, creating a situation where natural circulation could be initiated by bumping a reactor coolant pump (as was done at TMI-2) or by opening the high point vents which will be installed at TMI-1.⁶ Tr. 4616-17 (Jones).

29. The fact that Licensee's plant emergency procedures for inadequate core cooling direct the operators to restart one or more reactor coolant pumps, as UCS points out in its proposed finding 20, has no bearing upon UCS Contentions 1 and 2 and whether the pumps meet applicable General Design Criteria. The portions of the procedure cited provide guidance: (a) for inadequate core cooling events clearly beyond the design basis of the plant, see Licensee PF 40-43; or, (b) for overcooling events. See Lic. Ex. 48 at 23, 24.

30. UCS proposes the following finding by the Board:

The Licensee's witnesses testified that after adequate high pressure injection flow was restored, subsequent to core damage, the core was effectively cooled even though natural circulation was not occurring. (Keaten and Jones, ff. Tr. 4588, at 8) Under cross-examination, however, the witnesses testified that their attention had actually centered on the accident up to the time the last reactor coolant pump was initially turned off, at about one hour and forty minutes into the accident. (Tr. 4605, Keaten)

6 The Staff is in error when it states that the high-point vent system will be installed at TMI-1 prior to restart. See Staff PF 27. Licensee's commitment is to install the vents in accordance with the NUREG-0737 schedule -- which is July 1, 1982. Staff Ex. 14 at 53. See also, UCS PF 19.

UCS PF 21. First, the testimony on cross-examination cited by UCS is that of only one witness. Second, UCS has grossly misrepresented Mr. Keaten's testimony. Mr. Keaten was responding to UCS questions on the NSAC chart on the TMI-2 accident (UCS Ex. 1), and gave the following testimony:

The final comment that I would like to make is, while it is true that GPU participated in developing this information and subsequently commented on earlier drafts of both the report and this chart to the Nuclear Safety Analysis Center, our attention really has been centered more on the time period up to the point at which the last reactor coolant pump was initially turned off, which is at about an hour and forty minutes into the transient. And our review of the subsequent portions of the chart have been much less detailed.

Tr. 4605 (Keaten). Mr. Keaten clearly was discussing GPU's effort in reviewing the NSAC chart, and he was in no way limiting his direct testimony (or his knowledge of the accident) as UCS misleadingly implies.

31. In the same proposed finding (21), UCS contends that "the witnesses testified that the first time following the start of the accident when adequate core cooling is known to have been established is at 16 hours when a reactor coolant pump was restarted." Again, the testimony of one witness was cited. A complete representation of the testimony by Mr. Jones is that it is probably correct that this is the first time he knows and can document the establishment of adequate core cooling, although his judgment, based upon data on a variety of cited parameters, is that adequate core cooling must have been

occurring earlier. Tr. 4655 (Jones). See also, Tr. 4652-53 (Jones).

32. In its proposed findings 21 and 22, UCS criticizes the Staff for initially failing to present testimony with a detailed time-sequence analysis of the TMI-2 accident. UCS, of course, presented no testimony whatsoever. Here, as in its other proposed findings on forced and natural circulation, UCS misses the focus of its own Contention 1. The issue is not whether natural circulation is adequate to remove decay heat with a damaged core and void blockage in the top of the hot leg. Consequently, while the Board allowed UCS broad latitude in exploring the accident sequence (because it was generally relevant to this phase of the proceeding), in the final analysis we are not determining the adequacy of equipment design in TMI-1 by assuming that the TMI-2 accident is now the design basis. In any case, the TMI-2 accident indicates that natural circulation can cool a damaged core. See Keaten and Jones, ff. Tr. 4588, at 9. Cf. UCS PF 26.

33. Licensee's direct testimony, the sole record support cited in UCS proposed finding 24, in no way contains the limitations tacked on by UCS, and must be rejected for lack of evidentiary support.

34. UCS asserts, in its proposed finding 25, that in light of the TMI-2 accident, it must be assumed that accidents involving sufficient voiding to interrupt natural circulation are credible. While this has been assumed for single-phase

natural circulation, it is not true for the boiler-condenser cooling mode (two-phase natural circulation). Keaten and Jones, ff. Tr. 4588, at 7. See also, Licensee PF 13. The question of what events are "credible," of course, is the subject of the Board question on former UCS Contention 13. See Licensee PF 484-515. Further, the analogy in UCS proposed finding 25 to the requirement for high-point vents is not valid. This requirement, consistent with the NRC's "defense-in-depth" approach, is a back-up provided to mitigate a situation which is not expected to occur in the future -- the generation of noncondensable gases. Tr. 4991-93 (Jensen). We do not accept the argument often advanced by UCS that whenever the Staff decides safety would be enhanced by the addition of equipment, then the Staff's prudence must be viewed as an admission that the event being protected against is "credible." Finally, UCS proposed finding 25 is also rejected because it includes no citation to the evidentiary record. See paragraph 1, supra.

35. While the attempted point is mostly irrelevant to the Board's resolution of the issues here, the following portion of UCS proposed finding 27 again mischaracterizes the actual testimony given:

There are no plans to test the boiler-condenser mode on a B&W plant because there is no instrumentation available to control either the secondary or primary water levels accurately and the reactor might be damaged. (Tr. 4687-4688, Jones)

UCS PF 27. The following is the actual testimony given by Mr. Jones in answer to a question by UCS counsel Weiss:

Q So you are saying that you cannot safely perform this test at an operating reactor because they don't have the instrumentation to follow the core response properly?

A No. What I am saying is if you want to run a test of a boiler condenser mode, you would want to control system parameters to maximize the information obtained from such a test. It is senseless, in my opinion, to just run a test to show that a mode works, because there are other means that could be utilized to show the basic conceptual actions of the mode. And so what you would want to do is to control the secondary side level accurately, the primary side inventory accurately in the range of the steam generator tubes, and that type of instrumentation are not available on a nuclear power plant.

Tr. 4687-88 (Jones).

36. The "pumps" referred to in UCS proposed finding 28 obviously are BPI pumps, and not reactor coolant pumps. More importantly, UCS here misses the point that if the primary system is refilled, then the core is being cooled, even if the boiler-condenser mode is not functioning. See Licensee PF 14.

37. UCS provides no record citation for the proposition that the TMI-1 emergency feedwater system is required for either liquid or two-phase natural circulation to be effective. See UCS PF 29. In fact, main feedwater will do. See, generally, Keaten and Jones, ff. Tr. 4588. Consequently, a probability of failure of the EFW system is not a direct measure of the effectiveness of natural circulation. In

addition, the Staff estimates of EFW reliability cited by UCS are not based upon a mission success criterion of supporting natural circulation, do not consider the probability of the initiating event, and among other limitations, do not represent the probability of core damage occurring due to a lack of heat removal. Licensee PF 451-457. Thus, there is absolutely no evidentiary basis upon which to suggest that the Board should find, in this analysis of natural circulation capabilities, that the TMI-1 EFW system is "not sufficiently reliable."

38. UCS proposed findings 30 to 35, on feed-and-bleed cooling, do not address the one alleged deficiency in that cooling mode found in UCS Contention 2 -- i.e., that there is inadequate capacity and radiation shielding for the storage of the radioactive water bled from the primary coolant system. Neither does UCS address the deficiencies alleged in the contention with respect to the reactor coolant pumps or the residual heat removal system. The Board must view this failure essentially as a concession by UCS to the Staff and Licensee positions on UCS Contention 2.

39. While more relevant to Board Question 6, UCS proposed findings 31-35 will be addressed here. In its proposed finding 31, UCS overstates Licensee's reliance upon the Crystal River-3 event in support of feed-and-bleed cooling. Mr. Jones testified that the event demonstrated the operability of feed-and-bleed cooling. Jones, ff. Tr. 4588, at 4. His conclusions on the adequacy of that cooling mode rested upon

other grounds as well, including analyses. See Licensee PF 409-414.

40. UCS cites 52 pages of its cross-examination of Licensee witness Jones, and one page from a TMI-1 plant procedure, in support of the proposition that "... the combination of other actions [than those directly related to achieving feed-and-bleed] which the operator must take during a LOCA and the decision process that must be followed is complex." UCS PF 35. Our review of the record cited shows that while the questioning was complex, the testimony given by the witness does not support the proposed finding. In addition, the last sentence of UCS proposed finding 35 is rejected because of the absence of a citation to the record.

41. Much of UCS concluding proposed finding 36 reads like a new contention, since it does not directly address the specific allegations found in UCS Contentions 1 and 2. The Board rejects these summary proposed findings for the reasons stated above, and for the reasons set forth in Licensee's proposed findings 6-23 and the remainder of this Partial Initial Decision.

B. Detection of Inadequate Core Cooling

42. Proposed findings on the subject of the adequacy of instrumentation at TMI-1 for detection of inadequate core cooling were filed by Licensee, the Commonwealth of Pennsylvania, and the NRC Staff. The Commonwealth has proposed, as has Licensee, that the Board modify the Staff's

suggested restart requirements as to this issue. PA PF 82.

The Commonwealth's key proposed finding states as follows:

The Board finds that the Staff has not made a sufficient showing that the core water level meter is necessary to provide reasonable assurance that TMI-1 can be operated without endangering public health and safety, at least on the schedule required for this Licensee.

PA PF 97.

43. The NRC Staff generally has provided the Board with proposed findings which are supported by accurate citations to the evidentiary record, but which are incomplete because they do not address much of Licensee's testimony and the cross-examination of the Staff witnesses. Thus, while Staff proposed findings 90 and 106 imply that only TMI-1 and a few other B&W licensees disagree with the Staff's "position" on reactor vessel water level instrumentation and have not made laudable progress toward installation, the cross-examination showed that this assertion by the Staff is not correct. See Licensee PF 85-89.

44. While Staff proposed finding 92 does not so indicate, the cited Staff and Licensee definitions of "inadequate core cooling" are not consistent. Neither does the Commonwealth, in its proposed finding 85, accurately present Licensee's definition. See Licensee PF 34.

45. Staff proposed finding 97 states that the Staff has not completed its review of Licensee's inadequate core cooling procedures, citing to the direct testimony (filed in

December, 1980) of Mr. Phillips. The Staff's supplement no. 3 to its safety evaluation, however, issued in April, 1981, indicates that the Staff's review is complete and that the TMI-1 procedures are adequate. Staff Ex. 14 at 28.

46. Staff proposed finding 114, which speaks of "existing" and "additional" or "new" instrumentation to detect inadequate core cooling, uses those terms consistently with the discussion, in the Staff's safety evaluation report, of its review of Licensee's response to NUREG-0578, section 2.1.3.b. See Staff Ex. 1 at C8-14 to C8-21. The subtle misconception which might be spawned by this nomenclature is that "existing" instrumentation could be misunderstood to refer to the time of the TMI-2 accident. At the time of the TMI-2 accident, TMI-1 did not have: a saturation meter, with a control room display and alarm; all 52 of the core exit thermocouples connected to read out in the control room; or an expanded range (120°F to 920°F) for the reactor coolant system hot leg temperature measurement. This instrumentation will be provided at TMI-1 at the time of plant restart. See Licensee PF 32 and 33. Thus, it is misleading to state, as the Staff does in its proposed finding 114, that one of the lessons learned from the TMI-2 accident is the need for instrumentation other than that currently being used (i.e., other than "existing" instrumentation). New and additional instrumentation, other than that being used at the time of the TMI-2 accident, has since been provided at TMI-1.

47. The Board agrees with the conclusion of the Commonwealth, in its proposed finding 97 (see paragraph 42, supra), as to the inadequacy of the record to support the Staff's position on the recommended restart requirements with respect to this issue. The Commonwealth proceeds, however, to propose that the Board direct further requirements of Licensee on the basis of a recognition that a core water level meter would be desirable for the long term. PA PF 98. The Commonwealth's own proposed findings of fact, however, do not appear to support such a "recognition" at this point. Based upon our detailed consideration of the record presented, the Board cannot find that reactor vessel water level instrumentation will be helpful, or that it will be neutral and not detract from operational safety. Licensee PF 77. While the Board took care to point out that its decision does not foreclose or predict the potential that in the future, or on the basis of other information not provided to us here, reactor vessel water level instrumentation will be proven to be beneficial -- this Board does not make policy, it makes findings on the basis of an evidentiary record. We do not have a record which warrants the imposition of license conditions on this issue.

C. Abnormal Transient Operating Guidelines

48. Licensee, the Commonwealth of Pennsylvania, and the NRC Staff filed proposed findings of fact on Board Question

No. 11. The Commonwealth's proposed findings reflect a dissatisfaction with the depth of the Staff's review of Licensee's ATOG program (initiated in response to NUREG-0578, section 2.1.9.c), with the implementation schedule and the scope of ATOG. The Commonwealth's degree of concern with this issue, which consumed only two and one-half hours of hearing time, appears in large part to stem from a misconception that ATOG represents a "new, untested approach to accident response." PA PF 139. Actually, it represents only a new approach to writing procedures. The operational steps developed by the ATOG program are being compared with the steps in the current, event-oriented procedures, and there is a striking similarity between the steps developed by the two different processes. Tr. 10,950 (Br. . .).

49. The Commonwealth has not proposed, here or elsewhere, findings that the current TMI-1 plant emergency procedures for loss of main feedwater events, small-break loss-of-coolant accidents or inadequate core cooling are inadequate or fail to provide reasonable assurance that the plant can resume operation without endangering the health and safety of the public. The NUREG-0737 schedule for this item, which the Commonwealth did not ask us to find inadequate, calls for issuance of plant-specific (ATOG) procedures by the first refueling after January 1, 1982. Staff Ex. 14 at 46. In view of this schedule, the Board does not view the Staff's review to date to be inadequate.

50. Consequently, the Board declines to adopt the additional requirements for the ATOG program recommended by the Commonwealth.⁷ See PA PF 170.

D. Safety System Bypass and Override

51. UCS's proposed findings of fact on its Contention No. 10 continue the effort begun at the hearing by UCS witness Pollard to recast the contention. The contention admitted by the Board states as follows:

The design of the safety system at TMI is such that the operator can prevent the completion of a safety function which is initiated automatically; to wit: the operator can (and did) shut off the emergency core cooling system prematurely. This violates § 4.16 of IEEE 279 as incorporated in 10 CFR 50.55(a)(h) which states:

The protection system shall be so designed that, once initiated, a protection system action shall go to completion.

The design must be modified so that no operator action can prevent the completion of a safety function once initiated.

The contention clearly asserts only one basis: that the design of the TMI-1 emergency core cooling, emergency feedwater and containment isolation systems violates a Commission regulation

7 In connection with recommendation 7 in PA PF 170, the Board will take notice of page A-45 of NUREG-0578, because it is specifically referred to in Board Question No. 11. There, the Lessons Learned Task Force specifically concluded that multiple failures and passive failures may be considered in the long term, depending in part on Staff review of the results of the short-term analyses.

and therefore must be modified. The great bulk of the testimony UCS filed on September 25, 1980, in support of its Contention No. 10 is devoted to an attempt to prove that the TMI-1 design violates IEEE Standards 279 and/or 603. Only passing attention is paid to the "lessons learned" from the TMI-2 accident. See Pollard, ff. Tr. 6410. UCS now eschews "arguments over the language of the regulations" upon which its contention rests, and attempts to direct the Board toward the issues which "emerged." See UCS PF 252 and 253. This no doubt is because IEEE Std 279 cannot be read to support the UCS position, and UCS concedes as much. See UCS PF 287.

52. UCS also boldly proclaims that Mr. Pollard amended the contention at the hearing session of November 24, 1980, after Licensee's witnesses had been excused and after Licensee's cross-examination of Mr. Pollard had been completed. See UCS PF 242. Contentions in this proceeding were established at the prehearing stage, and were not left open for amendment by witnesses or in proposed findings. See Licensee PF 102, n.40. While UCS characterizes the change as a "narrowing," it may also have the effect of shifting the focus of the contention and undermining the thrust of Licensee's defense to the original contention. Further, the broad amendment described in UCS proposed finding 242 is not supported by the testimony cited.

53. UCS now asserts that its real contention is "that the TMI-2 accident graphically demonstrated the unacceptable consequences of permitting the operator to interfere with

the functioning of safety systems and that a clear lesson of the accident is therefore that such interference ought not to be permitted." UCS PF 250. At best, the contention admitted by the Board can be read as citing the TMI-2 accident as an example of the alleged design violation of a Commission regulation, which violation Mr. Pollard asserts exists in every licensed operating reactor in the United States. See Licensee PF 131. UCS also attempts to broaden the legal standard raised in its contention to include General Design Criterion 20. See UCS PF 246 and 251.

54. The Board rejects UCS proposed finding 261, which addresses a series of matters unrelated to UCS Contention 10 with the simple introduction "[i]n this connection it should be noted . . .".

55. In its proposed finding 262, UCS would have the Board be "heavily influenced" in deciding this plant design issue by the purported "fact that the post-TMI-2 training and requalification of operators is in many respects inadequate." UCS proposed finding 262 relies exclusively on the Commonwealth of Pennsylvania's Proposed Findings of Fact and Conclusions of Law on Management Issues, dated May 15, 1981. However, in Commonwealth of Pennsylvania's Reply Findings of Fact and Conclusions of Law on Management Issues, June 29, 1981, the Commonwealth withdrew, inter alia, all of its earlier proposed findings (paragraphs 35-117) on training. Consequently, the Board rejects UCS proposed finding 262 because it lacks any supportive citation to the evidentiary record.

56. UCS apparently feels that the Staff's testimony is weakened because the witness testified that he would have given the same interpretation of IEEE Std 279 and its requirements before the TMI-2 accident which he presented to the Board at this hearing. Compare UCS PF 263 with Tr. 6630 (Sullivan). Since the standard has not been amended following the accident, the Board does not understand how this could be viewed as an infirmity.

57. In UCS proposed finding 264, UCS attempts to use an exhibit beyond the purpose for which it was offered. During its cross-examination of Staff witness Sullivan, UCS produced a memorandum written by S. H. Hanauer, who did not testify, and requested that it be marked for identification as UCS Exhibit 18. Counsel for UCS moved the document into evidence "for the limited purpose of showing that it was received by Mr. Sullivan and that no response was made." Tr. 6682 (Weiss). Licensee's failure to object was expressly based upon this understood limitation. Tr. 6682-83 (Baxter). Now UCS cites the document for its contents and the opinions expressed therein by Dr. Hanauer. See UCS PF 264. The Board rejects the proposed finding in its entirety because it violates the Board's ruling on the offer of the exhibit.

58. In reciting Licensee's position on the disadvantage of modifying the TMI-1 design as UCS purposes, UCS PF 268, UCS omits Licensee's position that the addition of interlocking systems would also introduce new failure modes, an increased

potential for failures, and uncertain failure consequences.

See Tr. 6237 (Clark).

59. UCS criticizes Licensee witness Clark for some of his testimony on cross-examination. UCS PF 269. First, the testimony cited does not support the finding that Mr. Clark postulated an unnecessarily complex circuit to define plant stability or that he was unaware of the intended interpretation of the emergency procedures. Second, given his role as a very senior officer of GPU Nuclear and the content of the direct testimony he presented, the Board sees no reason why Mr. Clark should be intimately familiar with the design of the saturation meter circuits or which control room indications are safety-grade. Of course, UCS chose not to ask these questions of the other witnesses on Licensee's panel -- the TMI-1 Supervisor of Operations (M. Ross) and an instrumentation and control design engineer from B&W (Patterson).

60. UCS suggests that the Board balance the two alternatives (the UCS proposed concept of a design modification versus the current design at all operating reactors) by considering the probabilities of unforeseen events and appropriate operator response.⁸ See UCS PF 279-283. While UCS did

⁸ UCS misrepresents the testimony of Licensee witness Clark when it states that "he was unwilling to even agree that the probability of an unforeseen accident sequence was lower than the probability of a design basis accident." UCS PF 283. Mr. Clark stated that he would agree with that proposition for any given unforeseen event, but that he could not agree for the generic class of unforeseen events. Tr. 6255 (Clark).

not so propose, presumably the Board would also consider the probabilities associated with events initiated by failures of the UCS interlock and control systems, and with failures of such systems when called upon to operate by other events.

61. While UCS witness Pollard was willing to speculate on the probabilities of unforeseen events, he presented no substantive basis for his views. Even if we were inclined to undertake this exercise, there is not a reliable record upon which to compare quantitative or qualitative ranges of probabilities. We are, however, influenced by a point which UCS does not address. No matter what the probabilities are, the UCS proposal could result in an irreversible path to destruction if the interlock system fails, whereas the current designs would at least allow operators a chance to correct the situation. See Licensee PF 130.

62. UCS would have us conclude, without record citation, that the Staff's interpretation of the requirements of IEEE Std 279 "renders it nearly valueless to assuring plant safety." UCS PF 290. More accurately, it renders the standard valueless as a means of supporting UCS Contention No. 10. UCS stubbornly ignores the legitimate and valuable purpose of the standard. See Licensee PF 110 and 111.

63. UCS proposed findings that "[t]he Staff gave a specific example of how the provisions of IEEE Std 279 concerning completion of a protective action had been applied to equipment not part of protection system [sic]." UCS PF 294.

The example, however, was the scram system at old boiling water reactors many years ago. See Tr. 6639-40 (Sullivan).

64. UCS proposed finding 295 is rejected because it relies solely upon a document not in evidence. See paragraph 2, supra.

65. UCS proposed findings 276, 277, 280, 283 and 288 are rejected because the entire proposed findings, or important portions thereof, are followed by absolutely no citation to the evidentiary record. See paragraph 1, supra.

E. Pressurizer Heaters

66. In its proposed findings of fact on UCS Contention No. 3, UCS asserts that if reactor coolant system pressure drops, steam will form in the reactor coolant system, blocking natural circulation. UCS PF 41. While this is true for single-phase natural circulation, it is not true for the boiler-condenser cooling mode (two-phase natural circulation). Keaten and Jones, ff. Tr. 4588, at 7. See also, Licensee PF 13.

67. UCS proposes a finding that "[i]f the ability to maintain pressure control with the pressurizer heaters is lost, the only way to maintain reactor coolant system pressure is by adding water to the system." UCS PF 43. This proposed finding is incomplete, however, because it does not identify the low probability of the event or the time available before pressure is lost. First, there has never been a loss of off-site power

at Three Mile Island, Tr. 7566 (Brazill), Tr. 8032 (Keaten), and the reliability of the off-site power system is sufficiently high that such an event is not expected to occur during the lifetime of the plant. Capodanno et al., ff. Tr. 5642, at 14. Second, the need for alternatives to pressure control with the pressurizer heaters presumes: (a) an extended loss of off-site power (i.e., no recovery for a long period of time); and, (b) that the pressurizer heaters are not manually connected to the diesel generators. Tr. 7567 (Brazill). Further, a very conservative estimate is that the operators have two hours in which to connect the pressurizer heaters to the on-site power supply if necessary. Tr. 7565-66 (Brazill).

68. Neither does operation of the HPI pumps to add primary coolant to maintain pressure if the pressurizer heaters are lost constitute "in effect" a challenge to the emergency core cooling system, as UCS repeatedly asserts. See UCS PF 43, 55, 56. The makeup function of the HPI pumps is a part of normal plant operation. The makeup system is operated all the time during plant operation, so that this particular HPI nozzle has water from the makeup system flowing through it all the time. Consequently, use of the makeup system in controlling plant pressure would not place a thermal cycle on the HPI system. Tr. 8715 (Jensen).

69. UCS proposes several findings of fact with respect to NRC Regulatory Guide 1.139, "Guidance for Residual Heat Removal." See UCS PF 51 and 52. UCS ignores the fact,

however, that this is a draft guide issued for comment, and that its positions have not been applied to operating reactors. Tr. 8079-82 (Silver).

70. UCS apparently contends, in its proposed findings 53 and 65, that the qualification of the pressurizer heaters and their instruments and controls to operate in the environment following a small-break LOCA is a lesson learned from the TMI-2 accident. To the contrary, power was not lost to the pressurizer heaters during the TMI-2 accident, and the failure to maintain reactor coolant system pressure during the accident was not related in any way to operation of the pressurizer heaters. Tr. 7561 (Keaten).

71. UCS asserts that it is extremely difficult to control reactor coolant system pressure in the solid mode while making any changes whatever to the plant condition. UCS PF 60. Licensee's witnesses, however, presented data on the compressibility of water in the plant primary system, and explained that, recognizing the existing operating instructions, some 16 minutes would elapse, for example, before the plant pressure would go from normal to the safety valve set point. Tr. 8053-55 (Brazill); Tr. 8057 (Keaten). This is ample time for operator control. In addition, there is experience with this mode of operation, since TMI-2 operated for a very long time after the accident with a solid pressurizer. Tr. 8053-56 (Keaten).

72. UCS points out the Staff's long-term requirement to make emergency feedwater systems fully safety-grade, even

though alternatives are available for removing decay heat, and argues that alternatives to pressure control with the pressurizer heaters should not preclude the UCS proposed requirement that the pressurizer heaters be safety-grade. UCS PF 61. This proposed finding, however, ignores the critical difference between the restoration time called for in a loss of all feedwater event versus a loss of pressurizer heaters event. Emergency feedwater might have to be restored in as little as twenty minutes, Licensee PF 345, 346, 353, whereas at least two hours is available to return power to the pressurizer heaters. See paragraph 67, supra.

73. In its proposed finding 64, UCS asserts that Licensee did not refute a proposition that the use of alternatives to the pressurizer heaters has serious safety disadvantages. This is an amazing proposed finding since the obvious and entire thrust of Licensee's testimony in response to UCS Contention 3 was to refute that suggestion. See Licensee PF 133-138.

74. UCS proposed findings 49, 54 and 68 are rejected because the entire proposed finding, or important portions thereof, are followed by no citation to the evidentiary record.

F. Valves

75. The UCS proposed findings of fact on UCS Contention No. 5 are unique, among the UCS proposed findings, in the extent to which they violate and ignore the Commission's

well-established legal standards for proposed findings of fact and conclusions of law. While we have had occasion elsewhere in this decision to point out where UCS has failed to provide record citations in support of some proposed findings, the Board is both perplexed and surprised that as to this one issue UCS has engaged in wholesale violations of the Commission standards we have described. See paragraphs 1 and 2, supra.

76. The following UCS proposed findings of fact on its Contention No. 5 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: 178, 180, 181, 184, 186, 196, 206, 213, 220, 224, 226, 232, 233, 234, 237, 238 and 239. These proposed findings are rejected because they do not conform to 10 C.F.R. § 2.754(c). See paragraph 1, supra.

77. Second, UCS has made exhaustive use of a document which was not introduced into evidence: NUREG-0578, "TMI-2 Lessons Learned Task Force Status Report and Short-Term Recommendations" (July 1979). UCS employs the text of NUREG-0578 as the only citation in support of the following UCS proposed findings of fact: 151, 152, 158, 159, 160, 177, 201 and 229. UCS proposed finding 160 consists of seven, single-spaced pages of quotation from NUREG-0578. UCS has cited to NUREG-0578, along with other evidence which is in the record, in UCS proposed findings 150, 188 and 212.

78. As we explained above (paragraph 2, supra) it is both clear and fundamental that a licensing board may not base a decision on factual material which has not been introduced into evidence. To do so would deny other parties their right to confront and to rebut or impeach such factual material, and would deny to the Board its responsibility to probe the weight of the offered evidence. These same principles of due process underlied the Board's earlier ruling denying motions by UCS and Mr. Sholly that the Board take official notice of various matters and documents. See Confirmatory Memorandum and Order on Rulings Made at June 4, 1981 Hearing Session, dated June 9, 1981.

79. For in addition to the fact that UCS would deny the rest of us the opportunity to explore or controvert the facts asserted in the extensive pages from NUREG-0578 on which UCS relies, the document includes much that is opinion. When UCS witness Pollard included some limited passages from NUREG-0578 in his testimony, even when the excerpt represented opinion, at least it provided the other parties with the opportunity: to object to the offer; to move to strike the passages; to interrogate Mr. Pollard on the merits of the statements; and to rebut the statements through their own witnesses or the witnesses of another party. The usage UCS now makes of NUREG-0578 in its proposed findings of fact is quite another matter.

80. The only effort made by UCS to support its use of this extra-record material is a footnote to UCS proposed

finding 158, where it is suggested that the Board adopt NUREG-0578 as Board Exhibit 7.⁹ UCS never offered the document into evidence, or suggested that it desired to do so, at any time during the hearing. No excuse is presented for the extremely prejudicial timing of the offer in proposed findings. UCS argues in the footnote that NUREG-0578 was referred to frequently throughout the testimony, and that "[s]ince this document formed the basis of the requirements adopted by the Commission in its Order of August 9, 1979, the record would be incomplete without including it in full." First, the Commission did not adopt any requirements in its Order and Notice of Hearing. It recorded the recommendations of the Director of Nuclear Reactor Regulation for short-term and long-term actions, and set the necessity and sufficiency of those recommendations as the subject of this hearing.

81. Recommended short-term action 8 is that "[t]he licensee shall comply with the Category A recommendations as specified in Table B-1 of NUREG-0578." Recommended long-term action 3 is that Licensee "comply with the Category B recommendations as specified in Table B-1 of NUREG-0578." CLI-79-8, 10 N.R.C. 141, 145 (1979). Consequently, of course the recommendations specified on Table B-1 of NUREG-0578 were referred to frequently in the testimony. This does not warrant

9 Board Exhibit No. 7 is the Cumberland County Radiological Emergency Response Plan. See Tr. 21,812.

the receipt into evidence at this point of the entire lengthy document. Witnesses testified at the hearing in support of and in opposition to the NUREG-0578 recommendations. That was the reason for the hearing. We need not turn now to the reasons expressed by the Staff's task force in July, 1979. There is now an evidentiary record, presented before this Board, upon which to judge the necessity and sufficiency of those recommendations.

82. The Board therefore rejects UCS proposed findings 151, 152, 158, 159, 160, 177, 183, 201 and 229 because they are based exclusively on material which is not in evidence. UCS proposed findings 150, 188 and 212 will be considered only to the extent that they are supported by the record evidence cited. We turn, then, to the UCS proposed findings with citations to the evidentiary record.

83. The evidence cited at subparagraph (2) of UCS proposed finding 150 does not support the proposition that control circuitry associated with the PORV is to be tested.

84. UCS proposed finding 178, which includes no record citation, states:

In our view, it is self-evident that if the frequency with which ECCS is called upon to function may be greater than its design basis, then reducing the frequency of such challenges is a function that is itself important to safety.

There is absolutely no evidence, however, to support the speculation by UCS that the number (frequency is irrelevant

here) of ECCS actuations may exceed the system's design basis, or that the only answer to such a situation would be to make the PORV safety-grade.

85. UCS proposed finding 188 recites that one function of the PORV is to prevent the pressurizer safety valves from being opened for mild transients. This is an operational function, however, and not a safety function as UCS contends. See Tr. 8755 (Jones).

86. UCS asserts that "[n]o testimony was presented by the Licensee or Staff evaluating the challenge rate to the safety valves or the extent to which the modifications made to the set points and reactor trips have affected that challenge rate," and that no response was provided to UCS's "point" that reducing the differential between the PORV and safety valve set points "suggests" a "possible" increase in safety valve challenges. UCS PF 192. While no testimony was presented, evidence in the form of an exhibit was. See Lic. Ex. 1, § 8.2 (safety analysis of the set point modifications).

87. In its proposed finding 203, UCS states that "Licensee agreed that, if the plant is in cold shutdown condition with the reactor coolant system solid, the PORV 'may' serve a safety function in relieving the overpressure." The complete testimony given by Mr. Jones follows:

If you are in a cold shutdown condition without a bubble and you assume that you have taken no other actions to prevent overpressurization events from being credible, then it is possible that the PORV may serve a safety function in relieving the overpressure. However, the operator still has the

capability to terminate an overpressurization event, should it occur. The PORV could still just be a backup mode.

Tr. 8979 (Jones).

88. UCS would have us find, without the benefit of a citation to the record, that the pressurizer safety valves have never been qualified to operate under feed-and-bleed cooling conditions. UCS PF 210. See, however, the Board's findings on the Board question related to the former UCS Contention 6 (Valve Testing), a subject on which UCS has abandoned its interests by failing to propose findings of fact. See Licensee PF 467-472, 477-483.

89. Contrary to UCS proposed finding 211, Staff witness Zudans testified that he could not confirm the test facility's capability to simulate all feed-and-bleed conditions because he did not know what they were, although he affirmed that such simulation testing was a goal of the program. Tr. 8920-22 (Zudans).

90. There is no basis for the "leap in logic" in UCS proposed finding 226, which again is unadorned by citations, that because the plant procedure tells the operator to use the PORV, along with depressurizing via the steam generators, in an event beyond the plant design basis, then it is needed in the sense of required for safety.

91. In its proposed finding 236, UCS states that at most the environmental qualification of the PORV and its block valve would have been in accordance with the general criteria

in effect at the time the plant was licensed, and then condemns the equipment because the standards are now deemed to be in need of revision. There is no evidence that the equipment was qualified only to the minimum of the standards ("at most"), and UCS cites none. Further, it is patently untrue that the witnesses could only recall that temperature and radiation were addressed. In the very testimony cited by UCS the witnesses identified seismic, humidity and aging qualification. Tr. 8994-98 (Correa, Urquhart).

G. Integrated Control System

92. The majority of Mr. Sholly's proposed findings on his contention 6(a) concentrate on perceived inadequacies of the B&W study, "Integrated Control System Reliability Analysis," which was conducted pursuant to an agreement with the Staff that a failure modes and effects analysis of the ICS be performed. Mr. Sholly has adopted the concerns set forth in the Oak Ridge National Laboratory's (ORNL) review of the B&W ICS analysis (Sholly Ex. 2)¹⁰; indeed, Sholly proposed finding 169.a would require Licensee to perform a supplemental ICS FMEA utilizing a fault-tree approach, which would include those subjects which ORNL found to be lacking in the B&W study.

10 See, for example: Sholly PF 50-52, 55-56, 86-87 and 105 -- failure to consider multiple failures; Sholly PF 57-58 -- use of a functional block diagram; Sholly PF 27-28, 89, 95, 104 -- definition of ICS boundary; and, Sholly PF 49, 64-65, 88 -- failure to consider operator actions/system interactions.

However, Mr. Sholly has failed to appreciate that the deficiencies found by ORNL are due to ORNL's misconception of the intended scope of the B&W analysis. See, generally, Licensee P 200-206. The Board must here emphasize that the B&W study was conducted as a single failure analysis to determine areas for possible future studies, to determine if changes to the ICS were needed, and to determine where failures were possible or had been previously experienced; the study was not meant to be a safety analysis of the ICS. Tr. 7041-42 (Joyner). Analyses which encompass the concerns expressed by ORNL will be performed in conjunction with Licensee's ATOG program (see Licensee PF 92-99) and the continuation and refinement of the Staff's IREP program (see Licensee PF 539-544). Therefore, to the extent that Mr. Sholly's proposed findings are based upon ORNL's findings of deficiencies in the scope of the B&W report, the Board disagrees with Mr. Sholly's assertions, and we specifically reject Mr. Sholly's proposal (PF 169.a) that a supplemental FMEA -- which would, in effect, be a complete systems-interaction study -- be performed prior to permitting restart. In making this determination, the Board is cognizant of the opinion expressed by the Advisory Committee on Reactor Safeguards that such studies should not be a condition for restart. Staff Ex. 14, App. C at 2.

93. In Sholly proposed findings 3 and 92, the differences in reliability between the 721 and 820 hardware models of the ICS are discussed. With respect to the assertion

that the 820 model has demonstrated increased reliability, the Board takes note of the following:

- o While it appears as though the 820 model may be more reliable, the data upon which this conclusion is based is insufficient to state that the differences in reliability of the two models are statistically significant. Sholly Ex. 2 at 13; Tr. 7068 (Joyner), 7141-42 (Thatcher).
- o The problems encountered with the model 721 at Oconee-1 during startup was a "learning experience" for the ICS, and many of the initial problems were encountered and "debugged" during this period. Tr. 15,898 (D. Ross).
- o Failures tend to be more concentrated at some plants than at others, and are heavily dependent upon the quality of the maintenance performed on the ICS. Tr. 7068-69 (Joyner).
- o TMI-1 has a regularly scheduled maintenance program for the ICS, with well qualified instrumentation and control technicians; other plants do not have as good an ICS performance record as does TMI-1. Tr. 7091-92 (Joyner).

- o The Staff finds both the 721 and 820 ICS models to be acceptable. Tr. 7141-42 (Thatcher); Tr. 15,880 (Capra).

For these reasons, then, the Board rejects Sholly PF 169.b, which calls for Licensee to replace its current model 721 with a model 820 or to modify the existing ICS to increase its reliability.

94. Sholly proposed finding 10 characterizes NUREG-0560 as the "final version" of the sensitivity study of B&W reactors to feedwater transients. While NUREG-0560 may indeed represent a more complete evaluation of the preliminary data contained in the April 25, 1979 NRR Status Report, the Board observes that this study has been described by Staff personnel as " cursory in nature." Keaten, ff. Tr. 16,612, at 8. In Sholly proposed finding 11, recommendations from NUREG-0560 regarding analyses for plant control systems are listed. These recommendations are beyond the scope of the study requested by the Staff and agreed to by B&W and beyond what is necessary to satisfy the Staff's initial concerns with the ICS. See Licensee PF 183 and 200.

95. In Sholly proposed finding 19, Mr. Sholly has cited to the Commission's Order and Notice of Hearing in support of the statement that the Staff has made a finding that the B&W OTSG design and reliance on the ICS to automatically regulate feedwater flow contributes to the sensitivity of B&W reactors to feedwater transients. Similarly, in Sholly

proposed finding 20, the Order and Notice of Hearing is relied upon for the proposition that the Staff concluded that the B&W design places more reliance than other PWRs on the EFW system, the ICS and the ECCS. As Dr. Ross has pointed out, the basis for these Staff opinions was an early evaluation (the April 25, 1979 NRR Status Report) performed on an expedited basis which was incomplete and, in some instances, incorrect. Tr. 15,862 (D. Ross); see also, CLI-79-8, 10 N.R.C. 141 at 143 (1979).

96. Sholly proposed findings 23 and 43 allege that a factor which complicates an analysis of the ICS is a lack of information, citing to Staff witness Capra at Tr. 15,771-72 for the proposition that, except in unusual events, there is insufficient information upon which to determine the cause of a particular event. In Sholly proposed finding 97, this same testimony by Mr. Capra is relied upon for the proposition that the Staff has expressed concerns regarding the adequacy of the ICS operating history data base. Contrary to these assertions, Mr. Capra, at the pages cited, was discussing the limitations inherent in the Staff's use of Licensee Event Report data in determining feedwater transient arrival rates. See Tr. 15,770-72 (D. Ross, Capra). Further, the Board notes that ORNL did not contend that a lack of operating data information complicates the process of analyzing the ICS. Indeed, ORNL has stated that the operating history section of the B&W report complies adequately with B&W's commitment and that, since the scope of this review was not limited to ICS failures, this

section addresses the even more general control systems concerns raised by the Staff. Sholly Ex. 2 at 5, 13. Nor does the record contain any testimony from the Staff which was critical of the operating history data used by B&W in its study. Rather, the Board believes that the scope of the data analyzed by B&W is much broader, and therefore more conclusive, than the data base utilized by the Staff in performing many of its analyses. Compare, Lic. Ex. 18 at 5-1 with Tr. 15,770-71 (D. Ross, Capra). Finally, the Board rejects the cited ORNL "conclusion" in Sholly proposed finding 97 and relies instead on the concluding section of the ORNL report, "Evaluation and Recommendations," which holds that the ICS is a "significant asset to plant safety and availability" and, further, that the operating data "demonstrate[s] that the system is failure tolerant to a significant degree." Sholly Ex. 2 at 14.

97. Sholly proposed finding 31 asserts that the ORNL reviewers questioned the definition of "failure," based upon the limited boundary of the ICS as used in the B&W study. The Board does not read the cited portion of Sholly Exhibit 2 as supporting this assertion; rather, we view this statement by ORNL as noting that the definition of what constitutes an ICS failure is one of a number of engineering considerations which complicates the task of evaluating the ICS, and not as a criticism of the B&W study. Additionally, the problem of instrument drift raised by ORNL was identified by B&W in its operating history review as included within the ICS hardware

failures experienced. Lic. Ex. 18 at 5-8. Further in proposed finding 31, Mr. Sholly asserts that calibration problems accounted for "71 of the 162 instances of ICS involvement in trips" (emphasis added), relying upon Table 5-8 of Licensee Exhibit 18. This is incorrect, in that the calibration problems accounted for 71 of 162 ICS malfunctions, of which only 6 malfunctions led to reactor trip. Lic. Ex. 18 at 5-8, and Table 5-8 at 5-14.

98. The citations to Tr. 7122 in Sholly proposed finding 32 are incorrect (Mr. Thatcher at this page is merely adopting his pre-filed, direct testimony). The statement that the Staff has relied upon the figure of five trips caused by ICS internal failures is incorrect; the Staff uses the figure of six ICS hardware failure-caused trips, as reported in the B&W study. Thatcher, ff. Tr. 7122, at 6; Ross, ff. Tr. 15,855, at 4, 5. Mr. Sholly also relies upon Licensee witness Joyner for the proposition that ICS failures may have accounted for as many as 20 reactor trips. However, the Board observes that, at the pages cited, Dr. Joyner was discussing the ability of the ICS to perform compensating runbacks (preventing reactor trips) and was explaining that even if, in reality, the ICS had caused 20 trips, the conclusion that the system prevents more trips than it initiates would still be valid. Tr. 7082-84 (Joyner).

99. Sholly proposed findings 36, 94 and 105.b criticize the B&W report, based upon the fact that the FMEA portion of the report did not identify loss of power supplies

as an ICS failure mode. However, as acknowledged by Mr. Sholly in proposed finding 94, B&W's operating history review did identify loss of NNI/ICS power supply as a particular concern for which B&W has recommended plant-specific analysis.¹¹ Sholly Ex. 1 at 3; Lic. Ex. 18. at 2-2, 3-1, 5-5, 5-7. Sholly proposed finding 169.c would require Licensee to submit procedures which specifically address ICS/NNI power supply failures, pursuant to IE Bulletin 79-27. This subject was not raised in the hearing, except for Staff witness Capra's reference that additional followup work on power supplies is being performed pursuant to this bulletin. Tr. 15,893 (Capra). However, at that point, Mr. Sholly failed to pursue the nature of Licensee's response to IE Bulletin 79-27. Therefore, the Board has no evidence upon which to base a finding that such procedures are required by this bulletin. Further, we believe that the resolution of Licensee's response to IE Bulletin 79-27 is a matter appropriately left to the Staff. Additionally, Sholly proposed finding 169.d would require Licensee to submit a detailed report on NNI/ICS power supplies. The Board notes that Licensee has performed an analysis of the NNI/ICS power supplies and intends to incorporate the information derived from this analysis in its procedures see Licensee PF 191. For this reason, the Board declines to adopt this proposal.

11 Licensee's action in response to the B&W power supply recommendations is described in Licensee PF 191-192.

100. In Sholly proposed finding 86, Mr. Sholly states that Licensee has not analyzed the impact on the plant of a total power failure to the ICS. The Board finds no support for this statement at the page cited (Tr. 6991); further, as described in Licensee proposed finding 191, Licensee has analyzed the effect upon plant operation of the failure of each power supply sub-feed, in addition to the total failure of the power supply distribution panel.

101. Sholly proposed finding 105.b alleges that no further work has been done in the area of power supplies for ICS input instrumentation. The Board notes that the reference to Sholly Exhibit 1 at 6 discusses power supplies generally and states that this is a problem which needs to be resolved on a plant-by-plant basis. Licensee has, indeed, taken appropriate action in response to B&W's recommendation to review ICS/NNI power supplies. See Licensee PF 191 and 192.

102. Mr. Sholly raises in his proposed finding 36 the NUREG-0667 recommendation that a qualified I&C technician be on duty at B&W plants on all shifts and, in proposed finding 169.e, would require Licensee to implement this recommendation or demonstrate why such staffing is not needed. The Board rejects this proposal for the following reasons: (1) as acknowledged by Sholly proposed finding 36, the Staff's Division of Safety Technology did not believe this action would make a significant contribution to safety and, therefore, should not be implemented (Staff Ex. 9 at 2; see also, Licensee

PF 545-549); (2) Licensee's ICS maintenance program compares favorably with that of other B&W licensees (see paragraph 93, supra); (3) Mr. Sholly failed to raise this subject matter either during the testimony presented on the ICS or during the Staff's testimony in response to Board Question 7, dealing with NUREG-0667.¹² In a related matter, Sholly proposed finding 169.f would require Licensee to submit a report documenting its capability to effect immediate repairs of the NNI/ICS. In view of the uncontroverted testimony regarding the quality of Licensee's ICS maintenance program, the Board rejects this proposal. See paragraph 93, supra.

103. In Sholly proposed findings 39, 91 and 103, the FMEA portion of the B&W study is criticized for its inability to evaluate the involvement of the ICS in feedwater oscillations. However, as was the case with ICS/NNI power supply failures, the involvement of the ICS in such events was identified in the operating history review as a contributor to system upsets and reactor trips, which led B&W to recommend that ICS/BOP tuning be reviewed on a plant-specific basis.¹³

12 Since Mr. Sholly failed, apparently, to attempt to pursue this subject through cross-examination, we disapprove of his proposed findings requesting relief on the matter. See paragraph 22, supra.

13 Sholly PF 103 asserts that the degree of improvement due to the actions taken pursuant to B&W's recommendations has not been shown. As with other similar assertions (see, paragraphs 99 102, supra, and n.16, infra), the Board observes that Mr. Sholly did not raise this issue during the hearing nor did he question the adequacy of Licensee's response to the B&W recommendations. See n.12, supra.

Lic. Ex. 18 at 2-2, 3-1, 5-4. On this basis, the Board finds that the B&W report was not inadequate solely because the FMEA did not identify feedwater oscillations as being caused by ICS malfunctions. In Sholly PF 105.d, Mr. Sholly references ORNL's suggestions for further study of the dynamic characteristics (including system oscillation) of the ICS, alleging that these suggestions were ignored by B&W, Licensee and the Staff. As stated by ORNL in its preface to this suggestion, this type of analysis would be useful in determining "the dynamic response and stability of the plant control system (a broader definition of the ICS)." The Board views this suggestion as outside the intended scope of the B&W study, and concludes that it therefore need not be imposed here.

104. Sholly proposed findings 45 to 48 discuss the effect of plant operating conditions upon ICS failures and the asserted limitations of the B&W analysis for failing to consider these factors. Sholly proposed finding 45 implies that such factors (i.e., time in core life, power level, etc.) determine whether ICS failures will occur. Rather, the Board understands that these factors impact plant response to an ICS failure (i.e., whether a reactor trip will occur or whether the ESFAS or EFW systems will be initiated). Lic. Ex. 18 at 4-22, 23. Further, Sholly PF 47 alleges that all analyses of the ICS dealt with normal, full-power operation and did not consider off-normal plant conditions. While this may indeed be true of the FMEA, the B&W operating history review, by its very nature,

included events which were initiated under both normal and off-normal plant conditions. See Sholly Ex. 2 at 21.

105. Sholly proposed findings 51, 95, 96, 102 and 105.a claim that a lack of annunciation of ICS failures contributes to the severity of a variety of events, in that the operator is not informed of ICS failures. The basis for this alleged deficiency is a generic description in Licensee Exhibit 18 at 4-2 that ver-- few ICS failures are self-annunciated. Mr. Sholly failed to pursue this issue to determine the extent that ICS failures are annunciated at TMI-1. The Board has received evidence on the annunciation of ICS power supply failures (see Licensee PF 191); however, lacking any evidence as to ICS failure annunciation, the Board declines to make any finding on this issue. See also, n.12, supra.

106. In his proposed finding 56, Mr. Sholly asserts that multiple failures involving the ICS have been identified.¹⁴ Our reading of the transcript pages cited by Mr. Sholly leads the Board to believe that witnesses Joyner and Lanese were describing possible effects upon the plant if multiple failures were assumed; we do not believe these are references to identified events which have occurred. Tr. 5729-31 (Lanese); 7039-40 (Joyner).

107. Sholly proposed findings 59 to 63 discuss the perceived inadequacies of the computer simulation, POWER TRAIN

14 The Board has previously rejected Mr. Sholly's assertions that multiple failures should have been considered in the B&W study. See paragraph 91, supra.

IV ("PT-IV"), utilized by B&W to simulate plant response to ICS failures. Mr. Sholly initially alleges that the PT-IV simulation is not applicable to TMI-1 as the simulation was modeled upon the Rancho Seco (model 820) ICS. However, the Board notes that there is no difference in the functional performance between the two ICS models. Tr. 7068 (Joyner); see also, paragraph 93, supra. Further, in order to demonstrate the proper functioning of the PT-IV model, B&W compared a simulated turbine trip from full load with a runback to 15% load against plant data of a TMI-1 turbine trip which showed a high degree of similarity between the PT-IV and TMI-1 data. Lic. Ex. 18 at 4-21, and Fig. 4-5 at 4-69, 70. The Board therefore disagrees with Mr. Sholly's argument that the use of the PT-IV simulation data is inappropriate. Mr. Sholly also argues that, due to certain weaknesses in the PT-IV model, the simulation should be discounted and a full-plant simulator should be developed to evaluate the interaction of the primary, secondary and control systems. See Sholly PF 105.e. The Board here will rely upon the overall ORNL conclusion that, while the PT-IV model has certain limitations, it is adequate, its deficiencies do not greatly affect the overall results of the analysis, and ORNL expects that the PT-IV results are reasonably valid. Sholly Ex. 2 at 12, 22.

108. At several points in his proposed findings (i.e., Sholly PF 66, 88, 92, 99-100), Mr. Sholly takes issue with the Staff's and B&W's findings that the ICS provides no

more frequent or severe challenges to the RPS than other control systems and that the ICS prevents more trips than it initiates. With respect to this latter point, Mr. Sholly asserts that the data comparing runbacks (i.e., preventing reactor trips thereby lessening RPS challenges) to trips at the Rancho Seco plant is not applicable to TMI-1. However, according to Licensee's witness Dr. Joyner, Rancho Seco was neither the best nor the worst in terms of runbacks; and TMI-1 was one of the better plants for runbacks and had a record of successful runbacks on turbine trip/loss of load. Tr. 7084-85 (Joyner). ORNL agreed that the ICS prevents or mitigates any more upsets than it creates. Sholly Ex. 2 at 15. ORNL further acknowledged that the ability of the RPS to handle plant conditions caused by the ICS is not unique to B&W plants, but is a concern for any control system, and found no evidence that the ICS provides more frequent or more severe challenges to the RPS than other control systems or that the challenges exceed the RPS capability. Id. at 8, 14.

109. The Board here must also point out Mr. Sholly's mischaracterization of ORNL's statement, at page 11 of Sholly Exhibit 2, as referenced in Sholly proposed finding 92. Mr. Sholly states that ORNL found, with respect to B&W's conclusion that the ICS has prevented more trips than it has caused, "that while this may be true, it is not substantiated by historical data nor by the FMEA to be particularly significant." Sholly proposed finding 92 (emphasis by Mr. Sholly). However, ORNL's

statement, in the section of its review dealing only with the FMEA, is as follows: "Although this assertion is not pertinent and is probably true, the data presented do not substantiate the assertion."¹⁵ Sholly Ex. 2 at 11 (emphasis added).

110. Mr. Sholly, in his proposed findings 67 and 88, criticizes the B&W study for failing to address post-trip operation of the ICS. The Board is aware, however, that, after a reactor trip, the influence of the ICS on plant performance is minimal, i.e., the ICS does not manipulate the control rods or the turbine, but does control feedwater and the atmospheric or condenser dump valves. Tr. 7043 (Joyner). However, Licensee witness Colitz testified that the atmospheric dump valves can be controlled manually from the control room, independent of the ICS. Tr. 16,559-61; 16,573-74 (Colitz). The Board views the ICS post-trip control of EFW as significant; however, the short-term modification of separating EFW from ICS control alleviates our concern in this regard. See Licensee PF 182.

111. Sholly proposed findings 89, 90 and 101¹⁶ disagree with the reliance placed by the Staff and Licensee

15 The Board does not agree with ORNL's view that the capability of the ICS to prevent or mitigate reactor trips is not pertinent. Rather, we believe this ability to reduce RPS challenges is an important factor in reducing the probability of a severe transient.

16 Sholly proposed finding 101 relies upon NUREG-0667 for information regarding the extent of NNI/ICS failures which caused feedwater transients at B&W plants. As we discussed earlier (see paragraph 2, supra), the Board will not base its findings upon citations to non-record information. Further in this same paragraph, Mr. Sholly castigates Licensee and the

upon the historical data showing that ICS hardware failures caused only 6 out of 310 reactor trips studied and again cites the significance of trips caused by ICS/NNI power supply failures. The Staff has acknowledged that its early concern with ICS internal failures was "misplaced", as substantiated by the data in the B&W study which, in conjunction with the lessons learned from other events (such as the Oconee and Crystal River transients), has allowed the Staff to concentrate its attention on events of greater concern, such as power supply failures. Tr. 15,888-89 (Capra). This does not, however, lessen the importance of the B&W finding that ICS internal failures accounted for only 1.9% of all reactor trips studied.

112. Mr. Sholly, in proposed finding 94,¹⁷ claims that "ICS failures are responsible for between 1/5th and 1/6th of all reactor trips on B&W reactors." While this figure would be correct if one were to consider, in addition to trips caused by ICS internal failures, those trips caused by control

(continued)

Staff for failing to quantify the degree of improvement which will be brought about as a result of the actions taken in response to certain of the B&W recommendations. The Board notes that Mr. Sholly did not cross-examine the witnesses presented by the Staff or Licensee on this subject; it is incumbent upon intervenors to raise such issues during the course of the proceeding and not wait until the filing of proposed findings to assert such significant allegations. See n.12, supra.

17 The Board notes that the citation in this paragraph to the number of transients caused by power supply failures is incorrect; the correct cite is to UCS Exhibit 35, Reference 1, at 5.

response, input failures, etc., as Mr. Sholly would do (see Sholly PF 89), the Board notes that the Staff and Licensee's reliance on the figure of 6 trips caused by the ICS pertains only to trips due to ICS hardware failures. See Licensee PF 188 and 208.

113. Sholly proposed finding 96 alleges that the degree of improvement which will be brought about by the modifications to separate EFW control from the ICS is unclear. The Board is unsure of the nature of the improvement referred to by Mr. Sholly,¹⁸ but notes that Staff witnesses Wermiel and Curry testified as to the improvement in EFW availability at 5 minutes following a loss of main feedwater transient after the EFW modifications are implemented (both at restart and for the long-term). Wermiel and Curry, ff. Tr. 16,718, at Att. 3.

114. Sholly proposed findings 99 and 100 take issue with the Staff's finding that the ICS is sufficiently reliable because, among other reasons,¹⁹ the Staff failed to consider the effect of the inversion of the PORV and high pressure reactor trip setpoints upon the RPS challenge rate. Mr. Sholly alleges that due to this "gap" in the record, the Board is obliged to take official notice of information in NUREG-0667 regarding the effect of this setpoint inversion. Contrary to

18 Mr. Sholly did not conduct any cross-examination of the Staff or Licensee witnesses on this issue.

19 See paragraphs 108, 111 and 112, supra.

this assertion, the Board finds no such gap in the record, in that Licensee witness Jones testified that this change in setpoints will increase the frequency of reactor trips at B&W plants, but only up to approximately the previous industry average. Tr. 8777-78 (Jones). The Board, therefore, declines to rely upon a non-record citation.

115. Mr. Sholly, in proposed finding 105.c, claims ORNL recommended that a fault tree analysis utilizing an equipment block diagram for a loss of feedwater event should be performed. However, the Board notes that ORNL qualified this recommendation by stating, "[i]f further pursuit of the failure consequences of the ICS is desired...". Sholly Ex. 2 at 15; see also, Licensee PF 205. Mr. Sholly also claims that sufficient information was not presented to determine if the ATOG program will include an evaluation of a loss of feedwater event. Contrary to this assertion, the Board has been presented evidence that ATOG will include an event tree analysis of loss of feedwater. See Licensee PF 94.

116. Sholly proposed finding 105.f states that ORNL held that "[a]dditional investigations should be performed of ICS failures (component failures) under off-normal conditions of operation..." (emphasis added). The ORNL review actually states, "[a]dditional investigation of ICS component failures under off-normal conditions would be desirable..." (emphasis added). Sholly Ex. 2 at 11. Further, as we discussed in paragraph 104 above, the operating history review performed by

B&W did include failures during off-normal plant conditions. Therefore, the Board does not believe it necessary to require such additional investigations prior to restart.

117. Sholly proposed finding 169.1.(1)-(4) [sic: this paragraph should be numbered as 169.p.(1)-(4)] would require Licensee to submit modifications to its Technical Specifications relating to the ICS.²⁰ In that there was no evidence presented during the course of the hearing regarding the need for or value of technical specifications on these issues, the extent to which the current TMI-1 Technical Specifications incorporate these suggestions, or the feasibility of imposing such technical specifications, the Board declines to adopt these proposals. See also, paragraphs 19-21, supra.

118. We turn now to a consideration of Sholly proposed findings 70-84, which discuss the possibilities of reactor vessel thermal shock resulting from a severe over-cooling transient. Mr. Sholly has attempted to link consideration of this issue to his Contention 6(a), which the Board has previously allowed to be expanded to include the issue of whether the B&W ICS reliability analysis is adequate in addressing the Staff's concerns regarding the ICS. See

20 Sholly proposed finding 169.1.(3) relates to reporting requirements for feedwater transients which result in EFW, ECCS or safety valve actuations. The Board fails to see any nexus between this proposal and Mr. Sholly's admitted contentions.

Licensee PF 178. While the FMEA portion of the B&W study indicates that a postulated ICS failure could result in an overcooling transient (Lic. Ex. 18, Table 4-3 and 4-33), the Board fails to see the relevance of the vessel thermal shock issue to a contention whose intent is to examine the adequacy of the B&W study in addressing the ICS concerns expressed by the Staff following the TMI-2 accident.

119. Additionally, while the Board acknowledges the significance of the vessel thermal shock issue, we view this as a generic issue which is not within the scope of this hearing. Reactor vessel thermal shock would be initiated by an overcooling transient (see, generally, UCS Ex. 35), which the Board views as having no nexus to the TMI-2 accident.²¹ In that this is a generic concern applicable to all PWRs (see Staff Ex. 12 at II.K.2.13-1) which is being pursued by the Staff, and in view of the fact that vessel thermal shock was not one of the contested issues in this proceeding,²² the Board believes that

21 See Tr. 21,452, 21,454 for an expression of the Board's concern of the relevance of the thermal shock issue to the scope of this proceeding.

22 The issue of vessel thermal shock arose in this proceeding due to the Commonwealth's and UCS's desire to cross-examine the Staff regarding its finding in Staff Exhibit 12 that Licensee has complied with the requirements of item II.K.2.13 of NUREG-0737. While the Board allowed this testimony, the issue of vessel integrity was not subsumed within the scope of the contentions which had previously been admitted. As pointed out in Sholly PF 81, NUREG-0737 was issued in draft form in September, 1980; had any of the parties believed that this issue was one of sufficient significance, the Board would have entertained motions to admit new contentions on this issue, subject to a showing of relevance to the scope of this proceeding.

the resolution of this matter is one which should be left to the Staff in the normal course of its duties. Nevertheless, due to the seriousness of the thermal shock issue, the Board believes that it may be of assistance to the Commission if we respond to certain of the concerns raised by Mr. Sholly.

120. Sholly proposed finding 70 discusses the susceptibility of TMI-1 to overcooling transients. Initially, it should be noted that, while Licensee witness Lanese agreed that TMI-1 was sensitive to overcooling transients, he further stated that this sensitivity has been exaggerated. Tr. 5881 (Lanese). Indeed, TMI-1 has not experienced any overcooling transients which exceeded the technical specification cooldown rate. UCS Ex. 35, Ref. 1 at 2 and Table 1. The Board further notes that: although some single ICS failures could cause overfeeding to one steam generator if EFW had been initiated, the reactor operator would receive a warning of this condition; and, if excessive feedwater flow occurred, the operator has several methods by which this flow could be terminated. Tr. 7040 (Joyner), 7113-14 (Broughton).

121. Mr. Sholly has generally criticized the Staff's finding that thermal shock is not an immediate concern at TMI-1, noting Staff witness Klecker's inability to respond to certain questions on UCS Exhibit 35. See Sholly proposed findings 77, 80. However, the Board believes that the following data support the Staff's position (in which we concur) that there is no justification for singling out TMI-1 with respect to the resolution of this issue:

- o Those vessels which are of concern to the Staff are those with a history of both high radiation exposure and material composition with a high sensitivity to radiation damage; TMI-1 has not accumulated sufficient radiation exposure to be of immediate concern. Staff Ex. 12 at II.K.2.13-2; UCS Ex. 35, Att. 1 at 1.
- o If a transient similar to the March 20, 1978 Rancho Seco transient occurred at any B&W reactor within the next several years, the probability of vessel failure would be unlikely (i.e., much less than 1 failure in the current population of reactor vessels); indeed, the Staff would not expect a failure even for the vessel with the worst material properties. UCS Ex. 35, Att. 1 at 2.
- o The Oak Ridge National Laboratory's analysis of this subject supports the conclusion that it would be several years before any B&W reactor reached the threshold irradiation level, assuming a high copper content of 0.35%. UCS Ex. 35, Att. 1 at 3.

Mr. Sholly also relies upon a letter from Staff engineer Basdekas to Congressman Udall (UCS Ex. 35, Ref. 5) to support the statement in Sholly proposed finding 75 that there is disagreement within the Staff as to when thermal shock would become of concern. While Mr. Basdekas may believe that the level of irradiation which is of concern "probably" occurs as early as four effective full-power years, the Board sees no technical support for this assertion. See, generally, UCS Ex. 35.

122. Sholly proposed finding 81 criticizes the Staff for its delay in informing this Board of the vessel thermal shock issue, alleging that the Staff has had information on the frequency of severe overcooling transients since October 29, 1980. The October 29, 1980 memo referred to by Mr. Sholly (UCS Ex. 35, Reference 1) is a preliminary review of overcooling transients and cautions that the estimates contained therein are made on statistically limited base of experience and are not of high precision. UCS Ex. 35, Ref. 1 at 1. The Board observes, however, that this evaluation dealt only with the frequency of overcooling transients and did not discuss the issue of reactor vessel thermal shock. The earliest analysis included in UCS Exhibit 35 which deals with the issue of thermal shock is the ORNL analysis of March 3, 1981. UCS Ex. 35, Ref. 4. The Board therefore declines to take issue with the promptness of the Staff's notification to us.

123. Sholly proposed finding 169.0 would require a resolution of the reactor vessel thermal shock issue for TMI-1

prior to allowing restart of the unit. As we stated in paragraph 119, supra, the Board finds no basis for treating Licensee differently than any other operating reactor with respect to this issue. We further note that the Staff has found no need to require further action on this issue prior to restart. UCS Ex. 35, cover memo at 2. Therefore, the Board rejects this proposal.

124. In summary then, the Board concludes that the ICS analysis performed by B&W adequately answers the Staff's concerns regarding the ICS, and therefore additional studies need not be performed. The Board also reiterates its earlier finding (see Licensee PF 211) that the submission of the B&W report to the Staff complies fully with long-term item 1 of the Commission's Order and Notice of Hearing.

H. Containment Isolation

125. Addressing Sholly contention no. 1, Sholly proposed finding 107 contends that neither Licensee nor Staff witnesses could explain why the NUREG-0667 recommendation that a safety-grade high radiation containment isolation signal for the reactor building vent and purge system was not approved for implementation, but offers no support for this contention. However, the Board notes that Licensee witness Lanese was never asked this question. Further, Staff witness Ross explained the process under which the NUREG-0667 recommendations were reviewed by NRR for implementation, and provided an explanation

of the means by which the NUREG-0667 recommendations are being implemented at TMI-1. Tr. 15,786-87 (D. Ross); Staff Ex. 9; see also, Licensee PF 545-548.

126. Sholly proposed finding 110 claims that Licensee witness Lanese provided no justification for why a containment isolation signal based upon reactor trip is preferable to a high radiation containment isolation signal in the event of a spurious PORV opening, but again offers no support for this statement. Contrary to this assertion, Mr. Lanese explained the basis for this reasoning. Tr. 7355-56 (Lanese); see Licensee PF 216.

127. The Board notes that, with respect to Sholly proposed finding 111, Staff witness Hearn testified that is possible but improbable that the purge line would be open on a bypass and fail to close on the reactor trip signal. Tr. 7384 (Hearn).

128. The Board has been presented with no evidence which supports Sholly proposed finding 113, which would require Licensee to install a new safety-grade high radiation containment isolation signal for the purge line; nor do we find any support for the proposition that Licensee must submit to the Staff for approval procedures assuring that the containment purge line will be isolated upon receipt of a high radiation signal from the existing equipment to the Staff. Therefore, the Board finds that the diverse isolation signals being implemented by Licensee are adequate and require no further modification.

I. Computer

129. The TMI-1 plant computer system was the subject of Sholly Contention No. 13 and ECNP Contention No. 1(a). Proposed findings of fact on this issue were filed by Licensee, the NRC Staff, Mr. Sholly, and the Commonwealth of Pennsylvania.

130. The Commonwealth's proposed findings take issue with the nature of Licensee's compliance with GDC 13. Initially, the Board notes that the subject of Licensee's compliance (or lack thereof) with GDC 13 is not within the scope of the two contentions dealing with the TMI-1 process computer; rather, Sholly Contention No. 13 asserts that the computer system must be upgraded to meet the standards of this criterion. The contention does not challenge the TMI-1 facility's conformance to GDC 13 with other equipment. Both Licensee and the Staff responded to this contention with testimony that the computer system is not required to meet GDC-13, in that it simply augments the safety-grade, hard-wired instrumentation in the TMI-1 control room which meets that criterion. Hamilton and Keaten, ff. Tr. 7397, at 2, 3; Joyce, ff. Tr. 7467, at 3, 4. The matter in controversy, then, is the reliability of the computer system and the standard by which it is to be judged, and not overall facility compliance with GDC 13.²³ This is not an initial licensing proceeding and the

23 Mr. Sholly also mischaracterizes the issue in his proposed finding 115.

Commonwealth, like any other party, is not free at the briefing stage to raise new issues for the first time.²⁴ While the Board views the Commonwealth's position as outside the scope of the contentions as admitted, we nevertheless will address several of the points raised by the Commonwealth.

131. Commonwealth proposed finding 106, in conjunction with its proposed finding 113, implies that, in order to meet GDC 13, manual procedures are provided in the event that the computer system is unavailable. The Commonwealth has apparently misinterpreted Licensee's testimony cited in the Commonwealth's proposed finding 106. The Board understands Licensee's testimony as stating that, for those normal functions performed by the computer (i.e., nuclear calculations), the operator has alternate instrumentation or manual procedures which can be used should the computer not be available. Hamilton and Keaten, ff. Tr. 7397, at 3. We do not read this statement as support for the proposition that compliance with GDC 13 is met by reliance on the computer or manual procedures, as is asserted in the Commonwealth's proposed finding 113.

132. The Commonwealth also contends that the Staff must conduct a complete review of key safety parameters and

24 The Commonwealth, in its position reports of July 31, 1980 and January 21, 1981, did not raise the issue of Licensee's compliance with GDC 13. Rather, in its July 31, 1980 report, the Commonwealth asserted that, "[i]t must be demonstrated that the computer-related difficulties that occurred during the TMI-2 accident are not repeated at TMI-1...". The Board views this statement as within the scope of our inquiry, i.e., the reliability of the computer system.

determining that all such parameters can be read in the control room via hard-wired instrumentation, alleging that the basis for the Staff's finding of Licensee's compliance with GDC 13 is unclear without such a review. See PA PF 123-125. The Commonwealth bases this proposal upon the fact that Staff witness Joyce was unable to state whether an in-core thermocouple display (see paragraph 133, infra) was required by the terms of GDC 13. However, as Mr. Joyce noted (Tr. 7470), he did not appear at the hearing to testify as to Licensee's compliance with GDC 13 -- indeed, as the Board has previously stated in paragraph 130 above, this issue is not one properly within the scope of this hearing. Additionally, the Board views the testimony of Messrs. Jensen, et al., in response to ECNP Contention 1d (ff. Tr. 7548), as responding in part to the Commonwealth's concerns regarding the provision of instrumentation needed to monitor key safety parameters. While that testimony was not specifically addressed to GDC 13, the Board relies upon the Staff's finding that the instrumentation provided by Licensee to allow the operator to perform necessary functions and monitor important variables following a feedwater transient and small break LOCA is adequate. Jensen et al., ff. Tr. 7548, passim; Licensee PF 252-273. For these reasons, then, the Board finds no basis upon which to require the Staff to perform the requested review.

133. Commonwealth proposed findings 114 to 123 deal with the issue of a backup display for in-core thermocouple

readings. This issue has no bearing upon the reliability of the plant computer system and should have been addressed in connection with the subject, Detection of Inadequate Core Cooling. As the Commonwealth has stated, however, the Staff, based upon its human factors review of the TMI-1 control room, is recommending that Licensee implement a backup display (other than the process of taking manual voltmeter readings) prior to exceeding 5% power. Staff Ex. 15 at 12. The Commonwealth has expressed concern that the only backup system (to the plant computer system) to which Licensee is committed, other than the NUREG-0737 requirements, involves taking local readings at the instrument cabinet with a portable voltmeter which then can be converted to temperature. PA PF 116 and 119. However, the Commonwealth has overlooked Licensee's commitment to implement all outstanding requirements in Staff Exhibit 15 in conformance with the schedule set forth therein. Tr. 21,431-32 (Baxter). This oversight no doubt colored the Commonwealth's overall approach to the issue of the TMI-1 computer. The Board trusts, however, that Licensee's commitment to implement the backup in-core thermocouple display, as recommended by Staff Exhibit 15, satisfies the Commonwealth's concern with this issue.

134. Licensee's reliance on the computer system as the primary method of obtaining in-core thermocouple readings has apparently led the Commonwealth to question the extent to which TMI-1 operators rely on the computer to obtain key safety information during transients, a subject which is also of great

concern to Mr. Sholly. See, generally, PA PF 124-135, and Sholly PF 120-127. However, with the former exception of the in-core thermocouple display, the Board has been presented with no evidence that the operators rely on the computer in order to make operational decisions during upset conditions. Mr. Sholly relies upon conjecture by the Staff's human factors consultant that there is no reason to believe that the operators will not use and depend on the computer under all conditions. See Sholly PF 124 and 125, citing Tr. 10,515, 10,544-45 (Price). However, Licensee witness Keaten explained that, while from a human factors standpoint, an instrument which is used during normal operations is one which the operator will want to turn to under transient conditions, one would also expect the operator to turn to the computer for the type of information which is accessed via the computer under normal conditions, i.e., nuclear calculations and the like. (See Licensee PF 237 and 238). In the case of a reactor trip, the operator would not utilize the computer but would rely upon the control board to determine the nature of the transient.²⁵ Tr. 10,547-48 (Keaten); see also, Licensee PF 240 and 241; Tr. 10,589 (Price).

25 Sholly proposed finding 125 cites to this explanation by Mr. Keaten as an agreement that the operators will attempt to use the computer under all conditions. Considering Mr. Keaten's amplification concerning the "normal" use of the computer, as noted above, the Board does not view this statement as support for Mr. Sholly's position.

135. The Board is also cognizant of the fact that, after hearing Licensee's explanation of the uses made of the computer by the control room operators, the Staff's human factors witnesses withdrew their objections to the TMI-1 process computer and stated that the matter had been resolved to their satisfaction. Tr. 10,586-87 (Ramirez). Indeed, the supplement to the Staff's TMI-1 control room design review report does not take issue with the capability or utilization of the process computer. See, generally, Staff Ex. 15.

136. The Board turns now to an examination of several additional specific concerns addressed by Mr. Sholly and the Commonwealth in their proposed findings.

137. Commonwealth proposed finding 131 states that, upon the installation of the new CRTs, the operators will be more likely to utilize the CRTs to obtain information. The discussion cited by the Commonwealth concerns the operators' lack of use of the CRT during the TMI-2 accident and Mr. Keaten's testimony expressing the belief that, once the new computer system is fully implemented, the operators will tend to use the CRTs more than the computer printer output. Tr. 7428-29 (Keaten, Hamilton). Thus, while the operators may utilize the CRT output more frequently than the computer printer output, the Board finds no support in Mr. Keaten's testimony for the proposition that the operators will utilize the computer output more frequently than they have in the past.

138. The Commonwealth, in its proposed finding 134, contends that Licensee witness Keaten testified that some

procedures may instruct the operator to rely on the computer, if it is available. The Board notes, however, that Mr. Keaten here was referring to operating (not emergency) procedures and went on to testify that, under transient conditions, the only time the operator might be instructed to utilize the computer is to obtain in-core thermocouple readings. Tr. 7442-43 (Keaten).

139. Commonwealth proposed finding 135 would require Licensee to revise all of its emergency procedures to require the operator to use only hard-wired instrumentation to obtain key safety parameters, but allowing the computer to be used as a verification source. There is no evidence in the record in support of this recommendation. In fact, the record shows that operators do not attempt to utilize the computer for the immediate actions required by plant emergency procedures. See Licensee PF 241. In addition, the Board views this suggestion as cumbersome, and one which would further complicate already complex procedures. Further, we believe this proposal would be an unnecessary restriction on the operating staff's ability to use all the tools at their disposal by prohibiting the use of the computer (i.e., this would prohibit the shift supervisor or shift foreman from obtaining an overview of plant conditions via the computer during a transient). See Tr. 7431-32, 10,594-96 (Keaten). The Board does agree that Licensee's training programs should emphasize the need to rely on hard-wired instrumentation during a transient by the control

room operator; however, the evidence before us indicates that the present training program does include such instructions. Tr. 7421-23 (Keaten).

140. Both the Commonwealth (proposed finding 112) and Mr. Sholly (proposed findings 138 and 169.j) have raised questions concerning the reliability of the power supply for the computer. Licensee's witnesses agreed that the computer is not powered from redundant sources, but went on to explain that the power supply is battery-backed, which provides for an uninterruptible power supply in the event of a loss of off-site power. Tr. 7433-34 (Hamilton, Keaten). The Board has not received any evidence which indicates that power supply interruptions have resulted in computer unavailability. Therefore, we see no need to require the power supply study recommended by Sholly proposed findings 138 and 169.j.

141. Sholly proposed findings 135, 169.h and 170.b call for Licensee to establish a schedule for completing the upgrade of the TMI-1 computer system, to submit this schedule to the Staff for approval and to complete the upgrade as soon as practicable. In that Licensee has stated that it is moving as rapidly as possible in completing the computer upgrade (Tr. 10,540 (Keaten)), and in view of the fact that the NRC regulations do not even require a plant computer (Joyce, ff. Tr. 7467, at 3), the Board sees no need for requiring that a schedule be devised and imposed on Licensee for completing this modification.

142. Mr. Sholly also proposes (proposed findings 136, 169.i and 169.1.(5)) that Licensee design and implement, prior to restart, a monitoring system to assess the reliability of the computer system, and would further require that the TMI-1 Technical Specifications be modified to incorporate this requirement and to establish reporting standards for the information generated. With respect to the accuracy of the data produced by the computer, the Board notes that both Mr. Keaten and Mr. Price knew of no instances when the computer gave incorrect information, but Staff witness Ramirez believed that the combination of the CRT, printer and computer may have given some incorrect information. Tr. 10,541 (Keaten); Tr. 10,544 (Price); Tr. 10,546 (Ramirez). This proposal is apparently based on a suggestion by Mr. Ramirez that a verification program be established for the Bailey 855 computer pending completion of the upgraded system (Tr. 10,561 (Ramirez)), which was not recommended to us by the Staff in its proposed findings. See, generally, Staff PF 301-309. Without explicit evidence that the computer system has indeed produced incorrect information, and in view of the uses generally made of the computer, the Board finds no basis upon which to require the implementation of a monitoring system and associated Technical Specifications.

143. Sholly proposed finding 137 would require the Staff to undertake periodic routine observations of the TMI-1 operating staff to ascertain the extent of operators' reliance

on the computer. The Staff currently evaluates operator performance during the annual drill. Tr. 12,872 (Boger). The Board assumes that any inappropriate use of the computer would be noted at that time; if this is not the case, we would urge the Staff to include such an evaluation in its normal review process. The Board, however, declines to make this a requirement upon the Staff.

144. The Board, in reaching its decision on this issue, has considered the following facts: the computer is not required by NRC regulations; the computer system does enhance operation of the plant and Licensee should not be discouraged from providing operators with unrequired aids; and, Licensee is actively engaged in upgrading the computer system. Further, with respect to Mr. Sholly's proposal that the Staff undertake reviews of the usage of the TMI-1 computer, the Board believes Staff's efforts should not be diverted from matters which are critical to safety, but should be handled as discussed above in paragraph 143. Therefore, the Board has determined that neither Licensee nor the Staff will be required to undertake any additional actions with respect to the TMI-1 computer system.

J. In-Plant Instrument Ranges

145. Staff proposed finding 367 states that the expanded-range gaseous effluent monitors will be installed at TMI-1 prior to restart. The Board understands that, while

Licensee expects to have this instrumentation installed prior to restart, NUREG-0737 does not require implementation until January 1, 1982. If Licensee is unable to complete this requirement prior to restart, the Staff will assure that acceptable interim methods are in place. Staff Ex. 14 at 40-42; see also, Licensee PF 256, n. 80.

146. Staff proposed finding 376 states that the two additional high-range, in containment Area Gamma Detectors will be operable prior to restart. The Board notes, however, that the Staff, in its latest safety evaluation report supplement, is requiring that these monitors be installed pursuant to the NUREG-0737 implementation date, currently January 1, 1982. Staff Ex. 14 at 41; see also, Licensee PF 260.

K. Control Room Design - Human Factors Engineering

147. Because Mr. Sholly's main concerns in his Contention 15 have been answered with actions -- the performance of human factors engineering reviews of the TMI-1 Control Room by Licensee and the NRC Staff, and the implementation of corrective actions -- the Board's consideration of the proposed findings has been reduced to a focus upon details on the number of and implementation scheme for the array of modifications being undertaken.

148. Mr. Sholly generally asserts a close relationship between human factors engineering and operator

training as a prelude to a specific discussion of the use of simulators in training. Sholly PF 145-150.²⁶ In proposed findings 146 through 151, Mr. Sholly lists numerous uses for a replica simulator, including initial operator training and requalification training (Sholly PF 146), training of engineering staff and possibly other personnel (Sholly PF 149), and evaluation of control room design and future proposed modifications (Sholly PF 149). Mr. Sholly would have the Board order Licensee to install a replica control room simulator "as soon as possible (Licensee indicates that this should be possible by 1985)." Sholly PF 170(c). We address the issue of the replica simulator in detail in our findings on management capability. Suffice it to say here that Licensee has specifically committed:

[T]o purchase and have installed at TMI-1 an exact replica simulator. By April 1, 1982,

26 The general topic of training (and, more specifically, the use of simulators in training) was examined in great detail in the portion of this hearing which addressed management issues. Indeed, the vast majority of Mr. Sholly's transcript references are to the hearings on management issues. None of the direct testimony on Control Room Design - Human Factors Engineering even mentions simulators; the subject was raised with the human factors witnesses on cross-examination only, and, even then, relatively briefly. It is telling that the Staff, Licensee, the Commonwealth and Mrs. Aamodt timely filed proposed findings on simulators and training, on the schedule set for management findings. It is similarly worth noting that no party (other than Mr. Sholly) included proposed findings on simulators and training in its initial proposed design findings. Nevertheless, though the Board believes that Mr. Sholly's proposed findings on the use of simulators in training are actually late-filed management findings filed in the guise of design findings, we have considered those proposed findings in reaching our decision.

Licensee shall prepare for bids and distribute specifications for the simulator. Licensee shall make reasonable and diligent efforts to have the TMI-1 exact replica simulator installed by 1985. Annually, in October of each year, beginning with October 1982, Licensee shall provide to the NRC reports on progress toward fulfillment of this commitment.

Lic. Ex. 56 at 3, as modified at Tr. 22,203-04 (Blake). This commitment satisfies Mr. Sholly's concerns about the specificity of Licensee's commitment. Tr. 22,203 (Blake). Until the replica simulator is installed, the full-scale mock-up of the TMI-1 Control Room prepared by Licensee's human factors review team can be used for evaluation of future proposed control room design modifications, as necessary, and for part-task training. Tr. 12,146-48 (Long). Moreover, Licensee has committed to have available for use at TMI-1 prior to restart a cathode ray tube (CRT) part-task simulator which displays pressure and temperature, and to contract (prior to restart) for a basic principles trainer for TMI-1 anticipated to be installed in 1982. Lic. Ex. 56 at 3. This equipment will further enhance Licensee's training program. Of course, pending installation of the replica simulator, Licensee's operating personnel will also continue to train on the B&W simulator in Lynchburg. Long et al., ff. Tr. 12,140, at 29 (Long, Newton, Ross).

149. As Sholly proposed finding 151 notes, Licensee now performs a human factors review of all modifications to the TMI-1 Control Room. Mr. Sholly would have the Board further

recommend, "on the basis of the record developed in this proceeding," that Licensee also implement a human factors review of procedural changes. The totality of the record on the issue in this proceeding is a single question by Mr. Sholly. There was absolutely no development of the record as to what the precise purpose, scope or method of such a review might be. We therefore decline to make such a recommendation. However, we note that Licensee's human factors experts are working closely with the TMI-1 operating staff to ensure that the specific nomenclature used in procedures is consistent with the labeling of controls and instrumentation in the TMI-1 Control Room. Tr. 10,304-05 (Estrada). See also, Lic. Ex. 23 at 7.

150. Another set of Sholly proposed findings recites the historical positions of Licensee and the Staff on the provision of back-up display capability for in-core thermocouples. Sholly PF 154, 155. Mr. Sholly characterizes the matter as "[a] principal item of disagreement, which apparently has not yet been resolved judging from an exchange of correspondence and the Staff's Supplement No. 1 to NUREG-0752," and would have the Board require Licensee to provide such back-up display capability prior to restart. Sholly PF 169(k). Mr. Sholly has failed to note the statement of Licensee's counsel making the commitments requested in the Staff's supplemental control room design review report on the procedures proposed by the Staff, including the provision, ~~which~~ exceeding 5%

power, of back-up display capability for in-core thermocouples.²⁷ Licensee PF 318, citing Tr. 21,431-32 (Baxter). Thus, the "disagreement" which Mr. Sholly addressed in proposed findings 154, 155 and 169(k) was -- apparently unbeknownst to him -- mooted.²⁸

151. In proposed finding 156, Mr. Sholly would have the Board, inter alia, offer a number of almost casual observations about the performance of the "detailed control room design review" (DCRDR) by Licensee. The Staff will require Licensee to submit for review its DCRDR report, in accordance with the provisions of Item I.D.1, NUREG-0737, "Clarification of TMI-1 Action Plan Requirements," on a schedule consistent with other operating reactors (now projected for the end of 1982). Staff Ex. 2 at 19, 23. Human factors considerations in the control room are not concerns unique to TMI-1. Licensee PF 294. No party has suggested that Licensee must submit its DCRDR report on a schedule ahead of other operating reactor

27 The Commonwealth also overlooked this phase of the record. See paragraph 133, supra.

28 Mr. Sholly has overlooked other similar Licensee commitments. In proposed finding 156, Mr. Sholly would have the Board require Licensee to permanently mark final operating ranges on certain vertical meters by the end of the first refueling outage following restart, in accordance with the Staff's recommendation. Again, the differences between the Staff and Licensee have been mooted by the statement of Licensee's counsel making the commitment requested in the Staff's supplemental Control Room Design Review Report. Licensee PF 318, citing Tr. 21,431-32 (Baxter). Mr. Sholly has simply failed to recognize the commitment.

licensees. In fact, the Staff has expressly taken the position that Licensee's DCRDR is not required prior to restart. Staff Ex. 15 at 5. Mr. Sholly did not challenge that position in the hearing and has not even proposed any findings requiring Licensee to submit its DCRDR report on any special schedule, or requiring the Staff to review Licensee's DCRDR report on any particular schedule. It is therefore of no consequence to the Board whether or not Licensee Exhibit 23 is Licensee's DCRDR report, and we decline to make the gratuitous observations on the subject which Mr. Sholly proposes.

152. Mr. Sholly, in proposed finding 156, would also have the Board require Licensee to, in the Staff's words, "investigate systems and techniques for effective communication of indicator and display lamp status information to operators where 'push-to-test' lamp status information is not already available." See, Staff Ex. 15 at 2. Mr. Sholly seemingly regards this matter as an open item between the Staff and Licensee, and would have the Board intervene to resolve the issue. The Board believes that, as in the case of paragraph N4, supra, Mr. Sholly has simply failed to recognize the statement of Licensee's counsel making the commitments requested in the Staff's supplemental control room design review report, which included a commitment to perform the requested investigation and to report the findings and proposals to the Staff. Licensee PF 318, citing Tr. 21,431-32 (Baxter); Staff Ex. 15 at 2. Thus, the issue has been virtually mooted. We note,

however, that Mr. Sholly would have the Board require Licensee to complete the investigation by the end of the first refueling outage following restart. Mr. Sholly cites no evidence whatsoever in support of such a requirement. As a practical matter, it makes little difference when the investigation itself is completed; the more significant date is the deadline for the submittal of the findings and proposals to the Staff after the investigation has been completed -- and Mr. Sholly proposes no date for that submittal. Since the lamp status concern is not unique to TMI-1 [it is, in fact, common to all power plants, not just nuclear plants, Tr. 10,355 (Estrada)], there may well be value in reviewing the results of Licensee's investigation of the problem in the context of the DCRDR reports of the rest of the industry. The Board therefore rejects Mr. Sholly's proffered modification to the schedule proposed by the Staff and agreed to by Licensee.

153. Mr. Sholly expresses special concern about three areas related to the design of the TMI-1 Control Room. He first expresses special concern about the TMI-1 alarm and annunciator system²⁹ and would require Licensee to complete its

29 The asserted basis for concern is the statement of the Staff witnesses that neither of them had specifically reviewed the number and type of alarms that annunciated during the TMI-2 accident. However, Licensee's consultant reviewed the sequence of events of the TMI-2 accident to determine whether the TMI-1 Control Room, as modified for restart, will resolve the specific human factors problems which the TMI-2 operators encountered in the TMI-2 accident. The review included a comparative analysis of the TMI-1 and TMI-2 alarm systems, which revealed that, at TMI-1, only approximately 30 to 40

evaluation of alarm and acknowledgement alternatives before the end of the first refueling outage following restart, with the Staff to satisfy itself that Licensee is making reasonable progress toward satisfying this requirement as a condition of restart. Sholly PF 157. Licensee is already committed to discuss the evaluation and final resolution of the alarm system deficiencies, for Staff review and approval, in conjunction with Staff review of Licensee's DCRDR report. Staff Ex. 2 at 6; Lic. Ex. 33 at 2, 3. There is no evidence in the record which supports the schedule proposed by Mr. Sholly. Further, unlike certain physical plant and equipment modifications which can be implemented only (or most readily) in connection with an outage, there is no rational basis for connecting the completion of such an engineering review to any outage. Moreover,

(continued)

alarms would annunciate in the train of a reactor trip and turbine trip, in stark contrast to the 100 to 200 alarms that annunciated under those conditions at TMI-2. Tr. 10,299-300 (Estrada). Furthermore, as Mr. Sholly notes, an alarm prioritization system will be implemented prior to restart. Moreover, as Mr. Sholly also noted, administrative controls will be used to ensure that alarms are not acknowledged until operators have reviewed and understood the significance of each alarm. See also, Licensee PF 322. However, contrary to Mr. Sholly's representation, Staff witness Price did not testify "that the procedural change should take the form of a caution to the operations. [sic; operators] . . . " [emphasis supplied], but that he would "probably suggest that it be a caution." Tr. 10,466 (Price). Given the context of Mr. Price's testimony on this point, the Board believes that Mr. Price was simply trying to be helpful and responsive to Mr. Sholly, and was not rendering a considered professional opinion on the optimal format of the recommended procedural change. We are therefore particularly reluctant in this instance to direct a specific change to any particular procedure.

as we noted in similar circumstances in paragraph 152, supra, it makes little difference -- as a practical matter -- when the evaluation itself is completed; the significant date is the date of submittal of the report to the Staff, after the completion of the investigation, and Mr. Sholly has proposed no deadline for that date. The Board therefore declines to modify the schedule for this item, which has been proposed by the Staff and adopted by the Licensee. Nor do we require the Staff to make a "reasonable progress" determination on this item prior to restart. There is no record in this proceeding to support the need for such a determination in this instance, and we are particularly chary of explicitly defining "reasonable progress" for the Staff in this context in the absence of a record supporting such a definition.

154. Mr. Sholly also expresses special concern about operations-related communications at TMI-1, and would have the Board find that Licensee is not "giving a sufficiently high priority to this problem." Sholly PF 158, 159, 169(1). The Board concludes to the contrary. In satisfaction of the concerns expressed in the Staff's Control Room Design Review Report (Staff Exhibit 2), which Mr. Sholly recites, Licensee has already committed to repair -- prior to restart -- all inoperable page telephones. Staff Ex. 2 at 19-20; Lic. Ex. 33. To remedy the serious problem of frivolous use of the page system,³⁰ Licensee has further committed to do a detailed

30 The frivolous use of the page system, while a matter of serious concern to the Board, is typical of other power plants, both fossil and nuclear. Tr. 10,268 (Estrada).

engineering study of plant communications systems to determine areas for improvement. The study will include a determination of locations for the installation of additional page telephones to further enhance in-plant communications. Licensee's study is expected to begin in 1981 and to be completed by the end of 1982. The results will be reported to the Staff. Lic. Ex. 23 at 28; Lic. Ex. 33; Staff Ex. 2 at 19, 20. Licensee has already begun to solicit vendor proposals for improvements to plant communications systems, Tr. 10,265-66 (Walsh), and has underway a study of a system which would record transmissions over the page phone system, Tr. 10,270 (Walsh), which might assist in the identification of those who make frivolous use of the page system, though even taped laughter and whistling may be difficult to trace to any particular individual.³¹

Licensee's treatment of communications concerns in Licensee Exhibit 23, and Licensee's commitment to a longer term, comprehensive study of communications clearly illustrate Licensee's recognition of problems in the area and its dedication to the careful, timely resolution of those problems. There was no evidence to suggest that the long term schedule for resolution of the identified concerns, agreed upon by Staff and Licensee, would adversely impact upon plant safety.³² The

31 Licensee has, in the past, attempted to enforce the prohibition against frivolous use of the page system through disciplinary action. However, it has been difficult to identify the offending parties. Tr. 10,269 (Estrada).

32 To the contrary, the Staff witnesses testified that the implementation of modifications which the Staff proposed as

Board therefore declines to adopt the expedited schedules advanced by Mr. Sholly, and rejects his proposed findings 158, 159 and 169(1).³³

155. Mr. Sholly identifies the use of video and audio taping in the TMI-1 Control Room as a third area of special concern, and would have the Board order Licensee to install a video taping system in the TMI-1 Control Room prior to restart. Sholly PF 160, 169(m).³⁴ Mr. Sholly implies that Licensee's witness stated that "the use of audio/video taping in the control room, perhaps keyed to reactor/turbine trip annunciation, would be 'an extremely valuable tool' in analyzing operator response to accidents and transients . . .".³⁵

(continued)

restart requirements would "bring TMI-1 on a comparable basis with the other operating plants." Ramirez and Price, ff. Tr. 10,452, at 7. Similarly, Licensee's review team concluded that TMI-1 could be safely operated with no human factors modifications, though numerous enhancements were recommended. Walsh et al., ff. Tr. 10,234, at 9. These broad conclusions support the Board's decision not to further elevate the relative importance of this item.

33 The Board notes that Sholly proposed findings 159 and 169(1) suggest the imposition of potentially conflicting requirements in this area. We reject both proposals.

34 Sholly proposed finding 160 discusses both video and audio taping systems, though the ultimate proposed requirement is the installation of a video taping system only. Compare, Sholly PF 160 and 169(m). However, our decision would not be altered even if the proposed requirement were the installation of a combined audio/visual taping system or the installation of an audio taping system only.

35 An enhanced ability to perform post-accident analyses--which appears to be the principal value of such taping devices--is, in the Board's opinion, beyond the scope of this proceeding, since a post-accident analytical tool does not directly relate to an

Sholly PF 160. While Licensee's witness did acknowledge the potential advantages of such taping systems, the words "an extremely valuable tool" -- which Mr. Sholly sets off in quotation marks -- are the words of Mr. Sholly, not Licensee's witness. Tr. 10,271 (Sholly). Similarly, Mr. Sholly's citation to the transcript does not support the activation of such systems as "keyed to reactor/turbine trip annunciation" (or any other signal, for that matter).

156. Mr. Sholly also misrepresents the testimony and position of the Staff on this issue. The Staff expressed its strong opposition to requiring the installation of video or audio taping systems in the TMI-1 Control Room in light of "big brother" considerations. Tr. 10,498-501 (Ramirez, Price). While the Staff believes such taping may be occasionally useful on a temporary basis in proficiency training or in the development of procedures, the Staff sees no advantages to the permanent installation of such taping systems which are not outweighed by the "big brother" atmosphere which the presence of such equipment would engender in the Control Room. Tr. 10,498-99 (Ramirez, Price). Mr. Price went so far as to characterize the presence of such equipment in the Control Room as an undesirable human factors feature, which would inhibit

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improvement in the immediate, real time capability to protect the public health and safety while operating TMI-1. However, we do not rest our decision on this consideration only.

free discussion and exchange of information among operators in the event of a transient activating the taping system. Tr. 10,500 (Price). Mr. Ramirez did not, as Mr. Sholly suggests, testify that "the use of video/audio taping in simulator conditions would reduce the objections of operations personnel to the constant observation of on-shift performance." Sholly PF 150. Rather, Mr. Ramirez stated:

. . . I did not rule out the use of such [taping] devices or systems at one-for-one simulators. I think that is where they could be used to improve operations without having to worry about these things ["big brother" considerations] that Mr. Price is talking about.

Tr. 10,500-01 (Ramirez). This is a far cry from the testimony which Mr. Sholly attributes to Mr. Ramirez, and effectively distorts the Staff's position on the issue.

157. Mr. Sholly attempts to analogize the installation of a taping system in the TMI-1 Control Room to "the use of flight recorders and the so-called 'black box' recorder on commercial aircraft." Sholly PF 160. However, there is no testimony whatsoever on which the Board might base such a comparison.³⁶ Nor is such a comparison one which the Board can

36 The need for such testimony is highlighted by our confusion at Mr. Sholly's characterization of the "black box" and "flight recorder" as "analogous" to the video taping system he would require. We note parenthetically, without considering the point in our decision, that it is our impression that "black boxes" and "flight recorders" record sound only. There was no testimony describing what the "black box" and "flight recorder" are, where they are placed in a commercial aircraft, how and when they are activated, or how information they tape is used -- not to mention an analysis of how their presence

itself draw under the doctrine of official notice. See, e.g., "Confirmatory Memorandum and Order On Rulings Made At June 4, 1981 Hearing Session," (6/9/81), especially referenced Tr. 21,838-41 (Smith).

158. Mr. Sholly's proposed findings gloss over the strong reservations expressed by the Staff and Licensee (and shared by the Board) about the negative human factors implications of the taping system Mr. Sholly advocates. Even Mr. Sholly himself acknowledged the negative aspects of such systems. Tr. 10,271 (Sholly). The Board is unable to conclude, on the basis of the record, that the installation of such a system would not be, on balance, detrimental to the health and safety of the public. Moreover, Licensee is -- on its own -- studying installation of video and audio taping in the TMI-1 Control Room, which will include consideration of both the potential advantages and disadvantages associated with such systems. Tr. 10,270-72 (Walsh). It would thus be, at best, premature for the Board to require Licensee to install a video taping system in the TMI-1 Control Room on any schedule, let alone prior to restart. Accordingly, the Board rejects Mr. Sholly's proposed findings 160 and 169(m).

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affects crew performance. Mr. Sholly didn't even attempt to cross-examine any of the human factors witnesses on the "black box" and "flight recorder," though at least two of the witnesses -- Drs. Sheridan and Christensen -- have extensive experience in aerospace and aviation human factors engineering. See, respective Statements of Professional Qualifications, ff. Tr. 10,234.

159. Mr. Sholly also proposes the imposition of certain extraordinary reporting requirements on the Staff and Licensee. He would have the Board require the Staff to prepare "a final pre-restart report on the status of Licensee's implementation of modifications to the TMI-1 control room," with Licensee "to provide whatever information is required by the Staff in preparing this report." Sholly PF 161. Mr. Sholly also proposes that Licensee be required to modify its technical specifications to require reports on the status of the control room upgrading program until the modifications contemplated in "Licensee's control room design review report" are completed.³⁷ Sholly PF 162. Mr. Sholly further proposes that the Staff and Licensee be required to identify all post-restart human factors commitments "in the reports required by this decision." Sholly PF 163. In ruling on proposed finding 162, we are mindful of the standards described by the Appeal Board for the imposition of technical specifications and the concerns voiced by the Commissioners with respect to the growth of the number and detail of technical specifications. See paragraphs 19-21, supra. Further, none of these proposed requirements are supported by any transcript reference. Moreover, the Board's review of the record indicates that Mr.

37 The Board is not certain whether Mr. Sholly here refers to Licensee's DCRDR report, or to Licensee Exhibit 23, or to some other document. In light of our disposition of this subject generally, it makes no difference.

Sholly asked a single question on the subject of proposed finding 161, Tr. 10,502 (Sholly), which is not particularly enlightening, and conducted no cross-examination whatsoever on the subject of the reporting requirements discussed in proposed findings 162 and 163. Since the purposes and benefits of the reporting requirements included in proposed findings 161, 162 and 163 are not apparent from either Mr. Sholly's proposed findings or from the record, and so cannot be evaluated, we decline to impose them upon the Staff and Licensee.³⁸

160. Mr. Sholly would have the Board conclude its human factors finding with a list of all human factors modifications which Licensee has committed to implement prior to restart, and with a requirement that Licensee complete "the short-term upgrade of its control room as set forth in Finding No. 163" prior to restart. Sholly PF 163, 169(n). The Board has not attempted an exhaustive listing of all commitments in any other area of its decision, and sees no reason to do so here. We do not care to single out modifications in this area as opposed to others, and especially resist any implication

38 The Board notes, however, that the Office of Inspection and Enforcement ("I&E") and the Division of Human Factors Safety ("Human Factors") will be "in constant communication," both prior to restart and beyond, until both I&E and Human Factors are satisfied with the implementation of all human factors modifications to which Licensee has committed. Tr. 10,501-04 (Ramirez, Price). The Staff will also be monitoring Licensee's human factors engineering progress--as well as that of the rest of the industry--through the implementation of NUREG-0737, item I.D.1. Tr. 10,502 (Ramirez).

that modifications which Licensee may have committed to but which are not listed are unimportant. In fact, contrary to the implication of Sholly proposed finding 163, that finding is not an exhaustive listing of all items which Licensee has committed to implement prior to restart. Similarly, in an attempt to summarize commitments, Mr. Sholly has misstated some. Compare, e.g., Sholly PF 163(s) with Staff Ex. 2 at 11, item 4.e; Lic. Ex. 33. Moreover, certain items which Mr. Sholly lists as pre-restart commitments are not pre-restart commitments.³⁹ We are particularly unwilling to convert into a short-term order item those pre-restart commitments which Licensee made on its own, which were not the subject of Staff recommended pre-restart requirements, in the absence of any evidence to support a finding that those particular commitments are "necessary to provide reasonable assurance that TMI-1 can be operated without endangering the public health and safety." We therefore generally reject Sholly proposed findings 163 and 169(n), and leave to the NRC Staff -- as we have before -- the enforcement of matters not specifically addressed. For similar

39 For example, Sholly proposed finding 163(mm) purports to be a list of those items identified in Licensee Exhibit 33, at 3, as pre-restart commitments. However, License Exhibit 33 expressly indicates that particular items--items 7, 8, 13, 19 and 20--involve both pre-restart and post-restart commitments. Mr. Sholly offers no reasons why those items should be fully implemented prior to restart; the Board believes he has simply failed to note the post-restart component of those commitments. In any event, we decline to advance those post-restart commitments to pre-restart commitments.

reasons, we reject Sholly proposed finding 170(a), noting additionally that it is phrased so generally that, were we to adopt it, neither the Staff nor Licensee would know specifically what Licensee was required to do.

161. The Staff's proposed findings on Control Room Design - Human Factors Engineering briefly discuss the process computer. Staff PF 294, 295. As the Staff notes, the Staff and Licensee have resolved their differences on the subject of the computer. Staff PF 295. We review the record on the computer in detail in section II.K of our decision on plant design issues.

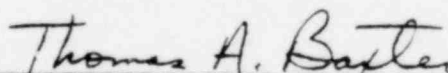
162. The Staff's initial proposed findings do not acknowledge Licensee's response to the Staff's Control Room Design Review Report (NUREG-0752), which is Licensee Exhibit 33. The Staff's proposed findings similarly overlook Supplement 1 to NUREG-0752, Staff Exhibit 15, and Licensee's response to the supplement. Staff proposed finding 295 therefore yields the mistaken impression that differences remain to be resolved between the Staff and Licensee in this area. In fact, Supplement 1 to NUREG-0752 reflected Licensee's commitment, in Licensee Exhibit 33, to implement all the recommended requirements of NUREG-0752, with the exception of eight specific and one general items. NUREG-0752, Supplement 1 went on to identify the sections of NUREG-0752 to which Licensee excepted, the Licensee's counter-proposals, and the Staff's responses to those proposals. Subsequently, Licensee's

counsel made all commitments requested in that supplement. Tr. 21,431-32 (Baxter). Thus, Licensee has committed to implement, on the schedules of Staff Exhibit 2 as modified by Staff Exhibit 15, all modifications which the Staff's design review team identified as proposed requirements. Licensee PF 318.

163. Like Mr. Sholly, the Staff would also have the Board list the human factors deficiencies which will be corrected prior to restart. Staff PF 294. For the reasons set forth in paragraph 160, supra, we decline to do so. We note, in any event, that -- contrary to the implication of item 10.0 of the list in Staff proposed finding 294 -- the installation of additional page telephones is a post-restart item, since the communications study to identify installation locations is a long term engineering study. See paragraph 154, supra. Similarly, the list in the Staff's findings does not include Licensee's pre-restart commitments which were not Staff recommended restart requirements. Lic. Ex. 33 at 3.

Respectfully submitted,

SHAW, PITTMAN, POTTS & TROWBRIDGE



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