UNITED STATES OF AMERICS
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

UNION OF CONCERNED SCIENTISTS PROPOSED FINDINGS OF FACT AND RULINGS OF LAW ON UCS CONTENTION 12

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UCS CONTENTION 12

UCS Contention 12 is as follows:

> The accident demonstrated that the severity of the environment in which equipment important to safety must operate was underestimated and that equipment previously deemed to be environmentally qualified failed. One example was the pressurizer level instruments. The environmental qualification of safety-related equipment at TMI is deficient in three respects: 1) the parameters of the relevant accident environment have not been identified, 2) the length of time the equipment must operate in the environment has been underestimated, and 3) the methods used to qualify the equipment are not adequate to give reasonable assurances that the equipment will remain operable. TMI-1 should not be permitted to resume operation until all safety-related equipment has been demonstrated to be qualified to operate as required by GDC 4. The criteria for determining qualification should be those set forth in Regulatory Guide 1.89 or equivalent."

631. UCS moved the Board to adopt this contention as its own, which the Board agreed to do. The contention was limited to equipment in the containment and auxiliary buildings. No further limitation was granted. The staff did not object to the contention as drafted. Testimony was

presented by the Licensee and the Staff. Both UCS and the Commonwealth of Pennsylvania did extensive cross-examination of these witnesses.

632. The Staff's testimony was presented in two parts. The first was presented by Zoltan Rosztoczy on November 26, 1980.(ff. Tr. 6927-A) The purpose of the testimony was "to respond partially" to UCS Contention 12. (Id. at 2) Rosztoczy stated that the Staff had "not yet determined whether the safety-related equipment at TMI-1 is fully qualified to postulated accident environments.," (id.) but that the question was still under review. The mechanism for this review is IE Bulletin 79-01B, (UCS Exhibit 37) which requires licensees to provide information demonstrating the environmental qualification of all safety related equipment potentially exposed to environments resulting from postulated accidents. (Id. at 3)

633. Licensees were to submit all information supporting environmental qualification no later than November 1, 1980. (Id. at 3) The NRC Staff's review and evaluation was to be completed and published in a Safety Evaluation Report by February 1, 1981. (Id. at 4) These deadlines, if met, would have permitted completion of the review well before the conclusion of the TMI-1 restart hearings.

634. During Mr. Rosztoczy's appearance on November 26, 1980, UCS requested that he appear again to give testimony before the Board when the Staff had made the determination of whether safety-related equipment is fully qualified to postulated accident environments. The Staff stipulated that he would return. (Tr. 6928, Rosztoczy, Cutchin). UCS also asked to be provided with the Licensee's submittals to the staff which it had been unable to obtain from the Public Document Room. (Tr. 6929-6930.) There can be no question that UCS has maintained an active and continuing interest in Contention 12. Mr. Rosztoczy did present further testimony and resumed the witness stand on June 29, 1981 (ff. Tr. 21,867).

635. On April 21, 1981, during hearing sessions on management competence issues not attended by a representative of UCS, Mr. Tourtellotte, counsel for the NRC Staff raised the issue of the scope of its testimony on Contention 12, without prior notification to any of the parties. Mr. Tourtellotte informed the Board that the Staff was preparing its testimony on environmental qualification limited to events with a clear nexus to the TMI-2 accident, loss of feedwater and small break LOCA. The Staff did not discuss the environmental parameters which it was using. (Tr. 19,487-9)

636. When the Board twice raised the question of whether UCS had been informed of the Staff's intention, it was told by Mr. Tourtellotte that UCS had "abandoned" its contention and that the Staff had made no attempt to inform UCS of its position.

637. It is clear that UCS did not "abandon" contention 12. On the contrary, UCS played the most active role in developing the record on environmental qualifications and the Staff was well aware both of its interest and of its intention to question Mr. Rosztoczy on the substance of the Staff's review of TMI-1 environmental qualifications when that review was performed. There is no other way to interpret Tr. 6928-6930 and 6934.

638. Under these circumstances, we view the Staff's behavior in affirmatively refusing to notify UCS either before or soon after April 21, 1981 of its decision to narrow the scope of its testimony as inexcusable. The effect of this action was to deny UCS the opportunity to argue in advance to the Board that the scope of the Staff's testimony was unreasonably restricted and to present this Board with the necessity of making very difficult evidentiary rulings during the course of the examination (Eg. Tr. 21,881-21,924) and of potentially delaying the conclusion of the proceedings if the Staff's definition of the scope of

the issue were not accepted. (Tr. 21,888-9, Cutchin)

639. There is no place in NRC proceedings for such gamesmanship on the part of the NRC Staff, which is charged with protecting the public interest. There was no reason to face this Board with a choice of either accepting the Staff's view or delaying the conclusion of the proceeding. (Tr. 21,888-9, Cutchin) It would have been simple enough for the Staff to inform UCS before April 21 of its position in order to give the intervenor a fair opportunity to respond. What troubles us the most is that the Staff's failure to do so was by positive design rather than inadvertence. We have attempted in reviewing this record to ensure that any litigative advantage gained by this ploy has not prejudiced the Board's consideration of the issues at hand.

640. One undisputed fact must be acknowledged at the outset: There has been no demonstration on this record that safety-related equipment in TMI-1 is environmentally qualified in accordance with General Design Criterion 4. In fact, the evidence is to the contrary. The Safety Evaluation Report on environmental qualification discussed by Mr. Rosztoczy in his November 26 testimony, issued on March 24, 1981 and supplemented on May 23, 1981 was introduced in evidence by UCS. (UCS Exhibit 40, Tr. 22,086) It identifies literally

dozens of safety-related components for which environmental qualification has not been established. Thus, unless the Board is willing to narrow the scope of Contention 12 to conform to the scope of the Staff's testimony, UCS will perforce prevail.*

641. We must therefore consider whether the Staff is correct that this Board should evaluate only the qualification of equipment which must survive a design basis small break LOCA against the environmental conditions predicted for a design basis small break LOCA. It should be noted that the Staff looked only at the environmental qualification of equipment Licensee identified as needed judged required to take the plant to hot shutdown. The Staff did not evaluate equipment needed for cold shutdown. (Tr. 21,945-6, Rosztoczy) In addition, the Staff reviewed the equipment in TMI-1 only against the environmental parameters associated with a design basis small break LOCA - 1% fuel failure (Tr. 22,132-4) - rather than against the actual conditions experienced during the TMI-2 accident, which were, of course, far more severe. (See Tr. 21,886-9) No evidence was presented to establish

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* The Board does not intend by this statement to indicate that the contention fails if its scope is narrowed. The question of whether the Staff's testimony is sufficient to support affirmative findings even on the qualification of equipment needed for a loss of feedwater and small break LOCA is treated later.

the qualification of equipment in TMI to survive high energy line break, main steam line break or large LOCA accidents other than UCS Exhibit 40. which indicates that much of the equipment in TMI-1 has not been demonstrated to be qualified for the environments resulting from these design basis accidents.

642. The Staff alternatively put forth two rationales for its position. First, it took the position that for this proceeding, the only equipment and environmental conditions of interest are those associated with accidents having a nexus to the TMI-2 accident. It limited those accidents with such a nexus as a loss of feedwater and design basis small break LOCA. (Rosztoczy, ff. Tr. 21,867 at 1; Tr. 21,884-5, Cutchin) The Board noted that when it adopted the contention, it did so with the idea that the testimony must address the ability of equipment to survive a radiation environment similar to that of the TMI-2 accident. (Tr. 21,886-8, 22,152-3 Dr. Jordan) It requires little elaboration to conclude that the conditions present during the TMI-2 accident itself present a close nexus to the TMI-2 accident for the purpose of determining the scope of the contentions admitted in this proceeding.

643. The Board also noted in this connection that the Staff's position on environmental qualification is directly inconsistent with its position on plant shielding, where

it has required the Licensee to provide protection against radiation levels far in excess of those to be expected from a design basis small break LOCA. (Tr. 21,889-90.)

644. The Staff could point to no regulation in support of its position. (Tr. 21,916) In essence, as the Chairman correctly stated, the Staff asked the Board to a priori "make an assumption that the accident won't happen again..." (Tr. 21,913) In other words, the Staff chose to stand on the proposition that a recurrence of the "TMI-2-type situation" is not "possible." (Tr. 21,913, Cutchin) The Board rejected this position. (Tr. 21,913-4)

645. In the Board's view, it flies in the face of the Lessons Learned from the TMI-2 accident to claim that core damage above 1% is not "possible" and to therefore use the design basis for small break LOCA as a shield to cut off review. It hardly need be reiterated at this point that TMI-2 was essentially a small break LOCA with consequences that greatly exceeded the design basis for such accidents. Many of even the immediate short-term requirements stemming from the TMI-2 Lessons Learned are based upon the the recognition that it is not sufficient to rely upon the hope that core damage will never recur, but that it is necessary to make changes so that such accidents can be

controlled. For example, §2.1.6.b, Design Review of Plant Shielding of Spaces for Post-Accident Operations (NUREG-0578, p. A-28 - A-29); Section 2.1.8.b, Increased Range of Radiation Monitors (NUREG-0578, p. A-36 - A-40); Section 2.1.9, Analysis of Design and Off-Normal Transients and Accidents [including inadequate core cooling] (NUREG-0578, p. A-42 - A-45).

646. Moreover, a general theme which runs through the Lessons Learned from TMI-2 is that the accident has shown the need to broadly reconsider the current licensing design basis. (See, NUREG-0578, pp. 16-17; NUREG-0585, pp. 3-1 - 3-6). For the Staff to claim that another accident of the dimension of TMI-2 is impossible, and to ask the Board to adopt this position is to repudidate the lessons of TMI-2. This we are not prepared to do on the record before us.

647. During the course of the hearing session, the Staff suggested another rationale for its position. When asked by the Board if the reason for limiting its review to a small break LOCA with 1% fuel failure related not to the "nexus" argument but to the fact that environment qualification to higher radiation levels may be a "long-term" requirement, the Staff Counsel agreed. (Tr. 21,905-21,908)

However, there are many problems with this formulation.

648. First, there is nothing whatever in the direct testimony of the Staff's witnesses to suggest that the Staff has made a review which would enable it to find that reasonable progress has been made toward achieving full qualification of safety-related equipment in accordance with GDC 4. The Staff witness, Mr. Rosztoczy, states one and only one ground for limiting the scope of his testimony - that the only accidents with a "nexus" to TMI-2 and loss of feedwater are design basis small break LOCA's. (Rosztoczy, ff. Tr. 21,867 at 1). His direct testimony nowhere concludes that reasonable progress has been made toward achieving full compliance with GDC 4, nor, more importantly, does it provide a basis upon which one could so conclude. On the contrary, the only evidence on this question which goes at all beyond the small break LOCA parameters was the SER introduced by UCS. (UCS Exhibit 40).

649. The Staff objected strenuously to any questioning on environmental qualification beyond these parameters and was largely successful. No questions were permitted related to the ability of equipment to withstand a high energy line break or a main steam line break (Tr. 21,920) or the status of the Licensee's efforts to comply with GDC 4 for these accidents. At the behest of the Staff and Licensee, UCS was denied the opportunity to make a record with regard to whether reasonable

progress has been shown toward fully meeting GDC 4. Under these circumstances, the Board cannot make a finding of reasonable progress.

650. Moreover, the record indicates that the short-term/long-term argument was an improvisation on the Staff's part at the hearing which does not correspond with the review the Staff actually made. As noted above, nothing in the Staff's direct testimony indicates that the Staff addressed the question of reasonable progress. No evaluation whatever was provided with respect to the state of the Licensee's compliance or noncompliance with GDC 4 beyond loss of main feedwater and design basis small break LOCA.

651. In addition, when the Staff's attention was directed by the Board to Item II.B.2 of NUREG-0737, Design of Plant Shielding and Environmental Qualification of Equipment for Spaces/Systems Which May Be Used in Post-Accident Operations, Staff Counsel stated:

> I am told that it is not one of the ones that was addressed as having to show reasonable progress toward during our review in the package of 0737 items that we culled out as being outside the order. (Tr. 21,897-8, Cutchin, emphasis added.)

652. Even if environmental qualification were a "long-term" item, that is not dispositive. One purpose of this hearing

is, after all, to determine whether the short-term measures identified by the Director of NRR are sufficient to permit restart. Contention 12 was admitted; it has a clear nexus to the TMI-2 accident. The Staff chose to limit its testimony to the design basis small break LOCA but that limitation is not binding on this Board.

653. UCS takes the position that the TMI-2 accident, which happened to be a small break LOCA, demonstrated that the equipment in TMI-1 did not meet the requirements of GDC 4. (Tr. 21,909-21,910, Pollard) UCS stated at the Special Rehearing Conference on November 8, 1979:

> The parameters of the relevant accident have not been identified;
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> The length of time equipment must operate has been underestimated...;
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> And the methods used to quantify the equipment were not adequate to give reasonable assurance that the equipment will remain operable during the period required.
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> I think it is clear that what is needed is essentially a reassessment of the environmental qualification of safety-related equipment in light of the Lessons Learned from the accident. I think the primary of of those lessons is that we haven't really understood the environment in which safety-related equipment will be called upon to perform its function or we haven't succeeded in bounding it properly.
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> (Tr. 236)

654. In other words, in UCS's view, the pertinent lesson learned from the accident is that safety-related equipment previously deemed to be qualified cannot in fact, be demonstrated to be capable of withstanding the effects of potential accident conditions. TMI-2 was a small break LOCA, but there is no logical reason to look only at small break LOCA's, much less design basis small break LOCA's. (Tr. 21,909-21,910, Pollard.)

655. The Board was troubled by the scope of the issue as suggested by UCS and would not allow any questioning going to the ability of equipment to withstand a high energy line break or a main steam line break. (Tr. 21,920) However, we are also troubled by the fact that this record indicates that for design basis large LOCA's, MSLB and HELB, many safety-related components in TMI-1 cannot be shown to be environmentally qualified. This Board is constrained by our interpretation of the scope of the Commission's Order establishing this proceeding. However, we wish to bring this matter to the Commission's attention when it reviews this case and urge that the Commission itself consider the propriety of allowing TMI-1 to operate when safety-related equipment may be unable to withstand design bases accident environments.

656. Two additional factors add to the Board's concern. First, even within the confines of its narrow scope of review, the Staff could not find that the equipment in TMI-1 was environmentally qualified for a design basis small break LOCA. It had to recommend that six conditions be imposed in order to support a finding that "equipment necessary to cope with a loss of feedwater/SBLOCA event will have been demonstrated, prior to exceeding 5% power operation, to be capable of performing their safety functions when subjected to the [corresponding] environmental conditions..."(Rosztoczy, ff. Tr. 21,867 at 7). The conditions require, inter alia, replacement of equipment with an insufficient qualified life, and evaluation of adverse test results on certain other components. (Id., at 6-7)

657. This indicates that in at least some cases, the problem goes beyond simply a failure to provide documentation and that clearly unqualified equipment exists in TMI-1. (See also Tr. 22,138, Rosztoczy) There is no reason to suppose that equipment needed for other design basis accidents does not exhibit similar deficiencies, particularly as to aging, which was not considered at all during the licensing of the plant. (See recommended conditions 1-4, Rosztoczy, ff. Tr. 21,867 at 6; see note A, on several pages of Staff Ex. 16, "Aging was not considered a design basis parameter for TMI-1.") In addition, the Staff has calculated the radiation field for a LOCA to be twice as high as that used by the Licensee. The issue is still unresolved. (Tr. 22,141-144, Rosztoczy)

658. Second, we have read the Commission's decision in Petition for Emergency and Remedial Action, CLI-80-21, 11 NRC 707,

May 27, 1980, in which the Commission adopted the new standards for environmental qualification. It is clear that the problem of environmental qualification is far from merely one of lack of documentation on the part of Licensees. The Commission concluded that the standard which governed previously was inadequate - that it "cannot serve as the standard against which qualification is to be judged." 11 NRC 707 at 711.

It "does not specify the accident conditions which the electrical equipment must meet. There are no specific requirements to maintain document files and no specific requirements concerning margin, aging and other needed equipment specifications." (Id.) Thus, it is apparent that just because a plant was deemed to meet the old standard is not reason to believe that equipment inside that plant is in fact environmentally qualified. The changes are in substance, not merely form. (See also, Id. at 659. Moreover, it is quite clear that the Commission did not intend the deadline of June 30, 1982 for demonstrating qualification in accordance with the new standards to permit Licensees to operate with unqualified equipment until that date: "These deadlines, however, do not excuse a Licensee from the obligation to modify or replace inadequate equipment promptly. (Id. at 715) The Commission continued:

> During its review, the Staff will be faced with many situations where qualification documentation is poor or where the existing documentation raises questions about the ability of the equipment to perform its intended function in accident conditions. In such cases, the Staff will make a technical judgment regarding continued operation. (Id., emphasis added)

660. There is no indication on this record that the Staff has made such a "technical judgment" with respect to the many components for which qualification deficiencies have been found. (UCS Exhibit 40) On the contrary, both the Staff and Licensee seem to view meeting the June 30, 1982 deadline as their only obligation.* We believe that the Commission should resolve this question.

661. We now proceed to the question of whether, even considering only small break LOCA accidents, the record is sufficient to support the conclusion that equipment in TMI-1 is environmentally qualified. We begin by assessing the qualifications and expertise of the witnesses and the depth of review which they undertook.

662. Mr. Rosztoczy, the sponsor of the Staff's direct testimony, did not personally review the environmental qualification of equipment in TMI-1. He coordinated the

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* The Staff has gone beyond this for SBLOCA and recommended conditions for restart. The Licensee seems to view even these as excessive. (Tr. 22,105-109,, Rosztoczy)

overall review effort for all Licensee's in connection with IE Bulletin 79-01B, UCS Exhibit 37 . (Tr. 6929, Rosztoczy) UCS therefore requested that the Staff produce a witness with personal knowledge of the status of equipment in TMI-1* and the Staff presented Robert G. LaGrange, who testified along with Mr. Rosztoczy. (Tr. 21,864-5)

663. Mr. LaGrange has, in his own words "no specific training relative to environmental qualification reviews." (Tr. 21,879, LaGrange) He did not participate in the development of any standards related to environmental qualification of electrical equipment. Prior to being assigned to the job of evaluating Licensee responses to IE Bulletin 79-01B, he had no training to prepare himself for the task. (Id.) In his view, though, the job to which he had been assigned - "comparing information submitted by the Licensee against environmental conditions specified with that equipment, in my opinion I don't think extensive training is required in that area." (Tr. 21,879, LaGrange)

664. Indeed, the record indicates that Mr. LaGrange did little more than check to see whether the Licensee claimed that the pertinent equipment was qualified. Another division in the Staff took the list of equipment supplied by the Licensee as required for a small break LOCA and simply "informed"

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* Letter from Ellyn R. Weiss to Mac Cutchin, June 19, 1981.

Mr. LaGrange that it was complete. (Tr. 21,929, LaGrange) Neither Mr. LaGrange nor Mr. Rosztoczy knew what equipment was included or why. (Tr. 21,928-30, LaGrange and Rosztoczy) Mr. Rosztoczy stated that he "provided no guidance for the review and [did] not know what instrument did they incl le and which one they did not include." (Tr. 21,929, Rosztoczy) Even considering that another division did the completeness review, it is very difficult to understand how Mr. LaGrange could have done a thorough review of the qualification information and not be able to recall whether such major components such as pressurizer level instruments and the in-core thermocouples had been included. (Tr. 21,929, 22,000, LaGrange)

665. Time and again Mssrs. LaGrange and Rosztoczy could not testify from their own knowledge as to whether particular components were needed to cope with a small break LOCA (Tr. 21,927-929), how long equipment is required to function after an accident for long-term heat removal (Tr. 21,956-8, LaGrange), the adequacy of the assumed accident profile or the assumptions which went into it (Tr. 21,957-9, 21,966 Rosztoczy and LaGrange), the parameters of the accident profile (Tr. 21,962-3, Rosztoczy), the nature of equipment in TMI-1 (Tr. 21,965 (fan coolers), 22,010-13 (terminal boxes)). While claiming that a small break LOCA would not actuate chemical spray, and therefore equipment need not be qualified to

withstand chemical spray, Mr. LaGrange did not even know whether chemical spray was actuated during the TMI-2 accident. (Tr. 21,932, LaGrange)

666. In fact, the Staff has not yet even reviewed "the majority" of the underlying documentation which the Licensee claims will demonstrate the environmental qualification of the pertinent components. (Tr. 21,970, 21,978, LaGrange and Rosztoczy) They based their testimony on a review of the summary sheets provided by the Licensee. (Tr. 21,978, Rosztoczy) They did no independent review of previous abnormal occurrences where equipment on the Licensee's list had failed in the past at TMI-1. (Tr. 21,971, LaGrange) They did not examine equipment noted as deficient in the bimonthly reports to the Commission in accordance with IE Bulletin 79-01B to determine whether any of it exists in TMI-1. (Tr. 21,972, LaGrange)

667. At best, the testimony reflected a superficial, preliminary sort of review, much like a checklist. The witnesses were unable to provide any reliable evidence even on whether the checklist was complete.

668. As noted above, the Staff made no attempt whatever to determine whether the equipment in TMI-1 can withstand the accident environment which occurred during the TMI-2 accident. (Tr. 21,913 - 21,916) In addition, the Staff

has not accepted the Licensee's calculations of radiation exposure even from a small break LOCA and itself estimated much higher radiation levels. (Tr. 21,962, Rostoczy) There is simply no basis in the record for a finding that equipment in TMI-1 which must function during a SBLOCA could withstand an environment as harsh as occurred during the TMI-2 accident.

669. Remarkably, neither did the Staff evaluate the environmental qualification of equipment installed or modified as a direct result of the TMI-2 Lessons Learned. Supplement No. 3 to IE Bulletin* (UCS Exhibit 37) makes it clear that qualification information for installed TMI Action Plan equipment was required of licensees by February 1, 1981. (UCS Ex. 37, page 28 of 30. See also Tr. 21,994-5, Rosztoczy) That equipment includes 1) position indication for the PORV and safety valves, (NUREG-0578, item 2.1.3.a, SER Supplement 3, Staff Ex. 14 at 26-27), 2) instrumentation for automatic emergency feedwater initiation (NUREG-0578, Item 2.1.7.a,

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* The transcript of June 29, 1981 does not indicate that UCS Exhibit 37 was admitted. At Tr. 22,040, the Board asked whether there were any objections to the Exhibit and none were offered. The Board hereby admits the exhibit with no objections.

Staff Exhibit 14 at 37), safety-grade emergency feedwater flow indicators (NUREG-0578 Item 2.1.7.b and A-32, Staff Exhibit 1 at C8-39 and Staff Exhibit 14 at 39). None of these components are included in the Licensee's submittal of May 18 purporting to list all equipment needed "to respond to" design basis SBLOCA's (ff. Tr. 21,867) and thus, as the Staff reiterated numerous times, were not evaluated. (If it is not on the list, it was not reviewed. Tr. 21,995, 22,000, LaGrange and Rosztoczy)

670. The Staff has no specific plans to review the qualification of equipment added or modified by the TMI-2 Lessons Learned. The information to establish qualification is to be placed in the Licensee's central files subject to possible NRC inspection at a future time. (Tr. 21,998, Rosztoczy) Thus, there is no basis in the record upon which this Board can find that components added or modified as a direct result of the TMI-2 Lessons Learned are environmentally qualified, although one can scarcely argue that such components do not have a "nexus" to the TMI-2 accident. By reviewing for its testimony only the Licensee's list of components required to respond to a design basis SBLOCA, the Staff has excluded these Lessons Learned components.

671. The March 24 SER (UCS Exhibit 40) also identifies a number of unresolved items which are related to the TMI-2 Lessons Learned. First, it calls for the Licensee to produce

a complete list of all display instrumentation mentioned in the LOCA and HELB emergency procedures. Equipment qualification data is to be provided for each. For instruments not considered "safety related" by the Licensee but which is mentioned in the emergency procedures, Licensees are required to provide 1) justification for not considering the instrument safety-related and 2) assurance that its failure will not mislead the operator or adversely affect mitigation of the accident. (Id. at 3)

672. This information was due to be provided within 90 days of March 24, well prior to restart. However, the Staff clearly did not have this information to review for its testimony. (Tr. 21,924-5, Rosztoczy) Therefore, there has been no assurance provided on this record as to whether the display instrumentation used by the operators during LOCA and HELB can be relied upon. Considering the enormous reliance which the Staff and Licensee put throughout this case on the efficacy of the new procedures and training to prevent future accidents, we find this omission particularly troubling.

673. The Staff was asked whether it had determined that the Licensee's May 18 list of equipment included the display instrumentation and the sensors which supply information to the instruments needed to cope with design basis SBLOCA's.

The witness stated that the list was compared with the SBLOCA procedures, but in another division: "It was not done under our supervision. We have the report of their conclusions and they stated in (sic) that they have compared it to the emergency procedures. I don't know the details, how did they perform it." (Tr. 21,927-8, Rosztoczy)

674. The pressurizer level instruments do appear on the Licensee's list. They have not been shown to be qualified for chemical spray or evaluated for aging. The Staff concludes that they are qualified on the assumption that chemical spray is not actuated for a SBLOCA. (Tr. 21,931-2, LaGrange) The witnesses did not know whether chemical spray was actuated during the TMI-2 accident. (Tr. 21,932) It is common knowledge that the spray was activated during the TMI-2 accident.* Thus, there is no assurance that the TMI-1 pressurizer level instruments and sensors, which provide vital information to the operators even for a SBLOCA, could withstand the effects of a TMI-2-type accident.

675. The witnesses were unsure whether the PORV block valve was on the Licensee's list and had therefore been reviewed.

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* This is a fact of which the Board can take official notice. See, e.g., Three Mile Island: A Report to the Commissioners and the Public, NRC Special Inquiry Group, at 329. (The "Rogovin Report")

(Tr. 21,995, Rosztoczy).

676. The sensors for the newly-installed saturation meter are listed on the Licensee's submittal. (Tr. 21,998-9). However, the Licensee has identified the wrong components - reactor coolant inlet temperature RTP's - as inputs to the meter. (Id.) The reactor coolant outlet temperature is obviously the input to the saturation meter. (Lic. Ex. 1, at 2.1-18, Am. 25)

677. The witnesses displayed both their own unfamiliarity with plant equipment and the superficiality of the Staff review during the following exchange, which began with the question of whether the witness believed it to be accurate that the reactor irlet temperature function is for calculation of TSAT:

A. (WITNESS LaGRANGE) I didn't really review that information for its accuracy.

Q. Well the Bulletin required the Licensee to identify the function and the service, right, but you did not consider that information in deciding whether or not this submittal was sufficient?

A. (WITNESS LaGRANGE) No, I looked at the qualification information. I can make a determination as to whether or not it appears to be qualified regardless of what its function and service is.

Q. Would it concern you that the TSAT meter does not in fact receive input for the reactor inlet temperature?

A. (WITNESS LaGRANGE) Not if all the other information on here is correct. I can still make that determination as to whether it is or is not qualified.

Q. Well, let's suppose the TSAT meter receives its input from reactor outlet temperature. Wouldn't that affect your determination of whether this list of equipment is adequate to justify restart?

A. (WITNESS LaGRANGE) I don't know. I did not review that list and I do not know what --

(Tr. 21,999)

678. The witness also did not know what instrument supplies the pressure input to the saturation meter, nor whether the meter and its inputs must be qualified for restart. (Tr. 22,000, LaGrange.)

679. The witness was asked whether he reviewed the qualification of the in-core thermocouples for his testimony. Again, the answer was: "If they are listed in the May 18 submittals." (Tr. 22,000, LaGrange) In fact, the thermocouples are not on the May 18 list,* despite the fact that they are included in the TMI-1 emergency procedures for SBLOCA and therefore,

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* Examination of the list, ff. Tr. 21,867, discloses this.

by the Staff's account, should be included. (Tr. 21,927-8, Rosztoczy; Lic. Ex. 48, at 7.0,8.0, and 9.0) This is one clear example of where the May 18 submittal, which bounded the scope of the Staff's review, is incomplete. Both Licensee and Staff ignored the fact that NUREG-0737 describes the necessary qualification criteria for incore thermocouples and other accident monitoring equipment. (NUREG-0737, at 3-117 to 3-118 and B-1 to B-4)

680. There are other instances of the incompleteness of the list of equipment needed for SBLOCA. The decay heat valves are on the list and thus, in the Staff's view, must be qualified prior to restart. (Tr. 22,004-5, LaGrange) The suction line for the decay heat removal pumps have a valve inside containment which is interlocked with a pressure switch (RC-3A PS2 and RC-3A PS5) so that it cannot be opened if reactor coolant pressure is too high. These pressure switches are not on the May 18 submittal (ff. Tr. 21,867) and have therefore not been qualified. (Nor are they included on the Licensee's larger master list of all components required to withstand all design basis accidents. (UCS Exhibit 38) (Tr. 22,004-22,009, Rosztoczy and LaGrange)

681. Thus, since the decay heat valves are required to cope with a SBLOCA and the pressure switches must be operable in order for these valves to be opened, it cannot be concluded that the decay heat valves would operate during a SBLOCA.

Even the Staff's criteria for restart would require this to be corrected prior to restart. (Tr. 22,008, Rosztoczy)

682. The list of equipment that must be environmentally qualified for a small break LOCA is incomplete in another very important respect - it does not include equipment whose failure could interfere with proper operation of the systems needed to cope with a SBLOCA.

683. For example, pressure switches PS-600 to PS-607 are located inside the containment (UCS Ex. 38, at Main Steam Master List Sheet 1 of 2) and are thus exposed to the SBLOCA environment. These switches are installed for the purpose of isolating feedwater in the event of a main steam line rupture. (UCS Ex. 39, at 1) However, if they are not environmentally qualfied for a SBLOCA, their failure in a mode indicating falsely a steam line break could also lead to isolation of feedwater during the SBLOCA.

684. The Staff has determined that the environmental qualification of these pressure switches has the following deficiencies: qualification time; chemical spray; radiation; material aging evaluation, replacement schedule, ongoing equipment surveillance; exempted equipment justification inadequate; and qualification method. (UCS Ex. 40, at B-1) However, the Staff has not evaluated the effect of failure of these switches on the ability to supply main or emergency feedwater to the steam generators during a SBLOCA. It is clear that emergency feedwater is needed to mitigate a loss of feedwater/SBLOCA event, the accident conceded by the Staff to have a close nexus to TMI-2.

685. Furthermore, there is no evidence on the record to indicate whether other equipment subjected to the SBLOCA environment could similarly interfere with operation of the equipment listed in the Licensee's May 18, 1981 list. Under these circumstances, we find that the record does not support a conclusion that TMI-1 meets GDC-4.

686. There was substantial questioning about the basis for the Staff's conclusion that components on the May 18 list are qualified. First, the witnesses were questioned about the accident profile.

687. The witnesses were asked how they determined the amount of time the equipment must operate in the accident environment; in other words, how long the plant can remain in a hot shutdown condition? The Staff used an accident profile, calculated by "another branch" which calculated that the equipment had to operate for 20.5 hours. (Tr. 21,956-7, LaGrange) However, the Staff has not identified an environmentally qualified path to cold shutdown. (Tr. 21,944-9, Rosztoczy) The Staff takes the position in this hearing that the reactor can be maintained in a safe condition, presumably indefinitely, even if it is not cooled down. (Id., particularly Tr. 21,946)

688. Thus, while claiming that hot shutdown is acceptable indefinitely the Staff has only reviewed the qualification of

components for 20.5 hours. The witness did not even know what components are used for long-term removal of decay heat. (Tr. 21,957, LaGrange) There is no basis for assurance that equipment needed to remove decay heat at hot shutdown is qualified for the periods of time that can be involved and likewise no assurance that the plant can be taken to cold shutdown with qualified equipment. Under these circumstances, the Board cannot accept the Staff's assertion that indefinite hot shutdown is a safe condition for TMI-1.*

689. Further questions were raised concerning the accident profile. It was noted that, using the Licensee's accident profile, containment spray would actuate, but not with the Staff's. (Compare Licensee's May 18 submittal, ff. Tr. 21,867 at n.7 with the Staff's profile, ff. Tr. 21,954. The former shows a peak pressure of 30 psig, while the latter shows only 25.9 psig.) The witness was aware that, while the Licensee asserted that containment spray would not actuate for a SBLOCA, the Licensee's calculations showed the pressure reaching the setpoint for spray - 30 psig. (Tr. 21,958-960, LaGrange) The witness consulted another Staff member:

> But I just pointed out that the Licensee calculated about 30 psig and the containment spray was to operate around there. And I asked him, you know, what fat was in that calculation. And he said, well,

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* This issue is discussed further below.

> we came up with 26. I said, okay, maybe there is a little margin in the pressure calculation.
>
> (Tr. 21,959, LaGrange)

690. Despite the clear indications otherwise in the Licensee's own submittal, the Staff witness was willing to base a conclusion that spray will not actuate in a SBLOCA upon a feeling that "maybe there is a little margin" in the calculation. The witness clearly has no personal knowledge of the accuracy of either the Licensee or Staff profiles. The result was that equipment not shown to be qualified for spray was nonetheless classed by the staff as qualified for a SBLOCA. We can find no justification for this; it represents precisely the opposite of a conservative approach.

691. The Staff asserted that the accident profile calculations assume a single failure - failure of one diesel generator and any equipment powered from that diesel. (Tr. 21,958, Rosztoczy) However, the Licensee's profile assumed operation of three fan coolers. (Tr. 21,960-5, LaGrange and Rosztoczy) It is not possible to have all three fan coolers operating if one diesel generator has failed. There are only 3 fan coolers in TMI-1. (UCS Ex. 3`, at Reactor Building Emergency Cooling Master List, Sheet 1 of 1)

692. The witnesses stated that they do not accept the Licensee's temperature calculations and have required further

justification or a change to higher temperature. (Tr. 21,961, Rosztoczy.) If fewer than three fan coolers are operating, the pressure could be higher than calculated. (Tr. 21,965, Rosztoczy)

693. The witnesses did not know how many fan coolers there are or how many are connected to each diesel. (Id.) It emerged that they had simply used the calculations originally performed when the plant was licensed. "It was stipulated for the purpose of this review that the pressure calculations had been correctly performed and had been reviewed by the NRC Staff as part of the licensing complement." (Tr. 21,965-6, Rosztoczy)

694. Thus, no effort was made to check the correction of the pressure profile nor could the witnesses testify as to its accuracy. On the contrary, given the assumption of three fan coolers operating, it is clear that the pressure profile does not assume a single failure and thus is not accurate. The Board therefore cannot find even that equipment needed to survive a SBLOCA is qualified to the appropriate pressure parameter.

695. Another disturbing indication of the superficiality of the Staff's review was brought out during questioning. The March 24 SER (UCS Exhibit 40) states that the Licensee was directed to review the deficiencies identified by the Staff

and "determine whether safe operation of the facility would be impacted in consideration of the deficiencies." The Staff reported that the Licensee has "completed a preliminary review of the identified deficiencies and has determined that, after due consideration of the deficiencies and their ramifications, continued safe operation would not be adversely affected." (Tr. 21,966-7, UCS Exhibit 40, at 11)

696. The Licensee submittal in purported support of this statement consists of a one-paragraph letter (UCS Exhibit 41, Tr. 21,967, Rosztoczy) reproduced in its entirety as follows:

> This letter is in response to your request of February 25, 1981 regarding environmental qualification of electrical equipment. Our staff has reviewed the preliminary list of deficiencies set forth in your letter of February 25, 1981, taking into account the information contained in our submittals of October 31, 1980 and January 30, 1981. Based on our review of these submittals and the planned activities underway for the restart of TMI-1, there will be adequate assurance that TMI-1 will operate safely following authorization for restart.

697. The witness "assumed" that the "planned activities underway for the restart of TMI-1" referred to the Licensee's indication in its January 30, 1981 response to IE Bulletin

79-01B that "it is going to replace some equipment prior to restart. (Tr. 21,969, Rosztoczy) If this is the review of deficiencies and their ramifications required by the Staff, it is a sham.

698. It disturbs this Board greatly that the Staff would specifically direct the Licensee to determine whether the many identified environment qualification deficiencies can adversely affect plant safety and then accept for a response to this critical question a one-paragraph letter that is entirely conclusory in nature, does nothing more than parrot back a truncated version of the original question, and offers no factual support whatever for its broad and sweeping conclusions. This suggests that the Staff is engaging in empty and ultimately deceptive formalities. It has no basis whatever upon which it could rationally conclude that identified deficiencies in the qualification of safety-related components will not adversely affect plant safety.

699. As noted above, the Staff does not know whether there is at TMI-1 even one environmentally qualified path to cold shutdown. Supplement No. 3 to IE Bulletin 79-01B clearly

states that "the licensee must identify and environmentally qualify the equipment needed to complete one method (path) of achieving and maintaining a cold shutdown condition. The equipment of other paths must be reviewed to assure that its failure will not aggravate or contribute to the accident." (UCS Exhibit 37, page 29 of 30. See also Tr. 21,948, Rosztoczy) This Staff requirement applies to TMI-1. (Tr. 22,148-9, 22,110-114, Rosztoczy) This information was due from all Licensees no later than February 1, 1981. (UCS Exhibit 37, page 29 of 30) It was not reviewed by the Staff for its testimony in this hearing.* (Tr. 21,880, 21,945, LaGrange and Rosztoczy) The record of this proceeding suggests that there is no qualified path to cold shutdown (Tr. 16,557-9, Keaten, 16,574-5 Rosztoczy, and 16,583-5, Keaten) This is not merely a matter of the absence of documentation.

700. Although the Staff has a clear and unambiguous requirement that an environmentally qualified path to cold shutdown must be provided, it is willing to allow TMI-1 to operate without one on the purported grounds "the plant can be handled safely without going to cold shutdown." (Tr. 21,948, Rosztoczy) This rationale is difficult to accept since it would make the Commission's requirement appear to be unrelated to safety. More importantly, as discussed above, the environmental qualification of equipment

* There are components which the Licensee has identified as needed for cold shutdown for which environmental qualification has not been established. (See, UCS Ex. 39, pages 8-12, 26, 42-45, and 74-79.)

needed to function at hot shutdown conditions for periods beyond 70.5 hours has not been established. (Supra) Therefore, one cannot conclude that hot shutdown is safe indefinitely.

701. The Staff's testimony also did not include an evaluation of the enviromental qualification of equipment needed to mitigate a SBLOCA which are not exposed to a harsh environment, but which must be qualified for ambient conditions.

702. The environmental qualification information supplied to the Staff by the Licensee indicates that the following equipment has not been demonstrated to be qualified for the ambient conditions during a SBLOCA with a loss of offsite power: steam supply valve MSV-6 for the EFW turbine pump; the EFW pump minimum flow valves, the EFW flow control valve, the HPI flow transmitters, the containment isolation valve for CRD cooling; and the motor control centers supplying equipment for HPI, LPI and reactor building isolation. (UCS Ex. 39, at 5-7, 22, 24, 25, 38, 51, 52 and 81) The deficiencies include failure to indicate a qualification method, references to general catalogs as supporting documentation, failure to evaluate potential operator confusion resulting from loss of valve position indication, and no data available. (Id.)

703. A major question was raised concerning whether safety-related equipment inside the TMI-1 containment is located above the region where flooding could occur. At the time TMI-1 was licensed, no flood level was calculated for the purpose of deter-

mining whether equipment would be submerged. (Croneberber, ff. Tr. 16, 252 at 3) It follows that, at the time TMI-1 was licensed, the Staff did not review flood level. During the TMI-2 accident, the water level in the containment flooded instruments and caused them to fail. (Id. at 2)

704. The Staff did not review the Licensee's flood level calculations prepared for this proceeding. It simply assumed

that they were correct. (Tr. 22,000-1, LaGrange) The Staff has no idea how the Licensee calculated flood level, nor the assumptions it used. (Tr. 22,097, Rosztoczy)

705. Because the Staff had a big job to do in a short period of time, it decided simply to take the Licensee's flood level numbers without attempting to verify them. (Tr. 22,098, Rosztoczy)

706. During the TMI-2 accident, the flood level inside the containment rose to 8-9 feet. (Tr. 22, 099, Rosztoczy) However, Licensee now calculates the maximum flood level in TMI-1 to be 5.66 feet or 5 feet, 7.92 inches. It had earlier calculated the level to be 5 feet, 9.75 inches. (Tr. 22,001, LaGrange.) The transmitters for the steam generator and pressurizer level instruments, needed for "safe shutdown" and in maintaining natural circulation, are located at 5.75 feet. (Croneberger, ff. Tr. 16,252, at 3) This is 1.83 inches above the Licensee's recalculated flood level and below its first calculated flood level, which hardly provides a margin for error in the calculation. The Staff witness found it "hard to believe" that one could calculate flood level to three significant figures, but the Staff has required no margin for error. (Tr. 22,001-2, LaGrange) The witness looked to see whether the Licensee indicated that the equipment was above or below its calculated

flood level. (Tr. 22,001, LaGrange)

707. The Staff witness stated that "it remains to some other means, which is beyond my responsibility, to assure that that flood level would not be exceeded." (Tr. 22,004, Rosztoczy) He stated that the Staff's approach would be to place operational limits on the plant to ensure that the calculated flood level is not exceeded. (Tr. 22,094, Rosztoczy) However, remarkably, the witness had not sought nor received any feedback from the other branches of the NRC to determine whether such limitations are appropriate or even possible. (Tr. 22,099-100, Rosztoczy) The witness did not know why the water level in the TMI-2 containment rose to 8-9 feet. He thought it was because water from some TMI-1 storage tanks was pumped into TMI-2. (Tr. 22,099, Rosztoczy)

708. There are obvious problems with assuming that plant operational limits could ensure that the calculated flood level is not exceeded. For one thing, the Staff has "no idea" what the Licensee included - not even whether it included normal leakage. (Tr. 22,097, Rosztoczy. See also Tr. 22,095-6) Thus, it has no way of confirming whether, even for a design basis accident during which all equipment functioned as expected, the flood level calculations are accurate. If they are off by less than two inches, safety-related equipment would be submerged. There is no way that

one could enforce operational limits under those circumstances if the calculation is simply incorrect. The operators could not "order" the systems to stop leaking or prematurely terminate safety systems when the calculated flood levels were approached.

709. Moreover, if the operators determine that it is unsafe to go into recirculation, as they did during TMI-2, the calculated flood level could be exceeded. Mr. Rosztoczy does not know how the operational limits would operate to prevent this. (Tr. 22,003-4, Rosztoczy)

710. Another troublesome issue arose reflecting on the extent to which this Board can rely on the Licensee's assertions in this case. It is particularly significant considering the extent to which the Staff has relied on such assertions without independently checking them. There are cable connectors inside the TMI-1 containment necessary to cope with a SBLOCA. (Rosztoczy, ff. Tr. 21,867 at 5. See also Licensee's May 18 submittal, ff. Tr. 21,867, the list for "Common Equipment") The connectors are not qualified and will be replaced. (Rosztoczy, ff. Tr. 21,867 at 5)

711. Our concern arises from the fact that in December of 1977, after having been specifically ordered by NRC in IE Bulletin 77-05A to determine whether unqualified connectors were installed in TMI-1, John Herbein, Vice President of

Metropolitan Edison, assured the NRC that Met Ed had reviewed the containment and areas outside of the containment. Mr. Herbein asserted that the only connectors were those in the control drive mechanisms and for the neutron detectors. (Tr. 21,981-987, LaGrange and Rosztoczy. UCS Exhibit 43)

712. The Conax connectors in question are in the containment.* They were not identified by Mr. Herbein in 1977. Mr. Rosztoczy stated that if the connectors fell within the IE Bulletin and were not included but were found later, "that would be an indication that the initial review had not been performed to the depth as normally one would expect." (Tr. 21,986) When asked how the Staff can be assured that all connectors have now been found, the witness responded: "The only assurance that we have is we have requested them to review this." (Tr. 21,983)

713. Unhappily, that statement fairly represents the state of the record on much of the environmental qualifications issue. Flood level has not been verified. The Staff has accepted the Licensees bald assertion that known and identified deficiencies will not adversely affect plant safety. The underlying documentation supporting the assertions that SBLOCA

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* UCS Exhibit 39 at 82, 83 and 84.

equipment is qualified have not been reviewed. Under these circumstances, and considering the general inability of the witnesses to provide any assurance that the SBLOCA list is complete or that the accident profiles are accurate, the Staff's testimony cannot be accorded significant weight. 714. In addition, we have found instances of incompleteness of the list of equipment* and obvious problems with the accident profile used.** We also do not believe this record provides reasonable assurance that the calculated flood level will not be exceeded. The Board cannot rely on the promise of purely hypothetical "operational limits" to provide this assurance. Moreover, the Board is not satisfied that the plant can safely operate with no showing that it is capable of going to cold shutdown with environmentally qualified equipment. Cold shutdown is a necessary end-point for a SBLOCA as well as all other accidents. It should be noted that the Licensee apparently does not accept that IE Bulletin 79-01B requires it to identify a qualified path to cold shutdown at any time,

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* Supra, paras. 679-685

** Supra, paras. 686-94

before or after restart.* (Tr. 22,048, Baxter. See also Tr. 22,110-115, Baxter and Rosztoczy)

715. Also, the record is devoid of evidence upon which the Board could base a finding that safety-related equipment in TMI-1 could accomodate the environmental conditions which occurred during the TMI-2 accident itself. The Staff chose not to review the TMI-1 components against those conditions. The only evidence in the record indicates 1) that many components in TMI-1 have not been shown capable of withstanding environments harsher than a SBLOCA (UCS Exhibit 40) 2) the Staff calculates the radiation field for a design basis LOCA to be twice as high as that used by the Licensee. This issue is not resolved. (Tr. 22,132 - 22, 144 Rosztoczy) No evidence was presented even on what environmental conditions prevailed during TMI-2, with the exception of flooding. We find that the ability of safety-related components in TMI-1 to withstand a TMI-2-type accident is within the scope of this proceeding and that the evidence does not support a finding that such components could accomodate that environment.

716. A similar conclusion must be drawn with respect to equipment added or modified as a direct consequence of the TMI-2 lessons learned. The environmental qualification of this equipment has nowhere been demonstrated on this record.

717. We note finally that, in its questioning, the Licensee did not challenge the substantive points raised during the

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* Curiously, the Staff counsel seemed to agree with the Licensee. Tr. 22,048, Cutchin. However, the Staff witness unambiguously stated that an environmentally qualified path to cold shutdown must be provided at least by June of 1982. (Tr. 22,109-22,115, Rosztoczy)

examination by UCS and the Commonwealth, other than the question of whether NRC is requiring the Licensee to show a qualified path to cold shutdown. Beyond that, the Licensee generally pursued its usual line of questions about whether TMI-1 is being treated differently than other plants. (Tr. 22,109-110, 22,120-130, Rosztoczy)

718. This misses the point. The Staff's review was intended to be responsive to a contention legitimately raised in this proceeding. When the Staff looked at the qualification of equipment required just for a SBLOCA, it found a number of deficiencies and concluded that, just considering the SBLOCA, safe operation of the plant cannot be assured without correcting those deficiencies. (Tr. 22, 124, Rosztoczy) The Staff has not yet looked at other plants (Tr. 22, 109, Rosztoczy), presumably because there are no other ongoing adjudicatory proceedings in which this issue has been raised.

719. The fact that there may be other plants with similar deficiencies does not provide an excuse for TMI-1 nor any justification for permitting it to operate with known deficiencies. This Board is not divested of its responsibility to find assurance that this plant can safely operate simply because other plants might be unsafe. Moreover, such an attitude would be fundamentally inconsistent with the Commission's direction that the June, 1982 generic deadline does "not excuse a Licensee from the obligation to modify or replace inadequate equipment promptly." Petition for

Emergency and Remedial Action, CLI-80-21, 11 NRC 707, 715.

720. For its part, the Licensee presented the testimony of Mr. Braulke. (Keaten, et al, ff Tr. 6802; Braulke, Bd. Questions on UCS 12, ff. Tr. 6802)

721. Mr. Braulke took the position that, except for flooding, the TMI-2 accident environment did not exceed the environment expected from a design bas LOCA. (Keaten, et al, ff Tr. 6802, at 3-4) The equipment failures which did occur were dismissed as unimportant because no important instruments were completely lost during the initial of the accident and, in later stages, the failures posed no threat to public health and safety because of redundancy or the availability of alternative actions. (Id., at 4-5) We do not agree that GDC-4 permits the use of equipment which is not environmentally qualified on the basis that some such equipment may survive or on the hope that during an accident alternatives can be devised. Such a conclusion would be contrary to the Commission's defense-in-depth approach.

722. Ultimately, Mr. Braulke's testimony responds to UCS Contention with the conclusion that upon completion of the review required by IE Bulletin 79-01B, there will be reasonable assurance that equipment used to protect the public health and safety is environmental qualified. (Id., at a) As discussed above, the review required by IE Bulletin 79-01B is not completed and, thus, such reasonable assurance does not now exist.

723. We also note that, like the Staff's witnesses, the Licensee's

witness was not able to assess whether the master list of equipment was complete. (Tr. 6863, Braulke)

724. Based upon the foregoing, the Board concludes that there is not reasonable assurance that even equipment which must withstand the environment of a SBLOCA has been qualified to do so. Therefore, there is not reasonable assurance that TMI-1 can operate without endangering the health and safety of the public.