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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE COMMISSION

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

LICENSEE'S BRIEF ON REVIEW
OF ALAB-729 AND ALAB-744

SHAW, PITTMAN, POTTS & TROWBRIDGE

George F. Trowbridge, P.C.
Thomas A. Baxter, P.C.

Counsel for Licensee

March 19, 1984

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INTRODUCTION

On December 14, 1981, the Atomic Safety and Licensing Board issued its Partial Initial Decision (Plant Design and Procedures, Unit Separation, and Emergency Planning Issues). Metropolitan Edison Company (Three Mile Island Nuclear Station, Unit No. 1), LBP-81-59, 14 N.R.C. 1211 (1981). On May 26, 1983, the Atomic Safety and Licensing Appeal Board issued its Decision on the issues of plant design and procedures and the separation of Units 1 and 2. Metropolitan Edison Company, et al. (Three Mile Island Nuclear Station, Unit No. 1), ALAB-729, 17 N.R.C. 814 (1983), request for reconsideration denied, ALAB-744, 18 N.R.C. ____ (Oct. 6, 1983).

On January 27, 1984, the Commission issued an Order identifying five specific issues on which it had decided to take

review of ALAB-729.1/ (The first of these issues will encompass ALAB-744 as well.) The Commission's Order provided for the simultaneous filing of initial and reply briefs on the five issues.2/

ISSUE NO. 1: ENVIRONMENTAL QUALIFICATION
OF ELECTRICAL EQUIPMENT

A. Genesis of the Issue in the
Restart Proceeding

In its First Special Prehearing Conference Order, LBP-79-34, 10 N.R.C. 828, 836-37 (1979), the Licensing Board addressed proposed UCS Contention 12, which stated:

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

1/ None of the issues identified for review involve the physical separation of Units 1 and 2.

2/ Only intervenor Union of Concerned Scientists ("UCS") had sought Commission review.

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.

The Licensing Board held that the proposed "contention is too broad in that its reference to GDC-4 would extend it to structures, systems, and components without further limitation," and limited the contention to "equipment important to safety in the containment building and auxiliary building." Id. at 837.

In May 1980, the Commission issued a decision on Petition for Emergency and Remedial Action, CLI-80-21, 11 N.R.C. 707 (1980).^{3/} In CLI-80-21, the Commission endorsed an NRC Staff decision to use the Division of Operating Reactors' "Guidelines for Evaluating Environmental Qualification of Class IE Electrical Equipment in Operating Reactors" (DOR Guidelines) to review operating plants, and to use NUREG-0588, "Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment" to review plants under licensing review and those pieces of equipment not meeting the DOR Guidelines.^{4/} The Commission ordered that, pending the completion of a

^{3/} The Commission's action was the result of a November 4, 1977 UCS Petition for Emergency and Remedial Action, which the Commission denied in CLI-78-6, 7 N.R.C. 400 (1978), and a May 2, 1978 UCS Petition for Reconsideration.

^{4/} By IE Bulletin 79-01B, the Staff had required that licensees provide a master list of equipment and document environmental qualification.

rulemaking, "these two documents form the requirements which licensees and applicants must meet in order to satisfy those aspects of 10 CFR 50, Appendix A, General Design Criteria (GDC)-4 which relate to environmental qualification of safety-related electrical equipment." Id. at 711 (footnote omitted).

The Commission provided additional instruction:

By no later than June 30, 1982 all safety-related electrical equipment in all operating plants shall be qualified to the DOR Guidelines or NUREG-0588. These deadlines, however, do not excuse a licensee from the obligation to modify or replace inadequate equipment promptly.

During its review, the staff will be faced with many situations where qualification documents are 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.

. . . If an interested person reviews the staff's written judgment on qualification and desires a hearing on the issue, that person may petition the Commission pursuant to 10 CFR 2.202 and 10 CFR 2.206.

Id. at 714-15. The June 30, 1982 deadline was incorporated into the technical specifications of all operating nuclear reactors (including TMI-1) by immediately-effective Orders for Modification of License (October 24, 1980).

Shortly after the issuance of CLI-80-21, but prior to commencement of the evidentiary hearings in this proceeding, UCS withdrew Contention 12, but urged the Licensing Board to adopt Contention 12 as a Board issue.

UCS's review has indicated that our resources are insufficient to adequately pursue all of the contentions admitted by the Board. With the Board's permission, UCS will therefore withdraw Contentions #6, 8 and 12.

Union of Concerned Scientists' Review of Contentions (July 31, 1980) at 1. The withdrawal of Contention 12 appears predicated on the Commission's decision in CLI-80-21, which UCS referred to and discussed, and on the Staff's designated role. Id. at 8-9. UCS stated:

Our latest response from the staff is that they "will conduct a reevaluation of the adequacy of equipment qualification for TMI-1 in addressing the licensees [sic] response to IE Bulletin 79-01B. Resolution of this issue is necessary for a finding that the plant can be safely operated. UCS does not have the resources to analyze the data that must form the basis for its resolution.

Id. at 9-10 (footnote omitted).

During a prehearing conference on August 12 and 13, 1980, the Licensing Board indicated that it would accept the withdrawal of UCS Contention 12, but would adopt part of that contention as a Board issue. Tr. 2289. The Licensing Board posed several questions delimiting its interest, and remarked that its interest did not extend to equipment in the auxiliary building. Tr. 2381-84. See also Memorandum and Order of Prehearing Conference of August 12-13, 1980 (Aug. 20, 1980), at 6. The Licensing Board also stated that it would not call independent experts. Tr. 2389.

As phrased in LBP-81-59, supra, 14 N.R.C. at 1396 (1981), the Board Questions were:

1. The TMI-2 accident demonstrated that some safety-related equipment may have been exposed or was in imminent danger of being exposed to environmental stresses beyond that for which it was qualified. The board's concern is primarily with such equipment qualification. In addition, environmental stresses to safety-related equipment will be of concern to the extent that such equipment is not included in existing staff requirements.
2. Which items of Regulatory Guide 1.89 have been grandfathered with respect to TMI-1? Explain any justification for allowing restart without compliance with the grandfathered items.
3. What are the environmental qualification criteria which equipment inside of containment must meet with respect to radiation levels and length of time of exposure? (Address the Interim Staff Position on Environmental Qualification of Electrical Equipment, NUREG-0588).

These questions, while addressing some of UCS' specific concerns, did not ask Licensee to demonstrate that all equipment was qualified.

B. The Evidentiary Record

Affirmative evidence on the Licensing Board's equipment qualification questions was presented by Licensee and the Staff. The evidence addressed the Licensing Board questions and three basic subjects: (1) the specific, known environmental qualification "lessons learned" from the TMI-2 accident;

(2) the IE Bulletin 79-01B program and Licensee's progress under it; and (3) a Staff evaluation of equipment required to mitigate the consequences of a loss of main feedwater event and a small-break loss-of-coolant accident.

Licensee presented the Licensing Board with considerable evidence on the performance of safety-related electrical equipment during the TMI-2 accident, and on a comparison of that accident environment with the environment expected for a design basis event. See Braulke, ff. Tr. 6802. The evidence showed that the environment inside containment during the TMI-2 accident, with respect to temperature, pressure, radiation,^{5/} and chemical sprays, was well below the levels associated with a design basis loss-of-coolant accident.^{6/} The only known environmental condition to which certain safety-related equipment at TMI-2 was exposed which was beyond that for which it was qualified was submergence due to flooding.^{7/}

^{5/} The design basis radiation value is based upon the release from the core of 100% of the noble gases, 50% of the halogens, and 1% of the solids. Excerpts from Licensee's Testimony of Robert W. Keaten, George R. Braulke and George J. Brazill in Response to UCS Contention No. 12, UCS Contention No. 14 and UCS Contention No. 3 (Safety Classification), ff. Tr. 6802, at 7, 8.

^{6/} Id. at 6 and Table 3 at 13. The humidity level experienced at TMI-2 was the same as that postulated for the design basis event environment. Id., Table 3 at 13.

^{7/} Id. at 4, 6; Licensee's Testimony of George R. Braulke in Response to Board Questions on UCS Contention 12, ff. Tr. 6802, at 1; NRC Staff Testimony of Zoltan R. Rosztoczy in Response to Board Questions on UCS Contention 12, ff. Tr. 6927-A, at 1.

The evidence presented also showed that based upon the experience of instrument submergence at TMI-2, Licensee calculated the flood level at TMI-1 in order to establish a level above which certain instruments should be located,^{8/} and reviewed the location of all safety-related equipment which had failed at TMI-2 in order to assure that these instruments at TMI-1 were located above the calculated flood level. Based on this review, Licensee has raised the location of the steam generator and pressurizer level transmitters,^{9/} which were previously located in the lowest elevation of the reactor building, to above the calculated design basis water level. These transmitters are for parameters utilized to achieve safe shutdown and to assist in maintaining natural circulation, and are believed to have failed at TMI-2 due to submergence. Croneberger, ff. Tr. 16,252, at 3.

In addition to the evidence on the equipment qualification implications of the TMI-2 accident and the general progress Licensee had made under the IE Bulletin 79-01B program, the record includes the results of a special Staff review conducted only for TMI-1, and not for any other operating reactor.^{10/}

^{8/} At the operating license stage, Licensee had calculated the minimum water level in containment in order to assure adequate net positive suction head for ECCS and reactor building spray pumps; the maximum flood level had not been previously calculated. Croneberger, ff. Tr. 16,252, at 3.

^{9/} Note that pressurizer level instrumentation is the only equipment specifically identified in UCS' original Contention 12.

^{10/} Yet, the Staff testified that there is not anything unique about the equipment in TMI-1 and its qualifications, compared

(Footnote Continued)

See Tr. 22,107-08 (Rosztoczy). The Staff reviewed the qualification of equipment, required to safely shut down TMI-1 following a loss of feedwater and small-break loss-of-coolant accident, to perform its safety function when subject to the environmental conditions to which it would be exposed during the period in which that safety function must be performed. Rosztoczy, ff. Tr. 21,867, at 1.

As a result of its review, the Staff determined that all the identified electrical equipment located in a harsh environment has been demonstrated to be capable of performing its intended function following a loss of feedwater/small-break LOCA event, with a few exceptions which were described in the Staff's testimony. Rosztoczy, ff. Tr. 21,867, at 4-6. Based upon these results, the commitments made by Licensee with respect to the exceptions, and the conditions for restart recommended in the Staff's testimony (which address the exceptions), the Staff concluded that the equipment necessary to cope with a loss of feedwater/small-break LOCA event will have been demonstrated, prior to exceeding 5% power operation, to be capable of performing its safety functions when subjected to the environmental conditions to which it would be exposed during the

(Footnote Continued)

with the equipment in other operating reactors of the same vintage. Tr. 22,109-10 (Rosztoczy).

period when its functions must be performed, should such an event occur. Id. at 7.

C. The Licensing Board Decision

The Licensing Board devoted a distinct section of its Partial Initial Decision to the subject of equipment qualification. LBP-81-59, supra, 14 N.R.C. at 1396-1409 (1981), as supplemented by LBP-82-27 (Memorandum and Order Modifying and Approving NRC Staff's Plan of Implementation), 15 N.R.C. 747, 750 (1982). The Licensing Board addressed most of the evidence, summarized above, and made substantive findings on equipment qualification at TMI-1.

With respect to the specific equipment qualification "lessons learned" from the TMI-2 accident -- submergence due to flooding -- the Licensing Board made findings on the basis of Licensee's testimony and, adopting recommendations of the Commonwealth of Pennsylvania, directed the Staff to review Licensee's flood level calculations and the operational limitations, if any, appropriate to ensure that the calculated level is not exceeded. Further, the Licensing Board directed relocation by June 30, 1982, of all equipment important to safe operation of the plant to a new flood level if the Staff determines that Licensee's calculations did not employ the appropriate degree of conservatism.^{11/} LBP-81-59, supra, 14 N.R.C. at 1406-07

^{11/} In response to these Licensing Board findings the Staff, on July 19, 1983, issued a Safety Evaluation in which it found

(Footnote Continued)

(1981).

Following up on its own concern^{12/} with the qualification of safety-related electrical equipment in containment for intense radiation fields, the Licensing Board directed ". . . the Staff to certify to the Commission, for review in immediate effectiveness, a report on Licensee's compliance with CLI-80-21 as it relates to safety equipment functioning in a radiological environment in a TMI-2 type accident." Id. at 1403-04. The Staff's report in compliance with this Licensing Board directive was filed with the Commission as an attachment to "NRC Staff Comments on Immediate Effectiveness with Respect to

(Footnote Continued)

that Licensee's method of calculation of Reactor Building flood level is acceptable and that appropriate assumptions and conservatisms were included. The Staff also reviewed, from an operational standpoint, emergency procedures related to postulated accidents that result in Reactor Building flooding to determine if additional operational limitations need be imposed to ensure the calculated flood level would not be exceeded while keeping the core adequately cooled. The Staff concluded that no additional operational limitations are necessary beyond those already specified in TMI-1 emergency procedures.

^{12/} In connection with the special Staff assessment, the Licensing Board apparently was dissatisfied that the radiation levels for the design basis small-break LOCA evaluation did not encompass the TMI-2 accident radiation levels. At the same time, the Licensing Board recognized that the DOR Guidelines to which TMI-1 was being evaluated under IE Bulletin 79-01B and CLI-80-21 would subsume the TMI-2 type accident. The Licensing Board concluded: "[w]e see no basis upon which to treat TMI-1 differently than other operating reactors on the issue of radiation environmental qualification of electrical equipment." LBP-81-59, supra, 14 N.R.C. at 1403 (1981).

Licensing Board Decision on Hardware/Design Issues, Unit Separation and Emergency Planning," (January 28, 1982).^{13/}

The Licensing Board also imposed as a condition of restart compliance with six conditions which arose from the Staff's special evaluation of TMI-1 for the environmental qualification of equipment for loss of feedwater/small-break LOCA events.

Id. at 1404. The Staff's favorable evaluation of Licensee's compliance with these six conditions was issued on October 8, 1982.

On a more general level, the Licensing Board observed that Licensee, from the evidence it presented, was making good progress in complying with IE Bulletin 79-01B and Commission Order CLI-80-21. Id. at 1400. Further, the Licensing Board observed that Commission and Staff generic action, independent of the TMI-1 Restart proceeding, had set qualification criteria, schedules, and other related requirements applicable to all operating reactors. Id. at 1398-1400, 1403.

D. The Appeal Board Decision

Shortly after the Licensing Board issued its Partial Initial Decision on plant design and procedures issues, the

^{13/} In LBP-82-27, supra, 15 N.R.C. at 750 (1982), the Licensing Board acknowledged the Staff's compliance with the Board's directive and also stated that it was "satisfied with the substance" of the Staff report.

Commission published a proposed rule for environmental qualification of electric equipment. 47 Fed. Reg. 2876 (Jan. 20, 1982). The proposed rule generally was based upon the requirements of the DOR Guidelines and NUREG-0588.

On June 30, 1982, the Commission issued an interim rule on environmental qualification of electric equipment (10 C.F.R. § 50.49). 47 Fed. Reg. 28363 (1982). The interim rule suspended the June 30, 1982 deadline set in CLI-80-21. The Commission promulgated the interim rule without notice and comments, pursuant to the good cause exception of the Administrative Procedure Act. Id. See 5 U.S.C. § 553(d)(1) (1983). In August 1982, UCS petitioned the U.S. Court of Appeals for the District of Columbia Circuit for review of the interim rule.

On January 21, 1983, the Commission issued its final rule, which superseded the interim rule. 48 Fed. Reg. 2729 (1983).

On May 26, 1983, the Appeal Board issued ALAB-729, supra, 17 N.R.C. 814 (1983). On the issue of environmental qualification of equipment, which was the subject of appeal by UCS alone, the Appeal Board noted that the Licensing Board had reviewed the evidence regarding environmental qualification, made various substantive findings, and imposed certain conditions for restart. ALAB-729, supra, 17 N.R.C. at 892 (1983). The Appeal Board also held:

We believe that the Licensing Board correctly determined that the issue of environmental qualification of safety related equipment must be resolved outside this

proceeding. (As a consequence, we find it unnecessary to reach the merits of UCS' individual arguments regarding equipment qualification.) All issues of environmental qualification as litigated in this case are fully embraced within the determinations announced by the Commission in CLI-80-21 and the ensuing rulemaking. The Commission established the substantive criteria for equipment qualification at TMI-1 (and all other plants) and set a deadline by which qualification must be demonstrated. It approved the staff's plan for interim review of each plant's compliance with newly developed environmental qualification criteria and established the procedural vehicle by which interested parties can challenge staff determinations regarding individual plants. As part of its ongoing review of the issue, the Commission observed:

The Commission has received, and the staff has evaluated, each operating plant licensee's justification for continued operation. On the bases of these analyses, the Commission has determined that continued operation of these plants pending completion of the equipment qualification program, will not present undue risk to the public health and safety.

See 47 Fed. Reg. at 28363. In such circumstances, we find that the issue of environmental qualification has been removed from consideration in this case.

Id. at 893-94 (footnotes omitted).

On June 30, 1983, the Court of Appeals vacated the NRC's interim rule on environmental qualification of electric equipment, holding that the Commission improperly dispensed with notice and comment procedures. UCS v. NRC, 711 F.2d 370 (D.C. Cir. 1983). In a letter to the Appeal Board of August 18,

1983, UCS enclosed a copy of the Court's decision and urged the Appeal Board to reconsider its earlier opinion on equipment qualification.^{14/} The Appeal Board denied this request and stated:

Although the court overturned the Commission's June 30 decision, it expressly declined to address the question of whether any evaluation must be undertaken in separate adjudications or may be conducted generically. See Union of Concerned Scientists, supra, 711 F.2d at 380 n.24. This is a matter that the court left to the Commission to consider as part of the proceeding on remand. In the absence of a change in the Commission's earlier position, the issue of environmental qualification remains outside the scope of this case.

ALAB-744, 18 N.R.C. ___, slip op. at 3 (Oct. 6, 1983).

E. The Commission's Questions

"Union of Concerned Scientists' Petition for Review of ALAB-729" was filed with the Commission on June 13, 1983. While UCS sought review of the Appeal Board's decision not to consider the environmental qualification of the Emergency Feedwater (EFW) system at TMI-1 (UCS Petition at 2-3),^{15/} UCS

^{14/} Leaving aside the impropriety of seeking such relief by letter, the UCS request was lodged in the wrong forum since at this point the UCS petition for review of ALAB-729 was pending before the Commission.

^{15/} UCS has also raised the environmental qualification of the EFW system in a petition for show cause filed January 20, 1984 under 10 C.F.R. § 2.206. The NRC should not address the technical merits of these UCS arguments in duplicative forums

(Footnote Continued)

did not seek review of that holding as it applies generically to the subject of equipment qualification at TMI-1.

1. Correctness of the Boards' Holdings on
the Effect of Generic Commission Actions

"The Commission has decided to review whether the Appeal Board erred in holding that the issue concerning environmental qualification of electrical equipment has been removed from the proceeding by the Commission's generic rulemaking on the subject." Commission Order at 1 (Jan. 27, 1984) (footnote omitted).

Before addressing the Commission's first question, Licensee emphasizes that there is an evidentiary record in this proceeding on environmental qualification of electrical equipment, and that the Licensing Board made substantive findings on that evidence, imposed restart conditions with which Licensee has complied, and directed the Staff to conduct and certify to the Commission, which it already has, the results of certain reviews. See sections B and C, supra.

(Footnote Continued)

(i.e., the Restart proceeding and under 2.206). Consolidated Edison Company of New York, Inc. (Indian Point, Units 1, 2 and 3), CLI-75-8, 2 N.R.C. 173, 177 (1975); Northern Indiana Public Service Company (Bailly Generating Station, Nuclear-1), CLI-78-7, 7 N.R.C. 429 (1978), aff'd, Porter County Chapter v. NRC, 606 F.2d 1363 (D.C. Cir. 1979); Pacific Gas and Electric Company (Diablo Canyon Nuclear Power Plant, Units 1 and 2), CLI-81-6, 13 N.R.C. 443 (1981).

As a general proposition, Licensing Boards should not accept in individual proceedings contentions which are or are about to become the subject of general rulemaking by the Commission. Potomac Electric Power Company (Douglas Point Nuclear Generating Station, Units 1 and 2), ALAB-218, 8 A.E.C. 79, 85 (1974). This policy avoids wasteful duplication of effort (id.), and it also avoids regulatory inconsistency. A corollary to this proposition is that when litigation of an issue is overtaken by a rulemaking, Licensing Boards should not decide the issue. See Sacramento Municipal Utility District (Rancho Seco Nuclear Generating Station), ALAB-655, 14 N.R.C. 799, 816-17 (1981). In the same vein, policy statements and policy declarations are binding on the Boards. Mississippi Power & Light Company, et al. (Grand Gulf Nuclear Station, Units 1 and 2), ALAB-704, 16 N.R.C. 1725, 1732 (1982); Northern States Power Company (Prairie Island Nuclear Generating Plant, Units 1 and 2), ALAB-455, 7 N.R.C. 41, 51 (1978), remanded on other grounds sub nom., Minnesota v. NRC, 602 F.2d 412 (D.C. Cir. 1979).

Examination of the circumstances here reveals no basis for speculating that the Commission intended a departure from these established principles on the treatment of generic issues in individual licensing proceedings. Equipment qualification per se was not the subject of the short- or long-term actions recommended by the Director of Nuclear Reactor Regulation and

specified by the Commission in its Order and Notice of Hearing.^{16/} See Metropolitan Edison Company (Three Mile Island Nuclear Station, Unit No. 1), CLI-79-8, 10 N.R.C. 141, 144-145 (1979). Presumably, then, UCS Contention 12 was advanced in the first place as a challenge to the sufficiency of the Staff's recommendations, in that they did not encompass a requirement for demonstrating anew the qualification of safety-related equipment.

When the Licensing Board admitted and limited the contention to "equipment important to safety in the containment building and auxiliary building," it held that ". . . the contention is too broad in that its reference to CDC-4 would extend to structures, systems, and components without further limitation." LBP-79-34, supra, 10 N.R.C. 828, 837 (1979). The issue was also limited, we submit, by the Licensing Board's general ruling that the scope of the proceeding is governed by the Commission's Order and Notice of Hearing and contentions having a reasonable nexus to the TMI-2 accident. See id. at 830-32; Metropolitan Edison Company (Three Mile Island Nuclear Station, Unit No. 1), LBP-81-32, 14 N.R.C. 381, 394 (1981).^{17/}

^{16/} This includes the recommendations of the TMI-2 Lessons Learned Task Force set forth in NUREG-0578 and incorporated by reference into the Order and Notice of Hearing.

^{17/} The "nexus" standard was endorsed by UCS. LBP-81-32, supra, 14 N.R.C. at 394 (1981); Metropolitan Edison Company, et al. (Three Mile Island Nuclear Station, Unit No. 1), ALAB-705, 16 N.R.C. 1733, 1743 (1982). The Appeal Board found that the

(Continued Next Page)

These Licensing Board decisions in 1979 on the scope of the UCS contention were not founded upon generic Commission rulemaking or other actions.^{18/}

Later, when UCS withdrew its contention -- an act which the Licensing Board characterized as abandonment (LBP-81-59, supra, 14 N.R.C. at 1401) -- the Licensing Board further limited its scope when it decided to pursue its own interests in parts of the UCS contention. Tr. 2289, 2381-84. This was a valid exercise of the Licensing Board's discretion. Nothing in the Commission's Order and Notice of Hearing made environmental qualification of electric equipment a mandatory issue in the TMI-1 Restart proceeding. At that point, the Licensing Board properly could have dropped the subject altogether.

UCS, however, subsequently reverted to the broadest statement in its abandoned contention (that "TMI-1 should not be permitted to resume operations until all safety-related equipment has been demonstrated to be qualified to operate as

(Footnote Continued)

nexus requirement was mandated by the Commission's August 9, 1979 Order and Notice of Hearing. ALAB-705, supra, 16 N.R.C. at 1743 (1982). Further, the requirement effectively has been ratified by the Commission. Id.; Commission Order of March 14, 1980 (unpublished); Metropolitan Edison Company, et al. (Three Mile Island Nuclear Station, Unit No. 1), CLI-83-5, 17 N.R.C. 331, 332 (1983).

^{18/} However, the NRC's environmental qualification program was underway at this point. See Petition for Emergency and Remedial Action, CLI-80-21, 11 N.R.C. 707, 710-14 (1980).

required by GDC-4"). UCS asserted in its proposed findings that "[t]here is no demonstration in this record that safety-related equipment in TMI-1 is environmentally qualified in accordance with General Design Criteria 4." Union of Concerned Scientists' Proposed Findings of Fact and Rulings of Law on UCS Contention 12 (July 13, 1981) at 254 (PF 640). The answer to this assertion, of course, is that no such demonstration is called for by the Restart proceeding.

The Licensing Board relied on the requirements set by the Commission in CLI-80-21, as it was bound to do. Boiled down to its essence, the purpose of the Restart proceeding was to determine, in light of the Commission's concerns arising from the TMI-2 accident, the short-term requirements necessary and sufficient for restart of TMI-1, and the long-term requirements necessary and sufficient to continued operation. Following the admission of UCS Contention 12 by the Licensing Board, the Commission established, in CLI-80-21, the qualification requirements for operating reactors, and the schedule for compliance. There is no reason to suspect that the Commission intended these standards and its schedule to be reconsidered and/or altered by its adjudicatory boards in the TMI-1 Restart or any other proceeding.

Nevertheless, as the Appeal Board notes:

In reaching its decision, the Licensing Board expressly considered whether, despite the Commission's findings, TMI-1 should be considered differently from other

plants. It concluded that it should not. In reaching this conclusion, it approved certain restart conditions proposed by the staff, in which the licensee acquiesced. See 14 NRC at 1404-05.

ALAB-729, supra, 17 N.R.C. at 894 n.361 (1983). The Appeal Board, faced with a new rulemaking proceeding as well as the Commission decision in CLI-80-21, approved this Licensing Board conclusion. ALAB-744, supra, 18 N.R.C. ___, slip op. at 3 (Oct. 6, 1983).

In sum, the broad subject of equipment environmental qualification was not raised as a Commission or Staff concern arising from the TMI-2 accident and identified in the Commission's Order and Notice of Hearing. The UCS attempt to litigate the entire question of compliance with General Design Criterion 4 was rejected by the Licensing Board in 1979 as too broad. When UCS withdrew its contention in 1980, the Licensing Board nevertheless pursued its own concerns, received evidence, made findings, and set conditions. Faced with a renewed claim by UCS in proposed findings that compliance with GDC-4 should be determined, the Licensing Board invoked CLI-80-21 and found that there was no reason to treat TMI-1 differently than other operating reactors. The Appeal Board affirmed this finding, noting the progression of the CLI-80-21 generic standards and schedules into the rulemaking proceeding on 10 C.F.R. § 50.49.

The only "issue" totally excluded from the proceeding, then, was the broad one of overall compliance with GDC-4.

Surely, in light of the schedules set in CLI-80-21 and section 50.49, the Commission did not intend the Restart proceeding, which was initiated in 1979 with an expected duration of one year, to be the forum for assessing TMI-1 compliance with the overall equipment qualification program which arose prior to the TMI-2 accident.^{19/}

The Boards did not expand the scope of the Restart proceeding beyond permissible bounds, but instead left the assessment of TMI-1 overall compliance with GDC-4 (and the technical judgment regarding continued operation) where the Commission had placed it -- with other operating reactors in the Staff's review program outside of and incidental to the Restart proceeding.

2. The Effect of UCS v. NRC

The Commission has requested the parties to brief the effect of the decision in UCS v. NRC, 711 F.2d 370 (D.C. Cir. 1983). Commission Order at 2 (Jan. 27, 1984). As the Appeal Board held in ALAB-744, that decision has no implications for the Licensing and Appeal Board findings in this proceeding on equipment qualification, since the Commission has not substantively changed its earlier positions.^{20/}

^{19/} In CLI-80-21, *supra*, 11 N.R.C. at 714-15 (1980), the Commission directed persons seeking a hearing with regard to the Staff's safety evaluation report on environmental qualification at a specific plant to petition the Commission pursuant to 10 C.F.R. § 2.206.

^{20/} As discussed below, the standards established in the final rule remain in effect, but the decisions of the Licensing and

On March 1, 1984, the Commission announced a proposed rulemaking in response to the UCS v. NRC decision. The proposal amends the environmental qualification rule, 10 C.F.R. § 50.49(g), by adding:

The schedule in this paragraph supersedes the June 30, 1982 deadline for environmental qualification of electric equipment contained in certain nuclear power operating licenses.

49 Fed. Reg. 8446 (March 7, 1984).

The Commission also issued a "Statement of Policy on Environmental Qualification." The Commission stated:

[I]t has been and continues to be the Commission's policy to monitor closely each licensee's progress on environmental qualification and to take enforcement action for safety reasons on a case-by-case basis. To this end, the staff intends to follow the guidelines described below in conducting its individual reviews.

(1) Evidence of environmental qualification deficiencies which would prevent a plant from going to and maintaining a safe shut down condition in the event of a design basis accident will be the basis for enforcement action. Enforcement action will generally not be taken where a licensee has asserted that operation will not involve undue risk, unless the staff has determined that continued operation cannot be justified. The Commission recognizes that this policy will permit power plants to

(Footnote Continued)

Appeal Boards could and did rely equally on CLI-80-21. If the final rule were invalid, the superseded standards in CLI-80-21 would be revived. See Action on Smoking and Health v. CAB, 713 F.2d 795, 797 (D.C. Cir. 1983).

continue to operate where licensees' assertions of qualification are still undergoing staff review. The Commission believes that this course of action is required unless the staff concludes that the justification for continued operation (JCO) reveals a deficiency requiring shutdown.

* * * *

(2) In the interim, if any person believes that there is information indicating that specific qualification deficiencies or other reasons related to environmental qualification require enforcement action at a particular plant, such information should be presented to the Director, NRR pursuant to 10 CFR 2.206. Within 45 days of the close of the comment period in the rulemaking initiated today by companion notice, the Director, NRR will report to the Commission on any generic issues raised by any comments on plant specific qualification issues.

49 Fed. Reg. 8422, 8426 (March 7, 1984). The Commission also stated, "The Commission's final rule is still in effect." Id.

3. Treatment of the Issue if it is
Within the Scope of the Proceeding

In its Order of January 27, 1984, at 2, the Commission poses the question: if the issue has not been removed from the proceeding, what is the proper scope of the contention both with regard to the equipment covered and the standards which it must meet?

To repeat, the subject of equipment qualification was not altogether excluded from the Restart proceeding. Nevertheless, if the issue was not removed as the Appeal Board held, then any

challenge to equipment qualification in this proceeding would have to have met the requirement of showing a nexus to the TMI-2 accident, as well as other requirements applicable to contentions under the Commission's Rules of Practice (e.g., basis with reasonable specificity). However, the only party raising such a challenge (UCS) abandoned its contention, and thereby left it to the Licensing Board to inquire into the matter as it saw fit. In an exercise of its discretion, the Licensing Board explored TMI-2 accident-related equipment qualification issues (e.g., containment flooding and radiation levels). It was also within that Board's discretion, then, to leave certain elements of the conclusion of its inquiry to Staff certification to the Commission.

The Commission next asks whether the qualification status of pertinent pieces of equipment (i.e., equipment that is within the scope of the contention) is an item to be certified by the Staff or, rather, a matter to be litigated in the hearing. Commission Order at 2 (Jan. 27, 1984). With respect to the scope of the issue (or contention) described above by Licensee, the issue has been litigated in the hearing and the Staff already has certified Licensee's compliance with the conditions imposed by the Licensing Board.

F. Conclusion

Viewed against the background of the Commission's Order and Notice of Hearing, the evidentiary record, the substantive factual determinations made and conditions imposed by the Licensing Board, and the generic actions taken by the Commission outside of this proceeding, the Appeal Board's decisions on environmental qualification of equipment clearly are correct and should be affirmed.

ISSUE NO. 2: EMERGENCY FEEDWATER
SYSTEM RELIABILITY

" . . . [T]he Commission has decided to review whether the Appeal Board erred in its treatment of the Licensing Board's quantitative analysis of the reliability of the emergency feedwater (EFW) system, and, if so, whether there is sufficient evidence in the record to support a finding that the EFW system is adequately reliable under either a quantitative or other rationale." Commission Order at 2 (Jan. 27, 1984).

A. The Licensing Board Decision

No party raised a contention at the outset of this proceeding challenging the reliability of the EFW system at TMI-1. Rather, the issue was raised at a prehearing conference in August, 1980, as Licensing Board Question 6. LBP-81-59, supra, 14 N.R.C. at 1355 (1981). An extensive evidentiary record was compiled in an effort both to identify and to respond to the Licensing Board's inquiries.

In the end, the Licensing Board endorsed the short-term and long-term actions applicable to the EFW system in the Commission's Order and Notice of Hearing as necessary and sufficient for the safe operation of TMI-1. With the exception of a concern identified with the Main Steam Line Rupture Detection System (Issue No. 5, infra), the Licensing Board recommended no additional actions with respect to procedures or equipment for the TMI-1 EFW system. The Licensing Board also found that "[t]he EFW system will be safety grade at restart for small break LOCA and MFW transients, the ones of concern to this Board," and cited with approval Staff testimony that the "... TMI-1 EFW system reliability at restart will be comparable with some other operating plants, and about equal to industry average based on the LER survey." Id. at 1372.

Nevertheless, the Licensing Board disagreed with every witness who testified on the subject and found that "... the reliability of the EFW system has not been demonstrated to be adequate by itself." Id. at 1370. The Licensing Board's conclusion appears to have been based exclusively on its own quantitative probabilistic analysis of the so-called "failure"21/ on demand of the EFW system. Id. at 1364-73.

21/ "Failure" was defined as the inability to avoid steam generator dryout. As noted below, the Appeal Board found that this definition was not consistent with EFW system function. See ALAB-729, supra, 17 N.R.C. at 833 (1983).

B. The Appeal Board Decision

The Appeal Board agreed with the Licensing Board's finding that the EFW system will be safety grade at restart for small-break LOCAs and main feedwater transients. The Appeal Board also agreed with the Staff and Licensee that the Licensing Board had misapplied its quantitative probabilistic analysis in reaching the conclusion that the EFW system is unreliable despite its safety-grade status. ALAB-729, supra, 17 N.R.C. at 831 (1983).

The Appeal Board found that, in performing its reliability analysis, the Licensing Board used a data base which was not well founded or appropriate to the situation, and that the Licensing Board's analysis did not investigate the postulated scenario to completion. Id. at 832. In particular, the Appeal Board found that:

1. It is uncertain that the EFW challenge rate used by the Licensing Board, based on data for five Babcock & Wilcox plants, is actually applicable to TMI-1 since B&W does not design those systems, which can vary widely.
2. The Licensing Board erred in assuming that EFW flow to the steam generators had to be established within five minutes (the time to prevent steam generator dryout). In addition

to the fact that this is not a realistic mission success criterion (20 minutes is available without resultant core damage), the use of a five-minute criterion ignored the opportunity for operator action to re-establish feedwater flow.

Id. at 832-33.

The Appeal Board also addressed the three main objections UCS raised to the Licensing Board's findings on reliability of the EFW system (i.e., relationship to the Integrated Control System, MSLRDS and potential challenges to relief valves), id. at 833-34, and concluded:

In sum, we find that we must disagree with the Licensing Board's overall conclusion on the reliability of the EFW system at TMI-1. We find that the reliability of the EFW system for a small break LOCA or loss of main feedwater is not significantly different from EFW systems at other nuclear power plants and that it is sufficiently reliable to adequately protect the health and safety of the public.

Id. at 835.

C. Argument

In its petition to the Commission for review of ALAB-729, UCS' main attack is on the failure to consider the environmental and seismic qualification of the EFW system.^{22/} On the

^{22/} UCS has since raised these issues in its 2.206 petition of January 20, 1984.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE COMMISSION

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

CERTIFICATE OF SERVICE

I hereby certify that copies of "Licensee's Brief on Review of ALAB-729 and ALAB-744" were served this 19th day of March, 1984, by deposit in the U.S. mail, first class, postage prepaid, upon the parties on the attached Service List.

Thomas A. Baxter
Thomas A. Baxter, P.C.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE COMMISSION

In the Matter of

METROPOLITAN EDISON COMPANY

(Three Mile Island Nuclear
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Docket No. 50-289
(Restart)

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question of the Appeal Board's rejection of the Licensing Board's quantitative reliability analysis, UCS simply asserts, without elaboration, that the Appeal Board did so on "specious grounds." UCS Petition at 2 (June 13, 1983).

1. The Appeal Board Properly Treated the
Licensing Board's Quantitative Reliability Analysis

The Licensing Board apparently was inspired in part by the Appeal Board's decision in Florida Power and Light Company (St. Lucie Nuclear Power Plant, Unit No. 2), ALAB-603, 12 N.R.C. 30 (1980), clarified by CLI-81-12, 13 N.R.C. 838 (1981). The Appeal Board embarked upon its consideration of quantitative assessments of the reliability of the electric power systems at St. Lucie because the underlying evidentiary record with respect to that plant revealed certain unique circumstances:

(1) that the peninsular shape of Florida limited the utility's ability to interconnect its system with those of other utilities such that off-site power might be less assured than for utilities interconnected with multiple grids; and (2) actual operating experience which tended to confirm that this is the case. ALAB-603, supra, 12 N.R.C. at 31-34.

Unlike the situation at St. Lucie, there is no disturbing operating history at TMI-1 to warrant unique consideration. To the contrary, there have been no failures of the TMI-1 EFW system on demand, and there have been no total loss of main

feedwater events (other than required tests) which would challenge the system. Keaten, ff. Tr. 16,612, at 11. The historical data indicates that the TMI-1 EFW system has been more reliable than the average. Tr. 6219 (Wermeil).

To the extent that the Licensing Board believed that B&W plants are more sensitive because of the once-through steam generator design and experience an unusually high challenge rate (see Tr. 6130, 6175, 6179-80), this view was in error. Uncontradicted Staff testimony based on a Staff survey showed that the arrival rate of feedwater transients is not dependent upon the NSSS design -- i.e., B&W plants are no more likely to have a feedwater transient than Westinghouse or Combustion Engineering plants. Tr. 15,769-70 (D. Ross).

The EFW challenge rate of 0.3 per year, adopted by the Licensing Board (14 N.R.C. at 1365), is not Licensee's number for TMI-1, but for five B&W plants. Keaten, ff. Tr. 16,612, at 9. The design of EFW systems is not a B&W responsibility, and the designs of these systems may vary widely. Id. at 5, 6. The unavailability of the TMI-1 emergency feedwater system was zero for five years of operation. Koppe, ff. Tr. 13,335, at 41. TMI-1 has not experienced a loss of main feedwater transient, or a total loss of feedwater, during its operating history. Keaten, ff. Tr. 16,612, at 9; Tr. 6175-76 (Wermeil).

The basis for the Licensing Board's postulation that the probability of failure of an EFW system is 1 in 25 per

reactor-year was testimony by NRC Staff witness Lantz, during cross-examination, that Licensee Event Reports indicate 8 failures of safety-grade EFW systems in 200 reactor-years. Tr. 6093-94 (Lantz). See LBP-81-59, supra, 14 N.R.C. at 1365 (1981). The data, however, is not applicable to TMI-1. Four of the eight failures reported by Mr. Lantz involved normal start-up operations. Tr. 6095-96 (Lantz). In contrast, the EFW system at TMI-1 is not normally used for plant startup or shutdown. The data also includes failures of associated systems which are not found at TMI-1. Keaten, ff. Tr. 16,612, at 10; Tr. 6136-37 (Wermeil).

Thus, the Licensing Board erred in concluding from some industry-wide data that a problem exists at TMI-1, and it compounded that error by using this data in its own quantitative analysis of TMI-1 EFW system reliability. See LBP-81-59, supra, 14 N.R.C. at 1365 (1981). Just as EFW system demand frequency is a function of plant specific factors, EFW system availability and operation upon demand are dependent upon plant specific EFW components, EFW support services, component and system testing, and maintenance. Keaten, ff. Tr. 16,612, at 10. Licensee again notes the Staff testimony that the historical data would indicate the TMI-1 EFW system to be more reliable than the average. Tr. 6219 (Wermeil).

Moreover, the Licensing Board's data is not only generic and therefore inapplicable, it is also historical and does not

reflect the improvements made not only to the TMI-1 EFW system, but to all operating reactors under the NRC's TMI Action Plan. These are sound technical reasons why the Licensing Board should have avoided what the Appeal Board in St. Lucie wisely avoided -- applying only generic failure or availability experience. The absence of a statistically meaningful operating data base at TMI-1 is no justification for blindly applying inappropriate data from other plants.

The NRC has used principally deterministic criteria, supplemented by elements of probabilistic analysis, in licensing nuclear power plants and in judging the acceptability of a plant system. Rosenthal and Check, ff. Tr. 11,152, at 17-18, 20-26; Tr. 11,200-02 (Check, Rosenthal); Tr. 11,253 (Check). The Licensing Board acknowledged early on that use of a probabilistic analysis in conjunction with some numerical acceptance criterion, in answer to Board Question 6, would not be necessary in the absence of a special situation. Tr. 6178-88 (Administrative Judge Jordan). There is no special situation with the emergency feedwater system at TMI-1 -- either in terms of the rate of challenge to the system or in terms of the likelihood that it will fail.^{23/} See Keaten, ff. Tr. 16,612, at 11.

^{23/} As noted earlier, the Licensing Board found that TMI-1 EFW system reliability at restart will be comparable with some other operating plants. Indeed, it is not inconsistent with the industry average estimate based on a Licensee Event Report survey. LBP-81-59, supra, 14 N.R.C. at 1372 (1981).

Directly in response to the Licensing Board's requests, Tr. 16,740 (Curry), the Staff nevertheless presented evidence on a quantitative estimate of EFW system reliability at TMI-1. See Wermeil and Curry, ff. Tr. 16,718, at 31-42; Tr. 16,732-34 (Curry). At the same time, the Staff witness candidly acknowledged the serious limitations on the exercise he had performed, and warned the Licensing Board of the danger in misusing, or placing too much reliance upon, his results.

The analysis was conducted to estimate the reliability of the EFW system in a five-minute period after the occurrence of the transient, and mission success was defined as delivery of required EFW flow to the steam generator(s) within five minutes. The Staff chose a five-minute time period because of the estimated time for steam generator dryout in a B&W plant if no feedwater is provided. The Staff believes that, in terms of plant operation, steam generator dryout is significant due to the unstable system condition it induces. Wermeil and Curry, ff. Tr. 16,718, at 32, 33. The Staff also acknowledged that it chose this success criterion (i.e., avoidance of steam generator dryout) in order to make the study consistent with those for other PWRs, even though it is a slightly more severe criterion for B&W plants. Tr. 17,068 (Curry). Licensee points out, however, that the absence of EFW flow for five minutes does not result in core damage, and that the significance of dryout at

B&W plants is not necessarily the same as for other plants since EFW is sprayed into the steam generator at a very high point and immediately starts to cool the primary system when it is reestablished. Tr. 16,613-15 (Keaten).

A major implication of the reliability estimate for a five-minute period is that the number and type of operator actions that may be expected to be accomplished to rectify an EFW system fault is very limited. Consequently, system reliability becomes largely a function of the probability of the system being in the proper configuration at the time of demand, and the inherent reliability of mechanical and electrical components to function on demand. Wermeil and Curry, ff. Tr. 16,718, at 33. This analysis really just characterizes the EFW system's innate reliability as a function of its hardware reliability. It does not recognize (or gives essentially no credit for) improved operating procedures and operator training. Tr. 16,744-46 (Curry); Tr. 16,700-02 (Keaten). Neither does it credit the hardware changes made at TMI-1 to facilitate operator action to recover feedwater. Tr. 17,016 (Curry). As a general rule, the Staff believes that consideration of operator recovery actions would certainly improve the reliability. Tr. 16,940 (Curry). While the Licensing Board recognized these limitations, 14 N.R.C. at 1369, we do not believe that it appreciated their significance.^{24/}

^{24/} As the Appeal Board found: "Operator procedures have been improved and such improvements should result in better operator

(Footnote Continued)

In addition, because of the smaller inventory of B&W steam generators, dryout would occur much sooner if all feedwater were lost than would occur under similar circumstances for a Westinghouse steam generator. This results in a more stringent response requirement for an emergency feedwater system associated with a B&W NSSS than one associated with a Westinghouse NSSS because significantly less reliance on operator intervention to rectify system faults can be credited for the B&W response than the Westinghouse. Thus, again, the selection of steam generator dryout prevention as the benchmark for successful EFW system operation influenced the analysis, and places some bias against the B&W design. Wermeil and Curry, ff. Tr. 16,718, at 41; Tr. 16,741, 17-075-76 (Curry).

A Staff witness testified that if the Staff had used a more realistic mission success criterion -- such as the capability of the EFW system to deliver minimum feedwater flow for mitigating a transient -- the potential bias associated with the criterion could have been corrected. He expressed confidence that if the Staff had used this sounder basis for comparison, the upgraded TMI-1 EFW system would have looked very similar to the Westinghouse plants. Tr. 17,080 (Wermeil). Accord, Tr. 17,068, 17,095 (Curry).

(Footnote Continued)

actions and, hence, improvements in the quantitatively measured reliability of the emergency feedwater system." ALAB-729, supra, 17 N.R.C. at 832-33 (1983).

Another important limitation on the Staff's analysis is that it represents a rough assessment of the potential of the EFW system to accomplish a given mission under given conditions. See Wermeil and Curry, ff. Tr. 16,718, at 39. There is not necessarily a perfect correlation between the comparative reliabilities of various plant auxiliary systems and the comparative risk associated with the operation of those plants. To draw conclusions about the comparative risks of operating various nuclear plants, consideration needs to be given to the integrated response of all plant systems to cope with potential transients and loss-of-coolant accidents. Id. at 39, 40; Tr. 16,722 (Curry). See, e.g., Tr. 16,748 (Curry) (analysis does not represent overall probability of core damage); Tr. 17,079 (Curry) (plant risk should take into account not only the fact that successful EFW system operation will occur even if flow is secured much later than five minutes, but also the fact that TMI-1 is equipped with a feed-and-bleed mode of operation which can successfully cool the core).

Nevertheless, the Staff witness expressed his judgment that with the EFW reliability estimate he presented, and based upon his knowledge of the additional system reliabilities to be considered in a sequence that would lead to core damage and his familiarity with reliability analyses of other plants, the probability of core damage at TMI-1 is less than or certainly no greater than in all other operating plants, and that it is

not inconsistent with the numerical safety goals then under consideration by the Commission. Tr. 17,089-92 (Curry).

There is no special circumstance here which would warrant the Licensing Board's resort to an unreliable numerical reliability estimate in the case of TMI-1. There is no basic difference between B&W plants and other PWRs in protecting against a loss of main feedwater transient, Tr. 17,064 (Wermeil), and operating history shows that the arrival rate for feedwater transients does not depend upon the NSSS design. Tr. 15,769 (D. Ross). That is, B&W plants are no more prone to have feedwater transients than are other PWRs. Tr. 15,770 (D. Ross). Further, there is no reason to suspect that EFW systems at B&W plants are less reliable than at other plants. Tr. 16,687-88 (Keaten); Tr. 17,068-69 (Curry). Yet, many other PWRs do not have the back-up feed-and-bleed cooling capability which exists at TMI-1. Tr. 17,064 (Wermeil).

2. There is Sufficient Evidence in the Record to Support a Finding that the EFW System is Adequately Reliable

The Licensing Board's conclusion on EFW system reliability, discussed above, was based exclusively on its quantitative probabilistic analysis. While, as shown above, that analysis is not valid, Licensee also takes issue with the Licensing Board's implicit rejection of the NRC's design criteria and the Staff's deterministic evaluation of the

reliability of the TMI-1 EFW system. The Licensing Board virtually equates quantitative probabilistic analysis with a safety review. See LBP-81-59, supra, 14 N.R.C. at 1366 ("We reject the implication of Licensee's argument that the lack of reliable data on the failure probability on demand of a safety system is adequate reason for refusing to inquire into the safety of that system.").^{25/}

There is no regulatory requirement in this agency that emergency (or auxiliary) feedwater systems (or entire decay heat removal systems) -- whether at TMI-1 or at other operating reactors -- must have their reliability estimated quantitatively; and there is yet no numerical standard against which they should be judged. The decisions in St. Lucie, supra, do not establish to the contrary.

The Licensing Board itself explored, as an issue independent of its concern with EFW reliability, the adequacy of Staff methodologies for determining design basis events and their significance to safety, including the comparative merits of the deterministic (or mechanistic) approach to regulation and quantitative probability analysis. See LBP-81-59, supra, 14 N.R.C.

^{25/} It was not Licensee's argument, or its implication, that the Licensing Board should not inquire into the reliability of the EFW system. Indeed, substantial evidence was presented by Licensee toward that end. It was our position, however, that one should not assess a plant system on the basis of a quantitative analysis of unreliable and inapplicable data. See generally, Keaten, ff. Tr. 16,612.

at 1379-89 (1981). The Licensing Board there encouraged the Staff to continue to incorporate probabilistic risk assessment techniques into its decision-making "whenever appropriate."

Id. at 1387. The Licensing Board concluded, however, that

They [Staff methods] depend upon a combination of deterministic and probabilistic assessments. Staff judgment plays an important role -- infallibility cannot be guaranteed. Nevertheless it is on that basis that we find that the Staff's method of determining that all of the necessary TMI-2 accident-related recommendations have been identified is sufficient to provide reasonable assurance that TMI-1 can be operated in the short and long term without endangering the health and safety of the public.

Id. at 1395-96.

Licensee does not in any way dismiss the utility of probabilistic risk assessment. Prior to the Staff's reliability evaluation prepared in response to Board Question 6, an evaluation of the reliability of the TMI-1 EFW system as it existed in mid-1979 had been performed in 1979 for Licensee by Babcock & Wilcox. Licensee Ex. 15 at 9. The B&W analysis considered the same transients the Staff subsequently considered, but also considered reliability for the time periods 5, 15 and 30 minutes. The Staff testified that because of the more detailed design and operational information used by B&W for its analysis, that analysis was necessarily more rigorous and more detailed than the conservative type of analysis performed by the Staff as a check. Wermeil and Curry, ff. Tr.

16,718, at 36; Tr. 17,022-23 (Curry). While the B&W analysis was not intended to establish a numerical reliability value for the TMI-1 EFW system, it did compare the 1979 system with those at Westinghouse and Combustion Engineering plants and found that the TMI-1 system fell in the mid-range.^{26/} Tr. 5948, 5984-85 (Capodanno); Tr. 6157-59 (Wermeil). The Staff reviewed this study and approved its methodology and results. Wermeil and Curry, ff. Tr. 16,718, at 5.

Licensee believes that both of these probabilistic risk assessments (B&W's and the Staff's) were valuable and accomplished their intended purpose, which is:

the assessment of the reliability of a given auxiliary feedwater system compared to other designs and the identification of major contributors to a given auxiliary feedwater system unreliability so that system upgrading can be most effectively undertaken, if desired.

Wermeil and Curry, ff. Tr. 16,718, at 39; Tr. 6134-35 (Wermeil). In fact, the 1979 B&W analysis identified the major contributors to TMI-1 EFW system unavailability, and led directly to several of the restart modifications to the system design and to plant procedures. See Licensee Ex. 15 at 8, 10;

^{26/} It should be noted that the original B&W analysis and the Staff review of it assumed that both electric-driven pumps were required for successful EFW system operation. Later analysis, however, indicates that only one electric driven EFW pump is needed for successful heat removal. Wermeil and Curry, ff. Tr. 16,718, at 38.

Wermeil, et al., ff. Tr. 6035, at 10; Wermeil and Curry, ff. Tr. 16,718, at 4, 5.

Prior to the B&W analysis, Licensee itself performed a reevaluation of the TMI-1 EFW system design and operation in order to determine where upgrades in the timeliness and reliability of the system could be made. This evaluation resulted in eight items that the Staff agreed would result in improvement to the EFW system reliability, and that were subsequently included in short-term action 1(a) of the Commission's Order and Notice of Hearing. Wermeil and Curry, ff. Tr. 16,718, at 3. Subsequent to the B&W study, four additional short-term recommendations were developed based on the Lessons Learned Task Force review and the Bulletins and Orders Task Force review of B&W operating plants. Id. at 5. As a final approach to reexamining the reliability of EFW systems in operating plants, the Bulletins and Orders Task Force performed a comparison of the EFW system designs against the current Standard Review Plan criteria for a safety-grade system in order to provide further insight into possible areas for improvement that were not identified in previous evaluations. The EFW system review effort was later consolidated into the NRC TMI Action Plan. Id. at 11.

Staff witness Wermeil provided the Licensing Board with a detailed discussion of the evolution of the Staff's criteria related to the EFW system, and of the manner in which system

reliability has been improved as a result of implementation of these criteria at TMI-1. See generally Wermeil and Curry, ff. Tr. 16,718, at 1-30; Tr. 16,719 (Wermeil). The EFW system review effort since the TMI-2 accident is substantially more detailed and exhaustive than the Staff's standard deterministic evaluation against the acceptance criteria of the Standard Review Plan. Based upon its review and evaluation of the requirements and of Licensee's compliance with them in terms of the resulting hardware, procedural and technical specification changes to be implemented, the Staff has concluded that the TMI-1 emergency feedwater system meets the requirements identified for implementation at the time of restart, and that with these changes the system will be sufficiently reliable to allow restart. Wermeil and Curry, ff. Tr. 16,718, at 12; Tr. 17,017 (Wermeil).

The Licensing Board found that "[t]he EFW system will be safety grade at restart for small break LOCA and MFW transients, the ones of concern to this Board." LBP-81-59, supra, 14 N.R.C. at 1372 (1981); accord, ALAB-729, supra, 17 N.R.C. at 831 (1983). Consequently, Licensee submits that compliance with all of this agency's design requirements is adequate support (and rationale) for a finding that the TMI-1 EFW system is reliable. The Commission itself has stated, in its Policy Statement on Safety Goals for the Operation of Nuclear Power Plants, that "[t]he staff should continue to use conformance to

regulatory requirements as the exclusive licensing basis for plants." 48 Fed. Reg. 10,772, 10,775 (1983).

ISSUE NO. 3: PORV USAGE DURING LOW TEMPERATURE
OPERATION AND INADEQUATE CORE
COOLING CONDITIONS

". . . [T]he Commission has decided to review whether the Appeal Board erred in holding that the arguments concerning use of the PORV during low temperature operation and inadequate core cooling conditions were outside the scope of the proceeding, and, if so, whether these alleged uses of the PORV require that it be safety-grade. The Commission is not reviewing whether the other alleged uses of the PORV require that it be safety-grade." Commission Order at 2-3 (Jan. 27, 1984).

A. The Licensing Board Decision

In posing the above issue for review, the Commission implies that the subject uses of the PORV were not the subject of evidentiary presentations in this proceeding. In fact, they were raised in testimony UCS presented to the Licensing Board without objection from Licensee or the Staff,^{27/} were addressed by Licensee in rebuttal testimony,^{28/} and were the subject of factual findings by the Licensing Board. LBP-81-59, supra, 14 N.R.C. at 1281-82 (1981).

^{27/} Pollard, ff. Tr. 9027.

^{28/} Tr. 8755-56, 8761-63 (Jones).

UCS had asserted that, during low temperature operation, the PORV performs a safety function -- protection against reactor vessel overpressurization -- and therefore should be required to be safety-grade. Pollard, ff. Tr. 9026, at 5-10, 5-11. However, evidence presented by Licensee showed that, while the PORV is set at a low pressure setpoint when in low temperature operation, the licensing basis for mitigating overpressure accidents in this mode was operator action.^{29/} Thus, the PORV serves only as a back-up to operator action, and its use was not given credit as a licensing basis for TMI-1. Tr. 8756, 8979 (Jones). On this basis, the Licensing Board rejected UCS' arguments that the PORV was required to be safety-grade for low temperature operation. LBP-81-59, supra, 14 N.R.C. at 1281 (1981).

Similarly, UCS had claimed that the potential use of the PORV to depressurize the reactor coolant system during inadequate core cooling conditions is a safety function requiring a safety-grade PORV. Pollard, ff. Tr. 9027, at 5-17. While the PORV can be used as an additional means for depressurizing the plant, it is much less significant than depressurizing with the operative steam generator(s).^{30/} Tr. 8761-62 (Jones). The

^{29/} There is more than ten minutes available for the operator to terminate an overpressure transient at low temperatures. Tr. 8756 (Jones).

^{30/} Licensee's procedures provide the operators with guidance to use both of these methods.

Licensing Board found that although "procedures have been developed for coping with inadequate core cooling conditions without dependence on the PORV -- the PORV must be considered to be possibly useful equipment for depressurizing under these conditions but not to be required for safety reasons."

LBP-81-59, supra, 14 N.R.C. at 1282 (1981). For such beyond design basis events, it is simply prudent to provide the operators with the option of using any available equipment. Indeed, in the reopened hearing before the Appeal Board, the NRC Staff testified that it would not want the operator to ignore equipment simply because it is not safety-grade, and would challenge licensees for failing to provide procedural guidance for using available non-safety equipment. App. Tr. 200-201 (Sheron); see also Tr. 8762-63 (Jones).

B. The Appeal Board Decision

While the Appeal Board did view the subject uses of the PORV to be outside the scope of the proceeding,^{31/} it nevertheless reviewed the Licensing Board's actual determinations and upheld them. ALAB-729, supra, 17 N.R.C. at 864-65 (1983).

^{31/} To Licensee's knowledge, this holding was not suggested to the Appeal Board by any party.

C. Argument

The Appeal Board rulings that the subject uses of the PORV are outside the scope of the proceeding are academic and represent, at worst, harmless error.^{32/} The Appeal Board and the Licensing Board both evaluated the arguments and evidence presented by the parties on these uses of the PORV. There is ample evidence in the record to support these findings and the Commission should affirm the conclusion that the PORV need not be made safety grade for its potential use during low temperature operation and inadequate core cooling conditions.

ISSUE NO. 4: SYSTEMS INTERACTION

" . . . [T]he Commission has decided to review whether allowing staff to address the need for a systems interaction study for TMI-1 in the long-term in its generic program is adequate, or whether such a study should be specifically required for TMI-1." Commission Order at 3 (Jan. 27, 1984). This issue was not raised in the UCS petition to the Commission for review of ALAB-729.

^{32/} The Appeal Board's reasoning on low temperature operation is persuasive, however, since overpressure protection during cold shutdown conditions has no reasonable nexus to the TMI-2 accident. As to the use of the PORV during inadequate core cooling conditions, Licensee believes that the acceptable use of non-safety-grade equipment to mitigate such beyond-design-basis events is a substantive reason for ruling against UCS. See ALAB-729, *supra*, 17 N.R.C. at 865 n.235 (1983). It does not, however, by itself place the issue outside the scope of the proceeding.

A. The Licensing Board Decision

Evidence regarding the Staff's programs for identifying and resolving potential adverse systems interactions was presented before the Licensing Board in response to Board Question 3 and, to a lesser extent, in conjunction with the litigation of UCS Contention 14.^{33/} LBP-81-59, supra, 14 N.R.C. at 1350-51, 1409-12 (1981). At the time of the hearing, reliability assessments of four plants were being undertaken by the Staff under the Interim Reliability Evaluation Plan (IREP).^{34/} The event-tree/fault-tree methodology utilized in the IREP studies was viewed as being one proper method of investigating interactions between safety and non-safety systems. Id. at 1411. Alternative methods of investigating systems interactions were also being reviewed, and it was envisioned that systems interaction pilot reviews would be conducted at a number of NTOL plants in order to evaluate the candidate methodologies. Tr. 8596-8601 (Conran), 15,615-29 (D. Ross). Thus, while the Licensing Board believed that IREP or other follow-on studies could lead to an enhancement of safety at TMI-1, it found that it would be premature to require the performance of

^{33/} Systems interaction in nuclear power plants was designated as a generic unresolved safety issue (USI A-17) in 1978, applicable to all light water reactors.

^{34/} An earlier IREP study had been completed on the Crystal River-3 plant.

such studies prior to the development of a standard methodology. LBP-81-59, supra, 14 N.R.C. at 1412 (1981). The Licensing Board did, however, direct the Staff to include TMI-1 in future generic reviews of systems interactions. Id. at 1351; see also LBP-82-27, supra, 15 N.R.C. 747, 751 (1982) (clarifying that future studies would be dependent upon a determination that the initial studies proved to be useful and worthwhile).

B. The Appeal Board Decision

The Appeal Board rejected UCS' arguments that completion of a comprehensive systems interaction study of TMI-1 was a prerequisite for restart and affirmed the Licensing Board's decision that systems interaction studies be conducted as a long-term objective. ALAB-729, supra, 17 N.R.C. at 881 (1983).

C. Argument

Since the close of the hearing record in this case, the Staff's systems interaction programs have undergone a number of perturbations, and a revised Task Action Plan for the resolution of the systems interaction unresolved safety issue was approved and released only last month. See Board Notification 84-33, dated February 16, 1984. While certain of the details of the systems interaction program have been extensively revised, a review of Board Notification 84-33 makes clear that the Staff has yet to approve a specific methodology for

conducting systems interaction studies, and that the Staff has not made a finding as to the need for all licensees and applicants to conduct such studies. Indeed, the Staff does not anticipate issuing a final resolution for this issue (including any proposed requirements) until March 1986. See Board Notification 84-33, Enclosure at A-17/17. Given the status of this unresolved safety issue, Licensee contends that the Licensing Board and Appeal Board decisions are still correct. It would be premature to require a systems interaction study of TMI-1 at this time.

The fact that an extensive systems interaction study has not been performed for TMI-1 does not mean that systems interaction effects have been disregarded. As the Appeal Board pointed out, several of the modifications being undertaken at TMI-1 result from the TMI-2 lessons learned regarding the effects of failures of non-safety-grade equipment. ALAB-729, supra, 17 N.R.C. at 883 (1983). Further, as Licensee committed to the ACRS, a probabilistic risk assessment of the TMI-1 plant will be performed.^{35/}

Fundamentally, however, this is a generic unresolved safety issue which, absent some special showing, should be resolved for TMI-1 on the same schedule as for all operating reactors.

^{35/} A contract has been issued to a reputable engineering firm, with completion expected by 1986.

See Metropolitan Edison Company, et al. (Three Mile Island Nuclear Station, Unit 1), CLI-81-3, 13 N.R.C. 291, 295-96 (1981).

ISSUE NO. 5: MAIN STEAM LINE RUPTURE
DETECTION SYSTEM

" . . . [T]he Commission has decided to review whether the Licensing Board erred in delegating to staff responsibility for approving licensee's solution to the main steam line rupture detection system problem." Commission Order at 3 (Jan. 27, 1984). The Commission also solicited comments from the parties on the adequacy of Licensee's proposed solution, and, if the comments reveal a remaining controversy on the proposal, invited the parties to address in their briefs whether adequacy of the solution should be treated as a contested matter. Id. The UCS comments filed indicate that controversy remains on the adequacy of Licensee's proposal.^{36/} Although, as pointed out below, the UCS criticisms are aimed at matters which are outside the scope of the Restart proceeding and which UCS has raised elsewhere under 10 C.F.R. § 2.206.

^{36/} Union of Concerned Scientists' Comments on the TMI-1 Main Steam Line Rupture Detection System, February 16, 1984.

A. The Licensing Board Decision

The Main Steam Line Rupture Detection System (MSLRDS) was addressed by the Licensing Board as a part of its inquiry on Board Question 6 concerning EFW system reliability at TMI-1. The issue arose during cross-examination by the Commonwealth of Pennsylvania and led to Licensing Board concern that actuation of the MSLRDS could isolate all feedwater flow to both steam generators. LBP-81-59, supra, 14 N.R.C. at 1373 (1981). The Licensing Board required

. . . that prior to restart, the Licensee propose for Staff approval, a long-term solution to the steam generator bypass logic problem for implementation as soon as possible after restart. Prior to restart, the Staff shall certify to the Commission that the Licensee has made reasonable progress in initiating its program for the long-term solution.

Id. at 1374; see also LBP-82-27, supra, 15 N.R.C. 747, 749-750 (1982).

B. The Appeal Board Decision

The Commonwealth, which raised the MSLRDS issue during the evidentiary hearings, did not appeal the Licensing Board's findings. UCS, however, did. The Appeal Board treated the matter in distinct sections of its decision -- first, on the technical merits, in its conclusions on EFW system reliability; second, on a legal plane, in its treatment of the proper delegation of decisional authority to the Staff.

On the technical level, the Appeal Board correctly observed that the MSLRDS is intended to prevent feedwater flow to a steam generator that is connected to a steam line break. Its circuitry is such that if low steam pressure is sensed in a steam line, the flow control valves for the main feedwater and emergency feedwater lines to that particular steam generator are closed. ALAB-729, supra, 17 N.R.C. at 834 n.56 (1983). Since, if the MSLRDS isolates feedwater inadvertently, the operator can bypass the detection system and manually open the EFW flow control valves, the Appeal Board found that it is safe for the plant to restart while a long-term solution is developed.^{37/} Id. at 834.

Prior to oral argument before the Appeal Board, and in response to a specific inquiry by that board, Licensee provided a description of its proposed long-term solution to the potential for inadvertent feedwater isolation caused by the MSLRDS -- i.e., removal of the MSLRDS signal from the EFW system and elimination of the excessive flow by the use of newly installed cavitating venturis. The Appeal Board found that this appears to solve the problem of inadvertent feedwater isolation.^{38/}

^{37/} As shown below, the adequacy of this restart solution is a moot question, since the long-term solution has been implemented.

^{38/} The Appeal Board went on, however, to express its concern that overpressurization of containment might result if the non-safety-grade MSLRDS failed to isolate main feedwater during a main steam line break accident. ALAB-729, supra, 17 N.R.C.

(Footnote Continued)

Id. at 834 n.59.

In somewhat hesitant language, the Appeal Board concluded on the legal front that:

development of a solution to the steam generator bypass logic problem may go beyond the implementation of the Board's decision and involve the resolution of disputed matters. If so, such determinations must be made by an adjudicatory body, not the staff.

Id. at 888. Finding that the Licensing Board's procedure was not irrevocably flawed, however, the Appeal Board imposed its own procedural correction to the situation by directing that Licensee submit its proposed solution directly to the Commission for approval. Id. at 888, 895.

Licensee complied with this Appeal Board condition.^{39/} No party filed a response with the Commission, but the opportunity for comment was expressly renewed in the Commission's Order of January 27, 1984.

(Footnote Continued)

at 834 n.59 (1983). The Appeal Board elsewhere recognized, however, that a main steam line break -- which has no reasonable nexus to the TMI-2 accident -- is outside the scope of this proceeding. Id. at 855. UCS apparently recognizes this as well and has addressed the potential for overpressurization from failure of MSLRDS to isolate feedwater in its 2.206 petition filed on January 20, 1984.

^{39/} Licensee's Proposal in Response to ALAB-729, Condition No. 5, dated June 29, 1983, filed with the Commission and all parties.

C. Argument

1. The Licensing Board did Not Improperly Delegate Responsibility to the Staff

Licensee disagrees with the Appeal Board's conclusion that the long-term solution to the problem of potential inadvertent feedwater isolation by the MSLRDS may involve the resolution of disputed matters in the adjudicatory context. Disputed matters were raised by parties in this proceeding as contentions meeting the standards set in 10 C.F.R. § 2.714. A purpose of the contention requirement, among others, is to alert the party with the burden of proof (i.e., Licensee) of the issues on which it must mount a case. See Philadelphia Electric Company, et al. (Peach Bottom Atomic Power Station, Units 2 and 3), ALAB-216, 8 A.E.C. 13, 20-21 (1974); Kansas Gas and Electric Company, et al. (Wolf Creek Generating Station, Unit No. 1), ALAB-279, 1 N.R.C. 559, 576 (1975).

There were no contentions on the MSLRDS. Rather, this issue arose during an evidentiary presentation (i.e., cross-examination) on a subject area (emergency feedwater reliability) of Licensing Board inquiry (Board Question 6). While the Licensing Board, in its decision, took steps to see that its concern which developed during that testimony would not go unattended, this issue hardly rose to the status of a disputed matter in adjudication. Certainly, UCS did not place

the matter in dispute in a way which gave rise to any rights in litigating the details of its ultimate resolution.

Further, the Appeal Board apparently misperceives the division of responsibility between the Licensing Board and the Staff which was contemplated by the Commission in framing its August 9, 1979 Order in this proceeding. The Commission there stated:

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

Order and Notice of Hearing, CLI-79-8, 10 N.R.C. 141, 148 (1979). The unmistakable import of this language is that the Licensing Board could, but was not expected routinely to, inquire into the details of the Staff's plans for implementing the Board's decision. Clearly, the Staff alone was given the responsibility for determining that the actions directed by the Licensing Board are satisfactorily completed. Thus, as the Licensing Board observed, it has sole responsibility for making the adjudicative determinations on contested issues, but the Staff bears the primary responsibility for implementing and enforcing those determinations. LBP-81-59, supra, 14 N.R.C. at 1419 (1981).

2. Any Licensing Board Error was Harmless

While Licensee's position is that the Licensing Board did not improperly delegate to the Staff the responsibility for approving Licensee's proposed long-term design solution to the problem of potential inadvertent feedwater isolation by the MSLRDS, any such error was harmless.

Licensee's proposed solution was filed with the Appeal Board and parties on August 12, 1982 -- prior to oral argument. It has since been addressed by the Appeal Board, filed with the Commission, and been the subject of ample opportunity for the parties to address the merits of the proposal. In addition, the Staff's Safety Evaluation on the proposal, issued on November 10, 1982, was filed with the parties and has been the subject of comments filed with the Commission.

3. The Solution is Technically Adequate

There is no controversy with respect to the long-term solution proposed to address the Licensing Board's concern for inadvertent feedwater isolation. The UCS comments filed with the Commission on February 16, 1984, merely create that impression because they confuse the facts profoundly.

The restart solution approved by both the Licensing and Appeal Boards is the operators' capability to bypass MSLRDS and manually open the EFW flow control valves. See ALAB-729, supra, 17 N.R.C. at 834 (1983).

The "long-term" solution, which has by now been implemented,^{40/} is deletion of the MSLRDS signal to the EFW system and the addition of cavitating venturis to the EFW system.

While Licensee plans to modify the MSLRDS to safety grade during the Cycle 6 refueling outage, this is not the proposed long-term solution to the Licensing Board's concern that a failure in the MSLRDS might prevent delivery of needed feedwater. Consequently, the UCS complaints about the absence of a detailed design for the safety-grade MSLRDS are totally irrelevant.^{41/} The remainder of the UCS Comments address the potential for containment overpressurization (i.e., failure to isolate feedwater and not the potential for inadvertent isolation) during a main steam line break. This scenario, which is the object of the safety-grade modification to the MSLRDS, is outside the scope of the Restart proceeding and is the subject of the UCS 2.206 petition of January 20, 1984.^{42/}

^{40/} See Staff Safety Evaluation, November 10, 1982.

^{41/} Further, it defies logic to construe a requirement for demonstrating reasonable progress in initiating a program as calling for approval of an actual design. Clearly, a design was not required by the Licensing and Appeal Board decisions. In any case, the long-term solution is complete.

^{42/} The NRC should not consider the same issue in duplicative forums. See n.15, supra.

CONCLUSION

For all of the foregoing reasons, ALAB-744 and those portions of ALAB-729 on which the Commission has undertaken review should be affirmed.

Respectfully submitted,

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