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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)
COMMONWEALTH EDISON COMPANY) Docket Nos. 50-454 OL
(Byron Nuclear Power Station,) 50-455 OL
Units 1 & 2))

APPLICANT'S REPLY TO DAARE/SAFE'S
PROPOSED FINDINGS OF FACT AND
CONCLUSIONS OF LAW REGARDING
WATERHAMMER

Pursuant to 10 C.F.R. §2.754(a)(3) and the August 18, 1982 Stipulation of the parties, Commonwealth Edison Company ("Applicant") submits the following reply to "DAARE/SAFE's Proposed Findings of Fact and Conclusions of Law Regarding Waterhammer" (hereafter "DAARE/SAFE's Proposed Findings").

Introduction

The proposed findings and conclusions that DAARE/SAFE would have this Board adopt with respect to Contention 9(a) challenge the adequacy of the measures that Applicant is taking to protect the feedwater bypass line from a Krsko-type waterhammer event based on the alleged unreliability of essential components of those measures, specifically, the check valves and temperature sensors.

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This position is unsupported by the record. Further, DAARE/SAFE's proposed findings and conclusions would demand evidence of "preoperational procedures or operation plans being developed [that] will specifically address feed line breaks or accident sequences." (DAARE/SAFE's Proposed Findings, p. 9.) Although DAARE/SAFE's meaning is not clear, it is apparent that they wish to interject a consideration of the consequences of a pipe rupture resulting from a Krsko-type waterhammer event. This position is also without support in the record and reflects a misunderstanding of the evidence and the Commission's regulatory framework. In addition, DAARE/SAFE mischaracterizes the evidence regarding the flow through the auxiliary nozzle and improperly attempts to expand the contention to include a consideration of waterhammer in the preheater region.

Reliability of Check Valves
and Temperature Sensors

DAARE/SAFE's challenge to the adequacy of the protective measures designed to prevent a Krsko-type waterhammer is two-fold. First, the check valves intended to prevent backleakage are alleged to be unreliable. Second, the temperature sensors which will monitor for backleakage are also alleged to be unreliable. (DAARE/SAFE's Proposed Findings, p. 6.) Neither proposition is supported by the record.

DAARE/SAFE emphasizes the testimony that the check valves in the Auxiliary Feedwater System at Krsko "were known to leak". (DAARE/SAFE Proposed Findings, p. 4 and proposed finding no. 8, citing Serkiz, NRC Staff Prepared Testimony, at 2, ff. Tr. 940, and Tr. 951.) Implicit in this emphasis is an allegation of the general unreliability of check valves. Taken in context, the testimony refers specifically to the check valves at Krsko. There is no evidence to support the notion that check valves in general should be considered unreliable.

Further, DAARE/SAFE fails to give any credit to the fact that additional check valves are being installed at Byron Station to provide redundant protection against back-leakage. The testimony clearly evidenced that each flow path by which backleakage could occur will have two check valves.^{1/} (Carlson, Applicant Prepared Testimony, at 14-15, ff. Tr. 930.)

The testimony indicated that the reliability of the check valves will be, in effect, monitored by the temperature sensors that will be positioned to detect backleakage

^{1/} DAARE/SAFE's proposed finding no. 51 correctly states that, pursuant to Westinghouse's recommendation, Applicant is removing a check valve from the bypass piping near the auxiliary nozzle, but DAARE/SAFE fails to state further that Applicant is installing a new check valve at a different location to ensure that two check valves will be present on each flow path by which backleakage could occur. (Carlson, Applicant Prepared Testimony, at 15, ff. Tr. 930.)

through the auxiliary nozzle. (Pleniewicz, Tr. 1109.) DAARE/SAFE asserts that these temperature sensors are unreliable and suggests that they are therefore inadequate to monitor the check valves. (DAARE/SAFE's Proposed Findings, p. 6.) In support of this assertion, DAARE/SAFE cites the testimony that there have been cases of failures of temperature sensors of the type to be used at Byron. (DAARE/SAFE proposed finding no. 14, citing Pleniewicz, Tr. 1106.) DAARE/SAFE's attempt to expand that comment into a general proposition regarding the reliability of the temperature sensors is unfounded. There is no evidence to support the assertion that the temperature sensors are generally unreliable.

DAARE/SAFE also fails to give credit to the redundancy of the temperature sensors. The testimony indicated that more than one temperature sensor will be placed on the feedwater bypass piping adjacent to the auxiliary feedwater nozzle on each of the steam generators at Byron. (Pleniewicz, Applicant Prepared Testimony, at 4, ff. Tr. 896.)

The evidence fails to support DAARE/SAFE's allegations that the check valves and the temperature sensors are unreliable. Accordingly, DAARE/SAFE's proposed findings in that regard should be rejected.

Accident Analysis

DAARE/SAFE cites portions of Section 15.2.8 of the

NRC Standard Review Plan, NUREG-75/087 (now NUREG-0800), purportedly as the review criteria pertinent to the evaluation of waterhammer. (DAARE/SAFE's Proposed Findings, p. 2.) However, that section of the Standard Review Plan is clearly irrelevant to the contention at hand. Section 15.2.8 of the Standard Review Plan postulates a feedwater line break for purposes of analysis of the resulting transient and represents internal NRC Staff guidance for the implementation of General Design Criteria 27, 28, 31 and 35 of Appendix A to 10 C.F.R. Part 50. (See the "Acceptance Criteria" of Section 15.2.8 of the Standard Review Plan, NUREG-0800.) No reference is made in Section 15.2.8 to General Design Criterion 4, which is the applicable criterion for evaluation of the design for protection against waterhammer events.

DAARE/SAFE Contention 9(a) is concerned with the prevention of the occurrence of a bubble-collapse waterhammer event in the feedwater bypass piping similar to the event that occurred at the Krsko plant. Applicant's evidence at the hearing focused on the protection of the feedwater bypass line from a Krsko-type waterhammer event through measures designed to prevent such an event. This evidence is consistent with the "appropriate protection" standard of General Design Criteria 4. The safety objective of General Design Criteria 4 is patently distinct from the

safety objectives of the General Design Criteria referenced in Section 15.2.8 of the Standard Review Plan. Specifically, the latter criteria are concerned with continued safety under postulated accident conditions. General Design Criterion 4 is concerned with protection against events that could lead to accident conditions. These separate safety objectives are consistent with the "defense-in-depth" philosophy of the Commission. However, Contention 9(a) concerns solely the question of the appropriate protection to be provided against a Krsko-type waterhammer event. A consideration of pipe break accidents is therefore beyond the scope of the contention. The reliance on Section 15.2.8 of the Standard Review Plan and DAARE/SAFE's corresponding proposed findings should be rejected.

Continuous Flow Through The Auxiliary Nozzle

DAARE/SAFE mischaracterizes two aspects of the situation with regard to the flow through the auxiliary nozzle. Their proposed findings indicate only one source of this flow -- the tempering flow. (DAARE/SAFE's Proposed Findings, pp. 7-8.) Not mentioned is the feedwater flow through the auxiliary nozzle, which is present between 0 to approximately 20 percent power. (Carlson, Applicant Prepared Testimony, at 10, ff. Tr. 930; Pleniewicz, Applicant Prepared

Testimony, at 5, ff. Tr. 896.) A second mischaracterization by DAARE/SAFE is the statement that the flow through the auxiliary nozzle "minimizes" backleakage. In fact, the flow through the auxiliary nozzle effectively prevents backleakage of the steam from the steam generator. (Id.) Thus, DAARE/SAFE's proposed findings and conclusions insofar as they concern the flow through the auxiliary nozzle should be viewed in light of the foregoing clarifications.

Preheater Region Waterhammer

DAARE/SAFE's proposed findings and conclusions improperly attempt to raise the issue of waterhammer in the preheater region in the context of the present contention. This issue is clearly beyond the scope of contention 9(a) as it was limited by the Board's January 7, 1983 "Memorandum and Order Ruling on Applicant's Motion for Clarification."

Further, DAARE/SAFE's attempt to assert the relevance of waterhammer in the preheater region based on the evidentiary record is without foundation. DAARE/SAFE's proposed findings cite the testimony concerning metal fatigue factors associated with bubble collapse waterhammer in the preheater region and then attempt to tie it to Mr. Carlson's statement that bubble collapse waterhammer events have some common elements regardless of where they occur. (See DAARE/SAFE's Proposed Findings, at p. 9 and findings nos. 55-56; cf. Carlson, Tr. 1075-1076.) Mr. Carlson refuted the notion that the metal

fatigue factors associated with preheater waterhammer is one of the elements associated with a Krsko-type waterhammer event. (Carlson, Tr. 1076-1077.) DAARE/SAFE fails to give heed to Mr. Carlson's caveat that the bubble-collapse waterhammer is dependent on the geometries involved and that, obviously, the geometry of the tube bundle and baffle plates in the preheater region is greatly different from the geometry of a pipe. (Carlson, Tr. 1075-1076.) DAARE/SAFE's attempt to assert the relevance of waterhammer in the preheater region to the present contention is without support in the record therefore DAARE/SAFE's proposed findings and conclusions in that regard should be rejected by the Board.

Conclusion

For the foregoing reasons, Applicant respectfully requests that the Board not accept DAARE/SAFE's proposed findings and conclusions in regard to DAARE/SAFE contention 9(a).

Respectfully submitted,

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CERTIFICATE OF SERVICE

The undersigned, one of the attorneys for Commonwealth Edison Company, certifies that he filed the original and two copies each of the attached "APPLICANT'S REPLY TO DAARE/ SAFE'S PROPOSED FINDINGS OF FACT AND CONCLUSIONS OF LAW REGARDING WATERHAMMER" and "MOTION FOR LEAVE TO FILE OUT OF TIME" with the Secretary of the Nuclear Regulatory Commission and served a copy of the same on each of the persons at the addresses shown on the attached service list. Service on the Secretary and all parties, unless otherwise indicated, was made by deposit in the U.S. Mail, first-class postage prepaid, this 21st day of June, 1983.

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