



Duquesne Light

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January 22, 1987

United States Nuclear Regulatory Commission
Region I
631 Park Avenue
King of Prussia, PA 19406

ATTENTION: Dr. Thomas E. Murley
Administrator

SUBJECT: Beaver Valley Power Station - Unit No. 2
Docket No. 50-412
High Energy Line Break Concerns Outside Containment
Potential Significant Deficiency Report 86-16

Gentlemen:

This Potentially Reportable Significant Deficiency Report is being submitted pursuant to the requirements of 10CFR50.55(e). It is anticipated that no additional reports will be required.

DUQUESNE LIGHT COMPANY

By J. J. Carey
J. J. Carey
Sr. Vice President

LMR/ijr
NRC/LMR/SDR/8616
Attachment
AR/NAR

cc: Mr. P. Tam, Project Manager
Mr. J. Beall, NRC Sr. Resident Inspector
Ms. A. Asars, NRC Resident Inspector
INPO Records Center
NRC Document Control Desk

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Attachment

1. Summary

In June 1984, Beaver Valley Unit 2 was notified by Westinghouse of a possible unreviewed safety question concerning the temperature envelope requirements on the Environmental Qualification of equipment outside of containment for High Energy Line Breaks (HELB). Westinghouse analyses have shown that the steam generator tube bundle may become uncovered during a HELB resulting in superheating of the steam exiting from the steam generator. This effect results in an increase in the temperature of this steam and may impact the environmental qualification envelopes of safety-related equipment outside containment which may be required to function during a HELB.

2. Immediate Action Taken

The Westinghouse Owners Group, of which Duquesne Light Company is a member, formed a High Energy Line Break/Superheated Blowdowns Outside Containment (HELB/SBOC) Subgroup to provide steamline break mass and energy release data, and the supporting documentation necessary to address the issue of equipment qualification.

Mr. L. M. Rabenau, Compliance Engineer, BV-2, notified Mr. D. Limroth, NRC Region I, of this concern on December 24, 1986.

3. Description of Deficiency

During the NRC Containment Systems Branch review of Westinghouse topical report, "Mass and Energy Releases Following a Steamline Rupture," WCAP-8822, the staff noted that heat transfer to the steam from the uncovered portion of the steam generator was not properly accounted for. Based on this review, the NRC required Westinghouse to include the steam superheating in their model.

As a result of this modeling change, Westinghouse has revised the main steamline break mass and energy release data. For some break sizes, locations, and plant conditions these releases may produce thermal environments more severe than previously prescribed for environmental qualification of safety-related equipment.

4. Analysis of Safety Implications

a. Inside Containment

The impact of the superheated steam effect on the temperature responses during HELB inside containment has been addressed by Westinghouse and it was determined to be negligible.

b. Outside Containment

Main steamline breaks in the main steam valve house and the upper elevation of the Service Building have been analyzed using the revised Westinghouse mass and energy release data.

All safety-related equipment and cables in the affected areas and their safety functions with respect to a main steamline break outside containment have been identified. For equipment required to perform a safety function for this event, actuation times have been compared to steam generator tube uncover time. For all functions except steam line isolation, the safety function is completed prior to superheated steam release. Regulatory Guide 1.97 equipment or cable in the area is required to operate after steamline isolation. For equipment and cable required to perform a safety function for other than steamline isolation, the equipment's qualification temperature is being compared with the temperature at the beginning of steam generator tube uncover. MSLB with superheat will also affect equipment within the BVPS-2 Mechanical Environmental Qualification (MEQ) Program.

A thermal lag analysis has also been performed on the main steam isolation valves, cabling and associated Class 1E electrical equipment to determine their actual temperatures at isolation plus 600 seconds, and up to a maximum time of 1800 seconds.

Additionally, a spurious signal analysis on safety-related equipment in the affected areas has been performed. This analysis had two objectives; the first was to determine if a spurious signal could be generated from the high temperature evident during an HELB; and the second was to determine if the spurious signal could have detrimental effects on the safety systems.

5. Corrective Action to Resolve the Deficiency

All of the above mentioned analyses have been completed. These analyses have been incorporated into Appendix E of the Equipment Qualification Report - Environmental Qualification of Class 1E Electrical Equipment and transmitted to the NRC via letter 2NRC-6-099, dated September 20, 1986. Supplemental information concerning Appendix E was also transmitted to the NRC via letter 2NRC-6-126, dated December 19, 1986. With the exception of the main steam isolation valve (MSIV) pressure transmitters, all Class 1E equipment has been shown by analyses to perform its function while remaining within its design and qualification parameter. It was shown that the MSIV pressure transmitters are required to be insulated in order to slow their temperature response to the accident environment. Without insulation, the pressure transmitters rapidly exceed their qualification temperature. Additionally, the accuracy for isolation of the MSIVs sharply decreases with increasing temperature, thereby, potentially impacting the safety analysis. The insulation requirement is documented in SWEC Calculation No. 12241-US(B)-202-1. Advance Change Notice ACN-0067 has been issued for construction of the insulated enclosure for the pressure transmitters.

The BVPS-2 Regulatory Guide 1.97 Implementation Report is currently under review for consistency with the analyses provided in Appendix E mentioned above. Any required revision to this report will be separately submitted to the NRC for review.

The effects of MSLB with superheat on the BVPS-2 MEQ Program is currently under review. BVPS-2 files will be updated to demonstrate that equipment is qualified for its application for this event.

6. Additional Reports

No additional reports are expected.