

August 13, 1982

Docket No. 50-029
LS05-82-08-035

Mr. James A. Kay
Senior Engineer - Licensing
Yankee Atomic Electric Company
25 Research Drive
Westborough, Massachusetts 01581

Dear Mr. Kay:

SUBJECT: SEP TOPIC VIII-4, ELECTRICAL PENETRATIONS OF REACTOR
CONTAINMENT - FINAL SAFETY EVALUATION REPORT (YANKEE)

The staff's final safety evaluation report on this topic for your plant is enclosed. Our report is based on our contractor's technical evaluation report that was forwarded by a letter from D. Crutchfield to J. Kay dated July 1, 1980, our review of your letter dated October 15, 1981, and a list of penetrations provided on August 2, 1982.

As a result of our review, the staff recommends changes in the protection for medium and low voltage electrical penetrations, plant technical specifications, and operating procedures.

This safety evaluation will be a basic input to the integrated safety assessment for your facility. This evaluation may be revised in the future if your facility design is changed or if NRC criteria relating to this subject are modified before the integrated assessment is completed.

Sincerely,

Ralph Caruso, Project Manager
Operating Reactors Branch No. 5
Division of Licensing

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M. Boyle

Enclosure:
As stated

cc w/enclosure:
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SYSTEMATIC EVALUATION PROGRAM

TOPIC VIII-4

YANKEE

TOPIC: VIII-4, ELECTRICAL PENETRATIONS OF REACTOR CONTAINMENT

I. INTRODUCTION

The safety objective of Topic VIII-4, "Electrical Penetrations of Reactor Containment," is to assure that all electrical penetrations in the containment structure are designed not to fail from electrical faults during a high energy line break.

As part of the Systematic Evaluation Program (SEP) the NRC staff performed an audit, comparing sample containment electrical penetrations in SEP facilities with current licensing criteria for protection against fault and overload currents following a postulated accident.

II. REVIEW CRITERIA

The review criteria are presented in Section 2.0 of EG&G Report "Electrical Penetrations of the Reactor Containment Yankee Nuclear Power Station." In addition, in licensing new plants, the staff requires compliance with the recommendations of Regulatory Guide 1.63 or an acceptable alternative method.

For each containment electrical penetration, the protective systems should provide primary and backup circuit protection devices to prevent a single failure in conjunction with a circuit overload from impairing containment integrity. The primary and backup protection devices must have trip time vs. current response characteristics which assure protection against penetration failure. The protection devices are to be periodically tested to verify trip setpoints and adequacy of response.

No single failure should allow excessive currents in the penetration conductors that will degrade the penetration seals. Where external control power is used for actuating the protection systems the power for primary and backup breakers should be derived from separate sources. Overcurrent signals for tripping primary and backup system devices should be electrically independent and physically separated.

III. RELATED SAFETY TOPICS AND INTERFACES

The scope of review for this topic was limited to avoid duplication of effort since some aspects of the review were performed under the related Topic III-12, "Environmental Qualification." The related topic report contains the acceptance criteria and review guidance for its subject matter.

Theoretically, there are no safety topics that are dependent on the present topic information for their completion, however, the results of the present topic have a definite impact upon the capability of equipment inside of containment to function after a high energy line break.

IV. REVIEW GUIDELINES

The review guidelines are presented in Section 3.0 of EG&G Report "Electrical Penetrations of the Reactor Containment Yankee Nuclear Power Station."

V. EVALUATION

As noted in the EG&G Report on this topic with a LOCA environment inside containment, the protection for some low voltage penetrations do not conform to the current licensing criteria. However, the licensee has designed a corrective program which is described in their October 15, 1981 submittal.

Their program includes qualifying some low voltage circuits inside of containment and demonstrating the adequacy of the low voltage primary protection devices. Where Class 1E circuits are not provided, the licensee has stated that he could provide suitable backup protection or could assure that the circuit is de-energized during operation.

The EG&G report also notes that medium voltage penetrations are used in parallel and no protection is provided to prevent damage should one of the parallel paths open.

VI. CONCLUSIONS

As a result of our review we have concluded that adequate protection for the following electrical penetrations does not exist. The staff recommends that the following be implemented to resolve this topic:

1. The medium voltage penetration pairs for the reactor coolant pumps should be monitored and their feeders tripped automatically when ever either penetration fail to carry its normal share of the load.
2. Class 1E qualified low voltage circuits inside of containment should be identified and provided with a Class 1E isolation device.
3. All non-Class 1E low voltage circuits that were identified in your August 2, 1982 message should be a) qualified to Class 1E standards and provide with a Class 1E isolation devices, or b) each circuit should be provided with redundant Class 1E isolation devices, c) the circuits should be de-energized during reactor operation, or d) the existing breakers should be modified to trip on an accident signal.

These recommendations assure containment penetration integrity assuming a single failure. The need to implement one or more of the above recommendations will be evaluated during the Integrated Assessment.