

December 23, 1981

Docket No. 50-029
LS05-81-12-078

Mr. James A. Kay
Senior Engineer - Licensing
Yankee Atomic Electric Company
1671 Worcester Road
Framingham, Massachusetts 01701



Dear Mr. Kay:

SUBJECT: SEP TOPIC IV-2. REACTIVITY CONTROL SYSTEMS
DRAFT SAFETY EVALUATION - YANKEE ROWE NUCLEAR
POWER PLANT

Enclosed is a copy of our draft safety evaluation of SEP Topic IV-2, Reactivity Control Systems for Yankee Rowe. This assessment compares your facility, as described in Docket No. 50-029, with the criteria currently used by the regulatory staff for licensing new facilities. Please inform us if your as-built facility differs from the licensing basis assumed in our assessment.

Your response within 30 days of the date you receive this letter is requested. If no response is received within that time, we will assume that you have no comments or corrections. This evaluation should be a basic input to the evaluation of Topic XV-8 and the integrated safety assessment for your facility unless you identify changes needed to reflect the as-built conditions at your facility. This assessment 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,

Dennis M. Crutchfield, Chief
Operating Reactors Branch No. 5
Division of Licensing

Enclosure:
As stated

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cc w/enclosure:
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S/11

Add: Alan Wang

DSU USE EX(11)

OFFICE	SEP:DL	SEP:DL	SEP:DL	ORB#5:PM	ORB#5:BC	AD:SA:DL	
SURNAME	RScholl:dk	RHerman	WRussell	RCaruso	DCrutchfield	GLainas	
DATE	12/15/81	12/16/81	12/17/81	12/18/81	12/23/81	12/21/81	



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555
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Sincerely,

for *Thomas V. Wambach*
Dennis M. Crutchfield, Chief
Operating Reactors Branch No. 5
Division of Licensing

Enclosure:
As stated

cc w/enclosure:
See next page

Mr. James A. Kay

CC

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Resident Inspector
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SAFETY EVALUATION REPORT
SEP TOPIC IV-2, REACTIVITY CONTROL SYSTEMS
INCLUDING FUNCTIONAL DESIGN AND
PROTECTION AGAINST SINGLE FAILURES
YANKEE ROWE NUCLEAR POWER PLANT
DOCKET NO. 50-029

I. INTRODUCTION

The purpose of this evaluation is to insure that the design basis for the Yankee Rowe reactivity control systems is consistent with analyses performed to verify that the protection system meets General Design Criterion 25. General Design Criterion 25 requires that the reactor protection system be designed to assure that specified acceptable fuel design limits are not exceeded for any single malfunction of the reactivity control systems, such as accidental withdrawal of control rods. Reactivity control systems need not be single failure proof. However, the protection system must be capable of assuring that acceptable fuel design limits are not exceeded in the event of a single failure in the reactivity control systems. The review criterion, covered in this evaluation, is addressed in Section II. Review areas that are not covered, but are related and essential to the completion of this topic are cover-

ed by other SEP topics addressed in Section III. The scope of the SEP topics is defined in the "Report on the Systematic Evaluation of Operating Facilities" dated November 25, 1977.

This report is limited to the identification of inadvertent control rod withdrawals and malpositioning of controls rods which may occur as a result of single failures in the control rod drive system.

II. REVIEW CRITERION

The review criterion for this topic is based upon Section 7.7, Part II of the NRC Standard Review Plan. In the specific case of the reactivity control systems a single failure shall not cause plant conditions more severe than those for which the reactor protection system is designed.

III. RELATED SAFETY TOPICS

The following listed review areas are not covered in this report, but are related and essential to the completion of this topic. These review areas are covered by other SEP topics as indicated below.

1. Analyses of the consequences of control rod withdrawals and

the malpositioning of control rods which may occur as a result of single failures in the electrical circuits of the reactivity control systems are covered by SEP Topic XV-8, "Control Rod Misoperation (System Malfunction or Operator Error)".

2. Analyses of reactivity insertions occurring as a result of inadvertent boron dilutions are covered in SEP Topic XV-10, "Chemical and Volume Control System Malfunction that Results in a Decrease in Boron Concentration in the Reactor Coolant."

IV. REVIEW GUIDELINES

The purpose of this evaluation is to identify inadvertent control rod withdrawals and malpositioning of control rods which may occur as a result of single failure in the control rod drive system for the Yankee Rowe Nuclear Power Plant.

V. EVALUATION

Information was provided in Yankee Atomic Electric Company letter dated September 17, 1981, describing single failures within the control rod drive system which can cause control rod withdrawals and malpositioning of control rods at the Yankee Rowe Nuclear Power Plant. Also included was a description of design features

which limit reactivity insertion rates and rod malpositionings resulting from single failures. Based upon an audit review of the information provided by the licensee we conclude that the following may occur as a result of single failures:

1. A single rod may drop into the core.
2. A single rod may not move when movement is commanded.
3. A single rod may be inadvertently moved or malpositioned.
4. An entire group may drop into the core.
5. An entire group may not move when movement is commanded.
This includes both automatic in (based on T_{ave}) and manual commands.
6. An entire group may be inadvertently moved or malpositioned.
This includes the simultaneous movement of two groups when only one group is commanded and the inward movement of a group when the outward movement is selected.
7. All rods may drop into the core.
8. All rods may not move in when movement commanded. This includes any number of groups failing to move in when all rods are commanded to move.
9. All rods may be inadvertently moved in or malpositioned.
10. An entire group of rods may be withdrawn beyond the 485 MWT limit.

The conclusion is based upon the design of the control rod drive system. The analysis performed by the licensee found many of the results and the remaining items were noted during the audit.

VI. CONCLUSION

The licensee should revise the evaluation of SEP Topic XV-8 to include the ten items above or should show why these types of failures cannot occur at Yankee Rowe.