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July 14, 1978

Re: Docket Nos. 50-277
50-278

Mr. Thomas Ippolito, Chief
Operating Reactors Branch #3
Division of Operating Reactors
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Ippolito:

Mr. George Lear's letter, dated May 15, 1978, to Mr. Edward G. Bauer, Jr. requested additional information on our use of the Recirculation Pump Trip (RPT) to mitigate the consequences of an Anticipated Transient Without Scram (ATWS). The enclosure to his letter listed criteria for a RPT design.

Attached are the original and thirty nine copies of our response which supplements the information submitted in our letter dated October 8, 1976, and the information contained in the answer to question 7.1.12 in Supplement 1 of the Final Safety Analysis Report. A logic diagram and an electrical schematic, E-171, Sheet 1 of 2, were provided in these responses. Our response includes electrical schematic, E-171, Sheet 2 of 2 which provides additional information.

Technical Specifications for pump trip set-points and surveillance requirements are contained in the present Peach Bottom Technical Specifications (Sections 3.2.6 and 4.2.6).

As discussed in items D, F and J, our RPT design does not completely conform to all of the criteria. We believe that changes to bring the RPT design into conformance with the criteria are inappropriate at this time. The criteria for RPT is from NUREG-0460 which is a statement of the current proposed position of the Staff relative to ATWS. Rulemaking to resolve the ATWS issue is anticipated, and until the rulemaking process is complete, we believe the criteria are subject to change in content and degree of implementation.

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Sincerely,

Eugene J. Bradley

Attachment

ATTACHMENT

Conformance of the Recirculation Pump Trip (RPT)
Design to the Criteria
in Enclosure 1 of the May 15, 1978 Letter
Peach Bottom Atomic Power Station Units 2 and 3

A. General Functional Requirements

The RPT circuitry automatically trips the reactor recirculation pumps on either a signal of high reactor pressure or low reactor level by the use of four pressure switches and four level switches in the nuclear boiler system. These switches are connected in a one-out-of-two logic for both level and pressure to trip each recirculation pump MG set drive motor breaker.

B. Independence and Integrity

All components used to trip the recirculation pumps are independent and separate from components that initiate the anticipated transient(s) being analyzed and diverse and separated from the normal scram system to minimize the probability of the ATWS disabling the operation of the mitigating system. Separation between the RPT and the Reactor Protection System (RPS) is obtained by:

(1) Mounting logic relays in different panels.

(2) Locating actuators in different portions of the plant.

(3) Using conduit to separate electrical cables.

Although the sensors for both the RPT and the RPS are located on the same instrument racks, there are redundant racks with the sensors arranged so that a failure of a rack or of an instrument sensing line cannot prevent a RPT. Diversity between the RPT and the RPS is achieved by incorporating the following:

(1) Use of sensors and actuators for the RPT which were supplied by different manufacturers than those used for the RPS. The RPS trip unit output relays and the RPT logic relays were made by the same manufacturer; however, all of the other RPS relays were made by a different manufacturer.

(2) Use of electromechanical sensors for the RPT and analog transmitters coupled with electronic trip units for the RPS.

(3) Use of energized trip status for the RPT circuitry and deenergized trip status for the RPS.

(4) Use of direct current power sources for the RPT circuitry and alternating current power sources for the RPS.

(5) Use of sensors in the RPT which employ different principles for measuring the same parameter measured in the RPS.

Analyses were performed and previously submitted in G.E. Co. Topical Report NEDO-10349, March, 1971 to demonstrate that the function of the RPT will not be disabled as a consequence of the ATWS event being analyzed.

C. RPT Interaction with Control System

The components used to trip the recirculation pumps are different than the components of the recirculation system used for normal control functions.

D. Equipment Qualification

The sensors, instrument racks, logic relays, test switches, and cables have been qualified to assure that the RPT will provide, on a continuing basis, its functional capability under conditions relevant to the postulated ATWS, including extremes of conditions relating to environment, which are expected to occur in the lifetime of the plant. The recirculation pump M-G set drive motor breakers have not been tested for similar conditions; however, the breakers are high quality components used throughout the utility industry in a variety of services. These breakers have proven to meet, on a continuing basis, their performance requirements under many adverse environmental conditions.

E. Periodic Surveillance and Preventative Maintenance Testing and Calibration

Peach Bottom Technical Specification periodic surveillance and calibration requirements provide continuing assurance that the RPT system, including sensors and actuated equipment, is capable of functioning as designed and that system accuracy and performance have not deteriorated with time and usage. This testing is directed toward the detection of those failures or degradation of accuracy and performance which would not otherwise be likely to be detected during the course of normal operations. An overlapping series of tests are performed to verify overall system performance. The frequency of testing and calibration is given in Table 4.2.G of the PBAPS 2&3 Technical Specifications.

F. Quality Assurance

A Quality Assurance Program in conformance with the requirements of 10CFR50 Appendix B was applied to the RPT design and to all components except the recirculation pump M-G Set drive motor breakers and associated circuitry. Although these breakers were purchased and installed without the imposition of a quality assurance program which conforms to Appendix B of 10CFR50, they are high quality devices which have been extensively tested following installation to provide assurance of quality.

G. Administrative Controls

Set point adjustments, calibration, testing and bypassing for Technical Spec surveillance testing the RPT are performed by trained personnel, under the supervision of plant staff, who use written procedures which have been approved by the Plant Operational Review Committee.

H. Information Readout

The RPT is designed to provide the operator with accurate, complete, and timely information regarding its status. Alarms and indicating lights in the control room indicate actuation of the RPT on a channel and system basis, testing of the RPT, breaker trip coil conductivity, and power availability. Human engineering factors have been considered in the design of operator information displays and controls.

I. Maintainability

The RPT is designed to enhance maintainability to reduce the mean-time-to-repair and to assure the continued availability and reliability of the system for the life of the plant. This includes features which facilitate the recognition, location, replacement, repair and adjustment of malfunctioning equipment, components, and modules.

J. Availability and Reliability

The reliability appropriate for the RPT is provided by fulfilling the requirements of option 1 of the NRC criteria for the RPT as follows:

(1) Compliance with the requirements established by IEEE 279-1971 is detailed on a section by section basis:

Section 4.1 General Functional Requirements - see paragraph (A) above.

Section 4.2 Single Failure Criterion - The single failure criterion is only partially met. The sensors, sensing lines, and instrument racks are redundant and separated such that a single failure cannot prevent initiation of a RPT. The recirculation pump MG set drive motor breakers and associated circuitry do not met the single failure criterion since there is only one breaker per recirculation pump.

Section 4.3 Quality of components and Modules - see paragraph (F) above.

Section 4.4 Equipment Qualification - see paragraph (D) above.

Section 4.5 Channel Integrity - see paragraph (D) above.

Section 4.6 Channel Independence - see paragraph (B) above.

Section 4.7 Control and Protection System Interaction - see paragraph (C) above.

Section 4.8 Derivation of System Inputs - RPT inputs of reactor water level and reactor pressure are directly measured.

Section 4.9 Capability for Sensor Checks - see paragraph (E) above.

Section 4.10 Capability for Test and Calibration - see paragraph (E) above.

Section 4.11 Channel Bypass or Removal from Operation - The RPT is designed to permit any one channel to be maintained, tested, and calibrated during power operation without initiating a protective action on the system level.

Section 4.12 Operating Bypasses - The RPT design does not include any operating bypasses.

Section 4.13 Indication of Bypasses - Bypassing the protective action for testing purposes is continuously indicated in the control room. See paragraph (H) above for additional details concerning information readout.

Section 4.14 Access to Means for Bypassing - see paragraph (G) above.

Section 4.15 Multiple Set Points - The RPT design does not require changing to more restrictive set points for particular modes of operation or sets of operating conditions.

Section 4.16 Completion of Protective Action Once It Is Initiated - The RPT is designed so that, once inititated, the protective action at the system level goes to completion. Return to operation requires subsequent deliberate operator action.

Section 4.17 Manual Initiation - Each recirculation pump MG set drive motor breaker can be tripped manually.

Section 4.18 Access to Set Point Adjustments, Calibration, and Test Points - see paragraph (G) above.

Section 4.19 Identification of Protective Actions - see paragraph (H) above.

Section 4.20 Informtion Read-out - see paragraph (H) above.

Section 4.21 System Repair - see paragraph (I) above.

Section 4.22 Identification - RPT equipment is not identified as being in the protection system since this equipment is not part of the protection system as defined by IEEE 279-1971.

(2) Compliance with the supplemental requirements described in the NRC letter of May 15, 1978, are detailed in paragraphs (A) through (I) above.

GAH/WWB:cic