

May 21, 2002

Mr. Garry L. Randolph
Vice President and Chief Nuclear Officer
Union Electric Company
Post Office Box 620
Fulton, MO 65251

SUBJECT: RESPONSE TIME TESTING ELIMINATION FOR POSITIVE FLUX RATE TRIP
FUNCTION FOR CALLAWAY PLANT, UNIT 1 (TAC NO. MB4796)

Dear Mr. Randolph:

In your letter of April 16, 2002 (ULNRC-04638), you requested that the NRC review and approve the application of Westinghouse Topical Report WCAP-14036-P-A, Revision 1, "Elimination of Periodic Protection Channel Response Time Tests," dated October 1998, to the power range neutron flux rate-high positive rate trip (PRNFR-HPRT) function. This review and approval is required by the Callaway Technical Specifications (TSs) in that the TS definition of the reactor trip system (RTS) response time requires NRC approval of any methodology used to allocate response times in lieu of measuring them.

Based on the enclosed safety evaluation, the staff concludes that WCAP-14036-P-A, Revision 1, is an acceptable methodology for allocating response times for the PRNFR-HPRT function in lieu of measuring the response times of the instrumentation channel. As part of the review, it has been identified and discussed with your staff, that a change to the TSs is needed to add Surveillance Requirement 3.3.1.16 to Table 3.3.1-1, "Reactor Trip System Instrumentation," for the PRNFR-HPRT function, to verify that RTS response times are within limits. You are requested to submit such an amendment to the TSs for Callaway.

Sincerely,

/RA/

Jack Donohew, Senior Project Manager, Section 2
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-483

Enclosure: Safety Evaluation

cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO ELIMINATION OF RESPONSE TIME TESTING FOR
POWER RANGE NEUTRON FLUX RATE - HIGH POSITIVE RATE TRIP FUNCTION

UNION ELECTRIC COMPANY

CALLAWAY PLANT, UNIT 1

DOCKET NO. 50-483

1.0 INTRODUCTION

By application dated April 16, 2002, Union Electric Company (the licensee) requested the NRC staff to review and approve the application of Westinghouse Topical Report WCAP-14036-P-A, Revision 1, "Elimination of Periodic Protection Channel Response Time Tests," dated October 1998, to the power range neutron flux rate-high positive rate trip (PRNFR-HPRT) function for the Callaway Plant, Unit 1 (Callaway). This review and approval is required by the Callaway Technical Specifications (TSs) in that the TS definition of the reactor trip system (RTS) response time requires NRC approval of any methodology used to allocate response times in lieu of measuring them.

2.0 BACKGROUND

Most operating nuclear power plants' TSs require licensees to periodically perform response time testing (RTT) for selected instrument channels in the RTS and the engineered safety features actuation system (ESFAS). The intent of these tests is to ensure that changes in the response time of instrumentation beyond the limits assumed in safety analyses are detected and combined with instrument calibrations, to ensure that the instrumentation is operating correctly. The changes proposed by the licensee would afford operational flexibility by eliminating the periodic requirement for RTT of certain components and systems.

The requirement for periodic testing of reactor trip systems is established in Section 50.55a, "Codes and Standards," of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50. Section 50.55a(h)(2) states that: "For nuclear power plants with construction permits issued after January 1, 1971, but before May 13, 1999, protection systems must meet the requirements stated in either IEEE Std. 279 or IEEE Std. 603-1991, and the correction sheet dated January 30, 1995." In addition, 10 CFR 50.36(c)(2)(ii)(A) requires a TS limiting condition for operation (LCO) for "installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary." Section 50.36(c)(3), "Surveillance Requirements," also states that: "Surveillance requirements are requirements related to test, calibration, or inspection to assure that the necessary quality

of systems and components is maintained, that facility operation will be within the safety limits, and that the limiting conditions of operation will be met." In 1975, the NRC implemented a program that made RTT a requirement of the TSs.

The basis for elimination of RTT is contained in IEEE 338, Section 6.3.4, paragraph 3 which states: "Response time testing of all safety-related equipment is not required if, in lieu of response time testing, the response time of the safety equipment is verified by functional testing, calibration checks or other tests or both. This is acceptable if it can be demonstrated that changes in response time beyond acceptable limits are accompanied by changes in performance characteristics which are detectable during routine periodic tests." This IEEE standard was endorsed by Regulatory Guide 1.118, "Periodic Testing of Electric Power and Protection Systems."

In 1991, the Electric Power Research Institute (EPRI) issued a report, NP-7243, "Investigation of Response Time Testing Requirements." That report included a failure mode and effects analysis (FMEA) of certain sensors as well as an evaluation of response time test data. The report determined that for these sensors, any failure that will affect the response time characteristic of the sensors will also affect the calibration and other routine surveillance, and therefore, a separate response time test is not required to demonstrate response time assumptions used in the Final Safety Analysis Report (FSAR).

In September 1995, the NRC staff approved Westinghouse Owners Group (WOG) Topical Report WCAP-13632-P, Revision 2, "Elimination of Pressure Sensor Response Time Testing Requirements." The staff accepted WCAP-13632-P, Revision 2, for reference in license amendment applications for all Westinghouse pressurized water reactors, with specified conditions, in a safety evaluation report (SER) dated September 5, 1995. In January 1996, Westinghouse issued WCAP-13632-P-A, Revision 2, which included the NRC staff's SER.

In October 1998, the NRC staff approved WOG Topical Report WCAP-14036-P, Revision 1, "Elimination of Periodic Protection Channel Response Time Tests." The staff accepted WCAP-14036-P, Revision 1, for reference in license amendment applications for all Westinghouse pressurized water reactors, with specified conditions, in a safety evaluation report dated October 5, 1998, and a correction stated in a letter to the WOG dated November 3, 1998. Westinghouse subsequently issued WCAP-14036-P-A, Revision 1, which included the NRC staff's SER.

By letter dated December 3, 1999, and with supplemental information provided in letters dated January 19 and February 24, 2000, the licensee requested elimination of selected RTT requirements. This request was based on the staff's SER approving WCAP-14036-P, Revision 1. On March 3, 2000, the NRC issued an amendment to the Callaway license which approved the elimination of RTT for selected components of engineered safety features (ESF) and RTS instrumentation channels in lieu of measuring the response times of the channels. In the safety evaluation, the staff approved the TS changes required to use the instrument calibration procedure as a method of verifying the response time of the selected instruments.

At the time of the December 3, 1999, request, Callaway did not perform RTT on the PRNFR-HPRT function, and, therefore, the function was not on the list of systems and components for

which elimination of the RTT requirement was requested. Callaway did not perform RTT on this function because they believed the function was not credited in any accident analysis. On April 3, 2002, the licensee learned from the Westinghouse Electric Company that credit is taken for the positive neutron rate trip in the PRNFR-HPRT function to maintain reactor coolant system pressure below the safety limit when Westinghouse analyzed the uncontrolled rod cluster control assembly (RCCA) bank withdrawal at power (BWAP) transient and to mitigate the consequences of certain partial power, low rod worth, RCCA ejection events. In the first instance, a response time of 3.0 seconds is required, and in the second instance, a response time of 0.5 seconds is required. The licensee now has a requirement to perform RTT on the PRNFR-HPRT function.

3.0 EVALUATION

The staff's SER on WCAP-14036-P, Revision 1, specifically stated that the nuclear instrumentation system (NIS) in power range channels was eligible for RTT elimination. Based on its review of that SER, the staff concludes that if at the time of the licensee's previous submittal of December 3, 1999, the licensee had the requirement to perform RTT on the PRNFR-HPRT function, and had, therefore, included this function with the previous RTT elimination request, RTT elimination would have been granted for that function.

In its application, the licensee has now requested that the NRC approve elimination of RTT for the PRNFR-HPRT function. The licensee has stated that they have verified that the function is part of the NIS as discussed in WCAP-14036-P-A, Revision 1, and that the components for which RTT elimination was requested, the Detector Current Monitor Circuits, Summing and Level Amplifier, Level Trip Bistables, and Isolation Amplifiers, were specifically addressed in the WCAP. The licensee also stated that a review of drawings and the materials database at Callaway verified that all installed and spare NIS components with an impact on response time are within the scope of the NIS FMEA discussed in Section 4.6 of the WCAP. One component within the function, the rate circuitry, was not evaluated in the NIS FMEA since that circuitry's time constant is required to be measured during the calibration on that circuitry, performed in accordance with TS Surveillance Requirement (SR) 3.3.1.11. No RTT elimination was requested for the rate circuitry. The application is limited to requesting approval to allocate a response time to the PRNFR function as listed in Table 8-1 of WCAP-14036-P-A, Revision 1 and as approved in the SER on that WCAP.

The staff has verified that the Detector Current Monitor Circuits, Summing and Level Amplifier, Level Trip Bistables, and Isolation Amplifiers, were specifically addressed in the WCAP, and that bounding response times were approved for that circuitry. The bounding response times approved in the SER on the WCAP was 200 milliseconds for a NIS level trip, and 20 milliseconds for the solid state protections system relays, for a total of 220 milliseconds. These are the values which the licensee requested, and as these are less than the most rapid response value, 0.5 seconds, required by the accident analysis, the staff agrees the values are appropriate.

During the review, the staff identified that a TS change is needed. The current Callaway TSs do not require RTT for the PRNFR-HPRT function. The appropriate surveillance requirement for this function would be SR 3.3.1.16 to verify that the RTS response times are within limits.

This surveillance requirement needs to be added to the PRNFR-HPRT function, function 3, in Table 3.3.1-1, "Reactor Trip System Instrumentation." Specifically, the surveillance requirements column in Table 3.3.1-1 for function 3 should have SR 3.3.1.16 added to SRs 3.3.1.7 and 3.3.1.11, which are already there.

4.0 CONCLUSION

Based on the above information in the previous section and the approval of the staff in the safety evaluation dated March 3, 2000, on the use of WCAP-14036-P-A, Revision 1, at Callaway, the staff concludes, as approved in the staff's SER on WCAP-14036-P, Revision 1, the licensee may eliminate separate RTT for the PRNFR-HPRT function instrumentation channels, using verification in lieu of measuring the response times of the channels to ensure the instrument channel will respond within the time requirement assumed by the accident analysis. As part of this review, the licensee is requested to submit a TS change to add SR 3.3.1.16 to the surveillance requirements in TS Table 3.3.1-1 for the PRNFR-HPRT function.

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Date: May 21, 2002

Callaway Plant, Unit 1

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