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SUBJECT: Responds to 840409 telcon & 840419 telecopy request for info on reactor trip breaker testing.Periodic calibr & tests currently performed adequate.Tech Spec changes unnecessary.

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SERIAL: NLS-84-291

Director of Nuclear Reactor Regulation
Attention: Mr. Steven A. Varga, Chief
Operating Reactors Branch No. 1
Division of Licensing
United States Nuclear Regulatory Commission
Washington, DC 20555

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261/LICENSE NO. DPR-23
RESPONSE TO REQUEST FOR INFORMATION
REACTOR TRIP BREAKER TESTING

Dear Mr. Varga:

SUMMARY

In an April 9, 1984 telephone conversation, Carolina Power & Light Company (CP&L) discussed with your staff questions regarding the use of the bypass reactor trip breakers and response time testing at H. B. Robinson, Unit No. 2 (HBR2). Subsequently, NRC telecopied remaining questions on April 19, 1984. The purpose of this letter is to provide the information requested in the conference call and telecopy.

DETAILS

The questions from the April 19, 1984 NRC telecopy and CP&L's respective responses are provided below:

NRC Question

Provide an evaluation to demonstrate that the allowed bypass time is so short that the probability of failure of the active logic channel would be commensurate with the probability of failure of the one-out-of-two system during its normal interval between tests. In addition, provide a discussion on the administrative controls used to enforce this bypass time, including the actions required to permit exceeding the established time allowance. In lieu of this discussion on administrative controls, the licensee may propose a Technical Specification revision to include this bypass time allowance.

CP&L Response

As discussed in our conversation, the on-line reactor protection logic train test is performed with one-out-of-two (1/2) logic trains in the bypassed mode. The time the 1/2 logic trains are bypassed for testing is limited by administrative controls to 24 hours of continuous operation. If the 24 hours must be exceeded, the Plant Nuclear Safety Committee (PNSC) is to be notified for additional time requests. In addition, should any trip or bypass breaker fail to open during testing, the NRC will be notified via red phone within one (1) hour.

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Under normal test conditions, the on-line testing of reactor protection logic trains and safeguards relay trains are completed within 4-6 hours. The current 24 hour criteria provides sufficient time for corrective actions if problems are encountered. Such corrective actions may be trouble shooting, proper notification and documentation approval, evaluation of problems and parts replacement or repair.

The unavailability of the reactor protection system during on-line testing was estimated using the methodology provided in Table 5.5 of NUREG/CR-2815 and in Table 2 of IEEE-352-1975 for logic configurations (assuming perfectly staggered testing). The calculations are provided in Attachment 1. The short term unavailability frequency during a temporary degraded configuration shows the 24 hour and 6 hour time limits are not large when compared to the overall unavailability. A comparison of the unavailabilities using the 6 hour actual test time and the 24 hour allowed test limit shows that the difference between the two is relatively small. In addition, the channel redundancies within each train[1] and redundant reactor trip arrangement during the test (bypass breaker being racked-in during test) were not considered. Therefore, CP&L believes the calculated unavailability frequency during on-line testing is a conservative value, and is well within an acceptable range.

In conclusion, CP&L believes the administrative controls which limit the time the reactor protection trains are bypassed for testing are adequate. Therefore, a request for a Technical Specification (TS) change to include bypass time allowance should not be necessary.

NRC Question

The HBR2 TS do not include response time test requirements. Further, it is not apparent from a review of the FSAR that such tests are being performed. Therefore, we request that you provide a discussion identifying the protection system response time tests that have been or will be performed. If periodic response time tests are not performed, provide a summary of the methods used to ensure that the assumptions of the safety analysis with regard to response times remain valid.

CP&L Response

As discussed in our conference call, response time testing of the reactor protection system was not part of the original HBR2 design criteria and providing the ability to routinely perform such tests now would involve extensive plant modifications. Currently, HBR2 TS require calibration and testing of the reactor protection instrumentation channels on a refueling interval to assure that the channel loop functions properly and meets the accuracy requirements.

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[1] Limiting Operating Conditions of the reactor protection channels are identified in Technical Specification Section 3.5, Table 3.5-2.

Thirteen years of operation have demonstrated that this method of testing is adequate for HBR2. However, as a result of the reactor trip breaker concerns, a procedure to trend the reactor trip breakers (RTB) opening response times has been developed. This procedure will provide RTB reliability data and will be performed every refueling.

In summary, since response time testing was not within the original design of HBR2, the TS do not include response time test requirements for the reactor protection instrumentation. Based on the past operating history of the plant, CP&L believes the periodic calibrations and tests currently being performed are adequate and TS change requests are not necessary.

CONCLUSION

Carolina Power & Light Company believes that the reactor trip breakers by-pass time and related controls and the noted response time testing procedures provide an adequate reactor protection system, and no TS changes are needed.

If you have any further questions regarding these issues, please contact Mr. David Stadler at (919) 836-6739.

Yours very truly,

S. R. Zimmerman
Manager
Nuclear Licensing Section

CGL/ccc (287CGL)
Attachment

Attachment 1

Unavailability as a Function of Logic Configuration and Testing Schedule

Using Table 2 of IEEE 352-1975 for a 1/2 Logic Configuration, assuming perfectly staggered testing:

$$U = 5/24\ (\lambda\theta)^2$$

where U = Unavailability
λ = Channel Failure Rate (Failure/Hr)[1]
θ = Test Interval, Hrs. (Monthly ≃720 Hrs.)

$$U = 5/24\ [(2.5 \times 10^{-6})\ (720)]^2$$
$$U = 6.75 \times 10^{-7}$$

When one (1) channel is being tested, the logic configuration is temporarily degraded to 1/1 configuration.

In this case $U^* = 1/2\ \lambda\ \theta^*$

where U^* = Short Term Unavailability During the Test
θ^* = Maximum Duration of Test (6 Hrs. or 24 Hrs.)

$$U_1^* = 1/2\ (2.5 \times 10^{-6})\ (6)$$
$$U_1^* = 7.5 \times 10^{-6}$$

$$U_2^* = 1/2\ (2.5 \times 10^{-6})\ (24)$$
$$U_2^* = 3 \times 10^{-5}$$

Using Table 5.5 of NUREG/CR-2815, calculating the overall unavailability[2] during the one month test interval, including the effects of testing, results in:

$$\overline{U} = 1/3\ \lambda^2\ \theta^2 + \frac{\theta^*}{\theta}\ [\lambda\ (\theta + 1/2\ \theta^*)] + \frac{\theta^*}{\theta}\ [1/2\ \lambda\ \theta^*]$$
$$\overline{U_1} = 1.6 \times 10^{-5} \qquad (6 \text{ hours})$$
$$\overline{U_2} = 6.3 \times 10^{-5} \qquad (24 \text{ hours})$$

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1 From HBR2 Technical Specification, Section 4.1-1, pg. 4.1-3; based on an average unsafe failure rate, the minimum testing frequency for those instrument channels connected to the safety system = 2.5×10^{-6} (failures/HR per channel).

2 Includes unavailability due to channel failure rate, short term unavailability during train A testing, and short term unavailability during train B testing.