SAFETY EVALUATION REPORT
DOCKET NO. 50-498/499
SOUTH TEXAS UNITS 1 & 2
GENERIC LETTER 83-28, ITEM 4.3
REACTOR TRIP BREAKER AUTOMATIC SHUNT TRIP

INTRODUCTION AND SUMMARY

Generic Letter 83-28 was issued by NRC on July 8, 1983 indicating actions to be taken by applicants based on the generic implication of the Salem ATWS events. Item 4.3 of the generic letter requires that modifications be made to improve the reliability of the Reactor Trip System by implementation of an automatic actuation of the shunt attachment on the reactor trip breakers. By letter dated October 14, 1985, Houston Lighting and Power Company provided responses to the plant specific questions identified by the staff in its August 10, 1983, safety evaluation report of the generic Westinghouse design. The staff has reviewed the applicant's proposed design for the automatic actuation of the reactor trip breaker shunt trip attachments and finds it acceptable.

The applicant has specified the implementation for these modifications to be completed prior to fuel load.

EVALUATION

The following required plant specific information items were identified based on the staff's review of the WOG proposed generic design for this modification:

1. Provide the electrical schematic/elementary diagrams for the reactor trip and bypass breakers showing the undervoltage and shunt coil actuation circuits as well as the breaker control (e.g., closing) circuits, and circuits providing breaker status information/alarms to the control room.

The applicant provided the electrical schematic diagrams for the reactor trip and bypass breakers showing the undervoltage and the shunt trip circuits. The design of the electrical circuits have been reviewed and found to be consistent with the WOG generic proposed design which was previously reviewed and approved by the staff. We find this is acceptable.

2. Identify the power sources for the shunt trip coils. Verify that they are Class 1E and that all components providing power to the shunt trip circuitry are Class 1E and that any faults within non-class 1E circuitry will not degrade the shunt trip function. Describe the annunciation/ indication provided in the control room upon loss of power to the shunt trip circuits. Also describe the overvoltage protection and/or alarms

provided to prevent or alert the operator(s) to an overvoltage condition that could affect both the UV coil and the parallel shunt trip actuation relay.

Redundant Class 1E power sources are used for the shunt trip actuation of the reactor trip breakers and for the shunt trip of the bypass breakers. Class 1E circuitry is separated from non-1E circuitry. Therefore, credible faults within non-Class 1E circuitry will not degrade the shunt trip function. This is in accordance with Regulatory Guide 1.75 and is, therefore, acceptable.

The breaker position status lights are used to supervise the availability of power to the shunt trip circuits. The red light which is connected in series with the shunt coil and the "a" auxiliary contact indicates that the breaker is closed and also indicates that the power is available to the shunt trip device and, therefore provides detectability of power failure to the shunt trip coil.

Normally the shunt trip coils in the reactor trip breakers are in de-energized condition. When the trip breakers are closed, the red lamp current (approx. 50 ma) flows through the trip coil to monitor the circuit continuity which is not large enough to actuate the trip coil armature. Since the current through the shunt trip coils is interrupted when the breaker trips, energization of

the shunt trip coil is only momentary. The maximum available voltage occurs during a battery equalizing charge at a maximum voltage of 115% of the nominal voltage. Due to the short duty cycle of the shunt trip coil, it can operate at this overvoltage condition without harmful effects.

The added shunt trip circuitry is powered from the reactor protection logic voltage supply (48 Vdc). Components in the added shunt trip circuitry have been selected based on their ability to perform their intended function up to 115% of nominal voltage. The reactor protection logic voltage is provided with overvoltage protection set at 115% of nominal voltage.

Based on our review, we conclude that appropriate consideration has been given to the aspects of the design described above and the design is, therefore, acceptable.

3. Verify that the relays added for the automatic shunt trip function are within the capacity of their associated power supplies and that the relay contacts are adequately sized to accomplish the shunt trip function. If the added relays are other than the Potter & Brumfield MDR series relays (P/N 2383A38 or P/N 955655) recommended by Westinghouse, provide a description of the relays and their design specifications.

The added relays for the automatic trip function are Potter and Brumfield MDR series relays P/N 955655. Westinghouse has verified that the relay contacts are adequately sized for the shunt trip function and are within the capacity of their associated power supplies. We find this to be acceptable.

4. State whether the test procedure/sequence used to independently verify operability of the undervoltage and shunt trip devices in response to an automatic reactor trip signal is identical to the test procedure proposed by the Westinghouse Owners Group (WOG). Identify any differences between the WOG test procedure and the test procedure to be used and provide the rationale/justification for these differences.

The applicant states that the test procedures used to independently verify operability of the UV and shunt trip devices will be written and in place prior to fuel load. The procedures submitted by the WOG will be referenced during the development of its procedures. No major deviations from the WOG procedures are anticipated. We find this commitment to be acceptable.

5. Verify that the circuitry used to implement the automatic shunt trip function is Class 1E (safety related), and that the procurement, installation, operation, testing and maintenance of this circuitry will be in accordance with the quality assurance criteria set forth in Appendix B to 10 CFR Part 50.

The applicant confirmed that the circuitry used to implement the automatic shunt trip function is Class 1E (safety related) and the procurement, installation, operation, testing and maintenance of this circuitry will be in accordance with the Westinghouse and South Texas project quality assurance procedures which satisfy the quality assurance requirements of Appendix B to 10 CFR Part 50. We find this to be acceptable.

6. Verify that the shunt trip attachments and associated circuitry are/will be seismically qualified (i.e., be demonstrated to be operable during and after a seismic event) in accordance with the provisions of Regulatory Guide 1.100, Revision 1 which endorses IEEE Standard 344, and that all non-safety related circuitry/components in physical proximity to or associated with the automatic shunt trip function will not degrade this function during or after a seismic event.

The applicant states that all components of the shunt trip and associated circuitry are incorporated within the reactor trip switchgear cabinets and are seismically qualified. We find this to be acceptable.

7. Verify that the components used to accomplish the automatic shunt trip function are designed for the environment where they are located.

The applicant notes that the components used to accomplish the automatic shunt trip function are designed for the environment where they are located. We find this to be acceptable.

8. Describe the physical separation provided between the circuits used to manually initiate the shunt trip attachments of the redundant reactor trip breakers. If physical separation is not maintained between these circuits, demonstrate that faults within these circuits cannot degrade both redundant trains.

The applicant confirmed that physical separation is maintained between redundant trains in the main control board, reactor trip switchgear and reactor protection logic for the shunt trip circuitry. Dual section manual reactor trip switches, with metal barriers between redundant train decks, are provided on the main control board. Shunt trip attachments interposing relays and their associated terminal blocks are mounted in separate metal enclosures. The reactor protection logic outputs for energizing the shunt trip interposing relays are housed in existing separate metal enclosures. Physical separation for field cabling between the redundant trains is maintained. We find this meets the requirement of Regulatory Guide 1.75 and is, therefore, acceptable.

9. Verify that the operability of the control room manual reactor trip switch contacts and wiring will be adequately tested prior to startup after each refueling outage. Verify that the test procedure used will not involve installing jumpers, lifting leads, or pulling fuses and identify any deviations from the WOG procedure. Permanently installed test connections (i.e., to allow connection of a voltmeter) are acceptable.

The applicant states that the test procedures will be written to verify the operability of control room manual reactor trip switch contacts and wiring prior to startup after each refueling outage. The test procedures will not involve installing jumpers, lifting leads, or pulling fuses. We find this to be acceptable.

10. Verify that each bypass breaker will be tested to demonstrate its operability prior to placing it into service for reactor trip breaker testing.

The applicant states that the Technical Specifications were revised to include testing of the bypass breaker prior to placing it into service for reactor trip breaker testing. We find this to be acceptable.

11. Verify that the test procedure used to determine reactor trip breaker operability will also demonstrate proper operation of the associated control room indication/annunciation.

The applicant notes that the revised test procedures used to determine reactor trip breaker operability will demonstrate proper operation of the associated control room indication/annunciation. We find this to be acceptable.

12. Verify that the response time of the automatic shunt trip feature will be tested periodically and shown to be less than or equal to that assumed in the FSAR analyses or that specified in the technical specifications.

The applicant states that Westinghouse has prepared a report of the reactor trip breaker UVTA and STA life cycle test which concludes that periodic testing for STA can be limited to verifying that it can trip the breaker with 70 Vdc (minimum design voltage). Therefore, periodic testing of the automatic shunt trip feature response time is not required. We find this to be acceptable.

13. Propose technical specification changes to require periodic testing of the undervoltage and shunt trip functions and the manual reactor trip switch contacts and wiring.

The applicant has submitted the proposed Technical Specification changes to require periodic testing of the undervoltage and shunt trip functions and the

manual reactor trip switch contacts and wiring. We find this to be in accordance with G.L. 85-09 and is therefore, acceptable. However, the applicant has added ACTION 11 to Table 3.3-1, but failed to reference it in Item No. 19. Therefore, it is required that the applicant add ACTION 11 to Item No. 19 of Table 3.3-1.

CONCLUSION

Based on the review of the licensee's response to the plant specific questions identified in the staff's evaluation of the Owner's Group generic design modifications, we find that the modifications are acceptable.