TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401
400 Chestnut Street Tower II

August 27, 1984

Director of Nuclear Reactor Regulation
Attention: Ms. E. Adensam, Chief
Licensing Branch No. 4
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Ms. Adensam:

In the Matter of the	)	Docket Nos. 50-327
Tennessee Valley Authority	)	50-328

By my November 7, 1983 letter to you, TVA provided a response for the Sequoyah Nuclear Plant to NRC Generic Letter 83-28, "Required Actions Based on Generic Implications of Salem ATWS Events." TVA's response to Generic Letter 83-28 did not address the NRC Staff's request for additional information identified in the Safety Evaluation Report (SER) issued by the NRC. Enclosed is the response to each of the items specified in the SER.

The SER was transmitted to the Westinghouse Owners Group (WOG) by the August 10, 1983 letter from D. G. Eisenhut to J. J. Sheppard (Chairman of the WOG) and subsequently distributed by the WOG to obtain utility responses to the NRC concerns. Even though TVA is a member of the WOG, we do not consider this method of obtaining utility response to NRC concerns to be appropriate. We believe that the NRC should have issued either a direct request to each utility or a supplement to Generic Letter 83-28.

If you have any questions concerning this matter, please get in touch with Jerry Wills at FTS 858-2683.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L. M. Mills

L. M. Mills, Manager
Nuclear Licensing

Sworn to and subscribed before me this 27th day of Aug. 1984.

Bryant M. Lowery
Notary Public

My Commission Expires 4/8/86

Prod Aperture Card Dist
A055 1/1
Drawing To: C. Stahle

Enclosure

cc: U.S. Nuclear Regulatory Commission (Enclosure)
Region II
Attn: Mr. James P. O'Reilly, Regional Administrator
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30323

ENCLOSURE

GENERIC LETTER 83-28
TVA Response to NRC Request for Additional Information
Specified in NRC SER on Westinghouse Generic Modification
for Reactor Trip System
SEQUOYAH NUCLEAR PLANT

NRC Question 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.

TVA Response

The auto shunt trip panel schematic and wiring diagram (Westinghouse drawing No. 5359C24) is attached. The reactor trip switchgear schematic drawings will be submitted to TVA under contract with Westinghouse and will be provided at a later date.

NRC Question 2

Identify the power sources of 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 nonclass 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 undervoltage coil and the parallel shunt trip actuation relay.

TVA Response

A. Power Supplies

The power sources for the shunt trip coils are as follows:

Unit 1 reactor trip switchgear train A - 125V vital battery board I
Unit 1 reactor trip switchgear train B - 125V vital battery board II
Unit 2 reactor trip switchgear train A - 125V vital battery board III
Unit 2 reactor trip switchgear train B - 125V vital battery board IV

In addition to the battery boards being class 1E components, all nonclass 1E components powered from the boards are isolated from the board by qualified isolators. Since the class 1E circuitry provided to the shunt trip is separated from nonclass 1E circuitry, credible faults within nonclass 1E circuitry will not degrade the shunt trip function.

B. Indication

Main control room annunciation is provided upon trip of any 125V dc breaker in the battery board. Also, undervoltage and overvoltage annunciation is provided for the shunt trip circuit's 125V dc power source. Annunciation is provided for the loss of any one of the two 48V dc power supplies in each train (for undervoltage trip circuit) of the solid-state protection system (SSPS).

Existing indications on the main control board for breaker operation are the red and green position lights. These lights are powered from the same fused 125V dc supply used for closing and shunt tripping the circuit breakers. The green light being on indicates that the breaker is open and power is available for closing and tripping the breaker. The red light indicates that the breaker is closed. Since the red light is connected in series with the shunt trip coil and an "a" auxiliary contact, the red light also indicates that power is available to the shunt trip device and that there is circuit continuity in the shunt trip coil. This provides an indication that the shunt trip coil is ready to perform its function when required.

C. Overvoltage Conditions

The added shunt trip circuitry (undervoltage trip circuit) is powered from the reactor protection logic power supply. The reactor protection logic power supply consists of two redundant 48V dc power supplies for each train of the SSPS. Components in the added shunt trip circuitry have been selected based on their ability to perform their intended function up to a voltage as high as approximately 115 percent of nominal voltage. The overvoltage protection in each redundant reactor protection logic power supply is set at 115 percent of nominal voltage (48V dc). Circuit malfunctions resulting in an overvoltage condition higher than 115-percent nominal voltage will result in the loss of that power supply. If both 48V dc power supplies are lost in a single train, the power to the undervoltage coil will be lost resulting in a reactor trip.

The shunt trip coils in the reactor trip breakers are powered from 125V dc via the station batteries. Since the shunt trip coils are powered from the 125V dc vital power system, their supply voltage will temporarily rise to the battery equalize potential (140 volts). The shunt trip coils are normally deenergized, and therefore not affected by overvoltage conditions. If an overvoltage condition is present when the shunt trip coil is energized, the higher potential will increase the current and magnetic force in the coil which will cause quick release of the breaker trip mechanism.

The undervoltage trip and shunt trip circuits have separate and diverse power sources; therefore, they are not subject to a common overvoltage condition.

NRC Question 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 Potter and Brumfield MDR series relays (P/N 2383A38 or P/N 955655) recommended by Westinghouse, provide a description of the relays and their design specifications.

TVA Response

The relay contacts are adequately sized for the shunt trip function and are within the capacity of their associated power supplies. The added relays are Potter and Brumfield MDR series relays, P/N 955655.

NRC Question 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.

TVA Response

The steps used to independently confirm the operability of the undervoltage trip and the shunt trip devices in response to a manual reactor trip signal are the same as the procedure submitted by the (WOG). Maintenance Instruction (MI) 10.9 for the undervoltage trip and for the shunt trip is the procedure for testing the operability of these devices. This MI is scheduled every six months to verify such operability. Automatic reactor trip functional test from the solid state protection system will be incorporated in the IMI-99, FT-19 instruction. These two steps could be removed, but verifying which relay operated the trip bar would not be possible. Administrative controls, by use of a second party return to normal verification, will ensure that the jumpers are removed and the fuses are replaced.

NRC Question 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.

TVA Response

Additional circuitry required to implement the automatic shunt trip feature is class 1E as well as all associated circuitry required to interface with this additional circuitry. The procurement, installation, operation, testing, and maintenance of this circuitry will be accomplished in accordance with TVA's approved quality assurance program and the Sequoyah-specific quality assurance procedures which satisfy 10 CFR Part 50, Appendix B requirements.

NRC Question 6

Verify 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.

TVA Response

The shunt trip coils and automatic shunt trip actuation circuitry panels are being seismically qualified by Westinghouse in accordance with IEEE 344-1975. Non-safety-related circuitry is isolated from the safety-related circuitry by qualified isolators such that no fault on the non-safety side will degrade safety-system functioning. In addition, the shunt trip circuitry is located within the class 1E reactor trip switchgear which is seismically qualified and contains no non-safety-related components. Physical separation between the redundant circuitry within the reactor trip switchgear is maintained by the methods identified in response to question 8.

NRC Question 7

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

TVA Response

The reactor trip switchgear is located in the control rod drive equipment room. The normal and abnormal environment conditions are enveloped by the generic design conditions described to the NRC in J. J. Sheppard's letter to D. G. Eisenhut dated June 13, 1983. The shunt trip coils and the automatic shunt trip panels are being environmentally qualified by Westinghouse in accordance with IEEE 323-1974.

NRC Question 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.

TVA Response

TVA uses the following methods in maintaining physical separation in the main control board, reactor trip switchgear, and reactor protection logic for the shunt trip circuitry:

1. Dual section manual reactor trip switches with metal barriers between redundant train switch decks.

2. Metal braid enclosed cabling used for train A and train B wiring where a 6-inch gap is not maintained.

3. Shunt trip attachments interposing relays and their associated terminal blocks mounted in separate metal enclosures.

4. Reactor protection logic outputs for energizing the shunt trip interposing relays are housed in existing separate metal enclosures.

5. Field cabling from the main control board and reactor protection logic to redundant train A and train B reactor trip switchgear is routed as train A and train B circuits.

6. Coil to contact isolation within reactor trip switchgear.

NRC Question 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 to a voltmeter) are acceptable.

TVA Response

The control room manual reactor trip switch contacts and wiring will be functionally tested before startup after each refueling outage by the performance of IMI-99, FT-18. Unlike the WOG procedure, jumpers are installed and fuses are removed only to obtain a more foolproof test than the WOG procedure.

(1) Jumpers are installed to prevent the UV relay from operating while the shunt trip coil is being tested.

(2) Fuses are removed to the shunt trip coil to prevent its operation while the UV coil is being tested.

NRC Question 10

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

TVA Response

Before performing the reactor trip breaker test during power operation, the operability of the bypass breaker required for the test is verified by performing IMI-99 FT-19.

NRC Question 11

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

TVA Response

IMI-99 FT-18 will also demonstrate proper operation of the associated control room indication/annunciation.

NRC Question 12

Verify that the response time of the automatic shunt trip feature will be teted periodically and shown to be less than or equal to that assumed in the FSAR analyses or that specified in the Technical Specifications (T/S).

TVA Response

SI-227 currently verifies all reactor trip response times. This procedure will be revised to response time test the automatic shunt trip function before startup after the new feature has been added.

NRC Question 13

Proppse T/S (Technical Specification) changes to require periodic testing of the undervoltage and shunt trip functions and the manual reactor trip switch contacts and wiring.

TVA Response

Currently, the T/S require a functional test of both automatic and manual reactor trip functions before startup; therefore, there are not plans to revise T/S.

DOCUMENT PAGE PULLED

* OVERSIZE DUPLICATE DRAWINGS

SEE APERTURE CARDS

APERTURE CARD NO# 8406220271

AVAILABILITY PDR (CF) HOLD

NUMBER OF PAGES. 1

ADDITIONAL APERTURE CARD NUMBERS BELOW.