



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

SAFETY EVALUATION REPORT BY OFFICE OF SPECIAL PROJECTS

EMPLOYEE CONCERN ELEMENT REPORT 23511

"CONTROL SWITCH MALFUNCTION GIVES OPERATOR MISLEADING

INDICATION OF VALVE POSITION"

TENNESSEE VALLEY AUTHORITY

SEQUOYAH NUCLEAR POWER PLANT, UNITS 1 AND 2

DOCKET NOS. 50-327/328

I. SUBJECT

Category: Engineering (20,000)  
Subcategory: Electrical Safety (23,600)  
Element: Control Switch Malfunction Gives Operator  
Misleading Indication of Valve Position  
(23511)  
Employee Concern: ECTG-3

Element Report 23511, Revision 2 prepared March 31, 1987, involves an employee concern stating "Valve wiring circuits allow red and green lights to operate at reduced voltage and light dimly, if at all, upon a malfunction of the P-auto contact of the Westinghouse W-2 control switch on the unit control board."

II. SUMMARY OF ISSUE

The concern is that a W-2 switch malfunction could cause a misleading indication of valve position. The problem was first identified for TVA plants in the Black and Veatch Findings Report for Watts Bar (finding 112 10/27/82). Additionally, NRC IE Bulletin 80-20 alerted TVA to the potential for W-2 switch malfunction. TVA's response to NRC regarding compliance to IE Bulletin 80-20 stated that TVA would test and modify all safety related equipment utilizing W-2 switches.

TVA's response to the NRC on Bulletin IE 80-20 included an option, based on a Westinghouse recommendation, to replace W-2 switches with new W-2 switches manufactured under a new process. After discussions with the NRC, Westinghouse reversed its position and eliminated the W-2 switch replacement option. The

reversal made necessary a revised final response by TVA as discussed in a TVA memo from Raulston to Mills, April 5, 1982. However, no record could be found that a revised response had been submitted to NRC.

Although the option for replacement of the original W-2 switches with new W-2 switches had been rejected, TVA did replace certain W-2 switches with new switches manufactured by Electroswitch. Neither drawings nor other documentation could be found for the switch replacement nor could evidence be found that a revised final response had informed the NRC of the switch replacement. As a result of the wiring change, the sneak circuit was introduced inadvertently. A sneak circuit can be defined as a path for electrical current, not intended by the circuit designer, and which causes unexpected and, usually, unacceptable circuit functioning. In this case, the sneak circuit could only exist if the W-2 switch contact, normally closed in neutral position, would fail open, causing the valve position indicating lights to dim. The sneak circuit was later identified by Black and Veatch on October 27, 1982, and was corrected by revision of ECN L5591. Design drawing revisions to eliminate the sneak circuit were completed June 8, 1984.

A TVA evaluation team found several discrepancies in the counting of W-2 switches and no evidence could be found of a program to prevent the recurrence of this problem in the future through possible circuit modifications.

TVA has committed to a number of steps which will be completed prior to restart:

1. TVA will add a cautionary note to the switch contact development drawing to prevent future applications or replacement of W-2 switches or in the introduction of sneak circuit paths.
2. TVA will identify all W-2 switches in safety related circuits.
3. TVA will review each type W-2 switch application to ensure that all failures which could result from spring return to neutral or sneak circuit will be detectable by the operators.
4. TVA will notify all plant operators of the possible failure mode of the W-2 switches and the effect on control board status indication.

TVA has committed to a number of steps, including the following corrective actions which will be completed post restart:

1. Revise the response to NRC IE Bulletin 80-20 to address the Reversal of the Westinghouse Position and the replacement of W-2 switches with Electroswitch Switches.
2. Establish as-designed and as-constructed status listing of switch circuits.

3. Revise the ECN L5591 to ensure inclusion of all applicable safety related switches and complete the actions required by ECN L5591.
4. Verify that there are no switches with a sneak circuit path.

### III. EVALUATION

NRC and its consultant, SAIC, reviewed the employee concern and prepared a request for additional information (RAI). The RAI requested clarification of several TVA review efforts and requested a forecast completion date for the implementation of corrective action. TVA provided additional information to NRC in an August 13, 1987, TVA to NRC letter. TVA committed to review all W-2 switch applications and to advise operators of any switches which require modifications. TVA committed to completing all reviews and modifications by April 1988. Additionally, TVA will perform continuity checks every 31 days for switches requiring modifications and will advise operators about the potential misleading information from these switch indicators.

### IV. CONCLUSION

Based on our review, we find TVA's investigation, evaluation and the corrective action plans to resolve the employee concern as described in EN-23511 SQN, Rev. 2 acceptable and believe that implementation of these corrective actions will close the issue. Verification of corrective actions which TVA has identified as a restart item should be verified by NRC inspectors in a future inspection.