



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

ENCLOSURE 2

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
SUPPORTING AMENDMENT NO. 180 TO FACILITY OPERATING LICENSE NO. DPR-52

TENNESSEE VALLEY AUTHORITY

BROWNS FERRY NUCLEAR PLANT, UNIT 2

DOCKET NO. 50-260

1.0 INTRODUCTION

The Tennessee Valley Authority, (TVA or the licensee) by letter May 24, 1990 submitted a request to change the Browns Ferry Nuclear Plant (BFN) Technical Specifications (TS) for Unit 2. The NRC reviewed the submittal and by letter dated August 17, 1990 requested additional information. TVA responded to the NRC's request on September 17, 1990 by letter. A summary of the proposed changes to reactor pressure measurement instruments, used for inter-system LOCA protection, are as follows:

- o The pressure switches, that are classified as non-Class 1E, are to be replaced with Class 1E pressure switches.
- o The pressure switches, that have two micro switch contacts, are to be replaced with pressure switches with one micro switch contact, and the pressure switches micro switch contact number 1 function is to be eliminated.
- o The pressure switches' range is 50 to 1200 psig. This range is to be changed to 20 to 180 psig.
- o The functional surveillance frequency, of once every month, is to be changed to once every three months.
- o The calibration surveillance frequency of once every three months, is to be changed to once every 18 months.

TVA did not propose changes to the pressure switches setpoint settings.

2.0 BACKGROUND

Pressure switches, 2-PS-68-93 and 2-PS-68-94, used to measure reactor pressure, have two sets of contacts. The number 2 contact is used as a bistable input to a control logic for protection of the reactor pressure boundary interconnection to the RHR system. This pressure boundary protection is accomplished by the control logic providing; (1) an automatic isolation signal for closing RHR pumps suction outboard/inboard reactor isolation valves, 2-FCV-74-47 and 2-FCV-74-48, whenever reactor pressure is 100 psig or greater, thus isolating the shutdown cooling system from the reactor vessel, and (2) a permissive to allow opening the valves whenever the reactor pressure is less than 100 psig. The isolation function protects the shutdown cooling system, that has a maximum

allowable pressure of 133 psig, and prevents an inter-system loss-of-coolant-accident (LOCA).

The pressure switch contact number 1 is used as a bistable input to a control logic that provides a permissive signal in conjunction with other interlocks, to allow opening of the RHR pump outboard discharge valves 2-FCV-84-53 and 2-FCV-74-67. The contact closes on decreasing reactor pressure of 100 psig or less.

The present switches have an adjustable set point range from 50 to 1200 psig and are classified as non-Class 1E. The bistable input contacts open and close at a setpoint of 100 plus or minus 15 psig. As a result of the wide range of the switches excessive drift has caused unacceptable instrument accuracy in the lower pressure ranges.

### 3.0 EVALUATION

TVA proposed replacement of the non-Class 1E pressure switches with Class 1E Static-O-Ring (SOR) type, with a setpoint range of 20 to 180 psig and an accuracy of 1 percent of the upper limit. However, the Class 1E pressure switches can only be purchased with one contact. TVA proposed to eliminate the functional requirement of pressure switch contact number 1 which is used as a permissive open interlock for valves 2-FCV-74-53 and 2-FCV-74-67 described in the above paragraph. The references to pressure switch 2-PS-68-93 and 2-PS-68-94 contact number 1 on TS Table 3.2.B and Table 4.2.B are to be deleted.

In the September 17, 1990 letter, TVA states: "The contacts provided a low reactor pressure permissive for isolation valves 2-FCV-74-53 and 2-FCV-74-67, which is not necessary since the permissive signal to these valves is also provided whenever valves 2-FCV-74-47 and 2-FCV-74-48 are in the open [not fully closed] position. These valves, 2-FCV-74-47 and 2-FCV-74-48, cannot be opened unless reactor pressure is below 100 psig. The removal of switch contact number 1 in effect provides a permanent low pressure permissive since the contacts are replaced with a jumper."

The NRC's evaluation of the opening logic for valves 2-FCV-74-53 and 2-FCV-74-67 indicates that all of the following signals are required to be satisfied to open the valves:

- o Valve 2-FCV-74-47 is not fully closed.
- o Valve 2-FCV-74-48 is not fully closed.
- o The reactor pressure must be 100 psig or less.
- o A containment isolation signal (CIS) must not be present.

The logic for opening valves 2-FCV-74-53 and 67 is; (1) the unit is in the shutdown mode with the RHR suction valves open [not fully closed], (2) the reactor pressure is 100 psig or less, and (3) no containment isolation system (CIS) signal is present and, therefore, the valves may be opened by the operator from the control room. In the revised circuit, the reactor low pressure permissive has been eliminated.

The staff's review of the schematic diagrams indicates that pressure switch 2-PS-68-93 contact number 2 closes on reactor pressure above shutdown pressure [greater than 100 psig], which causes relay 10A-K97A to be energized and that relay causes relay 10A-K98A to be energized. Relay 10A-K98A "a" contact is connected to the shutdown cooling suction valve 2-FCV-74-48, motor started closing circuit, and the "b" contact is connected to the opening circuit. Therefore, the valve 2-FCV-74-48 can not be opened unless the reactor pressure is 100 psig or less and the valve will be automatically closed if the reactor pressure is greater than 100 psig. Pressure switch 2-PS-68-94 contact number 2 functions similarly to valve 2-FCV-74-47.

Based on the above review, the NRC concludes that pressure switch 2-PS-68-93 and 2-PS-68-94 contact number 1 requirements may be eliminated and references to this function may be removed from the TS without a decrease of safety function.

The new pressure switch instrument numbers are to be added to Table 4.2.A as part of this amendment. The licensee's September 17, 1990 letter indicates a similar change to Table 3.2.A has been proposed in another amendment request submitted on August 6, 1990. While not a part of this amendment, the NRC staff supports the proposed change to Table 3.2.A as well.

TVA proposed to change the functional test interval from once each month to once every three months, and the calibration test interval from once every three months to once every 18 months. TVA justified the increase in the functional test surveillance interval and the calibration test interval because the new Class 1E Static-O-Ring (SOR) pressure switches have improved reliability and accuracy.

TVA stated in their September 17, 1990 letter that, "Although the pressure switches are not required to operate during a 10 CFR 50.49 event, the purchased pressure switches have been subjected, by the vendor, to mechanical aging by cycling the units 33,000 times at the upper adjustable limit and exposing the unit to the LOCA environment to determine the effect on the switch performance. The vendor has successfully demonstrated the switch capability to withstand the test conditions. The anticipated duty cycle would be the quarterly functional testing cycle and number of plant shutdowns." TVA considered a duty cycle of ten per year as being a conservative number.

The NRC concurs that the SOR pressure switches purchased have increased reliability and accuracy. TVA has reduced the range of the instrument from 50 to 1200 psig to 20 to 180 psig. The vendor's repeatability accuracy is one percent of 180 psig or 1.8 psig from setpoint. This gives more accuracy and better stability near the 100 psig setpoint. The setpoint value in the TS is 100 psig plus or minus 15 psig and has not been changed. Furthermore, the setpoint is 80 psig from either the upper or lower range of the instrument which is also a more accurate setting.

TVA has performed a Setpoint and Scaling Calculation to determine the accuracy of the instrument loops. This accuracy was compared to the required accuracies to assure sufficient margin between the setpoints, the operating limits and the safety limits. The staff review of the calculation indicated that TVA addressed errors associated with the following:

- o repeatability
- o drift
- o temperature
- o over-pressurization
- o radiation
- o reading test equipment
- o seismic
- o water leg

The vendor's errors are extrapolated to 18 months plus 25%, which is 22 1/2 months. This is the maximum calibration interval. The NRC concludes that the TS increase in surveillance interval for the functional test and calibration does not decrease the safety function of the instruments.

The NRC concludes that the present pressure switches contact number 1 requirement may be eliminated and all references may be removed from the TS. The pressure switches are properly identified in the TS. The increase in surveillance of the pressure switches is acceptable; (1) functional test frequency from once every month to once every three months and (2) calibration test frequency from once every three months to once every eighteen months.

#### 4.0 ENVIRONMENTAL CONSIDERATION

This amendment involves a change to a requirement with respect to the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes to the surveillance requirements. The staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that this amendment involves no significant hazards consideration and there has been no public comment on such finding. Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement nor environmental assessment need be prepared in connection with the issuance of the amendment.

#### 5.0 CONCLUSION

The Commission made a proposed determination that the amendment involves no significant hazards consideration which was published in the Federal Register (55 FR 32332) on August 8, 1990, 1990 and consulted with the State of Tennessee. No public comments were received and the State of Tennessee did not have any comments.

The staff has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security nor to the health and safety of the public.

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Dated: December 10, 1990