TENNESSEE VALLEY AUTHORITY
CHATTANOOGA, TENNESSEE 37401
5N 157B Lookout Place

MAR 18 1988

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Gentlemen:

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

SEQUOYAH NUCLEAR PLANT (SQN) UNITS 1 AND 2 - OFFICE OF INSPECTION AND ENFORCEMENT BULLETIN (IEB) 86-02 - STATIC "O" RING DIFFERENTIAL PRESSURE SWITCHES

Reference: TVA letter to NRC dated November 7, 1986

Enclosure 1 provides a supplemental response to the subject bulletin for SQN. This response updates TVA's previous response to reflect completion of previously addressed SQN actions and to clarify response to specific bulletin requirements. Completion of some activities only pertains to unit 2; however, the general bulletin response is applicable to both units 1 and 2 as indicated. The entire original response and supplemental response to items 3, 5, and 6 are provided. Original responses are identified by response headings.

Enclosure 2 lists outstanding commitments made in enclosure 1.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

M J Ray for

R. Gridley, Director
Nuclear Licensing and
Regulatory Affairs

Enclosures
cc: See page 2

IE11
1/1

U.S. Nuclear Regulatory Commission MAR 18 1988

cc (Enclosures):
Mr. K. P. Barr, Acting Assistant Director
for Inspection Programs
TVA Projects Division
U.S. Nuclear Regulatory Commission
Region II
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30323

Mr. G. G. Zech, Assistant Director
for Projects
TVA Projects Division
U.S. Nuclear Regulatory Commission
One White Flint, North
11555 Rockville Pike
Rockville, Maryland 20852

Sequoyah Resident Inspector
Sequoyah Nuclear Plant
2600 Igou Ferry Road
Soddy Daisy, Tennessee 37379

ENCLOSURE 1

SUPPLEMENTAL RESPONSE TO
INSPECTION AND ENFORCEMENT BULLETIN (IEB) 86-02
SEQUOYAH NUCLEAR PLANT (SQN)

Item 1

"Within 7 days, submit a report on the extent to which SOR Model 102 or 103 differential pressure switches are installed (or planned) as electrical equipment important to safety, as defined in 10 CFR 50.49(b). Include in the report: the model number of the switch; the system in which it is installed (e.g., low pressure safety injection), the application of the switch (e.g., water level measurement, system flow measurement), and the function of the switch (e.g., control of minimum flow recirculation valve). A negative report, if appropriate, is required."

SQN's Response

Table 1 contains a listing by system, application, function, model number, and applicable technical specification for the SOR Model 103 differential pressure switches at SQN that are installed as electrical equipment important to safety, as defined in 10 CFR 50.49(b). There are no SOR Model 102 switches at SQN.

The upper head injection (UHI) level switches and the residual heat removal (RHR) flow switches operate at elevated static pressures. The component cooling system (CCS) switches operate at essentially atmospheric pressure. SQN has seven months of data showing no abnormal setpoint drift for these switches operating at atmospheric pressure. Because the issue of this bulletin is how these switches will perform at elevated static operating pressures, the CCS switches will not be discussed further.

Item 2

"Within 7 days, take positive action to assure that licensed reactor operators on duty are prepared for potential malfunctions of SOR switches."

SQN's Response

Licensed reactor operators have been informed of identified problems with SOR switches and the systems at SQN that have these switches. The operators are aware of the information contained in this report, and the shift engineer will be immediately informed should any calibration checks identify excessive setpoint drift. The need for special operator training is not necessary at this time.

Item 3

"Within 30 days, conduct a special test of each SOR switch to determine if the switch and system function properly or if short term corrective actions are necessary. The tests are to determine if the switches/ systems will respond acceptably on the first demand after being at system operating conditions for a period of time. The tests should be planned and conducted so as to minimize any potential adverse affects of the testing. If any corrective action includes the replacement of SOR switches with mechanical differential pressure switches by another manufacturer, the licensee should submit a technical justification, including a reliability demonstration. Repeat the special tests on a monthly basis until two consecutive successful tests are attained."

SQN's Original Response

This requirement is not applicable because SQN is not in operation. None of the identified switches have any operating experience. The UHI level switches were installed after the units were shut down in August 1985. The flow switches for the RHR system are being replaced with SOR Model 103 switches. The switches had not been delivered to SQN at the time this bulletin was issued.

The UHI level switches have been returned to SOR for modifications to enhance repeatability and reduce the possibility of setpoint shift. SOR has developed a higher quality finish for the cross shaft surface to reduce friction between the shaft and the O-rings. The switches will also be recalibrated and recertified to the required accuracy. The higher quality finish for the cross shaft will also be added to the RHR switches before shipment. All switches will be returned to SQN with proper documentation, a hydrostatic test procedure, test records, and a certificate of conformance. All switches will be installed before restart of their respective units.

SQN has also purchased and received two high-pressure, delta-P calibrators from SOR that will allow differential switch calibration at operating static pressures.

SQN's Supplemental Response

Since the time of TVA's previous response, the unit 2 RHR and UHI SOR 103 switches were modified by SOR to enhance repeatability and reduce possibility of setpoint shift; these refurbished RHR and UHI switches have been installed in SQN unit 2. Test equipment initially obtained from SOR was determined to be unacceptable for required application and was returned to SOR. Test equipment obtained from Volumetrics has been used to test the unit 2 RHR and UHI switches at elevated static pressures on a monthly basis since the fall of 1987 (two of four RHR switches were not tested in December 1987 because of operational conflicts).

Testing demonstrated acceptable switch actuation before unit 2 entry into a mode for which proper actuation requirements become applicable, i.e., before entry into mode 4 in February 1988. Installation and testing of the modified unit 1 RHR and UHI switches will be completed before unit 1 entry into mode 4.

Item 4

"Report failures in accordance with 10 CFR 50.72 and 10 CFR 50.73."

SQN's Response

No 10 CFR 50.72 or 10 CFR 50.73 reportable failures have occurred.

Item 5

"Within 60 days, develop, implement, and submit a written report describing your interim performance monitoring program to provide continuing assurance that the performance of the switches and plant systems remains acceptably reliable until long term corrective actions are fully implemented."

SQN's Original Response

Before unit 2 restart, surveillance instructions (SIs) will be prepared and implemented to check calibration of the UHI and RHR switches. The SIs will be performed monthly until the reliability of the switches is proven.

SQN's Supplemental Response

SIs have been revised and implemented for unit 2 to check/perform calibration of the UHI and RHR switches. Performance is initiated by a preventive maintenance (PM) package. Similar changes will be made to the unit 1 SIs before restart of that unit. Monthly testing will be performed when the switches are required operable to monitor switch performance and establish a sufficient data base to justify increasing the surveillance interval.

Item 6

"Within 60 days, submit a written report which describes the margin and basis for switch actuation. The report should also describe the long term corrective actions to be taken, including the implementation schedule, the impacts of potential common mode failures, and an analysis to demonstrate that the system involved will meet regulatory requirements and function reliably. The report should include specific information on the installed SOR switches: the manufacturer's specified range for the switch, the nominal and allowable values for the calibration setpoint in the Technical Specifications in the same terms as the manufacturer's specified range for the switch, the relative locations of the instrument taps for water level monitoring applications, sources of systematic errors such as the differences in elevations of the installation of condensing pots, and 'as found' and any subsequent test data for any switch that does not conform to the Technical Specifications or is otherwise unacceptable."

SQN's Original Response

SQN has no operating experience for the UHI and RHR switches. SOR is presently performing long-term testing to systematically check for common mode failures and to verify setpoint stability. Preliminary data indicates the setpoint shift to be within manufacturer's specifications. SQN will evaluate all test data and results at test completion.

Table 2 gives the ranges and setpoints for the UHI and RHR switches. The RHR switches have not yet been installed. Margin calculations for these switches will be completed before startup. The setpoint accuracies will be verified upon receipt of SOR test data. Attachment 1 contains TVA drawings that give details of instrument taps for the RHR and UHI switches.

SQN's Supplemental Response

Margin calculations have been performed for the RHR and UHI switches; the results are reflected in the revised Table 2. Setpoint accuracies were verified upon receipt of SOR test data. Modification of the switches, testing conducted to date by SOR, and periodic testing at SQN for these switches at elevated static pressures provide basis that required actuation will occur within the allowable margins. Long term, SQN will continue to perform monthly calibration checks for the RHR and UHI SOR switches to monitor switch performance and establish a sufficient data base to justify increasing the surveillance interval. Additionally, SQN will evaluate results of continuing SOR testing at test completion. Any future identified deficiencies will be addressed within TVA's Condition Adverse to Quality (CAQ) program.

This bulletin asked that determination of long-term corrective actions consider potential effects of common mode failures based upon worst observed shift in trip point from calibration setpoint. At this time, SQN-observed switch performance indicates actuation will reliably occur within the limits of established analysis and technical specifications; therefore, consideration of potential common mode failures is not applicable to the SQN installations for the purposes described in this bulletin.

The following discussion of effects of switch actuation failure is provided for information purposes only and is based on assumed switch failure. The redundant UHI level switches actuate to isolate the UHI system following UHI injection to prevent nitrogen cover gas from being introduced into the RCS. Premature actuation of the switches for at least one valve on each injection line would result in incomplete UHI injection; safety significance is not expected to be high in consideration of existing analysis for various plants that support deletion of UHI for accident mitigation. Late actuation could allow some introduction of nitrogen into the RCS following UHI actuation, which could impair natural circulation. This would require two opposite train switches for the same injection path to fail concurrently.
The RHR flow switches actuate to open or close the RHR pump miniflow valves to provide pump protection or ensure adequate injection flow respectively. Each miniflow valve has separate opening and closing circuit flow switches. Single switch failures will affect only one RHR pump, whereas multiple failures are required to affect both trains of RHR. Failure to actuate (open miniflow) on low flow could result in pump dead head damage. Failure to actuate (close miniflow) on high flow does not impact a safety function. Westinghouse has performed analyses for TVA that document that failure to close the miniflow valves does not result in inadequate RHR pump performance.

Table 1

System	Application	Function	Model No.	Applicable Technical Specification
Residual Heat Removal (RHR)	RHR Pump Minimum Flow 1-FS-74-12A, -24A 2-FS-74-12A, -24A 1-FS-74-12B, -24B 2-FS-74-12B, -24B	Provides valve signal for flow control in RHR minimum flow line (pump protection feature)	 103AS-B202 103AS-B202 103AS-B212 103AS-B212	3.5.2 and 3.5.3
Upper Head Injection (UHI)	UHI Level 1-LS-87-21, -22, -23, -24 2-LS-87-21, -22, -23, -24	Provides valve closure of low UHI tank level to prevent noncondensible gas from entering the RCS	103AS-BB203	3.5.1.2
Component Cooling System (CCS)	CCS Surge Tank Level 1-LS-70-209A, -209B, 2-LS-70-210A, -210B	Provides isolation between class C/ class G piping	103AS-BB212	3.7.3

Table 2

System	TVA Switch No.	Range (in. wtr col)	Calibration [1] Setpoint (in. wtr col)	Margin [2] (in. wtr col)
UHI	1-LS-87-21	30-200	122.02 ±2	2
UHI	1-LS-87-22	30-200	124.02 ±2	2
UHI	1-LS-87-23	30-200	122.02 ±2	2
UHI	1-LS-87-24	30-200	124.02 ±2	2
UHI	2-LS-87-21	30-200	129.18 ±2	2
UHI	2-LS-87-22	30-200	125.98 ±2	2
UHI	2-LS-87-23	30-200	129.18 ±2	2
UHI	2-LS-87-24	30-200	125.98 ±2	2
RHR	1-FS-74-12A	5-35	not installed	
RHR	1-FS-74-12B	7-100	not installed	
RHR	1-FS-74-24A	5-35	not installed	
RHR	1-FS-74-24B	7-100	not installed	
RHR	2-FS-74-12A	5-35	14.51 (693 gal/min) ±.45	6.96 (193 gal/min)
RHR	2-FS-74-12B	7-100	47.22 (1,250 gal/min) ±1.40	17.00 (250 gal/min) [3]
RHR	2-FS-74-24A	5-35	14.51 (693 gal/min) ±.45	6.96 (193 gal/min)
RHR	2-FS-74-24B	7-100	47.22 (1,250 gal/min) ±1.40	17.00 (250 gal/min) [3]

(1) The difference in UHI setpoints is related to the different elevations of the field-installed condensate pots.

(2) Margin is the difference between the setpoint and safety limit.

(3) The closing setpoint must be sufficiently high to ensure that adequate cooling flow is available to the RHR pump when the miniflow path is isolated. A closing setpoint of 1,250 gal/min provides sufficient flow margin to ensure that 500 gal/min is maintained after closure of the miniflow valve. The safety limit for this case is 1,000 gal/min (500 gal/min through the injection lines and 500 gal/min through the miniflow line). It is not necessary that the miniflow paths be isolated at higher flow conditions. Westinghouse analyses provided to TVA document that operation of the RHR pump with an open miniflow path will not result in RHR pump runout, insufficient flow to the core, or loss of suction pressure to "piggy-backed" injection pumps. Additionally, the reset point of the closing switch must be sufficiently high so that it does not inhibit the opening circuitry of the miniflow valves. Demonstrated Accuracy Calculation 1-FS-74-12B has been performed and indicates that the closing switch will not inhibit the function of the valve opening circuitry.

Attachment 1

TVA Drawings: 47W600-93 R11
47W600-276 R12

(The drawings are not resubmitted with this supplemental response)

Enclosure 2

COMMITMENTS

1. Installation and testing of the unit 1 RHR and UHI switches will be completed before unit 1 entry into mode 4.

2. Monthly testing will be performed when the switches are required operable to monitor switch performance and establish a sufficient data base to justify increasing the surveillance intervals.