TVA

Tennessee Valley Authority, Post Office Box 2000, Soddy-Daisy, Tennessee 37379

March 28, 1996

U.S. Nuclear Regulatory Commission
ATTN: 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) - SUPPLEMENTAL INFORMATION FOR TECHNICAL SPECIFICATION (TS) CHANGE 92-07

The enclosure to this submittal provides information requested by NRC during a telephone conversation held between TVA and NRC personnel on February 20, 1996. This information is related to TS Change Request 92-07 and provides the SQN methodology for determining the reactor coolant system loss-of-flow reactor trip setpoint. The associated flow correlation constants for the SQN elbow tap flow transmitters are also included.

Please direct questions concerning this issue to Keith Weller at (423) 843-7527.

Sincerely,

R. H. Shell

R. H. Shell
Manager
SQN Site Licensing

Enclosure
cc: See page 2

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cc (Enclosure):

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SEQUOYAH NUCLEAR PLANT (SQN)
REACTOR COOLANT SYSTEM (RCS) FLOW MEASUREMENT

NRC Question

Describe the SQN methodology for setting the RCS flow transmitter/indication and the RCS low flow reactor trip setpoint. If any "K" factors are involved, determine what the "K" values are and state how they were determined.

TVA SQN Response

The effects of a low leakage core pattern, elimination of bypass resistance temperature detectors, and hot leg streaming results in hot leg measurement difficulties in a precision calorimetric. Therefore, SQN utilizes a method of comparing RCS loop flow element elbow tap differential pressures to determine RCS flow rate, as recommended by Westinghouse Electric Corporation. Westinghouse data of elbow taps indicated that the differential pressures were repeatable and were not significantly impacted by corrosion or chemical buildup from cycle to cycle (Reference 1).

The methodology consists of:

1. The initial baseline Cycle 1 calorimetric from the start-up test program is used to determine a "K" value where $K = Q/(DP)^{0.5}$. These "K" values are listed in 1 and 2-SI-SXX-068-155.0 and are attached.

2. This "K" value is used to determine the full scale span of the 0-110% flow instrument loop where 100% flow is the Technical Specification (TS) Table 3.2.1 required flow (378,400 gallons per minute [gpm] / 4 loops = 94,600 gpm per loop). This TS Table 3.2.1 flow contains a 3.5% measurement uncertainty.

3. WCAP-11239, Revision 6 provides uncertainties and allowable values for the loss of flow reactor trip setpoint based on RCS elbow tap differential pressure comparisons. The safety analysis limit is 86.9% of the 91,400 gpm design flow, the TS allowable value is 89.4% of design flow and the nominal setpoint is 90% of design flow. TS Change 92-07 changes the allowable value to 89.6% of design flow. The flow measurement uncertainty of 3.5% is not included in these TS Table 2.2.1 requirements.

4. Paragraph 2 above indicates that 100% indicated flow is 94,600 gpm or 3.5% above the design flow of 91,400 gpm. This allows the reactor trip to occur at 90% indicated flow or 85,140 gpm. This results in a conservative high setting of the trip setpoint since the 100% indicated flow is 3.5% above design flow. The TS required trip setpoint is 90% of 91,400 gpm or 82,260 gpm.

5. The allowable value for reactor trip (including the more restrictive TS Change 92-07 requirements) is 89.6% of 91,400 gpm or 81,894 gpm.

References

1. Westinghouse letter TVA-91-349 to TVA dated November 6, 1991 (B25 911114 251)

2. TS Tables 3.2.1 and 2.2.1

3. WCAP-11239, "Westinghouse Setpoint Methodology for Protection Systems, Sequoyah Units 1 and 2, Egale-21 Version", Revision 6, dated December 1991

4. 1 and 2-SI-SXX-068-155.0, Appendix A, Data Sheet A-4

5. 10 CFR 50.59 Safety Assessment for SQN Unit 2 channel calibration procedures for the following:

2-SI-ICC-068-06A.1, R1	2-SI-ICC-068-48A.1, R1
2-SI-ICC-068-06B.2, R1	2-SI-ICC-068-48B.2, R1
2-SI-ICC-068-06D.3, R1	2-SI-ICC-068-48D.3, R1
2-SI-ICC-068-29A.1, R1	2-SI-ICC-068-71A.1, R1
2-SI-ICC-068-29B.2, R1	2-SI-ICC-068-71B.2, R1
2-SI-ICC-068-29D.3, R1	2-SI-ICC-068-71D.3, R1

UNIT 1
ELBOW TAP FULL SCALE ΔP SPAN

1-FT-68-	MMI TEST POINT	FLOW COEFFICIENT (K)	DESCRIPTION	FULL SCALE ΔP ("H_2O)
6A	F-414	5679.10	Loop 1 RCS Flow	335.74
6B	F-415	5590.30	Loop 1 RCS Flow	346.50
6D	F-416	5545.83	Loop 1 RCS Flow	352.07
29A	F-424	5626.24	Loop 2 RCS Flow	342.08
29B	F-425	5505.13	Loop 2 RCS Flow	357.30
29D	F-426	5333.06	Loop 2 RCS Flow	380.73
48A	F-434	5493.91	Loop 3 RCS Flow	358.76
48B	F-435	5493.04	Loop 3 RCS Flow	358.87
48D	F-436	5459.96	Loop 3 RCS Flow	363.24
71A	F-444	5117.16	Loop 4 RCS Flow	413.53
71B	F-445	5668.62	Loop 4 RCS Flow	336.99
71D	F-446	5582.65	Loop 4 RCS Flow	347.45

UNIT 2
ELBOW TAP FULL SCALE ΔP SPAN

2-FT-68-	MMI TEST POINT	FLOW COEFFICIENT (K)	DESCRIPTION	FULL SCALE ΔP ("H_2O)
6A	F-414	5486.41	Loop 1 RCS Flow	359.74
6B	F-415	5564.43	Loop 1 RCS Flow	349.73
6D	F-416	5424.51	Loop 1 RCS Flow	368.00
29A	F-424	5317.59	Loop 2 RCS Flow	382.95
29B	F-425	5201.25	Loop 2 RCS Flow	400.27
29D	F-426	5409.51	Loop 2 RCS Flow	370.04
48A	F-434	5623.24	Loop 3 RCS Flow	342.45
48B	F-435	5422.28	Loop 3 RCS Flow	368.30
48D	F-436	5236.38	Loop 3 RCS Flow	394.92
71A	F-444	5417.06	Loop 4 RCS Flow	369.01
71B	F-445	5421.93	Loop 4 RCS Flow	368.35
71D	F-446	5591.30	Loop 4 RCS Flow	346.37