Watts Bar Nuclear Plant (WBN) Unit 1

Pre-Submittal Meeting for Proposed Change Modify the Allowable Value for WBN Unit 1 Technical Specification Table 3.3.2-1, “Engineered Safety Feature Actuation System Instrumentation,” Function 6.e(1), “Auxiliary Feedwater - Trip of all Main Feedwater Pumps - Turbine Driven Main Feedwater Pumps”

February 8, 2022

TVA TENNESSEE VALLEY AUTHORITY

Agenda

- Opening Remarks
- Background
- Reason for the Proposed Change
- Description of the Proposed Change
- Calculation of New AV
- Technical Analysis for the Calculation of the New AV
- License Amendment Request (LAR) Schedule Milestones
- Closing Remarks

Opening Remarks

- Purpose of the meeting is to discuss a proposed change to the allowable value (AV) for WBN Unit 1 Technical Specification (TS) 3.3.2, “ESFAS Instrumentation,” Table 3.3.2-1, “Engineered Safety Feature Actuation System Instrumentation,” Function 6.e(1), “Auxiliary Feedwater - Trip of all Main Feedwater Pumps - Turbine Driven Main Feedwater Pumps.”
- Proposed TS change will revise the from “≥ 48 psig” to “≥ 43.3 psig” for consistency with the similar AV for WBN Unit 2 TS Table 3.3.2-1, Function 6.e(1).
- No hardware change to the instrument required for the proposed change.
- Proposed change is consistent with TVA setpoint methodology and NRC guidance.

Background

- The rational for the differences in the AVs between WBN Units 1 and 2 TS Table 3.3.2-1, Function 6.e(1) (i.e., ≥ 48 psig versus ≥ 43.3 psig) was explained in the TVA response to a Nuclear Regulatory Commission (NRC) Request for Additional Information (RAI) during the development of the initial WBN Unit 2 TS [see the response to NRC Question 10 in TVA letter to NRC, "Watts Bar Nuclear Plant, Unit 2 -Request for Additional Information Regarding Technical Specifications Changes Instrumentation and Controls Branch (TAC No. ME7713)," dated March 21, 2013 (ML13085A219)], which stated:
    - "The change to the Auxiliary Feedwater Trip of all Turbine Driven Main Feedwater Pumps Allowable Value was made to calculate the value in accordance with the requirements of TSTF-493. These instruments are not safety-related and thus have no Safety or Analytical Limits. The allowable value was calculated in Setpoint and Scaling calculation 2-PS-046-13 and -40 based on the methodology provided in TVA EEB-TI-28. This TI was provided to the NRC in Reference 4. The general FSAR discussion of setpoint methodology is provided in FSAR Section 7.1. NRC's review of the TVA Setpoint Methodology for the RTS is contained in SSER 23. NRC concluded that the methodology meets the relevant requirements of the SRP and is therefore acceptable. WBN Unit 1 has not updated to TSTF-493 methods and this is the reason for the differences. The specific TS values are not discussed in the FSAR, the TS Bases, or in an SSER."

Background

- As noted in Technical Specification Task Force letter to Members of the PWROG and BWROG Licensing Committees, TSTF-19-07, “Elimination of the Requirement to Adopt TSTF-493, "Clarify Application of Setpoint Methodology for LSSS Functions," dated June 18, 2019 (ML19267A158), the Technical Specification Task Force (TSTF) recommended that:
    - “The TSTF recommends that licensees not propose adding the TSTF-493 footnotes to instrument functions in LARs to revise Allowable Values. In the amendment request, licensees should describe how the methods used to calculate Allowable Values and to control as-found and as-left tolerances for the parameter of concern are consistent with RIS 2006-17.”
- Conformance with Regulatory Issue Summary (RIS) 2006-17, “NRC Staff Position on the Requirements of 10 CFR 50.36, ‘Technical Specifications,’ Regarding Limiting Safety System Settings During Periodic Testing and Calibration of Instrument Channels,” is addressed in TVA Branch Technical Instruction EEB-TI-28, "Setpoint Calculations,“ which was provided to the NRC in TVA letter to NRC, "Watts Bar Nuclear Plant (WBN) Unit 2 - Transmittal of TVA EEB-TI-28, Branch Technical Instruction, 'Setpoint Calculations," dated May 13, 2010 (ML101380297 and ML101390102)

Background

- EEB-TI-28 was evaluated by the NRC as part of the licensing basis for WBN Unit 2 [see Section 7.1.3 to NUREG-0847, Supplement 23, “Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant, Unit 2 Docket Number 50-391,” dated July 2011 (ML11206A499)], which stated:
  - "By letter dated September 1, 2010 (ADAMS Accession No. ML102530216), TVA submitted WBN Unit 2 FSAR Amendment 100. In this amendment, TVA discussed in detail the setpoint methodology used by TVA and Westinghouse to calculate instrument setpoints for the RPS and the ESFAS. In response to staff questions about various aspects of the instrument setpoint methodology used by TVA and Westinghouse, TVA provided additional information by letter dated October 29, 2010 (letter open items 306 through 311; ADAMS Accession No. ML103120711). By letter dated December 17, 2010 (ADAMS Accession No. ML110070327), TVA incorporated the revised description of instrument setpoint methodologies used by TVA and Westinghouse into FSAR Amendment 102. TVA's description is consistent with Technical Specification Task Force (TSTF)-493, Revision 4, "Clarify Application of Setpoint Methodology for LSSS Functions," which was reviewed and accepted by the NRC staff by letter dated May 11, 2010 (ADAMS Accession No. ML100710442). TVA also stated in the FSAR that "Single-sided correction factors are not used in setpoint calculations within the scope of TSTF-493." Based on its review of WBN Unit 2 FSAR Amendment 102, the NRC staff concludes that the instrument setpoint methodology meets the guidance in RIS 2006-17 and RG 1.105."

Reason for the Proposed Change

- The proposed TS change aligns the AV for WBN Unit 1 TS 3.3.2, Table 3.3.2-1, Function 6.e(1) with the AV for Unit 2 TS 3.3.2, Table 3.3.2-1, Function 6.e(1).
- As discussed later in this presentation, TVA has evaluated the historical TS surveillance data for the pressure switches for WBN Unit 1 TS 3.3.2, Table 3.3.2-1, Function 6.e(1). This data indicates a number of occurrences where the as-found instrument values were outside the AV limit of 48 psig. TVA has utilized the Corrective Action Program to investigate these occurrences and determine a resolution to minimize these events. It was determined that the AV for this function was too limiting for the accuracy and repeatability of the switches for their TS nominal trip setpoint.

Description of the Proposed Change

Table 3.3.2-1 (page 5 of 7)
Engineered Safety Feature Actuation System Instrumentation

	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
6.	Auxiliary Feedwater (continued)						
	c. Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					
	d. Loss of Offsite Power	1, 2 ,3	4 per bus	F	Refer to Function 4 of Table 3.3.5-1 for SRs and Allowable Values		
	e. Trip of all Main Feedwater Pumps						
	(1) Turbine Driven Main Feedwater Pumps	1[(i)], 2	1 per pump	J	SR 3.3.2.8 SR 3.3.2.9 SR 3.3.2.10	≥ ~~4843~~.3 psig	50 psig
	and						
	(2) Standby Main Feedwater Pump	1, 2	1	P	SR 3.3.2.8 SR 3.3.2.10 SR 3.3.2.12	NA	NA

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Calculation of new AV

- The following calculation is in accordance with EEB-TI-28, which conforms to the guidance of RIS 2006-17. The following calculation is similar to that performed for the Sequoyah Nuclear Plant (SQN) Units 1 and 2 for a revision to the AV for the reactor trip system turbine trip on low fluid oil pressure function, which was approved by the NRC and determined to be in accordance with RIS 2006-17 (ML072550285). The manufacturer and model number for the SQN pressure switches are the same as the corresponding WBN Unit 1 pressure switches (United Electric J302-270 or J402-270).

Calculation of new AV

Normal Measurable Accuracy (Anf)

Per EEB-TI-28:

$Anf_{PS} = \sqrt{(Re_{PS}^2 + De_{PS}^2 + ICTe_{PS}^2 + Ab_{PS}^2 + ICRe_{PS}^2)}$ (Note 1)

Re_{PS} = 2.0 psig — Per vendor information

De_{PS} = 4.1 psig — Note 2

$ICTe_{PS} = Re_{PS}$ = 2.0 psig — Per EEB-TI-28

Ab_{PS} = 2 x Re_{PS} = 4.0 psig — Per EEB-TI-28

$ICRe_{PS} = Re_{PS}$ = 2.0 psig — Per EEB-TI-28

$Anf_{PS} = \sqrt{(2.0\ psig)^2 + (4.1\ psig)^2 + (2.0\ psig)^2 + (4.0\ psig)^2 + (2.0\ psig)^2}$

Anf_{PS} = 6.7 psig

$AV = SP_{PS} - Anf_{PS}$

Calculation of new AV

Normal Measurable Accuracy (Anf) (cont'd)

where:

Anf_{PS} = Normal Measurable Accuracy of the Pressure Switch

Re_{PS} = Reference Accuracy of the Pressure Switch

De_{PS} = Drift Error of the Pressure Switch (Note 2)

$ICTe_{PS}$ = Input Calibration Test Instrument Error for the Pressure Switch

Ab_{PS} = Acceptance Band of the Pressure Switch

$ICRe_{PS}$ = Input Calibration Test Instrument Reading Error for the Pressure Switch

SP_{PS} = Setpoint of the Pressure Switch

Calculation of new AV

Normal Measurable Accuracy (Anf) (cont'd)

SP_{PS} = 50 psig for TDMFWP Trip; therefore:

AV = 50 psig - 6.7 psig = 43.3 psig for TDMFWP Trip

Notes:

1. A similar equation in the LAR RAI response for SQN Units 1 and 2 (ML072150054) included TNe (normal temperature effects) to calculate Anf. TNe was removed from the calculation of Anf for WBN per Revision 9 of EEB-TI-28 to support RIS 2006-17 and because the pressures switches are not subject to seasonal temperature changes. The above equation was also used to calculate the corresponding AV for WBN Unit 2.
2. Drift, as calculated by statistical analysis, is defined as plus/minus 2.69% of full scale. This statistical analysis was performed using historical data from WBN and SQN. This statistical analysis does not separate drift, temperature, or any other environmental or time effects. Per EEB-TI-28, if alternate methods are used, the Normal Measurable Accuracy shall be small enough to detect abnormal channel performance. Therefore, it is conservative to use the Normal Measurable Accuracy value from the WBN demonstrated accuracy calculation that was calculated using the plus/minus 1.00% of full scale value for switch Acceptance Band. To accommodate this, Drift is defined as +/- 2.05% of full scale which equals 4.1 psi for a 0-200 psi span.

Technical Analysis for the Calculation of the new AV

- The WBN Unit 1 TS AV for the trip of the turbine driven main feedwater pump (TDMFWP) function is too limiting for the accuracy and repeatability of the switches (1 PS-46-13 and 1-PS-46-40) for their nominal trip setpoint in the TS.
- This trip/alarm is anticipatory because it is not credited any of the WBN dual-unit Updated Final Safety Analysis Report (UFSAR) Chapter 15 accident analyses. This system trip/alarm setpoint and AV are system generic values supplied by Westinghouse and are not specifically designed for application at WBN.
- Tables 1 and 2 show the out of tolerance (OOT) conditions for the WBN Unit 1 pressure switches. For comparison purposes, Tables 3 and 4 show the similar comparison data for the corresponding WBN Unit 2 pressure switches. Tables 1-4 also list the calibration values for Trip Setpoint, AAF (acceptable as found), and AAL (acceptable as left) for both units based on a head correction of -2.2 psig for WBN Unit 1 and -2.3 psig for WBN Unit 2. Note that only 1 out of 5 LO OOT and 4 out of 20 HI OOT values would have occurred if the WBN Unit 2 AAF limits had been used for WBN Unit 1.

Technical Analysis for the Calculation of the new AV

Table 1 Historical Calibration Data for WBN Unit 1 Pressure Switch 1-PS-46-13			
Data from 1-SI-3-25 (1-PS-46-13 - SW 1 - Alarm Only, Trip at 47.8 psig)			
Date	OOT (Y/N)	HI/LO	Reading (psig) (AAF: 45.8-49.8 psig)
3-29-99	Y	HI	50.0
9-28-00	N	N/A	47.5
3-14-02	N	N/A	49.5
10-10-03	N	N/A	49.3
3-15-05	Y	HI	51.3
10-30-06	N	N/A	48.5
3-9-08	Y	HI	51.5
10-10-09	Y	LO	45.7
5-5-11	Y	HI	50.0
9-25-12	N	N/A	49.3
4-18-14	Y	HI	51.0
10-7-15	N	N/A	48.7
4-14-17	N	N/A	47.6
9-26-18	Y	HI	54.9
5-12-20	N	N/A	46.5

Note: Each switch has two contacts but only switch contact 2 is a TS function, switch contact 1 is for alarm only. Accuracy is the same for both sets of contacts.

Technical Analysis for the Calculation of the new AV

Table 1 (cont'd) Historical Calibration Data for WBN Unit 1 Pressure Switch 1-PS-46-13			
Data from 1-SI-3-25 (1-PS-46-13 - SW 2 – Trip Interlock, Trip at 47.8 psig)			
Date	OOT (Y/N)	HI/LO	Reading (psig) (AAF: 45.8-49.8 psig)
3-29-99	Y	HI	50.2
3-14-02	N	N/A	49.5
10-10-03	N	N/A	47.4
3-15-05	N	N/A	49.0
10-30-06	N	N/A	47.0
3-9-08	Y	HI	53.2
10-10-09	N	N/A	47.9
5-5-11	Y	HI	50.0
9-25-12	N	N/A	48.6
4-18-14	Y	HI	51.0
10-7-15	N	N/A	46.0
4-14-17	N	N/A	48.4
9-26-18	Y	HI	54.7
5-12-20	N	N/A	46.8

Note: Each switch has two contacts but only switch contact 2 is a TS function, switch contact 1 is for alarm only. Accuracy is the same for both sets of contacts.

Technical Analysis for the Calculation of the new AV

Table 2 Historical Calibration Data for WBN Unit 1 Pressure Switch 1-PS-46-40			
Data from 1-SI-3-26 (1-PS-46-40 - SW 1 - Alarm Only, Trip at 47.8 psig)			
Date	OOT (Y/N)	HI/LO	Reading (psig) (AAF: 45.8-49.8 psig)
3-29-99	N	N/A	45.8
9-28-00	N	N/A	48.0
3-15-02	Y	HI	51.8
10-11-03	Y	LO	44.2
3-17-05	Y	HI	50.3
10-31-06	Y	LO	43.6
3-12-08	Y	HI	59.3
10-12-09	N	N/A	46.9
5-6-11	Y	HI	50.6
10-2-12	N	N/A	47.6
4-12-14	Y	LO	42.0
10-14-15	N	N/A	49.0
4-1-17	Y	HI	50.5
9-30-18	N	N/A	47.4
5-12-20	N	N/A	47.6

Note: Each switch has two contacts but only switch contact 2 is a TS function, switch contact 1 is for alarm only. Accuracy is the same for both sets of contacts.

Technical Analysis for the Calculation of the new AV

Table 2 (cont'd) Historical Calibration Data for WBN Unit 1 Pressure Switch 1-PS-46-40			
Data from 1-SI-3-26 (1-PS-46-40 - SW 2 - Trip Interlock, Trip at 47.8 psig)			
Date	OOT (Y/N)	HI/LO	Reading (psig) (AAF: 45.8-49.8 psig)
3-29-99	Y	HI	52.0
9-28-00	N	N/A	47.8
3-15-02	N	N/A	49.4
10-11-03	N	N/A	49.0
3-17-05	Y	HI	51.7
10-31-06	N	N/A	47.2
3-12-08	Y	HI	56.0
10-12-09	N	N/A	46.9
5-6-11	N	N/A	48.6
10-2-12	N	N/A	47.8
4-12-14	Y	LO	39.6
10-14-15	N	N/A	49.0
4-1-17	Y	HI	50.5
9-30-18	N	N/A	46.9
5-12-20	N	N/A	47.6

Note: Each switch has two contacts but only switch contact 2 is a TS function, switch contact 1 is for alarm only. Accuracy is the same for both sets of contacts.

Technical Analysis for the Calculation of the new AV

Table 3 - Historical Calibration Data For WBN Unit 2 Pressure Switch 2-PS-46-13			
Data from 2-SI-3-25 (2-PS-46-13 - SW 1 - Alarm Only, Trip at 47.7 psig)			
Date	OOT (Y/N)	HI/LO	Reading (psig) (AAF: 41.0-54.4 psig)
3-10-16	N	N/A	47.7
11-23-17	N	N/A	47.4
4-16-19	N	N/A	49.1
11-12-20	N/A	N/A	SW 1 has been deleted
Data from 2-SI-3-25 (2-PS-46-13 - SW 2 - Trip Interlock, Trip at 47.7 Psig)			
3-10-16	N	N/A	47.7
11-23-17	N	N/A	47.4
4-16-19	N	N/A	49.4
11-12-20	N	N/A	50.2

Note: Each switch has two contacts but only switch contact 2 is a TS function, switch contact 1 is for alarm only. Accuracy is the same for both sets of contacts.

Technical Analysis for the Calculation of the new AV

Table 3 - Historical Calibration Data For WBN Unit 2 Pressure Switch 2-PS-46-40			
Data from 2-SI-3-26 (2-PS-46-40 - SW 1 - Alarm Only, Trip at 47.7 psig)			
Date	OOT (Y/N)	HI/LO	Reading (psig) (AAF: 41.0-54.4 psig)
3-2-16	Y	LO	31.5
11-28-17	N	N/A	50.2
4-17-19	N	N/A	51.0
11-10-20	N/A	N/A	SW 1 has been deleted
Data from 2-SI-3-26 (2-PS-46-40 - SW 2 - Trip Interlock, Trip at 47.7 Psig)			
3-2-16	N	N/A	43.0
11-28-17	N	N/A	52.7
4-17-19	N	N/A	50.0
11-10-20	N	N/A	47.0

Note: Each switch has two contacts but only switch contact 2 is a TS function, switch contact 1 is for alarm only. Accuracy is the same for both sets of contacts.

Precedent

As previously noted, this LAR is similar to a license amendment, which was approved by the NRC for SQN Units 1 and 2 for a revision to the AV for the reactor trip system turbine trip on low fluid oil pressure function (ML072550285)

Schedule Milestones

- February 8, 2022 – LAR Pre-submittal meeting with NRC
- March 31, 2022 – LAR submittal – Request NRC approval within 12 months of submittal
- NRC approval of LAR within one year from the date of the submittal (Requested). 60-day implementation period

Closing Remarks

- The proposed TS change aligns the AV for WBN Unit 1 TS 3.3.2, Table 3.3.2-1, Function 6.e(1) with the AV for Unit 2 TS 3.3.2, Table 3.3.2-1, Function 6.e(1).
- The WBN Unit 1 TS AV for the trip of the TDMFWP function is too limiting for the accuracy and repeatability of the switches (1-PS-46-13 and 1-PS-46-40) for their nominal trip setpoint in the TS.
- Historical review of the TS surveillance data supports the proposed change.


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