

License Amendment Request

Application to Revise Function 5 of Technical Specification Table 3.3.2-1, "Engineered Safety Feature Actuation System Instrumentation," for the Sequoyah Nuclear Plant and Watts Bar Nuclear Plant

October 24, 2023

Agenda

- Introduction
- Description of the Proposed Change
- Reason for the Proposed Change
- System Description
- Technical Evaluation
- Precedent
- Schedule Milestones
- Closing Remarks

Introduction

- The purpose of this meeting is to discuss a proposed license amendment request (LAR) for the Sequoyah Nuclear Plant (SQN), Units 1 and 2 and the Watts Bar Nuclear Plant (WBN) Units 1 and 2.
- The proposed license amendment would add a new note to SQN Units 1 and 2 and WBN Units 1 and 2 Technical Specification (TS) 3.3.2, “Engineered Safety Feature Actuation System (ESFAS) Instrumentation,” Table 3.3.2-1, Function 5, “Turbine Trip and Feedwater Isolation,” for Modes 1, 2, and 3 regarding the turbine stop valves or governor valves,
- Proposed change will avoid an unnecessary entry into LCO 3.0.3 if the turbine stop valves or governor valves are already closed (in the required turbine trip condition) and are incapable of opening.

Description of the Proposed Change

- The proposed license amendment would add the following note to SQN Units 1 and 2 and WBN Units 1 and 2 TS 3.3.2, Table 3.3.2-1, Functions 5a and 5b for Modes 1, 2, and 3:

“Turbine trip function is not required when all turbine stop valves or governor valves are closed and are incapable of opening.”

- The remaining footnotes in TS 3.3.2, Table 3.3.2-1 are renumbered accordingly.

Description of the Proposed Change (cont'd)

• SQN Units 1 and 2 TS 3.3.2, Table 3.3.2-1

5. Turbine Trip and Feedwater Isolation

a. Automatic Actuation Logic and Actuation Relays	1 ⁽ⁱ⁾ , 2 ⁽ⁱ⁾⁽¹⁾ , 3 ⁽ⁱ⁾⁽¹⁾	2 trains	H	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5	NA	NA	
b. SG Water Level - High High (P-14)	1 ⁽ⁱ⁾ , 2 ⁽ⁱ⁾⁽¹⁾ , 3 ⁽ⁱ⁾⁽¹⁾	3 per SG	D	SR 3.3.2.1 SR 3.3.2.4 ^{(b)(c)} SR 3.3.2.8 ^{(b)(c)} SR 3.3.2.9	≤ 81.7%	81%	
c. Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.						

6. Auxiliary Feedwater

a. Automatic Actuation Logic and Actuation Relays	1,2,3	2 trains	H	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5	NA	NA	
---	-------	----------	---	--	----	----	--

- (b) If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.
- (c) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The methodologies used to determine the as-found and as-left tolerances are specified in UFSAR, Section 7.1.2.
- (i) Except when all MFIVs, MFRVs, and MFRV bypass valves are closed or isolated by a closed manual valve.
- (j) Turbine trip function is not required when all turbine stop valves or governor valves are closed and are incapable of opening

Description of the Proposed Change (cont'd)

• SQN Units 1 and 2 TS 3.3.2, Table 3.3.2-1

6. Auxiliary Feedwater

c. Safety Injection Refer to Function 1 (Safety Injection) for all initiation functions and requirements.

d. Loss of Offsite Power

(1) Voltage Sensors	1,2,3	3 per shutdown board ^(jk)	L,M	SR 3.3.2.6 SR 3.3.2.8 ^{(b)(c)} SR 3.3.2.9	Refer to Function 1 of Table 3.3.5-1 for setpoints and allowable values.	
(2) Load Shed Timer	1,2,3	1 per shutdown board ^(jk)	M	SR 3.3.2.8 ^{(b)(c)} SR 3.3.2.9	Refer to Function 1 of Table 3.3.5-1 for setpoints and allowable values.	
e. Trip of all Main Feedwater Pumps	1,2 ^(kl)	1 per pump	N	SR 3.3.2.7 SR 3.3.2.9	NA	NA
f. Auxiliary Feedwater Pump Suction Transfer on Suction Pressure - Low	1,2,3	3 per pump	P	SR 3.3.2.8 ^{(b)(c)}	≥ 2.44 psig (motor driven pump) ≥ 12 psig (turbine driven pump)	3.21 psig (motor driven pump) 13.9 psig (turbine driven pump)

(b) If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(c) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The methodologies used to determine the as-found and as-left tolerances are specified in UFSAR, Section 7.1.2.

(jk) Unit 1 shutdown boards only.

(kl) When one or more Main Feedwater Pump(s) are supplying feedwater to steam generators.

Description of the Proposed Change (cont'd)

• WBN Unit 1 TS 3.3.2, Table 3.3.2-1

SR 3.3.2.10							
5. Turbine Trip and Feedwater Isolation							
a. Automatic	1 ⁽ⁱ⁾ , 2 ^{(f)(i)} , 3 ^{(f)(i)}	2 trains	H	SR 3.3.2.2	NA	NA	
Actuation	SR 3.3.2.3						
Logic and Actuation Relays	SR 3.3.2.5						
b. SG Water	1 ⁽ⁱ⁾ , 2 ^{(f)(i)} , 3 ^{(f)(i)}	3 per SG	I	SR 3.3.2.1	≤ 83.1%	82.4%	
Level-High	SR 3.3.2.4						
High(P-14)	SR 3.3.2.9						
c. Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.						
d. North MSV Vault	1, 2 ^{(f), (g)}	3/vault	O	SR 3.3.2.6	≤ 5.31 inches	4 inches	
Room Water Level - High	SR 3.3.2.9						
e. South MSV Vault	1, 2 ^{(f), (g)}	3/vault	O	SR 3.3.2.6	≤ 4.56 inches	4 inches	
Room Water Level - High	SR 3.3.2.9						

(continued)

- (a) Above the P-11 (Pressurizer Pressure) interlock.
- (b) Time constants used in the lead/lag controller are $t_1 \geq 50$ seconds and $t_2 \leq 5$ seconds.
- (c) Except when all MSIVs are closed and de-activated.
- (d) Function automatically blocked above P-11 (Pressurizer Interlock) setpoint and is enabled below P-11 when safety injection on Steam Line Pressure Low is manually blocked.
- (e) Time constants utilized in the rate/lag controller are t_3 and $t_4 \geq 50$ seconds.
- (f) Except when all MFIVs, MFRVs, and associated bypass valves are closed and de-activated or isolated by a closed manual valve.
- (g) MODE 2 if Turbine Driven Main Feed Pumps are operating.
- (h) For the time period between February 23, 2000, and prior to turbine restart (following the next time the turbine is removed from service), the response time test requirement of SR 3.3.2.10 is not applicable for 1-FSV-47-027.
- (i) Turbine trip function is not required when all turbine stop valves or governor valves are closed and are incapable of opening.

Description of the Proposed Change (cont'd)

• WBN Unit 1 TS 3.3.2, Table 3.3.2-1

e.	Trip of all Main Feedwater Pumps						
(1)	Turbine Driven Main Feedwater Pumps	1 ^(h) , 2	1 per pump	J	SR 3.3.2.8 SR 3.3.2.9 SR 3.3.2.10	≥ 43.3 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
f.	Auxiliary Feedwater Pumps Train A and B Suction Transfer on Suction Pressure - Low	1, 2, 3, 4 ^(h)	3	B	SR 3.3.2.6 SR 3.3.2.9 SR 3.3.2.10	A) ≥0.5 psig B) ≥1.33 psig	A) 1.2 psig B) 2.0 psig
7.	Automatic Switchover to Containment Sump						
a.	Automatic Actuation Logic and Actuation Relays	1, 2, 3, 4	2 trains	C	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5	NA	NA

(continued)

(~~h~~) Entry into Condition J may be suspended for up to 4 hours when placing a Turbine Driven Main Feedwater (TDMFW) Pump in service or removing a TDMFW pump from service.

~~(j) Deleted.~~

(~~k~~) When steam generators are relied on for heat removal.

Description of the Proposed Change (cont'd)

• WBN Unit 2 TS 3.3.2, Table 3.3.2-1

5. Turbine Trip and Feedwater Isolation							
a.	Automatic Actuation Logic and Actuation Relays	1 ^(b) , 2 ^{(b)(i)} , 3 ^{(b)(i)}	2 trains	H	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5	NA	NA
b.	SG Water Level – High High (P-14)	1 ^(b) , 2 ^{(b)(i)} , 3 ^{(b)(i)}	3 per SG	I	SR 3.3.2.1 SR 3.3.2.4 ^{(b)(c)} SR 3.3.2.9 ^{(b)(c)} SR 3.3.2.10	≤83.1%	82.4%
c.	Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					
d.	North MSV Vault Room Water Level – High	1, 2 ^{(b)(i)}	3 per vault room	O	SR 3.3.2.6 SR 3.3.2.9	≤ 5.31 inches	4 inches
e.	South MSV Vault Room Water Level – High	1, 2 ^{(b)(i)}	3 per vault room	O	SR 3.3.2.6 SR 3.3.2.9	≤ 4.56 inches	4 inches

(continued)

- (b) If the as found channel setpoint is outside its redefined as found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.
- (c) The instrument channel setpoint shall be reset to a value that is within the as left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. The methodologies used to determine the as found and as left tolerances for the NTSP are specified in FSAR Section 7.1.2.
- (h) Except when all MFIVs, MFRVs, and associated bypass valves are closed and de-activated or isolated by a closed manual valve.
- (i) MODE 2 if Turbine Driven Main Feed Pumps are operating.
- (j) Turbine trip function is not required when all turbine stop valves or governor valves are closed and are incapable of opening.

Description of the Proposed Change (cont'd)

- WBN Unit 2 TS 3.3.2, Table 3.3.2-1

e.	Trip of all Main Feedwater Pumps							
(1)	Turbine Driven Main Feedwater Pumps	1 ^(jk) , 2	1 per pump	J	SR 3.3.2.8 ^{(b)(c)} SR 3.3.2.9 ^{(b)(c)} SR 3.3.2.10	≥43.3 psig	50 psig	
	and							
(2)	Standby Main Feedwater Pumps	1, 2	1	P	SR 3.3.2.8 SR 3.3.2.10 SR 3.3.2.12	NA	NA	
f.	Auxiliary Feedwater Pumps Train A and B Suction Transfer on Suction Pressure - Low	1, 2, 3, 4 ^(mi)	3	B	SR 3.3.2.6 SR 3.3.2.9 ^{(b)(c)} SR 3.3.2.10	A) ≥ 0.5 psig B) ≥ 1.33 psig	A) 1.2 psig B) 2.0 psig	

(continued)

- (b) If the as found channel setpoint is outside its redefined as found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.
- (c) The instrument channel setpoint shall be reset to a value that is within the as left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. The methodologies used to determine the as found and as left tolerances for the NTSP are specified in FSAR Section 7.1.2.
- (jk) Entry into Condition J may be suspended for up to 4 hours when placing a Turbine Driven Main Feedwater (TDMFW) Pump in service or removing a TDMFW pumps from service.
- ~~(k)~~ Deleted.
- ~~(mi)~~ When steam generators are being relied on for heat removal.

Reason for the Proposed Change

- SQN and WBN TS Table 3.3.2-1, Function 5 requires two trains of the Turbine Trip function to be operable in Mode 1 and in Modes 2 and 3 [except when all main feedwater (MFW) isolation valves, MFW regulating valves (MFRVs), and MFRV bypass valves are closed or isolated by a closed manual valve].
- This function requires the four main turbine stop valves to be capable of closing within the prescribed time limits.
- However, SQN and WBN TS 3.3.2 does not provide any specific condition/action for the main turbine stop valves.
- Therefore, if one or more of the turbine stop valves is inoperable (e.g., fails to meet the required closure time), then both trains of the Turbine Trip function must be declared inoperable, which requires entry into SQN and WBN TS Limiting Condition for Operation (LCO) 3.0.3 due to two trains inoperable with no applicable TS required action.
- However, entry into LCO 3.0.3 is unnecessary if the turbine stop valves or governor valves are already closed (in the required turbine trip condition) and are incapable of opening.

System Description

- The primary functions of the Turbine Trip and Feedwater Isolation signals are to prevent damage to the turbine due to water in the steam lines, and to stop the excessive flow of feedwater into the steam generators (SGs). These Functions are necessary to mitigate the effects of a high water level in the SGs, which could result in carryover of water into the steam lines and excessive cooldown of the primary system. The SG high water level indication is due to excessive feedwater flows.
- The Function is actuated when the level in any SG exceeds the high setpoint, and performs the following functions:
 - Trips the main turbine,
 - Trips the MFW pumps,
 - Initiates feedwater isolation, and
 - Shuts the MFW regulating valves and the bypass feedwater regulating valves.

System Description (cont'd)

- Each of the two main steam chests includes two turbine stop valves and two turbine control valves. The steam lines are cross-connected upstream of the turbine stop valves. The turbine provides anticipatory trips to the reactor protection system from contacts which change position when the turbine stop valves close or when the emergency trip header pressure goes below its setpoint.
- For a turbine trip, the reactor would be tripped directly (unless below approximately 50% power) from a signal derived from the turbine emergency trip header pressure or the turbine stop valve position. The turbine stop valves close on loss of emergency trip header pressure actuated by one of a number of possible turbine trip signals.

Technical Evaluation

- A turbine trip signal into the digital electric hydraulics (DEH) system (see Figures 1 and 2) must be present for the turbine stop and governor valves to be closed and incapable of opening. While the turbine is in the tripped state the trip block solenoid valves will de-energize and remain open removing hydraulic fluid pressure needed for valve movement. The trip block solenoid valves will energize only when all turbine trips are clear and the turbine is “latched”. These actions will allow system pressure to build therefore enabling valve movement when demand is present.

Figure 1

TVA DEH Design

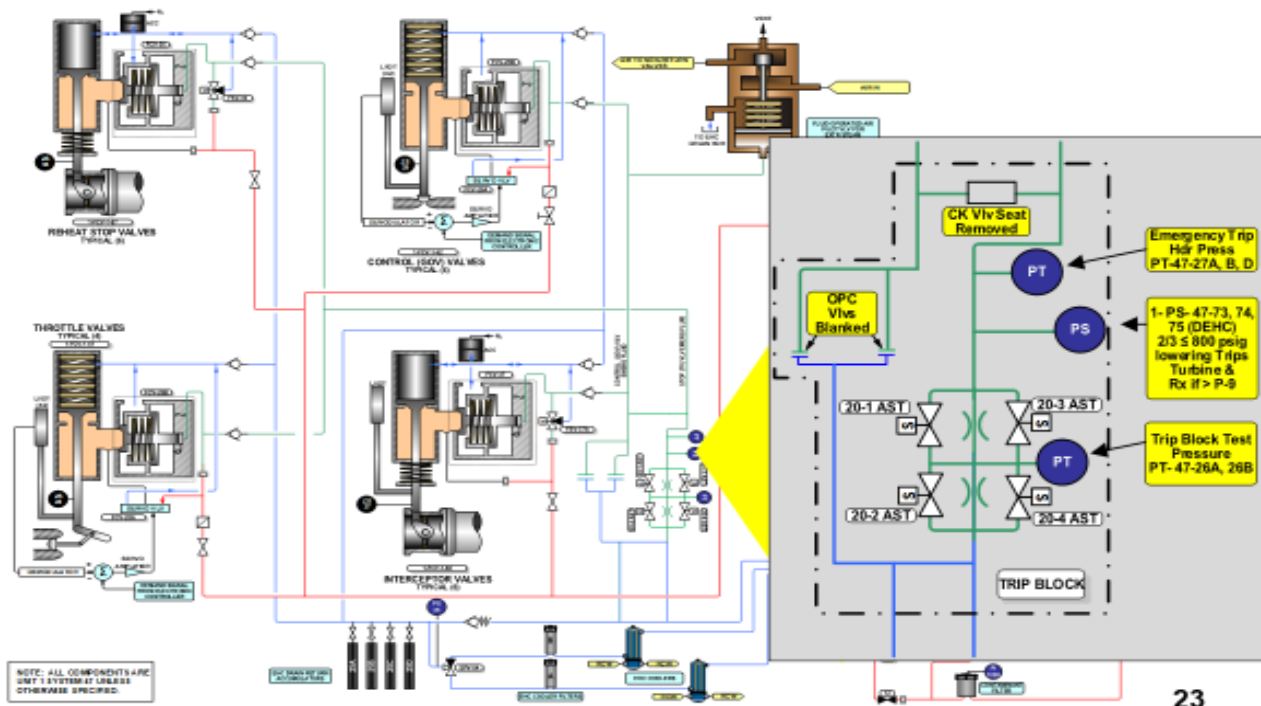
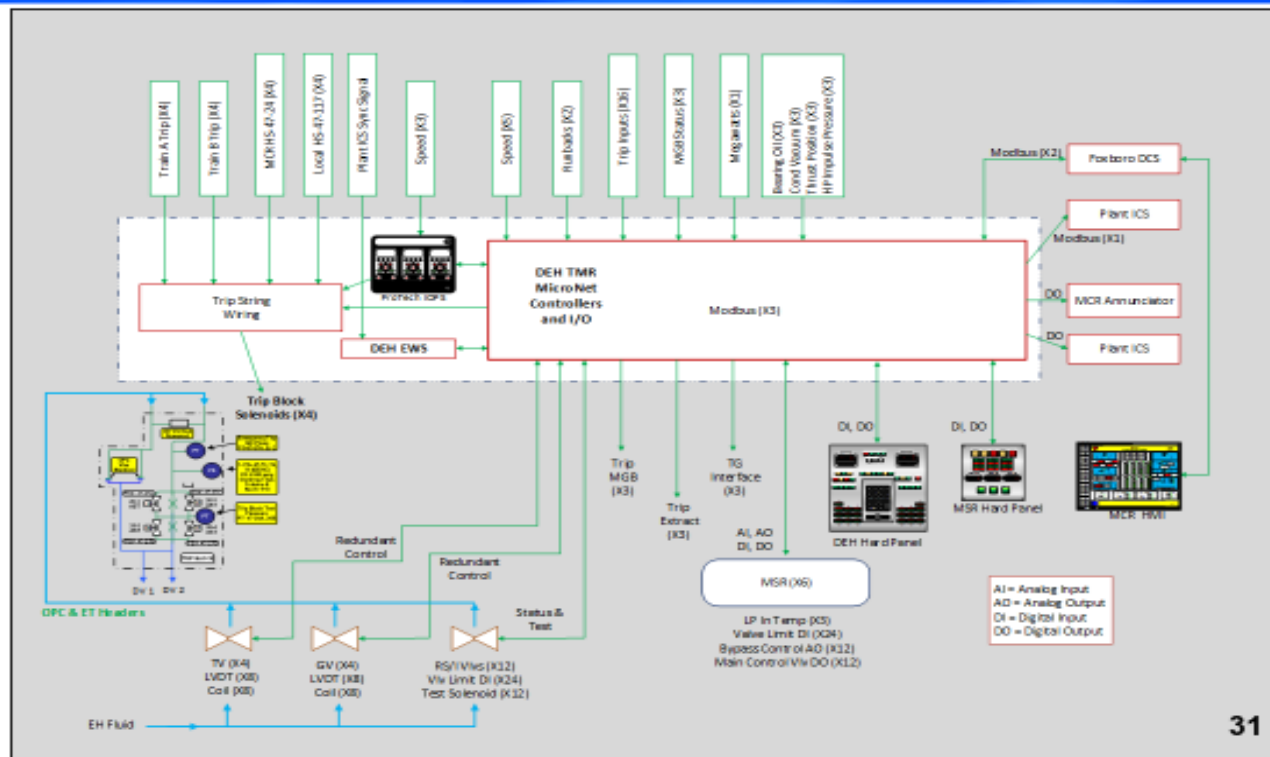


Figure 2

TVA DEH System Interfaces



Precedent

- There is no precedent for the proposed change.

Schedule Milestones

- TVA to submit LAR to NRC by December 22, 2023.
- Request NRC approval within 1-year from submittal.
- 60-day implementation following NRC approval.



TENNESSEE
VALLEY
AUTHORITY