Tennessee Valley Authority, 1101 Market Street, Chattanooga, Tennessee 37402

CNL-19-095

March 13, 2020

10 CFR 50.90

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Sequoyah Nuclear Plant, Units 1 and 2
Renewed Facility Operating License Nos. DPR-77 and DPR-79
NRC Docket Nos. 50-327 and 50-328

Subject: **Application to Modify the Sequoyah Nuclear Plant Units 1 and 2 Technical Specification 3.3.1, "Reactor Protection System Instrumentation," Turbine Trip Function on Low Fluid Oil Pressure (SQN-TS-19-04)**

In accordance with the provisions of Title 10 of the *Code of Federal Regulations* (10 CFR) 50.90, "Application for amendment of license, construction permit, or early site permit," Tennessee Valley Authority (TVA) is submitting for Nuclear Regulatory Commission (NRC) approval, a request for an amendment to Renewed Facility Operating License Nos. DPR-77 and DPR-79 for the Sequoyah Nuclear Plant (SQN) Units 1 and 2.

The proposed change revises Technical Specification (TS) 3.3.1, Table 3.3.1-1, "Reactor Trip System Instrumentation," Function 14.a. "Turbine Trip - Low Fluid Oil Pressure," for SQN Units 1 and 2 as follows.

- Increases the nominal trip setpoint (NTSP) from 45 pounds per square inch gauge (psig) to 800 psig, and the allowable value from greater than or equal to (≥) 39.5 psig to ≥ 710 psig.

The proposed changes to the TS are due to the replacement and relocation of the pressure switches from the low pressure auto-stop trip fluid oil header that operates at a nominal control pressure of 80 psig to the high pressure turbine electrohydraulic control (EHC) oil header that operates at a nominal control pressure of 2000 psig. The changes to the NTSP and allowable value are needed due to the higher EHC system operating pressure. Relocation of the initiating pressure switches to the high pressure turbine EHC header is needed to accommodate a modification to the EHC turbine control system while maintaining the function of transmitting the trip signal to the reactor protection system (RPS). This change does not affect any RPS trip functions.

The proposed change to the NTSP is consistent with NUREG-1431, Revision 4, "Standard Technical Specifications Westinghouse Plants." The proposed change in the allowable value is based on TVA's setpoint calculation methodology for the specific pressure switches used for the SQN low oil pressure application.

The enclosure provides a description of the proposed changes, technical evaluation of the proposed changes, regulatory evaluation, and a discussion of environmental considerations. Attachments 1 and 2 to the enclosure provide the existing TS pages marked-up to show the proposed changes for SQN Unit 1 and Unit 2, respectively. Attachments 3 and 4 to the enclosure provide the existing SQN Unit 1 and Unit 2 TS pages retyped to show the proposed changes. Attachment 5 to the enclosure provides the existing SQN Unit 1 TS Bases pages marked-up to show the proposed changes. Only the Unit 1 TS Bases pages have been provided, as the Unit 2 changes will be identical. Changes to the existing TS Bases are provided for information only and will be implemented under the Technical Specification Bases Control Program.

TVA requests approval of the proposed TS change within 12 months of the date of this letter. The proposed TS change is currently planned to be implemented in conjunction with the modifications to the low lube oil pressure switches to be performed in the SQN Unit 1 Cycle 24 (U1R24) refueling outage scheduled for the Spring of 2021 and the SQN Unit 2 Cycle 24 (U2R24) refueling outage scheduled for the Fall of 2021.

TVA has determined that there are no significant hazards considerations associated with the proposed amendments and TS changes. The proposed amendments and TS changes qualify for a categorical exclusion from environmental review pursuant to the provisions of 10 CFR 51.22(c)(9). Additionally, in accordance with 10 CFR 50.91(b)(1), TVA is sending a copy of this letter and attachments to the Division of Radiological Health - Tennessee State Department of Environment and Conservation.

There are no new regulatory commitments associated with this submittal. If you have any questions about this proposed change, please contact Kimberly D. Hulvey, Fleet Licensing Manager, at (423) 751-3275.

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 13th day of March 2020.

Respectfully,

James Barstow
Vice President, Nuclear Regulatory Affairs & Support Services

Enclosure: Evaluation of Proposed Technical Specification Change

cc: See Page 3

cc (Enclosure):

NRC Regional Administrator - Region II
NRC Resident Inspector – Sequoyah Nuclear Plant
NRC Project Manager – Sequoyah Nuclear Plant
Director, Division of Radiological Health - Tennessee State Department of Environment and Conservation

Enclosure

Evaluation of Proposed Technical Specification Change

Subject: Application to Modify the Sequoyah Nuclear Plant Units 1 and 2 Technical Specification 3.3.1, "Reactor Protection System Instrumentation," Turbine Trip Function on Low Fluid Oil Pressure (SQN-TS-19-04)

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Enclosure

Evaluation of Proposed Technical Specification Change

1.0 SUMMARY DESCRIPTION

This evaluation supports a request to amend Renewed Facility Operating License No. DPR-77 for the Sequoyah Nuclear Plant (SQN) Unit 1, and Renewed Facility Operating License No. DPR-79 for the SQN Unit 2. The proposed change revises Technical Specification (TS) 3.3.1, Table 3.3.1-1, "Reactor Trip System Instrumentation," Function 14.a. "Turbine Trip - Low Fluid Oil Pressure," to increase the values for the nominal trip setpoint (NTSP) and the allowable value.

The proposed changes to the TS are due to the replacement and relocation of the pressure switches from the low pressure auto-stop trip fluid oil header that operates at a nominal control pressure of 80 pounds per square inch gauge (psig) to the high pressure turbine electrohydraulic control (EHC) oil header that operates at a nominal control pressure of 2000 psig. The changes to the NTSP and allowable value are needed due to the higher EHC system operating pressure. Relocation of the initiating pressure switches to the high pressure turbine EHC header is needed to accommodate a modification to the EHC turbine control system while maintaining the function of transmitting the trip signal to the reactor protection system (RPS). This change does not affect any RPS trip functions. Relocation of the pressure switches to the high pressure EHC header requires a new turbine trip NTSP and allowable value for low fluid oil pressure and consequently, changes to the SQN Units 1 and 2 TS Table 3.3.1-1.

The proposed change to the NTSP is consistent with NUREG-1431, Revision 4, "Standard Technical Specifications Westinghouse Plants." The proposed change in the allowable value is based on TVA's setpoint calculation methodology for the specific pressure switches used for the SQN low oil pressure application.

SQN Units 1 and 2 have previously implemented the requirements of Technical Specification Task Force (TSTF) Traveler TSTF-493-A, Revision 4, "Clarify Application of Setpoint Methodology for LSSS Functions." The existing notes in TS Table 3.3.1-1 specifying the evaluation of channel performance in accordance with TSTF-493-A are adequate to support the changes to the nominal trip setpoint and the allowable value in this submittal.

2.0 DETAILED DESCRIPTION

2.1 Proposed Changes

The proposed change revises TS 3.3.1, Table 3.3.1-1, Function 14.a. for SQN Units 1 and 2 as follows:

- Increases the NTSP from 45 psig to 800 psig, and the allowable value from greater than or equal to (≥) 39.5 psig to ≥ 710 psig.

Attachments 1 and 2 to the enclosure provide the existing TS pages marked-up to show the proposed changes for SQN Unit 1 and Unit 2, respectively. Attachments 3 and 4 to the enclosure provide the existing SQN Unit 1 and Unit 2 TS pages retyped to show the proposed changes. Attachment 5 to the enclosure provides the existing SQN Unit 1 TS Bases pages marked-up to show the proposed changes. Only the Unit 1 TS Bases pages have been provided, as the Unit 2 changes will be identical. Changes to the existing TS Bases are provided for information only and will be implemented under the Technical Specification Bases Control Program.

2.2 Condition Intended to Resolve

The proposed changes to the TS are due to the replacement and relocation of the pressure switches from the low pressure auto-stop trip fluid oil header that operates at a nominal control pressure of 80 psig to the high pressure turbine EHC oil header that operates at a nominal control pressure of 2000 psig. The changes to the NTSP and allowable value are needed due to the higher EHC system operating pressure. Relocation of the initiating pressure switches to the high pressure turbine EHC header is needed to accommodate a modification to the EHC turbine control system while maintaining the function of transmitting the trip signal to the RPS. This change does not affect any RPS trip functions.

3.0 TECHNICAL EVALUATION

3.1 System Description

The Turbine Trip - Low Fluid Oil Pressure trip Function anticipates the loss of heat removal capabilities of the secondary system following a turbine trip. This trip Function acts to minimize the pressure/temperature transient on the reactor. Any turbine trip from a power level below the P-9 setpoint, approximately 50% power, will not actuate a reactor trip. Three pressure switches monitor the control oil pressure in the Turbine Electrohydraulic Control System. A low pressure condition sensed by two-out-of-three pressure switches will actuate a reactor trip. These pressure switches do not provide any input to the control system.

The reactor trip on turbine trip is an anticipatory trip input signal to the reactor protection system. This trip is anticipatory in that it is not assumed to occur in any of the Chapter 15 accident analyses. This trip meets all of the requirements of IEEE 279-1971 including separation, redundancy, single failure, and testability. Seismic location, qualification, or mounting of the sensors is not practical because of their location in the non-seismic Turbine Building.

3.1.1 Existing Pressure Switch Configuration

Three pressure switches are located on the low pressure fluid oil header (also referred to as the auto-stop trip (AST) system). The three low oil pressure switches have two output contacts that provide redundant inputs to each of the three RPS protection instrument channels I, II, and III (two-out-of-three logic). This signal initiates a reactor trip on a turbine trip if reactor power is above the P-9 power range neutron flux interlock (approximately 50% of full power). The low pressure AST fluid oil header operates at a nominal control pressure of approximately 80 psig. The existing NTSP is 45 psig and the allowable value is ≥ 39.5 psig.

3.1.2 Proposed New Pressure Switch Configuration

The proposed modifications to the EHC system removes the AST oil header where the existing low oil pressure switches were located. To support this modification, the RPS trip function will now be performed by three new pressure switches located on the high pressure turbine EHC trip header. As with the original pressure switches, the three new pressure switches have two output contacts that provide redundant inputs to each of the three RPS protection instrument channels I, II, and III (two-out-of-three logic). The RPS logic is not affected by the change and the signal will still initiate a reactor trip on a turbine trip if reactor power is above the P-9 power range neutron flux interlock (approximately 50% of full power). The EHC system supplies

hydraulic control oil fluid to the turbine stop, governor, intercept, and reheat valves. The EHC fluid is provided by skid-mounted hydraulic pumps that maintain operating pressure at approximately 2000 psig. The changes to the NTSP and allowable value are needed due to the higher EHC system operating pressure. The operation of the turbine is dependent on maintaining proper EHC system pressure.

On a turbine trip initiation signal, EHC dump valves connected to the EHC fluid header are signaled to open, draining the EHC fluid from the piping. The EHC header pressure is rapidly decreased, closing the turbine stop valves, and tripping the turbine. The decreased EHC fluid pressure is sensed by the new low fluid oil pressure switches. When the decreased pressure is sensed by the pressure switches, a reactor trip signal is initiated by two-out-of-three RPS channels. The circuitry associated with the pressure switches and the RPS is independent of the new turbine control system.

3.2 Technical Analysis

3.2.1 Low Oil Pressure Trip Updated Final Safety Analysis Report Described Functions

Section 7.2.1.1.2.6, Turbine Trip – Reactor Trip of the dual-unit SQN Updated Final Safety Analysis Report (UFSAR) describes the reactor trip on a turbine trip function as follows:

> "The turbine trip-reactor trip is actuated by two out of three logic from low autostop oil pressure signals or by all closed signals from the turbine steam stop valves. A turbine trip causes a direct reactor trip above P-9 setpoint.
>
> The reactor trip on turbine trip is an anticipatory trip input signal to the reactor protection system. This trip is anticipatory in that it is not assumed to occur in any of the Chapter 15 accident analysis. This trip meets all of the requirements of IEEE 279-1971 including separation, redundancy, single failure, and testability. Seismic location, qualification, or mounting of the sensors is not practical because of their location in the nonseismic Turbine Building."

Section 15.2.7, Loss Of External Electrical Load And/Or Turbine Trip of the SQN UFSAR describes the reactor trip on a turbine trip function as follows:

> "For a turbine trip, the reactor would be tripped directly (unless below approximately 50% power) from a signal derived from the turbine autostop oil pressure (Westinghouse Turbine) and turbine stop valves.
>
> The Sequoyah plant is designed to accept a load rejection of 50 percent of its rated electrical load, and signals from the reactor protection system will trip the plant for load rejections in sufficient excess of 50 percent of rated load."

Section 15.2.7.2 of the SQN UFSAR, under Methods of Analysis stated the initial plant response and conditions assumed in the analysis for the loss of load from 100 percent rated thermal power:

> "The reactor was not tripped on the turbine trip, but tripped later on a high pressurizer pressure trip. Main feedwater flow is terminated at the time of turbine trip, with no credit taken for auxiliary feedwater to mitigate the consequences of the transient."

The discussion of the Turbine Trip – Low Fluid Oil Pressure function is further described in the SQN Units 1 and 2 TS Bases B3.3.1, Function 14.a:

> "The Turbine Trip - Low Fluid Oil Pressure trip Function anticipates the loss of heat removal capabilities of the secondary system following a turbine trip. This trip Function acts to minimize the pressure/temperature transient on the reactor. Any turbine trip from a power level below the P-9 setpoint, approximately 50% power, will not actuate a reactor trip. Three pressure switches monitor the control oil pressure in the Turbine Electrohydraulic Control System. A low pressure condition sensed by two-out-of-three pressure switches will actuate a reactor trip. These pressure switches do not provide any input to the control system. The unit is designed to withstand a complete loss of load and not sustain core damage or challenge the RCS pressure limitations. Core protection is provided by the Pressurizer Pressure - High trip Function and RCS integrity is ensured by the pressurizer safety valves.
>
> The LCO requires three channels of Turbine Trip - Low Fluid Oil Pressure to be OPERABLE in MODE 1 above P-9.
>
> Below the P-9 setpoint, a turbine trip does not actuate a reactor trip. In MODE 2, 3, 4, 5, or 6, there is no potential for a turbine trip, and the Turbine Trip - Low Fluid Oil Pressure trip Function does not need to be OPERABLE."

3.2.2 Removal of the Auto Stop Oil System and New Pressure Switch Configuration

The existing turbine protection system consists of the low pressure auto-stop oil system, and the stop valve and control valve emergency trip fluid systems in the high-pressure EHC fluid control system. On a turbine trip signal, the auto-stop oil system line is depressurized by the actuation of protective devices, solenoid trip valves, or an emergency trip valve on a turbine trip condition. The EHC fluid is an incompressible fluid and when the solenoid/emergency trip valves are opened, the dump valves at each turbine governor and stop valves are depressurized and the high-pressure EHC fluid to the governor and stop valves actuators is released to drain (approximately 0 psig). The governor and stop valves are spring actuated closed so that when the high-pressure EHC fluid is removed from the valve actuators, they close.

When the low oil pressure condition on the auto stop line is sensed below the setpoint following a turbine trip by two-out-of-three pressure switches plant solid-state protection system (SSPS) Train A or B, the RPS initiates a reactor trip signal.

The new configuration will remove the auto stop oil system. With the new EHC configuration, a solenoid valve trip block assembly is connected to the high pressure EHC emergency trip header. On a trip condition, the solenoid valves are de-energized and open to depressurize the dump valves which again releases the high-pressure EHC fluid to the main steam governor and stop valves actuators to drain (approximately 0 psig). The RPS trip function will be performed by three new pressure switches in a different location but with the same function. The new pressure switches are located on the high pressure turbine EHC trip header. Consistent with the original pressure switches, the three new pressure switches have two output contacts that provide redundant inputs to each of the three RPS protection instrument channels I, II, and III (two-out-of-three logic). The RPS logic is not affected by the change and the signal will still

initiate a reactor trip on a turbine trip if reactor power is above the P-9 power range neutron flux interlock (approximately 50% of full power).

The new Barksdale TC9622-3-V pressure switch has a hydraulically actuated piston that closes the electrical contacts on the switch. There is no electrical power to the piston. The only electrical connections to the pressure switch are to the two sets of contacts on each switch. The wiring to the existing pressure switches will be lifted and re-landed on the new pressure switches so that the electrical connections to the SSPS are the same as to the existing pressure switches. Power to one set of the contacts on each pressure switch is from SSPS Train A. Power to the second set of contacts on each pressure switch is from the SSPS Train B. The SSPS system is configured as a fail safe system so that on a loss of SSPS power to one train of the SSPS system, a scram will be initiated.

Because the reactor trip on turbine trip function of the low fluid oil pressure is not credited in the accident analysis, the pressure switches are quality related, non-seismic devices. The switches are similar to switches used in the same EHC application in the Watts Bar Nuclear Plant and in similar EHC applications at the Browns Ferry Nuclear Plant (BFN) on the turbine stop valves. The BFN pressure switches have been in service since the late 1990s. The new switches are designed for consistent, dependable operation at the higher EHC fluid oil pressure. Operational experience at BFN has shown this style of switch to be reliable. The piping connecting the switches to the EHC header is capable of withstanding the system pressure. Postulated pipe breaks in the EHC header do not need to be considered in the design, as no safety-related equipment would be adversely impacted. A break would result in closure of the associated turbine valves and actuation of the pressure switches.

3.2.3 Response Time of the Existing Versus New Pressure Switch Configurations

Because the reactor trip on turbine trip function of the low fluid oil pressure is not credited in the accident analysis, the UFSAR does not impose any response time requirements for the initiation of this trip. The reactor trip on a turbine trip function from the low oil pressure switches response times are not included in the scope of plant surveillance instructions that verify safety system initiation and trip response times.

With the existing EHC configuration, the auto-stop oil system line is depressurized by the actuation of protective devices, solenoid trip valves, or an emergency trip valve on a turbine trip condition. The EHC fluid is an incompressible fluid and when the solenoid and emergency trip valves are opened, the dump valves at each main steam governor and stop valves are depressurized and the high-pressure EHC fluid to the main steam governor and stop valves actuators is released to drain (approximately zero psig). The governor and stop valves are spring-actuated closed so that when the high-pressure EHC fluid is removed from the valve actuators, they close. TVA surveillance instructions 1/2-SI-IRT-099-621.A and 1/2-SI-IRT-099-621.B checks response time from manual operation of Solid State Protection System (SSPS) Slave Relay K621 until the Main Turbine Stop valves close (i.e., not associated with the low oil pressure switch function). Turbine trip will be monitored at the input relays to SSPS. A protective relay is manually actuated that energizes to open the auto-stop oil line solenoid and emergency trip valves and depressurizes the auto-stop oil line. The time interval from the actuation of relay K621 to the closure of the stop valves is recorded and verified to be ≤1.2 seconds. Because this action includes the time to close the stop valves, the time to depressurize the auto-stop oil line is also ≤ 1.2 seconds.

With the new EHC configuration, a solenoid valve trip block assembly is connected to the high pressure EHC emergency trip header. On a trip condition, the solenoid valves are de-energized and open to depressurize the dump valves that release the high-pressure EHC fluid to the main steam governor and stop valves actuators to drain (approximately zero psig). By removal of the low-pressure auto-stop line, the time to directly depressurize the high-pressure EHC emergency trip header is expected to be the same or better than the existing configuration. The time response of the new trip block assembly to depressurize the EHC lines and close the stop valves will be confirmed during post installation testing by the performance of plant surveillance instructions 1/2-SI-IRT-099-621.A and 1/2-SI-IRT-099-621.B. With the modified EHC system, a protective relay is manually actuated that energizes interposing control relays that open normally closed contacts to de-energize the new EHC solenoid trip block assembly, which depressurizes the high-pressure EHC Emergency Trip header. The time interval from the actuation of the protective relay to the closure of the stop valves will be recorded and verified to be ≤1.2 seconds.

Therefore, the time to depressurize the EHC header to less than the low oil pressure switch actuation setpoint will be ≤1.2 seconds for both the existing and new configurations.

The response times of both the existing United Electric model J402/270 pressure switches and the new Barksdale TC9622-3-V are not provided in the vendor datasheets. However, as both are the same type of piston actuated pressure switches, there is not expected to be any discernable delay in actuation at the low pressure setpoints.

Based on the above discussion, there will be no discernable difference in the time to initiate a reactor scram on a turbine trip with the new pressure switch configuration.

3.2.4 Nominal Trip Setpoint and Allowable Value Determination

TVA Branch Technical Instruction BTI-EEB-TI-28, Setpoint Calculations, incorporates methodologies for the determination of setpoints for nuclear safety-related instrumentation in ISA Standard ISA-S67.04-1982 and 1994, “Setpoints for Nuclear Safety-Related Instrumentation Used in Nuclear Power Plants,” as endorsed in Regulatory Guide (RG) 1.105, Revisions 2 and 3, respectively. Although the pressure switches are considered non-safety related, the new turbine trip setpoint on low fluid oil pressure has been determined in accordance with BTI-EEB-TI-28. Instrument uncertainties such as calibration error and drift were considered in determining a total device uncertainty for the pressure switches.

The safety analyses in Chapter 15 of the SQN UFSAR do not credit the operation of the reactor trip on turbine trip function of the low fluid oil pressure switches. Therefore, an Analytical Limit or Limiting Trip Setpoint (LTSP) is not defined for the low oil pressure trip function.

The purpose of the switches is to actuate a reactor trip in response to a turbine trip event, not as a direct result of an accident such as a loss of coolant accident (LOCA) or a main steam line break (MSLB). The safety analyses do not credit the operation of the reactor trip on turbine trip function of the low fluid oil pressure switches; therefore there is not an associated Analytical Limit or safety limit. Therefore, the low fluid oil pressure setpoint is not a limiting setpoint used to protect a design or licensing basis limiting condition. The low fluid oil pressure setpoint represents the turbine tripped physical condition.

The allowable value (AV) is derived from the NTSP based on performance data and not an evaluation of total loop uncertainties applied to an Analytical Limit or LTSP. The Acceptance Band and AV were calculated in accordance with TVA Branch Technical Instruction BTI-EEB-TI-28, "Setpoint Calculations," as described below.

Nominal Trip Setpoint (NTSP)

The SQN UFSAR Section 7.1.2.1.9, Setpoints, states the following:

> "The Technical Specifications for the Sequoyah Nuclear Plant incorporate the Nominal Trip Setpoint (NTSP) and the Allowable Value (AV) for setpoints within the reactor protection system (RPS) which includes the Reactor Trip System (RTS) and the Engineering Safety Features Actuation System (ESFAS)…….
>
> Instrument spans are selected such that the AVs are at least 5 percent from the end of the instrument span. Automatic initiation of protective functions occurs at the NTSP (plus or minus the allowed tolerances)."

The NTSP is the nominal value at which the instrument is set when it is calibrated. Because most instruments cannot be set to an exact value, the instrument is set to the nominal setpoint within an allowed tolerance band defined as acceptable As-Left (AL), which is also referred to as an Acceptance Band (Ab) in BTI-EEB-TI-28.

Table 3.3.1-1, item 16.a of NUREG-1431, Revision 4, Standard Technical Specifications Westinghouse Plants, provides the referenced Nominal Trip Setpoint (NTSP) for Turbine Trip on Low Fluid Oil Pressure as 800 psig. This value is consistent with the EHC operating system pressure range associated with this parameter for SQN Units 1 and 2. The setpoint value of 800 psig was based on the minimum required EHC fluid oil pressure, the expected calibration tolerance and frequency of the switches, and the expected time-based drift of the pressure switches.

As-Left Tolerance (AL), also referred to as an Acceptance Band (Ab)

The SQN UFSAR Section 7.1.2.1.9 defines the As-Left Tolerance (AL) or Acceptance Band (Ab) as follows:

> "To ensure the AV protects the Analytical Limit, the channel must be reset or confirmed to be within the As Left (AL) tolerance during periodic surveillance testing. The AL is the tolerance band on either side of the NTSP within which an instrument or instrument loop is left after calibration or setpoint verification to ensure future operability. The As Found (AF) is the tolerance band on either side of the NTSP which defines the limits of acceptable instrument performance, beyond which the channel may be considered degraded and must be evaluated for operability prior to returning to service. Conditions where the device is found outside the AF will be entered into the corrective action program for further evaluation."

BTI-EEB-TI-28 Section 5.5.6, states that for TSTF-493, As-left Tolerance (AL) or Ab is calculated by the Square Root Sum of the Squares combination of Reference Accuracy (Re), M&TE error (ICTe and OCTe), and M&TE readability (ICRe and OCRe)

$$Ab_{PS} = \sqrt{(Re_{PS})^2+(ICTe_{PS})^2 + (ICRe_{PS})^2+(OCTe_{PS})^2 + (OCRe_{PS})^2}$$

Where:
Re_{PS} = Reference Accuracy
ICTe = Reference accuracy of the input M&TE
$ICTe_{PS}$ = Input Test Instrument Calibration Inaccuracy
$ICRe_{PS}$ = Input Test Instrument Reading Inaccuracy
OCTe = Reference accuracy of the output of M&TE
$OCTe_{PS}$ = Output Test Instrument Calibration Inaccuracy
$OCRe_{PS}$ = Output Test Instrument Reading Inaccuracy

The TVA calculation in support of the turbine high pressure EHC trip header pressure switches states, as part of the design input, that:

- For the $ICTe_{PS}$, the accuracy of the calibrating test equipment is as accurate as or better than the component reference accuracy ($ICTe_{PS} = Re_{PS}$).

- For $ICRe_{PS}$, the input calibration reading error shall not exceed the accuracy of the calibrating test equipment; therefore a digital gauge shall be used, or an analog gauge with a minor division less than or equal to 48 psi ($ICRe_{PS} = Re_{PS}$).

- $OCTe_{PS}$ and $OCRe_{PS}$ are both insignificant when determining contact status because the contact is either open or closed.

Where:
Calibrated Span CS_{minPS} = 250 psi (Input - Minimum)
CS_{maxPS} = 2650 psi (Input - Maximum)
$CS_{PS} = CS_{maxPS} - CS_{minPS}$
CS_{PS} = 2650 psi - 250 psi = 2400 psi
Re_{PS} = 2.0% CS_{PS}
Re_{PS} = (0.02)(2400 psi) = 48 psi
$ICTe_{PS} = Re_{PS} = ICRe_{PS}$ = 48 psi

Therefore,

$$Ab_{PS} = \sqrt{(48psi)^2+(48psi)^2 + (48psi)^2+0^2 + 0^2}$$

Ab_{PS} = ±83.14 psi.

However, BTI-EEB-TI-28 Sections 5.5.3.A and 5.5.6.B.6 state that Ab should always be equal to or greater than the device's reference accuracy. The Ab should not be so large that it could prevent or mask detection of instrument degradation or failure. As-left tolerances should never dominate the as-found tolerance. Therefore, Ab_{PS} was conservatively set to equal Reference Accuracy.

$Ab_{PS} = Re_{PS}$ = ±48 psi

Allowable Value (AV)

The UFSAR Section 7.1.2.1.9 defines the Allowable Value (AV) as follows:

> An allowable value is the limiting value of the as-found trip setting used during surveillance testing for the portion of the channel being tested, beyond which the channel is inoperable. The allowable value ensures that sufficient margin exists to the AL to account for unmeasurable uncertainties such as process effects to ensure that the protective action is performed under worst case conditions before the AL is exceeded when the channel is reset to within the acceptable as-left (AAL) tolerance.

Because an AL or safety limit is not defined for the low oil pressure trip function, the allowable value is derived from the NTSP in accordance with BTI-EEB-TI-28 as described below.

Normal Measurable Accuracy (Anf) or As-Found Tolerance
Normal measurable accuracy (Anf), is calculated in accordance with the TVA methodology in BTI-EEB-TI-28 Section 5.5.6 as follows:

$$Anf_{PS\_pos} = \sqrt{(De_{PSrandom})^2+(ICTe_{PS})^2 + (ICRe_{PS})^2}$$
$$Anf_{PS\_neg} = \sqrt{(De_{PSrandom})^2+(ICTe_{PS})^2 + (ICRe_{PS})^2} + De_{PSbias}$$

Where: De_{PS} = Drift Error
$ICTe_{PS}$ = Input Test Instrument Calibration Inaccuracy
$ICRe_{PS}$ = Input Test Instrument Reading Inaccuracy

> Drift and repeatability was calculated by a statistical analysis performed using historical drift data on the same type of pressure switches in an EHC application. No credit was taken for Temperature Effect (TNe) in the Anf calculation which results in a more conservative AV.

Where: Drift error = -0.1% URL bias (De_{PSbias}), ±2.1% URL random. ($De_{PSrandom}$)

De_{PSbias} = 0.1% CS_{maxPS} (Input – Maximum)
De_{PSbias} = (0.001)(2650psi)
De_{PSbias} = 2.65 psi

$De_{PSrandom}$ = 2.1% CS_{maxPS} (Input – Maximum)
$De_{PSrandom}$ = (0.021)(2650psi)
$De_{PSrandom}$ = 55.65 psi

From the above equation:

$$Anf_{PS\_pos} = \sqrt{(55.65psi)^2+(48\ psi)^2 + (48.8)^2}$$

Anf_{PSpos} = 87.78 psi
Anf_{PSneg} = 87.78 psi + 2.65 psi = 90.43 psi

Allowable Value

$AV_{PS} = SP_{PS} – Anf_{PSneg}$
$AV_{PS} = 800$ psi – 90.43 psi
$AV_{PS} = 709.57$ (approximately 710 psi)

Where: SP_{PS} = Setpoint value

Summary of Results

Instrument	Setpoint (SP_{PS}) (psi)	Range (psi) (CS_{minPS} to CS_{maxPS})	Output	Ab (Ab_{PS}) (psi)	Anf/AV (Anf_{PSneg})(psi)
1/2-PS-047-0073	800	250 to 2650	(OP DECR)	48	710
1/2-PS-047-0074	800	250 to 2650	(OP DECR)	48	710
1/2-PS-047-0075	800	250 to 2650	(OP DECR)	48	710

In order to ensure that an instrument channel is capable of performing its specified function, SQN performs testing of these instruments in accordance with current station procedures that govern the control of calibration requirements (including as-found and as-left tolerances), and the evaluation of out-of-tolerance instruments. Calibration accuracy is defined in the applicable instrument design output documents.

The new low fluid oil pressure setpoint allows for operator recovery actions from a decreasing EHC system pressure occurrence prior to a turbine trip (e.g., EHC system leakage). The EHC system low pressure alarm setpoint has sufficient margin to the system trip setpoint. The low pressure EHC fluid "Low Pressure Alarm" occurs on decreasing pressure at 1775 psig and alerts the operator in the control room that the EHC fluid oil pressure is decreasing. The “Main Pump Auto Start” is initiated on decreasing pressure at 1500 psig and starts the backup EHC fluid oil pump to maintain pressure in the high pressure header to prevent a turbine trip. An EHC fluid “Low-Low Pressure Alarm” occurs on decreasing pressure at 1350 psig and alerts the operator in the control room. This alarm allows for operator action to recover the EHC fluid oil pressure in response to the low pressure alarm and main pump auto start action. If EHC fluid oil pressure is not recovered by the time the pressure drops below 800 psig, the new low oil pressure switch contacts will open to send a trip signal to the RPS if reactor power is above the P-9 power range neutron flux interlock (approximately 50% of full power). The main turbine control system will also initiate a turbine trip when pressure is ≤800 psig from separate EHC pressure transmitters that input to the control system.

3.2.5 Conclusion

The proposed changes revise TS 3.3.1, Table 3.3.1-1, “Reactor Trip System Instrumentation,” Function 14.a. “Turbine Trip - Low Fluid Oil Pressure,” to increase the values for the nominal trip setpoint (NTSP) and the allowable value. These proposed TS changes do not impact or change any assumptions contained in the plant safety analyses. Therefore, the Margin of safety related to the ability of the fission product barriers to perform their design functions during and following accident conditions is not affected. These barriers include the fuel cladding, the reactor coolant system, and the containment system. The performance of these barriers is not significantly degraded by the proposed changes.

4.0 REGULATORY EVALUATION

4.1 Applicable Regulatory Requirements/Criteria

4.1.1 Regulations

10 CFR 50.36 sets forth the regulatory requirements for the content of the TSs. This regulation requires, in part, that the TS contain Surveillance Requirements (SRs). 10 CFR 50.36(c)(3), states that SRs to be included in the TS are those relating to test, calibration, or inspection, which assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the TS LCO will be met.

10 CFR 50.65 sets forth the regulatory requirements for monitoring the effectiveness of maintenance at nuclear power plants. The existing turbine generator control system including the pressure switches that initiate the reactor trip on a turbine trip are in the scope of the Maintenance Rule and monitored at the plant level as described in TVA procedure TI-4, "Maintenance Rule Performance Indicator Monitoring, Trending, and Reporting - 10CFR50.65," Appendix A (Function 047-B) and Appendix 11. The new turbine generator control system and pressure switches that provide a reactor scram function on a turbine trip will be monitored the same way. The Reactor Protection System (RPS) is also in the scope of the rule and monitored at the specific level in accordance with TI-4, Appendix A (Function 099-B) and Attachment 34. The TS changes will have no effect on the monitoring of RPS in the Maintenance Rule.

4.1.2 General Design Criteria

As noted in the SQN UFSAR Section 3.1.2, the Sequoyah Nuclear Plant was designed to meet the intent of the Proposed General Design Criteria for Nuclear Power Plant Construction Permits published in July 1967. The Sequoyah construction permit was issued in May 1970. This UFSAR, however, addresses the NRC General Design Criteria (GDC) published as Appendix A to 10 CFR 50 in July 1971.

The SQN UFSAR contains these GDC followed by a discussion of the design features and procedures that meet the intent of the criteria. The relevant GDC are described below.

Criterion 20—Protection System Functions

The protection system shall be designed (1) to initiate automatically the operation of appropriate systems including the reactivity control systems, to assure that specified acceptable fuel design limits are not exceeded as a result of anticipated operational occurrences and (2) to sense accident conditions and to initiate the operation of systems and components important to safety.

Criterion 20 is applicable to this amendment request because the input into the RPS must ensure RPS actuation even if the input component fails. The normal operational state of the existing auto stop low fluid oil pressure switch is contacts closed. The contacts open when the low fluid oil pressure drops below the setpoint. If the pressure switch fails, the contacts would open and therefore provide input to the associated RPS channel. The new low fluid oil header pressure switches are configured in the same manner as the existing auto stop low fluid oil pressure switches with contacts closed when EHC header pressure rises above the reset setpoint and contacts open when EHC header pressure drops below the trip setpoint. Pressure

switch failure would result in contact opening and input provided to the associated RPS channel in the same manner as an EHC header pressure drop below the trip setpoint. Criterion 20 is met because the new EHC fluid oil header pressure switches are designed to fail into a safe state.

Further conformance with GDC 20 is described in Section 3.1.2 of the SQN UFSAR.

Criterion 22—Protection System Independence

The protection system shall be designed to assure that the effects of natural phenomena, and of normal operating, maintenance, testing, and postulated accident conditions on redundant channels do not result in loss of the protection function, or shall be demonstrated to be acceptable on some other defined basis. Design techniques, such as functional diversity or diversity in component design and principles of operation, shall be used to the extent practical to prevent loss of the protection function.

Criterion 22 is applicable to this amendment request because the input into the RPS must ensure RPS channel separation is maintained to provide protection system independence. The low pressure AST fluid oil header pressure switches provides inputs to each of the three RPS protection instrument channels I, II and III (two-out-of-three logic) to initiate a reactor trip on a turbine trip if reactor power is above the P-9 power range neutron flux interlock. When the low oil pressure condition is sensed below the setpoint following a turbine trip by two-out-of-three pressure switches RPS Channel I, II, and III, the RPS initiates a reactor trip signal. Separation between the three pressure switches and associated wiring is provided in accordance with IEEE 279-1971 and ensures independence between the RPS channels. The RPS trip function will now be performed by three new pressure switches located on the high pressure turbine EHC trip header. As with the original pressure switches, the three new pressure switches have two output contacts that provide redundant inputs to each of the three RPS protection instrument channels I, II and III (two-out-of-three logic). The RPS logic is not affected by the change and the signal will still initiate a reactor trip on a turbine trip if reactor power is above the P-9 power range neutron flux interlock (approximately 50% of full power). Separation between the pressure switches for each RPS channel and associated wiring is maintained in accordance with IEEE 279-1971 and ensures independence between the RPS channels.

Further conformance with GDC 22 is described in Section 3.1.2 of the SQN UFSAR.

Criterion 23—Protection System Failure Modes

The protection system shall be designed to fail into a safe state or into a state demonstrated to be acceptable on some other defined basis if conditions such as disconnection of the system, loss of energy (e.g., electric power, instrument air), or postulated adverse environments (e.g., extreme heat or cold, fire, pressure, steam, water, and radiation) are experienced.

Criterion 23 is applicable to this modification to the extent that inputs to the RPS are affected. The RPS and the turbine control systems are independent. A failure of the turbine control system does not affect the input to the RPS from the existing auto stop low fluid oil pressure switches. The low pressure AST fluid oil header pressure switches provides inputs to each of the three RPS protection instrument channels I, II and III (two-out-of-three logic) to initiate a reactor trip on a turbine trip if reactor power is above the P-9 power range neutron flux interlock. The RPS trip function will now be performed by three new pressure switches located on the high

pressure turbine EHC trip header. The three new pressure switches have two output contacts that provide redundant inputs to each of the three RPS protection instrument channels I, II and III (two of three logic). The RPS logic is not affected by the change and the signal will still initiate a reactor trip on a turbine trip if reactor power is above the P-9 power range neutron flux interlock (approximately 50% of full power). The new switches have been used in similar EHC Turbine Stop Valve applications at Watts Bar Nuclear Plant and Browns Ferry Nuclear Plant and have a reliable operating history. The new low fluid oil header pressure switches do not provide any input into the turbine control system. The low fluid oil header pressure switches utilize the existing auxiliary relays to communicate with the RPS. The connection to the RPS from the auxiliary relays is not being modified. Criterion 23 is met because the relocation and replacement of the pressure switches maintains system reliability, redundancy, and independence from the turbine control system.

Further conformance with GDC 23 is described in Section 3.1.2 of the SQN UFSAR.

4.2 Precedent

The following precedents are related to the proposed TS change in this submittal:

- NRC Letter to TVA, "Watts Bar Nuclear Plant, Unit 2 - Issuance Of Amendment To Modify Technical Specification Table 3.3.1-1, 'Reactor Trip System Instrumentation,' Turbine Trip Function On Low Fluid Oil Pressure (EPID L-2017-LLA-0357)," dated October 30, 2018 (ML18255A156).

- NRC Letter to TVA, "Watts Bar Nuclear Plant, Unit 1 - Issuance of Amendment Regarding Reactor Protection System Instrumentation Turbine Trip Function (CAC NO. MF9401; EPID L-2017-LLA-0189)," dated March 28, 2018 (ML18052B347).

- NRC letter to Duke Energy Progress, Inc., "H. B. Robinson Steam Electric Plant, Unit No. 2 - Issuance of Amendment Regarding Technical Specification 3.3.1, Reactor Protection System Instrumentation Turbine Trip (TAC No. MF3463)," dated September 22, 2015 (ML15040A073).

4.3 No Significant Hazards Consideration

The Tennessee Valley Authority (TVA) is proposing an amendment to revise the Sequoyah Nuclear Plant (SQN) Units 1 and 2 Technical Specifications (TSs) to revise TS 3.3.1, Table 3.3.1-1, "Reactor Protection System Instrumentation," Function 14.a. "Turbine Trip - Low Fluid Oil Pressure." The proposed amendment revises the Nominal Trip Setpoint (NTSP) for this function from 45 pounds per square inch gauge (psig) to 800 psig and the allowable value from greater than or equal to (≥) 39.5 psig to ≥ 710 psig. The proposed change is due to the replacement and relocation of the pressure switches from the low pressure fluid oil system that operates at a nominal control pressure of 80 psig to the high pressure turbine electrohydraulic control (EHC) header that operates at a nominal control pressure of 2000 psig. The changes to the NTSP and allowable value are needed due to the higher EHC system operating pressure. Relocation of the initiating pressure switches to the high pressure turbine EHC header is necessary to accommodate the modification of the EHC Turbine Control system while maintaining the function of transmitting the trip signal to the Reactor Protection System (RPS).

Enclosure

Evaluation of Proposed Technical Specification Change

TVA has evaluated whether or not a significant hazards consideration is involved with the proposed amendment by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below:

1. *Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?*

   Response: No

   The proposed change reflects a design change to the turbine control system that results in the use of an increased control oil pressure system, necessitating a change to the value at which a low fluid oil pressure initiates a reactor trip on turbine trip. The low fluid oil pressure is an input to the reactor trip instrumentation in response to a turbine trip event. The value at which the low fluid oil initiates a reactor trip is not an accident initiator. A change in the nominal control oil pressure does not introduce any mechanisms that would increase the probability of an accident previously analyzed. The reactor trip on turbine trip function is initiated by the same protective signal as used for the existing auto stop low fluid oil system trip signal. There is no change in form or function of this signal and the probability or consequences of previously analyzed accidents are not impacted.

   The existing test requirements for the low fluid oil pressure TS instrument function related to those variables ensures that the instruments will function as required to initiate protective systems or actuate mitigating systems at the new setpoints derived in the setpoint calculation. Surveillance tests are not an initiator to any accident previously evaluated. As a result, the probability of any accident previously evaluated is not significantly increased. The systems and components required by the low fluid oil pressure TS instrument function for which surveillance tests are added are still required to be operable, meet the acceptance criteria for the surveillance requirements, and be capable of performing any mitigation function.

   Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. *Does the change create the possibility of a new or different kind of accident from any accident previously evaluated?*

   Response: No

   The EHC fluid oil pressure rapidly decreases in response to a turbine trip signal. The value at which the low fluid oil pressure switches initiates a reactor trip is not an accident initiator. The proposed TS change reflects the higher pressure that will be sensed after the pressure switches are relocated from the auto stop low fluid oil system to the EHC high pressure header. Failure of the new switches would not result in a different outcome than is considered in the current design basis. Further, the change does not alter assumptions made in the safety analysis, but ensures that the instruments perform as assumed in the accident analysis.

   Therefore, the proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

3. Does the change involve a significant reduction in a margin of safety?

Response: No

The change involves a parameter that initiates an anticipatory reactor trip following a turbine trip. The safety analyses do not credit this anticipatory trip for reactor core protection. The original pressure switch configuration and the new pressure switch configuration both generate the same reactor trip signal. The difference is that the initiation of the trip will now be adjusted to a different system of higher pressure. This system function of sensing and transmitting a reactor trip signal on turbine trip remains the same. The existing test requirements for the low fluid oil pressure TS instrument function related to those variables ensures that the instruments will function as required to initiate protective systems or actuate mitigating systems at the new setpoints derived in the setpoint calculation. The as-left tolerance requirements of the calibration procedures are calculated in accordance with BTI-EEB-TI-28 which ensures that the tolerances will not have an adverse effect on equipment operability. The testing methods and acceptance criteria for systems, structures, and components, specified in applicable codes and standards (or alternatives approved for use by the NRC) will continue to be met as described in the plant licensing basis including the updated Final Safety Analysis Report. There is no impact to safety analysis acceptance criteria as described in the plant licensing basis because no change is made to the accident analysis assumptions.

Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above, TVA concludes that the proposed amendment does not involve a significant hazards consideration under the standards set forth in 10 CFR 50.92 (c), and accordingly, a finding of “no significant hazards consideration” is justified.

4.4 Conclusions

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

5.0 ENVIRONMENTAL CONSIDERATION

A review has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed amendment does not involve (i) a significant hazards consideration; (ii) a significant change in the types or significant increases in the amounts of any effluents that may be released offsite; or (iii) result in a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment needs to be prepared in connection with the issuance of the amendment.

Enclosure

Evaluation of Proposed Technical Specification Change

ATTACHMENT 1

Proposed TS Changes (Mark-Ups) for SQN Unit 1

Table 3.3.1-1 (page 5 of 9)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
b. Low-Low (EAM)	1,2	3 per SG	R	SR 3.3.1.1 SR 3.3.1.7[(b)(c)] SR 3.3.1.10[(b)(c)] SR 3.3.1.14	≥ 10.1% NR Span	10.7% NR Span
Coincident with RCS Loop ΔT	1,2	4	T	SR 3.3.1.1 SR 3.3.1.7[(b)(c)] SR 3.3.1.10[(b)(c)] SR 3.3.1.14	RCS Loop ΔT variable input ≤ nominal trip setpoint + 2.5% RTP	RCS Loop ΔT variable input 50% RTP
with Time Delay T_S if one SG is affected					≤ (1.01)T_S (Note 3)	T_S (Note 3)
or Time Delay T_m if two or more SGs are affected					≤ (1.01)T_m (Note 3)	T_m (Note 3)
14. Turbine Trip						
a. Low Fluid Oil Pressure	1[(h)]	3	L	SR 3.3.1.10[(b)(c)] SR 3.3.1.13	≥ ~~39.5~~ 710 psig	~~45~~ 800 psig
b. Turbine Stop Valve Closure	1[(h)]	4	L	SR 3.3.1.10 SR 3.3.1.13	≥ 1% open	1% open
15. Safety Injection (SI) Input from Engineered Safety Feature Actuation System (ESFAS)	1,2	2 trains	M	SR 3.3.1.12	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.

(h) Above the P-9 (Power Range Neutron Flux) interlock.

Enclosure

Evaluation of Proposed Technical Specification Change

ATTACHMENT 2

Proposed TS Changes (Mark-Ups) for SQN Unit 2

Table 3.3.1-1 (page 5 of 9)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
b. Low-Low (EAM)	1,2	3 per SG	R	SR 3.3.1.1 SR 3.3.1.7[(b)(c)] SR 3.3.1.10[(b)(c)] SR 3.3.1.14	≥ 10.1% NR Span	10.7% NR Span
Coincident with RCS Loop ΔT	1,2	4	T	SR 3.3.1.1 SR 3.3.1.7[(b)(c)] SR 3.3.1.10[(b)(c)] SR 3.3.1.14	RCS Loop ΔT variable input ≤ nominal trip setpoint + 2.5% RTP	RCS Loop ΔT variable input 50% RTP
with Time Delay T_S if one SG is affected					≤ (1.01)T_S (Note 3)	T_S (Note 3)
or Time Delay T_m if two or more SGs are affected					≤ (1.01)T_m (Note 3)	T_m (Note 3)
14. Turbine Trip						
a. Low Fluid Oil Pressure	1[(h)]	3	L	SR 3.3.1.10[(b)(c)] SR 3.3.1.13	≥ ~~39.5~~ 710 psig	~~45~~ 800 psig
b. Turbine Stop Valve Closure	1[(h)]	4	L	SR 3.3.1.10 SR 3.3.1.13	≥ 1% open	1% open
15. Safety Injection (SI) Input from Engineered Safety Feature Actuation System (ESFAS)	1,2	2 trains	M	SR 3.3.1.12	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.

(h) Above the P-9 (Power Range Neutron Flux) interlock.

Enclosure

Evaluation of Proposed Technical Specification Change

ATTACHMENT 3

Proposed TS Changes (Final Typed) for SQN Unit 1

Table 3.3.1-1 (page 5 of 9)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
b. Low-Low (EAM)	1,2	3 per SG	R	SR 3.3.1.1 SR 3.3.1.7(b)(c) SR 3.3.1.10(b)(c) SR 3.3.1.14	≥ 10.1% NR Span	10.7% NR Span
Coincident with RCS Loop ΔT	1,2	4	T	SR 3.3.1.1 SR 3.3.1.7(b)(c) SR 3.3.1.10(b)(c) SR 3.3.1.14	RCS Loop ΔT variable input ≤ nominal trip setpoint + 2.5% RTP	RCS Loop ΔT variable input 50% RTP
with Time Delay T_S if one SG is affected					≤ (1.01)T_S (Note 3)	T_S (Note 3)
or Time Delay T_m if two or more SGs are affected					≤ (1.01)T_m (Note 3)	T_m (Note 3)
14. Turbine Trip						
a. Low Fluid Oil Pressure	1(h)	3	L	SR 3.3.1.10(b)(c) SR 3.3.1.13	≥ 710 psig	800 psig
b. Turbine Stop Valve Closure	1(h)	4	L	SR 3.3.1.10 SR 3.3.1.13	≥ 1% open	1% open
15. Safety Injection (SI) Input from Engineered Safety Feature Actuation System (ESFAS)	1,2	2 trains	M	SR 3.3.1.12	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.

(h) Above the P-9 (Power Range Neutron Flux) interlock.

Enclosure

Evaluation of Proposed Technical Specification Change

ATTACHMENT 4

Proposed TS Changes (Final Typed) for SQN Unit 2

Table 3.3.1-1 (page 5 of 9)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
b. Low-Low (EAM)	1,2	3 per SG	R	SR 3.3.1.1 SR 3.3.1.7[(b)(c)] SR 3.3.1.10[(b)(c)] SR 3.3.1.14	≥ 10.1% NR Span	10.7% NR Span
Coincident with RCS Loop ΔT	1,2	4	T	SR 3.3.1.1 SR 3.3.1.7[(b)(c)] SR 3.3.1.10[(b)(c)] SR 3.3.1.14	RCS Loop ΔT variable input ≤ nominal trip setpoint + 2.5% RTP	RCS Loop ΔT variable input 50% RTP
with Time Delay T_S if one SG is affected					≤ (1.01)T_S (Note 3)	T_S (Note 3)
or Time Delay T_m if two or more SGs are affected					≤ (1.01)T_m (Note 3)	T_m (Note 3)
14. Turbine Trip						
a. Low Fluid Oil Pressure	1[(h)]	3	L	SR 3.3.1.10[(b)(c)] SR 3.3.1.13	≥ 710 psig	800 psig
b. Turbine Stop Valve Closure	1[(h)]	4	L	SR 3.3.1.10 SR 3.3.1.13	≥ 1% open	1% open
15. Safety Injection (SI) Input from Engineered Safety Feature Actuation System (ESFAS)	1,2	2 trains	M	SR 3.3.1.12	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.

(h) Above the P-9 (Power Range Neutron Flux) interlock.

Enclosure

Evaluation of Proposed Technical Specification Change

ATTACHMENT 5

Proposed TS Bases Changes (Mark-Ups) for SQN Unit 1 (For Information Only)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

in MODE 3 and by the Residual Heat Removal (RHR) System in MODE 4, 5, or 6.

14. Turbine Trip

a. Turbine Trip - Low Fluid Oil Pressure

The Turbine Trip - Low Fluid Oil Pressure trip Function anticipates the loss of heat removal capabilities of the secondary system following a turbine trip. This trip Function acts to minimize the pressure/temperature transient on the reactor. Any turbine trip from a power level below the P-9 setpoint, approximately 50% power, will not actuate a reactor trip. Three pressure switches monitor the ~~auto stop~~ control oil pressure in the Turbine Electrohydraulic Control System high pressure header. A low pressure condition sensed by two-out-of-three pressure switches will actuate a reactor trip. These pressure switches do not provide any input to the control system. The unit is designed to withstand a complete loss of load and not sustain core damage or challenge the RCS pressure limitations. Core protection is provided by the Pressurizer Pressure - High trip Function and RCS integrity is ensured by the pressurizer safety valves.

The LCO requires three channels of Turbine Trip - Low Fluid Oil Pressure to be OPERABLE in MODE 1 above P-9.

Below the P-9 setpoint, a turbine trip does not actuate a reactor trip. In MODE 2, 3, 4, 5, or 6, there is no potential for a turbine trip, and the Turbine Trip - Low Fluid Oil Pressure trip Function does not need to be OPERABLE.

b. Turbine Trip - Turbine Stop Valve Closure

The Turbine Trip - Turbine Stop Valve Closure trip Function anticipates the loss of heat removal capabilities of the secondary system following a turbine trip from a power level above the P-9 setpoint, approximately 50% power. This action will actuate a reactor trip. The trip Function anticipates the loss of secondary heat removal capability that occurs when the stop valves close. Tripping the reactor in anticipation of loss of secondary heat removal acts to minimize the pressure and temperature transient on the reactor. This trip Function will not and is not required to operate in the presence of a single channel failure. The unit is designed to withstand a complete loss of load and not sustain core damage or challenge the RCS pressure limitations.