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

CNL-17-128

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

Watts Bar Nuclear Plant, Unit 2
Facility Operating License No. NPF-96
NRC Docket No. 50-391

Subject: **Application to Modify the Watts Bar Nuclear Plant Unit 2 Technical Specification 3.3.1, Reactor Protection System Instrumentation, Turbine Trip Function on Low Fluid Oil Pressure (391-WBN-TS-17-23)**

References:

1. TVA letter to NRC, CNL-17-026, “Application to Modify the Watts Bar Nuclear Plant Unit 1 Technical Specification 3.3.1, Reactor Protection System Instrumentation, Turbine trip Function on Low Fluid Oil Pressure (390-WBN-TS-17-04),” dated March 16, 2017 (ML17075A229)

2. TVA letter to NRC, CNL-17-108, “Response to Request for Additional Information Regarding Request to Modify Technical Specification 3.3.1, Reactor Protection System Instrumentation (CAC No. MF9401),” dated August 31, 2017 (ML17244A033)

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 Facility Operating License No. NPF-96 for the Watts Bar Nuclear Plant (WBN) 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,” 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 (≥) 38.3 psig to ≥ 710 psig.

The proposed change 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 WBN low oil pressure application.

The proposed WBN Unit 2 setpoint and allowable value TS changes are the same as those previously submitted for WBN Unit 1 in Reference 1. WBN Unit 2 has previously implemented the requirements of Technical Specification Task Force (TSTF) Traveler TSTF-493-A, Revision 4, "Clarify Application of Setpoint Methodology for LSSS Functions." Therefore, the addition of notes specifying the evaluation of channel performance in accordance with TSTF-493-A is not included in the proposed change to the WBN Unit 2 TS as was contained in Reference 1.

The enclosure provides a description of the proposed changes, technical evaluation of the proposed changes, regulatory evaluation, and a discussion of environmental considerations. The enclosure also incorporates the information in Reference 2 that submitted a response to an NRC request for additional information regarding Reference 1. Attachments 1 and 2 to the enclosure provide the existing TS and Bases pages marked-up to show the proposed changes. Attachments 3 and 4 to the enclosure provide the existing TS and Bases pages retyped to show the proposed changes.

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 WBN Unit 2 cycle 2 refueling outage scheduled for the Spring of 2019.

TVA has determined that there are no significant hazards considerations associated with the proposed amendments and Technical Specification changes. The proposed amendments and Technical Specification 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. Please address any questions regarding this request to Edward D. Schrull at (423) 751-3850.

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 11th day of October 2017.

Respectfully,

J. W. Shea
Vice President, Nuclear Regulatory Affairs and Support Services

Enclosure: Evaluation of Proposed Change

cc (Enclosure):

NRC Regional Administrator - Region II
NRC Resident Inspector – Watts Bar Nuclear Plant
NRC Project Manager – Watts Bar 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 Watts Bar Nuclear Plant Unit 2 Technical Specification 3.3.1, Reactor Protection System Instrumentation, Turbine trip function on Low Fluid Oil Pressure (391-WBN-TS-17-23)**

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Evaluation of Proposed Technical Specification Change

1.0 SUMMARY DESCRIPTION

This evaluation supports a request to amend Facility Operating License No. NPF-96 for the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant (WBN) 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 change to the TS is 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, a change to WBN Unit 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 WBN low oil pressure application.

The proposed WBN Unit 2 setpoint and allowable value TS changes are the same as those previously submitted for WBN Unit 1 in Reference 1. This enclosure also reflects the information in Reference 2 that provided a response to a Nuclear Regulatory Commission (NRC) request for additional information regarding Reference 1.

WBN Unit 2 has previously implemented the requirements of Technical Specification Task Force (TSTF) Traveler TSTF-493-A, Revision 4, "Clarify Application of Setpoint Methodology for LSSS Functions." Therefore, the addition of notes specifying the evaluation of channel performance in accordance with TSTF-493-A is not included in the proposed changes to the WBN Unit 2 TS as was contained in the WBN Unit 1 submittal (Reference 1).

2.0 DETAILED DESCRIPTION

2.1 Proposed Changes

The proposed change revises TS 3.3.1, Table 3.3.1-1, Function 14.a. as follows:

- Increases the NTSP from 45 psig to 800 psig, and the allowable value (AV) from greater than or equal to (≥) 38.3 psig to ≥ 710 psig.

Attachments 1 and 2 to this enclosure provide the existing TS and Bases pages marked-up to show the proposed changes. Attachments 3 and 4 to the enclosure provide the existing TS and Bases pages retyped to show the proposed changes.

Changes to the existing TS Bases are provided for information only and will be implemented under the TS 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 reactor trip system (RTS) initiates a unit shutdown, based on the values of selected unit parameters, to protect against violating the core fuel design limits and reactor coolant system (RCS) pressure boundary during anticipated operational occurrences (AOOs) and to assist the engineered safety features (ESF) systems in mitigating accidents.

The protection and monitoring systems have been designed to assure safe operation of the reactor. This is achieved by specifying limiting safety system settings (LSSSs) in terms of parameters directly monitored by the RTS, as well as specifying limiting conditions for operation (LCOs) on other reactor system parameters and equipment performance.

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. The reactor trip on a turbine trip is actuated by two-out-of-three logic from low oil pressure signals or by closed signals from all four turbine steam stop valves. The circuitry associated with the pressure switches is independent of the turbine control system and does not perform any turbine control functions.

A turbine trip causes a direct reactor trip above the P-9 setpoint of approximately 50 percent (%) power. Any turbine trip from a power level below the P-9 setpoint will not directly trip the reactor, but will allow the reactor control system to bring the reactor to zero power utilizing steam dump to the condenser as an artificial load. The reactor trip on turbine trip provides additional protection and conservatism beyond that required for the health and safety of the public. This trip is included as part of good engineering practice and prudent design. No credit is taken in the accident analyses for this trip.

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 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 ≥ 38.3 psig.

3.1.2 Proposed New Pressure Switch Configuration

The proposed modifications to the EHC system remove 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 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

The low pressure AST fluid oil header pressure switches provides inputs to each of the three RPS protection 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.

Section 7.2.1.1.2.6 of the WBN dual-unit Updated Final Safety Analysis Report (UFSAR) describes the reactor trip on a turbine trip function as follows:

> "The reactor trip on turbine trip provides additional protection and conservatism beyond that required for the health and safety of the public. This trip is included as part of good engineering practice and prudent design. No credit is taken in any of the accident analyses (Chapter 15) for this trip."

This trip anticipates the loss of heat removal capabilities of the secondary system following a turbine trip and acts to minimize the pressure/temperature transient on the RCS.

The accident analyses (UFSAR Chapter 15) do not credit this direct reactor trip on a turbine trip for any core protection function. WBN Unit 2 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 high pressurizer pressure and over temperature ΔT trip functions. RCS integrity is ensured by the pressurizer safety valves.

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 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.

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 to the 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 release the high-pressure EHC fluid to the main steam governor and stop valves actuators to drain (approximately zero 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 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. 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 are lifted and re-landed on the new pressure switches so that the electrical connections to the SSPS are the same as 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 scram is initiated on a loss of SSPS power to one train of the SSPS system.

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 similar EHC applications at the Browns Ferry Nuclear Plant (BFN) on the turbine stop valves. 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.

The low pressure setpoint provides an unambiguous, non-spurious indication of turbine trip status. The calculated setpoint uncertainties are determined for normal conditions because the switches are not credited for operation under accident conditions; therefore, the switches will not be exposed to adverse environmental conditions before or during the time they are needed to function.

In order to ensure that the instrument channel is capable of performing its specified function, WBN Unit 2 performs testing of this channel 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 will have sufficient margin from the system trip setpoint. The high pressure EHC fluid "Low Pressure Alarm" occurs on decreasing pressure at 1600 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 turbine will trip (as sensed by the two-out-of-three pressure switches) and 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).

3.2.3 Response Time of the Existing Verses New Pressure Switch Configuration

As noted in Reference 2, there is no discernable difference in the time interval from depressurization to trip logic initiation between the current auto-stop oil system configuration and the proposed high pressure turbine EHC oil system configuration. Further justification is provided below.

As noted in Section 3.2.1 of this enclosure, Section 7.2.1.1.2.6 of the WBN dual-unit UFSAR describes the reactor trip on a turbine trip function.

Consequently, the WBN dual-unit 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.

TVA surveillance instructions 2-SI-99-601-A and 2-SI-99-601-B, that apply to a different part of the plant SSPS circuity (i.e., not associated with the low oil pressure switch function), test the time to depressurize the auto-stop oil system line and the resulting closure of the turbine stop valves. These surveillance instructions require that the desired response time to fully close the stop valves is ≤ 0.75 seconds, which includes the time to depressurize the EHC lines.

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. In 2-SI-99-601-A and 2-SI-99-601-B, a protective relay (K621) 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 ≤0.75 seconds. Because this action includes the time to close the stop valves, the time to depressurize the auto-stop oil line is also ≤ 0.75 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 is confirmed during post installation testing by the performance of surveillance instructions 2-SI-99-601-A and 2-SI-99-601-B. With the modified EHC system, relay K621 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 relay K621 to the closure of the stop valves is recorded and verified to be ≤0.75 seconds.

Therefore, the time to depressurize the EHC header to less than the low oil pressure switch actuation setpoint is ≤0.75 seconds for both the existing and new configuration.

The response time of both the existing United Electric model J402/270 pressure switches and the new Barksdale TC9622-3-V pressure switches is 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.

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 WBN dual-unit 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 (AL) 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 AL 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 and not tripped physical condition.

The AV is derived from the NTSP based on performance data and not an evaluation of total loop uncertainties (TLUs) applied to an AL or LTSP. The Acceptance Band (Ab) and AV were calculated in accordance with BTI-EEB-TI-28 as described below. A summary of the calculations is provided at the end of this section.

Nominal Trip Setpoint

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 As Left Tolerance (AAL).
Table 3.3.1-1, item 16.a of NUREG-1431, Revision 4, Standard Technical Specifications Westinghouse Plants, provides the referenced 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 WBN Unit 2. The setpoint value of 800 psig is 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.

Acceptance Band or As-Left Tolerance

The WBN dual-unit UFSAR section 7.1.2.1.9 defines the AAL or Ab as follows:

> “Acceptable As Left Tolerance (AAL) - A tolerance band on either side of the NTSP within which an instrument or instrument loop is left after calibration or setpoint verification. The Acceptable As Left tolerance is equal to or less than the SRSS combination of reference accuracy, M&TE accuracy and M&TE readability. Other uncertainties may be included in the AAL if applicable.”

The Ab, which is sometimes referred to as the "As-Left Value" or "Setting tolerance," is the acceptable parameter variation limits above or below the desired output for a given input standard associated with the calibration of the instrument channel. The Ab is calculated in accordance with BTI-EEB-TI-28 section 5.5.6, as the square root sum of the squares

(SRSS) combination of reference accuracy (Re), measuring and test equipment (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 (i.e., $Ab_{PS} = Re_{PS}$ = 48 psi)

Allowable Value

The WBN dual-unit UFSAR section 7.1.2.1.9 defines the AV as follows:

> "Allowable Value (AV) - 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 AV 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 analytical limit is exceeded when the channel is reset to within the 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 or As-Found Tolerance

Normal measurable accuracy (Anf), is calculated in accordance with BTI-EEB-TI-28 sections 5.5.5 and 5.5.6. For instrument calculations where a bias error is only applied in either the positive or negative direction, it is convenient to separate the calculation into a positive as-found tolerance (Anf_{pos}) calculation and a negative as-found tolerance (Anf_{neg}) calculation.

For the Barksdale pressure switches used in the low oil pressure trip application, the drift error is a negative bias and is only applied to the Anf_{ps_neg} term to determine the total negative as-found tolerance 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 a similar EHC application. No credit was taken for temperature effect in the Anf calculation which results in a more conservative AV.

Where: Drift error = -0.1% URL bias[1](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 (to be applied to only the negative as-found tolerance calculation)
$De_{PSrandom}$ = 2.1% CS_{maxPS} (Input – Maximum)
$De_{PSrandom}$ = (0.021)(2650psi)
$De_{PSrandom}$ = 55.65 psi

Therefore:

$$Anf_{PS\_pos} = \sqrt{(55.65\,psi)^2 + (48\,psi)^2 + (48\,psi)^2}$$
$$Anf_{PS\_neg} = \sqrt{(55.65\,psi)^2 + (48\,psi)^2 + (48\,psi)^2} + 2.65\,psi$$

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

<u>Allowable Value</u>

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

Where: SP_{PS} = Setpoint value

<u>Summary</u>

Instrument	Setpoint (SP_{PS}) (psi)	Range (psi) (CS_{minPS} to CS_{maxPS})	Output	As-Left Value (Ab_{PS}) (psi)	Allowable Value (AV_{PS}) (psi)
2-PS-047-0073	800	250 to 2650	(OP DECR)	48	710
2-PS-047-0074	800	250 to 2650	(OP DECR)	48	710
2-PS-047-0075	800	250 to 2650	(OP DECR)	48	710

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 NTSP and the AV. 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

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1 Because this is a negative bias, it is only applied to the Anf_{ps_neg} term by adding it to the SRSS of the random drift error, instrument calibration and reading inaccuracy to determine the total negative as-found tolerance.

RCS, 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. As noted in Reference 2, the existing turbine generator control system (TGCS) is in the scope of the Maintenance Rule and monitored at the “plant level” (e.g., unplanned scrams, ESF actuations) as described in Appendix A to TVA procedure 0-TI-119 “Maintenance Rule Performance Indicator Monitoring, Trending, and Reporting - 10CFR50.65.” The new TGCS and pressure switches that provide a reactor scram function on a turbine trip will be monitored the same way. As noted in Section 3.1.2 of this enclosure, the proposed change modifies the output sensors of the TGCS that input to the reactor protection system (RPS). The RPS is also in the scope of the Maintenance Rule and monitored at the “specific level” (e.g., unavailability, unreliability, condition, or a special plant level criteria) in accordance with 0-TI-119. The proposed TS changes will have no effect on the monitoring of the RPS in the Maintenance Rule.

4.1.2 General Design Criteria

As noted in the WBN dual-unit UFSAR Section 3.1.1, WBN was designed to meet the intent of the "Proposed General Design Criteria for Nuclear Power Plant Construction Permits" published in July 1967. The WBN construction permit was issued in January 1973. The WBN dual-unit UFSAR, however, addresses the NRC General Design Criteria (GDC) published as Appendix A to 10 CFR 50 in July 1971, including Criterion 4 as amended October 27, 1987.

The WBN dual-unit 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.

<u>Criterion 20—Protection System Functions</u>

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 3.1.2.3 of the WBN dual-unit 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 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 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 3.1.2.3 of the WBN dual-unit 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 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 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 BFN 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 3.1.2.3 of the WBN dual-unit UFSAR.

4.2 Precedent

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

- TVA Letter to NRC, CNL-17-026, “Application to Modify the Watts Bar Nuclear Plant Unit 1 Technical Specification 3.3.1, Reactor Protection System Instrumentation, Turbine Trip Function on Low Fluid Oil Pressure (390-WBN-TS-17-04),” dated May 16, 2017 (ML17075A229). The proposed WBN Unit 2 setpoint and allowable value are the same as those previously submitted for WBN Unit 1.

- NRC letter to Indiana Michigan Power Company, “Donald C. Cook Nuclear Plant, Unit 2 - Issuance of Amendment Regarding Reactor Trip on Low Turbine Oil Pressure (TAC No. MD3161),” dated September 21, 2007 (ML072180639). This amendment modified the turbine control system to replace the control system, which increased the nominal control fluid oil operating pressure from 114 psig to 1600 psig. The control fluid oil pressure provided an input to the RPS via three pressure switches connected to the control fluid header. Due to the relocation of the pressure switches to a new higher operational pressure system, this amendment revised allowable value for low fluid oil pressure from 57 psig to 750 psig.

- 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). This license amendment modified TS 3.3.1, Table 3.3.1- 1, Function 15.a. "Low auto stop Oil Pressure," to reflect a modification to the Unit 2 turbine control system. A change to the turbine control system revised the TS for the RPS instrumentation turbine trip Function on low auto stop oil pressure to a turbine trip function on low fluid oil pressure. In addition, the nominal trip setpoint was changed from 45 psig to 800 psig and the allowable value was revised from 40.87 psig to 769 psig.

  This proposed LAR is very similar to this precedent because they both involve an increase in the NTSP and allowable value as the result of increased control fluid oil operating pressure originating from upgrades and/or replacement of the originally installed turbine control systems. In both cases, the pressure switches providing the RPS inputs do not interface with the turbine control system and can be considered independent of the turbine control system modifications.

4.3 Significant Hazards Consideration

The Tennessee Valley Authority (TVA) is proposing an amendment to revise the Watts Bar Nuclear Plant (WBN) Unit 2 Technical Specifications (TS) 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 (≥) 38.3 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).

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.

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. 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.

6.0 REFERENCES

1. TVA letter to NRC, CNL-17-026, “Application to Modify the Watts Bar Nuclear Plant Unit 1 Technical Specification 3.3.1, Reactor Protection System Instrumentation, Turbine trip Function on Low Fluid Oil Pressure (390-WBN-TS-17-04),” dated March 16, 2017 (ML17075A229)

2. TVA letter to NRC, CNL-17-108, “Response to Request for Additional Information Regarding Request to Modify Technical Specification 3.3.1, Reactor Protection System Instrumentation (CAC No. MF9401),” dated August 31, 2017 (ML17244A033)

Enclosure

Evaluation of Proposed Technical Specification Change

ATTACHMENT 1

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

Table 3.3.1-1 (page 4 of 9)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
13. SG Water Level – Low-Low	1, 2	3/SG	U	SR 3.3.1.1 SR 3.3.1.7 (b)(c) SR 3.3.1.10 (b)(c) SR 3.3.1.15	≥ 16.4% of narrow range span	17% of narrow range span
Coincident with:						
a) Vessel ΔT Equivalent to power ≤ 50% RTP	1, 2	3	V	SR 3.3.1.7 (b)(c) SR 3.3.1.10 (b)(c)	Vessel ΔT variable input ≤ 52.6% RTP	Vessel ΔT variable input 50% RTP
With a time delay (T_s) if one steam generator is affected					≤ 1.01 T_s (Refer to Note 3, Page 3.3-23)	T_s (Refer to Note 3, Page 3.3-23)
or						
A time delay (T_m) if two or more steam generators are affected					≤ 1.01 T_m (Refer to Note 3, Page 3.3-23)	T_m (Refer to Note 3, Page 3.3-23)
b) Vessel ΔT Equivalent to power > 50% RTP with no time delay (T_s and T_m = 0)	1, 2	3	V	SR 3.3.1.7 (b)(c) SR 3.3.1.10 (b)(c)	Vessel ΔT variable input ≤ 52.6% RTP	Vessel ΔT variable input 50% RTP
14. Turbine Trip						
a. Low Fluid Oil Pressure	1 (i)	3	O	SR 3.3.1.10 (b)(c) SR 3.3.1.14	≥ 710~~38.3~~ psig	800~~45~~ psig
b. Turbine Stop Valve Closure	1 (i)	4	Y	SR 3.3.1.10 SR 3.3.1.14	≥ 1% open	1% open

(continued)

(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. The methodologies used to determine the as found and as left tolerances for the NTSP are specified in FSAR Section 7.1.2.

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

Enclosure

Evaluation of Proposed Technical Specification Change

ATTACHMENT 2

Proposed TS Bases Changes (Mark-Ups) for WBN Unit 2 (For Information Only)

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

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 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 below the P-9 setpoint, approximately 50% power. This action will not 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. Core protection is provided by the Pressurizer

(continued)

Enclosure

Evaluation of Proposed Technical Specification Change

ATTACHMENT 3

Proposed TS Changes (Final Typed) for WBN Unit 2

Table 3.3.1-1 (page 4 of 9)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
13. SG Water Level – Low-Low	1, 2	3/SG	U	SR 3.3.1.1 SR 3.3.1.7 (b)(c) SR 3.3.1.10 (b)(c) SR 3.3.1.15	≥ 16.4% of narrow range span	17% of narrow range span
Coincident with:						
a) Vessel ΔT Equivalent to power ≤ 50% RTP	1, 2	3	V	SR 3.3.1.7 (b)(c) SR 3.3.1.10 (b)(c)	Vessel ΔT variable input ≤ 52.6% RTP	Vessel ΔT variable input 50% RTP
With a time delay (T_s) if one steam generator is affected					≤ 1.01 T_s (Refer to Note 3, Page 3.3-23)	T_s (Refer to Note 3, Page 3.3-23)
or						
A time delay (T_m) if two or more steam generators are affected					≤ 1.01 T_m (Refer to Note 3, Page 3.3-23)	T_m (Refer to Note 3, Page 3.3-23)
b) Vessel ΔT Equivalent to power > 50% RTP with no time delay (T_s and T_m = 0)	1, 2	3	V	SR 3.3.1.7 (b)(c) SR 3.3.1.10 (b)(c)	Vessel ΔT variable input ≤ 52.6% RTP	Vessel ΔT variable input 50% RTP
14. Turbine Trip						
a. Low Fluid Oil Pressure	1 (i)	3	O	SR 3.3.1.10 (b)(c) SR 3.3.1.14	≥ 710 psig	800 psig
b. Turbine Stop Valve Closure	1 (i)	4	Y	SR 3.3.1.10 SR 3.3.1.14	≥ 1% open	1% open

(continued)

(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. The methodologies used to determine the as found and as left tolerances for the NTSP are specified in FSAR Section 7.1.2.

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

Enclosure

Evaluation of Proposed Technical Specification Change

ATTACHMENT 4

Proposed TS Bases Changes (Final Typed) for WBN Unit 2 (For Information Only)

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

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 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 below the P-9 setpoint, approximately 50% power. This action will not 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. Core protection is provided by the Pressurizer

(continued)