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CPSES-200701323
TXX-07108

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August 16, 2007

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION
DOCKET NOS. 50-445 AND 50-446
LICENSE AMENDMENT REQUEST (LAR) 07-006, REVISION TO TECHNICAL SPECIFICATION 3.1.4, "ROD GROUP ALIGNMENT LIMITS", TABLE 3.3.1-1, "REACTOR TRIP SYSTEM INSTRUMENTATION", TABLE 3.3.2-1, "ENGINEERED SAFETY FEATURE ACTUATION SYSTEM INSTRUMENTATION", 3.4.10, "PRESSURIZER SAFETY VALVES", 3.7.1, "MAIN STEAM SAFETY VALVES (MSSVs)", AND TABLE 3.7.1-1, "OPERABLE MAIN STEAM SAFETY VALVES VERSUS MAXIMUM ALLOWABLE POWER"

REFERENCES:
1. Letter logged TXX-07063 from Mike Blevins of Luminant Power to the NRC, dated April 10, 2007, Transmitting License Amendment Request (LAR) 07-003.
2. Letter logged TXX-07047 from Mike Blevins of Luminant Power to the NRC, dated Feb, 22, 2007.

Dear Sir or Madam:

Pursuant to 10CFR50.90, TXU Generation Company LP (Luminant Power) hereby requests an amendment to the Comanche Peak Steam Electric Station, herein referred to as Comanche Peak Nuclear Power Plant (CPNPP), Unit 1 Operating License (NPF-87) and CPNPP Unit 2 Operating License (NPF-89) by incorporating the attached changes into the CPNPP Unit 1 and 2 Technical Specifications. This change request applies to both Units.

The proposed change will revise TS 3.1.4 entitled "Rod Group Alignment Limits", Table 3.3.1-1 entitled "Reactor Trip System Instrumentation ", Table 3.3.2-1 entitled "Engineered Safety Feature Actuation System Instrumentation", 3.4.10 entitled "Pressurizer Safety Valves", 3.7.1 entitled "Main Steam Safety Valves (MSSVs)", and Table 3.7.1-1 entitled "OPERABLE Main Steam Safety Valves versus Maximum Allowable Power." Proposed change LAR 07-006 is a request to revise several Technical Specifications (TS) for CPNPP Units 1 and 2 to reflect cycle-specific safety analysis assumptions and results

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associated with the adoption of Westinghouse accident analyses methodologies, as described in Luminant Power letter TXX-07063 (Reference 1). The cycle-specific analyses, performed in accordance with these methodologies, were performed at a core thermal power of 3612 MWth, which bounds the Rated Thermal Power of 3458 MWth.

Attachment 1 provides a detailed description of the proposed changes, a technical analysis of the proposed changes, Luminant Power's determination that the proposed changes do not involve a significant hazard consideration, a regulatory analysis of the proposed changes and an environmental evaluation. Attachment 2 provides the affected Technical Specification (TS) pages marked-up to reflect the proposed changes. Attachment 3 provides proposed changes to the Technical Specification Bases for information only. These changes will be processed per CPNPP site procedures. Attachment 4 provides retyped Technical Specification pages which incorporate the requested changes. Attachment 5 provides retyped Technical Specification Bases pages which incorporate the proposed changes.

Per Reference 2, Luminant Power committed, if approved by the NRC, to apply the Westinghouse Small Break LOCA NOTRUMP methodology to CPNPP Unit 1 beginning with Cycle 14 operation in the Fall of 2008 (Commitment Number 27436). Luminant Power will complete the transition to the proposed methodologies prior to Unit 1, Cycle 14 operation (Fall 2008). In addition, Luminant Power currently plans to use these proposed Core Operating Limit Report (COLR) methodologies to support Unit 2, Cycle 11 operation (Spring of 2008). Therefore, Luminant Power requests approval of this proposed License Amendment for cycle specific changes by March 1, 2008, to be implemented within 120 days of the issuance of the license amendment.

In accordance with 10CFR50.91(b), Luminant Power is providing the State of Texas with a copy of this proposed amendment.

This communication contains no new or revised commitments.

Should you have any questions, please contact Mr. J. Seawright at (254) 897-0140.

I state under penalty of perjury that the foregoing is true and correct.

Executed on August 16, 2007.

Sincerely,

TXU Generation Company LP

By: TXU Generation Management Company LLC, Its General Partner

Mike Blevins

By: Rafael Flores

Rafael Flores
Site Vice President

Attachments
1. Description and Assessment
2. Proposed Technical Specifications Changes
3. Proposed Technical Specifications Bases Changes (for information)
4. Retyped Technical Specification Pages
5. Retyped Technical Specification Bases Pages (for information)

c - B. S. Mallett, Region IV
B. K. Singal, NRR
Resident Inspectors, CPNPP

Ms. Alice K. Rogers
Environmental & Consumer Safety Section
Texas Department of State Health Services
1100 West 49th Street
Austin, Texas 78756-3189

ATTACHMENT 1 to TXX-07108

DESCRIPTION AND ASSESSMENT

LICENSEE'S EVALUATION

1.0 DESCRIPTION

By this letter, TXU Generation Company LP (Luminant Power) requests an amendment to the Comanche Peak Steam Electric Station, herein referred to as Comanche Peak Nuclear Power Plant (CPNPP), Unit 1 Operating License (NPF-87) and CPNPP Unit 2 Operating License (NPF-89) by incorporating the attached change into the CPNPP Unit 1 and 2 Technical Specifications. This proposed change, LAR 07-006, is a request to revise several Technical Specifications (TS) for CPNPP Units 1 and 2 to reflect cycle-specific safety analysis assumptions and results associated with the adoption of Westinghouse accident analyses methodologies, as described in Luminant Power letter TXX-07063 (Reference 7.1). The cycle-specific analyses, performed in accordance with these methodologies, were performed at a core thermal power of 3612 MWth, which bounds the Rated Thermal Power of 3458 MWth.

Technical Specification 3.1.4, "Rod Group Alignment Limits"

Revise Technical Specification Surveillance Requirement 3.1.4.3 for the maximum allowable Rod Cluster Control Assembly (RCCA) drop time from 2.4 seconds to 2.7 seconds.

Technical Specification 3.3.1, Table 3.3.1-1, "Reactor Trip System Instrumentation

Revise the Allowable Value for the Overtemperature N-16 reactor trip function, presented in TS Table 3.3.1-1, Functional Unit 6, to reflect a new Safety Analysis Limit developed with the revised accident analysis and updated uncertainty analyses. (Consistent with the current licensing basis, the nominal trip setpoint is presented in TS Bases Table B3.3.1-1.)

Revise the Allowable Value for the Overpower N-16 reactor trip function, presented in TS Table 3.3.1-1, Functional Unit 7, to reflect a new Safety Analysis Limit and updated uncertainty analyses. (Consistent with the current licensing basis, the nominal trip setpoint is presented in TS Bases Table B3.3.1-1.)

Revise the Allowable Value for the Power Range Neutron Flux - High and Power Range Neutron Flux - Low reactor trip functions, presented in TS Table 3.3.1-1, Functional Unit 2a and 2b, respectively, to reflect new Safety Analysis Limits and updated uncertainty analyses. (Consistent with the current licensing basis, the nominal trip setpoint is presented in TS Bases Table B3.3.1-1.)

Revise the Allowable Value for the Steam Generator Water Level - Low-Low reactor trip function presented in TS Table 3.3.1-1, Functional Unit 14, to reflect new Safety Analysis Limits and updated uncertainty analyses. (Consistent with the current licensing basis, the nominal trip setpoint is presented in TS Bases B 3.3.1-1.)

Revise TS Table 3.3.1-1, footnote (a) to reflect the identification of the Nominal Trip Setpoint (NTSP) as the Limiting Safety System Setpoint, consistent with the guidance presented in TSTF 493, Revision 2 and Regulatory Information Summary 06-17, for the reactor trip functions identified above.

Revise TS Table 3.3.1-1 to apply footnotes (q) and (r) to the Functional Units identified

above, consistent with the guidance presented in TSTF 493, Revision 2, and Regulatory Information Summary 06-17.

Revise TS Table 3.3.1-1 to add a note allowing the use of the current Unit 1 setpoints until the end of Cycle 13. The proposed setpoints would be applied to Unit 2, Cycle 11 operation; implementation for Unit 1 would be deferred until the end of the current operating cycle.

Technical Specification 3.3.2, Table 3.3.2-1, "Engineered Safety Feature Actuation System Instrumentation"

Revise the Allowable Value for the Steam Generator Water Level - Low-Low Engineered Safety Features Actuation System (ESFAS) function presented in TS Table 3.3.2-1, Functional Unit 6c, to reflect new Safety Analysis Limits and updated uncertainty analyses. (Consistent with the current licensing basis, the nominal trip setpoint is presented in TS Bases Table B3.3.2-1.)

Revise the Allowable Value for the Steam Generator Water Level - High-High ESFAS function presented in TS Table 3.3.2-1, Functional Unit 5b, to reflect an updated uncertainty analysis. (Consistent with the current licensing basis, the nominal trip setpoint is presented in TS Bases Table B3.3.2-1.

Revise the note on Table 3.3.2-1, footnote (c), to update the values of the lead/lag compensation on the Main Steamline Pressure ESFAS function from 50/5 to 10/5 to reduce the potential for unnecessary steamline isolations during plant maneuvers.

Revise TS Table 3.3.2-1, footnote (a) to reflect the identification of the Nominal Trip Setpoint (NTSP) as the Limiting Safety System Setpoint, consistent with the guidance presented in TSTF 493, Revision 2 and Regulatory Information Summary 06-17, for the reactor trip functions identified above.

Revise TS Table 3.3.2-1 to apply footnotes (q) and (r) to the Functional Units identified above, consistent with the guidance presented in TSTF 493, Revision 2, and Regulatory Information Summary 06-17.

Revise TS Table 3.3.2-1 to add a note allowing the use of the current Unit 1 setpoints until the end of Cycle 13. The proposed setpoints would be applied to Unit 2, Cycle 11 operation; implementation for Unit 1 would be deferred until the end of the current operating cycle.

Technical Specification 3.4.10, "Pressurizer Safety Valves"

Revise the Limiting Condition for Operation (LCO) for TS 3.4.10 for the pressurizer safety valve set pressure to reflect a reduced nominal set pressure of 2460 psig with as-found set pressure tolerances of +1, -2%.

Technical Specification 3.7.1, "Main Steam Safety Valves (MSSVs)", and Table 3.7.1-1, "OPERABLE Main Steam Safety Valves versus Maximum Allowable Power."

Revise TS Table 3.7.1-1 to reflect revised maximum allowable power level for continued operation with inoperable main steam safety valves. In addition, revise the Required Action for Condition A to require a power reduction to less than or equal to 68% Rated Thermal Power.

2.0 PROPOSED CHANGE

The proposed change would revise the following Technical Specifications as described below.

Technical Specification 3.1.4, "Rod Group Alignment Limits"

The proposed change would revise TS SR 3.1.4.3 to reflect a different value for the RCCA drop time. The current value is ≤ 2.4 seconds. The proposed value is ≤ 2.7 seconds. The proposed maximum rod drop time of 2.7 seconds was used in each of the revised transient and accident analyses, performed with the Westinghouse methodologies described in Reference 7.1, where a reactor trip is credited for mitigation of the initiating event. The conditions under which the RCCA drop time is measured, described in SR 3.1.4.3, remain unchanged.

Technical Specification 3.3.1, Table 3.3.1-1, "Reactor Trip System Instrumentation

The proposed change would revise TS Table 3.3.1-1, Functional Unit 6, to reflect a different value for the Allowable Value for this trip function. The current Allowable Values for this trip function, listed in Note 1 to Table 3.3.1-1, are presented as a percentage of the Overtemperature span. A revised value of the Safety Analysis Limit (the conservatively high value used in the safety analyses) was developed in accordance with the Westinghouse methodologies described in Reference 7.1. New uncertainty analyses were then performed by Westinghouse to develop the Allowable Values listed in Table 3.3.1-1. For the Overtemperature trip function, a separate Allowable Value is presented for each input (power, temperature, pressure, and axial flux difference (Δq) into the overtemperature setpoint function. The proposed changes would be effective for Unit 1, Cycle 14 and for Unit 2, Cycle 11. The proposed Allowable Values, applicable to both CPNPP units, are:

0.5 % N-16 span for the N-16 input,
0.5 % Tcold span for the Tcold input,
0.5 % pressure span for the pressurizer pressure input, and
0.5 % Δq span for the Δq input.

The proposed change would revise TS Table 3.3.1-1, Functional Unit 7, to reflect a different value of 112.8% of the N-16 span for the Allowable Value for the Overpower trip function. A revised value of the Safety Analysis Limit was developed in accordance with the Westinghouse methodologies described in Reference 7.1. New uncertainty analyses were then performed by Westinghouse to develop the Allowable Value presented in TS Table 3.3.1-1. The proposed changes would be effective for Unit 1, Cycle 14 and for Unit 2, Cycle 11.

The proposed change would revise TS Table 3.3.1-1, Functional Unit 2, to reflect different values of 109.6% and 25.6% of span for the Allowable Values for the power range neutron

flux - high and power range neutron flux - low trip functions. Revised values of the Safety Analysis Limits were developed in accordance with the Westinghouse methodologies described in Reference 7.1. New uncertainty analyses were then performed by Westinghouse to develop the Allowable Values presented in TS Table 3.3.1-1. The proposed changes would be effective for Unit 1, Cycle 14 and for Unit 2, Cycle 11.

The proposed change would revise TS Table 3.3.1-1, Functional Unit 14 to reflect a different value for the Allowable Value for the steam generator water level -low-low trip function. A revised value of the Safety Analysis Limit was developed in accordance with the Westinghouse methodologies described in Reference 7.1. A new uncertainty analysis was then performed by Westinghouse to develop the Allowable Value presented in TS Table 3.3.1-1. Due to the different steam generator designs, separate values of 37.5% and 34.9% span are provided for Units 1 and 2, respectively. The proposed changes would be effective for Unit 1, Cycle 14 and for Unit 2, Cycle 11.

Consistent with the guidance presented in TSTF-493, Revision 2 and Regulatory Information Summary 06-17, the proposed change would revise TS Table 3.3.1-1, footnote (a) to reflect the identification of the Nominal Trip Setpoint (NTSP) as the Limiting Safety System Setpoint for the Functional Units identified above. Similarly, footnotes (q) and (r) would be applied to these Functional Units.

The proposed change would revise TS Table 3.3.1-1 to add a note allowing the use of the current Unit 1 setpoints until the end of Cycle 13. The proposed setpoints would be applied to Unit 2, Cycle 11 operation; implementation for Unit 1 would be deferred until the end of the current operating cycle.

Technical Specification 3.3.2, Table 3.3.2-1, "Engineered Safety Feature Actuation System Instrumentation"

The proposed change would revise TS Table 3.3.2-1, Functional Unit 6c, to reflect a different value for the Allowable Value for the steam generator water level -low-low trip function. As discussed for TS Table 3.3.1-1, Functional Unit 14, a revised value of the Safety Analysis Limit was developed in accordance with the Westinghouse methodologies described in Reference 7.1. New uncertainty analyses were then performed by Westinghouse to develop the Allowable Values presented in Table 3.3.2-1. Due to the different steam generator designs, separate values of 37.5% and 34.9% span are provided for Units 1 and 2, respectively. The proposed changes would be effective for Unit 1, Cycle 14 and for Unit 2, Cycle 11.

The proposed change would revise TS Table 3.3.2-1, Functional Unit 5b, to reflect different values for the Allowable Value for the steam generator water level -high-high (P-14) trip function. The current Safety Analysis Limits were confirmed to remain valid when used with the revised accident analysis methodologies. New uncertainty analyses were performed by Westinghouse to develop the Allowable Value presented in TS Table 3.3.2-1. Due to the different steam generator designs, separate values of 82.0% and 84.5% of the narrow range span are provided for Units 1 and 2, respectively. The proposed changes would be effective for Unit 1, Cycle 14 and for Unit 2, Cycle 11.

The proposed change would revise TS Table 3.3.2-1, footnote (c) to reflect new time constants for the compensated steam pressure low - ESFAS trip function. These revised values of $\tau_1 \geq 10$ seconds and $\tau_2 \leq 5$ seconds were used in each of the revised transient and accident analyses, performed with the Westinghouse methodologies described in Reference 7.1, where a steamline isolation signal is credited for mitigation of the initiating event. The proposed changes would be effective for Unit 1, Cycle 14 and for Unit 2, Cycle 11.

Consistent with the guidance presented in TSTF-493, Revision 2 and Regulatory Information Summary 06-17, the proposed change would revise TS Table 3.3.2-1, footnote (a) to reflect the identification of the Nominal Trip Setpoint (NTSP) as the Limiting Safety System Setpoint for the Functional Units identified above. Similarly, footnotes (q) and (r) would be applied to these Functional Units.

The proposed change would revise TS Table 3.3.2-1 to add a note allowing the use of the current Unit 1 setpoints until the end of Cycle 13. The proposed setpoints would be applied to Unit 2, Cycle 11 operation; implementation for Unit 1 would be deferred until the end of the current operating cycle.

Technical Specification 3.4.10, "Pressurizer Safety Valves"

The proposed change would revise the LCO for TS 3.4.10 to be consistent with a pressurizer safety valve set pressure of 2460 psig and as-found tolerances of +1%, -2% of the nominal set pressure. The LCO would be revised to read: "Three pressurizer safety valves shall be OPERABLE with lift settings ≥ 2410 psig and ≤ 2485 psig." The as-left tolerance of ±1%, specified in SR 3.4.10.1 is unchanged.

Technical Specification 3.7.1, "Main Steam Safety Valves (MSSVs)", and Table 3.7.1-1, "OPERABLE Main Steam Safety Valves versus Maximum Allowable Power."

The proposed change would revise the Required Action for TS 3.7.1, Condition A, to reflect a different maximum power level for continued operation with an inoperable main steam safety valve. The change would also revised TS Table 3.7.1-1 to reflect different Maximum Allowable Power levels for operation with inoperable main steam safety valves. The proposed values, selected in accordance with the methodology described in TSTF-235, Revision 1, are:

Number of Operable MSSVs per Steam Generator	Maximum Allowable Power (%RTP)
4	≤ 61
3	≤ 43
2	≤ 26

In summary, as a result of revised transient and accident analyses performed in accordance with Westinghouse accident analysis methods described in Reference 7.1, several cycle-specific changes to the Technical Specifications are required.

3.0 BACKGROUND

In Reference 7.1, Luminant Power proposed the use of standard, NRC-approved, Westinghouse accident analysis methodologies for use at Comanche Peak Nuclear Power Plant (CPNPP) beginning with Unit 2 Cycle 11 in the spring of 2008 and applied to Unit 1 Cycle 14 in the fall of 2008. As the initial set of accident analyses was performed to implement the Westinghouse analysis methods, a core power of 3612 MWth was selected for use. This value bounds the Rated Thermal Power of 3458 MWth for both CPNPP units and was selected to be consistent with a future power uprate. In addition, several Technical Specifications were identified which would need to be revised to maintain compliance with 10CFR50.36. The revisions to the Allowable Values for the overtemperature N-16, overpower N-16, power range neutron flux, and steam generator water level reactor trip functions (and their associated footnotes) are a direct result of the implementation of the revised analyses.

During the performance of these accident analyses, three areas were identified where significant operating margin could be incorporated, reducing the potential for future TS violations or unnecessary steamline isolations during normal plant maneuvers. The changes to the RCCA drop time, the pressurizer safety valve set pressure and as-found tolerance, and the time constants on the low steamline pressure compensation fall into this category.

Finally, Westinghouse issued Nuclear Safety Advisory Letter (NSAL) 94-001 which described a potential concern with TS Table 3.7.1-1. The recommended changes from this NSAL were eventually incorporated into the Improved Standard Technical Specifications via TSTF-235, Revision 1. These documents described a simplified heat balance calculation methodology for determining the maximum allowable power level for continued operation with inoperable main steam safety valves. An alternate approach identified in the NSAL required the performance of specific system thermal-hydraulic analyses; these analyses were previously performed for CPNPP, but are not considered necessary in the future. With the adoption of the standard Westinghouse accident analysis methods, the simplified heat balance calculation method was adopted. The revisions to the Required Action for TS 3.7.1, Condition A, and Table 3.7.1-1 reflect this different approach.

4.0 TECHNICAL ANALYSIS

Technical Specification 3.1.4, "Rod Group Alignment Limits"

Verification of rod drop times allows the operator to determine that the maximum rod drop time measured is consistent with the assumed rod drop time used in the safety analysis. Measuring rod drop times prior to reactor criticality, after reactor vessel head removal and replacement, ensures that the reactor internals and rod drive mechanism will not interfere with rod motion or rod drop time, and that no degradation in these systems has occurred that would adversely affect control rod motion or drop time. This testing is performed with all RCPs operating and the average moderator temperature ≥ 500°F to simulate a reactor trip under actual conditions.

The proposed change would revise TS SR 3.1.4.3 to reflect a different value for the RCCA drop time. The current value is ≤ 2.4 seconds. The proposed value is ≤ 2.7 seconds. The proposed maximum rod drop time of 2.7 seconds was used in each of the revised transient and accident analyses, performed with the Westinghouse methodologies

described in Reference 7.1, where a reactor trip is credited for mitigation of the initiating event. The conditions under which the RCCA drop time is measured, described in SR 3.1.4.3, remain unchanged.

Note that this specification is proposed to be implemented in the spring of 2008 and will be applicable to both CPNPP units. The accident analyses performed with this maximum RCCA drop time (2.7 seconds) will be effective for Unit 2 following the completion of Cycle 10 operation in the spring of 2008. The accident analyses supporting Unit 1 Cycle 13 currently requires the use of a maximum RCCA drop time of 2.4 seconds which is more conservative than the proposed RCCA rod drop time of 2.7 seconds. This conservative drop time was met for the current Unit 1 cycle of operation during the last refueling outage (1RF12).

In conclusion, because the relevant event acceptance criteria for each of these accident analyses are shown to be satisfied, the maximum rod drop time of 2.7 seconds is acceptable.

Technical Specification 3.3.1, Table 3.3.1-1, "Reactor Trip System Instrumentation

Overtemperature N-16 reactor trip setpoint

The Overtemperature N-16 reactor trip setpoint is calculated such that a reactor trip will be initiated before the core safety limits are exceeded. The Overtemperature N-16 reactor trip function provides DNB protection from events which result in changes in power, pressure, temperature, or axial power shape. As for the core safety limits, the range over which the overtemperature reactor trip setpoint is calculated is bounded by the Pressurizer Pressure - Low and Pressurizer Pressure - High reactor trip setpoints and the overpower reactor trip setpoint. The operation of the Main Steam Safety Valves also limit the power/temperature range over which the overtemperature trip setpoint must provide DNB protection. If an event results in an axial power shape which is more severe, from a DNB standpoint, than the reference axial power shape, the Overtemperature N-16 trip setpoint is automatically reduced in order to assure that the DNB protection afforded by the trip setpoint remains adequate. The axial power shapes are "recognized" by the plant instrumentation in terms of delta- flux (ΔI); i.e., the difference between the currents generated by the top two excore power range neutron flux detector sections and the currents generated by the bottom two detector sections.

As part of the analyses performed to support the implementation of the Westinghouse accident analyses, revised values of the overtemperature N-16 setpoint were selected. The specific methodology is described in WCAP-8745-P-A, "Design Bases for the Thermal Overpower ΔT and Thermal Overtemperature ΔT Trip Functions," September 1986, adapted for the overtemperature N-16 function as described in Reference 7.1. The selected setpoint has been applied to both Unit 1 and Unit 2 at an assumed power level of 3612 MWth, which bounds the Rated Thermal Power of 3458 MWth. A revised value of the Safety Analysis Limit (SAL) (the conservatively high value used in the safety analyses) was developed in accordance with the Westinghouse methodologies described in Reference 7.1 (WCAP-8745-P-A). The acceptability of the new SAL was confirmed through the performance of transient and accident analyses performed in accordance with the methodology described in WCAP-14882-P-A, "RETRAN-02 Modeling and Qualification for Westinghouse Pressurized Water Reactor Non-LOCA Safety Analysis,"

April 1999, specifically, for the Rod Withdrawal at Power and the Turbine Trip analyses. Because the relevant event acceptance criteria were satisfied for these analyses, the SAL for the overtemperature N-16 setpoint is acceptable.

New uncertainty analyses were then performed by Westinghouse to develop the Allowable Values listed in Table 3.3.1-1 (See TS Table 3.3.1-1 Note (a)). The methodology describing which uncertainties to consider and how to statistically combine these uncertainties, uses a square root of the sum of the squares methodology, as described in the Bases to TS 3.3.1 and WCAP-12123, "Westinghouse Setpoint Methodology for Protection Systems Comanche Peak Unit 1, Revision 1." The nominal trip setpoint (NTSP) is then calculated. However, in contrast with the methodology presented in WCAP-12123, but consistent with the NRC's RIS-06-17 and the proposed TSTF-493, Revision 2, the NTSP is calculated and the Allowable Value is based on the expected Westinghouse 7300 process rack uncertainty. The approach makes the NTSP, specified in TS Bases Table 3.3.1-1, the Limiting Safety System Setpoint (LSSS). In addition, a separate Allowable Value is presented for each input (power, temperature, pressure, and axial flux difference (Δq)) into the overtemperature setpoint function. The proposed Allowable Values, applicable to both CPNPP units, are:

0.5 % N-16 span for the N-16 input,
0.5 % Tcold span for the Tcold input,
0.5 % pressure span for the pressurizer pressure input, and
0.5 % Δq span for the Δq input.

Finally, existing TS Table 3.3.1-1 footnote (a) is modified to identify that the LSSS for this function is the NTSP, and footnotes (q) and (r) are applied to the overtemperature N-16 setpoint, consistent with the NRC's RIS-06-17.

In conclusion, the proposed Allowable Values for the overtemperature N-16 setpoint are developed in accordance with NRC-approved methodologies proposed for use at CPNPP in Reference 7.1, the relevant safety analysis limits are met, and the NRC's expectations described in RIS-06-17 are satisfied.

Overpower N-16 reactor trip setpoint

As part of the analyses performed to the implementation of the revised Westinghouse analyses, revised values of the Overpower N-16 setpoint were selected. The specific methodology is described in WCAP-8745-P-A, "Design Bases for the Thermal Overpower ΔT and Thermal Overtemperature ΔT Trip Functions," September 1986, adapted for the overpower N-16 function as described in Reference 7.1. The selected setpoint has been applied to both Unit 1 and Unit 2 at an assumed power level of 3612 MWth, which bounds the Rated Thermal Power of 3458 MWth. A revised value of the Safety Analysis Limit (the conservatively high value used in the safety analyses) was developed in accordance with the Westinghouse methodologies described in Reference 7.1 (WCAP-8745-P-A). The acceptability of the new SAL was confirmed through the performance of transient and accident analyses performed in accordance with the Westinghouse methodology described in Reference 7.1, WCAP-14882-P-A, "RETRAN-02 Modeling and Qualification for Westinghouse Pressurized Water Reactor Non-LOCA Safety Analysis," April 1999. Because the relevant event acceptance criteria were satisfied for these analyses, the SAL for the Overpower N-16 setpoint is acceptable.

New uncertainty analyses were then performed by Westinghouse to develop the Allowable Values listed in Table 3.3.1-1 (See TS Table 3.3.1-1 Note (a)). The methodology describing which uncertainties to consider and how to statistically combine these uncertainties, uses a square root of the sum of the squares methodology, as described in the Bases to TS 3.3.1 and WCAP-12123. The nominal trip setpoint (NTSP) is then calculated. However, in contrast with the methodology presented in WCAP-12123, but consistent with the NRC's RIS-06-17 and the proposed TSTF-493, Revision 2, the NTSP is calculated, and the Allowable Value is based on the expected Westinghouse 7300 process rack uncertainty. The approach makes the NTSP, specified in TS Bases Table 3.3.1-1, the Limiting Safety System Setpoint (LSSS). The proposed Allowable Value, applicable to both CPNPP units, is 112.8% span, where the setpoint was developed based on a power level of 3612 MWth, but is conservatively applied to the current Rated Thermal Power of 3458 MWth.

Finally, existing TS Table 3.3.1-1 footnote (a) is modified to identify that the LSSS for this function is the NTSP, and footnotes (q) and (r) are applied to the overtemperature N-16 setpoint, consistent with the NRC's RIS-06-17.

In conclusion, the proposed Allowable Value for the overpower N-16 setpoint is developed in accordance with NRC-approved methodologies proposed for use at CPNPP in Reference 7.1, the relevant safety analysis limits are met, and the NRC's expectations described in RIS-06-17 are satisfied.

Power Range Neutron Flux - High and Power Range Neutron Flux - Low trip functions

The proposed change would revise TS Table 3.3.1-1, Functional Unit 2, to reflect different values of 109.6% and 25.6% of span for the Allowable Values for the Power Range Neutron Flux - High and Power Range Neutron Flux - Low trip functions. The original values of the SALs for these trip functions were based on a Rated Thermal Power of 3411 MWth. When both CPNPP units were previously uprated by approximately 1.4% power, the SALs were retained, but re-normalized to the new Rated Thermal Power of 3458 MWth. With adoption of the standard Westinghouse methodologies described in Reference 7.1, the SALs for these functions were returned to previous values (expressed as a percentage of the Rated Thermal Power) based on the assumed core power level of 3612 MWth, which bounds the current Rated Thermal Power of 3458 MWth.

The acceptability of the new SAL was confirmed through the performance of transient and accident analyses performed in accordance with the Westinghouse methodology described in Reference 7.1, WCAP-14882-P-A, "RETRAN-02 Modeling and Qualification for Westinghouse Pressurized Water Reactor Non-LOCA Safety Analysis," April 1999. Because the relevant event acceptance criteria were satisfied for these analyses, the SAL for the power range neutron flux setpoints are acceptable.

New uncertainty analyses were then performed by Westinghouse to develop the Allowable Values listed in Table 3.3.1-1 (See TS Table 3.3.1-1 Note (a)). The methodology describing which uncertainties to consider and how to statistically combine these uncertainties uses a square root of the sum of the squares methodology, as described in the Bases to TS 3.3.1 and WCAP-12123. The nominal trip setpoint (NTSP) is then calculated. However, in contrast with the methodology presented in WCAP-12123, but

consistent with the NRC's RIS-06-17 and the proposed TSTF-493, Revision 2, the NTSP is calculated, and the Allowable Value is based on the expected Westinghouse 7300 process rack uncertainty. The approach makes the NTSP, specified in TS Bases Table 3.3.1-1, the Limiting Safety System Setpoint (LSSS). The proposed Allowable Values, applicable to both CPNPP units, are 109.6% span and 25.6% span for the -high and -low trip functions, respectively, where the setpoints were developed based on a power level of 3612 MWth, but are conservatively applied to the current Rated Thermal Power of 3458 MWth.

Finally, existing TS Table 3.3.1-1 footnote (a) is modified to identify that the LSSS for this function is the NTSP, and footnotes (q) and (r) are applied to the power range neutron flux - high and -low trip functions, consistent with the NRC's RIS-06-17.

In conclusion, the proposed Allowable Values for the power range neutron flux -high and -low trip functions are developed in accordance with NRC-approved methodologies proposed for use at CPNPP in Reference 7.1, the relevant safety analysis limits are met, and the NRC's expectations described in RIS-06-17 are satisfied.

Allowable Value for the Steam Generator Water Level -Low-Low trip function

The proposed change would revise TS Table 3.3.1-1, Functional Unit 14 to reflect a different value for the Allowable Value for the Steam Generator Water Level -Low-Low trip function. In the current accident analyses, a SAL limit of 0% span was used for the Steam Generator Water Level -Low-Low trip function for all of the analyses in which this trip function was credited. In the new analyses performed in accordance with the Westinghouse methodologies, different SALs are assumed for some of the analyses in which this trip function is credited. Because of potential adverse containment environments, the feedline break analysis is most limiting. For this analysis, a SAL of 0% narrow range span is used.

The acceptability of the new SAL was confirmed through the performance of transient and accident analyses performed in accordance with the methodology described in WCAP-14882-P-A, "RETRAN-02 Modeling and Qualification for Westinghouse Pressurized Water Reactor Non-LOCA Safety Analysis," April 1999. Because the relevant event acceptance criteria were satisfied for these analyses, the SALs for the Steam Generator Water Level -Low-Low trip function are acceptable.

New uncertainty analyses were then performed by Westinghouse to develop the Allowable Values listed in Table 3.3.1-1 (See TS Table 3.3.1-1 Note (a)). The methodology describing which uncertainties to consider and how to statistically combine these uncertainties uses a square root of the sum of the squares methodology, as described in the Bases to TS 3.3.1 and WCAP-12123. The nominal trip setpoint (NTSP) is then calculated. However, in contrast with the methodology presented in WCAP-12123, but consistent with the NRC's RIS-06-17 and the proposed TSTF-493, Revision 2, the NTSP is calculated, and the Allowable Value is based on the expected Westinghouse 7300 process rack uncertainty. The approach makes the NTSP, specified in TS Bases Table 3.3.1-1, the Limiting Safety System Setpoint (LSSS). The proposed Allowable Values, applicable to both CPNPP units, are 37.5% and 34.9% narrow range span for Unit 1 and Unit 2, respectively, for the steam generator water level - low-low trip function.

Finally, existing TS Table 3.3.1-1 footnote (a) is modified to identify that the LSSS for this function is the NTSP, and footnotes (q) and (r) are applied to the steam generator water level -low-low trip function, consistent with the NRC's RIS-06-17.

In conclusion, the proposed Allowable Values for the steam generator water level -low-low trip function are developed in accordance with NRC-approved methodologies proposed for use at CPNPP in Reference 7.1, the relevant safety analysis limits are met, and the NRC's expectations described in RIS-06-17 are satisfied.

Technical Specification 3.3.2, Table 3.3.2-1, "Engineered Safety Feature Actuation System Instrumentation"

Allowable Value for the Steam Generator Water Level -Low-Low ESFAS trip function

The proposed change would revise TS Table 3.3.2-1, Functional Unit 6c, to reflect a different value for the Allowable Value for the Steam Generator Water Level -Low-Low ESFAS function. The discussion provided above for TS Table 3.3.1-1 Steam Generator Water Level -Low-Low trip function applies equally for the Allowable Value for the Steam Generator Water Level -Low-Low ESFAS function.

In conclusion, the proposed Allowable Value for the Steam Generator Water Level -Low-Low ESFAS setpoints are developed in accordance with NRC-approved methodologies proposed for use at CPNPP in Reference 7.1, the relevant safety analysis limits are met, and the NRC's expectations described in RIS-06-17 are satisfied.

Steam Generator Water Level -High-High (P-14) ESFAS trip function

The proposed change would revise TS Table 3.3.2-1, Functional Unit 5b, to reflect a different value for the Allowable Value for the Steam Generator Water Level -High-High (P-14) trip function. In the current accident analyses, a SAL limit of 100% span, adjusted to reflect the Maximum Reliable Level Indication as recommended in NSAL-02-003, 02-004, and 02-005, was used for the Steam Generator Water Level -High-High trip function for the analysis of the increase in feedwater flow analysis in which this trip function was credited.

The acceptability of the new SAL was confirmed through the performance of transient and accident analyses performed in accordance with the methodology described in WCAP-14882-P-A, "RETRAN-02 Modeling and Qualification for Westinghouse Pressurized Water Reactor Non-LOCA Safety Analysis," April 1999. Because the relevant event acceptance criteria were satisfied for these analyses, the SAL for the Steam Generator Water Level -High-High trip function is acceptable.

New uncertainty analyses were then performed by Westinghouse to develop the Allowable Values listed in Table 3.3.2-1 (See TS Table 3.3.2-1 Note (a)). The methodology describing which uncertainties to consider and how to statistically combine these uncertainties uses a square root of the sum of the squares methodology, as described in the Bases to TS 3.3.2 and WCAP-12123. The nominal trip setpoint (NTSP) is then calculated. However, in contrast with the methodology presented in WCAP-12123, but consistent with the NRC's RIS-06-17 and the proposed TSTF-493, Revision 2, the NTSP is

calculated, and the Allowable Value is based on the expected Westinghouse 7300 process rack uncertainty. The approach makes the NTSP, specified in TS Bases Table 3.3.2-1, the Limiting Safety System Setpoint (LSSS). The proposed Allowable Values, applicable to both CPNPP units, are 82.0% and 84.5% narrow range span for Unit 1 and Unit 2, respectively, for the steam generator water level - high-high trip function.

Finally, existing TS Table 3.3.2-1 footnote (a) is modified to identify that the LSSS for this function is the NTSP, and footnotes (q) and (r) are applied to the steam generator water level -high-high trip function, consistent with the NRC's RIS-06-17.

In conclusion, the proposed Allowable Values for the steam generator water level -high-high trip function are developed in accordance with NRC-approved methodologies proposed for use at CPNPP in Reference 7.1, the relevant safety analysis limits are met, and the NRC's expectations described in RIS-06-17 are satisfied.

Time constants for the compensated Steam Pressure Low - ESFAS trip function

The proposed change would revise TS Table 3.3.2-1, footnote (c) to reflect new time constants for the compensated steam pressure low - ESFAS trip function. These revised values of $\tau1 \geq 10$ seconds and $\tau2 \leq 5$ seconds were used in each of the revised transient and accident analyses, performed with the Westinghouse methodologies described in Reference 7.1, where a steamline isolation signal is credited for mitigation of the initiating event.

The current time constants used in the steamline pressure - low compensation circuits greatly amplify a sharp pressure decrease. Therefore, in practice, a compensated steamline pressure -low isolation signal could be initiated when the actual steam pressure is significantly higher than the trip setpoint. During the transition to Westinghouse methodologies, the compensation circuitry time constants were reduced from 50/5 to 10/5, resulting in an approximately five-fold decrease in the sensitivity of this circuitry to a decrease in the steamline pressure. This change is expected to improve operating margins when the reactor operators open the steam dump valves or the atmospheric relief valves to stabilize reactor coolant system temperatures or to initiate a plant cool down. By avoiding steam line isolation, thereby keeping the condenser available as the primary heat sink, nuclear safety is also improved.

In conclusion, because the accident analyses were performed in accordance with the Westinghouse methods proposed in Reference 7.1, resulted in acceptable results; i.e., the relevant event acceptance criteria were met. Therefore, the proposed compensation time constants are acceptable.

Technical Specification 3.4.10, "Pressurizer Safety Valves"

The proposed change would revise the LCO for TS 3.4.10 to be consistent with a pressurizer safety valve set pressure of 2460 psig and as-found tolerances of +1%, -2% of the nominal set pressure. The LCO would be revised to read: "Three pressurizer safety valves shall be OPERABLE with lift settings ≥ 2410 psig and ≤ 2485 psig." The current Technical Specification LCO is equivalent to a nominal set pressure of 2485 psig with an as-found tolerance of ±1%. The as-left tolerance of ±1%, specified in SR 3.4.10.1 is

unchanged.

During the performance of the accident analyses in accordance with the Westinghouse methodologies proposed in Reference 7.1 (particularly, WCAP-14882-P-A, "RETRAN-02 Modeling and Qualification for Westinghouse Pressurized Water Reactor Non-LOCA Safety Analysis) at the bounding power level of 3612 MWth, it was found to be necessary to reduce the pressurizer safety valve set pressure from 2485 psig to 2460 psig in order to meet the maximum Reactor Coolant System pressure relevant event acceptance criterion of 110% of the design pressure. The limiting transient for this function is the loss of load / turbine trip analysis. In addition, operating experience throughout the industry and at CPNPP, in particular, has revealed that the as-found pressurizer safety valve set pressure was occasionally lower than the current requirement of -1% of the set pressure due to mechanical setpoint drift. Thus, to avoid exceeding the LCO, it is desirable to increase the allowable as-found set pressure from -1% tolerance to a tolerance of -2%. The proposed set pressure of 2460 psig, with a tolerance of -2% (or approximately 50 psig), results in an allowable as-found lift pressure of 2410 psig. This value remains greater than both the opening pressure (2350 psig) of the pressurizer power-operated relief valves (PORVs) and the nominal trip setpoint of the pressurizer pressure - high reactor trip setpoint (2385 psig); thus, there is no significant increase in the potential of pressurizer safety valve opening for transients that would normally be attenuated by the operation of the PORVs or the reactor trip function.

In conclusion, reducing the pressurizer safety valve set pressure by 25 psig results in compliance with the relevant event acceptance criteria for the limiting loss of load / turbine trip analysis, and is, therefore, acceptable. Increasing the lower tolerance for the as-found set pressure does not result in interactions with the pressurizer pressure control system nor with the reactor trip system, and is, therefore, acceptable.

Technical Specification 3.7.1, "Main Steam Safety Valves"

The proposed change would revise the Required Action for TS 3.7.1, Condition A, to reflect a different maximum power level for continued operation with an inoperable main steam safety valve. The change would also revised TS Table 3.7.1-1 to reflect different Maximum Allowable Power levels for operation with inoperable main steam safety valves. The proposed values, selected in accordance with the methodology described in TSTF-235, Revision 1, are:

Number of Operable MSSVs per Steam Generator	Maximum Allowable Power (%RTP)
4	≤ 61
3	≤ 43
2	≤ 26

Westinghouse issued Nuclear Safety Advisory Letter (NSAL) 94-001 which described an potential concern with TS Table 3.7.1-1. The recommended changes from this NSAL were eventually incorporated into the Improved Standard Technical Specifications via TSTF-235, Revision 1. These documents described a simplified heat balance calculation methodology for determining the maximum allowable power level for continued operation with inoperable main steam safety valves. An alternate approach identified in the NSAL required the performance of specific system thermal-hydraulic analyses; these analyses were previously performed for CPNPP, but are not considered necessary in the future. With the adoption of the standard Westinghouse accident analysis methods, the simplified heat balance calculation method was adopted. The revisions to the Required Action for TS 3.7.1, Condition A, and Table 3.7.1-1 reflect this different approach. Consistent with the guidance of TSTF-235, Revision 1, a power uncertainty of 2.0% RTP is applied to the Required Action for TS 3.7.1, Condition A; a power range neutron flux trip setpoint uncertainty of 9.0% RTP is applied for TS 3.7.1-1. Both of these uncertainty allowances are conservatively large relative to the actual CPNPP uncertainties.

In conclusion, with the adoption of the standard Westinghouse accident analysis methods, the simplified heat balance calculation approach, as described in NSAL 94-001 and TSTF-235, Revision 1, the revisions to the Required Action for TS 3.7.1 Condition A and TS Table 3.7.1-1 reflecting this different approach is acceptable and conservative for the core power level of 3612 MWt as well as 3458 MWt.

5.0 REGULATORY ANALYSIS

5.1 No Significant Hazards Consideration

Luminant Power has evaluated whether or not a significant hazards consideration is involved with the proposed amendment(s) by focusing on the three standards set forth in 10CFR50.92, "Issuance of amendment," as discussed below:

1. Do the proposed changes involve a significant increase in the probability or consequences of an accident previously evaluated?

   Response: No

   The proposed changes only affect the transient and accident mitigation capability of the plant. The proposed changes to the pressurizer safety valve set pressure and as-found tolerance do not overlap with the pressurizer control system operation nor with the reactor trip setpoint. Therefore, the proposed changes do affect the probability of an accident previously evaluated.

   The revised Reactor Trip System and Engineered Safety Features Actuation System

setpoints have been shown, using NRC-approved analysis methodologies, to meet all relevant event acceptance criteria. Similarly, the change to the nominal set pressure of the pressurizer safety valve, when evaluated using NRC-approved analysis methodologies, has been shown to meet the relevant event acceptance criteria. The proposed reduction to maximum allowable power level for operation in inoperable MSSVs has been previously shown to be very conservative. Therefore, the proposed changes do not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Do the proposed changes create the possibility of a new or different kind of accident from any accident previously evaluated?

   Response: No

   The proposed changes are based on analyses and evaluations performed in accordance with NRC-approved methodologies shown to be applicable CPNPP and to be conservatively applied to CPNPP. None of the proposed changes can result in plant operation outside the limits previously considered, nor allow the progression of transient or accident in a manner different that previously considered. Therefore, the proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

3. Do the proposed changes involve a significant reduction in a margin of safety?

   Response: No

   The proposed changes are based on analyses and evaluations performed in accordance with NRC-approved methodologies shown to be applicable to CPNPP and to be conservatively applied to CPNPP. All relevant event acceptance criteria were found to be satisfied. Therefore the proposed change does not involve a reduction in a margin of safety.

Based on the above evaluations, Luminant Power concludes that the proposed amendment present no significant hazards under the standards set forth in 10CFR50.92(c) and, accordingly, a finding of "no significant hazards consideration" is justified.

5.2 Applicable Regulatory Requirements/Criteria

The proposed changes to Technical Specifications TS 3.1.4 entitled "Rod Group Alignment Limits", Table 3.3.1-1 entitled "Reactor Trip System Instrumentation ", Table 3.3.2-1 entitled "Engineered Safety Feature Actuation System Instrumentation", 3.4.10 entitled "Pressurizer Safety Valves", 3.7.1 entitled "Main Steam Safety Valves (MSSVs)", and Table 3.7.1-1 entitled "OPERABLE Main Steam Safety Valves versus Maximum Allowable Power," are based on methodologies submitted to the NRC in a previous License Amendment Request (LAR 07-003). LAR-07-003 proposed revisions to Technical Specification 5.6.5.b regarding NRC-approved methods that will be used to establish cycle operating limits. These limits were established with the referenced methodologies ensure that reload design, analysis, and plant operation remain within the regulatory requirements established for fuel assembly and core designs and conform to methodologies approved by the NRC for the intended application.

By this letter, Luminant Power requests an amendment to the CPNPP Unit 1 Operating License (NPF-87) and CPNPP Unit 2 Operating License (NPF-89) by incorporating the attached changes into the CPNPP Unit 1 and 2 Technical Specifications. Proposed change LAR 07-006 is a request to establish specific Unit 1 and 2 core operating limits based on standard Westinghouse-developed and NRC generically approved analytical methods.

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.

6.0 ENVIRONMENTAL CONSIDERATION

Luminant Power has determined that the proposed amendment would change requirements with respect to the installation or use of a facility component located within the restricted area, as defined in 10CFR20, or would change an inspection or surveillance requirement. Luminant Power has evaluated the proposed changes and has determined that the changes do not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amount of effluent that may be released offsite, or (iii) a significant increase in the individual or cumulative occupational radiation exposure. Accordingly, the proposed change meets the eligibility criterion for categorical exclusion set forth in 10CFR51.22 (c)(9). Therefore, pursuant to 10CFR51.22 (b), an environmental assessment of the proposed change is not required.

7.0 REFERENCES

7.1 Letter logged TXX-07063 from Mike Blevins of Luminant Power to the NRC, dated April 10, 2007, Transmitting License Amendment Request (LAR) 07-003.

ATTACHMENT 2 to TXX-07108

PROPOSED TECHNICAL SPECIFICATION CHANGES (MARK-UP)

Pages	3.1-10
	3.3-15
	3.3-16
	3.3-17
	3.3-18
	3.3-19
	3.3-20
	3.3-29
	3.3-30
	3.3-31
	3.3-32
	3.3-33
	3.3-34
	3.4-21
	3.7-1
	3.7-4

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.4.1	Verify individual rod positions within alignment limit.	12 hours
SR 3.1.4.2	Verify rod freedom of movement (trippability) by moving each rod not fully inserted in the core ≥ 10 steps in either direction.	92 days
SR 3.1.4.3	Verify rod drop time of each rod, from the fully withdrawn position, is ≤ ~~2.4~~ 2.7 seconds from the beginning of decay of stationary gripper coil voltage to dashpot entry, with: a. $T_{avg} \geq 500°F$; and b. All reactor coolant pumps operating.	Prior to reactor criticality after each removal of the reactor head

Table 3.3.1-1 (page 1 of 6)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE(a)	
1. Manual Reactor Trip	1,2	2	B	SR 3.3.1.14	NA	
	3(b), 4(b), 5(b)	2	C	SR 3.3.1.14	NA	
2. Power Range Neutron Flux						
a. High	1,2	4	D	SR 3.3.1.1 SR 3.3.1.2 SR 3.3.1.7 SR 3.3.1.11 SR 3.3.1.16	≤ ~~110.8% RTP~~ 109.6% RTP (q)(r)#	72 89
b. Low	1(c), 2	4	E	SR 3.3.1.1 SR 3.3.1.8 SR 3.3.1.11 SR 3.3.1.16	≤ ~~27.7% RTP~~ 25.6% RTP (q)(r)#	
3. Power Range Neutron Flux Rate High Positive Rate	1,2	4	E	SR 3.3.1.7 SR 3.3.1.11	≤ 6.3 % RTP with time constant ≥ 2 sec	
4. Intermediate Range Neutron Flux	1(c), 2(d)	2	F,G	SR 3.3.1.1 SR 3.3.1.8 SR 3.3.1.11	≤ 31.5% RTP	
5. Source Range Neutron Flux	2(e)	2	I,J	SR 3.3.1.1 SR 3.3.1.8 SR 3.3.1.11	≤ 1.4 E5 cps	
	3(b), 4(b), 5(b)	2	J,K	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.11	≤ 1.4 E5 cps	

(continued)

(a) The Allowable Value defines the limiting safety system setting except for Trip Functions 2a, 2b, 6, 7, and 14 (the Nominal Trip Setpoint defines the limiting safety system setting for these Trip Functions). See the Bases for the Nominal Trip Setpoints.
(b) With Rod Control System capable of rod withdrawal or one or more rods not fully inserted.
(c) Below the P-10 (Power Range Neutron Flux) interlock.
(d) Above the P-6 (Intermediate Range Neutron Flux) interlock.
(e) Below the P-6 (Intermediate Range Neutron Flux) interlock.
(q) If the as-found channel setpoint is conservative with respect to the Allowable Value but outside its predefined as-found acceptance criteria band, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.
(r) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance of the Nominal Trip Setpoint or a value that is more conservative than the Trip Setpoint; otherwise, the channel shall be declared inoperable. The Nominal Trip Setpoint, the methodology used to determine the as-found tolerance and the methodology used to determine the as-left tolerance shall be specified in the Technical Specification Bases.
For Unit 1, through Cycle 13, the ALLOWABLE VALUE for the Power Range Neutron Flux - High remains at 110.8% RTP and the Power Range Neutron Flux - Low remains at 27.7% RTP.

Table 3.3.1-1 (page 2 of 6)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE(a)
6. Overtemperature N-16	1,2	4	E	SR 3.3.1.1 SR 3.3.1.2 SR 3.3.1.3 SR 3.3.1.6 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	Refer to Note 1 (q)(r)
7. Overpower N-16	1,2	4	E	SR 3.3.1.1 SR 3.3.1.2 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	≤ ~~112.9% RTP~~ 112.8% RTP (q)(r)##
8. Pressurizer Pressure					
a. Low	1(g)	4	M	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	≥ 1863.6 psig (Unit 1) ≥ 1865.2 psig (Unit 2)
b. High	1,2	4	E	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	≤ 2400.8 psig (Unit 1) ≤ 2401.4 psig (Unit 2)
9. Pressurizer Water Level - High	1(g)	3	M	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10	≤ 93.9% of instrument span

72
89

(continued)

(a) The Allowable Value defines the limiting safety system setting except for Trip Functions 2a, 2b, 6, 7, and 14 (the Nominal Trip Setpoint defines the limiting safety system setting for these Trip Functions). See the Bases for the Nominal Trip Setpoints.

(g) Above the P-7 (Low Power Reactor Trips Block) interlock.

(q) If the as-found channel setpoint is conservative with respect to the Allowable Value but outside its predefined as-found acceptance criteria band, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(r) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance of the Nominal Trip Setpoint or a value that is more conservative than the Trip Setpoint; otherwise, the channel shall be declared inoperable. The Nominal Trip Setpoint, the methodology used to determine the as-found tolerance and the methodology used to determine the as-left tolerance shall be specified in the Technical Specification Bases.

For Unit 1, through Cycle 13, the ALLOWABLE VALUE for Overpower N16 remains at 112.9% RTP.

Table 3.3.1-1 (page 3 of 6)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE$^{(a)}$
10. Reactor Coolant Flow - Low	$1^{(g)}$	3 per loop	M	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	≥ 88.6% of indicated loop flow (Unit 1) ≥ 88.8% of indicated loop flow (Unit 2)
11. Not Used					
12. Undervoltage RCPs	$1^{(g)}$	1 per bus	M	SR 3.3.1.9 SR 3.3.1.10 SR 3.3.1.16	≥ 4753 V
13. Underfrequency RCPs	$1^{(g)}$	1 per bus	M	SR 3.3.1.9 SR 3.3.1.10 SR 3.3.1.16	≥ 57.06 Hz
14. Steam Generator (SG) Water Level Low-Low $^{(l)}$	1, 2	4 per SG	E	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	≥ ~~36%~~ 37.5%### of narrow range instrument span (Unit 1) $^{(q)(r)}$ ≥ ~~33.4%~~ 34.9% of narrow range instrument span (Unit 2)
15. Not Used.					
16. Turbine Trip					
a. Low Fluid Oil Pressure	$1^{(j)}$	3	O	SR 3.3.1.10 SR 3.3.1.15	≥ 46.6 psig
b. Turbine Stop Valve Closure	$1^{(j)}$	4	P	SR 3.3.1.10 SR 3.3.1.15	≥ 1% open

(continued)

(a) The Allowable Value defines the limiting safety system setting except for Trip Functions 2a, 2b, 6, 7, and 14 (the Nominal Trip Setpoint defines the limiting safety system setting for these Trip Functions). See the Bases for the Nominal Trip Setpoints.
(g) Above the P-7 (Low Power Reactor Trips Block) interlock.
(j) Above the P-9 (Power Range Neutron Flux) interlock.
(l) The applicable MODES for these channels in Table 3.3.2-1 are more restrictive.
(q) If the as-found channel setpoint is conservative with respect to the Allowable Value but outside its predefined as-found acceptance criteria band, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.
(r) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance of the Nominal Trip Setpoint, or a value that is more conservative than the Trip Setpoint; otherwise, the channel shall be declared inoperable. The Nominal Trip Setpoint, the methodology used to determine the as-found tolerance and the methodology used to determine the as-left tolerance shall be specified in the Technical Specification Bases.

For Unit 1, through Cycle 13, the ALLOWABLE VALUE for the Steam Generator Water Level Low-Low remains at 36% of narrow range instrument Span .

Table 3.3.1-1 (page 4 of 6)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE(a)
17. Safety Injection (SI) Input from Engineered Safety Feature Actuation System (ESFAS)	1,2	2 trains	Q	SR 3.3.1.14	NA
18. Reactor Trip System Interlocks					
a. Intermediate Range Neutron Flux, P-6	2(e)	2	S	SR 3.3.1.11 SR 3.3.1.13	≥ 6E-11 amp
b. Low Power Reactor Trips Block, P-7	1	1 per train	T	SR 3.3.1.5	NA
c. Power Range Neutron Flux, P-8	1	4	T	SR 3.3.1.11 SR 3.3.1.13	≤ 50.7% RTP
d. Power Range Neutron Flux, P-9	1	4	T	SR 3.3.1.11 SR 3.3.1.13	≤ 52.7% RTP
e. Power Range Neutron Flux, P-10	1,2	4	S	SR 3.3.1.11 SR 3.3.1.13	≥ 7.3% RTP and ≤ 12.7% RTP
f. Turbine First Stage Pressure, P-13	1	2	T	SR 3.3.1.10 SR 3.3.1.13	≤ 12.7% turbine power

except for Trip Functions 2a, 2b, 6, 7, and 14 (the Nominal Trip Setpoint defines the limiting safety system setting for these Trip Functions)

Nominal

(continued)

(a) The Allowable Value defines the limiting safety system setting. See the Bases for the Trip Setpoints.
(e) Below the P-6 (Intermediate Range Neutron Flux) interlock.

Table 3.3.1-1 (page 5 of 6)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE[a]
19. Reactor Trip Breakers(RTBs)[k]	1,2	2 trains	R	SR 3.3.1.4	NA
	3[b], 4[b], 5[b]	2 trains	C	SR 3.3.1.4	NA
20. Reactor Trip Breaker Undervoltage and Shunt Trip Mechanisms[k]	1,2	1 each per RTB	U	SR 3.3.1.4	NA
	3[b], 4[b], 5[b]	1 each per RTB	C	SR 3.3.1.4	NA
21. Automatic Trip Logic	1,2	2 trains	Q	SR 3.3.1.5	NA
	3[b], 4[b], 5[b]	2 trains	C	SR 3.3.1.5	NA

except for Trip Functions 2a, 2b, 6, 7, and 14 (the Nominal Trip Setpoint defines the limiting safety system setting for these Trip Functions)

Nominal

(continued)

(a) The Allowable Value defines the limiting safety system setting. See the Bases for the Trip Setpoints.
(b) With Rod Control System capable of rod withdrawal or one or more rods not fully inserted.
(k) Including any reactor trip bypass breakers that are racked in and closed for bypassing an RTB.

Table 3.3.1-1 (page 6 of 6)
Reactor Trip System Instrumentation

(For Unit 1 Cycle 13, see Note 2)

Note 1: Overtemperature N-16

0.5% N-16 span for N-16 input 0.5% T_{cold} span for T_{cold} input, 0.5% pressure span for pressure input, and 0.5% Δq span for Δq input.

The Overtemperature N-16 Function Allowable ~~Value~~ Values shall not exceed the following setpoint by more than ~~1.72% of span for Unit 1, or 2.82% of span for Unit 2.~~

$$Q_{setpoint} = K_1 - K_2\left[\frac{(1+T_1S)}{(1+T_2S)}T_c - T_c^o\right] + K_3\left(P - P^1\right) - f_1(\Delta q)$$

Where:

$Q_{setpoint}$ = Overtemperature N-16 trip setpoint,

K_1 = * 67

K_2 = */°F

K_3 = */psig

T_C = Measured Cold leg temperature, °F

$T_c°$ = Indicated Reference T_C at RATED THERMAL POWER, *°F 67

P = Measured pressurizer pressure, psig

P^1 ≥ * psig (Nominal RCS operating pressure) 67

s = the Laplace transform operator, sec^{-1}.

τ_1,τ_2 = Time constants utilized in lead-lag controller for T_c,
$\tau_1 \geq$ * sec, and $\tau_2 \leq$ * sec 67

$f_1(\Delta q)$ =

*{(q_t - q_b) + *%}	when (q_t - q_b) ≤ *% RTP
0%	when *% RTP < (q_t - q_b) < *% RTP
*{(q_t - q_b) - *%}	when (q_t - q_b) ≥ *% RTP

67

67

INSERT A

Note 2: ~~Not Used.~~

* as specified in the COLR ~~67~~

INSERT A

The Overtemperature N-16 Function Allowable Value shall not exceed the following setpoint by more than 1.72% of span.

$$Q_{setpoint} = K_1 - K_2\left[\frac{(1+T_1S)}{(1+T_2S)}T_c - T_c^o\right] + K_3\left(P - P^1\right) - f_1(\Delta q)$$

Where:

$Q_{setpoint}$ = Overtemperature N-16 trip setpoint,

K_1 = *

K_2 = */°F

K_3 = */psig

T_C = Cold leg temperature

$T_c°$ = Reference T_C at RATED THERMAL POWER, *°F

P = Measured pressurizer pressure, psig

P^1 ≥ * psig (Nominal RCS operating pressure)

s = the Laplace transform operator, sec^{-1}.

τ_1, τ_2 = Time constants utilized in lead-lag controller for T_c, $\tau_1 \geq$ * sec, and $\tau_2 \leq$ * sec

$f_1(\Delta q)$ =

*{(q_t - q_b) + *%}	when (q_t - q_b) ≤ *% RTP
0%	when *% RTP < (q_t - q_b) < *% RTP
*{(q_t - q_b) - *%}	when (q_t - q_b) ≥ *% RTP

Table 3.3.2-1 (page 1 of 6)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE(a)
1. Safety Injection					
a. Manual Initiation	1, 2, 3, 4	2	B	SR 3.3.2.8	NA
b. Automatic Actuation Logic and Actuation Relays	1, 2, 3, 4	2 trains	C	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA
c. Containment Pressure - High 1	1, 2, 3	3	D	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≤ 3.8 psig
d. Pressurizer Pressure - Low	1, 2, 3(b)	4	D	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≥ 1803.6 psig
e. Steam Line Pressure Low	1, 2, 3(b)	3 per steam line	D	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≥ 594.0 psig(c) (Unit 1) ≥ 578.4 psig(c) (Unit 2)
2. Containment Spray					
a. Manual Initiation	1, 2, 3, 4	2 per train, 2 trains	B	SR 3.3.2.8	NA
b. Automatic Actuation Logic and Actuation Relays	1, 2, 3, 4	2 trains	C	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA
c. Containment Pressure High - 3	1, 2, 3	4	E	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≤ 18.8 psig

except for functions 5b and 6c (the Nominal Trip Setpoint defines the limiting safety system setting for these Trip Functions)

Nominal

(continued)

(a) The Allowable Value defines the limiting safety system setting. See the Bases for the Trip Setpoints.
(b) Above the P-11 (Pressurizer Pressure) interlock and below P-11, unless the Function is blocked.
(c) Time constants used in the lead/lag controller are $\tau_1 \geq$ ~~60~~ seconds and $\tau_2 \leq 5$ seconds.

10

Table 3.3.2-1 (page 2 of 6)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE(a)
3. Containment Isolation					
a. Phase A Isolation					
(1) Manual Initiation	1, 2, 3, 4	2	B	SR 3.3.2.8	NA
(2) Automatic Actuation Logic and Actuation Relays	1, 2, 3, 4	2 trains	C	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA
(3) Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.				
b. Phase B Isolation					
(1) Manual Initiation	1, 2, 3, 4	2 per train, 2 trains	B	SR 3.3.2.8	NA
(2) Automatic Actuation Logic and Actuation Relays	1, 2, 3, 4	2 trains	C	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA
(3) Containment Pressure High - 3	1, 2, 3	4	E	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9	≤ 18.8 psig

(continued)

except for functions 5b and 6c (the Nominal Trip Setpoint defines the limiting safety system setting for these Trip Functions)

Nominal

(a) The Allowable Value defines the limiting safety system setting. See the Bases for the Trip Setpoints.

Table 3.3.2-1 (page 3 of 6)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE(a)
4. Steam Line Isolation					
a. Manual Initiation	1, 2(i), 3(i)	2	F	SR 3.3.2.8	NA
b. Automatic Actuation Logic and Actuation Relays	1, 2(i), 3(i)	2 trains	G	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA
c. Containment Pressure - High 2	1, 2(i), 3(i)	3	D	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≤ 6.8 psig
d. Steam Line Pressure					
(1) Low	1, 2(i), 3(b)(i)	3 per steam line	D	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≥ 594.0 psig(c) (Unit 1) ≥ 578.4 psig(c) (Unit 2)
(2) Negative Rate - High	3(g)(i)	3 per steam line	D	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≤ 178.7 psi(h)

except for functions 5b and 6c (the Nominal Trip Setpoint defines the limiting safety system setting for these Trip Functions)

Nominal

(continued)

(a) The Allowable Value defines the limiting safety system setting. See the Bases for the Trip Setpoints.
(b) Above the P-11 (Pressurizer Pressure) Interlock and below P-11, unless the Function is blocked.
(c) Time constants used in the lead/lag controller are $\tau_1 \geq$ ~~60~~ 10 seconds and $\tau_2 \leq 5$ seconds.
(g) Below the P-11 (Pressurizer Pressure) Interlock; however, may be blocked below P-11 when safety injection on steam line pressure-low is not blocked.
(h) Time constant utilized in the rate/lag controller is ≥ 50 seconds.
(i) Except when all MSIVs and their associated upstream drip pot isolation valves are closed and deactivated.

Table 3.3.2-1 (page 4 of 6)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE(a)
5. Turbine Trip and Feedwater Isolation					
a. Automatic Actuation Logic and Actuation Relays	1, 2(j)	2 trains	H	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA
b. SG Water Level -- High High (P-14)	1, 2(j)	3 per SG(p)	I	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≤ ~~86%~~ 84.5%# of narrow range span (Unit 1) (q)(r) ≤ ~~83.5%~~ 82.0% of narrow range span (Unit 2)
c. Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.				

(continued)

(a) The Allowable Value defines the limiting safety system setting except for functions 5b and 6c (the Nominal Trip Setpoint defines the limiting safety system setting for these Trip Functions). See the Bases for the Nominal Trip Setpoints.

(j) Except when all MFIVs and associated bypass valves are closed and de-activated or isolated by a closed manual valve.

(p) A channel selected for use as an input to the SG water level controller must be declared inoperable.

(q) If the as-found channel setpoint is conservative with respect to the Allowable Value but outside its predefined as-found acceptance criteria band, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(r) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance of the Nominal Trip Setpoint, or a value that is more conservative than the Trip Setpoint; otherwise, the channel shall be declared inoperable. The Nominal Trip Setpoint, the methodology used to determine the as-found tolerance and the methodology used to determining the as-left tolerance shall be specified in the Technical Specification Bases.

For Unit 1, through Cycle 13, the ALLOWABLE VALUE for the SG Water Level High-High remains at 86% of narrow range Span .

Table 3.3.2-1 (page 5 of 6)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE(a)
6. Auxiliary Feedwater					
a. Automatic Actuation Logic and Actuation Relays (Solid State Protection System)	1, 2, 3	2 trains	G	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA
b. Not Used.					
c. SG Water Level Low-Low	1, 2, 3	4 per SG	D	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≥ ~~36%~~ 37.5%## of narrow range span (Unit 1) (q)(r) ≥ ~~33.4%~~ 34.9% of narrow range span (Unit 2)
d. Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.				
e. Loss of Offsite Power	1, 2, 3	1 per train	F	SR 3.3.2.7 SR 3.3.2.9 SR 3.3.2.10	NA
f. Not Used.					
g. Trip of all Main Feedwater Pumps	1, 2	2 per AFW pump	J	SR 3.3.2.8	NA
h. Not Used.					

(continued)

(a) The Allowable Value defines the limiting safety system settings except for functions 5b and 6c (the Nominal Trip Setpoint defines the limiting safety system setting for these Trip Functions). See the Bases for the Nominal Trip Setpoints.

(q) If the as-found channel setpoint is conservative with respect to the Allowable Value but outside its predefined as-found acceptance criteria band, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(r) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance of the Nominal Trip Setpoint, or a value that is more conservative than the Trip Setpoint; otherwise, the channel shall be declared inoperable. The Nominal Trip Setpoint, the methodology used to determine the as-found tolerance and the methodology used to determine the as-left tolerance shall be specified in the Technical Specification Bases.

For Unit 1, through Cycle 13, the ALLOWABLE VALUE for the SG Water Level Low-Low remains at 33.4% of narrow range Span .

Table 3.3.2-1 (page 6 of 6)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE(a)
7. Automatic Switchover to Containment Sump					
a. Automatic Actuation Logic and Actuation Relays	1, 2, 3, 4	2 trains	C	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA
b. Refueling Water Storage Tank (RWST) Level - Low Low	1, 2, 3, 4	4	K	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≥ 31.9(b)% instrument span
Coincident with Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.				
8. ESFAS Interlocks					
a. Reactor Trip, P-4	1, 2, 3	1 per train, 2 trains	F	SR 3.3.2.11	NA
b. Pressurizer Pressure, P-11	1, 2, 3	3	L	SR 3.3.2.5 SR 3.3.2.9	≤ 1975.2 psig (Unit 1) ≤ 1976.4 psig (Unit 2)

except for functions 5b and 6c (the Nominal Trip Setpoint defines the limiting safety system setting for these Trip Functions)

Nominal

(a) The Allowable Value defines the limiting safety system setting. See the Bases for the Trip Setpoints.

(b) The Unit 1 RWST Level Low-Low Allowable Value will remain ≥ 43.9% instrument span until completion of Cycle 12.

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.10 Pressurizer Safety Valves

LCO 3.4.10 Three pressurizer safety valves shall be OPERABLE with lift settings ≥ ~~2460~~ 2410* psig and ≤ ~~2510~~ 2485* psig.

APPLICABILITY: MODES 1, 2, and 3,
MODE 4 with all RCS cold leg temperatures > 320°F

-------------------------------------NOTE-------------------------------------
The lift settings are not required to be within the LCO limits during MODES 3 and 4 for the purpose of setting the pressurizer safety valves under ambient (hot) conditions. This exception is allowed for 54 hours following entry into MODE 3 provided a preliminary cold setting was made prior to heatup.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One pressurizer safety valve inoperable.	A.1 Restore valve to OPERABLE status.	15 minutes
B. Required Action and associated Completion Time not met. <u>OR</u> Two or more pressurizer safety valves inoperable.	B.1 Be in MODE 3. <u>AND</u> B.2 Be in MODE 4 with any RCS cold leg temperatures ≤ 320°F.	6 hours 12 hours

* For Unit 1, through Cycle 13, the three pressurizer safety valve lift settings shall be ≥ 2460 psig and ≤ 2510 psig for the Limiting Condition for Operation.

3.7 PLANT SYSTEMS

3.7.1 Main Steam Safety Valves (MSSVs)

LCO 3.7.1 Five MSSVs per steam generator shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3

ACTIONS

-----NOTE-----
Separate Condition entry is allowed for each MSSV.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more steam generators with one MSSV inoperable and the Moderator Temperature Coefficient (MTC) zero or negative at all power levels.	A. Reduce THERMAL POWER to ≤~~87~~% RTP. 68	4 hours

(continued)

Table 3.7.1-1 (page 1 of 1)
OPERABLE Main Steam Safety Valves versus
Maximum Allowable Power

NUMBER OF OPERABLE MSSVs PER STEAM GENERATOR	MAXIMUM ALLOWABLE POWER (% RTP)
4	≤ ~~87~~ $\boxed{61}$
3	≤ ~~65~~ $\boxed{43}$
2	≤ ~~43~~ $\boxed{26}$

ATTACHMENT 3 to TXX-07108

PROPOSED TECHNICAL SPECIFICATIONS BASES CHANGES
(Markup For Information Only)

Pages B 3.3-1
B 3.3-4
B 3.3-5
B 3.3-7
B 3.3-55
B 3.3-59
B 3.3-60
B 3.3-61
B 3.3-104
B 3.3-105
B 3.5-3
B 3.7-1
B 3.7-2
B 3.7-3
B 3.7-4
B 3.7-5
B 3.7-24

B 3.3 INSTRUMENTATION

B 3.3.1 Reactor Trip System (RTS) Instrumentation

BASES

BACKGROUND

The 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 (LSSS) in terms of parameters directly monitored by the RTS, as well as specifying LCOs on other reactor system parameters and equipment performance.

except for Trip Functions 2a, 2b, 6, 7, and 14 (the Nominal Trip Setpoint defines the limiting safety system setting for these Trip Functions)

For the purposes of demonstrating compliance with 10CFR50.36, the Technical Specifications must specify Limiting Safety System Settings (LSSS). The Allowable Value specified in Table 3.3.1-1 serves as the LSSS. The Allowable Value in conjunction with the trip setpoint and LCO establishes the threshold for protective system action to prevent exceeding acceptable limits during Design Basis Accidents (DBAs).

as found trip setpoint value does

The Allowable Value serves as the LSSS such that a channel is OPERABLE if the trip setpoint is found not to exceed the Allowable Value during the CHANNEL OPERATIONAL TEST (COT). Note that, although the channel is OPERABLE under these circumstances, the trip setpoint must be left adjusted to a value within the established trip setpoint calibration tolerance band in accordance with uncertainty assumptions stated in the referenced setpoint methodology (as-left criteria), and confirmed to be operating within the allowances of the uncertainty terms assigned.

except for Trip Functions 2a, 2b, 6, 7, and 14 (the Nominal Trip Setpoint defines the limiting safety system setting for these Trip Functions)

During AOOs, which are those events expected to occur one or more times during the unit life, the acceptable limits are:

1. The Departure from Nucleate Boiling Ratio (DNBR) shall be maintained above the departure from nucleate boiling ratio (DNBR) limit;

2. Fuel centerline melt shall not occur; and

3. The RCS pressure Safety Limit of 2735 psig shall not be exceeded.

(continued)

BASES

BACKGROUND (continued)

testing required while the reactor is at power may be accomplished without initiating protective action, unless a trip condition actually exists. This arises from the use of coincidence logic in generating reactor trip signals and from the capability to bypass a partial protective action while in test.

Allowable Values and Trip Setpoints

The trip setpoints used in the bistables are based on the analytical limits stated in Reference 2. The selection of these trip setpoints is such that adequate protection is provided when all sensor and processing time delays are taken into account. To allow for calibration tolerances, instrumentation uncertainties, instrument drift, and severe environment errors for those RTS channels that must function in harsh environments as defined by 10 CFR 50.49 (Ref. 4), the Allowable Values specified in Table 3.3.1-1 in the accompanying LCO are conservative with respect to the analytical limits.

for all Trip Functions 2a, 2b, 6, 7, and 14

The methodology to derive the Trip Setpoints is based upon combining all of the uncertainties in the channels. The essential elements of the methodology are described in Reference 9. Changes in accordance with this methodology have been reviewed by the staff in the original Unit 2 Technical Specifications and in several subsequent license amendments (e.g., amendments 21/7 and 22/8 to the Unit 1/Unit 2 Technical Specifications). The actual nominal trip setpoint entered into the bistable is more conservative than that specified by the Allowable Value to account for changes in random measurement errors detectable by a COT. One example of such a change in measurement error is drift during the surveillance interval. If the measured setpoint does not exceed the Allowable Value, the bistable is considered OPERABLE. The trip setpoint is the value at which the bistable is set and is the expected value to be achieved during calibration. The trip setpoint value ensures the LSSS and the safety analysis limits are met for the time period of the surveillance interval when a channel is adjusted based on stated channel uncertainties. Any bistable is considered to be properly adjusted when the "as left" setpoint value is within the band for CHANNEL CALIBRATION uncertainty allowance (i.e., ± rack calibration + comparator setting uncertainties). The trip setpoint value of Table B3.3-1.1 is therefore considered a "nominal" value (i.e., expressed as a value without inequalities) for the purposes of COT and CHANNEL CALIBRATION.

for all Trip Functions 2a, 2b, 6, 7, and 14

INSERT A HERE

Trip setpoints consistent with the requirements of the Allowable Value ensure that design limits are not violated during AOOs (and that the consequences of DBAs will be acceptable, providing the unit is operated from within the LCOs at the onset of the AOO or DBA and the equipment

(continued)

INSERT A

The methodology used to calculate the Nominal Trip Setpoints for Functions 2a, 2b, 6, 7, and 14 in Table B 3.3.1-1 is the same basic square-root-sum-of-squares (SRSS) methodology with the inclusion of refinements to better reflect plant calibration practices and equipment performance. These refinements include the incorporation of a sensor reference accuracy term to address repeatabilty effects when performing a single pass calibration (i.e., one up and one down pass at several points verifies linearity and hysteresis, but not repeatability). In addition, sensor and rack error terms for calibration accuracy and drift are grouped in the Channel Statistical Allowance equation with their dependent M&TE terms, then combined with the other independent error terms using the SRSS methodology. The actual Nominal Trip Setpoint entered into the bistable is more conservative than that specified by the Allowable Value to account for changes in random measurement errors detectable by a COT. If the measured setpoint does not exceed the Allowable Value, the bistable is considered OPERABLE.

except for Trip Functions 2a, 2b, 6, 7, and 14 (the Nominal Trip Setpoint defines the limiting safety system setting for these Trip Functions)

BASES

BACKGROUND (continued)

functions as designed). Note that in the accompanying LCO 3.3.1, the Allowable Values of Table 3.3.1-1 are the LSSS.

Each channel of the process control equipment can be tested on line to verify that the signal or setpoint accuracy is within the specified allowance requirements. Once a designated channel is taken out of service for testing, a simulated signal is injected in place of the field instrument signal. The process equipment for the channel in test is then tested, verified, and calibrated. SRs for the channels are specified in the SRs section.

INSERT B HERE

Solid State Protection System

The SSPS equipment is used for the decision logic processing of outputs from the signal processing equipment bistables. To meet the redundancy requirements, two trains of SSPS, each performing the same functions, are provided. If one train is taken out of service for maintenance or test purposes, the second train will provide reactor trip and/or ESF actuation for the unit. If both trains are taken out of service or placed in test, a reactor trip will result. Each train is packaged in its own cabinet for physical and electrical separation to satisfy separation and independence requirements. The system has been designed to trip in the event of a loss of power, directing the unit to a safe shutdown condition.

The SSPS performs the decision logic for actuating a reactor or ESF actuation, generates the electrical output signal that will initiate the required trip or actuation, and provides the status, permissive, and annunciator output signals to the main control room of the unit.

The bistable outputs from the signal processing equipment are sensed by the SSPS equipment and combined into logic matrices that represent combinations indicative of various unit upset and accident transients. If a required logic matrix combination is completed, the system will initiate a reactor trip or send actuation signals via master and slave relays to those components whose aggregate Function best serves to alleviate the condition and restore the unit to a safe condition. Examples are given in the Applicable Safety Analyses, LCO, and Applicability sections of this Bases.

Reactor Trip Switchgear

The RTBs are in the electrical power supply line from the control rod drive motor generator set power supply to the CRDMs. Opening of the RTBs interrupts power to the CRDMs, which allows the shutdown rods and control rods to fall into the core by gravity. Each RTB is equipped with a bypass breaker to allow testing of the RTB while the unit is at power. During normal

(continued)

INSERT B

The Allowable Values listed in Table 3.3.1-1, except for Functions 2a, 2b, 6, 7, and 14 incorporates all of the known uncertainties applicable for each channel. The Allowable Values for Functions 2a, 2b, 6, 7, and 14 are based on the Nominal Trip Setpoints and are determined by subtracting or adding the rack calibration accuracy from the Nominal Trip Setpoint. The magnitudes of these uncertainties are factored into the determination of each Nominal Trip Setpoint. All field sensors and signal processing equipment for these channels are assumed to operate within the allowances of these uncertainty magnitudes.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

except for Trip Functions 2a, 2b, 6, 7, and 14

INSERT C HERE

A channel is OPERABLE with a trip setpoint value outside its calibration tolerance band provided the trip setpoint "as-found" value does not exceed its associated Allowable Value and provided the trip setpoint "as-left" value is adjusted to a value within the calibration tolerance band of the Nominal Trip Setpoint. A trip setpoint may be set more conservative than the Nominal Trip Setpoint as necessary in response to plant conditions.

The LCO generally requires OPERABILITY of four or three channels in each instrumentation Function, two channels of Manual Reactor Trip in each logic Function, and two trains in each Automatic Trip Logic Function. Four OPERABLE instrumentation channels in a two-out-of-four configuration are required when one RTS channel is also used as a control system input. This configuration accounts for the possibility of the shared channel failing in such a manner that it creates a transient that requires RTS action. In this case, the RTS will still provide protection, even with a random failure of one of the other three protection channels. Three operable instrumentation channels in a two-of-three configuration are generally required when there is no potential for control system and protection system interaction that could simultaneously create a need for RTS trip and disable one RTS channel. The two-out-of-three and two-out-of-four configurations allow one channel to be tripped or bypassed during maintenance or testing without causing a reactor trip. Specific exceptions to the above general philosophy exist and are discussed below.

Reactor Trip System Functions

The safety analyses and OPERABILITY requirements applicable to each RTS Function are discussed below:

1. Manual Reactor Trip

The Manual Reactor Trip ensures that the control room operator can initiate a reactor trip at any time by using either of two reactor trip switches in the control room. A Manual Reactor Trip accomplishes the same results as any one of the automatic trip Functions. It is used by the reactor operator to shut down the reactor whenever any parameter is rapidly trending toward its Trip Setpoint.

The LCO requires two Manual Reactor Trip channels to be OPERABLE. Each channel is controlled by a manual reactor trip switch. Each channel activates the reactor trip breaker in both trains. Two independent channels are required to be OPERABLE so that no single random failure will disable the Manual Reactor Trip Function.

(continued)

INSERT C

Note (r) requires the instrument channel setpoint for a channel in these Trip Functions to be reset to a value that is within the as-left setpoint tolerance of the Nominal Trip Setpoint, or to a value that is more conservative than the Nominal Trip Setpoint. The conservative direction is indicated by the direction of the inequality sign applied to the Nominal Trip Setpoint in Bases Table B 3.3.1-1. Setpoint restoration and post-test verification assure that the assumptions in the plant setpoint methodology are satisfied in order to protect the safety analysis limits. Note (r) preserves the safety analysis limits. If the channel can not be reset to a value within its as-left setpoint tolerance band, or to a value that is more conservative than the Nominal Trip Setpoint if required based on plant conditions, the channel shall be declared inoperable and the applicable Required Actions are taken. The methodology used to determine the as-left setpoint tolerance band is based on the square-root-sum-of-squares (SRSS) of the tolerances applicable to the instrument loop or sub-loop constituents being tested.

Table B 3.3.1-1 (Page 1 of 2)
Reactor Trip System Setpoints

FUNCTION	NOMINAL TRIP SETPOINT	
1. Manual Rector Trip	N/A	
2. a. Power Range Neutron Flux, High	109% RTP	
2. b. Power Range Neutron Flux, Low	25% RTP	
3. Power Range Neutron Flux Rate, High Positive Rate	5% RTP with a time constant ≥ 2 seconds	
4. Intermediate Range Neutron Flux, High	25% RTP	
5. Source Range Neutron Flux, High	10^5 cps	
6. Overtemperature N-16	See Note 1, Table 3.3.1-1	
7. Overpower N-16	$\boxed{\text{112\% RTP}}$ ~~110% RTP~~	
8. a. Pressurizer Pressure, Low	1880 psig	$\tau_1 \geq 10$ seconds
8. b. Pressurizer Pressure, High	2385 psig	$\tau_2 \leq 5$ seconds
9. Pressurizer Water Level - High	92% span	
10. Reactor Coolant Flow - Low	90% of nominal flow	
11. Not Used.		
12. Undervoltage RCPs	4830 volts	
13. Underfrequency RCPs	57.2 Hz	
14. Steam Generator Water Level - Low-Low	38% NR (Unit 1) 35.4% NR (Unit 2)	
15. Not Used.		
16. Turbine Trip		
a. Low Fluid Oil Pressure	59 psig	
b. Turbine Stop Valve Closure	1% open	

BASES

BACKGROUND (continued)

These requirements are described in IEEE-279-1971 (Ref. 4). The actual number of channels required for each unit parameter is specified in Reference 2.

Allowable Values and Trip Setpoints

The trip setpoints used in the bistables are based on the analytical limits stated in Reference 3. The selection of these trip setpoints is such that adequate protection is provided when all sensor and processing time delays are taken into account. To allow for calibration tolerances, instrumentation uncertainties, instrument drift, and severe environment errors for those ESFAS channels that must function in harsh environments as defined by 10 CFR 50.49 (Ref. 5), the Allowable Values specified in Table 3.3.2-1 in the accompanying LCO are conservative with respect to the analytical limits. Detailed descriptions of the methodologies used to calculate the trip setpoints, including their explicit uncertainties, are provided in the setpoint calculations. The methodology to derive the trip setpoints is based upon combining all of the uncertainties in the channels. The essential elements of the methodology are described in Reference 9.

for all functions except 5b and 6c

Changes in accordance with this methodology have been reviewed by the staff in the original Unit 2 Technical Specifications and in several subsequent license amendments (e.g., amendments 21/7 and 22/8 to the Unit 1/Unit 2 Technical Specifications). The actual nominal ESFAS setpoint entered into the bistable is more conservative than that specified by the Allowable Value to account for changes in random measurement errors detectable by a COT. The Allowable Value serves as the Technical Specification operability limit for the purpose of the COT. One example of such a change in measurement error is drift during the surveillance interval. If the measured setpoint does not exceed the Allowable Value, the bistable is considered OPERABLE.

Setpoints adjusted consistent with the requirements of the Allowable Value ensure that the consequences of Design Basis Accidents (DBAs) will be acceptable, providing the unit is operated from within the LCOs at the onset of the DBA and the equipment functions as designed.

The ESFAS setpoint is the value at which the bistable is set and is the expected value to be achieved during calibration. The ESFAS setpoint value ensures the safety analysis limits are met for the time period of the surveillance interval when a channel is adjusted based on stated channel uncertainties. Any bistable is considered to be properly adjusted when the "as left" setpoint value is within the band for CHANNEL CALIBRATION uncertainty allowance (i.e., ± rack calibration + comparator setting uncertainties). The ESFAS setpoint value of Table B3.3.2-1 is therefore considered a "nominal" value (i.e., expressed as a value without inequalities) for the purposes of COT and CHANNEL CALIBRATION.

for all functions except 5b and 6c

INSERT D HERE

(continued)

INSERT D

The methodology used to calculate the Nominal Trip Setpoints for Functions 5b and 6c in Table B 3.3.2-1 is the same basic square- Root-sum-of-squares (SRSS) methodology with the inclusion of refinements to better reflect plant calibration practices and equipment performance. These refinements include the incorporation of a sensor reference accuracy term to address repeatabilty effects when performing a single pass calibration (i.e., one up and one down pass at several points verifies linearity and hysteresis, but not repeatability). In addition, sensor and rack error terms for calibration accuracy and drift are grouped in the Channel Statistical Allowance equation with their dependent M&TE terms, then combined with the other independent error terms using the SRSS methodology. The actual Nominal Trip Setpoint entered into the bistable is more conservative than that specified by the Allowable Value to account for changes in random measurement errors detectable by a COT. If the measured setpoint does not exceed the Allowable Value, the bistable is considered OPERABLE.

BASES

BACKGROUND (continued)

Each channel can be tested on line to verify that the signal processing equipment and setpoint accuracy is within the specified allowance requirements. Once a designated channel is taken out of service for testing, a simulated signal is injected in place of the field instrument signal. The process equipment for the channel in test is then tested, verified, and calibrated. SRs for the channels are specified in the SR section.

INSERT E HERE

Solid State Protection System

The SSPS equipment is used for the decision logic processing of outputs from the signal processing equipment bistables. To meet the redundancy requirements, two trains of SSPS, each performing the same functions, are provided. If one train is taken out of service for maintenance or test purposes, the second train will provide ESF actuation for the unit. If both trains are taken out of service or placed in test, a reactor trip will result. Each train is packaged in its own cabinet for physical and electrical separation to satisfy separation and independence requirements.

The SSPS performs the decision logic for most ESF equipment actuation; generates the electrical output signals that initiate the required actuation; and provides the status, permissive, and annunciator output signals to the main control room of the unit.

The bistable outputs from the signal processing equipment are sensed by the SSPS equipment and combined into logic matrices that represent combinations indicative of various transients. If a required logic matrix combination is completed, the system will send actuation signals via master and slave relays to those components whose aggregate Function best serves to alleviate the condition and restore the unit to a safe condition. Examples are given in the Applicable Safety Analyses, LCO, and Applicability sections of this Bases.

Each SSPS train has a built in testing device that can automatically test the decision logic matrix functions and the actuation devices while the unit is at power. When any one train is taken out of service for testing, the other train is capable of providing unit monitoring and protection until the testing has been completed. The testing device is semiautomatic to minimize testing time.

The actuation of ESF components is accomplished through master and slave relays. The SSPS energizes the master relays appropriate for the condition of the unit. Each master relay then energizes one or more slave

(continued)

INSERT E

The Allowable Values for Functions 5b and 6c in the accompanying LCO are based on the Nominal Trip Setpoints and are determined by subtracting (for low setpoint trips) or adding (for high setpoint trips) the rack calibration accuracy from/to the Nominal Trip Setpoint. The magnitudes of these uncertainties are factored into the determination of each Nominal Trip Setpoint. All field sensors and signal processing equipment for these channels are assumed to operate within the allowances of these uncertainty magnitudes.

BASES

BACKGROUND (continued)

relays, which then cause actuation of the end devices. The master and slave relays are routinely tested to ensure operation. The test of the master relays energizes the relay, which then operates the contacts and applies a low voltage to the associated slave relays. The low voltage is not sufficient to actuate the slave relays but only demonstrates signal path continuity. The SLAVE RELAY TEST actuates the devices if their operation will not interfere with continued unit operation. For the latter case, actual component operation is prevented by the SLAVE RELAY TEST circuit, and slave relay contact operation is verified by a continuity check of the circuit containing the slave relay.

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

Each of the analyzed accidents can be detected by one or more ESFAS Functions. One of the ESFAS Functions is the primary actuation signal for that accident. An ESFAS Function may be the primary actuation signal for more than one type of accident. An ESFAS Function may also be a secondary, or backup, actuation signal for one or more other accidents. For example, Pressurizer Pressure-Low is a primary actuation signal for small loss of coolant accidents (LOCAs) and a backup actuation signal for steam line breaks (SLBs) outside containment. Functions such as manual initiation, not specifically credited in the accident safety analysis, are qualitatively credited. These Functions may provide protection for conditions that do not require dynamic transient analysis to demonstrate Function performance. These Functions may also serve as backups to Functions that were credited in the accident analysis (Ref. 3).

The LCO requires all instrumentation performing an ESFAS Function to be OPERABLE. Failure of any instrument renders the affected channel(s) inoperable and reduces the reliability of the affected Functions.

except for functions 5b and 6c

A channel is OPERABLE with a setpoint value outside its calibration tolerance band provided the trip setpoint "as-found" value does not exceed its associated Allowable Value and provided the trip setpoint "as-left" value is adjusted to a value within the calibration tolerance band of the Nominal Trip Setpoint. A trip setpoint may be set more conservative than the Nominal Trip Setpoint as necessary in response to plant conditions.

INSERT F HERE

The LCO generally requires OPERABILITY of four or three channels in each instrumentation function and two channels in each logic and manual initiation function. The two-out-of-three and the two-out-of-four configurations allow one channel to be tripped during maintenance or testing without causing an

(continued)

INSERT F

Note (q) requires the instrument channel setpoint for a channel in these Functions to be reset to a value within the as-left setpoint tolerance band for that channel on either side of the Nominal Trip Setpoint, or to a value that is more conservative than the Nominal Trip Setpoint. The conservative direction is indicated by the direction of the inequality sign applied to the Nominal Trip Setpoint in Bases Table B 3.3.2-1. Setpoint restoration and post-test verification assure that the assumptions in the plant setpoint methodology are satisfied in order to protect the safety analysis limits. Note (q) preserves the safety analysis limits. If the channel can not be reset to a value within its as-left setpoint tolerance band, or to a value that is more conservative than the Nominal Trip Setpoint if required based on plant conditions, the channel shall be declared inoperable and the applicable Required Actions are taken. The methodology used to determine the as-left setpoint tolerance band is based on the square-root-sum-ofsquares (SRSS) of the tolerances applicable to the instrument loop or sub-loop constituents being tested.

Table B 3.3.2-1 (Page 1 of 3)
ESFAS Trip Setpoints

FUNCTION	NOMINAL TRIP SETPOINT
1. Safety Injection	
a. Manual Initiation	NA
b. Automatic Actuation Logic and Actuation Relays	NA
c. Containment Pressure – High 1	3.2 psig
d. Pressurizer Pressure – Low	1820 psig
e. Steam Line Pressure – Low	$\boxed{10}$ 605 psig $\tau_1 \geq$ ~~50~~ seconds $\tau_2 \leq 5$ seconds
2. Containment Spray	
a. Manual Initiation	NA
b. Automatic Actuation Logic and Actuation Relays	NA
c. Containment Pressure – High 3	18.2 psig
3. Containment Isolation	
a. Phase A Isolation	
(1) Manual Initiation	NA
(2) Automatic Actuation Logic and Actuation Relays	NA
(3) Safety Injection	See Function 1
b. Phase B Isolation	
(1) Manual Initiation	NA
(2) Automatic Actuation Logic and Actuation Relays	NA
(3) Containment Pressure - High 3	18.2 psig

Table B 3.3.2-1 (Page 2 of 3)
ESFAS Trip Setpoints

FUNCTION	NOMINAL TRIP SETPOINT
4. Steam Line Isolation	
a. Manual Initiation	NA
b. Automatic Actuation Logic and Actuation Relays	NA
c. Containment Pressure - High 2	6.2 psig
d. Steam Line Pressure	
(1) Low	$\boxed{10}$ 605 psig $\tau_1 \geq$ ~~50~~ seconds $\tau_2 \leq 5$ seconds
(2) Negative Rate - High	100 psi $\tau \geq 50$ seconds
5. Turbine Trip and Feedwater Isolation	
a. Automatic Actuation Logic and Actuation Relays	NA
b. SG Water Level - High-High (P-14)	84% NR (Unit 1) 81.5% NR (Unit 2)
c. Safety Injection	See Function 1.
6. Auxiliary Feedwater	
a. Automatic Actuating Logic and Actuation Relays (SSPS)	NA
b. Not Used	
c. SG Water Level - Low-Low	38% NR (Unit 1) 35.4% NR (Unit 2)
d. Safety Injection	See Function 1.
e. Loss of Power	NA
f. Not Used	

BASES

APPLICABLE SAFETY ANALYSES (continued)

This LCO helps to ensure that the following acceptance criteria established for the ECCS by 10 CFR 50.46 (Ref. 3) will be met following a LOCA:

a. Maximum fuel element cladding temperature is ≤ 2200°F;

b. Maximum cladding oxidation is ≤ 0.17 times the total cladding thickness before oxidation;

c. Maximum hydrogen generation from a zirconium water reaction is ≤ 0.01 times the hypothetical amount that would be generated if all of the metal in the cladding cylinders surrounding the fuel, excluding the cladding surrounding the plenum volume, were to react; and

d. Core is maintained in a coolable geometry.

Since the accumulators discharge during the blowdown phase of a LOCA, they do not contribute to the long term cooling requirements of 10 CFR 50.46.

For small breaks, an increase in water volume may be either a peak clad temperature penalty or benefit depending on the transient characteristics.

For both the large and small break LOCA analyses, a nominal contained accumulator water volume is used. The contained water volume is the same as the deliverable volume for the accumulators, since the accumulators are emptied, once discharged. ~~For small breaks, an increase in water volume is a peak clad temperature penalty.~~ Depending on the NRC-approved methodology used to analyze large breaks, an increase in water volume may be either a peak clad temperature penalty or benefit, depending on downcomer filling and subsequent spill through the break during the core reflooding portion of the transient. The analysis makes a conservative assumption with respect to ignoring or taking credit for line water volume from the accumulator to the check valve. The safety analysis assumes values of 6119 gallons and 6597 gallons.

The minimum boron concentration setpoint is used in the post LOCA boron concentration calculation. The calculation is performed to assure reactor subcriticality in a post LOCA environment. Of particular interest is the large break LOCA, since no credit is taken for control rod assembly insertion. A reduction in the accumulator minimum boron concentration would produce a subsequent reduction in the available containment sump concentration for post LOCA shutdown and an increase in the maximum sump pH. The maximum boron concentration is used in determining the cold leg to hot leg recirculation injection switchover time and minimum sump pH.

(continued)

B 3.7 PLANT SYSTEMS

B 3.7.1 Main Steam Safety Valves (MSSVs)

BASES

BACKGROUND

The primary purpose of the MSSVs is to provide overpressure protection for the secondary system. The MSSVs also provide protection against overpressurizing the reactor coolant pressure boundary (RCPB) by providing a heat sink for the removal of energy from the Reactor Coolant System (RCS) if the preferred heat sink, provided by the Condenser and Circulating Water System, is not available.

Five MSSVs are located on each main steamline, outside containment, upstream of the main steam isolation valves, as described in the FSAR (Ref. 1). The MSSVs must have sufficient capacity to limit secondary system pressure to ≤ 110% of the steam generator design pressure in order to meet the requirements of the ASME Code, Section III (Ref. 2). The MSSV design includes staggered setpoints, according to Table 3.7.1-2 in the accompanying LCO, so that only the needed valves will actuate. Staggered setpoints reduce the potential for valve chattering that is due to steam pressure insufficient to fully open all valves following a turbine reactor trip.

Operation with one or more inoperable MSSVs is allowable if the reactor power is appropriately reduced. This action ensures that if an event were to occur, the operable MSSVs would continue to provide adequate overpressure protection.

APPLICABLE SAFETY ANALYSES

The design basis for the MSSVs comes from Reference 2 and its purpose is to limit the secondary system pressure to ≤ 110% of design pressure for any anticipated operational occurrence (AOO) or accident considered in the Design Basis Accident (DBA) and transient analysis.

The events that most significantly challenge the relieving capacity of the MSSVs, and thus RCS pressure, are those characterized as decreased heat removal events, which are presented in the FSAR, Section 15.2 (Ref. 3). Of these, the full power turbine trip without steam dump is typically the limiting AOO. This event also terminates normal feedwater flow to the steam generators.

The safety analysis demonstrates that the transient response for turbine trip occurring from full power without a direct reactor trip presents no hazard to the integrity of the RCS or the Main Steam System. One turbine trip analysis is performed assuming primary system pressure control via operation of the pressurizer relief valves and spray. This analysis demonstrates that theDNBdesign basis is met. Another analysis is performed assuming no primary system pressure control, but crediting reactor trip on high pressurizer pressure and operation of the pressurizer safety valves. ~~The turbine trip is performed assuming no primary system pressure control, but crediting reactor trip on high pressure and operation of the pressurizer safety valves.~~

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

This analysis demonstrates that RCS integrity is maintained by showing that the maximum RCS pressure does not exceed 110% of the design pressure. All cases analyzed demonstrate that the MSSVs maintain Main Steam System integrity by limiting the maximum steam pressure to less than 110% of the steam generator design pressure.

In addition to the decreased heat removal events, reactivity insertion events may also challenge the relieving capacity of the MSSVs. The uncontrolled rod cluster control assembly (RCCA) bank withdrawal at power event is characterized by an increase in core power and steam generation rate until reactor trip occurs when either the Overtemperature N-16 or Power Range Neutron Flux-High setpoint is reached. Steam flow to the turbine will not increase from its initial value for this event. The increased heat transfer to the secondary side causes an increase in steam pressure and may result in opening of the MSSVs prior to reactor trip, assuming no credit for operation of the atmospheric or condenser steam dump valves. The FSAR safety analysis of the RCCA bank withdrawal at power event for a range of initial core power levels demonstrates that the MSSVs are capable of preventing secondary side overpressurization for this AOO.

determined by system transient analysis or conservatively arrived at by a simple heat balance calculation.

The FSAR safety analyses discussed above assume that all of the MSSVs for each steam generator are OPERABLE. If there are inoperable MSSV(s), it is necessary to limit the primary system power during steady state operation and AOOs to a value that does not result in exceeding the combined steam flow capacity of the turbine (if available) and the remaining OPERABLE MSSVs. The required limitation on primary system power necessary to prevent secondary system overpressurization may be ~~determined by system transient analyses.~~ In some circumstances it is necessary to limit the primary side heat generation that can be achieved during an AOO by reducing the setpoint of the Power Range Neutron Flux-High reactor trip function. For example, if more than one MSSV on a single steam generator is inoperable, an uncontrolled RCCA bank withdrawal at power event occurring from a partial power level may result in an increase in reactor power that exceeds the combined steam flow capacity of the turbine and the remaining OPERABLE MSSVs. Thus, for multiple inoperable MSSVs on the same steam generator it is necessary to prevent this power increase by lowering the Power Range Neutron Flux-High setpoint to an appropriate value. When the Moderator Temperature Coefficient (MTC) is positive, the reactor power may increase above the initial value during an RCS heatup event (e.g., turbine trip). Thus, for any number of inoperable MSSVs it is necessary to reduce the trip setpoint if a positive MTC may exist at partial power conditions, unless it is demonstrated by analysis that a specified reactor power reduction alone is sufficient to prevent

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

The passive failure mode which is the failure to open upon demand is not assumed (Ref. 3).

overpressurization of the steam system. The MSSVs are assumed to have one active failure mode. The active failure mode is an inadvertent opening and failure to reclose once opened. ~~Failure to open upon demand is not assumed (Ref. 3).~~

The MSSVs satisfy Criterion 3 of 10CFR50.36(c)(2)(ii).

LCO

The accident analysis requires that five MSSVs per steam generator be OPERABLE to provide overpressure protection for design basis transients occurring at 102% RTP. The LCO requires that five MSSVs per steam generator be OPERABLE in compliance with Reference 2, and the DBA analysis.

The OPERABILITY of the MSSVs is defined as the ability to open upon demand within the setpoint tolerances, to relieve steam generator overpressure, and reseat when pressure has been reduced. The OPERABILITY of the MSSVs is determined by periodic surveillance testing in accordance with the Inservice Testing Program.

This LCO provides assurance that the MSSVs will perform their designed safety functions to mitigate the consequences of accidents that could result in a challenge to the RCPB or Main Steam System integrity.

APPLICABILITY

In MODES 1, 2, and 3, five MSSVs per steam generator are required to be OPERABLE to prevent Main Steam System overpressurization.

In MODES 4 and 5, there are no credible transients requiring the MSSVs. The steam generators are not normally used for heat removal in MODES 5 and 6, and thus cannot be overpressurized; there is no requirement for the MSSVs to be OPERABLE in these MODES.

ACTIONS

The ACTIONS table is modified by a Note indicating that separate Condition entry is allowed for each MSSV.

With one or more MSSVs inoperable, action must be taken so that the available MSSV relieving capacity meets the overpressure protection requirements.

Operation with less than all five MSSVs OPERABLE for each steam

(continued)

BASES

ACTIONS (continued)

generator is permissible, if THERMAL POWER is limited to the relief capacity of the remaining MSSVs. This is accomplished by restricting THERMAL POWER so that the energy transfer to the most limiting steam generator is not greater than the available relief capacity in that steam generator.

A.1

In the case of only a single inoperable MSSV on one or more steam generators when the Moderator Temperature Coefficient is not positive a reactor power reduction alone is sufficient to limit primary side heat generation such that overpressurization of the secondary side is precluded for any RCS heatup event. Furthermore, for this case there is sufficient total steam flow capacity provided by the turbine and remaining OPERABLE MSSVs to preclude overpressurization in the event of an increased reactor power due to reactivity insertion, such as in the event of an uncontrolled RCCA bank withdrawal at power. Therefore, Required Action A.1 requires an appropriate reduction in reactor power within 4 hours.

conservative heat balance calculation as discussed below,

The maximum THERMAL POWER corresponding to the heat removal capacity of the remaining OPERABLE MSSVs is determined via a ~~system transient analysis~~ with an appropriate allowance for calorimetric power uncertainty ~~and instrument uncertainties~~.

INSERT G HERE

B.1 and B.2

In the case of multiple inoperable MSSVs on one or more steam generators, with a reactor power reduction alone there may be insufficient total steam flow capacity provided by the turbine and remaining OPERABLE MSSVs to preclude overpressurization in the event of an increased reactor power due to reactivity insertion, such as in the event of an uncontrolled RCCA bank withdrawal at power. Furthermore, for a single inoperable MSSV on one or more steam generators when the Moderator Temperature Coefficient is positive the reactor power may increase as a result of an RCS heatup event such that flow capacity of the remaining OPERABLE MSSVs is insufficient. The 4 hour Completion Time for Required Action B.1 is consistent with A.1. An additional 32 hours is allowed in Required Action B.2 to reduce the setpoints. The Completion Time of 36 hours is based on a reasonable time to correct the MSSV inoperability, the time required to perform the power reduction, operating experience in resetting all channels of protective function, and on the low probability of the occurrence of a transient that could result in steam generator overpressure during this period.

(continued)

INSERT G

The maximum THERMAL POWER corresponding to the heat removal capacity of the remaining OPERABLE MSSVs is determined by the governing heat transfer relationship from the equation $q = \dot{m}\,\Delta h$, where q is the heat input from the primary side, $\dot{m}$ is the steam flow rate and Δh is the heat of vaporization at the steam relief pressure (assuming no subcooled feedwater). For each steam generator, at a specified pressure, the maximum allowable power level is determined as follows:

$$\text{Maximum Allowable Power Level} \leq 100/Q\ (w_s\, h_{fg}\, N)/K$$

where:

Q = Nominal NSSS power rating of the plant (including reactor coolant pump heat), Mwt.

K = Conversion factor, 947.82 (Btu/sec)/Mwt

W_s = Minimum total steam flow rate capability of the OPERABLE MSSVs on any one steam generator at the highest OPERABLE MSSV opening pressure including tolerance and accumulation, as appropriate, in lb/sec.

h_{fg} = Heat of vaporization for steam at the highest MSSV opening pressure including tolerance and accumulation, as appropriate, Btu/lbm.

N = Number of loops in plant.

For use in determining the % RTP in Action A, the Maximum NSSS Power calculated above is reduced by 2% RTP to account for the calorimetric power uncertainty.

BASES

ACTIONS

B.1 and B.2 (continued)

The maximum THERMAL POWER corresponding to the heat removal capacity of the remaining OPERABLE MSSVs is determined via a system transient analysis with an appropriate allowance for Nuclear Instrumentation System trip channel uncertainties.

To determine the Table 16.3.7.1-1 Maximum Allowable Power for Action B (% RTP), the calculated Maximum NSSS Power is reduced by 9.0% to account for Nuclear Instrumentation System trip channel uncertainties.

Required Action B.2 is modified by a Note, indicating that the Power Range Neutron Flux-High reactor trip setpoint reduction is only required in MODE 1. In MODES 2 and 3 the reactor protection system trips specified in LCO 3.3.1, "Reactor Trip System Instrumentation," provide sufficient protection.

The allowed Completion Times are reasonable based on operating experience to accomplish the Required Actions in an orderly manner without challenging unit systems.

C.1 and C.2

If the Required Actions are not completed within the associated Completion Time, or if one or more steam generators have ≥ 4 inoperable MSSVs, the unit must be placed in a MODE in which the LCO does not apply. To achieve this status, the unit must be placed in at least MODE 3 within 6 hours, and in MODE 4 within 12 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

SURVEILLANCE REQUIREMENTS

SR 3.7.1.1

This SR verifies the OPERABILITY of the MSSVs by the verification of each MSSV lift setpoint in accordance with the Inservice Testing Program. The ASME Code, Section XI (Ref. 4), requires that safety and relief valve tests be performed in accordance with ANSI/ASME OM-1-1987 (Ref. 5). According to Reference 5, the following tests are required:

a. Visual examination;

b. Seat tightness determination;

c. Setpoint pressure determination (lift setting);

d. Compliance with owner's seat tightness criteria; and

e. Verification of the balancing device integrity on balanced valves.

(continued)

BASES

BACKGROUND (continued)

The AFW System is designed to supply sufficient water to the steam generator(s) to remove decay heat with steam generator pressure at the lowest set pressure of the MSSVs plus accumulation. Subsequently, the AFW System supplies sufficient water to cool the unit to RHR entry conditions, with steam released through the ARVs.

The AFW System actuates automatically on steam generator water level - low-low by the ESFAS (LCO 3.3.2). The system also actuates on loss of offsite power and on an ATWS Mitigation System Actuation Circuitry (AMSAC) signal, however, AMSAC start of the AFW pumps is not required for AFW system operability. The motor driven pumps also start on safety injection and trip of all MFW pumps. During normal plant operations, the AFW system, under manual control, is used to maintain SG water level.

The AFW System is discussed in the FSAR (Ref. 1).

APPLICABLE SAFETY ANALYSES

The AFW System mitigates the consequences of any event with loss of normal feedwater.

The design basis of the AFW System is to supply water to the steam generator to remove decay heat and other residual heat by delivering at least the minimum required flow rate to the steam generators at pressures corresponding to the lowest steam generator safety valve set pressure plus 3% accumulation.

In addition, the AFW System must supply enough makeup water to replace steam generator secondary inventory lost as the unit cools to MODE 4 conditions. Sufficient AFW flow must also be available to account for flow losses such as pump recirculation and MFW line breaks.

The limiting Design Basis Accidents (DBAs) and transients for the AFW System are as follows:

a. Feedwater Line Break (FLB); and

b. Loss of MFW.

In addition, AFW flow is considered in the small break loss of coolant accident (SBLOCA), but does not have a significant effect on the transient characteristics.

~~In addition, the minimum available AFW flow and system characteristics are serious considerations in the analysis of a small break loss of coolant accident (LOCA).~~

The AFW System design is such that it can perform its function following a

(continued)

ATTACHMENT 4 to TXX-07108

RETYPED TECHNICAL SPECIFICATION PAGES

Pages	3.1-10
	3.3-15
	3.3-16
	3.3-17
	3.3-18
	3.3-19
	3.3-20
	3.3-29
	3.3-30
	3.3-31
	3.3-32
	3.3-33
	3.3-34
	3.4-21
	3.7-1
	3.7-4

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.4.1	Verify individual rod positions within alignment limit.	12 hours
SR 3.1.4.2	Verify rod freedom of movement (trippability) by moving each rod not fully inserted in the core $\geq$ 10 steps in either direction.	92 days
SR 3.1.4.3	Verify rod drop time of each rod, from the fully withdrawn position, is $\leq$ 2.7 seconds from the beginning of decay of stationary gripper coil voltage to dashpot entry, with: a. $T_{avg} \geq 500°F$; and b. All reactor coolant pumps operating.	Prior to reactor criticality after each removal of the reactor head

Table 3.3.1-1 (page 1 of 7)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE(a)
1. Manual Reactor Trip	1,2	2	B	SR 3.3.1.14	NA
	3(b), 4(b), 5(b)	2	C	SR 3.3.1.14	NA
2. Power Range Neutron Flux					
a. High	1,2	4	D	SR 3.3.1.1 SR 3.3.1.2 SR 3.3.1.7 SR 3.3.1.11 SR 3.3.1.16	≤ 109.6% RTP(q)(r)#
b. Low	1(c), 2	4	E	SR 3.3.1.1 SR 3.3.1.8 SR 3.3.1.11 SR 3.3.1.16	≤ 25.6% RTP(q)(r)#
3. Power Range Neutron Flux Rate High Positive Rate	1,2	4	E	SR 3.3.1.7 SR 3.3.1.11	≤ 6.3 % RTP with time constant ≥ 2 sec
4. Intermediate Range Neutron Flux	1(c), 2(d)	2	F,G	SR 3.3.1.1 SR 3.3.1.8 SR 3.3.1.11	≤ 31.5% RTP

(continued)

(a) The Allowable Value defines the limiting safety system setting except for Trip Functions 2a, 2b, 6, 7, and 14 (the Nominal Trip Setpoint defines the limiting safety system setting for these Trip Functions). See the Bases for the Nominal Trip Setpoints.
(b) With Rod Control System capable of rod withdrawal or one or more rods not fully inserted.
(c) Below the P-10 (Power Range Neutron Flux) interlock.
(d) Above the P-6 (Intermediate Range Neutron Flux) interlock.
(q) If the as-found channel setpoint is conservative with respect to the Allowable Value but outside its predefined as-found acceptance criteria band, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.
(r) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance of the Nominal Trip Setpoint or a value that is more conservative than the Trip Setpoint; otherwise, the channel shall be declared inoperable. The nominal Trip Setpoint, the methodology used to determine the as-found tolerance and the methodology used to determine the as-left tolerance shall be specified in the Technical Specification Bases.

\# For Unit 1, through Cycle 13 the ALLOWABLE VALUE for the Power Range Neutron Flux – High remains at 110.8% RTP and the Power Range Neutron Flux – Low remains at 27.7% RTP.

Table 3.3.1-1 (page 2 of 7)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE(a)
5. Source Range Neutron Flux	2(e)	2	I,J	SR 3.3.1.1 SR 3.3.1.8 SR 3.3.1.11	≤ 1.4 E5 cps
	3(b), 4(b), 5(b)	2	J,K	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.11	≤ 1.4 E5 cps
6. Overtemperature N-16	1,2	4	E	SR 3.3.1.1 SR 3.3.1.2 SR 3.3.1.3 SR 3.3.1.6 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	Refer to Note 1(q)(r)
7. Overpower N-16	1,2	4	E	SR 3.3.1.1 SR 3.3.1.2 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	≤ 112.8% RTP (q)(r)##
8. Pressurizer Pressure					
a. Low	1(g)	4	M	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	≥ 1863.6 psig (Unit 1) ≥ 1865.2 psig (Unit 2)
b. High	1,2	4	E	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	≤ 2400.8 psig (Unit 1) ≤ 2401.4 psig (Unit 2)

(continued)

(a) The Allowable Value defines the limiting safety system setting except for Trip Functions 2a, 2b, 6, 7, and 14 (the Nominal Trip Setpoint defines the limiting safety system setting for these Trip Functions). See the Bases for the Nominal Trip Setpoints.
(b) With Rod Control System capable of rod withdrawal or one or more rods not fully inserted.
(e) Below the P-6 (Intermediate Range Neutron Flux) interlock.
(g) Above the P-7 (Low Power Reactor Trips Block) interlock.
(q) If the as-found channel setpoint is conservative with respect to the Allowable Value but outside its predefined as-found acceptance criteria band, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.
(r) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance of the Nominal Trip Setpoint or a value that is more conservative than the Trip Setpoint; otherwise, the channel shall be declared inoperable. The nominal Trip Setpoint, the methodology used to determine the as-found tolerance and the methodology used to determine the as-left tolerance shall be specified in the Technical Specification Bases.

For Unit 1, through Cycle 13 the ALLOWABLE VALUE for Overpower N16 remains at 112.9% RTP.

Table 3.3.1-1 (page 3 of 7)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE(a)
9. Pressurizer Water Level - High	1(g)	3	M	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10	≤ 93.9% of instrument span
10. Reactor Coolant Flow - Low	1(g)	3 per loop	M	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	≥ 88.6% of indicated loop flow (Unit 1) ≥ 88.8% of indicated loop flow (Unit 2)
11. Not Used					
12. Undervoltage RCPs	1(g)	1 per bus	M	SR 3.3.1.9 SR 3.3.1.10 SR 3.3.1.16	≥ 4753 V
13. Underfrequency RCPs	1(g)	1 per bus	M	SR 3.3.1.9 SR 3.3.1.10 SR 3.3.1.16	≥ 57.06 Hz
14. Steam Generator (SG) Water Level Low-Low (l)	1, 2	4 per SG	E	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	≥ 37.5%### of narrow range instrument span (Unit 1)(q)(r) ≥ 34.9% of narrow range instrument span (Unit 2)
15. Not Used.					

(continued)

(a) The Allowable Value defines the limiting safety system setting except for Trip Functions 2a, 2b, 6, 7, and 14 (the Nominal Trip Setpoint defines the limiting safety system setting for these Trip Functions). See the Bases for the Nominal Trip Setpoints.

(g) Above the P-7 (Low Power Reactor Trips Block) interlock.

(l) The applicable MODES for these channels in Table 3.3.2-1 are more restrictive.

(q) If the as-found channel setpoint is conservative with respect to the Allowable Value but outside its predefined as-found acceptance criteria band, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(r) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance of the Nominal Trip Setpoint, or a value that is more conservative than the Trip Setpoint; otherwise, the channel shall be declared inoperable. The Nominal Trip Setpoint, the methodology used to determine the as-found tolerance and the methodology used to determine the as-left tolerance shall be specified in the Technical Specification Bases.

For Unit 1, through Cycle 13 the ALLOWABLE VALUE for Steam Generator Water Level Low-Low remains at 36% of narrow range instrumentation.

Table 3.3.1-1 (page 4 of 7)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE(a)
16. Turbine Trip					
a. Low Fluid Oil Pressure	1(j)	3	O	SR 3.3.1.10 SR 3.3.1.15	≥ 46.6 psig
b. Turbine Stop Valve Closure	1(j)	4	P	SR 3.3.1.10 SR 3.3.1.15	≥ 1% open
17. Safety Injection (SI) Input from Engineered Safety Feature Actuation System (ESFAS)	1,2	2 trains	Q	SR 3.3.1.14	NA
18. Reactor Trip System Interlocks					
a. Intermediate Range Neutron Flux, P-6	2(e)	2	S	SR 3.3.1.11 SR 3.3.1.13	≥ 6E-11 amp
b. Low Power Reactor Trips Block, P-7	1	1 per train	T	SR 3.3.1.5	NA
c. Power Range Neutron Flux, P-8	1	4	T	SR 3.3.1.11 SR 3.3.1.13	≤ 50.7% RTP
d. Power Range Neutron Flux, P-9	1	4	T	SR 3.3.1.11 SR 3.3.1.13	≤ 52.7% RTP
e. Power Range Neutron Flux, P-10	1,2	4	S	SR 3.3.1.11 SR 3.3.1.13	≥ 7.3% RTP and ≤ 12.7% RTP
f. Turbine First Stage Pressure, P-13	1	2	T	SR 3.3.1.10 SR 3.3.1.13	≤ 12.7% turbine power

(continued)

(a) The Allowable Value defines the limiting safety system setting except for Trip Functions 2a, 2b, 6, 7, and 14 (the Nominal Trip Setpoint defines the limiting safety system setting for these Trip Functions). See the Bases for the Nominal Trip Setpoints.
(e) Below the P-6 (Intermediate Range Neutron Flux) interlock.
(j) Above the P-9 (Power Range Neutron Flux) interlock.

Table 3.3.1-1 (page 5 of 7)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE(a)
19. Reactor Trip Breakers(RTBs)(k)	1,2	2 trains	R	SR 3.3.1.4	NA
	3(b), 4(b), 5(b)	2 trains	C	SR 3.3.1.4	NA
20. Reactor Trip Breaker Undervoltage and Shunt Trip Mechanisms(k)	1,2	1 each per RTB	U	SR 3.3.1.4	NA
	3(b), 4(b), 5(b)	1 each per RTB	C	SR 3.3.1.4	NA
21. Automatic Trip Logic	1,2	2 trains	Q	SR 3.3.1.5	NA
	3(b), 4(b), 5(b)	2 trains	C	SR 3.3.1.5	NA

(continued)

(a) The Allowable Value defines the limiting safety system setting except for Trip Functions 2a, 2b, 6, 7, and 14 (the Nominal Trip Setpoint defines the limiting safety system setting for these Trip Functions). See the Bases for the Nominal Trip Setpoints.
(b) With Rod Control System capable of rod withdrawal or one or more rods not fully inserted.
(k) Including any reactor trip bypass breakers that are racked in and closed for bypassing an RTB.

Table 3.3.1-1 (page 6 of 7)
Reactor Trip System Instrumentation

Note 1: Overtemperature N-16
(For Unit 1 Cycle 13, see Note 2)

The Overtemperature N-16 Function Allowable Values shall not exceed the following setpoint by more than 0.5% N-16 span for N-16 input 0.5% T_{cold} span for T_{cold} input, 0.5% pressure span for pressure input, and 0.5% Δq span for Δq input.

$$Q_{setpoint} = K_1 - K_2\left[\frac{(1+T_1S)}{(1+T_2S)}T_c - T_c^o\right] + K_3\left(P - P^1\right) - f_1(\Delta q)$$

Where:

$Q_{setpoint}$ = Overtemperature N-16 trip setpoint,

K_1 = *

K_2 = */°F

K_3 = */psig

T_C = Measured Cold leg temperature, °F

T_c^o = Indicated Reference T_C at RATED THERMAL POWER, *°F

P = Measured pressurizer pressure, psig

P^1 ≥ * psig (Nominal RCS operating pressure)

s = the Laplace transform operator, sec^{-1}.

τ_1,τ_2 = Time constants utilized in lead-lag controller for T_c,
$\tau_1 \geq$ * sec, and $\tau_2 \leq$ * sec

$f_1(\Delta q)$ =

*{(q_t - q_b) + *%}	when (q_t - q_b) ≤ *% RTP
0%	when *% RTP < (q_t - q_b) < *% RTP
*{(q_t - q_b) - *%}	when (q_t - q_b) ≥ *% RTP

* as specified in the COLR

(continued)

Table 3.3.1-1 (page 7 of 7)
Reactor Trip System Instrumentation

Note 2: The Overtemperature N-16 Function Allowable Value shall not exceed the following setpoint by more than 1.72% of span.

$$Q_{setpoint} = K_1 - K_2\left[\frac{(1+T_1S)}{(1+T_2S)}T_c - T_c^o\right] + K_3\left(P - P^1\right) - f_1(\Delta q)$$

Where:

$Q_{setpoint}$ = Overtemperature N-16 trip setpoint,

K_1 = *

K_2 = */°F

K_3 = */psig

T_C = Cold leg temperature

$T_c°$ = Reference T_C at RATED THERMAL POWER, *°F

P = Measured pressurizer pressure, psig

P^1 ≥ * psig (Nominal RCS operating pressure)

s = the Laplace transform operator, sec^{-1}.

τ_1,τ_2 = Time constants utilized in lead-lag controller for T_c,
$\tau_1 \geq$ * sec, and $\tau_2 \leq$ * sec

$f_1(\Delta q)$ =

*{(q_t - q_b) + *%}	when (q_t - q_b) ≤ *% RTP
0%	when *% RTP < (q_t - q_b) < *% RTP
*{(q_t - q_b) - *%}	when (q_t - q_b) ≥ *% RTP

* as specified in the COLR

Table 3.3.2-1 (page 1 of 6)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE[a]
1. Safety Injection					
a. Manual Initiation	1, 2, 3, 4	2	B	SR 3.3.2.8	NA
b. Automatic Actuation Logic and Actuation Relays	1, 2, 3, 4	2 trains	C	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA
c. Containment Pressure -- High 1	1, 2, 3	3	D	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≤ 3.8 psig
d. Pressurizer Pressure -- Low	1, 2, 3[b]	4	D	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≥ 1803.6 psig
e. Steam Line Pressure Low	1, 2, 3[b]	3 per steam line	D	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≥ 594.0 psig[c] (Unit 1) ≥ 578.4 psig[c] (Unit 2)
2. Containment Spray					
a. Manual Initiation	1, 2, 3, 4	2 per train, 2 trains	B	SR 3.3.2.8	NA
b. Automatic Actuation Logic and Actuation Relays	1, 2, 3, 4	2 trains	C	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA
c. Containment Pressure High -- 3	1, 2, 3	4	E	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≤ 18.8 psig

(continued)

(a) The Allowable Value defines the limiting safety system setting except for functions 5b and 6c (the Nominal Trip Setpoint defines the limiting safety system setting for these Trip Functions). See the Bases for the Nominal Trip Setpoints.
(b) Above the P-11 (Pressurizer Pressure) interlock and below P-11, unless the Function is blocked.
(c) Time constants used in the lead/lag controller are $\tau_1 \geq 10$ seconds and $\tau_2 \leq 5$ seconds.

Table 3.3.2-1 (page 2 of 6)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE(a)
3. Containment Isolation					
a. Phase A Isolation					
(1) Manual Initiation	1, 2, 3, 4	2	B	SR 3.3.2.8	NA
(2) Automatic Actuation Logic and Actuation Relays	1, 2, 3, 4	2 trains	C	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA
(3) Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.				
b. Phase B Isolation					
(1) Manual Initiation	1, 2, 3, 4	2 per train, 2 trains	B	SR 3.3.2.8	NA
(2) Automatic Actuation Logic and Actuation Relays	1, 2, 3, 4	2 trains	C	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA
(3) Contain-ment Pressure High – 3	1, 2, 3	4	E	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9	≤ 18.8 psig

(continued)

(a) The Allowable Value defines the limiting safety system setting except for functions 5b and 6c (the Nominal Trip Setpoint defines the limiting safety system setting for these Trip Functions). See the Bases for the Nominal Trip Setpoints.

Table 3.3.2-1 (page 3 of 6)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE(a)
4. Steam Line Isolation					
a. Manual Initiation	1, 2(i), 3(i)	2	F	SR 3.3.2.8	NA
b. Automatic Actuation Logic and Actuation Relays	1, 2(i), 3(i)	2 trains	G	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA
c. Containment Pressure -- High 2	1, 2(i), 3(i)	3	D	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≤ 6.8 psig
d. Steam Line Pressure					
(1) Low	1, 2(i), 3(b)(i)	3 per steam line	D	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≥ 594.0 psig(c) (Unit 1) ≥ 578.4 psig(c) (Unit 2)
(2) Negative Rate -- High	3(g)(i)	3 per steam line	D	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≤ 178.7 psi(h)

(continued)

(a) The Allowable Value defines the limiting safety system setting except for functions 5b and 6c (the Nominal Trip Setpoint defines the limiting safety system setting for these Trip Functions). See the Bases for the Nominal Trip Setpoints.
(b) Above the P-11 (Pressurizer Pressure) Interlock and below P-11, unless the Function is blocked.
(c) Time constants used in the lead/lag controller are $\tau_1 \geq 10$ seconds and $\tau_2 \leq 5$ seconds.
(g) Below the P-11 (Pressurizer Pressure) Interlock; however, may be blocked below P-11 when safety injection on steam line pressure-low is not blocked.
(h) Time constant utilized in the rate/lag controller is ≥ 50 seconds.
(i) Except when all MSIVs and their associated upstream drip pot isolation valves are closed and deactivated.

Table 3.3.2-1 (page 4 of 6)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE(a)
5. Turbine Trip and Feedwater Isolation					
a. Automatic Actuation Logic and Actuation Relays	1, 2(j)	2 trains	H	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA
b. SG Water Level -- High High (P-14)	1, 2(j)	3 per SG(p)	I	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≤ 84.5%# of narrow range span (Unit 1) (q)(r) ≤82.0% of narrow range span (Unit 2)
c. Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.				

(continued)

(a) The Allowable Value defines the limiting safety system setting except for functions 5b and 6c (the Nominal Trip Setpoint defines the limiting safety system setting for these Trip Functions). See the Bases for the Nominal Trip Setpoints.

(j) Except when all MFIVs and associated bypass valves are closed and de-activated or isolated by a closed manual valve.

(p) A channel selected for use as an input to the SG water level controller must be declared inoperable.

(q) If the as-found channel setpoint is conservative with respect to the Allowable Value but outside its predefined as-found acceptance criteria band, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(r) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance of the Nominal Trip Setpoint, or a value that is more conservative than the Trip Setpoint; otherwise, the channel shall be declared inoperable. The Nominal Trip Setpoint, the methodology used to determine the as-found tolerance and the methodology used to determining the as-left tolerance shall be specified in the Technical Specification Bases.

For Unit 1, through Cycle 13, the ALLOWABLE VALUE for the SG Water Level High-High remains at 86% of narrow range span.

Table 3.3.2-1 (page 5 of 6)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE(a)
6. Auxiliary Feedwater					
a. Automatic Actuation Logic and Actuation Relays (Solid State Protection System)	1, 2, 3	2 trains	G	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA
b. Not Used.					
c. SG Water Level Low-Low	1, 2, 3	4 per SG	D	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≥37.5%# of narrow range span (Unit 1) (q)(r) ≥34.9% of narrow range span (Unit 2)
d. Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.				
e. Loss of Offsite Power	1, 2, 3	1 per train	F	SR 3.3.2.7 SR 3.3.2.9 SR 3.3.2.10	NA
f. Not Used.					
g. Trip of all Main Feedwater Pumps	1, 2	2 per AFW pump	J	SR 3.3.2.8	NA
h. Not Used.					

(continued)

(a) The Allowable Value defines the limiting safety system setting except for functions 5b and 6c (the Nominal Trip Setpoint defines the limiting safety system setting for these Trip Functions). See the Bases for the Nominal Trip Setpoints.

(q) If the as-found channel setpoint is conservative with respect to the Allowable Value but outside its predefined as-found acceptance criteria band, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(r) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance of the Nominal Trip Setpoint, or a value that is more conservative than the Trip Setpoint; otherwise, the channel shall be declared inoperable. The Nominal Trip Setpoint, the methodology used to determine the as-found tolerance and the methodology used to determine the as-left tolerance shall be specified in the Technical Specification Bases.

For Unit 1, through Cycle 13, the ALLOWABLE VALUE for the SG Water Level Low-Low remains at 33.4% of narrow range span.

Table 3.3.2-1 (page 6 of 6)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE(a)
7. Automatic Switchover to Containment Sump					
a. Automatic Actuation Logic and Actuation Relays	1, 2, 3, 4	2 trains	C	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA
b. Refueling Water Storage Tank (RWST) Level - Low Low	1, 2, 3, 4	4	K	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≥ 31.9(b)% instrument span
Coincident with Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.				
8. ESFAS Interlocks					
a. Reactor Trip, P-4	1, 2, 3	1 per train, 2 trains	F	SR 3.3.2.11	NA
b. Pressurizer Pressure, P-11	1, 2, 3	3	L	SR 3.3.2.5 SR 3.3.2.9	≤ 1975.2 psig (Unit 1) ≤ 1976.4 psig (Unit 2)

(a) The Allowable Value defines the limiting safety system setting except for functions 5b and 6c (the Nominal Trip Setpoint defines the limiting safety system setting for these Trip Functions). See the Bases for the Nominal Trip Setpoints.

(b) The Unit 1 RWST Level Low-Low Allowable Value will remain ≥ 43.9% instrument span until completion of Cycle 12.

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.10 Pressurizer Safety Valves

LCO 3.4.10 Three pressurizer safety valves shall be OPERABLE with lift settings $\geq$ 2410* psig and $\leq$ 2485* psig.

APPLICABILITY: MODES 1, 2, and 3,
MODE 4 with all RCS cold leg temperatures > 320°F

-----NOTE-----
The lift settings are not required to be within the LCO limits during MODES 3 and 4 for the purpose of setting the pressurizer safety valves under ambient (hot) conditions. This exception is allowed for 54 hours following entry into MODE 3 provided a preliminary cold setting was made prior to heatup.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One pressurizer safety valve inoperable.	A.1 Restore valve to OPERABLE status.	15 minutes
B. Required Action and associated Completion Time not met. OR Two or more pressurizer safety valves inoperable.	B.1 Be in MODE 3. AND B.2 Be in MODE 4 with any RCS cold leg temperatures $\leq$ 320°F.	6 hours 12 hours

* For Unit 1, through Cycle 13, the three pressurizer safety valve lift settings shall be $\geq$ 2460 psig and $\leq$ 2510 psig for the Limiting Condition for Operation.

3.7 PLANT SYSTEMS

3.7.1 Main Steam Safety Valves (MSSVs)

LCO 3.7.1 Five MSSVs per steam generator shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3

ACTIONS

--NOTE--
Separate Condition entry is allowed for each MSSV.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more steam generators with one MSSV inoperable and the Moderator Temperature Coefficient (MTC) zero or negative at all power levels.	A. Reduce THERMAL POWER to $\leq$68% RTP.	4 hours

(continued)

ACTIONS (continued

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. One or more steam generators with two or more MSSVs inoperable. OR One or more steam generators with one MSSV inoperable and the MTC positive at any power level.	B.1	Reduce Thermal Power to less than or equal to the Maximum Allowable % RTP specified in Table 3.7.1-1 for the number of OPERABLE MSSVs.	4 hours
	AND		
		-------------NOTE------------ Only required in MODE 1. ---------------------------------	
	B.2	Reduce the Power Range Neutron Flux-High reactor trip setpoint to less than or equal to the Maximum Allowable % RTP specified in Table 3.7.1-1 for the number of OPERABLE MSSVs.	36 hours
C. Required Action and associated Completion Time not met. OR One or more steam generators with ≥ 4 MSSVs inoperable.	C.1	Be in MODE 3.	6 hours
	AND		
	C.2	Be in MODE 4.	12 hours

ATTACHMENT 5 to TXX-07108

RETYPED TECHNICAL SPECIFICATION BASES PAGES

Pages	B 3.3-1
	B 3.3-4
	B 3.3-5
	B 3.3-7
	B 3.3-8
	B 3.3-56
	B 3.3-60
	B 3.3-61
	B 3.3-63
	B 3.3-106
	B 3.3-107
	B 3.5-3
	B 3.7-1
	B 3.7-2
	B 3.7-3
	B 3.7-4
	B 3.7-5
	B 3.7-25

B 3.3 INSTRUMENTATION

B 3.3.1 Reactor Trip System (RTS) Instrumentation

BASES

BACKGROUND

The 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 (LSSS) in terms of parameters directly monitored by the RTS, as well as specifying LCOs on other reactor system parameters and equipment performance.

For the purposes of demonstrating compliance with 10CFR50.36, the Technical Specifications must specify Limiting Safety System Settings (LSSS). The Allowable Value specified in Table 3.3.1-1 serves as the LSSS except for Trip Functions 2a, 2b, 6, 7, and 14 (the Nominal Trip Setpoint defines the limiting safety system setting for these Trip Functions). The Allowable Value in conjunction with the trip setpoint and LCO establishes the threshold for protective system action to prevent exceeding acceptable limits during Design Basis Accidents (DBAs).

The Allowable Value serves as the LSSS except for Trip Functions 2a, 2b, 6, 7, and 14 (the Nominal Trip Setpoint defines the limiting safety system setting for these Trip Functions) such that a channel is OPERABLE if the trip as found trip setpoint value does setpoint is found not to exceed the Allowable Value during the CHANNEL OPERATIONAL TEST (COT). Note that, although the channel is OPERABLE under these circumstances, the trip setpoint must be left adjusted to a value within the established trip setpoint calibration tolerance band in accordance with uncertainty assumptions stated in the referenced setpoint methodology (as-left criteria), and confirmed to be operating within the allowances of the uncertainty terms assigned.

During AOOs, which are those events expected to occur one or more times during the unit life, the acceptable limits are:

1. The Departure from Nucleate Boiling Ratio (DNBR) shall be maintained above the departure from nucleate boiling ratio (DNBR) limit;

2. Fuel centerline melt shall not occur; and

3. The RCS pressure Safety Limit of 2735 psig shall not be exceeded.

(continued)

BASES

BACKGROUND (continued)

testing required while the reactor is at power may be accomplished without initiating protective action, unless a trip condition actually exists. This arises from the use of coincidence logic in generating reactor trip signals and from the capability to bypass a partial protective action while in test.

Allowable Values and Trip Setpoints

The trip setpoints used in the bistables are based on the analytical limits stated in Reference 2. The selection of these trip setpoints is such that adequate protection is provided when all sensor and processing time delays are taken into account. To allow for calibration tolerances, instrumentation uncertainties, instrument drift, and severe environment errors for those RTS channels that must function in harsh environments as defined by 10 CFR 50.49 (Ref. 4), the Allowable Values specified in Table 3.3.1-1 in the accompanying LCO are conservative with respect to the analytical limits.

The methodology to derive the Trip Setpoints is based upon combining all of the uncertainties in the channels. The essential elements of the methodology for all Trip Functions 2a, 2b, 6, 7, and 14 are described in Reference 9. Changes in accordance with this methodology have been reviewed by the staff in the original Unit 2 Technical Specifications and in several subsequent license amendments (e.g., amendments 21/7 and 22/8 to the Unit 1/Unit 2 Technical Specifications). The actual nominal trip setpoint entered into the bistable is more conservative than that specified by the Allowable Value to account for changes in random measurement errors detectable by a COT. One example of such a change in measurement error is drift during the surveillance interval. If the measured setpoint does not exceed the Allowable Value, the bistable is considered OPERABLE. The trip setpoint is the value at which the bistable is set and is the expected value to be achieved during calibration. The trip setpoint value ensures the LSSS and the safety analysis limits are met for the time period of the surveillance interval when a channel is adjusted based on stated channel uncertainties. Any bistable is considered to be properly adjusted when the "as left" setpoint value is within the band for CHANNEL CALIBRATION uncertainty allowance (i.e., ± rack calibration + comparator setting uncertainties). The trip setpoint value of Table B3.3-1.1 is therefore considered a "nominal" value (i.e., expressed as a value without inequalities) for the purposes of COT and CHANNEL CALIBRATION for all Trip Functions 2a, 2b, 6, 7, and 14.

The methodology used to calculate the Nominal Trip Setpoints for Functions 2a, 2b, 6, 7, and 14 in Table B 3.3.1-1 is the same basic square-root-sum-of-squares (SRSS) methodology with the inclusion of refinements to better reflect plant calibration practices and equipment performance. These

(continued)

BASES

BACKGROUND (continued)

refinements include the incorporation of a sensor reference accuracy term to address repeatability effects when performing a single pass calibration (i.e., one up and one down pass at several points verifies linearity and hysteresis, but not repeatability). In addition, sensor and rack error terms for calibration accuracy and drift are grouped in the Channel Statistical Allowance equation with their dependent M&TE terms, then combined with the other independent error terms using the SRSS methodology. The actual Nominal Trip Setpoint entered into the bistable is more conservative than that specified by the Allowable Value to account for changes in random measurement errors detectable by a COT. If the measured setpoint does not exceed the Allowable Value, the bistable is considered OPERABLE.

Trip setpoints consistent with the requirements of the Allowable Value ensure that design limits are not violated during AOOs (and that the consequences of DBAs will be acceptable, providing the unit is operated from within the LCOs at the onset of the AOO or DBA and the equipment functions as designed). Note that in the accompanying LCO 3.3.1, the Allowable Values of Table 3.3.1-1 are the LSSS except for Trip Functions 2a, 2b, 6, 7, and 14 (the Nominal Trip Setpoint defines the limiting safety system setting for these Trip Functions).

Each channel of the process control equipment can be tested on line to verify that the signal or setpoint accuracy is within the specified allowance requirements. Once a designated channel is taken out of service for testing, a simulated signal is injected in place of the field instrument signal. The process equipment for the channel in test is then tested, verified, and calibrated. SRs for the channels are specified in the SRs section.

The Allowable Values listed in Table 3.3.1-1, except for Functions 2a, 2b, 6, 7, and 14 incorporates all of the known uncertainties applicable for each channel. The Allowable Values for Functions 2a, 2b, 6, 7, and 14 are based on the Nominal Trip Setpoints and are determined by subtracting or adding the rack calibration accuracy from the Nominal Trip Setpoint. The magnitudes of these uncertainties are factored into the determination of each Nominal Trip Setpoint. All field sensors and signal processing equipment for these channels are assumed to operate within the allowances of these uncertainty magnitudes.

Solid State Protection System

The SSPS equipment is used for the decision logic processing of outputs from the signal processing equipment bistables. To meet the redundancy requirements, two trains of SSPS, each performing the same functions, are provided. If one train is taken out of service for maintenance or test

(continued)

BASES

BACKGROUND (continued)

can automatically test the decision logic matrix Functions and the actuation devices while the unit is at power. When any one train is taken out of service for testing, the other train is capable of providing unit monitoring and protection until the testing has been completed. The testing device is semiautomatic to minimize testing time.

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

The RTS functions to maintain the applicable Safety Limits during all AOOs and mitigates the consequences of DBAs in all MODES in which the Rod Control system is capable of rod withdrawal or one or more rods are not fully inserted.

Each of the analyzed accidents and transients can be detected by one or more RTS Functions. The accident analysis described in Reference 2 takes credit for most RTS trip Functions. RTS trip Functions not specifically credited in the accident analysis are qualitatively credited in the safety analysis and the NRC staff approved licensing basis for the unit. These RTS trip Functions may provide protection for conditions that do not require dynamic transient analysis to demonstrate Function performance. They may also serve as backup or diverse trips to RTS trip Functions that were credited in the accident analysis.

The LCO requires all instrumentation performing an RTS Function, listed in Table 3.3.1-1 in the accompanying LCO, to be OPERABLE. Failure of any instrument renders the affected channel(s) inoperable and reduces the reliability of the affected Functions.

A channel is OPERABLE with a trip setpoint value outside its calibration tolerance band provided the trip setpoint "as-found" value does not exceed its associated Allowable Value and provided the trip setpoint "as-left" value is adjusted to a value within the calibration tolerance band of the Nominal Trip Setpoint except for Trip Functions 2a, 2b, 6, 7, and 14. Note (r) requires the instrument channel setpoint for a channel in these Trip Functions to be reset to a value that is within the as-left setpoint tolerance of the Nominal Trip Setpoint, or to a value that is more conservative than the Nominal Trip Setpoint. The conservative direction is indicated by the direction of the inequality sign applied to the Nominal Trip Setpoint in Bases Table B 3.3.1-1. Setpoint restoration and post-test verification assure that the assumptions in the plant setpoint methodology are satisfied in order to protect the safety analysis limits. Note (r) preserves the safety analysis limits. If the channel can not be reset to a value within its as-left setpoint tolerance band, or to a value that is more conservative than the Nominal Trip Setpoint if required based on plant conditions, the channel methodology used to determine the

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

as-left setpoint tolerance band is based on the square-root-sum-of-squares (SRSS) of the tolerances applicable to the instrument loop or sub-loop constituents being tested. A trip setpoint may be set more conservative than the Nominal Trip Setpoint as necessary in response to plant conditions.

The LCO generally requires OPERABILITY of four or three channels in each instrumentation Function, two channels of Manual Reactor Trip in each logic Function, and two trains in each Automatic Trip Logic Function. Four OPERABLE instrumentation channels in a two-out-of-four configuration are required when one RTS channel is also used as a control system input. This configuration accounts for the possibility of the shared channel failing in such a manner that it creates a transient that requires RTS action. In this case, the RTS will still provide protection, even with a random failure of one of the other three protection channels. Three operable instrumentation channels in a two-of-three configuration are generally required when there is no potential for control system and protection system interaction that could simultaneously create a need for RTS trip and disable one RTS channel. The two-out-of-three and two-out-of-four configurations allow one channel to be tripped or bypassed during maintenance or testing without causing a reactor trip. Specific exceptions to the above general philosophy exist and are discussed below.

Reactor Trip System Functions

The safety analyses and OPERABILITY requirements applicable to each RTS Function are discussed below:

1. Manual Reactor Trip

The Manual Reactor Trip ensures that the control room operator can initiate a reactor trip at any time by using either of two reactor trip switches in the control room. A Manual Reactor Trip accomplishes the same results as any one of the automatic trip Functions. It is used by the reactor operator to shut down the reactor whenever any parameter is rapidly trending toward its Trip Setpoint.

The LCO requires two Manual Reactor Trip channels to be OPERABLE. Each channel is controlled by a manual reactor trip switch. Each channel activates the reactor trip breaker in both trains. Two independent channels are required to be OPERABLE so that no single random failure will disable the Manual Reactor Trip Function.

(continued)

Table B 3.3.1-1 (Page 1 of 2)
Reactor Trip System Setpoints

FUNCTION	NOMINAL TRIP SETPOINT
1. Manual Rector Trip	N/A
2. a. Power Range Neutron Flux, High	109% RTP
2. b. Power Range Neutron Flux, Low	25% RTP
3. Power Range Neutron Flux Rate, High Positive Rate	5% RTP with a time constant $\geq$ 2 seconds
4. Intermediate Range Neutron Flux, High	25% RTP
5. Source Range Neutron Flux, High	10^5 cps
6. Overtemperature N-16	See Note 1, Table 3.3.1-1
7. Overpower N-16	112% RTP
8. a. Pressurizer Pressure, Low	1880 psig $\tau_1 \geq$ 10 seconds $\tau_2 \leq$ 5 seconds
8. b. Pressurizer Pressure, High	2385 psig
9. Pressurizer Water Level - High	92% span
10. Reactor Coolant Flow - Low	90% of nominal flow
11. Not Used.	
12. Undervoltage RCPs	4830 volts
13. Underfrequency RCPs	57.2 Hz
14. Steam Generator Water Level - Low-Low	38% NR (Unit 1) 35.4% NR (Unit 2)
15. Not Used.	
16. Turbine Trip	
a. Low Fluid Oil Pressure	59 psig
b. Turbine Stop Valve Closure	1% open

BASES

BACKGROUND (continued)

These requirements are described in IEEE-279-1971 (Ref. 4). The actual number of channels required for each unit parameter is specified in Reference 2.

Allowable Values and Trip Setpoints

The trip setpoints used in the bistables are based on the analytical limits stated in Reference 3. The selection of these trip setpoints is such that adequate protection is provided when all sensor and processing time delays are taken into account. To allow for calibration tolerances, instrumentation uncertainties, instrument drift, and severe environment errors for those ESFAS channels that must function in harsh environments as defined by 10 CFR 50.49 (Ref. 5), the Allowable Values specified in Table 3.3.2-1 in the accompanying LCO are conservative with respect to the analytical limits. Detailed descriptions of the methodologies used to calculate the trip setpoints, including their explicit uncertainties, are provided in the setpoint calculations. The methodology to derive the trip setpoints is based upon combining all of the uncertainties in the channels. The essential elements of the methodology for all functions except 5b and 6c are described in Reference 9.

Changes in accordance with this methodology have been reviewed by the staff in the original Unit 2 Technical Specifications and in several subsequent license amendments (e.g., amendments 21/7 and 22/8 to the Unit 1/Unit 2 Technical Specifications). The actual nominal ESFAS setpoint entered into the bistable is more conservative than that specified by the Allowable Value to account for changes in random measurement errors detectable by a COT. The Allowable Value serves as the Technical Specification operability limit for the purpose of the COT. One example of such a change in measurement error is drift during the surveillance interval. If the measured setpoint does not exceed the Allowable Value, the bistable is considered OPERABLE.

Setpoints adjusted consistent with the requirements of the Allowable Value ensure that the consequences of Design Basis Accidents (DBAs) will be acceptable, providing the unit is operated from within the LCOs at the onset of the DBA and the equipment functions as designed.

The ESFAS setpoint is the value at which the bistable is set and is the expected value to be achieved during calibration. The ESFAS setpoint value ensures the safety analysis limits are met for the time period of the surveillance interval when a channel is adjusted based on stated channel uncertainties. Any bistable is considered to be properly adjusted when the "as left" setpoint value is within the band for CHANNEL CALIBRATION uncertainty allowance (i.e., ± rack calibration + comparator setting uncertainties). The ESFAS setpoint value of Table B3.3.2-1 is therefore

(continued)

BASES

BACKGROUND (continued)

considered a “nominal” value (i.e., expressed as a value without inequalities) for the purposes of COT and CHANNEL CALIBRATION for all functions except 5b and 6c.

The methodology used to calculate the Nominal Trip Setpoints for Functions 5b and 6c in Table B 3.3.2-1 is the same basic square-root-sum-of-squares (SRSS) methodology with the inclusion of refinements to better reflect plant calibration practices and equipment performance. These refinements include the incorporation of a sensor reference accuracy term to address repeatability effects when performing a single pass calibration (i.e., one up and one down pass at several points verifies linearity and hysteresis, but not repeatability). In addition, sensor and rack error terms for calibration accuracy and drift are grouped in the Channel Statistical Allowance equation with their dependent M&TE terms, then combined with the other independent error terms using the SRSS methodology. The actual Nominal Trip Setpoint entered into the bistable is more conservative than that specified by the Allowable Value to account for changes in random measurement errors detectable by a COT. If the measured setpoint does not exceed the Allowable Value, the bistable is considered OPERABLE.

Each channel can be tested on line to verify that the signal processing equipment and setpoint accuracy is within the specified allowance requirements. Once a designated channel is taken out of service for testing, a simulated signal is injected in place of the field instrument signal. The process equipment for the channel in test is then tested, verified, and calibrated. SRs for the channels are specified in the SR section.

The Allowable Values for Functions 5b and 6c in the accompanying LCO are based on the Nominal Trip Setpoints and are determined by subtracting (for low setpoint trips) or adding (for high setpoint trips) the rack calibration accuracy from/to the Nominal Trip Setpoint. The magnitudes of these uncertainties are factored into the determination of each Nominal Trip Setpoint. All field sensors and signal processing equipment for these channels are assumed to operate within the allowances of these uncertainty magnitudes.

Solid State Protection System

The SSPS equipment is used for the decision logic processing of outputs from the signal processing equipment bistables. To meet the redundancy requirements, two trains of SSPS, each performing the same functions, are provided. If one train is taken out of service for maintenance or test purposes, the second train will provide ESF actuation for the unit. If both trains are taken out of service or placed in test, a reactor trip will result. Each

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BASES (continued)

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

Each of the analyzed accidents can be detected by one or more ESFAS Functions. One of the ESFAS Functions is the primary actuation signal for that accident. An ESFAS Function may be the primary actuation signal for more than one type of accident. An ESFAS Function may also be a secondary, or backup, actuation signal for one or more other accidents. For example, Pressurizer Pressure-Low is a primary actuation signal for small loss of coolant accidents (LOCAs) and a backup actuation signal for steam line breaks (SLBs) outside containment. Functions such as manual initiation, not specifically credited in the accident safety analysis, are qualitatively credited. These Functions may provide protection for conditions that do not require dynamic transient analysis to demonstrate Function performance. These Functions may also serve as backups to Functions that were credited in the accident analysis (Ref. 3).

The LCO requires all instrumentation performing an ESFAS Function to be OPERABLE. Failure of any instrument renders the affected channel(s) inoperable and reduces the reliability of the affected Functions.

A channel is OPERABLE with a setpoint value outside its calibration tolerance band provided the trip setpoint "as-found" value does not exceed its associated Allowable Value and provided the trip setpoint "as-left" value is adjusted to a value within the calibration tolerance band of the Nominal Trip Setpoint except for functions 5b and 5c. Note (q) requires the instrument channel setpoint for a channel in these Functions to be reset to a value within the as-left setpoint tolerance band for that channel on either side of the Nominal Trip Setpoint, or to a value that is more conservative than the Nominal Trip Setpoint. The conservative direction is indicated by the direction of the inequality sign applied to the Nominal Trip Setpoint in Bases Table B 3.3.2-1. Setpoint restoration and post-test verification assure that the assumptions in the plant setpoint methodology are satisfied in order to protect the safety analysis limits. Note (q) preserves the safety analysis limits. If the channel can not be reset to a value within its as-left setpoint tolerance band, or to a value that is more conservative than the Nominal Trip Setpoint if required based on plant conditions, the channel shall be declared inoperable and the applicable Required Actions are taken. The methodology used to determine the as-left setpoint tolerance band is based on the square-root-sum-of-squares (SRSS) of the tolerances applicable to the instrument loop or sub-loop constituents being tested. A trip setpoint may be set more conservative than the Nominal Trip Setpoint as necessary in response to plant conditions.

The LCO generally requires OPERABILITY of four or three channels in each instrumentation function and two channels in each logic and manual initiation function. The two-out-of-three and the two-out-of-four configurations allow one channel to be tripped during maintenance or testing without causing an

(continued)

Table B 3.3.2-1 (Page 1 of 3)
ESFAS Trip Setpoints

FUNCTION	NOMINAL TRIP SETPOINT
1. Safety Injection	
a. Manual Initiation	NA
b. Automatic Actuation Logic and Actuation Relays	NA
c. Containment Pressure – High 1	3.2 psig
d. Pressurizer Pressure – Low	1820 psig
e. Steam Line Pressure – Low	605 psig $\tau_1 \geq 10$ seconds $\tau_2 \leq 5$ seconds
2. Containment Spray	
a. Manual Initiation	NA
b. Automatic Actuation Logic and Actuation Relays	NA
c. Containment Pressure – High 3	18.2 psig
3. Containment Isolation	
a. Phase A Isolation	
(1) Manual Initiation	NA
(2) Automatic Actuation Logic and Actuation Relays	NA
(3) Safety Injection	See Function 1
b. Phase B Isolation	
(1) Manual Initiation	NA
(2) Automatic Actuation Logic and Actuation Relays	NA
(3) Containment Pressure - High 3	18.2 psig

Table B 3.3.2-1 (Page 2 of 3)
ESFAS Trip Setpoints

FUNCTION	NOMINAL TRIP SETPOINT
4. Steam Line Isolation	
a. Manual Initiation	NA
b. Automatic Actuation Logic and Actuation Relays	NA
c. Containment Pressure - High 2	6.2 psig
d. Steam Line Pressure	
(1) Low	605 psig $\tau_1 \geq 10$ seconds $\tau_2 \leq 5$ seconds
(2) Negative Rate - High	100 psi $\tau \geq 50$ seconds
5. Turbine Trip and Feedwater Isolation	
a. Automatic Actuation Logic and Actuation Relays	NA
b. SG Water Level - High-High (P-14)	84% NR (Unit 1) 81.5% NR (Unit 2)
c. Safety Injection	See Function 1.
6. Auxiliary Feedwater	
a. Automatic Actuating Logic and Actuation Relays (SSPS)	NA
b. Not Used	
c. SG Water Level - Low-Low	38% NR (Unit 1) 35.4% NR (Unit 2)
d. Safety Injection	See Function 1.
e. Loss of Power	NA
f. Not Used	

BASES

APPLICABLE SAFETY ANALYSES (continued)

This LCO helps to ensure that the following acceptance criteria established for the ECCS by 10 CFR 50.46 (Ref. 3) will be met following a LOCA:

a. Maximum fuel element cladding temperature is ≤ 2200°F;

b. Maximum cladding oxidation is ≤ 0.17 times the total cladding thickness before oxidation;

c. Maximum hydrogen generation from a zirconium water reaction is ≤ 0.01 times the hypothetical amount that would be generated if all of the metal in the cladding cylinders surrounding the fuel, excluding the cladding surrounding the plenum volume, were to react; and

d. Core is maintained in a coolable geometry.

Since the accumulators discharge during the blowdown phase of a LOCA, they do not contribute to the long term cooling requirements of 10 CFR 50.46.

For both the large and small break LOCA analyses, a nominal contained accumulator water volume is used. The contained water volume is the same as the deliverable volume for the accumulators, since the accumulators are emptied, once discharged. For small breaks, an increase in water volume may be either a peak clad temperature penalty or benefit depending on the transient characteristics. Depending on the NRC-approved methodology used to analyze large breaks, an increase in water volume may be either a peak clad temperature penalty or benefit, depending on downcomer filling and subsequent spill through the break during the core reflooding portion of the transient. The analysis makes a conservative assumption with respect to ignoring or taking credit for line water volume from the accumulator to the check valve. The safety analysis assumes values of 6119 gallons and 6597 gallons.

The minimum boron concentration setpoint is used in the post LOCA boron concentration calculation. The calculation is performed to assure reactor subcriticality in a post LOCA environment. Of particular interest is the large break LOCA, since no credit is taken for control rod assembly insertion. A reduction in the accumulator minimum boron concentration would produce a subsequent reduction in the available containment sump concentration for post LOCA shutdown and an increase in the maximum sump pH. The maximum boron concentration is used in determining the cold leg to hot leg recirculation injection switchover time and minimum sump pH.

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B 3.7 PLANT SYSTEMS

B 3.7.1 Main Steam Safety Valves (MSSVs)

BASES

BACKGROUND

The primary purpose of the MSSVs is to provide overpressure protection for the secondary system. The MSSVs also provide protection against overpressurizing the reactor coolant pressure boundary (RCPB) by providing a heat sink for the removal of energy from the Reactor Coolant System (RCS) if the preferred heat sink, provided by the Condenser and Circulating Water System, is not available.

Five MSSVs are located on each main steamline, outside containment, upstream of the main steam isolation valves, as described in the FSAR (Ref. 1). The MSSVs must have sufficient capacity to limit secondary system pressure to ≤ 110% of the steam generator design pressure in order to meet the requirements of the ASME Code, Section III (Ref. 2). The MSSV design includes staggered setpoints, according to Table 3.7.1-2 in the accompanying LCO, so that only the needed valves will actuate. Staggered setpoints reduce the potential for valve chattering that is due to steam pressure insufficient to fully open all valves following a turbine reactor trip.

Operation with one or more inoperable MSSVs is allowable if the reactor power is appropriately reduced. This action ensures that if an event were to occur, the operable MSSVs would continue to provide adequate overpressure protection.

APPLICABLE SAFETY ANALYSES

The design basis for the MSSVs comes from Reference 2 and its purpose is to limit the secondary system pressure to ≤ 110% of design pressure for any anticipated operational occurrence (AOO) or accident considered in the Design Basis Accident (DBA) and transient analysis.

The events that most significantly challenge the relieving capacity of the MSSVs, and thus RCS pressure, are those characterized as decreased heat removal events, which are presented in the FSAR, Section 15.2 (Ref. 3). Of these, the full power turbine trip without steam dump is typically the limiting AOO. This event also terminates normal feedwater flow to the steam generators.

The safety analysis demonstrates that the transient response for turbine trip occurring from full power without a direct reactor trip presents no hazard to the integrity of the RCS or the Main Steam System. One turbine trip analysis is performed assuming primary system pressure control via operation of the pressurizer relief valves and spray. This analysis demonstrates that the DNB design basis is met. Another analysis is performed assuming no primary system pressure control, but crediting reactor trip on high pressurizer pressure and operation of the pressurizer safety valves.

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

This analysis demonstrates that RCS integrity is maintained by showing that the maximum RCS pressure does not exceed 110% of the design pressure. All cases analyzed demonstrate that the MSSVs maintain Main Steam System integrity by limiting the maximum steam pressure to less than 110% of the steam generator design pressure.

In addition to the decreased heat removal events, reactivity insertion events may also challenge the relieving capacity of the MSSVs. The uncontrolled rod cluster control assembly (RCCA) bank withdrawal at power event is characterized by an increase in core power and steam generation rate until reactor trip occurs when either the Overtemperature N-16 or Power Range Neutron Flux-High setpoint is reached. Steam flow to the turbine will not increase from its initial value for this event. The increased heat transfer to the secondary side causes an increase in steam pressure and may result in opening of the MSSVs prior to reactor trip, assuming no credit for operation of the atmospheric or condenser steam dump valves. The FSAR safety analysis of the RCCA bank withdrawal at power event for a range of initial core power levels demonstrates that the MSSVs are capable of preventing secondary side overpressurization for this AOO.

The FSAR safety analyses discussed above assume that all of the MSSVs for each steam generator are OPERABLE. If there are inoperable MSSV(s), it is necessary to limit the primary system power during steady state operation and AOOs to a value that does not result in exceeding the combined steam flow capacity of the turbine (if available) and the remaining OPERABLE MSSVs. The required limitation on primary system power necessary to prevent secondary system overpressurization may be determined by system transient analysis or conservatively arrived at by a simple heat balance calculation. In some circumstances it is necessary to limit the primary side heat generation that can be achieved during an AOO by reducing the setpoint of the Power Range Neutron Flux-High reactor trip function. For example, if more than one MSSV on a single steam generator is inoperable, an uncontrolled RCCA bank withdrawal at power event occurring from a partial power level may result in an increase in reactor power that exceeds the combined steam flow capacity of the turbine and the remaining OPERABLE MSSVs. Thus, for multiple inoperable MSSVs on the same steam generator it is necessary to prevent this power increase by lowering the Power Range Neutron Flux-High setpoint to an appropriate value. When the Moderator Temperature Coefficient (MTC) is positive, the reactor power may increase above the initial value during an RCS heatup event (e.g., turbine trip). Thus, for any number of inoperable MSSVs it is necessary to reduce the trip setpoint if a positive MTC may exist at partial power conditions, unless it is demonstrated by analysis that a specified reactor power reduction alone is sufficient to prevent

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

overpressurization of the steam system. The MSSVs are assumed to have one active failure mode. The active failure mode is an inadvertent opening and failure to reclose once opened. The passive failure mode which is the failure to open upon demand is not assumed (Ref. 3).

The MSSVs satisfy Criterion 3 of 10CFR50.36(c)(2)(ii).

LCO

The accident analysis requires that five MSSVs per steam generator be OPERABLE to provide overpressure protection for design basis transients occurring at 102% RTP. The LCO requires that five MSSVs per steam generator be OPERABLE in compliance with Reference 2, and the DBA analysis.

The OPERABILITY of the MSSVs is defined as the ability to open upon demand within the setpoint tolerances, to relieve steam generator overpressure, and reseat when pressure has been reduced. The OPERABILITY of the MSSVs is determined by periodic surveillance testing in accordance with the Inservice Testing Program.

This LCO provides assurance that the MSSVs will perform their designed safety functions to mitigate the consequences of accidents that could result in a challenge to the RCPB or Main Steam System integrity.

APPLICABILITY

In MODES 1, 2, and 3, five MSSVs per steam generator are required to be OPERABLE to prevent Main Steam System overpressurization.

In MODES 4 and 5, there are no credible transients requiring the MSSVs. The steam generators are not normally used for heat removal in MODES 5 and 6, and thus cannot be overpressurized; there is no requirement for the MSSVs to be OPERABLE in these MODES.

ACTIONS

The ACTIONS table is modified by a Note indicating that separate Condition entry is allowed for each MSSV.

With one or more MSSVs inoperable, action must be taken so that the available MSSV relieving capacity meets the overpressure protection requirements.

Operation with less than all five MSSVs OPERABLE for each steam

(continued)

BASES

ACTIONS (continued)

generator is permissible, if THERMAL POWER is limited to the relief capacity of the remaining MSSVs. This is accomplished by restricting THERMAL POWER so that the energy transfer to the most limiting steam generator is not greater than the available relief capacity in that steam generator.

A.1

In the case of only a single inoperable MSSV on one or more steam generators when the Moderator Temperature Coefficient is not positive a reactor power reduction alone is sufficient to limit primary side heat generation such that overpressurization of the secondary side is precluded for any RCS heatup event. Furthermore, for this case there is sufficient total steam flow capacity provided by the turbine and remaining OPERABLE MSSVs to preclude overpressurization in the event of an increased reactor power due to reactivity insertion, such as in the event of an uncontrolled RCCA bank withdrawal at power. Therefore, Required Action A.1 requires an appropriate reduction in reactor power within 4 hours.

The maximum THERMAL POWER corresponding to the heat removal capacity of the remaining OPERABLE MSSVs is determined via a conservative heat balance calculation as discussed below, with an appropriate allowance for calorimetric power uncertainty.

The maximum THERMAL POWER corresponding to the heat removal capacity of the remaining OPERABLE MSSVs is determined by the governing heat transfer relationship from the equation $q = m\ \Delta h$, where q is the heat input fro the primary side, m is the steam flow rate and Δh is the heat of vaporization at the steam relief pressure (assuming no subcooled feedwater). For each steam generator, at a specified pressure, the maximum allowable power level is determined as follows:

$$\text{Maximum Allowable Power Level} \leq 100/Q\ (W_s\ h_{fg}\ N)/K$$

where:

Q = Nominal NSSS power rating of the plant (including reactor coolant pump heat), Mwt.

K = Conversion factor, 947.82 (Btu/sec)/Mwt

(continued)

BASES

ACTIONS

A.1 (continued)

W_s = Minimum total steam flow rate capability of the OPERABLE MSSVs on any one steam generator at the highest OPERABLE MSSV opening pressure including tolerance and accumulation, as appropriate, in lb/sec.

h_{fg} = Heat of vaporization for steam at the highest MSSV opening pressure including tolerance and accumulation, as appropriate, Btu/lbm.

N = Number of loops in plant.

For use in determining the % RTP in Action A, the Maximum NSSS Power calculated above is reduced by 2% RTP to account for the calorimetric power uncertainty.

B.1 and B.2

In the case of multiple inoperable MSSVs on one or more steam generators, with a reactor power reduction alone there may be insufficient total steam flow capacity provided by the turbine and remaining OPERABLE MSSVs to preclude overpressurization in the event of an increased reactor power due to reactivity insertion, such as in the event of an uncontrolled RCCA bank withdrawal at power. Furthermore, for a single inoperable MSSV on one or more steam generators when the Moderator Temperature Coefficient is positive the reactor power may increase as a result of an RCS heatup event such that flow capacity of the remaining OPERABLE MSSVs is insufficient. The 4 hour Completion Time for Required Action B.1 is consistent with A.1. An additional 32 hours is allowed in Required Action B.2 to reduce the setpoints. The Completion Time of 36 hours is based on a reasonable time to correct the MSSV inoperability, the time required to perform the power reduction, operating experience in resetting all channels of protective function, and on the low probability of the occurrence of a transient that could result in steam generator overpressure during this period.

The maximum THERMAL POWER corresponding to the heat removal capacity of the remaining OPERABLE MSSVs is determined via a system transient analysis with an appropriate allowance for Nuclear Instrumentation System trip channel uncertainties.

To determine the Table 16.3.7.1-1 Maximum Allowable Power for Action B (% RTP), the calculated Maximum NSSS Power is reduced by 9.0% to account for Nuclear Instrumentation System trip channel uncertainties.

(continued)

BASES

BACKGROUND (continued)

The AFW System is designed to supply sufficient water to the steam generator(s) to remove decay heat with steam generator pressure at the lowest set pressure of the MSSVs plus accumulation. Subsequently, the AFW System supplies sufficient water to cool the unit to RHR entry conditions, with steam released through the ARVs.

The AFW System actuates automatically on steam generator water level - low-low by the ESFAS (LCO 3.3.2). The system also actuates on loss of offsite power and on an ATWS Mitigation System Actuation Circuitry (AMSAC) signal, however, AMSAC start of the AFW pumps is not required for AFW system operability. The motor driven pumps also start on safety injection and trip of all MFW pumps. During normal plant operations, the AFW system, under manual control, is used to maintain SG water level.

The AFW System is discussed in the FSAR (Ref. 1).

APPLICABLE SAFETY ANALYSES

The AFW System mitigates the consequences of any event with loss of normal feedwater.

The design basis of the AFW System is to supply water to the steam generator to remove decay heat and other residual heat by delivering at least the minimum required flow rate to the steam generators at pressures corresponding to the lowest steam generator safety valve set pressure plus 3% accumulation.

In addition, the AFW System must supply enough makeup water to replace steam generator secondary inventory lost as the unit cools to MODE 4 conditions. Sufficient AFW flow must also be available to account for flow losses such as pump recirculation and MFW line breaks.

The limiting Design Basis Accidents (DBAs) and transients for the AFW System are as follows:

a. Feedwater Line Break (FLB); and

b. Loss of MFW.

In addition, AFW flow is considered in the small break loss of coolant accident (SBLOCA), but does not have a significant effect on the transient characteristics.

The AFW System design is such that it can perform its function following a

(continued)