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ENCLOSURE 6 CONTAINS PROPRIETARY INFORMATION - WITHHOLD IN ACCORDANCE WITH 10 CFR 2.390. UPON SEPARATION THE REMAINDER OF THIS LETTER IS DECONTROLLED.

SOUTHERN COMPANY

March 3, 2011

Docket Nos.: 50-424 50-425

CORRECTED COPY
NL-11-0280

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

Vogtle Electric Generating Plant – Units 1 & 2
License Amendment Request for Steam Generator Water Level High-High
Setpoint Change

Ladies and Gentlemen:

In accordance with the provisions of 10 CFR 50.90 of Title 10 of the Code of Federal Regulations (10 CFR), Southern Nuclear Operating Company (SNC) is submitting a request for an amendment to the Technical Specifications (TS), for Vogtle Electric Generating Plant (VEGP). A non-conservative error was discovered in the Engineered Safety Feature Permissive P-14, Steam Generator Water Level High-High instrument setpoint and associated allowable value. The Nominal Trip Setpoint (NTSP) and Allowable Value have been corrected and administratively controlled in accordance with Administrative Letter 98-10, "Dispositioning of Technical Specifications That Are Insufficient to Assure Plant Safety." This TS change incorporates the corrected nominal trip setpoint and allowable value in TS Table 3.3.2.1, "Engineered Safety Feature Actuation System Instrumentation."

The proposed change incorporates Technical Specification Task Force (TSTF) Traveler TSTF-493-A, Revision 4, "Clarify Application of Setpoint Methodology for LSSS Functions," Option A. TSTF-493-A revises the Improved Standard TS to address NRC concerns that the TS requirements for Limiting Safety System Settings (LSSS) may not be fully in compliance with the intent of 10 CFR 50.36.

SNC requests approval of the proposed license amendments by March 15, 2012. Once approved, the amendment would be implemented within 90 days of issuance of the amendment.

Enclosure 1 provides the basis for the proposed changes. Enclosure 2 contains TS markup pages. Enclosure 3 provides clean-typed TS pages. Enclosure 4 includes TS Bases markups for reference only. Enclosure 5 provides application for withholding, affidavit, proprietary information notice, and copyright notice for information proprietary to Westinghouse Electric Company LLC. Enclosure 6 provides one copy of "Setpoint Methodology Used for the "Steam Generator Water Level High-High Function," (Proprietary). Enclosure 7 provides one copy of "Setpoint Methodology Used for the "Steam Generator Water Level High-High Function," (Non-Proprietary).

As Enclosure 6 contains information proprietary to Westinghouse Electric Company LLC, it is supported by an affidavit signed by Westinghouse, the owner of the information. The affidavit sets forth the basis on which the information may be withheld from public disclosure by the NRC and addresses with specificity the considerations listed in paragraph (b)(4) of 10 CFR 2.390, "Public inspections, exemptions, requests for withholding." Accordingly, it is respectfully requested that the information which is proprietary to Westinghouse be withheld from public disclosure in accordance with 10 CFR 2.390. Correspondence with respect to the copyright or proprietary aspects of Enclosure 6 and Enclosure 7 or the supporting Westinghouse affidavit should reference CAW-II-3088 and should be addressed to J. A. Gresham, Manager, Regulatory Compliance and Plant Licensing, Westinghouse Electric Company LLC, Suite 428, 1000 Westinghouse Drive, Cranberry Township, Pennsylvania 16066.

SNC has evaluated this request under the standards set forth in 10 CFR 50.92(c) and determined that a finding of "no significant hazards consideration" is justified.

Mr. M. J. Ajluni states he is Nuclear Licensing Director of Southern Nuclear Operating Company, is authorized to execute this oath on behalf of Southern Nuclear Operating Company and to the best of his knowledge and belief, the facts set forth in this letter are true.

This letter contains no NRC commitments.

Respectfully submitted,

Mark J Ajluni

M. J. Ajluni
Nuclear Licensing Director

MJA/dwm/lac

Sworn to and subscribed before me this 3rd *day of* March*, 2011.*

Laura L. Crumpt
Notary Public

My commission expires: 11-2-2013

Enclosures:
1. Basis for Proposed Changes
2. Technical Specification Markup Pages
3. Clean Typed Technical Specification Pages
4. Technical Specification Bases Markup Pages (for reference only)
5. Application for Withholding and Affidavit, Proprietary Information Notice, and Copyright Notice
6. Setpoint Methodology Used for the Steam Generator Water Level High-High Function (Proprietary)
7. Setpoint Methodology Used for the Steam Generator Water Level High-High Function (Non-Proprietary)

cc: <u>Southern Nuclear Operating Company</u>
Mr. J. T. Gasser, Executive Vice President
Mr. T. E. Tynan, Vice President – Vogtle
Ms. P. M. Marino, Vice President – Engineering
RType: Vogtle = CVC7000

<u>U. S. Nuclear Regulatory Commission</u>
Mr. Victor McCree, Regional Administrator
Mr. R. E. Martin, NRR Project Manager – Farley, Hatch and Vogtle
Mr. P. Boyle, NRR Project Manager
Mr. M. Cain, Senior Resident Inspector – Vogtle

<u>State of Georgia</u>
Mr. Mark Williams, Commissioner – Department of Natural Resources

Vogtle Electric Generating Plant – Units 1 & 2
License Amendment Request for Steam Generator Water Level High-High Setpoint Change

Enclosure 1

Basis for Proposed Change

Vogtle Electric Generating Plant – Units 1 & 2
License Amendment Request for Steam Generator Water Level High-High Setpoint Change

Enclosure 1

Basis for Proposed Change

Table of Contents

Enclosure 1

Basis for Proposed Change

1.0 Summary Description

This amendment request proposes to correct a non-conservative Technical Specification (TS) requirement by revising the Nominal Trip Setpoint (NTSP) and Allowable Value specified in Table 3.3.2-1 for Function 5c, Steam Generator (SG) Water Level High-High.

Although not required to address the non-conservative setpoint, the proposed change also revises the Technical Specifications (TSs) by applying additional testing requirements to applicable instrument Functions listed in Technical Specifications Task Force (TSTF) Traveler TSTF-493-A, Revision 4, "Clarify Application of Setpoint Methodology for LSSS [limiting safety system settings] Functions," Attachment A, "Identification of Instrument Functions to be Annotated with the TSTF-493-A Footnotes." Attachment A contains Functions related to those variables that have a significant safety function, as defined in Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.36(c)(1)(ii)(A), thereby ensuring instrumentation will function as required to initiate protective systems or actuate mitigating systems at values equal to or more conservative than the point assumed in applicable safety analyses. These TS changes are made by the addition of individual surveillance Note requirements to applicable instrument Functions in accordance with Option A of TSTF-493-A, Revision 4. The proposed change is consistent with Option A of NRC-approved Revision 4 to TSTF-493-A. The availability of this TS improvement was announced in the *Federal Register* on May 11, 2010 (75 FR 26294)

In addition, a typographical error is corrected in TS Table 3.3.1-1, Note 2, and an administrative change is made that deletes an expired allowance provided in TS Table 3.3.2-1, Note j.

2.0 Detailed Description

The proposed change is to revise the Technical Specifications and Bases as follows:

Affected Technical Specification		Change Description
3.3.1	Reactor Trip System Instrumentation	Incorporate TSTF-493-A, Option A, Deleted Table 3.3.1-1 Footnote (n), Correct typographical error in Table 3.3.1-1, Note 2
3.3.2	Engineered Safety Feature Actuation System Instrumentation	Revise Nominal Trip Setpoint and Allowable Value for Function 5c, SG Water Level – High High, Incorporate TSTF-493-A, Option A, Delete Table 3.3.2-1 Footnotes (i) and (j)
B 3.3.1	Reactor Trip System Instrumentation Bases	Incorporate TSTF-493-A, Option A

Affected Technical Specification	Change Description
B 3.3.2 Engineered Safety Feature Actuation System Instrumentation Bases	Incorporate TSTF-493-A, Option A
B 3.3.5 4.16 kV ESF Bus Loss of Power Instrumentation Bases	Incorporate TSTF-493-A, Option A
B 3.3.6 Containment Ventilation Isolation Instrumentation Bases	Incorporate TSTF-493-A, Option A
B 3.3.7 Control Room Emergency Filtration System Actuation Instrumentation Bases	Incorporate TSTF-493-A, Option A
B 3.3.8 High Flux at Shutdown Alarm Bases	Incorporate TSTF-493-A, Option A

3.0 Technical Evaluation

Function 5c, Steam Generator (SG) Water Level High-High (P14) Revision

On March 25, 2005, Westinghouse issued a draft, plant-specific assessment of the VEGP level control and protection function uncertainties. That assessment indicated that the P-14 function may not be accomplished in response to a feedwater malfunction event as described in Final Safety Analysis Report (FSAR) Section 15.1.2.1. This condition was reported to the NRC by Southern Nuclear Operating Company (SNC) in Licensee Event Report (LER) 1-2005-002, dated May 27, 2005 (Reference 2).

Engineered Safeguards Feature Permissive P-14 protects against excessive feedwater flow in the event of a feedwater control system malfunction or an operator error. At power conditions, this excess flow causes a greater load demand on the RCS due to increased sub-cooling in the steam generator. With the plant at no-load conditions, the addition of cold feedwater may cause a decrease in RCS temperature and thus a reactivity insertion due to the effects of the negative moderator temperature coefficient of reactivity. The P-14 signal also protects the turbine from steam generator moisture carryover.

Based on the findings presented by Westinghouse, SNC evaluated the effects of process measurement uncertainties on steam generator water level measurement and indication. Westinghouse identified several additional process measurement effects that were not originally considered in the uncertainty calculations. Four transient conditions were identified that could produce transient-specific effects that should be included in assessments of steam generator water level uncertainties. Based on discussions with Westinghouse, the only transient of concern for VEGP is a feedwater malfunction that results in an increase in feedwater flow (Final Safety Analysis Report (FSAR) 15.1.2). Westinghouse identified non-conservatisms in the SG Water Level-High High setpoint at certain power levels.

SNC has controlled the Steam Generator Water Level High-High NTSP and Allowable Value specified in TS Table 3.3.2-1 in accordance with NRC

Administrative Letter 98-10, "Dispositioning of Technical Specifications That Are Insufficient to Assure Plant Safety," (Reference 3). As described in Administrative Letter 98-10, following the imposition of administrative controls, an amendment to the TS, with appropriate justification and schedule, is to be submitted in a timely fashion. At the time the LER was submitted, the industry and the NRC were addressing issues associated with setpoint and allowable value calculation methodologies specified in ISA S67.04. In the LER, SNC stated that a TS change would be submitted to the NRC within approximately 12 months following the final resolution of the methodology issues. However, TSTF-493-A addressing these issues was not approved by the NRC until May 11, 2010. Hence there was a delay in the submittal correcting the P-14 NTSP and Allowable Value.

As discussed in Bases TS B3.3.2 for Function 5, "Turbine Trip and Feedwater Isolation", the primary functions of the Turbine Trip and Feedwater Isolation signals are to prevent damage to the turbine due to water in the steam lines, and to stop excessive flow of feedwater to the steam generators. These functions are necessary to mitigate the effects of a high water level in the steam generators, which could result in carryover of water into the steam lines and excessive cooldown of the primary system. When the P-14 setpoint is reached, turbine trip, reactor trip, feedwater isolation and feedwater pump trip occur.

FSAR 15.1.2.1 states: "Although not relied upon for mitigation of this transient, the high neutron flux trip, OPΔT trip, and OTΔT trip prevent any power increase which could lead to a DNBR less than the minimum allowable value in the event that the steam generator high-high water level protection does not actuate". In addition, based on discussions with Westinghouse, the nature of the transient is such that these trips would not be challenged. Therefore, the reactor core remains protected and the reduction in the P-14 setpoint is recommended to ensure that the turbine remains protected as described in the Bases.

At the steam generator water levels of interest, the effects on measurement uncertainty are such that the indicated steam generator water level may be lower than actual. In the case of a feedwater malfunction that results in an increase in feedwater flow, accounting for the effects of measurement uncertainty ensures that the steam generator will not overfill without reaching the P-14 setpoint.

SNC proposes to change the Steam Generator Water Level High-High Allowable Value from a value of ≤ 87.9% to value of ≤ 82.5% and the NTSP from a value of 86.0% to a value of 82.0% to correspond to the actual settings that are currently implemented under administrative controls. A summary of the setpoint methodology for the Steam Generator Water Level High-High Function is provided in Enclosure 6 (non-proprietary version) and Enclosure 7 (proprietary version).

The reduced NTSP provides reasonable assurance that the SG Water Level-High High setpoint (P-14) (TS Table 3.3.2-1, Function 5c) will continue to perform its intended safety functions.

Enclosure 1

Basis for Proposed Change

Incorporation of TSTF-493-A, Option A

SNC has reviewed the model safety evaluation (SE) referenced in the *Federal Register* Notice of Availability published on May 11, 2010 (75 FR 26294). As described herein, SNC has concluded that the justifications presented in TSTF-493-A, Revision 4, Option A, and the model SE prepared by the NRC staff for Option A are applicable to VEGP and support these changes to the VEGP TS.

SNC is proposing variations or deviations from the TS changes described in TSTF-493-A, Revision 4 or the NRC staff's model SE referenced in the Notice of Availability. Specifically, because the VEGP TS are based on a much earlier version of NUREG-1431, "Improved Standard Technical Specifications – Westinghouse Plants," the level of detail and content of the VEGP Bases for TS 3.3.1 is different from that provided in NUREG-1431, Revision 3, requiring modification of the Bases changes in TSTF-493-A, Option A.

The Technical Analysis for this application is described in TSTF-493-A as referenced in the NRC Notice of Availability published in the *Federal Register* on May 11, 2010 (75 FR 26294). Plant-specific information related to the Technical Analysis is described below to document that the content of TSTF-493-A, Revision 4, Option A, is applicable to VEGP

Use of the Term "Nominal Trip Setpoint"

The term "Nominal Trip Setpoint" (NTSP) is VEGP terminology for the setpoint value calculated by means of the plant-specific setpoint methodology documented in the Final Safety Analyses Report (FSAR) or a document incorporated by reference into the FSAR. The actual trip setpoint may be more conservative than the NTSP. The NTSP is the LSSS[1] which is required to be in the TS by 10 CFR 50.36.

The NTSP is the least conservative value to which the instrument channel is adjusted to actuate. The Allowable Value[2] (AV) is derived from the NTSP. The NTSP is the limiting setting for an operable channel trip setpoint considering all credible instrument errors associated with the instrument channel. The NTSP is the least conservative value (with an as-left tolerance (ALT)) to which the channel must be reset at the conclusion of periodic testing to ensure that the analytical limit (AL) will not be exceeded during an anticipated operational occurrence or accident before the next periodic surveillance or calibration. It is impossible to set a physical instrument channel to an exact value, so a calibration tolerance is established around the NTSP. Therefore, an instrument adjustment is considered

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[1] 10 CFR 50.36(c)(1(II)(a) states: "Limiting safety system settings for nuclear reactors are settings for automatic protective devices related to those variables having significant safety functions."

[2] The instrument setting "Allowable Value" is a limiting value of an instrument's as-found trip setting used during surveillances. The AV is more conservative than the Analytical Limit (AL) to account for applicable instrument measurement errors consistent with the plant-specific setpoint methodology. If during testing, the actual instrumentation setting is less conservative than the AV, the channel is declared inoperable and actions must be taken consistent with the TS requirements.

successful if the NTSP as left instrument setting is within the setting tolerance (i.e., a range of values around the NTSP). The field setting is the NTSP with margin added. The field setting is conservative as or more conservative than the NTSP.

Addition of Channel Performance Surveillance Notes to TS Instrumentation Functions

The determination to include surveillance Notes for specific Functions in the TS is based on these Functions being automatic protective devices related to variables having significant safety functions as delineated by 10 CFR 50.36(c)(1)(ii)(A). There are two surveillance Notes added to the TS regarding the use of TS AVs for operability determinations and for assessing channel performance. Evaluation of Exclusion Criterion, (below) discusses the principles applied to determine which Functions are to be annotated with the two surveillance Notes. The following table provides a comparison of the Functions required to be annotated in NUREG-1431 and the VEGP TS.

Functions Required to be Annotated	
NUREG-1431	VEGP TS
Table 3.3.1-1, "Reactor Trip System Instrumentation" Functions	Table 3.3.1-1, "Reactor Trip System Instrumentation" Functions
2. Power Range Neutron Flux a. High b. Low	2. Power Range Neutron Flux a. High b. Low
3. Power Range Neutron Flux Rate a. High Positive Rate b. High Negative Rate	3. Power Range Neutron Flux High Positive Rate (High Negative rate not specified in VEGP TS)
4. Intermediate Range Neutron Flux	4. Intermediate Range Neutron Flux
5. Source Range Neutron Flux	5. Source Range Neutron Flux
6. Overtemperature ΔT	6. Overtemperature ΔT
7. Overpower ΔT	7. Overpower ΔT
8. Pressurizer Pressure a. Low b. High	8. Pressurizer Pressure a. Low b. High
9. Pressurizer Water Level - High	9. Pressurizer Water Level - High
10. Reactor Coolant Flow - Low	10. Reactor Coolant Flow – Low a. Single Loop b. Two Loop
12. Undervoltage RCPs	11. Undervoltage RCPs
13. Underfrequency RCPs	12. Underfrequency RCPs
14. Steam Generator (SG) Water Level - Low Low	13. Steam Generator (SG) Water Level - Low Low
15. SG Water Level - Low Coincident with Steam Flow/Feedwater Flow Mismatch	(Not specified in VEGP TS)
16. Turbine Trip	14. Turbine Trip

Enclosure 1

Basis for Proposed Change

Functions Required to be Annotated	
NUREG-1431	VEGP TS
a. Low Fluid Oil Pressure	a. Low Fluid Oil Pressure
<u>Table 3.3.2-1, "Engineered Safety Feature Actuation System Instrumentation" Functions</u>	<u>Table 3.3.2-1, "Engineered Safety Feature Actuation System Instrumentation" Functions</u>
1. Safety Injection c. Containment Pressure - High 1 d. Pressurizer Pressure - Low e. Steam Line Pressure (1) Low (2) High Differential Pressure Between Steam Lines f. High Steam Flow in Two Steam Lines Coincident with Tavg - Low Low g. High Steam Flow in Two Steam Lines Coincident with Steam Line Pressure - Low	1. Safety Injection c. Containment Pressure - High 1 d. Pressurizer Pressure - Low e. Steam Line Pressure – Low (Functions 1.e(2), 1.f and 1.g not specified in VEGP TS)
2. Containment Spray c. Containment Pressure High - 3 (High High) d. Containment Pressure High - 3 (Two Loop Plants)	2. Containment Spray c. Containment Pressure High – 3 (Function 2.d applicable only to two loop plants)
3. Containment Isolation b. Phase B Isolation (3) Containment Pressure High - 3 (High High)	(Function 3.b not specified in VEGP TS)
4. Steam Line Isolation c. Containment Pressure - High 2 d. Steam Line Pressure (1) Low (2) Negative Rate - High e. High Steam Flow in Two Steam Lines Coincident with Tavg - Low Low f. High Steam Flow in Two Steam Lines Coincident with Steam Line Pressure - Low g. High Steam Flow Coincident with Tavg - Low Low h. High High Steam Flow	4. Steam Line Isolation c. Containment Pressure - High 2 d. Steam Line Pressure (1) Low (2) Negative Rate - High (Functions 4.e, 4.f, 4.g, and 4.h not specified in VEGP TS)
5. Turbine Trip and Feedwater Isolation b. SG Water Level - High High (P-14)	5. Turbine Trip and Feedwater Isolation b. Low RCS Tavg c. SG Water Level - High High (P-14)
6. Auxiliary Feedwater c. SG Water Level - Low Low e. Loss of Offsite Power	6. Auxiliary Feedwater b. SG Water Level - Low Low

Functions Required to be Annotated	
NUREG-1431	VEGP TS
f. Undervoltage Reactor Coolant Pump g. Trip of all Main Feedwater Pumps h. Auxiliary Feedwater Pump Suction Transfer on Suction Pressure - Low	(Functions 6.e, 6.f and 6.h not specified in VEGP TS. Function 6.g – SR 3.3.2.6 modified by Note stating "Verification of setpoint not required for manual initiation functions.")
7. Automatic Switchover to Containment Sump b. Refueling Water Storage Tank (RWST) Level - Low Low c. RWST Level - Low Low Coincident with Containment Sump Level – High	7. Semi-Automatic Switchover to Containment Sump b. Refueling Water Storage Tank (RWST) Level - Low Low (Function 7.c not specified in VEGP TS)

Surveillance Note 1 states: "If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service."

Surveillance Note 2 states: "The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the surveillance procedures (field setting) to confirm channel performance. The methodologies used to determine the as-found and the as-left tolerances are specified in NMP-ES-033-006, Vogtle Setpoint Uncertainty Methodology and Scaling Instructions."

Setpoint calculations establish a NTSP based on the AL of the Safety Analysis to ensure that trips or protective actions will occur prior to exceeding the process parameter value assumed by the Safety Analysis calculations. These setpoint calculations also calculate an allowed limit of expected change (i.e., the as-found tolerance) between performances of the surveillance test for assessing the value of the setpoint setting. The least conservative as-found instrument setting value that a channel can have during calibration without requiring performing a TS remedial action is the setpoint AV. Discovering an instrument setting to be less conservative than the setting AV indicates that there may not be sufficient margin between the setting and the AL. TS channel calibrations, channel operational tests, and trip actuation operational tests (with setpoint verification) are performed to verify channels are operating within the assumptions of the setpoint methodology calculated NTSP and that channel settings have not exceeded the TS AVs. When the measured as-found setpoint is non-conservative with respect to the AV, the channel is inoperable and the actions identified in the TS must be taken.

The first surveillance Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the AV. Evaluation of channel performance will verify that the channel will continue to perform in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service.

Verifying that a trip setting is conservative with respect to the AV when a surveillance test is performed does not by itself verify the instrument channel will operate properly in the future. Although the channel was operable during the previous surveillance interval, if it is discovered that channel performance is outside the performance predicted by the plant setpoint calculations for the test interval, then the design basis for the channel may not be met, and proper operation of the channel for a future demand cannot be assured. Surveillance Note 1 formalizes the establishment of the appropriate as-found tolerance for each channel. This as-found tolerance is applied about the NTSP or about any other more conservative setpoint. The as-found tolerance ensures that channel operation is consistent with the assumptions or design inputs used in the setpoint calculations and establishes a high confidence of acceptable channel performance in the future. Because the as-found tolerance allows for both conservative and non-conservative deviation from the NTSP, changes in channel performance that are conservative with respect to the NTSP will also be detected and evaluated for possible effects on expected performance.

To implement surveillance Note 2 the as-left tolerance for some instrumentation Function channels is established to ensure that realistic values are used that do not mask instrument performance. Setpoint calculations assume that the instrument setpoint is left at the NTSP within a specific as-left tolerance (e.g., 25 psig ± 2 psig). A tolerance band is necessary because it is not possible to read and adjust a setting to an absolute value due to the readability and/or accuracy of the test instruments or the ability to adjust potentiometers. The as-left tolerance is normally as small as possible considering the tools and the objective to meet an as low as reasonably achievable calibration setting of the instruments. The as-left tolerance is considered in the setpoint calculation. Failure to set the actual plant trip setpoint to the NTSP (or more conservative than the NTSP), and within the as-left tolerance, would invalidate the assumptions in the setpoint calculation because any subsequent instrument drift would not start from the expected as-left setpoint.

Currently, TS Table 3.3.1-1 and TS Table 3.3.2-1 Nominal Trip Setpoint columns are modified by Notes that require the as-left condition for a channel to be within the calibration tolerance for that channel. In addition, the as-left condition may be more conservative than the specified NTSP. TS Table 3.3.1-1 and TS Table 3.3.2-1 footnotes 'n' and 'i,' respectively, state: "A channel is OPERABLE with an actual Trip Setpoint value outside its calibration tolerance band provided the Trip Setpoint value is conservative with respect to its associated Allowable Value and the channel is readjusted to within the established 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."

Incorporating the surveillance Note 1 of TSTF-493-A and deleting the existing Notes described above results in a more restrictive requirement in that an evaluation of the channel performance is required for the condition where the as-found setting for a channel setpoint is outside its as-found tolerance, but conservative with respect to the Allowable Value. In addition, incorporation of TSTF-493-A, surveillance Note 2 results in a more conservative requirement in that the allowance for the trip setpoints to be set more conservative than the NTSP explicitly requires that the as-found and as-left tolerances apply to the actual setpoint implemented in the surveillance procedures to confirm channel performance.

Evaluation of Exclusion Criteria

Exclusion criteria are used to determine which Functions do not need to receive the proposed footnotes, as discussed in TSTF-493-A, Revision 4. Instruments are excluded from the additional requirements when their functional purpose can be described as (1) a manual actuation circuit, (2) an automatic actuation logic circuit, or (3) an instrument function that derives input from contacts which have no associated sensor or adjustable device. Many permissives or interlocks are excluded if they derive input from a sensor or adjustable device that is tested as part of another TS function. The list of affected Functions identified in the table below was developed on the principle that all Functions in the affected TS are included unless one or more of the exclusion criterion apply. If the excluded functions differ from the list of excluded functions in TSTF-493-A, Revision 4, a justification for that deviation is provided.

Excluded Functions	
NUREG-1431	VEGP TS
<u>Table 3.3.1-1, "Reactor Trip System Instrumentation" Functions</u>	<u>Table 3.3.1-1, "Reactor Trip System Instrumentation" Functions</u>
1. Manual Reactor Trip – (Manual actuation excluded from surveillance Notes)	1. Manual Reactor Trip – (Manual actuation excluded from surveillance Notes)
11. Reactor Coolant Pump (RCP) Breaker Position – (Mechanical component excluded from surveillance Notes)	(Not specified in VEGP TS)
16. Turbine Trip b. Turbine Stop Valve Closure (Mechanical component excluded from surveillance Notes)	14. Turbine Trip b. Turbine Stop Valve Closure (Mechanical component excluded from surveillance Notes)
17. Safety Injection (SI) Input from Engineered Safety Feature Actuation System (ESFAS) (Automatic actuation logic circuit excluded from surveillance Notes)	15. Safety Injection (SI) Input from Engineered Safety Feature Actuation System (ESFAS) (Automatic actuation logic circuit excluded from surveillance Notes)

Excluded Functions	
NUREG-1431	VEGP TS
18. Reactor Trip System Interlocks is excluded from surveillance Notes if it derives input from a sensor or adjustable device that is tested as part of another TS function.)	16. Reactor Trip System Interlocks (Excluded from surveillance Notes. SNC confirms the interlocks derive input from sensors or adjustable devices that are tested as part of another TS Function.)
19. Reactor Trip Breakers (RTBs) (Mechanical component excluded from surveillance Notes)	17. Reactor Trip Breakers (RTBs) (Mechanical component excluded from surveillance Notes)
20. Reactor Trip Breaker Undervoltage and Shunt Trip Mechanisms (Mechanical component excluded from surveillance Notes)	18. Reactor Trip Breaker Undervoltage and Shunt Trip Mechanisms (Mechanical component excluded from surveillance Notes)
21. Automatic Trip Logic (Automatic actuation logic circuit excluded from surveillance Notes)	19. Automatic Trip Logic (Automatic actuation logic circuit excluded from surveillance Notes)
<u>Table 3.3.2-1, "Engineered Safety Feature Actuation System Instrumentation" Functions</u>	<u>Table 3.3.2-1, "Engineered Safety Feature Actuation System Instrumentation" Functions</u>
1. Safety Injection a. Manual Initiation (Manual actuation excluded from surveillance Notes) b. Automatic Actuation Logic and Actuation Relays (Automatic actuation logic circuit excluded from surveillance Notes)	1. Safety Injection a. Manual Initiation (Manual actuation excluded from surveillance Notes) b. Automatic Actuation Logic and Actuation Relays (Automatic actuation logic circuit excluded from surveillance Notes)
2. Containment Spray a. Manual Initiation - (Manual actuation excluded from surveillance Notes) b. Automatic Actuation Logic and Actuation Relays (Automatic actuation logic circuit excluded from surveillance Notes)	2. Containment Spray a. Manual Initiation - (Manual actuation excluded from surveillance Notes) b. Automatic Actuation Logic and Actuation Relays (Automatic actuation logic circuit excluded from surveillance Notes)

Excluded Functions	
NUREG-1431	VEGP TS
3. Containment Isolation a. Phase A Isolation (1) Manual Initiation (Manual actuation excluded from surveillance Notes) (2) Automatic Actuation Logic and Actuation Relays (Automatic actuation logic circuit excluded from surveillance Notes) (3) Safety Injection (Automatic actuation logic circuit excluded from surveillance Notes) b. Phase B Isolation (1) Manual Initiation (Manual actuation excluded from surveillance Notes) (2) Automatic Actuation Logic and Actuation Relays (Automatic actuation logic circuit excluded from surveillance Notes)	3. Containment Isolation a. Phase A Isolation (1) Manual Initiation (Manual actuation excluded from surveillance Notes) (2) Automatic Actuation Logic and Actuation Relays (Automatic actuation logic circuit excluded from surveillance Notes) (3) Safety Injection (Automatic actuation logic circuit excluded from surveillance Notes) (Function 3.b not specified in VEGP TS)
4. Steam Line Isolation a. Manual Initiation (Manual actuation excluded from surveillance Notes) b. Automatic Actuation Logic and Actuation Relays (Automatic actuation logic circuit excluded from surveillance Notes) g. High Steam Flow Coincident with Safety Injection (Automatic actuation logic circuit excluded from surveillance Notes) h. High High Steam Flow Coincident with Safety Injection (Automatic actuation logic circuit excluded from surveillance Notes)	4. Steam Line Isolation a. Manual Initiation (Manual actuation excluded from surveillance Notes) b. Automatic Actuation Logic and Actuation Relays (Automatic actuation logic circuit excluded from surveillance Notes) (Functions 4.g and 4.h not specified in VEGP TS)
5. Turbine Trip and Feedwater Isolation a. Automatic Actuation Logic and Actuation Relays (Automatic actuation logic circuit excluded from surveillance Notes) c. Safety Injection (Automatic actuation logic circuit excluded from surveillance Notes)	5. Turbine Trip and Feedwater Isolation a. Automatic Actuation Logic and Actuation Relays (Automatic actuation logic circuit excluded from surveillance Notes) d. Safety Injection (Automatic actuation logic circuit excluded from surveillance Notes)

Excluded Functions	
NUREG-1431	VEGP TS
6. Auxiliary Feedwater a. Automatic Actuation Logic and Actuation Relays (Solid State Protection System) (Automatic actuation logic circuit excluded from surveillance Notes) b. Automatic Actuation Logic and Actuation Relays (Balance of Plant ESFAS) (Automatic actuation logic circuit excluded from surveillance Notes) d. Safety Injection (Automatic actuation logic circuit excluded from surveillance Notes)	6. Auxiliary Feedwater a. Automatic Actuation Logic and Actuation Relays (Solid State Protection System) (Automatic actuation logic circuit excluded from surveillance Notes) c. Safety Injection (Automatic actuation logic circuit excluded from surveillance Notes) d. Trip of all Main Feedwater Pumps (SR 3.3.2.6 modified by Note stating "Verification of setpoint not required for manual initiation functions.")
7. Automatic Switchover to Containment Sump a. Automatic Actuation Logic and Actuation Relays (Automatic actuation logic circuit excluded from surveillance Notes) b. Refueling Water Storage Tank (RWST) Level - Low Low Coincident with Safety Injection (Automatic actuation logic circuit excluded from surveillance Notes) c. RWST Level - Low Low Coincident with Safety Injection (Automatic actuation logic circuit excluded from surveillance Notes)	7. Automatic Switchover to Containment Sump a. Automatic Actuation Logic and Actuation Relays (Automatic actuation logic circuit excluded from surveillance Notes) b. Refueling Water Storage Tank (RWST) Level - Low Low Coincident with Safety Injection (Automatic actuation logic circuit excluded from surveillance Notes)
8. ESFAS Interlocks excluded from surveillance Notes if it derives input from a sensor or adjustable device that is tested as part of another TS function.)	8. ESFAS Interlocks (Excluded from surveillance Notes. SR 3.3.2.9 states "Verification of setpoint not required". SNC confirms the interlocks derive input from sensors or adjustable devices that are tested as part of another TS Function.)

Administrative Changes

The proposed change corrects a typographical error on TS Table 3.3.1-1, page 9 of 9. The heading for Note 2 is revised from "Overtemperature Delta T," to "Overpower Delta T." The portion of the Note on page 9 of 9 is a continuation of Note 2 on page 8 of 9. This change is administrative in nature.

The proposed change deletes an expired allowance provided by TS Table 3.3.2-1, Note (j). Note (j) applied to Function 7b, Semi-automatic Switchover to Containment Sump, Refueling Water Storage Tank (RWST) Level-

Low Low and stated: "Two channels may be inoperable for a limited period of time during implementation of Amendments 151 and 132 until four Required Channels have been adjusted for each unit." Amendments 151 and 131 have been fully implemented on Vogtle Units 1 and 2, therefore, the Note serves no further purpose and the allowance is deleted as an administrative change.

The proposed changes are acceptable because: 1) the proposed NTSP and Allowable Value provide reasonable assurance that the SG Water Level High-High setpoint (P-14) (TS Table 3.3.2-1, Function 5c) will continue to perform its intended safety functions and 2) the proposed changes address NRC issues associated with NTSPs and Allowable Values by incorporation of TSTF-493-A, Revision 4, Option A.

4.0 Regulatory Evaluation

4.1 No Significant Hazards Consideration

The changes proposed by this license amendment application would revise the VEGP TS to correct a non-conservative instrument setpoint, incorporates the Nuclear Regulatory Commission (NRC) approved Technical Specification Task Force (TSTF) Traveler TSTF-493-A, Revision 4, "Clarify Application of Setpoint Methodology for LSSS Functions," Option A, corrects a typographical error in TS Table 3.3.1-1, Note 2, and makes an administrative change that deletes an expired allowance provided in TS Table 3.3.2-1, Note j.

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

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

Response: No.

The proposed change revises the Technical Specification (TS) Table 3.3.2-1, Function 5c, Steam Generator Water Level High-High, Nominal Trip Setpoint (NTSP) and Allowable Value. The Steam Generator Water Level High-High function is not an initiator to any accident previously evaluated. As such, the probability of an accident previously evaluated is not increased. The Steam Generator Water Level High-High function revised values continue to provide reasonable assurance that the Function 5c will continue to perform its intended safety functions. As a result, the proposed change will not increase the consequences of an accident previously evaluated.

The proposed change incorporates TSTF-493-A, Revision 4, Option A, to clarify the requirements for instrumentation NTSPs and Allowable Values, thus ensuring the instrumentation will actuate as assumed in the safety analyses. The affected instruments are not an assumed initiator of any accident previously evaluated. Surveillance tests are not initiators to any accident previously evaluated. As a result, the proposed change will not increase the probability of an accident previously evaluated. The systems and components required by the TS for which tests are revised are still required to be operable, meet the acceptance criteria for the surveillance requirements, and be capable of performing any mitigation function assumed in the accident analysis. As a result, the proposed change will not increase the consequences of an accident previously evaluated.

The proposed change corrects a typographical error and removes an allowance that is no longer applicable. These changes are strictly administrative in nature and have no effect on the probability or consequences of an accident previously evaluated.

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

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

Response: No.

The proposed change revises the TS Table 3.3.2-1, Function 5c, Steam Generator Water Level High-High, Nominal Trip Setpoint (NTSP) and Allowable Value. No new operational conditions beyond those currently allowed are introduced. This change is consistent with the safety analyses assumptions and current plant operating practices. This simply corrects the setpoint consistent with the accident analyses and therefore cannot create the possibility of a new or different kind of accident from any previously evaluated accident.

The proposed change incorporates TSTF-493-A, Revision 4, Option A, to clarify the requirements for instrumentation NTSPs and Allowable Values. The change does not alter assumptions made in the safety analysis but ensures that the instruments perform as assumed in the accident analysis. The proposed change is consistent with the safety analysis assumptions. Therefore, the proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

The proposed change corrects a typographical error and removes an allowance that is no longer applicable. These changes are strictly administrative in nature and, as such, cannot create the possibility of a new or different kind of accident from any previously evaluated.

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

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

Response: No.

The proposed change revises the TS Table 3.3.2-1, Function 5c, Steam Generator Water Level High-High, Nominal Trip Setpoint (NTSP) and Allowable Value. Function 5c protects against excessive feedwater flow in the event of a feedwater control system malfunction or an operator error. This change is consistent with the safety analyses assumptions and current plant operating practices. No new operational conditions beyond those currently allowed are created by these changes

The proposed change incorporates TSTF-493-A, Revision 4, Option A, to clarify the requirements for instrumentation NTSPs and Allowable Values. The proposed change adds test requirements that will assure that (1) technical specifications instrumentation Allowable Values will be limiting settings for assessing instrument channel operability and (2) will be conservatively determined so that evaluation of instrument performance history and the as-left tolerance requirements of the calibration procedures will not have an adverse effect on equipment operability. The testing methods and acceptance criteria for systems, structures, and components, specified in applicable codes and standards (or alternatives approved for use by the NRC) will continue to be met as described in the plant licensing basis including the updated Final Safety Analysis Report. The proposed change provides reasonable assurance that the instrumentation will continue to perform its intended safety functions. No new operational conditions beyond those currently allowed are created by these changes.

The proposed change corrects a typographical error and removes an allowance that is no longer applicable. These changes are strictly administrative in nature and, as such, have no effect on margin of safety.

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

Based on the above, it is concluded that the proposed amendment presents no significant hazards consideration under the standards set forth in 10 CFR 50.92 (c), and accordingly, a finding of "no significant hazards consideration" is justified.

4.2 Applicable Regulatory Requirements/Criteria

SNC has reviewed the NRC staff's model SE published as part of the Notice of Availability and concluded that the regulatory evaluation section is applicable to VEGP.

4.3 Precedent

The proposed change to the Steam Generator Water Level High-High Function is consistent with the guidelines of Nuclear Regulatory Commission (NRC) Administrative Letter 98-10, "Dispositioning of Technical Specifications That Are Insufficient to Assure Plant Safety." The adoption of TSTF-493-A is consistent with NRC approved Industry/Technical Specification Task Force (TSTF) Standard Technical Specification Change Traveler TSTF-493-A, Revision 4, "Clarify Application of Setpoint Methodology for LSSS Functions," Option A.

5.0 Environmental Consideration

The scope of the proposed amendment is limited to the categorical exclusion provided by 10 CFR 51.21(c)(10)(ii), "Changes recordkeeping, reporting, or administrative procedures or requirements." Therefore, no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

6.0 References

1. Industry/Technical Specification Task Force (TSTF) Standard Technical Specification Change Traveler TSTF-493-A, Revision 4 "Clarify Application of Setpoint Methodology for LSSS Functions."
2. Licensee Event Report 1-2005-002, "Inaccurate Steam Generator Water Level Setpoints Due to Design Calculation Error," dated May 27, 2005.
3. NRC Administrative Letter 98-10, "Dispositioning of Technical Specifications That Are Insufficient to Assure Plant Safety," dated December 29, 1998.

Vogtle Electric Generating Plant – Units 1 & 2
License Amendment Request for Steam Generator Water Level High-High Setpoint Change

Enclosure 2

Technical Specification Markup Pages

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

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT~~[n]~~
1. Manual Reactor Trip	1,2	2	B	SR 3.3.1.13	NA	NA
	3[a], 4[a], 5[a]	2	C	SR 3.3.1.13	NA	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[n][o] SR 3.3.1.11[n][o] SR 3.3.1.15	≤ 111.3% RTP	109% RTP
b. Low	1[b],2	4	E	SR 3.3.1.1 SR 3.3.1.8[n][o] SR 3.3.1.11[n][o] SR 3.3.1.15	≤ 27.3% RTP	25% RTP
3. Power Range Neutron Flux High Positive Rate	1,2	4	E	SR 3.3.1.7[n][o] SR 3.3.1.11[n][o]	≤ 6.3% RTP with time constant ≥ 2 sec	5% RTP with time constant ≥ 2 sec
4. Intermediate Range Neutron Flux	1[b], 2[c]	2	F,G	SR 3.3.1.1 SR 3.3.1.8[n][o] SR 3.3.1.11[n][o]	≤ 41.9% RTP	25% RTP
	2[d]	2	H	SR 3.3.1.1 SR 3.3.1.8[n][o] SR 3.3.1.11[n][o]	≤ 41.9% RTP	25% RTP

(continued)

(a) With Reactor Trip Breakers (RTBs) closed and Rod Control System capable of rod withdrawal.

(b) Below the P-10 (Power Range Neutron Flux) interlocks.

(c) Above the P-6 (Intermediate Range Neutron Flux) interlocks.

(d) Below the P-6 (Intermediate Range Neutron Flux) interlocks.

(n) ~~A channel is OPERABLE with an actual Trip Setpoint value outside its calibration tolerance band provided the Trip Setpoint value is conservative with respect to its associated Allowable Value and the channel is readjusted to within the established 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.~~If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(o) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The methodologies used to determine the as-found and the as-left tolerances are specified in NMP-ES-033-006, Vogtle Setpoint Uncertainty Methodology and Scaling Instructions.

Table 3.3.1-1 (page 2 of 9)
Reactor Trip System Instrumentation

	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT~~(n)~~
5.	Source Range Neutron Flux	$2^{(d)}$	2	I,J	SR 3.3.1.1 SR 3.3.1.8$^{(n)(o)}$ SR 3.3.1.11$^{(n)(o)}$	≤ 1.7 E5 cps	1.0 E5 cps
		$3^{(a)}, 4^{(a)}, 5^{(a)}$	2	J,K	SR 3.3.1.1 SR 3.3.1.7$^{(n)(o)}$ SR 3.3.1.11$^{(n)(o)}$	≤ 1.7 E5 cps	1.0 E5 cps
		$3^{(e)}, 4^{(e)}, 5^{(e)}$	1	L	SR 3.3.1.1 SR 3.3.1.11$^{(n)(o)}$	NA	NA
6.	Overtemperature ΔT	1,2	4	E	SR 3.3.1.1 SR 3.3.1.3 SR 3.3.1.6 SR 3.3.1.7$^{(n)(o)}$ SR 3.3.1.10$^{(n)(o)}$ SR 3.3.1.15	Refer to Note 1 (Page 3.3.1-20)	Refer to Note 1 (Page 3.3.1-20)
7.	Overpower ΔT	1,2	4	E	SR 3.3.1.1 SR 3.3.1.7$^{(n)(o)}$ SR 3.3.1.10$^{(n)(o)}$ SR 3.3.1.15	Refer to Note 2 (Page 3.3.1-21)	Refer to Note 2 (Page 3.3.1-21)

(continued)

(a) With RTBs closed and Rod Control System capable of rod withdrawal.

(d) Below the P-6 (Intermediate Range Neutron Flux) interlocks.

(e) With the RTBs open. In this condition, source range Function does not provide reactor trip but does provide input to the High Flux at Shutdown Alarm System (LCO 3.3.8) and indication.

(n) ~~A channel is OPERABLE with an actual Trip Setpoint value outside its calibration tolerance band provided the Trip Setpoint value is conservative with respect to its associated Allowable Value and the channel is readjusted to within the established 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~~If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(o) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The methodologies used to determine the as-found and the as-left tolerances are specified in NMP-ES-033-006, Vogtle Setpoint Uncertainty Methodology and Scaling Instructions.

Table 3.3.1-1 (page 3 of 9)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT(n)
8. Pressurizer Pressure						
a. Low	1(f)	4	M	SR 3.3.1.1 SR 3.3.1.7(n)(o) SR 3.3.1.10(n)(o) SR 3.3.1.15	≥ 1950 psig	1960(g) psig
b. High	1,2	4	E	SR 3.3.1.1 SR 3.3.1.7(n)(o) SR 3.3.1.10(n)(o) SR 3.3.1.15	≤ 2395 psig	2385 psig
9. Pressurizer Water Level - High	1(f)	3	M	SR 3.3.1.1 SR 3.3.1.7(n)(o) SR 3.3.1.10(n)(o)	≤ 93.9%	92%
10. Reactor Coolant Flow - Low						
a. Single Loop	1(h)	3 per loop	N	SR 3.3.1.1 SR 3.3.1.7(n)(o) SR 3.3.1.10(n)(o) SR 3.3.1.15	≥ 89.4%	90%
b. Two Loops	1(i)	3 per loop	M	SR 3.3.1.1 SR 3.3.1.7(n)(o) SR 3.3.1.10(n)(o) SR 3.3.1.15	≥ 89.4%	90%

(continued)

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

(g) Time constants utilized in the lead-lag controller for Pressurizer Pressure-Low are 10 seconds for lead and 1 second for lag.

(h) Above the P-8 (Power Range Neutron Flux) interlock.

(i) Above the P-7 (Low Power Reactor Trips Block) interlock and below the P-8 (Power Range Neutron Flux) interlock.

(n) ~~A channel is OPERABLE with an actual Trip Setpoint value outside its calibration tolerance band provided the Trip Setpoint value is conservative with respect to its associated Allowable Value and the channel is readjusted to within the established 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~~If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(o) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The methodologies used to determine the as-found and the as-left tolerances are specified in NMP-ES-033-006, Vogtle Setpoint Uncertainty Methodology and Scaling Instructions.

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

	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT~~(n)~~
11.	Undervoltage RCPs	1(f)	2 per bus	M	SR 3.3.1.9 SR 3.3.1.10<u>(n)(o)</u> SR 3.3.1.15	≥ 9481 V	9600 V
12.	Underfrequency RCPs	1(f)	2 per bus	M	SR 3.3.1.9 SR 3.3.1.10<u>(n)(o)</u> SR 3.3.1.15	≥ 57.1 Hz	57.3 Hz
13.	Steam Generator (SG) Water Level - Low Low	1,2	4 per SG	E	SR 3.3.1.1 SR 3.3.1.7<u>(n)(o)</u> SR 3.3.1.10<u>(n)(o)</u> SR 3.3.1.15	≥ 35.9%	37.8%

(continued)

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

(n) ~~A channel is OPERABLE with an actual Trip Setpoint value outside its calibration tolerance band provided the Trip Setpoint value is conservative with respect to its associated Allowable Value and the channel is readjusted to within the established 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~~<u>If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service</u>.

<u>(o) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The methodologies used to determine the as-found and the as-left tolerances are specified in NMP-ES-033-006, Vogtle Setpoint Uncertainty Methodology and Scaling Instructions.</u>

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

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT~~(n)~~
14. Turbine Trip						
a. Low Fluid Oil Pressure	1(j)	3	O	SR 3.3.1.10(n)(o) SR 3.3.1.16	≥ 500 psig	580 psig
b. Turbine Stop Valve Closure	1(j)	4	P	SR 3.3.1.10 SR 3.3.1.14	≥ 90% open	96.7% open
15. Safety Injection (SI) Input from Engineered Safety Feature Actuation System (ESFAS)	1,2	2 trains	Q	SR 3.3.1.13	NA	NA
16. Reactor Trip System Interlocks						
a. Intermediate Range Neutron Flux, P-6	2(d)	2	R	SR 3.3.1.11 SR 3.3.1.12	≥ 1.2E-5% RTP	2.0E-5% RTP
b. Low Power Reactor Trips Block, P-7	1	1 per train	S	SR 3.3.1.5	NA	NA
c. Power Range Neutron Flux, P-8	1	4	S	SR 3.3.1.11 SR 3.3.1.12	≤ 50.3% RTP	48% RTP
d. Power Range Neutron Flux, P-9	1	4	S	SR 3.3.1.11 SR 3.3.1.12	≤ 40.6% RTP	40% RTP
e. Power Range Neutron Flux, P-10 and input to P-7	1,2	4	R	SR 3.3.1.11 SR 3.3.1.12	(l,m)	(l,m)
f. Turbine Impulse Pressure, P-13	1	2	S	SR 3.3.1.10 SR 3.3.1.12	≤ 12.3% Impulse Pressure Equivalent turbine	10% Impulse Pressure Equivalent turbine

(continued)

(d) Below the P-6 (Intermediate Range Neutron Flux) interlocks.
(j) Above the P-9 (Power Range Neutron Flux) interlock.
(l) For the P-10 input to P-7, the Allowable Value is ≤ 12.3% RTP and the Nominal Trip Setpoint is 10% RTP.
(m) For the Power Range Neutron Flux, P-10, the Allowable Value is ≥ 7.7% RTP and the Nominal Trip Setpoint is 10% RTP.
(n) ~~A channel is OPERABLE with an actual Trip Setpoint value outside its calibration tolerance band provided the Trip Setpoint value is conservative with respect to its associated Allowable Value and the channel is readjusted to within the established 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.~~ If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(o) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The methodologies used to determine the as-found and the as-left tolerances are specified in NMP-ES-033-006, Vogtle Setpoint Uncertainty Methodology and Scaling Instructions.

Table 3.3.1-1 (page 6 of 9)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT~~(n)~~
17. Reactor Trip Breakers(k)	1,2	2 trains	T,V	SR 3.3.1.4	NA	NA
	3(a), 4(a), 5(a)	2 trains	C	SR 3.3.1.4	NA	NA
18. Reactor Trip Breaker Undervoltage and Shunt Trip Mechanisms	1,2	1 each per RTB	U,V	SR 3.3.1.4	NA	NA
	3(a), 4(a), 5(a)	1 each per RTB	C	SR 3.3.1.4	NA	NA
19. Automatic Trip Logic	1,2	2 trains	Q,V	SR 3.3.1.5	NA	NA
	3(a), 4(a), 5(a)	2 trains	C	SR 3.3.1.5	NA	NA

(a) With RTBs closed and Rod Control System capable of rod withdrawal.

(k) Including any reactor trip bypass breakers that are racked in and closed for bypassing an RTB.

~~(n) A channel is OPERABLE with an actual Trip Setpoint value outside its calibration tolerance band provided the Trip Setpoint value is conservative with respect to its associated Allowable Value and the channel is readjusted to within the established 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.~~

Table 3.3.1-1 (page 7 of 9)
Reactor Trip System Instrumentation

Note 1: Overtemperature Delta-T

The Allowable Value of each input to the Overtemperature Delta-T function as defined by the equation below shall not exceed its as-left value by more than the following:

(p)

(1) 0.5% ΔT span for the ΔT channel
(2) 0.5% ΔT span for the T_{avg} channel
(3) 0.5% ΔT span for the pressurizer pressure channel
(4) 0.5% ΔT span for the $f_1(AFD)$ channel

$$\left[100\frac{\Delta T}{\Delta T_0}\frac{\{1+\tau_1 s\}}{\{1+\tau_2 s\}}\frac{1}{\{1+\tau_3 s\}}\right] \le \left[K_1 - K_2\frac{\{1+\tau_4 s\}}{\{1+\tau_5 s\}}\left[T\frac{1}{\{1+\tau_6 s\}} - T'\right]^{(\theta)} - K_3\{P' - P\} - f_1(AFD)\right]$$

Where:	ΔT	measured loop specific RCS differential temperature, degrees F
	ΔT_0	indicated loop specific RCS differential at RTP, degrees F
	$\frac{1+\tau_1 s}{1+\tau_2 s}$	lead-lag compensator on measured differential temperature
	τ_1, τ_2	time constants utilized in lead-lag compensator for differential temperature: τ_1 = 0 seconds, τ_2 = 0 seconds
	$\frac{1}{1+\tau_3 s}$	lag compensator on measured differential temperature
	τ_3	time constant utilized in lag compensator for differential temperature, ≤ 6 seconds
	K_1	fundamental setpoint, ≤ 114.9% RTP
	K_2	modifier for temperature, = 2.24% RTP per degree F
	$\frac{1+\tau_4 s}{1+\tau_5 s}$	lead-lag compensator on dynamic temperature compensation
	τ_4, τ_5	time constants utilized in lead-lag compensator for temperature compensation: τ_4 ≥ 28 seconds, τ_5 ≤ 4 seconds
	T	measured loop specific RCS average temperature, degrees F
	$\frac{1}{1+\tau_6 s}$	lag compensator on measured average temperature
	τ_6	time constant utilized in lag compensator for average temperature, ≤ 6 seconds
	T'	indicated loop specific RCS average temperature at RTP, ≤ 588.4 degrees F
	K_3	modifier for pressure, = 0.177% RTP per psig
	P	measured RCS pressurizer pressure, psig
	P'	reference pressure, ≥ 2235 psig
	s	Laplace transform variable, inverse seconds

Table 3.3.1-1 (page 8 of 9)
Reactor Trip System Instrumentation

Note 1: Overtemperature Delta-T (continued)

f_1(AFD) modifier for Axial Flux Difference (AFD):

1. for AFD between -23% and +10%, = 0% RTP
2. for each % AFD is below -23%, the trip setpoint shall be reduced by 3.3% RTP
3. for each % AFD is above +10%, the trip setpoint shall be reduced by 1.95% RTP

(ep) The compensated temperature difference $\frac{\{1 + \tau_4 s\}}{\{1 + \tau_5 s\}}\left[T\frac{1}{\{1 + \tau_6 s\}} - T'\right]$ shall be no more negative than 3 degrees F.

Note 2: Overpower Delta-T

The Allowable Value of each input to the Overpower Delta-T function as defined by the equation below shall not exceed its as-left value by more than the following:

(1) 0.5% ΔT span for the ΔT channel
(2) 0.5% ΔT span for the T_{avg} channel

$$\left[100\frac{\Delta T}{\Delta T_0}\frac{\{1 + \tau_1 s\}}{\{1 + \tau_2 s\}}\frac{1}{\{1 + \tau_3 s\}}\right] \leq \left[K_4 - \left[K_5\frac{\{\tau_7 s\}}{\{1 + \tau_7 s\}}\frac{1}{\{1 + \tau_6 s\}}T\right] - K_6\left[T\frac{1}{\{1 + \tau_6\}} - T''\right] - f_2(\text{AFD})\right]$$

Where:

ΔT measured loop specific RCS differential temperature, degrees F

ΔT_0 indicated loop specific RCS differential at RTP, degrees F

$\frac{1+\tau_1 s}{1+\tau_2 s}$ lead-lag compensator on measured differential temperature

τ_1, τ_2 time constants utilized in lead-lag compensator for differential temperature: τ_1 = 0 seconds, τ_2 = 0 seconds

$\frac{1}{1+\tau_3 s}$ lag compensator on measured differential temperature

τ_3 time constant utilized in lag compensator for differential temperature, ≤ 6 seconds

K_4 fundamental setpoint, ≤ 110% RTP

K_5 modifier for temperature change: ≥ 2% RTP per degree F for increasing temperature, ≥ 0% RTP per degree F for decreasing temperature

$\frac{\tau_7 s}{1+\tau_7 s}$ rate-lag compensator on dynamic temperature compensation

τ_7 time constant utilized in rate-lag compensator for temperature compensation, ≥ 10 seconds

T measured loop specific RCS average temperature, degrees F

$\frac{1}{1+\tau_6 s}$ lag compensator on measured average temperature

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

Note 2: ~~Overtemperature~~ Overpower Delta-T (continued)

τ_6	time constant utilized in lag compensator for average temperature, ≤ 6 seconds
K_6	modifier for temperature: ≥ 0.244% RTP per degree F for T > T″, = 0% RTP for T ≤ T″
T″	indicated loop specific RCS average temperature at RTP, ≤ 588.4 degrees F
s	Laplace transform variable, inverse seconds
f_2(AFD)	modifier for Axial Flux Difference (AFD), = 0% RTP for all AFD

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

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT[i]
1. Safety Injection						
a. Manual Initiation	1,2,3,4	2	B	SR 3.3.2.6	NA	NA
b. Automatic Actuation Logic and Actuation Relays	1,2,3,4	2	C	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5	NA	NA
c. Containment Pressure - High 1	1,2,3	3	D	SR 3.3.2.1 SR 3.3.2.4[i][j] SR 3.3.2.7[i][j] SR 3.3.2.8	≤ 4.4 psig	3.8 psig
d. Pressurizer Pressure - Low	1,2,3[a]	4	D	SR 3.3.2.1 SR 3.3.2.4[i][j] SR 3.3.2.7[i][j] SR 3.3.2.8	≥ 1856 psig	1870 psig
e. Steam Line Pressure - Low	1,2,3[a]	3 per steam line	D	SR 3.3.2.1 SR 3.3.2.4[i][j] SR 3.3.2.7[i][j] SR 3.3.2.8	≥ 570[b] psig	585[b] psig

(continued)

(a) Above the P-11 (Pressurizer Pressure) interlock.

(b) Time constants used in the lead/lag controller are $t_1 \geq 50$ seconds and $t_2 \leq 5$ seconds.

(i) ~~A channel is OPERABLE with an actual Trip Setpoint value outside its calibration tolerance band provided the Trip Setpoint value is conservative with respect to its associated Allowable Value and the channel is readjusted to within the established 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~~If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(j) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The methodologies used to determine the as-found and the as-left tolerances are specified in NMP-ES-033-006, Vogtle Setpoint Uncertainty Methodology and Scaling Instructions.

Table 3.3.2-1 (page 2 of 7)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT~~(i)~~
2. Containment Spray						
a. Manual Initiation	1,2,3,4	2	B	SR 3.3.2.6	NA	NA
b. Automatic Actuation Logic and Actuation Relays	1,2,3,4	2	C	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5	NA	NA
c. Containment Pressure						
High - 3	1,2,3	4	E	SR 3.3.2.1 SR 3.3.2.4(i)(j) SR 3.3.2.7(i)(j) SR 3.3.2.8	≤ 22.4 psig	21.5 psig

(continued)

(i) ~~A channel is OPERABLE with an actual Trip Setpoint value outside its calibration tolerance band provided the Trip Setpoint value is conservative with respect to its associated Allowable Value and the channel is readjusted to within the established 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~~If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(j) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The methodologies used to determine the as-found and the as-left tolerances are specified in NMP-ES-033-006, Vogtle Setpoint Uncertainty Methodology and Scaling Instructions.

Table 3.3.2-1 (page 3 of 7)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT~~(i)~~
3. Phase A Containment Isolation						
(a) Manual Initiation	1,2,3,4	2	B	SR 3.3.2.6	NA	NA
(b) Automatic Actuation Logic and Actuation Relays	1,2,3,4	2 trains	C	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5	NA	NA
(c) Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					
4. Steam Line Isolation						
a. Manual Initiation	1,2(c),3(c)	2	F	SR 3.3.2.6	NA	NA
b. Automatic Actuation Logic and Actuation Relays	1,2(c),3(c)	2	G	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5	NA	NA

(continued)

(c) Except when one main steam isolation valve and associated bypass isolation valve per steam line is closed.

~~(i) A channel is OPERABLE with an actual Trip Setpoint value outside its calibration tolerance band provided the Trip Setpoint value is conservative with respect to its associated Allowable Value and the channel is readjusted to within the established 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.~~

Table 3.3.2-1 (page 4 of 7)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT~~(i)~~
4. Steam Line Isolation (continued)						
c. Containment Pressure - High 2	1,2(c), 3(c)	3	D	SR 3.3.2.1 SR 3.3.2.4(i)(j) SR 3.3.2.7(i)(j) SR 3.3.2.8	≤ 15.4 psig	14.5 psig
d. Steam Line Pressure						
(1) Low	1,2(c), 3(a)(c)	3 per steam line	D	SR 3.3.2.1 SR 3.3.2.4(i)(j) SR 3.3.2.7(i)(j) SR 3.3.2.8	≥ 570 (b) psig	585 (b) psig
(2) Negative Rate - High	3(d)(c)	3 per steam line	D	SR 3.3.2.1 SR 3.3.2.4(i)(j) SR 3.3.2.7(i)(j) SR 3.3.2.8	≤ 125 (e) psi/sec	100 (e) psi/sec

(continued)

(a) Above the P-11 (Pressurizer Pressure) interlock.

(b) Time constants used in the lead/lag controller are $t_1 \geq 50$ seconds and $t_2 \leq 5$ seconds.

(c) Except when one main steam isolation valve and associated bypass isolation valve per steam line is closed.

(d) Below the P-11 (Pressurizer Pressure) interlock.

(e) Time constant utilized in the rate/lag controller is ≥ 50 seconds.

(i) ~~A channel is OPERABLE with an actual Trip Setpoint value outside its calibration tolerance band provided the Trip Setpoint value is conservative with respect to its associated Allowable Value and the channel is readjusted to within the established 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.~~If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(j) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The methodologies used to determine the as-found and the as-left tolerances are specified in NMP-ES-033-006, Vogtle Setpoint Uncertainty Methodology and Scaling Instructions.

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

FUNCTION			APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT[~~(i)~~]
5.	Turbine Trip and Feedwater Isolation							
	a.	Automatic Actuation Logic and Actuation Relays	1,2[(f)]	2 trains	H	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5	NA	NA
	b.	Low RCS T_{avg}	1,2[(f)]	4	I	SR 3.3.2.1 SR 3.3.2.4[(i)(j)] SR 3.3.2.7[(i)(j)]	≥ 561.5 °F	564 °F
		Coincident with Reactor Trip, P-4	Refer to Function 8a for all P-4 requirements.					
	c.	SG Water Level-High High (P-14)	1,2[(f)]	4 per SG	I	SR 3.3.2.1 SR 3.3.2.4[(i)(j)] SR 3.3.2.7[(i)(j)] SR 3.3.2.8	≤ ~~87.9~~82.5%	~~86.0~~82.0%
	d.	Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					
6.	Auxiliary Feedwater							
	a.	Automatic Actuation Logic and Actuation Relays	1,2,3	2 trains	G	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5	NA	NA
	b.	SG Water Level-Low Low	1,2,3	4 per SG	D	SR 3.3.2.1 SR 3.3.2.4[(i)(j)] SR 3.3.2.7[(i)(j)] SR 3.3.2.8	≥ 35.9%	37.8%

(continued)

(f) Except when one MFIV or MFRV, and its associated bypass valve per feedwater line is closed and deactivated or isolated by a closed manual valve.

(i) ~~A channel is OPERABLE with an actual Trip Setpoint value outside its calibration tolerance band provided the Trip Setpoint value is conservative with respect to its associated Allowable Value and the channel is readjusted to within the established 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~~If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(j) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The methodologies used to determine the as-found and the as-left tolerances are specified in NMP-ES-033-006, Vogtle Setpoint Uncertainty Methodology and Scaling Instructions.

Table 3.3.2-1 (page 6 of 7)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT~~(i)~~
6. Auxiliary Feedwater (continued)						
c. Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					
d. Trip of all Main Feedwater Pumps	$1,2^{(g)}$	1 per pump	J	SR 3.3.2.6	NA	NA
7. Semi-automatic Switchover to Containment Sump						
a. Automatic Actuation Logic and Actuation Relays	$1,2,3,4^{(h)}$	2	C	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5	NA	NA
b. Refueling Water Storage Tank (RWST) Level-Low Low~~(i)~~	1,2,3,4	4	K	SR 3.3.2.1 SR 3.3.2.4(i)(j) SR 3.3.2.7(i)(j) SR 3.3.2.8	≤ 216.6 in. and ≥ 210.4 in.	213.5 in.
Coincident with Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					

(continued)

(g) When the Main Feedwater System is operating to supply the SGs.

(h) In MODE 4, only 1 train is required to be OPERABLE to support semi-automatic switchover for the RHR pump that is required to be OPERABLE in accordance with Specification 3.5.3, ECCS-shutdown.

(i) ~~A channel is OPERABLE with an actual Trip Setpoint value outside its calibration tolerance band provided the Trip Setpoint value is conservative with respect to its associated Allowable Value and the channel is readjusted to within the established 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~~If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(j) ~~Two channels may be inoperable for a limited period of time during implementation of Amendments 151 and 132 until four Required Channels have been adjusted for each unit.~~ The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The methodologies used to determine the as-found and the as-left tolerances are specified in NMP-ES-033-006, Vogtle Setpoint Uncertainty Methodology and Scaling Instructions.

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

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT~~(i)~~
8. ESFAS Interlocks						
a. Reactor Trip, P-4	1,2,3	1 per train, 2 trains	F	SR 3.3.2.9	NA	NA
b. Pressurizer Pressure, P-11	1,2,3	3	L	SR 3.3.2.4 SR 3.3.2.7	≤ 2010 psig	2000 psig

~~(i) A channel is OPERABLE with an actual Trip Setpoint value outside its calibration tolerance band provided the Trip Setpoint value is conservative with respect to its associated Allowable Value and the channel is readjusted to within the established 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.~~

Vogtle Electric Generating Plant – Units 1 & 2
License Amendment Request for Steam Generator Water Level High-High Setpoint Change

Enclosure 3

Clean Typed Technical Specification Pages

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

	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
1.	Manual Reactor Trip	1,2	2	B	SR 3.3.1.13	NA	NA
		3(a), 4(a), 5(a)	2	C	SR 3.3.1.13	NA	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(n)(o) SR 3.3.1.11(n)(o) SR 3.3.1.15	≤ 111.3% RTP	109% RTP
	b. Low	1(b),2	4	E	SR 3.3.1.1 SR 3.3.1.8(n)(o) SR 3.3.1.11(n)(o) SR 3.3.1.15	≤ 27.3% RTP	25% RTP
3.	Power Range Neutron Flux High Positive Rate	1,2	4	E	SR 3.3.1.7(n)(o) SR 3.3.1.11(n)(o) SR 3.3.1.15	≤ 6.3% RTP with time constant ≥ 2 sec	5% RTP with time constant ≥ 2 sec
4.	Intermediate Range Neutron Flux	1(b), 2(c)	2	F,G	SR 3.3.1.1 SR 3.3.1.8(n)(o) SR 3.3.1.11(n)(o)	≤ 41.9% RTP	25% RTP
		2(d)	2	H	SR 3.3.1.1 SR 3.3.1.8(n)(o) SR 3.3.1.11(n)(o)	≤ 41.9% RTP	25% RTP

(continued)

(a) With Reactor Trip Breakers (RTBs) closed and Rod Control System capable of rod withdrawal.

(b) Below the P-10 (Power Range Neutron Flux) interlocks.

(c) Above the P-6 (Intermediate Range Neutron Flux) interlocks.

(d) Below the P-6 (Intermediate Range Neutron Flux) interlocks.

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

(o) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The methodologies used to determine the as-found and the as-left tolerances are specified in NMP-ES-033-006, Vogtle Setpoint Uncertainty Methodology and Scaling Instructions.

Table 3.3.1-1 (page 2 of 9)
Reactor Trip System Instrumentation

	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
5.	Source Range Neutron Flux	2(d)	2	I,J	SR 3.3.1.1 SR 3.3.1.8(n)(o) SR 3.3.1.11(n)(o)	≤ 1.7 E5 cps	1.0 E5 cps
		3(a), 4(a), 5(a)	2	J,K	SR 3.3.1.1 SR 3.3.1.7(n)(o) SR 3.3.1.11(n)(o)	≤ 1.7 E5 cps	1.0 E5 cps
		3(e), 4(e), 5(e)	1	L	SR 3.3.1.1 SR 3.3.1.11(n)(o)	NA	NA
6.	Overtemperature ΔT	1,2	4	E	SR 3.3.1.1 SR 3.3.1.3 SR 3.3.1.6 SR 3.3.1.7(n)(o) SR 3.3.1.10(n)(o) SR 3.3.1.15	Refer to Note 1 (Page 3.3.1-20)	Refer to Note 1 (Page 3.3.1-20)
7.	Overpower ΔT	1,2	4	E	SR 3.3.1.1 SR 3.3.1.7(n)(o) SR 3.3.1.10(n)(o) SR 3.3.1.15	Refer to Note 2 (Page 3.3.1-21)	Refer to Note 2 (Page 3.3.1-21)

(continued)

(a) With RTBs closed and Rod Control System capable of rod withdrawal.

(d) Below the P-6 (Intermediate Range Neutron Flux) interlocks.

(e) With the RTBs open. In this condition, source range Function does not provide reactor trip but does provide input to the High Flux at Shutdown Alarm System (LCO 3.3.8) and indication.

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

(o) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The methodologies used to determine the as-found and the as-left tolerances are specified in NMP-ES-033-006, Vogtle Setpoint Uncertainty Methodology and Scaling Instructions.

Table 3.3.1-1 (page 3 of 9)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
8. Pressurizer Pressure						
a. Low	1(f)	4	M	SR 3.3.1.1 SR 3.3.1.7(n)(o) SR 3.3.1.10(n)(o) SR 3.3.1.15	≥ 1950 psig	1960(g) psig
b. High	1,2	4	E	SR 3.3.1.1 SR 3.3.1.7(n)(o) SR 3.3.1.10(n)(o) SR 3.3.1.15	≤ 2395 psig	2385 psig
9. Pressurizer Water Level - High	1(f)	3	M	SR 3.3.1.1 SR 3.3.1.7(n)(o) SR 3.3.1.10(n)(o)	≤ 93.9%	92%
10. Reactor Coolant Flow - Low						
a. Single Loop	1(h)	3 per loop	N	SR 3.3.1.1 SR 3.3.1.7(n)(o) SR 3.3.1.10(n)(o) SR 3.3.1.15	≥ 89.4%	90%
b. Two Loops	1(i)	3 per loop	M	SR 3.3.1.1 SR 3.3.1.7(n)(o) SR 3.3.1.10(n)(o) SR 3.3.1.15	≥ 89.4%	90%

(continued)

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

(g) Time constants utilized in the lead-lag controller for Pressurizer Pressure-Low are 10 seconds for lead and 1 second for lag.

(h) Above the P-8 (Power Range Neutron Flux) interlock.

(i) Above the P-7 (Low Power Reactor Trips Block) interlock and below the P-8 (Power Range Neutron Flux) interlock.

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

(o) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The methodologies used to determine the as-found and the as-left tolerances are specified in NMP-ES-033-006, Vogtle Setpoint Uncertainty Methodology and Scaling Instructions.

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

	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
11.	Undervoltage RCPs	1(f)	2 per bus	M	SR 3.3.1.9 SR 3.3.1.10(n)(o) SR 3.3.1.15	≥ 9481 V	9600 V
12.	Underfrequency RCPs	1(f)	2 per bus	M	SR 3.3.1.9 SR 3.3.1.10(n)(o) SR 3.3.1.15	≥ 57.1 Hz	57.3 Hz
13.	Steam Generator (SG) Water Level - Low Low	1,2	4 per SG	E	SR 3.3.1.1 SR 3.3.1.7(n)(o) SR 3.3.1.10(n)(o) SR 3.3.1.15	≥ 35.9%	37.8%

(continued)

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

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

(o) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The methodologies used to determine the as-found and the as-left tolerances are specified in NMP-ES-033-006, Vogtle Setpoint Uncertainty Methodology and Scaling Instructions.

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

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
14. Turbine Trip						
a. Low Fluid Oil Pressure	1(j)	3	O	SR 3.3.1.10(n)(o) SR 3.3.1.16	≥ 500 psig	580 psig
b. Turbine Stop Valve Closure	1(j)	4	P	SR 3.3.1.10 SR 3.3.1.14	≥ 90% open	96.7% open
15. Safety Injection (SI) Input from Engineered Safety Feature Actuation System (ESFAS)	1,2	2 trains	Q	SR 3.3.1.13	NA	NA
16. Reactor Trip System Interlocks						
a. Intermediate Range Neutron Flux, P-6	2(d)	2	R	SR 3.3.1.11 SR 3.3.1.12	≥ 1.2E-5% RTP	2.0E-5% RTP
b. Low Power Reactor Trips Block, P-7	1	1 per train	S	SR 3.3.1.5	NA	NA
c. Power Range Neutron Flux, P-8	1	4	S	SR 3.3.1.11 SR 3.3.1.12	≤ 50.3% RTP	48% RTP
d. Power Range Neutron Flux, P-9	1	4	S	SR 3.3.1.11 SR 3.3.1.12	≤ 40.6% RTP	40% RTP
e. Power Range Neutron Flux, P-10 and input to P-7	1,2	4	R	SR 3.3.1.11 SR 3.3.1.12	(l,m)	(l,m)
f. Turbine Impulse Pressure, P-13	1	2	S	SR 3.3.1.10 SR 3.3.1.12	≤ 12.3% Impulse Pressure Equivalent turbine	10% Impulse Pressure Equivalent turbine

(continued)

(d) Below the P-6 (Intermediate Range Neutron Flux) interlocks.
(j) Above the P-9 (Power Range Neutron Flux) interlock.
(l) For the P-10 input to P-7, the Allowable Value is ≤ 12.3% RTP and the Nominal Trip Setpoint is 10% RTP.
(m) For the Power Range Neutron Flux, P-10, the Allowable Value is ≥ 7.7% RTP and the Nominal Trip Setpoint is 10% RTP.
(n) If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.
(o) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The methodologies used to determine the as-found and the as-left tolerances are specified in NMP-ES-033-006, Vogtle Setpoint Uncertainty Methodology and Scaling Instructions.

Table 3.3.1-1 (page 6 of 9)
Reactor Trip System Instrumentation

	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
17.	Reactor Trip Breakers[k]	1,2	2 trains	T,V	SR 3.3.1.4	NA	NA
		3[a], 4[a], 5[a]	2 trains	C	SR 3.3.1.4	NA	NA
18.	Reactor Trip Breaker Undervoltage and Shunt Trip Mechanisms	1,2	1 each per RTB	U,V	SR 3.3.1.4	NA	NA
		3[a], 4[a], 5[a]	1 each per RTB	C	SR 3.3.1.4	NA	NA
19.	Automatic Trip Logic	1,2	2 trains	Q,V	SR 3.3.1.5	NA	NA
		3[a], 4[a], 5[a]	2 trains	C	SR 3.3.1.5	NA	NA

(a) With RTBs closed and Rod Control System capable of rod withdrawal.

(k) Including any reactor trip bypass breakers that are racked in and closed for bypassing an RTB.

Table 3.3.1-1 (page 7 of 9)
Reactor Trip System Instrumentation

Note 1: Overtemperature Delta-T

The Allowable Value of each input to the Overtemperature Delta-T function as defined by the equation below shall not exceed its as-left value by more than the following:

(1) 0.5% ΔT span for the ΔT channel
(2) 0.5% ΔT span for the T_{avg} channel
(3) 0.5% ΔT span for the pressurizer pressure channel
(4) 0.5% ΔT span for the f_1(AFD) channel

$$\left[100\frac{\Delta T}{\Delta T_0}\frac{\{1+\tau_1 s\}}{\{1+\tau_2 s\}}\frac{1}{\{1+\tau_3 s\}}\right] \le \left[K_1 - K_2\frac{\{1+\tau_4 s\}}{\{1+\tau_5 s\}}\left[T\frac{1}{\{1+\tau_6 s\}} - T'\right]^{(p\ )} - K_3\{P' - P\} - f_1(AFD)\right]$$

Where:	ΔT	measured loop specific RCS differential temperature, degrees F
	ΔT_0	indicated loop specific RCS differential at RTP, degrees F
	$\frac{1+\tau_1 s}{1+\tau_2 s}$	lead-lag compensator on measured differential temperature
	τ_1, τ_2	time constants utilized in lead-lag compensator for differential temperature: τ_1 = 0 seconds, τ_2 = 0 seconds
	$\frac{1}{1+\tau_3 s}$	lag compensator on measured differential temperature
	τ_3	time constant utilized in lag compensator for differential temperature, ≤ 6 seconds
	K_1	fundamental setpoint, ≤ 114.9% RTP
	K_2	modifier for temperature, = 2.24% RTP per degree F
	$\frac{1+\tau_4 s}{1+\tau_5 s}$	lead-lag compensator on dynamic temperature compensation
	τ_4, τ_5	time constants utilized in lead-lag compensator for temperature compensation: τ_4 ≥ 28 seconds, τ_5 ≤ 4 seconds
	T	measured loop specific RCS average temperature, degrees F
	$\frac{1}{1+\tau_6 s}$	lag compensator on measured average temperature
	τ_6	time constant utilized in lag compensator for average temperature, ≤ 6 seconds
	T′	indicated loop specific RCS average temperature at RTP, ≤ 588.4 degrees F
	K_3	modifier for pressure, = 0.177% RTP per psig
	P	measured RCS pressurizer pressure, psig
	P′	reference pressure, ≥ 2235 psig
	s	Laplace transform variable, inverse seconds

Table 3.3.1-1 (page 8 of 9)
Reactor Trip System Instrumentation

Note 1: Overtemperature Delta-T (continued)

f_1(AFD) modifier for Axial Flux Difference (AFD):

1. for AFD between -23% and +10%, = 0% RTP
2. for each % AFD is below -23%, the trip setpoint shall be reduced by 3.3% RTP
3. for each % AFD is above +10%, the trip setpoint shall be reduced by 1.95% RTP

(p) The compensated temperature difference $\frac{\{1 + \tau_4 s\}}{\{1 + \tau_5 s\}}\left[T\frac{1}{\{1 + \tau_6 s\}} - T'\right]$ shall be no more negative than 3 degrees F.

Note 2: Overpower Delta-T

The Allowable Value of each input to the Overpower Delta-T function as defined by the equation below shall not exceed its as-left value by more than the following:

(1) 0.5% ΔT span for the ΔT channel
(2) 0.5% ΔT span for the T_{avg} channel

$$\left[100\frac{\Delta T}{\Delta T_0}\frac{\{1 + \tau_1 s\}}{\{1 + \tau_2 s\}}\frac{1}{\{1+\tau_3 s\}}\right] \leq \left[K_4 - \left[K_5\frac{\{\tau_7 s\}}{\{1 + \tau_7 s\}}\frac{1}{\{1+\tau_6 s\}}T\right] - K_6\left[T\frac{1}{\{1 + \tau_6\}} - T''\right] - f_2(\mathrm{AFD})\right]$$

Where:

ΔT	measured loop specific RCS differential temperature, degrees F
ΔT_0	indicated loop specific RCS differential at RTP, degrees F
$\frac{1+\tau_1 s}{1+\tau_2 s}$	lead-lag compensator on measured differential temperature
τ_1, τ_2	time constants utilized in lead-lag compensator for differential temperature: τ_1 = 0 seconds, τ_2 = 0 seconds
$\frac{1}{1+\tau_3 s}$	lag compensator on measured differential temperature
τ_3	time constant utilized in lag compensator for differential temperature, $\leq$ 6 seconds
K_4	fundamental setpoint, $\leq$ 110% RTP
K_5	modifier for temperature change: $\geq$ 2% RTP per degree F for increasing temperature, $\geq$ 0% RTP per degree F for decreasing temperature
$\frac{\tau_7 s}{1+\tau_7 s}$	rate-lag compensator on dynamic temperature compensation
τ_7	time constant utilized in rate-lag compensator for temperature compensation, $\geq$ 10 seconds
T	measured loop specific RCS average temperature, degrees F
$\frac{1}{1+\tau_6 s}$	lag compensator on measured average temperature

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

Note 2: Overpower Delta-T (continued)

τ_6	time constant utilized in lag compensator for average temperature, ≤ 6 seconds
K_6	modifier for temperature: ≥ 0.244% RTP per degree F for T > T″, = 0% RTP for T ≤ T″
T″	indicated loop specific RCS average temperature at RTP, ≤ 588.4 degrees F
s	Laplace transform variable, inverse seconds
f_2(AFD)	modifier for Axial Flux Difference (AFD), = 0% RTP for all AFD

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

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
1. Safety Injection						
a. Manual Initiation	1,2,3,4	2	B	SR 3.3.2.6	NA	NA
b. Automatic Actuation Logic and Actuation Relays	1,2,3,4	2	C	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5	NA	NA
c. Containment Pressure - High 1	1,2,3	3	D	SR 3.3.2.1 SR 3.3.2.4[(i)(j)] SR 3.3.2.7[(i)(j)] SR 3.3.2.8	≤ 4.4 psig	3.8 psig
d. Pressurizer Pressure - Low	1,2,3[(a)]	4	D	SR 3.3.2.1 SR 3.3.2.4[(i)(j)] SR 3.3.2.7[(i)(j)] SR 3.3.2.8	≥ 1856 psig	1870 psig
e. Steam Line Pressure - Low	1,2,3[(a)]	3 per steam line	D	SR 3.3.2.1 SR 3.3.2.4[(i)(j)] SR 3.3.2.7[(i)(j)] SR 3.3.2.8	≥ 570[(b)] psig	585[(b)] psig

(continued)

(a) Above the P-11 (Pressurizer Pressure) interlock.

(b) Time constants used in the lead/lag controller are $t_1 \geq 50$ seconds and $t_2 \leq 5$ seconds.

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

(j) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The methodologies used to determine the as-found and the as-left tolerances are specified in NMP-ES-033-006, Vogtle Setpoint Uncertainty Methodology and Scaling Instructions.

Table 3.3.2-1 (page 2 of 7)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
2. Containment Spray						
a. Manual Initiation	1,2,3,4	2	B	SR 3.3.2.6	NA	NA
b. Automatic Actuation Logic and Actuation Relays	1,2,3,4	2	C	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5	NA	NA
c. Containment Pressure						
High - 3	1,2,3	4	E	SR 3.3.2.1 SR 3.3.2.4(i)(j) SR 3.3.2.7(i)(j) SR 3.3.2.8	≤ 22.4 psig	21.5 psig

(continued)

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

(j) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The methodologies used to determine the as-found and the as-left tolerances are specified in NMP-ES-033-006, Vogtle Setpoint Uncertainty Methodology and Scaling Instructions.

Table 3.3.2-1 (page 3 of 7)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION		APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
3.	Phase A Containment Isolation						
(a)	Manual Initiation	1,2,3,4	2	B	SR 3.3.2.6	NA	NA
(b)	Automatic Actuation Logic and Actuation Relays	1,2,3,4	2 trains	C	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5	NA	NA
(c)	Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					
4.	Steam Line Isolation						
a.	Manual Initiation	1,2(c),3(c)	2	F	SR 3.3.2.6	NA	NA
b.	Automatic Actuation Logic and Actuation Relays	1,2(c),3(c)	2	G	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5	NA	NA

(continued)

(c) Except when one main steam isolation valve and associated bypass isolation valve per steam line is closed.

Table 3.3.2-1 (page 4 of 7)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
4. Steam Line Isolation (continued)						
c. Containment Pressure - High 2	1,2(c), 3(c)	3	D	SR 3.3.2.1 SR 3.3.2.4(i)(j) SR 3.3.2.7(i)(j) SR 3.3.2.8	≤ 15.4 psig	14.5 psig
d. Steam Line Pressure						
(1) Low	1,2(c), 3(a)(c)	3 per steam line	D	SR 3.3.2.1 SR 3.3.2.4(i)(j) SR 3.3.2.7(i)(j) SR 3.3.2.8	≥ 570 (b) psig	585 (b) psig
(2) Negative Rate - High	3(d)(c)	3 per steam line	D	SR 3.3.2.1 SR 3.3.2.4(i)(j) SR 3.3.2.7(i)(j) SR 3.3.2.8	≤ 125 (e) psi/sec	100 (e) psi/sec

(continued)

(a) Above the P-11 (Pressurizer Pressure) interlock.

(b) Time constants used in the lead/lag controller are $t_1 \geq 50$ seconds and $t_2 \leq 5$ seconds.

(c) Except when one main steam isolation valve and associated bypass isolation valve per steam line is closed.

(d) Below the P-11 (Pressurizer Pressure) interlock.

(e) Time constant utilized in the rate/lag controller is ≥ 50 seconds.

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

(j) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The methodologies used to determine the as-found and the as-left tolerances are specified in NMP-ES-033-006, Vogtle Setpoint Uncertainty Methodology and Scaling Instructions.

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

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
5. Turbine Trip and Feedwater Isolation						
a. Automatic Actuation Logic and Actuation Relays	1,2(f)	2 trains	H	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5	NA	NA
b. Low RCS T_{avg}	1,2(f)	4	I	SR 3.3.2.1 SR 3.3.2.4(i)(j) SR 3.3.2.7(i)(j)	≥ 561.5 °F	564 °F
Coincident with Reactor Trip, P-4	Refer to Function 8a for all P-4 requirements.					
c. SG Water Level-High High (P-14)	1,2(f)	4 per SG	I	SR 3.3.2.1 SR 3.3.2.4(i)(j) SR 3.3.2.7(i)(j) SR 3.3.2.8	≤ 82.5%	82.0%
d. Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					
6. Auxiliary Feedwater						
a. Automatic Actuation Logic and Actuation Relays	1,2,3	2 trains	G	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5	NA	NA
b. SG Water Level-Low Low	1,2,3	4 per SG	D	SR 3.3.2.1 SR 3.3.2.4(i)(j) SR 3.3.2.7(i)(j) SR 3.3.2.8	≥ 35.9%	37.8%

(continued)

(f) Except when one MFIV or MFRV, and its associated bypass valve per feedwater line is closed and deactivated or isolated by a closed manual valve.

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

(j) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The methodologies used to determine the as-found and the as-left tolerances are specified in NMP-ES-033-006, Vogtle Setpoint Uncertainty Methodology and Scaling Instructions.

Table 3.3.2-1 (page 6 of 7)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
6. Auxiliary Feedwater (continued)						
c. Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					
d. Trip of all Main Feedwater Pumps	1,2(g)	1 per pump	J	SR 3.3.2.6	NA	NA
7. Semi-automatic Switchover to Containment Sump						
a. Automatic Actuation Logic and Actuation Relays	1,2,3,4(h)	2	C	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5	NA	NA
b. Refueling Water Storage Tank (RWST) Level-Low Low(j)	1,2,3,4	4	K	SR 3.3.2.1 SR 3.3.2.4(i)(j) SR 3.3.2.7(i)(j) SR 3.3.2.8	≤ 216.6 in. and ≥ 210.4 in.	213.5 in.
Coincident with Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					

(continued)

(g) When the Main Feedwater System is operating to supply the SGs.

(h) In MODE 4, only 1 train is required to be OPERABLE to support semi-automatic switchover for the RHR pump that is required to be OPERABLE in accordance with Specification 3.5.3, ECCS-shutdown.

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

(j) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The methodologies used to determine the as-found and the as-left tolerances are specified in NMP-ES-033-006, Vogtle Setpoint Uncertainty Methodology and Scaling Instructions.

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

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
8. ESFAS Interlocks						
a. Reactor Trip, P-4	1,2,3	1 per train, 2 trains	F	SR 3.3.2.9	NA	NA
b. Pressurizer Pressure, P-11	1,2,3	3	L	SR 3.3.2.4 SR 3.3.2.7	≤ 2010 psig	2000 psig

Vogtle Electric Generating Plant – Units 1 & 2
License Amendment Request for Steam Generator Water Level High-High Setpoint Change

Enclosure 4

Technical Specification Bases Markup Pages
(for reference only)

BASES

BACKGROUND (continued)

limits. Different accident categories are allowed a different fraction of these limits, based on probability of occurrence. Meeting the acceptable dose limit for an accident category is considered having acceptable consequences for that event.

The RTS instrumentation is segmented into four distinct but interconnected modules as illustrated in Figure 7.1.1-1, FSAR, Chapter 7 (Ref. 1), and as identified below:

1. Field transmitters or process sensors: provide a measurable electronic signal based upon the physical characteristics of the parameter being measured;

2. Signal Process Control and Protection System, including Analog Protection System, Nuclear Instrumentation System (NIS), field contacts, and protection channel sets: provides signal conditioning, bistable setpoint comparison, process algorithm actuation, compatible electrical signal output to protection system ~~devices~~ channels, and control board/control room/miscellaneous indications;

3. Solid State Protection System (SSPS), including input, logic, and output bays: initiates proper unit shutdown and/or ESF actuation in accordance with the defined logic, which is based on the bistable outputs from the signal process control and protection system; and

4. Reactor trip switchgear, including reactor trip breakers (RTBs) and bypass breakers: provides the means to interrupt power to the control rod drive mechanisms (CRDMs) and allows the rod cluster control assemblies (RCCAs), or "rods," to fall into the core and shut down the reactor. The bypass breakers allow testing of the RTBs at power.

Field Transmitters or Sensors

To meet the design demands for redundancy and reliability, more than one, and often as many as four, field transmitters or sensors are used to measure unit parameters. To account for the calibration tolerances and instrument drift, which

(continued)

BACKGROUND

Field Transmitters or Sensors (continued)

are assumed to occur between calibrations, statistical allowances are provided in the Nominal Trip Setpoint (NTSP) and Allowable Values. The OPERABILITY of each transmitter or sensor can be evaluated when its "as found" calibration data are compared against its documented acceptance criteria.

Signal Process Control and Protection System

Generally, three or four channels of process control equipment are used for the signal processing of unit parameters measured by the field instruments. The process control equipment provides signal conditioning, comparable output signals for instruments located on the main control board, and comparison of measured input signals with ~~setpoints~~ NTSPs derived from Analytical Limits established by the safety analyses. ~~These setpoints~~ Analytical Limits are defined in FSAR, Chapter 7 (Ref. 1), Chapter 6 (Ref. 2), and Chapter 15 (Ref. 3). If the measured value of a unit parameter exceeds the predetermined setpoint, an output from a bistable is forwarded to the SSPS for decision evaluation. Channel separation is maintained up to and through the input bays. However, not all unit parameters require four channels of sensor measurement and signal processing. Some unit parameters provide input only to the SSPS, while others provide input to the SSPS, the main control board, the unit computer, and one or more control systems.

Generally, if a parameter is used only for input to the protection circuits, three channels with a two-out-of-three logic are sufficient to provide the required reliability and redundancy. If one channel fails in a direction that would not result in a partial Function trip, the Function is still OPERABLE with a two-out-of-two logic. If one channel fails, such that a partial Function trip occurs, a trip will not occur and the Function is still OPERABLE with a one-out-of-two logic.

Generally, if a parameter is used for input to the SSPS and a control function, four channels with a two-out-of-four logic are sufficient to provide the required reliability and redundancy. The circuit must be able to withstand both an input failure to the control system, which may then require the protection function actuation, and a single failure in

(continued)

BASES

BACKGROUND

Signal Process Control and Protection System (continued)

the other channels providing the protection function actuation. Again, a single failure will neither cause nor prevent the protection function actuation. These requirements are described in IEEE-279-1971 (Ref. 4). The actual number of channels required for each unit parameter is specified in Reference 1.

Two logic channels are required to ensure no single random failure of a logic channel will disable the RTS. The logic channels are designed such that testing required while the reactor is at power may be accomplished without causing trip. Provisions to allow removing logic channels from service during maintenance are unnecessary because of the logic system's designed reliability.

Nominal Trip Setpoints and Allowable Values

~~The Trip Setpoints are the nominal values at which the bistables are set. Any bistable is considered to be properly adjusted when the "as left" value is within the band for CHANNEL CALIBRATION tolerance.~~

The ~~Trip Setpoints~~trip setpoints used in the bistables are based on the analytical limits stated in Reference 1. The ~~selection~~ calculation of ~~these~~ the Nominal Trip Setpoints specified in Table 3.3.1-1 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. 5), the ~~Trip Setpoints and~~ Allowable Values specified in Table 3.3.1-1 in the accompanying LCO are conservatively adjusted with respect to the analytical limits. A detailed description of the methodology used to calculate the ~~Trip Setpoints~~Allowable Values and NTSPs, including their explicit uncertainties, is provided in the "RTS/ESFAS Setpoint Methodology Study" (Ref. 6). The as-left and as-found tolerance band methodology is provided in NMP-ES-033-006, Vogtle Setpoint Uncertainty Methodology and Scaling Instructions. The magnitudes of these uncertainties are factored into the determintationn of each NTSP and corresponding Allowable Value. The ~~actual nominal Trip Setpoint~~ trip setpoint entered into the bistable is more conservative than that specified by the Allowable Value to

(continued)

account for changes in random measurement errors detectable by a COT. The Allowable Value serves as the as-found 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.~~

(continued)

BACKGROUND

Nominal Trip Setpoints and Allowable Values (continued)

~~If the measured setpoint does not exceed the Allowable Value, the bistable is considered OPERABLE.~~

Nominal Trip Setpoints in ~~accordance~~ conjunction with the use of as-found and as-left tolerances, together with the requirements of the Allowable Value ensure that SLs 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). For the purpose of demonstrating compliance with 10 CFR 50.36 to the extent that the Technical Specifications are required to specify Limiting Safety System Settings (LSSS), the LSSS for VEGP are comprised of ~~both~~ the Nominal Trip Setpoints ~~and the Allowable Values~~ specified in Table 3.3.1-1. The Nominal Trip Setpoint is the expected value to be achieved during calibrations. The Nominal Trip Setpoint considers all factors which may affect channel performance by statistically combining rack drift, rack measurement and test equipment effects, rack calibration accuracy, rack comparator setting accuracy, rack temperature effects, sensor measurement and test equipment effects, sensor calibration accuracy, primary element accuracy, and process measurement accuracy. The Nominal Trip Setpoint is the value that will always ensure that safety analysis limits are met (with margin) given all of the above effects. The Allowable Value has been established by considering the values assumed for rack effects only. ~~The Allowable Value serves as an operability limit for the purpose of the quarterly CHANNEL OPERATIONAL TESTS.~~ Note that the Allowable Values listed in Table 3.3.1-1 are the least conservative value of the as-found setpoint that a channel can have during a periodic CHANNEL CALIBRATION, CHANNEL OPERATIONAL TESTS, or a TRIP ACTUATING DEVICE OPERATIONAL TEST that requires a trip setpoint verification.

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 of Reference 2. 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 Nominal Trip Setpoints and Allowable Values listed in Table 3.3.1-1 are based on the methodology described in Reference 6, which incorporates all of the known uncertainties applicable for each channel. The magnitudes of these uncertainties are factored into the determination of each Nominal Trip Setpoint. All field sensors and signal

(continued)

BASES

BACKGROUND

Nominal Trip Setpoints and Allowable Values (continued)

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 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

(continued)

BASES

BACKGROUND

Reactor Trip Switchgear (continued)

trip mechanism is sufficient by itself, thus providing a diverse trip mechanism.

The decision logic matrix Functions are described in the functional diagrams included in Reference 1. In addition to the reactor trip or ESF, these diagrams also describe the various "permissive interlocks" that are associated with unit conditions. Each train has a built in testing device that can automatically test the decision logic matrix Functions and the actuation ~~devices~~ channels 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~~ preserve the SLs during all AOOs and mitigates the consequences of DBAs in all MODES in LCO, and which the RTBs are closed.

Each of the analyzed accidents and transients can be detected by one or more RTS Functions. The accident analysis described in Reference 3 takes credit for most RTS trip Functions. RTS trip Functions that are retained yet not specifically credited in the accident analysis are ~~qualitatively~~ implicitly 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 backups to RTS trip Functions that were credited in the accident analysis.

Permissive and interlock setpoints allow the blocking of trips during plant startups and restoration of trips when the permissive conditions are not satisfied, but they are not explicitly modeled in the Safety Analyses. These permissives and interlocks ensure that the starting conditions are consistent with the safety analysis before preventative or mitigating actions occur. Because these permissives or interlocks are only one of multiple conservative starting assumptions for the accident analysis, they are generally considered as nominal values without regard to measurement accuracy. ~~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. The Nominal Trip Setpoint column is modified by a Note that requires the as-left condition for a channel to be within the calibration tolerance for that channel. In addition, the as-~~

(continued)

~~left condition may be more conservative than the specified Nominal Trip Setpoint.~~

The LCO requires all instrumentation performing an RTS Function, listed in Table 3.3.1-1 to be OPERABLE. The Allowable Value specified in Table 3.3.1-1 is the least conservative value of the as-found setpoint that the channel can have when tested, such that a channel is OPERABLE if the as-found setpoint is within the as-found tolerance and is conservative with respect to the Allowable Value during a CHANNEL CALIBRATION or CHANNEL OPERATIONAL TEST (COT). As such, the Allowable Value differs from the NTSP by an amount greater than or equal to the expected instrument channel uncertainties, such as drift, during the surveillance interval. In this manner, the actual setting of the channel (NTSP) will ensure that a SL is not exceeded at any given point of time as long as the channel has not drifted beyond expected tolerances during the surveillance interval. Note that, although the channel is OPERABLE under these circumstances, the trip setpoint must be left adjusted to a value within the as-left tolerance, in accordance with uncertainty assumptions stated in the referenced setpoint methodology (as-left criteria), and confirmed to be operating within the statistical allowances of the uncertainty terms assigned (as-found criteria).

If the actual setting of the channel is found to be conservative with respect to the Allowable Value but is beyond the as-found tolerance band, the channel is OPERABLE but degraded. The degraded condition of the channel will be further evaluated during performance of the SR. This evaluation will consist of resetting the channel setpoint to the NTSP (within the allowed tolerance), and evaluating the channel response. If the channel is functioning as required and is expected to pass the next surveillance, then the channel is OPERABLE and can be restored to service at the completion of the surveillance. After the surveillance is completed, the channel as-found condition will be entered into the Corrective Action Program for further evaluation.

A trip setpoint may be set more conservative than the NTSP as necessary in response to plant conditions. However, in this case, the operability of this instrument must be verified based on the field setting and not the NTSP. Failure of any instrument renders the affected channel(s) inoperable and reduces the reliability of the affected Functions.

(continued)

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

19. Automatic Trip Logic (continued)

coil to trip the breaker open when needed. Each RTB is equipped with a bypass breaker to allow testing of the trip breaker while the unit is at power. The reactor trip signals generated by the RTS Automatic Trip Logic cause the RTBs and associated bypass breakers to open and shut down the reactor.

The LCO requires two channels of RTS Automatic Trip Logic to be OPERABLE. Having two OPERABLE channels ensures that random failure of a single logic channel will not prevent reactor trip.

These trip Functions must be OPERABLE in MODE 1 or 2 when the reactor is critical. In MODE 3, 4, or 5, these RTS trip Functions must be OPERABLE when the RTBs or associated bypass breakers are closed, and the Rod Control System is capable of rod withdrawal.

The RTS instrumentation satisfies Criterion 3 of 10 CFR 50.36 (c)(2)(ii).

ACTIONS

A Note has been added to the ACTIONS to clarify the application of Completion Time rules. The Conditions of this Specification may be entered independently for each Function listed in Table 3.3.1-1.

In the event a channel's ~~Trip Setpoint~~ NTSP is found non-conservative with respect to the Allowable Value, or the channel is not functioning as required, or the transmitter, instrument loop, signal processing electronics, or bistable is found inoperable, then all affected Functions provided by that channel must be declared inoperable and the LCO Condition(s) entered for the protection function(s) affected.

When the number of inoperable channels in a trip Function exceed those specified in one or other related Conditions associated with a trip Function, then the unit is outside the safety analysis. Therefore, LCO 3.0.3 must be immediately entered if applicable in the current MODE of operation.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.1.6

SR 3.3.1.6 is a calibration of the excore channels to the incore channels. If the measurements do not agree, the excore channels are not declared inoperable but must be calibrated to agree with the incore detector measurements. If the excore channels cannot be adjusted, the channels are declared inoperable. This surveillance is primarily performed to verify the f(AFD) input to the overtemperature ΔT function.

Two Notes modify SR 3.3.1.6. Note 1 states that this Surveillance is required only if reactor power is > 75% RTP and that 7 days is allowed for performing the first surveillance after reaching 75% RTP. Note 2 states that neutron detectors are excluded from the calibration.

The Frequency of 92 EFPD is adequate. It is based on industry operating experience, considering instrument reliability and operating history data for instrument drift.

SR 3.3.1.7

SR 3.3.1.7 is the performance of a COT every 184 days.

A COT is performed on each required channel to ensure the entire channel will perform the intended Function. Setpoints must be ~~within~~ conservative with respect to the Allowable Values specified in Table 3.3.1-1.

The difference between the current "as found" values and the previous test "as left" values must be consistent with the drift allowance used in the setpoint methodology. The setpoint shall be left set consistent with the assumptions of the current unit specific setpoint methodology.

The "~~as~~ as-found" and "~~as~~ as-left" values must also be recorded and reviewed for consistency with the assumptions of Reference 6.

This Surveillance Requirement is modified by two Notes that apply only to the Source Range instrument channels. Note 1 requires that the COT include verification that interlocks P-6 and P-10 are in the required state for the existing unit

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.1.7 (continued)

conditions. Note 2 provides a 4 hour delay in the requirement to perform this surveillance for source range instrumentation when entering Mode 3 from Mode 2. This Note allows a normal shutdown to proceed without delay for the performance of this SR to meet the applicability requirements in Mode 3. This delay allows time to open the RTBs in Mode 3 after which this SR is no longer required to be performed. If the unit is to be in Mode 3 with the RTBs closed for greater than 4 hours, this surveillance must be completed prior to the expiration of the 4 hours.

The Frequency of 184 days is justified in Reference 11.

SR 3.3.1.7 is modified by two Notes as identified in Table 3.3.1-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be returned to within the as-left tolerance of the NTSP. Where a setpoint more conservative than the NTSP is used in the plant surveillance procedures (field setting), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the NTSP, then the channel shall be declared inoperable.

The second Note also requires that the methodologies for calculating the as-left and the as-found tolerances be in NMP-ES-033-006, Vogtle Setpoint Uncertainty Methodology and Scaling Instructions.

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SR 3.3.1.8

SR 3.3.1.8 is the performance of a COT as described in SR 3.3.1.7, except the frequency is prior to reactor startup. This SR is not required to be met when reactor power is decreased below P-10 (10% RTP) or when MODE 2 is entered from MODE 1 during controlled shutdowns. The Surveillance is modified by a Note that specifies this surveillance can be satisfied by the performance of a COT within 31 days prior to reactor startup. This test ensures that the NIS source range, intermediate range, and power range low setpoint channels are OPERABLE prior to taking the reactor critical.

SR 3.3.1.8 is modified by two Notes as identified in Table 3.3.1-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be returned to within the as-left tolerance of the NTSP. Where a setpoint more conservative than the NTSP is used in the plant surveillance procedures (field setting), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the NTSP, then the channel shall be declared inoperable.

The second Note also requires that the methodologies for calculating the as-left and the as-found tolerances be in NMP-ES-033-006, Vogtle Setpoint Uncertainty Methodology and Scaling Instructions.

SR 3.3.1.9

SR 3.3.1.9 is the performance of a TADOT and is performed every 92 days, as justified in Reference 9.

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BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.1.10

A CHANNEL CALIBRATION is performed every 18 months, or approximately at every refueling. CHANNEL CALIBRATION is a complete check of the instrument loop, including the sensor. The test verifies that the channel responds to a measured parameter within the necessary range and accuracy.

CHANNEL CALIBRATIONS must be performed consistent with the assumptions of the unit specific setpoint methodology. The difference between the current "~~as-~~as-found" values and the NTSP or previous test "~~as-~~as-left" values must be consistent with the drift allowance used in the setpoint methodology.

The Frequency of 18 months is based on the assumption of an 18 month calibration interval in the determination of the magnitude of equipment drift in the setpoint methodology for some instrument functions, and the need to perform this Surveillance for some instrument functions under the conditions that apply during a plant outage and the potential for an unplanned plant transient if the Surveillance were performed at power. Operating experience has shown these components usually pass the Surveillance when performed on the 18 month Frequency.

SR 3.3.1.10 is modified by a Note stating that this test shall include verification that the time constants are adjusted to the prescribed values where applicable.

SR 3.3.1.10 is modified by two Notes as identified in Table 3.3.1-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be returned to within the as-left tolerance of the NTSP. Where a setpoint more conservative than the NTSP is used in the plant surveillance procedures (field setting), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure

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that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the NTSP, then the channel shall be declared inoperable.

The second Note also requires that the methodologies for calculating the as-left and the as-found tolerances be in NMP-ES-033-006, Vogtle Setpoint Uncertainty Methodology and Scaling Instructions.

SR 3.3.1.11

SR 3.3.1.11 is the performance of a CHANNEL CALIBRATION, as described in SR 3.3.1.10, every 18 months. This SR is modified by a Note that states that neutron detectors are excluded from the CHANNEL CALIBRATION. The CHANNEL CALIBRATION for the power range neutron detectors includes a normalization of the detectors based on a power calorimetric and flux map performed above 75% RTP. The CHANNEL CALIBRATION for the source range neutron detectors includes obtaining the detector preamp discriminator curves and evaluating those curves.

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SURVEILLANCE REQUIREMENTS

SR 3.3.1.11 (continued)

The 18 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown these components usually pass the Surveillance when performed on the 18 month Frequency.

SR 3.3.1.11 is modified by two Notes as identified in Table 3.3.1-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be returned to within the as-left tolerance of the NTSP. Where a setpoint more conservative than the NTSP is used in the plant surveillance procedures (field setting), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the NTSP, then the channel shall be declared inoperable.

The second Note also requires that the methodologies for calculating the as-left and the as-found tolerances be in NMP-ES-033-006, Vogtle Setpoint Uncertainty Methodology and Scaling Instructions.

SR 3.3.1.12

SR 3.3.1.12 is the performance of a COT of RTS interlocks every 18 months.

The Frequency is based on the known reliability of the interlocks and the multichannel redundancy available, and has been shown to be acceptable through operating experience.

(continued)

B 3.3 INSTRUMENTATION

B 3.3.2 Engineered Safety Feature Actuation System (ESFAS) Instrumentation

BASES

BACKGROUND

The ESFAS initiates necessary safety systems, based on the values of selected unit parameters, to protect against violating core design limits and the Reactor Coolant System (RCS) pressure boundary, and to mitigate accidents. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the ESFAS, as well as specifying LCOs on other reactor system parameters and equipment performance.

Technical Specifications are required by 10 CFR 50.36 to include LSSS for variables that have significant safety functions. LSSS are defined by the regulation as "Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The Analytical Limit is the limit of the process variable at which a protective action is initiated, as established by the safety analysis, to ensure that a SL is not exceeded. Any automatic protection action that occurs on reaching the Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic protection channels must be chosen to be more conservative than the Analytical Limit to account for instrument loop uncertainties related to the setting at which the automatic protective action would actually occur.

The Nominal Trip Setpoint (NTSP) specified in Table 3.3.2-1 is a predetermined setting for a protection channel chosen to ensure automatic actuation prior to the process variable reaching the Analytical Limit and thus ensuring that the SL would not be exceeded. As such, the NTSP accounts for uncertainties in setting the channel (e.g., calibration), uncertainties in how the channel might actually perform (e.g., repeatability), changes in the point of action of the channel over time (e.g., drift during surveillance intervals), and any other factors which may influence its actual performance (e.g., harsh accident environments). In this manner, the NTSP ensures that SLs are not exceeded. Therefore, the NTSP meets the definition of an LSSS (Ref. 1).

Technical Specifications contain values related to the OPERABILITY of equipment required for safe operation of the facility. OPERABLE is defined in Technical Specifications as "...being capable of performing its safety functions(s)." Relying solely on the NTSP to define OPERABILITY in Technical Specifications would be an overly restrictive requirement if it were applied as an OPERABILITY limit for the "as-found" value of a protection channel setting during a

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surveillance. This would result in Technical Specification compliance problems, as well as reports and corrective actions required by the rule which are not necessary to ensure safety. For example, an automatic protection channel with a setting that has been found to be different from the NTSP due to some drift of the setting may still be OPERABLE since drift is to be expected. This expected drift would have been specifically accounted for in the setpoint methodology for calculating the NTSP and thus the automatic protective action would still have ensured that the SL would not be exceeded with the "as-found" setting of the protection channel. Therefore, the channel would still be OPERABLE since it would have performed its safety function and the only corrective action required would be to reset the channel within the established as-left tolerance around the NTSP to account for further drift during the next surveillance interval.

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 SL value to prevent departure from nucleate boiling (DNB),

2. Fuel centerline melt shall not occur, and

3. The RCS pressure SL of 2750 psia shall not be exceeded.

Operation within the SLs of Specification 2.0, "Safety Limits (SLs)," also maintains the above values and assures that offsite dose will be within the 10 CFR 50 and 10 CFR 100 criteria during AOOs.

Accidents are events that are analyzed even though they are not expected to occur during the unit life. The acceptable limit during accidents is that offsite dose shall be maintained within an acceptable fraction of 10 CFR 100 limits. Different accident categories are allowed a different fraction of these limits, based on probability of occurrence. Meeting the acceptable dose limit for an accident category is considered having acceptable consequences for that event.

The ESFAS instrumentation is segmented into four distinct but interconnected modules as identified below:

- Field transmitters or process sensors and instrumentation: provide a measurable electronic signal based on the physical characteristics of the parameter being measured;

- Signal processing equipment including analog protection system, field contacts, and protection channel sets: provide signal conditioning, bistable setpoint comparison, process algorithm actuation, compatible electrical signal output to protection system

(continued)

~~devices~~channels, and control board/control room/miscellaneous indications; and

- Solid State Protection System (SSPS) including input, logic, and output bays: initiates the proper unit shutdown or engineered safety feature (ESF) actuation in accordance with the defined logic and based on the bistable outputs from the signal process control and protection system.

- Sequencer output relays which change state upon the applicable ESFAS signal to energize ESF loads powered by the 4160-V ESF bus: these relays are required to change state upon the applicable ESFAS signal to energize ESF loads powered by the 4160-V ESF bus and in this way they function as ESFAS actuation relays.

Field Transmitters or Sensors

To meet the design demands for redundancy and reliability, more than one, and often as many as four, field transmitters or sensors are used to measure unit parameters. In many

(continued)

BASES

BACKGROUND

Field Transmitters or Sensors (continued)

cases, field transmitters or sensors that input to the ESFAS are shared with the Reactor Trip System (RTS). In some cases, the same channels also provide control system inputs. To account for calibration tolerances and instrument drift, which are assumed to occur between calibrations, statistical allowances are provided in the ~~Trip Setpoint~~NTSP and Allowable Value~~s~~. The OPERABILITY of each transmitter or sensor can be evaluated when its "as found" calibration data are compared against its documented acceptance criteria.

Signal Processing Equipment

Generally, three or four channels of process control equipment are used for the signal processing of unit parameters measured by the field instruments. The process control equipment provides signal conditioning, comparable output signals for instruments located on the main control board, and comparison of measured input signals with ~~setpoints~~ NTSPs derived from Analytical Limits established by the safety analyses. ~~These setpoints~~Analytical Limits are discussed in FSAR, Chapter 6 (Ref. ~~1~~2), Chapter 7 (Ref. ~~2~~3), and Chapter 15 (Ref. ~~3~~4). If the measured value of a unit parameter exceeds the predetermined setpoint, an output from a bistable is forwarded to the SSPS for decision evaluation. Channel separation is maintained up to and through the input bays. However, not all unit parameters require four channels of sensor measurement and signal processing. Some unit parameters provide input only to the SSPS, while others provide input to the SSPS, the main control board, the unit computer, and one or more control systems.

Generally, if a parameter is used only for input to the protection circuits, three channels with a two-out-of-three logic are sufficient to provide the required reliability and redundancy. If one channel fails in a direction that would not result in a partial Function trip, the Function is still OPERABLE with a two-out-of-two logic. If one channel fails such that a partial Function trip occurs, a trip will not occur and the Function is still OPERABLE with a one-out-of-two logic.

(continued)

BASES

BACKGROUND

Signal Processing Equipment (continued)

Generally, if a parameter is used for input to the SSPS and a control function, four channels with a two-out-of-four logic are sufficient to provide the required reliability and redundancy. The circuit must be able to withstand both an input failure to the control system, which may then require the protection function actuation, and a single failure in the other channels providing the protection function actuation. Again, a single failure will neither cause nor prevent the protection function actuation.

These requirements are described in IEEE-279-1971 (Ref. ~~4~~5). The actual number of channels required for each unit parameter is specified in Reference ~~2~~3.

~~Trip Setpoints~~NTSPs and Allowable Values

~~The Trip Setpoints are the nominal values at which the bistables are set. Any bistable is considered to be properly adjusted when the "as left" value is within the band for CHANNEL CALIBRATION accuracy.~~

The ~~Trip Setpoints~~trip setpoints used in the bistables are based on the analytical limits stated in Reference ~~2~~3. The ~~selection~~ calculation of ~~these Trip Setpoints~~the Nominal Trip Setpoints specified in Table 3.3.2-1 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~~6), the ~~Trip Setpoints and~~ Allowable Values specified in Table 3.3.2-1 in the accompanying LCO are conservatively adjusted with respect to the analytical limits. A detailed description of the methodology used to calculate the Allowable Values and ~~Trip Setpoints~~NTSPs, including their explicit uncertainties, is provided in the "RTS/ESFAS Setpoint Methodology Study" (Ref. ~~6~~7) which incorporates all of the known uncertainties applicable to each channel. The as-left tolerance and as-found tolerance band methodology is provided in NMP-ES-033-006, Vogtle Setpoint Uncertainty Methodology and Scaling Instructions. The magnitude of these uncertainties are factored into the determination of each NTSP and corresponding Allowable Value. The actual nominal ~~Trip Setpoint~~setpoint entered into the bistable is more conservative than that specified by the ~~Allowable Value~~NTSP to account for ~~changes in random~~ measurement errors detectable by a COT. The Allowable Value serves as the as-found Technical Specification OPERABILITY limit for the purpose of the COT. ~~One example of such a change~~

(continued)

~~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 NTSP is the value at which the bistables are set and is the expected value to be achieved during calibration. The NTSP value is the LSSS and ensures the safety analysos limits are met for the surveillance interval selected when a channel is adjusted based on stated channel uncertainties. Any bistable is considered to be properly adjusted when the "as-left" NTSP value is within the as-left tolerance for Channel Calibration uncertainty allowance (i.e., rack calibration and comparator setting uncertainties). The NTSP value is therefore considered a "nominal value" (i.e., expressed as a value without inequalities) for the purposes of the COT and CHANNEL CALIBRATION.

NTSPs in conjunction with the use of as-found and as-left tolerances together 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.

Note that the Allowable Values listed in Table 3.3.2-1 are the least conservative value of the as-found setpoint that a channel can have during a periodic CHANNEL CALIBRATION, COT, or a TADOT.

(continued)

BASES

BACKGROUND

Trip Setpoints and Allowable Values (continued)

~~Setpoints in accordance with 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.~~

Each channel can be tested on line to verify that the signal processing equipment and setpoint accuracy is within the specified allowance requirements of Reference ~~2~~3. 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 Trip Setpoints and Allowable Values listed in Table 3.3.2-1 are based on the methodology described in Reference 6, which incorporates all of the known uncertainties applicable for each channel. The magnitudes of these uncertainties are factored into the determination of each 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 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.

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BASES

BACKGROUND

Solid State Protection System (continued)

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 ~~some of~~ the actuation ~~devices~~ channels 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 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.

Sequencer Output Relays

The sequencer output relays which change state to actuate ESF loads powered by the 4160-V ESF bus function as ESFAS actuation relays because these relays are required to function to energize the ESF loads. These particular relays are located in the termination and relay cabinets of the

(continued)

BASES

BACKGROUND

Sequencer Output Relays (continued)

sequencer and are part of the control circuitry of these ESF loads. There are two independent trains of sequencers and each is powered by the respective train of 120-Vac ESF electrical power supply. The power supply for the output relays is the sequencer power supply. The applicable output relays are tested in the slave relay testing procedures, and in particular, in conjunction with the specific slave relay also required to actuate to energize the applicable ESF load.

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~~ implicitly credited in the safety analysis and the NRC staff approved licensing basis for the unit. 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~~4).

Permissive and interlock setpoints allow the blocking of trips during plant startups, and restoration of trips when the permissive conditions are not satisfied, but they are not explicitly modeled in the Safety Analyses. These permissives and interlocks ensure that the starting conditions are consistent with the safety analysis, before preventive or mitigating actions occur. Because these permissives or interlocks are only one of multiple conservative starting assumptions for the accident analysis, they are generally considered as nominal values without regard to measurement accuracy.

The LCO requires all instrumentation performing an ESFAS Function listed in Table 3.3.2-1 in the accompanying LCO to be OPERABLE. The Allowable Value specified in Table 3.3.2-1 is the least conservative value of the as-found setpoint that the channel can have when tested, such that a channel is OPERABLE if the as-found setpoint is within the as-found tolerance and is conservative with respect to the Allowable Value during the CHANNEL CALIBRATION or CHANNEL OPERATIONAL TEST (COT). As such, the Allowable Value differs from the NTSP by an amount greater than or equal to the expected instrument channel uncertainties, such as drift, during

(continued)

the surveillance interval. In this manner, the actual setting of the channel (NTSP) will ensure that a SL is not exceeded at any given point of time as long as the channel has not drifted beyond expected tolerances during the surveillance interval. Note that, although the channel is OPERABLE under these circumstances, the trip setpoint must be left adjusted to a value within the as-left tolerance, in accordance with uncertainty assumptions stated in the referenced setpoint methodology (as-left criteria), and confirmed to be operating within the statistical allowances of the uncertainty terms assigned (as-found criteria).

If the actual setting of the channel is found to be conservative with respect to the Allowable Value but is beyond the as-found tolerance band, the channel is OPERABLE but degraded. The degraded condition of the channel will be further evaluated during performance of the SR. This evaluation will consist of resetting the channel setpoint to the NTSP (within the allowed tolerance) and evaluating the channel response. If the channel is functioning as required and expected to pass the next surveillance, then the channel can be restored to service at the completion of the surveillance.

A trip setpoint may be set more conservative than the NTSP as necessary in response to plant conditions. However, in this case, the operability of this instrument must be verified based on the field setting and not the NTSP. Failure of any instrument renders the affected channel(s) inoperable and reduces the reliability of the affected Functions. ~~The Nominal Trip Setpoint column is modified by a Note that requires the as-left conditions for a channel to be within the calibration tolerance for that channel. In addition, the as-left condition may be more conservative than the specified Nominal Trip Setpoint. The conservative direction is established by the direction of the inequality applied to the Allowable Value. It is consistent with the setpoint methodology for the as-left trip setpoint to be outside the calibration tolerance but in the conservative direction with respect to the Nominal Trip Setpoint.~~

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

b. Safety Injection - Automatic Actuation Logic and Actuation Relays (continued)

consequences of an abnormal condition or accident. Unit pressure and temperature are very low and many ESF components are administratively locked out or otherwise prevented from actuating to prevent inadvertent overpressurization of unit systems.

c. Safety Injection - Containment Pressure — High 1

(PI-0934, PI-0935, PI-0936)

NOTE: Containment pressure channels are also required OPERABLE by the Post Accident Monitoring Technical Specification.

This signal provides protection against the following accidents:

- SLB inside containment;
- LOCA; and
- Feed line break inside containment.

Containment Pressure — High 1 provides no input to any control functions. Thus, three OPERABLE channels are sufficient to satisfy protective requirements with a two-out-of-three logic. The transmitters (d/p cells) and electronics are located outside of containment with the sensing line (high pressure side of the transmitter) located inside containment.

Thus, the high pressure Function will not experience any adverse environmental conditions and the ~~Trip Setpoint~~NTSP reflects only steady state instrument uncertainties. Containment Pressure — High 1 must be OPERABLE in MODES 1, 2, and 3 when there is sufficient energy in the primary and secondary systems to pressurize the containment following a pipe break. In MODES 4, 5, and 6, there is insufficient energy in the primary or secondary systems to pressurize the containment.

(continued)

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

d. Safety Injection - Pressurizer Pressure — Low

This signal (PI-0455A, B, & C, PI-0456, PI-0456A, PI-0457, PI-0457A, PI-0458 & PI-0458A) provides protection against the following accidents:

- Inadvertent opening of a steam generator (SG) relief or safety valve;
- SLB;
- A spectrum of rod cluster control assembly ejection accidents (rod ejection);
- Inadvertent opening of a pressurizer relief or safety valve;
- LOCAs; and
- SG Tube Rupture.

Pressurizer pressure provides both control and protection functions: input to the Pressurizer Pressure Control System, reactor trip, and SI. Therefore, the actuation logic must be able to withstand both an input failure to control system, which may then require the protection function actuation, and a single failure in the other channels providing the protection function actuation. Thus, four OPERABLE channels are required to satisfy the requirements with a two-out-of-four logic.

The transmitters are located inside containment, with the taps in the vapor space region of the pressurizer, and thus possibly experiencing adverse environmental conditions (LOCA, SLB inside containment, rod ejection). Therefore, the ~~Trip Setpoint~~NTSP reflects the inclusion of both steady state and adverse environmental instrument uncertainties.

This Function must be OPERABLE in MODES 1, 2, and 3 (above P-11) to mitigate the consequences of an HELB inside containment. This signal may

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

d. Safety Injection - Pressurizer Pressure — Low (continued)

be manually blocked by the operator below the P - 11 setpoint. Automatic SI actuation below this pressure setpoint continues to be performed by the Containment — High 1 signal.

This Function is not required to be OPERABLE in MODE 3 below the P - 11 setpoint. Other ESF functions are used to detect accident conditions and actuate the ESF systems in this MODE. In MODES 4, 5, and 6, this Function is not needed for accident detection and mitigation.

e. Safety Injection - Steam Line Pressure — Low

LOOP 1	LOOP 2	LOOP 3	LOOP 4
PI-0514A,B&C	PI-0524A&B	PI-0534A&B	PI-0544A,B&C
PI-0515A	PI-0525A	PI-0535A	PI-0545A
PI-0516A	PI-0526A	PI-0536A	PI-0546A

NOTE: Steam Line Pressure channels are also required OPERABLE by the Post Accident Monitoring Technical Specification.

Steam Line Pressure — Low provides protection against the following accidents:

- SLB;
- Feed line break; and
- Inadvertent opening of an SG relief or an SG safety valve.

Steam Line Pressure — Low provides no input to any control functions. Thus, three OPERABLE channels on each steam line are sufficient to satisfy the protective requirements with a two-out-of-three logic on each steam line.

With the transmitters located inside the steam tunnels, it is possible for them to experience adverse environmental conditions during a secondary side break. Therefore, the ~~Trip Setpoint~~NTSP reflects both steady state and adverse environmental instrument uncertainties.

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

b. Containment Spray - Automatic Actuation Logic and Actuation Relays (continued)

this MODE, adequate time is available to manually actuate required components in the event of a DBA. However, because of the large number of components actuated on a containment spray, actuation is simplified by the use of the manual actuation handswitches. Automatic actuation logic and actuation relays must be OPERABLE in MODE 4 to support system level manual initiation. In MODES 5 and 6, there is insufficient energy in the primary and secondary systems to result in containment overpressure. In MODES 5 and 6, there is also adequate time for the operators to evaluate unit conditions and respond, to mitigate the consequences of abnormal conditions by manually starting individual components.

c. Containment Spray - Containment Pressure High — 3

(PI-0934, PI-0935, PI-0936, PI-0937)

NOTE: Containment Pressure Channels are also required OPERABLE by the Post Accident Monitoring Technical Specification.

This signal provides protection against a LOCA or an SLB inside containment. The transmitters (d/p cells and electronics) are located outside of containment with the sensing line (high pressure side of the transmitter) located inside containment. Thus, they will not experience any adverse environmental conditions and the ~~Trip Setpoint~~NTSP reflects only steady state instrument uncertainties.

This Function requires the bistable output to energize to perform its required action. It is not desirable to have a loss of power actuate containment spray, since the consequences of an inadvertent actuation of containment spray could be serious. Note that this Function also has the inoperable channel placed in bypass rather than trip to decrease the probability of an inadvertent actuation.

(continued)

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

4. Steam Line Isolation (continued)

unless one MSIV and associated bypass valve in each steam line is closed. In MODES 4, 5, and 6, there is insufficient energy in the RCS and SGs to experience an SLB or other accident releasing significant quantities of energy.

c. Steam Line Isolation — Containment Pressure — High 2

(PI-0934, PI-0935, PI-0936)

NOTE: Containment Pressure channels are also required OPERABLE by the Post Accident Monitoring Technical Specification.

This Function actuates closure of the MSIVs in the event of a LOCA or an SLB inside containment to maintain at least one unfaulted SG as a heat sink for the reactor, and to limit the mass and energy release to containment. The transmitters (d/p cells) are located outside containment with the sensing line (high pressure side of the transmitter) located inside containment. Thus, they will not experience any adverse environmental conditions, and the ~~Trip Setpoint~~NTSP reflects only steady state instrument uncertainties. Containment Pressure — High 2 provides no input to any control functions. Thus, three OPERABLE channels are sufficient to satisfy protective requirements with two-out-of-three logic.

Containment Pressure — High 2 must be OPERABLE in MODES 1, 2, and 3, when there is sufficient energy in the primary and secondary side to pressurize the containment following a pipe break. This would cause a significant increase in the containment pressure, thus allowing detection and closure of the MSIVs. The Steam Line Isolation Function remains OPERABLE in MODES 2 and 3 unless one MSIV and associated bypass valve in each steam line is closed. In

(continued)

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

(2) Steam Line Pressure — Negative Rate — High (continued)

the rapid depressurization of the steam line(s). In MODES 1 and 2, and in MODE 3, when above the P-11 setpoint, this signal is automatically enabled. The Steam Line Isolation Function is required to be OPERABLE in MODES 2 and 3 unless one MSIV and associated bypass valve in each steam line is closed. In MODES 4, 5, and 6, there is insufficient energy in the primary and secondary sides to have an SLB or other accident that would result in a release of significant enough quantities of energy to cause a cooldown of the RCS.

While the transmitters may experience elevated ambient temperatures due to an SLB, the trip function is based on rate of change, not the absolute accuracy of the indicated steam pressure. Therefore, the ~~Trip Setpoint~~NTSP reflects only steady state instrument uncertainties.

5. Turbine Trip and Feedwater Isolation

The primary functions of the Turbine Trip and Feedwater Isolation signals are to prevent damage to the turbine due to water in the steam lines, and to stop the excessive flow of feedwater into the SGs. These Functions are necessary to mitigate the effects of a high water level in the SGs, which could result in carryover of water into the steam lines and excessive cooldown of the primary system. The SG high water level is due to excessive feedwater flows.

This Function is actuated by SG Water Level — High High, or by an SI signal. The RTS also initiates a turbine trip signal whenever a reactor trip (P-4) is generated. In the event of SI, the unit is taken off line and the turbine generator must be tripped. The MFW System is also taken out of operation and the AFW System is automatically started. The SI signal was discussed previously.

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

c. <u>Turbine Trip and Feedwater Isolation — Steam Generator Water Level — High High (P-14)</u> (continued)

This signal provides protection against excessive feedwater flow. The ESFAS SG water level instruments provide input to the SG Water Level Control System. Therefore, the actuation logic must be able to withstand both an input failure to the control system (which may then require the protection function actuation) and a single failure in the other channels providing the protection function actuation. Thus, four OPERABLE channels are required to satisfy the requirements with a two-out-of-four logic.

The transmitters (d/p cells) are located inside containment. However, the events that this Function protects against cannot cause an adverse environment in containment. Therefore, the ~~Trip Setpoint~~NTSP reflects only steady state instrument uncertainties.

d. <u>Turbine Trip and Feedwater Isolation — Safety Injection</u>

Turbine Trip and Feedwater Isolation is also initiated by all Functions that initiate SI. The Feedwater Isolation Function requirements for these Functions are the same as the requirements for their SI function. Therefore, the requirements are not repeated in Table 3.3.2-1. Instead Function 1, SI, is referenced for all initiating functions and requirements.

Turbine Trip and Feedwater Isolation Functions must be OPERABLE in MODES 1 and 2 except when one MFIV or MFRV and associated bypass valve per feedwater line are closed and deactivated or isolated by a closed manual valve when the MFW System is in operation and the turbine generator may be in operation. In MODES 3, 4, 5, and 6, the MFW System and the turbine generator are not in service and this Function is not required to be OPERABLE.

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

b. Auxiliary Feedwater — Steam Generator Water Level — Low Low (continued)

MFW, would result in a loss of SG water level. SG Water Level — Low Low provides input to the SG Level Control System. Therefore, the actuation logic must be able to withstand both an input failure to the control system which may then require a protection function actuation and a single failure in the other channels providing the protection function actuation. Thus, four OPERABLE channels are required to satisfy the requirements with two-out-of-four logic. SG Water Level — Low Low in any operating SG will cause the motor driven AFW pumps to start. The system is aligned so that upon a start of the pump, water immediately begins to flow to the SGs. SG Water Level — Low Low in any two operating SGs will cause the turbine driven pump to start.

With the transmitters (d/p cells) located inside containment and thus possibly experiencing adverse environmental conditions (feed line break), the ~~Trip Setpoint~~NTSP reflects the inclusion of both steady state and adverse environmental instrument uncertainties.

c. Auxiliary Feedwater — Safety Injection

An SI signal starts the motor driven AFW pumps. The AFW initiation functions are the same as the requirements for their SI function. Therefore, the requirements are not repeated in Table 3.3.2-1. Instead, Function 1, SI, is referenced for all initiating functions and requirements.

Functions 6.a through 6.c must be OPERABLE in MODES 1, 2, and 3 to ensure that the SGs remain the heat sink for the reactor. These Functions do not have to be OPERABLE in MODES 5 and 6 because there is not enough heat being generated in the reactor to require the SGs as a heat sink. In MODE 4, AFW actuation does not need to be OPERABLE because either AFW or residual heat removal (RHR) will already be in operation to

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

b. Automatic Switchover to Containment Sump — Refueling Water Storage Tank (RWST) Level — Low Low Coincident With Safety Injection (continued)

automatically. The operator must complete the switchover by manually closing the RWST suction valves.

The RWST is equipped with four level transmitters. These transmitters provide no control functions. Therefore, a two-out-of-four logic is adequate to initiate the protection function actuation. Although only three channels would be sufficient, a fourth channel has been added for increased reliability.

The setpoints for this function on Table 3.3.2-1 are in inches from the RWST base. The ~~trip setpoint~~NTSP is equivalent to 29.0% of instrument span, including instrument uncertainty. ~~and~~ ~~t~~The Allowable Values ~~is~~ are equivalent to ≥ 28.5% and ≤ 29.5 % of instrument span.

The transmitters are located in an area not affected by HELBs or post accident high radiation. Thus, they will not experience any adverse environmental conditions and the ~~Trip Setpoint~~NTSP reflects only steady state instrument uncertainties.

Semi-Automatic switchover occurs only if the RWST low low level signal is coincident with SI. This prevents accidental switchover during normal operation. Accidental switchover could damage ECCS pumps if they are attempting to take suction from an empty sump. The automatic switchover Function requirements for the SI Functions are the same as the requirements for their SI function. Therefore, the requirements are not repeated in Table 3.3.2-1. Instead, Function 1, SI, is referenced for all initiating Functions and requirements.

These Functions must be OPERABLE in MODES 1, 2, 3, and 4 when there is a potential for a LOCA to occur, to ensure a continued supply of water for

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

a. Engineered Safety Feature Actuation System Interlocks — Reactor Trip, P-4 (continued)

- Trip the main turbine;
- Isolate MFW with coincident low T_{avg};
- Prevent reactuation of SI after a manual reset of SI; and
- Prevent opening of the MFW isolation valves if they were closed on SI or SG Water Level — High High.

Each of the above Functions is interlocked with P-4 to avert or reduce the continued cooldown of the RCS following a reactor trip. An excessive cooldown of the RCS following a reactor trip could cause an insertion of positive reactivity with a subsequent increase in generated power.

To avoid such a situation, the noted Functions have been interlocked with P-4 as part of the design of the unit control and protection system.

None of the noted Functions serves a mitigation function in the unit licensing basis safety analyses. Only the turbine trip Function is explicitly assumed since it is an immediate consequence of the reactor trip Function. Neither turbine trip, nor any of the other four Functions associated with the reactor trip signal, is required to show that the unit licensing basis safety analysis acceptance criteria are not exceeded.

The RTB position switches that provide input to the P-4 interlock only function to energize or de-energize or open or close contacts. Therefore, this Function has no adjustable trip setpoint with which to associate a ~~Trip Setpoint~~NTSB and Allowable Value. The interlock is armed when the RTB (RTA or RTB) or associated bypass breaker (BYA or BYB) is closed in each Train.

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

a. Engineered Safety Feature Actuation System Interlocks — Reactor Trip, P-4 (continued)

This Function must be OPERABLE in MODES 1, 2, and 3 when the reactor may be critical, approaching criticality, or the automatic SI function is required to be OPERABLE. This Function does not have to be OPERABLE in MODE 4, 5, or 6 because the main turbine, the MFW System, and the automatic SI function are not required to be OPERABLE. The P-4 function to trip the turbine and isolate main feedwater are only required in MODES 1 and 2 when these systems may be in service.

b. Engineered Safety Feature Actuation System Interlocks — Pressurizer Pressure, P-11

The P-11 interlock (PT-0455, PT-0456, PT-0457) permits a normal unit cooldown and depressurization without actuation of SI or main steam line isolation. With two-out-of-three pressurizer pressure channels (discussed previously) less than the P-11 setpoint, the operator can manually block the Pressurizer Pressure — Low and Steam Line Pressure — Low SI signals and the Steam Line Pressure — Low steam line isolation signal (previously discussed). When the Steam Line Pressure — Low steam line isolation signal is manually blocked, a main steam isolation signal on Steam Line Pressure — Negative Rate — High is enabled. This provides protection for an SLB by closure of the MSIVs. With two-out-of-three pressurizer pressure channels above the P-11 setpoint, the Pressurizer Pressure — Low and Steam Line Pressure — Low SI signals and the Steam Line Pressure — Low steam line isolation signal are automatically enabled. The operator can also enable these trips by use of the respective manual reset buttons. When the Steam Line Pressure — Low steam line isolation signal is enabled, the main steam isolation on Steam Line Pressure — Negative Rate — High is disabled. The ~~Trip Setpoint~~NTSP

(continued)

BASES

ACTUATION RELAYS (continued)

response is affected, then the actuation logic and actuation relay TS requirements should be applied, in addition to any necessary system TS requirements.

The ESFAS instrumentation satisfies Criterion 3 of 10 CFR 50.36 (c)(2)(ii).

ACTIONS

In the event a channel's ~~Trip Setpoint~~NTSP is found nonconservative with respect to the Allowable Value, or the channel is not functioning as required, or the transmitter, instrument loop, signal processing electronics, or bistable is found inoperable, then all affected Functions provided by that channel must be declared inoperable and the LCO Condition(s) entered for the protection Function(s) affected. When the Required Channels in Table 3.3.2-1 are specified (e.g., on a per steam line, per loop, per SG, etc., basis), then the Condition may be entered separately for each steam line, loop, SG, etc., as appropriate.

A Note has been added in the ACTIONS to clarify the application of Completion Time rules. The Conditions of this Specification may be entered independently for each Function listed on Table 3.3.2-1.

When the number of inoperable channels in a trip function exceed those specified in one or other related Conditions associated with a trip function, then the unit is outside the safety analysis. Therefore, LCO 3.0.3 should be immediately entered if applicable in the current MODE of operation.

A.1

Condition A applies to all ESFAS protection functions.

Condition A addresses the situation where one or more channels for one or more Functions are inoperable at the same time. The Required Action is to refer to Table 3.3.2-1 and to take the Required Actions for the protection functions affected. The Completion Times are those from the referenced Conditions and Required Actions.

(continued)

ACTIONS

C.1, C.2.1, and C.2.2 (continued)

the risk assessment of on-line maintenance and to evaluate the change in risk from a component failure. The equipment out of service risk monitor uses the plant probabilistic risk assessment model to evaluate the risk of removing equipment from service based on current plant configuration and equipment condition.

This action addresses the train orientation of the SSPS and the master and slave relays. If one train is inoperable, 24 hours are allowed to restore the train to OPERABLE status. The 24 hours allowed for restoring the inoperable train to OPERABLE status is justified in Reference ~~7~~8. The specified Completion Time is reasonable considering that there is another train OPERABLE, and the low probability of an event occurring during this interval. If the train cannot be restored to OPERABLE status, the unit must be placed in a MODE in which the LCO does not apply. This is done by placing the unit in at least MODE 3 within an additional 6 hours (30 hours total time) and in MODE 5 within an additional 30 hours (60 hours total time). The 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.

The Required Actions are modified by a Note that allows one train to be bypassed for up to 4 hours for surveillance testing or maintenance, provided the other train is OPERABLE. This allowance is based on the reliability analysis assumption of WCAP-10271-P-A (Ref. ~~8~~9) that 4 hours is the average time required to perform train surveillance.

D.1, D.2.1, and D.2.2

Condition D applies to:

- Containment Pressure — High 1;
- Pressurizer Pressure — Low;
- Steam Line Pressure — Low;
- Containment Pressure — High 2;

(continued)

ACTIONS

D.1, D.2.1, and D.2.2 (continued)

- Steam Line Pressure — Negative Rate — High; and
- SG Water level — Low Low.

This Condition contains bypass times and Completion Times that are risk-informed. The Configuration Risk Management Program (CRMP) is used to assess changes in core damage frequency resulting from applicable plant configurations. The CRMP uses the equipment out of service risk monitor, a computer based tool that may be used to aid in the risk assessment of on-line maintenance and to evaluate the change in risk from a component failure. The equipment out of service risk monitor uses the plant probabilistic risk assessment model to evaluate the risk of removing equipment from service based on current plant configuration and equipment condition.

If one channel is inoperable, 72 hours are allowed to restore the channel to OPERABLE status or to place it in the tripped condition. Generally this Condition applies to functions that operate on two-out-of-three logic. Therefore, failure of one channel places the Function in a two-out-of-two configuration. One channel must be tripped to place the Function in a one-out-of-three configuration that satisfies redundancy requirements. The 72 hours allowed to restore the channel to OPERABLE status or to place it in the tripped condition is justified in Reference ~~15~~8.

Failure to restore the inoperable channel to OPERABLE status or place it in the tripped condition within 72 hours requires the unit be placed in MODE 3 within the following 6 hours and MODE 4 within the next 6 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. In MODE 4, these Functions are no longer required OPERABLE.

The Required Actions are modified by a Note that allows placing one channel in bypass for up to 12 hours while performing routine surveillance testing. The 12 hour time limit is justified in Reference ~~7~~8.

E.1, E.2.1, and E.2.2

Condition E applies to:

(continued)

ACTIONS

E.1, E.2.1, and E.2.2 (continued)

The Required Actions are modified by a Note that, with one channel inoperable, allows routine surveillance testing of another channel with a channel in bypass for up to 12 hours. Placing a second channel in the bypass condition for up to 12 hours for testing purposes is acceptable based on the results of Reference ~~7~~8.

F.1, F.2.1, and F.2.2

Condition F applies to:

- Manual Initiation of Steam Line Isolation; and
- P-4 Interlock.

For the Manual Initiation and the P-4 Interlock Functions, this action addresses the train orientation of the SSPS. If a channel is inoperable, 48 hours is allowed to return it to OPERABLE status. The specified Completion Time is reasonable considering the nature of this Function, the available redundancy, and the low probability of an event occurring during this interval. If the channel cannot be returned to OPERABLE status, the unit must be placed in MODE 3 within the next 6 hours and MODE 4 within the following 6 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power in an orderly manner and without challenging unit systems. In MODE 4, the unit does not have any analyzed transients or conditions that require the explicit use of the protection function noted above.

G.1, G.2.1, and G.2.2

Condition G applies to the automatic actuation logic and actuation relays for the Steam Line Isolation and AFW actuation Functions.

This Condition contains bypass times and Completion Times that are risk-informed. The Configuration Risk Management Program (CRMP) is used to assess changes in core damage frequency resulting from applicable plant configurations. The CRMP uses the equipment out of service risk monitor, a computer based tool that may be used to aid in the risk assessment of on-line maintenance and to evaluate the change in risk from a component failure. The equipment out of

(continued)

BASES

ACTIONS

G.1, G.2.1, and G.2.2 (continued)

service risk monitor uses the plant probabilistic risk assessment model to evaluate the risk of removing equipment from service based on current plant configuration and equipment condition.

The action addresses the train orientation of the SSPS and the master and slave relays for these functions. If one train is inoperable, 24 hours are allowed to restore the train to OPERABLE status. The 24 hours allowed for restoring the inoperable train to OPERABLE status is justified in Reference ~~7~~8. The Completion Time for restoring a train to OPERABLE status is reasonable considering that there is another train OPERABLE, and the low probability of an event occurring during this interval.

If the train cannot be returned to OPERABLE status, the unit must be brought to MODE 3 within the next 6 hours and MODE 4 within the following 6 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. Placing the unit in MODE 4 removes all requirements for OPERABILITY of the protection channels and actuation functions. In this MODE, the unit does not have analyzed transients or conditions that require the explicit use of the protection functions noted above.

The Required Actions are modified by a Note that allows one train to be bypassed for up to 4 hours for surveillance testing provided the other channel is OPERABLE. This allowance is based on the reliability analysis (Ref. ~~8~~9) assumption that 4 hours is the average time required to perform channel surveillance.

H.1 and H.2

Condition H applies to the automatic actuation logic and actuation relays for the Turbine Trip and Feedwater Isolation Function.

This Condition contains bypass times and Completion Times that are risk-informed. The Configuration Risk Management Program (CRMP) is used to assess changes in core damage frequency resulting from applicable plant configurations. The CRMP uses the equipment out of service risk monitor, a computer based tool that may be used to aid in

(continued)

BASES

ACTIONS

H.1 and H.2 (continued)

the risk assessment of on-line maintenance and to evaluate the change in risk from a component failure. The equipment out of service risk monitor uses the plant probabilistic risk assessment model to evaluate the risk of removing equipment from service based on current plant configuration and equipment condition.

This action addresses the train orientation of the SSPS and the master and slave relays for this Function. If one train is inoperable, 24 hours are allowed to restore the train to OPERABLE status or the unit must be placed in MODE 3 within the following 6 hours. The 24 hours allowed for restoring the inoperable train to OPERABLE status is justified in Reference ~~7~~8. The Completion Time for restoring a train to OPERABLE status is reasonable considering that there is another train OPERABLE, and the low probability of an event occurring during this interval. The allowed Completion Time of 6 hours is reasonable, based on operating experience, to reach MODE 3 from full power conditions in an orderly manner and without challenging unit systems. These Functions are no longer required in MODE 3. Placing the unit in MODE 3 removes all requirements for OPERABILITY of the protection channels and actuation functions. In this MODE, the unit does not have analyzed transients or conditions that require the explicit use of the protection functions noted above.

The Required Actions are modified by a Note that allows one train to be bypassed for up to 4 hours for surveillance testing or maintenance provided the other train is OPERABLE. This allowance is based on the reliability analysis (Ref. ~~8~~9) assumption that 4 hours is the average time required to perform channel surveillances.

I.1 and I.2

Condition I applies to:

- SG Water Level — High High (P-14).

This Condition contains bypass times and Completion Times that are risk-informed. The Configuration Risk Management Program (CRMP) is used to assess changes in core damage frequency resulting from applicable plant configurations. The CRMP uses the equipment out of service risk monitor, a computer based tool that may be used to aid in

(continued)

BASES

ACTIONS

I.1 and I.2 (continued)

the risk assessment of on-line maintenance and to evaluate the change in risk from a component failure. The equipment out of service risk monitor uses the plant probabilistic risk assessment model to evaluate the risk of removing equipment from service based on current plant configuration and equipment condition.

If one channel is inoperable, 72 hours are allowed to restore one channel to OPERABLE status or to place it in the tripped condition. If placed in the tripped condition, the Function is then in a partial trip condition where one-out-of-three logic will result in actuation. The 72 hours allowed to restore one channel to OPERABLE status or to place it in the tripped condition is justified in Reference ~~7~~8. Failure to restore the inoperable channel to OPERABLE status or place it in the tripped condition within 72 hours requires the unit to be placed in MODE 3 within the following 6 hours. The allowed Completion Time of 6 hours is reasonable, based on operating experience, to reach MODE 3 from full power conditions in an orderly manner and without challenging unit systems. In MODE 3, this Function is no longer required OPERABLE.

The Required Actions are modified by a Note that allows placing one channel in bypass for up to 12 hours while performing routine surveillance testing. The 12 hour time limit is justified in Reference ~~7~~8.

J.1 and J.2

Condition J applies to the AFW pump start on trip of all MFW pumps.

This action addresses the train orientation for the auto start function of the AFW System on loss of all MFW pumps. The OPERABILITY of the AFW System must be assured by allowing automatic start of the AFW System pumps. If a channel is inoperable, 48 hours are allowed to return it to an OPERABLE status. If the function cannot be returned to an OPERABLE status, 6 hours are allowed to place the unit in MODE 3. The allowed Completion Time of 6 hours is reasonable, based on operating experience, to reach MODE 3 from full power conditions in an orderly manner and without challenging unit systems. In MODE 3, the unit does not have any analyzed

(continued)

BASES

ACTIONS

J.1 and J.2 (continued)

transients or conditions that require the explicit use of the protection function noted above. The allowance of 48 hours to return the train to an OPERABLE status is justified in Reference ~~8~~9.

K.1, K.2.1, and K.2.2

Condition K applies to:

- RWST Level — Low Low Coincident with Safety Injection.

This Condition contains bypass times and Completion Times that are risk-informed. The Configuration Risk Management Program (CRMP) is used to assess changes in core damage frequency resulting from applicable plant configurations. The CRMP uses the equipment out of service risk monitor, a computer based tool that may be used to aid in the risk assessment of on-line maintenance and to evaluate the change in risk from a component failure. The equipment out of service risk monitor uses the plant probabilistic risk assessment model to evaluate the risk of removing equipment from service based on current plant configuration and equipment condition.

RWST Level — Low Low Coincident With SI provides actuation of switchover to the containment sump. Note that this Function requires the bistables to energize to perform their required action. The failure of up to two channels will not prevent the operation of this Function. However, placing a failed channel in the tripped condition could result in a premature switchover to the sump, prior to the injection of the minimum volume from the RWST. Placing the inoperable channel in bypass results in a two-out-of-three logic configuration, which satisfies the requirement to allow another failure without disabling actuation of the switchover when required. Restoring the channel to OPERABLE status or placing the inoperable channel in the bypass condition within 72 hours is sufficient to ensure that the Function remains OPERABLE, and minimizes the time that the Function may be in a partial trip condition (assuming the inoperable channel has failed high). The 72 hour Completion Time is justified in Reference ~~7~~8. If the channel cannot be returned to OPERABLE status or placed in the bypass condition within 72 hours, the unit must be brought to MODE 3 within the following 6 hours and MODE 5 within the next 30 hours.

(continued)

BASES

ACTIONS

K.1, K.2.1, and K.2.2 (continued)

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. In MODE 5, the unit does not have any analyzed transients or conditions that require the explicit use of the protection functions noted above.

The Required Actions are modified by a Note that allows placing one channel in bypass for up to 12 hours while performing routine surveillance testing. The channel to be tested can be tested in bypass with the inoperable channel also in bypass. The 12 hour time limit is justified in Reference ~~7~~8.

L.1, L.2.1, and L.2.2

Condition L applies to the P-11 interlock.

With one or more channels inoperable, the operator must verify that the interlock is in the required state for the existing unit condition. This action manually accomplishes the function of the interlock. Determination must be made within 1 hour. The 1 hour Completion Time is equal to the time allowed by LCO 3.0.3 to initiate shutdown actions in the event of a complete loss of ESFAS function. If the interlock is not in the required state (or placed in the required state) for the existing unit condition, the unit must be placed in MODE 3 within the next 6 hours and MODE 4 within the following 6 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. Placing the unit in MODE 4 removes all requirements for OPERABILITY of this interlock.

SURVEILLANCE REQUIREMENTS

The SRs for each ESFAS Function are identified by the SRs column of Table 3.3.2-1.

A Note has been added to the SR Table to clarify that Table 3.3.2-1 determines which SRs apply to which ESFAS Functions.

Note that each channel of process protection supplies both trains of the ESFAS. When testing channel I, train A and train B must be examined. Similarly, train A and train B must be examined when

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.2.1 (continued)

channels. It is based on the assumption that instrument channels monitoring the same parameter should read approximately the same value. Significant deviations between the two instrument channels could be an indication of excessive instrument drift in one of the channels or of something even more serious. A CHANNEL CHECK will detect gross channel failure; thus, it is key to verifying the instrumentation continues to operate properly between each CHANNEL CALIBRATION.

Agreement criteria are determined by the unit staff, based on a combination of the channel instrument uncertainties, including indication and reliability. If a channel is outside the criteria, it may be an indication that the sensor or the signal processing equipment has drifted outside its limit.

The Frequency is based on operating experience that demonstrates channel failure is rare. The CHANNEL CHECK supplements less formal, but more frequent, checks of channels during normal operational use of the displays associated with the LCO required channels.

SR 3.3.2.2

SR 3.3.2.2 is the performance of an ACTUATION LOGIC TEST. The SSPS is tested every 92 days on a STAGGERED TEST BASIS, using the semiautomatic tester. The train being tested is placed in the bypass condition, thus preventing inadvertent actuation. Through the semiautomatic tester, all possible logic combinations, with and without applicable permissives, are tested for each protection function. In addition, the master relay coil is pulse tested for continuity. This verifies that the logic modules are OPERABLE and that there is an intact voltage signal path to the master relay coils. The Frequency of every 92 days on a STAGGERED TEST BASIS is justified in Reference 910.

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.2.3

SR 3.3.2.3 is the performance of a MASTER RELAY TEST. The MASTER RELAY TEST is the energizing of the master relay, verifying contact operation and a low voltage continuity check of the slave relay coil. Upon master relay contact operation, a low voltage is injected to the slave relay coil. This voltage is insufficient to pick up the slave relay, but large enough to demonstrate signal path continuity. This test is performed every 92 days on a STAGGERED TEST BASIS. The time allowed for the testing (4 hours) is justified in Reference ~~8~~9. The frequency of 92 days is justified in Reference ~~9~~10.

SR 3.3.2.4

SR 3.3.2.4 is the performance of a COT.

A COT is performed on each required channel to ensure the entire channel will perform the intended Function. Setpoints must be found ~~within~~ conservative with respect to the Allowable Values specified in Table 3.3.~~1~~2-1.

The difference between the current "~~as~~-as-found" values and the previous test "~~as~~-as-left" values must be consistent with the drift allowance used in the setpoint methodology. The setpoint shall be left set consistent with the assumptions of the current unit specific setpoint methodology.

The "~~as~~-as-found" and "~~as~~-as-left" values must also be recorded and reviewed for consistency with the assumptions of Reference ~~6~~7.

The Frequency of 184 days is justified in Reference ~~9~~10.

SR 3.3.2.4 is modified by two Notes as identified in Table 3.3.2-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that

(continued)

the as-left setting for the channel be returned to within the as-left tolerance of the NTSP. Where a setpoint more conservative than the NTSP is used in the plant surveillance procedures (field setting), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the NTSP, then the channel shall be declared inoperable.

The second Note also requires that the methodologies for calculating the as-left and the as-found tolerances be in NMP-ES-033-006, Vogtle Setpoint Uncertainty Methodology and Scaling Instructions.

SR 3.3.2.5

SR 3.3.2.5 is the performance of a SLAVE RELAY TEST. The SLAVE RELAY TEST is the energizing of the slave relays. Contact operation is verified in one of two ways. Actuation equipment that may be operated in the design mitigation MODE is either allowed to function, or is placed in a condition

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.2.7 (continued)

CHANNEL CALIBRATIONS must be performed consistent with the assumptions of the unit specific setpoint methodology. The difference between the current "~~as~~ as-found" values and the previous test "~~as~~ as-left" values must be consistent with the drift allowance used in the setpoint methodology.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.2.7 (continued)

The Frequency of 18 months is based on the assumption of an 18 month calibration interval in the determination of the magnitude of equipment drift in the setpoint methodology.

This SR is modified by a Note stating that this test should include verification that the time constants are adjusted to the prescribed values where applicable. The steam line pressure-low and steam line pressure negative rate-high functions have time constants specified in their setpoints.

SR 3.3.2.4 is modified by two Notes as identified in Table 3.3.2-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be returned to within the as-left tolerance of the NTSP. Where a setpoint more conservative than the NTSP is used in the plant surveillance procedures (field setting), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the NTSP, then the channel shall be declared inoperable.

The second Note also requires that the methodologies for calculating the as-left and the as-found tolerances be in NMP-ES-033-006, Vogtle Setpoint Uncertainty Methodology and Scaling Instructions.

SR 3.3.2.8

This SR ensures the individual channel ESF RESPONSE TIMES are less than or equal to the maximum values assumed in the accident analysis. Response Time testing acceptance criteria are included in the FSAR, Chapter 16 (Ref. ~~10~~11). Individual component response times are not modeled in the analyses. The

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.2.8 (continued)

(1) historical records based on acceptable response time tests (hydraulic, noise, or power interrupt tests), (2) inplace, onsite, or offsite (e.g., vendor) test measurements, or (3) using vendor engineering specifications. WCAP-13632-P-A Revision 2, "Elimination of Pressure Sensor Response Time Testing Requirements" (Reference ~~11~~12), provides the basis and methodology for using allocated sensor response times in the overall verification of the channel response time for specific sensors identified in the WCAP. Response time verification for other sensor types must be demonstrated by test.

WCAP-14036-P Revision 1, "Elimination of Periodic Protection Channel Response Time Tests" (Reference ~~12~~13), provides the basis and methodology for using allocated signal processing and actuation logic response times in the overall verification of the protection system channel response time. The allocations for sensor, signal conditioning and actuation logic response times must be verified prior to placing the component in operational service and re-verified following maintenance that may adversely affect response time. In general, electrical repair work does not impact response time provided the parts used for repair are of the same type and value. Specific components identified in the WCAP may be replaced without verification testing. One example where response time could be affected is replacing the sensing assembly of a transmitter.

ESF RESPONSE TIME tests are conducted on an 18 month STAGGERED TEST BASIS. Testing of the final actuation devices, which make up the bulk of the response time, is included in the testing of each channel. The final actuation device in one train is tested with each channel. Therefore, staggered testing results in response time

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.2.8 (continued)

verification of these devices every 18 months. The 18 month Frequency is consistent with the typical refueling cycle and is based on unit operating experience, which shows that random failures of instrumentation components causing serious response time degradation, but not channel failure, are infrequent occurrences.

This SR is modified by a Note that clarifies that the turbine driven AFW pump is tested within 24 hours after reaching 900 psig in the SGs.

SR 3.3.2.9

SR 3.3.2.9 is the performance of a TADOT as described in SR 3.3.2.6 for the P-4 Reactor Trip Interlock, and the Frequency is once per 18 months. This Frequency is based on operating experience. The SR is modified by a note that excludes verification of setpoints during the TADOT. The function tested has no associated setpoint.

REFERENCES

1. Regulatory Guide 1.105, "Setpoints for Safety Related Instrumentation," Revision 3.

~~1~~2. FSAR, Chapter 6.

~~2~~3. FSAR, Chapter 7.

~~3~~4. FSAR, Chapter 15.

~~4~~5. IEEE-279-1971.

~~5~~6. 10 CFR 50.49.

~~6~~7. WCAP-11269, Westinghouse Setpoint Methodology for Protection Systems; as supplemented by:

- Amendments 38 (Unit 1) and 18 (Unit 2), ESFAS Safety Injection Pressurizer — Low allowable value revision.

- Amendments 34 (Unit 1) and 14 (Unit 2), RTS Steam Generator Water Level — Low Low, ESFAS Turbine Trip and Feedwater Isolation SG Water Level — High High, and ESFAS AFW SG Water Level — Low Low.

(continued)

BASES

REFERENCES (continued)

- Amendments 43 and 44 (Unit 1) and 23 and 24 (Unit 2), revised ESFAS Interlocks Pressurizer P-11 trip setpoint and allowable value.

~~7~~8. WCAP-14333-P-A, Rev. 1, October 1998.

~~8~~9. WCAP-10271-P-A, Supplement 2, Rev. 1, June 1990.

~~9~~10. WCAP-15376, Rev. 0, October 2000.

~~10~~11. FSAR, Chapter 16.

~~11~~12. WCAP-13632-P-A Revision 2, “Elimination of Pressure Sensor Response Time Testing Requirements,” January 1996.

~~12~~13. WCAP-14036-P-A Revision 1, “Elimination of Periodic Protection Channel Response Time Tests,” October 1998.

~~13~~14. Westinghouse Letter GP-16696, November 5, 1997.

~~14~~15. WCAP-13878-P-A Revision 2, “Reliability Assessment of Potter & Brumfield MDR Series Relays,” April 1996.

~~15~~16. WCAP-13900 Revision 0, “Extension of Slave Relay Surveillance Test Intervals,” April 1994.

~~16~~17. WCAP-14129 Revision 1, “Reliability Assessment of Westinghouse Type AR Relays Used as SSPS Slave Relays,” January 1999.

BASES

APPLICABLE SAFETY ANALYSES (continued)

Accident analyses credit the loading of the DG based on the loss of offsite power during a loss of coolant accident (LOCA). The actual DG start has historically been associated with the ESFAS actuation. The DG loading has been included in the delay time associated with each safety system component requiring DG supplied power following a loss of offsite power. The analyses assume a non-mechanistic DG loading, which does not explicitly account for each individual component of loss of power detection and subsequent actions.

The required channels of LOP instrumentation, in conjunction with the ESF systems powered from the DGs, and the turbine-driven Auxiliary Feedwater Pump provide unit protection in the event of any of the analyzed accidents discussed in Reference 2, in which a loss of offsite power is assumed.

The delay times assumed in the safety analysis for the ESF equipment include the DG start delay, and the appropriate sequencing delay, if applicable. The response times for ESFAS actuated equipment in LCO 3.3.2, "Engineered Safety Feature Actuation System (ESFAS) Instrumentation," include the appropriate DG loading and sequencing delay. The short time delays used in conjunction with the loss of voltage and degraded voltage bistables are chosen to preclude sequence initiation due to momentary voltage fluctuations. The undervoltage sensing bistable time delays are nominal values and are not included in the safety analyses.

The LOP instrumentation channels satisfy Criterion 3 of 10 CFR 50.36 (c)(2)(ii).

LCO

The LCO for LOP instrumentation requires that four channels per bus of both the loss of voltage and degraded voltage Functions shall be OPERABLE in MODES 1, 2, 3, and 4 when the LOP instrumentation supports safety systems associated with the ESFAS. In MODES 5 and 6, the four channels must be OPERABLE whenever the associated DG is required to be OPERABLE to ensure that the automatic start of the DG is available when needed. Loss of the LOP instrumentation Function could result in the delay of safety systems initiation when required. This could lead to unacceptable consequences during accidents. During the loss of offsite power the DG powers the motor driven auxiliary feedwater pumps. Failure of these pumps to start would leave only one turbine driven pump, as well as an increased potential for a loss of decay heat removal through the secondary system.

(continued)

BASES

ACTIONS

E.1 (continued)

required to be entered immediately. The actions of this LCO provide for adequate compensatory actions to support unit safety.

SURVEILLANCE REQUIREMENTS

SR 3.3.5.1

SR 3.3.5.1 is the performance of a COT. This test is performed every 92 days. A COT is performed on each required channel to ensure the entire channel will perform the intended Function. ~~Setpoints must be found within the specified Allowable Values.~~There is a plant specific program which verifies that the instrument channel functions as required by verifying the as-left and as-found setting are consistent with those established by the setpoint methodology. The Frequency is based on the known reliability of the equipment and controls and the multichannel redundancy available, and has been shown to be acceptable through operating experience.

SR 3.3.5.2

SR 3.3.5.2 is the performance of a CHANNEL CALIBRATION. The Nominal Trip Setpoint considers factors that may affect channel performance such as rack drift, etc. Therefore, the Nominal Trip Setpoint (within the calibration tolerance) is the expected value for the CHANNEL CALIBRATION. However, the Allowable Value is the value that was used for the loss of voltage and degraded grid studies. Therefore, a channel with an actual Trip Setpoint value that is conservative with respect to the Allowable Value is considered OPERABLE; but the channel should be reset to the Nominal Trip Setpoint value (within the calibration tolerance) to allow for factors which may affect channel performance (such as rack drift) prior to the next surveillance.

The setpoints, as well as the response to a loss of voltage and a degraded voltage test, shall include a single point verification that the trip occurs within the required time delay.

A CHANNEL CALIBRATION is performed every 18 months, or approximately at every refueling. CHANNEL CALIBRATION is a complete check of the instrument loop, including the sensor. The test verifies that the channel responds to a measured parameter within the necessary range and accuracy. There is a plant specific program which verifies that the instrument channel functions as required by verifying the as-left and as-found setting are consistent with those established by the setpoint methodology.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.6.4

A COT is performed every 92 days on each required channel to ensure the entire channel will perform the intended Function. The Frequency is based on the staff recommendation for increasing the availability of radiation monitors according to NUREG-1366 (Ref. 2). For MODES 1, 2, 3, and 4, this test verifies the capability of the instrumentation to provide the containment purge and exhaust system isolation. During CORE ALTERATIONS and movement of irradiated fuel in containment, this test verifies the capability of the required channels to generate the signals required for input to the control room alarm. ~~The setpoint shall be left consistent with the current unit specific calibration procedure tolerance.~~ There is a plant specific program which verifies that the instrument channel functions as required by verifying the as-left and as-found setting are consistent with those established by the setpoint methodology.

SR 3.3.6.5

SR 3.3.6.5 is the performance of a SLAVE RELAY TEST. The SLAVE RELAY TEST is the energizing of the slave relays. Contact operation is verified in one of two ways. Actuation equipment that may be operated in the design mitigation mode is either allowed to function or is placed in a condition where the relay contact operation can be verified without operation of the equipment. Actuation equipment that may not be operated in the design mitigation mode is prevented from operation by the SLAVE RELAY TEST circuit. For this latter case, contact operation is verified by a continuity check of the circuit containing the slave relay.

For slave relays and associated auxiliary relays in the CVI actuation system circuit that are Potter and Brumfield (P&B) type Motor Driven Relays (MDR), the SLAVE RELAY TEST is performed on an 18-month frequency. This test frequency is based on relay reliability assessments presented in WCAP-13878, “Reliability Assessment of Potter and Brumfield MDR Series Relays.” The reliability assessments are relay specific and apply only to Potter and Brumfield MDR series relays. Quarterly testing of the slave relays associated with non-P&B MDR auxiliary relays will be administratively controlled until an alternate method of testing the auxiliary relays is developed or until they are replaced by P&B MDR series relays.

SR 3.3.6.6

SR 3.3.6.6 is the performance of a TADOT. This test is a check of the Manual Actuation Functions and is performed every 18 months. Each Manual Actuation Function is tested up to, and including, the master relay coils. In some instances, the test includes actuation of the end device (i.e., pump starts, valve cycles, etc.).

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.6.6 (continued)

The test also includes trip devices that provide actuation signals directly to the SSPS, bypassing the analog process control equipment. The SR is modified by a Note that excludes verification of setpoints during the TADOT. The Functions tested have no setpoints associated with them. The Frequency is based on the known reliability of the Function and the redundancy available, and has been shown to be acceptable through operating experience.

SR 3.3.6.7

A CHANNEL CALIBRATION is performed every 18 months, or approximately at every refueling. CHANNEL CALIBRATION is a complete check of the instrument loop, including the sensor. The test verifies that the channel responds to a measured parameter within the necessary range and accuracy. There is a plant specific program which verifies that the instrument channel functions as required by verifying the as-left and as-found setting are consistent with those established by the setpoint methodology.

The Frequency is based on operating experience and is consistent with the typical industry refueling cycle.

SR 3.3.6.8

This SR ensures the individual channel RESPONSE TIMES are less than or equal to the maximum values assumed in the accident analysis. Response time testing acceptance criteria are included in the FSAR. Individual component response times are not modeled in the analyses. The analyses model the overall or elapsed time, from the point at which the parameter exceeds the Trip Setpoint Valve at the sensor, to the point at which the equipment in both trains reaches the required functional state.

RESPONSE TIME tests are conducted on an 18 month STAGGERED TEST BASIS. Testing of the final actuation devices, which make up the bulk of the response time, is included in the testing of each channel. The final actuation device in one train is tested with each channel. Therefore, staggered testing results in response time verification of these devices every 18 months. The 18 month frequency is consistent with the typical refueling cycle and is based on unit operating experience, which shows that random failures of instrumentation components causing serious response time degradation, but not channel failure, are infrequent occurrences.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.7.1 (continued)

something even more serious. A CHANNEL CHECK will detect gross channel failure; thus, it is key to verifying the instrumentation continues to operate properly between each CHANNEL CALIBRATION.

Agreement criteria are determined by the unit staff, based on a combination of the channel instrument uncertainties, including indication and readability. If a channel is outside the criteria, it may be an indication that the sensor or the signal processing equipment has drifted outside its limit.

The Frequency is based on operating experience that demonstrates channel failure is rare. The CHANNEL CHECK supplements less formal, but more frequent, checks of channels during normal operational use of the displays associated with the LCO required channels.

SR 3.3.7.2

A COT is performed once every 92 days on each required channel to ensure the entire channel will perform the intended function. This test verifies the capability of the instrumentation to provide the CREFS actuation. ~~The setpoints shall be left consistent with the unit specific calibration procedure tolerance.~~ There is a plant specific program which verifies that the instrument channel functions as required by verifying the as-left and as-found setting are consistent with those established by the setpoint methodology. The Frequency is based on the known reliability of the monitoring equipment and has been shown to be acceptable through operating experience.

SR 3.3.7.3

SR 3.3.7.3 is the performance of an ACTUATION LOGIC TEST. The train being tested is placed in the bypass condition, thus preventing inadvertent actuation. Through the semiautomatic tester, all possible logic combinations, with and without applicable permissives, are tested for each protection function. In addition, the master relay coil is pulse tested for continuity. This verifies that the logic modules are OPERABLE and there is an intact voltage signal path to the master relay coils. This test is performed every 31 days on a STAGGERED TEST BASIS. The Frequency is justified in WCAP-10271-P-A, Supplement 2, Rev. 1 (Ref. 1).

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BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.7.4

SR 3.3.7.4 is the performance of a TADOT. This test is a check of the Manual Actuation Functions and is performed every 18 months. Each Manual Actuation Function is tested, which in some instances includes actuation of the end device (i.e., pump starts, valve cycles, etc.).

The Frequency is based on the known reliability of the function and the redundancy available, and has been shown to be acceptable through operating experience. The SR is modified by a Note that excludes verification of setpoints during the TADOT. The Functions tested have no setpoints associated with them.

SR 3.3.7.5

A CHANNEL CALIBRATION is performed every 18 months, or approximately at every refueling. CHANNEL CALIBRATION is a complete check of the instrument loop, including the sensor. The test verifies that the channel responds to a measured parameter within the necessary range and accuracy.

There is a plant specific program which verifies that the instrument channel functions as required by verifying the as-left and as-found setting are consistent with those established by the setpoint methodology.

The Frequency is based on operating experience and is consistent with the typical industry refueling cycle.

SR 3.3.7.6

This SR ensures the individual channel ESF RESPONSE TIME for the CREFS radiogas monitor actuation instrumentation is less than or equal to the maximum values assumed in the accident analyses. Response time testing acceptance criteria are included in the FSAR, Chapter 16 (Ref. 3). Individual component response times are not modeled in the analyses. The analyses model the overall or total elapsed time, from the point at which the parameter exceeds the Trip Setpoint value at the sensor, to the point at which the equipment in both trains reaches the required functional state (e.g., pumps at rated discharge pressure, valves in full open or closed position).

For channels that include dynamic transfer functions (e.g., lag, lead/lag, rate/lag, etc.), the response time test may

(continued)

BASES

ACTIONS

B.1 and B.2 (continued)

SR 3.9.2.1. This places the unit in a condition that precludes an unplanned dilution event. The Completion Times of 1 hour and once per 12 hours thereafter for verifying SDM provide timely assurance that no unintended dilution occurred while the HFASA was inoperable and that SDM is maintained. The Completion Times of 4 hours and once per 14 days thereafter for verifying that the unborated source is isolated provide timely assurance that an unplanned dilution event cannot occur while the HFASA is inoperable and that this protection is maintained until the HFASA is restored.

SURVEILLANCE REQUIREMENTS

The HFASA channels are subject to a COT and a CHANNEL CALIBRATION.

SR 3.3.8.1

SR 3.3.8.1 requires the performance of a COT every 184 days to ensure that each channel of the HFASA and its setpoint are OPERABLE. This test shall include verification that the HFASA setpoint is less than or equal to 2.3 times background. There is a plant specific program which verifies that the instrument channel functions as required by verifying the as-left and as-found setting are consistent with those established by the setpoint methodology. The frequency of 184 days is consistent with the requirements for the source range channels. This Surveillance Requirement is modified by a Note that provides a 4-hour delay in the requirement to perform this surveillance for the HFASA instrumentation upon entering MODE 3 from MODE 2. This Note allows a normal shutdown to proceed without delay for the performance of the surveillance to meet the applicability requirements in MODE 3.

SR 3.3.8.2

SR 3.3.8.2 requires the performance of a CHANNEL CALIBRATION every 18 months. There is a plant specific program which verifies that the instrument channel functions as required by verifying the as-left and as-found setting are consistent with those established by the setpoint methodology. This test verifies that each channel responds to a measured parameter within the necessary range and accuracy. It encompasses the HFASA portion of the instrument loop. The frequency is based on operating experience and consistency with the typical industry refueling cycle.

Vogtle Electric Generating Plant – Units 1 & 2
License Amendment Request for Steam Generator Water Level High-High Setpoint Change

Enclosure 5

Application for Withholding and Affidavit, Proprietary Information Notice, and Copyright Notice

Westinghouse

Westinghouse Electric Company
Nuclear Services
1000 Westinghouse Drive
Cranberry Township, Pennsylvania 16066
USA

U.S. Nuclear Regulatory Commission
Document Control Desk
11555 Rockville Pike
Rockville MD 20852

Direct tel: (412) 374-4643
Direct fax: (724) 720-0754
e-mail: greshaja@westinghouse.com
Proj letter: LTR-SUA-11-5

CAW-11-3088

February 1, 2011

APPLICATION FOR WITHHOLDING PROPRIETARY
INFORMATION FROM PUBLIC DISCLOSURE

Subject: "Setpoint Methodology Used for the Steam Generator Water Level-High High Function," (Proprietary)

The proprietary information for which withholding is being requested in the above-referenced report is further identified in Affidavit CAW-11-3088 signed by the owner of the proprietary information, Westinghouse Electric Company LLC. The affidavit, which accompanies this letter, sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of 10 CFR Section 2.390 of the Commission's regulations.

Accordingly, this letter authorizes the utilization of the accompanying affidavit by Southern Nuclear Operating Company (SNC).

Correspondence with respect to the proprietary aspects of the application for withholding or the Westinghouse affidavit should reference this letter, CAW-11-3088, and should be addressed to J. A. Gresham, Manager, Regulatory Compliance and Plant Licensing, Westinghouse Electric Company LLC, Suite 428, 1000 Westinghouse Drive, Cranberry Township, Pennsylvania 16066.

Very truly yours,

BFMaurer /for

J. A. Gresham, Manager
Regulatory Compliance and Plant Licensing

Enclosures

CAW-11-3088

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

ss

COUNTY OF BUTLER:

Before me, the undersigned authority, personally appeared B. F. Maurer, who, being by me duly sworn according to law, deposes and says that he is authorized to execute this Affidavit on behalf of Westinghouse Electric Company LLC (Westinghouse), and that the averments of fact set forth in this Affidavit are true and correct to the best of his knowledge, information, and belief:

BF Maurer

B. F. Maurer, Manager
ABWR Licensing

Sworn to and subscribed before me
this 1st day of February 2011

Renee' Giampole
Notary Public

COMMONWEALTH OF PENNSYLVANIA
NOTARIAL SEAL
Renee Giampole, Notary Public
Penn Township, Westmoreland County
My Commission Expires September 25, 2013

(1) I am Manager, ABWR Licensing, in Nuclear Services, Westinghouse Electric Company LLC (Westinghouse), and as such, I have been specifically delegated the function of reviewing the proprietary information sought to be withheld from public disclosure in connection with nuclear power plant licensing and rule making proceedings, and am authorized to apply for its withholding on behalf of Westinghouse.

(2) I am making this Affidavit in conformance with the provisions of 10 CFR Section 2.390 of the Commission's regulations and in conjunction with the Westinghouse Application for Withholding Proprietary Information from Public Disclosure accompanying this Affidavit.

(3) I have personal knowledge of the criteria and procedures utilized by Westinghouse in designating information as a trade secret, privileged or as confidential commercial or financial information.

(4) Pursuant to the provisions of paragraph (b)(4) of Section 2.390 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld.

(i) The information sought to be withheld from public disclosure is owned and has been held in confidence by Westinghouse.

(ii) The information is of a type customarily held in confidence by Westinghouse and not customarily disclosed to the public. Westinghouse has a rational basis for determining the types of information customarily held in confidence by it and, in that connection, utilizes a system to determine when and whether to hold certain types of information in confidence. The application of that system and the substance of that system constitutes Westinghouse policy and provides the rational basis required.

Under that system, information is held in confidence if it falls in one or more of several types, the release of which might result in the loss of an existing or potential competitive advantage, as follows:

(a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by any of

Westinghouse's competitors without license from Westinghouse constitutes a competitive economic advantage over other companies.

(b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage, e.g., by optimization or improved marketability.

(c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.

(d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of Westinghouse, its customers or suppliers.

(e) It reveals aspects of past, present, or future Westinghouse or customer funded development plans and programs of potential commercial value to Westinghouse.

(f) It contains patentable ideas, for which patent protection may be desirable.

There are sound policy reasons behind the Westinghouse system which include the following:

(a) The use of such information by Westinghouse gives Westinghouse a competitive advantage over its competitors. It is, therefore, withheld from disclosure to protect the Westinghouse competitive position.

(b) It is information that is marketable in many ways. The extent to which such information is available to competitors diminishes the Westinghouse ability to sell products and services involving the use of the information.

(c) Use by our competitor would put Westinghouse at a competitive disadvantage by reducing his expenditure of resources at our expense.

(d) Each component of proprietary information pertinent to a particular competitive advantage is potentially as valuable as the total competitive advantage. If competitors acquire components of proprietary information, any one component may be the key to the entire puzzle, thereby depriving Westinghouse of a competitive advantage.

(e) Unrestricted disclosure would jeopardize the position of prominence of Westinghouse in the world market, and thereby give a market advantage to the competition of those countries.

(f) The Westinghouse capacity to invest corporate assets in research and development depends upon the success in obtaining and maintaining a competitive advantage.

(iii) The information is being transmitted to the Commission in confidence and, under the provisions of 10 CFR Section 2.390; it is to be received in confidence by the Commission.

(iv) The information sought to be protected is not available in public sources or available information has not been previously employed in the same original manner or method to the best of our knowledge and belief.

(v) The proprietary information sought to be withheld in this submittal is that which is appropriately marked in "Setpoint Methodology Used for the Steam Generator Water Level-High High Function," (Proprietary), for submittal to the Commission, being transmitted by Southern Nuclear Operating Company letter and Application for Withholding Proprietary Information from Public Disclosure, to the Document Control Desk. The proprietary information as submitted for use by Westinghouse for the Vogtle Electric Generating Plant Units 1 and 2.

This information is part of that which will enable Westinghouse to:

(a) Provide information in support of submittals for setpoint changes.

(b) Provide customer specific calculations.

(c) Provide licensing support for customer submittals.

Further this information has substantial commercial value as follows:

(a) Westinghouse plans to sell the use of similar information to its customers for the purpose of meeting NRC requirements for licensing documentation associated with setpoint changes.

(b) Westinghouse can sell support and defense of the technology to its customer in the licensing process.

(c) The information requested to be withheld reveals the distinguishing aspects of a methodology which was developed by Westinghouse.

Public disclosure of this proprietary information is likely to cause substantial harm to the competitive position of Westinghouse because it would enhance the ability of competitors to provide similar information and licensing defense services for commercial power reactors without commensurate expenses. Also, public disclosure of the information would enable others to use the information to meet NRC requirements for licensing documentation without purchasing the right to use the information.

The development of the technology described in part by the information is the result of applying the results of many years of experience in an intensive Westinghouse effort and the expenditure of a considerable sum of money.

In order for competitors of Westinghouse to duplicate this information, similar technical programs would have to be performed and a significant manpower effort, having the requisite talent and experience, would have to be expended.

Further the deponent sayeth not.

PROPRIETARY INFORMATION NOTICE

Transmitted herewith are proprietary and/or non-proprietary versions of documents furnished to the NRC in connection with requests for generic and/or plant-specific review and approval.

In order to conform to the requirements of 10 CFR 2.390 of the Commission's regulations concerning the protection of proprietary information so submitted to the NRC, the information which is proprietary in the proprietary versions is contained within brackets, and where the proprietary information has been deleted in the non-proprietary versions, only the brackets remain (the information that was contained within the brackets in the proprietary versions having been deleted). The justification for claiming the information so designated as proprietary is indicated in both versions by means of lower case letters (a) through (f) located as a superscript immediately following the brackets enclosing each item of information being identified as proprietary or in the margin opposite such information. These lower case letters refer to the types of information Westinghouse customarily holds in confidence identified in Sections (4)(ii)(a) through (4)(ii)(f) of the affidavit accompanying this transmittal pursuant to 10 CFR 2.390(b)(1).

COPYRIGHT NOTICE

Vogtle Electric Generating Plant – Units 1 & 2
License Amendment Request for Steam Generator Water Level High-High Setpoint Change

Enclosure 7

Setpoint Methodology Used for the Steam Generator Water Level High-High Function (Non-Proprietary)

Westinghouse Non-Proprietary Class 3

LTR-SUA-11-5
Revision 0
Attachment 2

Setpoint Methodology Used for the Steam Generator Water Level-High High Function

Westinghouse Electric Company LLC
1000 Westinghouse Drive
Cranberry Township, PA 16066

Basic Westinghouse Uncertainty Methodology

The general uncertainty algorithm used as a base to determine the overall instrument uncertainty for a Reactor Trip System / Engineered Safety Features Actuation System (RTS/ESFAS) trip function is defined in a Westinghouse paper presented at an Instrument Society of America/Electric Power Research Institute (ISA/EPRI) conference in June, 1992. This approach is consistent with American National Standards Institute (ANSI), ANSI/ISA-67.04.01-2006. The basic uncertainty algorithm is the Square-Root-Sum-of-the-Squares (SRSS) of the applicable uncertainty terms, which is endorsed by the ISA standard. All appropriate and applicable uncertainties, as defined by a review of the plant baseline design input documentation, have been included in each RTS/ESFAS trip function uncertainty calculation. ISA-RP67.04.02-2000 was utilized as a general guideline, but each uncertainty and its treatment is based on Westinghouse methods which are consistent or conservative with respect to this document. The latest version of Nuclear Regulatory Commission (NRC) Regulatory Guide 1.105 (Revision 3) endorses the 1994 version of ISA S67.04, Part I. Westinghouse has evaluated this NRC document and has determined that the RTS/ESFAS trip function uncertainty calculation contained herein is consistent with the guidance contained in Revision 3. It is believed that the total channel uncertainty (Channel Statistical Allowance or CSA) represents a 95/95 value as requested in Regulatory Guide 1.105.

The methodology used to combine the uncertainty components for a channel is an appropriate combination of those groups which are statistically and functionally independent. Those uncertainties which are not independent are conservatively treated by arithmetic summation and then systematically combined with the independent terms. The basic methodology used is the SRSS technique. This technique, or others of a similar nature, has been used in WCAP-10395 and WCAP-8567. WCAP-8567 is approved by the NRC noting acceptability of statistical techniques for the application requested. Also, various ANSI, American Nuclear Society (ANS), and ISA standards approve the use of probabilistic and statistical techniques in determining safety-related setpoints. The basic methodology used herein is essentially the same as that identified in a Westinghouse paper presented at an ISA/EPRI conference in June, 1992. Differences between the algorithm presented in this paper and the equations presented below are due to Vogtle Units 1 and 2 specific characteristics in design and should not be construed as differences in approach.

The generalized relationship between the uncertainty components and the calculated uncertainty for a channel is:

$$CSA = \sqrt{\begin{array}{l} PMA^2 + PEA^2 + SRA^2 + (SMTE + SD)^2 + (SMTE + SCA)^2 + \\ SPE^2 + STE^2 + (RMTE + RD)^2 + (RMTE + RCA)^2 + \\ RTE^2 \end{array}} \\ + EA + Bias$$

where,

CSA	=	Channel Statistical Allowance
PMA	=	Process Measurement Accuracy
PEA	=	Primary Element Accuracy
SRA	=	Sensor Reference Accuracy
SCA	=	Sensor Calibration Accuracy
SMTE	=	Sensor Measurement and Test Equipment Accuracy

SPE	=	Sensor Pressure Effects
STE	=	Sensor Temperature Effects
SD	=	Sensor Drift
RCA	=	Rack Calibration Accuracy
RMTE	=	Rack Measurement and Test Equipment Accuracy
RTE	=	Rack Temperature Effects
RD	=	Rack Drift
EA	=	Environmental Allowance
BIAS	=	One directional, known magnitude allowance

The equation above is based on the following: 1) The sensor and rack measurement and test equipment uncertainties are treated as dependent parameters with their respective drift and calibration accuracy allowances. 2) While the environmental allowances are not considered statistically dependent with all other parameters, the equipment qualification testing generally results in large magnitude, non-random terms that are conservatively treated as limits of error which are added to the statistical summation. Westinghouse generally considers a term to be a limit of error if the term is a bias with an unknown sign. The term is added to the SRSS in the direction of conservatism. 3) Bias terms are one directional with known magnitudes (which may result from several sources, e.g., drift or calibration data evaluations) and are also added to the statistical summation. 4) The calibration terms are treated in the same radical with the other terms based on an assumption of trending, i.e., drift and calibration data are evaluated on a periodic and timely basis. This evaluation should confirm that the distribution function characteristics assumed as part of the treatment of the terms are still applicable. 5) Vogtle Units 1 and 2 will monitor the "as left" and "as found" data for the sensors and process racks. This process provides performance information that results in a net reduction of the CSA magnitude (over that which would be determined if data review were not performed). Consistent with the request of Regulatory Guide 1.105, the CSA value from this equation is believed to have been determined at a 95 % probability and at a 95 % confidence level (95/95).

Instrument Channel Uncertainty Calculations

Table 1 below provides individual component uncertainties and the CSA calculation for the Steam Generator Water Level – High-High (P14) Engineered Safety Features Actuation System Channel for Vogtle Units 1 and 2. This table lists the Safety Analysis Limit (SAL), Nominal Trip Setpoint (NTS), and Allowable Value (AV) (in engineering units), and Channel Statistical Allowance, Margin, Total Allowance (TA), As Left, As Found, and uncertainty terms (in % span). Westinghouse reports the values in uncertainty calculations to one decimal place using the technique of rounding down values less than 0.05 % span and rounding up values greater than or equal to 0.05 % span. Parameters reported as "0.0" have been identified as having a value of ≤ 0.04 % span. Parameters reported as "0" or "---" in the tables are not applicable (i.e., have no value) for that channel.

Definitions

The following definitions of critical uncertainty terms are provided as follows:

As Found

The condition in which a transmitter, process rack module, or process instrument loop is found after a period of operation. For example, after one cycle of operation, a Steam Generator Level transmitter's output at 50 % span was measured to be 12.05 mA. This would be the "as found" condition. For the process racks, the As Found Tolerance (AFT) is equal to the process rack As Left Tolerance (ALT), which is equal to the magnitude of the Rack Calibration Accuracy (RCA), i.e., AFT = ALT = RCA. The AFT is a two-sided parameter (+/-) about the NTS.

As Left

The condition in which a transmitter, process rack module, or process instrument loop is left after calibration or bistable trip setpoint verification. This condition is typically better than the calibration accuracy for that piece of equipment. For example, the calibration point for a Steam Generator Level transmitter at 50 % span is 12.0 ± 0.04 mA. A measured "as left" condition of 12.03 mA would satisfy this calibration tolerance. In this instance, if the calibration was stopped at this point (i.e., no additional efforts were made to decrease the deviation) the "as left" error would be + 0.03 mA or + 0.19 % span, assuming a 16 mA (4 to 20 mA) instrument span. For the process racks, the ALT is equal to the magnitude of the RCA, i.e., ALT = RCA. The ALT is a two-sided parameter (+/-) about the NTS.

Channel Statistical Allowance

The combination of the various channel uncertainties via SRSS and algebraic techniques. It includes instrument (sensor and process rack) uncertainties and non-instrument related effects (PMA), see above equation. This parameter is compared with the Total Allowance for determination of instrument channel margin. The uncertainties and conservatism of the CSA algorithm result in a CSA magnitude that is believed to be determined on a two-sided 95/95 basis.

Margin

The calculated difference (in % instrument span) between TA and CSA.

Margin = TA – CSA
Margin is defined to be a non-negative number, i.e., Margin ≥ 0 % span

Nominal Trip Setpoint

A bistable trip setpoint found in plant procedures. This value is the nominal value to which the bistable is set, as accurately as reasonably achievable. The NTS is based on engineering judgement (to arrive at a Margin ≥ 0 % span), or a historical value, that has been demonstrated over time to result in adequate operational margin.

Rack Calibration Accuracy

Rack calibration accuracy is defined as the two-sided (+/-) calibration tolerance about the NTS of the process racks. It is assumed that the individual modules in a loop are calibrated to a particular tolerance and that the process loop as a string is verified to be calibrated to a specific tolerance. The string tolerance is typically less than the arithmetic sum or SRSS of the individual module tolerances. This forces calibration of the process loop in such a manner as to exclude a systematic bias in the individual module calibrations, i.e., as left values for individual modules must be compensating in sign and magnitude when considered as an instrument string.

Safety Analysis Limit

The parameter value found in the Updated Final Safety Analysis Report (UFSAR) safety analysis or other plant operating limit at which a reactor trip or actuation function is assumed to be initiated.

Total Allowance

The absolute value of the difference (in % instrument span) between the SAL and the NTS.

$TA = |SAL - NTS|$

The following is a diagram of the Setpoint relationships for the Westinghouse Setpoint Methodology.

Figure 1 - Setpoint Relationships

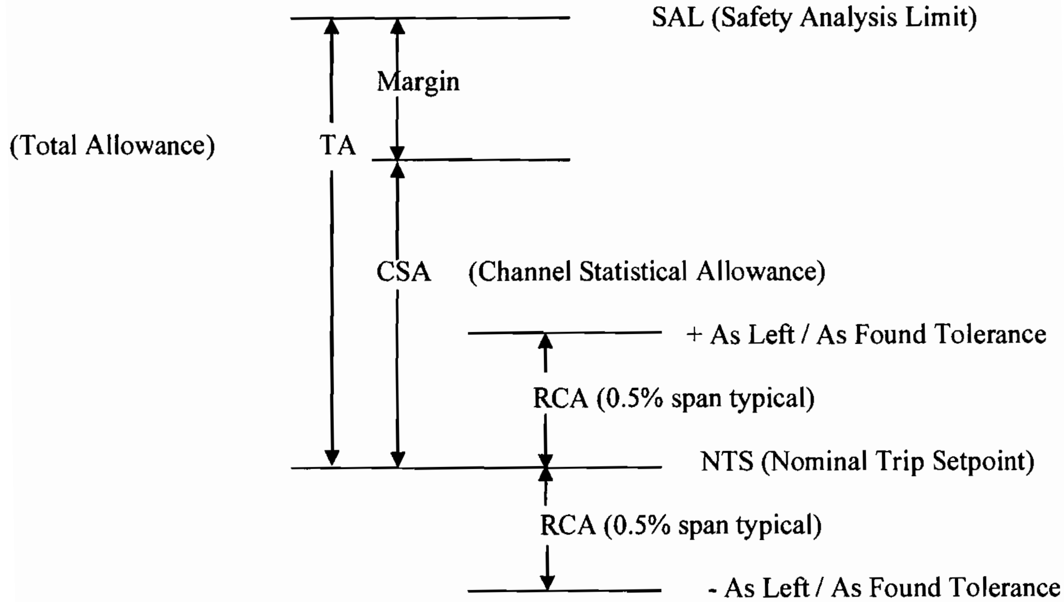

Table 1 Steam Generator Water Level - High-High
(Rosemount 1154DH5 Transmitter)

Parameter	Allowance *
[ ] a,c	[ ] a,c
All treated as a bias	
Primary Element Accuracy (PEA)	
Sensor Calibration Accuracy (SCA)	
Sensor Reference Accuracy (SRA)	
Measurement & Test Equipment Accuracy (SMTE)	
Sensor Pressure Effects (SPE)	
Sensor Pressure Effects Bias (SPE_B)	
Sensor Temperature Effects (STE)	
Sensor Drift (SD)	
Sensor Drift Bias (SD_B)	
Rack Calibration Accuracy (RCA)	
Rack Measurement & Test Equipment Accuracy (RMTE)	
Rack Temperature Effect (RTE)	
Rack Drift (RD)	

*In percent span (100%)

Table 1 Steam Generator Water Level - High-High (Rosemount 1154DH5 Transmitter) cont.

Channel Statistical Allowance =

$$\sqrt{\begin{array}{l} PEA^2 + (SMTE + SD)^2 + (SMTE + SCA)^2 + SRA^2 + SPE^2 + STE^2 + \\ (RMTE + RCA)^2 + RTE^2 + (RMTE + RD)^2 \end{array}}$$

$$+PMA_{PP} + PMA_{RL} + PMA_{FV} + PMA_{DL} + PMA_{SC} + PMA_{ID} + PMA_{FR} + PMA_{MD} + SD_B + SPE_B$$

[ ] a,c

Negative value for CSA indicates direction not margin

SAL = 106.1 % span
NTS = 82 % span
TA = SAL – NTS = 24.1 % span
Margin = TA – CSA = 2.0 % span

Allowable Value and As Left and As Found Calculations

RCA = 0.5% span
+ As Left = NTS + RCA = 82.5 % span
- As Left = NTS – RCA = 81.5 % span
+ As Found = NTS + RCA = 82.5 % span
- As Found = NTS – RCA = 81.5 % span
Allowable Value = NTS + RCA = ≤ 82.5 % span

Westinghouse Uncertainty Calculations Basic Assumptions / Premises

The equation noted above is based on several premises. These are:

1) The instrument technicians make reasonable attempts to achieve the NTS as an "as left" condition at the start of each process rack's surveillance interval.

2) The process rack drift will be evaluated (probability distribution function characteristics and drift magnitude) over multiple surveillance intervals. Process rack drift is defined as the arithmetic difference between previous as left and current as found values.

3) The process rack calibration accuracy will be evaluated (probability distribution function characteristics and calibration magnitude) over multiple surveillance intervals.

4) The process racks, including the bistables, are verified/functionally tested in a string or loop process.

It should be noted for (1) above that it is not necessary for the instrument technician to recalibrate a device or channel if the "as found" condition is not exactly at the nominal condition, but is within the two-sided ALT. As noted above, the uncertainty calculations assume that the ALT (conservative and non-conservative direction) is satisfied on a reasonable, statistical basis, not that the nominal condition is satisfied exactly. This evaluation assumes that the RCA and RD parameter values noted in Table 1 are satisfied on at least a two-sided 95 % probability / 95 % confidence level basis. It is therefore necessary for the plant to periodically re-verify the continued validity of these assumptions. This prevents the introduction of non-conservative biases due to a procedural basis without the plant staff's knowledge and appropriate treatment.

In summary, a process rack channel is considered to be "calibrated" when the two-sided ALT is satisfied. An instrument technician may determine to recalibrate if near the extremes of the ALT, but it is not required. Recalibration is explicitly required any time the "as found" condition of the device or channel is outside of the ALT. A device or channel may not be left outside the ALT without declaring the channel "inoperable" and appropriate action taken. Thus, an ALT may be considered as an outer limit for the purposes of calibration and instrument uncertainty calculations.

From the above it should be noted that the discussion was limited to the ALT. Nothing was said with respect to the AFT. That is because, for Westinghouse supplied process racks, drift is expected to be small with respect to the ALT. Statistical evaluations of Westinghouse supplied 7300 process racks have determined that an operable process rack channel with an as left condition near the NTS should have an as found condition near the NTS on the next surveillance, and well within the two-sided ALT about the NTS. Thus, Westinghouse has concluded that for operable racks AFT = ALT = RCA.

The above results in the Westinghouse Setpoint Methodology's reliance on the NTS and not the Limiting Trip Setpoint (LTSP) as defined in ISA 67.04.01-2006 or the Limiting Setpoint (LSP) as defined in RIS 2006-17. Specific to RIS 2006-17, the LSP is noted as: "... the limiting setting for the channel trip setpoint (TSP) considering all credible instrument errors associated with the instrument channel. The LSP is the limiting value to which the channel must be reset at the conclusion of periodic testing to ensure the safety limit (SL) will not be exceeded if a design basis event occurs before the next periodic surveillance or calibration." As noted on the previous page, with respect to the Westinghouse Setpoint Methodology, operability of the process racks is defined as the ability to be calibrated about the NTS (ALT about the NTS) and subsequent surveillance should find the channel within the AFT = ALT about the NTS. On those rare occasions that the channel is found outside of the AFT = ALT, then operability requirements would be initially satisfied via recalibration, or reset, about the NTS. Operability defined as conservative with respect to a zero margin LSP is a concept that is insufficient for the Westinghouse Setpoint Methodology, and is inconsistent with its basic assumption of the AFT = ALT = RCA definition. In order to have confidence (statistical or otherwise) of appropriate operation of the process racks, it is necessary that the process racks operate within the two-sided limits defined about the NTS. This is particularly true for protection functions that have historical NTS values that generate large Margins. From a Westinghouse Setpoint Methodology perspective, systematic allowance of large drift magnitudes in excess of equipment design – either by large magnitude RD or RMTE terms or utilization of an LSP, generates a false sense of security which is inappropriate for future operation consideration, and which erodes the concept of performance based specifications and limits.

Process Rack Operability Determination Program and Criteria

The parameter of most interest as a first pass operability criterion is relative drift ("as found" – "as left") found to be within RD, where RD is the two-sided 95/95 drift value assumed for that channel. However, this would require the instrument technician to record both the "as left" and "as found" conditions and perform a calculation in the field. This field calculation requires having the "as left" value for that device at the time of drift determination.

An alternative for the process racks is the Westinghouse method for use of a fixed magnitude, two-sided AFT about the NTS. It would be reasonable for this AFT to be RMTE + RD, where RD is the actual statistically determined 95/95 drift value and RMTE is defined in the Vogtle Units 1 and 2 procedures. However, comparison of this value with the RCA tolerance utilized in the Westinghouse uncertainty calculations would yield a value where the AFT is less than the RCA tolerance (ALT). This is due to RD being defined as a relative drift magnitude as opposed to an absolute drift magnitude and the process racks being very stable, i.e., no significant drift. Thus, it is not reasonable to use this criterion as an AFT in an absolute sense, as it conflicts with the second criterion for operability determination, which is the ability of the equipment to be returned to within its calibration tolerance. That is, a channel could be found outside the absolute drift criterion, yet be inside the calibration criterion. Therefore, a more reasonable approach for the plant staff was determined. An AFT criterion based on an absolute magnitude that is the same as the RCA criterion, i.e., the allowed deviation from the NTS on an absolute indication basis is plus or minus the RCA tolerance (ALT). A process loop found inside the RCA tolerance (ALT) on an indicated basis is considered to be operable. A channel found outside the RCA tolerance (ALT) is evaluated and recalibrated. The channel must be returned to within the ALT, for the channel to be considered operable. This criterion is incorporated into plant, function specific calibration and drift procedures as the defined ALT about the NTS. At a later date, once the "as found" data is compiled, the relative drift ("as found"– "as left") can be calculated and compared against the RD value. This comparison can then be utilized to ensure consistency with the assumptions of the uncertainty calculations documented in Table 1. A channel found to exceed this criterion multiple times should trigger a more comprehensive evaluation of the operability of the channel. It is believed that a Vogtle Units 1 and 2 systematic program of drift and calibration review used for the process racks is acceptable as a set of first pass criteria. More elaborate evaluation and monitoring may be included, as necessary, if the drift is found to be excessive or the channel is found difficult to calibrate. Based on the above, it is believed that the total process rack program used at Vogtle Units 1 and 2 will provide a more comprehensive evaluation of operability than a simple determination of an acceptable "as found."

Application to the Plant Technical Specifications

The drift operability criteria described for the process racks above would be based on a statistical evaluation of the performance of the installed hardware. Thus, this criterion would change if the M&TE is changed, or the procedures used in the surveillance process are changed significantly and particularly if the process rack modules themselves are changed. Therefore, the operability criteria are not expected to be static. In fact they are expected to change as the characteristics of the equipment change. This does not imply that the criteria can increase due to increasingly poor performance of the equipment over time; but rather just the opposite. As new and better equipment and processes are instituted, the operability criteria magnitudes would be expected to decrease to reflect the increased capabilities of the replacement equipment. For example, if the plant purchased some form of equipment that allowed the determination of relative drift in the field, it would be expected that the rack operability would then be based on the RD value.

The above is basically consistent with the recommendations of the Westinghouse paper presented at the June 1994, ISA/EPRI conference in Orlando, FL. In addition, the plant operability determination processes described above are consistent with the basic intent of the ISA paper.

Therefore the Steam Generator Water Level – High-High (P14) AV for the Vogtle Units 1 and 2 Technical Specifications are "performance based" and are determined by adding (or subtracting) the calibration accuracy (RCA = ALT) of the device tested during the Channel Operational Test to the NTS in the non-conservative direction (i.e., toward or closer to the SAL) for the application. This value is calculated on Table 1.

References:

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