Advanced Passive 1000 (AP1000)
Generic Technical Specification Traveler (GTST)

Title: Changes Related to LCO 3.3.2, Reactor Trip System (RTS) Source Range Instrumentation

I. Technical Specifications Task Force (TSTF) Travelers, Approved Since Revision 2 of STS NUREG-1431, and Used to Develop this GTST

TSTF Number and Title:

TSTF-425-A, Rev 3, Relocate Surveillance Frequencies to Licensee Control – RITSTF Initiative 5b
TSTF-469-T, Rev 0, Correct Action to Suspend Positive Reactivity Additions
TSTF-519-T, Rev 0, Increase Standardization in Condition and Required Action Notes

STS NUREGs Affected:

TSTF-425-A, Rev 3: NUREGs 1430, 1431, 1432, 1433, and 1434
TSTF-469-T, Rev 0: NUREG 1431 and 1432
TSTF-519-T, Rev 0: NUREG 1430 and 1431

NRC Approval Date:

TSTF-425-A, Rev. 3: 06-Jul-09
TSTF-469-T, Rev 0: 22-Apr-04
TSTF-519-T, Rev 0: 16-Oct-09 (TSTF Review)

TSTF Classification:

TSTF-425-A, Rev 3: Technical Change
TSTF-469-T, Rev 1: Editorial Change
TSTF-519-T, Rev 0: NUREG Only Change

II. Reference Combined License (RCOL) Standard Departures (Std. Dep.), RCOL COL Items, and RCOL Plant-Specific Technical Specifications (PTS) Changes Used to Develop this GTST

RCOL Std. Dep. Number and Title:

There are no Vogtle Electric Generating Plant Units 3 and 4 (Vogtle or VEGP) departures applicable to GTS 3.3.1.

RCOL COL Item Number and Title:

There are no Vogtle COL items applicable to GTS 3.3.1.

RCOL PTS Change Number and Title:

The VEGP License Amendment Request (LAR) proposed the following changes to the initial version of the PTS (referred to as the current TS by the VEGP LAR). These changes include Administrative Changes (A), Detail Removed Changes (D), Less Restrictive Changes (L), and More Restrictive Changes (M). These changes are discussed in Sections VI and VII of this GTST.

VEGP LAR DOC A024:	Reformat of GTS 3.3.1 into Seven Parts; 3.3.1 through 3.3.7; note that this maps GTS 3.3.1 requirements into interim A024-modified TS (MTS) Subsection 3.3.2, to which the other changes are applied.
VEGP LAR DOC A026:	SR Note Change
VEGP LAR DOC M01:	Deletion of Reactor Trip Channel Operational Test (RTCOT) Definition
VEGP LAR DOC M02:	Provision for Two or More Inoperable Divisions or Channels
VEGP LAR DOC L07:	Certain TS Required Actions Requiring the Reactor Trip Breakers (RTBs) to be Opened Are Revised into Two Required Actions
VEGP LAR DOC L09:	Revise Table 3.3.1-1 Function 5 and related Conditions
VEGP LAR DOC L10:	Delete PTS 3.3.1 Function 16, Interlocks
VEGP LAR DOC L11:	Delete Table 3.3.1-1 Function 5 third row and associated references

III. Comments on Relations Among TSTFs, RCOL Std. Dep., RCOL COL Items, and RCOL PTS Changes

This section discusses the considered changes that are: (1) applicable to operating reactor designs, but not to the AP1000 design; (2) already incorporated in the GTS; or (3) superseded by another change.

TSTF-425-A deferred for future consideration.

TSTF-519-T has already been incorporated into the AP1000 GTS regarding the Writer's Guide for Improved Standard Technical Specifications (Reference 4) placement of Notes in TS Actions tables.

IV. Additional Changes Proposed as Part of this GTST (modifications proposed by NRC staff and/or clear editorial changes or deviations identified by preparer of GTST)

Uniformly use:

- Power Range Neutron Flux,
- Intermediate Range Neutron Flux, and
- Source Range Neutron Flux

in place of other phrases that refer to power, intermediate, and source range instrumentation channels or detectors.

Insert “as-left” in SR phrases “within the allowed **as-left** tolerance.” (NRC Staff Comment)

Reference 2 in the Bases is revised from “APP-GW-GLR-137, Revision 1, “Bases of Digital Overpower and Overtemperature Delta-T (OPΔT/ OTΔT) Reactor Trips,” Westinghouse Electric Company LLC” to “APP-GW-GSC-020, “Technical Specification Completion Time and Surveillance Frequency Justification.” OPΔT/ OTΔT reactor trips are addressed in STS 3.3.1. Reference 2 in STS 3.3.2 is cited in reference to TS Completion Times and Surveillance Frequencies.

Editorial changes are made throughout the Bases to provide consistent instrumentation terminology. Additional minor editorial changes are also implemented throughout the Bases to correct grammar, provide consistency between sections, and improve clarity.

Identify all acronyms at the first occurrence in the Bases discussion.

Added appropriate references. Adjusted the listed reference order to reflect the order of their initial appearance.

APOG Recommended Changes to Improve the Bases

For added clarity, revise the opening sentence of the “ASA, LCO, and Applicability” section of the Bases for STS Subsections 3.3.1 through 3.3.7 to state:

> The RTS functions to maintain **compliance with** the SLs during all AOOs and mitigates the consequences of DBAs in all MODES in which the **reactor trip breakers (**RTBs**)** are closed.

Throughout the Bases, references to Sections and Chapters of the FSAR do not include the “FSAR” clarifier. Since these Section and Chapter references are to an external document, it is appropriate to include the “FSAR” modifier. (DOC A003)

V. Applicability

Affected Generic Technical Specifications and Bases:

Section 3.3.2, Reactor Trip System (RTS) Source Range Instrumentation

Changes to the Generic Technical Specifications and Bases:

GTS 3.3.1, "Reactor Trip System (RTS) Instrumentation," is reformatted by DOC A024 into multiple Specifications including interim A024-modified TS (MTS) 3.3.2, "Reactor Trip System (RTS) Source Range Instrumentation." The reformatting relocates GTS 3.3.1 Function 5, "Source Range Neutron Flux High Setpoint," into MTS 3.3.2 as part of the LCO statement. The MTS format is depicted in Section XI of this GTST as the reference case in the markup of the GTS instrumentation requirements for the source range instrumentation.

MTS 3.3.2 LCO Title	GTS 3.3.1 Function
Reactor Trip System (RTS) Source Range Instrumentation	5. Source Range Neutron Flux High Setpoint

References 2, 3, and 6 provide details showing the correspondence of GTS 3.3.1 Functions and STS 3.3.1 through 3.3.7 Functions.

The Applicability Statement for MODES 3, 4, and 5 is revised to "Plant Control System capable of rod withdrawal or one or more rods not fully inserted." from "Reactor Trip Breakers (RTBs) closed and Plant Control System capable of rod withdrawal." This avoids undesirable plant secondary effects due to interlock actuation. (DOC L07)

GTS 3.3.1 Conditions I, J, Q and R are reordered and relabeled as AP1000 MTS 3.3.2 Conditions A, B, C and D. (DOC A024)

GTS Table 3.3.1-1, Function 5, third row is deleted (including footnote (e)). This eliminates the need for MTS Condition D. The requirement is inappropriately placed in the Specification requiring Reactor Trip System operability. (DOC L11)

GTS Table 3.3.1-1 footnote (d), "Below the P-6 (Intermediate Range Neutron Flux) interlocks," applies to operation in MODE 2 for source range instrumentation. GTS Table 3.3.1-1 footnote (d) is incorporated into the MTS 3.3.3 LCO Applicability statement for MODE 2. GTS Table 3.3.1-1 footnote (a), "With Reactor Trip Breakers (RTBs) closed and Plant Control System capable of rod withdrawal," and footnote (e), "With RTBs open. In this condition, Source Range Function does not provide reactor trip but does provide indication," applies to operation in MODES 3, 4, and 5 for source range instrumentation. GTS Table 3.3.1-1 footnote (a) is incorporated into the MTS 3.3.3 LCO Applicability statement for MODES 3, 4, and 5 and footnote (e) is eliminated. (DOC A024 and DOC L11)

STS 3.3.2 Conditions A and B are added to provide Actions to place inoperable channels in bypass and/or trip in MODE 2. (DOC L09)

MTS 3.3.2 Condition A statement becomes STS 3.3.2 Condition C and is revised to reference new Actions A and B. (editorial result of DOC L09)

MTS 3.3.2 Condition B (STS 3.3.2 Condition F) is revised to address three or more inoperable channels. Otherwise, LCO 3.0.3 would apply when the LCO is not met and the associated Actions are not met or an associated Action is not provided. (DOC M02)

MTS 3.3.2 Condition A Action statement A.1 becomes STS 3.3.2 Action statement C.1 and is revised to “Suspend positive reactivity additions that could result in a loss of required SDM.” The accident analyses assume that events are initiated with the required SDM present. The proposed Required Actions will protect this assumption. (TSTF-469-T)

MTS 3.3.2 Condition C becomes STS 3.3.2 Condition D. The requirement to open RTBs associated with proposed MTS 3.3.2 Action Statement C.2 is replaced by two Actions to “initiate action to fully insert all rods” and “place the Plant Control System in a condition incapable of rod withdrawal.” This provides flexibility to avoid potentially undesirable effects of opening RTBs and initiating certain interlocks. (DOC L07 and editorial result of DOC L09)

MTS 3.3.2 Condition D (GTS 3.3.1 Condition R) is deleted. This is related to the elimination of Function 5, third row requirement associated with GTS 3.3.1 Table 3.3.1-1. (DOC L11)

GTS SR 3.3.1.1 is retained and renumbered as MTS SR 3.3.2.1. GTS SR 3.3.1.8 and 3.3.1.9 are combined and renumbered as STS SR 3.3.2.2. GTS SR 3.3.1.11 is retained and renumbered as STS SR 3.3.2.3. GTS SR 3.3.1.13 is retained and renumbered as STS SR 3.3.2.4. No Function Table is required. The MTS format is depicted as the reference case in the attached markup. (DOC A024)

MTS SR 3.3.2.2 Surveillance Note regarding verification that interlock P-6 is in the required state for existing unit conditions is deleted. As discussed in the Bases, the interlock operability is adequately addressed by each related Function’s requirement to be Operable and the requirement for actuation logic operability. (DOC L10)

MTS SR 3.3.2.2 is revised from “Perform RTCOT...” to “Perform COT...” and Frequency Note is repositioned as a Surveillance Note, replacing the PTS Surveillance Note. The definition of RTCOT does not explicitly require adjustments of required alarm, interlock, and trip setpoints required for channel OPERABILITY such that the setpoints are within the necessary range and accuracy. NUREG-1431 specifies the COT for similar Functions. The Note relocation is per the Writer's Guide (Reference 5). (DOC M01 and DOC A026)

The Bases are revised to reflect these changes.

The following tables are provided as an aid to tracking the various changes to GTS 3.3.1 Conditions, Required Actions, Functions, Applicability Footnotes, and Surveillance Requirements that result in interim A024-modified TS (MTS) 3.3.2 and as further changed, STS 3.3.2.

Changes to Conditions

GTS 3.3.1 Condition	MTS 3.3.2 Condition	STS 3.3.2 Condition	Other STS Subsections Addressing the Listed Condition	Additional DOC Changes
---	---	A	---	L09
---	---	B	---	L09
A	→	→	3.3.1	---
B	→	→	3.3.5	---
C	→	→	3.3.5	---
D	→	→	3.3.1	---
E	→	→	3.3.1	---
F	→	→	3.3.3	---
G	→	→	3.3.3	---
H	→	→	3.3.3	---

GTS 3.3.1 Condition	MTS 3.3.2 Condition	STS 3.3.2 Condition	Other STS Subsections Addressing the Listed Condition	Additional DOC Changes
I	A	C	---	L09
J	B	F	---	M02
K	→	→	3.3.1	---
L	→	→	3.3.4, 3.3.6	---
M	→	→	3.3.1	---
N	→	→	3.3.7	---
O	→	→	3.3.7	---
P	→	→	3.3.4, 3.3.6	---
Q	C	D	GTS Condition Q split into 2 Conditions	L07
Q	---	E	---	L07
R	D	---	Deleted	L11

Changes to Functions

Function [Modes(footnote)]			STS 3.3.2	Other STS Subsections	Additional
GTS 3.3.1	MTS 3.3.2	STS 3.3.2	Conditions	and Additional Changes	DOC Changes
5 [2(d)]	LCO 3.3.2	LCO 3.3.2	A, B	---	---
5 [3(a),4(a),5(a)]	LCO 3.3.2	LCO 3.3.2	C, D, E, F	---	---
5 [3(e),4(e),5(e)]	LCO 3.3.2	---	---	Deleted	L11

Changes to Applicability Footnotes

GTS 3.3.1 Footnote	MTS 3.3.2 Footnote	STS 3.3.2 Footnote	STS 3.3.2 Function	STS Subsections Also Addressing Listed footnote	Additional Changes DOC Number
a	-----LCO Applicability-----		---	3.3.4, 3.3.5, 3.3.6, 3.3.7	L07
d	-----LCO Applicability-----		---	3.3.3	---
e	---	Deleted	---	---	L11

Changes to Surveillance Requirements

GTS 3.3.1 SR	MTS 3.3.2 SR	STS 3.3.2 SR	STS Subsections Also Addressing the Listed SR	Example Surveillance No. Surveillance Description
3.3.1.1	3.3.2.1	3.3.2.1	3.3.1, 3.3.3	3.3.1.1 CHANNEL CHECK
3.3.1.2	→	→	3.3.1	3.3.1.2 Compare calorimetric heat balance to NI channel output
3.3.1.3	→	→	3.3.1	3.3.1.3 Compare calorimetric heat balance to delta-T power calculation
3.3.1.4	→	→	3.3.1	3.3.1.4 Compare incore detector measurement to NI AXIAL FLUX DIFFERENCE
3.3.1.5	→	→	3.3.1	3.3.1.5 Calibrate excore channels
3.3.1.6	→	→	3.3.7	3.3.7.1 Perform TADOT
3.3.1.7	→	→	3.3.4, 3.3.6	3.3.4.1 ACTUATION LOGIC TEST
3.3.1.8	3.3.3.2	3.3.3.2	3.3.1	3.3.1.6 Perform COT
3.3.1.9	3.3.2.2	3.3.2.2	3.3.1, 3.3.3	3.3.1.7 Perform COT
3.3.1.10	→	→	3.3.1	3.3.1.8 CHANNEL CALIBRATION
3.3.1.11	3.3.2.3	3.3.2.3	3.3.1, 3.3.3	3.3.1.9 CHANNEL CALIBRATION
3.3.1.12	→	→	3.3.1, 3.3.5	3.3.1.10 Perform TADOT
3.3.1.13	3.3.2.4	3.3.2.4	3.3.1, 3.3.3	3.3.1.11 Verify RTS RESPONSE TIME

The opening sentence of the “ASA, LCO, and Applicability” section of the Bases for STS Subsections 3.3.1 through 3.3.7 is revised to provide additional clarity. (APOG Comment)

The nomenclature for “Power Range,” “Intermediate Range,” and “Source Range,” Neutron Flux detectors is revised for consistency throughout the Bases. (APOG Comment and NRC Staff Edit)

The word “interlock” is removed after P-6 and P-10, except when used to refer to the interlock and not the setpoint-and to be consistent with TS wording. (NRC Staff Comment)

The “Surveillance Requirements” section of the Bases under the heading “SR 3.3.2.2,” is revised to provide consistency and clarity. (NRC Staff Comment)

The acronym “FSAR” is added to modify “Section” and “Chapter” in references to the FSAR throughout the Bases. (DOC A003) (APOG Comment)

Reference 2 in the Bases is revised to the correct citation. (Evaluation Comment)

VI. Traveler Information

Description of TSTF changes:

Required Actions which prohibit positive reactivity additions are corrected to prohibit positive reactivity additions that could result in a loss of required SDM. The existing Required Actions do not accomplish the purpose as described in the Bases.

Rationale for TSTF changes:

The proposed Required Actions will prohibit activities which could result in a loss of SDM. That is consistent with the intent of the existing Required Actions, but eliminates the inconsistencies in the existing actions.

The accident analyses assume that events are initiated with the required SDM present. The proposed Required Actions will protect this assumption.

Description of changes in RCOL Std. Dep., RCOL COL Item(s), and RCOL PTS Changes:

The Vogtle Electric Generating Plant Units 3 and 4 (VEGP) technical specifications upgrade (TSU) License Amendment Request (VEGP TSU LAR) (Reference 2) proposed changes to the initial version of the VEGP PTS (referred to as the current TS by the VEGP TSU LAR). As detailed in VEGP TSU LAR Enclosure 1, administrative change number 24 (DOC A024) reformats PTS 3.3.1 into multiple Specifications as follows:

- 3.3.1, “Reactor Trip System (RTS) Instrumentation”;
- 3.3.2, “Reactor Trip System (RTS) Source Range Instrumentation”;
- 3.3.3, “Reactor Trip System (RTS) Intermediate Range Instrumentation”;
- 3.3.4, “Reactor Trip System (RTS) Engineered Safety Feature Actuation
- 3.3.5, “Reactor Trip System (RTS) Manual Actuation”;
- 3.3.6, “Reactor Trip System (RTS) Automatic Trip Logic”; and
- 3.3.7, “Reactor Trip System (RTS) Trip Actuation Devices.”

Since PTS 3.3.1, “Reactor Trip System (RTS) Instrumentation,” is identical to GTS 3.3.1, it is appropriate for this GTST to consider the proposed changes to PTS 3.3.1 as changes to GTS 3.3.1 for incorporation in AP1000 STS 3.3.2. DOC A024 is extensive, but retains the intention of PTS 3.3.1 while improving operational use of the TS. The numerous Functions, Conditions and extensive bases discussion associated with PTS 3.3.1 are repackaged into seven smaller parts. Therefore, the changes implemented by DOC A024 are presented in the attached Subsection 3.3.2 markup, in Section XI of this GTST, as the “clean” starting point for this GTST and are identified as interim A024-modified TS (MTS) 3.3.2. The specific details of the reformatting for MTS 3.3.2 can be found in VEGP TSU LAR (Reference 2), in Enclosure 2 (markup) and Enclosure 4 (clean). The NRC staff safety evaluation regarding DOC A024 can be found in Reference 3, VEGP LAR SER. The VEGP TSU LAR was modified in response to NRC staff RAIs in Reference 6 and the Southern Nuclear Operating Company RAI Response in Reference 7.

DOC A026 moves the proposed MTS SR 3.3.2.2 Frequency Note “Only required when not performed within previous 92 days” to replace the PTS Surveillance Note. The new Surveillance Note states “Only required to be performed when not performed within previous 92 days.”

DOC M01 revises MTS SR 3.3.2.2 requirements from “Perform RTCOT in accordance with Setpoint Program,” to “Perform COT in accordance with Setpoint Program.”

DOC M02 addresses the fact that MTS 3.3.2, “Reactor Trip System (RTS) Source Range Instrumentation,” does not specify Actions for inoperability of more than two inoperable source range channels. This results in entry into LCO 3.0.3 when three or more channels are inoperable.

DOC L07 revises the Action to open the RTBs into a two-step process to “initiate action to fully insert all rods,” and “place the Plant Control System in a condition incapable of rod withdrawal.”

DOC L09 allows for placing inoperable channels in bypass and/or trip thereby allowing continued operation.

DOC L10 removes the MTS SR 3.3.2.2 Surveillance Note regarding verification that interlock P-6 is in the required state for existing unit conditions.

DOC L11 deletes MTS Table 3.3.1-1, Function 5, Source Range Neutron Flux High Setpoint, third row for that function including applicability set “3(e),4(e),5(e)” and associated references to Required Channel, Condition, and Surveillance Requirements; Footnote (e); and PTS Action R.

A more detailed description of the changes by each of the above DOCs can be found in Reference 2, VEGP TSU LAR in Enclosure 1; the NRC staff safety evaluation can be found in Reference 3, VEGP LAR SER. The VEGP TSU LAR was modified in response to NRC staff RAIs (Reference 5) by Southern Nuclear Operating Company’s RAI Response in Reference 6.

Rationale for changes in RCOL Std. Dep., RCOL COL Item(s), and RCOL PTS Changes:

The reformatting per DOC A024, except where addressed in other DOCs, addresses inconsistencies in formatting and approach between PTS 3.3.1 and PTS 3.3.2, respectively. Simplification and clarification are proposed for each Specification. In breaking down each PTS Specification into specific subsets of the Protection and Safety Monitoring System (PMS) function, improved human factored operator usability results.

These improvements also reflect the general approach currently in use in the Improved Standard Technical Specifications (STS) for Babcock and Wilcox Plants, NUREG-1430, Rev. 4. That is to separate the functions for [sensor] instrumentation, Manual Actuation, Trip/Actuation Logic, and Trip Actuation Devices (e.g., Reactor Trip Breakers (RTBs)) into separate Specification subsections. Furthermore, the Actions for some ESFAS Functions generally involve a more complex presentation than needed for other Functions, such that simple common Actions are not reasonable. Such Functions are also provided with separate Specification subsections.

When TS instrument function tables are utilized to reference Actions, the generally preferred format of the Actions for an instrumentation Specification in NUREG-1430 is to provide the initial Actions that would be common to all of the specified functions (typically for bypassing and/or tripping one or two inoperable channels), then the “default” Action would direct consulting the function table for follow-on Actions applicable to the specific affected function. These follow-up Actions generally reflect the actions to exit the Applicability for that function.

This format also allows splitting the default Actions from the initial preferred actions. This general approach is the standard format for other Specifications and for Instrumentation Specifications for other vendors' Improved STS.

DOC A026 is consistent with the TS Writer's Guide found in reference 5. DOC L10 notes that the GTS SR 3.3.1.9 Surveillance Note provides details of performing a Channel Operational Test (COT) and is deleted. GTS SR 3.3.1.9 is proposed as MTS SR 3.3.2.2. The requirement for verification that interlocks P-6 and P-10 are in their required state for existing unit conditions is unchanged and is appropriately summarized in the Bases.

DOC M01 notes that the definition of RTCOT does not explicitly require "adjustments of required alarm, interlock, and trip setpoints" that are "required for channel OPERABILITY such that the setpoints are within the necessary range and accuracy." The PTS Bases associated with the RTCOT describe these adjustments, but the bases are intended to clarify, not provide additional requirements. The COT definition explicitly requires these adjustments. Therefore, because the definition of COT more closely aligns with the RTCOT test description provided in the bases, the COT is specified instead of an RTCOT. The RTCOT definition is deleted from TS Section 1.1. A COT may be performed by means of any series of sequential, overlapping, or total channel steps. The changes are consistent with the intent of the required TS testing, and are consistent with NUREG-1431.

DOC M02 directly provides for the default Actions of LCO 3.0.3 without allowing for the additional hour that LCO 3.0.3 permits prior to initiating shutdown. This provides clarity for the operator and is more restrictive than LCO 3.0.3.

DOC L07 notes that when the RTBs are opened, certain other interlocks can be initiated. The initiation of the associated interlocks may have an undesirable secondary effect on the ease of operation of the plant such as the initiation of the P-4 interlock, which, in the event of low RCS temperature, can result in isolation of main feedwater to the steam generators.

DOC L09 places up to two inoperable channels in bypass or trip. In MODE 2, this allows continued operation and flexibility to continue a power ascension. Otherwise, further positive reactivity additions are not allowed per proposed MTS Action A.

DOC L10 notes that Interlock Operability is adequately addressed by each related Function's requirement to be Operable and the requirement for actuation logic operability. Interlock functions do not directly trip the reactor or initiate an ESFAS function, and as such are removed from the actuation instrumentation listing in TS.

Per DOC L11, the Source Range Neutron Flux indication Function in Modes 3, 4, and 5 with RTBs open, is not related to the Reactor Trip System, but involves indication only as stated in the PTS Applicability Footnote (e), and only requires one channel to be providing indication. The associated Bases also state that in Mode 3, 4, or 5 with the RTBs open, the LCO does not require the Source Range Neutron Flux channels for reactor trip functions to be Operable. As such, this requirement is inappropriately placed in the Specification requiring Reactor Trip System operability.

Description of additional changes proposed by NRC staff/preparer of GTST:

All acronyms are identified at the first occurrence in the Bases discussion.

The opening sentence of the "ASA, LCO, and Applicability" section of the Bases for STS Subsections 3.3.1 through 3.3.7 is revised to state:

> The RTS functions to maintain **compliance with** the SLs during all AOOs and mitigates the consequences of DBAs in all MODES in which the **reactor trip breakers (**RTBs**)** are closed. (APOG Comment)

The modifier "PMS" is deleted for "Power Range," "Intermediate Range," and "Source Range," detectors throughout the Bases. In addition, references to these three detector types are uniformly changed to:

- Power Range Neutron Flux,
- Intermediate Range Neutron Flux, and
- Source Range Neutron Flux

in place of other phrases that refer to power, intermediate, and source range instrumentation channels or detectors. (APOG Comment and NRC Staff Edit)

The second, third, fourth, fifth, sixth, and seventh paragraphs in the "ASA, LCO, and Applicability" section of the Bases for STS Subsection 3.3.2 are revised to state:

> The RTS Source Range Neutron Flux **– High reactor** trip Function provides protection against an uncontrolled bank rod withdrawal accident from a subcritical condition during startup. This **reactor** trip Function provides redundant protection to the Power Range Neutron Flux – Low Setpoint and Intermediate Range Neutron Flux **reactor** trip Functions. In MODES 3, 4, and 5, administrative controls also prevent the uncontrolled withdrawal of rods. The Protection and Safety Monitoring System (PMS) ~~source range~~ **Source Range Neutron Flux** detectors are located external to the reactor vessel and measure neutrons leaking from the core. The safety analyses do not take credit for the Source Range Neutron Flux **– High reactor** trip Function. Even though the safety analyses take no credit for ~~the Source Range Neutron Flux~~ **this reactor** trip **Function**, the functional capability at the specified Trip Setpoint is assumed to be available and ~~the~~ **this reactor** trip **Function** is implicitly assumed in the safety analyses.
>
> The Trip Setpoint reflects only steady state instrument uncertainties as the **Source Range Neutron Flux** detectors do not provide primary protection for any events that result in a harsh environment. This **reactor** trip **Function** can be manually blocked by the main control room operator when above the P-6 setpoint (Intermediate Range Neutron Flux interlock) and is automatically unblocked when below the P-6 setpoint. The manual block of the **Source Range Neutron Flux reactor** trip **Function** ~~function~~ also de-energizes the ~~source range~~ **Source Range Neutron Flux** detectors. The ~~source range~~ **Source Range Neutron Flux** detectors are automatically re-energized when below the P-6 setpoint. ~~The~~ **This reactor** trip **Function** is automatically blocked when above the P-10 setpoint (Power Range Neutron Flux interlock). The **Source Range Neutron Flux reactor** trip **Function** is the only RTS automatic protective Function required in MODES 3, 4, and 5. Therefore, the functional capability at the specified Trip Setpoint is assumed to be available.

The LCO requires four channels of **the** Source Range Neutron Flux **– High reactor trip Function** to be OPERABLE in MODE 2 below P-6 and in MODE 3, 4, or 5 with ~~RTBs closed and~~ **the Plant** Control ~~Rod Drive~~ System **(PLS)** capable of rod withdrawal **or one or more rods not fully inserted**. Four channels are provided to permit one channel **to be** in trip or bypass indefinitely and still ensure no single random failure will disable this **reactor** trip Function. In MODE 3, 4, or 5 with the ~~**Plant Control System (PLS)**~~ **PLS incapable of rod withdrawal and all rods fully inserted** ~~RTBs open~~, the LCO does not require the Source Range Neutron Flux **– High** ~~channels for~~ reactor trip Function~~s~~ to be OPERABLE.

In MODE 2 when below the P-6 setpoint during a reactor startup, the Source Range Neutron Flux **– High reactor** trip **Function** must be OPERABLE. Above the P-6 setpoint, the Intermediate Range Neutron Flux **– High** ~~trip~~ and ~~the~~ Power Range Neutron Flux – Low Setpoint **reactor** trip **Functions** will provide core protection for reactivity accidents. Above the P-6 setpoint, the ~~PMS~~ ~~source range~~ **Source Range Neutron Flux** detectors are de-energized and inoperable as described above.

In MODE 3, 4, or 5 with the reactor shutdown, the Source Range Neutron Flux **– High reactor** trip Function must also be OPERABLE. If the PLS is capable of rod withdrawal **or one or more rods are not fully inserted**, the Source Range Neutron Flux **– High reactor** trip **Function** must be OPERABLE to provide core protection against a rod withdrawal accident. If the PLS is not capable of rod withdrawal, the ~~source range~~ **Source Range Neutron Flux** detectors are required to be OPERABLE to provide monitoring of neutron **flux** levels and provide protection for events like an inadvertent boron dilution. These Functions are addressed in LCO 3.3.8**,** "Engineered Safety Feature Actuation System (ESFAS) Instrumentation," Function 17, "Source Range Neutron Flux Doubling," LCO 3.3.15, "Engineered Safety Feature Actuation System (ESFAS) Actuation Logic – Operating," and LCO 3.3.16, "Engineered Safety Feature Actuation System (ESFAS) Actuation Logic – Shutdown." The requirements for the ~~PMS~~ **S**ource **R**ange **Neutron Flux** detectors in MODE 6 are addressed in LCO 3.9.3, "Nuclear Instrumentation."

The RTS Source Range **Neutron Flux** instrumentation satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii). (NRC Staff Comment)

The first paragraph in the "Actions" section of the Bases for STS Subsection 3.3.2 is revised to state:

In the event a ~~channels~~ **Source Range Neutron Flux – High reactor trip Function channel** as-found ~~condition~~ **trip setting** is outside the as-found tolerance described in the SP, or the channel is not functioning as required, or the transmitter, instrument loop, signal processing electronics, or trip output 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. (NRC Staff Comment)

In the same section, the paragraph under the heading "A.1" is revised to state:

Condition A addresses the situation where one ~~**source range instrumentation**~~ **Source Range Neutron Flux – High reactor trip Function**

channel is inoperable in MODE 2. With one channel inoperable, the inoperable channel must be placed in a bypass or trip condition within two hours. If one channel is bypassed, the logic becomes two-out-of-three, while still meeting the single failure criterion. (A failure in one of the three remaining channels will not prevent the protective function.) If one channel is tripped, the logic becomes one-out-of-three, while still meeting the single failure criterion. (A failure in one of the three remaining channels will not prevent the protective function). The 2 hours allowed to place the inoperable channel~~(s)~~ in the bypassed or tripped condition is consistent with the Required Action Completion Times for an inoperable channel of the Intermediate Range Neutron Flux – High reactor trip Function ~~instrumentation Completion Times~~ provided in LCO 3.3.3. (NRC Staff Comment)

In the same section, the paragraph under the heading “B.1 and B.2” is revised to state:

Condition B addresses the situation where two ~~source range instrumentation~~ Source Range Neutron Flux – High reactor trip Function channels are inoperable in MODE 2. With two channels inoperable, one affected channel must be placed in a bypass condition within 2 hours and one affected channel must be placed in a trip condition within 2 hours. If one channel is bypassed and one channel is tripped, the logic becomes one-out-of-two, while still meeting the single failure criterion. The 2 hours allowed to place the inoperable channel(s) in the bypassed or tripped condition is consistent with the Required Action Completion Times for an inoperable channel of the Intermediate Range Neutron Flux – High reactor trip Function ~~instrumentation Completion Times~~ provided in LCO 3.3.3. (NRC Staff Comment)

In the same section, the paragraph under the heading “C.1” is revised to state:

Condition C is entered when any Required Action and associated Completion Time of ~~Conditions~~ Condition A or B ~~is~~ are not met. If the inoperable Source Range Neutron Flux – High reactor trip Function channel(s) is not restored to OPERABLE status or placed in trip or bypass, as applicable, within the allowed Completion Time, Required Action C.1 requires immediate suspension of positive reactivity additions that could result in a loss of required SDM. (NRC Staff Comment)

In the same section, the paragraph under the heading “D.1” is revised to state:

Condition D addresses the situations where one or two ~~source range instrumentation~~ Source Range Neutron Flux – High reactor trip Function channels are inoperable in MODE 3, 4, or 5. With one or two ~~source range instrumentation~~ Source Range Neutron Flux – High reactor trip Function channels inoperable, three of the four required channels must be restored to OPERABLE status within 48 hours. The Completion Time of 48 hours to restore three of four ~~source range instrumentation~~ Source Range Neutron Flux – High reactor trip Function channels to OPERABLE status is justified in Reference 2. (NRC Staff Comment)

In the same section, the paragraph under the heading “E.1 and E.2” is revised to state:

Condition E is entered when the Required Action and associated Completion Time of Condition D ~~is~~ are not met. If three of the four required ~~source range instrumentation~~ Source Range Neutron Flux – High reactor trip Function channels are not restored to OPERABLE status within the allowed Completion Time, Required Action E.1 requires that action be initiated to fully insert all rods within 1 hour, and Required Action E.2 requires that the PLS be placed in a condition incapable of rod withdrawal within 1 hour. The allowed Completion Times are ~~is~~ reasonable, based on operating experience, to reach the specified condition in an orderly manner and without challenging plant systems. (NRC Staff Comment)

In the same section, the paragraph under the heading "F.1" is revised to state:

Condition F addresses the situation where three or more ~~source range instrumentation~~ Source Range Neutron Flux – High reactor trip Function channels are inoperable. With three or more channels inoperable, the single failure criterion cannot be met and the reactor trip breakers must be opened immediately. (NRC Staff Comment)

The first paragraph in the "Surveillance Requirements" section of the Bases for STS Subsection 3.3.2, under the heading "SR 3.3.2.2," is revised to state:

SR 3.3.2.2 is the performance of a ~~RT~~COT. The test is performed in accordance with the SP. If the actual **trip** setting of the channel is found to be outside the ~~as found~~ **as-found** tolerance, the channel is considered inoperable. This condition of the channel will be further evaluated during performance of the SR. This evaluation will consist of resetting the channel **Trip Setpoint** to the NTS (within the allowed **as-left** tolerance), and evaluating the **channel** response... (NRC Staff Comment)

In the same section, the third paragraph, first sentence is revised to state:

A test subsystem is provided with the ~~protection and safety monitoring system~~ **PMS** to aid the plant staff in performing the ~~RT~~COT. (NRC Staff Comment)

In the same section, the sixth paragraph, first sentence is revised to state:

To the extent possible, ~~protection and safety monitoring system~~ **PMS** functional testing is accomplished with continuous system self-checking features and the continuous functional testing features. (NRC Staff Comment)

In the same section, the ninth paragraph, first sentence is revised to state:

~~This~~ **The** ~~test frequency~~ **COT Surveillance Frequency** of 92 days is justified based on Reference 2 **(which refers to this test as "RTCOT")** and the use of continuous diagnostic test features, such as deadman timers, cross-check of redundant channels, memory checks, numeric coprocessor checks, and tests of timers, counters and crystal time bases, which will report a failure within the ~~protection and safety monitoring system~~ **PMS** cabinets to the operator within 10 minutes of a detectable failure. (NRC Staff Comment)

In the same section, the last two paragraphs are revised to state:

~~The Frequency is modified by a Note that allows this surveillance to be satisfied if it has been performed within 92 days of the Frequencies prior to reactor startup and four hours after reducing power below P-6.~~ The Frequency of "prior to reactor startup" ensures this surveillance is performed prior to critical operations, **and applies to the Source Range Neutron Flux – High, Intermediate Range Neutron Flux – High (SR 3.3.3.2), and Power Range Neutron Flux – Low Setpoint (SR 3.3.1.7) reactor trip Function instrument channels**. The Frequency of 4 hours after reducing power below P-6 allows a normal shutdown to be completed and the unit removed from the MODE of Applicability for this surveillance without a delay to perform the testing required by this surveillance. The Frequency of ~~every~~ 92 days thereafter applies if the ~~plant~~ **unit** remains in the MODE of Applicability after the initial performances of prior to reactor startup and ~~four~~ **4** hours after reducing power below P-6. The MODE of Applicability for this surveillance is < P-6. Once the unit is in MODE 3, this surveillance is no longer required. If power is to be maintained ~~<~~ **below** P-6 for more than ~~4~~ **four** hours, then the testing required by this surveillance must be performed prior to the expiration of the ~~4~~ **four** hour limit. Four hours is a reasonable time to complete the required testing or place the unit in a MODE where this surveillance is no longer required. **The Surveillance Frequencies for this COT ensure** ~~This test ensures~~ that the ~~NIS source range~~ **Source Range Neutron Flux – High reactor trip Function** instrumentation channels are OPERABLE prior to taking the reactor critical and after reducing power into the applicable MODE (< P-6) for periods ~~> 4~~ **of greater than four** hours.

During the ~~RT~~COT, the ~~protection and safety monitoring system~~ **PMS** cabinets in the division under test may be placed in bypass. (NRC Staff Comment)

The first three paragraphs in the "Surveillance Requirements" section of the Bases for STS Subsection 3.3.2, under the heading "SR 3.3.2.3," are revised to state:

~~SR 3.3.2.3 is the performance of a~~ **A** CHANNEL CALIBRATION **is performed** every 24 months **or approximately at every refueling**. This SR is modified by a Note stating that neutron detectors are excluded from the CHANNEL CALIBRATION. ~~The test is performed in accordance with the SP. If the actual setting of the channel is found to be outside the as found tolerance, the channel is considered inoperable.~~

The ~~test~~ **CHANNEL CALIBRATION** is performed in accordance with the SP. If the actual **trip** setting of the channel is found to be outside the ~~as found~~ **as-found** tolerance, the channel is considered inoperable. This condition of the channel will be further evaluated during performance of the SR. This evaluation will consist of resetting the ~~channel setpoint~~ **channel Trip Setpoint** to the NTS (within the allowed **as-left** 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.

The CHANNEL CALIBRATION for the ~~source range neutron~~ **Source Range Neutron Flux** detectors consists of obtaining the preamp discriminator curves, evaluating those curves, and comparing the curves to the manufacturer's data. (NRC Staff Comment)

Adjusted the reference order to reflect the order of their first appearance.

The acronym “FSAR” is added to modify “Section” and “Chapter” in references to the FSAR throughout the Bases. (DOC A003) (APOG Comment)

Reference 2 in the Bases is revised from “APP-GW-GLR-137, Revision 1, “Bases of Digital Overpower and Overtemperature Delta-T (OPΔT/ OTΔT) Reactor Trips,” Westinghouse Electric Company LLC” to “APP-GW-GSC-020, “Technical Specification Completion Time and Surveillance Frequency Justification.” (Evaluation Comment)

Rationale for additional changes proposed by NRC staff/preparer of GTST:

The opening sentence of the “ASA, LCO, and Applicability” section of the Bases for STS Subsections 3.3.1 through 3.3.7 is revised for additional clarity.

The Bases modifier “PMS” for “Power Range,” “Intermediate Range,” and “Source Range” detectors is unnecessary and inconsistent with other PMS instruments. The Bases references to all these detector types are standardized for consistency.

The non-technical change to the “Surveillance Requirements” section of the Bases under the heading “SR 3.3.2.2” provides clarity.

Since Bases references to FSAR Sections and Chapters are to an external document, it is appropriate to include the “FSAR” modifier.

Reference 2 in the Bases is revised because OPΔT/ OTΔT reactor trips are addressed in STS 3.3.1. Reference 2 in STS 3.3.2 is cited in reference to TS Completion Times and Surveillance Frequencies. The reference citation is revised to correctly reflect the citation.

VII. GTST Safety Evaluation

Technical Analysis:

TSTF-469-T revises MTS Action A.1 to “Suspend positive reactivity additions that could result in a loss of required SDM.” The Required Action will prohibit activities which could result in a loss of required SDM. That is consistent with the intent of the existing Required Action, but eliminates the inconsistencies in the existing action. The accident analyses assume that events are initiated with the required SDM present. The Required Action will protect this assumption.

DOC M01 revises MTS SR 3.3.2.2 description to state “Perform COT in accordance with Setpoint Program,” in place of “Perform RTCOT in accordance with Setpoint Program.” PTS Section 1.1 defines a Reactor Trip Channel Operational Test (RTCOT) as “A RTCOT shall be the injection of a simulated or actual signal into the reactor trip channel as close to the sensor as practicable to verify OPERABILITY of the required interlock and/or trip functions. The RTCOT may be performed by means of a series of sequential, overlapping, or total channel steps so that the entire channel is tested from the signal conditioner through the trip logic.”

The STS Section 1.1 definition for Channel Operational Test (COT) per reference 2, DOC A001, states “A COT shall be the injection of a simulated or actual signal into the channel as close to the sensor as practicable to verify OPERABILITY of all devices in the channel required for channel OPERABILITY. The COT shall include adjustments, as necessary, of the required alarm, interlock, and trip setpoints required for channel OPERABILITY such that the setpoints are within the necessary range and accuracy. The COT may be performed by means of any series of sequential, overlapping, or total channel steps.”

MTS SR 3.3.2.2 requires an RTCOT, in accordance with the Setpoint Program, to be performed on each TS required automatic protection instrumentation Function. Each Function requiring performance of an RTCOT by MTS SR 3.3.2.2 also requires performance of a Channel Calibration by MTS SR 3.3.2.3. Therefore, the Functions referencing MTS SR 3.3.2.2 contain adjustable devices.

The definition of RTCOT does not explicitly require adjustments of required alarm, interlock, and trip setpoints required for channel OPERABILITY such that the setpoints are within the necessary range and accuracy. The Bases associated with the RTCOT describe these adjustments, but the Bases are intended to clarify, not provide additional requirements. A COT explicitly requires these adjustments. Therefore, the definition of a COT more closely aligns with the description of the testing provided in the Bases for MTS SR 3.3.2.2. Use of COT for this SR is consistent with similar testing specified in NUREG-1431, TS 3.3.1. Use of COT is also consistent with testing performed on other instrumentation specified in the PTS.

The GTS/PTS Section 1.1 definition of RTCOT is deleted for a series of reasons as described in DOC M01. Changes made by DOC M01 result in consistency with the use of Actuation Logic Test and COT in other TS requirements, are consistent with the intent of the required TS testing, and are consistent with NUREG-1431, Rev. 4.

DOC M02 addresses the fact that MTS 3.3.2, “Reactor Trip System (RTS) Source Range Instrumentation,” does not specify Actions for inoperability of more than two inoperable source range channels. This results in entry into LCO 3.0.3 when three or more channels are inoperable. GTS LCO 3.0.3 is only applicable in MODES 1, 2, 3, and 4, and states:

When an LCO is not met and the associated ACTIONS are not met, an associated ACTION is not provided, or if directed by the associated ACTIONS, the unit shall be placed in a MODE or other specified condition in which the LCO is not applicable. Action shall be initiated within 1 hour to place the unit, as applicable,

a. MODE 3 within 7 hours; and
b. MODE 4 within 13 hours; and
c. MODE 5 within 37 hours.

GTS 3.3.1 and 3.3.2 Functions with applicability statements that include MODE 1, 2, 3, or 4, generally have no Actions specified for addressing a loss of function condition, such as when all required channels are inoperable. Upon discovery of such a condition, LCO 3.0.3 would apply. The intent of LCO 3.0.3 (as stated in the TS Bases) is to "impose time limits for placing the unit in a safe MODE or other specified condition when operation cannot be maintained within the limits for safe operation as defined by the LCO and its ACTIONS."

The Actions for inoperable RTS and ESFAS instrumentation provide restoration time and/or compensatory action allowances (e.g., place the inoperable channel in trip); but only for inoperability of some of the channels (e.g., 1 or 2 out of 4 required channels, typically). If these restoration and/or compensatory actions cannot be met in the required time, "default" actions are provided, which are designed to place the unit in a safe MODE or other specified condition – typically, actions that result in exiting the Applicability for that Function.

The shutdown actions of LCO 3.0.3 are typical of "default" actions throughout the TS that direct plant shutdown to exit the Applicability, with the exception that LCO 3.0.3 includes an additional 1 hour before the shutdown is required to be initiated.

The revisions described in DOC M02 address multiple-channel inoperability. The revisions will immediately impose the "default" Actions for that Function – without allowance for the 1 hour delay that is provided in LCO 3.0.3. Furthermore, the Function-specific "default" actions (currently, or proposed to be, specified for some Functions) impose requirements intended to establish safe operation that are not necessarily required by LCO 3.0.3. Since each Function-specific default action is specifically considering that Function's safety-basis, such default actions necessarily result in more appropriate actions than the general default actions of LCO 3.0.3. Specifically, the Actions for each new Condition associated with DOC M02 for RTS and ESFAS Functions applicable in MODES1, 2, 3, or 4, are compared to LCO 3.0.3, and in each case, the new Actions are equivalent to or more restrictive than the actions of LCO 3.0.3.

STS 3.3.2 Condition F leads to a default action to exit the LCO Applicability immediately, which is more restrictive than the time allowed by LCO 3.0.3. These actions, which are introduced by DOC L07, as discussed below, are not found in LCO 3.0.3.

GTS 3.3.1 and 3.3.2 actions do not specify conditions that explicitly address multiple inoperable channels (that is, more than two inoperable channels or divisions, in most cases), and therefore default to LCO 3.0.3. In each instance, the proposed actions to address these conditions are more restrictive than the LCO 3.0.3 actions because completion times for reaching lower operational modes are shorter by 1 hour. In addition, Function-specific actions, where specified, are more appropriate for the affected Function than the unit-shutdown actions of LCO 3.0.3 alone. Therefore, the changes specified by DOC M02 do not introduce any adverse impact on public health and safety.

Each of the PTS 3.3.1 required actions to open the reactor trip breakers (RTBs) is intended to ensure that control rods cannot be withdrawn thereby eliminating the possibility for control rod related positive reactivity additions and associated heat input into the reactor coolant.

Additionally, all control rods are inserted by opening the RTBs. Therefore, replacing each required action to open RTBs with the two actions, which require initiating action to fully insert all rods and placing the Plant Control System in a condition incapable of rod withdrawal, maintains the intent of the PTS action requirements. DOC L07 replaces the specific method of precluding rod withdrawal and ensuring all rods are inserted while maintaining the requirement for establishing the plant conditions equivalent to opening the RTBs. The revised actions still ensure rod withdrawal is precluded and all rods are inserted; therefore, the detail to open the RTBs is not required to be in the TS to provide adequate protection of the public health and safety.

To ensure that when the revised required actions are taken the unit is removed from the operational modes or other specified conditions in the Specification's Applicability, conforming revisions to the Applicability statements are made. The equivalent condition to the PTS Applicability statements that include "RTBs closed" is the condition of Plant Control System capable of rod withdrawal. However, since rods could have been withdrawn prior to making the Plant Control System incapable of rod withdrawal, the revised Specifications include the additional condition of "or one or more rods not fully inserted." This change also aligns with the required actions to both "fully insert all rods" and "place the Plant Control System in a condition incapable of rod withdrawal." The equivalent condition to the PTS Applicability statements that include "RTBs open" is the condition of "Plant Control System incapable of rod withdrawal and all rods fully inserted."

Removing the specific method of precluding rod withdrawal and establishing all rods inserted, and defining this condition solely in terms of the RTB status, from the TS is acceptable because this type of information is not necessary to be included to provide adequate protection of public health and safety. AP1000 STS 3.3.2 retains requirements to ensure that control rod withdrawal is prohibited and all rods are inserted, when required. DOC L07 is designated as a less restrictive change because one specific method for meeting the intended TS requirements is being removed from the TS, and replaced with actions to allow using alternate methods to establish the equivalent operational conditions.

DOC L09 allows for placing inoperable channels in bypass and/or trip thereby allowing continued operation. GTS/PTS 3.3.1 Action I.1 ("Suspend operations involving positive reactivity additions"), for one or two Source Range Neutron Flux – High reactor trip Function channels inoperable in Mode 2, restricts power ascension. The VEGP LAR DOC L09 change adding STS 3.3.2 Actions A and B for these conditions requires placing the inoperable channels in bypass and/or trip. Completing these Required Actions allows continued operation and the flexibility to continue power ascension. This is a less restrictive change.

As summarized in Final Safety Analysis Report (FSAR) Table 7.2-2, Reactor Trips, each automatic RTS function is provided with 4 channels, with division trip logic of 2-out-of-four ("2/4") and similar bypass logic and capability. This bypass capability is also described in the TS Bases:

> The use of four channels for protection functions is based on a minimum of two channels being required for a trip or actuation, one channel in test or bypass, and a single failure on the remaining channel. The signal selector algorithm in the Plant Control System (PLS) will function with only three channels. This includes two channels properly functioning and one channel having a single failure. For protection channels providing data to the control system, the fourth channel permits one channel to be in test or bypass. Minimum requirements for protection and control are achieved with only three channels OPERABLE. The fourth channel is provided to increase plant availability, and permits the plant to run for an indefinite time with a single channel out of service.

Furthermore, the RTS TS Bases for Function 5 specifically describe this capability for the Source Range Neutron Flux – High reactor trip Function: This same discussion appears in other automatic RTS Function Bases.

> Four channels are provided to permit one channel in trip or bypass indefinitely and still ensure no single random failure will disable this trip Function.

The requirement to bypass and/or trip one and two inoperable automatic channels is applicable to most other automatic channels as provided in GTS/PTS 3.3.1 Actions E, F, and K. These Actions have the same provisions for tripping and/or bypassing inoperable channels. Currently, with one or two channels inoperable, one affected channel must be placed in a bypass or trip condition. If one channel is bypassed, the logic becomes two-out-of-three, while still meeting the single failure criterion. (A failure in one of the three remaining channels will not prevent the protective function.) If one channel is tripped, the logic becomes one-out-of three, while still meeting the single failure criterion. (A failure in one of the three remaining channels will not prevent the protective function.) For two inoperable channels, with one channel bypassed and one channel tripped, the logic becomes one-out-of-two, while still meeting the single failure criterion.

Therefore, the change to provide Actions to bypass or trip one inoperable channel and bypass one channel and trip one channel for two inoperable Source Range Neutron Flux – High reactor trip Function channels is consistent with the design and consistent with the intent as described in the TS Bases for these Functions. Based on the Completion Times for AP1000 GTS 3.3.1 Action F, applicable to Intermediate Range Neutron Flux – High reactor trip Function channels, bypassing and/or tripping within 2 hours is provided for the STS 3.3.2, Actions A and B. Since RTS trip capability remains with one or two Source Range Neutron Flux – High reactor trip Function channels inoperable, the additional 2 hours allowed by Actions A and B do not have any significant impact on safety. The current action in the GTS/PTS to suspend all operations involving positive reactivity additions unless all four Source Range Neutron Flux – High reactor trip Function channels are Operable is overly restrictive given RTS trip capability remains and that the safety analyses do not take credit for the Source Range Neutron Flux- High reactor trip Function, as stated in the Bases.

The DOC L09 change results in closer alignment with Actions for other automatic RTS Functions. The actions continue to assure operation within the assumptions of the safety analysis such as preserving single-failure criterion for indefinite operations. As such there is no adverse impact to public health and safety.

DOC L10 removes Function 12, Reactor Trip System Interlocks (P-6, P-10, and P-11), from MTS 3.3.1, Table 3.3.1-1. RTS interlocks are provided to ensure reactor trip system instrumentation and actuation Functions are in the correct configuration for the current plant status. They back up operator actions to ensure protection system Functions are not blocked during plant conditions in which the safety analysis assumes the Functions are Operable.

The interlocks, as separate RTS and ESFAS Functions are removed from the GTS and the associated action requirements are deleted. Interlock Operability is adequately addressed by each supported Function’s requirement to be Operable and the requirement for reactor trip logic and ESF actuation logic operability.

For these supported RTS and ESFAS instrumentation and actuation Functions to be Operable, the associated RTS and ESFAS interlock functions would have to be in the required state as a support feature for Operability. These RTS and ESFAS interlock functions do not directly trip the reactor or actuate ESFAS, and as such are removed from the actuation instrumentation listing in TS. The role of the interlocks, and their support for the operability of RTS trip and ESFAS

actuation Functions, are described in the TS Bases, as well as in Final Safety Analysis Report (FSAR) Chapter 7, Instrumentation and Controls.

Furthermore, each RTS trip and ESFAS actuation Function is required operable during the stated TS Applicability. The Applicability for certain trip or actuation Functions is based on transitioning above or below an interlock; while other Functions are not directly supported by an interlock. For Functions supported by an interlock, while operating within the TS required Applicability for that Function, its associated supporting interlock is not required to automatically change state. The interlock status must be established in conjunction with assuring supported Function's operability prior to entering the specified Applicability. In addition, LCO 3.0.4 requires the operators to ensure RTS trip and ESFAS operability prior to entering their specified Applicability. These TS requirements remain in effect and impose the necessary operability requirements related to the removed interlock Functions. As such, interlocks are adequately addressed by each related Function's requirement to be operable and the requirement for actuation logic operability.

MTS SR 3.3.2.2 Surveillance Note provides details of performing a Channel Operational Test (COT) and is deleted. The requirement for verification that interlock P-6 is in the required state for existing unit conditions is unchanged and is appropriately summarized in the Bases.

If the interlock is not automatically functioning as designed, the condition is entered into the Corrective Action Program and appropriate operability evaluations performed for the affected Function(s), which would evaluate potential operability impact on individual instrument Function channels and/or the coincident logic subsystem channel. Adverse impacts to operability could be evaluated to affect individual instrumentation channels, or may be evaluated to impact the divisional coincident logic. In either outcome, the appropriate actions are provided by the LCO Actions for affected supported feature(s).

Instrument Function channels with interlocks implicitly required to support the channel's operability, are also addressed by the COT and Channel Calibration Surveillance Requirements. Actuation logic divisions with interlocks implicitly required to support the division's operability is also addressed by the Actuation Logic Test Surveillance Requirements. The applicable COT, Channel Calibration, and Actuation Logic Test Bases will include the following discussion supporting this change ("CHANNEL CALIBRATION" is replaced with "COT" or "ACTUATION LOGIC TEST" as appropriate):

> Interlocks implicitly required to support the Function's OPERABILITY are also addressed by this CHANNEL CALIBRATION. This portion of the CHANNEL CALIBRATION ensures the associated Function is not bypassed when required to be enabled. This can be accomplished by ensuring the interlocks are calibrated properly in accordance with the SP. If the interlock is not automatically functioning as designed, the condition is entered into the Corrective Action Program and appropriate OPERABILITY evaluations performed for the affected Function. The affected Function's OPERABILITY can be met if the interlock is manually enforced to properly enable the affected Function. When an interlock is not supporting the associated Function's OPERABILITY at the existing plant conditions, the affected Function's channels must be declared inoperable and appropriate ACTIONS taken.

DOC L11 deletes GTS/PTS Table 3.3.1-1, Function 5, Source Range Neutron Flux – High, requirements for 1 channel to be operable in Modes 3(e), 4(e), and 5(e) and the associated references to the required number of channels (Required Channels), applicable Actions (Condition), and applicable Surveillance Requirements; Footnote (e) (With RTBs open. In this condition, Source Range Function does not provide reactor trip but does provide indication.); and GTS/PTS 3.3.1 Action R. The Source Range Neutron Flux indication Function in Modes 3,

4, and 5 with RTBs open, is not related to the Reactor Trip System, but involves indication only as stated in Footnote (e), and only requires one channel to be providing indication. The associated Bases also state that in Mode 3, 4, or 5 with the RTBs open, the LCO does not require the Source Range Neutron Flux – High reactor trip Function channels to be operable. Therefore, the operability, applicability, action, and surveillance requirements for one Source Range Neutron Flux indication channel are inappropriately placed in the Reactor Trip System Specification.

GTS/PTS 3.3.2, Engineered Safeguards Actuation System (ESFAS) Instrumentation, Table 3.3.2-1, Function 15a, Boron Dilution Block – Source Range Neutron Flux Doubling, requires 4 Source Range Neutron Flux channels to be Operable in Modes $3^{(n)}$, $4^{(e)}$, and $5^{(e)}$, (Footnote (n): "Not applicable when critical or during intentional approach to criticality"; Footnote (e): Not applicable for valve isolation Functions whose associated flow path is isolated"). This Applicability includes the specified Applicability of GTS/PTS LCO 3.3.1 for 1 operable Source Range Neutron Flux indication channel, which is being omitted from AP1000 STS LCO 3.3.2. Furthermore, the SRs for the Source Range Neutron Flux Doubling ESFAS Function channels also encompass the GTS/PTS 3.3.1 Channel Check and Channel Calibration Surveillances for a Source Range Neutron Flux indication channel, which are being omitted from STS Section 3.3.

GTS/PTS 3.3.1, Action R applies solely for inoperability of the one required Source Range Neutron Flux indication channel (i.e., the condition of all four Source Range Neutron Flux indication channels inoperable). In the unlikely event that all four channels were inoperable, the GTS/PTS 3.3.2 action requirements associated with the Boron Dilution Block – Source Range Neutron Flux Doubling ESFAS Function channels, are appropriate to provide the necessary protection. Changes to these Actions are addressed in changes to GTS/PTS 3.3.2, Table 3.3.2-1, Function 15a, Boron Dilution Block – Source Range Neutron Flux Doubling Function, and are reflected in the MTS 3.3.8, "Engineered Safety Feature Actuation System (ESFAS) Instrumentation." The MTS 3.3.8 Actions direct entering applicable actions for inoperable valves associated with boron dilution flow paths, i.e., TS 3.1.9, Chemical and Volume Control System (CVS) Demineralized Water Isolation Valves and Makeup Line Isolation Valves. STS 3.1.9 Action B would apply to this condition (i.e., all required valves would be considered inoperable) and require isolation of the affected flow paths within 1 hour, consistent with GTS/PTS 3.3.1, Required Action R.2. The potential for an uncontrolled boron dilution accident is eliminated by isolating all unborated water sources as required by this action. This change eliminates GTS/PTS 3.3.1 Required Actions R.1 (suspend operations involving positive reactivity additions) and R.3 (perform Shutdown Margin verifications); however, with the RTBs open and potential boron dilution paths isolated, unit safety is adequately maintained without completing these other, currently specified, required actions.

This change is consistent with changes made in TSTF-135, "3.3 – RPS and ESFAS Instrumentation," Revision 3, and as reflected in NUREG-1431. Therefore, this change results in closer alignment with NUREG-1431 presentation of Source Range Neutron Flux indication instrumentation. The Actions of AP1000 STS 3.3.8 and 3.1.9 for the Condition of no operable channels of the Boron Dilution Block – Source Range Neutron Flux Doubling ESFAS Function continue to assure operation within the assumptions of the safety analysis. As such there is no adverse impact to public health and safety.

Reference 2 in the Bases is revised from "APP-GW-GLR-137, Revision 1, "Bases of Digital Overpower and Overtemperature Delta-T (OPΔT/ OTΔT) Reactor Trips," Westinghouse Electric Company LLC" to "APP-GW-GSC-020, "Technical Specification Completion Time and Surveillance Frequency Justification." OPΔT/ OTΔT reactor trips are addressed in STS 3.3.1. Reference 2 in STS 3.3.2 is cited in reference to TS Completion Times and Surveillance Frequencies. Therefore, APP-GW-GSC-020 is the correct reference.

The remaining changes, including those made by DOC A024, are editorial, clarifying, grammatical, or otherwise considered administrative. These changes do not affect the technical content, but improve the readability, implementation, and understanding of the requirements, and are therefore acceptable.

Having found that this GTST's proposed changes to the GTS and Bases are acceptable, the NRC staff concludes that AP1000 STS Subsection 3.3.2 is an acceptable model Specification for the AP1000 standard reactor design.

References to Previous NRC Safety Evaluation Reports (SERs):

None

VIII. Review Information

Evaluator Comments:

None

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Review Information:

Availability for public review and comment on Revision 0 of this traveler approved by NRC staff on 5/29/2014.

APOG Comments (Ref. 8) and Resolutions:

1. (Internal # 3 and # 146) Throughout the Bases, references to Sections and Chapters of the FSAR do not include the “FSAR” clarifier. Since these Section and Chapter references are to an external document, it is appropriate (DOC A003) to include the “FSAR” modifier. This is resolved by adding the FSAR modifier as appropriate.

2. (Internal # 6) The GTST sections often repeat VEGP LAR DOCs, which reference “existing” and “current” requirements. The inclusion in the GTST of references to “existing” and “current,” are not always valid in the context of the GTS. Each occurrence of “existing” and “current” should be revised to be clear and specific to GTS, MTS, or VEGP COL TS (or other), as appropriate. Noted ambiguities are corrected in the GTST body.

3. (Internal # 7) Section VII, GTST Safety Evaluation, inconsistently completes the subsection “References to Previous NRC Safety Evaluation Reports (SERs)” by citing the associated SE for VEGP 3&4 COL Amendment 13. It is not clear whether there is a substantive intended difference when omitting the SE citation. This is resolved by removing the SE citation in Section VII of the GTST and ensuring that appropriate references to the consistent citation of this reference in Section X of the GTST are made.

4. (Internal #13) Many GTSTs evaluated TSTF-425 with the following note: Risk-informed TS changes will be considered at a later time for application to the AP1000 STS.

   The NRC approval of TSTF-425, and model safety evaluation provided in the CLIIP for TSTF-425, are generically applicable to any design’s Technical Specifications. As such, the replacement of certain Frequencies with a Surveillance Frequency Control Program should be included in the GTST for AP1000 STS NUREG.

   However, implementation in the AP1000 STS should not reflect optional (i.e., bracketed) material showing retention of fixed Surveillance Frequencies where relocation to a Surveillance Frequency Control Program is acceptable. Since each represented AP1000 Utility is committed to maintaining standardization, there is no rationale for an AP1000 STS that includes bracketed options.

Consistent with TSTF-425 criteria, replace applicable Surveillance Frequencies with "In accordance with the Surveillance Frequency control Program" and add that Program as new AP1000 STS Specification 5.5.15.

NRC Staff disagreed with implementing TSTF-425 in the initial version of the STS. Although the APOG thinks the analysis supporting this traveler is general enough to be applicable to AP1000, staff thinks an AP1000-specific proposal from APOG is needed to identify any GTS SRs that should be excluded. Also, with the adoption of a Surveillance Frequency Control Program (SFCP) in the AP1000 STS, bracketed Frequencies, which provide a choice between the GTS Frequency and the SFCP Frequency, are needed because the NRC will use the AP1000 STS as a reference, and to be consistent with NUREG-1431, Rev. 4. APOG was requested to consider proposing an AP1000 version of TSTF-425 for a subsequent revision of the STS.

5. (Internal # 116) In GTST for Subsection 3.3.2, Section VI, under the heading "Rationale for changes in RCOL Std. Dep., RCOL COL Item(s), and RCOL PTS Changes," the first paragraph mentions DOC A028. This DOC is for changes to ESFAS TS and does not affect Subsection 3.3.2. Note that it is not mentioned anywhere else in this Subsection. This is also stated in Subsection 3.3.1 and Subsections 3.3.3 through 3.3.7. Change "DOCs A024 and A028" to "DOC A024" in GTST 3.3.1 through GTST 3.3.7. This is resolved by making the recommended change.

6. (Internal # 119) The modifier "PMS" for "power range detectors," "Intermediate Range Neutron Flux," and "Source Range, Neutron Flux," is unnecessary. Inclusion of "PMS" in the Bases is inconsistent with other PMS instruments, with the LCO requirement nomenclature, and the general AP1000 DCD presentation. Delete "PMS" as a modifier to "power range," "Intermediate Range," and "Source Range," throughout the Bases. NRC Staff notes that this comment also applies to STS Subsections 3.3.1, 3.3.3, 3.3.8, and 3.9.3. This is resolved by making the recommended change with additional edits. NRC staff notes that the initial use of Protection and Safety Monitoring System (PMS) in the Bases for an STS Subsection should be retained. In addition, NRC staff proposes to uniformly use

   - Power Range Neutron Flux,
   - Intermediate Range Neutron Flux, and
   - Source Range Neutron Flux

   in place of other phrases that refer to power, intermediate, and source range instrumentation channels or detectors. NRC staff further proposes to remove "interlock" after P-6 and P-10, except when used to refer to the interlock and not the setpoint-and to be consistent with TS wording.

   In the "ASA, LCO, and Applicability" section of the Bases for STS Subsection 3.3.2, revise the second, third, fourth, fifth, sixth, and seventh paragraphs as indicated:

   > The RTS Source Range Neutron Flux **– High reactor** trip Function provides protection against an uncontrolled bank rod withdrawal accident from a subcritical condition during startup. This **reactor** trip Function provides redundant protection to the Power Range Neutron Flux – Low Setpoint and Intermediate Range Neutron Flux **reactor** trip Functions. In MODES 3, 4, and 5, administrative controls also prevent the uncontrolled withdrawal of rods. The Protection and Safety Monitoring System (PMS) ~~source range~~ **Source Range Neutron Flux** detectors are located external to the reactor vessel and measure neutrons leaking from the core. The safety analyses

do not take credit for the Source Range Neutron Flux **– High reactor** trip Function. Even though the safety analyses take no credit for ~~the Source Range Neutron Flux~~ **this reactor** trip **Function**, the functional capability at the specified Trip Setpoint is assumed to be available and ~~the~~ **this reactor** trip **Function** is implicitly assumed in the safety analyses.

The Trip Setpoint reflects only steady state instrument uncertainties as the **Source Range Neutron Flux** detectors do not provide primary protection for any events that result in a harsh environment. This **reactor** trip **Function** can be manually blocked by the main control room operator when above the P-6 setpoint (Intermediate Range Neutron Flux interlock) and is automatically unblocked when below the P-6 setpoint. The manual block of the **Source Range Neutron Flux reactor** trip **Function** ~~function~~ also de-energizes the ~~source range~~ **Source Range Neutron Flux** detectors. The ~~source range~~ **Source Range Neutron Flux** detectors are automatically re-energized when below the P-6 setpoint. ~~The~~ **This reactor** trip **Function** is automatically blocked when above the P-10 setpoint (Power Range Neutron Flux interlock). The **Source Range Neutron Flux reactor** trip **Function** is the only RTS automatic protective Function required in MODES 3, 4, and 5. Therefore, the functional capability at the specified Trip Setpoint is assumed to be available.

The LCO requires four channels of **the** Source Range Neutron Flux **– High reactor trip Function** to be OPERABLE in MODE 2 below P-6 and in MODE 3, 4, or 5 with ~~RTBs closed and~~ **the Plant** Control ~~Rod Drive~~ System **(PLS)** capable of rod withdrawal **or one or more rods not fully inserted**. Four channels are provided to permit one channel **to be** in trip or bypass indefinitely and still ensure no single random failure will disable this **reactor** trip Function. In MODE 3, 4, or 5 with the ~~**Plant Control System (PLS)**~~ **PLS incapable of rod withdrawal and all rods fully inserted** ~~RTBs open~~, the LCO does not require the Source Range Neutron Flux **– High** ~~channels for~~ reactor trip Function~~s~~ to be OPERABLE.

In MODE 2 when below the P-6 setpoint during a reactor startup, the Source Range Neutron Flux **– High reactor** trip **Function** must be OPERABLE. Above the P-6 setpoint, the Intermediate Range Neutron Flux **– High** ~~trip~~ and ~~the~~ Power Range Neutron Flux – Low Setpoint **reactor** trip **Functions** will provide core protection for reactivity accidents. Above the P-6 setpoint, the ~~PMS~~ ~~source range~~ **Source Range Neutron Flux** detectors are de-energized and inoperable as described above.

In MODE 3, 4, or 5 with the reactor shutdown, the Source Range Neutron Flux **– High reactor** trip Function must also be OPERABLE. If the PLS is capable of rod withdrawal **or one or more rods are not fully inserted**, the Source Range Neutron Flux **– High reactor** trip **Function** must be OPERABLE to provide core protection against a rod withdrawal accident. If the PLS is not capable of rod withdrawal, the ~~source range~~ **Source Range Neutron Flux** detectors are required to be OPERABLE to provide monitoring of neutron **flux** levels and provide protection for events like an inadvertent boron dilution. These Functions are addressed in LCO 3.3.8**, "Engineered Safety Feature Actuation System (ESFAS) Instrumentation," Function 17, "Source Range Neutron Flux Doubling," LCO 3.3.15,** "Engineered Safety Feature Actuation System (ESFAS) Actuation Logic – Operating," and LCO 3.3.16, "Engineered Safety Feature

Actuation System (ESFAS) Actuation Logic – Shutdown." The requirements for the ~~PMS~~ **S**ource **R**ange **Neutron Flux** detectors in MODE 6 are addressed in LCO 3.9.3, "Nuclear Instrumentation."

The RTS Source Range **Neutron Flux** instrumentation satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii).

In the "Actions" section of the Bases for STS Subsection 3.3.2, revise the first paragraph as indicated:

In the event a ~~channels~~ **Source Range Neutron Flux – High reactor trip Function channel** as-found ~~condition~~ **trip setting** is outside the as-found tolerance described in the SP, or the channel is not functioning as required, or the transmitter, instrument loop, signal processing electronics, or trip output 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.

In the same section, revise the paragraph under the heading "A.1" as indicated:

Condition A addresses the situation where one ~~source range instrumentation~~ Source Range Neutron Flux – High reactor trip Function channel is inoperable in MODE 2. With one channel inoperable, the inoperable channel must be placed in a bypass or trip condition within two hours. If one channel is bypassed, the logic becomes two-out-of-three, while still meeting the single failure criterion. (A failure in one of the three remaining channels will not prevent the protective function.) If one channel is tripped, the logic becomes one-out-of-three, while still meeting the single failure criterion. (A failure in one of the three remaining channels will not prevent the protective function). The 2 hours allowed to place the inoperable channel~~(s)~~ in the bypassed or tripped condition is consistent with the Required Action Completion Times for an inoperable channel of the Intermediate Range Neutron Flux – High reactor trip Function ~~instrumentation Completion Times~~ provided in LCO 3.3.3.

In the same section, revise the paragraph under the heading "B.1 and B.2" as indicated:

Condition B addresses the situation where two ~~source range instrumentation~~ Source Range Neutron Flux – High reactor trip Function channels are inoperable in MODE 2. With two channels inoperable, one affected channel must be placed in a bypass condition within 2 hours and one affected channel must be placed in a trip condition within 2 hours. If one channel is bypassed and one channel is tripped, the logic becomes one-out-of-two, while still meeting the single failure criterion. The 2 hours allowed to place the inoperable channel(s) in the bypassed or tripped condition is consistent with the Required Action Completion Times for an inoperable channel of the Intermediate Range Neutron Flux – High reactor trip Function ~~instrumentation Completion Times~~ provided in LCO 3.3.3.

In the same section, revise the paragraph under the heading "C.1" as indicated:

Condition C is entered when any Required Action and associated Completion Time of ~~Conditions~~ Condition A or B ~~is~~ are not met. If the inoperable Source Range Neutron Flux – High reactor trip Function channel(s) is not restored to OPERABLE status or placed in trip or bypass, as applicable, within the allowed Completion Time, Required Action C.1 requires immediate suspension of positive reactivity additions that could result in a loss of required SDM.

In the same section, revise the paragraph under the heading "D.1" as indicated:

Condition D addresses the situations where one or two ~~source range instrumentation~~ Source Range Neutron Flux – High reactor trip Function channels are inoperable in MODE 3, 4, or 5. With one or two ~~source range instrumentation~~ Source Range Neutron Flux – High reactor trip Function channels inoperable, three of the four required channels must be restored to OPERABLE status within 48 hours. The Completion Time of 48 hours to restore three of four ~~source range instrumentation~~ Source Range Neutron Flux – High reactor trip Function channels to OPERABLE status is justified in Reference 2.

In the same section, revise the paragraph under the heading "E.1 and E.2" as indicated:

Condition E is entered when the Required Action and associated Completion Time of Condition D ~~is~~ are not met. If three of the four required ~~source range instrumentation~~ Source Range Neutron Flux – High reactor trip Function channels are not restored to OPERABLE status within the allowed Completion Time, Required Action E.1 requires that action be initiated to fully insert all rods within 1 hour, and Required Action E.2 requires that the PLS be placed in a condition incapable of rod withdrawal within 1 hour. The allowed Completion Times are ~~is~~ reasonable, based on operating experience, to reach the specified condition in an orderly manner and without challenging plant systems.

In the same section, revise the paragraph under the heading "F.1" as indicated:

Condition F addresses the situation where three or more ~~source range instrumentation~~ Source Range Neutron Flux – High reactor trip Function channels are inoperable. With three or more channels inoperable, the single failure criterion cannot be met and the reactor trip breakers must be opened immediately.

In the "Surveillance Requirements" section of the Bases for STS Subsection 3.3.2, under the heading "SR 3.3.2.2," revise the first paragraph as indicated:

SR 3.3.2.2 is the performance of a ~~RT~~COT. The test is performed in accordance with the SP. If the actual **trip** setting of the channel is found to be outside the ~~as found~~ **as-found** tolerance, the channel is considered inoperable. This condition of the channel will be further evaluated during performance of the SR. This evaluation will consist of resetting the channel **Trip Setpoint** to the NTS (within the allowed **as-left** tolerance), and evaluating the **channel** response...

In the same section, revise the third paragraph, first sentence as indicated:

A test subsystem is provided with the ~~protection and safety monitoring system~~ **PMS** to aid the plant staff in performing the ~~RT~~COT.

In the same section, revise the sixth paragraph, first sentence as indicated:

To the extent possible, ~~protection and safety monitoring system~~ **PMS** functional testing is accomplished with continuous system self-checking features and the continuous functional testing features.

In the same section, revise the ninth paragraph, first sentence as indicated:

~~This~~ **The** ~~test frequency~~ **COT Surveillance Frequency** of 92 days is justified based on Reference 2 **(which refers to this test as "RTCOT")** and the use of continuous diagnostic test features, such as deadman timers, cross-check of redundant channels, memory checks, numeric coprocessor checks, and tests of timers, counters and crystal time bases, which will report a failure within the ~~protection and safety monitoring system~~ **PMS** cabinets to the operator within 10 minutes of a detectable failure.

In the same section, revise the last two paragraphs as indicated for consistency with the Bases for SR 3.3.1.7 and SR 3.3.3.2 (see comment # 135):

~~The Frequency is modified by a Note that allows this surveillance to be satisfied if it has been performed within 92 days of the Frequencies prior to reactor startup and four hours after reducing power below P-6.~~ The Frequency of "prior to reactor startup" ensures this surveillance is performed prior to critical operations, **and applies to the Source Range Neutron Flux – High, Intermediate Range Neutron Flux – High (SR 3.3.3.2), and Power Range Neutron Flux – Low Setpoint (SR 3.3.1.7) reactor trip Function instrument channels**. The Frequency of 4 hours after reducing power below P-6 allows a normal shutdown to be completed and the unit removed from the MODE of Applicability for this surveillance without a delay to perform the testing required by this surveillance. The Frequency of ~~every~~ 92 days thereafter applies if the ~~plant~~ **unit** remains in the MODE of Applicability after the initial performances of prior to reactor startup and ~~four~~ **4** hours after reducing power below P-6. The MODE of Applicability for this surveillance is < P-6. Once the unit is in MODE 3, this surveillance is no longer required. If power is to be maintained ~~<~~ **below** P-6 for more than ~~4~~ **four** hours, then the testing required by this surveillance must be performed prior to the expiration of the ~~4~~ **four** hour limit. Four hours is a reasonable time to complete the required testing or place the unit in a MODE where this surveillance is no longer required. **The Surveillance Frequencies for this COT ensure** ~~This test ensures~~ that the ~~NIS source range~~ **Source Range Neutron Flux – High reactor trip Function** instrumentation channels are OPERABLE prior to taking the reactor critical and after reducing power into the applicable MODE (< P-6) for periods ~~> 4~~ **of greater than four** hours.

During the ~~RT~~COT, the ~~protection and safety monitoring system~~ **PMS** cabinets in the division under test may be placed in bypass.

In the "Surveillance Requirements" section of the Bases for STS Subsection 3.3.2, under the heading "SR 3.3.2.3," revise the first three paragraphs as indicated, and move the last

two sentences of paragraph 1 to the beginning of paragraph 2 for consistency with the Bases for STS SR 3.3.1.8:

> ~~SR 3.3.2.3 is the performance of a~~ **A** CHANNEL CALIBRATION **is performed** every 24 months **or approximately at every refueling**. This SR is modified by a Note stating that neutron detectors are excluded from the CHANNEL CALIBRATION. ~~The test is performed in accordance with the SP. If the actual setting of the channel is found to be outside the as found tolerance, the channel is considered inoperable.~~
>
> The ~~test~~ **CHANNEL CALIBRATION** is performed in accordance with the SP. If the actual **trip** setting of the channel is found to be outside the ~~as found~~ **as-found** tolerance, the channel is considered inoperable. This condition of the channel will be further evaluated during performance of the SR. This evaluation will consist of resetting the ~~channel setpoint~~ **channel Trip Setpoint** to the NTS (within the allowed **as-left** 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.
>
> The CHANNEL CALIBRATION for the ~~source range neutron~~ **Source Range Neutron Flux** detectors consists of obtaining the preamp discriminator curves, evaluating those curves, and comparing the curves to the manufacturer's data.

7. (Internal # 126) In the "ASA, LCO, and Applicability" section of the Bases for STS Subsections 3.3.1 through 3.3.7, revise the opening sentence to state:

> The RTS functions to maintain **compliance with** the SLs during all AOOs and mitigates the consequences of DBAs in all MODES in which the **reactor trip breakers (**RTBs**)** are closed

This provides additional clarity. This is resolved by making the recommended change.

8. (Internal # 135) The "Surveillance Requirements" section of the Bases under the heading "SR 3.3.1.7," states that the Frequency is "prior to startup." The TS SR 3.3.1.7 Frequency is actually "prior to reactor startup." Change "prior to startup" to "prior to reactor startup" This is resolved by making the recommended change with additional edits including the Bases discussion for SR 3.3.2.2 as shown in the resolution of comments for comment # 119 above.

9. (Internal # 139) In GTST Section V under the heading "Changes to the Generic TS and Bases," correct the following typographical errors:

- On page 5, first paragraph fourth line, change MTS 3.3.3 to MTS 3.3.2; and
- On page 6, first paragraph on page, change (STS 3.3.3 Condition F) to (STS 3.3.2 Condition F)
- On page 6, before the "Changes to Condition" table, change "(MTS) 3.3.3 and as further changed, STS 3.3.3" to "(MTS) 3.3.2 and as further changed, STS 3.3.2"

This is resolved by making the recommended GTST changes.

10. (Internal # 140) In GTST Section V under the heading “Changes to the Generic TS and Bases” and in GTST Section VII under heading “Technical Analysis,” the discussion states the Required Action is changed to state, “Suspend positive reactivity additions that could result in a loss of SDM,” consistent with TSTF-469-T. TSTF-469-T and the AP1000 STS markups state, “Suspend positive reactivity additions that could result in a loss of *required* SDM.” Revise the discussions to add the word “required” to be consistent with the TS markups. This is resolved by making the recommended GTST change.

11. (Internal # 141) In GTST Section V under the heading “Changes to the Generic TS and Bases” in the “Changes to Condition” table, in row with STS 3.3.2 Condition E, Condition column lists two Condition “Q” items. The second one of these items identifies the STS 3.3.2 Condition as “E” and the Additional DOC Changes as “M02.” The DOC change should be “L07” just like the previous Condition Q item. Change M02 to L07. This is resolved by making the recommended GTST change.

12. (Internal # 142 and 143) In GTST Section VII under the heading “GTST Safety Evaluation” the sixth paragraph states, “Based on the DOC L01 changes, an RTCOT is not required by the TS. Therefore, the Section 1.1 RTCOT definition is deleted.” The definition of RTCOT is deleted for a series of reasons as described in DOC M01. Replace sentences with “Current section 1.1 definition of RTCOT is deleted per TSU LAR DOC M01.” This is resolved by making the recommended GTST change (consistent with comment # 117):

    > The GTS/PTS Section 1.1 definition of RTCOT is deleted for a series of reasons as described in DOC M01. Changes made by DOC M01 result in consistency with the use of Actuation Logic Test and COT in other TS requirements, are consistent with the intent of the required TS testing, and are consistent with NUREG-1431, Rev.4.

13. (Internal # 144) In the “ASA, LCO, and Applicability” section of the Bases for STS Subsection 3.3.2, the penultimate paragraph, discusses other LCOs where the source range detectors are addressed. LCO 3.3.15, Engineered Safety Feature Actuation System (ESFAS) Actuation Logic – Operating,” should be identified since Source Range Monitors are required by LCO 3.3.8 in MODE 2, 3, and 4. Add LCO 3.3.15 into the listing. In addition, the modifier “PMS” for “power range detectors,” “Intermediate Range Neutron Flux,” and “Source Range, Neutron Flux,” is unnecessary. Inclusion of “PMS” in the Bases is inconsistent with other PMS instruments, with the LCO requirement nomenclature, and the general AP1000 DCD presentation. Delete “PMS” as a modifier to “power range,” “Intermediate Range,” and “Source Range,” throughout the Bases (see comment # 119). This is resolved by making the recommended change with additional edits including the “ASA, LCO, and Applicability” section of the Bases as shown in the resolution of comments for comment # 119 above.

14. (Internal # 145) In the “Surveillance Requirements” section of the Bases for STS Subsection 3.3.2 under the heading “SR 3.3.2.2,” the third paragraph, first sentence repeats a Note (i.e., provides a new description of the note), which is already described in the previous paragraph. Delete the first sentence of this paragraph. This is resolved by making the recommended change with additional edits including the “Surveillance Requirements” section of the Bases as shown in the resolution of comments for comment # 119 above.

NRC Final Approval Date: 12/14/2015

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IX. Evaluator Comments for Consideration in Finalizing Technical Specifications and Bases

None

X. References Used in GTST

1. AP1000 DCD, Revision 19, Section 16, “Technical Specifications,” June 2011 (ML11171A500).

2. Southern Nuclear Operating Company, Vogtle Electric Generating Plant, Units 3 and 4, Technical Specifications Upgrade License Amendment Request, February 24, 2011 (ML12065A057).

3. NRC Safety Evaluation (SE) for Amendment No. 13 to Combined License (COL) No. NPF-91 for Vogtle Electric Generating Plant (VEGP) Unit 3, and Amendment No. 13 to COL No. NPF-92 for VEGP Unit 4, September 9, 2013, ADAMS Package Accession No. ML13238A337, which contains:

ML13238A355	Cover Letter - Issuance of License Amendment No. 13 for Vogtle Units 3 and 4 (LAR 12-002).
ML13238A359	Enclosure 1 - Amendment No. 13 to COL No. NPF-91
ML13239A256	Enclosure 2 - Amendment No. 13 to COL No. NPF-92
ML13239A284	Enclosure 3 - Revised plant-specific TS pages (Attachment to Amendment No. 13)
ML13239A287	Enclosure 4 - Safety Evaluation (SE), and Attachment 1 - Acronyms
ML13239A288	SE Attachment 2 - Table A - Administrative Changes
ML13239A319	SE Attachment 3 - Table M - More Restrictive Changes
ML13239A333	SE Attachment 4 - Table R - Relocated Specifications
ML13239A331	SE Attachment 5 - Table D - Detail Removed Changes
ML13239A316	SE Attachment 6 - Table L - Less Restrictive Changes

   The following documents were subsequently issued to correct an administrative error in Enclosure 3:

ML13277A616	Letter - Correction To The Attachment (Replacement Pages) - Vogtle Electric Generating Plant Units 3 and 4-Issuance of Amendment Re: Technical Specifications Upgrade (LAR 12-002) (TAC No. RP9402)
ML13277A637	Enclosure 3 - Revised plant-specific TS pages (Attachment to Amendment No. 13) (corrected)

4. TSTF-286, Revision 2, “Define ‘Operations Involving Positive Reactivity Additions.’”

5. TSTF-GG-05-01, “Writer's Guide for Plant-Specific Improved Technical Specifications,” June 2005.

6. RAI Letter No. 01 Related to License Amendment Request (LAR) 12-002 for the Vogtle Electric Generating Plant Units 3 and 4 Combined Licenses, September 7, 2012 (ML12251A355).

7. Southern Nuclear Operating Company, Vogtle Electric Generating Plant, Units 3 and 4, Response to Request for Additional Information Letter No. 01 Related to License Amendment Request LAR-12-002, ND-12-2015, October 04, 2012 (ML12286A363 and ML12286A360)

8. APOG-2014-008, APOG (AP1000 Utilities) Comments on AP1000 Standardized Technical Specifications (STS) Generic Technical Specification Travelers (GTSTs), Docket ID NRC-2014-0147, September 22, 2014 (ML14265A493).

XI. MARKUP of the Applicable GTS Subsection for Preparation of the STS NUREG

The entire section of the Specifications and the Bases associated with this GTST is presented next.

Changes to the Specifications and Bases are denoted as follows: Deleted portions are marked in strikethrough red font, and inserted portions in bold blue font.

3.3 INSTRUMENTATION

3.3.2 Reactor Trip System (RTS) Source Range Instrumentation

LCO 3.3.2 Four channels of RTS Source Range Neutron Flux – High Setpoint instrumentation shall be OPERABLE.

APPLICABILITY: MODE 2 with Intermediate Range Neutron Flux below the P-6 interlock, MODES 3, 4, and 5 with ~~Reactor Trip breakers (RTBs) closed and~~ Plant Control System capable of rod withdrawal **or one or more rods not fully inserted**.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One channel inoperable in MODE 2.	**A.1 Place inoperable channel in bypass or trip.**	**2 hours**
B. Two channels inoperable in MODE 2.	**B.1 Place one inoperable channel in bypass.** **AND** **B.2 Place one inoperable channel in trip.**	**2 hours** **2 hours**
C~~A~~. Required Action and associated Completion Time of Condition A or B not met ~~One or two Source Range Neutron Flux channels inoperable~~.	**C~~A~~.1** Suspend ~~operations involving~~ positive reactivity additions **that could result in a loss of required SDM**.	Immediately

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D~~C~~. One or two channels inoperable in MODE 3, 4, or 5.	**D~~C~~.1** Restore three of four channels to OPERABLE status. ~~OR~~ ~~C. 2 Open RTBs.~~	48 hours ~~49 hours~~
~~D. Required Source Range Neutron Flux channel inoperable.~~	~~D.1 Suspend operations involving positive reactivity additions.~~ ~~AND~~ ~~D.2 Close unborated water source isolation valves.~~ ~~AND~~ ~~D.3 Perform SR 3.1.1.1.~~	~~Prior to increasing THERMAL POWER to > P-6~~ ~~1 hour~~ ~~1 hour~~ ~~AND~~ ~~Once per 12 hours thereafter~~
E. Required Action and associated Completion Time of Condition D not met.	**E.1 Initiate action to fully insert all rods.** **AND** **E.2 Place the Plant Control System in a condition incapable of rod withdrawal.**	**1 hour** **1 hour**

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
F~~B~~. Three **or more** ~~Source Range Neutron Flux~~ channels inoperable.	**F**~~B~~.1 Open reactor trip breakers (RTBs).	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.3.2.1	Perform CHANNEL CHECK.	12 hours
SR 3.3.2.2	----------NOTES---------- ~~1. This Surveillance shall include verification that interlock P-6 is in its required state for existing unit conditions.~~ **1. Only required to be performed when not performed within previous 92 days.** 2. Not required to be performed prior to entering MODE 3 from MODE 2 until 4 hours after entry into MODE 3. ---------- Perform ~~RT~~COT in accordance with Setpoint Program.	~~-----NOTE----- Only required when not performed within previous 92 days ----------~~ Prior to reactor startup AND 4 hours after reducing power below P-6 AND 92 days thereafter

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 3.3.2.3	----------NOTE---------- Neutron detectors are excluded from CHANNEL CALIBRATION. ---------- Perform CHANNEL CALIBRATION in accordance with Setpoint Program.	24 months
SR 3.3.2.4	----------NOTE---------- Neutron detectors are excluded from response time testing. ---------- Verify RTS RESPONSE TIME is within limits.	24 months on a STAGGERED TEST BASIS

B 3.3 INSTRUMENTATION

B 3.3.2 Reactor Trip System (RTS) Source Range Instrumentation

BASES

BACKGROUND

A description of the RTS Instrumentation is provided in the Bases for LCO 3.3.1, “Reactor Trip System (RTS) Instrumentation.”

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

The RTS functions to maintain **compliance with** the SLs during all AOOs and mitigates the consequences of DBAs in all MODES in which the **reactor trip breakers (**RTBs**)** are closed.

The RTS Source Range Neutron Flux **– High reactor** trip Function provides protection against an uncontrolled bank rod withdrawal accident from a subcritical condition during startup. This **reactor** trip Function provides redundant protection to the Power Range Neutron Flux – Low Setpoint and Intermediate Range Neutron Flux **reactor** trip Functions. In MODES 3, 4, and 5, administrative controls also prevent the uncontrolled withdrawal of rods. The Protection and Safety Monitoring System (PMS) **Source Range Neutron Flux** ~~source range~~ detectors are located external to the reactor vessel and measure neutrons leaking from the core. The safety analyses do not take credit for the Source Range Neutron Flux **– High reactor** trip Function. Even though the safety analyses take no credit for ~~the Source Range Neutron Flux~~ **this reactor** trip **Function**, the functional capability at the specified Trip Setpoint is assumed to be available and ~~the~~ **this reactor** trip **Function** is implicitly assumed in the safety analyses.

The Trip Setpoint reflects only steady state instrument uncertainties as the **Source Range Neutron Flux** detectors do not provide primary protection for any events that result in a harsh environment. This **reactor** trip **Function** can be manually blocked by the main control room operator when above the P-6 setpoint (Intermediate Range Neutron Flux interlock) and is automatically unblocked when below the P-6 setpoint. The manual block of the **Source Range Neutron Flux reactor** trip **Function** ~~function~~ also de-energizes the **Source Range Neutron Flux** ~~source range~~ detectors. The **Source Range Neutron Flux** ~~source range~~ detectors are automatically re-energized when below the P-6 setpoint. **This reactor** ~~The~~ trip **Function** is automatically blocked when above the P-10 setpoint (Power Range Neutron Flux interlock). The **Source Range Neutron Flux reactor** ~~source range~~ trip **Function** is the only RTS automatic protective Function required in MODES 3, 4, and 5. Therefore,

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

the functional capability at the specified Trip Setpoint is assumed to be available.

The LCO requires four channels of **the** Source Range Neutron Flux **– High reactor trip Function** to be OPERABLE in MODE 2 below P-6 and in MODE 3, 4, or 5 with ~~RTBs closed and~~ **the Plant** Control ~~Rod Drive~~ System **(PLS)** capable of rod withdrawal **or one or more rods not fully inserted**. Four channels are provided to permit one channel **to be** in trip or bypass indefinitely and still ensure no single random failure will disable this **reactor** trip Function. In MODE 3, 4, or 5 with the **PLS incapable of rod withdrawal and all rods fully inserted** ~~RTBs open~~, the LCO does not require the Source Range Neutron Flux **– High** ~~channels for~~ reactor trip Function~~s~~ to be OPERABLE.

In MODE 2 when below the P-6 setpoint during a reactor startup, the Source Range Neutron Flux **– High reactor** trip **Function** must be OPERABLE. Above the P-6 setpoint, the Intermediate Range Neutron Flux **– High** ~~trip~~ and ~~the~~ Power Range Neutron Flux – Low Setpoint **reactor** trip **Functions** will provide core protection for reactivity accidents. Above the P-6 setpoint, the **Source Range Neutron Flux** ~~PMS source range~~ detectors are de-energized and inoperable as described above.

In MODE 3, 4, or 5 with the reactor shutdown, the Source Range Neutron Flux **– High reactor** trip Function must also be OPERABLE. If the PLS is capable of rod withdrawal **or one or more rods are not fully inserted**, the Source Range Neutron Flux **– High reactor** trip **Function** must be OPERABLE to provide core protection against a rod withdrawal accident. If the PLS is not capable of rod withdrawal, the **Source Range Neutron Flux** ~~source range~~ detectors are required to be OPERABLE to provide monitoring of neutron **flux** levels and provide protection for events like an inadvertent boron dilution. These Functions are addressed in LCO 3.3.8, **"Engineered Safety Feature Actuation System (ESFAS) Instrumentation," Function 17, "Source Range Neutron Flux Doubling," LCO 3.3.15,** "Engineered Safety Feature Actuation System (ESFAS) Instrumentation Actuation Logic – Operating," and LCO 3.3.16, "Engineered Safety Feature Actuation System (ESFAS) Actuation Logic – Shutdown." The requirements for the **Source Range Neutron Flux** ~~PMS source range~~ detectors in MODE 6 are addressed in LCO 3.9.3, "Nuclear Instrumentation."

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

The RTS Source Range instrumentation **(Neutron Flux – High trip Function)** satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii).

ACTIONS

In the event a **Source Range Neutron Flux – High reactor trip Function channel** ~~channels~~ as-found **trip setting** ~~condition~~ is outside the as-found tolerance described in the SP, or the channel is not functioning as required, or the transmitter, instrument loop, signal processing electronics, or trip output 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.

A.1

Condition A addresses the situation where one Source Range Neutron Flux – High reactor trip Function channel is inoperable in MODE 2. With one channel inoperable, the inoperable channel must be placed in a bypass or trip condition within two hours. If one channel is bypassed, the logic becomes two-out-of-three, while still meeting the single failure criterion. (A failure in one of the three remaining channels will not prevent the protective function.) If one channel is tripped, the logic becomes one-out-of-three, while still meeting the single failure criterion. (A failure in one of the three remaining channels will not prevent the protective function). The 2 hours allowed to place the inoperable channel in the bypassed or tripped condition is consistent with the Required Action Completion Times for an inoperable channel of the Intermediate Range Neutron Flux – High reactor trip Function provided in LCO 3.3.3.

B.1 and B.2

Condition B addresses the situation where two Source Range Neutron Flux – High reactor trip Function channels are inoperable in MODE 2. With two channels inoperable, one affected channel must be placed in a bypass condition within 2 hours and one affected channel must be placed in a trip condition within 2 hours. If one channel is bypassed and one channel is tripped, the logic becomes one-out-of-two, while still meeting the single failure criterion. The 2 hours allowed to place the inoperable channel(s) in the bypassed or tripped condition is consistent with the Required Action Completion Times for an inoperable channel of the Intermediate

ACTIONS (continued)

Range Neutron Flux – High reactor trip Function provided in LCO 3.3.3.

C.1

Condition C is entered when any Required Action and associated Completion Time of Condition A or B are not met. If the inoperable Source Range Neutron Flux – High reactor trip Function channel(s) is not restored to OPERABLE status or placed in trip or bypass, as applicable, within the allowed Completion Time, Required Action C.1 requires immediate suspension of positive reactivity additions that could result in a loss of required SDM.

D.1

Condition D addresses the situation where one or two Source Range Neutron Flux – High reactor trip Function channels are inoperable in MODE 3, 4, or 5. With one or two Source Range Neutron Flux – High reactor trip Function channels inoperable, three of the four required channels must be restored to OPERABLE status within 48 hours. The Completion Time of 48 hours to restore three of four Source Range Neutron Flux – High reactor trip Function channels to OPERABLE status is justified in Reference 1.

E.1 and E.2

Condition E is entered when the Required Action and associated Completion Time of Condition D are not met. If three of the four required Source Range Neutron Flux – High reactor trip Function channels are not restored to OPERABLE status within the allowed Completion Time, Required Action E.1 requires that action be initiated to fully insert all rods within 1 hour, and Required Action E.2 requires that the PLS be placed in a condition incapable of rod withdrawal within 1 hour. The allowed Completion Times are reasonable, based on operating experience, to reach the specified condition in an orderly manner and without challenging plant systems.

BASES

ACTIONS (continued)

F.1

Condition F addresses the situation where three or more Source Range Neutron Flux – High reactor trip Function channels are inoperable. With three or more channels inoperable, the single failure criterion cannot be met and the RTBs must be opened immediately.

~~A.1~~

~~Condition A applies to one or two Source Range Neutron Flux trip channels inoperable when in MODE 2, below the P-6 setpoint, and performing a reactor startup. With the unit in this Condition, below P-6, the PMS source range performs the monitoring and protection functions. With one or two of the four channels inoperable, operations involving positive reactivity additions that could result in a loss of required SDM shall be suspended immediately. This will preclude any power escalation. With only two source range channels OPERABLE, core protection is severely reduced and any actions that add positive reactivity to the core must be suspended immediately.~~

~~B.1~~

~~Condition B applies to three inoperable Source Range Neutron Flux channels when in MODE 2, below the P-6 setpoint, and performing a reactor startup, or in MODE 3, 4, or 5 with the RTBs closed and the CRD System capable of rod withdrawal. With the unit in this Condition, below P-6, the NIS source range performs the monitoring and protection functions. With three source range channels inoperable, the RTBs must be opened immediately. With the RTBs open, the core is in a more stable condition.~~

~~C.1 and C.2~~

~~Condition C applies to one or two inoperable Source Range Neutron Flux channels in MODE 3, 4, or 5 with the RTBs closed and the PLS capable of rod withdrawal. With the unit in this Condition, below P-6, the NIS source range performs the monitoring and protection functions. With one or two of the source range channels inoperable, 48 hours is allowed to restore three of the four channels to an OPERABLE status. If the channels cannot be returned to an OPERABLE status, 1 additional hour is allowed to open the RTBs. Once the RTBs are open, the core is in a~~

ACTIONS (continued)

~~more stable condition and the unit enters Condition R. The allowance of 48 hours to restore the channel to OPERABLE status, and the additional hour to open the RTBs, are justified in Reference 2.~~

~~D.1, D.2, and D.3~~

~~Condition D applies when the required Source Range Neutron Flux channel is inoperable in MODE 3, 4, or 5 with the RTBs open. With the unit in this Condition, the NIS source range performs the monitoring and protection functions. With the required source range channel inoperable, operations involving positive reactivity additions shall be suspended immediately. This will preclude any power escalation. In addition to suspension of positive reactivity additions, all valves that could add unborated water to the RCS must be closed within 1 hour as specified in LCO 3.9.2. The isolation of unborated water sources will preclude a boron dilution accident.~~

~~Also, the SDM must be verified within 1 hour and once every 12 hours thereafter as per SR 3.1.1.1, SDM verification. With no source range channels OPERABLE, core protection is severely reduced. Verifying the SDM within 1 hour allows sufficient time to perform the calculations and determine that the SDM requirements are met. The SDM must also be verified once per 12 hours thereafter to ensure that the core reactivity has not changed. Required Action D.3 precludes any positive reactivity additions; therefore, core reactivity should not be increasing, and a 12 hour Frequency is adequate. The Completion Times of within 1 hour and once per 12 hours are based on operating experience in performing the Required Actions and the knowledge that unit conditions will change slowly.~~

SURVEILLANCE REQUIREMENTS

The CHANNEL CALIBRATION and ~~RT~~COT are performed in a manner that is consistent with the assumptions used in analytically calculating the required channel accuracies. For channels that include dynamic transfer functions, such as, lag, lead/lag, rate/lag, the response time test may be performed with the transfer function set to one, with the resulting measured response time compared to the appropriate **FSAR** Chapter 7 response time (Ref. **2**~~1~~). Alternately, the response time test can be performed with the time constants set to their nominal value provided the required response time is analytically calculated assuming the time constants are set at their nominal values. The response time may be

BASES

SURVEILLANCE REQUIREMENTS (continued)

measured by a series of overlapping tests such that the entire response time is measured.

SR 3.3.2.1

Performance of the CHANNEL CHECK once every 12 hours ensures that gross failure of instrumentation has not occurred. A CHANNEL CHECK is normally a comparison of the parameter indicated on one channel to a similar parameter on other 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 even something more serious. A CHANNEL CHECK will detect gross channel failure; thus, it is key to verifying that the instrumentation continues to operate properly between each CHANNEL CALIBRATION.

Agreement criteria are determined by the plant 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 have drifted outside their corresponding limits.

The Frequency is based on operating experience that demonstrates that channel failure is rare. Automated operator aids may be used to facilitate the performance of the CHANNEL CHECK.

SR 3.3.2.2

SR 3.3.2.2 is the performance of a ~~RT~~COT. The test is performed in accordance with the SP. If the actual **trip** setting of the channel is found to be outside the as-found tolerance, the channel is considered inoperable. This condition of the channel will be further evaluated during performance of the SR. This evaluation will consist of resetting the channel **Trip Setpoint** ~~setpoint~~ to the NTS (within the allowed **as-left** tolerance), and evaluating the channel~~s~~ 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.

BASES

SURVEILLANCE REQUIREMENTS (continued)

A ~~RT~~COT is performed on each required channel to provide reasonable assurance that the entire channel will perform the intended Function.

A test subsystem is provided with the **PMS** ~~protection and safety monitoring system~~ to aid the plant staff in performing the ~~RT~~COT. The test subsystem is designed to allow for complete functional testing by using a combination of system self checking features, functional testing features, and other testing features. Successful functional testing consists of verifying that the capability of the system to perform the safety function has not failed or degraded.

For hardware functions this would involve verifying that the hardware components and connections have not failed or degraded. Generally this verification includes a comparison of the outputs from two or more redundant subsystems or channels.

Since software does not degrade, software functional testing involves verifying that the software code has not changed and that the software code is executing.

To the extent possible, **PMS** ~~protection and safety monitoring system~~ functional testing is accomplished with continuous system self-checking features and the continuous functional testing features. The ~~RT~~COT shall include a review of the operation of the test subsystem to verify the completeness and adequacy of the results.

If the ~~RT~~COT cannot be completed using the built-in test subsystem, either because of failures in the test subsystem or failures in redundant channel hardware used for functional testing, the ~~RT~~COT can be performed using portable test equipment.

Interlocks implicitly required to support the Function's OPERABILITY are also addressed by this COT. This portion of the COT ensures the associated Function is not bypassed when required to be enabled. This can be accomplished by ensuring the interlocks are calibrated properly in accordance with the SP. If the interlock is not automatically functioning as designed, the condition is entered into the Corrective Action Program and appropriate OPERABILITY evaluations performed for the affected Function. The affected Function's OPERABILITY can be met if the interlock is manually enforced to properly enable the affected Function. When an interlock is not supporting the associated Function's

BASES

SURVEILLANCE REQUIREMENTS (continued)

OPERABILITY at the existing plant conditions, the affected Function's channels must be declared inoperable and appropriate ACTIONS taken.

The COT Surveillance Frequency ~~This test frequency~~ of 92 days is justified based on Reference **1**~~2~~ **(which refers to this test as "RTCOT")** and the use of continuous diagnostic test features, such as deadman timers, cross-check of redundant channels, memory checks, numeric coprocessor checks, and tests of timers, counters and crystal time bases, which will report a failure within the **PMS** ~~protection and safety monitoring system~~ cabinets to the operator within 10 minutes of a detectable failure.

SR 3.3.2.2 is modified by two Notes. The first Note ~~states that this test shall include verification that the P-6 interlock is in its required state for the existing unit condition.~~ **allows this surveillance to be satisfied if it has been performed within the previous 92 days**. The second Note provides a 4 hour delay in the requirement to perform this Surveillance when entering MODE 3 from MODE 2. This note allows a normal shutdown to proceed without a delay for testing in MODE 2 and for a short time in MODE 3 until the RTBs are open and SR 3.3.2.2 is no longer required to be performed. If the unit is to be in MODE 3 with the RTBs closed for a time greater than 4 hours, this Surveillance must be performed prior to 4 hours after entry into MODE 3.

~~The Frequency is modified by a Note that allows this surveillance to be satisfied if it has been performed within 92 days of the Frequencies prior to reactor startup and four hours after reducing power below P-6.~~ The Frequency of prior to reactor startup ensures this surveillance is performed prior to critical operations, **and applies to the Source Range Neutron Flux – High, Intermediate Range Neutron Flux – High (SR 3.3.3.2), and Power Range Neutron Flux – Low Setpoint (SR 3.3.1.7) reactor trip Function instrument channels**. The Frequency of 4 hours after reducing power below P-6 allows a normal shutdown to be completed and the unit removed from the MODE of Applicability for this surveillance without a delay to perform the testing required by this surveillance. The Frequency of ~~every~~ 92 days thereafter applies if the **unit** ~~plant~~ remains in the MODE of Applicability after the initial performances of prior to reactor startup and ~~four~~ **4** hours after reducing power below P-6. The MODE of Applicability for this surveillance is **below** ~~<~~ P-6. Once the unit is in MODE 3, this surveillance is no longer required. If power is to be maintained < P-6 for more than **four** ~~4~~ hours, then the testing required by this surveillance must be

SURVEILLANCE REQUIREMENTS (continued)

performed prior to the expiration of the **four** ~~4~~ hour limit. Four hours is a reasonable time to complete the required testing or place the unit in a MODE where this surveillance is no longer required. **The Surveillance Frequencies for this COT ensure** ~~This test ensures~~ that the **Source Range Neutron Flux – High reactor trip Function** ~~NIS source range~~ instrumentation channels are OPERABLE prior to taking the reactor critical and after reducing power into the applicable MODE (< P-6) for periods **of greater than four** ~~> 4~~ hours.

During the ~~RT~~COT, the **PMS** ~~protection and safety monitoring system~~ cabinets in the division under test may be placed in bypass.

SR 3.3.2.3

A ~~SR 3.3.2.3 is the performance of a~~ CHANNEL CALIBRATION **is performed** every 24 months **or approximately at every refueling**. This SR is modified by a Note stating that neutron detectors are excluded from the CHANNEL CALIBRATION. ~~The test is performed in accordance with the SP. If the actual setting of the channel is found to be outside the as found tolerance, the channel is considered inoperable.~~

The CHANNEL CALIBRATION is performed in accordance with the SP. If the actual trip setting of the channel is found to be outside the as-found tolerance, the channel is considered inoperable. This condition of the channel will be further evaluated during performance of the SR. This evaluation will consist of resetting the channel **Trip Setpoint** ~~setpoint~~ to the NTS (within the allowed **as-left** tolerance), and evaluating the channel~~s~~ 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.

The CHANNEL CALIBRATION for the **Source Range Neutron Flux** ~~source range neutron~~ detectors consists of obtaining the preamp discriminator curves, evaluating those curves, and comparing the curves to the manufacturer's data.

SURVEILLANCE REQUIREMENTS (continued)

Interlocks implicitly required to support the Function's OPERABILITY are also addressed by this CHANNEL CALIBRATION. This portion of the CHANNEL CALIBRATION ensures the associated Function is not bypassed when required to be enabled. This can be accomplished by ensuring the interlocks are calibrated properly in accordance with the SP. If the interlock is not automatically functioning as designed, the condition is entered into the Corrective Action Program and appropriate OPERABILITY evaluations performed for the affected Function. The affected Function's OPERABILITY can be met if the interlock is manually enforced to properly enable the affected Function. When an interlock is not supporting the associated Function's OPERABILITY at the existing plant conditions, the affected Function's channels must be declared inoperable and appropriate ACTIONS taken.

The 24 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 24 month Frequency.

SR 3.3.2.4

This SR 3.3.2.4 verifies that the individual channel actuation response times are less than or equal to the maximum values assumed in the accident analysis. Response Time testing criteria are included in Reference **2**~~1~~.

For channels that include dynamic transfer Functions (e.g., lag, lead/lag, rate/lag, etc.), the response time test may be performed with the transfer Function set to one, with the resulting measured response time compared to the appropriate **FSAR** ~~DCD~~ Chapter 7 **(Ref. 2)** response time. Alternately, the response time test can be performed with the time constants set to their nominal value, provided the required response time is analytically calculated assuming the time constants are set at their nominal values. The response time may be measured by a series of overlapping tests such that the entire response time is measured.

BASES

SURVEILLANCE REQUIREMENTS (continued)

Response time may be verified by actual response time tests in any series of sequential, overlapping or total channel measurements, or by the summation of allocated sensor, signal processing and actuation logic response times with actual response time tests on the remainder of the channel.

Each channel response must be verified every 24 months on a STAGGERED TEST BASIS (i.e., all four Protection Channel Sets would be tested after 96 months). Response times cannot be determined during plant operation because equipment operation is required to measure response times. Experience has shown that these components usually pass this surveillance when performed on a refueling frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

SR 3.3.2.4 is modified by a note exempting neutron detectors from RTS RESPONSE TIME testing. This Note is necessary because of the difficulty in generating an appropriate detector input signal. Excluding the detectors is acceptable because the principles of detector operation ensure a virtually instantaneous response.

REFERENCES

1. **APP-GW-GSC-020, "Technical Specification Completion Time and Surveillance Frequency Justification."** ~~Chapter 7.0, "Instrumentation and Controls."~~

~~2. APP-GW-GLR-137, Revision 1, "Bases of Digital Overpower and Overtemperature Delta-T (OPΔT/ OTΔT) Reactor Trips," Westinghouse Electric Company LLC.~~

2. FSAR Chapter 7.0, "Instrumentation and Controls."

XII. Applicable STS Subsection After Incorporation of this GTST's Modifications

The entire subsection of the Specifications and the Bases associated with this GTST, following incorporation of the modifications, is presented next.

3.3 INSTRUMENTATION

3.3.2 Reactor Trip System (RTS) Source Range Instrumentation

LCO 3.3.2 Four channels of RTS Source Range Neutron Flux – High Setpoint instrumentation shall be OPERABLE.

APPLICABILITY: MODE 2 with Intermediate Range Neutron Flux below the P-6 interlock,
MODES 3, 4, and 5 with Plant Control System capable of rod withdrawal or one or more rods not fully inserted.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One channel inoperable in MODE 2.	A.1	Place inoperable channel in bypass or trip.	2 hours
B. Two channels inoperable in MODE 2.	B.1	Place one inoperable channel in bypass.	2 hours
	AND		
	B.2	Place one inoperable channel in trip.	2 hours
C. Required Action and associated Completion Time of Condition A or B not met.	C.1	Suspend positive reactivity additions that could result in a loss of required SDM.	Immediately
D. One or two channels inoperable in MODE 3, 4, or 5.	D.1	Restore three of four channels to OPERABLE status.	48 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. Required Action and associated Completion Time of Condition D not met.	E.1 Initiate action to fully insert all rods. AND E.2 Place the Plant Control System in a condition incapable of rod withdrawal.	1 hour 1 hour
F. Three or more channels inoperable.	F.1 Open reactor trip breakers (RTBs).	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.3.2.1	Perform CHANNEL CHECK.	12 hours

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 3.3.2.2	----------NOTES---------- 1. Only required to be performed when not performed within previous 92 days. 2. Not required to be performed prior to entering MODE 3 from MODE 2 until 4 hours after entry into MODE 3. ---------- Perform COT in accordance with Setpoint Program.	Prior to reactor startup AND 4 hours after reducing power below P-6 AND 92 days thereafter
SR 3.3.2.3	----------NOTE---------- Neutron detectors are excluded from CHANNEL CALIBRATION. ---------- Perform CHANNEL CALIBRATION in accordance with Setpoint Program.	24 months
SR 3.3.2.4	----------NOTE---------- Neutron detectors are excluded from response time testing. ---------- Verify RTS RESPONSE TIME is within limits.	24 months on a STAGGERED TEST BASIS

B 3.3 INSTRUMENTATION

B 3.3.2 Reactor Trip System (RTS) Source Range Instrumentation

BASES

BACKGROUND

A description of the RTS Instrumentation is provided in the Bases for LCO 3.3.1, “Reactor Trip System (RTS) Instrumentation.”

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

The RTS functions to maintain compliance with the SLs during all AOOs and mitigates the consequences of DBAs in all MODES in which the reactor trip breakers (RTBs) are closed.

The RTS Source Range Neutron Flux – High reactor trip Function provides protection against an uncontrolled bank rod withdrawal accident from a subcritical condition during startup. This reactor trip Function provides redundant protection to the Power Range Neutron Flux – Low Setpoint and Intermediate Range Neutron Flux reactor trip Functions. In MODES 3, 4, and 5, administrative controls also prevent the uncontrolled withdrawal of rods. The Protection and Safety Monitoring System (PMS) Source Range Neutron Flux detectors are located external to the reactor vessel and measure neutrons leaking from the core. The safety analyses do not take credit for the Source Range Neutron Flux – High reactor trip Function. Even though the safety analyses take no credit for this reactor trip Function, the functional capability at the specified Trip Setpoint is assumed to be available and this reactor trip Function is implicitly assumed in the safety analyses.

The Trip Setpoint reflects only steady state instrument uncertainties as the Source Range Neutron Flux detectors do not provide primary protection for any events that result in a harsh environment. This reactor trip Function can be manually blocked by the main control room operator when above the P-6 setpoint (Intermediate Range Neutron Flux interlock) and is automatically unblocked when below the P-6 setpoint. The manual block of the Source Range Neutron Flux reactor trip Function also de-energizes the Source Range Neutron Flux detectors. The Source Range Neutron Flux detectors are automatically re-energized when below the P-6 setpoint. This reactor trip Function is automatically blocked when above the P-10 setpoint (Power Range Neutron Flux interlock). The Source Range Neutron Flux reactor trip Function is the only RTS automatic protective Function required in MODES 3, 4, and 5. Therefore, the functional capability at the specified Trip Setpoint is assumed to be available.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

The LCO requires four channels of the Source Range Neutron Flux – High reactor trip Function to be OPERABLE in MODE 2 below P-6 and in MODE 3, 4, or 5 with the Plant Control System (PLS) capable of rod withdrawal or one or more rods not fully inserted. Four channels are provided to permit one channel to be in trip or bypass indefinitely and still ensure no single random failure will disable this reactor trip Function. In MODE 3, 4, or 5 with the PLS incapable of rod withdrawal and all rods fully inserted, the LCO does not require the Source Range Neutron Flux – High reactor trip Function to be OPERABLE.

In MODE 2 when below the P-6 setpoint during a reactor startup, the Source Range Neutron Flux – High reactor trip Function must be OPERABLE. Above the P-6 setpoint, the Intermediate Range Neutron Flux – High and Power Range Neutron Flux – Low Setpoint reactor trip Functions will provide core protection for reactivity accidents. Above the P-6 setpoint, the Source Range Neutron Flux detectors are de-energized and inoperable as described above.

In MODE 3, 4, or 5 with the reactor shutdown, the Source Range Neutron Flux – High reactor trip Function must also be OPERABLE. If the PLS is capable of rod withdrawal or one or more rods are not fully inserted, the Source Range Neutron Flux – High reactor trip Function must be OPERABLE to provide core protection against a rod withdrawal accident. If the PLS is not capable of rod withdrawal, the Source Range Neutron Flux detectors are required to be OPERABLE to provide monitoring of neutron flux levels and provide protection for events like an inadvertent boron dilution. These Functions are addressed in LCO 3.3.8, “Engineered Safety Feature Actuation System (ESFAS) Instrumentation,” Function 17, “Source Range Neutron Flux Doubling,” LCO 3.3.15, “Engineered Safety Feature Actuation System (ESFAS) Instrumentation Actuation Logic – Operating,” and LCO 3.3.16, “Engineered Safety Feature Actuation System (ESFAS) Actuation Logic – Shutdown.” The requirements for the Source Range Neutron Flux detectors in MODE 6 are addressed in LCO 3.9.3, “Nuclear Instrumentation.”

The RTS Source Range instrumentation (Neutron Flux – High trip Function) satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii).

BASES

ACTIONS

In the event a Source Range Neutron Flux – High reactor trip Function channel as-found trip setting is outside the as-found tolerance described in the SP, or the channel is not functioning as required, or the transmitter, instrument loop, signal processing electronics, or trip output 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.

A.1

Condition A addresses the situation where one Source Range Neutron Flux – High reactor trip Function channel is inoperable in MODE 2. With one channel inoperable, the inoperable channel must be placed in a bypass or trip condition within two hours. If one channel is bypassed, the logic becomes two-out-of-three, while still meeting the single failure criterion. (A failure in one of the three remaining channels will not prevent the protective function.) If one channel is tripped, the logic becomes one-out-of-three, while still meeting the single failure criterion. (A failure in one of the three remaining channels will not prevent the protective function). The 2 hours allowed to place the inoperable channel in the bypassed or tripped condition is consistent with the Required Action Completion Times for an inoperable channel of the Intermediate Range Neutron Flux – High reactor trip Function provided in LCO 3.3.3.

B.1 and B.2

Condition B addresses the situation where two Source Range Neutron Flux – High reactor trip Function channels are inoperable in MODE 2. With two channels inoperable, one affected channel must be placed in a bypass condition within 2 hours and one affected channel must be placed in a trip condition within 2 hours. If one channel is bypassed and one channel is tripped, the logic becomes one-out-of-two, while still meeting the single failure criterion. The 2 hours allowed to place the inoperable channel(s) in the bypassed or tripped condition is consistent with the Required Action Completion Times for an inoperable channel of the Intermediate Range Neutron Flux – High reactor trip Function provided in LCO 3.3.3.

BASES

ACTIONS (continued)

C.1

Condition C is entered when any Required Action and associated Completion Time of Condition A or B are not met. If the inoperable Source Range Neutron Flux – High reactor trip Function channel(s) is not restored to OPERABLE status or placed in trip or bypass, as applicable, within the allowed Completion Time, Required Action C.1 requires immediate suspension of positive reactivity additions that could result in a loss of required SDM.

D.1

Condition D addresses the situation where one or two Source Range Neutron Flux – High reactor trip Function channels are inoperable in MODE 3, 4, or 5. With one or two Source Range Neutron Flux – High reactor trip Function channels inoperable, three of the four required channels must be restored to OPERABLE status within 48 hours. The Completion Time of 48 hours to restore three of four Source Range Neutron Flux – High reactor trip Function channels to OPERABLE status is justified in Reference 1.

E.1 and E.2

Condition E is entered when the Required Action and associated Completion Time of Condition D are not met. If three of the four required Source Range Neutron Flux – High reactor trip Function channels are not restored to OPERABLE status within the allowed Completion Time, Required Action E.1 requires that action be initiated to fully insert all rods within 1 hour, and Required Action E.2 requires that the PLS be placed in a condition incapable of rod withdrawal within 1 hour. The allowed Completion Times are reasonable, based on operating experience, to reach the specified condition in an orderly manner and without challenging plant systems.

F.1

Condition F addresses the situation where three or more Source Range Neutron Flux – High reactor trip Function channels are inoperable. With three or more channels inoperable, the single failure criterion cannot be met and the RTBs must be opened immediately.

BASES

SURVEILLANCE REQUIREMENTS

The CHANNEL CALIBRATION and COT are performed in a manner that is consistent with the assumptions used in analytically calculating the required channel accuracies. For channels that include dynamic transfer functions, such as, lag, lead/lag, rate/lag, the response time test may be performed with the transfer function set to one, with the resulting measured response time compared to the appropriate FSAR Chapter 7 response time (Ref. 2). Alternately, the response time test can be performed with the time constants set to their nominal value provided the required response time is analytically calculated assuming the time constants are set at their nominal values. The response time may be measured by a series of overlapping tests such that the entire response time is measured.

SR 3.3.2.1

Performance of the CHANNEL CHECK once every 12 hours ensures that gross failure of instrumentation has not occurred. A CHANNEL CHECK is normally a comparison of the parameter indicated on one channel to a similar parameter on other 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 even something more serious. A CHANNEL CHECK will detect gross channel failure; thus, it is key to verifying that the instrumentation continues to operate properly between each CHANNEL CALIBRATION.

Agreement criteria are determined by the plant 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 have drifted outside their corresponding limits.

The Frequency is based on operating experience that demonstrates that channel failure is rare. Automated operator aids may be used to facilitate the performance of the CHANNEL CHECK.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.2.2

SR 3.3.2.2 is the performance of a COT. The test is performed in accordance with the SP. If the actual trip setting of the channel is found to be outside the as-found tolerance, the channel is considered inoperable. This condition of the channel will be further evaluated during performance of the SR. This evaluation will consist of resetting the channel Trip Setpoint to the NTS (within the allowed as-left 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 COT is performed on each required channel to provide reasonable assurance that the entire channel will perform the intended Function.

A test subsystem is provided with the PMS to aid the plant staff in performing the COT. The test subsystem is designed to allow for complete functional testing by using a combination of system self checking features, functional testing features, and other testing features. Successful functional testing consists of verifying that the capability of the system to perform the safety function has not failed or degraded.

For hardware functions this would involve verifying that the hardware components and connections have not failed or degraded. Generally this verification includes a comparison of the outputs from two or more redundant subsystems or channels.

Since software does not degrade, software functional testing involves verifying that the software code has not changed and that the software code is executing.

To the extent possible, PMS functional testing is accomplished with continuous system self-checking features and the continuous functional testing features. The COT shall include a review of the operation of the test subsystem to verify the completeness and adequacy of the results.

SURVEILLANCE REQUIREMENTS (continued)

If the COT cannot be completed using the built-in test subsystem, either because of failures in the test subsystem or failures in redundant channel hardware used for functional testing, the COT can be performed using portable test equipment.

Interlocks implicitly required to support the Function's OPERABILITY are also addressed by this COT. This portion of the COT ensures the associated Function is not bypassed when required to be enabled. This can be accomplished by ensuring the interlocks are calibrated properly in accordance with the SP. If the interlock is not automatically functioning as designed, the condition is entered into the Corrective Action Program and appropriate OPERABILITY evaluations performed for the affected Function. The affected Function's OPERABILITY can be met if the interlock is manually enforced to properly enable the affected Function. When an interlock is not supporting the associated Function's OPERABILITY at the existing plant conditions, the affected Function's channels must be declared inoperable and appropriate ACTIONS taken.

The COT Surveillance Frequency of 92 days is justified based on Reference 1 (which refers to this test as "RTCOT") and the use of continuous diagnostic test features, such as deadman timers, cross-check of redundant channels, memory checks, numeric coprocessor checks, and tests of timers, counters and crystal time bases, which will report a failure within the PMS cabinets to the operator within 10 minutes of a detectable failure.

SR 3.3.2.2 is modified by two Notes. The first Note allows this surveillance to be satisfied if it has been performed within the previous 92 days. The second Note provides a 4 hour delay in the requirement to perform this Surveillance when entering MODE 3 from MODE 2. This note allows a normal shutdown to proceed without a delay for testing in MODE 2 and for a short time in MODE 3 until the RTBs are open and SR 3.3.2.2 is no longer required to be performed. If the unit is to be in MODE 3 with the RTBs closed for a time greater than 4 hours, this Surveillance must be performed prior to 4 hours after entry into MODE 3.

The Frequency of prior to reactor startup ensures this surveillance is performed prior to critical operations, and applies to the Source Range Neutron Flux – High, Intermediate Range Neutron Flux – High (SR 3.3.3.2), and Power Range Neutron Flux – Low Setpoint (SR 3.3.1.7) reactor trip Function instrument channels. The Frequency of 4 hours after reducing power below P-6 allows a normal shutdown to be

SURVEILLANCE REQUIREMENTS (continued)

completed and the unit removed from the MODE of Applicability for this surveillance without a delay to perform the testing required by this surveillance. The Frequency of 92 days thereafter applies if the unit remains in the MODE of Applicability after the initial performances of prior to reactor startup and 4 hours after reducing power below P-6. The MODE of Applicability for this surveillance is below P-6. Once the unit is in MODE 3, this surveillance is no longer required. If power is to be maintained < P-6 for more than four hours, then the testing required by this surveillance must be performed prior to the expiration of the four hour limit. Four hours is a reasonable time to complete the required testing or place the unit in a MODE where this surveillance is no longer required. The Surveillance Frequencies for this COT ensure that the Source Range Neutron Flux – High reactor trip Function instrumentation channels are OPERABLE prior to taking the reactor critical and after reducing power into the applicable MODE (< P-6) for periods of greater than four hours.

During the COT, the PMS cabinets in the division under test may be placed in bypass.

SR 3.3.2.3

A CHANNEL CALIBRATION is performed every 24 months or approximately at every refueling. This SR is modified by a Note stating that neutron detectors are excluded from the CHANNEL CALIBRATION.

The CHANNEL CALIBRATION is performed in accordance with the SP. If the actual trip setting of the channel is found to be outside the as-found tolerance, the channel is considered inoperable. This condition of the channel will be further evaluated during performance of the SR. This evaluation will consist of resetting the channel Trip Setpoint to the NTS (within the allowed as-left 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.

The CHANNEL CALIBRATION for the Source Range Neutron Flux detectors consists of obtaining the preamp discriminator curves, evaluating those curves, and comparing the curves to the manufacturer's data.

SURVEILLANCE REQUIREMENTS (continued)

Interlocks implicitly required to support the Function's OPERABILITY are also addressed by this CHANNEL CALIBRATION. This portion of the CHANNEL CALIBRATION ensures the associated Function is not bypassed when required to be enabled. This can be accomplished by ensuring the interlocks are calibrated properly in accordance with the SP. If the interlock is not automatically functioning as designed, the condition is entered into the Corrective Action Program and appropriate OPERABILITY evaluations performed for the affected Function. The affected Function's OPERABILITY can be met if the interlock is manually enforced to properly enable the affected Function. When an interlock is not supporting the associated Function's OPERABILITY at the existing plant conditions, the affected Function's channels must be declared inoperable and appropriate ACTIONS taken.

The 24 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 24 month Frequency.

SR 3.3.2.4

This SR 3.3.2.4 verifies that the individual channel actuation response times are less than or equal to the maximum values assumed in the accident analysis. Response Time testing criteria are included in Reference 2.

For channels that include dynamic transfer Functions (e.g., lag, lead/lag, rate/lag, etc.), the response time test may be performed with the transfer Function set to one, with the resulting measured response time compared to the appropriate FSAR Chapter 7 (Ref. 2) response time. Alternately, the response time test can be performed with the time constants set to their nominal value, provided the required response time is analytically calculated assuming the time constants are set at their nominal values. The response time may be measured by a series of overlapping tests such that the entire response time is measured.

Response time may be verified by actual response time tests in any series of sequential, overlapping or total channel measurements, or by the summation of allocated sensor, signal processing and actuation logic

BASES

SURVEILLANCE REQUIREMENTS (continued)

response times with actual response time tests on the remainder of the channel.

Each channel response must be verified every 24 months on a STAGGERED TEST BASIS (i.e., all four Protection Channel Sets would be tested after 96 months). Response times cannot be determined during plant operation because equipment operation is required to measure response times. Experience has shown that these components usually pass this surveillance when performed on a refueling frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

SR 3.3.2.4 is modified by a note exempting neutron detectors from RTS RESPONSE TIME testing. This Note is necessary because of the difficulty in generating an appropriate detector input signal. Excluding the detectors is acceptable because the principles of detector operation ensure a virtually instantaneous response.

REFERENCES

1. APP-GW-GSC-020, “Technical Specification Completion Time and Surveillance Frequency Justification.”

2. FSAR Chapter 7.0, “Instrumentation and Controls.”