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

Title: Changes Related to LCO 3.3.10, Engineered Safety Feature Actuation System (ESFAS) Reactor Coolant System (RCS) Hot Leg Level 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-411-A, Rev 1,	Surveillance Test Interval Extensions for Components of the Reactor Protection System (WCAP-15376-P)
TSTF-418-A, Rev 2,	RPS and ESFAS Test Times and Completion Times (WCAP-14333)
TSTF-519-T, Rev 0,	Increase Standardization in Condition and Required Action Notes

STS NUREGs Affected:

TSTF-411-A, Rev 1:	NUREG 1431
TSTF-418-A, Rev 2:	NUREG 1431
TSTF-519-T, Rev 0:	NUREG 1430 and 1431

NRC Approval Date:

TSTF-411-A, Rev 1:	30-Aug-02
TSTF-418-A, Rev 2:	02-Apr-03
TSTF-519-T, Rev 0:	16-Oct-09 (TSTF Review)

TSTF Classification:

TSTF-411-A, Rev 1:	Technical Change
TSTF-418-A, Rev 2:	Technical 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 3.3.2.

RCOL COL Item Number and Title:

There are no Vogtle COL items applicable to GTS 3.3.2.

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 A028:	Reformat of GTS 3.3.2 into Nine Parts; 3.3.8 through 3.3.16; note that this maps GTS 3.3.2 requirements into interim A028-modified TS (MTS) Subsection 3.3.10, to which the other changes are applied.
VEGP LAR DOC A025:	SR text phrase change from “the prescribed values” to “within limits.”
VEGP LAR DOC A031:	Revision of Various MTS 3.3.10 Required Action statements
VEGP LAR DOC A034:	Revision of Modes or Other Specified Conditions and footnotes in MTS Table 3.3.10-1
VEGP LAR DOC A035:	Deletion of design-related details - coincident
VEGP LAR DOC L10:	Delete Current TS 3.3.2 Function 18, Interlocks except reactor trip, P-4

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

This section discusses changes: (1) that were applicable to previous designs, but are not to the current design; (2) that are already incorporated in the GTS; and (3) that are superseded by another change.

TSTF-411-A, Rev.1 provides justification to (1) increase the required action completion time and the bypass test time allowance for the reactor trip breakers and (2) increase the surveillance test intervals for the reactor trip breakers, master relays, logic cabinets, and analog channels based on analysis provided in WCAP-15376-P, Rev. 0, “Risk-Informed Assessment of the RTS and ESFAS Surveillance Test Intervals and Reactor Trip Breaker Test and Completion Times.” WCAP-15376-P, Rev. 0 did not specifically consider the AP1000 design. The AP1000 GTS completion times and surveillance frequencies for instrumentation functions and reactor trip breakers were justified by APP-GW-GSC-020 (WCAP-16787), which is listed as Reference 6 in the GTS Subsection 3.3.2 Bases. Therefore, TSTF-411-A is not applicable to the AP1000 STS, and is not discussed further in this GTST.

TSTF-418-A adjusts the WOG STS (NUREG-1431) required action completion times for the conventional Westinghouse Plant Protection System instrumentation design for which the WOG STS instrumentation requirements are applicable. The changes in TSTF-418 are based on the analysis in WCAP-14333-P, which did not consider the AP1000 protection and safety monitoring system (PMS) instrumentation design. The AP1000 GTS required action completion times (and surveillance frequencies) for the PMS were justified by APP-GW-GSC-020 (WCAP-16787), which is listed as Reference 6 in the GTS Subsection 3.3.2 Bases. APP-GW-GSC-020 does not reference WCAP-14333-P, but notes, “the AP1000 protection and safety monitoring system (PMS) redundancy is as good as or better than that of the conventional Westinghouse Plant Protection System. Although the PMS equipment reliability is considered to be equivalent to or better than that of the conventional Westinghouse Plant Protection System, a common basis for comparison to the digital portion of the PMS is not readily available.”

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)

In the MTS 3.3.10 “Actions” section of the Bases, the phrase “...then all affected Functions provided by that channel must be declared inoperable...” is revised to “...then all affected protection Functions supported by or dependent on that channel must be declared inoperable...”

V. Applicability

Affected Generic Technical Specifications and Bases:

Section 3.3.10 Engineered Safety Feature Actuation System (ESFAS) Reactor Coolant System (RCS) Hot Leg Level Instrumentation

Changes to the Generic Technical Specifications and Bases:

GTS 3.3.2, "Engineered Safety Feature Actuation System (ESFAS) Instrumentation," is reformatted by VEGP LAR DOC A028 into multiple Specifications including interim A028-modified TS (MTS) 3.3.10, "Engineered Safety Feature Actuation System (ESFAS) Reactor Coolant System (RCS) Hot Leg Level Instrumentation." As a result of the reformatting, GTS 3.3.2 Functions 10.c and 28.a are grouped together in MTS 3.3.10 and renumbered as Functions 1 and 2, as shown in the following list.

MTS/STS 3.3.10 Function No. & STS Title	GTS 3.3.2 Function(s)
1. Hot Leg Level - Low 2	10. Automatic Depressurization System (ADS) Stage 4 Actuation c. Coincident RCS Loop 1 and 2 Hot Leg Level - Low 2
2. Hot Leg Level - Low 1	28. Chemical and Volume Control System Letdown Isolation a. Hot Leg Level - Low 1

References 2, 3, and 6 provide details showing the correspondence of GTS 3.3.2 Functions and STS 3.3.8 through 3.3.16 Functions.

GTS 3.3.2 Conditions A, C, Y, and AA are reordered, split, and relabeled as AP1000 MTS 3.3.10 Conditions A through F and as changed become STS 3.3.10 Conditions A through F, as follows (applicability footnote references are listed). (DOC A028).

GTS	MTS	STS	STS 3.3.10 Functions [Applicable MODES (footnote)]	
C	A	A	1 [4(a),5,6(b)]	2 [4(a),4(c),5(c)6(c),6(d)]
A	B	B	1 [4(a),5,6(b)]	2 [4(a),4(c),5(c)6(c),6(d)]
Y	C	C	1 [4(a),5]	
Y	D	D	1 [6(b)]	
AA	E	E	2 [4(a),4(c),5(c)]	
AA	F	F	2 [6(c),6(d)]	

GTS Table 3.3.2-1 footnotes c, k, p, and q are reordered and relabeled as MTS Table 3.3.10-1 footnotes a through d and as changed become STS Table 3.3.9-1, footnotes a through d, as follows:

GTS	MTS	STS	STS Table 3.3.10-1 footnote or deleted GTS Table 3.3.2-1 footnote
(c)	(a)	(a)	With the RCS being cooled by the RNS.
(j)	(b)	---	Not applicable when the required ADS valves are open. See LCO 3.4.12 and LCO 3.4.13 for ADS valve and equivalent relief area requirements.
(k)	---	(b)	With upper internals in place.
(p)	(c)	(c)	Below the P-12 (Pressurizer Level) interlock.
(q)	(d)	(d)	With the water level < 23 feet above the top of the reactor vessel flange.

MTS Table 3.3.10-1 footnote (b) is deleted, "Not applicable when the required ADS valves are open," which affects MTS Table 3.3.10-1 Function 1 (GTS Table 3.3.2-1 Function 10.c and footnote (j)). New footnote (b) is added, "With upper internals in place." (DOC A034)

GTS SR 3.3.2.1, SR 3.3.2.4, SR 3.3.2.5, and SR 3.3.2.6 are retained and renumbered as MTS SR 3.3.10.1, SR 3.3.10.3, SR 3.3.10.2, and SR 3.3.10.4, respectively.

MTS SR 3.3.10.2 and SR 3.3.10.3 Bases are revised to include a discussion of interlocks implicitly required to support the Function's OPERABILITY. (DOC L10)

MTS SR 3.3.10.3 Note is revised from “...adjusted to the prescribed values.” to “... adjusted to within limits.” This change is made for clarity and consistency. (DOC A025)

MTS 3.3.10 Action D.2 phrase is revised from “… initiate action to be MODE 6 with the water level ≥ 23 feet above the top of the reactor vessel flange,” to “Initiate action to establish water level ≥ 23 feet above the top of the reactor vessel flange.” This change is made for clarity and consistency. (DOC A031)

MTS 3.3.10 Action F.1 phrase is revised from “… initiate action to be MODE 6 with the water level ≥ 23 feet above the top of the reactor vessel flange,” to “Initiate action to establish water level ≥ 23 feet above the top of the reactor vessel flange.” This change is made for clarity and consistency. (DOC A031)

Design-related details such as “coincident” in proposed MTS Table 3.3.10-1 Function 1 (GTS Table 3.3.2-1 Function 10.c) are deleted. VEGP LAR DOC A028 reformats GTS Table 3.3.2-1. Because the new (reformatted) Functions now refer to the instrumentation in lieu of the system actuations, discussion of coincidence is no longer required. (DOC A035)

The following tables are provided as an aid to tracking the various changes to GTS 3.3.2 Conditions, Required Actions, Functions, Applicability Footnotes, and Surveillance Requirements that result in interim A028-modified TS (MTS) 3.3.10 and as further changed, STS 3.3.10.

Changes to Conditions

GTS 3.3.2 Condition	MTS 3.3.10 Condition	STS 3.3.10 Condition	Other STS Subsections Addressing the Listed Condition	Additional DOC Changes
A	B	B	3.3.8, 3.3.9	---
B	→	→	3.3.8	---
C,BB	A	A	---	---
D	→	→	3.3.12, 3.3.15	---
E	→	→	3.3.9	---
F	→	→	3.3.13	---
G	→	→	3.3.9, 3.3.13, 3.3.16	---

GTS 3.3.2 Condition	MTS 3.3.10 Condition	STS 3.3.10 Condition	Other STS Subsections Addressing the Listed Condition	Additional DOC Changes
H	→	→	3.3.11, 3.3.14	---
I	→	→	3.3.8	---
J	→	→	3.3.8	---
K	→	→	3.3.13	---
L	→	→	3.3.8	---
M	→	→	3.3.8, 3.3.12	---
N	→	→	3.3.8, 3.3.9,, 3.3.11	---
O	→	→	3.3.8, 3.3.9, 3.3.13, 3.3.15	---
P	→	→	3.3.8, 3.3.14	---
Q	→	→	3.3.8, 3.3.9	---
R	→	→	3.3.8, 3.3.9	---
S	→	→	3.3.8, 3.3.9	---
T	→	→	3.3.8	---
U	→	→	3.3.9	---
V	→	→	3.3.8	---
W	→	→	3.3.16	---
X	→	→	3.3.8, 3.3.9	---
GTS 3.3.2 Condition Y actions are split between two Conditions in STS 3.3.10				
Y	C	C	3.3.8, 3.3.9	A031
	D	D	---	A031
Z	→	→	3.3.8	---
GTS 3.3.2 Condition AA actions are split between two Conditions in STS 3.3.10				
AA	E	E	---	A031
	F	F	---	A031
CC	→	→	3.3.8, 3.3.9	---

Changes to Functions (a complete function list appears in GTST AP1000-O61-3.3.8)

----------	Function [Modes(footnote)]	----------	STS 3.3.10	Other STS Subsections	Additional
GTS 3.3.2	MTS 3.3.10	STS 3.3.10	Conditions	and Additional Changes	DOC Changes
10.c [4(c),5(j)]	1 [4(a),5(b)]	1 [4(a),5]	C	---	A034 A035
10.c [6(j)]	1 [6(b)]	1 [6(b)]	D	---	A034 A035
28.a [4(c),4(p),5(p)]	2 [4(a),4(c),5(c)]	2 [4(a),4(c),5(c)]	E	---	---
28.a [6(p),6(q)]	2 [6(c),6(d)]	3 [6(c),6(d)]	F	---	---

Changes to Applicability Footnotes

GTS 3.3.2 Footnote	MTS 3.3.10 Footnote	STS 3.3.10 Footnote	STS 3.3.10 Function	STS Subsections Addressing Listed footnote	Additional Changes DOC Number
a	→	→	→	3.3.8	---
b	→	→	→	3.3.8, 3.3.9	---
c	a	a	1	3.3.8, 3.3.9	A034 A035
d	→	→	→	3.3.8, 3.3.9	---
e	→	→	→	3.3.8, 3.3.9	---
f	→	→	→	3.3.8, 3.3.9	---
g	→	→	→	3.3.8	---
h	→	→	→	3.3.8, 3.3.9	---
i	→	→	→	3.3.8	---
j	b	Eliminated	1	3.3.8, 3.3.9	A034
k	---	b	2	3.3.8	A034 A035
l	→	→	→	3.3.8	---
m	→	→	→	3.3.8	---
n	→	→	→	3.3.8	---
o	→	→	→	3.3.13	---
p	c	c	2	---	---
q	d	d	2	---	---
r	→	→	→	3.3.8, 3.3.9	---

Changes to Surveillance Requirements

GTS 3.3.2 SR	MTS 3.3.10 SR	STS 3.3.10 SR	STS Subsections Also Addressing the Listed SR	Example Surveillance No. Surveillance Description
3.3.2.1	3.3.10.1	3.3.10.1	3.3.8, 3.3.10, 3.3.11, 3.3.13, 3.3.14	3.3.8.1 CHANNEL CHECK
3.3.2.2	→	→	3.3.15, 3.3.16	3.3.15.1 ACTUATION LOGIC TEST
3.3.2.3	→	→	3.3.9, 3.3.12	3.3.9.1 TRIP ACTUATING DEVICE OPERATIONAL TEST

GTS 3.3.2 SR	MTS 3.3.10 SR	STS 3.3.10 SR	STS Subsections Also Addressing the Listed SR	Example Surveillance No. Surveillance Description
3.3.2.4	3.3.10.3	3.3.10.3	3.3.8, 3.3.11, 3.3.13, 3.3.14	3.3.8.3 CHANNEL CALIBRATION
3.3.2.5	3.3.10.2	3.3.10.2	3.3.8, 3.3.11, 3.3.13, 3.3.14	3.3.8.2 CHANNEL OPERATIONAL TEST
3.3.2.6	3.3.10.4	3.3.10.4	3.3.8, 3.3.11, 3.3.13, 3.3.14	3.3.8.4 ESF RESPONSE TIME
3.3.2.7	→	→	3.3.8, 3.1.9, 3.5.2, 3.5.4, 3.5.6, 3.6.10, 3.7.7	ACTUATION DEVICE TEST*
3.3.2.8	→	→	3.3.8, 3.4.11, 3.4.13	Squib Valve ACTUATION DEVICE TEST
3.3.2.9	→	→	3.3.15, 3.3.16	Pressurizer Heater ACTUATION DEVICE TEST

* Typically, the associated STS system specification or STS 3.3.15 or 3.3.16 will include a SR for the actuation device, as follows: “Verify [tested required component] actuates to the [required position or state] on an actual or simulated actuation signal.” Such SRs overlap with the Actuation Logic Test for complete testing of the actuation device. (DOC L01)

VI. Traveler Information

Description of TSTF changes:

Not Applicable

Rationale for TSTF changes:

Not Applicable

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 28 (DOC A028) reformats current TS 3.3.2 into multiple Specifications as follows:

- 3.3.8, “Engineered Safety Feature Actuation System (ESFAS) Instrumentation,”
- 3.3.9, “Engineered Safety Feature Actuation System (ESFAS) Manual Initiation,”
- 3.3.10, “Engineered Safety Feature Actuation System (ESFAS) Reactor Coolant System (RCS) Hot Leg Level Instrumentation,”
- 3.3.11, “Engineered Safety Feature Actuation System (ESFAS) Startup Feedwater Flow Instrumentation,”
- 3.3.12, “Engineered Safety Feature Actuation System (ESFAS) Reactor Trip Initiation,”
- 3.3.13, “Engineered Safety Feature Actuation System (ESFAS) Control Room Air Supply Radiation Instrumentation,”
- 3.3.14, “Engineered Safety Feature Actuation System (ESFAS) Spent Fuel Pool Level Instrumentation,”
- 3.3.15, “Engineered Safety Feature Actuation System (ESFAS) Actuation Logic - Operating,” and
- 3.3.16, “Engineered Safety Feature Actuation System (ESFAS) Actuation Logic - Shutdown.”

Since current TS 3.3.2, “Engineered Safety Feature Actuation System (ESFAS) Instrumentation,” is identical to GTS 3.3.2, it is appropriate for this GTST to consider the proposed changes to current TS 3.3.2 as changes to GTS 3.3.2 for incorporation in AP1000 STS 3.3.10. VEGP LAR DOC A028 is extensive, but retains the intention of current TS 3.3.2 while improving operational use of the TS. The numerous Functions, Conditions and extensive bases discussion associated with PTS 3.3.2 are repackaged into nine smaller parts. Therefore, the changes implemented by DOC A028 are presented in the attached Subsection 3.3.10 markup, in Section XI of this GTST, as the “clean” starting point and are identified as interim A028-modified TS (MTS) 3.3.10. The specific details of the reformatting for MTS 3.3.10 can be found in VEGP TSU LAR (Reference 2), in Enclosure 2 (markup) and Enclosure 4 (clean). The NRC staff safety evaluation regarding DOC A028 can be found in Reference 3, VEGP LAR SER. The VEGP TSU LAR was modified in response to NRC staff RAIs in Reference 5 and the Southern Nuclear Operating Company RAI Response in Reference 6.

VEGP LAR DOC A025 revises MTS 3.3.10 SR 3.3.10.3 Note to change the phrase “the prescribed values” to “within limits.”

VEGP LAR DOC A031 revises MTS 3.3.10 Required Action D.2 and F.1 from "… initiate action to be in MODE 6 with the water level ≥ 23 feet above the top of the reactor vessel flange," to "Initiate action to establish water level ≥ 23 feet above the top of the reactor vessel flange."

VEGP LAR DOC A034 deletes MTS Table 3.3.10-1 footnote (b); "Not applicable when the required ADS valves are open. See LCO 3.4.12 and LCO 3.4.13 for ADS valve and equivalent relief area requirements." New footnote (b) is added; "With upper internals in place."

VEGP LAR DOC A035 deletes design-related details such as "coincident" in MTS Table 3.3.10-1 Function 1. (GTS Table 3.3.2-1, Function 10.c)

VEGP LAR DOC L10 provides a discussion of interlocks implicitly required to support the Function's OPERABILITY in the Bases discussion of proposed MTS SR 3.3.10.2 and SR 3.3.10.3.

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 VEGP LAR DOCs A024 and A028, except where addressed in other DOCs, addresses inconsistencies in formatting and approach between current TS 3.3.1 and current TS 3.3.2, respectively. Simplification and clarification are proposed for each Specification. In breaking down each current 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.

VEGP LAR DOC A025 is consistent with similar requirements elsewhere in the AP1000 GTS and STS (NUREG-1431).

VEGP LAR DOC A031 is consistent with the TS Writer's Guide (Reference 4).

VEGP LAR DOC A034 acknowledges that DOC A028 revises GTS subsection 3.3.2, including Table 3.3.2-1, by breaking the subsection into nine subsections corresponding to specific subsets of the PMS function. This reformatting entails combining function table applicability footnotes and removing Condition and Required Action lead-in phrases that reference a specific operational mode or applicability condition in order to establish context for the action requirement. Such phrases are no longer necessary to establish context for the Action because the Actions table has been suitably revised to make the context of each action requirement clear.

VEGP LAR DOC A035 acknowledges that DOC A028 revises GTS subsection 3.3.2, including current GTS Table 3.3.2-1, by breaking the subsection into nine subsections corresponding to specific subsets of the PMS function. This reformatting simplifies the instrumentation function tables in the AP1000 STS by deleting ESFAS automatic function names that describe ESF system actuations but retaining the supporting functions, which have names describing the associated process sensor instrumentation and the associated trip or actuation settings. Because the STS function listings now refer to the instrumentation from which the system actuation functions are derived, discussion of coincidence of instrument and actuation signals is no longer required. Therefore, the explicit design-related details of which signals are combined in “coincident” logic for initiating a system actuation may be omitted in the AP1000 STS ESFAS instrumentation subsections.

VEGP LAR 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.

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

In the second paragraph of the MTS 3.3.10 “Actions” section of the Bases, the phrase “...then all affected Functions provided by that channel must be declared inoperable...” is revised to “...then all affected protection Functions supported by or dependent on that channel must be declared inoperable...”

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

This change was requested by NRC staff RAIs in Reference 5. Southern Nuclear Operating Company declined to make the change in its plant TS as documented in its RAI Response, Reference 6, because the wording is part of the original AP1000 GTS. However, the change is made to the AP1000 STS to provide clarity.

VII. GTST Safety Evaluation

Technical Analysis:

VEGP LAR DOC L10 provides a discussion of interlocks implicitly required to support the Function's OPERABILITY in the Bases discussion of proposed MTS SR 3.3.10.2 and SR 3.3.10.3. ESFAS interlocks are provided to ensure ESFAS Functions are in the correct configuration for the current plant status. The ESFAS interlocks backup unit operator manual actions to ensure that ESFAS Functions, which can be bypassed, are not bypassed, but are operable during the unit conditions assumed in the safety analyses. ESFAS interlocks permit a unit operator to block some signals, automatically enable other signals, prevent some actions from occurring, and cause other actions to occur.

The interlocks, as separate RTS and ESFAS Functions, except for GTS Table 3.3.2-1, Function 18.b, Reactor Trip, P-4, are removed from the STS and the associated Actions are deleted. The reactor trip interlock is addressed in STS 3.3.12, “Engineered Safety Feature Actuation System (ESFAS) Reactor Trip Initiation.” Interlock Operability is adequately addressed by each related Function’s requirement to be Operable and the requirement for actuation logic operability.

For these RTS trip and ESFAS 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 to be 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 required Applicability. In addition, LCO 3.0.4 requires the operators to ensure RTS trip and ESFAS operability prior to entering their 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.

Certain Actions being deleted for inoperable interlock functions, such as GTS 3.3.1 Required Action M.1 for RTS interlocks and GTS 3.3.2 Required Action J.1 for ESFAS interlocks, provide an optional allowance: “Verify the interlocks are in the required state for the existing plant conditions” within “1 hour.” This verification is essentially the operability evaluation for the supported functions. If interlocks are not in the required state for the existing plant conditions, then the affected supported Functions would be inoperable and their Actions would apply. The GTS one hour allowance provides time for the operator to manually place the interlock in the state that accomplishes the interlock function necessary to support RTS and ESFAS actuation Function operability. Once this Required Action is completed, unlimited operation is allowed. As such, the provision provides an acceptable alternative to reliance on the automatic interlock function - allowing the operator to manually assure the required interlock state. With this action deleted, the determination of supported function operability is immediate and the actions for any

inoperable supported Functions are immediately entered; thereby making this portion of the change more restrictive.

Instrument channel Functions with interlocks implicitly required to support the Function's operability, are also addressed by the COT and Channel Calibration Surveillance Requirements. Actuation logic with interlocks implicitly required to support operability of the logic 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.

Related actions being deleted are GTS 3.3.2 Action J.2.1 and J.2.2 for ESFAS interlocks, which are to trip and/or bypass inoperable channels. These actions also have an additional 1-hour greater allowance than specified for associated inoperable actuation Functions. Therefore, removal of these actions in the STS is more restrictive than the GTS.

The remaining actions referenced for GTS interlocks supporting ESFAS actuation Functions being removed, specifically GTS 3.3.2, Actions D, L, M, N, Y, and BB, are equivalent to, or more restrictive than the existing actions for inoperable supported ESFAS Functions.

The changes, including VEGP LAR DOC A028, 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.

References to Previous NRC Safety Evaluation Reports (SERs):

VEGP TSU LAR SER (Reference 3)

VIII. Review Information

Evaluator Comments:

None

Randy Belles
Oak Ridge National Laboratory
865-574-0388
bellesrj@ornl.gov

Review Information:

Availability for public review and comment on Revision 0 of this traveler approved by NRC staff on Thursday, May 29, 2014.

NRC Final Approval Date:

NRC Contact:

C. Craig Harbuck
United States Nuclear Regulatory Commission
301-415-3140
Craig.Harbuck@nrc.gov

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

The database does not yet recognize non-breaking hyphens or spaces. For Rev. 0 of this GTST, it was necessary to manually insert (1) non-breaking hyphens as necessary to interlock designations such as P-10 to avoid breaking across the end of a line; and (2) non-breaking spaces as necessary to (a) keep symbols such as “≥” with the subsequent value; and (b) avoid stranding a number value on a subsequent line, such as MODE 5.

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-GG-05-01, "Writer's Guide for Plant-Specific Improved Technical Specifications," June 2005.

5. 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).

6. 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)

XI. MARKUP of the Applicable GTS Section 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

3.3.10 Engineered Safety Feature Actuation System (ESFAS) Reactor Coolant System (RCS) Hot Leg Level Instrumentation

LCO 3.3.10 The ESFAS RCS Hot Leg Level instrumentation channels for each Function in Table 3.3.10-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.10-1.

ACTIONS

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

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One channel inoperable.	A.1 Place inoperable channel in bypass. AND A.2 ----------NOTE---------- Only applicable to Function 1. ---------- Continuously monitor hot leg level.	6 hours 6 hours
B. Required Action and associated Completion Time of Condition A not met.	B.1 Enter the Condition referenced in Table 3.3.10-1 for the channel.	Immediately

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. As required by Required Action B.1 and referenced in Table 3.3.10-1.	C.1 Suspend positive reactivity additions. AND C.2 Be in MODE 5. AND C.3 Initiate action to establish a pressurizer level ≥ 20% with the RCS pressure boundary intact.	Immediately 12 hours 12 hours
D. As required by Required Action B.1 and referenced in Table 3.3.10-1.	D.1 Suspend positive reactivity additions. AND D.2 Initiate action to **establish** ~~be in MODE 6 with the~~ water level ≥ 23 feet above the top of the reactor vessel flange.	Immediately Immediately
E. As required by Required Action B.1 and referenced in Table 3.3.10-1.	----------NOTE---------- Flow path(s) may be unisolated intermittently under administrative controls. ---------- E.1.1 Isolate the affected flow path(s). AND	 24 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. (continued)	E.1.2.1 Isolate the affected flow path(s) by use of at least one closed and deactivated automatic valve, closed manual valve, blind flange, or check valve with flow through the valve secured. OR	7 days
	E.1.2.2 Verify the affected flow path is isolated. OR	Once per 7 days
	E.2.1 Be in MODE 5. AND	12 hours
	E.2.2 Initiate action to establish a pressurizer level ≥ 20%.	12 hours
F. As required by Required Action B.1 and referenced in Table 3.3.10-1.	F.1 Initiate action to **establish** ~~be in MODE 6 with the~~ water level ≥ 23 feet above the top of the reactor vessel flange.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.3.10.1	Perform CHANNEL CHECK.	12 hours

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.3.10.2	Perform CHANNEL OPERATIONAL TEST (COT) in accordance with Setpoint Program.	92 days
SR 3.3.10.3	----------NOTE---------- This surveillance shall include verification that the time constants are adjusted to **within limits** ~~the prescribed values~~. ---------- Perform CHANNEL CALIBRATION in accordance with Setpoint Program.	 24 months
SR 3.3.10.4	Verify ESF RESPONSE TIME is within limit.	24 months on a STAGGERED TEST BASIS

Table 3.3.10-1 (page 1 of 1)
Engineered Safeguards Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS
1. ~~Coincident RCS Loop 1 and 2~~ Hot Leg Level - Low 2	4[(a)],5[~~(b)~~]	1 per loop	C
	6[**(b)**]	1 per loop	D
2. Hot Leg Level - Low 1	4[(a)(c)],5[(c)]	1 per loop	E
	6[(c)(d)]	1 per loop	F

(a) With the RCS being cooled by the RNS.

~~(b) Not applicable when the required ADS valves are open. See LCO 3.4.12 and LCO 3.4.13 for ADS valve and equivalent relief area requirements.~~

(**b**) **With upper internals in place.**

(c) Below the P-12 (Pressurizer Level) interlock.

(d) With the water level < 23 feet above the top of the reactor vessel flange.

B 3.3 INSTRUMENTATION

B 3.3.10 Engineered Safety Feature Actuation System (ESFAS) Reactor Coolant System (RCS) Hot Leg Level Instrumentation

BASES

BACKGROUND

A description of the ESFAS Instrumentation is provided in the Bases for LCO 3.3.8, “Engineered Safety Feature Actuation System (ESFAS) Instrumentation.”

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

The required channels of ESFAS instrumentation provide plant protection in the event of any of the analyzed accidents. **A description of ESFAS P-12 interlocks is provided in the Bases for LCO 3.3.8.** ESFAS protective functions include:

ADS Stage 4 Actuation

A description of the ADS Stage 4 Actuation is provided in the Bases for LCO 3.3.8.

Chemical and Volume Control System (CVS) Letdown Isolation

A description of the Chemical and Volume Control System (CVS) Letdown Isolation is provided in the Bases for LCO 3.3.8.

The following are descriptions of the individual instrument Functions required by this LCO as presented in Table 3.3.10-1. Each Function also provides the ESFAS protective functions actuated by the instrumentation.

1. ~~Loop 1 and Loop 2~~ Hot Leg Level - Low 2

   A signal to automatically open the ADS Stage 4 is generated when coincident loop 1 and 2 reactor coolant system hot leg level indication decreases below an established setpoint for a duration exceeding an adjustable time delay. The ADS provides a sequenced depressurization of the reactor coolant system to allow passive injection from the Core Makeup Tanks (CMTs), accumulators, and the IRWST to mitigate the effects of a LOCA. This Function is required to be OPERABLE in MODE 4 with the RCS being cooled by the RNS. This Function is also required to be OPERABLE in MODE 5, and in MODE 6 **with the upper internals in place**.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

2. Hot Leg Level - Low 1

A signal to isolate the Chemical and Volume Control System (CVS) letdown valves is generated upon the occurrence of a Low 1 hot leg level in either of the two RCS hot leg loops. This helps to maintain reactor system inventory in the event of a LOCA. This Function can be blocked in MODES 1, 2, and 3 and is automatically reset when P-12 is first activated. It may be manually reset as well. This Function is required to be OPERABLE in MODE 4 with the RCS being cooled by the RNS and below the P-12 (Pressurizer Level) interlock. This Function is also required to be OPERABLE in MODE 5 below the P-12 interlock, and in MODE 6 below the P-12 interlock and with the water level < 23 feet above the top of the reactor vessel flange.

ESFAS **RCS** ~~Instrumentation~~ Hot Leg Level **Instrumentation** satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii).

ACTIONS

A Note has been added in the ACTIONS to clarify the application of Completion Time rules. The Conditions of this specification may be entered independently for each Function listed on Table 3.3.10-1. The Completion Time(s) of the inoperable equipment of a Function will be tracked separately for each Function starting from the time the Condition was entered for that Function. Where the required channels are specified on a per loop basis, separate Condition entry is allowed for each loop.

In the event a channel's as-found condition is outside the as-found tolerance described in the Setpoint Program, or the channel is not functioning as required, or the transmitter, or the Protection and Safety Monitoring System Division, associated with a specific Function is found inoperable, then all affected **protection** Functions ~~provided~~ **supported** by **or dependent on** that channel must be declared inoperable and the LCO Condition(s) entered for the particular protection Function(s) affected.

BASES

ACTIONS (continued)

A.1 and A.2

With one channel inoperable, the affected channel must be placed in a bypass condition within 6 hours. For Function 1, if one channel is placed in bypass, automatic actuation will not occur. For Function 2, the 6 hours allowed to place the inoperable channel in the bypass condition is justified in Reference 3. If one CVS isolation channel is bypassed, the logic becomes one-out-of-one. A single failure in the remaining channel could cause a spurious CVS isolation. Spurious CVS isolation, while undesirable, would not cause an upset plant condition. Therefore, Required Action A.2 requires continuous monitoring of the hot leg level. This provides sufficient information to permit timely operator action to ensure that ADS Stage 4 actuation can occur, if needed to mitigate events requiring RCS makeup, boration, or core cooling. Operator action to manually initiate ADS Stage 4 actuation is assumed in the analysis of shutdown events (Ref. 4). It is also credited in the shutdown PRA (Ref. 5) when automatic actuation is not available.

Required Action A.2 is modified by a Note stating that the action is only applicable to Function 1.

B.1

Condition B addresses the situation where the Required Action and associated Completion Time of Condition A is not met. The Required Action is to refer to Table 3.3.10-1 and to take the Required Actions for the protection Functions affected. The Completion Times are those from the referenced Conditions and Required Actions.

C.1, C.2, and C.3

If the Required Action and associated Completion Time of Condition A are not met for ~~the~~ Function~~s~~ **1** in Table 3.3.10-1, the plant must be placed in a MODE in which the likelihood and consequences of an event are minimized. This is accomplished by placing the plant in MODE 5 within 12 hours (Required Action C.2). The 12 hours is a reasonable time to reach MODE 5 from MODE 4 with RCS cooling provided by the RNS (approximately 350°F) in an orderly manner without challenging plant systems.

BASES

ACTIONS (continued)

Required Action C.3 requires initiation of action within 12 hours to close the RCS pressure boundary and establish ≥ 20% pressurizer level. The 12-hour Completion Time allows transition to MODE 5, if needed, prior to initiating action to open the RCS pressure boundary.

Required Action C.1 minimizes the potential for a criticality event by suspension of positive reactivity additions. Required Actions C.2 and C.3 minimize the consequences of a loss of decay heat removal event by optimizing conditions for RCS cooling in MODE 5 using the PRHR HX.

Additionally, maximizing RCS inventory and maintaining RCS temperature as low as practical further minimize the consequences of a loss of decay heat removal event. Closing the RCS pressure boundary in MODE 5 assures that PRHR HX cooling is available

D.1 and D.2

If the Required Action and associated Completion Time of Condition A are not met for ~~the~~ Function~~s~~ **1** in Table 3.3.10-1, the plant must be placed in a condition in which the likelihood and consequences of an event are minimized. This is accomplished by immediately initiating action to establish the reactor cavity water level ≥ 23 feet above the top of the reactor vessel flange (Required Action D.2) and suspend positive reactivity additions (Required Action D.1).

Required Action D.2 minimizes the consequences of a loss of decay heat removal event by optimizing conditions for RCS cooling in MODE 6 using IRWST injection.

Additionally, maximizing RCS inventory and maintaining RCS temperature as low as practical further minimize the consequences of a loss of decay heat removal event. Additionally, the potential for a criticality event is minimized by suspension of positive reactivity additions.

BASES

ACTIONS (continued)

E.1.1, E.1.2.1, E.1.2.2, E.2.1, and E.2.2

If the Required Action and associated Completion Time of Condition A are not met for ~~the~~ Function~~s~~ **2** in Table 3.3.10-1, the plant must be placed in a condition where the instrumentation Function for valve isolation is no longer needed. This is accomplished by isolating the affected flow path within 24 hours. By isolating the CVS letdown flow path from the RCS, the need for automatic isolation is eliminated.

To assure that the flow path remains closed, the flow path shall be isolated by the use of one of the specified means (Required Action E.1.2.1) or the flow path shall be verified to be isolated (Required Action E.1.2.2). A means of isolating the affected flow path includes at least one closed and deactivated automatic valve, closed manual valve, blind flange, or check valve with flow through the valve secured, within 7 days. If one of the Required Action E.1.2.1 specified isolation means is not used, the affected flow path shall be verified to be isolated once per 7 days.

This action is modified by a Note allowing the flow path to be unisolated intermittently under administrative control. These administrative controls consist of stationing a dedicated operator at the valve controls, who is in continuous communication with the control room. In this way the flow path can be rapidly isolated when a need for flow path isolation is indicated.

If the flow path cannot be isolated in accordance with Required Actions E.1.1, E.1.2.1 and E.1.2.2, the plant must be placed in a MODE in which the likelihood and consequences of an event are minimized. This is accomplished by placing the plant in MODE 5 within 12 hours. The 12 hours is a reasonable time to reach MODE 5 from MODE 4 with RCS cooling provided by the RNS (approximately 350°F) in an orderly manner without challenging plant systems.

Required Action E.2.2 requires initiation of action, within 12 hours, to establish ≥ 20% pressurizer level, This minimizes the consequences of an event by optimizing conditions for RCS cooling in MODE 5 using the PRHR HX. The 12-hour Completion Time allows transition to MODE 5 in accordance with E.2.1, if needed, prior to initiating action to establish the pressurizer level.

BASES

ACTIONS (continued)

If in MODE 6, Required Action E.2.3 requires the plant to be maintained in MODE 6 and initiation of action to establish the reactor cavity water level ≥ 23 feet above the top of the reactor vessel flange.

F.1

If the Required Action and associated Completion Time of Condition A are not met for ~~the~~ Function~~s~~ **2** in Table 3.3.10-1, the plant must be placed in a condition where the instrumentation Function for valve isolation is no longer needed. This is accomplished by immediately initiating action to establish the reactor cavity water level ≥ 23 feet above the top of the reactor vessel flange.

Required Action F.1 minimizes the consequences of an event by optimizing conditions for RCS cooling in MODE 6 using IRWST injection.

SURVEILLANCE REQUIREMENTS

SR 3.3.10.1

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

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

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

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.10.2

SR 3.3.10.2 is the performance of a CHANNEL OPERATIONAL TEST (COT) every 92 days. 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. This condition of the channel will be further evaluated during performance of the SR. This evaluation will consist of resetting the channel setpoint to the NTS (within the allowed 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.

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

A test subsystem is provided with the protection and safety monitoring system 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, protection and safety monitoring system 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.

BASES

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 92-day Frequency is based on Reference 3 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 integrated protection cabinets to the operator.

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

SR 3.3.10.3

SR 3.3.10.3 is the performance of a CHANNEL CALIBRATION every 24 months or approximately at every refueling. CHANNEL CALIBRATION is a complete check of the instrument loop, including the sensor and the IPC. 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. This condition of the channel will be further evaluated during performance of the SR. This evaluation will consist of resetting the channel setpoint to the NTS (within the allowed tolerance), and evaluating the channel's response. If the channel is functioning as

SURVEILLANCE REQUIREMENTS (continued)

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. Transmitter calibration must be performed consistent with the assumptions of the setpoint methodology. The difference between the current as-found values and the previous as-left values must be consistent with the transmitter drift allowance used in the setpoint methodology.

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 setpoint methodology requires that 30 months drift be used (1.25 times the surveillance calibration interval, 24 months).

The Frequency is based on operating experience and consistency with the refueling cycle.

This Surveillance Requirement is modified by a Note. The Note states that this test should include verification that the time constants are adjusted to within limits.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.10.4

This SR ensures the individual channel ESF RESPONSE TIME is less than or equal to the maximum value assumed in the accident analysis. Individual component response times are not modeled in the analyses. The analyses model the overall or total elapsed time, from the point at which the parameter exceeds the NTS value at the sensor, to the point at which the equipment reaches the required functional state (e.g., valves in full open or closed position).

For channels that include dynamic transfer functions (e.g., lag, lead/lag, rate/lag, etc.), the response time test may be performed with the transfer functions set to one with the resulting measured response time compared to the appropriate 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 response times with actual response time tests on the remainder of the channel. Allocations for sensor response times may be obtained from: (1) historical records based on acceptable response time tests (hydraulic, noise, or power interrupt tests), (2) in place, onsite, or offsite (e.g., vendor) test measurements, or (3) utilizing vendor engineering specifications. WCAP-13632-P-A, Revision 2, “Elimination of Pressure Sensor Response Time Testing Requirements” (Ref. 6), provides the basis and methodology for using allocated sensor response times in the overall verification of the channel response time for specific sensors identified in the WCAP. Response time verification for other sensor types must be demonstrated by test.

ESF RESPONSE TIME tests are conducted on a 24 month STAGGERED TEST BASIS. Testing of the devices, which make up the bulk of the response time, is included in the testing of each channel. The final actuation device in one train is tested with each channel. Therefore, staggered testing results in response time verification of these devices

BASES

SURVEILLANCE REQUIREMENTS (continued)

every 24 months. The 24-month Frequency is consistent with the typical refueling cycle and is based on unit operating experience, which shows that random failures of instrumentation components causing serious response time degradation, but not channel failure, are infrequent occurrences.

REFERENCES

1. Chapter 15.0, “Accident Analysis.”

2. Chapter 7.0, “Instrumentation and Controls.”

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

4. APP-GW-GLR-004, Rev. 0, “AP1000 Shutdown Evaluation Report,” July 2002.

5. Chapter 19.0, “Probabilistic Risk Assessment,” Appendix 19E, “Shutdown Evaluation.”

6. WCAP-13632-P-A (Proprietary) and WCAP-13787-A (Non Proprietary), Revision 2, “Elimination of Pressure Sensor Response Time Testing Requirements,” January 1996.

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

3.3.10 Engineered Safety Feature Actuation System (ESFAS) Reactor Coolant System (RCS) Hot Leg Level Instrumentation

LCO 3.3.10 The ESFAS RCS Hot Leg Level instrumentation channels for each Function in Table 3.3.10-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.10-1.

ACTIONS

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

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One channel inoperable.	A.1 Place inoperable channel in bypass. AND A.2 ----------NOTE---------- Only applicable to Function 1. ---------- Continuously monitor hot leg level.	6 hours 6 hours
B. Required Action and associated Completion Time of Condition A not met.	B.1 Enter the Condition referenced in Table 3.3.10-1 for the channel.	Immediately

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. As required by Required Action B.1 and referenced in Table 3.3.10-1.	C.1 Suspend positive reactivity additions. AND C.2 Be in MODE 5. AND C.3 Initiate action to establish a pressurizer level ≥ 20% with the RCS pressure boundary intact.	Immediately 12 hours 12 hours
D. As required by Required Action B.1 and referenced in Table 3.3.10-1.	D.1 Suspend positive reactivity additions. AND D.2 Initiate action to establish water level ≥ 23 feet above the top of the reactor vessel flange.	Immediately Immediately
E. As required by Required Action B.1 and referenced in Table 3.3.10-1.	----------NOTE---------- Flow path(s) may be unisolated intermittently under administrative controls. ---------- E.1.1 Isolate the affected flow path(s). AND	 24 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. (continued)	E.1.2.1 Isolate the affected flow path(s) by use of at least one closed and deactivated automatic valve, closed manual valve, blind flange, or check valve with flow through the valve secured. OR	7 days
	E.1.2.2 Verify the affected flow path is isolated. OR	Once per 7 days
	E.2.1 Be in MODE 5. AND	12 hours
	E.2.2 Initiate action to establish a pressurizer level ≥ 20%.	12 hours
F. As required by Required Action B.1 and referenced in Table 3.3.10-1.	F.1 Initiate action to establish water level ≥ 23 feet above the top of the reactor vessel flange.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.3.10.1	Perform CHANNEL CHECK.	12 hours

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.3.10.2	Perform CHANNEL OPERATIONAL TEST (COT) in accordance with Setpoint Program.	92 days
SR 3.3.10.3	----------NOTE---------- This surveillance shall include verification that the time constants are adjusted to within limits. ---------- Perform CHANNEL CALIBRATION in accordance with Setpoint Program.	24 months
SR 3.3.10.4	Verify ESF RESPONSE TIME is within limit.	24 months on a STAGGERED TEST BASIS

Table 3.3.10-1 (page 0 of 1)
Engineered Safeguards Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS
1. Hot Leg Level - Low 2	4[(a)],5	1 per loop	C
	6[(b)]	1 per loop	D
2. Hot Leg Level - Low 1	4[(a)(c)],5[(c)]	1 per loop	E
	6[(c)(d)]	1 per loop	F

(a) With the RCS being cooled by the RNS.

(b) With upper internals in place.

(c) Below the P-12 (Pressurizer Level) interlock.

(d) With the water level < 23 feet above the top of the reactor vessel flange.

B 3.3 INSTRUMENTATION

B 3.3.10 Engineered Safety Feature Actuation System (ESFAS) Reactor Coolant System (RCS) Hot Leg Level Instrumentation

BASES

BACKGROUND

A description of the ESFAS Instrumentation is provided in the Bases for LCO 3.3.8, “Engineered Safety Feature Actuation System (ESFAS) Instrumentation.”

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

The required channels of ESFAS instrumentation provide plant protection in the event of any of the analyzed accidents. A description of ESFAS P-12 interlocks is provided in the Bases for LCO 3.3.8. ESFAS protective functions include:

ADS Stage 4 Actuation

A description of the ADS Stage 4 Actuation is provided in the Bases for LCO 3.3.8.

Chemical and Volume Control System (CVS) Letdown Isolation

A description of the Chemical and Volume Control System (CVS) Letdown Isolation is provided in the Bases for LCO 3.3.8.

The following are descriptions of the individual instrument Functions required by this LCO as presented in Table 3.3.10-1. Each Function also provides the ESFAS protective functions actuated by the instrumentation.

1. Hot Leg Level - Low 2

   A signal to automatically open the ADS Stage 4 is generated when coincident loop 1 and 2 reactor coolant system hot leg level indication decreases below an established setpoint for a duration exceeding an adjustable time delay. The ADS provides a sequenced depressurization of the reactor coolant system to allow passive injection from the Core Makeup Tanks (CMTs), accumulators, and the IRWST to mitigate the effects of a LOCA. This Function is required to be OPERABLE in MODE 4 with the RCS being cooled by the RNS. This Function is also required to be OPERABLE in MODE 5, and in MODE 6 with the upper internals in place.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

2. Hot Leg Level - Low 1

A signal to isolate the Chemical and Volume Control System (CVS) letdown valves is generated upon the occurrence of a Low 1 hot leg level in either of the two RCS hot leg loops. This helps to maintain reactor system inventory in the event of a LOCA. This Function can be blocked in MODES 1, 2, and 3 and is automatically reset when P-12 is first activated. It may be manually reset as well. This Function is required to be OPERABLE in MODE 4 with the RCS being cooled by the RNS and below the P-12 (Pressurizer Level) interlock. This Function is also required to be OPERABLE in MODE 5 below the P-12 interlock, and in MODE 6 below the P-12 interlock and with the water level < 23 feet above the top of the reactor vessel flange.

ESFAS RCS Hot Leg Level Instrumentation satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii).

ACTIONS

A Note has been added in the ACTIONS to clarify the application of Completion Time rules. The Conditions of this specification may be entered independently for each Function listed on Table 3.3.10-1. The Completion Time(s) of the inoperable equipment of a Function will be tracked separately for each Function starting from the time the Condition was entered for that Function. Where the required channels are specified on a per loop basis, separate Condition entry is allowed for each loop.

In the event a channel's as-found condition is outside the as-found tolerance described in the Setpoint Program, or the channel is not functioning as required, or the transmitter, or the Protection and Safety Monitoring System Division, associated with a specific Function is found inoperable, then all affected protection Functions supported by or dependent on that channel must be declared inoperable and the LCO Condition(s) entered for the particular protection Function(s) affected.

BASES

ACTIONS (continued)

A.1 and A.2

With one channel inoperable, the affected channel must be placed in a bypass condition within 6 hours. For Function 1, if one channel is placed in bypass, automatic actuation will not occur. For Function 2, the 6 hours allowed to place the inoperable channel in the bypass condition is justified in Reference 3. If one CVS isolation channel is bypassed, the logic becomes one-out-of-one. A single failure in the remaining channel could cause a spurious CVS isolation. Spurious CVS isolation, while undesirable, would not cause an upset plant condition. Therefore, Required Action A.2 requires continuous monitoring of the hot leg level. This provides sufficient information to permit timely operator action to ensure that ADS Stage 4 actuation can occur, if needed to mitigate events requiring RCS makeup, boration, or core cooling. Operator action to manually initiate ADS Stage 4 actuation is assumed in the analysis of shutdown events (Ref. 4). It is also credited in the shutdown PRA (Ref. 5) when automatic actuation is not available.

Required Action A.2 is modified by a Note stating that the action is only applicable to Function 1.

B.1

Condition B addresses the situation where the Required Action and associated Completion Time of Condition A is not met. The Required Action is to refer to Table 3.3.10-1 and to take the Required Actions for the protection Functions affected. The Completion Times are those from the referenced Conditions and Required Actions.

C.1, C.2, and C.3

If the Required Action and associated Completion Time of Condition A are not met for Function 1 in Table 3.3.10-1, the plant must be placed in a MODE in which the likelihood and consequences of an event are minimized. This is accomplished by placing the plant in MODE 5 within 12 hours (Required Action C.2). The 12 hours is a reasonable time to reach MODE 5 from MODE 4 with RCS cooling provided by the RNS (approximately 350°F) in an orderly manner without challenging plant systems.

BASES

ACTIONS (continued)

Required Action C.3 requires initiation of action within 12 hours to close the RCS pressure boundary and establish ≥ 20% pressurizer level. The 12-hour Completion Time allows transition to MODE 5, if needed, prior to initiating action to open the RCS pressure boundary.

Required Action C.1 minimizes the potential for a criticality event by suspension of positive reactivity additions. Required Actions C.2 and C.3 minimize the consequences of a loss of decay heat removal event by optimizing conditions for RCS cooling in MODE 5 using the PRHR HX.

Additionally, maximizing RCS inventory and maintaining RCS temperature as low as practical further minimize the consequences of a loss of decay heat removal event. Closing the RCS pressure boundary in MODE 5 assures that PRHR HX cooling is available

D.1 and D.2

If the Required Action and associated Completion Time of Condition A are not met for Function 1 in Table 3.3.10-1, the plant must be placed in a condition in which the likelihood and consequences of an event are minimized. This is accomplished by immediately initiating action to establish the reactor cavity water level ≥ 23 feet above the top of the reactor vessel flange (Required Action D.2) and suspend positive reactivity additions (Required Action D.1).

Required Action D.2 minimizes the consequences of a loss of decay heat removal event by optimizing conditions for RCS cooling in MODE 6 using IRWST injection.

Additionally, maximizing RCS inventory and maintaining RCS temperature as low as practical further minimize the consequences of a loss of decay heat removal event. Additionally, the potential for a criticality event is minimized by suspension of positive reactivity additions.

ACTIONS (continued)

E.1.1, E.1.2.1, E.1.2.2, E.2.1, and E.2.2

If the Required Action and associated Completion Time of Condition A are not met for Function 2 in Table 3.3.10-1, the plant must be placed in a condition where the instrumentation Function for valve isolation is no longer needed. This is accomplished by isolating the affected flow path within 24 hours. By isolating the CVS letdown flow path from the RCS, the need for automatic isolation is eliminated.

To assure that the flow path remains closed, the flow path shall be isolated by the use of one of the specified means (Required Action E.1.2.1) or the flow path shall be verified to be isolated (Required Action E.1.2.2). A means of isolating the affected flow path includes at least one closed and deactivated automatic valve, closed manual valve, blind flange, or check valve with flow through the valve secured, within 7 days. If one of the Required Action E.1.2.1 specified isolation means is not used, the affected flow path shall be verified to be isolated once per 7 days.

This action is modified by a Note allowing the flow path to be unisolated intermittently under administrative control. These administrative controls consist of stationing a dedicated operator at the valve controls, who is in continuous communication with the control room. In this way the flow path can be rapidly isolated when a need for flow path isolation is indicated.

If the flow path cannot be isolated in accordance with Required Actions E.1.1, E.1.2.1 and E.1.2.2, the plant must be placed in a MODE in which the likelihood and consequences of an event are minimized. This is accomplished by placing the plant in MODE 5 within 12 hours. The 12 hours is a reasonable time to reach MODE 5 from MODE 4 with RCS cooling provided by the RNS (approximately 350°F) in an orderly manner without challenging plant systems.

Required Action E.2.2 requires initiation of action, within 12 hours, to establish ≥ 20% pressurizer level, This minimizes the consequences of an event by optimizing conditions for RCS cooling in MODE 5 using the PRHR HX. The 12-hour Completion Time allows transition to MODE 5 in accordance with E.2.1, if needed, prior to initiating action to establish the pressurizer level.

BASES

ACTIONS (continued)

If in MODE 6, Required Action E.2.3 requires the plant to be maintained in MODE 6 and initiation of action to establish the reactor cavity water level ≥ 23 feet above the top of the reactor vessel flange.

F.1

If the Required Action and associated Completion Time of Condition A are not met for Function 2 in Table 3.3.10-1, the plant must be placed in a condition where the instrumentation Function for valve isolation is no longer needed. This is accomplished by immediately initiating action to establish the reactor cavity water level ≥ 23 feet above the top of the reactor vessel flange.

Required Action F.1 minimizes the consequences of an event by optimizing conditions for RCS cooling in MODE 6 using IRWST injection.

SURVEILLANCE REQUIREMENTS

SR 3.3.10.1

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

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

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

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.10.2

SR 3.3.10.2 is the performance of a CHANNEL OPERATIONAL TEST (COT) every 92 days. 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. This condition of the channel will be further evaluated during performance of the SR. This evaluation will consist of resetting the channel setpoint to the NTS (within the allowed 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.

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

A test subsystem is provided with the protection and safety monitoring system 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, protection and safety monitoring system 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.

BASES

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 92-day Frequency is based on Reference 3 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 integrated protection cabinets to the operator.

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

SR 3.3.10.3

SR 3.3.10.3 is the performance of a CHANNEL CALIBRATION every 24 months or approximately at every refueling. CHANNEL CALIBRATION is a complete check of the instrument loop, including the sensor and the IPC. 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. This condition of the channel will be further evaluated during performance of the SR. This evaluation will consist of resetting the channel setpoint to the NTS (within the allowed 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 REQUIREMENTS (continued)

surveillance. After the surveillance is completed, the channel as-found condition will be entered into the Corrective Action Program for further evaluation. Transmitter calibration must be performed consistent with the assumptions of the setpoint methodology. The difference between the current as-found values and the previous as-left values must be consistent with the transmitter drift allowance used in the setpoint methodology.

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 setpoint methodology requires that 30 months drift be used (1.25 times the surveillance calibration interval, 24 months).

The Frequency is based on operating experience and consistency with the refueling cycle.

This Surveillance Requirement is modified by a Note. The Note states that this test should include verification that the time constants are adjusted to within limits.

SR 3.3.10.4

This SR ensures the individual channel ESF RESPONSE TIME is less than or equal to the maximum value assumed in the accident analysis. Individual component response times are not modeled in the analyses. The analyses model the overall or total elapsed time, from the point at which the parameter exceeds the NTS value at the sensor, to the point at which the equipment reaches the required functional state (e.g., valves in full open or closed position).

BASES

SURVEILLANCE REQUIREMENTS (continued)

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 functions set to one with the resulting measured response time compared to the appropriate 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 response times with actual response time tests on the remainder of the channel. Allocations for sensor response times may be obtained from: (1) historical records based on acceptable response time tests (hydraulic, noise, or power interrupt tests), (2) in place, onsite, or offsite (e.g., vendor) test measurements, or (3) utilizing vendor engineering specifications. WCAP-13632-P-A, Revision 2, “Elimination of Pressure Sensor Response Time Testing Requirements” (Ref. 6), provides the basis and methodology for using allocated sensor response times in the overall verification of the channel response time for specific sensors identified in the WCAP. Response time verification for other sensor types must be demonstrated by test.

ESF RESPONSE TIME tests are conducted on a 24 month STAGGERED TEST BASIS. Testing of the devices, which make up the bulk of the response time, is included in the testing of each channel. The final actuation device in one train is tested with each channel. Therefore, staggered testing results in response time verification of these devices every 24 months. The 24-month Frequency is consistent with the typical refueling cycle and is based on unit operating experience, which shows that random failures of instrumentation components causing serious response time degradation, but not channel failure, are infrequent occurrences.

BASES

REFERENCES

1. Chapter 15.0, “Accident Analysis.”

2. Chapter 7.0, “Instrumentation and Controls.”

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

4. APP-GW-GLR-004, Rev. 0, “AP1000 Shutdown Evaluation Report,” July 2002.

5. Chapter 19.0, “Probabilistic Risk Assessment,” Appendix 19E, “Shutdown Evaluation.”

6. WCAP-13632-P-A (Proprietary) and WCAP-13787-A (Non Proprietary), Revision 2, “Elimination of Pressure Sensor Response Time Testing Requirements,” January 1996.