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

Title: Changes Related to LCO 3.4.9, RCS Leakage Detection 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-205-A, Rev 3,	Revision of Channel Calibration, Channel Functional Test, and Related Definitions
TSTF-359-A, Rev 9,	Increase Flexibility in MODE Restraints
TSTF-425-A, Rev 3,	Relocate Surveillance Frequencies to Licensee Control – RITSTF Initiative 5b
TSTF-513-A, Rev 3,	Revise PWR Operability Requirements and Actions for RCS Leakage Instrumentation

STS NUREGs Affected:

TSTF-205-A, Rev 3:	NUREGs 1430, 1431, 1432, 1433, and 1434
TSTF-359-A, Rev 9:	NUREGs 1430, 1431, 1432, 1433, and 1434
TSTF-425-A, Rev 3:	NUREGs 1430, 1431, 1432, 1433, and 1434
TSTF-513-A, Rev 3:	NUREGs 1430, 1431, and 1432

NRC Approval Date:

TSTF-205-A, Rev 3:	13-Jan-99
TSTF-359-A, Rev 9:	12-May-03
TSTF-425-A, Rev. 3:	06-Jul-09
TSTF-513-A, Rev 3:	03-Jan-11

TSTF Classification:

TSTF-205-A, Rev 3:	Correct Specifications
TSTF-359-A, Rev 9:	Technical Change
TSTF-425-A, Rev 3:	Technical Change
TSTF-513-A, Rev 3:	Technical 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 departures applicable to Specification 3.4.9.

RCOL COL Item Number and Title:

There are no Vogtle COL items applicable to Specification 3.4.9.

RCOL PTS Change Number and Title:

VEGP LAR DOC A003:	References to various Chapters and Sections of the Final Safety Analysis Report (FSAR) are revised to include FSAR.
VEGP LAR DOC A048:	Containment atmosphere F18 particulate monitor nomenclature update
VEGP LAR DOC A049:	Clarify SR statements
VEGP LAR DOC A050:	Clarify Condition D statement

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(1) applicable to operating reactor designs, but not to the AP1000 design; (2) already incorporated in the GTS; or (3) superseded by another change.

The justification for TSTF-359 is based on vendor-specific evaluations. For Westinghouse plants, that evaluation is in MUHP-3015, "Qualitative Risk Assessment Supporting Increased Flexibility in Mode Restraints," January 2002. This report evaluated "the key plant changes that occur during the Mode changes so it is possible to identify the initiating events that can occur and systems available for event detection, actuation, and mitigation." It also considered initiating events and equipment available to mitigate those events. Based on that evaluation, Notes were proposed for several systems to prohibit the use of LCO 3.0.4.b. These Notes were applied to LTOP, ECCS-Shutdown, AFW, and AC Sources - Operating. TSTF-359-A also removed existing Notes from the ISTS and revised SR 3.0.4. There is no technical basis for concluding that the analysis performed in support of TSTF-359-A and the high-risk configurations addressed by the Notes are applicable to AP1000 plants. TSTF-359-A is not implemented by this GTST and is deferred for future consideration.

TSTF-425-A deferred for future consideration.

Questions have been raised regarding the Operability requirements for the RCS leakage detection instruments in Westinghouse Owners Group (WOG) plants. In particular, improvements in plant fuel integrity have resulted in a reduction of the Reactor Coolant System (RCS) activity. As a result, the containment atmosphere radioactivity (in particular gaseous) monitors may not be capable of promptly detecting an increase in RCS leakage. TSTF-513-A, Rev 3 revises the Bases to clearly define the RCS leakage detection instrumentation operability requirements and to modify the Actions to be taken when the containment atmosphere gaseous radioactivity monitor is the only operable monitor to require additional, more frequent monitoring of other indications of RCS leakage and to shorten the time allowed to restore another monitor to operable status.

The AP1000 RCS leakage detection equipment differs from the WOG detection equipment. As such, the Specification Actions are significantly different. In addition, the AP1000 design does not have gaseous radioactivity monitors; therefore, TSTF-513-A does not apply to the AP1000 GTS. TSTF-513-A will not be discussed further in this GTST.

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)

Revise the last sentence of the second paragraph in the "Actions" section of the Bases under the heading "A.1 and A.2" to state (NRC Staff Comment):

> Restoration of two **containment** sump **level** channels to OPERABLE status is required to regain ~~the function~~ **sump level indication redundancy** in a Completion Time of 14 days after ~~the~~ **discovery of one sump level** ~~monitor's~~ **channel** failure. This time is acceptable, considering the frequency and adequacy of the monitoring of the change in integrated **containment** sump discharge required by **Required** Action A.1.

Revise the first and second paragraphs in the "Actions" section of the Bases under the heading "B.1 and B.2" as follows for added clarity and consistency with language about "RCS steady state operation" to match DCD Rev. 19 Section 5.2.5.3.2, second paragraph, third sentence (NRC Staff Comment):

> With ~~two of the two~~ **both** required containment sump level channels inoperable, no other form of sampling can provide the equivalent information; however, the containment atmosphere F18 particulate radioactivity monitor will provide indications of changes in LEAKAGE. Together with the **containment** atmosphere **F18 particulate** monitor, the periodic ~~surveillance for~~ RCS inventory balance, SR 3.4.7.1, must be performed at an increased frequency of **once per** 24 hours to provide information that is adequate to detect LEAKAGE. A Note is ~~added~~ **provided for Required Action B.1** allowing that SR 3.4.7.1 is not required to be **initially** performed until 12 hours after establishing steady state operation **(defined as stable RCS pressure, temperature, power level, pressurizer level, and reactor coolant drain tank and in-containment refueling water storage tank levels)** ~~(stable temperature, power level, pressurizer and makeup tank levels, makeup and letdown)~~. The 12 hour allowance provides sufficient time to collect and process all necessary data after stable plant conditions are established.
>
> Restoration of one **containment** sump **level** channel to OPERABLE status is required to regain the **sump level indication** function in a Completion Time of 72 hours after **discovery of** the **second sump level** ~~monitor's~~ **channel** failure. This time is acceptable, considering the frequency and adequacy of the RCS inventory balance required by **Required** Action **B.1**~~A.1~~.

Revise the first, second, and third paragraphs in the "Actions" section of the Bases under the heading "C.1.1, C.1.2, and C.2" as follows for added clarity and consistency with language about "RCS steady state operation" to match DCD Rev. 19 Section 5.2.5.3.2, second paragraph, third sentence (NRC Staff Comment):

> With the **containment atmosphere** F18 particulate ~~containment atmosphere radioactivity~~ monitoring instrumentation channel inoperable, ~~alternative~~ action is required. Either grab samples of the containment atmosphere must be taken and analyzed**,** or RCS inventory balance~~d~~ **must be performed**, in accordance with SR 3.4.7.1, to provide alternate periodic information.

> With a **containment atmosphere** sample obtained and analyzed or an RCS inventory balance performed every 24 hours, the reactor may be operated for up to 30 days to allow restoration of the **F18 particulate** ~~radioactivity~~ monitor **to OPERABLE status**.
>
> The 24 ~~hours~~ **hour** interval for grab samples or RCS inventory **balances**~~balance~~ provides periodic information that is adequate to detect LEAKAGE. A Note is ~~added~~ **provided for Required Action C.1.2** allowing that SR 3.4.7.1 is not required to be **initially** performed until 12 hours after establishing steady state operation **(defined as stable RCS pressure, temperature, power level, pressurizer level, and reactor coolant drain tank and in-containment refueling water storage tank levels)**~~(stable temperature, power level, pressurizer and makeup tank levels, and makeup and letdown)~~. The 12 hour allowance provides sufficient time to collect and process all necessary data after stable plant conditions are established. The 30 day Completion Time recognizes **that** at least one other form of leak detection is available.

Minor editorial corrections are made to the Bases discussion, such as revising “condition” to “Condition.”

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

APOG Recommended Changes to Improve the Bases

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)

Remove the extra space in LCO 3.4.9 statement “b.” Revise Applicability Note 1 to be consistent with LCO 3.4.9 statement “b.”

Revise the reference in the GTS 3.4.9 “Applicable Safety Analyses” section of the Bases regarding leakage detection system response time and sensitivities from “Chapter 15” to “Chapter 5.” The reference to Chapter 15 is not correct and Chapter 5 (Section 5.2) has the appropriate discussions. In the “References” section of the Bases, change “3. Chapter 15, “Accident Analysis” to “3. FSAR Chapter 5, “Reactor Coolant System and Connected Systems.”

The GTS 3.4.9 “Applicability” section of the Bases discussion of “RCS inventory monitoring via the pressurizer level changes...” should be deleted because monitoring pressurizer level changes is not part of RCS Leakage Detection Instrumentation. The indirect relation to RCS inventory balance is a discussion item for GTS 3.4.7, “RCS Operational LEAKAGE.” Therefore, the following GTS Bases sentence should be moved to the SR 3.4.7.1 Bases discussion:

> RCS inventory monitoring via the pressurizer level changes is valid in MODES 1, 2, 3, and 4 only when RCS conditions are stable, i.e., temperature is constant, pressure is constant, no makeup and no letdown.

Note that the above paragraph is further revised by the GTST for Subsection 3.4.7, with language about stable RCS conditions (“steady state operation”) to match DCD Rev. 19 Section 5.2.5.3.2, second paragraph, third sentence.

Revise the last sentence of the last paragraph under the headings “A.1 and A.2” and “B.1 and B.2” in the “Actions” section of the Bases to state:

This time is acceptable, considering the frequency and adequacy of the monitoring of the change in integrated sump discharge required by **Required** Action A.1.

In addition, since there are two required channels inoperable, in the “Actions” section of the Bases under the heading “B.1 and B.2,” the 72-hours applies after the second monitor’s failure. This kind of detail is not typical of STS Bases. Delete the following from the second paragraph:

Restoration of one sump channel to OPERABLE status is required to regain the function in a Completion Time of 72 hours ~~after the monitor’s failure~~. . . .

In the “Actions” section of the Bases, revise the first sentence of the first paragraph under the headings “C.1.1, C.1.2, and C.2” as follows:

With the containment atmosphere F18 particulate monitoring instrumentation channel inoperable, ~~alternative~~ action is required.

These non-technical changes provide improved accuracy, clarity, consistency, and operator usability.

Revise the GTS 3.4.9 “Actions” section of the Bases, under the heading “E.1”, to replace “automatic” with “required.” There could be “automatic” means that are either inoperable or not required to be operable. More accurately, the Condition is entered when all LCO “required” means are inoperable. The following (edited) revision is implemented that retains the word “automatic”:

With all required monitors inoperable, no **LCO required** automatic means of monitoring leakage is available and plant shutdown in accordance with LCO 3.0.3 is required.

In the “SRs” section of the Bases, under the heading “SR 3.4.9.3 and SR 3.4.9.4”, revise the last sentence to delete the first word “Again.” This non-technical change provides improved clarity, consistency, and operator usability.

V. Applicability

Affected Generic Technical Specifications and Bases:

Section 3.4.9, RCS Leakage Detection Instrumentation

Changes to the Generic Technical Specifications and Bases:

Equipment nomenclature is updated in the LCO statement, Applicability Notes, Actions, and Surveillance Requirements. (DOC A048)

An extra space in LCO 3.4.9 statement “b.” is also removed. Applicability Note 1 is revised. (APOG Comment and NRC SPSB Editorial Correction)

The word “Required” is removed from Condition C and three SRs. This is consistent with the TS Writer's Guide (Reference 7). (DOC A049)

Condition Statement D is revised to be consistent with the TS Writer's Guide (Reference 7). (DOC A050)

The reference in the GTS 3.4.9 “Applicable Safety Analyses” section of the Bases regarding leakage detection system response time and sensitivities is revised from “Chapter 15” to “Chapter 5.” The corresponding item in the “References” section of the Bases is changed from “3. Chapter 15, “Accident Analysis” to “3. FSAR Chapter 5, “Reactor Coolant System and Connected Systems.” (APOG Comment)

The last sentence of the third paragraph of the “Applicability” section of the Bases is deleted. (APOG Comment)

The “Actions” section of the Bases, under the headings “A.1 and A.2” and “B.1 and B.2,” is revised to improve accuracy, clarity, consistency, and operator usability. (APOG Comment and NRC Staff Comment)

The “Actions” section of the Bases, under the headings “C.1.1, C.1.2, C.2,” is revised to improve clarity, consistency, and operator usability. (APOG Comment and NRC Staff Comment)

The “Actions” section of the Bases, under the heading “E.1”, is revised. (APOG Comment and NRC Staff Edit):

The Bases discussion of SR 3.4.9.2 is revised to add clarity regarding a successful Channel Operational Test. This eliminates a GTS ambiguity and possible misinterpretation of Channel Calibration, Channel Functional Test, Actuation Logic Test, Channel Operational Test, Trip Actuating Device Operational Test, and Logic System Functional Test. (TSTF-205-A)

The last sentence in the “SRs” section of the Bases, under the heading “SR 3.4.9.3 and SR 3.4.9.4” is revised. (APOG Comment)

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

VI. Traveler Information

Description of TSTF changes:

Problems have been identified with the ISTS definitions of Channel Calibration, Channel Functional Test, and related definitions. Revised definitions were developed for these terms and Bases discussions of these Surveillances have been enhanced.

Rationale for TSTF changes:

TSTF-205-A notes that a successful test of a channel relay and associated required contacts may be the verification of a single contact and that all contacts of the required device need not be tested provided the required channel contact is otherwise tested. The Bases of applicable Surveillances are modified to include this clarification of the acceptable methods of testing. This clarification is applied to the definitions and Bases discussions for all Channel Functional Tests, Channel Operational Tests, and TADOTs.

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

DOC A048 revises LCO 3.4.9.b, Applicability Note 1, Condition C, Required Action C.2, SR 3.4.9.1, SR 3.4.9.2, and SR 3.4.9.4 to specify the “containment atmosphere F18 particulate monitor.”

DOC A049 deletes the word “required” in Condition C, SR 3.4.9.1, SR 3.4.9.2 and SR 3.4.9.4.

DOC A050 revises Condition D from “Required Action and associated Completion Time not met,” to “Required Action and associated Completion Time of Condition A, B, or C not met.”

A more detailed description of each DOC can be found in Reference 2, VEGP TSU LAR Enclosure 1, and 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 in Reference 8 and the Southern Nuclear Operating Company RAI Response in Reference 9.

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

All plant-specific TS changes are recommended to correct equipment nomenclature and provide consistency with the improved STS Writer's Guide (Reference 7).

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

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

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

An extra space in LCO 3.4.9 statement “b.” is removed. Applicability Note 1 is revised. (APOG Comment and NRC Staff Editorial Correction)

The reference in the GTS 3.4.9 “Applicable Safety Analyses” section of the Bases regarding leakage detection system response time and sensitivities is revised from “Chapter 15” to “Chapter 5.” The corresponding item in the “References” section of the Bases is changed from “3. Chapter 15, “Accident Analysis” to “3. FSAR Chapter 5, “Reactor Coolant System and Connected Systems.” (APOG Comment)

The last sentence is deleted from the third paragraph of the GTS 3.4.9 “Applicability” section of the Bases (APOG Comment:

> RCS inventory monitoring via the pressurizer level changes is valid in MODES 1, 2, 3, and 4 only when RCS conditions are stable, i.e., temperature is constant, pressure is constant, no makeup and no letdown.)

The last sentence of the second paragraph in the “Actions” section of the Bases under the heading “A.1 and A.2” is revised to state (APOG Comment and NRC Staff Comment):

> Restoration of two **containment** sump **level** channels to OPERABLE status is required to regain ~~the function~~ **sump level indication redundancy** in a Completion Time of 14 days after ~~the~~ **discovery of one sump level** ~~monitor's~~ **channel** failure. This time is acceptable, considering the frequency and adequacy of the monitoring of the change in integrated **containment** sump discharge required by **Required** Action A.1.

The first and second paragraphs in the “Actions” section of the Bases under the heading “B.1 and B.2” are revised to state (APOG Comment and NRC Staff Comment):

> With ~~two of the two~~ **both** required containment sump level channels inoperable, no other form of sampling can provide the equivalent information; however, the containment atmosphere F18 particulate radioactivity monitor will provide indications of changes in LEAKAGE. Together with the **containment** atmosphere **F18 particulate** monitor, the periodic ~~surveillance for~~ RCS inventory balance, SR 3.4.7.1, must be performed at an increased frequency of **once per** 24 hours to provide information that is adequate to detect LEAKAGE. A Note is ~~added~~ **provided for Required Action B.1** allowing that SR 3.4.7.1 is not required to be **initially** performed until 12 hours after establishing steady state operation **(defined as stable RCS pressure, temperature, power level, pressurizer level, and reactor coolant drain tank and in-containment refueling water storage tank levels)** ~~(stable temperature, power level, pressurizer and makeup tank levels, makeup and letdown)~~. The 12 hour allowance provides sufficient time to collect and process all necessary data after stable plant conditions are established.
>
> Restoration of one **containment** sump **level** channel to OPERABLE status is required to regain the **sump level indication** function in a Completion Time of 72 hours after **discovery of** the **second sump level** ~~monitor's~~ **channel** failure. This time is acceptable, considering the frequency and adequacy of the RCS inventory balance required by **Required** Action **B.1**~~A.1~~.

The first, second, and third paragraphs in the “Actions” section of the Bases under the heading “C.1.1, C.1.2, and C.2” are revised to state (APOG Comment and NRC Staff Comment):

> With the **containment atmosphere** F18 particulate ~~containment atmosphere radioactivity~~ monitoring instrumentation channel inoperable, ~~alternative~~ action is required. Either grab samples of the containment atmosphere must be taken and

analyzed, or RCS inventory balances~~d~~ **must be performed**, in accordance with SR 3.4.7.1, to provide alternate periodic information.

With a **containment atmosphere** sample obtained and analyzed or an RCS inventory balance performed every 24 hours, the reactor may be operated for up to 30 days to allow restoration of the **F18 particulate** ~~radioactivity~~ monitor **to OPERABLE status**.

The 24 ~~hours~~ **hour** interval for grab samples or RCS inventory **balances**~~balance~~ provides periodic information that is adequate to detect LEAKAGE. A Note is ~~added~~ **provided for Required Action C.1.2** allowing that SR 3.4.7.1 is not required to be **initially** performed until 12 hours after establishing steady state operation **(defined as stable RCS pressure, temperature, power level, pressurizer level, and reactor coolant drain tank and in-containment refueling water storage tank levels)**~~(stable temperature, power level, pressurizer and makeup tank levels, and makeup and letdown)~~. The 12 hour allowance provides sufficient time to collect and process all necessary data after stable plant conditions are established. The 30 day Completion Time recognizes **that** at least one other form of leak detection is available.

The GTS 3.4.9 "Actions" section of the Bases, under the heading "E.1," is revised to state (APOG Comment edited by NRC Staff):

With all required monitors inoperable, no **LCO required** automatic means of monitoring leakage is available and plant shutdown in accordance with LCO 3.0.3 is required.

The last sentence in the "SRs" section of the Bases, under the heading "SR 3.4.9.3 and SR 3.4.9.4" is revised to delete the first word "Again." In addition, the word "proven" is revised to "shown." (APOG Comment edited by NRC Staff)

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

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

LCO 3.4.9 statement "b." is revised to be grammatically correct. Applicability Note 1 is revised to be consistent with LCO 3.4.9 statement "b."

The reference to Chapter 15 is not correct. Chapter 5 (Section 5.2) has the appropriate discussions regarding the leakage detection system response time and sensitivities.

The sentence in the GTS 3.4.9 "Applicability" section of the Bases is deleted because monitoring pressurizer level changes is not part of RCS Leakage Detection Instrumentation. The indirect relation to RCS inventory balance is a discussion item for GTS 3.4.7, "RCS Operational LEAKAGE." The indirect relation to RCS inventory balance is a discussion item that is better suited for GTS 3.4.7, "RCS Operational LEAKAGE."

The non-technical changes to the "Actions" section of the Bases under the headings "A.1 and A.2" and "B.1 and B.2" provide improved accuracy, clarity, consistency, and operator usability.

The non-technical changes to the "Actions" section of the Bases under the headings "C.1.1, C.1.2, and C.2" provide improved accuracy, clarity, consistency, and operator usability.

The single word “automatic” is inaccurate in the GTS 3.4.9 “Actions” section of the Bases, under the heading “E.1.” There could be “automatic” means that are either inoperable or not required to be operable. More accurately, the Condition is entered when all LCO “required” means are inoperable.

The revision to last sentence in the “SRs” section of the Bases, under the heading “SR 3.4.9.3 and SR 3.4.9.4” is a non-technical change that provides improved clarity, consistency, and operator usability. (APOG Comment edited by NRC SPSB)

VII. GTST Safety Evaluation

Technical Analysis:

The revised definitions eliminate a GTS ambiguity and possible misinterpretation of Channel Calibration, Channel Functional Test, Actuation Logic Test, Channel Operational Test, Trip Actuating Device Operational Test, and Logic System Functional Test. The GTS definitions use phrases similar to “required sensor, alarm, interlock, display and trip functions,” and “required relays and contacts, trip units, solid state logic elements, etc.” There is ambiguity in the application of the word “required” and whether the list is inclusive or representative. Therefore, this list has been replaced with phrases similar to, “all devices in the channel required for channel OPERABILITY.” This clarifies the use of the word “required” and makes clear that the components that are required to be tested or calibrated are only those that are necessary for the channel to perform its safety function. The list of components is eliminated from the definition. These changes will clarify the requirements and allow for consistent application of the definitions, tests, and calibrations.

The revised CHANNEL FUNCTIONAL TEST definition does not address the method of the testing of all of the required channel devices. A successful test of a channel relay and associated required contacts may be the verification of a single contact and that all contacts of the required device need not be tested provided the required channel contact is otherwise tested. The Bases of applicable Surveillances are modified to include this clarification of the acceptable methods of testing. This clarification is applied to all Channel Functional Tests, Channel Operational Tests, and TADOTs.

In the Bases of the SRs a statement is added to indicate that, “A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable [CHANNEL FUNCTIONAL TEST / CHANNEL OPERATIONAL TEST / TADOT] of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests.” This statement is necessary to clarify what verification is required to support a successful test. This Bases statement to address the specifics of how the tests as defined may be performed is appropriate and acceptable because: 1) the entire scope of the required test is still being performed – only the acceptance criteria is modified to require verification of a certain portion of the instrument functions to have a successful test, and 2) all portions of the scope of the required test required for OPERABILITY are being tested, and 3) provision for the acceptance of the verification of change of the state of a single contact of the relay as desired by the NRC.

The sentence (edited) in the STS 3.4.9 “Applicability” section of the Bases:

> RCS inventory monitoring via the pressurizer level changes is valid in MODES 1, 2, 3, and 4 only when RCS conditions are stable, as described above.

is relocated to the SR 3.4.7.1 Bases discussion because the current location of the sentence in the STS 3.4.9 is not applicable to RCS Leakage Detection Instrumentation. The indirect relation to RCS inventory balance is a discussion item that is better suited for STS 3.4.7, “RCS Operational LEAKAGE.” The proposed change to the STS 3.4.9 “Applicability” section of the Bases and the SR section of the GTS 3.4.7 Bases is administrative because it does not result in a technical change and is, therefore, acceptable.

The single word “automatic” is inaccurate in the GTS 3.4.9 “Actions” section of the Bases, under the heading “E.1.” There could be “automatic” means that are either inoperable or not required to be operable. More accurately, the Condition is entered when all LCO “required” means are inoperable. Adding the phrase “LCO required” in front of “automatic” improves the accuracy of the Bases statement. The proposed change to the “Actions” section of the Bases is administrative because it does not result in a technical change and is, therefore, acceptable.

The remaining changes 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 3.4.9 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 5/16/2014.

APOG Comments (Ref. 10) and Resolutions:

1. (Internal #3) 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 # 11) The GTST incorporates TSTF-359-A, Rev. 9. The justification for TSTF-359 was based on vendor-specific evaluations. For Westinghouse plants, that evaluation was in MUHP-3015, “Qualitative Risk Assessment Supporting Increased Flexibility in Mode Restraints,” January 2002. This report evaluated “the key plant changes that occur during the Mode changes so it is possible to identify the initiating events that can occur and systems available for event detection, actuation, and mitigation.” It also considered initiating events and equipment available to mitigate those events. Based on that evaluation, Notes were proposed for several systems to prohibit the use of LCO 3.0.4.b. These Notes were applied to LTOP, ECCS-Shutdown, AFW, and AC Sources - Operating. TSTF-359-A also removed existing Notes from the ISTS and revised SR 3.0.4. There is no technical basis for concluding that the analysis performed in support of TSTF-359-A and the high-risk configurations addressed by the Notes are applicable to AP1000 plants. Remove TSTF-359-A from the GTST. Include TSTF-359-A in the reference disposition tables, as “TSTF deferred for future consideration”

Note: also reinstate LCO 3.0.4 “not applicable” Notes deleted in various Specifications as a result of incorporating TSTF-359. This is resolved by reversing all changes implemented by the initial application of TSTF-359-A by this GTST.

5. (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.

6. (Internal # 254) In GTST for Subsection 3.4.9, Section V, the DOC A048 description does not identify that changes were also made to the Surveillance Requirements. Revise the description of DOC A048 to include mention of “the Surveillance Requirements.” This is resolved by including mention of the Surveillance Requirements including appropriate editorial changes for correct grammar.

7. (Internal # 255) GTS LCO 3.4.9 Applicability has 2 Notes. GTST contains no evaluation discussing deletion of these Notes. This appears to be a typographical oversight omitting these Notes. Include Applicability Notes as found in GTS 3.4.9. This is resolved by inserting the Applicability Notes. An extra space in LCO 3.4.9 statement “b.” is also removed. Applicability Note 1 is revised to be consistent with LCO 3.4.9 statement “b,” and the phrase “with RTP > 20%” is corrected to “with THERMAL POWER > 20% RTP.”

8. (Internal # 256 and 262) Revise the reference in the GTS 3.4.9 “Applicable Safety Analyses” section of the Bases regarding Leakage detection system response time and sensitivities from Chapter 15 to Chapter 5. The reference to Chapter 15 is not correct and Chapter 5 (Section 5.2) has the appropriate discussions. In the “References” section of the Bases, change “3. Chapter 15, “Accident Analysis” to “3. FSAR Chapter 5, “Reactor Coolant System and Connected Systems.” This is resolved by making the recommended changes.

9. (Internal # 257) Revise the GTS 3.4.9 “Applicability” section of the Bases to delete discussion of “RCS inventory monitoring via the pressurizer level changes.” Monitoring pressurizer level changes is not part of RCS Leakage Detection Instrumentation. The indirect relation to RCS inventory balance is a discussion item for GTS 3.4.7, “RCS Operational LEAKAGE.” Therefore, move this GTS Bases sentence to the SR 3.4.7.1 Bases. This is resolved by deleting the last sentence of the third paragraph in the “Applicability” section of the Bases. A separate APOG comment (Internal # 246) implemented the addition of this information to the Bases discussion for SR 3.4.7.1. This paragraph is further revised by the GTST for Subsection 3.4.7, with language about stable RCS conditions (“steady state operation”) to match DCD Rev. 19 Section 5.2.5.3.2, second paragraph, third sentence.

10. (Internal # 258 and 259) In the “Actions” section of the Bases, revise the last sentence of the last paragraph under the headings “A.1 and A.2” and “B.1 and B.2” as follows:

> This time is acceptable, considering the frequency and adequacy of the monitoring of the change in integrated sump discharge required by **Required** Action A.1.

In addition, since there are two required channels inoperable, in the “Actions” section of the Bases under the heading “B.1 and B.2,” the 72 hours applies after the second monitor’s failure. This kind of detail is not typical of STS Bases. Delete the following from the second paragraph (NRC staff suggested clarifying the sentence, instead of removing the detail suggested by APOG; see below):

> Restoration of one sump channel to OPERABLE status is required to regain the function in a Completion Time of 72 hours ~~after the monitor’s failure~~. . . .

These non-technical changes provide improved accuracy, clarity, consistency, and operator usability. This is resolved by making the first recommended change with additional edits and revising the detail provided for the second recommended change. The NRC staff recommends editing the last sentence of the second paragraph in the “Actions” section of the Bases under the heading “A.1 and A.2” as follows for added clarity:

> Restoration of two **containment** sump **level** channels to OPERABLE status is required to regain ~~the function~~ **sump level indication redundancy** in a Completion Time of 14 days after ~~the~~ **discovery of one sump level** ~~monitor’s~~ **channel** failure. This time is acceptable, considering the frequency and adequacy of the monitoring of the change in integrated **containment** sump discharge required by **Required** Action A.1.

The NRC staff recommends editing the first and second paragraphs in the “Actions” section of the Bases under the heading “B.1 and B.2” as follows for added clarity and consistency with language about “RCS steady state operation” to match DCD Rev. 19 Section 5.2.5.3.2, second paragraph, third sentence:

> With ~~two of the two~~ **both** required containment sump level channels inoperable, no other form of sampling can provide the equivalent information; however, the containment atmosphere F18 particulate radioactivity monitor will provide indications of changes in LEAKAGE. Together with the **containment** atmosphere **F18 particulate** monitor, the periodic ~~surveillance for~~ RCS inventory balance, SR 3.4.7.1, must be performed at an increased frequency of **once per** 24 hours to provide information that is adequate to detect LEAKAGE. A Note is ~~added~~

provided for Required Action B.1 allowing that SR 3.4.7.1 is not required to be **initially** performed until 12 hours after establishing steady state operation **(defined as stable RCS pressure, temperature, power level, pressurizer level, and reactor coolant drain tank and in-containment refueling water storage tank levels)** ~~(stable temperature, power level, pressurizer and makeup tank levels, makeup and letdown)~~. The 12 hour allowance provides sufficient time to collect and process all necessary data after stable plant conditions are established.

Restoration of one **containment** sump **level** channel to OPERABLE status is required to regain the **sump level indication** function in a Completion Time of 72 hours after **discovery of** the **second sump level** ~~monitor's~~ **channel** failure. This time is acceptable, considering the frequency and adequacy of the RCS inventory balance required by **Required** Action **B.1**~~A.1~~.

11. (Internal # 260) In the "Actions" section of the Bases, revise the first sentence of the first paragraph under the headings "C.1.1, C.1.2, and C.2" as follows:

    With the containment atmosphere F18 particulate monitoring instrumentation channel inoperable, ~~alternative~~ action is required.

    This non-technical change provides improved clarity, consistency, and operator usability. This is resolved by making the recommended change with additional edits. The NRC staff recommends editing the first, second, and third paragraphs in the "Actions" section of the Bases under the heading "C.1.1, C.1.2, and C.2" as follows for added clarity and consistency with language about "RCS steady state operation" to match DCD Rev. 19 Section 5.2.5.3.2, second paragraph, third sentence:

    With the containment atmosphere F18 particulate monitoring instrumentation channel inoperable, ~~alternative~~ action is required. Either grab samples of the containment atmosphere must be taken and analyzed**,** or RCS inventory balance**s**~~d~~ **must be performed**, in accordance with SR 3.4.7.1, to provide alternate periodic information.

    With a **containment atmosphere** sample obtained and analyzed or an RCS inventory balance performed every 24 hours, the reactor may be operated for up to 30 days to allow restoration of the **F18 particulate** ~~radioactivity~~ monitor **to OPERABLE status**.

    The 24 ~~hours~~ **hour** interval for grab samples or RCS inventory **balances**~~balance~~ provides periodic information that is adequate to detect LEAKAGE. A Note is ~~added~~ **provided for Required Action C.1.2** allowing that SR 3.4.7.1 is not required to be **initially** performed until 12 hours after establishing steady state operation **(defined as stable RCS pressure, temperature, power level, pressurizer level, and reactor coolant drain tank and in-containment refueling water storage tank levels)**~~(stable temperature, power level, pressurizer and makeup tank levels, and makeup and letdown)~~. The 12 hour allowance provides sufficient time to collect and process all necessary data after stable plant conditions are established. The 30 day Completion Time recognizes **that** at least one other form of leak detection is available.

12. (Internal # 261) Revise the GTS 3.4.9 “Actions” section of the Bases, under the heading “E.1”, to replace “automatic” with “required.” There could be “automatic” means that are either inoperable or not required to be operable. More accurately, the Condition is entered when all LCO “required” means are inoperable. This is an editorial change recommended to provide better accuracy. This is resolved by making the following revision that retains the word “automatic”:

    With all required monitors inoperable, no **LCO required** automatic means of monitoring leakage is available and plant shutdown in accordance with LCO 3.0.3 is required.

13. (Internal # 263) In the “SRs” section of the Bases, under the heading “SR 3.4.9.3 and SR 3.4.9.4”, revise the last sentence to delete the first word “Again.” This non-technical change provides improved clarity, consistency, and operator usability. This is resolved by making the recommended change with an additional edit to clarify that operating experience has shown, not proven, that the 24 month Frequency is acceptable.

NRC Final Approval Date: 12/7/2015

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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. 10 CFR 50.65, “Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants.”

5. NUMARC 93-01, Section 11, Revision 4, “Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants,” December 2010 (ML110050227).

6. NRC Regulatory Guide 1.182, “Assessing and Managing Risk before Maintenance Activities at Nuclear Power Plants,” May 2000 (ML003699426).

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

8. 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).

9. 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)

10. 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.

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.9 RCS Leakage Detection Instrumentation

LCO 3.4.9 The following RCS leakage detection instrumentation shall be OPERABLE:

a. Two containment sump level channels; **and**

b. One containment atmosphere **F18 particulate** ~~radioactivity~~ monitor ~~(F18 particulate)~~.

APPLICABILITY: MODES 1, 2, 3, and 4.

----------NOTES----------

1. The ~~F18 particulate~~ containment atmosphere ~~radioactivity~~ **F18 particulate** monitor is only required to be OPERABLE in MODE 1 with **THERMAL POWER** ~~RTP~~ > 20% **RTP**.

2. Containment sump level measurements cannot be used for leak detection if leakage is prevented from draining to the sump such as by redirection to the In-Containment Refueling Water Storage Tank (IRWST) by the containment shell gutter drains.

ACTIONS

----------NOTE----------
LCO 3.0.4 is not applicable.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required containment sump channel inoperable.	A.1 Verify that the volume input per day to the containment sump does not change (+ or -) more than 10 gallons or 33% of the volume input (whichever is greater). The volume used for comparison will be the value taken during the first day following the entrance into this **Condition** ~~CONDITION~~. AND A.2 Restore two containment sump channels to OPERABLE status.	Once per 24 hours 14 days
B. Two required containment sump channels inoperable.	B.1 ----------NOTE---------- Not required until 12 hours after establishment of steady state operation. ---------- Perform SR 3.4.7.1. AND B.2 Restore one containment sump channel to OPERABLE status.	 Once per 24 hours 72 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
C. ~~Required~~ **C**ontainment atmosphere **F18 particulate** ~~radioactivity~~ monitor inoperable.	C.1.1	Analyze grab samples of containment atmosphere.	Once per 24 hours
		OR	
	C.1.2	----------NOTE---------- Not required until 12 hours after establishment of steady state operation. ----------	
		Perform SR 3.4.7.1.	Once per 24 hours
	AND		
	C.2	Restore containment atmosphere **F18 particulate** ~~radioactivity~~ monitor to OPERABLE status.	30 days
D. Required Action and associated Completion Time **of Condition A, B, or C** not met.	D.1	Be in MODE 3.	6 hours
	AND		
	D.2	Be in MODE 5**.**	36 hours
E. All required monitors inoperable.	E.1	Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.9.1	Perform a CHANNEL CHECK of ~~required~~ containment atmosphere **F18 particulate** ~~radioactivity~~ monitor.	12 hours

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.4.9.2	Perform a COT of ~~required~~ containment atmosphere **F18 particulate** ~~radioactivity~~ monitor.	92 days
SR 3.4.9.3	Perform a CHANNEL CALIBRATION of required containment sump monitor.	24 months
SR 3.4.9.4	Perform a CHANNEL CALIBRATION of ~~required~~ containment atmosphere **F18 particulate** ~~radioactivity~~ monitor.	24 months

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.9 RCS Leakage Detection Instrumentation

BASES

BACKGROUND

GDC 30 of Appendix A to 10 CFR 50 (Ref. 1) requires means for detecting, and, to the extent practical, identifying the source of RCS LEAKAGE. Regulatory Guide 1.45 (Ref. 2) describes acceptable methods for selecting LEAKAGE detection systems.

LEAKAGE detection systems must have the capability to detect significant reactor coolant pressure boundary (RCPB) degradation as soon after occurrence as practical to minimize the potential for propagation to a gross failure. Thus, an early indication or warning signal is necessary to permit proper evaluation of all unidentified LEAKAGE.

Industry practice has shown that water flow changes of 0.5 gpm can be readily detected in contained volumes by monitoring changes in water level, in flow rate, or in the operating frequency of a pump. The containment sump used to collect unidentified LEAKAGE, is instrumented to alarm for increases of 0.5 gpm in the normal flow rates. This sensitivity is acceptable for detecting increases in unidentified LEAKAGE. Note that the containment sump level instruments are also used to identify leakage from the main steam lines inside containment. Since there is not another method to identify steam line leakage in a short time frame, two sump level sensors are required to be OPERABLE. The containment water level sensors (LCO 3.3.~~3~~**17**) provide a diverse backup method that can detect a 0.5 gpm leak within 3.5 days.

The reactor coolant contains radioactivity that, when released to the containment, can be detected by radiation monitoring instrumentation. Reactor coolant radioactivity used for leak detection is the decay of F18. The production of F18 is proportional to the reactor power level. F18 becomes a particulate after leaving the RCS, and it is used for leak detection. Instrument sensitivities for particulate monitoring are practical for these LEAKAGE detection systems. The Radiation Monitoring System includes monitoring F18 particulate activity to provide leak detection.

APPLICABLE SAFETY ANALYSES

The need to evaluate the severity of an alarm or an indication is important to the operators, and the ability to compare and verify with indications from other systems is necessary. The system response times and sensitivities are described in **FSAR** Chapter ~~1~~5 (Ref. 3).

BASES

APPLICABLE SAFETY ANALYSES (continued)

The safety significance of RCS LEAKAGE varies widely depending on its source, rate, and duration. Therefore, detecting and monitoring RCS LEAKAGE into the containment area is necessary. Quickly separating the identified LEAKAGE from the unidentified LEAKAGE provides quantitative information to the operators, allowing them to take corrective action should a leak occur.

RCS LEAKAGE detection instrumentation satisfies Criterion 1 of 10 CFR 50.36(c)(2)(ii).

LCO

One method of protecting against large RCS LEAKAGE derives from the ability of instruments to rapidly detect extremely small leaks. This LCO requires instruments of diverse monitoring principles to be OPERABLE to provide a high degree of confidence that small leaks are detected in time to allow actions to place the plant in a safe condition, when RCS LEAKAGE indicates possible RCPB degradation.

The LCO is satisfied when monitors of diverse measurement means are available. Thus, ~~the~~ **two** containment sump level monitor**s**, in combination with ~~an~~ **a containment atmosphere** F18 particulate ~~radioactivity~~ monitor, provide~~s~~ an acceptable minimum. Containment sump level monitoring is performed by **two of the** three redundant, seismically qualified level instruments. The LCO **Note** ~~note~~ clarifies that if LEAKAGE is prevented from draining to the sump, its level change measurements made by OPERABLE sump level instruments will not be valid for quantifying the LEAKAGE.

APPLICABILITY

Because of elevated RCS temperature and pressure in MODES 1, 2, 3, and 4, RCS LEAKAGE detection instrumentation is required to be OPERABLE.

In MODE 5 or 6, the temperature is ≤ 200°F and pressure is maintained low or at atmospheric pressure. Since the temperatures and pressures are lower than those for MODES 1, 2, 3, and 4, the likelihood of LEAKAGE and crack propagation are much smaller. Therefore, the requirements of this LCO are not applicable in MODES 5 and 6.

BASES

APPLICABILITY (continued)

Containment sump level monitoring is a valid method for detecting LEAKAGE in MODES 1, 2, 3, and 4. The containment atmosphere F18 particulate radioactivity LEAKAGE measurement during MODE 1 is valid only for reactor power > 20% RTP. ~~RCS inventory monitoring via the pressurizer level changes is valid in MODES 1, 2, 3, and 4 only when RCS conditions are stable, i.e., temperature is constant, pressure is constant, no makeup and no letdown.~~

The containment sump level change method of detecting leaks during MODES 1, 2, 3, and 4 is not valid while containment purge occurs or within 2 hours after the end of containment purge.

The containment atmosphere F18 particulate radioactivity LEAKAGE measurement during MODE 1 is not valid while containment purge occurs or within 2 hours after the end of containment purge.

The containment sump level change method of detecting leaks during MODES 1, 2, 3, and 4 is not valid during extremely cold outside ambient conditions when frost is forming on the interior of the containment vessel.

ACTIONS

The actions are modified by a Note that indicates that the provisions of LCO 3.0.4 are not applicable. As a result, a MODE change is allowed when leakage detection channels are inoperable. This allowance is provided because in each **Condition,** ~~condition~~ other instrumentation is available to monitor for RCS LEAKAGE.

A.1 and A.2

With one of the two required containment sump level channels inoperable, the one remaining OPERABLE channel is sufficient for RCS leakage monitoring since the containment radiation provides a method to monitor RCS leakage. However, that is not the case for the steam line leakage monitoring. The remaining OPERABLE sump level monitor is adequate as long as it continues to operate properly. Continuing plant operation is expected to result in containment sump level indication increases and in periodic operation of the containment sump pump. Therefore, proper operation of the one remaining sump level sensor is verified by the operators checking the volume input to the sump (as determined by the sump level changes and discharges from the containment) to determine that it does not change significantly. A significant change is considered to be ±10 gallons per day or 33%

ACTIONS (continued)

(whichever is greater) of the volume input for the first 24 hours after this Condition is entered. The containment sump level instruments are capable of detecting a volume change of less than 2 gallons. The containment water level sensors also provide a diverse backup that can detect a 0.5 gpm leak within 3.5 days.

Restoration of two **containment** sump **level** channels to OPERABLE status is required to regain **sump level indication redundancy** ~~the function~~ in a Completion Time of 14 days after **discovery of one sump level channel** ~~the monitor's~~ failure. This time is acceptable, considering the frequency and adequacy of the monitoring of the change in integrated **containment** sump discharge required by **Required** Action A.1.

B.1 and B.2

With **both** ~~two of the two~~ required containment sump level channels inoperable, no other form of sampling can provide the equivalent information; however, the containment atmosphere F18 particulate radioactivity monitor will provide indications of changes in LEAKAGE. Together with the **containment** atmosphere **F18 particulate** monitor, the periodic ~~surveillance for~~ RCS inventory balance, SR 3.4.7.1, must be performed at an increased frequency of **once per** 24 hours to provide information that is adequate to detect LEAKAGE. A Note is **provided for Required Action B.1** ~~added~~ allowing that SR 3.4.7.1 is not required to be **initially** performed until 12 hours after establishing steady state operation **(defined as stable RCS pressure, temperature, power level, pressurizer level, and reactor coolant drain tank and in-containment refueling water storage tank (IRWST) levels)** ~~(stable temperature, power level, pressurizer and makeup tank levels, makeup and letdown)~~. The 12 hour allowance provides sufficient time to collect and process all necessary data after stable plant conditions are established.

Restoration of one **containment** sump **level** channel to OPERABLE status is required to regain the **sump level indication** function in a Completion Time of 72 hours after **discovery of** the **second sump level channel** ~~monitor's~~ failure. This time is acceptable, considering the frequency and adequacy of the RCS inventory balance required by **Required** Action **B.1** ~~A.1~~.

BASES

ACTIONS (continued)

C.1.1, C.1.2, and C.2

With the **containment atmosphere** F18 particulate ~~containment atmosphere radioactivity~~ monitoring instrumentation channel inoperable, ~~alternative~~ action is required. Either grab samples of the containment atmosphere must be taken and analyzed or RCS inventory balance**s**~~d~~ **must be performed**, in accordance with SR 3.4.7.1, to provide alternate periodic information.

With a **containment atmosphere** sample obtained and analyzed or an RCS inventory balance performed every 24 hours, the reactor may be operated for up to 30 days to allow restoration of the **F18 particulate** ~~radioactivity~~ monitor **to OPERABLE status**.

The 24 hour~~s~~ interval for grab samples or RCS inventory balance**s** provides periodic information that is adequate to detect LEAKAGE. A Note is **provided for Required Action C.1.2** ~~added~~ allowing that SR 3.4.7.1 is not required to be **initially** performed until 12 hours after establishing steady state operation **(defined as stable RCS pressure, temperature, power level, pressurizer level, and reactor coolant drain tank and IRWST levels)** ~~(stable temperature, power level, pressurizer and makeup tank levels, makeup and letdown)~~. The 12 hour allowance provides sufficient time to collect and process all necessary data after stable plant conditions are established. The 30 day Completion Time recognizes **that** at least one other form of leak detection is available.

D.1 and D.2

If a Required Action of Condition A, B or C cannot be met within the required Completion Time, the reactor must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner without challenging plant systems.

BASES

ACTIONS (continued)

E.1

With all required monitors inoperable, no **LCO required** automatic means of monitoring leakage is available and plant shutdown in accordance with LCO 3.0.3 is required.

SURVEILLANCE REQUIREMENTS

SR 3.4.9.1

SR 3.4.9.1 requires the performance of a CHANNEL CHECK of the containment atmosphere F18 particulate ~~radioactivity~~ monitor. The check gives reasonable confidence that the channel is operating properly. The Frequency of 12 hours is based on instrument reliability and risk and is reasonable for detecting off normal conditions.

SR 3.4.9.2

SR 3.4.9.2 requires the performance of a CHANNEL OPERATIONAL TEST (COT) on the **containment** atmosphere F18 particulate ~~radioactivity~~ monitor. The test ensures that the monitor can perform its function in the desired manner. **A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable CHANNEL OPERATIONAL TEST of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests at least once per refueling interval with applicable extensions.** The test verifies the alarm setpoint and relative accuracy of the instrument string. The Frequency of 92 days considers risks and instrument reliability, and operating experience has shown that it is proper for detecting degradation.

SR 3.4.9.3 and SR 3.4.9.4

These SRs require the performance of a CHANNEL CALIBRATION for each of the **required** RCS Leakage detection instrumentation channels. The calibration verifies the accuracy of the instrument string, including the instruments located inside containment. The Frequency of 24 months is a typical refueling cycle and considers channel reliability. **Operating** ~~Again, operating~~ experience has **shown** ~~proven~~ that this Frequency is acceptable.

BASES

REFERENCES

1. 10 CFR 50, Appendix A, Section IV, GDC 30.

2. Regulatory Guide 1.45, “Reactor Coolant Pressure Boundary LEAKAGE Detection Systems,” U.S. Nuclear Regulatory Commission.

3. **FSAR** Chapter ~~1~~5, “**Reactor Coolant System and Connected Systems**~~Accident Analysis~~.”

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.

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.9 RCS Leakage Detection Instrumentation

LCO 3.4.9 The following RCS leakage detection instrumentation shall be OPERABLE:

a. Two containment sump level channels; and

b. One containment atmosphere F18 particulate monitor.

APPLICABILITY: MODES 1, 2, 3, and 4.

----------NOTES----------

1. The containment atmosphere F18 particulate monitor is only required to be OPERABLE in MODE 1 with THERMAL POWER > 20% RTP.

2. Containment sump level measurements cannot be used for leak detection if leakage is prevented from draining to the sump such as by redirection to the In-Containment Refueling Water Storage Tank (IRWST) by the containment shell gutter drains.

ACTIONS

----------NOTE----------
LCO 3.0.4 is not applicable.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required containment sump channel inoperable.	A.1 Verify that the volume input per day to the containment sump does not change (+ or -) more than 10 gallons or 33% of the volume input (whichever is greater). The volume used for comparison will be the value taken during the first day following the entrance into this Condition. AND	Once per 24 hours
	A.2 Restore two containment sump channels to OPERABLE status.	14 days
B. Two required containment sump channels inoperable.	B.1 ----------NOTE---------- Not required until 12 hours after establishment of steady state operation. ---------- Perform SR 3.4.7.1. AND	Once per 24 hours
	B.2 Restore one containment sump channel to OPERABLE status.	72 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Containment atmosphere F18 particulate monitor inoperable.	C.1.1 Analyze grab samples of containment atmosphere. OR C.1.2 ----------NOTE---------- Not required until 12 hours after establishment of steady state operation. ---------- Perform SR 3.4.7.1. AND C.2 Restore containment atmosphere F18 particulate monitor to OPERABLE status.	Once per 24 hours Once per 24 hours 30 days
D. Required Action and associated Completion Time of Condition A, B, or C not met.	D.1 Be in MODE 3. AND D.2 Be in MODE 5.	6 hours 36 hours
E. All required monitors inoperable.	E.1 Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.9.1	Perform a CHANNEL CHECK of containment atmosphere F18 particulate monitor.	12 hours

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.4.9.2	Perform a COT of containment atmosphere F18 particulate monitor.	92 days
SR 3.4.9.3	Perform a CHANNEL CALIBRATION of required containment sump monitor.	24 months
SR 3.4.9.4	Perform a CHANNEL CALIBRATION of containment atmosphere F18 particulate monitor.	24 months

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.9 RCS Leakage Detection Instrumentation

BASES

BACKGROUND

GDC 30 of Appendix A to 10 CFR 50 (Ref. 1) requires means for detecting, and, to the extent practical, identifying the source of RCS LEAKAGE. Regulatory Guide 1.45 (Ref. 2) describes acceptable methods for selecting LEAKAGE detection systems.

LEAKAGE detection systems must have the capability to detect significant reactor coolant pressure boundary (RCPB) degradation as soon after occurrence as practical to minimize the potential for propagation to a gross failure. Thus, an early indication or warning signal is necessary to permit proper evaluation of all unidentified LEAKAGE.

Industry practice has shown that water flow changes of 0.5 gpm can be readily detected in contained volumes by monitoring changes in water level, in flow rate, or in the operating frequency of a pump. The containment sump used to collect unidentified LEAKAGE, is instrumented to alarm for increases of 0.5 gpm in the normal flow rates. This sensitivity is acceptable for detecting increases in unidentified LEAKAGE. Note that the containment sump level instruments are also used to identify leakage from the main steam lines inside containment. Since there is not another method to identify steam line leakage in a short time frame, two sump level sensors are required to be OPERABLE. The containment water level sensors (LCO 3.3.17) provide a diverse backup method that can detect a 0.5 gpm leak within 3.5 days.

The reactor coolant contains radioactivity that, when released to the containment, can be detected by radiation monitoring instrumentation. Reactor coolant radioactivity used for leak detection is the decay of F18. The production of F18 is proportional to the reactor power level. F18 becomes a particulate after leaving the RCS, and it is used for leak detection. Instrument sensitivities for particulate monitoring are practical for these LEAKAGE detection systems. The Radiation Monitoring System includes monitoring F18 particulate activity to provide leak detection.

APPLICABLE SAFETY ANALYSES

The need to evaluate the severity of an alarm or an indication is important to the operators, and the ability to compare and verify with indications from other systems is necessary. The system response times and sensitivities are described in FSAR Chapter 5 (Ref. 3).

BASES

APPLICABLE SAFETY ANALYSES (continued)

The safety significance of RCS LEAKAGE varies widely depending on its source, rate, and duration. Therefore, detecting and monitoring RCS LEAKAGE into the containment area is necessary. Quickly separating the identified LEAKAGE from the unidentified LEAKAGE provides quantitative information to the operators, allowing them to take corrective action should a leak occur.

RCS LEAKAGE detection instrumentation satisfies Criterion 1 of 10 CFR 50.36(c)(2)(ii).

LCO

One method of protecting against large RCS LEAKAGE derives from the ability of instruments to rapidly detect extremely small leaks. This LCO requires instruments of diverse monitoring principles to be OPERABLE to provide a high degree of confidence that small leaks are detected in time to allow actions to place the plant in a safe condition, when RCS LEAKAGE indicates possible RCPB degradation.

The LCO is satisfied when monitors of diverse measurement means are available. Thus, two containment sump level monitors, in combination with a containment atmosphere F18 particulate monitor, provide an acceptable minimum. Containment sump level monitoring is performed by two of the three redundant, seismically qualified level instruments. The LCO Note clarifies that if LEAKAGE is prevented from draining to the sump, its level change measurements made by OPERABLE sump level instruments will not be valid for quantifying the LEAKAGE.

APPLICABILITY

Because of elevated RCS temperature and pressure in MODES 1, 2, 3, and 4, RCS LEAKAGE detection instrumentation is required to be OPERABLE.

In MODE 5 or 6, the temperature is ≤ 200°F and pressure is maintained low or at atmospheric pressure. Since the temperatures and pressures are lower than those for MODES 1, 2, 3, and 4, the likelihood of LEAKAGE and crack propagation are much smaller. Therefore, the requirements of this LCO are not applicable in MODES 5 and 6.

Containment sump level monitoring is a valid method for detecting LEAKAGE in MODES 1, 2, 3, and 4. The containment atmosphere F18 particulate radioactivity LEAKAGE measurement during MODE 1 is valid only for reactor power > 20% RTP.

BASES

APPLICABILITY (continued)

The containment sump level change method of detecting leaks during MODES 1, 2, 3, and 4 is not valid while containment purge occurs or within 2 hours after the end of containment purge.

The containment atmosphere F18 particulate radioactivity LEAKAGE measurement during MODE 1 is not valid while containment purge occurs or within 2 hours after the end of containment purge.

The containment sump level change method of detecting leaks during MODES 1, 2, 3, and 4 is not valid during extremely cold outside ambient conditions when frost is forming on the interior of the containment vessel.

ACTIONS

The actions are modified by a Note that indicates that the provisions of LCO 3.0.4 are not applicable. As a result, a MODE change is allowed when leakage detection channels are inoperable. This allowance is provided because in each Condition, other instrumentation is available to monitor for RCS LEAKAGE.

A.1 and A.2

With one of the two required containment sump level channels inoperable, the one remaining OPERABLE channel is sufficient for RCS leakage monitoring since the containment radiation provides a method to monitor RCS leakage. However, that is not the case for the steam line leakage monitoring. The remaining OPERABLE sump level monitor is adequate as long as it continues to operate properly. Continuing plant operation is expected to result in containment sump level indication increases and in periodic operation of the containment sump pump. Therefore, proper operation of the one remaining sump level sensor is verified by the operators checking the volume input to the sump (as determined by the sump level changes and discharges from the containment) to determine that it does not change significantly. A significant change is considered to be ±10 gallons per day or 33% (whichever is greater) of the volume input for the first 24 hours after this Condition is entered. The containment sump level instruments are capable of detecting a volume change of less than 2 gallons. The containment water level sensors also provide a diverse backup that can detect a 0.5 gpm leak within 3.5 days.

BASES

ACTIONS (continued)

Restoration of two containment sump level channels to OPERABLE status is required to regain sump level indication redundancy in a Completion Time of 14 days after discovery of one sump level channel failure. This time is acceptable, considering the frequency and adequacy of the monitoring of the change in integrated containment sump discharge required by Required Action A.1.

B.1 and B.2

With both required containment sump level channels inoperable, no other form of sampling can provide the equivalent information; however, the containment atmosphere F18 particulate radioactivity monitor will provide indications of changes in LEAKAGE. Together with the containment atmosphere F18 particulate monitor, the periodic RCS inventory balance, SR 3.4.7.1, must be performed at an increased frequency of once per 24 hours to provide information that is adequate to detect LEAKAGE. A Note is provided for Required Action B.1 allowing that SR 3.4.7.1 is not required to be initially performed until 12 hours after establishing steady state operation (defined as stable RCS pressure, temperature, power level, pressurizer level, and reactor coolant drain tank and in-containment refueling water storage tank (IRWST) levels). The 12 hour allowance provides sufficient time to collect and process all necessary data after stable plant conditions are established.

Restoration of one containment sump level channel to OPERABLE status is required to regain the sump level indication function in a Completion Time of 72 hours after discovery of the second sump level channel failure. This time is acceptable, considering the frequency and adequacy of the RCS inventory balance required by Required Action B.1.

C.1.1, C.1.2, and C.2

With the containment atmosphere F18 particulate monitoring instrumentation channel inoperable, action is required. Either grab samples of the containment atmosphere must be taken and analyzed or RCS inventory balances must be performed, in accordance with SR 3.4.7.1, to provide alternate periodic information.

With a containment atmosphere sample obtained and analyzed or an RCS inventory balance performed every 24 hours, the reactor may be operated for up to 30 days to allow restoration of the F18 particulate monitor to OPERABLE status.

BASES

ACTIONS (continued)

The 24 hour interval for grab samples or RCS inventory balances provides periodic information that is adequate to detect LEAKAGE. A Note is provided for Required Action C.1.2 allowing that SR 3.4.7.1 is not required to be initially performed until 12 hours after establishing steady state operation (defined as stable RCS pressure, temperature, power level, pressurizer level, and reactor coolant drain tank and IRWST levels). The 12 hour allowance provides sufficient time to collect and process all necessary data after stable plant conditions are established. The 30 day Completion Time recognizes that at least one other form of leak detection is available.

D.1 and D.2

If a Required Action of Condition A, B or C cannot be met within the required Completion Time, the reactor must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner without challenging plant systems.

E.1

With all required monitors inoperable, no LCO required automatic means of monitoring leakage is available and plant shutdown in accordance with LCO 3.0.3 is required.

SURVEILLANCE REQUIREMENTS

SR 3.4.9.1

SR 3.4.9.1 requires the performance of a CHANNEL CHECK of the containment atmosphere F18 particulate monitor. The check gives reasonable confidence that the channel is operating properly. The Frequency of 12 hours is based on instrument reliability and risk and is reasonable for detecting off normal conditions.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.4.9.2

SR 3.4.9.2 requires the performance of a CHANNEL OPERATIONAL TEST (COT) on the containment atmosphere F18 particulate monitor. The test ensures that the monitor can perform its function in the desired manner. A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable CHANNEL OPERATIONAL TEST of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests at least once per refueling interval with applicable extensions. The test verifies the alarm setpoint and relative accuracy of the instrument string. The Frequency of 92 days considers risks and instrument reliability, and operating experience has shown that it is proper for detecting degradation.

SR 3.4.9.3 and SR 3.4.9.4

These SRs require the performance of a CHANNEL CALIBRATION for each of the required RCS Leakage detection instrumentation channels. The calibration verifies the accuracy of the instrument string, including the instruments located inside containment. The Frequency of 24 months is a typical refueling cycle and considers channel reliability. Operating experience has shown that this Frequency is acceptable.

REFERENCES

1. 10 CFR 50, Appendix A, Section IV, GDC 30.
2. Regulatory Guide 1.45, “Reactor Coolant Pressure Boundary LEAKAGE Detection Systems,” U.S. Nuclear Regulatory Commission.
3. FSAR Chapter 5, “Reactor Coolant System and Connected Systems.”