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

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**Title: Revision of AP1000 GTS Subsection 3.9.4, Refueling Cavity Water Level**

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**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:**

None

**STS NUREGs Affected:**

Not applicable

**NRC Approval Date:**

Not applicable

**TSTF Classification:**

Not applicable

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**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:**

None

**RCOL COL Item Number and Title:**

Not applicable

**RCOL PTS Change Number and Title:**

The Vogtle Electric Generating Plant Units 3 and 4 License Amendment Request (VEGP 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) and Less Restrictive Changes (L) and are addressed in enumerated discussions of change (DOCs). These changes are discussed in Sections VI and VII of this GTST.

DOC A038: Editorial/clarification change

DOC L05: Elimination of LCO 3.0.8

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(1) applicable to operating reactor designs, but not to the AP1000 design; (2) already incorporated in the GTS; or (3) superseded by another change.

This subsection with its title is equivalent to Subsection 3.9.7 in WOG STS Rev. 4.

DOC A038 makes a minor editorial change for LCO SR 3.9.4.1 by eliminating the word 'that' under Surveillance.

DOC L05 eliminates LCO 3.0.8 from LCO 3.9.4 Actions and from Bases 3.9.4 Actions.

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**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)**

APOG Recommended Changes to Improve Bases 3.9.4

Insert Chapter 15, "Accident Analysis" as Reference 3 in the list of references. (APOG #499)

The references are numbered in the order of their first appearance in the text. (#495, #496, #498)

Delete the phrase "refueling canal" from Bases-Background. (APOG #495)

Change the phrase "in containment" to "within containment" in Bases-Applicability. (APOG #497)

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## **V. Applicability**

### **Affected Generic Technical Specifications and Bases:**

Section 3.9.4, Refueling Cavity Water Level

### **Changes to the Generic Technical Specifications and Bases:**

Eliminate in SR 3.9.4.1 Surveillance the word 'that' from the phrase "Verify that refueling cavity water level is" where the word 'that' is underlined. (DOC A038)

Eliminate LCO 3.0.8 from LCO 3.9.4 Actions and from Bases 3.9.4 Actions. (DOC L05)

Insert Chapter 15, "Accident Analysis" as Reference 3 in the list of references. (APOG #499)  
The references are numbered in the order of their first appearance in the text. (#495, #496, #498)

Delete the phrase "refueling canal" from Bases-Background. (APOG #495)

Change the phrase "in containment" to "within containment" in Bases-Applicability.  
(APOG #497)

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**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:**

Administrative Changes (A):

DOC A038:

In SR 3.9.4.1, the Surveillance is revised by eliminating the word 'that' from the phrase "Verify that refueling cavity water level is" where the word 'that' is underlined.

Less Restrictive Changes (L):

DOC L05:

The reference to LCO 3.0.8 is eliminated in TS LCO Actions Note and Bases Actions for this subsection. The changes are highlighted later in the Markup of this subsection at the end of this GTST.

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

According to DOC A038, "deletion of 'that' from Surveillances is consistent with the guidance provided in TSTF-GG-05-01, subsection 3.1.1.g, that states: "Avoid the use of 'that' in the Specifications if the statement is clear without it." Deleting 'that' from the current SRs does not reduce the clarity of the SRs."

In reference to the elimination of LCO 3.0.8, DOC L05 indicates that "current TS LCO 3.0.8 applies in Modes 5 and 6 when the associated Actions are not met or an associated Action is not provided. In some cases, LCO 3.0.8 is explicitly excluded from applying by way of a Note. In conjunction with the change to eliminate LCO 3.0.8, these Notes are no longer necessary and are administratively eliminated." VEGP TSU DOC concludes that, "removing LCO 3.0.8 (and references to it) will not adversely impact public health and safety."

Accordingly, the changes made by DOC A038 and DOC L05 are acceptable. Furthermore, these changes are consistent with WOG STS 3.9.7, Rev. 4 (which is equivalent to GTS 3.9.4). Therefore, these changes are implemented by this GTST in AP1000 STS 3.9.4, Rev. 0.

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

None

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

Not applicable

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**VII. GTST Safety Evaluation****Technical Analysis:**

Technical discussion for the changes proposed by DOC A038 and DOC L05 are covered in the section VI of this GTST under “Rationale for changes in RCOL Std. Dep., RCOL COL Item(s), and RCOL PTS Changes.”

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 3.9.4 is an acceptable model Specification for the AP1000 standard reactor design.

**References to Previous NRC Safety Evaluation Reports (SERs):**

None

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**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 5/21/2014.

**APOG Comments (Ref. 7) and Resolutions:**

1. (Internal #495, #496, #498, #499) 3.9.4, Bases: APOG recommends (# 499) inserting Chapter 15, "Accident Analyses" as Reference 3 in the list of references. The references are numbered in the order of their first appearance in the text. (#495, #496, #498)

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 (APOG #3) to include the "FSAR" modifier. This is resolved by adding the FSAR modifier as appropriate.

2. (Internal #495) 3.9.4, Bases Background: APOG recommends deleting the phrase "refueling canal." APOG comments that this is an editorial change that provides improved clarity, consistency, and operator usability. This change is made as recommended to improve the Bases.
3. (Internal #497) 3.9.4, Bases Applicability: APOG recommends changing the phrase "in containment" to "within containment." APOG comments that this is an editorial change that provides improved clarity, consistency, and operator usability. This change is made as recommended to improve the Bases.
4. (Internal # 5) TSTF-51-A made two changes: (1) it changed Applicabilities and Actions from "movement of irradiated fuel" to "movement of [recently] irradiated fuel" and (2) removed most uses of the defined term Core Alterations. This change has the effect of removing the Applicability of the affected TS after a specified decay time (i.e., beyond "recently") has occurred. Only the second change to delete Core Alterations was incorporated into the AP1000 STS. Further clarification of the full scope of TSTF-51 should be addressed; that is to acknowledge that it is deferred for future consideration. This is resolved by making the requested notation for TSTF-51-A.

**NRC Final Approval Date:** 12/14/2015

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

None

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**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:

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|-------------|---|
| 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).

7. 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).
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**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.

Refueling Cavity Water Level  
3.9.4

## 3.9 REFUELING OPERATIONS

## 3.9.4 Refueling Cavity Water Level

LCO 3.9.4 Refueling Cavity Water Level shall be maintained  $\geq 23$  ft above the top of the reactor vessel flange.

APPLICABILITY: During movement of irradiated fuel assemblies within containment.

## ACTIONS

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~~—NOTE—~~

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~~LCO 3.0.8 is not applicable.~~

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CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Refueling cavity water level not within limit.	A.1 Suspend movement of irradiated fuel assemblies within containment.	Immediately

## SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.9.4.1 Verify <del>that</del> refueling cavity water level is $\geq 23$ ft above the top of reactor vessel flange.	24 hours

## B 3.9 REFUELING OPERATIONS

## B 3.9.4 Refueling Cavity Water Level

BASES

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**BACKGROUND** The movement of irradiated fuel assemblies within containment requires a minimum water level of 23 ft above the top of the reactor vessel flange. During refueling, this maintains sufficient water level in containment, refueling cavity, ~~refueling canal~~, fuel transfer canal, and spent fuel pool to retain iodine fission product activity in the event of a fuel handling accident (Refs. 1 and 2). Sufficient iodine activity would be retained to limit offsite doses from the accident to within the values reported in **FSAR** Chapter 15 (**Ref. 3**).

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**APPLICABLE SAFETY ANALYSES** During movement of irradiated fuel assemblies, the water level in the refueling cavity and the refueling canal is an initial condition design parameter in the analysis of a fuel-handling accident in containment, as postulated by Regulatory Guide 1.183 (Ref. 1).

The fuel handling accident analysis inside containment is described in Reference 2. This analysis assumes a minimum water level of 23 feet.

Refueling Cavity Water Level satisfies Criterion 2 of 10 CFR 50.36(c)(2)(ii).

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**LCO** A minimum refueling cavity water level of 23 ft above the reactor vessel flange is required to ensure that the radiological consequences of a postulated fuel handling accident inside containment are within the values calculated in Reference 1.

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**APPLICABILITY** Refueling Cavity Water Level is applicable when moving irradiated fuel assemblies ~~in~~**within** containment. The LCO minimizes the possibility of radioactive release due to a fuel handling accident in containment that is beyond the assumptions of the safety analysis. If irradiated fuel assemblies are not being moved in containment, there can be no significant radioactivity release as a result of a postulated fuel handling accident. Requirements for fuel handling accidents in the spent fuel pool are covered by LCO 3.7.5, "Spent Fuel Pool Water Level."

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BASES

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## ACTIONS

~~LCO 3.0.8 is applicable while in MODE 5 or 6. Since irradiated fuel assembly movement can occur in MODE 5 or 6, the ACTIONS have been modified by a Note stating that LCO 3.0.8 is not applicable. If moving irradiated fuel assemblies while in MODE 5 or 6, the fuel movement is independent of shutdown reactor operations. Entering LCO 3.0.8 while in MODE 5 or 6 would require the optimization of plant safety, unnecessarily.~~

A.1

With a water level of < 23 ft above the top of the reactor vessel flange, all operations involving movement of irradiated fuel assemblies within containment shall be suspended immediately to ensure that a fuel handling accident cannot occur.

The suspension of fuel movement shall not preclude completion of movement to safe position.

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SURVEILLANCE  
REQUIREMENTSSR 3.9.4 1

Verification of a minimum water level of 23 ft above the top of the reactor vessel flange ensures that the design basis for the analysis of the postulated fuel handling accident during refueling operations is met. Water at the required level above the top of the reactor vessel flange limits the consequences of damaged fuel rods that are postulated to result from a fuel handling accident inside containment (Ref. 2).

The Frequency of 24 hours is based on engineering judgment and is considered adequate in view of the large volume of water and the normal procedural controls of valve positions which make significant unplanned level changes unlikely.

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REFERENCES

1. Regulatory Guide 1.183, "Alternate Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors."
  2. **FSAR** Section 15.7.4, "Fuel Handling Accident."
  3. **FSAR Chapter 15, "Accident Analyses."**
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**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.

Refueling Cavity Water Level  
3.9.4

## 3.9 REFUELING OPERATIONS

## 3.9.4 Refueling Cavity Water Level

LCO 3.9.4 Refueling Cavity Water Level shall be maintained  $\geq 23$  ft above the top of the reactor vessel flange.

APPLICABILITY: During movement of irradiated fuel assemblies within containment.

## ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Refueling cavity water level not within limit.	A.1 Suspend movement of irradiated fuel assemblies within containment.	Immediately

## SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.9.4.1 Verify refueling cavity water level is $\geq 23$ ft above the top of reactor vessel flange.	24 hours

## B 3.9 REFUELING OPERATIONS

## B 3.9.4 Refueling Cavity Water Level

BASES

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**BACKGROUND**      The movement of irradiated fuel assemblies within containment requires a minimum water level of 23 ft above the top of the reactor vessel flange. During refueling, this maintains sufficient water level in containment, refueling cavity, fuel transfer canal, and spent fuel pool to retain iodine fission product activity in the event of a fuel handling accident (Refs. 1 and 2). Sufficient iodine activity would be retained to limit offsite doses from the accident to within the values reported in FSAR Chapter 15 (Ref. 3).

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**APPLICABLE SAFETY ANALYSES**      During movement of irradiated fuel assemblies, the water level in the refueling cavity and the refueling canal is an initial condition design parameter in the analysis of a fuel-handling accident in containment, as postulated by Regulatory Guide 1.183 (Ref. 1).

                                 The fuel handling accident analysis inside containment is described in Reference 2. This analysis assumes a minimum water level of 23 feet.

                                 Refueling Cavity Water Level satisfies Criterion 2 of 10 CFR 50.36(c)(2)(ii).

---

**LCO**      A minimum refueling cavity water level of 23 ft above the reactor vessel flange is required to ensure that the radiological consequences of a postulated fuel handling accident inside containment are within the values calculated in Reference 1.

---

**APPLICABILITY**      Refueling Cavity Water Level is applicable when moving irradiated fuel assemblies within containment. The LCO minimizes the possibility of radioactive release due to a fuel handling accident in containment that is beyond the assumptions of the safety analysis. If irradiated fuel assemblies are not being moved in containment, there can be no significant radioactivity release as a result of a postulated fuel handling accident. Requirements for fuel handling accidents in the spent fuel pool are covered by LCO 3.7.5, "Spent Fuel Pool Water Level."

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BASES

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## ACTIONS

A.1

With a water level of < 23 ft above the top of the reactor vessel flange, all operations involving movement of irradiated fuel assemblies within containment shall be suspended immediately to ensure that a fuel handling accident cannot occur.

The suspension of fuel movement shall not preclude completion of movement to safe position.

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SURVEILLANCE  
REQUIREMENTSSR 3.9.4 1

Verification of a minimum water level of 23 ft above the top of the reactor vessel flange ensures that the design basis for the analysis of the postulated fuel handling accident during refueling operations is met. Water at the required level above the top of the reactor vessel flange limits the consequences of damaged fuel rods that are postulated to result from a fuel handling accident inside containment (Ref. 2).

The Frequency of 24 hours is based on engineering judgment and is considered adequate in view of the large volume of water and the normal procedural controls of valve positions which make significant unplanned level changes unlikely.

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REFERENCES

1. Regulatory Guide 1.183, "Alternate Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors."
  2. FSAR Section 15.7.4, "Fuel Handling Accident."
  3. FSAR Chapter 15, "Accident Analyses."
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