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

Title: Revision of AP1000 GTS Section 4.0, Design Features

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

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).

VEGP LAR DOC A116: Administrative editorial/clarification changes
VEGP LAR DOC A117: Administrative editorial/clarification changes

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(1) applicable to operating reactor designs, but not to the AP1000 design; (2) already incorporated in the GTS; or (3) superseded by another change.

DOC A116 expands the phrase in the second paragraph of plant-specific TS (PTS) 4.2.2, which matches the second paragraph of GTS 4.2.2, from “MSHIM load follow operation” to “Mechanical Shim (MSHIM) load follow operation” in AP1000 STS 4.2.2 and PTS 4.2.2.

DOC A117, GTS/PTS paragraph 4.3.1.1.c is revised to enumerate the three requirements into three separate items.

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)

Editorial changes are made in subsection 4.1 for clarification.

- “Not applicable to AP1000 Design Certification. Site-specific information to be provided by COL applicant” is changed to “Site-specific information to be provided by the combined license COL applicant
- “This information will be provided by the combined license applicant” is changed to “Site-specific information to be provided by the combined license applicant.”

V. Applicability

Affected Generic Technical Specifications and Bases:

Section 4.0, DESIGN FEATURES

Changes to the Generic Technical Specifications and Bases:

Make editorial changes in GTS 4.1 for clarification.

Expand the phrase in the second paragraph of GTS 4.2.2 from “MSHIM load follow operation” to “Mechanical Shim (MSHIM) load follow operation.” (DOC A116)

Revise paragraph 4.3.1.1.c to enumerate the three technical requirements into three separate paragraphs ‘c’, ‘d’, and ‘e’ and renumber the following paragraphs. (DOC A117)

VI. Traveler Information

Description of TSTF changes:

None

Rationale for TSTF changes:

Not applicable

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

The Vogtle Electric Generating Plant Units 3 and 4 License Amendment Request (VEGP LAR) (Ref. 4) proposed the following changes to the initial version of the plant-specific TS (PTS) (referred to as the current TS by the VEGP LAR).

Administrative Changes (A):

VEGP LAR DOC A116:

VEGP LAR DOC A116 expands the phrase in the second paragraph of plant-specific TS (PTS) 4.2.2, which matches the second paragraph of GTS 4.2.2, from “MSHIM load follow operation” to “Mechanical Shim (MSHIM) load follow operation” in AP1000 STS 4.2.2 and PTS 4.2.2.

VEGP LAR DOC A117:

AP1000 GTS, Rev. 19, subsection 4.3.1, “Criticality,” paragraph 4.3.1.1.c and plant-specific TS (PTS) 4.3.1.1.c contain three technical requirements as follows:

c. A nominal 10.93 inch center-to-center distance between fuel assemblies placed in Region 1, a nominal 9.04 inch center-to-center distance between fuel assemblies placed in Region 2 of the spent fuel storage racks, and a nominal 11.65 inch center-to-center distance between fuel assemblies placed in the Defective Fuel Cells.”

According to VEGP LAR Enclosure 1, DOC A117, GTS/PTS paragraph 4.3.1.1.c is revised to enumerate the three requirements into separate items in the ordered list, as follows:

c. A nominal 10.93 inch center-to-center distance between fuel assemblies placed in Region 1 of the spent fuel storage racks;

d. A nominal 9.04 inch center-to-center distance between fuel assemblies placed in Region 2 of the spent fuel storage racks;

e. A nominal 11.65 inch center-to-center distance between fuel assemblies placed in the Defective Fuel Cells.”

Subsequent items in the list are renumbered due to this change; i.e., GTS/PTS 4.3.1.1.d, e, and f become STS/PTS 4.3.1.1.f, g, and h, respectively.

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

According to DOC A116, the change "is made to provide consistency with TSTF-GG-05-01[, "Writer's Guide for Plant-Specific Improved Technical Specifications," June 2005 (Ref. 8)], subsection 3.2.2.a. [Writer's Guide] Subsection 3.2.2.a states that upon the first reference in each Specification or Bases to a phrase for which an abbreviation is desired to be used, use the full phrase followed by the acronym or initialism set off by parentheses. This is the first use of the acronym 'MSHIM' in [PTS] Section 4.0. This change is designated as an administrative change and is acceptable because it does not result in technical changes to the [P]TS." Therefore, this change, which was approved in Amendment 13 to the COLs for VEGP Units 3 and 4 (Ref. 7), will be adopted by this GTST in AP1000 STS subsection 4.2.2, Rev. 0.

According to DOC A117, the change to PTS subsection 4.3.1 "is made to provide clarification and for consistency with NUREG-1431 numbering. Specifically, NUREG-1431 has separate TS numbers for center-to-center distance requirements for the two types of fuel storage racks (i.e., high density and low density), as shown in NUREG-1431, [P]TS 4.3.1.1.c and [PTS 4.3.1.1.]d. [P]TS 4.3.1.1.c currently provides the center-to-center distances between fuel assemblies for Regions 1 and 2 and the Defective Fuel Cells. Similar to NUREG-1431, the requirements of [P]TS 4.3.1.1.c are revised to be split into three separate TS items: [P]TS 4.3.1.1.c (for Region 1), [P]TS 4.3.1.1.d (for Region 2), and [P]TS 4.3.1.1.e (for Defective Cells). This change is designated as an administrative change and is acceptable because it does not result in technical changes to the TS."

The above changes will be adopted by this GTST in AP1000 STS subsection 4.3.1, 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

VII. GTST Safety Evaluation

Technical Analysis:

The changes made by VEGP LAR DOCs A116 and A117 are designated as administrative changes and are acceptable because they do not result in technical changes to the TS.

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 5/5/2014.

NRC Final Approval Date: 5/18/2015

NRC Contact:

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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. Vogtle Electric Generating Plant (VEGP), Units 3 &4 COL Application, Part 4, Technical Specifications, Revision 3 (ML11180A102, 07/01/2011).

3. Vogtle Electric Generating Plant (VEGP) Units 3 and 4 - Final Safety Evaluation Report (ML110450302, 08/10/2011)

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

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 07, 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. 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)

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

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.

4.0 DESIGN FEATURES

4.1 Site Location

[~~Not applicable to AP1000 Design Certification.~~Site ~~-~~specific information to be provided by **the combined license** ~~COL~~ applicant.]

4.1.1 Site and Exclusion Boundaries

[~~This~~ **Site-specific** information **to** ~~will~~ be provided by the combined license applicant.]

4.1.2 Low Population Zone (LPZ)

[~~This~~ **Site-specific** information **to** ~~will~~ be provided by the combined license applicant.]

4.2 Reactor Core

4.2.1 Fuel Assemblies

The reactor shall contain 157 fuel assemblies. Each assembly shall consist of a matrix of fuel rods clad with a zirconium based alloy and containing an initial composition of natural or slightly enriched uranium dioxide (UO_2) as fuel material. Limited substitutions of zirconium based alloy or stainless steel filler rods for fuel rods, in accordance with approved applications of fuel rod configurations, may be used. Fuel assemblies shall be limited to those fuel designs that have been analyzed with applicable NRC staff approved codes and methods and shown by tests or analyses to comply with fuel safety design bases. A limited number of lead test assemblies that have not completed representative testing may be placed in nonlimiting core regions.

4.2.2 Control Rod and Gray Rod Assemblies

The reactor core shall contain 53 Rod Cluster Control Assemblies (RCCAs), each with 24 rodlets/RCCA. The RCCA absorber material shall be silver indium cadmium as approved by the NRC.

Additionally, there are 16 low worth Gray Rod Cluster Assemblies (GRCAs), with 24 rodlets/GRCA, which, in conjunction with the RCCAs, are used to augment **Mechanical Shim (**MSHIM**)** load follow operation.

4.0 DESIGN FEATURES

4.3 Fuel Storage

4.3.1 Criticality

4.3.1.1 The spent fuel storage racks are designed and shall be maintained with:

a. Fuel assemblies having a maximum U-235 enrichment of 4.95 weight percent;

b. $k_{eff} \leq 0.95$ if flooded with unborated water which includes an allowance for uncertainties (Region 1 racks);

c. A nominal 10.93 inch center-to-center distance between fuel assemblies placed in Region 1~~,~~ **of the spent fuel storage racks;**

d. ~~a~~**A** nominal 9.04 inch center-to-center distance between fuel assemblies placed in Region 2 of the spent fuel storage racks~~, and~~**;**

e. ~~a~~**A** nominal 11.65 inch center-to-center distance between fuel assemblies placed in the Defective Fuel Cells;

~~d~~**f.** New or partially spent fuel assemblies with any discharge burnup may be allowed unrestricted storage in Region 1 and the Defective Fuel Cells of Figure 4.3-1;

~~e~~**g.** Partially spent fuel assemblies meeting the initial enrichment and burnup requirements of LCO 3.7.12, “Spent Fuel Pool Storage,” may be stored in Region 2 of Figure 4.3-1; and

~~f~~**h.** $k_{eff} < 1.0$ if flooded with unborated water and $k_{eff} \leq 0.95$ if flooded with borated water at a minimum soluble boron concentration described in the Bases for LCO 3.7.12 for normal and design basis criticality-related accident conditions, which includes an allowance for uncertainties (Region 2 racks).

4.3.1.2 The new fuel storage racks are designed and shall be maintained with:

a. Fuel assemblies having a maximum U-235 enrichment of 5.0 weight percent;

b. The maximum k_{eff} value, including all biases and uncertainties, shall be less than or equal to 0.95 with full density unborated water;

4.0 DESIGN FEATURES

4.3 Fuel Storage (continued)

c. The maximum k_{eff} value, including all biases and uncertainties, shall be less than or equal to 0.98 with optimum moderation and full reflection conditions; and

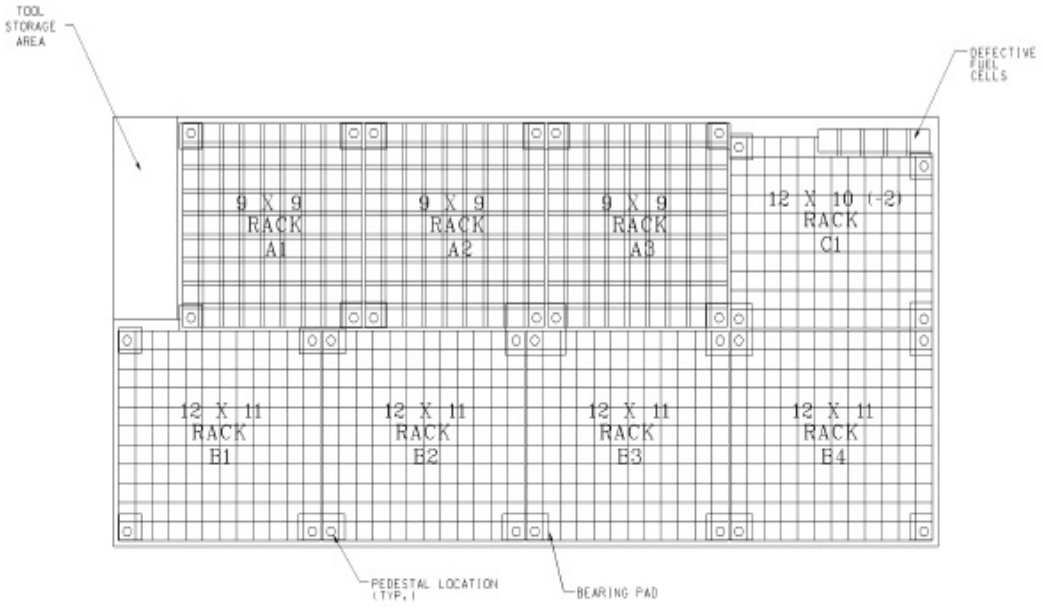
d. A nominal 10.90 inch center-to-center distance between fuel assemblies placed in the new fuel storage racks.

4.3.2 Drainage

The spent fuel pool is designed and shall be maintained to prevent inadvertent draining of the pool below a minimum water depth of ≥ 23 ft above the surface of the fuel storage racks.

4.3.3 Capacity

The spent fuel pool is designed and shall be maintained with a storage capacity limited to no more than 889 fuel assemblies.



Region 1 (A1, A2, A3) – 243 locations

Region 2 (B1, B2, B3, B4, C1) – 641 locations

Defective Fuel Cells (DFCs) – 5 locations

Total Storage Locations – 889

Figure 4.3-1 (page 1 of 1)
Discrete Two Region Spent Fuel Pool Rack Layout

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.

4.0 DESIGN FEATURES

4.1 Site Location

[Site-specific information to be provided by the combined license applicant.]

4.1.1 Site and Exclusion Boundaries

[Site-specific information to be provided by the combined license applicant.]

4.1.2 Low Population Zone (LPZ)

[Site-specific information to be provided by the combined license applicant.]

4.2 Reactor Core

4.2.1 Fuel Assemblies

The reactor shall contain 157 fuel assemblies. Each assembly shall consist of a matrix of fuel rods clad with a zirconium based alloy and containing an initial composition of natural or slightly enriched uranium dioxide (UO_2) as fuel material. Limited substitutions of zirconium based alloy or stainless steel filler rods for fuel rods, in accordance with approved applications of fuel rod configurations, may be used. Fuel assemblies shall be limited to those fuel designs that have been analyzed with applicable NRC staff approved codes and methods and shown by tests or analyses to comply with fuel safety design bases. A limited number of lead test assemblies that have not completed representative testing may be placed in nonlimiting core regions.

4.2.2 Control Rod and Gray Rod Assemblies

The reactor core shall contain 53 Rod Cluster Control Assemblies (RCCAs), each with 24 rodlets/RCCA. The RCCA absorber material shall be silver indium cadmium as approved by the NRC.

Additionally, there are 16 low worth Gray Rod Cluster Assemblies (GRCAs), with 24 rodlets/GRCA, which, in conjunction with the RCCAs, are used to augment Mechanical Shim (MSHIM) load follow operation.

4.0 DESIGN FEATURES

4.3 Fuel Storage

4.3.1 Criticality

4.3.1.1 The spent fuel storage racks are designed and shall be maintained with:

a. Fuel assemblies having a maximum U-235 enrichment of 4.95 weight percent;

b. $k_{eff} \leq 0.95$ if flooded with unborated water which includes an allowance for uncertainties (Region 1 racks);

c. A nominal 10.93 inch center-to-center distance between fuel assemblies placed in Region 1 of the spent fuel storage racks;

d. A nominal 9.04 inch center-to-center distance between fuel assemblies placed in Region 2 of the spent fuel storage racks;

e. A nominal 11.65 inch center-to-center distance between fuel assemblies placed in the Defective Fuel Cells;

f. New or partially spent fuel assemblies with any discharge burnup may be allowed unrestricted storage in Region 1 and the Defective Fuel Cells of Figure 4.3-1;

g. Partially spent fuel assemblies meeting the initial enrichment and burnup requirements of LCO 3.7.12, “Spent Fuel Pool Storage,” may be stored in Region 2 of Figure 4.3-1; and

h. $k_{eff} < 1.0$ if flooded with unborated water and $k_{eff} \leq 0.95$ if flooded with borated water at a minimum soluble boron concentration described in the Bases for LCO 3.7.12 for normal and design basis criticality-related accident conditions, which includes an allowance for uncertainties (Region 2 racks).

4.3.1.2 The new fuel storage racks are designed and shall be maintained with:

a. Fuel assemblies having a maximum U-235 enrichment of 5.0 weight percent;

b. The maximum k_{eff} value, including all biases and uncertainties, shall be less than or equal to 0.95 with full density unborated water;

4.0 DESIGN FEATURES

4.3 Fuel Storage (continued)

c. The maximum k_{eff} value, including all biases and uncertainties, shall be less than or equal to 0.98 with optimum moderation and full reflection conditions; and

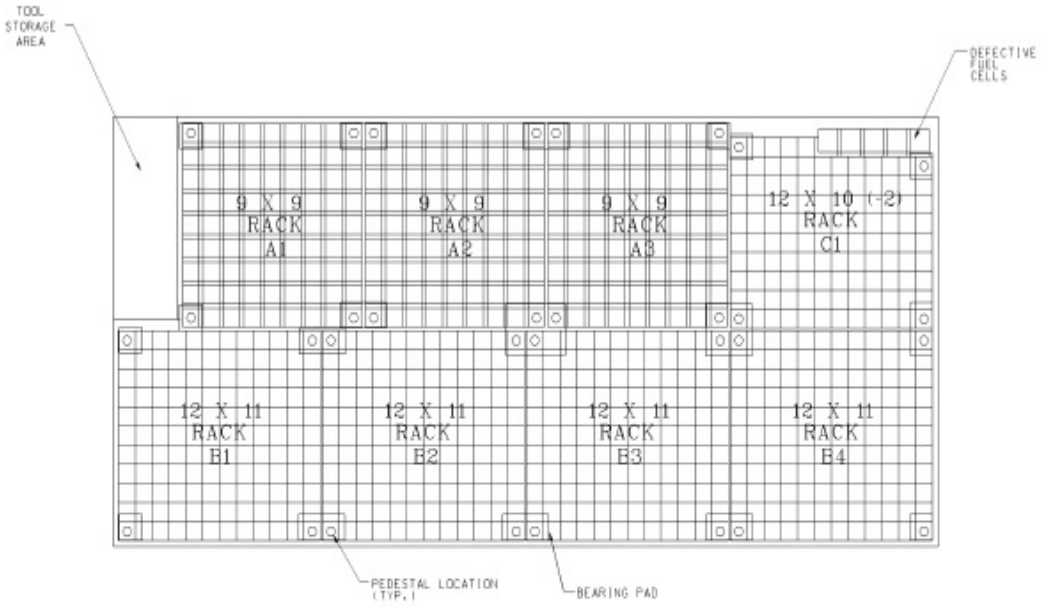
d. A nominal 10.90 inch center-to-center distance between fuel assemblies placed in the new fuel storage racks.

4.3.2 Drainage

The spent fuel pool is designed and shall be maintained to prevent inadvertent draining of the pool below a minimum water depth of ≥ 23 ft above the surface of the fuel storage racks.

4.3.3 Capacity

The spent fuel pool is designed and shall be maintained with a storage capacity limited to no more than 889 fuel assemblies.



Region 1 (A1, A2, A3) – 243 locations

Region 2 (B1, B2, B3, B4, C1) – 641 locations

Defective Fuel Cells (DFCs) – 5 locations

Total Storage Locations – 889

Figure 4.3-1 (page 1 of 1)
Discrete Two Region Spent Fuel Pool Rack Layout