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

Title: Changes related to Section 3.8.6, Distribution Systems - Shutdown

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

TSTF Number and Title:

TSTF-425, Rev. 3, Relocate Surveillance Frequencies to Licensee Control - RITSTF Initiative 5b
TSTF-471-A, Rev. 1, Eliminate Use of term CORE ALTERATIONS in ACTIONS and Notes

STS NUREGs Affected:

TSTF-425, Rev. 3: NUREG-1430, -1431, -1432, -1433, -1434
TSTF-471-A, Rev. 1: NUREG-1430, -1431, -1432

NRC Approval Date:

TSTF-425, Rev. 3: 18-Mar-2009
TSTF-471-A, Rev. 1: 07-Dec-2006

TSTF Classification:

TSTF-425, Rev. 3: Technical Change
TSTF-471-A, Rev. 1: 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:

None

RCOL COL Item Number and Title:

None

RCOL PTS Change Number and Title:

VEGP LAR DOC A108:	TS 3.8.6, Required Action A.1 is revised replacing “associated supported” with “affected.”
VEGP LAR DOC A112:	TS 3.8.6, “Distribution Systems - Shutdown,” is revised to delete “bus” from the name of subsystem “AC instrument and control.” (This DOC was revised based on NRC RAI No. 01, Question 16-16.)
VEGP LAR DOC L03:	TS are revised to eliminate the use of the defined term “CORE ALTERATIONS” and incorporate changes reflected in TSTF-471-A.

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(1) applicable to operating reactor designs, but not to the AP1000 design; (2) already incorporated in the GTS; or (3) superseded by another change.

RCOL PTS Change VEGP LAR DOC L03 and TSTF-471-A changes are the same. Following incorporation of TSTF-471-A changes, no additional change was needed for PTS Change VEGP LAR DOC L03.

TSTF-51-A, requiring addition of “recently” before “irradiated fuel assemblies” is deferred for future consideration.

TSTF-425 is deferred for future consideration.

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

In the “Applicable Safety Analyses” section of the Bases, clarifying edits are added and ESF is defined.

In the “Background,” 'LCO,” and “Actions” sections of the Bases, clarifying edits are added, corrections made, and some previous changes are withdrawn.

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)

In the “background” section of the Bases, delete the word “bus” from “Class 1E AC instrument and control bus” and replace “Distribution System - Operating” with “Distribution Systems - Operating.”

Make an editorial change in the “Applicable Safety Analyses” section of the Bases. Spell out the acronym ESF as engineered safety features.

V. Applicability

Affected Generic Technical Specifications and Bases:

Section 3.8.6, Distribution Systems – Shutdown

Changes to the Generic Technical Specifications and Bases:

TS 3.8.6, Required Action A.1 is revised replacing “associated supported” with “affected.” (DOC A108)

TS 3.8.6, Required Action A.2.1 is deleted and subsequent Actions are renumbered. (TSTF-471-A; DOC L03)

TS 3.8.6, Required Action A.2.4 (revised numbering) is revised deleting the word “bus.” (DOC A112)

The “Background” section of the Bases was revised for editorial changes. (APOG comment, NRC staff changes)

The “Applicable Safety Analyses” section of the Bases was revised defining ESF as “engineered safety features” and “Class 1E AC” with “Class 1E AC instrument and control.” (APOG comment, NRC staff changes)

The “LCO” section of the Bases was revised replacing hyphen in “components-all” with em dash “components-all.” (NRC staff change)

The “Actions” section of the Bases is revised removing discussions of CORE ALTERATIONS. “AC instrument and control bus” is replaced with “AC instrument and control.” (TSTF-471-A; DOC L03; DOC A112) Additional editorial and grammatical corrections are made. (APOG comment, NRC staff changes)

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

VI. Traveler Information

Description of TSTF changes:

TSTF-471

TSTF-471 proposes elimination of the defined term CORE ALTERATIONS and all uses of the term for the Specifications and Bases. For AP1000 TS 3.8.6, this implies deletion of Required Action A.2.1, Suspend CORE ALTERATIONS, and removing corresponding discussions in the Bases.

Rationale for TSTF changes:

TSTF-471

The rationale for removing CORE ALTERATIONS from Specifications and Bases is as follows:

CORE ALTERATIONS only occur when the reactor vessel head is removed, i.e. it only applies in MODE 6. There are only two accidents considered during MODE 6 for PWRs: a fuel handling accident and a boron dilution accident. According to the Standard Review Plan, a fuel handling accident is initiated by the dropping of a irradiated fuel assembly, either in the containment or in the fuel building. There are no mitigation actions, except some plants credit ventilation systems to reduce the dose consequences. Suspension of CORE ALTERATIONS, except for suspension of movement of irradiated fuel, will not prevent or impair the mitigation of a fuel handling accident.

The second analyzed event is a boron dilution accident. A boron dilution accident is initiated by a dilution source which results in the boron concentration dropping below that required to maintain the SHUTDOWN MARGIN. As described in the Bases of Specification 3.9.1, “Boron Concentration,” (which applies in MODE 6), “The refueling boron concentration limit is specified in the COLR. Unit procedures ensure the specified boron concentration in order to maintain an overall core reactivity of $k_{eff} \leq 0.95$ during fuel handling, with control element assemblies (CEAs) and fuel assemblies assumed to be in the most adverse configuration (least negative reactivity) allowed by unit procedures.” The accident is mitigated by stopping the dilution. Suspension of CORE ALTERATIONS has no effect on the mitigation of a boron dilution accident. Movement of control rods or fuel do not affect the initial conditions of a boron dilution accident as it is assumed that the control rods and fuel are in the most adverse conditions with a large safety margin ($k_{eff} \leq 0.95$). To address the possibility of a misloaded fuel assembly, Technical Specification 3.9.3, Required Action A.1 is revised to require suspending positive reactivity additions if one of the two source range neutron flux nuclear instrumentation monitors is inoperable. This precludes movement of fuel assemblies which could add reactivity to the core.

In summary, with the exception of suspending movement of irradiated fuel assemblies, there are no DBAs or transients that are initiated by, or mitigation affected by, suspension of CORE ALTERATIONS. Therefore, if Required Actions that require suspension of CORE ALTERATIONS also require suspension of movement of [recently] irradiated fuel, suspension of CORE ALTERATIONS provides no safety benefit.

In TS 3.8.5 of NUREG-1431, when a one or more required DC electrical power subsystem is inoperable, the Required Actions require:

- Suspension of CORE ALTERATIONS,
- Suspension of movement of irradiated fuel assemblies, and
- Suspension of operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.

As discussed above, because the Required Actions require the suspension of movement of irradiated fuel assemblies, the initiating conditions for a fuel handling accident are prohibited. Because the Required Actions require the suspension of positive reactivity additions that could result in a loss of SDM, the initial conditions for a boron dilution accident are prevented. Therefore, the action to suspend CORE ALTERATIONS provides no safety benefit and is not needed.

There are several benefits to eliminating the ACTIONS which reference CORE ALTERATIONS.

The term CORE ALTERATIONS unnecessarily complicates plant operation. Plants go to great lengths to ensure that no prohibited CORE ALTERATIONS take place, such as pausing the lift of the reactor vessel head and having individuals lay on the floor or use video cameras to look under the head to ensure that no control rod drive mechanisms are still latched to avoid accidentally lifting a control rod and violating a Required Action which prohibits CORE ALTERATIONS. These actions have no safety benefit as the boron concentration limit ensures adequate SDM even with the worst configuration of control rods. These actions result in increased personnel dose and provide no safety benefit.

There are a large number of reportable events regarding CORE ALTERATIONS. A review of Licensee Event Reports over approximately ten years revealed 12 LERs related to failure to suspend CORE ALTERATIONS. As described above, these actions have no effect on plant safety and distract the plant and the NRC from more safety significant issues.

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

VEGP LAR DOC A108:

TS 3.8.6, “Distribution Systems - Shutdown,” Required Action A.1 is revised from “Declare associated supported required features inoperable” to “Declare affected required features inoperable” (replacing “associated supported” with “affected”).

VEGP LAR DOC A112:

TS 3.8.6, “Distributing Systems - Shutdown” is revised to delete “bus” from the name of subsystem “AC instrument and control.”

VEGP LAR DOC L03:

TS 3.8.6 is revised to eliminate the use of the defined term “CORE ALTERATIONS” and incorporates changes in TSTF-471-A. In TS 3.8.6, required Action A.2.1 is deleted, resulting in renumbering of the subsequent Required Actions.

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

VEGP LAR DOC A108:

This Required Action A.1 in TS 3.8.6 is similar to TS 3.8.4, “Inverters - Shutdown,” Required Action A.1, which used the phrasing “affected” in lieu of the phrase “associated supported” that is used in TS 3.8.6. While both phrases convey the same intent, for consistency, the preferred phrase “affected” is selected. This editorial wording preference change is designated as administrative changes and is acceptable because it does not result in technical changes to the TS.

VEGP LAR DOC A112:

The nomenclature used for the two Class 1E electrical power distribution subsystems is clarified by deleting “bus” from the name for subsystem “AC instrument and control.” This change provides useful clarification and aligns the description more closely with terminology in the FSAR.

VEGP LAR DOC L03:

Please refer to VEGP Technical Specification Upgrade LAR Enclosure 1 DOC L03 for the Technical Evaluation in support of the change. The Technical Evaluation is consistent with the Technical Evaluation in TSTF-471-A.

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

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

The changes addressed in different Bases sections, based on APOG comments and NRC staff proposed changes, are as follows:

The “Background” section of the Bases is revised as follows:

> A description of the Class 1E AC instrument and control ~~bus~~ and Class 1E DC electrical power distribution **systems** ~~system~~ is provided in the Bases for Specification 3.8.5, “Distribution System**s** - Operating.”

The “Applicable Safety Analyses” section of the Bases is revised as follows:

- first paragraph

  > The initial conditions of Design Basis Accident (DBA) and transient analyses in **FSAR** Chapter 6 (Ref. 1) and **FSAR** Chapter 15 (Ref. 2), assume engineered safety features **(ESFs)** are OPERABLE. The Class 1E AC **instrument and control** and DC electrical power sources and associated power distribution systems are designed to provide sufficient capacity, redundancy, and reliability to ensure the availability of necessary power to the ESF systems so that the fuel, Reactor Coolant System **(RCS)**, and containment design limits are not exceeded.

- second paragraph, first sentence

The OPERABILITY of the minimum Class 1E AC **instrument and control** and DC electrical power sources and associated power distribution subsystems during MODES 5 and 6, and during movement of irradiated fuel assemblies ensures that:

- third paragraph

  The Class 1E AC **instrument and control** and DC electrical power distribution systems satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

The last sentence in the first paragraph of the “LCO” section of the Bases was revised by replacing hyphen in “components-all” with em dash “components-all.”

The “Actions” section, under heading “A.1...A.2.4,” first paragraph, of the Bases is revised as follows:

- first and second sentences

  If one or more required Class 1E DC or Class 1E AC instrument and control ~~bus~~ electrical power distribution subsystems are inoperable, the remaining OPERABLE divisions may be capable of supporting required features to allow continuation of ~~CORE ALTERATIONS,~~ fuel movement~~, and/or~~ **and** operations with a potential for draining the reactor vessel. By allowing the option to declare required features associated with an inoperable distribution subsystem inoperable, appropriate restrictions will be implemented in accordance with the affected equipment LCO Required Actions.

- sixth and eight sentences

  Introduction of coolant inventory must be from sources that have a boron concentration greater than ~~that~~ what would be required in the RCS for minimum SDM or refueling boron concentration. . . . Introduction of temperature changes including temperature increases when operating with a positive **moderator temperature coefficient (MTC)** ~~MTC~~ must also be evaluated to ensure they do not result in a loss of required SDM.

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

The changes are editorial, clarifying, and grammatical. they provide clarity and consistency with the TS requirement(s).

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

VII. GTST Safety Evaluation

Technical Analysis:

Revision to Required Action A.1

The revision to Required Action A.1, replacing “associated supported” with “affected,” makes the wording of this Action same as the wording of the Required Action A.1 in TS 3.8.4. For same Actions in different section of the TS, the wording should be the same to avoid ambiguity and misinterpretation. This change makes AP1000 TS consistent and improves clarity for application. It is, therefore, acceptable.

Deletion of Required Action A.2.1 (deletion of the term CORE ALTERATIONS)

AP1000 defines CORE ALTERATION as follows “CORE ALTERATION shall be the movement of any fuel, sources, or reactivity control components, within the reactor vessel with the vessel head removed and fuel in the vessel. Suspension of CORE ALTERATIONS shall not preclude completion of movement of a component to a safe position.”

For Pressurized water Reactors (PWRs) like AP1000, as discussed in TSTF-471, CORE ALTERATIONS can only occur when the reactor vessel head is removed, which only applies in MODE 6.

There are only two accidents considered during MODE 6 for PWRs: a fuel handling accident and a boron dilution accident. According to the Standard Review Plan, a fuel handling accident is initiated by the dropping of an irradiated fuel assembly, either in the containment or in the fuel building. There are no mitigation actions, except to credit ventilation systems to reduce the dose consequences. Suspension of CORE ALTERATIONS, except for suspension of movement of irradiated fuel, will not prevent or impair the mitigation of a fuel handling accident.

A boron dilution accident is initiated by a dilution source which results in the boron concentration dropping below that required to maintain the SHUTDOWN MARGIN. The accident is mitigated by stopping the dilution. Suspension of CORE ALTERATIONS has no effect on the mitigation of a boron dilution accident. Movement of control rods or fuel do not affect the initial conditions of a boron dilution accident as it is assumed that the control rods and fuel are in the most adverse conditions with a large safety margin ($k_{eff} \leq 0.95$). To address the possibility of a misloaded fuel assembly, Technical Specification 3.9.3, Required Action A.1 is revised to require suspending positive reactivity additions if one of the two source range neutron flux nuclear instrumentation monitors is inoperable. This precludes movement of fuel assemblies which could add reactivity to the core.

Therefore, with the exception of suspending movement of irradiated fuel assemblies, there are no DBAs or transients that are initiated by, or mitigation affected by, suspension of CORE ALTERATIONS. Accordingly, if Required Actions that require suspension of CORE ALTERATIONS also require suspension of movement of irradiated fuel, suspension of CORE ALTERATIONS provides no safety benefit.

In TS 3.8.6 of AP1000, when a one or more required DC electrical power subsystem is inoperable, the Required Actions require:

- Suspension of CORE ALTERATIONS,
- Suspension of movement of irradiated fuel assemblies,

- Suspension of operation with a potential for draining the reactor vessel, and
- Suspension of operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.

As discussed above, because the Required Actions require the suspension of movement of irradiated fuel assemblies, the initiating conditions for a fuel handling accident are prohibited. Because the Required Actions require the suspension of positive reactivity additions that could result in a loss of SDM, the initial conditions for a boron dilution accident are prevented. Therefore, the action to suspend CORE ALTERATIONS provides no safety benefit and is not needed.

Several benefits are expected. Plants will not be required to take actions to ensure that no prohibited CORE ALTERATIONS take place. This will avoid unnecessary personnel dose and will not distract the plant and NRC from more safety significant issues.

Replacing “AC instrument and control bus” with “AC instrument and control”

Deletion of “bus” from the name of subsystem “AC instrument and control” is acceptable since this change closely aligns the description with the terminology in FSAR Chapter 8 and brings consistency with other TS Sections. This change also clarifies that AC instrument and control divisions are electrical power distribution subsystems.

Remaining 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 3.8.6 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 4/15/2014.

APOG Comments (Ref. 7) and Resolutions

(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 to include the “FSAR” modifier. This is resolved by adding the FSAR modifier as appropriate.

(Internal #475) In GTST, Section VI, under heading “Rationale for TSTF Changes,” Subheading “TSTF-471” and Section VII, “Technical Analyses,” Subheading “Deletion of Required Action A.2.1 (deletion of the term CORE ALTERATIONS),” discussion of boron dilution accident was revised.

(Internal #476) An editorial change spelling out ESF as engineered safety features was recommended. This change was incorporated at an earlier location in the paragraph.

(Internal #477) Editorial changes recommended deleting the word “bus” and replacing “system” with “systems” were incorporated.

NRC Final Approval Date: 04/28/2015

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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, Unit 3 and 4, Technical Specifications Upgrade License Amendment Request, February 24, 2011 (ML12065A057).

3. TSTF-GG-05-01, Technical Specification Task Force (TSTF) Writer's Guide for Plant-Specific Improved Technical Specifications, Revision 1.

4. 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).

5. 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).

6. 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)

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 (ML 14265A493).

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.

3.8 ELECTRICAL POWER SYSTEMS

3.8.6 Distribution Systems – Shutdown

LCO 3.8.6 The necessary portions of DC and AC instrument and control ~~bus~~ electrical power distribution subsystems shall be OPERABLE to support equipment required to be OPERABLE.

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

ACTIONS

----------NOTE----------
LCO 3.0.3 is not applicable.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required DC or AC instrument and control ~~bus~~ electrical power distribution subsystems inoperable.	A.1 Declare **affected**~~associatedsupported~~ required features inoperable. OR ~~A.2.1 Suspend CORE ALTERATIONS.~~ ~~AND~~ A.2.1~~2~~ Suspend movement of irradiated fuel assemblies. AND	Immediately ~~Immediately~~ Immediately

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.2.2~~3~~ Initiate action to suspend operations with a potential for draining the reactor vessel. AND	Immediately
	A.2.3~~4~~ Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration. AND	Immediately
	A.2.4~~5~~ Initiate actions to restore required DC and AC instrument and control ~~bus~~ electrical power distribution subsystems to OPERABLE status.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.6.1	Verify correct breaker and switch alignments and voltage to required DC and AC instrument and control ~~bus~~ electrical power distribution subsystems.	7 days

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.6 Distribution Systems – Shutdown

BASES

BACKGROUND

A description of the Class 1E AC instrument and control ~~bus~~ and Class 1E DC electrical power distribution system**s** is provided in the Bases for Specification 3.8.5, “Distribution System**s** - Operating.”

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in **FSAR** Chapter 6 (Ref. 1) and **FSAR** Chapter 15 (Ref. 2), assume engineered safety features **(ESFs)** are OPERABLE. The Class 1E AC **instrument and control** and DC electrical power sources and associated power distribution systems are designed to provide sufficient capacity, redundancy, and reliability to ensure the availability of necessary power to the ESF systems so that the fuel, Reactor Coolant System **(RCS)**, and containment design limits are not exceeded.

The OPERABILITY of the minimum Class 1E AC **instrument and control** and DC electrical power sources and associated power distribution subsystems during MODES 5 and 6, and during movement of irradiated fuel assemblies ensures that:

a. The unit can be maintained in the shutdown or refueling condition for extended periods;

b. Sufficient instrumentation and control capability is available for monitoring and maintaining the unit status; and

c. Adequate power is provided to mitigate events postulated during shutdown, such as an inadvertent draindown of the vessel or a fuel handling accident.

The Class 1E AC **instrument and control** and DC electrical power distribution systems satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

Various combinations of subsystems, equipment, and components are required OPERABLE by other LCOs, depending on the specific plant condition. Implicit in those requirements is the required OPERABILITY of necessary support required features. This LCO explicitly requires energization of the portions of the electrical distribution system necessary to support OPERABILITY of required systems, equipment, and

BASES

LCO (continued)

components—all specifically addressed in each LCO and implicitly required via the definition of OPERABILITY.

Maintaining these portions of the distribution system energized ensures the availability of sufficient power to operate the unit in a safe manner to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents).

APPLICABILITY

The Class 1E AC **instrument and control** and DC electrical power distribution subsystems are required to be OPERABLE in MODES 5 and 6 and during movement of irradiated fuel assemblies provide assurance that:

a. Systems to provide adequate coolant inventory makeup are available for the irradiated fuel assemblies in the core in case of an inadvertent draindown of the reactor vessel;

b. Systems needed to mitigate a fuel handling accident are available;

c. Systems necessary to mitigate the effects of events that can lead to core damage during shutdown are available; and

d. Instrumentation and control capability is available for monitoring and maintaining the unit in a cold shutdown condition and refueling condition.

The Class 1E AC **instrument and control** and DC electrical power distribution subsystem requirements for MODES 1, 2, 3, and 4 are covered in LCO 3.8.5, “Distribution Systems - Operating.

ACTIONS

LCO 3.0.3 is not applicable while in MODE 5 or 6. However, since irradiated fuel assembly movement can occur in MODE 1, 2, 3, or 4, the ACTIONS have been modified by a Note stating that LCO 3.0.3 is not applicable. If moving irradiated fuel assemblies while in MODE 5 or 6, LCO 3.0.3 would not specify any action. If moving irradiated fuel assemblies while in MODE 1, 2, 3, or 4, the fuel movement is independent of reactor operations. Entering LCO 3.0.3, while in MODE 1, 2, 3, or 4 would require the unit to be shutdown unnecessarily.

BASES

ACTIONS (continued)

A.1**, A.2.1, A.2.2, A.2.3,** and A.2.**4**

If one or more required Class 1E DC or Class 1E AC instrument and control ~~bus~~ electrical power distribution subsystems are inoperable, the remaining OPERABLE divisions may be capable of supporting required features to allow continuation of ~~CORE ALTERATIONS,~~ fuel movement, and~~/or~~ operations with a potential for draining the reactor vessel. By allowing the option to declare required features associated with an inoperable distribution subsystem inoperable, appropriate restrictions will be implemented in accordance with the affected equipment LCO Required Actions. In many instances this would likely involve undesired administrative efforts. Therefore, the allowance for sufficiently conservative actions is made (i.e., to suspend ~~CORE ALTERATIONS,~~ movement of irradiated fuel assemblies, any activities that could potentially result in inadvertent draining of the reactor vessel, and operations involving positive reactivity additions that could result in loss of required SDM (MODE 5) or boron concentration (MODE 6)). Suspending positive reactivity additions that could result in failure to meet the minimum SDM or boron concentration limit is required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than ~~that~~ what would be required in the RCS for minimum SDM or refueling boron concentration. This may result in an overall reduction in RCS boron concentration, but provides acceptable margin to maintaining subcritical operation. Introduction of temperature changes including temperature increases when operating with a positive **moderator temperature coefficient (**MTC**)** must also be evaluated to ensure they do not result in a loss of required SDM.

Suspension of these activities does not preclude completion of actions to establish a safe conservative condition. These actions will minimize the probability of the occurrence of postulated events. It is further required to immediately initiate action to restore the required AC **instrument and control** and DC electrical power distribution subsystems and to continue this action until restoration is accomplished in order to provide the necessary power to the unit safety systems.

The Completion Time of immediately is consistent with the required times for actions requiring prompt attention. The restoration of the required distribution subsystems should be completed as quickly as possible in order to minimize the time the unit safety systems may be without power.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.6.1

This Surveillance verifies that the Class 1E AC **instrument and control** and DC electrical power distribution subsystems are functioning properly, with the required circuit breakers and switches properly aligned. The verification of proper voltage availability on the buses ensures that the required power is readily available for motive as well as control functions for critical system loads connected to these buses. The 7 day Frequency takes into account the redundant capability of the electrical power distribution subsystems and other indications available in the control room that alert the operator to subsystem malfunctions.

REFERENCES

1. **FSAR** Chapter 6, “Engineered Safety Features.”
2. **FSAR** Chapter 15, “Accident Analysis.”
3. **FSAR** Section 8.3.2, “DC Power Systems.”

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.

3.8 ELECTRICAL POWER SYSTEMS

3.8.6 Distribution Systems – Shutdown

LCO 3.8.6 The necessary portions of DC and AC instrument and control electrical power distribution subsystems shall be OPERABLE to support equipment required to be OPERABLE.

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

ACTIONS

----------NOTE----------
LCO 3.0.3 is not applicable.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required DC or AC instrument and control electrical power distribution subsystems inoperable.	A.1 Declare affected required features inoperable. OR A.2.1 Suspend movement of irradiated fuel assemblies. AND A.2.2 Initiate action to suspend operations with a potential for draining the reactor vessel. AND	Immediately Immediately Immediately

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.2.3 Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration. AND	Immediately
	A.2.4 Initiate actions to restore required DC and AC instrument and control electrical power distribution subsystems to OPERABLE status.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.6.1	Verify correct breaker and switch alignments and voltage to required DC and AC instrument and control electrical power distribution subsystems.	7 days

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.6 Distribution Systems – Shutdown

BASES

BACKGROUND

A description of the Class 1E AC instrument and control and Class 1E DC electrical power distribution systems is provided in the Bases for Specification 3.8.5, “Distribution Systems - Operating.”

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in FSAR Chapter 6 (Ref. 1) and FSAR Chapter 15 (Ref. 2), assume engineered safety features (ESFs) are OPERABLE. The Class 1E AC instrument and control and DC electrical power sources and associated power distribution systems are designed to provide sufficient capacity, redundancy, and reliability to ensure the availability of necessary power to the ESF systems so that the fuel, Reactor Coolant System (RCS), and containment design limits are not exceeded.

The OPERABILITY of the minimum Class 1E AC instrument and control and DC electrical power sources and associated power distribution subsystems during MODES 5 and 6, and during movement of irradiated fuel assemblies ensures that:

a. The unit can be maintained in the shutdown or refueling condition for extended periods;

b. Sufficient instrumentation and control capability is available for monitoring and maintaining the unit status; and

c. Adequate power is provided to mitigate events postulated during shutdown, such as an inadvertent draindown of the vessel or a fuel handling accident.

The Class 1E AC instrument and control and DC electrical power distribution systems satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

Various combinations of subsystems, equipment, and components are required OPERABLE by other LCOs, depending on the specific plant condition. Implicit in those requirements is the required OPERABILITY of necessary support required features. This LCO explicitly requires energization of the portions of the electrical distribution system necessary to support OPERABILITY of required systems, equipment, and

BASES

LCO (continued)

components—all specifically addressed in each LCO and implicitly required via the definition of OPERABILITY.

Maintaining these portions of the distribution system energized ensures the availability of sufficient power to operate the unit in a safe manner to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents).

APPLICABILITY

The Class 1E AC instrument and control and DC electrical power distribution subsystems are required to be OPERABLE in MODES 5 and 6 and during movement of irradiated fuel assemblies provide assurance that:

a. Systems to provide adequate coolant inventory makeup are available for the irradiated fuel assemblies in the core in case of an inadvertent draindown of the reactor vessel;

b. Systems needed to mitigate a fuel handling accident are available;

c. Systems necessary to mitigate the effects of events that can lead to core damage during shutdown are available; and

d. Instrumentation and control capability is available for monitoring and maintaining the unit in a cold shutdown condition and refueling condition.

The Class 1E AC instrument and control and DC electrical power distribution subsystem requirements for MODES 1, 2, 3, and 4 are covered in LCO 3.8.5, “Distribution Systems - Operating.

ACTIONS

LCO 3.0.3 is not applicable while in MODE 5 or 6. However, since irradiated fuel assembly movement can occur in MODE 1, 2, 3, or 4, the ACTIONS have been modified by a Note stating that LCO 3.0.3 is not applicable. If moving irradiated fuel assemblies while in MODE 5 or 6, LCO 3.0.3 would not specify any action. If moving irradiated fuel assemblies while in MODE 1, 2, 3, or 4, the fuel movement is independent of reactor operations. Entering LCO 3.0.3, while in MODE 1, 2, 3, or 4 would require the unit to be shutdown unnecessarily.

ACTIONS (continued)

A.1, A.2.1, A.2.2, A.2.3, and A.2.4

If one or more required Class 1E DC or Class 1E AC instrument and control electrical power distribution subsystems are inoperable, the remaining OPERABLE divisions may be capable of supporting required features to allow continuation of fuel movement, andoperations with a potential for draining the reactor vessel. By allowing the option to declare required features associated with an inoperable distribution subsystem inoperable, appropriate restrictions will be implemented in accordance with the affected equipment LCO Required Actions. In many instances this would likely involve undesired administrative efforts. Therefore, the allowance for sufficiently conservative actions is made (i.e., to suspend movement of irradiated fuel assemblies, any activities that could potentially result in inadvertent draining of the reactor vessel, and operations involving positive reactivity additions that could result in loss of required SDM (MODE 5) or boron concentration (MODE 6)). Suspending positive reactivity additions that could result in failure to meet the minimum SDM or boron concentration limit is required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than what would be required in the RCS for minimum SDM or refueling boron concentration. This may result in an overall reduction in RCS boron concentration, but provides acceptable margin to maintaining subcritical operation. Introduction of temperature changes including temperature increases when operating with a positive moderator temperature coefficient (MTC) must also be evaluated to ensure they do not result in a loss of required SDM.

Suspension of these activities does not preclude completion of actions to establish a safe conservative condition. These actions will minimize the probability of the occurrence of postulated events. It is further required to immediately initiate action to restore the required AC instrument and control and DC electrical power distribution subsystems and to continue this action until restoration is accomplished in order to provide the necessary power to the unit safety systems.

The Completion Time of immediately is consistent with the required times for actions requiring prompt attention. The restoration of the required distribution subsystems should be completed as quickly as possible in order to minimize the time the unit safety systems may be without power.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.6.1

This Surveillance verifies that the Class 1E AC instrument and control and DC electrical power distribution subsystems are functioning properly, with the required circuit breakers and switches properly aligned. The verification of proper voltage availability on the buses ensures that the required power is readily available for motive as well as control functions for critical system loads connected to these buses. The 7 day Frequency takes into account the redundant capability of the electrical power distribution subsystems and other indications available in the control room that alert the operator to subsystem malfunctions.

REFERENCES

1. FSAR Chapter 6, “Engineered Safety Features.”
2. FSAR Chapter 15, “Accident Analysis.”
3. FSAR Section 8.3.2, “DC Power Systems.”