

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

**Title: Changes Related to LCO 3.4.11, Automatic Depressurization System (ADS) –
Operating**

**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:

There are no Vogtle departures applicable to GTS 3.4.11.

RCOL COL Item Number and Title:

There are no Vogtle COL items applicable to GTS 3.4.11.

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 A027 SR Clarification and Consistency with TS Writers Guide
VEGP LAR DOC A038: Numerous TS surveillances are revised by deletion of word "that" from the surveillance
VEGP LAR DOC A052: TS 3.4.11, Condition D is revised
VEGP LAR DOC A053: TS 3.4.11, LCO statement and Condition D second entry are revised
VEGP LAR DOC L01: TS Definition for Actuation Device Test is deleted

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(1) applicable to operating reactor designs, but not to the AP1000 design; (2) already incorporated in the GTS; or (3) superseded by another change.

None

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)

A minor grammatical error is corrected in the Bases.

Revise the GTS 3.4.11 "Actions" section of the Bases under the heading "D.1 and D.2" to make "Conditions" be "Condition," consistent with the Writer's Guide.

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)

Revise the GTS 3.4.11 "Actions" section of the Bases by moving the heading "D.1 and D.2" to before the preceding paragraph. This corrects an error and provides improved clarity.

Modify the second paragraph of the "SRs" section of the Bases under the heading "SR 3.4.11.3" to make editorial improvements to more completely reference the stated ASME OM Code and add the Code as a Reference consistent with other TS Bases Specifications. The "paragraph 4.6" reference for squib valve testing is more specifically "paragraph ISTC 4.6," which is the applicable paragraph from ASME OM Code 1995, 1996 addenda, Subsection ISTC (refer to AP1000 DCD 3.9.6, and 3.9.9 Reference 2). In the "References" section of the Bases, add a new reference citation for the ASME OM Code.

Add the following to the first paragraph of the "SRs" section of the Bases, under the heading "SR 3.4.11.5" for consistency with the TS requirement(s) being discussed in the TS Bases:

This SR verifies that each Stage 4 ADS valve actuates to the correct position on an actual or simulated actuation signal. The ACTUATION LOGIC TEST overlaps this Surveillance to provide complete testing of the assumed safety function. **The OPERABILITY of the squib valves is checked by performing a continuity check of the circuit from the Protection Logic Cabinets to the squib valve.**

V. Applicability

Affected Generic Technical Specifications and Bases:

Section 3.4.11, Automatic Depressurization System (ADS) – Operating

Changes to the Generic Technical Specifications and Bases:

Statement of LCO Specification is revised. This is an editorial change for clarity. (DOC A053)

Condition D revised to include “of Condition A, B, or C.” This is an editorial change for clarity. (DOC A052)

Condition D revised to delete “Requirements of.” This is an editorial change for clarity. (DOC A053)

The “Actions” section of the Bases, under heading “C.1,” is revised to improve clarity, consistency, and operator usability. (APOG Comment)

The “Actions” section of the Bases is revised by moving the heading “D.1 and D.2” to before the preceding paragraph. (APOG Comment)

The second paragraph of the GTS 3.4.11 “Actions” section of the Bases under the heading “D.1 and D.2” is revised to make “Conditions” be “Condition.” (NRC Staff Comment)

The text for SR 3.4.11.1, SR 3.4.11.2, and SR 3.4.11.3 is revised to provide clarity by deleting the word “that” from the surveillance descriptions. (DOC A038)

The SR 3.4.11.2 description is revised. The surveillance description is revised to conform to the TS Writer's Guide (Reference 4). (DOC A027)

The second paragraph of the “SRs” section of the Bases under the heading “SR 3.4.11.3” is modified to make editorial improvements. (APOG Comment)

SR 3.4.11.4 and SR 3.4.11.5 are added. GTS 3.3.2, SR 3.3.2.7 (“Perform ACTUATION DEVICE TEST”) and SR 3.3.2.8 (“Perform ACTUATION DEVICE TEST for squib valves”) are deleted from GTS 3.3.2 and Table 3.3.2-1, Function 26.a, ESF Actuation Subsystem. The equivalent requirement (using phrasing generally consistent with NUREG-1431) is included in individual Specifications for the actuated devices with the same 24 month Frequency as the deleted SRs. (DOC L01)

An addition is added to the first paragraph of the “SRs” section of the Bases, under the heading “SR 3.4.11.5” for consistency with the TS requirement(s) being discussed. (APOG Comment)

In the “References” section of the Bases, a new reference citation for the ASME OM Code is added. (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:**

Not Applicable

Rationale for TSTF changes:

Not Applicable

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

DOC A027 revises SR 3.4.11.2 from "... is OPERABLE by stroking the valve" to "... strokes."

DOC A038 revises SR 3.4.11.1, SR 3.4.11.2, and SR 3.4.11.3 by deleting "that" from the surveillance description.

DOC A052 revises Condition D, first entry condition by addition of "of Condition A, B, or C."

DOC A053 revises the LCO statement from "The ADS, including 10 flow paths, shall be OPERABLE," to "Ten ADS flow paths shall be OPERABLE." and Condition D, second entry condition by deleting of "Requirements of" from the condition statement.

DOC L01 adds a new SR 3.4.11.4 to TS 3.4.11 that states: "Verify each stage 1, 2, and 3 ADS valve actuates on an actual or simulated actuation signal." and new SR 3.4.11.5 that states: "Verify continuity of the circuit from the Protection Logic Cabinets to each stage 4 ADS valve;" also including a Note to the SR stating: "Squib actuation may be excluded."

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 5 and the Southern Nuclear Operating Company RAI Response in Reference 6.

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

DOC A027 provides clarity and is consistent with the TS Writer's Guide (Reference 4).

Editorial changes per DOC A038, DOC A052, and DOC A053 are consistent with the guidance provided in the TS Writer's Guide (Reference 4).

GTS 3.3.2, SR 3.3.2.7 ("Perform ACTUATION DEVICE TEST") and SR 3.3.2.8 ("Perform ACTUATION DEVICE TEST for squib valves") are deleted from GTS 3.3.2 and Table 3.3.2-1, Function 26.a, ESF Actuation Subsystem per DOC L01. The equivalent requirement (using phrasing generally consistent with NUREG-1431) must be included in individual Specifications for the actuated devices with the same 24 month Frequency as the deleted SRs.

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

The word “on” is replaced by “of” under Actions D.1 and D.2 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)

The GTS 3.4.11 “Actions” section of the Bases is revised by moving the heading “D.1 and D.2” to before the preceding paragraph. (APOG Comment)

The GTS 3.4.11 “Actions” section of the Bases is revised under the heading “D.1 and D.2” to make “Conditions” be “Condition.” (NRC Staff Comment)

The second paragraph of the “SRs” section of the Bases under the heading “SR 3.4.11.3” is modified to make editorial improvements to more completely reference the stated ASME OM Code. (APOG Comment)

The first paragraph of the “SRs” section of the Bases, under the heading “SR 3.4.11.5” is revised to state (APOG Comment):

This SR verifies that each Stage 4 ADS valve actuates to the correct position on an actual or simulated actuation signal. The ACTUATION LOGIC TEST overlaps this Surveillance to provide complete testing of the assumed safety function. **The OPERABILITY of the squib valves is checked by performing a continuity check of the circuit from the Protection Logic Cabinets to the squib valve.**

In the “References” section of the Bases, a new reference citation for the ASME OM Code is added. (APOG Comment)

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

Provide correct grammar.

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

Moving the heading “D.1 and D.2” to before the preceding paragraph is a non-technical change that corrects an error and provides improved clarity, consistency, and operator usability.

Revising the first sentence of the second paragraph under the heading “D.1 and D.2” is consistent with the Writer's Guide.

The modifications to the second paragraph of the “SRs” section of the Bases under the heading “SR 3.4.11.3” more completely references the stated ASME OM Code and adds the Code as a Reference consistent with other TS Bases Specifications. The “paragraph 4.6” reference for squib valve testing is more specifically “paragraph ISTC 4.6,” which is the applicable paragraph from ASME OM Code 1995, 1996 addenda, Subsection ISTC (refer to AP1000 DCD 3.9.6 and 3.9.9, Reference 2).

The non-technical changes to the “SRs” section of the Bases under the heading “SR 3.4.11.5” provide consistency with the TS requirement(s) being discussed in the TS Bases.

VII. GTST Safety Evaluation

Technical Analysis:

DOC L01 deletes the Actuation Device Test and adds STS SR 3.4.11.4 that states: "Verify each stage 1, 2, and 3 ADS valve actuates to the open position on an actual or simulated actuation signal." and STS SR 3.4.11.5 that states: "Verify continuity of the circuit from the Protection Logic Cabinets to each stage 4 ADS valve;" also including a Note to the SR stating: "Squib actuation may be excluded." In accordance with the defined term, an actuation device test is a test of the actuated equipment. And as discussed in the TS Bases, performance of an actuation device test demonstrates that the actuated device responds to a simulated actuation signal. As such, Surveillances associated with the testing of the actuated equipment should be addressed in the actuated equipment Specifications, where failures of the surveillance would lead to entering the Actions for the inoperable actuated equipment.

Currently, the only Surveillances that utilize this defined term are in GTS 3.3.2, "Engineered Safety Feature Actuation System (ESFAS) Instrumentation;" as GTS SRs 3.3.2.7, 3.3.2.8, and 3.3.2.9. GTS SR 3.3.2.7 and SR 3.3.2.8 provide the actuation device test for Engineered Safety Features (ESF) that are actuated by Table 3.3.2-1, Function 26. As such, failures of GTS SR 3.3.2.7 and SR 3.3.2.8 (i.e., failures in the actuated equipment) would inappropriately result in applying the Actions of GTS 3.3.2 for Function 26. This is inconsistent with the intent of applying Actions specific to the equipment inoperability. Therefore GTS SRs 3.3.2.7 and 3.3.2.8 are deleted from GTS 3.3.2 and Table 3.3.2-1, Function 26, ESF Actuation. In conjunction with this deletion, each Specification for ESF actuated equipment is provided with Surveillance(s) that appropriately address the testing of the actuated devices consistent with these SRs and the definition being removed. In certain actuated device Specifications, there is currently an appropriate actuated device test and no new SR is added. Where an actuated device test is not specified in the existing actuated equipment Specification, a new SR is added.

The effect of moving the requirement for the actuated device test from GTS 3.3.2 to the individual equipment Specifications is for less restrictive actions when the device is inoperable. As an SR associated with GTS 3.3.2, Table 3.3.2-1, Function 26 for Modes 1, 2, 3, and 4, would allow a 6 hour restoration (Action D) prior to a required plant shutdown (Action O). GTS 3.4.11 with SRs added to address actuation device testing has a 7-day restoration allowance. These less restrictive actions are currently approved in STS as appropriate for the inoperable devices. The more restrictive actions of GTS 3.3.2 are therefore unnecessarily restrictive. The change maintains the same level of safety provided by the separate GTS Actions for inoperability of the specific actuated devices.

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 3.4.11 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. 7) 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 # 266) The last paragraph in GTST Section VII "Technical Analysis" states that the changes (implied "all") are editorial, clarifying, grammatical, or otherwise considered administrative." However, the Technical Analysis discusses DOC L01 as "less restrictive." This is resolved by adding the word "remaining" to the text.
5. (Internal # 267) Revise the GTS 3.4.11 "Actions" section of the Bases by moving the heading "D.1 and D.2" to before the preceding paragraph. This non-technical change corrects an error and provides improved clarity, consistency, and operator usability. This is resolved by making the recommended change. In addition, NRC Staff recommends in next paragraph under the heading "D.1 and D.2", revise the first sentence to make "Conditions" be "Condition", consistent with the Writer's Guide (Ref.4).
6. (Internal # 268 and 270) In the "SRs" section of the Bases, under the heading "SR 3.4.11.3" modify second paragraph to make editorial improvements to more completely reference the stated ASME OM Code and add the Code as a Reference consistent with the

Bases for other Specifications. The “paragraph 4.6” reference for squib valve testing is better stated as “paragraph ISTC 4.6,” which is the applicable paragraph from ASME OM Code 1995, 1996 addenda, Subsection ISTC (refer to AP1000 DCD 3.9.6, and 3.9.9 Reference 2). In the “References” section of the Bases, add a new reference citation for the ASME OM Code. This is resolved by making the recommended changes.

7. (Internal # 269) Add the following to the first paragraph of the “SRs” section of the Bases, under the heading “SR 3.4.11.5” for consistency with the TS requirement(s) being discussed in the TS Bases:

This SR verifies that each Stage 4 ADS valve actuates to the correct position on an actual or simulated actuation signal. The ACTUATION LOGIC TEST overlaps this Surveillance to provide complete testing of the assumed safety function. **The OPERABILITY of the squib valves is checked by performing a continuity check of the circuit from the Protection Logic Cabinets to the squib valve.**

This is resolved by making the recommended change.

8. (Internal # 272) In the GTS 3.4.12 “Actions” section of the Bases, under heading “C.1,” make the list of combinations of three inoperable flow paths to be a bulleted list with spaces. This non-technical change corrects an error and provides improved clarity, consistency, and operator usability. This is resolved by making the recommended change. For consistency, the same change is applied to the GTS 3.4.11 “Actions” section of the Bases, under heading “C.1.”

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. 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.

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.11 Automatic Depressurization System (ADS) – Operating

LCO 3.4.11 **Ten** ~~The ADS, including 10~~ flow paths, shall be OPERABLE.

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One stage 1, 2, or 3 ADS flow path inoperable.	A.1 Restore flow path to OPERABLE status.	7 days
B. One stage 4 ADS flow path inoperable.	B.1 Restore flow path to OPERABLE status.	72 hours
C. Two or three ADS flow paths inoperable with a combined inoperable flow capacity less than or equal to that of a division with the largest ADS flow capacity.	C.1 Restore flow paths to OPERABLE status.	72 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Required Action and associated Completion Time of Condition A, B, or C not met. <u>OR</u> Requirements of LCO not met for reasons other than Condition A, B, or C.	D.1 Be in MODE 3.	6 hours
	<u>AND</u> D.2 Be in MODE 5.	36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.4.11.1 Verify that the motor operated valve in series with each 4th stage ADS valve is fully open.	12 hours
SR 3.4.11.2 Verify that each stage 1, 2, and 3 ADS valve is OPERABLE by stroking them strokes open.	In accordance with the Inservice Testing Program
SR 3.4.11.3 Verify that each stage 4 ADS valve is OPERABLE in accordance with the Inservice Testing Program.	In accordance with the Inservice Testing Program
SR 3.4.11.4 Verify each stage 1, 2, and 3 ADS valve actuates to the open position on an actual or simulated actuation signal.	24 months

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.4.11.5 -----NOTE----- Squib actuation may be excluded. -----</p> <p>Verify continuity of the circuit from the Protection Logic Cabinets to each stage 4 ADS valve.</p>	<p>24 months</p>

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.11 Automatic Depressurization System (ADS) – Operating

BASES

BACKGROUND

The ADS is designed to assure that core cooling and injection can be achieved for Design Basis Accidents (DBA). The four stages of ADS valves are sequenced in coordination with the passive core cooling system injection performance characteristics.

The ADS consists of 10 flow paths arranged in four different stages that open sequentially (Ref. 1). Stages 1, 2, and 3 each include 2 flow paths. Each of the stage 1, 2, 3 flow paths has a common inlet header connected to the top of the pressurizer. The outlets of the stage 1, 2, 3 flow paths combine into one of the two common discharge lines to the spargers located in the in-containment refueling water storage tank (IRWST). The first stage valves are 4-inch valves with DC motor operators. The second and third stage valves are 8-inch valves with DC motor operators. An OPERABLE stage 1, 2, or 3 automatic depressurization flow path consists of two OPERABLE normally closed motor operated valves, in series.

Stage 4 includes 4 flow paths. The fourth stage ADS valves are 14-inch squib valves. The four fourth stage flow paths connect directly to the top of the reactor coolant hot legs and vent directly into the associated steam generator compartment. An OPERABLE stage 4 flow path consists of an open motor operated valve and an OPERABLE closed squib valve. These motor operated valves are not required to be OPERABLE because they are open.

The automatic depressurization valves are designed to open automatically when actuated, and to remain open for the duration of any automatic depressurization event. The valves are actuated sequentially. The stage 1 valves are actuated on a low core makeup tank (CMT) level. Stages 2 and 3 are actuated on the stage 1 signal plus time delays. Stage 4 is actuated on a Low 2 CMT level signal with a minimum time delay after stage 3. Stage 4 is blocked from actuating at normal RCS pressure.

In order to perform a controlled, manual depressurization of the RCS, the valves are opened starting with the first stage. The first stage valves can also be modulated to perform a partial RCS depressurization if required. ADS stage 1, 2, 3 valves may be manually operated under controlled conditions for testing purposes.

 BASES

BACKGROUND (continued)

ADS stages 1, 2 and 3 valves are designed to open relatively slowly, from approximately 40 seconds for the first stage valves, to approximately 100 seconds for the second and third stage valves.

The ADS valves are powered by batteries. In the unlikely event that offsite and onsite AC power is lost for an extended period of time, a timer will actuate ADS within 24 hours of the time at which AC power is lost, before battery power has been degraded to the point where the valves cannot be opened.

The number and capacity of the ADS flow paths are selected so that adequate safety injection is provided from the accumulators, IRWST and containment recirculation for the limiting DBA loss of coolant accident (LOCA). For small break LOCAs the limiting single failure is the loss of one fourth stage flow path (Ref. 2). The **probabilistic risk assessment (PRA)** (Ref. 3) shows that adequate core cooling can be provided with the failure of up to seven (all ADS stage 1 to 3 and one ADS stage 4) flow paths. The ADS PRA success criteria following a LOCA or non-LOCA with failure of other decay heat removal features is for 3 of 4 ADS stage 4 valves to open. All of the ADS stage 1, 2, 3 valves can fail to open. This ADS capacity is sufficient to support PXS gravity injection and containment recirculation operation.

 APPLICABLE
SAFETY
ANALYSES

For non-LOCA events, use of the ADS is not required and is not anticipated. For these events, injection of borated water into the core from the CMTs may be required for makeup or boration. However, the amount of water necessary will not reduce the level in the CMTs to the point of ADS actuation.

For events which involve a loss of primary coolant inventory, such as a LOCA, the ADS will be actuated, allowing for injection from the accumulators, the IRWST, and the containment recirculation (Ref. 2).

The ADS satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii).

 LCO

The requirement that ~~ten the 16 ADS flow paths valves~~ be OPERABLE ensures that upon actuation, the depressurization of the RCS will proceed smoothly and completely, as assumed in the DBA safety analyses.

BASES

LCO (continued)

For the **ten ADS flow paths** to be considered OPERABLE, the 16 ADS valves must be closed and OPERABLE (capable of opening on an actuation signal). In addition, the stage 4 motor operated isolation valves must be open. These stage 4 motor operated isolation valves are not required to be OPERABLE because they are maintained open per SR 3.4.11.1.

APPLICABILITY

In MODES 1, 2, 3 and 4 the ADS must be OPERABLE to mitigate the potential consequences of any event which causes a reduction in the RCS inventory, such as a LOCA.

The requirements for the ADS in MODES 5 and 6 are specified in LCO 3.4.12, “Automatic Depressurization System (ADS) – Shutdown, RCS Intact,” and LCO 3.4.13, “Automatic Depressurization System – Shutdown, RCS Open.”

ACTIONSA.1

If any one ADS stage 1, 2, or 3 flow path is determined to be inoperable, the remaining OPERABLE ADS flow paths are more than adequate to perform the required safety function as long as a single failure involving the other flow path of the same stage does not also occur. A flow path is inoperable if one or two of the ADS valves in the flow path are determined to be inoperable. A Completion Time of 7 days is reasonable based on the capability of the remaining ADS valves to perform the required safety functions assumed in the safety analyses and the low probability of a DBA during this time period.

If more than one ADS stage 1, 2, or 3 flow paths are inoperable, Condition C or D is applicable.

B.1

If any one ADS stage 4 flow path is determined to be inoperable, the remaining OPERABLE stage 4 ADS flow paths are adequate to perform the required safety function as long as a single failure of an additional stage 4 ADS flow path does not also occur. A Completion Time of 72 hours is reasonable based on the capability of the remaining ADS valves to perform the required safety functions assumed in the safety analyses and the low probability of a DBA during this time period. This

BASES

ACTIONS (continued)

Completion Time is the same as is used for two train ECCS systems which are capable of performing their safety function without a single failure.

C.1

If two or three flow paths with a combined flow capacity less than or equal to the largest capacity ADS division are determined to be inoperable, the remaining OPERABLE ADS flow paths are adequate to perform the required safety function as long as a single failure does not also occur. Divisions A and B have the largest flow capacity, each consisting of one stage 1 flow path, one stage 2 or 3 flow path, and one stage 4 flow path. This Condition is equivalent to the worst case single failure of an ADS division.

This Condition is applicable to any combination of two inoperable **required** flow paths, except two stage 4 flow paths. Applicable combinations of three inoperable flow paths include:

- One stage 1, one stage 2 or 3, and one stage 4
- One stage 1 and two stage 2 or 3
- Two stage 1 and one stage 2, 3, or 4
- Two stage 2 or 3 and one stage 4
- Three stage 2 or 3

A Completion Time of 72 hours is reasonable based on the capability of the remaining ADS valves to perform the required safety functions assumed in the safety analyses and the low probability of a DBA during this time period. This Completion Time is the same as is used for two train ECCS systems which are capable of performing their safety function without a single failure.

BASES

ACTIONS (continued)

D.1 and D.2

Condition D is applicable, if two stage 4 flow paths are inoperable, more than three flow paths are inoperable, or a combination of three flow paths not listed above (i.e., with a combined flow capacity greater than the largest capacity ADS division) is inoperable.

~~D.1 and D.2~~

If the Required Actions and associated Completion Times **of Condition A, B, or C** are not met or ~~the requirements of LCO 3.4.11~~ **is are** not met for reasons other than Condition A, B, or C, the plant must be brought to MODE 5 where the probability and consequences **of an** event are minimized. 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.

SURVEILLANCE
REQUIREMENTSSR 3.4.11.1

Each stage 4 ADS isolation motor operated valve must be verified to be open every 12 hours. Note that these valves receive confirmatory open signals. The Surveillance Frequency is acceptable considering valve position is manually monitored in the control room.

SR 3.4.11.2

This Surveillance requires verification that each ADS stage 1, 2, 3 valve strokes to its fully open position. Note that this surveillance is performed during shutdown conditions.

The Surveillance Frequency for demonstrating valve OPERABILITY references the Inservice Testing Program (**Ref. 4**).

BASES

SURVEILLANCE REQUIREMENTS (continued)**SR 3.4.11.3**

This Surveillance requires verification that each ADS stage 4 squib valve is OPERABLE in accordance with the Inservice Testing Program. The Surveillance Frequency for verifying valve OPERABILITY references the Inservice Testing Program.

The squib valves will be tested in accordance with the ASME OM Code (**Ref. 5**). The applicable ASME OM Code squib valve requirements are specified in paragraph **ISTC 4.6**, Inservice Tests for Category D Explosively Actuated Valves. The requirements include actuation of a sample of the installed valves each 2 years and periodic replacement of charges.

SR 3.4.11.4

This SR verifies that each Stage 1, 2, and 3 ADS valve actuates to the correct position on an actual or simulated actuation signal. The ACTUATION LOGIC TEST overlaps this Surveillance to provide complete testing of the assumed safety function.

The Frequency of 24 months is based on the need to perform this surveillance during periods in which the plant is shutdown for refueling to prevent any upsets of plant operation.

SR 3.4.11.5

This SR verifies that each Stage 4 ADS valve actuates to the correct position on an actual or simulated actuation signal. The ACTUATION LOGIC TEST overlaps this Surveillance to provide complete testing of the assumed safety function. The OPERABILITY of the squib valves is checked by performing a continuity check of the circuit from the Protection Logic Cabinets to the squib valve.

This Surveillance is modified by a Note that excludes squib valve actuation as a requirement for this Surveillance to be met. This is acceptable because the design of the squib actuated valve was selected for this application because of its very high reliability. The OPERABILITY of squib actuated valves is verified by the Inservice Test Program for squib actuated valves.

BASES

SURVEILLANCE REQUIREMENTS (continued)

The Frequency of 24 months is based on the need to perform this surveillance during periods in which the plant is shutdown for refueling to prevent any upsets of plant operation.

REFERENCES

1. **FSAR** Section 6.3, “Passive Core Cooling System.”
 2. **FSAR** Section 15.6, “Decrease in Reactor Coolant Inventory.”
 3. ~~AP1000~~ **FSAR Chapter 19**, Probabilistic Risk Assessment (**PRA**), Appendix A
 4. **FSAR** Section 3.9.6, “Inservice Testing of Pumps and Valves.”
 5. **ASME OM Code**, “Code for Operation and Maintenance of Nuclear Power Plants.”
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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.

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.11 Automatic Depressurization System (ADS) – Operating

LCO 3.4.11 Ten ADS flow paths shall be OPERABLE.

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One stage 1, 2, or 3 ADS flow path inoperable.	A.1 Restore flow path to OPERABLE status.	7 days
B. One stage 4 ADS flow path inoperable.	B.1 Restore flow path to OPERABLE status.	72 hours
C. Two or three ADS flow paths inoperable with a combined inoperable flow capacity less than or equal to that of a division with the largest ADS flow capacity.	C.1 Restore flow paths to OPERABLE status.	72 hours
D. Required Action and associated Completion Time of Condition A, B, or C not met. <u>OR</u> LCO not met for reasons other than Condition A, B, or C.	D.1 Be in MODE 3. <u>AND</u> D.2 Be in MODE 5.	6 hours 36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.11.1	Verify the motor operated valve in series with each 4th stage ADS valve is fully open.	12 hours
SR 3.4.11.2	Verify each stage 1, 2, and 3 ADS valve strokes open.	In accordance with the Inservice Testing Program
SR 3.4.11.3	Verify each stage 4 ADS valve is OPERABLE in accordance with the Inservice Testing Program.	In accordance with the Inservice Testing Program
SR 3.4.11.4	Verify each stage 1, 2, and 3 ADS valve actuates to the open position on an actual or simulated actuation signal.	24 months
SR 3.4.11.5	<p>-----NOTE----- Squib actuation may be excluded. -----</p> <p>Verify continuity of the circuit from the Protection Logic Cabinets to each stage 4 ADS valve.</p>	24 months

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.11 Automatic Depressurization System (ADS) – Operating

BASES

BACKGROUND

The ADS is designed to assure that core cooling and injection can be achieved for Design Basis Accidents (DBA). The four stages of ADS valves are sequenced in coordination with the passive core cooling system injection performance characteristics.

The ADS consists of 10 flow paths arranged in four different stages that open sequentially (Ref. 1). Stages 1, 2, and 3 each include 2 flow paths. Each of the stage 1, 2, 3 flow paths has a common inlet header connected to the top of the pressurizer. The outlets of the stage 1, 2, 3 flow paths combine into one of the two common discharge lines to the spargers located in the in-containment refueling water storage tank (IRWST). The first stage valves are 4-inch valves with DC motor operators. The second and third stage valves are 8-inch valves with DC motor operators. An OPERABLE stage 1, 2, or 3 automatic depressurization flow path consists of two OPERABLE normally closed motor operated valves, in series.

Stage 4 includes 4 flow paths. The fourth stage ADS valves are 14-inch squib valves. The four fourth stage flow paths connect directly to the top of the reactor coolant hot legs and vent directly into the associated steam generator compartment. An OPERABLE stage 4 flow path consists of an open motor operated valve and an OPERABLE closed squib valve. These motor operated valves are not required to be OPERABLE because they are open.

The automatic depressurization valves are designed to open automatically when actuated, and to remain open for the duration of any automatic depressurization event. The valves are actuated sequentially. The stage 1 valves are actuated on a low core makeup tank (CMT) level. Stages 2 and 3 are actuated on the stage 1 signal plus time delays. Stage 4 is actuated on a Low 2 CMT level signal with a minimum time delay after stage 3. Stage 4 is blocked from actuating at normal RCS pressure.

In order to perform a controlled, manual depressurization of the RCS, the valves are opened starting with the first stage. The first stage valves can also be modulated to perform a partial RCS depressurization if required. ADS stage 1, 2, 3 valves may be manually operated under controlled conditions for testing purposes.

BASES

BACKGROUND (continued)

ADS stages 1, 2 and 3 valves are designed to open relatively slowly, from approximately 40 seconds for the first stage valves, to approximately 100 seconds for the second and third stage valves.

The ADS valves are powered by batteries. In the unlikely event that offsite and onsite AC power is lost for an extended period of time, a timer will actuate ADS within 24 hours of the time at which AC power is lost, before battery power has been degraded to the point where the valves cannot be opened.

The number and capacity of the ADS flow paths are selected so that adequate safety injection is provided from the accumulators, IRWST and containment recirculation for the limiting DBA loss of coolant accident (LOCA). For small break LOCAs the limiting single failure is the loss of one fourth stage flow path (Ref. 2). The probabilistic risk assessment (PRA) (Ref. 3) shows that adequate core cooling can be provided with the failure of up to seven (all ADS stage 1 to 3 and one ADS stage 4) flow paths. The ADS PRA success criteria following a LOCA or non-LOCA with failure of other decay heat removal features is for 3 of 4 ADS stage 4 valves to open. All of the ADS stage 1, 2, 3 valves can fail to open. This ADS capacity is sufficient to support PXS gravity injection and containment recirculation operation.

**APPLICABLE
SAFETY
ANALYSES**

For non-LOCA events, use of the ADS is not required and is not anticipated. For these events, injection of borated water into the core from the CMTs may be required for makeup or boration. However, the amount of water necessary will not reduce the level in the CMTs to the point of ADS actuation.

For events which involve a loss of primary coolant inventory, such as a LOCA, the ADS will be actuated, allowing for injection from the accumulators, the IRWST, and the containment recirculation (Ref. 2).

The ADS satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

The requirement that ten ADS flow paths be OPERABLE ensures that upon actuation, the depressurization of the RCS will proceed smoothly and completely, as assumed in the DBA safety analyses.

BASES

LCO (continued)

For the ten ADS flow paths to be considered OPERABLE, the 16 ADS valves must be closed and OPERABLE (capable of opening on an actuation signal). In addition, the stage 4 motor operated isolation valves must be open. These stage 4 motor operated isolation valves are not required to be OPERABLE because they are maintained open per SR 3.4.11.1.

APPLICABILITY

In MODES 1, 2, 3 and 4 the ADS must be OPERABLE to mitigate the potential consequences of any event which causes a reduction in the RCS inventory, such as a LOCA.

The requirements for the ADS in MODES 5 and 6 are specified in LCO 3.4.12, "Automatic Depressurization System (ADS) – Shutdown, RCS Intact," and LCO 3.4.13, "Automatic Depressurization System – Shutdown, RCS Open."

ACTIONS**A.1**

If any one ADS stage 1, 2, or 3 flow path is determined to be inoperable, the remaining OPERABLE ADS flow paths are more than adequate to perform the required safety function as long as a single failure involving the other flow path of the same stage does not also occur. A flow path is inoperable if one or two of the ADS valves in the flow path are determined to be inoperable. A Completion Time of 7 days is reasonable based on the capability of the remaining ADS valves to perform the required safety functions assumed in the safety analyses and the low probability of a DBA during this time period.

If more than one ADS stage 1, 2, or 3 flow paths are inoperable, Condition C or D is applicable.

B.1

If any one ADS stage 4 flow path is determined to be inoperable, the remaining OPERABLE stage 4 ADS flow paths are adequate to perform the required safety function as long as a single failure of an additional stage 4 ADS flow path does not also occur. A Completion Time of 72 hours is reasonable based on the capability of the remaining ADS valves to perform the required safety functions assumed in the safety analyses and the low probability of a DBA during this time period. This

BASES

ACTIONS (continued)

Completion Time is the same as is used for two train ECCS systems which are capable of performing their safety function without a single failure.

C.1

If two or three flow paths with a combined flow capacity less than or equal to the largest capacity ADS division are determined to be inoperable, the remaining OPERABLE ADS flow paths are adequate to perform the required safety function as long as a single failure does not also occur. Divisions A and B have the largest flow capacity, each consisting of one stage 1 flow path, one stage 2 or 3 flow path, and one stage 4 flow path. This Condition is equivalent to the worst case single failure of an ADS division.

This Condition is applicable to any combination of two inoperable required flow paths, except two stage 4 flow paths. Applicable combinations of three inoperable flow paths include:

- One stage 1, one stage 2 or 3, and one stage 4
- One stage 1 and two stage 2 or 3
- Two stage 1 and one stage 2, 3, or 4
- Two stage 2 or 3 and one stage 4
- Three stage 2 or 3

A Completion Time of 72 hours is reasonable based on the capability of the remaining ADS valves to perform the required safety functions assumed in the safety analyses and the low probability of a DBA during this time period. This Completion Time is the same as is used for two train ECCS systems which are capable of performing their safety function without a single failure.

BASES

ACTIONS (continued)D.1 and D.2

Condition D is applicable, if two stage 4 flow paths are inoperable, more than three flow paths are inoperable, or a combination of three flow paths not listed above (i.e., with a combined flow capacity greater than the largest capacity ADS division) is inoperable.

If the Required Actions and associated Completion Times of Condition A, B, or C are not met or LCO 3.4.11 is not met for reasons other than Condition A, B, or C, the plant must be brought to MODE 5 where the probability and consequences of an event are minimized. 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.

**SURVEILLANCE
REQUIREMENTS**SR 3.4.11.1

Each stage 4 ADS isolation motor operated valve must be verified to be open every 12 hours. Note that these valves receive confirmatory open signals. The Surveillance Frequency is acceptable considering valve position is manually monitored in the control room.

SR 3.4.11.2

This Surveillance requires verification that each ADS stage 1, 2, 3 valve strokes to its fully open position. Note that this surveillance is performed during shutdown conditions.

The Surveillance Frequency for demonstrating valve OPERABILITY references the Inservice Testing Program (Ref. 4).

SR 3.4.11.3

This Surveillance requires verification that each ADS stage 4 squib valve is OPERABLE in accordance with the Inservice Testing Program. The Surveillance Frequency for verifying valve OPERABILITY references the Inservice Testing Program.

BASES

SURVEILLANCE REQUIREMENTS (continued)

The squib valves will be tested in accordance with the ASME OM Code (Ref. 5). The applicable ASME OM Code squib valve requirements are specified in paragraph ISTC 4.6, Inservice Tests for Category D Explosively Actuated Valves. The requirements include actuation of a sample of the installed valves each 2 years and periodic replacement of charges.

SR 3.4.11.4

This SR verifies that each Stage 1, 2, and 3 ADS valve actuates to the correct position on an actual or simulated actuation signal. The ACTUATION LOGIC TEST overlaps this Surveillance to provide complete testing of the assumed safety function.

The Frequency of 24 months is based on the need to perform this surveillance during periods in which the plant is shutdown for refueling to prevent any upsets of plant operation.

SR 3.4.11.5

This SR verifies that each Stage 4 ADS valve actuates to the correct position on an actual or simulated actuation signal. The ACTUATION LOGIC TEST overlaps this Surveillance to provide complete testing of the assumed safety function. The OPERABILITY of the squib valves is checked by performing a continuity check of the circuit from the Protection Logic Cabinets to the squib valve.

This Surveillance is modified by a Note that excludes squib valve actuation as a requirement for this Surveillance to be met. This is acceptable because the design of the squib actuated valve was selected for this application because of its very high reliability. The OPERABILITY of squib actuated valves is verified by the Inservice Test Program for squib actuated valves.

The Frequency of 24 months is based on the need to perform this surveillance during periods in which the plant is shutdown for refueling to prevent any upsets of plant operation.

BASES

- REFERENCES
1. FSAR Section 6.3, “Passive Core Cooling System.”
 2. FSAR Section 15.6, “Decrease in Reactor Coolant Inventory.”
 3. FSAR Chapter 19, Probabilistic Risk Assessment (PRA), Appendix A
 4. FSAR Section 3.9.6, “Inservice Testing of Pumps and Valves.”
 5. ASME OM Code, “Code for Operation and Maintenance of Nuclear Power Plants.”
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