



March 20, 2018

Docket No. 52-048

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738

SUBJECT: NuScale Power, LLC Supplemental Response to NRC Request for Additional Information No. 228 (eRAI No. 9034) on the NuScale Design Certification Application

REFERENCES: 1. U.S. Nuclear Regulatory Commission, "Request for Additional Information No. 228 (eRAI No. 9034)," dated September 14, 2017
2. NuScale Power, LLC Response to NRC "Request for Additional Information No. 228 (eRAI No. 9034)," dated November 13, 2017

The purpose of this letter is to provide the NuScale Power, LLC (NuScale) supplemental response to the referenced NRC Request for Additional Information (RAI).

The Enclosure to this letter contains NuScale's supplemental response to the following RAI Questions from NRC eRAI No. 9034:

- 16-30
- 16-31

This letter and the enclosed response make no new regulatory commitments and no revisions to any existing regulatory commitments.

If you have any questions on this response, please contact Steven Mirsky at 240-833-3001 or at smirsky@nuscalepower.com.

Sincerely,

A handwritten signature in black ink, appearing to read "Zackary W. Rad".

Zackary W. Rad
Director, Regulatory Affairs
NuScale Power, LLC

Distribution: Samuel Lee, NRC, OWFN-8G9A
Anthony Markley, NRC, OWFN-8G9A
Prosanta Chowdhury NRC, OWFN-8G9A

Enclosure 1: NuScale Supplemental Response to NRC Request for Additional Information eRAI No. 9034



Enclosure 1:

NuScale Supplemental Response to NRC Request for Additional Information eRAI No. 9034

Response to Request for Additional Information Docket No. 52-048

eRAI No.: 9034

Date of RAI Issue: 09/14/2017

NRC Question No.: 16-30

Paragraph (a)(11) of 10 CFR 52.47 and paragraph (a)(30) of 10 CFR 52.79 state that a design certification (DC) applicant and a combined license (COL) applicant, respectively, are to propose technical specifications (TS) prepared in accordance with 10 CFR 50.36 and 50.36a. 10 CFR 50.36 sets forth requirements for TS to be included as part of the operating license for a nuclear power facility. The model standard technical specifications (STS) in the following documents provide NRC guidance on format and content of TS as acceptable means to meet 10 CFR 50.36 requirements. These documents may be accessed using the Agencywide Documents Access and Management Systems (ADAMS) by their accession numbers.

- NUREG-1431, “STS Westinghouse Plants,” Revision 4
(ADAMS Accession Nos. ML12100A222 and ML12100A228)
- NUREG-1432, “STS Combustion Engineering Plants,” Revision 4
(ADAMS Accession Nos. ML12102A165 and ML12102A169)
- NUREG-2194, “STS Westinghouse Advanced Passive 1000 (AP1000) Plants,” Revision 0
(ADAMS Accession No. ML16111A132)

The NRC staff needs to evaluate technical differences in the proposed generic TS (GTS) from applicable provisions in these documents, which are referenced by the DC applicant in Design Control Document (DCD) Tier 2, Section 16.1, and the docketed rationale for each difference because conformance to STS provisions is used in the safety review as the initial point of guidance for evaluating the adequacy of the GTS to ensure adequate protection of public health and safety, and the completeness and accuracy of the GTS Bases.

Acronyms used in this comment are as follows:

LCO	Limiting Condition for Operation
SDM	SHUTDOWN MARGIN
COLR	CORE OPERATING LIMITS REPORT
CRAs	control rod assemblies
CVCS	Chemical and Volume Control System
CFDS	Containment Flood and Drain System



- b. CRA position;
- c. RCS average temperature;
- d. Fuel burnup based on gross thermal energy generation;
- e. Xenon concentration;
- f. Samarium concentration; and
- g. Isothermal Temperature Coefficient (ITC).

The SR section of the Bases for Subsection 3.1.1 also states,

SR 3.1.1.1 is modified by a Note that allows entry into MODE 4 prior to performing the SR.

GTS Section 1.4 provides no example that matches the Note for SR 3.1.1.1. The most similar example is Example 1.4-3, which has a Note that modifies the 7 day Frequency of performance by stating:

-----NOTE-----
Not required to be performed until 12 hours after
≥ 25% RTP.

This example states, in part

... Should the 7 day interval be exceeded while operation is < 25% RTP, this Note allows 12 hours after power reaches ≥ 25% RTP to perform the Surveillance....

End of Background Information

- a. The staff is unable to determine whether SR 3.1.1.1 can be performed in MODE 4 (following entry from MODE 3) if the performance requires measurements of the boron concentration and temperature of the reactor coolant in the reactor vessel, since connections to the plant sampling system (PSS) presumably would be isolated.
 - 1. If such measurements in MODE 4 are not necessary to perform the SDM calculation, then the calculation would need to rely on such data obtained in MODE 3, and also on an assurance that, after entry into MODE 4 until entry into MODE 5, core reactivity changes (due to changes in reactor coolant temperature, and the Xenon and Samarium distributions in the core) would not violate the MODE 4 criterion that k_{eff} be maintained < 0.95. The applicant is requested to explain how the MODE 3 boron concentration is adjusted to provide such assurance.
 - 2. If such measurements in MODE 4 are necessary to perform the SDM calculation, the applicant is requested to describe how such measurements would be obtained.



- b. The proposed Note seems to indicate that the SDM calculation is not performed in MODE 4. However, the quoted statement from the Bases seems to indicate that the SDM calculation is performed in MODE 4. The applicant is requested to revise the presentation of SR 3.1.1.1 Note and Frequency, and the content of the Bases to be mutually consistent, and also consistent with the intended restrictions and allowances for performing the SDM calculation in MODES 3 and 4.
- c. The proposed Note also applies to the performance of SR 3.1.1.1 while in MODE 5 before entry into MODE 4, in accordance with SR 3.0.4; and after entry into MODE 4.
- In the first case, SR 3.5.3.3 (“Verify Ultimate Heat Sink bulk average boron concentration is within limits.”) ensures that the $k_{eff} < 0.95$ criterion of MODE 4 is satisfied because LCO 3.5.3.c states that the Ultimate Heat Sink “bulk average boron concentration shall be maintained within the limit specified in the COLR”; which is presumably more than sufficient to ensure the reactor is > 5 percent shutdown. Also, Specification 4.3.1.b indicates that water in the spent fuel pool (and by inference, the Ultimate Heat Sink) has a “minimum soluble boron concentration of 800 ppm.”
 - In the second case, it would appear that the above discussion in Sub-questions a.1 and a.2 would apply.

The applicant is requested to revise the presentation of SR 3.1.1.1 Note and Frequency, and the content of the Bases to be mutually consistent, and also consistent with the intended restrictions and allowances for performing the SDM calculation in MODE 5 with a full core in the reactor vessel and after entry into MODE 4.

- d. The applicant is requested to explicitly state the base Frequency for SR 3.1.1.1, using the bracketed presentation indicated in the above markup. Note that the stated 24 hours may not be an appropriate Frequency for verifying SDM is within limits for NuScale in MODES 2, 3, and 4. The applicant is requested to provide a bracketed justification for the base Frequency in the Bases for SR 3.1.1.1. For example, the Bases for the 24 hour Frequency of SR 3.1.1.1 of the CE STS, states:



[The Frequency of 24 hours is based on the generally slow change in required boron concentration, and also allows sufficient time for the operator to collect the required data, which includes performing a boron concentration analysis, and complete the calculation.

OR

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

-----REVIEWER'S NOTE-----
Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.
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- e. The SR 3.1.1.1 Frequency states: "In accordance with the Surveillance Frequency Control Program." The applicant is requested to state the Frequency as "[24 hours OR In accordance with the Surveillance Frequency Control Program]" as indicated above.

The applicant is referred to a memorandum dated May 20, 2010 (ADAMS Accession No. ML101390330), from Robert B. Elliott, Chief, Technical Specifications Branch, NRR, to branch chiefs in the NRR Division of Operating Reactor Licensing, "Notification of Issue with NRC Approved TSTF-425, Revision 3, 'Relocate Surveillance Frequencies to Licensee Control-RITSTF Initiative 5b.'" In this memorandum, the staff stated that a licensee requesting an amendment to the operating license to incorporate TSTF-425, Revision 3, into the facility technical specifications must include in the license amendment request the following statement "regarding SF [Surveillance Frequency] Bases relocated to the Surveillance Frequency Control Program (SFCP)" [without changing the SF]:

The existing Bases information describing the basis for the Surveillance Frequency will be relocated to the licensee-controlled Surveillance Frequency Control Program.

For most GTS SRs, the NuScale DCA includes neither the base SFs nor the base SF Bases.

1. Including the above reviewer's note in the SR section of the Bases for each affected GTS SR is recommended for informing a COL applicant that relocation of the base SF for each affected SR to the SFCP shall include the associated Bases for the SF. The applicant is requested to include the base SFs and associated Bases in DCD Chapter 16, as bracketed COL action item information, consistent with STS presentation.



2. Alternatively, the applicant is requested to propose adding a bracketed listing to GTS 5.5.11.a of the SFCP Specification that documents, for each SR, the base SF and the base SF Bases. This approach would be equivalent to the above change, but would be administratively easier to implement by a COL applicant. This listing of base SFs and Bases would need an associated reviewer's note that describes how a COL applicant is expected to resolve the COL action item. For example:

***** EXAMPLE SFCP SPECIFICATION *****

5.5 Programs and Manuals

5.5.11 Surveillance Frequency Control Program

This program provides controls for Surveillance Frequencies. The program shall ensure that Surveillance Requirements specified in the Technical Specifications are performed at intervals sufficient to assure the associated Limiting Conditions for Operation are met.

- a. The Surveillance Frequency Control Program shall contain a list of Frequencies of those Surveillance Requirements for which the Frequency is controlled by the program.

[-----REVIEWER'S NOTE-----]

A COL applicant planning to control Surveillance Frequencies under a Surveillance Frequency Control Program shall relocate the base Frequency and the base Frequency Bases, as given below, to the Surveillance Frequency Control Program for each associated Surveillance Requirement. Else, the Frequency shall be stated in the Surveillance Requirement, and its basis in the Bases for the Surveillance Requirement.

Surveillance	Frequency	Bases
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SR 3.1.1.1	24 hours	The Frequency of 24 hours is based on the generally slow change in required boron concentration, and also allows sufficient time for the operator to collect the required data, which includes performing a boron concentration analysis, and complete the calculation.
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SR 3.1.2.1	31 EFPD thereafter	<i>(Based on AP1000) The required subsequent Frequency of 31 effective full power days (EFPD) following the initial 60 EFPD after entering MODE 1 is acceptable based on the slow rate of core changes due to fuel depletion and the presence of other indicators (enthalpy rise hot channel factor and AXIAL OFFSET) for prompt indication of an anomaly.</i>
SR 3.1.4.1	12 hours	Associated Bases for base SF
SR 3.1.4.2	92 days	Associated Bases for base SF
SR 3.1.5.1	12 hours	Associated Bases for base SF
SR 3.1.6.1	12 hours	Associated Bases for base SF
SR 3.1.8.1	30 minutes	Associated Bases for base SF
SR 3.1.8.2	24 hours	Associated Bases for base SF
SR 3.1.9.1	24 months	Associated Bases for base SF
SR 3.1.9.2	31 days	Associated Bases for base SF
SR 3.2.1.1	31 EFPD	Associated Bases for base SF
SR 3.2.2.1	12 hours	Associated Bases for base SF
SR 3.3.1.1	12 hours	Associated Bases for base SF
SR 3.3.1.2	24 hours	Associated Bases for base SF
SR 3.3.1.3	24 months	Associated Bases for base SF
SR 3.3.1.4	24 months	Associated Bases for base SF
SR 3.3.2.1	24 months	Associated Bases for base SF
SR 3.3.2.2	24 months	Associated Bases for base SF
SR 3.3.3.1	24 months	Associated Bases for base SF
SR 3.3.3.2	24 months	Associated Bases for base SF
SR 3.3.4.1	24 months	Associated Bases for base SF
SR 3.3.5.1	24 months	Associated Bases for base SF
SR 3.3.5.2	24 months	Associated Bases for base SF
SR 3.3.5.3	24 months	Associated Bases for base SF
SR 3.3.5.4	24 months	Associated Bases for base SF
SR 3.4.1.1	12 hours	Associated Bases for base SF
SR 3.4.1.2	12 hours	Associated Bases for base SF
SR 3.4.2.1	12 hours	Associated Bases for base SF
SR 3.4.3.1	30 minutes	Associated Bases for base SF
SR 3.4.5.1	72 hours	Associated Bases for base SF
SR 3.4.5.2	72 hours	Associated Bases for base SF
SR 3.4.6.2	24 months	Associated Bases for base SF
SR 3.4.7.1	12 hours	Associated Bases for base SF
SR 3.4.7.2	12 hours	Associated Bases for base SF
SR 3.4.7.3	12 hours	Associated Bases for base SF
SR 3.4.7.4	92 days	Associated Bases for base SF
SR 3.4.7.5	24 months	Associated Bases for base SF
SR 3.4.7.6	24 months	Associated Bases for base SF



SR 3.4.7.7	24 months	Associated Bases for base SF
SR 3.4.8.1	7 days	Associated Bases for base SF
SR 3.4.8.2	14 days	Associated Bases for base SF
SR 3.5.1.1	24 months	Associated Bases for base SF
SR 3.5.1.3	NuScale specific	Associated Bases for base SF
SR 3.5.2.1	24 hours	Associated Bases for base SF
SR 3.5.3.1	24 hours	Associated Bases for base SF
SR 3.5.3.2	24 hours	Associated Bases for base SF
SR 3.5.3.3	31 days	Associated Bases for base SF
	<u>AND</u> Once within 6 hours after each solution volume increase of ≥ 15,000 gal	
SR 3.6.2.1	31 days	Associated Bases for base SF
SR 3.6.2.3	24 months	Associated Bases for base SF
SR 3.8.1.1	12 hours	Associated Bases for base SF
SR 3.8.1.2	24 months	Associated Bases for base SF

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- b. Changes to the Frequencies listed in the Surveillance Frequency Control Program shall be made in accordance with NEI 04-10, "Risk-Informed Method for Control of Surveillance Frequencies," Revision 1.
- c. The provisions of Surveillance Requirements 3.0.2 and 3.0.3 are applicable to the Frequencies established in the Surveillance Frequency Control Program.

***** END OF EXAMPLE SFCP SPECIFICATION *****

A response based on this suggested presentation of base frequencies and associated SF Bases must provide the actual base Frequency and its actual rationale, since the example depicts typical values and no NuScale-specific SF Bases.

The applicant is requested to treat this Sub-question as a global issue for all SRs for which the Frequency is stated as "In accordance with the Surveillance Frequency Control Program."



NuScale Response:

In response to questions identified during the public meeting on February 21, 2018 between the NRC staff and NuScale regarding technical specifications, the following clarifications and additions are provided to supplement that previously provided in the November 13, 2017 response to RAI 228-9034, Question 16-30 (ML17317B552):

A reference to table 16.1-1 has been added to the description of the Surveillance Frequency Control Program provided in Technical Specification 5.5.11.

Impact on DCA:

The Technical Specifications have been revised as described in the response above and as shown in the markup provided in this response.

5.5 Programs and Manuals

5.5.11 Surveillance Frequency Control Program (continued)

- b. Changes to the Frequencies listed in the Surveillance Frequency Control Program shall be made in accordance with NEI 04-10, "Risk-Informed Method for Control of Surveillance Frequencies," Revision 1. FSAR Table 16.1-1, Surveillance Frequency Control Program Base Frequencies, describes the plant licensing bases for the surveillance test intervals.
- c. The provisions of Surveillance Requirements 3.0.2 and 3.0.3 are applicable to the Frequencies established in the Surveillance Frequency Control Program.

5.5.12 Spent Fuel Storage Rack Neutron Absorber Monitoring Program

This Program provides controls for monitoring the condition of the neutron absorber used in the spent fuel pool storage racks to verify the neutron absorber density is consistent with the assumptions in the spent fuel pool criticality analysis. The program shall be in accordance with NEI 16-03-A, "Guidance for Monitoring of Fixed Neutron Absorbers in Spent Fuel Pools," Revision 0, May 2017.

Response to Request for Additional Information Docket No. 52-048

eRAI No.: 9034

Date of RAI Issue: 09/14/2017

NRC Question No.: 16-31

Paragraph (a)(11) of 10 CFR 52.47 and paragraph (a)(30) of 10 CFR 52.79 state that a design certification (DC) applicant and a combined license (COL) applicant, respectively, are to propose technical specifications (TS) prepared in accordance with 10 CFR 50.36 and 50.36a. 10 CFR 50.36 sets forth requirements for TS to be included as part of the operating license for a nuclear power facility. The model standard technical specifications (STS) in the following documents provide NRC guidance on format and content of TS as acceptable means to meet 10 CFR 50.36 requirements. These documents may be accessed using the Agencywide Documents Access and Management Systems (ADAMS) by their accession numbers.

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- NUREG-1432, “STS Combustion Engineering Plants,” Revision 4 (ADAMS Accession Nos. ML12102A165 and ML12102A169)
- NUREG-2194, “STS Westinghouse Advanced Passive 1000 (AP1000) Plants,” Revision 0 (ADAMS Accession No. ML16111A132)

The NRC staff needs to evaluate technical differences in the proposed generic TS (GTS) from applicable provisions in these documents, which are referenced by the DC applicant in Design Control Document (DCD) Tier 2, Section 16.1, and the docketed rationale for each difference because conformance to STS provisions is used in the safety review as the initial point of guidance for evaluating the adequacy of the GTS to ensure adequate protection of public health and safety, and the completeness and accuracy of the GTS Bases.

The statements of the LCO, Condition A, Required Action A.2, and SR 3.1.2.1 of Subsection 3.1.2 differ from the corresponding statements in the Westinghouse, CE, and AP1000 STS Subsection 3.1.2, “Core Reactivity”; differences in these STS requirements are indicated in the following quotations using **blue** and **red** colored font. *The changes indicate how to revise each STS requirement to match the corresponding GTS requirement.*

In the quotation of GTS 3.1.2 requirements, the **underlined blue colored font** indicates modification of GTS Frequency requirements, which has been globally requested by the staff in



another RAI Question Sub-question. An editorial correction to GTS 3.1.2 Required Action A.2 is indicated by ~~lined-out~~ red colored font.

- a. The applicant is requested to justify the GTS phrasing over the phrasing of the three STS subsections for each GTS provision quoted.
- b. The applicant is also requested to compare the GTS 3.1.2 Bases against the Bases of the three STS subsections and, for all phrasing differences, justify the GTS Bases phrasing over the phrasing of the three STS Bases subsections.

NuScale GTS

LCO 3.1.2	The core reactivity balance shall be within $\pm 1\%$ $\Delta k/k$ of the normalized predicted values.
Condition A	Core reactivity not within limit.
Required Action A.2	Established appropriate operating restrictions. 7 days
SR 3.1.2.1	
Note	Predicted reactivity values may be adjusted to correspond to measured core reactivity prior to exceeding a fuel burnup of 60 effective full power days (EFPD) after each fuel loading.
Surveillance	Verify overall core reactivity balance is within $\pm 1\%$ $\Delta k/k$ of predicted values.
Frequency	Once prior to exceeding 5% RTP after each refueling
	<u>AND</u>
	-----NOTE-----
	Only required after 60 EFPD

	[31 EFPD thereafter
	<u>OR</u>
	In accordance with the Surveillance Frequency Control Program]

Westinghouse STS (revised to match GTS)



LCO 3.1.2	The measured core reactivity <u>balance</u> shall be within $\pm 1\%$ $\Delta k/k$ of <u>the normalized</u> predicted values.
Condition A	Measured core <u>Core</u> reactivity not within limit.
Required Action A.2	Establish appropriate operating restrictions and SRs . 7 days
SR 3.1.2.1	
Note	The predicted <u>Predicted</u> reactivity values may be adjusted (normalized) to correspond to the measured core reactivity prior to exceeding a fuel burnup of 60 effective full power days (EFPD) after each fuel loading.
Surveillance	Verify <u>overall</u> measured core reactivity <u>balance</u> is within $\pm 1\%$ $\Delta k/k$ of predicted values.
Frequency	Once prior to <u>exceeding 5% RTP</u> entering MODE-1 after each refueling

AND

-----NOTE-----
 Only required after 60 EFPD

[31 EFPD thereafter

OR

In accordance with the Surveillance Frequency Control Program]

CE STS (revised to match GTS)

LCO 3.1.2	The core reactivity balance shall be within $\pm 1\%$ $\Delta k/k$ of <u>the normalized</u> predicted values.
Condition A	Core reactivity balance not within limit.
Required Action A.2	Establish appropriate operating restrictions and SRs . 7 days
SR 3.1.2.1	

Note 1 ~~The predicted~~ Predicted reactivity values may be adjusted ~~(normalized)~~ to correspond to ~~the~~ measured core reactivity prior to exceeding a fuel burnup of 60 effective full power days (EFPD) after each fuel loading.

~~Note 2 This Surveillance is not required to be performed prior to entry into MODE 2.~~

Surveillance Verify overall core reactivity balance is within $\pm 1.0\%$ $\Delta k/k$ of predicted values.

Frequency ~~Once prior to~~ Prior to entering MODE 1 after fuel loading exceeding 5% RTP after each refueling

AND

-----NOTE-----
Only required after 60 EFPD

[31 EFPD thereafter

OR

In accordance with the Surveillance Frequency Control Program]

AP1000 STS (revised to match GTS)

LCO 3.1.2 The ~~measured~~ core reactivity balance shall be within $\pm 1\%$ $\Delta k/k$ of the normalized predicted values.

Condition A ~~Measured core~~ Core reactivity not within limit.

Required Action A.2 Establish appropriate operating restrictions ~~and SRs~~. | 7 days

SR 3.1.2.1

Note ~~The predicted~~ Predicted reactivity values may be adjusted ~~(normalized)~~ to correspond to ~~the~~ measured core reactivity prior to exceeding a fuel burnup of 60 effective full power days (EFPD) after each fuel loading.

Surveillance Verify overall measured core reactivity balance is within $\pm 1\%$ $\Delta k/k$ of predicted values.



Frequency Once prior to entering MODE 1 exceeding 5% RTP after each refueling

AND

-----NOTE-----

Only required ~~to be~~
~~performed~~ after 60 EFPD

31 EFPD thereafter

NuScale Response:

In response to questions identified during the public meeting on February 21, 2018 between the NRC staff and NuScale regarding technical specifications, the following clarifications and additions are provided to supplement those previously provided in the November 13, 2017 response to RAI 228-9034 (ML17317B552), Question 16-31, Sub-question b:

1. The last sentence of the second paragraph of the Bases for Actions A.1 and A.2 is revised to be consistent with NUREG-1431.
2. Enclosure 1, Surveillance Requirement 3.1.2.1, column titled "Comparison to Similar Surveillance Intervals Where Applicable of the previous response is revised to state:

Similar to the bases for SR 3.1.2.1 in NUREG-1431. This base SR frequency is reasonable because NuScale uses similar fuel and reactivity control processes as Westinghouse Plants. The rate of change in core reactivity during routine operation is not expected to be significantly different for NuScale compared to Westinghouse Plants. The initial Frequency requiring performance once prior to 5% rated thermal power is comparable to the NUREG-1431 initial frequency once prior to entering MODE 1 because NUREG-1431 defines MODE 1 as operation at greater than 5% rated thermal power.

The underlined sentence is added to clarify the comparison with regard to MODE definition differences between the NuScale Technical Specifications and the definitions provided in NUREG-1431.

Impact on DCA:

The Technical Specifications have been revised as described in the response above and as shown in the markup provided in this response.

BASES

ACTIONS (continued)

acceptable for continued operation, then the boron letdown curve may be renormalized and power operation may continue. If operational restriction or additional SRs are necessary to ensure the reactor core is acceptable for continued operation, then they must be defined. ~~If changes to operational restrictions are necessary to ensure the reactor core is acceptable for continued operation, then they must be defined and implemented.~~

The required Completion Time of 7 days is adequate for preparing and implementing whatever operating restrictions that may be required to allow continued reactor operation.

B.1

If the core reactivity cannot be restored to within the 1% $\Delta k/k$ limit, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 2 within 6 hours. If the SDM for MODE 2 is not met, then boration may be required to meet SR 3.1.1.1 prior to entry into MODE 2. The allowed Completion Time is reasonable, for reaching MODE 2 from full power conditions in an orderly manner.

SURVEILLANCE
REQUIREMENTS

SR 3.1.2.1

Core reactivity is verified by periodic comparisons of measured and predicted RCS boron concentrations. The comparison is made considering that other core conditions are fixed or stable, including CRA position, moderator temperature, fuel temperature, fuel depletion, xenon concentration, and samarium concentration. The Surveillance is performed prior to exceeding 5% RTP as an initial check on core conditions and design calculations at BOC. The Surveillance is performed again prior to exceeding 60 effective full power days (EFPDs) to confirm the core reactivity is responding to reactivity predictions and then periodically thereafter during the operating cycle in accordance with the Surveillance Frequency Control Program. The SR is modified by a Note indicating that the predicted core reactivity may be adjusted to the measured value provided this normalization is performed prior to exceeding a fuel burnup of 60 EFPDs. This allows sufficient time for core conditions to reach steady state, but prevents operation for a large fraction of the fuel cycle without establishing a benchmark for the design calculations.

The subsequent Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

Validation:

RAI 16-31S1,CP2-0908

CP-0214

RAI 9034 16-32, CP-0535