NuScaleDCRaisPEm Resource

From: Cranston, Gregory
Sent: Thursday, September 14, 2017 11:54 AM
To: RAI@nuscalepower.com
Cc: NuScaleDCRaisPEm Resource; Lee, Samuel; Chowdhury, Prosanta; Whitman, Jennifer; Tjader, Theodore; Markley, Anthony
Subject: Request for Additional Information No. 228, RAI 9034 (16)
Attachments: Request for Additional Information No. 228 (eRAI. No. 9034).pdf

Attached please find NRC staff's request for additional information concerning review of the NuScale Design Certification Application.

Please submit your technically correct and complete response within 60 days of the date of this RAI to the NRC Document Control Desk.

If you have any questions, please contact me.

Thank you.

Gregory Cranston, Senior Project Manager
Licensing Branch 1 (NuScale)
Division of New Reactor Licensing
Office of New Reactors
U.S. Nuclear Regulatory Commission
301-415-0546

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Request for Additional Information No. 228 (eRAI. No. 9034)

Issue Date: 09/14/2017
Application Title: NuScale Standard Design Certification - 52-048
Operating Company: NuScale Power, LLC
Docket No. 52-048
Review Section: 16 - Technical Specifications
Application Section: 3.1 Reactivity Control Systems, 5.5.11 Surveillance Frequency Control Program

QUESTIONS

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.

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- 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
SFCP	Surveillance Frequency Control Program
SR	Surveillance Requirement

The following background information is provided to support the staff's questions, which are stated afterwards.

The LCO and Applicability statements of proposed Subsection 3.1.1 are:

LCO 3.1.1	SDM shall be within the limits specified in the COLR.
APPLICABILITY:	MODE 1 with k_{eff} < 1.0, MODES 2, 3, and 4.

The definition of MODE 4 (Transition) in Table 1.1-1 requires (with staff recommended edits in blue) that k_{eff} be < 0.95, and by

Footnote (b), that

- All control rod assemblies (CRAs) are incapable of withdrawal,
- The CVCS and CFDS connections to the MODULE are isolated, and
- One or more reactor vent valves are de-energized; and by

Footnote (c), that

- All reactor vessel flange bolts are fully tensioned.

SR 3.1.1.1 states (with staff recommended edits in blue):

SR 3.1.1.1	----------NOTE---------- Not required to be performed in MODE 4. ----------	
	Verify SDM to be within the limits specified in the COLR.	[24 hours OR In accordance with the Surveillance Frequency Control Program]

The SR section of the Bases for Subsection 3.1.1, concerning SR 3.1.1.1, states,

> In MODE 1 with k_{eff} < 1.0, and in MODES 2, 3, and 4, the SDM is verified by performing a reactivity balance calculation, considering the listed reactivity effects:
>
> a. RCS boron concentration;
>
> 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 peformance 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 <u>are not necessary</u> 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 <u>are necessary</u> 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.
>
> ----------]

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
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.
SR 3.1.2.1	31 EFPD thereafter	*(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.*
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 <u>AND</u> Once within 6 hours after each solution volume increase of ≥ 15,000 gal	Associated Bases for base SF
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

]

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.”

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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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, Requied 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 ±1% Δk/k of the normalized predicted values.
Condition A	Core reactivity not within limit.
Required Action A.2	Establish~~ed~~ 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 ±1% Δk/k of predicted values.
Frequency	Once prior to 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]

Westinghouse STS (revised to match GTS)

LCO 3.1.2	The ~~measured~~ core reactivity balance shall be within ± 1% Δk/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 ±1% Δk/k of predicted values.
Frequency	Once prior to exceeding 5% RTP ~~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 ± 1% Δk/k of the normalized 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 ±1.0% Δk/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 ± 1% Δk/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 ±1% Δk/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

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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 applicant is requested to describe the operational steps taken to shutdown a MODULE within 48 hours beginning from MODE 1 at RTP and ending in MODE 3 with all reactor coolant system temperatures less than 200 degrees F. Discuss why 48 hours is specified to perform this evolution upon entering Specification 3.1.3, "Moderator Temperature Coefficient (MTC)," Condition B in accordance with Required Action B.1. Since Specification 3.8.2, "Decay Time" only requires 48 hours to have elapsed since reactor shutdown (since the reactor was last critical) before allowing irradiated fuel movement in the reactor vessel (which is only possible in MODE 5), it appears that Required Action B.1 could still be completed "in an orderly manner and without challenging plant systems" in a time much less than 48 hours.

> The associated Bases for Required Action B.1 state, "The allowed Completion Time is a reasonable time based on the activities needed to reach the required MODE from full power operation in an orderly manner and without challenging plant systems."

Also, correct typo by inserting "on" as indicated.

Explain why "required MODE" is used instead of "required MODULE conditions."

Please also address your response to the same, or similar, shutdown action completion times in the following action requirements. Explain the many variations in the rationale for the same completion time of the same shutdown action. The Bases for the following shutdown action requirements appear to be inconsistent regarding reliance on the use of safety systems to cooldown the MODULE in MODE 3. The requested explanations under each set of action requirements that are similar may be provided jointly.

1. 3.3.1, MODULE Protection System Instrumentation,

   Function 7.b, DHRS actuation on High Pressurizer Pressure

   Function 9.b, DHRS actuation on Low Low Pressurizer Pressure

   Function 13.b, DHRS actuation on High Narrow Range RCS Hot Temperature

   Function 16.a, ECCS actuation on Low RPV Riser Level

   Function 17.b, DHRS actuation on High Main Steam Pressure

   Function 22.b, DHRS actuation on High Narrow Range Containment Pressure

   Function 23.a, ECCS actuation on High Containment Water Level

   Required Action I.1: Be in MODE 2. | 6 hours

   Required Action I.2: Be in MODE 3 and PASSIVELY COOLED. | 36 hours

   > The associated Bases for Required Actions I.1 and I.2 state, "Completion Times are established considering the likelihood of a LOCA event that would require ECCS or DHRS actuation. They also provide adequate time to permit evaluation of conditions and restoration of actuation logic OPERABILITY without unnecessarily challenging plant systems during a shutdown."

Explain why "actuation logic OPERABILITY" restoration is mentioned instead of "channel OPERABILITY" restoration.

Explain why "unnecessarily" is needed.

Function 10.b, DHRS actuation on Low Low Main Steam Pressure

Required Action K.1: Be in MODE 2. | 6 hours

Required Action K.2: Be in MODE 3. | 36 hours

The associated Bases for Required Actions K.1 and K.2 state, "The allowed Completion Times are reasonable to reach the required MODULE conditions from full power conditions in an orderly manner and without challenging MODULE systems."

Explain why "MODULE systems" is used instead of "plant systems."

Function 22.c, CIS actuation on High Narrow Range Containment Pressure,

Required Action L.1: Be in MODE 2. | 6 hours

Required Action L.2: Be in MODE 3 with RCS temperature hot < 200°F. | 48 hours

The associated Bases for Required Actions L.1 and L.2 state, "Completion Times are established considering the likelihood of a design basis event that would require CIS actuation during the period of inoperability. They also provide adequate time to permit evaluation of conditions and restoration of logic OPERABILITY without unnecessarily challenging plant systems during a shutdown. Analysis shows that 48 hours from entry into this condition is a reasonable time to reach MODE 3 with RCS wide range temperature hot < 200°F using normal plant systems and procedures.

Explain why "logic OPERABILITY" restoration is mentioned instead of "channel OPERABILITY" restoration.

Explain why "unnecessarily" is needed.

Explain why last sentence says "using normal plant systems and procedures" instead of "using only safety-related plant systems and procedures."

Function 25, Low AC Voltage to ELVS Battery Chargers, and

Function 26, High Under-the-Bioshield Temperature,

Each of which causes actuation of RTS, DHRS, CIS, DWSI, and Pressurizer Heater Trip (PHT)

Required Action M.1: Be in MODE 2. | 72 hours

Required Action M.2: Be in MODE 3 and PASSIVELY COOLED. | 96 hours

Required Action M.3: Be in MODE 3 with RCS temperature hot < 200°F. | 96 hours

The associated Bases for Required Actions M.2 and M.3 state, "Completion Times are established considering the likelihood of a design basis event that would require automatic actuation during the period of inoperability. They also provide adequate time to permit evaluation of conditions and restoration of logic OPERABILITY without unnecessarily challenging plant systems during a shutdown.

Explain why "logic OPERABILITY" restoration is mentioned instead of "channel OPERABILITY" restoration.

Explain why "unnecessarily" is needed.

Explain why 72 hours are allowed to be in MODE 2; and 96 hours are allowed to be in MODE 3 and PASSIVELY COOLED, and in MODE 3 below 200°F.

2. 3.3.3, ESFAS Logic and Actuation, Function 1, ECCS, and Function 2, DHRS,

   Required Action C.1: Be in MODE 2. | 6 hours

   Required Action C.2: Be in MODE 3 and PASSIVELY COOLED. | 36 hours

   > The associated Bases for Required Actions C.1 and C.2 state, "Completion Times are established considering the likelihood of a LOCA event that would require ECCS or DHRS actuation. They also provide adequate time to permit evaluation of conditions and restoration of *actuation* logic OPERABILITY without unnecessarily challenging plant systems during a shutdown.

   Explain why "unnecessarily" is needed.

3. 3.3.3, ESFAS Logic and Actuation, Function 3, CIS

   Required Action D.1: Be in MODE 2. | 6 hours

   Required Action D.2: Be in MODE 3 with RCS temperature hot < 200°F. | 48 hours

   Explain omission of "hot" in D.2, or insert "hot" as indicated. Also, address this apparent omission in the discussion of CIS Actuation in the Applicable Safety Analyses, LCO, and Applicability section of Bases Subsection B 3.3.3.

   > The associated Bases for Required Actions D.1 and D.2 state, "Completion Times are established considering the *limited likelihood* of a design basis event that would require CIS actuation during the period of inoperability. They also provide adequate time to permit evaluation of conditions and restoration of logic OPERABILITY without unnecessarily challenging plant systems during a shutdown. Analysis shows that 48 hours from entry into this condition is a reasonable time to reach MODE 3 with RCS wide range ~~Thot~~ T_{hot} < 200°F using normal plant systems and procedures.

   Explain why "limited likelihood" is used instead of "low probability," "low likelihood," or small probability," etc.

   Explain why "logic OPERABILITY" and not "actuation logic OPERABILITY" is used, or add "actuation."

   Explain why "unnecessarily" is needed.

   Correct typo "Thot" in last sentence, as indicated, or replace with "temperature hot."

   Explain why last sentence says "using normal plant systems and procedures" instead of "using only safety-related plant systems and procedures."

4. 3.3.3, ESFAS Logic and Actuation, Actions section of Bases Subsection B 3.3.3, for Action B C, D, E, F, and G include a paragraph similar to the following paragraph:

   > The redundant signal paths and logic of the OPERABLE division provides robust capability to automatically actuate the required ESFAS function with a single division of logic OPERABLE.

   The Bases for Actions C, D, E, F, and G include a similar paragraph, as follows:

   > With one division of *actuation* logic inoperable, the redundant signal paths and logic of the OPERABLE division provide robust capability to

automatically actuate the [ECCS, DHRS, CIS, DWSI, CVCSI, or PHT] if required.

Note that the paragraph for Action C inadvertently omits the word "actuation" in the opening phrase; this should be changed to match the other paragraphs.

Explain why the subjective phrase "robust capability" is used instead of the objective phrase "sufficient capability" in these paragraphs, or replace "robust" with "sufficient."

5. 3.3.4, Manual Actuation Functions, Function 2, ECCS, and Function 3, DHRS,

   Required Action D.1: Be in MODE 2. | 24 hours

   Required Action D.2: Be in MODE 3 and PASSIVELY COOLED. | 72 hours

   The associated Bases for Required Actions D.1 and D.2 state, "...Condition D provides 24 hours to restore the manual actuation capability to OPERABLE status before the MODULE must be in MODE 2. ~~The Actions~~ Required Action D.2 requires the MODULE be in MODE 3 and PASSIVELY COOLED within 72 hours of entering the condition. The Completion Times provide opportunity for correction of the identified inoperability while maintaining the reactor coolant system closed, minimizing the transients and complexity of a return to operation when OPERABILITY is restored."

   "The Completion Times are reasonable because the credited automatic actuation function remains OPERABLE as specified in LCO 3.3.3, and alternative means of manually initiating the safety function remain available, e.g., manually initiating individual MPS division trip logic and component-level actuations."

   Correct typo as indicated.

   Explain why LCO 3.3.4 only addresses division level manual actuation controls, and not component-level manual actuation controls.

   *Explain why Condition B, for both manual actuation divisions inoperable (loss of division level system manual actuation capability), allows 6 hours **followed by** the 24 hour allowance of Condition D to be in MODE 2, without other Required Actions, which verify OPERABILITY of the automatic actuation logic for ECCS and DHRS, as well as component-level manual actuation controls. Explain why 72 hours is needed to be in MODE 3 and PASSIVELY COOLED.*

   Explain the phrase "while maintaining the reactor coolant system closed, minimizing the transients and complexity of a return to operation."

6. 3.3.4, Manual Actuation Functions, Function 4, Containment Isolation System,

   Required Action I.1: Be in MODE 2. | 6 hours

   Required Action I.2: Be in MODE 3 with RCS temperature hot < 200°F. | 48 hours

   The associated Bases for Required Actions I.1 and I.2 state, "...the MODULE must be placed in MODE 2 within 6 hours and in MODE 3 with the RCS temperature hot < 200 °F within 48 hours. Reducing the RCS temperature to < 200 °F places the MODULE in a MODE or specified condition in which the LCO no longer applies."

   "The Completion Times are reasonable because the credited automatic actuation function remains OPERABLE as specified in LCO 3.3.3, and alternative means of manually initiating the safety function remain available, e.g., manually initiating individual MPS division trip logic and component-level actuations.

Explain why an inoperable ECCS or DHRS manual initiation gets 24 hours to be in MODE 2 and 72 hours to be in MODE 3 and PASSIVELY COOLED, but an inoperable CIS manual initiation gets 6 hours to be in MODE 2 and 48 hours to be in MODE 3 with ~~RCS temperature hot~~ all RCS temperatures below 200 °F.

Explain why Required Action I.2 says "RCS temperature hot < 200°F" instead of "All RCS temperatures < 200°F," as indicated, to be more consistent with Footnote (c), which says, "With any RCS temperature ≥ 200° F."

Correct the typo in Footnote (c), which should say "...≥ 200 °F" or "...≥ 200°F" according to the convention used in the NuScale DCA.

7. 3.3.4, Manual Actuation Functions, Function 7, Pressurizer Heater Trip

Explain why the 48 hours of Condition A, or the 6 hours of Condition B, followed by the 24 hours of Condition G are needed before manually opening the pressurizer heater breakers (de-energizing pressurizer heaters).

*Required Action G.1 should say "De-energize **affected** pressurizer heaters." because Condition G can be entered from Condition A.*

8. 3.4.5, RCS Operational LEAKAGE,

Required Action B.1: Be in MODE 2. | 6 hours

Required Action B.2: Be in MODE 3 with RCS temperature hot < 200 °F. | 48 hours

> The associated Bases for Required Actions B.1 and B.2 state, "The allowed Completion Times are reasonable, based on operating requirements and normal cooling capabilities, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems."

Explain whether "normal cooling capabilities" includes non-safety systems.

Explain why "required plant conditions" is used instead of "required MODULE conditions."

Explain why last sentence says "based on operating requirements and normal plant systems and procedures" instead of "based on operating requirements and only safety-related plant systems and procedures."

9. 3.4.6, Chemical and Volume Control System Isolation Valves,

Required Action C.1: Be in MODE 2. | 6 hours

Required Action C.2: Be in MODE 3 with RCS temperature hot < 200°F. | 48 hours

> The associated Bases for Required Actions C.1 and C.2 do not address the rationale for the Completion Times.

Add Bases for the Completion Times.

Correct typo in Required Action A.2, Note 1, by inserting "devices" after "Isolation."

10. 3.4.7, RCS Leakage Detection Instrumentation,

Required Action C.1: Be in MODE 2. | 6 hours

Required Action C.2: Be in MODE 3 with RCS temperature hot < 200°F. | 48 hours

Explain why "required plant conditions" is used instead of "required MODULE conditions."

Explain why last sentence says "based on operating requirements and normal cooling capabilities" instead of "based on operating requirements and only safety-related cooling requirements."

11. 3.4.8, RCS Specific Activity,

    Required Action C.1: Be in MODE 2. | 6 hours

    Required Action C.2: Be in MODE 3. | 36 hours

    > The associated Bases for Required Actions C.1 and C.2 state, "If ~~the~~ a Required Action and associated Completion Time of Condition A or B is not met, or if the DOSE EQUIVALENT I-131 is > 12 µCi/gm, the reactor must be brought to MODE 2 within 6 hours and MODE 3 within 36 hours. The allowed Completion Times are reasonable, based on operating requirements, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems."

    Correct typo in first line as indicated by markup.

    Explain why the last sentence uses "required plant conditions" instead of "required MODULE conditions."

12. 3.4.9, SG Tube Integrity

    Required Action B.1: Be in MODE 2. | 6 hours

    Required Action B.2: Be in MODE 3 and PASSIVELY COOLED. | 36 hours

    > The associated Bases for Required Actions B.1 and B.2 state, "The allowed Completion Times are reasonable, based on operating experience, to reach the desired plant conditions from full power conditions in an orderly manner and without challenging plant systems."

    *Explain why the last sentence uses "*based on operating experience, to reach the desired *plant conditions" instead of "based on operating requirements, to reach the required MODULE conditions."*

13. 3.5.1, ECCS

    Required Action C.1: Be in MODE 2. | 6 hours

    Required Action C.2: Be in MODE 3 and PASSIVELY COOLED. | 36 hours

    > The associated Bases for Required Actions C.1 and C.2 state, "If the Required Actions cannot be completed within the associated Completion Times, if two or more RVVs, or both RRVs are inoperable the plant must be placed in a condition that does not rely on the ECCS valves opening. To accomplish this, the plant must be shutdown and placed in a safe condition. To do this the plant is shutdown and enters MODE 2 within 6 hours."
    >
    > "Additionally, within 36 hours the PASSIVE COOLING must be established to ensure decay heat is removed and transferred to the UHS."

    Explain why the rationale for these shudown actions differes from that of similar shutdown actions in other subsections. Note that a rationale for the completion times is not explicitly included.

14. 3.5.2, DHRS

    Required Action B.1: Be in MODE 2. | 6 hours

Required Action B.2: Be in MODE 3 and PASSIVELY COOLED. | 36 hours

> The associated Bases for Required Actions B.1 and B.2 state, “If the Required Actions cannot be completed within the associated Completion Time, or if both trains of DHRS are declared inoperable the plant must be placed in a mode that does not rely on the DHRS. To accomplish this the plant must be in MODE 2 within 6 hours and PASSIVE COOLING must be established within 36 hours. This condition ensures decay heat is removed and transferred to the UHS.”

Explain why the rationale for these shudown actions differes from that of similar shutdown actions in other subsections. Note that a rationale for the completion times is not explicitly included.

15. 3.5.3, UHS

    Required Action D.1: Be in MODE 2. | 6 hours

    Required Action D.2: Be in MODE 3. | 36 hours

    > The associated Bases for Required Actions B.1 and B.2 state, “If the UHS level or bulk average temperature cannot be returned to within limits within the associated Completion Time, the plant must be brought to a condition where the decay heat of the plant with the potential to be rejected to the UHS is minimized. To achieve this status, the plant must be brought to MODE 2 within 6 hours and MODE 3 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 and without challenging plant systems.”

    Explain why the last sentence uses “based on operating experience, to reach the required plant conditions” instead of “based on operating requirements, to reach the required MODULE conditions.”

16. 3.6.1, Containment,

    Required Action B.1: Be in MODE 2. | 6 hours

    Required Action B.2: Be in MODE 3 with RCS temperature hot < 200°F. | 48 hours

    > The associated Bases for Required Actions B.1 and B.2 state, “If containment cannot be restored to OPERABLE status within the required Completion Time, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 2 within 6 hours and to MODE 3 with RCS temperature hot < 200ºF within 48 hours(Ref. 3). The allowed Completion Times are reasonable, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.”

    Explain why the last sentence uses “are reasonable, to reach the required plant conditions” instead of “are reasonable, based on operating requirements, to reach the required MODULE conditions.”

17. 3.6.2, Containment Isolation Valves,

    Required Action C.1: Be in MODE 2. | 6 hours

    Required Action C.2: Be in MODE 3 with RCS temperature hot < 200°F. | 48 hours

    > The associated Bases for Required Actions C.1 and C.2 state, “If the Required Actions and associated Completion Times are not met, the plant must be brought to a MODE or condition in which the LCO does not apply. To achieve this status, the

plant must be brought to at least MODE 2 within 6 hours and MODE 3 with RCS temperature hot < 200ºF within 48 hours.

Add Bases for the Completion Times.

16-33

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.

As proposed, some provisions of Subsection 3.1.3 are not clear.

a. The applicant is requested to reformat the Applicabilty statement of Subsection 3.1.3 so that it has the following presentation:

   APPLICABILITY: MODE 1 for upper MTC limit,
   MODES 1 and 2 for lower MTC limit,
   MODE 3 with reactor coolant temperature ≥ 200°F for
   lower MTC limit.

b. For the MODE 3 applicability statement, the applicant is requested to state which of the following reactor coolant temperatures is meant:

   - Reactor coolant system (RCS) coolant temperature cold (Core inlet)
   - RCS coolant temperature hot (Core outlet), or
   - RCS coolant temperature average.

   Also state whether

- All RCS temperature sensors must indicate ≥ 200°F, or
- One or more RCS temperature sensors must indicate ≥ 200°F.

c. The applicant is also requested to revise (1) the Applicability statement to clarify the intended meaning, and (2) the Applicability section of Subsection B 3.1.3 as needed to conform the Bases discussion to the revised MODE 3 applicability statement.

d. The applicant is further requested to (1) revise Required Action B.1 ("Be in MODE 3 with reactor coolant temperature < 200°F.") to be consistent with exiting the Applicability (as clarified) of LCO 3.1.3; (2) clarify whether all RCS coolant temperature sensors must indicate < 200°F, or just certain ones, to complete the action; and (3) revise the Actions section of Subsection B 3.1.3 as needed to conform the Bases discussion to the revised Applicability and Action statements.

16-34

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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SR 3.1.4.1 requires verification of individual control rod assembly (CRA) alignment. The Frequency is modified by a surveillance column Note. The Surveillance and its Note, state (with a staff suggested grammatical enhancement added):

SR 3.1.4.1 ----------NOTE----------
Not required to be performed for rods associated with an inoperable rod position indicator.

Verify position of individual CRAs within alignment limit.

The third paragraph of the Bases for SR 3.1.4.1 states,

> The SR is modified by a Note that permits it not to be performed for rods associated with an inoperable rod position indicator. The alignment limit is based on rod position indicator which is not available if the indicator is inoperable. LCO 3.1.7, "Rod Position Indication," provides Actions to verify the rods are in alignment when one or more rod position indicators are inoperable.

a. The applicant is requested to describe whether other means of determining rod position are available to perform SR 3.1.4.1 (such as provided in the Actions of LCO 3.1.7). If other means are available, discuss whether they should be allowed for determining rod alignment. If they are allowed, then the staff suggests removing the Note, to preclude an interpretation that the Note would allow unit operation with the rod alignment undetermined.

b. The staff notes that the second and third paragraphs of the Applicable Safety Analyses section of Subsection B 3.1.4 need correction for consistency with the Chapter 2.0 SLs, and editing for improved clarity, as follows:

> Accident and transient ~~analysis~~ analyses associated with CRA misalignment, static and dynamic, ~~are analyzed~~ accounting for misalignment of 6 steps at the initiation of the event ~~of 6 steps~~. The results of the CRA misoperation analysis show that during the most limiting misoperation events, no violations of the SAFDLs, ~~fuel centerline temperature, or RCS~~ or the SLs on CHFR, peak Linear Heat Rate, and pressurizer pressure occur.
>
> CRA alignment limits and OPERABILITY requirements satisfy ~~Criteria~~ Criterion 2 of 10 CFR 50.36(c)(2)(ii).

The applicant is requested to make the indicated changes after verifying their technical accuracy.

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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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 applicant is requested to consider revising the following Bases Subsections by inserting "(SAFDLs)" after the first use of the phrase "specified acceptable fuel design limits." Subsequent uses of the phrase within the Subsection should be replaced by "SAFDLs." Note that Subsection B 3.1.1 uses the phrase twice, and Subsection B 3.1.4 uses 'SAFDLs" without having defined it on first use.

B 2.1.1, Background section,

— Paragraph 1, Sentence 1

B 3.1.1, Applicable Safety Analyses (ASA) section,

— Paragraph 1, Sentence 2

— Paragraph 2

B 3.1.4, ASA section,

— Paragraph 1, list item a.1

— Paragraph 2, Sentence 2

B 3.1.5, ASA section, Paragraph 2, list item a.1

B 3.3.1, Background section, Paragraph 1, Sentence 1

16-36

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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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 AP1000 STS Subsetion 3.1.8, "PHYSICS TESTS Exceptions," specifies a CHANNEL OPERATIONAL TEST (COT) in SR 3.1.8.1 for the power range neutron flux and intermediate range neutron flux channels per SR 3.3.1.6, SR 3.3.1.7, and SR 3.3.3.2, with a Frequency of "Once prior to initiation of PHYSICS TESTS." The applicant is requested to justify the omission of an equivalent COT in GTS Subsection 3.1.8.