RAIO-0319-64994

April 02, 2019

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. 512 (eRAI No. 9634) on the NuScale Design Certification Application

REFERENCES:
1. U.S. Nuclear Regulatory Commission, "Request for Additional Information No. 512 (eRAI No. 9634)," dated November 29, 2018
2. NuScale Power, LLC Response to NRC "Request for Additional Information No. 512 (eRAI No.9634)," dated January 10, 2019
3. NuScale Power, LLC Response to NRC "Request for Additional Information No. 512 (eRAI No. 9634)" dated January 29, 2019

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. 9634:

- 16-60-17
- 16-60-38
- 16-60-42
- 16-60-43

Previous responses to RAI 16-60 were submitted in References 2 and 3.

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 Carrie Fosaaen at 541-452-7126 or at cfosaaen@nuscalepower.com.

Sincerely,

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

Distribution: Gregory Cranston, NRC, OWFN-8H12
Samuel Lee, NRC, OWFN-8H12
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Attachment 1: eRAI No. 9634, Question 16-60 Cross Reference Table
Enclosure 1: NuScale Supplemental Response to NRC Request for Additional Information eRAI No. 9634

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NuScale Tracking Number	NRC RAI Sub-paragraph Number	NuScale Letter No.	Submittal Letter Date	Accession Number
16-60-1	1	RAIO-0119-64111	January 10, 2019	ML19010A409
16-60-2	2	pending		
16-60-3	3	RAIO-0119-64281	January 29, 2019	ML19029B572
16-60-4	4	RAIO-0119-64111	January 10, 2019	ML19010A409
16-60-5	5	RAIO-0119-64111	January 10, 2019	ML19010A409
16-60-6	6	RAIO-0119-64178	January 16, 2019	ML19016A374
16-60-7	7	RAIO-0119-64281	January 29, 2019	ML19029B572
16-60-8	8	RAIO-0119-64111	January 10, 2019	ML19010A409
16-60-9	9	RAIO-0119-64281	January 29, 2019	ML19029B572
16-60-10	10	RAIO-0119-64111	January 10, 2019	ML19010A409
16-60-11	11	RAIO-0119-64111	January 10, 2019	ML19010A409
16-60-12	12	RAIO-0119-64111	January 10, 2019	ML19010A409
16-60-13	13	RAIO-0119-64111	January 10, 2019	ML19010A409
16-60-14	14	RAIO-0119-64111	January 10, 2019	ML19010A409
16-60-15	15	RAIO-0119-64111	January 10, 2019	ML19010A409
16-60-16	16	RAIO-0119-64111	January 10, 2019	ML19010A409
16-60-17	17	RAIO-0119-64281	January 29, 2019	ML19029B572
16-60-18	18	RAIO-0119-64281	January 29, 2019	ML19029B572
16-60-19	18	RAIO-0119-64111	January 10, 2019	ML19010A409
16-60-20	19	RAIO-0119-64111	January 10, 2019	ML19010A409
16-60-21	20	RAIO-0119-64281	January 29, 2019	ML19029B572
16-60-22	21	RAIO-0119-64281	January 29, 2019	ML19029B572
16-60-23	22	RAIO-0119-64281	January 29, 2019	ML19029B572
16-60-24	23	RAIO-0119-64281	January 29, 2019	ML19029B572
16-60-25	24	RAIO-0119-64281	January 29, 2019	ML19029B572
16-60-26	25	RAIO-0119-64281	January 29, 2019	ML19029B572
16-60-27	26	RAIO-0119-64281	January 29, 2019	ML19029B572
16-60-28	27	RAIO-0119-64281	January 29, 2019	ML19029B572
16-60-29	28	RAIO-0119-64281	January 29, 2019	ML19029B572
16-60-30	29	RAIO-0119-64281	January 29, 2019	ML19029B572
16-60-31	29	RAIO-0119-64281	January 29, 2019	ML19029B572
16-60-32	29	RAIO-0119-64281	January 29, 2019	ML19029B572
16-60-33	30	RAIO-0119-64281	January 29, 2019	ML19029B572
16-60-34	30	RAIO-0119-64281	January 29, 2019	ML19029B572
16-60-35	31	RAIO-0119-64281	January 29, 2019	ML19029B572
16-60-36	32	RAIO-0119-64111	January 10, 2019	ML19010A409
16-60-37	33	RAIO-0119-64111	January 10, 2019	ML19010A409
16-60-38	34	RAIO-0119-64111	January 10, 2019	ML19010A409

NuScale Tracking Number	NRC RAI Sub-paragraph Number	NuScale Letter No.	Submittal Letter Date	Accession Number
16-60-39	35	RAIO-0119-64111	January 10, 2019	ML19010A409
16-60-40	36	RAIO-0119-64281	January 29, 2019	ML19029B572
16-60-41	37.1	RAIO-0119-64111	January 10, 2019	ML19010A409
16-60-42	37.2	RAIO-0119-64281	January 29, 2019	ML19029B572
16-60-43	37.3	RAIO-0119-64281	January 29, 2019	ML19029B572
16-60-44	38	RAIO-0119-64111	January 10, 2019	ML19010A409
16-60-45	39	RAIO-0219-64635	February 25, 2019	ML19056A587
16-60-46	40	RAIO-0119-64281	January 29, 2019	ML19029B572
16-60-47	41	RAIO-0119-64111	January 10, 2019	ML19010A409
16-60-48	42	RAIO-0119-64111	January 10, 2019	ML19010A409
16-60-49	43	RAIO-0119-64111	January 10, 2019	ML19010A409
16-60-50	44	RAIO-0119-64111	January 10, 2019	ML19010A409
16-60-51	45	RAIO-0119-64111	January 10, 2019	ML19010A409
16-60-52	Tracking number 16-60-52 not used			
16-60-53	46	RAIO-0119-64111	January 10, 2019	ML19010A409
16-60-54	47	RAIO-0119-64111	January 10, 2019	ML19010A409
16-60-55	48	RAIO-0119-64178	January 16, 2019	ML19016A374
16-60-56	49	RAIO-0119-64111	January 10, 2019	ML19010A409
16-60-57	50	RAIO-0119-64111	January 10, 2019	ML19010A409
16-60-58	51	RAIO-0119-64111	January 10, 2019	ML19010A409
16-60-59	52	RAIO-0119-64178	January 16, 2019	ML19016A374
16-60-60	53	RAIO-0219-64635	February 25, 2019	ML19056A587
16-60-61	54	RAIO-0119-64281	January 29, 2019	ML19029B572
16-60-62	55	RAIO-0119-64281	January 29, 2019	ML19029B572
16-60-63	55	RAIO-0119-64281	January 29, 2019	ML19029B572
16-60-64	56, 57, 58	RAIO-0119-64178	January 16, 2019	ML19016A374
16-60-65	59	RAIO-0219-64635	February 25, 2019	ML19056A587
16-60-66	60	RAIO-0219-64635	February 25, 2019	ML19056A587
16-60-67	61	RAIO-0119-64178	January 16, 2019	ML19016A374
16-60-68	62	RAIO-0119-64178	January 16, 2019	ML19016A374
16-60-69	63	RAIO-0119-64178	January 16, 2019	ML19016A374
16-60-70	64	RAIO-0119-64178	January 16, 2019	ML19016A374
16-60-71	65	RAIO-0119-64178	January 16, 2019	ML19016A374
16-60-72	66	RAIO-0119-64281	January 29, 2019	ML19029B572
16-60-73	67	RAIO-0119-64281	January 29, 2019	ML19029B572
16-60-74	68	RAIO-0119-64111	January 10, 2019	ML19010A409
16-60-75	69 (i – iv)	RAIO-0219-64635	February 25, 2019	ML19056A587
16-60-76	69 (v)	RAIO-0219-64635	February 25, 2019	ML19056A587
16-60-77	70	pending		

NuScale Tracking Number	NRC RAI Sub-paragraph Number	NuScale Letter No.	Submittal Letter Date	Accession Number
16-60-78	71	RAIO-0119-64281	January 29, 2019	ML19029B572
16-60-79	72	RAIO-0219-64635	February 25, 2019	ML19056A587
16-60-80	73	RAIO-0219-64635	February 25, 2019	ML19056A587
16-60-81	74	RAIO-0219-64635	February 25, 2019	ML19056A587
16-60-82	75	RAIO-0219-64635	February 25, 2019	ML19056A587

Enclosure 1:

NuScale Supplemental Response to NRC Request for Additional Information eRAI No. 9634

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

eRAI No.: 9634
Date of RAI Issue: 11/29/2018

NRC Question No.: 16-60-17

17. A response is not required because in the November 6, 2018, public meeting conference call, the applicant stated the requested changes will be incorporated in Revision 3 of DCA part 2. In Revision 2 of DCA part 2, FSAR Tier 2 page 3.9-40, last paragraph of Subsection 3.9.4.1.1 under heading **Sensor Coil Assembly**. The first sentence should be two sentences with the indicated corrections:

The sensor coil assembly contains the rod position indication coils. The coil ~~coils the coil~~ assembly slides over the rod travel housing and sits ~~sets~~ on a ledge at the base of the rod travel housing.

NuScale Response:

This supplemental response addresses the unnumbered open item described in Footnote 11 to Table 16.4.8-1 of the draft SER for FSAR Chapter 16, Technical Specifications.

- The term 'refueling' is adopted and replaces 'fuel loading' in the Frequency of SR 3.1.3.1.
- The letter 's' was appended to the acronym 'EFPD' in SR 3.1.2.1 and one other location in LCO 3.1.2.
- The period at the end of the Note to the Frequency of SR 3.1.3.2 was previously incorporated in the Technical Specifications as an editorial correction.
- The word 'is' was inserted into the description of SR 3.1.4.3. The phrase 'reactor criticality' was retained in the Frequency of SR 3.1.4.3 because the test conditions foreseen make this more appropriate for performance of the surveillance on the NuScale design with a small core and fewer CRA.

- The Frequency of SR 3.1.7.1 was modified as suggested. Corresponding changes were made to the associated bases description.
- The words 'is' and 'the' are added to the Surveillance description of SR 3.2.1.1.
- The word 'actuation' was previously added to the description of SR 3.5.1.4 as an editorial correction.
- The description of SR 3.6.2.3 was previously modified as shown in the table.

Impact on DCA:

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

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
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 (EFPDs) after each fuel loading. ---------- Verify overall core reactivity balance is within ±1% Δk/k of predicted values.	Once prior to exceeding 5% RTP after each refueling AND --------NOTE-------- Only required after 60 EFPDs. ---------- In accordance with the Surveillance Frequency Control Program

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.3.1	Verify MTC is within the upper limit.	Once prior to exceeding 5% RTP after each refueling~~fuel loading~~
SR 3.1.3.2	Verify MTC is within the lower limit.	Once within 7 effective full power days (EFPDs) after reaching 40 EFPDs fuel burnup from beginning of cycle (BOC) AND Once within 7 EFPDs after reaching 2/3 fuel burnup from BOC AND -------NOTE------- Only required when projected end of cycle MTC is not within limit. ---------- 7 EFPDs thereafter

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
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.	In accordance with the Surveillance Frequency Control Program
SR 3.1.4.2	Verify rod freedom of movement (trippability) by moving each rod not fully inserted in the core ≥ 4 steps in either direction.	In accordance with the Surveillance Frequency Control Program
SR 3.1.4.3	Verify each CRA drop time is ≤ 2.2 seconds.	Prior to reactor criticality after each removal of the upper reactor pressure vessel section

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.7.1	Verify each RPI channel agrees within 6 steps of the group counter~~demand~~ position indication for the full indicated range of CRA travel.	Prior to criticality after coupling ~~of one or more~~a CRA to the associated CRDM for one or more CRAs

3.2 POWER DISTRIBUTION LIMITS

3.2.1 Enthalpy Rise Hot Channel Factor ($F_{\Delta H}$)

LCO 3.2.1 $F_{\Delta H}$ shall be within the limits specified in the COLR.

APPLICABILITY: MODE 1 with THERMAL POWER ≥ 25% RTP.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. $F_{\Delta H}$ not within limit.	A.1	Reduce THERMAL POWER to < 25% RTP.	6 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.2.1.1	Verify $F_{\Delta H}$ is within the limits specified in the COLR.	Once after each refueling prior to THERMAL POWER exceeding 25% RTP AND In accordance with the Surveillance Frequency Control Program

BASES

SURVEILLANCE REQUIREMENTS

SR 3.1.7.1

Verification that each~~the~~ RPI channel agrees within 6 steps of the counter~~demand~~ position indication~~within 6 steps~~ provides assurance that the RPI channel is operating correctly.

This surveillance is performed prior to reactor criticality after coupling of ~~the~~a CRA to the associated CRDM for one or more CRAs, as there is the potential for unnecessary unit transients if the SR were performed with the reactor critical~~at power~~.

REFERENCES

1. 10 CFR 50, Appendix A, GDC 13.

2. FSAR Chapter 15, "Transient and Accident Analysis."

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

eRAI No.: 9634
Date of RAI Issue: 11/29/2018

NRC Question No.: 16-60-38

34. A separate response is not required, because in the November 6, 2018, public meeting conference call with the staff, NuScale stated it would respond to this sub-question when it responds to RAI 506-9614, Question 16-52, which also addresses GTS Subsection 3.7.1 Actions. In Revision 2 of DCA part 4, on GTS pages 3.7.1-1 and -2, the applicant is requested to revise GTS Subsection 3.7.1, "MSIVs," Actions A and B, as indicated by mark up:

A. One *or more* ~~required MSIV valves~~ *MSIVs* inoperable. | A.1 Isolate the affected main steam line MSIV flow path by use of at least one closed and de-activated automatic valve, closed manual valve, or blind flange. | 72 hours AND A.2 Verify the affected main steam line MSIV flow path is isolated. | Once per 7 days

B. One *or more* ~~required~~ MSIV bypass *valves* inoperable. | B.1 Isolate the affected main steam line bypass flow path by use of at least one closed and de-activated automatic valve, closed manual valve, or blind flange. | 72 hours AND A.2 Verify the affected main steam line bypass flow path is isolated. | Once per 7 days

The staff observes that the word "required" in Conditions A and B appears to be unnecessary. The LCO requires two operable MSIVs and two operable MSIV bypass valves in the common main steam line from each SG. As long as the MSIV and associated MSIV bypass valve in either the inner valve set or outer valve set, are capable of closing with leakage within the specified limits, the main steam line isolation function to support the actuation of the associated DHRS train remains operable, although there is no capability to withstand a single failure of one of these valves.

The applicant is requested to confirm that the intent of the word "required" is to convey that an MSIV and associated bypass valve are not "required" to be operable for automatic closure if (1) the other MSIV and associated bypass valve in the same main steam line are both closed and de-activated with leakage within specified limits, or (2) the associated flow paths containing the other MSIV and associated bypass valve are otherwise isolated by use of at least one closed manual valve, or blind flange with leakage within specified limits. If this is correct, the applicant is requested to revise Subsection B 3.7.1 by adding an explicit discussion explaining the intended meaning of the word 'required.' This explanation should discuss that each main steam line contains four flow paths, (1) an inner pair of parallel flow paths, one with an MSIV and one with an MSIV bypass valve, located just outside the containment vessel downstream of the steam line penetration, and (2) an outer pair of parallel flow paths, one with an MSIV and one with an MSIV bypass valve, located downstream of the main steam line spool piece. Isolation of a main steam line requires at least the isolation of either the inner pair of flow paths or the outer pair of flow paths.

The applicant is requested to clarify Actions table Note 1, as indicated: "Separate Condition entry is allowed for each MSIV and each MSIV bypass ~~inoperable~~ valve." It is understood that Conditions are entered for inoperable valves, which are required to be operable by the LCO.

As written, Condition A applies when one SG's main steam line has (1) an open MSIV flow path which is incapable of isolation using the MSIV on either an automatic or manual actuation signal, or (2) an open or closed MSIV with leakage outside the specified limit. By specifying that separate Condition entry is allowed for each MSIV, Condition A could be stated as "One or more MSIV flow paths with the MSIV inoperable." Likewise, Condition B could be stated as "One or more MSIV bypass flow paths with the MSIV bypass valve inoperable."

NuScale Response:

This response supplements the original submittal (ML19010A409) made in response to RAI 16-60 on January 10, 2019 in letter RAIO-0119-64111. It addresses a comment in the Chapter 16 draft Safety Evaluation Report on page 16-96 regarding Question 16-60, Subquestion 34, NuScale number 16-60-38.

The word 'inoperable' was removed from the locations identified in the staff's question.

Impact on DCA:

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

3.1 REACTIVITY CONTROL SYSTEMS

3.1.7 Rod Position Indication (RPI)

LCO 3.1.7 The Control Rod Drive System (CRDS) Rod Position Indicators~~ion~~ (RPIs) ~~System~~ and the Control Rod Assembly (CRA) Counter Position Indicators~~ion~~ (CPIs) ~~System~~ shall be OPERABLE.

APPLICABILITY: MODE 1.

ACTIONS

----------NOTE----------
Separate Condition entry is allowed for each ~~inoperable~~ CRDS rod position indicator and each CRA counter position indicator.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One RPI per CRDM inoperable for one or more CRDMs.	A.1 Verify the position of the CRA with inoperable position indicators with the Module Control System (MCS).	Once per 8 hours
B. More than one RPI per CRDM inoperable.	B.1 Place the CRA under manual control. AND B.2 Verify the position of the CRA with inoperable CRDS position indicators indirectly by using the in-core neutron detectors. AND	Immediately Once per 8 hours

3.7 PLANT SYSTEMS

3.7.1 Main Steam Isolation Valves (MSIVs)

LCO 3.7.1 Two MSIVs and two MSIV bypass valves per steam line shall be OPERABLE.

APPLICABILITY: MODES 1 and 2,
MODES 3 and not PASSIVELY COOLED.

ACTIONS

----------NOTES----------

1. Separate Condition entry is allowed for each inoperable valve.

2. Main steam line flow path(s) may be unisolated intermittently under administrative controls.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ----------NOTE---------- Separate Condition entry is allowed for each valve. ---------- One or more required MSIV valves inoperable.	A.1 Isolate the affected main steam line flow path by use of at least one closed and de-activated automatic valve, closed manual valve, or blind flange. AND A.2 ----------NOTES---------- 1. Isolation in high radiation areas may be verified by use of administrative means. 2. Isolation devices that are locked, sealed, or otherwise secured may be verified by use of administrative means. ---------- Verify the affected main steam line flow path is isolated.	72 hours Once per 7 days

3.7 PLANT SYSTEMS

3.7.2 Feedwater Isolation

LCO 3.7.2 One Feedwater Isolation Valve (FWIV) and one Feedwater Regulation Valve (FWRV) for each steam generator shall be OPERABLE.

APPLICABILITY: MODES 1 and 2,
MODES 3 and not PASSIVELY COOLED.

ACTIONS

----------NOTES----------

1. Separate Condition entry is allowed for each inoperable valve.

2. Feedwater flow path(s) may be unisolated intermittently under administrative controls.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or two FWIVs inoperable.	A.1 Isolate the affected FWIV flow path by use of at least one closed and de-activated automatic valve, closed manual valve, or blind flange. AND A.2 ----------NOTES---------- 1. Isolation in high radiation areas may be verified by use of administrative means. 2. Isolation devices that are locked, sealed, or otherwise secured may be verified by use of administrative means. ---------- Verify FWIV path isolated.	72 hours Once per 7 days

BASES

APPLICABILITY (continued)

regulating ~~groups~~banks has the potential to affect the required SDM, but this effect can be compensated for by an increase in the boron concentration of the Reactor Coolant System (RCS).

ACTIONS

The ACTIONS table is modified by a Note indicating that a separate Condition entry is allowed for each ~~inoperable counter position indicator~~CPI and each RPI indicator. This is acceptable because the Required Actions for each Condition provide appropriate compensatory actions for each inoperable position indicator.

A.1

When one channel of RPI ~~train~~sensors per CRDM fails, the position of the CRA can still be determined by use of the ~~I~~in-~~C~~core ~~I~~instrumentation ~~S~~system ~~(ICIS)~~. Normal power operation does not require excessive movement of groups. If a group has been significantly moved, the Actions of B.1 or B.2 below are required. Therefore, verification of CRA position within the Completion Time of 8 hours is adequate to allow continued full power operation, since the probability of simultaneously having a CRA significantly out of position and an event sensitive to that CRA position is small.

B.1, B.2, and B.3

When more than one channel of RPI ~~train~~ sensors per CRA fails, additional actions are necessary to ensure that acceptable power distribution limits are maintained, minimum SDM is maintained, and the potential effects of CRA misalignment on associated accident analyses are limited. Placing the rod control function in manual mode ensures unplanned CRA motion will not occur. Together with the position determination available via the ~~ICIS~~in-core instrumentation system, this will minimize the potential for CRA misalignment. The immediate Completion Time for placing the Rod Control function in manual mode reflects the urgency with which unplanned rod motion must be prevented while in this Condition.

The position of the CRAs may be determined indirectly by use of the ~~ICIS.~~in-core instrumentation system neutron detectors. Plant procedures define the required number and locations of in-core neutron detectors that must function to permit evaluation of the CRA position.

BASES

ACTIONS (continued)

~~D.1 and D.2~~

~~With Required Actions and associated Completion Times not met, isolation capability of the main steam line(s) is not maintained. The associated DHRS and the ability to isolate postulated releases from the SGs are affected. The unit must be placed in a condition in which the LCO does not apply using Required Action D.1 and D.2.~~

~~Required Action D.1 requires the unit must be placed in MODE 2 within 6 hours.~~

~~Required Action D.2 requires the unit to be in MODE 3 and PASSIVELY COOLED within 36 hours.~~

~~The Completion Times are reasonable based operating activities required to reach these conditions in an orderly manner. The time permits use of normal means to exit the conditions of Applicability. It is also consistent with the Completion Times for an inoperable train of the DHRS.~~The ACTIONS are modified by a Note indicating that steam line flow paths may be unisolated intermittently under administrative control. These administrative controls consist of stationing a dedicated operator at the device controls, who is in continuous communication with the control room. In this way, the MSIV flow path can be rapidly isolated when a need is indicated.

A.1 and A.2

This Conditions is modified by a Note stating that a separate Condition entry is allowed for each valve. This is acceptable because the Required Actions provide appropriate compensatory actions for each inoperable isolation valve. The series-parallel valve arrangement could result in multiple valves being inoperable and the redundant capability to isolate the steam line maintained.

With a required valve open and inoperable, isolation of the main steam flow using that valve to perform the credited isolation function can no longer be assured. The isolation function could be susceptible to a single failure because only the redundant isolation valves on the affected steam line maintain the ability to isolate the effected steam flow.

BASES

APPLICABLE SAFETY ANALYSES (continued)

removes post-reactor trip residual and core decay heat and allows transition of the reactor to safe shutdown conditions. The FWIV and FWRV have a specific leakage criteria to maintain DHRS inventory.

The FWIV and FWRV satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

This LCO requires the FWIVs and FWRV in each of the two feedwater lines to be OPERABLE. The valves are considered OPERABLE when their isolation times are within limits and they close on an isolation actuation signal and their leakage is within limits.

This LCO provides assurance that the FWIVs will perform their design safety function and the FWRVs their non-safety function to limit consequences of accidents that could result in offsite exposures comparable to the 10 CFR 50.34 limits or the NRC staff approved licensing basis.

APPLICABILITY

The FWIVs and FWRVs must be OPERABLE whenever there is significant mass and energy in the Reactor Coolant System and the steam generators. This ensures that, in the event of a high energy line break, a single failure cannot result in the blowdown of more than one steam generator, an inoperability of the DHRS, or a containment bypass path in the event of a steam generator tube failure. In MODE 1 and 2 FWIVs and FWRVs are required to be OPERABLE to limit the amount of available fluid that could be added to containment in case of a secondary system pipe break inside containment. In MODE 3 and not PASSIVELY COOLED, the FWIVs and FWRV are required to be OPERABLE, to support DHRS operability.

In MODES 4 and 5 the steam generators energy is low. Therefore, the MFIVs and MFRVs are normally closed since MFW system is not required.

ACTIONS

The ACTIONS table is modified by two Notes. The first being that separate entry is allowed for each ~~inoperable~~ valve. This is acceptable because the ACTIONS table provide actions for individual component entry. The second indicating that FWIV flow path may be unisolated intermittently under administrative control.

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

eRAI No.: 9634
Date of RAI Issue: 11/29/2018

NRC Question No.: 16-60-42

37.2 In Revision 2 of DCA part 4, the various Required Actions to isolate the demineralized water source to the CVCS makeup pumps are phrased in a variety of ways; these Actions are LCO 3 1.9 Action B, LCO 3.3.1 Actions H and M, LCO 3.3.3 Action E, and LCO 3.3.4 Action E. The staff requests that the applicant consider phrasing these Required Actions more consistently, since they all intend to accomplish the same objective of precluding the CVCS system from injecting demineralized water and diluted boric acid from the boron addition system into the RCS.

NuScale Response:

The staff identified a concern related to the initial RAI in the draft safety evaluation report for Chapter 16, Technical Specifications where they indicated

> ...that LCO 3.1.9, “Boron Dilution Control,” Action B, requires isolating the dilution source, which completes the safety function of the DWSI makeup isolation valves. It appears that the Applicability of LCO 3.1.9 would be more accurate by stating: “MODES 1, 2, and 3 with any CVCS demineralized water isolation valve open.” The staff is tracking the resolution of this Applicability suggestion, as well as the above suggested edits, as an editorial open item under RAI 512-9634, Question 16-60, Subquestions 37.1 and 37.2. [NRC Subquestion 37.2 is tracked as RAI 16-60-42 by NuScale.]

NuScale has revised the Applicability and bases for LCO 3.1.9 to align with the exit condition of Action B, and consistent with the safety function of isolating possible sources of dilution flow via the CVCS makeup line.

Impact on DCA:

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

3.1 REACTIVITY CONTROL SYSTEMS

3.1.9 Boron Dilution Control

LCO 3.1.9 Two CVCS demineralized water isolation valves shall be OPERABLE.

AND

Boric Acid supply boron concentration shall be within the limits specified in the COLR.

AND

Maximum CVCS makeup pump demineralized water flow path flowrate shall be~~is~~ within the limits specified in the COLR.

APPLICABILITY: MODES 1, 2, and 3 with any dilution source flow path in the CVCS makeup line not isolated.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One CVCS demineralized water isolation valve inoperable.	A.1 Restore CVCS demineralized water isolation valves to OPERABLE status.	72 hours

BASES

LCO

The requirement that two demineralized water isolation valves be OPERABLE assures that there will be redundant means available to terminate an inadvertent boron dilution event. The requirement that the boron concentration of the boric acid supply be maintained within the limits specified in the COLR ensures that the supply is not a source to the CVCS that could result in an inadvertent boron dilution event.

The limits on maximum CVCS makeup pump demineralized water flow path flowrate are established by restricting the flow that can be provided during system operation to within the limits in the COLR. The restrictions may be implemented by use of at least one closed manual or one closed and de-activated automatic valve, or by removing the power supply from one CVCS makeup pump.

APPLICABILITY

The requirement that two demineralized water isolation valves be OPERABLE, and that the boric acid storage tank boron concentration and maximum CVCS makeup pump demineralized water flow path flowrate is within the limits specified in the COLR is applicable in MODES 1, 2, and 3 with any dilution source flow path in the CVCS makeup line not isolated. In these MODES, a boron dilution event is considered possible, and the automatic closure of these valves is assumed in the safety analysis. The boron concentration of the boric acid sources are not assumed to be capable of causing a dilution event by the boron dilution event analysis. The maximum CVCS makeup pump demineralized water flow path flowrate is an assumption of the boron dilution event.

In MODE 1 < 15% RTP, the detection and mitigation of a boron dilution event would be signaled by a High Source or Intermediate Range Log Power Rate or a High Source Range Count Rate.

In MODE 1 ≥ 15% RTP, the detection and mitigation of a boron dilution event would be signaled by a High Power Range Rate or High Power Range Linear Power. In MODES 2 and 3, the detection and mitigation of a boron dilution event would be signaled by a Source Range High Count Rate trip, a trip on Source Range High Log Power Rate, or a trip on High Subcritical Multiplication, or low RCS flow.

In MODES 4 and 5, a dilution event is precluded because the CVCS RCS injection and discharge flow paths are~~is~~ not connected to the ~~normal CVCS~~RCS, thus eliminating the possibility of a boron dilution event in the RCS. Pool volume is sufficient to minimize the potential for boron dilution during MODE 5 within the surveillance intervals provided by LCO 3.5.3, Ultimate Heat Sink.

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

eRAI No.: 9634
Date of RAI Issue: 11/29/2018

NRC Question No.: 16-60-43

37.3 Coordinate response to this sub-question with the response to similar Sub-question No. 7. In Revision 2 of DCA part 4, Required Action E.1 of LCO 3.3.1 states "Reduce THERMAL POWER" to below the N-2L interlock. | 6 hours"; this Action applies to the following MPS Functions which are applicable in Mode 1 with power above the N-2H interlock according to Footnote (b) of Table 3.3.1-1.

2.a RTS on High Power Range Positive and Negative Rate

18.a RTS on Low Main Steam Pressure

18.b DHRS on Low Main Steam Pressure

18.c PHT on Low Main Steam Pressure

The staff observes that to be consistent, Required Action E.1 ought to say N-2H instead of N-2L. However, since both interlocks use 15% RTP to switch from active to inactive, this error appears to have no practical impact on the meaning of the action statement. Nevertheless, the applicant is requested to make this correction

NuScale Response:

LCO 3.3.1, Required Action E.1 has been modified to align with the applicability of footnote (b) to Table 3.3.1-1 by referring to the N-2H interlock rather than the N-2L interlock. Corresponding changes were made to the Bases for LCO 3.3.1.

Impact on DCA:

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

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. As required by Required Action C.1 and referenced in Table 3.3.1-1.	D.1 Open reactor trip breakers.	6 hours
E. As required by Required Action C.1 and referenced in Table 3.3.1-1.	E.1 Reduce THERMAL POWER to below the N-2~~L~~H interlock.	6 hours
F. As required by Required Action C.1 and referenced in Table 3.3.1-1.	F.1 ----------NOTE---------- ~~CVCS f~~Flow path~~(s)~~ may be unisolated intermittently under administrative controls. ---------- Isolate the ~~CVCS~~ flow paths between the CVCS and the ~~to the~~ Reactor Coolant System ~~(RCS)~~.	6 hours
G. As required by Required Action C.1 and referenced in Table 3.3.1-1.	G.1 ----------NOTE---------- Pressurizer Heater breakers may be closed intermittently under administrative controls. ---------- Open pressurizer heater breakers	6 hours
H. As required by Required Action C.1 and referenced in Table 3.3.1-1.	H.1 ~~Isolate demineralized water flow path to RCS.~~Isolate dilution source flow paths in the CVCS makeup line by use of at least one closed manual or one closed and de-activated automatic valve.	1 hour

BASES

ACTIONS (continued)

- 20a, Steam Superheat – High (RTS)
- 20b, Steam Superheat – High (DHRS)
- 21a, Steam Superheat – Low (RTS)
- 21b, Steam Superheat – Low (DHRS)
- 22a, NR Containment Pressure – High (RTS)

If a Required Action associated with Condition A or B cannot be completed within the required Completion Time for the referenced MPS Function, or three or more channels of the referenced MPS Function are inoperable, the unit must be brought to a MODE or other specified condition where the LCO and Required Actions for the referenced MPS Function do not apply. This is accomplished by opening the reactor trip breakers. The above MPS Functions that result in a reactor trip or DHRS actuation are not required to be OPERABLE when the reactor trip breakers are open. The Completion Time of 6 hours is reasonable, based on operating experience, for reaching the required MODE from full power conditions in an orderly manner.

E.1

Condition E is entered when Condition C applies to Functions that result in a reactor trip signal when reactor THERMAL POWER is above the N-2~~L~~H interlock, as listed in Table 3.3.1-1.

If the Required Actions associated with this Condition cannot be completed within the required Completion Time, the unit must be brought to a MODE or other specified condition where the Required Actions do not apply. This is accomplished by reducing THERMAL POWER to below the N-2~~L~~H interlock. The allowed Completion Time for E.1 of 6 hours is reasonable, based on operating experience, for reaching the required condition from full power conditions in an orderly manner.

F.1

Condition F is entered when Condition C applies to Functions that result in isolation of the CVCS system as listed in Table 3.3.1-1