



March 16, 2018

Docket No. 52-048

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
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Rockville, MD 20852-2738

SUBJECT: NuScale Power, LLC Supplemental Response to NRC Request for Additional Information No. 57 (eRAI No. 8865) on the NuScale Design Certification Application

REFERENCES: 1. U.S. Nuclear Regulatory Commission, "Request for Additional Information No. 57 (eRAI No. 8865)," dated June 09, 2017
2. NuScale Power, LLC Response to NRC "Request for Additional Information No. 57 (eRAI No.8865)," dated July 11, 2017
3. NuScale Power, LLC Supplemental Response to NRC "Request for Additional Information No. 57 (eRAI No. 8865) on the NuScale Design Certification Application," date December 7, 2017 (ML17341A930)

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 Question from NRC eRAI No. 8865:

- 16-1

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

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Enclosure 1: NuScale Supplemental Response to NRC Request for Additional Information eRAI No. 8865



Enclosure 1:

NuScale Supplemental Response to NRC Request for Additional Information eRAI No. 8865

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

eRAI No.: 8865

Date of RAI Issue: 06/09/2017

NRC Question No.: 16-1

NuScale FSAR Tier 2, Section 6.2.4.2.2, "Component Description," describes the actuation system of the containment isolation valves (CIVs) as a gas-hydraulic system:

"Hydraulic actuators are used for both PSCIV and SSCIV designs....Maintaining the hydraulic system pressure supplies the force to keep the valve in the open position. Pre-charged, nitrogen-filled cylinders are mounted on the "closed" side of each actuator. The gases in the cylinders are compressed as part of the valve opening action. Compression of the gas in each cylinder provides the passive stored energy used for valve closure."

Containment isolation is a function relied upon to mitigate a design basis accident. Knowing the pressure in each actuator is a means to determine that the passive stored energy used for valve closure is adequate. RG 1.206 Section 6.2.4, "Containment Isolation System," states that an applicant should discuss the assurance of operability of valves and valve operators. However, the NuScale FSAR does not describe the operator's ability to monitor (e.g., indication and alarm) each containment isolation valve's gas pressure to ensure the valve is operable.

10 CFR 50.36, "Technical Specifications," requires, in part, that a technical specification limiting condition for operation be established (e.g., for a system that is part of the primary success path and which functions or actuates to mitigate a design basis accident) and will include surveillance requirements, in part, to ensure the limiting conditions of operation will be met. The NuScale Technical Specifications describe CIV limiting conditions for operation but do not discuss surveillance requirements related to isolation valve gas pressure.

Therefore, based on the regulation and guidance cited above, the NRC staff requests that the NuScale design certification applicant provide information in the FSAR on the assurance of operability of CIV valves and valve operators, and in the FSAR and Technical Specifications for how the operator can assure that the isolation valve can perform its safety function (e.g., gas-spring is sufficiently charged and available to support valve closure). The information is needed in order for the staff to make a regulatory decision regarding the adequacy of assuring that the CIVs are able to perform their safety functions.

NuScale Response:

The pressure required to assure OPERABILITY of safety-related valves described in the Surveillance Requirements listed below and addressed in RAI 8865 16-1 will be established and maintained in accordance with the INSERVICE TESTING PROGRAM (IST). The pressure limit will include consideration of temperature effects on the accumulator pressure. The associated Surveillance Requirements are:

- SR 3.4.6.1 CVCS Isolation Valves
- SR 3.5.2.1 DHRS Actuation Valves
- SR 3.6.2.1 Containment Isolation Valves
- SR 3.7.1.1 Main Steam Isolation Valves
- SR 3.7.2.1 Feedwater Isolation Valves

The Bases are modified to reflect the inclusion and maintenance of the accumulator pressure limits in the IST program.

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)

B.1

With two CVCS isolation valves in one or more penetration flow paths inoperable, the affected penetration flow path must be isolated within 1 hour. The method of isolation must include the use of at least one isolation device that cannot be adversely affected by a single active failure. Isolation devices that meet this criterion are a closed and deactivated automatic valve, a closed manual valve, and a blind flange.

The 1 hour Completion Time is consistent with the ACTIONS of LCO 3.6.2. In the event the affected penetration is isolated in accordance with Required Action B.1, the affected penetration must be verified to be isolated on a periodic basis per Required Action A.2, which remains in effect. This periodic verification is necessary to assure leak tightness of containment and that penetrations requiring isolation following an accident are isolated. The Completion Time of once per 31 days for verifying each affected penetration flow path is isolated is appropriate considering the fact that the devices are operated under administrative controls and the probability of the misalignment is low.

C.1 and C.2

If the Required Actions and associated completion Times are not met, the unit must be brought to a MODE or condition in which containment isolation requirement no longer applies. To achieve this status, the unit must be brought to at least MODE 2 within 6 hours and MODE 3 with RCS hot temperature < 200°F within 48 hours. The allowed Completion Times are reasonable to reach the required unit conditions from full power conditions in an orderly manner.

SURVEILLANCE REQUIREMENTS

SR 3.4.6.1

This SR verifies adequate pressure in the accumulators required for CVCS isolation valve OPERABILITY. The pressure limits required for OPERABILITY, including consideration of temperature effects on those limits, applicable to the valve accumulators are established and maintained in accordance with the INSERVICE TESTING PROGRAM. The Frequency is controlled under the Surveillance Frequency Control Program.

BASES

SURVEILLANCE
REQUIREMENTSSR 3.5.2.1

This SR verifies adequate pressure in the accumulators required for DHRS actuation valve OPERABILITY. The pressure limits required for OPERABILITY, including consideration of temperature effects on those limits, applicable to the valve accumulators are established and maintained in accordance with the INSERVICE TESTING PROGRAM. The Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.5.2.2

Verification that the DHRS including the heat exchanger is filled ensures that there is sufficient inventory in the loop to fulfill its design function, and that non-condensable gases have not accumulated in the system. Each train of the DHRS has four level sensors - two located on the DHRS piping below each of the two actuation valves that would indicate a reduced water level in the DHRS loop. Any level switch indicating a reduced water level is sufficient to determine the DHRS loop is not filled. The DHRS is filled with feedwater during startup, and during normal operation it is maintained filled by feedwater pressure. Feedwater flow through the DHRS loop does not occur because the DHRS actuation valves are closed.

Dissolved gas concentrations are maintained very low in feedwater during startup and operations by secondary water chemistry requirements. Therefore, significant levels of noncondensable gases are not expected to accumulate in the DHRS piping. However, maintaining the required DHRS inventory using the level sensors protects against buildup of noncondensable gases which could adversely affect DHRS operation. Monitoring the level switches ensures the system remains filled and non-condensable gas accumulation has not occurred.

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

SR 3.5.2.3

Verification that the DHRS actuation valves are OPERABLE by stroking the valves open ensures that each train of DHRS will function as designed when these valves are actuated. The DHRS actuation valves safety function is to open as described in the safety analysis.

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

BASES

SURVEILLANCE
REQUIREMENTS

SR 3.6.2.1

This SR verifies adequate pressure in the accumulators required for containment isolation valve OPERABILITY. The pressure limits required for OPERABILITY, including consideration of temperature effects on those limits, applicable to the valve accumulators are established and maintained in accordance with the INSERVICE TESTING PROGRAM. The Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.6.2.2

This SR requires verification that each manual containment isolation valve and blind flange located outside containment, and not locked, sealed, or otherwise secured in position, and required to be closed during accident conditions, is closed. The SR helps to ensure that post accident leakage of fission products outside the containment boundary is within design limits. This SR does not require any testing or device manipulation. Rather, it involves verification that those containment isolation devices outside containment and capable of being mispositioned are in the correct position.

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

This SR specifies that containment isolation valves that are open under administrative controls are not required to meet the SR during the time the valves are open. This SR does not apply to devices that are locked, sealed, or otherwise secured in the closed position, since these were verified to be in the correct position upon locking, sealing, or securing.

The Note applies to valves and blind flanges located in high radiation areas and allows these devices to be verified closed by use of administrative means. Allowing verification by administrative means is considered acceptable, since access to these areas is typically restricted in MODES 1, 2, and 3 with RCS hot temperature $\geq 200^{\circ}$ F for ALARA reasons.

Therefore, the probability of misalignment of these containment isolation valves, since they have been verified to be in the proper position, is small.

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.

SURVEILLANCE
REQUIREMENTS

SR 3.7.1.1

This SR verifies adequate pressure in the accumulators required for MSIV and main steam line bypass isolation valve OPERABILITY. The pressure limits required for OPERABILITY, including consideration of temperature effects on those limits, applicable to the valve accumulators are established and maintained in accordance with the INSERVICE TESTING PROGRAM. The Frequency is controlled under the Surveillance Frequency Control Program.

BASES

ACTIONS (continued)

and deactivated automatic valve, closed manual valve, or blind flange. An inoperable FWIV/FWRV may be utilized to isolate the line only if its leak tightness has not been compromised. This action returns the system to a condition in which at least one valve in the affected flow path is performing the required safety function. The 8 hour Completion Time is a reasonable amount of time to complete the actions required to close the FWIV, or FWRV, which includes performing a controlled unit shutdown without challenging plant systems.

D.1, and D.2

If the FWIVs and FWRVs cannot be restored to OPERABLE status, or closed, or isolated within the associated Completion Time, the unit must be placed in a MODE in which the LCO does not apply. To achieve this status, the unit must be placed in at least MODE 2 within 6 hours, in MODE 3 and PASSIVELY COOLED within 36 hours. The allowed Completion Times are reasonable, to reach the required unit conditions from full power conditions in an orderly manner.

SURVEILLANCE REQUIREMENTS

SR 3.7.2.1

This SR verifies adequate pressure in the accumulators required for feedwater isolation valve OPERABILITY. The pressure limits required for OPERABILITY, including consideration of temperature effects on those limits, applicable to the valve accumulators are established and maintained in accordance with the INSERVICE TESTING PROGRAM. The Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.7.2.2

This SR verifies that the closure time of each FWIV and FWRV is within limits, on an actual or simulated actuation signal. The FWIV and FWRV isolation times are assumed in the accident and containment analyses. This Surveillance is normally performed upon returning the unit to operation following a refueling outage. These valves are tested when the unit is in a shutdown condition, since even a part stroke exercise increases the risk of a valve closure when the unit is generating power. Because the isolation valves are not tested when the unit is in a shutdown condition, they are exempt from ASME OM Code (Ref. 5) requirements during operation in MODE 1.

The Frequency is in accordance with the INSERVICE TESTING PROGRAM.