RAIO-0318-59209

March 20, 2018

Docket No. 52-048

U.S. Nuclear Regulatory Commission
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SUBJECT: NuScale Power, LLC Response to NRC Request for Additional Information No. 359 (eRAI No. 9321) on the NuScale Design Certification Application

REFERENCE: U.S. Nuclear Regulatory Commission, "Request for Additional Information No. 359 (eRAI No. 9321)," dated February 02, 2018

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

The Enclosure to this letter contains NuScale's response to the following RAI Question from NRC eRAI No. 9321:

- 06.04-3

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 Steven Mirsky at 240-833-3001 or at smirsky@nuscalepower.com.

Sincerely,

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Enclosure 1: NuScale Response to NRC Request for Additional Information eRAI No. 9321

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NuScale Response to NRC Request for Additional Information eRAI No. 9321

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

eRAI No.: 9321
Date of RAI Issue: 02/02/2018

NRC Question No.: 06.04-3

Reactor operators are important to nuclear safety. To support its finding on the control room and that operators can be safely at the controls under GDCs 1, 3, 4, 5, 19 and 50.54, the staff needs additional information and assurance of known operability and availability of the control room envelope. Further, 10 CFR 50.36 (c)(2)(ii)(A), Criterion 1, requires that a technical specification limiting condition for operation be established for installed instrumentation in the control room used to detect significant abnormal degradation of the reactor coolant pressure boundary. For this criterion to be meaningful an operator must be able to be present in the control room during normal and accident conditions to monitor and respond to that condition. While NuScale states that operator action is not needed to mitigate a design-basis accident, operators are expected to be in the control room and a safe environment for workers is expected.

NuScale is requested to provide a TS limiting condition for operation for assurance that the control room envelope is suitable for operator presence, including but not limited to, identifying operability conditions/criteria of the CRE, expected time to restore operability, any necessary compensatory and follow-on actions, and surveillance requirement(s) for essential components.

If NuScale believes any feature requested above is the responsibility of the license applicant, provide the location that describes, or include in the DCD, the COL Action as a specific item.

NuScale Response:

NuScale considers the ability of the operating staff to remain in the control room during postulated radiological releases important and has included design features to assure they can do so. These features include ventilation system capability to provide isolation, filtered external supply, and an onsite reserve of air if the other features become unavailable. However, the NuScale design does not rely on operators to perform safety-related functions, so that protection of the health and safety of the public does not rely on the operating staff to remain in the control room. Because of the reduced importance to safety of operability and availability of the control room envelope in the NuScale design, the

10 CFR 50.36 criteria are not met for inclusion of an LCO in the NuScale technical specifications.

Specifically, with respect to Criterion 1 of 10 CFR 50.36(c)(2)(ii)(A), creating an LCO to assure the control room envelope is suitable for operator presence is inconsistent with NRC policy, guidance, and industry experience. The interpretation of Criterion 1 of 10 CFR 50.36(c)(2)(ii)(A) is provided in the NRC Final Policy Statement on Technical Specifications Improvements for Nuclear Power Reactors, 58 FR 39132, which states:

> A basic concept in the adequate protection of the public health and safety is the prevention of accidents. Instrumentation is installed to detect significant abnormal degradation of the reactor coolant pressure boundary so **as to allow operator actions to either correct the condition or to shut down the plant safely, thus reducing the likelihood of a loss-of-coolant accident.**
>
> This criterion is intended to ensure that Technical Specifications control those instruments specifically installed to detect excessive reactor coolant system leakage. This criterion should not, however, be interpreted to include instrumentation to detect precursors to reactor coolant pressure boundary leakage or instrumentation to identify the source of actual leakage (e.g., loose parts monitor, seismic instrumentation, valve position indicators). *(emphasis added)*

As described in the Policy Statement, the instrumentation addressed in Criterion 1 is used to reduce the likelihood of a loss-of-coolant accident (LOCA) by detecting leakage that could indicate significant primary coolant system boundary degradation. The instrumentation is not credited in the response to a loss-of-coolant event that has occurred. It is not credited to detect or mitigate any other design basis event, nor is it credited to function during or after a design basis event. Therefore, there is no reason to extend application of Criterion 1 to include control room habitability during or after a design basis event because there is no need to monitor this instrumentation in these circumstances.

Six standard Technical Specifications (TS) have been published in NUREGs 1430 through 1434 and NUREG 2194, and one generic TS has been approved by the staff (ESBWR) that include Bases for the requirements specified in the limiting conditions for operation (LCOs) related to Control Room Habitability. None of the aforementioned seven technical specifications Bases for Control Room ventilation, isolation, and filtration identify or otherwise associate Criterion 1 as a reason for including the LCOs in the TS. Rather each indicates that the requirements are based on the need for control room staff to perform actions necessary to achieve and maintain safe shutdown.

The only specifications that are listed in each of the approved standard or generic TS to satisfy Criterion 1 are those related to RCS leakage instrumentation. The NuScale TS include LCO 3.4.7, Reactor Coolant System Leakage Detection Instrumentation that lists Criterion 1 as its reason for inclusion.

Additionally, the application of this criteria does not apply in these circumstances to the NuScale design because the passive NuScale response to a LOCA condition includes ECCS actuation which results in opening of the ECCS valves. This action obviates the purpose of the RCS boundary as a leak-tight pressure retaining component. The ECCS actuates by 'opening' the RCS to the containment volume and initiating passive cooling to the ultimate heat sink. Based on this design feature, there is no reason for an operator to monitor for reactor coolant pressure boundary leakage during accident conditions. Therefore, the RAI statement implying a need for an operator to monitor and respond to reactor coolant pressure boundary leakage during accident conditions is not applicable to the NuScale passive design.

Although control room envelope operability does not meet the criteria for inclusion within the technical specifications, NuScale is including availability and reliability controls, including periodic testing, in the owner-controlled requirements manual. This is consistent with the Policy for relocation of requirements that were formerly in technical specifications at existing plants. These controls provide assurance, commensurate with the importance to safety of control room availability for the NuScale design, that the control room radiological protection features will be maintained available in a manner similar to all non-technical specification design basis features.

Impact on DCA:

The FSAR has been revised as described in the response above and as shown in the markup provided in this response.

assumption in the analysis, that control room equipment powered by the normal DC power system remains powered for three hours. After 72 hours, the CRVS (Section 9.4.1) provides cooling to the CRE.

The MCR is provided with adequate lighting for safe operation of the plant during accidents and all modes of operation. Refer to Section 9.5.3 for more information.

The CRE includes access to procedures, drawings, and other technical resources useful for mitigating accident conditions. The CRE includes a lavatory, kitchen facilities, and a dining area. Food, water, and first-aid medical supplies are stored in an accessible location within the CRE. The food and water supply is adequate for the minimum needs of the number of main control room occupants identified in Technical Specifications Section 5.2 for 72 hours.

RAI 06.04-1

COL Item 6.4-3: Not used.

RAI 06.04-1

COL Item 6.4-4: Not used.

6.4.5 Testing and Inspection

Refer to Section 14.2 for information regarding preoperational testing.

Inservice testing includes demonstration of the integrity of the CRE in accordance with RG 1.197.

COL Item 6.4-5: A COL applicant that references the NuScale Power Plant design certification will specify testing and inspection requirements for the control room habitability system, including control room envelope integrity testing.

RAI 05.02.05-7, RAI 06.04-3

Controls over the availability and reliability of the CRHS including the control room envelope will be included in the owner-controlled requirements manual.

In addition to periodic tests, CRE testing is performed when changes are made to structures, systems, and components that could impact CRE integrity, including systems internal and external to the CRE. These tests are commensurate with the types and degrees of modifications and repairs and the potential impact upon integrity. Additional CRE testing is also performed if a new limiting condition or alignment arises for which no in-leakage data is available (e.g., a hazardous chemical source appears where previously there was none). In-leakage in excess of the licensing basis value for the particular challenge to CRE integrity constitutes test failure.

6.4.6 Instrumentation Requirements

The CRHS design includes instrumentation and controls to ensure safe, efficient, and reliable operation. Instrumentation and controls for the CRHS are part of the plant protection system, which is described in Chapter 7.

TA of ASME AG-1, with maximum total leakage rate as defined in Article SA-4500. Periodic in-place testing of the AFU is in accordance with Section C.6 of RG 1.140, which endorses portions of ASME Standard N510 (Reference 9.4.1-16). Laboratory testing of AFUs is in accordance with Section C.7 of RG 1.140.

Access for in-service testing and inspection are per ASME AG-1, and for the CRVS air filtration unit (AFU), ASME N509, Section 4.8.

Fans, cooling coils, and heating coils are factory tested and certified. Initial testing and balancing to SMACNA HVAC Systems Testing, Adjusting and Balancing standards (Reference 9.4.1-10) are performed during the commissioning phase to verify operational performance. Routine maintenance is performed in accordance with manufacturer's recommendations.

COL Item 9.4-1: A COL applicant that references the NuScale Power Plant design certification will specify a periodic testing and inspection program for the normal control room heating ventilation and air conditioning system.

RAI 05.02.05-7, RAI 06.04-3

Controls over the availability and reliability of the CRVS will be included in the owner-controlled requirements manual.

9.4.1.5 Instrumentation Requirements

The CRVS includes instrumentation and controls essential to its performance. Principal instruments are listed in Table 9.4.1-4. The CRVS human-system interface is developed with human factors engineering functional allocations, task analyses, and alarm philosophies to determine the functions of the CRVS that are monitored or controlled locally, in the MCR, or both.

The CRVS uses reliable, industry-accepted temperature, pressure, smoke detection, and flow elements and transmitters. Instrumentation is designed to be placed in the system to efficiently and safely control the CRVS and alert the operator of undesirable conditions. Instrumentation and controls are in accordance with the applicable guidance or ASME AG-1 and ASME N509.

The CRVS design incorporates automatic HVAC controls accessible from the MCR. During normal operating conditions, the CRVS is operated in the automatic mode with local manual override capabilities.

The CRVS intake ductwork includes radiation monitors, toxic gas monitors, and smoke detectors. Additional smoke and radiation monitors are located downstream of the AHUs. Signals from smoke detectors located in HVAC equipment are sent to the fire detection system and the MCR.

9.4.1.6 References

9.4.1-1 American Society of Mechanical Engineers, "Nuclear Power Plant Air-Cleaning Units and Components," ASME N509-2002