November 10, 2016 Docket: PROJ0769

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

SUBJECT: NuScale Power, LLC Response to Potential Docketing Issue Related to Regulatory Treatment of Nonsafety Systems Identified during NRC's Pre-Application Readiness Assessment of Potential NuScale Power, LLC Design Certification Application

REFERENCE: Letter from Frank M. Akstulewicz (NRC) to Tom Bergman (NuScale), "Detailed Pre-Application Readiness Assessment Observations of the NuScale Power, LLC Design Certification Application (PROJ0769)," and Enclosures 1, 2, and 3, dated November 3, 2016 (ML16287A591)

During September 19, 2016 through September 29, 2016, the U.S. Nuclear Regulatory Commission (NRC) performed a pre-application readiness assessment of the potential NuScale Power, LLC (NuScale) design certification application (DCA). The NRC provided its detailed observations of the assessment by the referenced letter dated November 3, 2016. Enclosure 1 to the letter contained a list of Potential DCA Docketing issues. Docketing Issue No. 74 provided examples of where the NRC stated that the information related to regulatory treatment of nonsafety systems (RTNSS) contained in Section 19.3 of the final safety analysis report (FSAR) was not a sufficiently comprehensive RTNSS evaluation in accordance with SRP 19.0 and SRP 19.3.

The purpose of the information provided in the attachment to this letter is to facilitate discussion during the public meeting on RTNSS planned for November 17, 2017. The attachment provides a comprehensive description of NuScale's RTNSS evaluation. NuScale plans to include this information in Section 19.3 of the NuScale FSAR. The level of detail on the RTNSS evaluation provided in the attachment is consistent with the guidance of SRP 19.3.

This correspondence includes certain preliminary information which reflects the current stage of NuScale's design and analysis and may be subject to change.

This letter makes no regulatory commitments and no revisions to any existing regulatory commitments.

Please feel free to contact Steve Mirsky at 240-833-3001 or at smirsky@nuscalepower.com if you have any questions.

Sincerely,

Thomas A. Bergman
Vice President, Regulatory Affairs
NuScale Power, LLC

Distribution: Frank Akstulewicz, NRC, TWFN-6C20
Greg Cranston, NRC, TWFN-6E55
Omid Tabatabai, NRC, TWFN-6E7
Mark Tonacci, NRC, TWFN-6E55

Attachment: NuScale Evaluation of Regulatory Treatment of Nonsafety Systems

Regulatory Treatment of Nonsafety Systems

Regulatory oversight is required for certain nonsafety-related structures, systems, and components (SSC) that perform risk-significant functions, consistent with NRC policy. The regulatory oversight is identified for specific SSC by the regulatory treatment of nonsafety systems (RTNSS) process.

The RTNSS process provides assurance that:

- the design of the nonsafety-related, risk-significant SSC satisfies the performance capabilities and reliability/availability (R/A) missions;
- proper design information for the reliability assurance program, including the design information for implementing the Maintenance Rule, is included; and
- proper short-term availability control mechanisms, if required for safety and determined by risk significance, are provided.

The process for identifying nonsafety-related SSC that perform risk- significant functions in accordance with RTNSS criteria, and for determining the appropriate levels of regulatory treatment required is described below. The RTNSS scope, process, and criteria are consistent with the guidance of NUREG-0800 Section 19.3, SECY-94-084, and SECY-95-132.

RTNSS Criteria

The criteria used to determine the functions performed by the nonsafety-related SSC that perform risk-significant functions, and therefore, are candidates for regulatory oversight, are established in NUREG-0800 Section 19.3 as follows:

A. SSC functions relied upon to meet beyond design basis deterministic NRC performance requirements, such as those set forth in 10 CFR 50.62, for mitigating anticipated transients without scram (ATWS) and in 10 CFR 50.63 for station blackout (SBO).
B. SSC functions relied upon to ensure long-term safety (the period beginning 72 hours after a design basis accident and lasting the following 4 days) and to address seismic events.
C. SSC functions relied upon under power-operating and shutdown conditions to meet NRC goals of a core damage frequency (CDF) of less than 1x10-4 each reactor year and a large release frequency (LRF) of less than 1x10-6 each reactor year.
D. SSC functions needed to meet the containment performance goal, including containment bypass, during severe accidents.
E. SSC functions relied upon to prevent significant adverse systems interactions between passive safety systems and active nonsafety SSC.

The designation of the SSC within the RTNSS program scope reflects the applicable criterion. For example, the SSC which satisfy RTNSS criterion A are designated as RTNSS A SSC.

The identification of RTNSS SSC functions and components is performed as part of design reliability assurance program (D-RAP)

As noted in the criteria above, the RTNSS SSC selected for regulatory oversight are nonsafety-related SSC that are necessary to meet NRC regulations, safety goal guidelines, and containment performance goal objectives. The RTNSS systems needed to meet Criteria A, B, and E are based on deterministic considerations, and the RTNSS systems needed to meet Criteria C and D are based on probabilistic insights including results from the baseline PRA and a focused PRA sensitivity study.

The scope of the RTNSS program includes those nonsafety-related risk-significant SSC that satisfy the RTNSS criteria above and are therefore subject to additional regulatory treatment. The following sections provide a discussion of the evaluation of the nonsafety-related risk-significant SSC, and the results of the evaluation.

RTNSS A

Nonsafety-related SSC functions identified through the D-RAP process were evaluated to determine whether they are relied upon to meet beyond design basis performance requirements for ATWS (10 CFR 50.62) and SBO (10 CFR 50.63).

The regulations in 10 CFR 50.62(b) define ATWS as an anticipated operational occurrence followed by a failure of the reactor trip portion of the protection system. Each pressurized water reactor must have equipment that is diverse from the reactor trip system to automatically initiate the auxiliary (or emergency) feedwater system and initiate a turbine trip under conditions indicative of an ATWS in accordance with 10 CFR 50.62(c)(1). The NuScale design does not include an auxiliary or emergency feedwater system; therefore, this portion of the rule is not applicable. Additionally, NuScale is seeking an exemption from the requirement for a diverse turbine trip system based on the design of the module protection system (MPS). The MPS is a safety-related system and not subject to RTNSS criteria.

The regulations in 10 CFR 50.63 require, in part, that a light water reactor must be designed to withstand, for a specified duration, and recover from an SBO. The SBO coping analysis for the NuScale Power Plant concludes that the design functions adequately during an SBO. However, the normal coping strategy includes reliance on the nonsafety-related DC power supplies, consistent with the regulations in 10 CFR 50.63(a)(2). Although nonsafety-related DC power is utilized during the normal coping strategy, the SBO analysis also demonstrates that core cooling and containment integrity are successfully maintained with only safety-related systems and no reliance on DC power systems. As such, there are no SSC for mitigating SBO that meet RTNSS criteria.

Based on the consideration of beyond design basis deterministic NRC performance requirements for ATWS and SBO, there are no SSC that meet the RTNSS A criteria.

RTNSS B

Nonsafety-related risk-significant SSC functions identified through the D-RAP process were evaluated to determine whether they are relied upon to:

- provide a long term nonsafety-related back-up to passive system functional capability and for a period after 72 hours up to 7 days following an accident.
- relied upon to meet the acceptance criteria for the seismic margin analysis.

The safety analyses, PRA insights, and expert panel considerations did not identify any nonsafety-related SSC relied on to perform a backup to passive safety functions (i.e., ensure long term safety) in the period of 72 hours to 7 days. NuScale is evaluating the recently completed results of the seismic margin analysis with respect to the RTNSS B criteria.

RTNSS C

Nonsafety-related, risk-significant SSC functions identified through the D-RAP process were evaluated to determine whether they are relied upon under power operating and shutdown conditions to meet the NRC core damage frequency goal of less than $1x10^{-4}$ each reactor year and large release frequency goal of less than $1x10^{-6}$ each reactor year. Included were the nonsafety-related SSC that are used to prevent the occurrence of initiating events based on their importance to risk as determined from the PRA, and the

nonsafety-related SSC that compensate for the uncertainties in the PRA and in the modeling of severe accident phenomenon.

Risk significance of the nonsafety SSC with respect to initiating event frequency was assessed using a set of screening criteria that were defined on the basis of considerations that included SSC unavailability and its impact on initiating event frequency, and impact of initiating event frequency on CDF and LRF. The assessment included determination of the nonsafety-related SSC needed to maintain the initiating event frequencies at the comprehensive baseline PRA levels.

A focused PRA evaluated CDF by assuming that only safety-related SSC function and all nonsafety-related SSC fail. The results of the focused PRA determined that CDF and LRF goals are met by relying on only safety-related SSC (i.e., without crediting nonsafety-related SSC). Therefore, no nonsafety-related SSC meet the RTNSS C criteria.

RTNSS D

Nonsafety-related, risk-significant SSC functions identified through the D-RAP process were evaluated to determine whether they are needed to meet the containment performance goal, including containment bypass, during severe accidents.

The containment design meets the containment performance goals. Accordingly, the containment provides a reliable, leak-tight barrier by ensuring that containment stresses do not exceed ASME service level C limits for a minimum period of 24 hours following the onset of core damage. Following this 24-hour period, the containment continues to provide a barrier against the uncontrolled release of fission products. The containment design also meets the conditional containment failure probability goal of 0.1.

The containment performance goal is a measure of containment performance and is calculated by dividing the LRF by the CDF. The numeric value of the containment performance goal is 0.1, meaning that containment should fail no more than 10% of the times that core damage occurs. The PRA shows that the containment performance goal of 0.1 is met without relying on nonsafety-related SSC. Therefore, no nonsafety- related SSC meet the RTNSS D criteria.

RTNSS E

Nonsafety-related, risk-significant SSC functions identified through the D-RAP process were evaluated to determine whether they are relied upon to prevent significant adverse systems interactions between passive safety systems and active nonsafety SSC. No nonsafety-related SSC were identified by the expert panel that would have an adverse interaction with passive systems in the NuScale Power Plant design. Therefore, no nonsafety-related SSC meet the RTNSS E criteria.

Functional Design of RTNSS Structures, Systems, and Components

A reliability/availability (R/A) mission is a set of requirements related to the performance, reliability, and availability of a risk-significant SSC function that adequately ensures the accomplishment of its task, as defined by the focused PRA or deterministic analysis.

Design requirements are imposed on these active nonsafety-related SSC commensurate with the risk significance of the SSC functions performed.

The R/A missions are established using the applicable probabilistic, deterministic, and other methods and assumptions used to identify and quantify risk, including information obtained from sources such as the PRA, severe accident evaluations, industry operating experience, and expert panels.

No R/A missions are established for the nonsafety-related, risk-significant SSC since, as discussed in previous sections, no SSC are determined to meet the RTNSS criteria, and therefore, no RTNSS SSC are identified.

Focused Probabilistic Risk Assessment

The focused PRA is a sensitivity study that includes the passive systems and only those active systems that are necessary to meet the safety goal guidelines of SECY-94-084. The focused PRA is constructed from the Level 2 PRA by removing nonsafety-related functions and their support from the baseline PRA event tree logic in order to assess the capabilities of the passive plant safety systems when challenged.

The focused PRA is used to determine the functional R/A missions of active systems needed to meet NRC regulations, goals, and the containment performance goal objectives; and the risk significance associated with failure to accomplish each R/A mission. Focused PRA is also used to determine the nonsafety-related SSC needed to maintain the initiating event frequencies at the comprehensive baseline PRA levels.

The focused PRA maintains the same scope of initiating events and their frequencies as identified in the baseline PRA. This includes determination of the nonsafety-related SSC needed to maintain the initiating event frequencies at the comprehensive baseline PRA levels.

The results of the focused PRA sensitivity studies are also used to develop technical specification requirements for nonsafety-related design features or functions relied on to reduce the CDF or LRF below the Nuclear Regulatory Commission goals where credited in the focused PRA.

As discussed earlier, PRA results support the identification of RTNSS functions for RTNSS C and RTNSS D SSC, while contributing to identifying RTNSS B SSC. No RTNSS B, RTNSS C, or RTNSS D SSC have been identified for the NuScale Power Plant design.

Augmented Design Standards

Augmented design standards are required for RTNSS B SSC to assure reliable performance in the event of applicable hazards, such as natural phenomena. These natural phenomena hazards include safe shutdown earthquake, hurricane and tornado winds, and floods including internal flooding.

RTNSS B SSC are also required to be designed such that safety functions required in the post 72-hour through 4-day period following an accident can be accomplished with the required onsite equipment and supplies.

NuScale will evaluate the application of augmented design standards for any RTNSS B SSC identified as a result of the review the seismic margins analysis.

Regulatory Treatment of RTNSS SSC

Regulatory oversight of RTNSS SSC may include Maintenance Rule (monitoring the effectiveness of maintenance), and either the Technical Specifications or a licensee controlled Availability Controls Manual.

The Availability Controls Manual is established in a manner similar to Technical Specifications and includes availability control limited conditions of operation (ACLCO) and availability controls surveillance requirements. Availability controls are commensurate with the assumptions in the PRA, and include, at a minimum, RTNSS B SSC. The establishment of ACLCO and surveillance requirements provides assurance that the RTNSS SSC can meet their R/A missions and that the component availability is consistent with its R/A mission.

NuScale will evaluate the need for any additional regulatory oversight for any RTNSS B SSC identified as a result of the review the seismic margins analysis.