



April 24, 2018

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 Response to NRC Request for Additional Information No. 378 (eRAI No. 9372) on the NuScale Design Certification Application

REFERENCE: U.S. Nuclear Regulatory Commission, "Request for Additional Information No. 378 (eRAI No. 9372)," dated March 09, 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 Enclosures to this letter contain NuScale's response to the following RAI Question from NRC eRAI No. 9372:

- 18-14

Enclosure 1 is the proprietary version of the NuScale Response to NRC RAI No. 378 (eRAI No. 9372). NuScale requests that the proprietary version be withheld from public disclosure in accordance with the requirements of 10 CFR § 2.390. The enclosed affidavit (Enclosure 3) supports this request. Enclosure 2 is the nonproprietary version of the NuScale response.

This letter and the enclosed responses 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". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

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

Distribution: Samuel Lee, NRC, OWFN-8G9A
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Enclosure 1: NuScale Response to NRC Request for Additional Information eRAI No. 9372, proprietary

Enclosure 2: NuScale Response to NRC Request for Additional Information eRAI No. 9372, nonproprietary

Enclosure 3: Affidavit of Zackary W. Rad, AF-0418-59694



RAIO-0418-59693

Enclosure 1:

NuScale Response to NRC Request for Additional Information eRAI No. 9372, proprietary



Enclosure 2:

NuScale Response to NRC Request for Additional Information eRAI No. 9372, nonproprietary

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

eRAI No.: 9372

Date of RAI Issue: 03/09/2018

NRC Question No.: 18-14

Title 10 of the *Code of Federal Regulations* (10 CFR) Section 52.47(a)(8) requires an applicant for a design certification to provide an FSAR [Final Safety Analysis Report] which includes the information necessary to demonstrate compliance with any technically relevant portions of the Three Mile Island requirements set forth in 10 CFR 50.34(f), with certain exceptions. Section 10 CFR 50.34(f)(2)(ii) requires an applicant to "Establish a program, to begin during construction and follow into operation, for integrating and expanding current efforts to improve plant procedures. The scope of the program shall include.....human factors engineering..." The current NRC guidance for developing a human factors engineering (HFE) program is NUREG-0711, Rev 3, "Human Factors Engineering Program Review Model."

NUREG-0711 Section 4.4, Criterion 8 states:

The applicant should verify that the FRA [functional requirements analysis] and FA [function allocation] accomplish the following:

- *All the high-level functions needed to achieve safe operation are identified.*
- *All requirements of each high-level function are identified.*
- *The allocation of functions to humans and automatic systems assures a role for personnel that takes advantage of human strengths and avoids human limitations.*

This criterion seeks to confirm that the FRA/FA process has achieved certain high-level goals. It is clear from the submitted materials that the FRA/FA process attempts to achieve these goals, however, it is not clear how NuScale verified that these goals have been accomplished.

Please describe how NuScale verified that the items in the criterion have been accomplished and update the results summary report (RSR) to include an explanation of the verification process.

NuScale Response:

All NuScale plant functions, including all high-level functions needed to achieve safe operation,



are described in RP-0316-17615, Human Factors Engineering Functional Requirements Analysis and Function Allocation Results Summary Report (HFE FRA/FA RSR), Table 3-1:

Table 3-1 NuScale Plant Functions

Plant Function	Description
Remove Fuel Assembly Heat	Design features used to remove heat from the fuel assemblies via passive convection and conduction.
Maintain Containment Integrity	Design features used to maintain Containment Integrity to prevent fission products from escaping the containment boundary.
Maintain Reactor Coolant Pressure Boundary Integrity	Design features used to maintain reactor coolant pressure boundary (RCPB) integrity to prevent fission products from escaping the RCPB.
Reactivity Control	Design features used to maintain reactivity within required limits.
Radioactivity Control	Design features used to control the spread of radioactive contamination.
Emergency Response	Design features used to identify and communicate plant conditions to internal and external organizations during emergencies.
Human Habitability	Design features used to maintain comfortable and safe environmental conditions for personnel habitability by providing adequate air quality, air temperature, humidity; fire and radiation protection; illumination; and sanitary and potable water supplies.
Protection of Plant Assets	Design features used to protect plant assets from degradation due to plant environmental conditions or external environmental conditions.
Plant Security	Design features used to protect the physical security of the plant.
Power Generation	Design features used to to perform startup, normal operations, shutdown, and refueling.

Within the FRA/FA element, high level functions and their associated requirements were verified by an interdisciplinary team. This verification is described in RP-0316-17615, Section 5.0, third paragraph:

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As alluded to in the FRA/FA RSR, Section 5.0, third paragraph, verification of the high-level



functions and associated requirements continues through the subsequent NUREG-0711 elements culminating in the integrated systems validation. Because the NuScale simulator configuration is maintained consistent with the current design, simulator performance results from the staffing plan validation, operator training and pilot testing provide independent verification that a complete set of high-level functions and their associated requirements have been identified.

The HFE process interfaces with the engineering design process to establish the functional requirements for risk-significant SSCs associated with each of the high-level functions. This process concludes with a final review and approval of the requirement by an expert panel with collective experience in Safety Analysis, Licensing, PRA, Design Engineering, Systems Engineering, Operations, and maintenance processes. The conduct of this expert panel is controlled by procedures.

These verification activities identified no additional changes to NuScale's initial high-level functions and were effective in identifying additional functional requirements as evidenced by the example changes identified in the FRA/FA RSR, Section 4.6, "Design Incorporation Recommendations Examples."

Verification of the allocation of functions is best verified by performance based testing. The staffing plan validation provided initial and substantial evidence that the allocation of functions to humans and automatic systems is appropriate as the design manning levels successfully operated 12 reactor modules through a series of challenging operational conditions and events. The allocation verification continues as operator training and pilot testing are completed. The ISV will provide additional and final confirmation of allocation effectiveness.

Impact on DCA:

There are no impacts to the DCA as a result of this response.



RAIO-0418-59693

Enclosure 3:

Affidavit of Zackary W. Rad, AF-0418-59694

NuScale Power, LLC
AFFIDAVIT of Zackary W. Rad

I, Zackary W. Rad, state as follows:

1. I am the Director, Regulatory Affairs of NuScale Power, LLC (NuScale), and as such, I have been specifically delegated the function of reviewing the information described in this Affidavit that NuScale seeks to have withheld from public disclosure, and am authorized to apply for its withholding on behalf of NuScale.
2. I am knowledgeable of the criteria and procedures used by NuScale in designating information as a trade secret, privileged, or as confidential commercial or financial information. This request to withhold information from public disclosure is driven by one or more of the following:
 - a. The information requested to be withheld reveals distinguishing aspects of a process (or component, structure, tool, method, etc.) whose use by NuScale competitors, without a license from NuScale, would constitute a competitive economic disadvantage to NuScale.
 - b. The information requested to be withheld consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), and the application of the data secures a competitive economic advantage, as described more fully in paragraph 3 of this Affidavit.
 - c. Use by a competitor of the information requested to be withheld would reduce the competitor's expenditure of resources, or improve its competitive position, in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product.
 - d. The information requested to be withheld reveals cost or price information, production capabilities, budget levels, or commercial strategies of NuScale.
 - e. The information requested to be withheld consists of patentable ideas.
3. Public disclosure of the information sought to be withheld is likely to cause substantial harm to NuScale's competitive position and foreclose or reduce the availability of profit-making opportunities. The accompanying Request for Additional Information response reveals distinguishing aspects about the method by which NuScale develops its human factors engineering.

NuScale has performed significant research and evaluation to develop a basis for this method and has invested significant resources, including the expenditure of a considerable sum of money.

The precise financial value of the information is difficult to quantify, but it is a key element of the design basis for a NuScale plant and, therefore, has substantial value to NuScale.

If the information were disclosed to the public, NuScale's competitors would have access to the information without purchasing the right to use it or having been required to undertake a similar expenditure of resources. Such disclosure would constitute a misappropriation of NuScale's intellectual property, and would deprive NuScale of the opportunity to exercise its competitive advantage to seek an adequate return on its investment.

4. The information sought to be withheld is in the enclosed response to NRC Request for Additional Information RAI No. 378, eRAI No. 9372. The enclosure contains the designation "Proprietary" at the top of each page containing proprietary information. The information considered by NuScale to be proprietary is identified within double braces, "{{ }}" in the document.
5. The basis for proposing that the information be withheld is that NuScale treats the information as a trade secret, privileged, or as confidential commercial or financial information. NuScale relies upon the exemption from disclosure set forth in the Freedom of Information Act ("FOIA"), 5 USC § 552(b)(4), as well as exemptions applicable to the NRC under 10 CFR §§ 2.390(a)(4) and 9.17(a)(4).
6. Pursuant to the provisions set forth in 10 CFR § 2.390(b)(4), the following is provided for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld:
 - a. The information sought to be withheld is owned and has been held in confidence by NuScale.
 - b. The information is of a sort customarily held in confidence by NuScale and, to the best of my knowledge and belief, consistently has been held in confidence by NuScale. The procedure for approval of external release of such information typically requires review by the staff manager, project manager, chief technology officer or other equivalent authority, or the manager of the cognizant marketing function (or his delegate), for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside NuScale are limited to regulatory bodies, customers and potential customers and their agents, suppliers, licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or contractual agreements to maintain confidentiality.
 - c. The information is being transmitted to and received by the NRC in confidence.
 - d. No public disclosure of the information has been made, and it is not available in public sources. All disclosures to third parties, including any required transmittals to NRC, have been made, or must be made, pursuant to regulatory provisions or contractual agreements that provide for maintenance of the information in confidence.
 - e. Public disclosure of the information is likely to cause substantial harm to the competitive position of NuScale, taking into account the value of the information to NuScale, the amount of effort and money expended by NuScale in developing the information, and the difficulty others would have in acquiring or duplicating the information. The information sought to be withheld is part of NuScale's technology that provides NuScale with a competitive advantage over other firms in the industry. NuScale has invested significant human and financial capital in developing this technology and NuScale believes it would be difficult for others to duplicate the technology without access to the information sought to be withheld.

I declare under penalty of perjury that the foregoing is true and correct. Executed on 4/24/2018.



Zackary W. Rad