RAIO-0518-59984

May 14, 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 Supplemental Response to NRC Request for Additional Information No. 90 (eRAI No. 8758) on the NuScale Design Certification Application

REFERENCES:

1. U.S. Nuclear Regulatory Commission, "Request for Additional Information No. 90 (eRAI No. 8758)," dated July 10, 2017
2. NuScale Power, LLC Response to NRC "Request for Additional Information No. 90 (eRAI No.8758)," dated July 26, 2017
3. NuScale Power, LLC Supplemental Response to "NRC Request for Additional Information No. 90 (eRAI No. 8758)" dated November 17, 2017
4. NuScale Power, LLC Supplemental Response to "NRC Request for Additional Information No. 90 (eRAI No. 8758)" dated December 4, 2017

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 Enclosures to this letter contain NuScale's supplemental response to the following RAI Questions from NRC eRAI No. 8758:

- 18-1
- 18-2

Enclosure 1 is the proprietary version of the NuScale Supplemental Response to NRC RAI No. 90 (eRAI No. 8758). 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,

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

Distribution: Samuel Lee, NRC, OWFN-8G9A
Prosanta Chowdhury NRC, OWFN-8G9A
Demetrius Murray, NRC, OWFN-8G9A

Enclosure 1: NuScale Supplemental Response to NRC Request for Additional Information eRAI No. 8758, proprietary

Enclosure 2: NuScale Supplemental Response to NRC Request for Additional Information eRAI No. 8758, nonproprietary

Enclosure 3: Affidavit of Zackary W. Rad, AF-0518-59985

Enclosure 1:

NuScale Supplemental Response to NRC Request for Additional Information eRAI No. 8758, proprietary

NuScale Power, LLC
1100 NE Circle Blvd., Suite 200 Corvalis, Oregon 97330, Office: 541.360.0500, Fax: 541.207.3928
www.nuscalepower.com

Enclosure 2:

NuScale Supplemental Response to NRC Request for Additional Information eRAI No. 8758, nonproprietary

NuScale Power, LLC
1100 NE Circle Blvd., Suite 200 Corvalis, Oregon 97330, Office: 541.360.0500, Fax: 541.207.3928
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Response to Request for Additional Information
Docket No. 52-048

eRAI No.: 8758
Date of RAI Issue: 07/10/2017

NRC Question No.: 18-1

Title 10 of the Code of Federal Regulations (10CFR) Section 52.47(a)(8) requires an applicant for a design certification to provide a final safety analysis report (FSAR) that must include 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), except paragraphs (f)(1)(xii), (f)(2)(ix), and (f)(3)(v). Section 10 CFR 50.34(f)(2)(iii) requires an applicant to "Provide, for Commission review, a control room design that reflects state-of-the-art human factor principles prior to committing to fabrication or revision of fabricated control room panels and layouts." Chapter 18, "Human Factors Engineering," of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," and NUREG-0711, "Human Factors Engineering Program Review Model," identify criteria the staff uses to evaluate whether an applicant meets the regulation. The applicant stated in the FSAR, Tier 2, Section 18.0, "Human Factors Engineering - Overview," that the HFE program incorporates accepted HFE standards and guidelines including the applicable guidance provided in NUREG-0711, Revision 3.

Question 1:

Criterion 11.4.3.8, "Validation Conclusions," in NUREG-0711, states, "the applicant should document the statistical and logical bases for determining that the performance of the integrated system is, and will be acceptable."

The NuScale Verification and Validation Implementation Plan, Section 4.6.1, "Scenario Sequencing," says a minimum of two operating crews will perform each scenario. However, the bases for determining that the performance of the integrated system will be acceptable using a minimum of two operating crews per scenario is not described in the application.

Additionally, the NRC Commission has previously taken action based on a greater number of scenario trials. The staff is concerned that a minimum of two trials for each ISV scenario does not provide (1) enough opportunities for users of the integrated system to identify errors with the design or (2) reasonable assurance that results from the ISV test will be indicative of the ability of the integrated system to support safe plant operation. Please describe the bases for determining that performance of the integrated system using a minimum of two operating crews

per scenario will be acceptable and will provide reasonable assurance that the health and safety of the public would be protected.

NuScale Response:

This information supplements the response provided in eRAI 8758 Question 18-1 (ML17322A051) as a result of NRC questions asked during an HFE Audit exit call conducted on February 14, 2018.

NRC Question 1:

During the February 14 call, NRC noted that independent observers are the minority within the integrated system validation (ISV) design team, and although it is stated that training will "include the specific roles of the two independent observers and their importance to mitigate team bias", it is not clear to the staff how the applicant will ensure that observations from the "independent" observers are not discounted or over-ruled.

NuScale Response 1:

NuScale plans to preserve independent observer comments as a record for future audit or review. The observation process starts with all observers taking notes during the scenario performance. These notes will be scanned and retained as attached files to the final ISV Test Report (i.e. the notes will not be presented in the report, but can be accessed by NuScale document control through an audit). The observers conference together after the scenario is completed to discuss observation notes. The independent observers have equal participation in the observer conference session. During this session, as notes are being discussed, they will be categorized and assigned as HEDs with an initial prioritization. NuScale recognizes the function of having independent observers to prevent test design bias. If an independent observer does not agree with the disposition of an observation comment, the comment will be tabled by the observation team members and presented to the NuScale operations senior management for review. Since all notes will be captured and scanned, the original notes are available to compare with final consensus of discrepancies.

NRC Question 2

The NRC staff asked NuScale to provide the "errors of commission" assessment referenced in the previous response that is restated below.

NuScale supplementary response to RAI 8758 question 18-1S1:

> *There are no operator actions credited in the evaluation of NuScale design-basis accidents. Passive systems and automated (fail-safe) systems place and maintain the*

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unit in a safe state for at least 72 hours after a DBE including assumed failures. Single human errors of both omission and commission were analyzed and the conclusion of the analysis was that operator errors cannot make the consequences more severe than the bounding FSAR Chapter 15 analysis. (FSAR Sections 15.0.0.5 and 15.0.0.6.4)

NuScale Response 2

FSAR Section 15.0.0.5 item 4) states:

Single human errors are considered. In this regard, a key consideration is whether the potential error is an error of "omission" or an error of "commission." An error of omission is one in which an operator action is required to achieve a safety function, but the operator fails to perform the function. A error of commission is one in which no operator action is required, but an erroneous action is taken.

- *Operator errors are considered in identifying event initiators. The NuScale Power Plant design limits operator errors to consequences that are no more severe than the worst-case single failure. Therefore, there are no operator errors that have to be analyzed in the accident analysis. Because the NuScale Power Plant is a passive plant, no operator actions are required for 72 hours. Operator actions allowed by procedure make the consequences less severe. Failure to take one of these actions cannot make the consequences worse than the bounding Chapter 15 analysis.*
- *Multiple operator errors or errors that result in common mode failures are beyond design basis. These events are analyzed in Chapter 19.*

FSAR Section 15.0.0.6.4 further states:

There are no operator actions credited in the evaluation of NuScale DBEs. After a DBE, automated actions place the NPM in a safe-state and it remains in the safe-state condition for at least 72 hours without operator action, even with assumed failures.

Assessment and Clarification to the FSAR Section 15.0.0.5 item 4) statement repeated below:

“The NuScale Power Plant design limits operator errors to consequences that are no more severe than the worst case single failure. Therefore, there are no operator errors that have to be analyzed in the accident analysis.”

Assumptions and Key Points to consider in the above statement:

- This assessment pertains to Chapter 15, design-basis-events only.
- No operator actions are required for 72 hours after initiation of event. Since no operator

actions are required, there can be no acts of omission.

- The consequences of an event listed in Chapter 15 are no more severe whether it was initiated by an operator error or a worst-case single failure for safety-related SSCs. NuScale did not evaluate worst-case single failure in addition to errors of commission; rather, an error of commission is bounded by the worst-case single failure assumption for safety-related SSCs.
- Single actions taken on safety-related SSCs are bounded by the single failure criteria since a safety-related SSC cannot be impacted by a single action from the main control room (MCR) with the exception of initiating an engineered safety feature.
- Control room operators cannot manipulate safety-related SSCs except through the use of the module protection system (MPS) hard-wired manual actuation switches located at the standup panel for each unit. Operation of any of these switches is an infrequent operation directed by procedure and normally requires a peer-check prior to operation. Operation of these switches is also expected to receive supervisory oversight and because of their physical location, operation of these safety-related switches is conspicuous to the operating crew.
- The MPS cannot be overridden by an operator either before or after initiation, with the exception of containment isolation override to support either adding inventory to the reactor vessel using the chemical and volume control system (CVCS) or to containment using the containment flooding and drain system (CFDS). Once an MPS setpoint is reached, the associated safety related SSCs will transition to their single safety position.
- The containment isolation override function is only required during highly improbable beyond-design basis events which are addressed in Chapter 19 and is beyond the scope of this response, which is for Chapter 15 events only. The containment isolation override function requires multiple deliberate steps which are directed by procedures. The Conduct of Operations and generally accepted industry standards on human performance and use of error reduction tools ensure that a peer check and proper supervisory oversight would be provided to complete this “Important Human Action”. To accidentally perform this action in error or to complete this action on the wrong unit is not deemed credible.
- In the Chapter 15 analysis, non-safety related system normal operation that increases the consequences of the event are modeled. Non-safety related system normal operation that improves (decreases) the consequences of the event is not modeled. Therefore, an operator act of commission performed in error on non-safety related SSCs that increases the consequences of the event are bounded in the Chapter 15 analysis.
- Multiple operator errors or errors that result in common mode failures are beyond design basis. These events are analyzed in Chapter 19.

Assessment Conclusion:

Based on the above assumptions and key points, any operator actions performed erroneously would be bounded by the Chapter 15 analyses. A single operator error of consequence on a safety-related SSC is not credible and, in any case, would be bounded by the single failure

criteria assumed in the analysis. A single operator error on a non-safety SSC is bounded by the Chapter 15 analyses.

Additional defense-in-depth considerations regarding operator actions during a transient/abnormal operating occurrence:

- The STA provides independent oversight during off normal conditions.
- Task based displays are incorporated to reduce navigation steps conditions.
- Three-way communication is a tool used to ensure the sender and receiver clearly understands the same message. Operational direction to manipulate plant controls shall always use three-way communication.
- Due to the large amount of pre-approved automation incorporated into the operation and control of a NuScale plant, in many cases the HSI assumes the traditional role of plant operator using a pre-approved procedure and the human operator becomes the peer checker, as in the case of two humans where one operator performs manipulations with a pre-approved procedure only after receiving peer check agreement from a second operator.
- Operating procedures are incorporated into the HSI and are generally not performed by using a hardcopy. Procedures are presented to the operator automatically by the HSI as triggered by plant parameters or events or accessed manually by selecting the desired procedure sequence. For example, post reactor trip the safety function status screen will automatically display color coded indications that provide navigation to required operator actions, these actions are considered the post trip procedure.
- The HSI is designed with checks to ensure that procedures are performed properly not just by completion of steps but by feedback from the interface. If an automation sequence is unsuccessful, the operator is notified by alarm notification, the sequence is automatically stopped, and the reason for the automation failure is investigated and corrected.
- Place-keeping is a method to track the status and sequence of a procedure in-use. The place-keeping function for automated procedures incorporated into the HSI is performed by the interface.
- The Control Room Supervisor (CRS) is required to provide oversight of all reactivity manipulations; reactivity manipulations shall be communicated to the CRS prior to initiation.
- A licensed operator will take action at any time to manually initiate an MPS safety function when the safety function has failed to automatically initiate at the appropriate setpoint, however it is expected that operators will allow the safety system to operate as designed and provide manual initiation only as a back-up.

Procedural guidance, training, qualifications, plant design, and HSI design all work to minimize the potential for operator acts of commission during transient response. This was demonstrated during the Staffing plan validation (SPV) where two separate crews each conducted three

challenging, workload-intensive, full-scope simulator scenarios. There were no operator acts of commission during this test (i.e. there were no instances where the wrong equipment was operated). More comprehensive validation will be conducted during the integrated system validation (ISV).

Impact on DCA:

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

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

eRAI No.: 8758
Date of RAI Issue: 07/10/2017

NRC Question No.: 18-2

Question 2

Criterion 11.4.3.1 of NUREG 0711 states, "The applicant should describe how the team performing the validation has independence from the personnel responsible for the actual design." Additionally it states, "The members of the validation team should have no responsibility for the design; i.e., they should never have been part of the design team. While they may work for the same organization, their responsibilities must not include contributions to the design, other than validating it."

Section 4.1 of the Human Factors Verification and Validation Implementation Plant (V&V IP states,

"Validation team members can be selected from the HFE Design Team. There is very low risk of impact to the validity of the ISV [integrated systems validation] results. Objective performance measures and success criteria are developed as part of the methodology...The Validation Team members are trained and qualified to conduct the ISV in an objective and unbiased manner." In addition FSAR Tier 2, Chapter 18, Section 18.10.2.3.1, states, "The test team administers the ISV and collects data via questionnaires, post-scenario debriefing, personal observations...Bias is reduced by the training program applicable to each validation team member; in addition, the test results are obtained by consensus of the test team rather than individual observations."

The staff understands that objective performance and success criteria will be used to determine the results of the ISV; however, questionnaires and personal observations, which are subjective in nature, are also used to collect data and to determine the results and any design changes that may need to be made. The main intent of Criterion 11.4.3.1 of NUREG 0711 is to ensure that bias is reduced to the greatest extent during ISV data collection (e.g. observer notes/evaluations) and when the results of ISV are analyzed and evaluated to determine whether design changes are necessary.

Clarify whether the validation will include members who were not part of the design team Explain how training and results by consensus minimize bias and ensure objectivity of the validation team members who are part of the HFE Design Team. Also, if any other means will

be established to maximize objectivity, please revise the application to describe them.

NuScale Response:

The second supplement to eRAI 8758 Question 18-2 responds to questions received during a Human Factors Engineering (HFE) Audit exit phone call conducted on February 14, 2018.

NRC Question 1:

During the February 14, 2018 conference call, the NRC noted that the RAI response discussed a review "by an independent individual or group to ensure actions have been properly characterized and dispositioned appropriately". The staff asked for clarification as to what the reviewer(s) is(are) looking for and what expertise they have related to HFE.

NuScale Response 1:

NuScale would like to clarify the key elements that ensure issues are properly characterized and appropriately dispositioned.

Issue characterization is addressed in the HFE Program Management Plan, RP-0914-8534, and the HFE Verification and Validation Implementation Plan (V&V IP), RP-0914-8543. Video and sound recordings, SME observations, independent observer observations, and crew debriefs are all used in concert to ensure issues are identified and captured accurately.

Issue resolution is primarily verified by the design solution evaluation consistent with NUREG-0711 criterion 11.4.4(4). This evaluation provides the performance basis for demonstrating the resolution is acceptable. The NuScale approach to this evaluation is to conduct the design solution evaluation using the same V&V method that originally detected the issue, consistent with the review criteria. Engineering judgment is applied to the evaluation method to ensure it is the most reliable and efficient way to verify acceptable performance of the design solution. As acknowledged by the review criteria, there may be reasons for using other methods to determine the satisfactory resolution. The V&V IP allows for design solution evaluations but does not include this strategy. New section 5.3 "Design Solution Testing has been added to the V&V IP in order to more closely conform to review criterion 11.4.4(4) and to ensure that it is clear that HFE design solutions for HEDs are based on performance testing results.

Because design solution testing applies engineering judgment, an independent review of priority one Human Error Deficiencies (HEDs) is conducted. It is intended to provide additional assurance that the implemented solution adequately addresses the HED. The independent individual or group tasked with reviewing the priority one HED resolution is not required to have formal HFE training or experience. The performance test provides the detailed specific HFE

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information about how design objectives are met. The independent review provides an outside challenge and unbiased verification that the priority one HED resolution is effective and appropriate from a plant safety perspective in addition to verifying HED resolution effectiveness. As previously stated in the response, a management review board, an outside consultant or peer group, or a team of individuals within NuScale that have not been involved with task analysis, Human-System Interface (HSI) design activities, or the Integrated System Validation (ISV) can provide the common-sense, objective review as intended.

NRC Question 2:

Explain how training and results by consensus minimize bias and ensure objectivity of the validation team members who are part of the HFE Design Team. The NRC also asked NuScale to clarify how effectiveness of the independent observers is determined.

NuScale Response 2:

NuScale is taking an exception to NUREG-0711, review criterion 11.4.3.1 with respect to its direction that the team be entirely independent of the HFE design process. Understanding how the design was developed and what it is expected to accomplish brings additional diversity to the validation observation team. Specifically, those who contributed to the design understand what was intended to be accomplished and can identify where objectives are not met. Two of the observers will be independent of the ISV test design. This alternate approach provides for more diversity within the team, a detailed knowledge of HFE design attributes and functions, a combination of practical and theoretical perspectives, and an enhanced orientation to the challenges that operators face.

This approach does increase the potential for bias. To ensure this potential is not realized, at least one internal assessment will be completed during the conduct of the ISV to review the effectiveness of the independent observers and verify compliance with the test plan as stated in the first supplemental response to this RAI.

The assessment (i.e. the action or an instance of making a judgment about something) will, by definition, determine the effectiveness of the independent observers as well as the team members with HFE design experience. Common methods of assessment are field observations, documentation reviews, and personnel interviews or surveys. The self-assessment will be conducted in accordance with the NuScale Self-Assessment Procedure. Deficiencies will be resolved in accordance with NuScale Corrective Action Program.

NRC Question 3:

The NRC noted that a discrepancy exists in the human factors verification and validation implementation plan (V&V IP), Revision 4, Section 4.1 in that the validation team would have at least two independent observers; however, there is a statement later on the same page that said at least one observer would be independent from the HFE Design Team.

NuScale Response 3:

The HFE V&V IP has been updated to correct the discrepancy and now states "At least two of the selected observers in each ISV test performance must have independence from the HFE Design Team".

Impact on DCA:

RP-0914-8543, Human Factors Verification and Validation Implementation Plan, has been revised as described in the response above and as shown in the markup provided with this response.

(i.e., the planned attributes) with the alarms, controls, indications, procedures, automation, and task support in the HSI inventory and characterization (i.e., the actual attributes). The HFE Design Team follows a process that provides a Retest step if needed as shown in Figure 3-2.

Results of the task support verification are based on the criterion that the information, control, and functional characteristics to support the task requirements identified during TA are present in the HSI that is being verified for the task. Results are documented for each task in the V&V RSR (see Section 6.0) once the V&V activities are complete.

3.2.3 Task Support Verification

The verification process is conducted using internal procedures and is based on

- the most recently completed TA.
- the personnel task requirements identified by the TA with the available alarms, controls, indications, and procedures in the HSI inventory.
- guidelines for determining whether the HSI is "acceptable" or "discrepant" based on the associated HFE design criteria.
- completed Inventory and Characterization forms used to verify that the elements on the pages have the appropriate design characteristics, including dynamic behavior.
- completed HFE Design Verification forms used to verify that the elements on the pages were consistent both on the page being tested and with other pages in the inventory.
- the most recent version of HSI display pages.
- an active simulator.

3.2.4 Human-System Interface Acceptability Criteria

Internal procedures are used for determining whether the HSI is "acceptable" or "discrepant." This procedural guidance includes:

1. A judgment that an HSI is “acceptable” should be made only if compliance is total (i.e., only if every instance of the item is fully consistent with the criteria established by the HFE guidelines).
2. If there is any noncompliance, full or partial, then an evaluation of “discrepant” should be given, and a notation made as to where it occurs.
3. If discrepant, it should be designated as an HED, tracked, and evaluated.

3.2.5 Task Support Verification Documentation

The verification produces

- a documented list of each test team member's findings used to develop a team consensus.
- a completed task support verification form used to verify the tasks can be performed using the display pages.
- a description of the means of comparing HFE design criteria to HSI components in the context of the various environmental conditions or locations of those HSIs (e.g., noise, lighting). This piece of the task support verification will be performed in the simulator during operator training or testing.

3.3 Human Factors Engineering Design Verification

The HFE design verification is conducted to confirm that HSI characteristics conform to HFE guidelines as represented in the style guide. The style guide consists of procedures for use, general considerations, and system-specific guidance for screen-based HSIs (the term system-specific applies to plant systems as well as HSI systems). The HFE design verification process is shown in Figure 3-2.

3.3.1 Verification Criteria

The criteria for HFE design verification is provided by the HSI style guide. The style guide includes procedural guidance for determining appropriate design criteria when the style guide does not apply to the characteristics of the HSI component being designed.

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3.3.2 Design Verification Evaluation Methodology

HFE design verification is conducted in accordance with a written process to assure consistency of results and to control bias. The design verification phase for all selected HSI follows a process that provides a Retest step if needed as shown in Figure 3-2.

Procedures describing HFE design verification include

- checklists and guidelines for comparison of the HFE design criteria (style guide) to HSI components (e.g., alarms, controls, indications, procedures, navigation aids)
- a description of the means of comparing HFE design criteria to HSI components in the context of the various environmental conditions or locations of those HSIs (e.g., noise, lighting, ambient temperature and humidity)
- guidelines for determining whether the HSI is acceptable or discrepant based on the associated HFE design criteria

4.0 Integrated System Validation

The ISV is the process by which an integrated system design (i.e., hardware, software, and personnel elements) is evaluated using performance-based tests to determine whether it acceptably supports safe operation of the plant. The ISV is undertaken only after HEDs that were identified in the upstream process, including design verification, have been resolved and the resulting changes implemented.

Scenarios are developed using the guidance described in the implementing procedures. Performance measures used for assessing the results of an ISV are summarized in Section 4.5 and further described in implementing procedures.

4.1 Validation Team

Some validation team members can be selected from the HFE design team but at least two of the observers must have independence from ISV test design. Objective performance measures and success criteria are developed as part of the methodology and listed within the scenario guides used for the conduct of ISV tests. Objective performance measures are designed to trigger evaluation of the condition regardless of observation comments, and are purposely set at a low threshold. The methodology, scenarios, ISV test plan, and ISV test performance are available for NuScale management assessment or NRC audit well in advance of or during the conduct of the ISV in order to allow for an outside perspective to detect and influence potential bias concerns. The validation team members are trained and qualified to conduct the ISV in an objective and unbiased manner. A detailed ISV test report is developed which supports the results documented in the V&V RSR; both documents will be submitted to the NRC. The HFE Design Team developing and conducting the ISV is analogous to a commercial nuclear plant's Training Department developing and conducting an NRC license exam or annual requalification exam.

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}}2(a),(c) The observers are trained and qualified using the NuScale training program. At least twoone of the selected observers in each ISV test performance must have independence from HFE Design Team (i.e. has not been involved in the design, development, or testing of the NuScale HFE program, HSI, or concept of operations). Observations made by these observers are relied upon to provide independent, unbiased, and objective observations of the test performance.

All observer comments will be assessed by consensus to determine which will result in HEDs and for priority assignment. The independent observers are equal participants during scenario debriefs. If consensus agreement cannot be met on resultant HEDs or priority, the conflict will be presented to management for resolution.

The administrators (test lead, test bed engineer, and test bed support staff) manage the ISV, control each scenario in accordance with the test procedure, maintain and set up the test bed, and collect the test bed archived data following each scenario. The Validation Team personnel may act as simulated plant personnel as necessary within each scenario. The administrators are trained and qualified using the NuScale training program. Bias is further reduced by the training program applicable to each validation team member, and the fact that results are obtained by consensus of the team rather than individual observations.

Observer training will consist of practice observations to ensure understanding of the measurement techniques and ensure understanding of the test objectives and acceptance criteria.

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4.2 Test Objectives

The objectives of the ISV are to validate

- the acceptability of the shift staffing, the assignment of tasks to operating crew members, and crew coordination within the control room, between the control room and local control stations and support centers, and with individuals performing tasks locally. This should encompass validating minimum shift staffing levels, nominal levels, higher levels, and shift turnover.
- that the design has adequate capability for alerting, informing, controlling, and feedback such that personnel tasks are successfully completed during normal plant evolutions, transients, design-basis accidents, and also under selected risk significant events beyond-design basis, as defined by the SOC.
- that specific personnel tasks can be accomplished within the time and performance criteria, with effective situational awareness, and acceptable workload levels that balance vigilance and personnel burden.
- that the HSIs minimize personnel error and ensure error detection and recovery capability when errors occur.
- the assumptions about performance on important human actions (IHAs).
- personnel can effectively transition between the HSIs and procedures in accomplishing their tasks, such as display configuration and navigation, are not a distraction or an undue burden.

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Data and data-analysis tools (e.g., equations, measures, spreadsheets, expert opinions, resulting HEDs) are documented for subsequent audit and application during design integration and/or human performance monitoring HFE program elements. Individual HFEITS items are maintained as auditable records in the HFEITS database.

5.3 Design Solution Testing

Generally, design solutions will be verified to be acceptable using the same V&V method that originally detected the issue. For example, if an HED-1 is identified during performance of an ISV scenario, a similar scenario would be run to verify the solution was acceptable. Because the impact of design solutions vary widely this general practice may be adjusted using engineering judgment to ensure a thorough and appropriate test is conducted. The following elements are considered when making this judgment:

- number of procedures affected
- number of HSIs affected
- complexity of the condition under which the design solution is used
- uniqueness of the design solution

If scenario testing is used, one scenario run is sufficient, provided that:

- the scenario tests all aspects of design solution and
- all performance data is collected

Enclosure 3:

Affidavit of Zackary W. Rad, AF-0518-59985

NuScale Power, LLC
1100 NE Circle Blvd., Suite 200 Corvalis, Oregon 97330, Office: 541.360.0500, Fax: 541.207.3928
www.nuscalepower.com

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 verification and validation.

    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. 90, eRAI 8758. 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 5/14/2018.

Zackary W. Rad