NuScaleDCRaisPEm Resource

From:	Chowdhury, Prosanta
Sent:	Wednesday, April 25, 2018 5:23 PM
To:	Request for Additional Information
Cc:	Lee, Samuel; Cranston, Gregory; Kent, Lauren; Scheetz, Maurin; NuScaleDCRaisPEm Resource
Subject:	Request for Additional Information No. 435 eRAI No. 9434 (13.05.02.01)
Attachments:	Request for Additional Information No. 435 (eRAI No. 9434).pdf

Attached please find NRC staff's request for additional information (RAI) concerning review of the NuScale Design Certification Application.

Please submit your technically correct and complete response within 60 days of the date of this RAI to the NRC Document Control Desk.

If you have any questions, please contact me.

Thank you.

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Licensing Branch 1 (NuScale)
Division of New Reactor Licensing
Office of New Reactors
U.S. Nuclear Regulatory Commission
301-415-1647

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Request for Additional Information No. 435 (eRAI No. 9434)

Issue Date: 04/25/2018
Application Title: NuScale Standard Design Certification - 52-048
Operating Company: NuScale Power, LLC
Docket No. 52-048
Review Section: 13.05.02.01 - Operating and Emergency Operating Procedures
Application Section: SRP 13.5.2.1

QUESTIONS

13.05.02.01-20

REGULATORY BASIS REQUIREMENTS

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 emergency procedures, ... "

TMI Action Plan Item I.C.1, a Post-TMI requirement approved by the Commission for implementation, requires the preparation of emergency procedure technical guidelines for development of the Emergency Operating Procedures (EOPs). Preparation of the technical guidelines is conducted in accordance with NUREG-0737, "Clarification of TMI Action Plan Requirements," and NUREG-0737, Supplement 1, "Requirements for Emergency Response Capability," which also specify submittal of the technical guidelines to the NRC for review and approval.

Meeting the requirements of TMI Action Plan Item I.C.1 as prescribed in NUREG-0737, Section I.C.1, and Supplement 1 to NUREG-0737, Section 7, is acceptance criteria in SRP 13.5.2.1, "Operating and Emergency Operating Procedures." Design-specific Generic Technical Guidelines (GTGs), otherwise referred to as the Emergency Operating Guidelines (EOGs), will be used by COL applicants to develop their Plant-Specific Technical Guidelines (P-STGs), from which their EOPs will be developed, and are the responsibility of the DC applicant.

By letter dated November 30, 2017 (ADAMS Accession No. ML17334B822) NuScale submitted technical report TR-1117-57216, "NuScale Generic Technical Guidelines," for docketing.

ISSUE

The NuScale GTGs are "symptom-based" procedural guidelines that allow the operator to respond directly to indications presented as part of an accident progression. Legacy plant generic guidelines include "event-based" descriptions; i.e., events based on the Transient and Accident Analysis events and associated operator actions described in Chapter 15 of the FSAR for a specific design. Because the NuScale design has no credited manual actions in FSAR Chapter 15, the "symptom-based" approach allows for mitigating strategies to be effective with

multiple failures, regardless of the combination. The evaluation of symptoms in the NuScale GTGs is grouped into critical safety functions (CSFs). Three CSFs, have been defined for the NuScale design:

- Containment Integrity
- Reactivity
- Core Heat Removal

Section 4.3, "Structure and Use," of the NuScale GTGs states:

> *"The guidance is arranged in a flowchart format and is intended to be implemented in a similar manner when finalized as a procedure. The flowchart consists of a series of decision points that culminate in either a list of operator actions or displays a status that no action is needed. The flowcharts are to be implemented in one of three ways (in order of preference):*
>
> 1. *Electronically through the human-system interface (HSI)*
>
> 2. *Manually through a user interface that asks the decision point questions and provides the appropriate procedure*
>
> 3. *Manually by using the paper version of the flowchart"*

Section 4.3 further explains that the paper copies of the individual CSF flowcharts are grouped into functional areas (i.e., sub-functions) comprised of decision point logic and associated operator actions. These sub-functions are prioritized from most to least severe (i.e., left to right). If the plant operates per design (as indicated on the flowcharts with green arrows), then no operator action is needed and the CSF is met. If any decision point is answered in a way that is not in accordance with the plant design (as indicated with a dashed red arrow), then a set of manual actions is specified.

Section 4.3 provides no additional guidance or insight regarding implementation/execution strategies for paper copies of the individual CSF flowcharts other than what has been described above. NRC staff is questioning the implementation/execution strategies for the CSF flowcharts with respect to the following:

- Given that the entry conditions are the same for each CSF flowchart, it appears that operators would be in all three CSFs simultaneously. Accordingly:
    - Item 1: Has a CSF hierarchy/priority been established?
    - Item 2: Is CSF flowchart implementation strategy a series, parallel, or series/parallel hybrid approach?
    - Item 3: If a concurrent "red" path condition (i.e., CSF not met) existed on two or more CSFs for the **same** unit, how would operators implement the GTGs?
    - Item 4: Assuming CSF flowchart sub-functions are implemented in series (given that they are prioritized from most to least severe), how would the flowcharts be implemented if unable to satisfy a higher order sub-function? Would the

operator, by procedure, be on hold at the higher order sub-function until it was met or be permitted to continue on to the lower order sub-function logic?

- Item 5: Given the inability to satisfy a sub-function (e.g., RA-2 manual actions associated with the Reactor Trip System (RTS) Actuation sub-function are unsuccessful), and procedural guidance that precludes the ability to execute lower order sub-function logic within the Reactivity CSF flowchart until the higher order sub-function logic has been satisfied, (assumes CSF flowchart sub-functions are implemented in series),

  Then, what strategy would be employed if a concurrent red condition existed, for example, on the Core Heat Removal (CHR) CSF for the same or different unit (assumes the CHR CSF is a lower priority than the Reactivity CSF)? Would the operator be on hold at the RTS Actuation sub-function until it could be met, or be procedurally allowed to address the CHR CSF issue?

- Item 6: The CSF flowcharts do not depict the decision logic for how operators would progress to the lower order sub-functions within the flowcharts (if in fact necessary), when the manual Operator Action(s) taken to address a “red” path condition within a higher-order sub-function have been successful.

INFORMATION NEEDED

NRC staff requests that NuScale: (1) explain the implementation/execution strategies for the CSF flowcharts to specifically address the staff’s concerns listed as Items 1-6 above, and (2) make the necessary changes to incorporate these strategies into Section 4.3, “Structure and Use,” of technical report TR-1117-57216, so that operators will be provided the appropriate guidance to efficiently and effectively implement the CSF flowcharts.