## NuScaleDCRaisPEm Resource

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| **From:** | Cranston, Gregory |
| **Sent:** | Friday, August 23, 2019 7:04 AM |
| **To:** | Request for Additional Information |
| **Cc:** | Lee, Samuel; Chowdhury, Prosanta; Hayes, Michelle; Grady, Anne-Marie; NuScaleDCRaisPEm Resource |
| **Subject:** | Request for Additional Information No. 525 eRAI No. 9705 (19.02) |
| **Attachments:** | Request for Additional Information No. 525 (eRAI No. 9705).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 by August 15, 2019, to the RAI to the NRC Document Control Desk.

If you have any questions, please contact me.

Thank you.

**Hearing Identifier:** NuScale_SMR_DC_RAI_Public
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# Request for Additional Information No. 525 (eRAI No. 9705)

Issue Date: 08/15/2019
Application Title: NuScale Standard Design Certification - 52-048
Operating Company: NuScale Power, LLC
Docket No. 52-048
Review Section: 19.02 - Review of Risk Information Used to Support Permanent Plant-Specific Changes to the Licensing Basis: General Guidance
Application Section: 19.02

QUESTIONS

19.02-1

**Regulatory Basis**

10 CFR 52.47(a)(2)(iv) states, in part, that the application for a design certification must contain an FSAR that includes the safety features that are to be engineered into the facility and those barriers that must be breached as a result of an accident before a release of radioactive material to the environment can occur. Special attention must be directed to plant design features intended to mitigate the radiological consequences of accidents.

SECY-90-016, Evolutionary Light Water Reactor (LWR) Certification Issues and their Relationship to Current Regulatory Requirements, states that mitigation features must be designed so there is reasonable assurance that they will operate in the severe accident environment for which they are intended and over the time span for which they are needed. Equipment survivability expectations should include consideration of the environment (e.g., pressure, temperature, radiation) in which the equipment is relied upon to function.

SECY-90-016, also discusses that the containment should maintain its role as a reliable leak tight barrier and should provide a barrier against the uncontrolled release of fission products. This review should be informed by SECY 19-0047, "Containment Performance Goals for The NuScale Small Modular Reactor Design," and its acceptance criteria.

10 CFR 50.44 Combustible Gas Control for Nuclear Power Reactors, *50.44(c)(3) Equipment Survivability, states, in part,* Containments that do not rely upon an inerted atmosphere to control combustible gases must be able to establish and maintain safe shutdown and containment structural integrity with systems and components capable of performing their functions during and after exposure to the environmental conditions created by the burning of hydrogen. Environmental conditions caused by local detonations of hydrogen must also be included, unless such detonations can be shown unlikely to occur. The amount of hydrogen to be considered must be equivalent to that generated from a fuel clad-coolant reaction involving 100 percent of the fuel cladding surrounding the active fuel region.

10 CFR 50.44(c)(4) Monitoring, states, in part, that equipment must be provided for monitoring hydrogen and oxygen in the containment. Equipment for monitoring hydrogen and oxygen must be functional, reliable, and capable of continuously measuring the concentration of hydrogen and oxygen in the containment atmosphere following a significant beyond design-basis accident for accident management, including emergency planning.

**Background**

LO-0519-65662 NuScale Power, LLC Submittal of Changes to Final Safety Analysis Report, Section 19.2, "Severe Accident Evaluation", 22 May 2019

NuScale TR-0716-50424-P, Revision 1 "Combustible Gas Control," ML19091A235

NuScale ER-P020-7109, Rev 0, 16 May 2019, "Equipment Survivability Methodology and Results" , located in the NuScale electronic reading room.

**Issue**

For the NuScale design, the severe accident mitigation functions are maintaining containment integrity and providing post-accident monitoring of hydrogen and oxygen in containment.

In order to demonstrate reasonable assurance that equipment required to mitigate severe accidents is shown to meet the requirements of SECY-90-016 and the staff review criteria described in SECY 19-0047, severe accident mitigation equipment and its required functions must be identified. The time duration and the environmental conditions of pressure, temperature, humidity, and radiological dose for which this function is required must also be identified. These conditions also include exposure to the environmental conditions created by the burning of hydrogen. The means to demonstrate that the equipment would perform its required function under post-accident conditions, whether by testing, analysis or a combination, must also be identified.

NuScale has performed such an evaluation in its report ER-P020-7109, Rev 0, 16 May 2019, "Equipment Survivability Methodology and Results". The purpose of this document is to identify the equipment survivability expectations in the context of radiation dose due to a core damage accident. As specified in SECY-90-016, "mitigation features must be designed so that there is reasonable assurance that they will operate in the severe-accident environment for which they are intended and over the time span for which they are needed." In order for staff to make a safety finding that the NuScale severe accident features will operate in the radiological dose environment identified in NuScale report ER-P020-7109, Rev 0, please submit this information in the FSAR. Additionally,

1. As specified in SECY-90-016, "mitigation features must be designed so that there is reasonable assurance that they will operate in the severe-accident environment for which they are intended and over the time span for which they are needed." Since NuScale specifies that the Containment Evacuation System (CES) and the Containment Flooding and Drain (CFDS) Containment Isolation Valves (CIVs) will be re-opened no later than 72 hours after a severe accident, staff requests that NuScale revise the duration of the radiological dose to these CIVs to at least 72 hours. NuScale should provide a technical basis as to why a longer time span is not needed.

2. In order to meet the regulation 10 CFR 50.44(c)(4) to provide hydrogen and oxygen monitoring post-accident, NuScale will utilize the CES, CFDS and Process Sampling System (PSS) systems. This monitoring must be established by 72 hours post-accident, but could be aligned earlier, as long as the containment pressure is less than 250 psia, in order not to exceed the CES design pressure. For this reason, NuScale is requested to revise the duration for the post-accident monitoring variable of Wide Range Containment Pressure to at least 72 hours. NuScale should provide a technical basis as to why a longer time span is not needed.

3. NuScale report ER-P020-7109, Rev 0, 16 May 2019, section 3.0, Methodology, states that equipment survivability will be assured either through dose comparisons, qualitative assessment, and/or additional testing or analysis. NuScale further states that qualitative assessment is a justification of survivability based on existing industry or vendor data. Staff requests that NuScale elaborate on their basis for concluding that vendor data or test results relevant to the NuScale containment high radiation dose post-accident atmosphere exist. Staff requests that NuScale discuss how the vendor data and/or test results would be assessed, and which acceptance criteria would apply.

4. NuScale is requested to submit a COL Item in FSAR chapter 19.2 which addresses the following:

The COL applicant that references the NuScale Power Plant design certification should submit a full description of the Equipment Survivability Program in accordance with the scope and methodology described in FSAR Section 19.2.3.3.8. Milestones and completion dates for program implementation should also be included.

5. In order to demonstrate reasonable assurance that equipment required to mitigate severe accidents is shown to meet the requirements of SECY-90-016 and the staff review criteria described in SECY 19-0047, severe accident mitigation equipment and its required functions must be identified. The time duration and the environmental conditions of pressure, temperature, humidity, and radiological dose for which this function is required must also be identified. In order to meet 10 CFR *50.44(c)(3) Equipment Survivability,* containments must be able to establish and maintain safe shutdown and structural integrity with systems and components capable of performing their functions during and after exposure to the environmental conditions created by the burning of hydrogen. NuScale is requested show that the scope, durations, and methodology of ER-P020-7109, Rev 0, 16 May 2019 apply to the environmental conditions of pressure and temperature following the combustion of hydrogen in containment.