

## NuScaleDCRaisPEm Resource

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**From:** Cranston, Gregory  
**Sent:** Saturday, August 12, 2017 8:11 AM  
**To:** RAI@nuscalepower.com  
**Cc:** NuScaleDCRaisPEm Resource; Lee, Samuel; Chowdhury, Prosanta; Jung, Ian; Betancourt, Luis; Tabatabai, Omid  
**Subject:** RE: Request for Additional Information No. 170, RAI 9027 (7.01)  
**Attachments:** Request for Additional Information No. 170 (eRAI No. 9027).pdf

Attached please find NRC staff's request for additional information 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.

Gregory Cranston, Senior Project Manager  
Licensing Branch 1 (NuScale)  
Division of New Reactor Licensing  
Office of New Reactors  
U.S. Nuclear Regulatory Commission  
301-415-0546

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## Request for Additional Information No. 170 (eRAI No. 9027)

Issue Date: 08/12/2017

Application Title: NuScale Standard Design Certification - 52-048

Operating Company: NuScale Power, LLC

Docket No. 52-048

Review Section: 07.01.DSRS - Fundamental Design Principles

Application Section: NuScale DCD, Part 2 - Tier 2, Section 7.1.2, "Independence"

### QUESTIONS

#### 07.01.DSRS-3

Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a(h) requires compliance to the Institute of Electrical and Electronics Engineers (IEEE) Standard (Std.) 603-1991. IEEE Std. 603-1991, Clause 5.6.1, states in part that "*Redundant portions of a safety system provided for a safety function shall be independent of and physically separated from each other to the degree necessary to retain the capability to accomplish the safety function during and following any design basis event requiring that safety function*"; and Clause 5.6.3, states, in part that "*The safety system design shall be such that credible failures in and consequential actions by other systems, as documented in 4.8 of the design basis, shall not prevent the safety systems from meeting the requirements of this standard.*" NuScale Design Design-Specific Review Standard Section 7.1.2, "Independence," provides guidance for meeting the communications and functional independence between redundant divisions of safety for meeting the independence requirements of IEEE Std 603-1991, Clause 5.6.

NuScale Design Control Document (DCD), Part 2 – Tier 2, Section 7.0.4.1.3, "Engineered Safety Feature Actuation System" states in part:

An EIM [Equipment Interface Module] is included in each division for each ESF [Engineered Safety Feature] component actuated by the MPS [Module Protection System]. Each EIM has two separate logic paths to allow for connection to separate ESF components. Each component is connected to two separate EIMs, resulting in two EIMs providing redundant control to each component as shown in Figure 7.0-7.

NuScale DCD, Part 2 – Tier 2, Section 7.1.2.4, "Functional Independence," states in part that:

The RTS [Reactor Trip System] and ESFAS [Engineered Safety Features Actuation System] protective functions listed in Table 7.1-3 and Table 7.1-4 are assigned to a single, separate SFM [Safety Function Module] within the MPS. The MPS separation group components (SFM, SBM [Scheduling and Bypass Module], and SDB [Safety Data Bus]) are functionally independent from the division components (SVM [Schedule and Voting Module], EIM) and installed in physically separate cabinets providing functional independence.

NuScale DCD, Part 2 – Tier 2, Section 7.1.5.1.2, "Guideline 2 - Determining Diversity," states that:

Each EIM can control two groups of field components. The EIMs are configured for functions only associated with those groups of components by limiting the number of components that an EIM can control. For example, an EIM may be required to close valves on a CNTS [Containment System] isolation signal while another EIM is dedicated to tripping a breaker on a low pressurizer level signal. Although there are instances where EIMs implement different safety functions, there are certain separate EIMs within the MPS that implement more than one safety function.

The applicant claims that the MPS division components (i.e., SVM, EIM) are functionally independent. However, it is not clear to the staff how functional independence is maintained from the

sensor to the field component. For example, there are cases where certain EIMs can implement more than one safety function. Therefore, the staff requests the applicant to demonstrate for each safety function how functional independence is maintained from the sensor to the field component.