



April 23, 2018

Docket No. 52-048

U.S. Nuclear Regulatory Commission  
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Rockville, MD 20852-2738

**SUBJECT:** NuScale Power, LLC Response to NRC Request for Additional Information No. 382 (eRAI No. 9402) on the NuScale Design Certification Application

**REFERENCE:** U.S. Nuclear Regulatory Commission, "Request for Additional Information No. 382 (eRAI No. 9402)," dated March 12, 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 Enclosure to this letter contains NuScale's response to the following RAI Question from NRC eRAI No. 9402:

- 18-20

This letter and the enclosed response 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](mailto:smirsky@nuscalepower.com).

Sincerely,

A handwritten signature in black ink, appearing to read "Zackary W. Rad".

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

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Enclosure 1: NuScale Response to NRC Request for Additional Information eRAI No. 9402



**Enclosure 1:**

NuScale Response to NRC Request for Additional Information eRAI No. 9402

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

**eRAI No.:** 9402

**Date of RAI Issue:** 03/12/2018

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**NRC Question No.:** 18-20

Title 10 of the *Code of Federal Regulations* (10 CFR) 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 FSAR, Tier 2, Section 18.0, "Human Factors Engineering - Overview," indicates that the HFE program incorporates the applicable guidance provided in NUREG-0711, Revision 3.

Chapter 18, "Human Factors Engineering," of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," lists NUREG-0711, "Human Factors Engineering Program Review Model," and NUREG-0700, "Human-System Interface Design Review Guidelines," as the sources of acceptance criteria the staff uses to evaluate whether an applicant meets the regulation.

NUREG-0711, Section 8.4.4.6(1), states that, "The applicant should describe the basis for deciding which HSIs will be included in the MCR design, and which will be provided locally."

The staff reviewed the application and could not find where NuScale addressed this criterion. Describe the basis NuScale used for deciding which HSIs to include in the MCR and which to provide locally or why this criterion does not apply to the NuScale design.

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**NuScale Response:**

NuScale used the following process as a basis for determining which human-system interface

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(HSI) to include in the main control room (MCR) and which HSIs to provide locally. Those systems having a control room interface provided the starting point for associating systems to the functional requirements identified in the functional requirements analysis/ functional analysis phase. The components in these systems were associated with specific tasks identified in the Task Analysis phase. Plant operations subject matter experts (SMEs) followed the methodology discussed in the Human Factors Engineering Task Analysis Result Summary Report (RP-0316-17616) when deciding which HSIs to include in the MCR and which to provide locally.

Those systems determined to be operated locally were not included in further HFE evaluations unless subsequent HFE program phases identified a need for their inclusion. The current engineering results are shown in the Tables 1 and 2 below entitled "List of plant systems simulated" and "List of plant systems not simulated," respectively. These results will be further confirmed during integrated systems validation testing.

Table 1 List of plant systems simulated

<b>System Code</b>	<b>System Title</b>
AB	Auxiliary Boiler System
BAS	Boric Acid System
BPSS	Backup Power Supply System
CAR	Condenser Air Removal System
CE	Containment Evacuation System
CFD	Containment Flooding and Drain System
CHW	Chilled Water
CPS	Condensate Polisher Resin Regeneration System
CRDS	Control Rod Drive System
CRH	Control Room Habitability System
CRV	Normal Control Room HVAC System
CNT	Containment System
CRA	Control Rod Assembly
CVC	Chemical and Volume Control System
CW	Circulating Water System
DHR	Decay Heat Removal System
DW	Demineralized Water System
ECC	Emergency Core Cooling System
EDNS	Normal DC Power System
EDS	Highly Reliable DC Power System
EHV	13.8 KV and Switchyard
ELV	Low Voltage AC Electrical Distribution System
EMV	Medium Voltage AC Electrical Distribution System
FD	Fire Detection System
FP	Fire Protection System
FW	Condensate and Feedwater System
GRW	Gaseous Radioactive Waste Management System
HVD	Heater Vents and Drain System



System Code	System Title
IA	Instrument and Control Air System
ICI	In-core Instrumentation System
LRW	Liquid Radioactive Waste Management System
MCS	Module Control System
MEM	Meteorological and Environmental Monitoring System
MHS	Module Heatup System
MPS	Module Protection System
MS	Main Steam System
NDS	Nitrogen Distribution System
NMS	Neutron Monitoring System
PCS	Plant Control System
PCU	Pool Cleanup System
PLD	Pool Leakage Detection Systems
PPS	Plant Protection System
PSC	Pool Surge Control System
PZR	Pressurizer
RBV	Reactor Building HVAC System
RCS	Reactor Coolant System
RCCW	Reactor Component Cooling Water System
RM	Fixed Area Radiation Monitoring System
RPC	Reactor Pool Cooling System
RPV	Reactor Pressure Vessel
RXC	Reactor Core System
RXF	Reactor Fuel Assembly
RXM	Reactor Module
RXS	Reactor System
SA	Service Air System
SCW	Site Cooling Water
SDI	Safety Display and Indication
SG	Steam Generator System
SM	Seismic Monitoring System
SFPC	Spent Fuel Pool Cooling System
TG	Turbine Generator System
UHS	Ultimate Heat Sink

Table 2 List of plant systems not simulated

System Code	System Title	Reason
ABV	Annex Building HVAC	No control room interface
BPD	BOP Drains System	No control room interface

<b>System Code</b>	<b>System Title</b>	<b>Reason</b>
COM	Communication Systems	The simulator does not model the EFS networking scheme but does provide similar functions for communication systems. The simulator mimics the plant communication systems with a Private Branch Exchange PBX phone system for the Training Center.
CP	Cathodic Protection System	No control room interface
DGBV	Diesel Generator Building HVAC	No control room interface
GLP	Grounding and Lightning Protection System	No control room interface
CP	Cathodic Protection System	No control room interface
FHE	Fuel Handling Equipment	No control room interface
FWT	Feedwater Treatment	No control room interface
HPN	Health Physics Network	System is designated but currently undefined
MAE	Module Assembly Equipment	No control room interface
MAEB	Module Assembly Equipment - Bolting	No control room interface
NFS	New Fuel Storage System	No control room interface
NSA	Neutron Source Assembly	No control room interface
PL	Plant Lighting System	No control room interface
PVM	Plant-wide Video Monitoring System	Not required for control room task performance
PSS	Process Sampling System	No control room interface
PW	Potable Water System	No control room interface
RBSS	Reactor Building Spray System	No control room interface
RVI	Reactor Vessel Internals	No control room interface
RWBV	Radioactive Waste Building Ventilation	No control room interface
RWD	Radioactive Waste Drain System	No control room interface
RWM	Radioactive Waste Management System	No control room interface
SBV	Security Building HVAC	No control room interface
SDS	Site Drainage System	No control room interface
SEC	Plant Security System	No control room interface
SFS	Spent Fuel Storage System	No control room interface
SRW	Solid Radioactive Waste Management System	No control room interface
SP	Security Power System	No control room interface
TBV	Turbine Building Ventilation	No control room interface
TLOS	Turbine Lube Oil Storage System	No control room interface
UW	Utility Water System	No control room interface



**Impact on DCA:**

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