

## NuScaleDCRaisPEm Resource

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**Sent:** Saturday, August 05, 2017 1:13 PM  
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**Subject:** RE: Request for Additional Information No. 145, RAI 9006 (8.3.1)  
**Attachments:** Request for Additional Information No. 145 (eRAI No. 9006).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  
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301-415-0546

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## Request for Additional Information NO. 145 (eRAI No. 9006)

Issue Date: 08/05/2017

Application Title: NuScale Standard Design Certification - 52-048

Operating Company: NuScale Power, LLC

Docket No. 52-048

Review Section: 08.03.01 - AC Power Systems (Onsite)

Application Section: 8.3.1 Alternating Current Power Systems

### QUESTIONS

08.03.01-1

#### Question

In FSAR Tier 2, Section 8.3.1.1.1, "Normal Power Distribution System," page 8.3-5, it is stated that there are four Unit Auxiliary Transformers (UATs) connecting 13.8 kV EHVS system to the medium voltage 4.16 kV EMVS system. In the same section, it is also stated that "the loss of an UAT or voltage regulating transformer (VRT) is mitigated by automatically transferring the affected EMVS bus to an adjacent EMVS bus." The staff noted that the VRT is connected to UAT-2 only for Division I, as shown in Figure 8.3-2a, "13.8 kV and Switchyard System," and the description of the loads on the bus is not unique to the nuclear power module (NPM). Similarly, for Division II, the VRT is connected to UAT-2.

The staff needs clarification regarding:

- a) The purpose of the VRT and why the VRT is only required on UAT-2;
- b) During a bus transfer of an EMVS bus with VRT (i.e. connected to UAT-2) to an adjacent bus not having a VRT, how is voltage regulation accomplished?

08.03.01-2

Question:

The electrical power distribution configuration for NuScale Design in Figure 8.3-1, "Station Single Line Diagram", shows that there are six generators in each division, and identified as part of six NPMs. On the onsite power distribution configuration, the staff noted that the six generators are connected to four 13.8 kV buses (EHVS), and through four UATs to four 4.16kV buses (EMVS). (i.e., a distribution of six generators loads into four EHVS buses).

10 CFR 50, Appendix A, GDC 5, "Sharing of Structures, Systems and Components," states that structures, systems, and components important to safety shall not be shared among nuclear power units unless it can be shown that such sharing will not significantly impair their ability to perform their safety functions, including, in the event of an accident in one unit, an orderly shutdown and cooldown of the remaining units.

- a) FSAR Tier 2 Section 8.3.1.2.7, "Onsite Alternating Current Power System Conformance with Regulatory Framework," states that for GDC 5, failures affecting the onsite AC power systems do not affect the ability to achieve and maintain safety functions for any NPM, including a DBE in one NPM.

The staff understands that the applicant has requested an exemption from the requirements of GDC 17, however, regarding the power distribution configuration, the staff noted that the onsite AC power system is not unitized. FSAR Tier 2, Section 8.3 did not provide sufficient clarity to assess the design concept of each NPM for its safe operation to meet the requirement of GDC 5. Staff understands that the NPMs share buses and therefore, the medium voltage (MV) and low voltage (LV) loads are shared.

Considering the EHVS and EMVS buses are shared, please explain how failures affecting one of the EHVS buses connected to two generators will not affect the ability to achieve and maintain safety functions for any NPM, including a design basis event (DBE) in one NPM, to meet the requirement of GDC 5.

b) FSAR Tier 2, Section 8.3.1.1.1 (page 8.3-5) states that the design of the EMVS is such that any two UATs can supply the load requirements for six NPMs. If there is a fault on an UAT, the EMVS bus is transferred and powered by an adjacent UAT. For example: If UAT 2 has a fault, the EMVS bus 2 associated with it may be transferred to adjacent EMVS Bus 3, sharing combined loads of both EMVS Bus 2 and 3.

For clarity, please confirm that the UAT is sized to carry the loads of four NPMs, as indicated in Figure 8.3-1.

#### 08.03.01-3

Question:

FSAR Tier 2, Section 8.3.1.1.1, page 8.3-5, states that the UATs are provided with either no-load or load-manual tap changers to maintain secondary voltage with established voltage limits.

Please clarify:

- (a.) whether load-manual tap changers can be categorized as OLTC, and
- (b) if no-load tap changers are provided, how is voltage regulation accomplished while the UAT is online?,

#### 08.03.01-4

Question:

FSAR Tier 2, Section 8.3.1.1.2, states that in addition to back up diesel generator (BDG) on the BDG bus, a portable generator can be connected for diverse and flexible coping strategy purposes. The portable generator is also shown in Figures 8.3-5a and 8.3-5b.

Please clarify if the portable generator is interlocked with the BDG or the BDG and portable generator can run in parallel.