

## NuScaleTRRaisPEm Resource

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**From:** Cranston, Gregory  
**Sent:** Monday, January 14, 2019 10:27 AM  
**To:** NuScaleTRRaisPEm Resource  
**Cc:** Lee, Samuel; Karas, Rebecca; Thurston, Carl; Franovich, Rani; Bovol, Bruce; Chowdhury, Prosanta  
**Subject:** Request for Additional Information Letter No. 9648 (eRAI No. 9648) Topical Report, Thermal Hydraulics , 15.06.05, SRSB  
**Attachments:** Request for Additional Information No. 9648 (eRAI No.9648).pdf

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

Please submit your technically correct and complete response by March 8, 2019, to the NRC Document Control Desk.

If you have any questions, please contact me.

Thank you.

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**From:** Cranston, Gregory

**Created By:** Gregory.Cranston@nrc.gov

**Recipients:**

"Lee, Samuel" <Samuel.Lee@nrc.gov>  
Tracking Status: None  
"Karas, Rebecca" <Rebecca.Karas@nrc.gov>  
Tracking Status: None  
"Thurston, Carl" <Carl.Thurston@nrc.gov>  
Tracking Status: None  
"Franovich, Rani" <Rani.Franovich@nrc.gov>  
Tracking Status: None  
"Bavol, Bruce" <Bruce.Bavol@nrc.gov>  
Tracking Status: None  
"Chowdhury, Prosanta" <Prosanta.Chowdhury@nrc.gov>  
Tracking Status: None  
"NuScaleTRRaisPEm Resource" <NuScaleTRRaisPEm.Resource@nrc.gov>  
Tracking Status: None

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## **Request for Additional Information No. 9648 (eRAI No.9648)**

Issue Date: 01/14/2019

Application Title: NuScale Topical Report

Operating Company: NuScale

Docket No. PROJ0769

Review Section: 15.06.05 - Loss of Coolant Accidents Resulting From Spectrum of Postulated Piping Breaks Within the Reactor Coolant Pressure Boundary

Application Section: 15.06.05

### **QUESTIONS**

#### **15.06.05-22**

Title 10 of the Code of Federal Regulations (CFR) Part 50, Appendix K, II (Required Documentation) requires,

1. a. A description of each evaluation model shall be furnished. The description shall be sufficiently complete to permit technical review of the analytical approach including the equations used, their approximations in difference form, the assumptions made, and the values of all parameters or the procedure for their selection, as for example, in accordance with a specified physical law or empirical correlation.

1. b. A complete listing of each computer program, in the same form as used in the evaluation model, must be furnished to the Nuclear Regulatory Commission upon request.

By letter dated March 7, 2017 (ML17066A463), NuScale submitted supplemental information in support of multiple NuScale topical reports (TR), including the loss of coolant analysis (LOCA) methodology TR. Among the files submitted were those related to the NRELAP5 code executable, at the request of the staff in a public meeting held on March 2, 2017 (ML17061A569) in support of 10 CFR 50, Appendix K documentation requirements. The code executable was provided as an acceptable alternative to the requirement to furnish the source code, if requested. The NRELAP5 version provided by NuScale was Version 1.3, which was the current version at the time. On July 17, 2018, NRC staff held a public meeting (ADAMS Accession # ML18141A735) with NuScale Power LLC and discussed various topics related to NuScale's Topical Report, "LOSS OF COOLANT ACCIDENT EVALUATION MODEL." During the meeting, NuScale informed NRC staff that a new version of NRELAP5 code has been developed and will be used to replace Version 1.3, which was the reference version submitted with the LOCA topical report submittal. In addition, NuScale indicated that all Final Safety Analysis Report (FSAR) Chapter 15 event analyses will be reanalyzed using Version 1.4.

After the public meeting, NRC staff audited the code development files related to the development of NRELAP5 Version 1.4 and found several code updates including the following major model updates:

1. Updated critical heat flux (CHF) model for the Extended Henschel and Chang implementation and modified-Zuber implementation;
2. Updated Windows executable to 64-bit version;
3. Real\*16 precision is now default to replace Real\*8 precision;
4. Correction to Moody/Henry-Fauske Choking model;
5. Shah Correlation Condensation model fixes and update.

The NRC staff must make a regulatory finding on whether the NRELAP5 code performs adequately to predict relevant figures of merit (FoM) in the licensing basis analysis, some of which have limited margin. To assess NRELAP5's ability to predict the important FoM, the staff must evaluate the evaluation model (EM). Evaluation of the EM involves review of user selectable options or inputs considered part of the EM. The selection of user options or inputs can affect the correlations used and/or the stability of the numerical results (i.e., numerical stability solution), and user selected modeling criteria can have potentially non-conservative impacts that might not be readily apparent when looking only at the FoM. To assess the EM, with what the staff considers a significantly modified version (from Version 1.3 to Version 1.4), the staff is requesting the following information be submitted:

1. Version 1.4 of NRELAP5 source code listing, or, as an alternate, Version 1.4 of NRELAP5 code executable (with staff access to the source code via audit);
2. All the necessary model update descriptions in the relevant theory manual;
3. Basemodel Rev1 NuScale Power Module™ input model decks for the limiting LOCA core coverage and containment pressure cases. Provide both steady-state and transient model decks;
4. Basemodel Rev3 NIST-1 input model deck for HP-49 (or HP-43). Provide both steady-state and transient model decks.

