

NuScaleDCRaisPEm Resource

From: Cranston, Gregory
Sent: Monday, April 16, 2018 4:06 PM
To: Request for Additional Information
Cc: Lee, Samuel; Tabatabai, Omid; Mitchell, Matthew; Makar, Gregory; NuScaleDCRaisPEm Resource; Chowdhury, Prosanta
Subject: Request for Additional Information No. 425 eRAI No. 9515 (6.2.2)
Attachments: Request for Additional Information No. 425 (eRAI No. 9515).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 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

Hearing Identifier: NuScale_SMR_DC_RAI_Public
Email Number: 460

Mail Envelope Properties (CY4PR09MB1287CBDE57319F17C6577BCB90B00)

Subject: Request for Additional Information No. 425 eRAI No. 9515 (6.2.2)
Sent Date: 4/16/2018 4:05:40 PM
Received Date: 4/16/2018 4:05:44 PM
From: Cranston, Gregory

Created By: Gregory.Cranston@nrc.gov

Recipients:

"Lee, Samuel" <Samuel.Lee@nrc.gov>
Tracking Status: None
"Tabatabai, Omid" <Omid.Tabatabai-Yazdi@nrc.gov>
Tracking Status: None
"Mitchell, Matthew" <Matthew.Mitchell@nrc.gov>
Tracking Status: None
"Makar, Gregory" <Gregory.Makar@nrc.gov>
Tracking Status: None
"NuScaleDCRaisPEm Resource" <NuScaleDCRaisPEm.Resource@nrc.gov>
Tracking Status: None
"Chowdhury, Prosanta" <Prosanta.Chowdhury@nrc.gov>
Tracking Status: None
"Request for Additional Information" <RAI@nuscalepower.com>
Tracking Status: None

Post Office: CY4PR09MB1287.namprd09.prod.outlook.com

Files	Size	Date & Time
MESSAGE	566	4/16/2018 4:05:44 PM
Request for Additional Information No. 425 (eRAI No. 9515).pdf		40703

Options

Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

Request for Additional Information No. 425 (eRAI No. 9515)

Issue Date: 04/16/2018

Application Title: NuScale Standard Design Certification - 52-048

Operating Company: NuScale Power, LLC

Docket No. 52-048

Review Section: 06.02.02 - Containment Heat Removal Systems

Application Section: 6.2.2

QUESTIONS

06.02.02-10

Background

The staff determined that the response to RAI 9169, Question 06.02.02-9 (ADAMS Accession No. ML17331A994), did not provide information sufficient for the staff to understand and evaluate the design with respect to chemical precipitates as a potential form of debris in the recirculating coolant following a postulated loss of coolant accident (LOCA). It is not clear how the proposed debris limits relate to the fuel assembly inlet blockage testing and fuel deposition analysis on which the design is based. This includes the revised limits proposed in the response to RAI 8806, Question 06.02.02-1 (ML17214A894). In addition, the response did not provide information to clarify or correct the use of the word "aluminum" when apparently referring to chemical precipitates (i.e., aluminum oxyhydroxide) formed from aluminum.

Regulatory Basis

Title 10 of the Code of Federal Regulations (10 CFR) 50.46(b)(5) requires, in part, that following operation of the emergency core cooling system (ECCS), the calculated core temperature shall be maintained at an acceptably low value and decay heat shall be removed for an extended period of time. As discussed in Regulatory Guide 1.82, "Water Sources for Long-Term Recirculation Cooling Following a Loss of Coolant Accident," Revision 4, this requires identification of debris sources and evaluation of cooling flow in the presence of limiting debris loading. Final Safety Analysis Report (FSAR) Section 6.3.3.1, "Debris Generation and Impact Evaluation," includes aluminum oxyhydroxide to represent any chemical precipitate that could be present as a debris source in the circulating fluid following a LOCA.

Information Requested

- a. Please identify a limit on chemical precipitates according to the fuel inlet head-loss testing and fuel deposition analysis. Since fuel inlet head-loss testing is performed using a chemical surrogate prepared and added according to a specific protocol, and since the role of the chemical surrogate in head-loss testing is different than that of the particles and fibers, the standard plant design should include a specific limit for chemical precipitate. The limit should be bounding for both the fuel head-loss testing and fuel deposition analyses used for meeting the requirements of 10 CFR 50.46(b)(5).
- b. If testing or analysis of chemical precipitate quantities greater than the design basis limit are described in the FSAR, please clarify the applicability of the quantities and how they were derived. For example, FSAR Tier 2, Section 6.3.3.1, states that "adequate core cooling is ensured," and "acceptable cooling performance" is demonstrated with, respectively, 271 pounds of chemical and 944 pounds of chemical species. The 271-pound value is provided with corresponding fiber and particulate quantities, but it is not clear whether the analysis applies to fuel inlet blockage or only to deposition on the fuel. For the 944-pound value, it is not clear whether it includes fibers, whether it applies to inlet blockage, deposition on the fuel, or both, or whether it is supported by testing.
- c. Please revise the FSAR as required to distinguish between aluminum and aluminum-based chemical precipitates. For example, FSAR Tier 2, page 6.3-17 refers to 271 pounds of aluminum deposited on fuel rods. The staff understands this to refer to aluminum oxyhydroxide, consistent with the analysis assumptions listed on page 6.3-14.