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Sent:	Monday, July 18, 2022 4:29 PM
To:	RAI@nuscalepower.com
Cc:	NuScale-SDA-720RAIsPEm Resource; Griffith, Thomas; Tesfaye, Getachew; Dudek, Michael
Subject:	Final Request for Additional Information (RAI) 9936
Attachments:	Final Request for Additional Information RAI_9936_NuScale Rod Ejection TR.pdf

Good Morning,

Attached please find NRC staff's request for additional information (RAI 9936) concerning the review of Licensing Topical Report "Rod Ejection Accident Methodology" TR-0716-50350 Rev. 2. (Agencywide Documents Access and Management System [ADAMS] Accession Nos. ML21351A400 [proprietary] and ML21351A399 [nonproprietary]).

Please submit your technically correct and complete response by the agreed upon date to the NRC Document Control Desk.

If you have any questions, please feel free to contact me at 301-415-6715.

Thank you,

Bruce M. Bavol

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Options
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Reply Requested: No
Sensitivity: Normal
Expiration Date:

Request for Additional Information

Issue Date: July 13, 2022
Application Title: Pre-Application Activities for NuScale SDA Application
Operating Company: NuScale
Docket No. 99902078
Review Section: NTR - NuScale Topical Report for SDA (Rod Ejection Accident Methodology)
Application Section: TR-0716-50350, Rev 2

RAI 9936 - QUESTIONS

NTR-01

Regulatory Basis:
In accordance with 10 CFR 50 Appendix A GDC 28, "Reactivity Limits," the reactivity control systems must be designed with appropriate limits on potential reactivity increases so the effects of a rod ejection accident (REA) can result in neither damage to the reactor coolant pressure boundary nor result in sufficient disturbance to significantly impair the core cooling capability. A spectrum of initial conditions for an REA should be considered to ensure the analysis of the event is appropriately bounded.

Regulatory Guide 1.236, Section 2.2.1, "PWR CRE Initial Conditions" states accident analyses should consider the full range of cycle operation from beginning of cycle (BOC) to end of cycle (EOC) and full range of power operation.

Issue:
Section 5.1.2 of TR-0716-50350, Rev 2, states the REA is analyzed at BOC and EOC burnups to bound core reactivity conditions and the expected limiting MCHFR case will occur at EOC. Middle of cycle (MOC) conditions are not explicitly considered, and no justification is provided for the statement that EOC is limiting. Consistent with RG 1.236, the REA method should address the full spectrum of cycle burnup and range of power operation, which includes consideration of all MOC conditions.

Request:
To support a finding that the REA analysis is appropriately bounded, the staff requests that the TR be updated to include consideration of the full spectrum of cycle burnup and range of power operation in the set of initial conditions for the REA analysis, or provide justification for excluding MOC conditions from these initial conditions.

NTR-02

Regulatory Basis:
Regulatory Guide 1.236, section 3.3, "Molten Fuel Cladding Failure Threshold" states that "Fuel cladding failure is presumed if predicted fuel temperature anywhere in the pellet exceeds incipient fuel melting conditions." Section 6, "Allowable Limits on Damaged Core Coolability," states that in medium- to high-burnup rods, fuel melting outside the centerline region should be precluded.

Issue:
Section 2.2.2 "Fuel Cladding Failure" of TR-0716-50350, Rev 2, states that burnup-enhanced incipient fuel melt temperature is determined using equation 12-3 from BAW-10231P-A, "COPERNIC Fuel Rod Design Computer Code," and using a conservative burnup value. The NRC staff has previously approved the methodology in BAW-10231P-A for uranium dioxide fuels with M5 cladding to a peak rod average burnup of 62 GWd/MTU; however, NuScale has not stated the range over which this methodology will be applied.

Request:
The staff requests that NuScale update the LTR to: a) state the range of burnup over which the REA methodology may be applied, and b) if that range extends beyond 62 GWd/MTU, provide justification for applicability of equation 12-3 up to the maximum burnup allowed.