

## NuScaleDCRaisPEm Resource

---

**From:** Cranston, Gregory  
**Sent:** Saturday, August 12, 2017 1:59 PM  
**To:** RAI@nuscalepower.com  
**Cc:** NuScaleDCRaisPEm Resource; Lee, Samuel; Chowdhury, Prosanta; Lupold, Timothy; Tsirigotis, Alexander; Vera Amadiz, Marieliz  
**Subject:** RE: Request for Additional Information No. 178, RAI 9072 (3.12)  
**Attachments:** Request for Additional Information No. 178 (eRAI No. 9072).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  
U.S. Nuclear Regulatory Commission  
301-415-0546

**Hearing Identifier:** NuScale\_SMR\_DC\_RAI\_Public  
**Email Number:** 202

**Mail Envelope Properties** (14dbc0f4d107476c908013d0c69a3699)

**Subject:** RE: Request for Additional Information No. 178, RAI 9072 (3.12)  
**Sent Date:** 8/12/2017 1:58:54 PM  
**Received Date:** 8/12/2017 1:58:57 PM  
**From:** Cranston, Gregory

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

**Recipients:**

"NuScaleDCRaisPEm Resource" <NuScaleDCRaisPEm.Resource@nrc.gov>

Tracking Status: None

"Lee, Samuel" <Samuel.Lee@nrc.gov>

Tracking Status: None

"Chowdhury, Prosanta" <Prosanta.Chowdhury@nrc.gov>

Tracking Status: None

"Lupold, Timothy" <Timothy.Lupold@nrc.gov>

Tracking Status: None

"Tsirigotis, Alexander" <Alexander.Tsirigotis@nrc.gov>

Tracking Status: None

"Vera Amadiz, Marieliz" <Marieliz.VeraAmadiz@nrc.gov>

Tracking Status: None

"RAI@nuscalepower.com" <RAI@nuscalepower.com>

Tracking Status: None

**Post Office:** HQPWMSMRS08.nrc.gov

<b>Files</b>	<b>Size</b>	<b>Date &amp; Time</b>
MESSAGE	560	8/12/2017 1:58:57 PM
Request for Additional Information No. 178 (eRAI No. 9072).pdf		95687

**Options**

**Priority:** Standard

**Return Notification:** No

**Reply Requested:** No

**Sensitivity:** Normal

**Expiration Date:**

**Recipients Received:**

## Request for Additional Information No. 178 (eRAI No. 9072)

Issue Date: 08/12/2017

Application Title: NuScale Standard Design Certification - 52-048

Operating Company: NuScale Power, LLC

Docket No. 52-048

Review Section: 03.12 - ASME Code Class 1, 2, and 3 Piping Systems and Piping Components and Their Associated Supports

Application Section: 3.12

### QUESTIONS

03.12-9

10 CFR 52.47 requires the FSAR include a description and evaluation of the SSCs sufficient to permit the understanding of the system design and their relationship to safety evaluations. Standard Review Plan (SRP) Section 3.12 specifies that when a piping system is to be broken up into two parts with the input from the larger piping system used to analyze the smaller piping system, the decoupling criteria provided in SRP Section 3.7.2 are applicable. NuScale FSAR Tier 2, Subsection 3.7.3.3 and in part Subsection 3.12.4.4 specify decoupling criteria for piping consistent with those in SRP Section 3.7.2. FSAR Subsection 3.12.4.4 introduces a choice of two additional decoupling criteria for piping that are different from the guidance in SRP Section 3.7.2 and those specified in FSAR Subsection 3.7.3.3.

The following is requested from the applicant:

- 1) If the branch piping geometry is known, clarify whether the branch piping is included in the piping analysis model with the header. If the branch piping geometry is not included, justify the need to decouple the branch from the header.
- 2) For branch piping with known geometry for which decoupling is justified based on the item above, SRP Section 3.12 indicates that decoupling criteria from SRP Section 3.7.2 should be used, which are shown in FSAR Subsections 3.7.3.3 and 3.12.4.4. Clarify whether these criteria, which are consistent with SRP 3.7.2, will be utilized in this case or provide a technical justification for utilizing other criteria.
- 3) FSAR Section 3.12.4.4 includes as one of the decoupling criteria that the branch pipe may be decoupled from the run pipe if the ratio of run to branch pipe moment of inertia is 25 to 1 or more. The Welding Research Council (WRC) Bulletin (BL) 300, "Technical Position on Damping and on Industry Practice," provides the technical justification for using the moment of inertia ratio of 25 for decoupling with exceptions, which is based on engineering experience and has been accepted by the NRC when justified in certain applications. Since this decoupling criterion is in FSAR Section 3.12.4.4, refer to and add WRC BL 300 in the FSAR Section 3.12 list of references and also show in FSAR 3.12.4.4 that, as shown in WRC BL 300, if either of the two factors listed below apply, piping cannot be decoupled. If an alternative to these two factors is selected, provide a technical justification.
  - a. If an anchor or fixed restraint on the branch pipe is located near the run pipe and significantly restrains the movement of the run pipe, the branch pipe should be included with the model of the run pipe, up to the anchor (or up to and including the series of fixed restraints that effectively permits termination of the problem at some point remote from the run pipe).

- b. The branch pipe should be included in the computer model of the run pipe if more precise magnitudes of reactions are required at terminal points (i.e., equipment, penetrations, etc.) to determine their (the reactions) acceptability.
- 4) In addition to the WRC BL 300 criterion mentioned above, FSAR Section 3.12.4.4 includes an additional criterion for decoupling, that branch lines can be decoupled when the ratio of run to branch pipe diameter is 3 to 1 or greater. Clarify the need for having these two criteria in place and when one will be used versus the other. Provide a technical basis for using this criterion.
- 5) FSAR Section 3.12.4.4 also discusses the pipe overlap method and states that:

It is allowed to terminate the analytical model of a piping system at a location without a structural anchor if decoupling criteria is satisfied or if adjacent analytical models sufficiently overlap.

Decoupling of piping is customarily used to decouple branch lines that are smaller than the main run of pipe from the analysis math model of the main run and analyzed separately. To aid in understanding how this method is used, provide an example where the analytical model of a piping system can be terminated at a location without a structural anchor (or nozzle used as an anchor) using pipe decoupling criteria (not pipe overlap criteria).

- 6) In providing the overlap region methodology, FSAR 3.12.4.4 states that:

In accordance with the recommendations of NUREG/CR-1980 (Reference 3.12-11) the region of overlap is selected to be in a rigid (or relatively rigid) portion of the piping system per Section 2 (conclusions and recommendations) of NUREG/CR-1980 for specific analysis criteria, including the required stiffness of the overlap region.

Show that all of the conditions in NUREG/CR-1980, Section 2 are followed when applying the structural overlap method and the three criteria specified in Section 2 of NUREG/CR-1980 are used. Specifically, verify that there are at least four rigid restraints in each of three mutually perpendicular directions in the overlap region (including the ends) when the method is applied. For axial restraints only, this requirement may be relaxed to a single restraint in any straight segment.