



June 25, 2019

Docket No. 52-048

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
One White Flint North  
11555 Rockville Pike  
Rockville, MD 20852-2738

**SUBJECT:** NuScale Power, LLC Supplemental Response to NRC Request for Additional Information No. 232 (eRAI No. 9113) on the NuScale Design Certification Application

**REFERENCES:**

1. U.S. Nuclear Regulatory Commission, "Request for Additional Information No. 232 (eRAI No. 9113)," dated September 21, 2017
2. NuScale Power, LLC Response to NRC "Request for Additional Information No. 232 (eRAI No.9113)," dated July 23, 2018
3. NuScale Power, LLC Supplemental Response to "NRC Request for Additional Information No. 232 (eRAI No. 9113)" dated October 15, 2018
4. NuScale Power, LLC Supplemental Response to "NRC Request for Additional Information No. 232 (eRAI No. 9113)" dated June 6, 2019

The purpose of this letter is to provide the NuScale Power, LLC (NuScale) supplemental response to the referenced NRC Request for Additional Information (RAI).

The Enclosures to this letter contain NuScale's supplemental response to the following RAI Question from NRC eRAI No. 9113:

- 03.06.03-9

Enclosure 1 is the proprietary version of the NuScale Supplemental Response to NRC RAI No. 232 (eRAI No. 9113). NuScale requests that the proprietary version be withheld from public disclosure in accordance with the requirements of 10 CFR § 2.390. The enclosed affidavit (Enclosure 3) supports this request. Enclosure 2 is the nonproprietary version of the NuScale response.

This letter and the enclosed responses make no new regulatory commitments and no revisions to any existing regulatory commitments.



If you have any questions on this response, please contact Marty Bryan at 541-452-7172 or at mbryan@nuscalepower.com.

Sincerely,

Zackary W. Rad  
Director, Regulatory Affairs  
NuScale Power, LLC

Distribution: Gregory Cranston, NRC, OWFN-8H12  
Samuel Lee, NRC, OWFN-8H12  
Marieliz Vera, NRC, OWFN-8H12

Enclosure 1: NuScale Supplemental Response to NRC Request for Additional Information eRAI No. 9113, proprietary

Enclosure 2: NuScale Supplemental Response to NRC Request for Additional Information eRAI No. 9113, nonproprietary

Enclosure 3: Affidavit of Zackary W. Rad, AF-0619-66064



**Enclosure 1:**

NuScale Supplemental Response to NRC Request for Additional Information eRAI No. 9113,  
proprietary



**Enclosure 2:**

NuScale Supplemental Response to NRC Request for Additional Information eRAI No. 9113,  
nonproprietary

## **Response to Request for Additional Information Docket No. 52-048**

**eRAI No.:** 9113

**Date of RAI Issue:** 09/21/2017

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**NRC Question No.:** 03.06.03-9

The equations presented in FSAR Section 3.6.3.3 have been used to generate the SBAC Figures referenced in FSAR Section 3.6.3.4 showing normal operating (N) and maximum (N+SSE) stresses for LBB locations. Many of these graphs presented in Figures 3.6-23 through 3.6-32 are unusual in that the maximum (N+SSE) stresses are lower than the normal stresses for some cases. To assist the staff in understanding these graphs, please provide the following;

- Provide a table of stresses or forces and moments at the girth weld (node points) from the piping stress analysis and indicate which of these locations are used in the LBB analysis. In these tables, also identify the different stress components, i.e., thermal expansion, pressure, dead-weight, seismic/inertial, seismic/anchor motion, etc.
  - The normal stress versus maximum stress plots shown Figure 3.6-23 to Figure 3.6-32 for various segments for MS and FW system show that there were some data points below 1:1 line indicating that N+SSE stresses are lower than normal stress. Please explain.
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### **NuScale Response:**

The initial response to RAI 9113 Question 03.06.03-9 was submitted by NuScale letter RAIO-0718-60989, dated July 23, 2018. In a follow-up public meeting with NRC on August 23, 2018, the staff requested the following additional information.

*In order to proceed with confirmatory analyses, additional data, i.e., all three component values ( $M_x$ ,  $M_y$ , and  $M_z$ ) of resultant moment for each loading condition (i.e., DW, TH, PR, SSE, and SAM) at 36 weld locations are required - as resultant moment alone is not sufficient. NuScale is requested to provide this additional data so that confirmatory analyses can proceed as planned.*



The requested data was submitted by NuScale letter RAIO-1018-62135, dated October 15, 2018. However, these data differ from the data that were used in calculating the stress points in FSAR Section 3.6 Figure 3.6-23 through Figure 3.6-32. The differences between the FSAR piping and the new piping include load magnitudes and the number of welds. The number of welds has increased by four to a total of 40.

In a follow-up public meeting with NRC on November 7, 2018, the staff requested the following additional information.

*If the data has changed from the original FSAR where the piping loads and number of welds have changed, then NuScale will need to provide new BACs for the 36 weld locations so confirmatory analysis can be performed on the new data and assure that the analysis is bounding.*

NuScale response - The requested Feedwater (FW) weld data were provided in an additional supplemental RAI 9113 Question 03.06.03-9 response, NuScale letter RAIO-0619-65847, dated June 6, 2019. The Main Steam (MS) weld data are provided below.

The MS piping has 16 welds. The forces and moments at these locations are provided in Tables 1 and 2 below. In these tables, the loads are calculated based on a local Cartesian coordinate system at each weld location. Fa is axial force, Mx is the moment about the axial direction, and My and Mz are moments about the transverse directions.

Table 1: MS line 1 weld location forces and moments

<b>MS1 Point</b>	<b>Load Combination</b>	<b>Fa (lbf)</b>	<b>Mx (ft-lbf)</b>	<b>My (ft-lbf)</b>	<b>Mz (ft-lbf)</b>
A00	Dead Weight	{}			
	Therm. Exp. <sup>(1)</sup>				
	Pressure				
	SAM <sup>(2)</sup>				
	Seismic				
A03A	Dead Weight				
	Therm. Exp.				
	Pressure				
	SAM				
	Seismic				
A06N- <sup>(3)</sup>	Dead Weight				
	Therm. Exp.				
	Pressure				
	SAM				
	Seismic				}} <sup>2(a),(c)</sup>

A06N+ <sup>(3)</sup>	Dead Weight	{			
	Therm. Exp.				
	Pressure				
	SAM				
	Seismic				
A06F- <sup>(3)</sup>	Dead Weight				
	Therm. Exp.				
	Pressure				
	SAM				
	Seismic				
A06F+ <sup>(3)</sup>	Dead Weight				
	Therm. Exp.				
	Pressure				
	SAM				
	Seismic				
A10	Dead Weight				
	Therm. Exp.				
	Pressure				
	SAM				
	Seismic				
A09A	Dead Weight				
	Therm. Exp.				
	Pressure				
	SAM				
	Seismic				
B03A	Dead Weight				
	Therm. Exp.				
	Pressure				
	SAM				
	Seismic				
B07	Dead Weight				
	Therm. Exp.				
	Pressure				
	SAM				
	Seismic				} <sup>2(a),(c)</sup>

Note <sup>(1)</sup>: Thermal Expansion

<sup>(2)</sup>: Seismic Anchor Motion

<sup>(3)</sup>: Straight pipe side of the data: "F+" and "N-"; bent pipe side: "F-" and "N+"

Table 2: MS line 2 weld location forces and moments

<b>MS2 Point</b>	<b>Load Combination</b>	<b>Fa (lbf)</b>	<b>Mx (ft-lbf)</b>	<b>My (ft-lbf)</b>	<b>Mz (ft-lbf)</b>
C00	Dead Weight	{{			
	Therm. Exp.				
	Pressure				
	SAM				
	Seismic				
C04	Dead Weight				
	Therm. Exp.				
	Pressure				
	SAM				
	Seismic				
C07N-	Dead Weight				
	Therm. Exp.				
	Pressure				
	SAM				
	Seismic				
C07N+	Dead Weight				
	Therm. Exp.				
	Pressure				
	SAM				
	Seismic				
C07F-	Dead Weight				
	Therm. Exp.				
	Pressure				
	SAM				
	Seismic				
C07F+	Dead Weight				
	Therm. Exp.				
	Pressure				
	SAM				
	Seismic				
C11	Dead Weight				
	Therm. Exp.				
	Pressure				
	SAM				
	Seismic				
D01	Dead Weight				
	Therm. Exp.				
	Pressure				
	SAM				
	Seismic				}} <sup>2(a),(c)</sup>



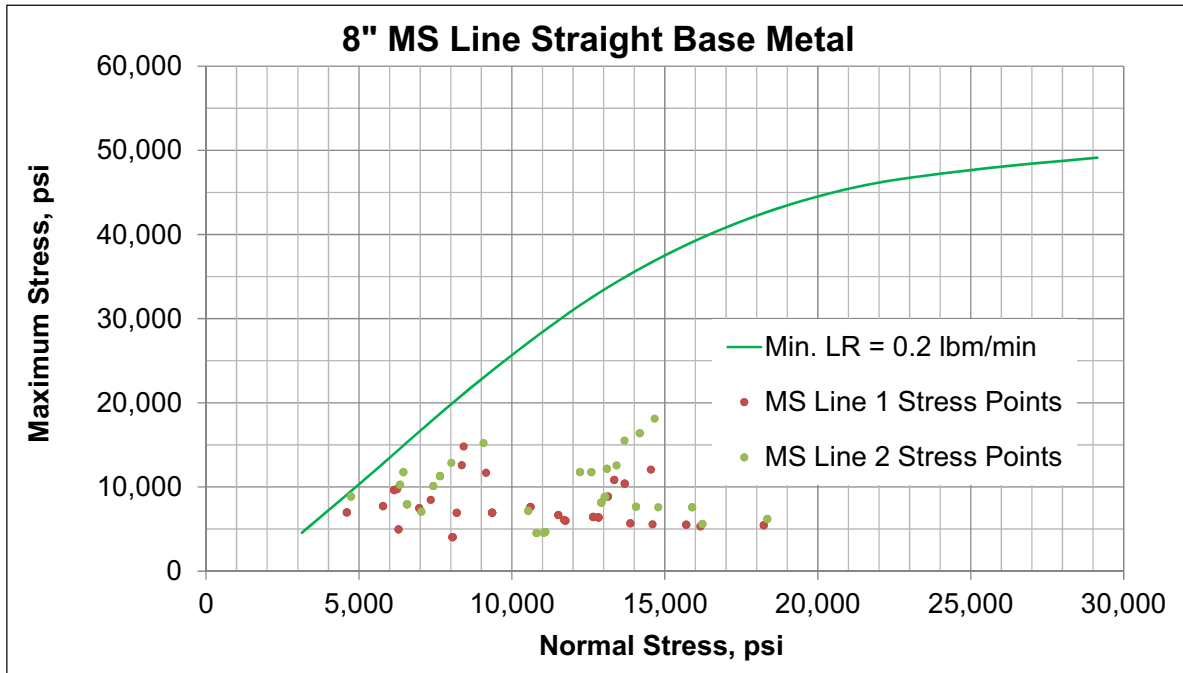
D05A	Dead Weight	{			
	Therm. Exp.				
	Pressure				
	SAM				
	Seismic				
D09	Dead Weight				
	Therm. Exp.				
	Pressure				
	SAM				
	Seismic				}} <sup>2(a),(c)</sup>

**Impact on DCA:**

The FSAR Tier 2, Section 3.6 Figure 3.6-23 through Figure 3.6-28 have been revised as described in the response above and as shown in the markup provided with this response.

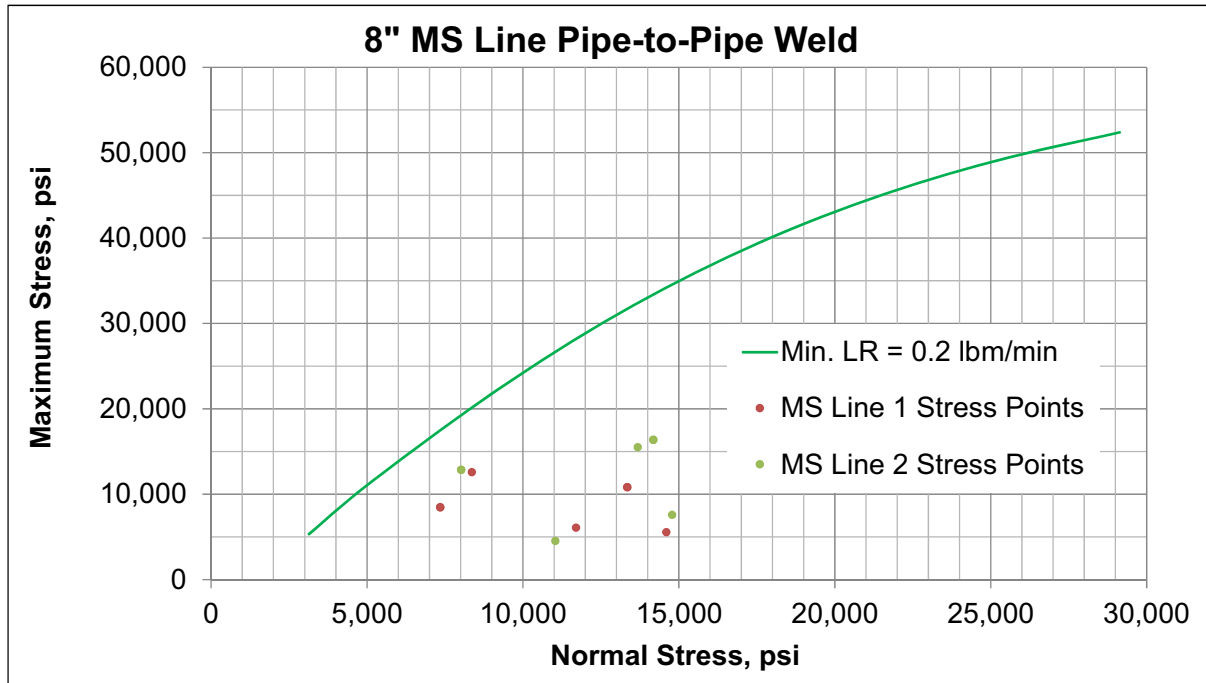
RAI 03.06.03-953

Figure 3.6-23: Smooth Bounding Analysis Curve for Main Steam System Nominal Pipe Size 8 Straight Pipe Base Metal



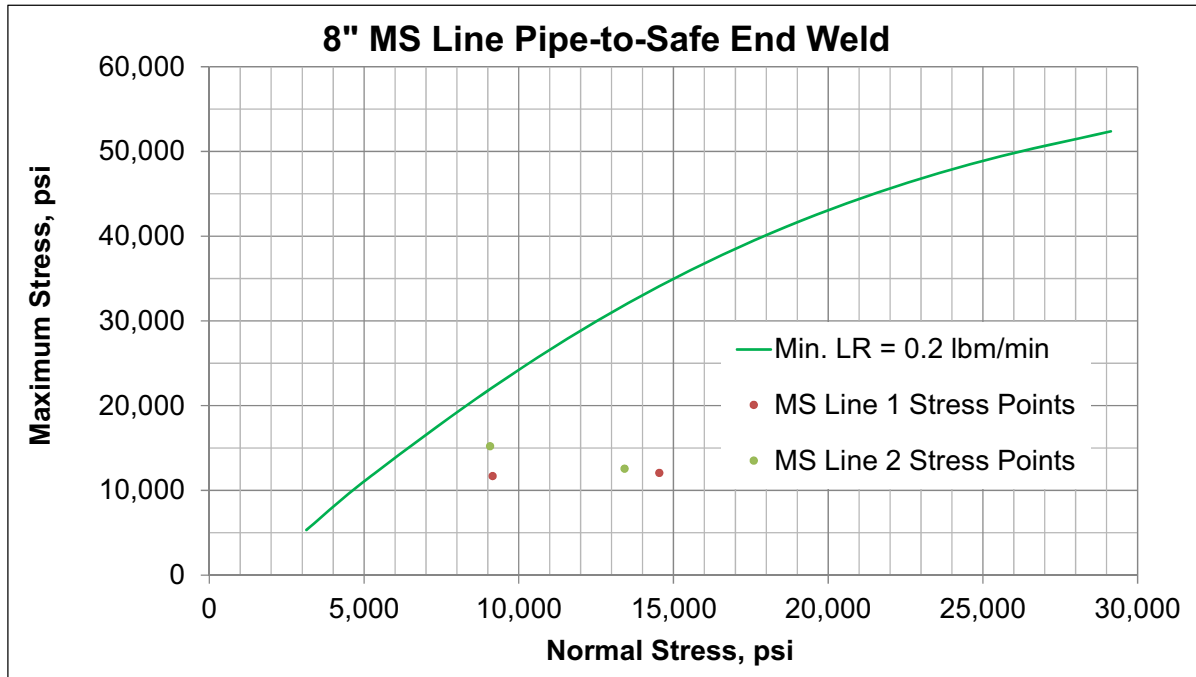
RAI 03.06.03-9S3

Figure 3.6-24: Smooth Bounding Analysis Curve for Main Steam System Nominal Pipe Size 8 Pipe-to-Pipe Weld



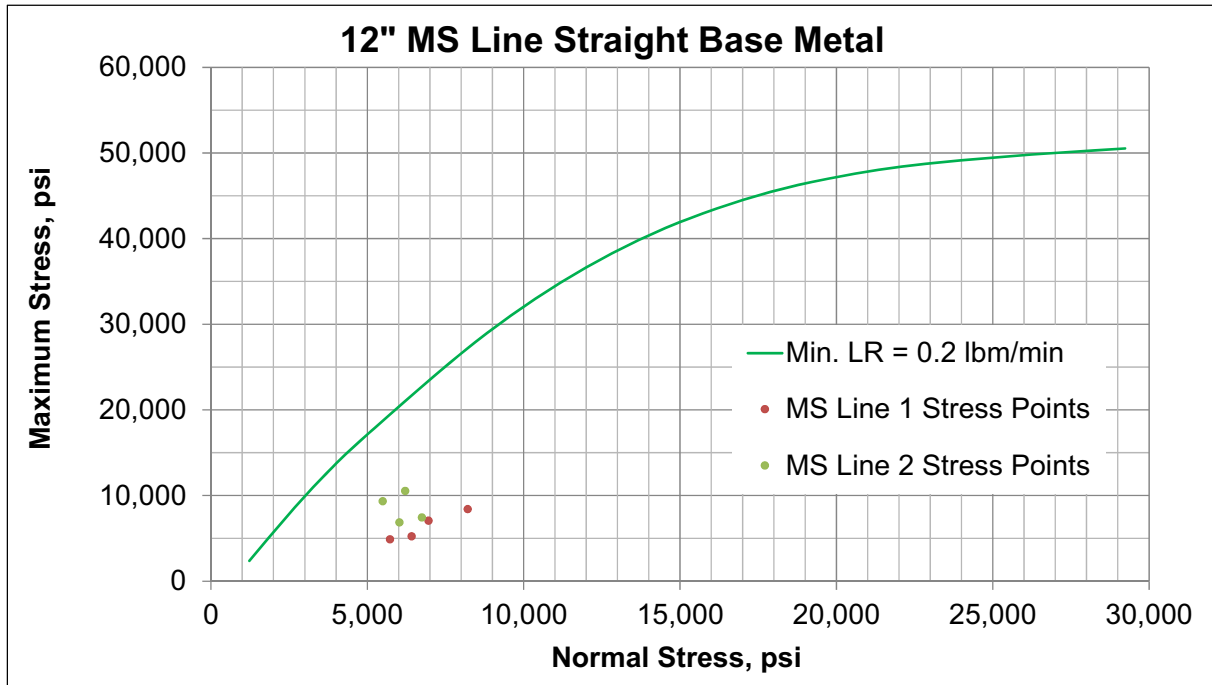
RAI 03.06.03-9S3

Figure 3.6-25: Smooth Bounding Analysis Curve for Main Steam System Nominal Pipe Size 8 Pipe-to-Safe-End Weld



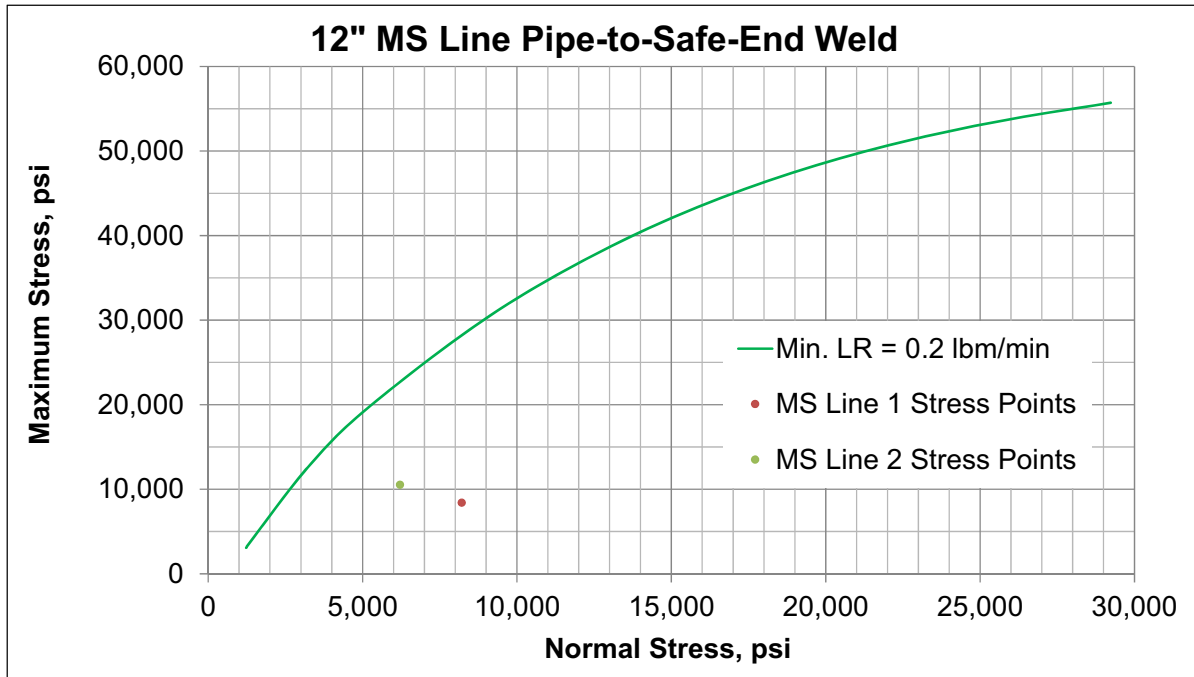
RAI 03.06.03-9S3

Figure 3.6-26: Smooth Bounding Analysis Curve for Main Steam System Nominal Pipe Size 12 Straight Pipe Base Metal



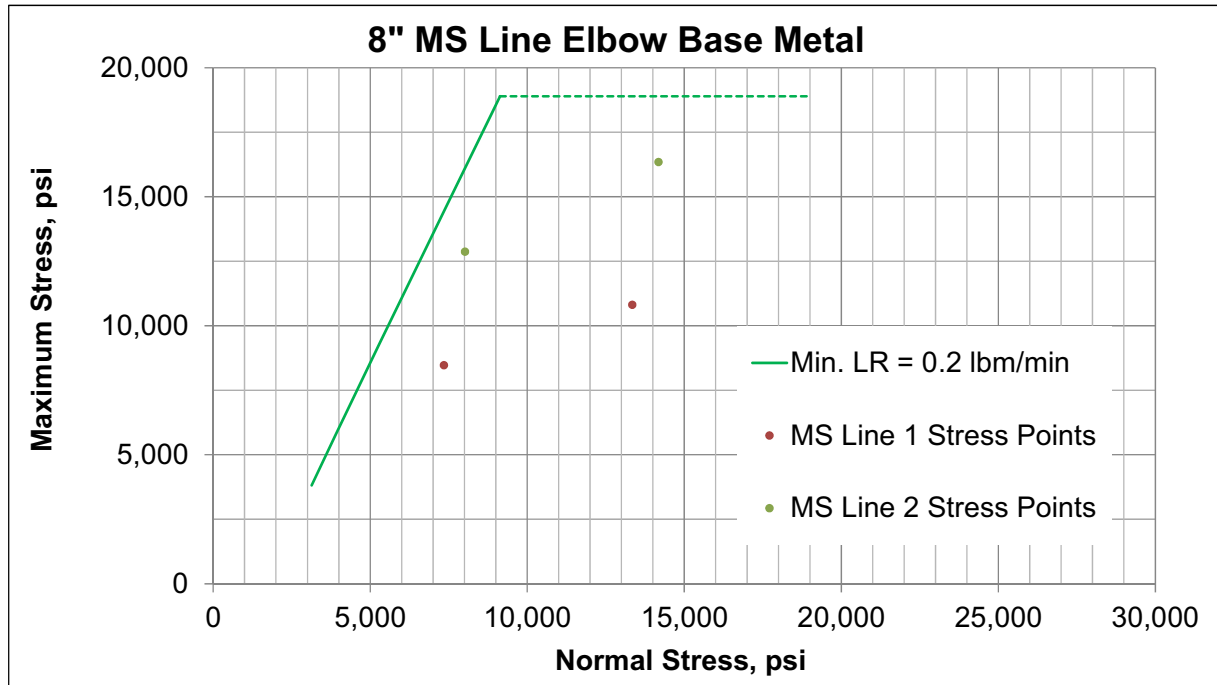
RAI 03.06.03-9S3

Figure 3.6-27: Smooth Bounding Analysis Curve for Main Steam System Nominal Pipe Size 12 Pipe-to-Safe-End Weld



RAI 03.06.03-953

Figure 3.6-28: Smooth Bounding Analysis Curve for Main Steam System Nominal Pipe Size 8 Elbow Base Metal





RAIO-0619-66063

**Enclosure 3:**

Affidavit of Zackary W. Rad, AF-0619-66064



**NuScale Power, LLC**  
AFFIDAVIT of Zackary W. Rad

I, Zackary W. Rad, state as follows:

1. I am the Director, Regulatory Affairs of NuScale Power, LLC (NuScale), and as such, I have been specifically delegated the function of reviewing the information described in this Affidavit that NuScale seeks to have withheld from public disclosure, and am authorized to apply for its withholding on behalf of NuScale.
2. I am knowledgeable of the criteria and procedures used by NuScale in designating information as a trade secret, privileged, or as confidential commercial or financial information. This request to withhold information from public disclosure is driven by one or more of the following:
  - a. The information requested to be withheld reveals distinguishing aspects of a process (or component, structure, tool, method, etc.) whose use by NuScale competitors, without a license from NuScale, would constitute a competitive economic disadvantage to NuScale.
  - b. The information requested to be withheld consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), and the application of the data secures a competitive economic advantage, as described more fully in paragraph 3 of this Affidavit.
  - c. Use by a competitor of the information requested to be withheld would reduce the competitor's expenditure of resources, or improve its competitive position, in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product.
  - d. The information requested to be withheld reveals cost or price information, production capabilities, budget levels, or commercial strategies of NuScale.
  - e. The information requested to be withheld consists of patentable ideas.
3. Public disclosure of the information sought to be withheld is likely to cause substantial harm to NuScale's competitive position and foreclose or reduce the availability of profit-making opportunities. The accompanying Request for Additional Information response reveals distinguishing aspects about the method by which NuScale develops its power module systems.

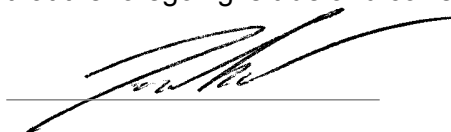
NuScale has performed significant research and evaluation to develop a basis for this method and has invested significant resources, including the expenditure of a considerable sum of money.

The precise financial value of the information is difficult to quantify, but it is a key element of the design basis for a NuScale plant and, therefore, has substantial value to NuScale.

If the information were disclosed to the public, NuScale's competitors would have access to the information without purchasing the right to use it or having been required to undertake a similar expenditure of resources. Such disclosure would constitute a misappropriation of NuScale's intellectual property, and would deprive NuScale of the opportunity to exercise its competitive advantage to seek an adequate return on its investment.

4. The information sought to be withheld is in the enclosed response to NRC Request for Additional Information No. 232, eRAI No. 9113. The enclosure contains the designation "Proprietary" at the top of each page containing proprietary information. The information considered by NuScale to be proprietary is identified within double braces, "{{ }}" in the document.
5. The basis for proposing that the information be withheld is that NuScale treats the information as a trade secret, privileged, or as confidential commercial or financial information. NuScale relies upon the exemption from disclosure set forth in the Freedom of Information Act ("FOIA"), 5 USC § 552(b)(4), as well as exemptions applicable to the NRC under 10 CFR §§ 2.390(a)(4) and 9.17(a)(4).
6. Pursuant to the provisions set forth in 10 CFR § 2.390(b)(4), the following is provided for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld:
  - a. The information sought to be withheld is owned and has been held in confidence by NuScale.
  - b. The information is of a sort customarily held in confidence by NuScale and, to the best of my knowledge and belief, consistently has been held in confidence by NuScale. The procedure for approval of external release of such information typically requires review by the staff manager, project manager, chief technology officer or other equivalent authority, or the manager of the cognizant marketing function (or his delegate), for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside NuScale are limited to regulatory bodies, customers and potential customers and their agents, suppliers, licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or contractual agreements to maintain confidentiality.
  - c. The information is being transmitted to and received by the NRC in confidence.
  - d. No public disclosure of the information has been made, and it is not available in public sources. All disclosures to third parties, including any required transmittals to NRC, have been made, or must be made, pursuant to regulatory provisions or contractual agreements that provide for maintenance of the information in confidence.
  - e. Public disclosure of the information is likely to cause substantial harm to the competitive position of NuScale, taking into account the value of the information to NuScale, the amount of effort and money expended by NuScale in developing the information, and the difficulty others would have in acquiring or duplicating the information. The information sought to be withheld is part of NuScale's technology that provides NuScale with a competitive advantage over other firms in the industry. NuScale has invested significant human and financial capital in developing this technology and NuScale believes it would be difficult for others to duplicate the technology without access to the information sought to be withheld.

I declare under penalty of perjury that the foregoing is true and correct. Executed on June 25, 2019.



Zackary W. Rad