

## Comment Response Matrix Chapter 6

<b>Comment # (Affiliation: NuScale Power, LLC)</b>	<b>DSRS Section</b>	<b>Paragraph, Item, or Page</b>	<b>Comment / Basis</b>	<b>Commenter Recommendation</b>	<b>NRC Staff Technical Resolution</b>
278	6.1.1, Section III	Whole Section	The numbering in this DSRS section starts at 2.	NuScale recommends that the format be corrected.	See footnote 1 <sup>1</sup>
279	6.1.2, Section VI	Item 5 on Page 6.1.2 - 7	The NuScale DSRS includes a reference to RG 1.182 which has been withdrawn by the NRC.	NuScale recommends removal of the reference to RG 1.182.	See footnote 1
280	6.2.1.1.A, Section VI	Page 13 and 14	The DSRS References are not numbered correctly on these pages.	NuScale recommends correcting the numbering sequence.	The staff agrees with this comment and has revised the DSRS accordingly.
281	6.2.1.1.A	Pg.6.2.1.1-4 DSRS Acceptance Criterion #1	The DSRS acceptance criterion states "... the containment design pressure should provide at least a 10% margin above the accepted peak calculated containment pressure..."	NuScale recommends that the peak containment pressure acceptance criteria be changed to "the peak calculated containment pressure following a loss-of- coolant accident, or a steam or feedwater line break, should be less than the containment design pressure."	A 10% margin between peak containment pressure and the design pressure is considered sufficient for the construction permit stage. Staff has accepted margins less than 10% when justified, as the next sentence in the DSRS suggests (OL/COL), even for DC applicants. The

<sup>1</sup> The NRC Staff determined whether to develop a new DSRS section after considering whether significant differences in the functions, characteristics, or attributes of the NuScale design required major revision of the related SRP section guidance, or whether structures, systems, and components identified in the NuScale design are unique and not addressed by the current SRP. The Staff revisited these criteria after publishing the Draft version of this DSRS section (Issued in June 2015) and determined, based on the most recent NuScale design, that the related SRP section is appropriate to perform the NRC safety review. Therefore, this DSRS section will not be issued as final and the related SRP section will be used for this portion of the NuScale review. Since this comment is on a Draft DSRS Section that is no longer being used, the staff will not provide a specific response to it. In deciding to use the related SRP section, the staff has not necessarily determined that the SRP section is wholly applicable without modification. For example, as the NRC staff gains greater understanding of the NuScale design or if the design changes during the review, the staff would assess whether different or supplemental review criteria are needed.

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					DSRS has been revised for clarity.
282	6.2.1.3, Section II	DSRS Acceptance Criteria, 1.C.v, Page 6.2.1.3-6	The DSRS text refers to DSRS 9.2.5, but there is no DSRS 9.2.5 and the Scope and Safety Matrix points to the SRP for the review of Section 9.2.5.	NuScale recommends a change to the text to reflect SRP 9.2.5.	The staff agrees with this comment and has revised the DSRS to refer to SRP 9.2.5.
283	6.2.1.3, Section VI	Reference 3	The DSRS Reference 3 lists RG 1.182 which has been withdrawn by the NRC.	NuScale recommends removal of the reference to RG 1.182.	The staff agrees with this comment and has revised the DSRS by removing the reference to RG 1.182.
284	6.2.1.3	Pg. 6.2.1.3- 1 I. Areas of Review, Paragraph 3	The DSRS text states "If the SBLOCA is in the upper portion of the reactor vessel and is sufficiently small to preclude the voiding of reactor coolant below the primary system inlet to the steam generators, the DHRS heat exchangers will provide cooling to the core to effect cooldown and depressurization."	NuScale recommends rewording this sentence to "If the SBLOCA is in the upper portion of the reactor vessel and is sufficiently small to preclude the loss of single phase natural circulation, the DHRS heat exchangers will provide cooling to the core to effect cooldown and depressurization." to more accurately describe the phenomena.	The staff agrees with this comment and has revised the DSRS for accuracy and clarity.
285	6.2.1.3	Section II 6.2.1.3-5, Item C.ii Initial Blowdown Phase	The DSRS includes following paragraph: "Calculations of heat transfer from released reactor steam into the containment wall should be based on forced convection	NuScale recommends rewording the paragraph to state: "For purposes of calculating peak containment pressure, heat transfer to the containment wall from released reactor coolant	The staff agrees that the paragraph, as it existed in the draft DSRS, may have been overly restrictive in prescribing specific heat transfer correlation regimes based on containment

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		Containment Design Basis, last paragraph	in regions where there is steam jetting and natural convection at points away from jetting. Calculations of heat transferred from condensed reactor water in the containment sump into the containment wall and from the reactor vessel wall into the pooled sump water should be based on natural convection. Heat transfer through the containment vessel wall into the reactor building pool should be based on conduction and natural convection with nucleate boiling." This paragraph is overly restrictive.	should be calculated based on heat transfer regimes that conservatively underestimate heat removal from the containment. Heat transfer correlations that are based on jetting of coolant may be used when justified. Steam condensation heat transfer correlations that consider the presence of non-condensable gas in containment may be used when justification is provided. Calculations of heat transfer from condensed reactor water in the containment sump into the containment wall and from the reactor vessel wall into the pooled sump water should be based on heat transfer correlations that are applicable to the physical conditions in the pool and on the containment wall surfaces. For purposes of determining peak containment pressure the calculation of heat transfer through the containment vessel wall into the reactor building pool should be demonstrated to conservatively underestimate heat transfer to the pool."	location and conditions. Ultimately, however, NuScale's comment also presages what they believe appropriate correlations should be, based on the containment conditions. Staff believes that heat removal should be conservatively estimated so that containment pressure is maximized, and that adequate justification by an applicant allows for a range of correlations to be used under different conditions, as appropriate. The existing correlations referenced are appropriately conservative, and are left in the revised paragraph as examples of correlations the staff has found appropriate.  Additional changes have been made so this paragraph more closely resembles NuScale's proposal while leaving out language the staff does not agree with.

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286	6.2.1.3, Section I	Areas of Review, Second paragraph, Page 6.2.1.3-1	The discussion makes reference to the Shutdown Accumulator System. This system has been removed from the design.	NuScale recommends removal of all references to the "Shutdown Accumulator System."	The staff agrees with this comment and has revised the DSRS to eliminate references to the Shutdown Accumulator System.
287	6.2.1.3	Pg. 6.2.1.3- 2, I. Specific Areas of Review, Item 3; Pg. 6.2.1.3- 5 II.1C.iii; and Pg. 6.2.1.3- 6 II.1C.iv	The discussion makes reference to reflooding. The NuScale design does not experience core uncover, or heatup or reflood phenomena.	NuScale recommends removal of any references to "reflood" phenomena.	The staff agrees with this comment and has revised the DSRS to remove "reflood" or replace with "recirculation," as appropriate.
288	6.2.1.4	Pg.6.2.1.4-5 DSRS Acceptance Criterion #3	For DSRS Acceptance Criterion #3, the original test from SRP 6.2.1.4 should be added to the discussion of the single failure analysis. "For the assumed failure of a safety-grade steam or feedwater line isolation valve, operation of nonsafety- grade equipment may be relied upon as a backup to the safety-grade equipment. In this event, the reviewer will confer with the responsible organizations for SRP Sections 3.2.1, 3.2.2, 3.6.2, and 10.4.9 to ensure a	NuScale recommends that content is added from the SRP related to treatment of non-safety components as backup to safety equipment.	The DSRS was revised to include the same language as the SRP except that "safety related" and "nonsafety related" replace "safety-grade" and "nonsafety- grade," respectively.

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			consistent staff position regarding the acceptability of the design criteria for the nonsafety-grade equipment."		
289	6.2.1.4, Section VI	Reference 3	The DSRS Reference 3 lists RG 1.182 which has been withdrawn by the NRC.	NuScale recommends removal of the reference to RG 1G 1.182.	The staff agrees with this comment and has revised the DSRS by removing the reference to RG 1.182.
290	6.2.2, Sec tion I	Review interfaces, Item 7, Page 6.2.2-2	The DSRS Item 7 description refers to a vessel evacuation and vacuum retention system. NuScale does not include "and vacuum retention" as part of the system description.	NuScale recommends to delete the text "and vacuum retention"	The DSRS was revised to reflect this comment because this comment only proposed to change the title of the system and not any of the DSRS acceptance criteria; therefore, the staff views this change as editorial.
291	6.2.2, Section II	Item 4	Typo - GDC 4 should be GDC 40	Revise text to read GDC 40	The staff agrees with this comment and has revised the DSRS by replacing GDC 4 with GDC 40.

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292	6.2.2	II. Acceptance Criteria, DSRS Acceptance Criteria, Item 4 pg. 6.2.2-4.	The DSRS discussion of an "emergency sump" is not consistent with the NuScale design.	NuScale recommends a revision to the text of item 4 to remove reference to "emergency sump", as follows: "To satisfy the requirements of GDC 38 and 10 CFR 50.46(b)(5) regarding long-term cooling, the containment should be designed to provide a reliable, long-term water source for ECCS. The containment and reactor vessel design should allow for the drainage of condensed water inside containment for recirculation of this water through the ECCS RRVs. The design of the containment is a critical element in ensuring ECCS long-term recirculation cooling capability. Therefore, the design should reflect (1) adequate consideration of containment pool hydraulic performance (such as water level (head) above the RRV inlet) ... "	During a postulated accident, the lower portion of NuScale's containment serves as a reservoir and collects water for use in the emergency core cooling system. The low portion of a vessel, which collects water, is appropriately referred to as a sump. The use of the term emergency is associated with the fact that the water which collects in the sump serves the emergency core cooling function. No revision made to DSRS.
293	6.3 Section III	Requirements Item 12, Page 6.3-6	DSRS Item 12 addresses 50.34(f)(1)(vi) and is applicable to BWR designs as stated specifically in the regulation.	NuScale recommends removal of item 12.	The staff agrees with this comment because the NuScale SMR is an integral PWR, not a BWR, and has revised the DSRS to remove Item 12.

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294	6.3 Section III	Item 22, Page 6.3-16	DSRS Item 22 B provides criteria addressing the diversion of ECCS flow. The capability to divert ECCS flow is not included in NuScale design.	NuScale recommends a revision to Item 22 to delete the reference to diversion of ECCS flow.	Staff agrees with the recommendation because the NuScale design has no pipes, valves or pumps capable of diverting ECCS flow from the primary means of ECCS recirculation. Accordingly, the DSRS was revised by deleting the reference to diversion of ECCS flow.
295	6.3 Section III	Item 25.A, Page 6.3-17	DSRS Item 25 A provides review criteria that indicates that testing of ECCS is required when shutdown for refueling. During refueling, the containment upper shell and RPV upper shell (with the RRVs and RVVs) will be removed. ECCS is essentially dismantled during refueling operations.	NuScale recommends a revision to Item 25 to delete the criteria for testing during plant shutdown for refueling.	Staff agrees with the recommendation because the module will be disassembled during refueling and hence the ECCS system will be inoperable. Accordingly, the DSRS was revised by deleting the criteria for testing during plant shutdown for refueling for this item.

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296	6.3, Section III	Item 25.C, Page 6.3-18	DSRS Item 25 C provides review criteria for testing ECCS motor operated valves. The NuScale ECCS design does not include motor operated valves.	NuScale recommends that Item 25 C be deleted.	Staff agrees with the comment and recommendation because the NuScale design does not utilize motor operated valves. Accordingly, the DSRS was revised by deleting references to motor operated valves. However, the provision to test ECCS valves under design-basis differential pressure is retained to ensure the valves can perform their design function under the full range of expected operating conditions.
297	6.3, Section III	Item 27.A, Page 6.3-18	DSRS Item 27 A addresses the NUREG 0737 requirement that the leakage control program include the portion of the ECCS that are located outside the containment. There are no portions of the ECCS located outside of containment.	NuScale recommends that Item 27A be deleted.	The staff agrees with this comment and has revised the DSRS. Item 27, in total, was deleted as no portions of the ECCS are outside of containment and TMI action item II.K.3.16 applies to BWRs.

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298	6.3	DSRS, II, Requirements, 10	DSRS Requirements "10. TMI Action Plan II.K.3.45 of NUREG-0737, which is equivalent to 10 CFR 50.34(f)(1)(xi) for applicants subject to 10 CFR 50.34(f), in regard to an evaluation of depressurization methods, other than full actuation of the RVV, that would reduce the possibility of exceeding vessel integrity limits during rapid cooldowns." is applicable to BWRs only.	NuScale recommends removal of this requirement.	The staff agrees with this comment because the NuScale SMR is an integral PWR, not a BWR. Accordingly, the DSRS has been revised to delete this item. However, an item under Review Procedures has been added to ensure vessel integrity limits are not exceeded with full actuation of the ECCS.
299	6.3	I. Areas of Review, Item 7 of Review Interfaces, Page 6.3-3	The NuScale design does not employ a pneumatic supply for the ECCS function as referenced by Item 7 of the DSRS. Also, the review standard should be SRP 9.3.1 instead of DSRS 9.3.1.	NuScale recommends that Item 7 be deleted.	The staff agrees with the comment and recommendation because the NuScale design does not employ pneumatic supply for the ECCS valves. Accordingly, the DSRS was revised to delete Item 7.
300	6.3	II. Acceptance Criteria, Technical Rationale Item 9, Page 6.3-12	The NuScale ECCS does not provide negative reactivity as a function as described in the second paragraph of Item 9.	NuScale recommends a revision to the text of Item 9 to remove negative reactivity as a function of the NuScale ECCS.	The staff agrees with the comment. Recommendation accepted as negative reactivity is not added to the RCS with ECCS operation. The NuScale design does not inject borated water but recirculates existing RCS water. Accordingly, the DSRS was revised to remove negative reactivity as a function of the NuScale ECCS from Item 9.

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301	6.3	III. Review Procedures, Item 13, Page 6.3-15	The DSRS Item 13 is not applicable to the NuScale design. The RRV/RVV interface with the RCS is the normal RCS pressure boundary and upon actuation opens to establish the containment shell as the extended RCS boundary. The NuScale design does not include piping or check valves within the ECCS and as part of the RCPB the valves are designed to RCPB criteria.	NuScale recommends a revision to this item to reflect the NuScale design.	The staff agrees with this comment and modified Item 13 to state the RRV/RVV are part of the RCPB and should be designed to withstand pressures consistent with the RCPB design criteria. References to check valves were deleted.
302	6.6	I. Areas of Review	<p>The NuScale design does not include an Ultimate Heat Sink Tank. The Ultimate Heat Sink is the reactor pool.</p> <p>The NRC did not issue a DSRS Section 9.2.5. Additionally, the title of SRP Section 9.2.5 is "Ultimate Heat Sink."</p>	<p>NuScale recommends deleting "Tank" and insert "SRP" in Review Interface Item 8, as follows:</p> <p>"The review of plant programs for surveillance, testing, inspection, and maintenance of safety-related and/or risk significant cooling water systems is performed under DSRS Sections 5.4.7, "Residual Heart Removal</p>	The staff agrees with this comment and has revised Review Interface Item #8 to clarify the appropriate DSRS and SRP sections. The staff also corrected the title of SRP 9.2.5 as requested in the comment.

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				(RHR) System," 6.2.2, "Containment Heat Removal Systems," 6.3, "Emergency Core Cooling System," <b>SRP</b> 9.2.5, "Ultimate Heat Sink <del>Tank</del> " and its associated refill system	
303	6.6	I. Areas of Review	The title of DSRS Section 5.4.7 is "Residual Heat Removal (RHR) System"	NuScale recommends correcting the error in the title of DSRS Section 5.4.7 referenced in Review Interface Item 8, as follows: "The review of plant programs for surveillance, testing, inspection, and maintenance of safety-related and/or risk significant cooling water systems is performed under DSRS Sections 5.4.7, "Residual <u>Heat</u> Removal (RHR) System," ..."	The staff agrees with this comment and has revised the DSRS accordingly.
304	6.6	II. Acceptance Criteria	The NRC did not issue a DSRS Section 3.9.6.	NuScale recommends deletion of "DSRS" and replace it with "SRP" in Requirements 10 and 11, and Technical Rationale 1.	The staff agrees with this comment and has revised the DSRS accordingly.
305	6.6	II. Acceptance Criteria	The NRC did not issue a DSRS Section 3.2.2.	NuScale recommends deletion of "DSRS" and replace it with "SRP" in DSRS Acceptance Criterion 1.	The staff agrees with this comment and has revised the DSRS accordingly.
306	6.6	I. Areas of Review	The NRC did not issue DSRS Sections 3.9.7, 3.9.8 or 19.1.	NuScale recommends deletion of "DSRS" and replace it with "SRP" in Review Interface Item 5.	The staff agrees with this comment and has revised the DSRS accordingly.

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307	6.6	I. Areas of Review	The NRC did not issue a DSRS Section 3.9.6.	NuScale recommends deletion of "DSRS" and replace it with "SRP" in Review Interface Item 4 and 8.	The staff agrees with this comment and has revised the DSRS accordingly.
308	6.6	I. Areas of Review	The NRC did not issue a DSRS Section 3.6.2.	NuScale recommends deletion of "DSRS" and replace it with "SRP" in Review Interface Item 10.	The staff agrees with this comment and has revised the DSRS accordingly.
309	6.6	II. Acceptance Criteria	Error identified in DSRS Acceptance Criterion 13	NuScale recommends the following change to first sentence in DSRS Acceptance Criterion 13:  "Risk Informed ISI Program. When submitting a risk informed ISI program, the applicant or licensee should provide all information necessary to meet the other DSRS acceptance criteria in this <b><u>DSRS SRP</u></b> , including..."	The staff agrees with this comment and has revised the DSRS accordingly.

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310	6.6	III. Review Procedures	10 CFR 52.79 is applicable to COL applicants and not design certification applicants.	NuScale recommends the following change to the first sentence in Review Procedure Item 2:  "In accordance with 10 CFR 52.47(a)(8), (21), and (22) for design certification applications, and 10 CFR 52.79(a)(17), (20) and (37), for combined license applications submitted under Part 52..."	The staff agrees with this comment and has revised the DSRS accordingly.
311	6.6	IV. References	Add reference to 10 CFR 52.79 to reflect added content.	NuScale recommends the following reference be added:  10 CFR 52.79, "Contents of applications; technical information in final safety analysis report."	The staff agrees with this comment and has revised the DSRS accordingly.
312	6.6	IV. References	NUREG-1430 is only applicable to Babcock and Wilcox plants. Delete this reference for NuScale-specific DSRS.	NuScale recommends the following reference be deleted: NUREG-1430, Volume 1, "Standard Technical Specifications--Babcock and Wilcox Plants."	The staff agrees with this comment and has revised the DSRS accordingly.

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313	BTP 6-1	Page BTP 6.1- 2	Reference D.1 is a Westinghouse proprietary Class 2 document to which the NRC does not provide access for applicants.	NuScale recommends removal of the references to proprietary class 2 documents or provide sufficient information for the applicants to address differences that may be associated with their applications.	See footnote 1