Comment Response Matrix
Chapter 7

Comment # *(Affiliation: NuScale Power, LLC)*	**DSRS Section**	**Paragraph, Item, or Page**	**Comment / Basis**	**Commenter Recommendation**	**NRC Staff Technical Resolution**
314	7.0	7.0-8	In Item III, need period punctuation mark between 4)" and Typical.	Editorial correction	The staff agrees and will revise the DSRS
315	7.0	7.0-13	Need hanging indent for first data row item 7.1.4.	Editorial correction	The staff agrees and will revise the DSRS
316	7.0	7.0-24	Need hanging indent for last data row item 7.2.3.	Editorial correction	The staff agrees and will revise the DSRS
317	7.0	7.0-8	DSRS Items II and III list several systems that do not exist for NuScale: Pressurized-water reactor (PWR) auxiliary feedwater systems, Containment air purification and cleanup systems, and Containment combustible gas control systems.	NuScale recommends that these items are deleted from the DSRS.	No Revision Required - Systems identified in the list are "typical" to aid the NRC staff in identifying systems where I&C ESFAS functions may reside. The NRC technical branch primarily responsible for reviewing Chapter 7 will interface with the NRC staff responsible for other corresponding chapters to ensure all ESFAS functions have been identified and evaluated in the Chapter 7 safety evaluation.
318	7.0 Appendix A	1	Document does not have a page number on the first page.	Editorial correction	No Revision Required. The page numbering is consistent with SRP Chapter 7 appendices.

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319	7.0 Appendix A	7.0 Appendix A-3	Item 5 needs punctuation mark after) at end of sentence.	Editorial correction	The staff agrees and will revise the DSRS
320	7.0, Appendix B	1	Document does not have a page number on the first page.	Editorial correction	No Revision Required. The page numbering is consistent with SRP Chapter 7 appendices.
321	7.0, Appendix C	1	Document does not have a page number on the first page.	Editorial correction	No Revision Required. The page numbering is consistent with SRP Chapter 7 appendices.
322	7.0, Appendix C	7.0 Appendix C-2	Warrant is misspelled.	Editorial correction	The staff agrees and will revise the DSRS
323	7.0, Appendix C	7.0 Appendix C-4	Item 6 has several misspelled words.	Editorial correction	The staff agrees and will revise the DSRS
324	7.0, Appendix D	1	Document does not have a page number on the first page.	Editorial correction	No Revision Required. The page numbering is consistent with SRP Chapter 7 appendices.
325	7.0, Appendix D	1	Delete Item 15, since IEEE Std 730 is no longer discussed in Section 7.2.1.	Recommend deletion	The staff agrees and will revise the DSRS
326	7.1.4	7.1-22	In DSRS section 7.1.4 for Repeatability and Predictability the review procedures in this section indirectly defines the completion of a protective action twice, both with slight	Revise wording to be consistent with definition of "Completion of Protective Action" provided in IEEE 603-1991.	The staff agrees and will revise the DSRS. Additionally, the staff will make a similar change on page 7.1-20, Item II.1.B

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			differences from the IEEE 603-1991 definition for completion of a protective action. Page 7.1-22, Item III.4: Section 5.2, regarding the sequence of protective actions, the safety systems shall be designed so that, once initiated automatically or manually, the intended sequence of protective actions of the execute features shall continue until completion ~~(from receipt of a signal from the sense and command features to the actuated equipment that perform the safety function)~~ ~~that will go to completion after initiation by either automatic or manual means.~~ Page 7.1- 22, Item 2:The digital I&C system timing analysis should address all system components from signal collection to completion of protective action (e.g., sensor, transmitter, analog-to-digital converter, multiplexer, data communication equipment, de- multiplexer, computers, memory devices, ~~controls, displays,~~ logic processing, output processing, and		

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			voting). The IEEE Std 603 definition is: 5.2 Completion of Protective Action. The safety systems shall be designed so that, once initiated automatically or manually, the intended sequence of protective actions of the execute features shall continue until completion. Deliberate operator action shall be required to return the safety systems to normal. This requirement shall not preclude the use of equipment protective devices identified in 4.11 of the design basis or the provision for deliberate operator interventions. Seal-in of individual channels is not required		
327	7.2.1	7.2-16	The discussion in Item III.6 is not applicable to the NuScale design certification effort.	Recommend deletion.	The staff agrees to delete the discussion on the use of CMMI and will revise the DSRS to discuss only the use of a proven third-party certification for high-quality software development. Understanding that there is no requirement to use a third-party certification (item 6) and if used it does not replace any of the guidance (Items 1-5) that the staff

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					will use. However, the staff's understanding of the third-party certification developing process (if used) may supplement the existing guidance.
328	7.2.1	7.2-9	The NuScale design will use FPGA technology. The software cycle review should be modified to reflect this technology. Item G should be revised to read: G. Software or Programmable Logic Device Implementation	NuScale recommends that Item G is revised to incorporate the FPGA technology process.	The DSRS system development discussion includes FPGA technology so there are no changes to existing text. Statements made in 7.2.1 with regards to software does not preclude processes for programmable logic devices. Staff discussed complex logic such as programmable logic devices on page 7.2-5 of DSRS: "This guidance applies to microprocessor-based technology as well as other forms of complex logic such as programmable logic devices (e.g., Field Programmable Gate Arrays (FPGAs)). This DSRS uses the term software to refer to such technology and complex logic. In developing these systems, an applicant should follow a well-defined and documented system development approach that is consistent with the guidance in this section."
329	7.2.1	7.2-10	The NuScale design will use FPGA technology. The	NuScale recommends that Item G.i. is revised to incorporate the	The DSRS system development discussion includes FPGA

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			software cycle review should be modified to reflect this technology. Item G.i should be revised to read: i. A software implementation plan should be developed that documents the criteria for testing each software unit and the test procedures and data for testing each software unit.	FPGA technology process.	technology so there are no changes to existing text. Statements made in 7.2.1 with regards to software does not preclude processes for programmable logic devices. Staff discussed complex logic such as programmable logic devices on page 7.2-5 of DSRS: "This guidance applies to microprocessor-based technology as well as other forms of complex logic such as programmable logic devices (e.g., Field Programmable Gate Arrays (FPGAs)). This DSRS uses the term software to refer to such technology and complex logic. In developing these systems, an applicant should follow a well-defined and documented system development approach that is consistent with the guidance in this section."
330	7.2.1	7.2-10	The NuScale design will use FPGA technology. The software cycle review should be modified to reflect this technology. Item G.v should be revised to read: v. Strict coding rules, methods, standards, and other applicable criteria should be defined and enforced. For example, use of global	NuScale recommends that Item G.v is revised to incorporate the FPGA technology process.	The DSRS system development discussion includes FPGA technology so there are no changes to existing text. Statements made in 7.2.1 with regards to software do not preclude processes for programmable logic devices. Staff discussed complex logic such as programmable logic devices on page 7.2-5 of DSRS: "This

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			variables and dynamic memory allocation in software should be discouraged.		guidance applies to microprocessor-based technology as well as other forms of complex logic such as programmable logic devices (e.g., Field Programmable Gate Arrays (FPGAs)). This DSRS uses the term software to refer to such technology and complex logic. In developing these systems, an applicant should follow a well-defined and documented system development approach that is consistent with the guidance in this section."
331	7.2.1	7.2-10	The NuScale design will use FPGA technology. The software cycle review should be modified to reflect this technology. Item G.vii should be revised to read: vii. The correct implementation of software requirements in each programmable logic device or software unit should be verified to ensure accuracy and conformance with design requirements.	NuScale recommends that Item G.vii is revised to incorporate the FPGA technology process.	The DSRS system development discussion includes FPGA technology so there are no changes to existing text. Statements made in 7.2.1 with regards to software do not preclude processes for programmable logic devices. Staff discussed complex logic such as programmable logic devices on page 7.2-5 of DSRS: "This guidance applies to microprocessor-based technology as well as other forms of complex logic such as programmable logic devices (e.g., Field Programmable Gate Arrays (FPGAs)). This DSRS uses the term software to refer to such technology and complex logic. In developing

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					these systems, an applicant should follow a well-defined and documented system development approach that is consistent with the guidance in this section."
332	7.2.1	7.2-10	The NuScale design will use FPGA technology. The software cycle review should be modified to reflect this technology. Item G.viii should be revised to read: viii. Software unit testing or programmable logic device testing should be performed as software or logic is developed to ensure it satisfies design requirements, consistent with the guidance in RG 1.170. The primary testing methods and standards, test cases used, and test coverage should be documented.	NuScale recommends that Item G.viii is revised to incorporate the FPGA technology process.	The DSRS system development discussion includes FPGA technology so there are no changes to existing text. Statements made in 7.2.1 with regards to software do not preclude processes for programmable logic devices. Staff discussed complex logic such as programmable logic devices on page 7.2-5 of DSRS: "This guidance applies to microprocessor-based technology as well as other forms of complex logic such as programmable logic devices (e.g., Field Programmable Gate Arrays (FPGAs)). This DSRS uses the term software to refer to such technology and complex logic. In developing these systems, an applicant should follow a well-defined and documented system development approach that is consistent with the guidance in this section."
333	7.2.1	7.2-10	The NuScale design will use FPGA technology. The software cycle review should	NuScale recommends that Item H is revised to incorporate the FPGA technology process.	The DSRS system development discussion includes FPGA technology so there are no

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			be modified to reflect this technology. Item H should be revised to read: H. Software or Programmable Logic Device Integration		changes to existing text. Statements made in 7.2.1 with regards to software do not preclude processes for programmable logic devices. Staff discussed complex logic such as programmable logic devices on page 7.2-5 of DSRS: "This guidance applies to microprocessor-based technology as well as other forms of complex logic such as programmable logic devices (e.g., Field Programmable Gate Arrays (FPGAs)). This DSRS uses the term software to refer to such technology and complex logic. In developing these systems, an applicant should follow a well-defined and documented system development approach that is consistent with the guidance in this section."
334	7.2.1	7.2-10	The NuScale design will use FPGA technology. The software cycle review should be modified to reflect this technology. Item H.i should be revised to read: i. A software integration plan should be developed to describe the methods for integrating software modules into a software unit. Aggregates of units tested	NuScale recommends that Item H.i is revised to incorporate the FPGA technology process.	The DSRS system development discussion includes FPGA technology so there are no changes to existing text. Statements made in 7.2.1 with regards to software do not preclude processes for programmable logic devices. Staff discussed complex logic such as programmable logic devices on page 7.2-5 of DSRS: "This guidance applies to

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			during the unit test phase should be integrated into a software item in accordance with the integration plan. A programmable logic device integration plan should be developed to describe the methods for integrating logic modules and hardware components.		microprocessor-based technology as well as other forms of complex logic such as programmable logic devices (e.g., Field Programmable Gate Arrays (FPGAs)). This DSRS uses the term software to refer to such technology and complex logic. In developing these systems, an applicant should follow a well-defined and documented system development approach that is consistent with the guidance in this section."
335	7.2.1	7.2-10	The NuScale design will use FPGA technology. The software cycle review should be modified to reflect this technology. Item H.ii should be revised to read: ii. Critical elements of integration should include, but are not limited to: identifying software modules for integration; defining and implementing the integration environment; management of interfaces; and item integration sequences. Critical elements of programmable logic device integration should include, but are not limited to: identifying logic modules and hardware components for	NuScale recommends that Item H.ii is revised to incorporate the FPGA technology process.	The DSRS system development discussion includes FPGA technology so there are no changes to existing text. Statements made in 7.2.1 with regards to software do not preclude processes for programmable logic devices. Staff discussed complex logic such as programmable logic devices on page 7.2-5 of DSRS: "This guidance applies to microprocessor-based technology as well as other forms of complex logic such as programmable logic devices (e.g., Field Programmable Gate Arrays (FPGAs)). This DSRS uses the term software to refer to such technology and complex logic. In developing these systems, an applicant

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			integration; defining and implementing the integration environment; management of interfaces; and item integration sequences.		should follow a well-defined and documented system development approach that is consistent with the guidance in this section."
336	7.2.1	7.2.11	The NuScale design will use FPGA technology. The software cycle review should be modified to reflect this technology. Item H.iv should be revised to read: iv. Software or programmable logic device component testing should be conducted to verify that software or logic requirements have been adequately implemented for this phase of the software life-cycle.	NuScale recommends that Item H.iv is revised to incorporate the FPGA technology process.	The DSRS system development discussion includes FPGA technology so there are no changes to existing text. Statements made in 7.2.1 with regards to software do not preclude processes for programmable logic devices. Staff discussed complex logic such as programmable logic devices on page 7.2-5 of DSRS: "This guidance applies to microprocessor-based technology as well as other forms of complex logic such as programmable logic devices (e.g., Field Programmable Gate Arrays (FPGAs)). This DSRS uses the term software to refer to such technology and complex logic. In developing these systems, an applicant should follow a well-defined and documented system development approach that is consistent with the guidance in this section."
337	7.2.1	7.2-11	The NuScale design will use FPGA technology. The software cycle review should	NuScale recommends that Item I.i is revised to incorporate the FPGA technology process.	The DSRS system development discussion includes FPGA technology so there are no

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			be modified to reflect this technology. Item I.i should be revised to read: i. A system test plan should be developed that documents the integration and testing of all software items, programmable logic devices, hardware, manual processes, and other system interfaces that constitute the I&C system, consistent with the architectural design.		changes to existing text. Statements made in 7.2.1 with regards to software do not preclude processes for programmable logic devices. Staff discussed complex logic such as programmable logic devices on page 7.2-7 of DSRS: "This guidance applies to microprocessor-based technology as well as other forms of complex logic such as programmable logic devices (e.g., Field Programmable Gate Arrays (FPGAs)). This DSRS uses the term software to refer to such technology and complex logic. In developing these systems, an applicant should follow a well-defined and documented system development approach that is consistent with the guidance in this section."
338	7.2.1	7.2-11	The NuScale design will use FPGA technology. The software cycle review should be modified to reflect this technology. Item I.ii should be revised to read: ii. System testing should consider all of the integrated software modules that have successfully passed integration testing and also the software system itself	NuScale recommends that Item I.ii is revised to incorporate the FPGA technology process.	The DSRS system development discussion includes FPGA technology so there are no changes to existing text. Statements made in 7.2.1 with regards to software do not preclude processes for programmable logic devices. Staff discussed complex logic such as programmable logic devices on page 7.2-5 of DSRS: "This guidance applies to

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			integrated with any applicable hardware systems. System testing should consider all of the integrated programmable logic device components that have successfully passed integration testing.		microprocessor-based technology as well as other forms of complex logic such as programmable logic devices (e.g., Field Programmable Gate Arrays (FPGAs)). This DSRS uses the term software to refer to such technology and complex logic. In developing these systems, an applicant should follow a well-defined and documented system development approach that is consistent with the guidance in this section."
339	7.2.1	7.2-11	The NuScale design will use FPGA technology. The software cycle review should be modified to reflect this technology. Item I.iv should be revised to read: iv. The test plan should include tasks to integrate and test all software, and hardware items, and programmable logic devices, to prepare the test environment, to write test cases (inputs, outputs, and test criteria), and to test interfaces to other systems.	NuScale recommends that Item I.iv is revised to incorporate the FPGA technology process.	The DSRS system development discussion includes FPGA technology so there are no changes to existing text. Statements made in 7.2.1 with regards to software do not preclude processes for programmable logic devices. Staff discussed complex logic such as programmable logic devices on page 7.2-5 of DSRS: "This guidance applies to microprocessor-based technology as well as other forms of complex logic such as programmable logic devices (e.g., Field Programmable Gate Arrays (FPGAs)). This DSRS uses the term software to refer to such technology and complex logic. In developing these systems, an applicant

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					should follow a well-defined and documented system development approach that is consistent with the guidance in this section."
340	7.2.1	7.2-11	The NuScale design will use FPGA technology. The software cycle review should be modified to reflect this technology. Item I.v should be revised to read: v. System testing should detect any inconsistencies between the programmed logic or software and the associated hardware.	NuScale recommends that Item I.v is revised to incorporate the FPGA technology process.	The DSRS system development discussion includes FPGA technology so there are no changes to existing text. Statements made in 7.2.1 with regards to software do not preclude processes for programmable logic devices. Staff discussed complex logic such as programmable logic devices on page 7.2-5 of DSRS: "This guidance applies to microprocessor-based technology as well as other forms of complex logic such as programmable logic devices (e.g., Field Programmable Gate Arrays (FPGAs)). This DSRS uses the term software to refer to such technology and complex logic. In developing these systems, an applicant should follow a well-defined and documented system development approach that is consistent with the guidance in this section."
341	7.2.1	7.2-11	The NuScale design will use FPGA technology. The software cycle review should be modified to reflect this	NuScale recommends that item I.vii is revised to incorporate the FPGA technology process.	The DSRS system development discussion includes FPGA technology so there are no changes to existing text.

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			technology. Item I.vii should be revised to read: vii. Testing should demonstrate that hazards have been eliminated or controlled to an acceptable level of risk. Additional hazardous states identified during testing should undergo analysis prior to software or programmable logic device delivery or use.		Statements made in 7.2.1 with regards to software do not preclude processes for programmable logic devices. Staff discussed complex logic such as programmable logic devices on page 7.2-5 of DSRS: "This guidance applies to microprocessor-based technology as well as other forms of complex logic such as programmable logic devices (e.g., Field Programmable Gate Arrays (FPGAs)). This DSRS uses the term software to refer to such technology and complex logic. In developing these systems, an applicant should follow a well-defined and documented system development approach that is consistent with the guidance in this section."
342	7.2.13	7.2.60 and 7.2-61	This DSRS Item 8 lists review criteria for 10 CFR 50.34(f)(2)(xx) (Power for Pressurizer Level Indication and Controls for Pressurizer Relief and Block Valves). This section is not applicable to NuScale since the design does not include Pressurizer Power Operated Relief Valves or Block Valves.	NuScale recommends that this portion of the TMI actions be revised to match NuScale plant design.	No Revision Required - DSRS Chapter 1 provides a guide to conformance with regulatory criteria. These criteria include Regulatory Guides (RG), Standard Review Plans (SRP), Generic Issues, (including Three Mile Island (TMI) requirements), Operational Experience (Generic Communications) and Advanced and Evolutionary Light-Water Reactor design issues. NRC guidance expectation is for

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			Therefore, the NuScale design will not have these items to be powered. Also, the requirement to power pressurizer level indicators from vital buses would not be applicable to NuScale's pressurizer level indicators, since these indicators will be powered by highly reliable power.		applicant to address specific conformance with a regulatory criterion in multiple Final Safety Analysis Report (FSAR) sections, provide exceptions to specific, limited portions of a listed regulatory criterion based on specific applicability to its design, and to provide exceptions or clarifications necessary to address potential guidance conflicts and the relative pertinence. Chapter 7 interfaces with Chapter 1 to identify compliance with conformance issues .