

May 16, 2019

Docket No. 52-048

U.S. Nuclear Regulatory Commission  
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**SUBJECT:** NuScale Power, LLC Submittal of Changes to Design Certification Application  
Part 4, Technical Specifications

**REFERENCE:** Letter from NuScale Power, LLC to Nuclear Regulatory Commission, "NuScale  
Power, LLC Submittal of the NuScale Standard Plant Design Certification  
Application, Revision 2," dated October 30, 2018 (ML18311A006)

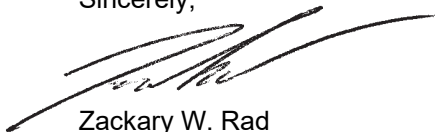
During the Advisory Committee on Reactor Safeguards Subcommittee meeting on March 20, 2019 the NRC Staff identified unresolved concerns with the NuScale proposed Generic Technical Specifications and Bases related to the omission of response time testing definitions and the inclusion of the term 'required' in certain surveillance requirement test requirements. As a result of this discussion, NuScale changed the Generic Technical Specifications and Bases to address these concerns. The Enclosure to this letter provides a mark-up of the pages incorporating revisions to the technical specifications and bases, in redline/strikeout format. NuScale will include this change as part of a future revision to the NuScale Design Certification Application.

- The changes add definitions for CHANNEL RESPONSE TIME and ACTUATION RESPONSE TIME that relocate the scope of required response time testing into the technical specifications from their former location in the associated surveillance test bases. These defined terms are incorporated into the relevant response time testing surveillance requirements and associated bases.
- The term 'required' in valve actuator accumulator pressure surveillance requirements and the associated bases were modified by placing the terms in square brackets. This indicates that the content is required to be finalized by a COL applicant when final plant-specific information is finalized. The requirement to provide final plant-specific information identified by square brackets is described in FSAR chapter 16, Technical Specifications, as COL item 16.1-1.

This letter makes no regulatory commitments or revisions to any existing regulatory commitments.

If you have any questions, please feel free to contact Carrie Fosaaen at 541-452-7126 or at [cfosaaen@nuscalepower.com](mailto:cfosaaen@nuscalepower.com).

Sincerely,



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Enclosure: "Changes to Design Certification Application Part 4, Technical Specifications"

**Enclosure:**

“Changes to Design Certification Application Part 4, Technical Specifications”

## 1.0 USE AND APPLICATION

### 1.1 Definitions

-----NOTE-----

The defined terms of this section appear in capitalized type and are applicable throughout these Technical Specifications and Bases.

<u>Term</u>	<u>Definition</u>
ACTIONS	ACTIONS shall be that part of a Specification that prescribes Required Actions to be taken under designated Conditions within specified Completion Times.
ACTUATION LOGIC TEST	<p>An ACTUATION LOGIC TEST shall be:</p> <ol style="list-style-type: none"> <li>The use of self-testing features, or application of simulated or actual input combinations as appropriate, to test digital computer hardware; and</li> <li>Verification of the required logic output.</li> </ol> <p>An ACTUATION LOGIC TEST shall include each possible interlock logic state required for OPERABILITY of a logic circuit. The ACTUATION LOGIC TEST shall verify the OPERABILITY of each manual logic input device required for channel OPERABILITY. The ACTUATION LOGIC TEST shall be conducted such that it provides component overlap with the actuated device. The ACTUATION LOGIC TEST may be performed by means of any series of sequential, overlapping, or total steps, and each step must be performed within the Frequency in the Surveillance Frequency Control Program for the devices included in the step.</p>
<u>ACTUATION RESPONSE TIME</u>	<u>The time from when the Module Protection System equipment interface module output initiates an actuation signal until the actuated valves or breakers reach their final actuated position.</u>
AXIAL OFFSET (AO)	<p>AO shall be the difference in power generated in the top half of the core (<math>P_{top}</math>) and the bottom half of the core (<math>P_{bottom}</math>), divided by the sum of the power generated in the core (<math>P_{total}</math>).</p> $AO = (P_{top} - P_{bottom}) / P_{total}$

## 1.1 Definitions

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<u>CHANNEL RESPONSE TIME</u>	<u>The time from when the process variable exceeds its setpoint until the output from the channel analog logic reaches the input of the digital portion of the Module Protection System digital logic.</u>
CORE OPERATING LIMITS REPORT (COLR)	The COLR is the unit-specific document that provides cycle specific parameter limits for the current reload cycle. These cycle specific parameter limits shall be determined for each reload cycle in accordance with Specification 5.6.3. Module operation within these parameter limits is addressed in individual Specifications.
DOSE EQUIVALENT I-131	DOSE EQUIVALENT I-131 shall be that concentration of I-131 (microcuries per gram) that alone would produce the same committed effective dose equivalent as the quantity and isotopic mixture of I-131, I-132, I-133, I-134, and I-135 actually present. The dose conversion factors used for this calculation shall be those listed in Table 2.1 of EPA Federal Guidance Report No. 11, "Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion," EPA-520/1-88-020, September 1988.
DOSE EQUIVALENT XE-133	DOSE EQUIVALENT XE-133 shall be that concentration of Xe-133 (microcuries per gram) that alone would produce the same effective dose equivalent as the quantity and isotopic mixture of noble gases (Kr-85m, Kr-85, Kr-87, Kr-88, Xe-131m, Xe-133m, Xe-133, Xe-135m, Xe-135, and Xe-138) actually present. The dose conversion factors used for this calculation shall be those listed in Table III.1 of EPA Federal Guidance Report No. 12, "External Exposure to Radionuclides in Air, Water, and Soil," EPA 402-R-93-081, September 1993.
INSERVICE TESTING PROGRAM	The INSERVICE TESTING PROGRAM is the licensee program that fulfills the requirements of 10 CFR 50.55a(f).

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.3.1.2</p> <p>-----NOTES-----</p> <ol style="list-style-type: none"> <li>1. Adjust Neutron Monitoring System (NMS) nuclear instrument channel when absolute difference is &gt; 1% RTP.</li> <li>2. Not required to be performed until 12 hours after reaching 15% RTP.</li> <li>3. If the calorimetric heat balance is &lt; 50% RTP, and if NMS nuclear instrumentation channel indicated power is:               <ol style="list-style-type: none"> <li>a. lower than the calorimetric measurement by &gt; 1%, then adjust the NMS nuclear instrumentation channel upward to match the calorimetric measurement.</li> <li>b. higher than the calorimetric measurement, then no adjustment is required.</li> </ol> </li> </ol> <p>-----</p> <p>Compare results of calorimetric heat balance to NMS nuclear instrument channel output.</p>	<p>In accordance with the Surveillance Frequency Control Program</p>
<p>SR 3.3.1.3</p> <p>-----NOTE-----</p> <p>Neutron detectors are excluded from response time testing.</p> <p>-----</p> <p>Verify <del>channel required response time</del> <u>CHANNEL RESPONSE TIME</u> is within limits.</p>	<p>In accordance with the Surveillance Frequency Control Program</p>

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
<p>SR 3.3.2.1</p> <p style="text-align: center;">-----NOTE-----</p> <p>Not required to be met for reactor trip breakers that are open.</p> <p style="text-align: center;">-----</p> <p>Perform ACTUATION LOGIC TEST.</p>	<p>In accordance with the Surveillance Frequency Control Program</p>
<p>SR 3.3.2.2</p> <p style="text-align: center;">-----NOTE-----</p> <p>Not required to be met for reactor trip breakers that are open.</p> <p style="text-align: center;">-----</p> <p>Verify <del>required</del> <u>ACTUATION RESPONSE TIME</u> <del>response time</del> is within limits.</p>	<p>In accordance with the Surveillance Frequency Control Program</p>
<p>SR 3.3.2.3</p> <p style="text-align: center;">-----NOTE-----</p> <p>Not required to be met for Class 1E isolation devices that have isolated 1E circuits from non-1E power.</p> <p style="text-align: center;">-----</p> <p><u>Perform CHANNEL CALIBRATION on each Class 1E isolation device.</u> <del>Verify associated Class 1E isolation devices are OPERABLE.</del></p>	<p>In accordance with the Surveillance Frequency Control Program</p>
<p>SR 3.3.2.4</p> <p style="text-align: center;">-----NOTE-----</p> <p>Not required to be met for reactor trip breakers that are open.</p> <p style="text-align: center;">-----</p> <p>Verify each RTB actuates to the open position on an actual or simulated actuation signal.</p>	<p>In accordance with the Surveillance Frequency Control Program</p>

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>G. As required by Required Action B.1 and referenced in Table 3.3.3-1.</p> <p><u>OR</u></p> <p>Both divisions of Pressurizer Heater <u>trip actuation</u> <del>de-energization</del> function inoperable.</p>	<p>G.1 -----NOTE-----  <del>Heater(s) may be energized</del> <u>Pressurizer heater breakers may be closed</u> intermittently under <del>manual</del> <u>administrative</u> controls.            -----  <u>Open pressurizer heater breakers.</u> <del>De-energize Pressurizer Heaters.</del></p>	<p>6 hours</p>

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
<p>SR 3.3.3.1 Perform ACTUATION LOGIC TEST.</p>	<p>In accordance with the Surveillance Frequency Control Program</p>
<p>SR 3.3.3.2 -----NOTE-----            Not required to be met for pressurizer heater breakers that are open or closed under <del>manual</del> <u>administrative</u> control.            -----            Verify <del>required</del> pressurizer heater breaker <del>response time</del> <u>ACTUATION RESPONSE TIME</u> is within limits.</p>	<p>In accordance with the Surveillance Frequency Control Program</p>



SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.4.6.1      Verify [required] valves accumulator pressures are within limits.	In accordance with the Surveillance Frequency Control Program.
SR 3.4.6.2      -----NOTE----- Not required to be met for valves that are closed or open under administrative controls. -----  Verify the <del>required</del> isolation <del>time</del> <u>ACTUATION RESPONSE TIME</u> of each automatic power operated CVCS valve is within limits.	In accordance with the INSERVICE TESTING PROGRAM
SR 3.4.6.3      Verify each automatic CVCS valve that is not locked, sealed, or otherwise secured in position, actuates to the isolation position on an actual or simulated actuation signal except for valves that are open under administrative controls.	In accordance with the Surveillance Frequency Control Program

SURVEILLANCE REQUIREMENTS

~~NOTE~~

~~Not required to be met for valves that are open.~~

SURVEILLANCE		FREQUENCY
SR 3.4.10.1	Verify each RVV actuates to the open position on an actual or simulated actuation signal.	In accordance with the Surveillance Frequency Control Program
SR 3.4.10.2	Verify the open <del>actuation time</del> <u>ACTUATION RESPONSE TIME</u> of each RVV is within limits.	In accordance with the INSERVICE TESTING PROGRAM
SR 3.4.10.3	Verify the inadvertent actuation block function for each RVV.	In accordance with the Surveillance Frequency Control Program
SR 3.4.10.4	Verify the inadvertent actuation block setpoint is within limits for each RVV.	In accordance with the INSERVICE TESTING PROGRAM

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
<p>SR 3.5.1.1</p> <p>-----NOTE----- Not required to be met for valves that are open. -----</p> <p>Verify each RVV and RRV actuates to the open position on an actual or simulated actuation signal.</p>	<p>In accordance with the Surveillance Frequency Control Program</p>
<p>SR 3.5.1.2</p> <p>-----NOTE----- Not required to be met for valves that are open. -----</p> <p>Verify the open <del>actuation time</del><u>ACTUATION RESPONSE TIME</u> of each RVV and RRV is within limits.</p>	<p>In accordance with the INSERVICE TESTING PROGRAM</p>
<p>SR 3.5.1.3</p> <p>Verify the inadvertent actuation block function of each RVV and RRV.</p>	<p>In accordance with the Surveillance Frequency Control Program</p>
<p>SR 3.5.1.4</p> <p>Verify the inadvertent actuation block setpoint is within limits for each RVV and RRV.</p>	<p>In accordance with the INSERVICE TESTING PROGRAM</p>

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.2.1	Verify [required] valves accumulator pressures are within limits.	In accordance with the Surveillance Frequency Control Program
SR 3.5.2.2	Verify DHRS <u>heat exchangers</u> <del>loops</del> are filled.	In accordance with the Surveillance Frequency Control Program
<u>SR 3.5.2.3</u>	<p>-----NOTE-----  <u>Not required to be performed for DHRS loop with associated FWIV open.</u>            -----</p> <p><u>Verify SG level is &gt; [5]% and ≤ [65]%</u></p>	<u>In accordance with the Surveillance Frequency Control Program</u>
SR 3.5.2. <del>4</del> <u>3</u>	Verify that each DHRS actuation valve actuates to the open position on an actual or simulated actuation signal.	In accordance with the Surveillance Frequency Control Program
SR 3.5.2. <del>5</del> <u>4</u>	Verify the open <del>actuation time</del> <u>ACTUATION RESPONSE TIME</u> of each DHRS actuation valve is within limits.	In accordance with the INSERVICE TESTING PROGRAM

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
<p>SR 3.6.2.1      Verify [required] valves accumulator pressures are within limits.</p>	<p>In accordance with the Surveillance Frequency Control Program</p>
<p>SR 3.6.2.2      -----NOTE----- Valves and blind flanges in high radiation areas may be verified by use of administrative means. -----  Verify each containment isolation manual valve and blind flange that is located outside containment and not locked, sealed, or otherwise secured and is required to be closed during accident conditions is closed, except for containment isolation valves that are open under administrative controls.</p>	<p>In accordance with the Surveillance Frequency Control Program</p>
<p>SR 3.6.2.3      -----NOTE----- <u>Not required to be met for automatic containment isolation valves that are closed to comply with ACTIONS, that are open under administrative controls.</u> -----  Verify the isolation <del>time</del><u>ACTUATION RESPONSE TIME</u> of each automatic containment isolation valve is within limits <del>except for valves that are open under administrative controls.</del></p>	<p>In accordance with the INSERVICE TESTING PROGRAM</p>
<p>SR 3.6.2.4      -----NOTE----- <u>Not required to be met for automatic containment isolation valves that are closed to comply with ACTIONS, that are open under administrative controls.</u> -----  Verify each automatic containment isolation valve that is not locked, sealed, or otherwise secured in position, actuates to the isolation position on an actual or simulated actuation signal <del>except for valves that are open under administrative controls.</del></p>	<p>In accordance with the Surveillance Frequency Control Program</p>

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.1.1	Verify [required] valves accumulator pressures are within limits.	In accordance with the Surveillance Frequency Control Program
SR 3.7.1.2	Verify isolation <del>time</del> <u>ACTUATION RESPONSE TIME</u> of each MSIV and MSIV bypass valve is within limits on an actual or simulated actuation signal.	In accordance with the INSERVICE TESTING PROGRAM
SR 3.7.1.3	Verify each MSIV and MSIV bypass valve leakage is within limits.	In accordance with the INSERVICE TESTING PROGRAM

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.2.1	Verify [required] FWIV accumulator pressures are within limits.	In accordance with the Surveillance Frequency Control Program.
SR 3.7.2.2	Verify the closure <del>time</del> <u>ACTUATION RESPONSE TIME</u> of each FWIV and FWRV is within limits on an actual or simulated actuation signal.	In accordance with the INSERVICE TESTING PROGRAM
SR 3.7.2.3	Verify each FWIV and FWRV leakage is within limits.	In accordance with the INSERVICE TESTING PROGRAM

BASES

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SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.1.2

A periodic calibration (heat balance) is performed when THERMAL POWER is above 15%. The Linear Power Level signal and the nuclear instrumentation system addressable constant multipliers are adjusted to make the nuclear power calculations agree with the calorimetric calculation if the absolute difference is  $\geq 1\%$ . The value of 1% is adequate because this value is assumed in the safety analysis. These checks (and, if necessary, the adjustment of the nuclear power signal) are adequate to ensure that the accuracy is maintained within the analyzed error margins. The power level must be above 15% RTP to obtain accurate data. At lower power levels, the accuracy of calorimetric data is questionable.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

The Surveillance is modified by three Notes. The first Note indicates that the neutron monitoring system nuclear instrument channel must be calibrated when the absolute difference is  $> 1\%$  when compared to the calorimetric heat balance. The second Note indicates that this Surveillance need only be performed within 12 hours after reaching 15% RTP. The 12 hours after reaching 15% RTP is required for unit stabilization, data taking, and flow verification. The secondary calorimetric is inaccurate at lower power levels. A third Note is provided that permits operation below 15% RTP without adjusting the instrument channel as long as the indicated nuclear instrument power is conservatively higher than the calorimetric heat balance results. This third Note is an exception to the first Note and only applies when below 15% RTP.

SR 3.3.1.3

This SR 3.3.1.3 verifies that the individual ~~channel-actuation-response-times~~ CHANNEL RESPONSE TIMES are less than or equal to the maximum values assumed in the ~~safety~~accident analysis. ~~The channel-actuation response time is the time from when the process variable exceeds its setpoint until the output from the channel analog logic reaches the input of the MPS digital logic.~~ Response time testing criteria are included in FSAR Chapter 7.



## BASES

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### SURVEILLANCE REQUIREMENTS (continued)

~~Response time~~ CHANNEL RESPONSE TIME may be verified by any series of sequential, overlapping or total channel measurements, including allocated sensor response time, such that the ~~response-time~~ CHANNEL RESPONSE TIME is verified. [Allocations for sensor response times may be obtained from records of test results, vendor test data, or vendor engineering specifications.] The ~~response-time~~ ACTUATION RESPONSE TIME testing of the RTS and ESFAS divisions are tested in accordance with LCO 3.3.2, "Reactor Trip System Logic and Actuation," ~~and~~ 3.3.3, "Engineered Safety Features Actuation Logic and Actuation," LCO. 3.4.6, "Chemical and Volume Control System Isolation Valves," LCO 3.4.10, "LTOP Valves," LCO 3.5.1, "ECCS," LCO 3.5.2, "DHRS," LCO 3.6.2, "Containment Isolation Valves," LCO 3.7.1, "MSIVs," and LCO 3.7.2, "Feedwater Isolation.".

SR 3.3.1.3 is modified by a Note indicating that neutron detectors are excluded from ~~response-time~~ CHANNEL RESPONSE TIME testing. This Note is necessary because of the difficulty in generating an appropriate detector input signal. Excluding the detectors is acceptable because the principles of detector operation ensure a virtually instantaneous response.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

#### SR 3.3.1.4

This SR is modified by a Note that indicates that neutron detectors are excluded from CHANNEL CALIBRATION.

The Surveillance verifies that the channel responds to a measured process variable within the necessary range and accuracy. CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drift between successive calibrations to ensure that the channel remains operational between successive tests. The test is performed in accordance with the SP. If all as-found measured values during calibration and surveillance testing are inside the as-left tolerance band, then the channel is fully operable, no additional actions are required.

If all as-found measured values during calibration testing and surveillance testing are within the as-found tolerance band but outside the as-left tolerance band, then the instrumentation channel is fully operable, however, calibration is required to restore the channel within the as-left tolerance band.

If any as-found measured value is outside the as-found tolerance band, then the channel is inoperable, and corrective action is required. The unit

## BASES

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### SURVEILLANCE REQUIREMENTS (continued)

#### SR 3.3.2.2

This SR ensures that the ACTUATION RESPONSE TIME~~response time~~ of the RTS divisions are verified to be less than or equal to the maximum values assumed in the safety analysis. Individual component response times are not modeled in the analyses. The analyses model the overall or total elapsed time, from the point at which the process variable exceeds the trip setpoint value at the sensor to the time at which the RTBs open. Total ACTUATION RESPONSE TIME~~response time~~ may be verified by any series of sequential, overlapping, or total division~~channel~~ measurements.

~~Response times of the sensors~~CHANNEL RESPONSE TIMES are tested in accordance with LCO 3.3.1. The maximum digital time response is described in the FSAR. This SR encompasses the ACTUATION RESPONSE TIME~~response time~~ of the RTS division from the output of the equipment interface modules until the RTBs are open.

A note provides an allowance for the SR so that it does not need to be met for reactor trip breakers that are open. This allowance permits continued operation when a trip breaker may not be able to satisfy the requirements of the SR but is already open. When a reactor trip breaker is open it has performed its safety function.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

BASES

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SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.3.2

This SR ensures that the pressurizer heater breaker opening ~~response-times~~ACTUATION RESPONSE TIMES are verified to be less than or equal to the maximum values assumed in the safety analysis. Individual component response times are not modeled in the analyses. The analyses model the overall or total elapsed time, from the point at which the process variable exceeds the trip setpoint value at the sensor to the time at which ESF component actuates. ~~Total response time~~ACTUATION RESPONSE TIME may be verified by any series of sequential, overlapping, or total division~~channel~~ measurements.

~~Response times of the sensors~~CHANNEL RESPONSE TIMES are tested in accordance with LCO 3.3.1. The maximum digital time response is described in the FSAR. This SR encompasses the response time of the ESFAS from the output of the equipment interface modules to the loss of voltage at the output of the pressurizer heater breaker.

The ~~response-time~~ACTUATION RESPONSE TIME of valves actuated by the ESFAS are verified in accordance with the IST program, and LCO 3.4.6, "Chemical and Volume Control System Isolation Valves," LCO 3.4.10, "LTOP Valves," LCO 3.5.1, "ECCS," LCO 3.5.2, "DHRS," LCO 3.6.2, "Containment Isolation Valves," LCO 3.7.1, "MSIVs," and LCO 3.7.2, "Feedwater Isolation."

A note provides an allowance for the SR so that it does not need to be met for pressurizer heater breakers that are open in their actuated position. This allowance permits continued operation when a pressurizer heater ~~trip~~ breaker is open because it has performed its safety function. The note also allows intermittent closure of the breakers under manual administrative control when the SR is not met because the slowly occurring nature of the phenomena the automatic heater ~~trip~~ breakers mitigate.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

## BASES

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### ACTIONS (continued)

#### B.1

With two CVCS isolation valves in one or more penetration flow paths inoperable, the affected penetration flow path must be isolated within 1 hour. The method of isolation must include the use of at least one isolation device that cannot be adversely affected by a single active failure. Isolation devices that meet this criterion are a closed and deactivated automatic valve, a closed manual valve, and a blind flange.

The 1 hour Completion Time is consistent with the ACTIONS of LCO 3.6.2. In the event the affected penetration is isolated in accordance with Required Action B.1, the affected penetration must be verified to be isolated on a periodic basis per Required Action A.2, which remains in effect. This periodic verification is necessary to assure leak tightness of containment and that penetrations requiring isolation following an accident are isolated. The Completion Time of once per 31 days for verifying each affected penetration flow path is isolated is appropriate considering the fact that the devices are operated under administrative controls and the probability of the misalignment is low.

#### C.1 and C.2

If the Required Actions and associated Completion Times are not met, the unit must be brought to a MODE or condition in which containment isolation requirement no longer applies. To achieve this status, the unit must be brought to at least MODE 2 within 6 hours and MODE 3 with RCS hot temperature < 200°F within 48 hours. The allowed Completion Times are reasonable to reach the required unit conditions from full power conditions in an orderly manner.

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### SURVEILLANCE REQUIREMENTS

#### SR 3.4.6.1

This SR [applies to valves with actuators that incorporate pressurized accumulators as a source of stored energy. The SR] verifies adequate pressure in the accumulators required for CVCS isolation valve OPERABILITY. The pressure limits required for OPERABILITY, including consideration of temperature effects on those limits, applicable to the valve accumulators are established and maintained in accordance with the INSERVICE TESTING PROGRAM. The Frequency is controlled under the Surveillance Frequency Control Program.

BASES

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SURVEILLANCE REQUIREMENTS (continued)

SR 3.4.6.2

Verifying that the isolation ACTUATION RESPONSE TIMEtime of each automatic power operated CVCS isolation valve is within limits is required to demonstrate OPERABILITY. The isolation time test ensures that the valve will isolate in a time period less than or equal to that assumed in the safety analysis. Isolation time is measured from output of the module protection system equipment interface module until the valves are isolated.

A Note is provided that indicates that the SR is not required to be met when valves are closed or open under administrative controls. This is acceptable because of the slowly occurring nature of the design basis events the CVCS isolation function mitigates. Frequency of this SR is in accordance with the INSERVICE TESTING PROGRAM.

SR 3.4.6.3

This Surveillance demonstrates that each automatic CVCS isolation valve actuates to the isolated position on an actual or simulated actuation signal. This Surveillance is not required for valves that are locked sealed, or otherwise secured in the isolated position under administrative controls. The actuation logic is tested as part of Engineered Safety Features Actuation System Actuation and Logic testing. An exception to the SR is provided for valves that are opened under administrative controls. This is acceptable because of the slowly occurring nature of the design basis events the CVCS isolation function mitigates.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

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REFERENCES

1. FSAR Chapter 15, "Transient and Accident Analysis."
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## BASES

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### ACTIONS (continued)

#### B.1 and B.2

With two closed RVVs inoperable, overpressurization is possible. Four hours to restore the closed RVV to OPERABILITY or open the RVV permits evaluation of the condition and completion of the action required to assure an LTOP condition cannot occur in a deliberate manner. The RCS vent to the containment atmosphere with two RVVs open prevents an overpressure condition from occurring.

#### C.1 and C.2

With three closed inoperable RVVs the RCS does not have overpressure protection. The Completion Time considers the urgency of removing the RCS from this condition, the time required to place the plant in this Condition in an orderly manner without challenging plant systems, and the relatively low probability of an overpressure event during this time period.

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### SURVEILLANCE REQUIREMENTS

A Note is provided to indicate that the surveillance requirements are not required to be met for valves that are open. This merely clarifies the intent of the surveillance testing applicability and is consistent with the LCO requirement that each closed RVV be OPERABLE.

#### SR 3.4.10.1, SR 3.4.10.2, SR 3.4.10.3, and SR 3.4.10.4

The ability of the RVVs to perform their LTOP safety function requires the same testing as required for them to perform their ECCS function. The bases for these surveillance requirements are the same as those specified in LCO 3.5.1, "Emergency Core Cooling System" however they only apply to the RVVs.

~~Actuation time~~ ACTUATION RESPONSE TIME is measured from output of the module protection system equipment interface module until the valves are open.

In addition to verification that the valves will perform as designed, the inadvertent actuation block must be verified to function at a setpoint that will not prevent LTOP actuation if needed.

The Frequencies are controlled under the Surveillance Frequency Control Program or the INSERVICE TESTING PROGRAM consistent with the testing required by LCO 3.5.1.

BASES

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SURVEILLANCE  
REQUIREMENTSSR 3.5.1.1

Verification that the RVVs and RRVs are OPERABLE by stroking the valves open ensures that each train of ECCS will function as designed when these valves are actuated. One RVV is designed to be actuated by either division of the MPS and it must be verified to open from each division without dependence on the other. The RVVs and RRVs safety function is to open as described in the safety analysis. A Note is provided indicating that the SR is not required to be met for a valve that is open. This Note is necessary to allow a valve to be credited with performing its safety function when it may not be able to satisfy the SR requirements. When an ECCS valve is open it has performed its safety function.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.5.1.2

Verifying that the open ~~actuation time~~ ACTUATION RESPONSE TIME of each RVV and RRV is within limits is required to demonstrate OPERABILITY. The open ~~actuation time~~ ACTUATION RESPONSE TIME test ensures that the valve will open in a time period less than or equal to that assumed in the safety analysis. The opening times are as specified in the INSERVICE TESTING PROGRAM. One RVV is designed to be actuated by either division of the MPS and its actuation time must be tested from each division without dependence on the other.

~~Actuation time~~ ACTUATION RESPONSE TIME is measured from output of the module protection system equipment interface module until the valves are open.

A Note is provided indicating that the SR is not required to be met for a valve that is open. This Note is necessary to allow a valve to be credited with performing its safety function when it may not be able to satisfy the SR requirements. When an ECCS valve is open it has performed its safety function.

Frequency of this SR is in accordance with the INSERVICE TESTING PROGRAM.

BASES

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SURVEILLANCE  
REQUIREMENTSSR 3.5.2.1

This SR [applies to valves with actuators that incorporate pressurized accumulators as a source of stored energy. The SR] verifies adequate pressure in the accumulators required for DHRS actuation valve OPERABILITY. The pressure limits required for OPERABILITY, including consideration of temperature effects on those limits, applicable to the valve accumulators are established and maintained in accordance with the INSERVICE TESTING PROGRAM. The Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.5.2.2

Verification that the DHRS including the heat exchanger is filled ensures that there is sufficient inventory in the loop to fulfill its design function, and that non-condensable gases have not accumulated in the system. Each looptrain of the DHRS has four level sensors - two located on the DHRS piping below each of the two actuation valves that would indicate a reduced water level in the DHRS heat exchanger legloop. Any level switch indicating a reduced water level is sufficient to determine the DHRS heat exchanger legloop is not filled. The DHRS is filled with feedwater during startup, and during normal operation it is maintained filled by feedwater pressure. Feedwater flow through the DHRS loop does not occur because the DHRS actuation valves are closed.

Dissolved gas concentrations are maintained very low in feedwater during startup and operations by secondary water chemistry requirements. Therefore, significant levels of noncondensable gases are not expected to accumulate in the DHRS piping. However, maintaining the required DHRS inventory using the level sensors protects against buildup of noncondensable gases which could adversely affect DHRS operation. Monitoring the level switches ensures the system remains filled and non-condensable gas accumulation has not occurred.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.



BASES

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SURVEILLANCE REQUIREMENTS (continued)

SR 3.5.2.3

Verification that the level in a steam generator (SG) is > [5]% and ≤ [65]% when its associated feedwater isolation valve is closed assures that the SG contains inventory adequate to support actuation and OPERABILITY of the associated decay heat removal system loop if it is required.

A Note is provided indicating that the surveillance is not required to be performed when the associated FWIV is open. In those conditions, the normal feedwater system controls ensure that the SG will support DHRS OPERABILITY if it is required.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.5.2.4

Verification that the DHRS actuation valves are OPERABLE by stroking the valves open ensures that each looptrain of DHRS will function as designed when these valves are actuated. The DHRS actuation valves safety function is to open as described in the safety analysis.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.5.2.5

Verifying that the open ~~actuation time~~ ACTUATION RESPONSE TIME of each DHRS actuation valve is within limits is required to demonstrate OPERABILITY. The open ~~actuation time~~ ACTUATION RESPONSE TIME test ensures that the valve will open in a time period less than or equal to that assumed in the safety analysis. The opening times are as specified in the INSERVICE TESTING PROGRAM. Each looptrain of DHRS contains two actuation valves, one actuated from each division of the MPS ESFAS actuation logic.

~~Actuation time~~ ACTUATION RESPONSE TIME is measured from output of the module protection system equipment interface module until the valves are open.

Frequency of this SR is in accordance with the INSERVICE TESTING PROGRAM.

BASES

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SURVEILLANCE  
REQUIREMENTS

SR 3.6.2.1

This SR [applies to valves with actuators that incorporate pressurized accumulators as a source of stored energy. The SR] verifies adequate pressure in the accumulators required for containment isolation valve OPERABILITY. The pressure limits required for OPERABILITY, including consideration of temperature effects on those limits, applicable to the valve accumulators are established and maintained in accordance with the INSERVICE TESTING PROGRAM. The Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.6.2.2

This SR requires verification that each manual containment isolation valve and blind flange located outside containment, and not locked, sealed, or otherwise secured in position, and required to be closed during accident conditions, is closed. The SR helps to ensure that post accident leakage of fission products outside the containment boundary is within design limits. This SR does not require any testing or device manipulation. Rather, it involves verification that those containment isolation devices outside containment and capable of being mispositioned are in the correct position.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

This SR specifies that containment isolation valves that are open under administrative controls are not required to meet the SR during the time the valves are open. This SR does not apply to devices that are locked, sealed, or otherwise secured in the closed position, since these were verified to be in the correct position upon locking, sealing, or securing.

The Note applies to valves and blind flanges located in high radiation areas and allows these devices to be verified closed by use of administrative means. Allowing verification by administrative means is considered acceptable, since access to these areas is typically restricted in MODES 1, 2, and 3 with RCS hot temperature  $\geq 200^{\circ}$  F for ALARA reasons.

Therefore, the probability of misalignment of these containment isolation valves, since they have been verified to be in the proper position, is small.

BASES

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SURVEILLANCE REQUIREMENTS (continued)

SR 3.6.2.3

Verifying that the isolation ~~time~~ACTUATION RESPONSE TIME of each automatic containment isolation valve is within the limits is required to demonstrate OPERABILITY. The ~~isolation time~~ACTUATION RESPONSE TIME test ensures the valve will isolate in a time period less than or equal to that assumed in the safety analysis. Isolation ~~time~~ACTUATION RESPONSE TIME is measured from output of the module protection system equipment interface module until the valves are isolated.

~~An exception to the SR is provided for valves that are open under administrative control. A Note is provided indicating that the surveillance requirement is not required to be met for automatic containment isolation valves that were closed to comply with ACTIONS, but are open under administrative controls.~~

The isolation time and Frequency of this SR are in accordance with the INSERVICE TESTING PROGRAM.

SR 3.6.2.4

Automatic containment isolation valves close on a containment isolation signal to minimize leakage of fission products from containment and to maintain required RCS inventory following a DBA. This SR ensures each automatic containment isolation valve will actuate to its isolation position on an actual or simulated actuation signal. The Surveillance is not required for valves that are locked, sealed, or otherwise secured in the required position under administrative controls. ~~An exception to the SR is also provided for valves that are open under administrative control.~~

~~A Note is provided indicating that the surveillance requirement is not required to be met for automatic containment isolation valves that were closed to comply with ACTIONS, but are open under administrative controls.~~

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

BASES

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SURVEILLANCE  
REQUIREMENTSSR 3.7.1.1

This SR [applies to valves with actuators that incorporate pressurized accumulators as a source of stored energy. The SR] verifies adequate pressure in the accumulators required for MSIV and main steam line bypass isolation valve OPERABILITY. The pressure limits required for OPERABILITY, including consideration of temperature effects on those limits, applicable to the valve accumulators are established and maintained in accordance with the INSERVICE TESTING PROGRAM. The Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.7.1.2

This SR verifies the safety related and non-safety related MSIV and MSIV Bypass Valve closure ~~times~~ACTUATION RESPONSE TIMES are within limits on an actual or simulated actuation signal. Isolation ~~time~~ACTUATION RESPONSE TIME is measured from output of the module protection system equipment interface module until the valves are isolated.

The isolation time is assumed in the accident and containment analyses. The MSIVs and MSIV Bypass Valves are not tested at power to reduce the likelihood of an unplanned transient due to valve closure when the unit is generating power. As the MSIVs are not tested at power, they are exempt from the ASME OM Code (Ref. 6) requirements during operation in MODES 1 and 2.

The Frequency is in accordance with the INSERVICE TESTING PROGRAM.

This test is typically conducted during shutdown conditions or with the unit at reduced operating temperatures and pressures before their OPERABILITY is required by the Applicability of this LCO.

SR 3.7.1.3

This SR verifies the safety related and non-safety related MSIV and MSIV Bypass Valves leakage are within limits. The MSIVs and MSIV Bypass Valves serve as a boundary for the DHRS and route steam from the steam generator to the DHR condenser when the DHR system is actuated.

The Frequency is in accordance with the INSERVICE TESTING PROGRAM.

BASES

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ACTIONS (continued)

and deactivated automatic valve, closed manual valve, or blind flange. An inoperable FWIV/FWRV may be utilized to isolate the line only if its leak tightness has not been compromised. This action returns the system to a condition in which at least one valve in the affected flow path is performing the required safety function. The 8 hour Completion Time is a reasonable amount of time to complete the actions required to close the FWIV, or FWRV, which includes performing a controlled unit shutdown without challenging plant systems.

D.1, and D.2

If the FWIVs and FWRVs cannot be restored to OPERABLE status, or closed, or isolated within the associated Completion Time, the unit must be placed in a MODE in which the LCO does not apply. To achieve this status, the unit must be placed in at least MODE 2 within 6 hours, in MODE 3 and PASSIVELY COOLED within 36 hours. The allowed Completion Times are reasonable, to reach the required unit conditions from full power conditions in an orderly manner.

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SURVEILLANCE  
REQUIREMENTS

SR 3.7.2.1

This SR [applies to valves with actuators that incorporate pressurized accumulators as a source of stored energy. The SR] verifies adequate pressure in the accumulators required for feedwater isolation valve OPERABILITY. The pressure limits required for OPERABILITY, including consideration of temperature effects on those limits, applicable to the valve accumulators are established and maintained in accordance with the INSERVICE TESTING PROGRAM. The Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.7.2.2

This SR verifies that the closure ~~time~~ACTUATION RESPONSE TIME of each FWIV and FWRV is within limits, on an actual or simulated actuation signal. Isolation ~~time~~ACTUATION RESPONSE TIME is measured from output of the module protection system equipment interface module until the valves are isolated.

The FWIV and FWRV isolation times are assumed in the accident and containment analyses. This Surveillance is normally performed upon returning the unit to operation following a refueling outage. These valves are tested when the unit is in a shutdown condition, since even a part stroke exercise increases the risk of a valve closure when the unit is generating power. Because the isolation valves are not tested when the