

Response to SDAA Audit Question

Question Number: A-16.3.1.9-2

Receipt Date: 03/18/2024

Question:

Revision 1 of GTS 3.1.9 Required Action B.1 states

“Isolate dilution source flow paths [in the CVCS makeup line] by use of at least one closed manual or one closed and deactivated automatic valve.”; but omits the phrase enclosed in brackets. The same action statement, with this phrase included is specified in

- GTS 3.3.1 Required Action H.1, which applies to MPS instrument Functions that initiate DWSI: 1.b, 2.b, 3.b, 4.b, 5.b, 6.a, 7.d, 9.b, 10.b, 11.e, 13.d, 14.b, 15.a, 16.b, 17.d, 19.c, 21.c, and 22.e, and
- GTS 3.3.1 Required Action L.4, which applies to MPS instrument Functions that initiate DWSI: 25.e, and 26.e; and
- GTS 3.3.3 Required Action E.1 which applies to the MPS ESFAS Logic and Actuation function that initiates DWSI: 4, and
- GTS 3.3.4 Required Action E.1 which applies to the Manual Actuation function that initiates DWSI: 4,

The applicant is requested to insert the omitted phrase in GTS 3.1.9 Required Action B.1 for consistency.

Response:

Condition B of GTS 3.1.9 currently provides the Required Action and Completion Time for four CVCS conditions that could impact boron dilution control. The first three conditions; Two CVCS demineralized water isolation valves inoperable, Boric Acid supply boron concentration not within limits, and CVCS makeup pump demineralized water flow path not configured to ensure maximum flow rate is within limits, are all part of the CVCS makeup line flow path. The last condition; module heatup system flow paths to or from other module CVCS not isolated by a

locked, sealed, or otherwise secured valve or device, is part of the CVCS recirculation flow path and not within the scope of the CVCS makeup flow path.

With the inclusion of the module heatup system flow path in GTS 3.1.9 Condition B, the phrase “in the CVCS makeup line” was no longer appropriate for Required Action B.1. Required Action B.1 was revised to use the more encompassing and generic language of “Isolate dilution source flow paths.”

In response to NRC Audit Item A-16.3.1.9-3, NuScale is revising GTS 3.1.9 to create a new Required Action specific to module heatup system isolation. As result of that change, NuScale revises GTS 3.1.9 Required Action B.1 to read:

“Isolate dilution source flow paths in the CVCS makeup path by use of at least one closed manual or one closed and de-activated automatic valve.”

Markups of the affected changes, as described in the response, are provided below:

3.1 REACTIVITY CONTROL SYSTEMS

3.1.9 Boron Dilution Control

LCO 3.1.9 Two CVCS demineralized water isolation valves shall be OPERABLE.

AND

Boric Acid supply boron concentration shall be within the limits specified in the COLR.

AND

Maximum CVCS makeup pump demineralized water flow path flowrate shall be within the limits specified in the COLR.

AND

Module heatup system (MHS) flow paths to and from cross-connected systems shall be isolated by a locked, sealed, or otherwise secured valve or device.

APPLICABILITY: MODES 1, 2, and 3 with any dilution source flow path not isolated.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One CVCS demineralized water isolation valve inoperable.	A.1 Restore CVCS demineralized water isolation valves to OPERABLE status.	72 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>B. Required Action and associated Completion Time not met.</p> <p><u>OR</u></p> <p>Two CVCS demineralized water isolation valves inoperable.</p> <p><u>OR</u></p> <p>Boric Acid supply boron concentration not within limits.</p> <p><u>OR</u></p> <p>CVCS makeup pump demineralized water flow path not configured to ensure maximum flowrate is within limits.</p> <p><u>OR</u></p> <p>MHS flow paths to or from other module <u>CVCS cross-connected systems</u> not isolated by a locked, sealed, or otherwise secured valve or device.</p>	<p>B.1 -----NOTE----- Flow paths may be unisolated intermittently under administrative controls. -----</p> <p><u>B.1</u> Isolate dilution source flow paths <u>in the CVCS makeup path</u> by use of at least one closed manual or one closed and de-activated automatic valve.</p> <p><u>AND</u></p> <p><u>B.2</u> Isolate MHS flows paths to <u>and from cross-connected systems by use of at least one locked, sealed, and otherwise secured valve or device.</u></p>	<p>1 hour</p> <p><u>1 hour</u></p>

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.9.1	Verify that CVCS makeup pump demineralized water flow path is configured to ensure that the maximum demineralized water flowrate remains within the limits specified in the COLR.	In accordance with the Surveillance Frequency Control Program
SR 3.1.9.2	Verify each automatic CVCS demineralized water isolation valve that is not locked, sealed, or otherwise secured in the isolated position, actuates to the isolated position on an actual or simulated signal.	In accordance with the Surveillance Frequency Control Program
SR 3.1.9.3	Verify Boric Acid supply boron concentration is within the limits specified in the COLR.	In accordance with the Surveillance Frequency Control Program
SR 3.1.9.4	Verify each CVCS makeup pump maximum flowrate is ≤ 25 gpm.	In accordance with the Surveillance Frequency Control Program
SR 3.1.9.5	<p>-----NOTE-----</p> <ol style="list-style-type: none"> 1. Only required to be met when CVCS flow is aligned through the module heatup system (MHS). 2. Isolation devices that are locked, sealed, or otherwise secured may be verified by use of administrative means. <p>-----</p> <p>Verify MHS flow paths to and from <u>cross-connected systems</u> other module CVCS are isolated by a locked, sealed, or otherwise secured valve or device.</p>	In accordance with the Surveillance Frequency Control Program

BASES

LCO

The requirement that two demineralized water isolation valves be OPERABLE ~~assures~~ensures that there will be redundant means available to terminate an inadvertent boron dilution event. The requirement that the boron concentration of the boric acid supply be maintained within the limits specified in the COLR ensures that the supply is not a source to the CVCS that could result in an inadvertent boron dilution event.

The limits on maximum CVCS makeup pump demineralized water flow path flowrate are established by restricting the flow that can be provided during system operation to within the limits in the COLR. The restrictions may be implemented by use of at least one closed manual or one closed and de-activated automatic valve, or by removing the power supply from one CVCS makeup pump.

The requirement that Module heatup system (MHS) flow paths to and from cross-connected systems are isolated by a locked, sealed, or otherwise secured valve or device prevents CVCS flow between units via the module heating system (MHS) headers that could result in unplanned changes to the boration of a unit aligned to the MHS.

APPLICABILITY

The requirement that two demineralized water isolation valves be OPERABLE, and that the boric acid storage tank boron concentration and maximum CVCS makeup pump demineralized water flow path flowrate is within the limits specified in the COLR is applicable in MODES 1, 2, and 3 with any dilution source flow path in the CVCS makeup line not isolated. In these MODES, a boron dilution event is considered possible, and the automatic closure of these valves is assumed in the safety analysis. The boron concentration of the boric acid sources are not assumed to be capable of causing a dilution event by the boron dilution event analysis. The maximum CVCS makeup pump demineralized water flow path flowrate is an assumption of the boron dilution event.

In MODE 1 < 15% RTP, the detection and mitigation of a boron dilution event would be signaled by a High Source or Intermediate Range Log Power Rate or a High Source Range Count Rate.

In MODE 1 \geq 15% RTP, the detection and mitigation of a boron dilution event would be signaled by a High Power Range Rate or High Power Range Linear Power. In MODES 2 and 3, the detection and mitigation of a boron dilution event would be signaled by a Source Range High Count Rate trip, a trip on Source Range High Log Power Rate, or a trip on High Subcritical Multiplication, or low RCS flow.

BASES

APPLICABILITY (continued)

In MODES 4 and 5, a dilution event is precluded because the CVCS RCS injection and discharge flow paths are not connected to the RCS, thus eliminating the possibility of a boron dilution event in the RCS. Pool volume is sufficient to minimize the potential for boron dilution during MODE 5 within the surveillance intervals provided by LCO 3.5.3, "Ultimate Heat Sink."

ACTIONS

A.1

If one CVCS demineralized water isolation valve is inoperable, the valve must be restored to OPERABLE status in 72 hours. The allowed Completion Time is considered acceptable because the safety function of automatically isolating the dilution source can be accomplished by the redundant isolation valve.

B.1

If the Required Action and associated Completion Time is not met, or if both CVCS demineralized water isolation valves are not OPERABLE (i.e., not able to be closed automatically), then the demineralized water supply flow path to the RCS must be isolated to preclude a boron dilution event. Isolation can be accomplished by manually isolating the CVCS demineralized water isolation valve(s) or by positioning the manual 3-way combining valve to only take suction from the boric acid tank. Alternatively, the dilution path may be isolated by closing appropriate isolation valve(s) in the flow path(s) from the demineralized water storage tank to the RCS.

If the boric acid concentration in the boric acid supply or if the CVCS makeup pump demineralized water flow path flowrate are not within the limits specified in the COLR, then the flow path to the RCS must be isolated to preclude a boron dilution event. Condition B permits indefinite operation with the boric acid storage tank or the boric acid batch tank not meeting the COLR concentration limits with the source isolated from the CVCS.

~~The Required Actions B.1 and B.2 are~~ ~~is~~ modified by a Note allowing ~~either~~ flow paths to be unisolated intermittently under administrative controls. These administrative controls consist of stationing a dedicated operator at the valve controls, who is in continuous communication with the main control room. In this way, the flow path can be rapidly isolated when a need for isolation is indicated.

BASES

ACTIONS (continued)

B.2

If the MHS flow paths to or from cross-connected systems are not isolated, the unisolated flow paths must be isolated by a locked, sealed, or otherwise secured valve or device.

SURVEILLANCE REQUIREMENTS

SR 3.1.9.1

This Surveillance verifies that CVCS makeup pump demineralized water flow path is configured to ensure that the maximum dilution flow rate that can exist during makeup pump operation remains within the limits specified in the COLR. The Surveillance accomplishes this by assuring that when the maximum demineralized water flowrate is restricted to that of a single CVCS makeup pump, at least one closed manual or one closed and de-activated automatic valve is correctly configured, or verifying that the power supply has been removed from one CVCS makeup pump. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.1.9.2

This Surveillance demonstrates that each automatic CVCS demineralized water isolation valve actuates to the isolated position on an actual or simulated actuation signal. This Surveillance is not required for automatic valves that are locked, sealed, or otherwise controlled under administrative controls.

In addition to this Surveillance, the automatic actuation logic is tested as part of Engineered Safety Features Actuation System Actuation and Logic testing, and valve performance is monitored as part of the INSERVICE TESTING PROGRAM.

The Surveillance Frequency for this test is controlled under the Surveillance Frequency Control Program.

SR 3.1.9.3

This Surveillance ensures that the boric acid supply is not a potential source of dilution water.