

SHOREHAM NUCLEAR POWER STATION
PLANT SPECIFIC TECHNICAL GUIDELINES

PSTG #9

RPV FLOODING

REVISION NO: 1

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SHOREHAM NUCLEAR POWER STATION

Plant Specific Technical Guidelines

Contingency # 4

RPV Flooding

EPG Step:

If while executing the following steps RPV water level can be determined:

- If any control rod cannot be determined to be inserted to or beyond position [02 (Maximum Subcritical Banked Withdrawal Position)] and it has not been determined that the reactor will remain shutdown under all conditions without boron, enter [procedure developed from Contingency #5] and [procedure developed from the RPV Control Guideline] at [Step RC/P-4] and execute these procedures concurrently.
- If all control rods are inserted to or beyond position [02 (Maximum Subcritical Banked Withdrawal Position)] or it has been determined that the reactor will remain shutdown under all conditions without boron, enter [procedure developed from the RPV Control Guideline] at [Steps RC/L and RC/P-4] and execute these steps concurrently.

SNPS PSTG Step:

If while executing the following steps RPV water level can be determined:

- If any control rod cannot be determined to be inserted to or beyond position 02 and it has not been determined that the reactor will remain shutdown under all conditions without boron, enter procedure developed from Contingency #5 and procedure developed from the RPV Control Guideline at Step RC/P-4 and execute these procedures concurrently.
- If all control rods are inserted to or beyond position 02 or it has been determined that the reactor will remain shutdown under all conditions without boron, enter procedure developed from the RPV Control Guideline at Steps RC/L and RC/P-4 and execute these steps concurrently.

Justification For Differences/References

Maximum Subcritical Banked Withdrawal Position: NED Appendix C Calculation No. C-NFD-200.

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RPV Flooding

EPG Step:

If while executing the following steps primary containment water level and suppression chamber pressure cannot be maintained below the Maximum Primary Containment Water Level Limit, then irrespective of whether adequate core cooling is assured terminate injection into the RPV from sources external to the primary containment until primary containment water level and suppression chamber pressure can be maintained below the Maximum Primary Containment Water Level Limit.

SNPS PSTG Step:

If while executing the following steps primary containment water level and suppression chamber pressure cannot be maintained below the Maximum Primary Containment Water Level Limit, then irrespective of whether adequate core cooling is assured terminate injection into the RPV from sources external to the primary containment until primary containment water level and suppression chamber pressure can be maintained below the Maximum Primary Containment Water Level Limit. (Figure M).

Justification for Differences/References

Maximum Primary Containment Water Level Limit: NED Appendix C Calculation No. C-NAD-268

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RPV Flooding

EPG Step:

C4-1 If any control rod cannot be determined to be inserted to or beyond position [02 (Maximum Subcritical Banked Withdrawal Position)] and it has not been determined that the reactor will remain shutdown under all conditions without boron, flood the RPV as follows:

If while executing the following steps either all control rods are inserted to or beyond position [02 (Maximum Subcritical Banked Withdrawal Position)] or it has been determined that the reactor will remain shutdown under all conditions without boron but RPV water level cannot be determined, continue in this procedure at [Step C4-2].

SNPS PSIG Step:

C4-1 If any control rod cannot be determined to be inserted to or beyond position 02 and it has not been determined that the reactor will remain shutdown under all conditions without boron, flood the RPV as follows:

If while executing the following steps either all control rods are inserted to or beyond position 02 or it has been determined that the reactor will remain shutdown under all conditions without boron but RPV water level cannot be determined, continue in this procedure at Step C4-2.

Justification for Differences/References

Maximum Subcritical Banked Withdrawal Position: NED Appendix C Calculation C-NFD-200.

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RPV Flooding

EPG Step:

C4-1.1 Terminate and prevent all injection into the RPV except from boron injection systems and CRD until RPV pressure is below the Minimum Alternate RPV Flooding Pressure.

If less than [1 (minimum number of SRVs for which the Minimum Alternate RPV Flooding Pressure is below the lowest SRV lifting pressure)] SRV[s] can be opened, continue in this procedure.

SNPS PSTG Step:

C4-1.1 Terminate and prevent all injection into the RPV except from boron injection systems and CRD until RPV pressure is below the Minimum Alternate RPV Flooding Pressure.

If no SRV can be opened, continue in this procedure.

<u>Minimum Alternate RPV Flooding Pressure</u>	<u>Number of SRVs</u>
84	7
101	6
124	5
159	4
216	3
332	2
678	1

Justification for Differences/References

Minimum Alternate RPV Flooding Pressure: NED Appendix C Calculation No. C-NAD-298.

Lowest SRV lifting pressure: Tech Spec 3.4.2

NOTE: MARFP Numbers rounded to nearest interger for usability considerations.

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RPV Flooding

EPG Step:

C4-1.2 If at least [3 (Minimum Number of SRVs Required for Emergency Depressurization)] SRVs can be opened, close the MSIVs, main steam line drain valves, and IC, RCIC, and RHR steam condensing isolation valves.

SNPS PSTG Step:

C4-1.2 If at least 4 SRVs can be opened, close the MSIVs, main steam line drain valves, and RCIC, and RHR steam condensing isolation valves. |<

Justification for Differences/References

Minimum Number of SRVs required for Emergency Depressurization: NED Appendix C Calculation C-NAD-269.

IC Deleted from list of systems to isolate (N/A to SNPS).

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RPV Flooding

Justification for Differences/References

Minimum Alternate RPV flooding pressure: NED Appendix C Calculation C-NAD-298.

Deleted "Motor Driven Feedwater Pumps" from list (N/A to SNPS).

Lowest SRV lifting pressure: Tech Spec section 3.4.2.

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Contingency # 4

RPV Flooding

EPG Step:

C4-1 (Con) If less than [1 (minimum number of SRVs for which the Minimum Alternate RPV Flooding Pressure is below the lowest SRV lifting pressure)] SRV[s] [is] open or RPV pressure cannot be increased to above the Minimum Alternate RPV Flooding Pressure, commence and, irrespective of pump NPSH and vortex limits, slowly increase injection into the RPV with the following systems until at least [1 (minimum number of SRVs for which the Minimum Alternate RPV Flooding Pressure is below the lowest SRV lifting pressure)] SRV[s] [is] open and RPV pressure is above the Minimum Alternate RPV Flooding Pressure:

- HPCS, defeating high RPV water level isolation interlocks if necessary.
- LPCS
- [• RHR service water crosstie]
- [• Fire System]
- [• Interconnections with other units]
- [• ECCS keep-full systems]

SNPS PSTG Step:

C4-1.3 (Con't) If no SRV is open or RPV pressure cannot be increased to above the Minimum Alternate RPV Flooding Pressure, commence and, irrespective of pump NPSH and vortex limits, slowly increase injection into the RPV with the following systems until at least 1 SRV is open and RPV pressure is above the Minimum Alternate RPV Flooding Pressure:

Minimum Alternate RPV Flooding Pressure	Number of SRVs
84	7
101	6
124	5
159	4
216	3
332	2
678	1

- Core Spray System
- RHR service water crosstie (Ultimate Cooling)
- Fire Main to Ultimate Cooling through 1P41-06V-3029
- ECCS Connections from Condensate Transfer

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Contingency # 4

RPV Flooding

C4-1.3
(Con't)

Justification for Differences/References

Minimum Alternate RPV Flooding Pressure: NED Appendix C Calculation C-NAD-298. |<1

Lowest SRV Lifting Pressure: Tech Spec Section 3.4.2

Deleted HFCS, reworded LPCS, deleted interconnections to other units and clarified the others to make them compatible to SNPS.

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RPV Flooding

If less than [1 (minimum number of SRVs in which the Minimum Alternate RPV Flooding Pressure is below the lowest SRV lifting pressure)] SRV[s] [is] open or RPV pressure cannot be increased to above the Minimum Alternate RPV Flooding Pressure, enter [procedure developed from Contingency #6] and [procedure developed from the RPV Control Guideline] at [Step RC/P-4] and execute these procedures concurrently.

SNPS PSTG Step:

If no SRV is open or RPV pressure cannot be increased to above the Minimum Alternate RPV Flooding Pressure, enter procedure developed from Contingency #6 and procedure developed from the RPV Control Guideline at Step RC/P-4 and execute these procedures concurrently.

Justification for Differences/References

Minimum Alternate RPV Flooding Pressure: NED Appendix Calculation C-NAD-298

Lowest SRV lifting pressure: Tech Spec 3.4.2.

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Contingency # 4

RPV Flooding

EPG Step:

C4-1.4 When at least [1 (minimum number of SRVs for which the Minimum Alternate RPV Flooding Pressure is below the lowest SRV lifting pressure)] SRV[s] [is] open and RPV pressure is above the Minimum Alternate RPV Flooding Pressure, control injection to maintain at least [1 (minimum number of SRVs for which the Minimum Alternate RPV Flooding Pressure is below the lowest SRV lifting pressure)] SRV[s] open and RPV pressure above the Minimum Alternate RPV Flooding Pressure but as low as practicable.

SNPS PSTG Step:

C4-1.4 When at least 1 SRV is open and RPV pressure is above the Minimum Alternate RPV Flooding Pressure, control injection to maintain at least 1 SRV open and RPV pressure above the Minimum Alternate RPV Flooding Pressure but as low as practicable.

Justification for Difference/References

Minimum Alternate RPV Flooding Pressure: NED Appendix C Calculation C-NAD-298.

Lowest SRV lifting pressure: Tech Spec 3.4.2

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Contingency # 4

RPV Flooding

EPG Step:

- C4-1.5 When all control rods are inserted to or beyond position [02 (Maximum Subcritical Banked Withdrawal Position)] or it has been determined that the reactor will remain shutdown under all conditions without boron, continue in this procedure.

SNPS PSTG Step:

- C4-1.5 When all control rods are inserted to or beyond position 02 or it has been determined that the reactor will remain shutdown under all conditions without boron, continue in this procedure.

Justification for Differences/References

Maximum Subcritical Banked Withdrawal Position: Appendix C Calculation C-NFD-200.

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Contingency # 4

RPV Flooding

EPG Step:

C4-2 If at least [3 (Minimum Number of SRVs Required for Emergency Depressurization)] SRVs can be opened or if a HPCS or motor driven feedwater pump is available for injection, close the MSIVs, main steam line drain valves, and IC, RCIC, and RHR steam condensing isolation valves.

SNPS PSTG Step:

C4-2 If at least 4 SRVs can be opened, close the MSIVs, main steam line drain valves, and RCIC, and RHR steam condensing isolation valves.

Justification for Differences/References

Minimum number of SRVs required for Emergency Depressurization: NED Appendix C Calculation C-NAD-269.

Deleted reference to HPCS, IC and motor driven feedwater pumps. (N/A to SNPS).

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RPV Flooding

EPG Step:

C4-3 Flood the RPV as follows:

C4-3.1 Commence and, irrespective of pumps NPSH and vortex limits, increase injection into the RPV with the following systems until at least [3 (Minimum Number of SRVs Required for Emergency Depressurization)] SRVs are open and RPV pressure is not decreasing and is [75 psig (Minimum RPV Flooding Pressure)] or more above suppression chamber pressure:

- HPCS, defeating high RPV water level isolation interlocks if necessary.
- Motor driven feedwater pumps, defeating high RPV water level isolation interlocks if necessary.
- LPCS
- LPCI with injection through the heat exchangers as soon as possible.
- Condensate Pumps
- CRD
- [• RHR service water crosstie]
- [• Fire System]
- [• Interconnections with other units]
- [• ECCS keep-full systems]
- [• SLC (test tank)]
- [• SLC (boron tank)]

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RPV Flooding

SNPS PSTG Step:

C4-3 Flood the RPV as follows:

C4-3.1 Commence and, irrespective of pumps NPSH and vortex limits, increase injection into the RPV with the following systems until at least 4 SRVs are open and RPV pressure is not decreasing and is 50 psig or more above suppression chamber pressure:

- Core Spray System
- LPCI with injection through the heat exchangers as soon as possible.
- Condensate Pumps
- CRD
- RHR service water crosstie (ultimate cooling)
- Fire Main to Ultimate Cooling through 1P41-06V-3029
- ECCS connections from condensate transfer
- SLC (test tank)
- SLC (boron tank)

Justification for Differences/References

Minimum Number of SRVs required for Emergency Depressurization: NED Appendix C Calculation C-NAD-269.

Minimum RPV Flooding Pressure: NED Appendix C Calculation C-NAD-269.

Deleted HPCS, Motor Driven Feedwater pumps and interconnections with other units (N/A to SNPS)

Changed LPCS to Core Spray System

Clarified the alternate injection subsystems as applicable to SNPS.

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RPV Flooding

EPG Step:

If less than [3 (Minimum Number of SRVs Required for Emergency Depressurization)] SRV[s] are open or RPV pressure cannot be maintained at least [75 psig (Minimum RPV Flooding Pressure)] above suppression chamber pressure, enter [procedure developed from Contingency #6] and [procedure developed from the RPV Control Guideline] at [Step RC/P-4] and execute these procedures concurrently.

SNPS PSTG Step:

If less than 4 SRVs are open or RPV pressure cannot be maintained at least 50 psig above suppression chamber pressure, enter procedure developed from Contingency #6 and procedure developed from the RPV Control Guideline at Step RC/P-4 and execute these procedures concurrently.

Justification for Differences/References

Minimum Number of SRVs required for Emergency Depressurization: NED Appendix C Calculation C-NAD-269.

Minimum RPV Flooding Pressure: NED Appendix C Calculation C-NAD-269.

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RPV Flooding

EPG Step:

C4-3.1 When at least [3 (Minimum Number of SRVs Required for Emergency Depressurization)] SRV[s] are open and RPV pressure can be maintained at least [75 psig (Minimum RPV Flooding Pressure)] above suppression chamber pressure, control injection to maintain at least [3 (Minimum Number of SRVs Required for Emergency Depressurization)] SRVs open and RPV pressure at least [75 psig (Minimum RPV Flooding Pressure)] above suppression chamber pressure but as low as practicable.

SNPS PSTG Step:

C4-3.2 When at least 4 SRVs are open and RPV pressure can be maintained at least 50 psig above suppression chamber pressure, control injection to maintain at least 4 SRVs open and RPV pressure at least 50 psig above suppression chamber pressure but as low as practicable.

Justification for Differences/References

Minimum Number of SRVs required for Emergency Depressurization: NED Appendix C Calculation C-NAD-269.

Minimum RPV Flooding Pressure: NED Appendix C Calculation C-NAD-269.

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RPV Flooding

EPG Step:

C4-4 When:

- RPV water level instrumentation is available, and
- Temperature[s] [near the cold reference leg instrument vertical runs] are below 212°F, and
- RPV pressure has remained at least [75 psig (Minimum RPV Flooding Pressure)] above suppression chamber pressure for at least [the Minimum Core Flooding Interval]

Terminate all injection into the RPV and reduce RPV water level until RPV water level indication is restored.

If RPV water level indication is not restored within the Maximum Core Uncovery Time Limit after commencing termination of injection into the RPV, return to [Step C4-3.1].

SNPS PSTG Step:

C4-4 When:

- RPV water level instrumentation is available, and
- Temperatures near the cold reference leg instrument vertical runs are below 212°F, and
- RPV pressure has remained at least 50 psig above suppression chamber pressure for at least the Minimum Core Flooding Interval.

<u>Minimum Core Flooding Interval</u>	<u>Number of SRVs</u>
47 min.	4
30 min.	5
22 min.	6
17 min.	7

Terminate all injection into the RPV and reduce RPV water level until RPV water level indication is restored.

If RPV water level indication is not restored within the Maximum Core Uncovery Time Limit (Figure M) after commencing termination of injection into the RPV, return to Step C4-3.1.

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RPV Flooding

Justifications for Differences/References

Minimum RPV Flooding Pressure: NED Appendix C Calculation C-NAD-269.

Minimum Core Flooding Interval: NED Appendix C Calculation C-NAD-269. Rounded up
for conservatism and human factors criteria.

Maximum Core Uncovery Time: NED Appendix C Calculation C-NAD-269.

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RPV Flooding

EPG Step:

C4-5 Enter [procedure developed from the RPV Control Guideline] at [Steps RC/L and RC/P-4] and execute these steps concurrently.

SNPS PSTG Step:

C4-5 Enter procedure developed from the RPV Control Guideline at Steps RC/L and RC/P-4 and execute these steps concurrently.

Justification for Differences/References

N/A