

INDIAN POINT STATION

UNIT NO. 2

POP-3.4 REV. 0

LOW PRESSURE OPERATION WITHOUT A STEAM BUBBLE

BTM
Brendan T. Moroney
Written By

Anthony A. Neapole
Reviewed By

John M. McKeown 1/6/76
SNSC Review / Date

C. Limon 7/13/76
Approved By / Date

8111070577 761028
PDR ADOCK 05000247
P PDR

Low Pressure Operation Without A Steam Bubble1.0 Intent

To provide a detailed procedure for the operation of the Reactor Coolant System during low pressure operations without a steam bubble.

2.0 Precautions and Limitations

2.1 The following are requirements of Technical Specifications:

- 2.1.A The Reactor Coolant System pressure must be maintained within the allowable area of the appropriate pressure - temperature curve. (Refer to Graph RCS-1A or 1B)
- 2.1.B The maximum pressurizer heatup and cooldown rate is 200°F/hr. However the administrative limit of 100°F/hr. should be observed.
- 2.1.C RCS heatup rate shall not exceed 50°F/hr. for temperatures below 220°F. For temperatures above 220°F it shall not exceed 100°F/hr.
- 2.1.D RCS cooldown rate shall not exceed 100°F/hr. for temperatures above 220°F. For temperatures below 220°F it shall be based upon the limits of the Pressure-Temperature curve. (Refer to curve RCS-1B in the Graphs Book.)
- 2.1.E The maximum ΔT between the spray fluid (either normal or auxiliary spray) and the pressurizer shall be less than 320°F.
- 2.1.F At least one reactor coolant pump or one residual heat removal pump in the RHR system, when connected to the RCS, shall be in operation when a reduction is made in boron concentration of the RCS.
- 2.1.G At least one pressurizer code safety valve shall be operable whenever the reactor head is on the vessel except for hydrostatically testing the RCS. The pressurizer code safety valve lift setting shall be set at 2485 psig with + 1% allowance for error.
- 2.1.H The secondary side of the steam generators must not be pressurized above 200 psig if the temperature of the steam generator is below 70°F.

2.1.I When fuel is in the reactor there shall be at least one flow path to the core for boric acid injection.

2.2 While the RCS is solid, extreme caution shall be exercised during evolutions since changing RCS temperature or charging and letdown flows could result in an uncontrolled RCS pressure spike.

2.3 When the RHR system is in service, the RCS pressure ^{and temperature} should not exceed 450 psig or 350°F. *respectively.*

3.0 Initial Conditions

3.1 The Reactor Coolant System is filled and no steam bubble exists in the pressurizer.

3.2 The Reactor Coolant System is aligned per COL-2.

3.3 Component Cooling is being supplied per SOP-4.1.2.

3.4 The charging and letdown sections of the Chemical and Volume Control System are aligned per COL-3.

3.5 The Residual Heat Removal System is operational as required per SOP-4.2.1.

4.0 Instructions

4.1 When the RCS has been placed in the cold shutdown condition, ^{or is operated in the solid mode} automatic SI should be defeated by removing the lead on terminal 2 of the following relays.

SIR1 - Logic Channel 1 - Panel G3

SIR2 - Logic Channel 2 - Panel G5

4.2 While the Reactor Coolant is solid, extreme caution shall be used when changing any parameter that could result in an uncontrolled RCS pressure spike. The following is a list of parameters and how they effect RCS pressure when changed.

A) Increased charging flow will increase RCS pressure.

B) Decreased charging flow will decrease RCS pressure.

C) Increased letdown flow will decrease RCS pressure.

D) Decreased letdown flow will increase RCS pressure.

E) Increased feedwater addition may decrease RCS pressure.

- F) Increased component cooling flow while the RHR System is in service will decrease RCS pressure.
- G) Increasing RCS temperature will result in an RCS pressure increase.
- H) Starting an RHR Pump will cause a decrease in RCS pressure.
- I) Stopping an RHR Pump will cause an increase in RCS pressure.

- 4.3 Adjust RCS pressure, as necessary to remain within the allowable area of the appropriate pressure-temperature curve (refer to Graph RCS-1A or 1B) by manually adjusting charging pump speed and/or letdown flow. Letdown flow should be adjusted by changing the setpoint of the low pressure letdown backpressure controller (PCV-135) as required. When the RHR system is in service the RHR purification path letdown valve (HCV-133) should be sufficiently open so that PCV-135 is the controlling pressure regulating valve. Do not increase RCS pressure above 450 psig if the RHR loop is in service or decrease below 400 psig if an RCP is operating.
- 4.4 All three letdown orifice isolation valves should remain open so that an unanticipated RCS pressure increase can be relieved through the orifices.
- 4.5 The volume control tank pressure should not be reduced below 15 psig whenever RCP's are in service.
- 4.6 Maintain the RCS temperature at the desired value consistent with plant conditions by adjusting the RHR flow per SOP-4.2.1.
- A) Do not allow RCS temperature to exceed 200°F unless containment integrity is in effect.
 - B) Do not allow RCS temperature to exceed 250°F unless the chemistry specification of SOP-8.1 are met.
 - C) Do not allow RCS temperature to exceed 350°F if the RHR loop is in service.

4.7 To preclude Reactor Coolant System (RCS) pressure spikes which exceed the RCS pressure-temperature relationship requirements of the Technical Specifications (refer to Graph RCS-1A or 1B) do not start a RCP, if no other RCPs are running, unless one of the following conditions is met:

- a) A gas bubble exists in the RCS. The bubble may be either air, nitrogen or steam. If the bubble is in the pressurizer (nitrogen or steam), the pressurizer level must be less than 95% of span. If the bubble exists in the steam generators due to filling drained loops (air), the pressurizer should be completely filled.

NOTE: Indicated pressurizer level must be corrected to take into account temperature as per Graph RCS-3B and must be at least 5% less than that indicated for a solid pressurizer.

OR

- b) There is complete temperature equalization between the water in the Reactor Vessel and the water in the Steam Generators. A comparison between core thermocouples and steam generator shell thermocouples should be made to verify this.

4.8 If the Reactor Coolant System pressure cannot be maintained 10 psi greater than Volume Control Tank pressure, the No. 1 seal return valves and the No. 1 seal bypass valve must be closed to prevent backflow of the Volume Control Tank cover gas.

4.9 The No. 1 seal bypass valve should be open prior to running an RCP.

C-A-U-T-I-O-N

Do not open the No. 1 seal bypass valve unless the No. 1 seal return valves are open and there is at least a 100 psi differential across the No. 1 seals. This will prevent lifting the seal ring off the runner, which can cause the seal ring to hang up.