Enclosure 8

Comments Questions 15 and 21

Question: 15

Consider the following plant conditions:

- Loss of all AC power has occurred and is affecting the entire site.
- The Turbine Driven ABF pump is providing flow to the SGs.
- A rapid cooldown has been commenced.

During the cooldown, what are the expected methods of control for the following:

(1) 21-24 SG Turbine Driven ABFP flow control valves (FCV-405A, B, C&D) and
(2) 21-24 Atmospheric Steam Dumps (PCV-1134 through 1137)

A. (1) Manual remote (CCR) control using nitrogen.
(2) Manual local control using nitrogen

B. (1) Manual local control using nitrogen
(2) Manual local control using nitrogen

C. (1) Manual remote (CCR) control using nitrogen
(2) Manual remote (CCR) control using nitrogen.

D. (1) Manual local control using nitrogen
(2) Manual remote (CCR) control using nitrogen.

Question 15

The conditions of the question has a loss of all AC power on site with the turbine driven Auxiliary Boiler Feedwater Pump (#22) providing water to the steam generators and the cool down commenced. The conditions place the operator in 2-ECA-0.0, "Loss of All AC Power" at step 17, sub-step b. RNO, as the normal instrument air supply to the Steam Generator Atmospheric Dump Valves would not be available. Step 17, sub-step b. RNO allows either:

- Manually operate atmospheric steam dumps from CCR by connecting N2 Backup Hose, OR
- Locally operate atmospheric steam dumps

by referring to 2-SOP-ESP-001, "Local Equipment Operation And Compensatory Actions." 2-SOP-ESP-001 Section 4.11 provides procedural direction to lineup nitrogen and operate the steam generator atmospheric dump valves from the local control panels. 2-SOP-ESP-001 Section 4.12 provides procedural direction to locally align nitrogen so that the steam generator atmospheric dump valves maybe operated from the control room.
In the question stem, the word "expected" is underlined. Since either remote operation from the control room or local operation are equally allowed by procedure, neither is expected more than the other.

The nitrogen backup to the turbine driven Auxiliary Boiler Feedwater Pump flow control valves (FCV-405A thru 405D) automatically allows for continued remote operation from the control room.

<u>Facility Position</u>
Both answers A and C are correct and are procedurally supported.

References:

2-ECA-0.0, "Loss of All AC Power"
2-SOP-ESP-001, "Local Equipment Operation and Compensatory Actions"

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
16.	Check CST Level - GREATER THAN 2 FT	Switch to city water supply: a. Open city water header isolation valve: o FCV-1205A b. Open AFW pump suction valves as necessary: o PCV-1187 o PCV-1188 o PCV-1189

CAUTION

- o SG pressures should NOT be decreased to less than 200 psig to prevent injection of accumulator nitrogen into the RCS.
- o SG narrow range level should be maintained greater than 10% (27% FOR ADVERSE CONTAINMENT) in at least one intact SG. If level can NOT be maintained, SG depressurization should be stopped until level is restored in at least one SG.

NOTE

- o The SGs should be depressurized at a rate sufficient to maintain a cooldown rate in the RCS cold legs near 100°F/Hr. This will minimize RCS inventory loss while cooling the RCP seals in a controlled manner.
- o PRZR level may be lost and reactor vessel upper head voiding may occur due to depressurization of SGs. Depressurization should NOT be stopped to prevent these occurrences.

17. Depressurize Intact SGs To 300 psig:

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	a. Check SG narrow range levels - GREATER THAN 10% (27% FOR ADVERSE CONTAINMENT) in at least one SG	a. Perform the following: 1) Maintain maximum AFW flow until narrow range level greater than 10% (27% FOR ADVERSE CONTAINMENT) in at least one SG. o Preferentially RESTORE level to 22 <u>OR</u> 23 SG 2) Continue with Step 18. <u>WHEN</u> narrow range level greater than 10% (27% FOR ADVERSE CONTAINMENT) in at least one SG, <u>THEN</u> do Steps 17b through 17e.
	b. Manually dump steam using SG atmospheric steam dumps to maintain cooldown rate in RCS cold legs - LESS THAN 100°F/HR	b. Perform either of the following by refering to 2-SOP-ESP-001, LOCAL EQUIPMENT OPERATION <u>AND</u> COMPENSATORY ACTIONS: o Manually operate atmospheric steam dumps from CCR by connecting N2 Backup Hose. - OR - o Locally operate atmospheric steam dumps.
	c. Check RCS cold leg temperatures - GREATER THAN 325°F	c. Perform the following: 1) Control SG atmospheric steam dumps to stop SG depressurization. 2) Go to Step 18.
	d. Check SG pressures - LESS THAN 300 PSIG	d. Continue with Step 18. <u>WHEN</u> SG pressures decrease to less than 300 psig, <u>THEN</u> do Step 17e.
	e. Manually control SG atmospheric steam dumps to maintain SG pressures at 300 psig	e. Locally control SG atmospheric steam dumps to maintain SG pressures at 300 psig: o Refer to 2-SOP-ESP-001, LOCAL EQUIPMENT OPERATION <u>AND</u> COMPENSATORY ACTIONS for local operation as necessary.

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One Site, One Team, One Fleet

Indian Point Energy Center

Procedure Use Is:

☑ Continuous

☐ Reference

☐ Information

Control Copy: ________

Effective Date: 8/7/2012

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2-SOP-ESP-001, Revision: 8

LOCAL EQUIPMENT OPERATION AND CONTINGENCY ACTIONS

Approved By:

John Bellette / [signature] / 7-24-12

RPO or Designee: **Print Name / Sign / Date**

Team 2A

Procedure Owner

Indian Point Operations

EDITORIAL REVISION

REVISION SUMMARY
(Page 1 of 1)

1.0 REASON FOR REVISION

1.1 Incorporate feedback IP2-10515.

1.2 Incorporated operator comments for section 4.12, CCR Atmospheric Steam Dumps using backup nitrogen bottles.

2.0 SUMMARY OF CHANGES

2.1 Revised abbreviation for Atmospheric valves in section 4.12, from "ADV" to "ATMOS" to conform to labels and tags in the field, no rev bars") **[Editorial change, step 4.6.9]**.

2.2 Revised Section 4.12 (Align ATMO for CCR Operation, using backup N_2) per operator comments: Revised wording in step 4.12.1 Note (deleted 1st bullet "This section is available after the completion of EC-29868", added "Normally only one nitrogen bottle is aligned for service at the PCV-1134/PCV-1135 OR at PCV-1136/PCV-1137 control station at a time except when swapping bottles"). Added additional guidance to hook up and remove Nitrogen operation for the Atmospheric valves **[Editorial change, step 4.6.13]**.

2.3 Added step 4.12.10, to provide additional guidance to swap N_2 Bottles **[Editorial change, step 4.6.11]**.

2.4 Corrected typo in Attachment 2, page 95: changed fuse from "F-27" to "F-21" (IP2-10515) **[Editorial change, step 4.6.9]**.

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4.11 Operate Atmospheric Steam Dumps

CAUTION

- 21 and 22 steam generators (SGs) have reliable backup wide range level indication at the Safe Shutdown Panel. If 23 or 24 SG level indication is suspected of being degraded (Example: due to fire or electrical fault, etc.) then 23 or 24 SGs should NOT be steamed unless both 21 AND 22 SGs are unavailable.
- If SG differential pressure between SGs is greater than 155 psid, then a Safety Injection signal will be initiated.

NOTE

Nitrogen header is supplied from bottles located next to the auxiliary feedwater regulating valves or from backup N2 bottles via quick disconnects located at the Atmospheric local control panels .

4.11.1 To align SG Atmospheric Dump Valve for a specific SG GO TO:

- 21 SG step 4.11.2
- 22 SG step 4.11.4
- 23 SG step 4.11.6
- 24 SG step 4.11.8

4.11.2 ALIGN PCV-1134, (STM Gen 21 Atmospheric Dump) for local operation as follows:

4.11.2.1 VERIFY MS-3A, (PCV-1134 Inlet Stop Main Stm Line 21) OPEN.

4.11.2.2 CLOSE IA-1202, (PCV-1134 Positioner Instrument Air Stop).

4.11.2.3 VERIFY PRV-5608 (Nitrogen Regulator to PCV-1134) is BACKED OUT FULLY (counter-clockwise).

4.11.2.4 OPEN SGN-500 (PCV-1134 Local Control Station Nitrogen Supply Stop).

4.11.2.5 SLOWLY OPEN SGN-508 (Nitrogen Stop Valve to PCV-1134 Diaphragm).

4.11.2.6 CLOSE IA-1008, (PCV-1134 Instrument Air Control Panel Vent).

4.11.2.7 IF Back-up N_2 is required, CONNECT back-up N_2 bottle as follows:

- CLOSE SGN-520, Primary N2 Supply Isolation.
- CONNECT quick disconnect AND OPEN N2 bottle isolation.
- OPEN N-853, Secondary N2 Bottle Supply Stop (downstream of bottle regulator).
- CHECK N2 bottle regulator set to 85 psig.

CAUTION

Use of valve IA-1008 (PCV-1134 Instrument Air Control Panel Vent) to throttle closed the atmospheric should be minimized to preserve N_2 supply. Valve IA-1008 should not be left open to maintain pressure.

4.11.2.8 OPEN/THROTTLE/CLOSE PCV-1134 (STM Gen 21 Atmospheric Dump) as follows:

- THROTTLE in OPEN direction by slowly increasing(clockwise) Nitrogen pressure using PRV-5608 (Nitrogen Regulator to PCV-1134)
- THROTTLE in CLOSE direction by decreasing (counter clockwise) Nitrogen pressure using PRV-5608 (Nitrogen Regulator to PCV-1134)
- IF necessary to assist in throttling Closed THEN VENT Nitrogen pressure with IA-1008 (PCV-1134, Instrument Air Control Panel Vent).

4.11.3 RESTORE PCV-1134, (STM Gen 21 Atmospheric Dump) alignment for normal operation as follows:

4.11.3.1 If Back-up N_2 bottle is aligned, RESTORE as follows:

- CLOSE N_2 bottle isolation
- CLOSE N-853, Secondary N2 Bottle Supply Stop (downstream of bottle regulator)
- CLOSE SGN-500, (PCV-1134 Local Control Station Nitrogen Supply Stop)
- DISCONNECT quick disconnect

4.11.3.2 CLOSE SGN-500, (PCV-1134 Local Control Station Nitrogen Supply Stop).

4.11.3.3 OPEN IA-1008, (PCV-1134 Instrument Air Control Panel Vent).

4.11.3.4 OPEN IA-1202, (PCV-1134 Positioner Instrument Air Stop).

4.11.3.5 CLOSE SGN-508, (Nitrogen Stop Valve to PCV-1134 Diaphragm).

4.11.3.6 CLOSE IA-1008, (PCV-1134 Instrument Air Control Panel Vent).

4.11.3.7 OPEN SGN-520, Primary N2 Supply Isolation.

4.11.4 ALIGN PCV-1135, (STM Gen 22 Atmospheric Dump) for local operation as follows:

4.11.4.1 VERIFY MS-3B, (PCV-1135 Inlet Stop Main Stm Line 22) OPEN.

4.11.4.2 CLOSE IA-1203, (PCV-1135 Positioner Instrument Air Stop).

4.11.4.3 VERIFY PRV-5610 (Nitrogen Regulator to PCV-1135) is BACKED OUT FULLY (counter-clockwise).

4.11.4.4 OPEN SGN-501, (PCV-1135 Local Control Station Nitrogen Supply Stop).

4.11.4.5 SLOWLY OPEN SGN-509 (Nitrogen Stop Valve to PCV-1135 Diaphragm).

4.11.4.6 CLOSE IA-1009, (PCV-1135 Instrument Air Control Panel Vent).

4.11.4.7 IF Back-up N_2 is required, THEN CONNECT back-up N_2 bottle as follows:

- CLOSE SGN-520, Primary N2 Supply Isolation.
- CONNECT quick disconnect AND OPEN N_2 bottle isolation.
- OPEN N-853, Secondary N2 Bottle Supply Stop (downstream of bottle regulator).
- CHECK N2 bottle regulator set to 85 psig.

CAUTION

Use of valve IA-1009 (PCV-1135 Instrument Air Control Panel Vent) to throttle closed the atmospheric should be minimized to preserve N_2 supply. Valve IA-1009 should NOT be left open to maintain pressure.

4.11.4.8 OPEN/THROTTLE/CLOSE PCV-1135 (STM Gen 22 Atmospheric Dump) as follows:

- THROTTLE in OPEN direction by slowly increasing (clockwise) Nitrogen pressure using PRV-5610, (Nitrogen Regulator to PCV-1135).
- THROTTLE in CLOSED direction by decreasing (counter clockwise) Nitrogen pressure using PRV-5610 (Nitrogen Regulator to PCV-1135)
- IF necessary to assist in throttling Closed THEN VENT Nitrogen pressure with IA-1009 (PCV-1135 Instrument Air Control Panel Vent).

4.11.5 RESTORE PCV-1135, (STM Gen 22 Atmospheric Dump) alignment for normal operation as follows:

4.11.5.1 IF Back-up N_2 bottle is aligned, THEN RESTORE as follows:

- CLOSE N_2 bottle isolation.
- CLOSE N-853, Secondary N2 Bottle Supply Stop (downstream of bottle regulator).
- CLOSE SGN-501, (PCV-1135 Local Control Station Nitrogen Supply Stop).
- DISCONNECT quick disconnect.

4.11.5.2 CLOSE SGN-501, (PCV-1135 Local Control Station Nitrogen Supply Stop).

4.11.5.3 OPEN IA-1009, (PCV-1135 Instrument Air Control Panel Vent).

4.11.5.4 OPEN IA-1203, (PCV-1135 Positioner Instrument Air Stop).

4.11.5.5 CLOSE SGN-509 (Nitrogen Stop Valve to PCV-1135 Diaphragm).

4.11.5.6 CLOSE IA-1009, (PCV-1135 Instrument Air Control Panel Vent).

4.11.5.7 OPEN SGN-520, Primary N2 Supply Isolation.

4.11.6 ALIGN PCV-1136, (STM Gen 23 Atmospheric Dump) for local operation as follows:

4.11.6.1 VERIFY MS-3C, (PCV-1136 Inlet Stop Main Stm Line 23) OPEN.

4.11.6.2 CLOSE IA-1204, (PCV-1136 Positioner Instrument Air Stop).

4.11.6.3 VERIFY PRV-5612, (Nitrogen Regulator to PCV-1136) is BACKED OUT FULLY. (Counter-clockwise)

4.11.6.4 OPEN SGN-502, (PCV-1136 Local Control Station Nitrogen Supply Stop).

4.11.6.5 SLOWLY OPEN SGN-510 (Nitrogen Stop Valve to PCV-1136 Diaphragm).

4.11.6.6 CLOSE IA-1010, (PCV-1136 Nitrogen Supply Vent Stop).

4.11.6.7 IF Back-up N_2 is required,
THEN CONNECT back-up N_2 bottle as follows:

- CLOSE SGN-521, Primary N2 Supply Isolation
- CONNECT quick disconnect AND OPEN N2 bottle isolation
- OPEN N-851, Secondary N2 Bottle Supply Stop (downstream of bottle regulator)
- CHECK N_2 bottle regulator set to 85 psig

CAUTION

Use of valve IA-1010 (PCV-1136 Instrument Air Control Panel Vent) to throttle closed the atmospheric should be minimized to preserve N_2 supply. Valve IA-1010 should NOT be left open to maintain pressure.

4.11.6.8 OPEN/THROTTLE/CLOSE PCV-1136, (STM Gen 23 Atmospheric Dump) as follows:

- THROTTLE in OPEN direction by slowly increasing (clockwise) Nitrogen pressure using PRV-5612, (Nitrogen Regulator to PCV-1136)
- THROTTLE in CLOSED direction by decreasing (counter clockwise) Nitrogen pressure using PRV-5612, (Nitrogen Regulator to PCV-1136)
- IF necessary to assist in throttling Closed THEN VENT Nitrogen pressure with IA-1010 (PCV-1136 Instrument Air Control Panel Vent)

4.11.7 RESTORE PCV-1136, (STM Gen 23 Atmospheric Dump) alignment for normal operation as follows:

4.11.7.1 IF Back-up N2 bottle is aligned, THEN RESTORE as follows:

- CLOSE N2 bottle isolation
- CLOSE N-851, Secondary N2 Bottle Supply Stop (downstream of bottle regulator)
- CLOSE SGN-502, (PCV-1136 Local Control Station Nitrogen Supply Stop)
- DISCONNECT quick disconnect

4.11.7.2 CLOSE SGN-502, (PCV-1136 Local Control Station Nitrogen Supply Stop).

4.11.7.3 OPEN IA-1010, (PCV-1136 Nitrogen Supply Vent Stop).

4.11.7.4 OPEN IA-1204, (PCV-1136 Positioner Instrument Air Stop).

4.11.7.5 CLOSE SGN-510 (Nitrogen Stop Valve to PCV-1136 Diaphragm).

4.11.7.6 CLOSE IA-1010, (PCV-1136 Nitrogen Supply Vent Stop).

4.11.7.7 OPEN SGN-521, Primary N2 Supply Isolation.

4.11.8 ALIGN PCV-1137, (STM Gen 24 Atmospheric Dump).for local operation as follows:

4.11.8.1 VERIFY MS-3D, (PCV-1137 Inlet Stop Main Stm Line 24) OPEN.

4.11.8.2 CLOSE IA-1205, (PCV-1137 Positioner Instrument Air Stop).

4.11.8.3 VERIFY PRV-5614, (Nitrogen Regulator Valve to PCV-1137) is BACKED OUT FULLY (counter-clockwise).

4.11.8.4 OPEN SGN-503 (PCV-1137 Local Control Station Nitrogen Supply Stop).

4.11.8.5 SLOWLY OPEN SGN-511, (Nitrogen Stop Valve to PCV-1137 Diaphragm).

4.11.8.6 CLOSE IA-1011 (PCV-1137 Nitrogen Supply Vent Stop).

4.11.8.7 IF Back-up N_2 is required,
THEN CONNECT back-up N_2 bottle as follows:

- CLOSE SGN-521, Primary N2 Supply Isolation.
- CONNECT quick disconnect AND OPEN N_2 bottle isolation.
- OPEN N-851, Secondary N2 Bottle Supply Stop (downstream of bottle regulator).
- CHECK N_2 bottle regulator set to 85 psig.

CAUTION

Use of valve IA-1011 (PCV-1137 Instrument Air Control Panel Vent) to throttle closed the atmospheric should be minimized to preserve N_2 supply. Valve IA-1011 should NOT be left open to maintain pressure.

4.11.8.8 OPEN/THROTTLE/CLOSE PCV-1137, (STM Gen 24 Atmospheric Dump) as follows:

- THROTTLE in OPEN direction by slowly increasing (clockwise) Nitrogen pressure using PRV-5614, (Nitrogen Regulator Valve to PCV-1137)
- THROTTLE in CLOSED direction by decreasing (counter clockwise) Nitrogen pressure using PRV-5614, (Nitrogen Regulator Valve to PCV-1137)
- IF necessary to assist in throttling Closed THEN VENT Nitrogen pressure with IA-1011 (PCV-1137 (Instrument Air Control Panel Vent)

4.11.9 RESTORE PCV-1137, (STM Gen 24 Atmospheric Dump) alignment for normal operation as follows:

4.11.9.1 IF Back-up N2 bottle is aligned, RESTORE as follows:

- CLOSE N2 bottle isolation.
- CLOSE N-851, Secondary N2 Bottle Supply Stop (downstream of bottle regulator).
- CLOSE SGN-503, (PCV-1137 Local Control Station Nitrogen Supply Stop).
- DISCONNECT quick disconnect.

4.11.9.2 CLOSE SGN-503 (PCV-1137 Local Control Station Nitrogen Supply Stop).

4.11.9.3 OPEN IA-1011 (PCV-1137 Nitrogen Supply Vent Stop).

4.11.9.4 OPEN IA-1205, (PCV-1137 Positioner Instrument Air Stop).

4.11.9.5 CLOSE SGN-511, (Nitrogen Stop Valve to PCV-1137 Diaphragm).

4.11.9.6 CLOSE IA-1011 (PCV-1137 Nitrogen Supply Vent Stop).

4.11.9.7 OPEN SGN-521, Primary N2 Supply Isolation.

4.12 CCR Atmospheric Steam Dumps (ATMOs) Operation using Backup N_2 Bottles (Reference 5.2.8.)

NOTE

- Normally only one nitrogen bottle is aligned for service at the PCV-1134/PCV-1135 (OR at PCV-1136/PCV-1137) control station at a time except when swapping bottles.
- After aligning Nitrogen bottle(s) to the ATMOs, monitor N_2 bottle pressure as necessary to ensure adequate volume to allow continuous ATMOs operation AND to place spare N_2 bottle in service when pressure in the in service bottle reaches 500 psig. Replace the N_2 bottle removed from service as necessary, since ATMOs fail CLOSED.

4.12.1 To ALIGN a specific Atmospheric Steam Dump (ATMOs) GO TO:

- Step 4.12.2 for 21 ATMO
- Step 4.12.4 for 22 ATMO
- Step 4.12.6 for 23 ATMO
- Step 4.12.8 for 24 ATMO

4.12.2 IF PCV-1134 (21 ATMO) needs to be operated from the CCR THEN ALIGN backup N_2 Bottle Supply as follows:

4.12.2.1 VERIFY MS-3A, (PCV-1134 Inlet Stop Main Steam Line 21) is OPEN.

4.12.2.2 CONNECT both Nitrogen bottle quick disconnects to the fittings upstream of SGN-522 / SGN-524.

4.12.2.3 OPEN both Nitrogen bottles isolation valves.

4.12.2.4 OPEN one of the following valves:

- N-853, Secondary Nitrogen Bottle Supply Stop to PCV-1134/PCV-1135 Panel
- N-855, Secondary Nitrogen Bottle Supply Stop to PCV-1134/PCV-1135 Panel

4.12.2.5 VERIFY both of the following regulators are set for 85 psig.

a) N-850, Secondary N2 Bottle Supply Reg to PCV-1134/PCV-1135 Panel.

b) N-854, Secondary N2 Bottle Supply Reg to PCV-1134/PCV-1135 Panel.

4.12.2.6 CLOSE IA-806, 21 S/G ATMO Relief PCV-1134 IA Stop.

4.12.2.7 OPEN SGN-522, CCR Remote Backup Nitrogen Inlet Stop to 21 ATMO.

4.12.2.8 NOTIFY CCR, N_2 Bottle Supply is aligned to PCV-1134 (21 SG ATMO).

4.12.2.9 CCR operator to POSITION PCV-1134 (21 SG ATMO) as directed.

4.12.2.10 NPO to MONITOR bottle pressure AND SWAP to alternate bottle per step 4.12.10 when pressure reaches 500 psig.

4.12.3 IF PCV-1134, (21 ATMO) needs to be removed from N_2 backup operation, THEN PERFORM the following:

4.12.3.1 OPEN IA-806, 21 S/G ATMO Relief PCV-1134 IA Stop.

4.12.3.2 CLOSE SGN-522, CCR Remote Backup Nitrogen Inlet Stop (21 ATMO).

4.12.3.3 NOTIFY CCR; PCV-1134 (21 ATMO) N_2 Bottle Supply is isolated AND Instrument Air has been restored.

4.12.3.4 IF nitrogen is NOT needed for PCV-1135 (22 ATMO) THEN PERFORM the following:

a) CLOSE both Nitrogen bottles isolation valves.

b) VERIFY the following are FULLY BACKED OUT:

1) N-850, Secondary N2 Bottle Supply Reg to PCV-1134/PCV-1135 Panel.

2) N-854, Secondary N2 Bottle Supply Reg to PCV-1134/PCV-1135 Panel.

c) Carefully DISCONNECT both quick disconnects AND INSTALL the dust covers.

d) VERIFY the following valves are Closed:

1) N-853, Secondary Nitrogen Bottle Supply Stop to PCV-1134/PCV-1135 Panel.

2) N-855, Secondary Nitrogen Bottle Supply Stop to PCV-1134/PCV-1135 Panel.

4.12.4 IF PCV-1135, (22 ATMO) needs to be operated from the CCR THEN ALIGN backup N_2 Bottle Supply as follows:

4.12.4.1 VERIFY MS-3B, (PCV-1135 Inlet Stop Main Steam Line 22) is OPEN.

4.12.4.2 CONNECT both nitrogen bottle quick disconnects to the fittings upstream of SGN-522 / SGN-524.

4.12.4.3 OPEN both Nitrogen bottles isolation valves.

4.12.4.4 OPEN one of the following valves:

- N-853, Secondary Nitrogen Bottle Supply Stop to PCV-1134/PCV-1135 Panel.
- N-855, Secondary Nitrogen Bottle Supply Stop to PCV-1134/PCV-1135 Panel.

4.12.4.5 VERIFY both of the following regulators are set for 85 psig.

a) N-850, Secondary N2 Bottle Supply Reg to PCV-1134/PCV-1135 Panel.

b) N-854, Secondary N2 Bottle Supply Reg to PCV-1134/PCV-1135 Panel.

4.12.4.6 CLOSE IA-807, 22 S/G ATMO Relief PCV-1135 IA Stop.

4.12.4.7 OPEN SGN-524, CCR Remote Backup Nitrogen Inlet Stop to 22 ATMO.

4.12.4.8 NOTIFY CCR, N_2 Bottle Supply is aligned to PCV-1135 (22 ATMO).

4.12.4.9 CCR operator to POSITION PCV-1135 (22 ATMO) as directed.

4.12.4.10 NPO to MONITOR bottle pressure AND SWAP to alternate bottle per step 4.12.10 when pressure reaches 500 psig.

4.12.5 IF PCV-1135, (22 ATMO) needs to be removed from N_2 backup operation, THEN PERFORM the following:

4.12.5.1 OPEN IA-807, 22 S/G ATMOS Relief PCV-1135 IA Stop.

4.12.5.2 CLOSE SGN-524, CCR Remote Backup Nitrogen Inlet Stop (22 ATMO).

4.12.5.3 NOTIFY CCR; PCV-1135 (22 ATMO) N_2 Bottle Supply is isolated AND Instrument Air has been restored.

4.12.5.4 IF nitrogen is NOT needed for PCV-1134 (21 ATMO) THEN PERFORM the following:

a) CLOSE both Nitrogen bottles isolation valves.

b) VERIFY the following are FULLY BACKED OUT.

1) N-850, Secondary N2 Bottle Supply Reg to PCV-1134/PCV-1135 Panel.

2) N-854, Secondary N2 Bottle Supply Reg to PCV-1134/PCV-1135 Panel.

c) Carefully DISCONNECT both quick disconnects AND INSTALL the dust covers.

d) VERIFY the following valves are Closed:

1) N-853, Secondary Nitrogen Bottle Supply Stop to PCV-1134/PCV-1135 Panel.

2) N-855, Secondary Nitrogen Bottle Supply Stop to PCV-1134/PCV-1135 Panel.

4.12.6 IF PCV-1136, (23 ATMO) needs to be operated from the CCR, THEN ALIGN backup N_2 Bottle Supply as follows:

4.12.6.1 VERIFY MS-3C, (PCV-1136 Inlet Stop Main Steam Line 23) is OPEN.

4.12.6.2 CONNECT both Nitrogen bottle quick disconnects to the fittings upstream of SGN-526 / SGN-528.

4.12.6.3 OPEN both Nitrogen bottles isolation valves.

4.12.6.4 OPEN one of the following valves:

- N-851, Secondary Nitrogen Bottle Supply Stop to PCV-1136/PCV-1137 Panel
- N-857, Secondary Nitrogen Bottle Supply Stop to PCV-1136/PCV-1137 Panel

4.12.6.5 VERIFY both of the following regulators are set for 85 psig.

a) N-852, Secondary N2 Bottle Supply Reg to PCV-1136/PCV-1137 Panel.

b) N-856, Secondary N2 Bottle Supply Reg to PCV-1136/PCV-1137 Panel.

4.12.6.6 CLOSE IA-808, 23 S/G ATMOS Relief PCV-1135 IA Stop.

4.12.6.7 OPEN SGN-526, CCR Remote Backup Nitrogen Inlet Stop to 23 ATMO.

4.12.6.8 NOTIFY CCR, N_2 Bottle Supply is aligned to PCV-1136 (23 ATMO).

4.12.6.9 CCR operator to POSITION PCV-1136 (23 SG ATMO) as directed.

4.12.6.10 NPO to MONITOR bottle pressure AND SWAP to alternate bottle per step 4.12.10 when pressure reaches 500 psig.

4.12.7 IF PCV-1136, (23 ATMO) needs to be removed from N_2 Backup operation, THEN PERFORM the following:

4.12.7.1 OPEN IA-808, 23 S/G ATMOS Relief PCV-1136 IA Stop.

4.12.7.2 CLOSE SGN-526, CCR Remote Backup Nitrogen Inlet Stop (23 ATMO).

4.12.7.3 NOTIFY CCR; PCV-1136 (23 ATMO) N_2 Bottle Supply is isolated AND Instrument Air has been restored.

4.12.7.4 IF nitrogen is NOT needed for PCV-1137 (24 ATMO) THEN PERFORM the following:

a) CLOSE both Nitrogen bottles isolation valves.

b) VERIFY the following are FULLY BACKED OUT.

1) N-852, Secondary N2 Bottle Supply Reg to PCV-1136/PCV-1137 Panel

2) N-856, Secondary N2 Bottle Supply Reg to PCV-1136/PCV-1137 Panel

c) Carefully DISCONNECT both quick disconnects AND INSTALL the dust covers.

d) VERIFY the following are Closed:

1) N-851, Secondary Nitrogen Bottle Supply Stop to PCV-1136/PCV-1137 Panel.

2) N-857, Secondary Nitrogen Bottle Supply Stop to PCV-1136/PCV-1137 Panel.

4.12.8 IF PCV-1137 (24 ATMO) needs to be operated from the CCR, THEN ALIGN backup N_2 Bottle Supply as follows:

4.12.8.1 VERIFY MS-3D, (PCV-1137 Inlet Stop Main Steam Line 24) is OPEN.

4.12.8.2 CONNECT both Nitrogen bottle quick disconnects to the fittings upstream of SGN-526 / SGN-528.

4.12.8.3 OPEN both Nitrogen bottles isolation valves.

4.12.8.4 OPEN one of the following valves:

- N-851, Secondary Nitrogen Bottle Supply Stop to PCV-1136/PCV-1137 Panel
- N-857, Secondary Nitrogen Bottle Supply Stop to PCV-1136/PCV-1137 Panel

4.12.8.5 VERIFY both of the following regulators are set for 85 psig.

a) N-852, Secondary N2 Bottle Supply Reg to PCV-1136/PCV-1137 Panel.

b) N-856, Secondary N2 Bottle Supply Reg to PCV-1136/PCV-1137 Panel.

4.12.8.6 CLOSE IA-809, 24 S/G ATMO Relief PCV-1137 IA Stop.

4.12.8.7 OPEN SGN-528, CCR Remote Backup Nitrogen Inlet Stop to 24 ATMO.

4.12.8.8 NOTIFY CCR, N_2 Bottle Supply is aligned to PCV-1137 (24 ATMO).

4.12.8.9 CCR operator to POSITION PCV-1137 (24 ATMO) as directed.

4.12.8.10 NPO to MONITOR bottle pressure AND SWAP to alternate bottle per step 4.12.10 when pressure reaches 500 psig.

4.12.9 IF PCV-1137 (24 ATMO) needs to be removed from N_2 backup operation, THEN PERFORM the following:

4.12.9.1 OPEN IA-809, 24 S/G ATMOS Relief PCV-1137 IA Stop.

4.12.9.2 CLOSE SGN-528, CCR Remote Backup Nitrogen Inlet Stop (24 ATMO).

4.12.9.3 NOTIFY CCR; PCV-1137 (24 ATMO) N_2 Bottle Supply is isolated AND Instrument Air has been restored.

4.12.9.4 IF nitrogen is NOT needed for PCV-1136 (23 ATMO) THEN PERFORM the following:

a) CLOSE both Nitrogen bottles isolation valves.

b) VERIFY the following are FULLY BACKED OUT.

1) N-852, Secondary N2 Bottle Supply Reg to PCV-1136/PCV-1137 Panel.

2) N-856, Secondary N2 Bottle Supply Reg to PCV-1136/PCV-1137 Panel.

c) Carefully DISCONNECT both quick disconnects AND INSTALL the dust covers.

d) VERIFY the following are Closed:

1) N-851, Secondary Nitrogen Bottle Supply Stop to PCV-1136/PCV-1137 Panel.

2) N-857, Secondary Nitrogen Bottle Supply Stop to PCV-1136/PCV-1137 Panel

4.12.10 WHEN pressure in a backup nitrogen bottle is 500 psig THEN SWAP applicable nitrogen bottles as follows:

4.12.10.1 OPEN the following to place a spare N_2 Bottle in service:

a) N-851, Secondary Nitrogen Bottle Supply Stop to PCV-1136/PCV-1137 Panel.

b) N-853, Secondary Nitrogen Bottle Supply Stop to PCV-1134/PCV-1135 Panel.

c) N-855, Secondary Nitrogen Bottle Supply Stop to PCV-1134/PCV-1135 Panel.

d) N-857, Secondary Nitrogen Bottle Supply Stop to PCV-1136/PCV-1137 Panel.

4.12.10.2 CLOSE the applicable valves for the N_2 Bottle with the low pressure:

a) N-851, Secondary Nitrogen Bottle Supply Stop to PCV-1136/PCV-1137 Panel.

b) N-853, Secondary Nitrogen Bottle Supply Stop to PCV-1134/PCV-1135 Panel.

c) N-855, Secondary Nitrogen Bottle Supply Stop to PCV-1134/PCV-1135 Panel.

d) N-857, Secondary Nitrogen Bottle Supply Stop to PCV-1136/PCV-1137 Panel.

4.12.10.3 CLOSE the isolation valve on the nitrogen bottle removed from service

4.12.10.4 REMOVE the regulator, valve and hose assembly from the bottle and remove the bottle.

4.12.10.5 INSTALL a new nitrogen bottle AND RE-INSTALLL the regulator, valve and hose assembly.

4.12.10.6 OPEN the nitrogen bottle isolation valve.

Entergy

Nuclear Northeast

One Site, One Team, One Fleet

Indian Point Energy Center

Procedure Use Is:

☑ Continuous

☐ Reference

☐ Information

Control Copy: ___________

Effective Date: 1/24/2013

2-SOP-ESP-001, Revision: 9

LOCAL EQUIPMENT OPERATION AND CONTINGENCY ACTIONS

Indian Point Operations

Approved By:

John Balletta / [signature] / 1/17/13

RPO or Designee: **Print Name / Sign / Date**

Team 2A

Procedure Owner

EDITORIAL REVISION

REVISION SUMMARY
(Page 1 of 1)

1.0 REASON FOR REVISION

1.1 Incorporate feedback IP2-10845.

2.0 SUMMARY OF CHANGES

2.1 Deleted Hydrant #18 from Step 4.49.2. This hydrant has been removed from service via EC-11314. **[Editorial 4.6.12]**

2.2 Formatted per IP-SMM-AD-104. **[Editorial 4.6.14]**

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4.11 Operate Atmospheric Steam Dumps

CAUTION

- 21 and 22 steam generators (SGs) have reliable backup wide range level indication at the Safe Shutdown Panel. If 23 or 24 SG level indication is suspected of being degraded (Example: due to fire or electrical fault, etc.) then 23 or 24 SGs should NOT be steamed unless both 21 AND 22 SGs are unavailable.
- If SG differential pressure between SGs is greater than 155 psid, then a Safety Injection signal will be initiated.

NOTE

Nitrogen header is supplied from bottles located next to the auxiliary feedwater regulating valves or from backup N_2 bottles via quick disconnects located at the Atmospheric local control panels .

4.11.1 To align SG Atmospheric Dump Valve for a specific SG GO TO:

- 21 SG step 4.11.2
- 22 SG step 4.11.4
- 23 SG step 4.11.6
- 24 SG step 4.11.8

4.11.2 ALIGN PCV-1134, (STM Gen 21 Atmospheric Dump) for local operation as follows:

4.11.2.1 VERIFY MS-3A, (PCV-1134 Inlet Stop Main Stm Line 21) OPEN.

4.11.2.2 CLOSE IA-1202, (PCV-1134 Positioner Instrument Air Stop).

4.11.2.3 VERIFY PRV-5608 (Nitrogen Regulator to PCV-1134) is BACKED OUT FULLY (counter-clockwise).

4.11.2.4 OPEN SGN-500 (PCV-1134 Local Control Station Nitrogen Supply Stop).

4.11.2.5 SLOWLY OPEN SGN-508 (Nitrogen Stop Valve to PCV-1134 Diaphragm).

4.11.2.6 CLOSE IA-1008, (PCV-1134 Instrument Air Control Panel Vent).

4.11.2.7 IF Back-up N_2 is required, CONNECT back-up N_2 bottle as follows:

- CLOSE SGN-520, Primary N_2 Supply Isolation.
- CONNECT quick disconnect AND OPEN N_2 bottle isolation.
- OPEN N-853, Secondary N_2 Bottle Supply Stop (downstream of bottle regulator).
- CHECK N_2 bottle regulator set to 85 psig.

CAUTION

Use of valve IA-1008 (PCV-1134 Instrument Air Control Panel Vent) to THROTTLE CLOSED the atmospheric should be minimized to preserve N_2 supply. Valve IA-1008 should not be left open to maintain pressure.

4.11.2.8 OPEN/THROTTLE/CLOSE PCV-1134 (STM Gen 21 Atmospheric Dump) as follows:

- THROTTLE in OPEN direction by slowly increasing(clockwise) Nitrogen pressure using PRV-5608 (Nitrogen Regulator to PCV-1134)
- THROTTLE in CLOSE direction by decreasing (counter clockwise) Nitrogen pressure using PRV-5608 (Nitrogen Regulator to PCV-1134)
- IF necessary to assist in THROTTLING CLOSED THEN VENT Nitrogen pressure with IA-1008 (PCV-1134, Instrument Air Control Panel Vent).

4.11.3 RESTORE PCV-1134, (STM Gen 21 Atmospheric Dump) alignment for normal operation as follows:

4.11.3.1 IF Back-up N_2 bottle is aligned, THEN RESTORE as follows:

- CLOSE N_2 bottle isolation
- CLOSE N-853, Secondary N_2 Bottle Supply Stop (downstream of bottle regulator)
- CLOSE SGN-500, (PCV-1134 Local Control Station Nitrogen Supply Stop)
- DISCONNECT quick disconnect

4.11.3.2 CLOSE SGN-500, (PCV-1134 Local Control Station Nitrogen Supply Stop).

4.11.3.3 OPEN IA-1008, (PCV-1134 Instrument Air Control Panel Vent).

4.11.3.4 OPEN IA-1202, (PCV-1134 Positioner Instrument Air Stop).

4.11.3.5 CLOSE SGN-508, (Nitrogen Stop Valve to PCV-1134 Diaphragm).

4.11.3.6 CLOSE IA-1008, (PCV-1134 Instrument Air Control Panel Vent).

4.11.3.7 OPEN SGN-520, Primary N_2 Supply Isolation.

4.11.4 ALIGN PCV-1135, (STM Gen 22 Atmospheric Dump) for local operation as follows:

4.11.4.1 VERIFY MS-3B, (PCV-1135 Inlet Stop Main Stm Line 22) OPEN.

4.11.4.2 CLOSE IA-1203, (PCV-1135 Positioner Instrument Air Stop).

4.11.4.3 VERIFY PRV-5610 (Nitrogen Regulator to PCV-1135) is BACKED OUT FULLY (counter-clockwise).

4.11.4.4 OPEN SGN-501, (PCV-1135 Local Control Station Nitrogen Supply Stop).

4.11.4.5 SLOWLY OPEN SGN-509 (Nitrogen Stop Valve to PCV-1135 Diaphragm).

4.11.4.6 CLOSE IA-1009, (PCV-1135 Instrument Air Control Panel Vent).

4.11.4.7 IF Back-up N_2 is required,
THEN CONNECT back-up N_2 bottle as follows:

- CLOSE SGN-520, Primary N_2 Supply Isolation.
- CONNECT quick disconnect
  AND OPEN N_2 bottle isolation.
- OPEN N-853, Secondary N_2 Bottle Supply Stop (downstream of bottle regulator).
- CHECK N_2 bottle regulator set to 85 psig.

CAUTION

Use of valve IA-1009 (PCV-1135 Instrument Air Control Panel Vent) to throttle closed the atmospheric should be minimized to preserve N_2 supply. Valve IA-1009 should NOT be left open to maintain pressure.

4.11.4.8 OPEN/THROTTLE/CLOSE PCV-1135 (STM Gen 22 Atmospheric Dump) as follows:

- THROTTLE in OPEN direction by SLOWLY INCREASING (clockwise) Nitrogen pressure using PRV-5610, (Nitrogen Regulator to PCV-1135).
- THROTTLE in CLOSED direction by decreasing (counter clockwise) Nitrogen pressure using PRV-5610 (Nitrogen Regulator to PCV-1135)
- IF necessary to assist in THROTTLING CLOSED THEN VENT Nitrogen pressure with IA-1009 (PCV-1135 Instrument Air Control Panel Vent).

4.11.5 RESTORE PCV-1135, (STM Gen 22 Atmospheric Dump) alignment for normal operation as follows:

4.11.5.1 IF Back-up N_2 bottle is aligned, THEN RESTORE as follows:

- CLOSE N_2 bottle isolation.
- CLOSE N-853, Secondary N_2 Bottle Supply Stop (downstream of bottle regulator).
- CLOSE SGN-501, (PCV-1135 Local Control Station Nitrogen Supply Stop).
- DISCONNECT quick disconnect.

4.11.5.2 CLOSE SGN-501, (PCV-1135 Local Control Station Nitrogen Supply Stop).

4.11.5.3 OPEN IA-1009, (PCV-1135 Instrument Air Control Panel Vent).

4.11.5.4 OPEN IA-1203, (PCV-1135 Positioner Instrument Air Stop).

4.11.5.5 CLOSE SGN-509 (Nitrogen Stop Valve to PCV-1135 Diaphragm).

4.11.5.6 CLOSE IA-1009, (PCV-1135 Instrument Air Control Panel Vent).

4.11.5.7 OPEN SGN-520, Primary N_2 Supply Isolation.

4.11.6 ALIGN PCV-1136, (STM Gen 23 Atmospheric Dump) for local operation as follows:

4.11.6.1 VERIFY MS-3C, (PCV-1136 Inlet Stop Main Stm Line 23) OPEN.

4.11.6.2 CLOSE IA-1204, (PCV-1136 Positioner Instrument Air Stop).

4.11.6.3 VERIFY PRV-5612, (Nitrogen Regulator to PCV-1136) is BACKED OUT FULLY. (Counter-clockwise)

4.11.6.4 OPEN SGN-502, (PCV-1136 Local Control Station Nitrogen Supply Stop).

4.11.6.5 SLOWLY OPEN SGN-510 (Nitrogen Stop Valve to PCV-1136 Diaphragm).

4.11.6.6 CLOSE IA-1010, (PCV-1136 Nitrogen Supply Vent Stop).

4.11.6.7 IF Back-up N_2 is required,
THEN CONNECT back-up N_2 bottle as follows:

- CLOSE SGN-521, Primary N_2 Supply Isolation
- CONNECT quick disconnect AND OPEN N_2 bottle isolation
- OPEN N-851, Secondary N_2 Bottle Supply Stop (downstream of bottle regulator)
- CHECK N_2 bottle regulator set to 85 psig

CAUTION

Use of valve IA-1010 (PCV-1136 Instrument Air Control Panel Vent) to throttle closed the atmospheric should be minimized to preserve N_2 supply. Valve IA-1010 should NOT be left open to maintain pressure.

4.11.6.8 OPEN/THROTTLE/CLOSE PCV-1136, (STM Gen 23 Atmospheric Dump) as follows:

- THROTTLE in OPEN direction by slowly increasing (clockwise) Nitrogen pressure using PRV-5612, (Nitrogen Regulator to PCV-1136)
- THROTTLE in CLOSED direction by decreasing (counter clockwise) Nitrogen pressure using PRV-5612, (Nitrogen Regulator to PCV-1136)
- IF necessary to assist in THROTTLING CLOSED THEN VENT Nitrogen pressure with IA-1010 (PCV-1136 Instrument Air Control Panel Vent)

4.11.7 RESTORE PCV-1136, (STM Gen 23 Atmospheric Dump) alignment for normal operation as follows:

4.11.7.1 IF Back-up N_2 bottle is aligned, THEN RESTORE as follows:

- CLOSE N_2 bottle isolation
- CLOSE N-851, Secondary N_2 Bottle Supply Stop (downstream of bottle regulator)
- CLOSE SGN-502, (PCV-1136 Local Control Station Nitrogen Supply Stop)
- DISCONNECT quick disconnect

4.11.7.2 CLOSE SGN-502, (PCV-1136 Local Control Station Nitrogen Supply Stop).

4.11.7.3 OPEN IA-1010, (PCV-1136 Nitrogen Supply Vent Stop).

4.11.7.4 OPEN IA-1204, (PCV-1136 Positioner Instrument Air Stop).

4.11.7.5 CLOSE SGN-510 (Nitrogen Stop Valve to PCV-1136 Diaphragm).

4.11.7.6 CLOSE IA-1010, (PCV-1136 Nitrogen Supply Vent Stop).

4.11.7.7 OPEN SGN-521, Primary N_2 Supply Isolation.

4.11.8 ALIGN PCV-1137, (STM Gen 24 Atmospheric Dump).for local operation as follows:

4.11.8.1 VERIFY MS-3D, (PCV-1137 Inlet Stop Main Stm Line 24) OPEN.

4.11.8.2 CLOSE IA-1205, (PCV-1137 Positioner Instrument Air Stop).

4.11.8.3 VERIFY PRV-5614, (Nitrogen Regulator Valve to PCV-1137) is BACKED OUT FULLY (counter-clockwise).

4.11.8.4 OPEN SGN-503 (PCV-1137 Local Control Station Nitrogen Supply Stop).

4.11.8.5 SLOWLY OPEN SGN-511, (Nitrogen Stop Valve to PCV-1137 Diaphragm).

4.11.8.6 CLOSE IA-1011 (PCV-1137 Nitrogen Supply Vent Stop).

4.11.8.7 IF Back-up N_2 is required,
THEN CONNECT back-up N_2 bottle as follows:

- CLOSE SGN-521, Primary N_2 Supply Isolation.
- CONNECT quick disconnect AND OPEN N_2 bottle isolation.
- OPEN N-851, Secondary N_2 Bottle Supply Stop (downstream of bottle regulator).
- CHECK N_2 bottle regulator set to 85 psig.

CAUTION

Use of valve IA-1011 (PCV-1137 Instrument Air Control Panel Vent) to throttle closed the atmospheric should be minimized to preserve N_2 supply. Valve IA-1011 should NOT be left open to maintain pressure.

4.11.8.8 OPEN/THROTTLE/CLOSE PCV-1137, (STM Gen 24 Atmospheric Dump) as follows:

- THROTTLE in OPEN direction by slowly increasing (clockwise) Nitrogen pressure using PRV-5614, (Nitrogen Regulator Valve to PCV-1137)
- THROTTLE in CLOSED direction by decreasing (counter clockwise) Nitrogen pressure using PRV-5614, (Nitrogen Regulator Valve to PCV-1137)
- IF necessary to assist in throttling Closed THEN VENT Nitrogen pressure with IA-1011 (PCV-1137 (Instrument Air Control Panel Vent)

4.11.9 RESTORE PCV-1137, (STM Gen 24 Atmospheric Dump) alignment for normal operation as follows:

4.11.9.1 IF Back-up N_2 bottle is aligned, THEN RESTORE as follows:

- CLOSE N_2 bottle isolation.
- CLOSE N-851, Secondary N_2 Bottle Supply Stop (downstream of bottle regulator).
- CLOSE SGN-503, (PCV-1137 Local Control Station Nitrogen Supply Stop).
- DISCONNECT quick disconnect.

4.11.9.2 CLOSE SGN-503 (PCV-1137 Local Control Station Nitrogen Supply Stop).

4.11.9.3 OPEN IA-1011 (PCV-1137 Nitrogen Supply Vent Stop).

4.11.9.4 OPEN IA-1205, (PCV-1137 Positioner Instrument Air Stop).

4.11.9.5 CLOSE SGN-511, (Nitrogen Stop Valve to PCV-1137 Diaphragm).

4.11.9.6 CLOSE IA-1011 (PCV-1137 Nitrogen Supply Vent Stop).

4.11.9.7 OPEN SGN-521, Primary N_2 Supply Isolation.

4.12 CCR Atmospheric Steam Dumps (ATMOs) Operation using Backup N_2 Bottles (Reference 5.2.8.)

NOTE

- Normally only one nitrogen bottle is aligned for service at the PCV-1134/PCV-1135 (OR at PCV-1136/PCV-1137) control station at a time except when swapping bottles.
- After aligning Nitrogen bottle(s) to the ATMOs, monitor N_2 bottle pressure as necessary to ensure adequate volume to allow continuous ATMOs operation AND to place spare N_2 bottle in service when pressure in the in service bottle reaches 500 psig. Replace the N_2 bottle removed from service as necessary, since ATMOs fail CLOSED.

4.12.1 To ALIGN a specific Atmospheric Steam Dump (ATMOs) GO TO:

- Step 4.12.2 for 21 ATMO
- Step 4.12.4 for 22 ATMO
- Step 4.12.6 for 23 ATMO
- Step 4.12.8 for 24 ATMO

4.12.2 IF PCV-1134 (21 ATMO) needs to be operated from the CCR THEN ALIGN backup N_2 Bottle Supply as follows:

4.12.2.1 VERIFY MS-3A, (PCV-1134 Inlet Stop Main Steam Line 21) is OPEN.

4.12.2.2 CONNECT both Nitrogen bottle quick disconnects to the fittings upstream of SGN-522 / SGN-524.

4.12.2.3 OPEN both Nitrogen bottles isolation valves.

4.12.2.4 OPEN one of the following valves:

- N-853, Secondary Nitrogen Bottle Supply Stop to PCV-1134/PCV-1135 Panel
- N-855, Secondary Nitrogen Bottle Supply Stop to PCV-1134/PCV-1135 Panel

4.12.2.5 VERIFY both of the following regulators are set for 85 psig.

a) N-850, Secondary N_2 Bottle Supply Reg to PCV-1134/PCV-1135 Panel.

b) N-854, Secondary N_2 Bottle Supply Reg to PCV-1134/PCV-1135 Panel.

4.12.2.6 CLOSE IA-806, 21 S/G ATMO Relief PCV-1134 IA Stop.

4.12.2.7 OPEN SGN-522, CCR Remote Backup Nitrogen Inlet Stop to 21 ATMO.

4.12.2.8 NOTIFY CCR, N_2 Bottle Supply is aligned to PCV-1134 (21 SG ATMO).

4.12.2.9 CCR operator to POSITION PCV-1134 (21 SG ATMO) as directed.

4.12.2.10 NPO to MONITOR bottle pressure AND SWAP to alternate bottle per step 4.12.10 when pressure reaches 500 psig.

4.12.3 IF PCV-1134, (21 ATMO) needs to be removed from N_2 backup operation,
THEN PERFORM the following:

4.12.3.1 OPEN IA-806, 21 S/G ATMO Relief PCV-1134 IA Stop.

4.12.3.2 CLOSE SGN-522, CCR Remote Backup Nitrogen Inlet Stop (21 ATMO).

4.12.3.3 NOTIFY CCR; PCV-1134 (21 ATMO) N_2 Bottle Supply is isolated AND Instrument Air has been restored.

4.12.3.4 IF nitrogen is NOT needed for PCV-1135 (22 ATMO)
THEN PERFORM the following:

a) CLOSE both Nitrogen bottles isolation valves.

b) VERIFY the following are FULLY BACKED OUT:

1) N-850, Secondary N_2 Bottle Supply Reg to PCV-1134/PCV-1135 Panel.

2) N-854, Secondary N_2 Bottle Supply Reg to PCV-1134/PCV-1135 Panel.

c) CAREFULLY DISCONNECT both quick disconnects AND INSTALL the dust covers.

d) VERIFY the following valves are CLOSED:

1) N-853, Secondary Nitrogen Bottle Supply Stop to PCV-1134/PCV-1135 Panel.

2) N-855, Secondary Nitrogen Bottle Supply Stop to PCV-1134/PCV-1135 Panel.

4.12.4 IF PCV-1135, (22 ATMO) needs to be operated from the CCR THEN ALIGN backup N_2 Bottle Supply as follows:

4.12.4.1 VERIFY MS-3B, (PCV-1135 Inlet Stop Main Steam Line 22) is OPEN.

4.12.4.2 CONNECT both nitrogen bottle quick disconnects to the fittings upstream of SGN-522 / SGN-524.

4.12.4.3 OPEN both Nitrogen bottles isolation valves.

4.12.4.4 OPEN one of the following valves:

- N-853, Secondary Nitrogen Bottle Supply Stop to PCV-1134/PCV-1135 Panel.
- N-855, Secondary Nitrogen Bottle Supply Stop to PCV-1134/PCV-1135 Panel.

4.12.4.5 VERIFY both of the following regulators are set for 85 psig.

a) N-850, Secondary N_2 Bottle Supply Reg to PCV-1134/PCV-1135 Panel.

b) N-854, Secondary N_2 Bottle Supply Reg to PCV-1134/PCV-1135 Panel.

4.12.4.6 CLOSE IA-807, 22 S/G ATMO Relief PCV-1135 IA Stop.

4.12.4.7 OPEN SGN-524, CCR Remote Backup Nitrogen Inlet Stop to 22 ATMO.

4.12.4.8 NOTIFY CCR, N_2 Bottle Supply is aligned to PCV-1135 (22 ATMO).

4.12.4.9 CCR operator to POSITION PCV-1135 (22 ATMO) as directed.

4.12.4.10 NPO to MONITOR bottle pressure AND SWAP to alternate bottle per step 4.12.10 when pressure reaches 500 psig.

4.12.5 IF PCV-1135, (22 ATMO) needs to be removed from N_2 backup operation,
THEN PERFORM the following:

4.12.5.1 OPEN IA-807, 22 S/G ATMOS Relief PCV-1135 IA Stop.

4.12.5.2 CLOSE SGN-524, CCR Remote Backup Nitrogen Inlet Stop (22 ATMO).

4.12.5.3 NOTIFY CCR; PCV-1135 (22 ATMO) N_2 Bottle Supply is isolated AND Instrument Air has been restored.

4.12.5.4 IF nitrogen is NOT needed for PCV-1134 (21 ATMO)
THEN PERFORM the following:

a) CLOSE both Nitrogen bottles isolation valves.

b) VERIFY the following are FULLY BACKED OUT.

1) N-850, Secondary N_2 Bottle Supply Reg to PCV-1134/PCV-1135 Panel.

2) N-854, Secondary N_2 Bottle Supply Reg to PCV-1134/PCV-1135 Panel.

c) CAREFULLY DISCONNECT both quick disconnects AND INSTALL the dust covers.

d) VERIFY the following valves are CLOSED:

1) N-853, Secondary Nitrogen Bottle Supply Stop to PCV-1134/PCV-1135 Panel.

2) N-855, Secondary Nitrogen Bottle Supply Stop to PCV-1134/PCV-1135 Panel.

4.12.6 IF PCV-1136, (23 ATMO) needs to be operated from the CCR,
THEN ALIGN backup N_2 Bottle Supply as follows:

4.12.6.1 VERIFY MS-3C, (PCV-1136 Inlet Stop Main Steam Line 23) is OPEN.

4.12.6.2 CONNECT both Nitrogen bottle quick disconnects to the fittings upstream of SGN-526 / SGN-528.

4.12.6.3 OPEN both Nitrogen bottles isolation valves.

4.12.6.4 OPEN one of the following valves:

- N-851, Secondary Nitrogen Bottle Supply Stop to PCV-1136/PCV-1137 Panel
- N-857, Secondary Nitrogen Bottle Supply Stop to PCV-1136/PCV-1137 Panel

4.12.6.5 VERIFY both of the following regulators are set for 85 psig.

a) N-852, Secondary N_2 Bottle Supply Reg to PCV-1136/PCV-1137 Panel.

b) N-856, Secondary N_2 Bottle Supply Reg to PCV-1136/PCV-1137 Panel.

4.12.6.6 CLOSE IA-808, 23 S/G ATMOS Relief PCV-1135 IA Stop.

4.12.6.7 OPEN SGN-526, CCR Remote Backup Nitrogen Inlet Stop to 23 ATMO.

4.12.6.8 NOTIFY CCR, N_2 Bottle Supply is aligned to PCV-1136 (23 ATMO).

4.12.6.9 CCR operator to POSITION PCV-1136 (23 SG ATMO) as directed.

4.12.6.10 NPO to MONITOR bottle pressure AND SWAP to alternate bottle per step 4.12.10 when pressure reaches 500 psig.

4.12.7 IF PCV-1136, (23 ATMO) needs to be removed from N_2 Backup operation,
THEN PERFORM the following:

4.12.7.1 OPEN IA-808, 23 S/G ATMOS Relief PCV-1136 IA Stop.

4.12.7.2 CLOSE SGN-526, CCR Remote Backup Nitrogen Inlet Stop (23 ATMO).

4.12.7.3 NOTIFY CCR; PCV-1136 (23 ATMO) N_2 Bottle Supply is isolated AND Instrument Air has been restored.

4.12.7.4 IF nitrogen is NOT needed for PCV-1137 (24 ATMO) THEN PERFORM the following:

a) CLOSE both Nitrogen bottles isolation valves.

b) VERIFY the following are FULLY BACKED OUT.

1) N-852, Secondary N_2 Bottle Supply Reg to PCV-1136/PCV-1137 Panel

2) N-856, Secondary N_2 Bottle Supply Reg to PCV-1136/PCV-1137 Panel

c) CAREFULLY DISCONNECT both quick disconnects AND INSTALL the dust covers.

d) VERIFY the following are CLOSED:

1) N-851, Secondary Nitrogen Bottle Supply Stop to PCV-1136/PCV-1137 Panel.

2) N-857, Secondary Nitrogen Bottle Supply Stop to PCV-1136/PCV-1137 Panel.

4.12.8 IF PCV-1137 (24 ATMO) needs to be operated from the CCR, THEN ALIGN backup N_2 Bottle Supply as follows:

4.12.8.1 VERIFY MS-3D, (PCV-1137 Inlet Stop Main Steam Line 24) is OPEN.

4.12.8.2 CONNECT both Nitrogen bottle quick disconnects to the fittings upstream of SGN-526 / SGN-528.

4.12.8.3 OPEN both Nitrogen bottles isolation valves.

4.12.8.4 OPEN one of the following valves:

- N-851, Secondary Nitrogen Bottle Supply Stop to PCV-1136/PCV-1137 Panel
- N-857, Secondary Nitrogen Bottle Supply Stop to PCV-1136/PCV-1137 Panel

4.12.8.5 VERIFY both of the following regulators are set for 85 psig.

a) N-852, Secondary N_2 Bottle Supply Reg to PCV-1136/PCV-1137 Panel.

b) N-856, Secondary N_2 Bottle Supply Reg to PCV-1136/PCV-1137 Panel.

4.12.8.6 CLOSE IA-809, 24 S/G ATMO Relief PCV-1137 IA Stop.

4.12.8.7 OPEN SGN-528, CCR Remote Backup Nitrogen Inlet Stop to 24 ATMO.

4.12.8.8 NOTIFY CCR, N_2 Bottle Supply is aligned to PCV-1137 (24 ATMO).

4.12.8.9 CCR operator to POSITION PCV-1137 (24 ATMO) as directed.

4.12.8.10 NPO to MONITOR bottle pressure AND SWAP to alternate bottle per step 4.12.10 when pressure reaches 500 psig.

4.12.9 IF PCV-1137 (24 ATMO) needs to be removed from N_2 backup operation,
THEN PERFORM the following:

4.12.9.1 OPEN IA-809, 24 S/G ATMO Relief PCV-1137 IA Stop.

4.12.9.2 CLOSE SGN-528, CCR Remote Backup Nitrogen Inlet Stop (24 ATMO).

4.12.9.3 NOTIFY CCR; PCV-1137 (24 ATMO) N_2 Bottle Supply is isolated AND Instrument Air has been restored.

4.12.9.4 IF nitrogen is NOT needed for PCV-1136 (23 ATMO)
THEN PERFORM the following:

a) CLOSE both Nitrogen bottles isolation valves.

b) VERIFY the following are FULLY BACKED OUT.

1) N-852, Secondary N_2 Bottle Supply Reg to PCV-1136/PCV-1137 Panel.

2) N-856, Secondary N_2 Bottle Supply Reg to PCV-1136/PCV-1137 Panel.

c) CAREFULLY DISCONNECT both quick disconnects AND INSTALL the dust covers.

d) VERIFY the following are CLOSED:

1) N-851, Secondary Nitrogen Bottle Supply Stop to PCV-1136/PCV-1137 Panel.

2) N-857, Secondary Nitrogen Bottle Supply Stop to PCV-1136/PCV-1137 Panel

4.12.10 WHEN pressure in a backup nitrogen bottle is 500 psig THEN SWAP applicable nitrogen bottles as follows:

4.12.10.1 OPEN the following to place a spare N_2 Bottle in service:

a) N-851, Secondary Nitrogen Bottle Supply Stop to PCV-1136/PCV-1137 Panel.

b) N-853, Secondary Nitrogen Bottle Supply Stop to PCV-1134/PCV-1135 Panel.

c) N-855, Secondary Nitrogen Bottle Supply Stop to PCV-1134/PCV-1135 Panel.

d) N-857, Secondary Nitrogen Bottle Supply Stop to PCV-1136/PCV-1137 Panel.

4.12.10.2 CLOSE the applicable valves for the N_2 Bottle with the low pressure:

a) N-851, Secondary Nitrogen Bottle Supply Stop to PCV-1136/PCV-1137 Panel.

b) N-853, Secondary Nitrogen Bottle Supply Stop to PCV-1134/PCV-1135 Panel.

c) N-855, Secondary Nitrogen Bottle Supply Stop to PCV-1134/PCV-1135 Panel.

d) N-857, Secondary Nitrogen Bottle Supply Stop to PCV-1136/PCV-1137 Panel.

4.12.10.3 CLOSE the isolation valve on the nitrogen bottle removed from service

4.12.10.4 REMOVE the regulator, valve and hose assembly from the bottle and remove the bottle.

4.12.10.5 INSTALL a new nitrogen bottle AND RE-INSTALLL the regulator, valve and hose assembly.

4.12.10.6 OPEN the nitrogen bottle isolation valve.

Question: 21

Initial Conditions:

- A 20% load rejection from 100% has occurred and the crew is stabilizing the plant in accordance with the appropriate AOP.

Current Conditions:

- Control Bank "D" Group Counters are at 180 steps.
- H-2, a Control Bank "D" rod, indicates 223 steps on IRPI.
- All other Control Bank "D" rods indicate 180 steps on IRPI.
- I&C reports no blown fuse indicators for H-2.

Which ONE (1) of the following describes the current condition of rod H-2 and the basis for the applicable Tech Spec action?

	Condition	Basis
A.	Untrippable	Shutdown Margin
B.	Untrippable	Peaking Factors
C.	Trippable	Shutdown Margin
D.	Trippable	Peaking Factors

Question 21

The conditions provided in the stem of the question provide information to determine that control rod H2 is untrippable and therefore not operable. LCO 3.1.4 Actions Condition A "One or more rod(s) inoperable" applies. The final plant conditions, provided by the stem, place the plant at 80% power with control rod H2 at 223 steps and its bank demand position at 180 steps. LCO 3.1.4 requires "When THERMAL POWER is ≤85% RTP, the difference between each individual indicated rod position and its group step counter demand position shall be ≤24 steps." Control rod H2 is 43 steps above its bank demand position, so LCO 3.1.4 Actions Condition B "One rod not within alignment limits" also applies.

In the Technical Specification Bases, B3.1.4 "Rod Group Alignment Limits", in the Applicable Safety Analyses section, the second paragraph on page B3.1.4-3 states:

> "Two types of misalignment are distinguished. During movement of a control rod group, one rod may stop moving, while the other rods in the group continue. This condition may cause excessive power peaking. The second type of misalignment occurs if one rod fails to insert upon a reactor trip and remains stuck fully withdrawn. This condition requires an evaluation to determine that sufficient reactivity worth is held in the control rods to meet the SDM requirement, with the maximum worth rod stuck fully withdrawn."

The last paragraph on page B3.1.4-4 states:

> "Shutdown and control rod OPERABILITY and alignment are directly related to power distributions and SDM, which are initial conditions assumed in safety analyses...."

Control rod H2 embodies both types of misalignment described above so excessive power peaking and shutdown margin (SDM) are both concerns.

<u>Facility Position</u>

Both answers A and B are correct and supported by the Technical Specifications.

References:

Technical Specification section 3.1.4, "Rod Group Alignment Limits"

Technical Specification Bases section B3.1.4, "Rod Group Alignment Limits"

3.1 REACTIVITY CONTROL SYSTEMS

3.1.4 Rod Group Alignment Limits

LCO 3.1.4 All shutdown and control rods shall be OPERABLE.

AND

Individual indicated rod positions shall be within the following limits:

a. When THERMAL POWER is > 85% RTP, the difference between each individual indicated rod position and its group step counter demand position shall be within the limits specified in Table 3.1.4-1 for the group step counter demand position; and

b. When THERMAL POWER is ≤ 85% RTP, the difference between each individual indicated rod position and its group step counter demand position shall be ≤ 24 steps.

APPLICABILITY: MODES 1 and 2.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more rod(s) inoperable.	A.1.1 Verify SDM to be within the limits specified in the COLR.	1 hour
	OR	
	A.1.2 Initiate boration to restore SDM to within limit.	1 hour
	AND	
	A.2 Be in MODE 3.	6 hours
B. One rod not within alignment limits.	B.1 Restore rod to within alignment limits.	1 hour
	OR	

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
	B.2.1.1 Verify SDM to be within the limits specified in the COLR.	1 hour
	<u>OR</u>	
	B.2.1.2 Initiate boration to restore SDM to within limit.	1 hour
	<u>AND</u>	
	B.2.2 Reduce THERMAL POWER to ≤ 75% RTP.	2 hours
	<u>AND</u>	
	B.2.3 Verify SDM is within the limits specified in the COLR.	Once per 12 hours
	<u>AND</u>	
	B.2.4 Perform SR 3.2.1.1.	72 hours
	<u>AND</u>	
	B.2.5 Perform SR 3.2.2.1.	72 hours
	<u>AND</u>	
	B.2.6 Re-evaluate safety analyses and confirm results remain valid for duration of operation under these conditions.	5 days
C. Required Action and associated Completion Time of Condition B not met.	C.1 Be in MODE 3.	6 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. More than one rod not within alignment limit.	D.1.1 Verify SDM is within the limits specified in the COLR.	1 hour
	OR	
	D.1.2 Initiate boration to restore required SDM to within limit.	1 hour
	AND	
	D.2 Be in MODE 3.	6 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.4.1	-- NOTE -- Not required to be met for individual control rods until 1 hour after completion of control rod movement.	
	Verify individual rod positions within alignment limit.	12 hours
SR 3.1.4.2	Verify rod freedom of movement (trippability) by moving each rod not fully inserted in the core ≥ 10 steps in one direction.	92 days
SR 3.1.4.3	Verify rod drop time of each rod, from the fully withdrawn position, is ≤ 2.4 seconds from the gripper release to dashpot entry, with:	Prior to criticality after each removal of the reactor head
	a. T_{avg} ≥ 500°F and	
	b. All reactor coolant pumps operating.	

Table 3.1.4-1

Maximum Permissible Rod Misalignment when > 85% RTP
(IRPI Rod Position minus Group Step Counter Demand Position)

Group Step Counter Demand Position (steps)	Maximum Positive Deviation (IRPIs reading greater than Group Step Counter Demand Position)	Maximum Negative Deviation (IRPIs reading less than Group Step Counter Demand Position)
≤ 209	+12	-12
210 to 221	+16	-12
222	+16	-13
223	+16	-14
224	+16	-15
≥ 225	+16	-16

B 3.1 REACTIVITY CONTROL SYSTEMS

B 3.1.4 Rod Group Alignment Limits

BASES

BACKGROUND

The OPERABILITY (trippability) of the shutdown and control rods is an initial assumption in all safety analyses that assume rod insertion upon reactor trip. Maximum rod misalignment is an initial assumption in the safety analysis that directly affects core power distributions and assumptions of available SDM.

The applicable criteria for these reactivity and power distribution design requirements are 10 CFR 50, Appendix A, GDC 10, "Reactor Design," GDC 26, "Reactivity Control System Redundancy and Capability" (Ref. 1), and 10 CFR 50.46, "Acceptance Criteria for Emergency Core Cooling Systems for Light Water Nuclear Power Plants" (Ref. 2).

Mechanical or electrical failures may cause a control or shutdown rod to become inoperable or to become misaligned from its group. Rod inoperability or misalignment may cause increased power peaking, due to the asymmetric reactivity distribution and a reduction in the total available rod worth for reactor shutdown. Therefore, rod alignment and OPERABILITY are related to core operation in design power peaking limits and the core design requirement of a minimum SDM.

Limits on rod alignment have been established, and all rod positions are monitored and controlled during power operation to ensure that the power distribution and reactivity limits defined by the design power peaking and SDM limits are preserved.

Rod cluster control assemblies (RCCAs), or rods, are moved by their control rod drive mechanisms (CRDMs). Each CRDM moves its RCCA one step (approximately 5/8 inch) at a time, but at varying rates (steps per minute) depending on the signal output from the Rod Control System.

The RCCAs are divided among control banks and shutdown banks. Each bank may be further subdivided into two groups to provide for precise reactivity control. A group consists of two or more RCCAs that are electrically paralleled to step simultaneously. If a bank of RCCAs consists of two groups, the groups are moved in a staggered fashion, but always within one step of each other. IP2 has four control banks and four shutdown banks.

BASES

BACKGROUND (continued)

The shutdown banks are maintained either in the fully inserted or fully withdrawn position. The control banks are moved in an overlap pattern, using the following withdrawal sequence: When control bank A reaches a predetermined height in the core, control bank B begins to move out with control bank A. Control bank A stops at the position of maximum withdrawal, and control bank B continues to move out. When control bank B reaches a predetermined height, control bank C begins to move out with control bank B. This sequence continues until control banks A, B, and C are at the fully withdrawn position, and control bank D is approximately halfway withdrawn. The insertion sequence is the opposite of the withdrawal sequence. The control rods are arranged in a radially symmetric pattern, so that control bank motion does not introduce radial asymmetries in the core power distributions.

The axial position of shutdown rods and control rods is indicated by two separate and independent systems, which are the Bank Demand Position Indication System (commonly called group step counters) and the Individual Rod Position Indication (IRPI) System.

The Bank Demand Position Indication System counts the pulses from the rod control system that moves the rods. There is one step counter for each group of rods. Individual rods in a group all receive the same signal to move and should, therefore, all be at the same position indicated by the group step counter for that group. The Bank Demand Position Indication System is considered highly precise (± 1 step or ± [illegible] inch). If a rod does not move one step for each demand pulse, the step counter will still count the pulse and incorrectly reflect the position of the rod.

The IRPI System provides an accurate indication of actual rod position, but at a lower precision than the step counters. This system is based on inductive analog signals from an electrical coil stack located above the stepping mechanisms of the control rod magnetic jacks, external to the pressure housing, but concentric with the rod travel. When the associated control rod is at the bottom of the core, the magnetic coupling between the primary and secondary coil winding of the detector is small and there is a small voltage induced in the secondary. As the control rod is raised by the magnetic jacks, the relatively high permeability of the lift rod causes an increase in magnetic coupling. Thus, an analog signal proportional to rod position is obtained. Direct, continuous readout of every control rod is presented to the operator on individual indicators (Ref. 3).

BASES

APPLICABLE SAFETY ANALYSES

Control rod misalignment accidents are analyzed in the safety analysis (References 4 and 5). The acceptance criteria for addressing control rod inoperability or misalignment are that:

a. There be no violations of:

    1. Specified acceptable fuel design limits or

    2. Reactor Coolant System (RCS) pressure boundary integrity and

b. The core remains subcritical after accident transients.

Two types of misalignment are distinguished. During movement of a control rod group, one rod may stop moving, while the other rods in the group continue. This condition may cause excessive power peaking. The second type of misalignment occurs if one rod fails to insert upon a reactor trip and remains stuck fully withdrawn. This condition requires an evaluation to determine that sufficient reactivity worth is held in the control rods to meet the SDM requirement, with the maximum worth rod stuck fully withdrawn.

Two types of analysis are performed in regard to static rod misalignment (Ref. 5). With control banks at their insertion limits, one type of analysis considers the case when any one rod is completely inserted into the core. The second type of analysis considers the case of a completely withdrawn single rod from a bank inserted to its insertion limit. Satisfying limits on departure from nucleate boiling ratio in both of these cases bounds the situation when a rod is misaligned.

When reactor power is > 85% RTP, an indicated misalignment of ± 12 steps (± 7.5 inches) between individual rod positions and the group step counter demand position will not cause the power peaking factor limits to be exceeded. This limit assumes a maximum IRPI instrument error of ± 12 steps (± 7.5 inches) allowing for an actual misalignment of ± 24 steps (± 15 inches). However, when the group step counter demand position is > 209 steps, it is acceptable for the IRPI to indicate misalignment greater than + 12 steps (i.e., may be up to + 16 steps) as specified in Table 3.1.4-1 without accounting for peaking factor margin. This is acceptable because the top of active fuel (TAF) is at 221 steps. With group step counter demand position > 209 steps and IRPI deviation > + 12 steps, the IRPI determined rod position is above the top of active fuel where it will not result in increased peaking factors for increased misalignments. Similarly, allowable negative deviation limits may increase by 1 step for every step of group step counter demand position over the top of active fuel as specified in Table 3.1.4-1. These rod misalignment limits were justified in Reference 5 and approved in Reference 6.

BASES

APPLICABLE SAFETY ANALYSES (continued)

When reactor power is ≤ 85% RTP, an indicated misalignment of ± 24 steps (± 15 inches) between individual rod (i.e., IRPI) positions and the group step counter demand position will not cause the power peaking factor limits to be exceeded. This limit assumes a maximum instrument error of ± 12 steps (± 7.5 inches) allowing for an actual misalignment of ± 36 steps (± 22.5 inches). These rod misalignment limits were justified in Reference 5 and approved in Reference 6.

As explained in Reference 5, the rod alignment limit analyses were performed using two distinct models of the IP2 core. These models addressed large variations in cycle length, number of feed assemblies, fuel enrichments and burnable poisons and are expected to bound any current or future fuel management strategies. Therefore, the results of the rod misalignment analyses are considered to be cycle independent.

Another type of misalignment occurs if one RCCA fails to insert upon a reactor trip and remains stuck fully withdrawn. This condition is assumed in the evaluation to determine that the required SDM is met with the maximum worth RCCA also fully withdrawn (Ref. 5).

The Required Actions in this LCO ensure that either deviations from the alignment limits will be corrected or that THERMAL POWER will be adjusted so that excessive local linear heat rates (LHRs) will not occur, and that the requirements on SDM and ejected rod worth are preserved.

Continued operation of the reactor with a misaligned control rod is allowed if the heat flux hot channel factor ($F_Q(Z)$) and the nuclear enthalpy hot channel factor ($F^N_{\Delta H}$) are verified to be within their limits in the COLR and the safety analysis is verified to remain valid. When a control rod is misaligned, the assumptions that are used to determine the rod insertion limits, AFD limits, and quadrant power tilt limits are not preserved. Therefore, the limits may not preserve the design peaking factors, and $F_Q(Z)$ and $F^N_{\Delta H}$ must be verified directly by incore mapping. Bases Section 3.2 (Power Distribution Limits) contains more complete discussions of the relation of $F_Q(Z)$ and $F^N_{\Delta H}$ to the operating limits.

Shutdown and control rod OPERABILITY and alignment are directly related to power distributions and SDM, which are initial conditions assumed in safety analyses. Therefore they satisfy Criterion 2 of 10 CFR 50.36(c)(2)(ii).

BASES

LCO

The limits on shutdown or control rod alignments ensure that the assumptions in the safety analysis will remain valid. The requirements on control rod OPERABILITY ensure that upon reactor trip, the assumed reactivity will be available and will be inserted. The control rod OPERABILITY requirements (i.e., trippability) are separate from the alignment requirements, which ensure that the RCCAs and banks maintain the correct power distribution and rod alignment. The rod OPERABILITY requirement is satisfied provided the rod will fully insert in the required rod drop time assumed in the safety analysis. Rod control malfunctions that result in the inability to move a rod (e.g., rod lift coil failures), but that do not impact trippability, do not result in rod inoperability.

To ensure that individual rods are properly aligned with their associated group step counter demand position, the following limits are placed on individual rod positions:

a. When THERMAL POWER is > 85% RTP, the difference between each individual indicated rod position and its group step counter demand position shall be within the limits specified in Table 3.1.4-1 for the group step counter demand position; and

b. When THERMAL POWER is ≤ 85% RTP, the difference between each individual indicated rod position and its group step counter demand position shall be ≤ 24 steps.

Control rod misalignment is the IRPI Rod Position minus Group Step Counter Demand Position.

Failure to meet the requirements of this LCO may produce unacceptable power peaking factors and LHRs, or unacceptable SDMs, all of which may constitute initial conditions inconsistent with the safety analysis.

APPLICABILITY

The requirements on RCCA OPERABILITY and alignment are applicable in MODES 1 and 2 because these are the only MODES in which neutron (or fission) power is generated, and the OPERABILITY (i.e., trippability and rod insertion speed) and alignment of rods have the potential to affect the safety of the plant. In MODES 3, 4, 5, and 6, the alignment limits do not apply because the control rods are bottomed and the reactor is shut down and not producing fission power. In the shutdown MODES, the OPERABILITY of the shutdown and control rods has the potential to affect the required SDM, but this effect can be compensated for by an increase in the boron concentration

BASES

APPLICABILITY (continued)

of the RCS. See LCO 3.1.1, "SHUTDOWN MARGIN," for SDM in MODES 3, 4, and 5 and LCO 3.9.1, "Boron Concentration," for boron concentration requirements during refueling.

ACTIONS

A.1.1 and A.1.2

When one or more rods are inoperable (i.e. untrippable), there is a possibility that the required SDM may be adversely affected. Under these conditions, it is important to determine the SDM, and if it is less than the required value, initiate boration until the required SDM is recovered. The Completion Time of 1 hour is adequate for determining SDM and, if necessary, for initiating emergency boration and restoring SDM.

In this situation, SDM verification must include the worth of the untrippable rod, as well as a rod of maximum worth.

A.2

If the inoperable rod(s) cannot be restored to OPERABLE status, the plant must be brought to a MODE or condition in which the LCO requirements are not applicable. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours.

The allowed Completion Time is reasonable, based on operating experience, for reaching MODE 3 from full power conditions in an orderly manner and without challenging plant systems.

B.1

When a rod becomes misaligned, it can usually be moved and is still trippable. If the rod can be realigned within the Completion Time of 1 hour, local xenon redistribution during this short interval will not be significant, and operation may proceed without further restriction.

Alternately, a power reduction to ≤ 85% RTP will result in the LCO being met if IRPIs associated with all groups indicate within ± 24 steps (± 15 inches) of the group step counter demand position. If LCO 3.1.4.b is met when ≤ 85% RTP, realigning RCCAs to within the limits of LCO 3.1.4.a is required only as a condition for increasing power to > 85% RTP.

BASES

ACTIONS (continued)

An alternative to realigning a single misaligned RCCA to the group average position is to align the remainder of the group to the position of the misaligned RCCA. However, this must be done without violating the bank sequence, overlap, and insertion limits specified in LCO 3.1.5, "Shutdown Bank Insertion Limits," and LCO 3.1.6, "Control Bank Insertion Limits." The Completion Time of 1 hour gives the operator sufficient time to adjust the rod positions in an orderly manner.

B.2.1.1 and B.2.1.2

With a misaligned rod, SDM must be verified to be within limit or boration must be initiated to restore SDM to within limit.

Power operation may continue with one RCCA trippable but misaligned, provided that SDM is verified within 1 hour. The Completion Time of 1 hour represents the time necessary for determining the actual unit SDM and, if necessary, aligning and starting the necessary systems and components to initiate boration.

B.2.2, B.2.3, B.2.4, B.2.5, and B.2.6

For continued operation with a misaligned rod, RTP must be reduced, SDM must periodically be verified within limits, hot channel factors ($F_Q(Z)$ and $F^N_{\Delta H}$) must be verified within limits, and the safety analyses must be re-evaluated to confirm continued operation is permissible.

Reduction of power to 75% RTP ensures that local LHR increases due to a misaligned RCCA will not cause the core design criteria to be exceeded. The Completion Time of 2 hours gives the operator sufficient time to accomplish an orderly power reduction without challenging the Reactor Protection System.

When a rod is known to be misaligned, there is a potential to impact the SDM. Since the core conditions can change with time, periodic verification of SDM is required. A Frequency of 12 hours is sufficient to ensure this requirement continues to be met.

Verifying that $F_Q(Z)$, as approximated by $F^C_Q(Z)$ and $F^W_Q(Z)$, and $F^N_{\Delta H}$ are within the required limits ensures that current operation at 75% RTP with a rod misaligned is not resulting in power distributions that may invalidate safety analysis assumptions at full power. The Completion Time of 72 hours allows sufficient time to obtain flux maps of the core power distribution using the incore flux mapping system and to calculate $F_Q(Z)$ and $F^N_{\Delta H}$.

BASES

ACTIONS (continued)

Once current conditions have been verified acceptable, time is available to perform evaluations of accident analysis to determine that core limits will not be exceeded during a Design Basis Event for the duration of operation under these conditions. The accident analyses presented in Reference 5 that may be adversely affected will be evaluated to ensure that the analysis results remain valid for the duration of continued operation under these conditions. A Completion Time of 5 days is sufficient time to obtain the required input data and to perform the analysis.

C.1

When Required Actions cannot be completed within their Completion Time, the unit must be brought to a MODE or Condition in which the LCO requirements are not applicable. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours, which obviates concerns about the development of undesirable xenon or power distributions. The allowed Completion Time of 6 hours is reasonable, based on operating experience, for reaching MODE 3 from full power conditions in an orderly manner and without challenging the plant systems.

D.1.1 and D.1.2

More than one control rod becoming misaligned from its group average position is not expected, and has the potential to reduce SDM. Therefore, SDM must be evaluated. One hour allows the operator adequate time to determine SDM. Restoration of the required SDM, if necessary, requires increasing the RCS boron concentration to provide negative reactivity, as described in the Bases for LCO 3.1.1. The required Completion Time of 1 hour for initiating boration is reasonable, based on the time required for potential xenon redistribution, the low probability of an accident occurring, and the steps required to complete the action. This allows the operator sufficient time to align the required valves and start the boric acid pumps. Boration will continue until the required SDM is restored.

A power reduction to ≤ 85% RTP will result in the LCO being met if IRPIs associated with all groups indicate within ± 24 steps (± 15 inches) of the group step counter demand position. If LCO 3.1.4.b is met when ≤ 85% RTP, realigning RCCAs to within the limits of LCO 3.1.4.a is required only as a condition for increasing power to > 85% RTP.

BASES

ACTIONS (continued)

D.2

If more than one rod is found to be misaligned or becomes misaligned because of bank movement, the unit conditions fall outside of the accident analysis assumptions. Since automatic bank sequencing would continue to cause misalignment, the unit must be brought to a MODE or Condition in which the LCO requirements are not applicable. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours.

The allowed Completion Time is reasonable, based on operating experience, for reaching MODE 3 from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.1.4.1

Verification that individual rod positions are within alignment limits at a Frequency of 12 hours provides a history that allows the operator to detect a rod that is beginning to deviate from its expected position. Rod position may be verified using normal indication, direct readings using a digital volt meter, or the plant computer. The specified Frequency takes into account other rod position information that is continuously available to the operator in the control room, so that during actual rod motion, deviations can immediately be detected.

This SR is modified by a Note that explains the SR is not required to be met for an individual control rod until 1 hour after completion of movement of that rod. This allowance is needed because it provides time for thermal stabilization of rod position instrumentation. This allowance is acceptable because individual rod position indicators may not accurately reflect control rod position prior to thermal stabilization and there is a presumption that individual control rods will move with their group (Ref. 6).

SR 3.1.4.2

Verifying each control rod is OPERABLE would require that each rod be tripped. However, in MODES 1 and 2, tripping each control rod would result in radial or axial power tilts, or oscillations. Exercising each individual control rod every 92 days provides increased confidence that all rods continue to be OPERABLE without exceeding the alignment limit, even if they are not regularly tripped. Moving each control rod by 10 steps in one direction will not cause radial or axial power tilts, or oscillations, to occur.

BASES

SURVEILLANCE REQUIREMENTS (continued)

This SR requires that control rods be inserted or withdrawn by at least 10 steps which is sufficient to ensure that rod movement can be confirmed by individual rod position indicators. The 92 day Frequency takes into consideration other information available to the operator in the control room and SR 3.1.4.1, which is performed more frequently and adds to the determination of OPERABILITY of the rods. Between required performances of SR 3.1.4.2 (determination of control rod OPERABILITY by movement), if a control rod(s) is discovered to be immovable, but remains trippable the control rod(s) is considered to be OPERABLE. At any time, if a control rod(s) is immovable, a determination of the trippability (OPERABILITY) of the control rod(s) must be made, and appropriate action taken.

SR 3.1.4.3

Verification of rod drop times allows the operator to determine that the maximum rod drop time permitted is consistent with the assumed rod drop time used in the safety analysis. Measuring rod drop times prior to reactor criticality, after reactor vessel head removal, ensures that the reactor internals and rod drive mechanism will not interfere with rod motion or rod drop time, and that no degradation in these systems has occurred that would adversely affect control rod motion or drop time. This testing is performed with all RCPs operating and the average moderator temperature ≥ 500°F to simulate a reactor trip under actual conditions.

This Surveillance is performed during a plant outage, due to the plant conditions needed to perform the SR and the potential for an unplanned plant transient if the Surveillance was performed with the reactor at power.

REFERENCES

1. 10 CFR 50, Appendix A.
2. 10 CFR 50.46.
3. UFSAR, Section 7.3.
4. UFSAR, Appendix 3.B.3.
5. WCAP-15902, "Conditional Extension of the Rod Misalignment Technical Specification for Indian Point Unit 2."

BASES

REFERENCES (continued)

6. Safety Evaluation by the Office of Nuclear Reactor Regulation Related to Amendment No. 234 to Facility Operating License No. DPR-26, October 12, 2002.