| Approval | Vogtle Electric Generating Plant<br>NUCLEAR OPERATIONS | Procedure No.<br>18028-C |
|---|---|---|
| Date<br>3/16/90 | Unit COMMON<br>Georgia Power | Revision No.<br>7 |
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ATTACH AIR CONCERN

B6 NOTE, C5 CAUTION, C9, C13

ABNORMAL OPERATING PROCEDURE 05-90-90

# LOSS OF INSTRUMENT AIR

19

## PURPOSE

This procedure specifies response to a loss of Instrument Air pressure. It is divided into the following sub-procedures:

A. Loss of Instrument Air At Power (Page 2).

B. Loss of Instrument Air In Mode 3 (Page 7).

C. Loss of Instrument Air In Modes 4, 5 or 6 (Page 12).

## SYMPTOMS

- SERVICE AIR HDR LO PRESS Annunciator.
- INSTR AIR EQUIP LO PRESS ISO Annunciator.
- Instrument Air supply header pressure indicating less than 80 psig on PI-9361 at Main Control Board.
- INSTR AIR CNMT SPLY LINE BREAK Annunciator.
- Trip of running air compressor and standby fails to start.

## A. LOSS OF INSTRUMENT AIR AT POWER

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
| --- | --- |
| A1. Verify all available air compressors for the affected unit - Running. | A1. Start all available air compressors for the affected unit. |

NOTE

A loss of Service Air will cause failure of the Fuel Transfer Canal and/or Cask Loading Pit Gate Seal Assemblies if valved in to Service Air header.

| | |
| --- | --- |
| A2. Monitor instrument air header pressure - IF stable or rising, THEN go to Step A5. | A2. IF instrument air header pressure lowers to less than 80 psig, THEN dispatch an operator to ensure Service Air Header Isolation Valve PV-9375 is closed. |

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
| --- | --- |

NOTE

UNIT 1 SERV AIR HDR TIED TO UNIT 2 Annunciator C05 of ALB01 will annunciate in the Unit 1 Control Room when instrument air header common to Unit 1 and Unit 2 is established.

If the pressure in the instrument air header common to both units lowers below 80 psig, the Unit 1 and Unit 2 headers should be reisolated from each other.

SERVICE AIR SWING CMPSR MISALIGNED Annunciator A05 of ALB01 may annunciate in the Unit 1 Control Room if the Unit 1 and Unit 2 headers are reisolated from each other.

| | |
| --- | --- |
| A3. Check air compressors running on affected unit - IF 2 or more, THEN go to Step A5. | A3. a. Verify all available air compressors for both units are running.<br><br>b. IF the total number of running Unit 1 and Unit 2 air compressors is 4 or more, THEN dispatch operator equipped with a radio to establish an open instrument air header between Unit 1 and Unit 2 by opening the following valves:<br><br>• 1-2401-U4-510, Service Air Receiver 504 to Air Dryer Isolation Valve<br><br>• 2-2401-U4-510, Service Air Unit 1 to Unit 2 Header Isolation Valve<br><br>The operator will remain at the valve location and establish communication with the Control Room. |

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
| --- | --- |
| | c. IF the instrument air pressure of the unaffected unit lowers to less than 80 psig, THEN restore/reisolate unaffected unit Instrument air as follows:<br><br>UNIT 1<br><br>• Open valve 1-2401-U4-510<br>• Shut valve 2-2401-U4-510<br>• Verify swing compressor is running<br><br>UNIT 2<br><br>• Shut valve 1-2401-U4-510<br>• Open valve 2-2401-U4-510<br>• Verify swing compressor is running. |

NOTE

Loss of Turbine Building instrument air will close all Extraction Steam NRVs and fail all Feedwater Heater High Level Dump valves fully open.

A4. If necessary, dispatch an operator to place Instrument Air Dryers in the Two Chamber/Full Flow mode per 13711, INSTRUMENT AIR SYSTEM.

A5. Identify the source of the leakage and isolate if possible.

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
| --- | --- |
| A6. IF header pressure falls below 70 psig, THEN dispatch an operator to ensure Turbine Building Instrument Air Isolation Valve PV-19414 is closed. | A6. Go to Step A8. |
| A7. IF the instrument air header pressure can be restored, THEN immediately locally reset and reopen PV-19414. | A7. IF instrument air header pressure can NOT be restored AND is less than 70 psig, THEN trip the reactor and initiate 19000-C, E-0 REACTOR TRIP OR SAFETY INJECTION and go to Section B of this procedure. |

NOTE

Total loss of instrument air pressure will preclude continued plant operation.

| | |
| --- | --- |
| A8. Verify header pressure - Stable Or Rising. | A8. IF source of the leakage cannot be isolated, THEN perform the following:<br>a. Restore/reisolate the unaffected unit instrument air as follows:<br>UNIT 1<br>• Open valve 1-2401-U4-510<br>• Shut valve 2-2401-U4-510<br>• Verify swing compressor is running.<br>UNIT 2<br>• Shut valve 1-2401-U4-510<br>• Open valve 2-2401-U4-510<br>• Verify swing compressor is running. |

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
| --- | --- |
| A9. Monitor Instrument Air Header pressure on PI-9361 - Less Than 100 psig. | A9. Return to procedure and step in effect. |
| A10. Determine if plant operation may continue under the UOP in effect. | A10. Commence Unit Shutdown in accordance with the appropriate UOP. |
| A11. WHEN the cause has been corrected, THEN initiate 13710, SERVICE AIR SYSTEM and 13711-C, INSTRUMENT AIR SYSTEM to restore systems to normal. | |

END OF SUB-PROCEDURE TEXT

## B. LOSS OF INSTRUMENT AIR IN MODE 3

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
| --- | --- |
| B1. Verify all available air compressors for the affected unit - Running. | B1. Start all available air compressors for the affected unit. |
| B2. Check if control of swing compressor is set to affected unit -<br><br>IF control is set to the affected unit,<br>THEN start swing compressor. | B2. IF the swing compressor is not running to support unaffected unit,<br>THEN:<br><br>a. Dispatch operator to verify for the affected unit:<br><br>UNIT 1<br><br>• Service Air Receiver 504 to Air Dryer Isolation Valve 1-2401-U4-510 open<br>• Service Air Unit 1 to Unit 2 Header Isolation Valve 2-2401-U4-510 shut<br>• Unit 1/Unit 2 Control Transfer Switch A-HS-19458 in "UNIT 1" position<br><br>UNIT 2<br><br>• Valve 1-2401-U4-510 shut<br>• Valve 2-2401-U4-510 open<br>• Switch A-HS-19458 in "UNIT 2" position<br><br>b. Start swing compressor. |

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
| --- | --- |
| B3. Monitor Instrument Air supply header pressure on PI-9361 - Less Than 100 psig. | B3. Go to Step B11. |
| B4. If necessary, dispatch an operator to place Instrument Air Dryers in the Two Chamber/Full Flow mode per 13711, INSTRUMENT AIR SYSTEM. | |
| B5. IF header pressure falls below 70 psig, THEN dispatch an operator to ensure Turbine Building Instrument Air Isolation Valve PV-19414 is closed. | |
| NOTE<br>If Instrument Air pressure continues to degrade, preparation should be made for manual control of the SG Atmospheric Relief Valves. | |
| B6. Verify SG Atmospheric Relief Valves - Maintaining SG Pressure Between 1085 And 1135 psig. | B6. Perform the following:<br>a. Ensure SG Atmospheric Relief Valves in AUTO:<br>SG 1: PIC-3000A<br>SG 2: PIC-3010A<br>SG 3: PIC-3020A<br>SG 4: PIC-3030A<br>b. Ensure controller setpoint potentiometers set at 7.5. |
| B7. Verify SG levels - Trending To 50% NR. | B7. Restore AFW flow to SG. |

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
| --- | --- |
| NOTE<br>A loss of Instrument Air will cause the PD Pump to fail to maximum speed. Loss of Service Air will cause failure of the Fuel Transfer Canal and/or Cask Loading Pit gate seal assemblies if valved in to service air header. | |
| B8. Establish charging using Attachment A, Establishing Charging Without Instrument Air and ensure PRZR level trending to Programmed Value. | B8. IF PRZR level is falling, check for an excessive RCS cooldown rate. |
| B9. When Tavg has stabilized, shut down 3 RCPs. | |
| CAUTION<br>Cooldown to Mode 4 should not be initiated until Instrument Air pressure is restored and makeup water is available to the Reactor Makeup Water System and Condensate Storage and Degasifier System. | |
| B10. Check VCT level - Greater Than 10%. | B10. IF VCT level falls below 7%, ensure that Charging Pump suction is aligned to the RWST:<br><br>LV-0112D: Open<br>LV-0112E: Open<br>LV-0112B: Closed<br>LV-0112C: Closed<br>HV-8508A (HV-8508B): Open<br>HV-8509A (HV-8509B): Open<br>HV-8111A (HV-8111B): Closed |

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
| --- | --- |
| B11. Investigate the cause of low Instrument Air pressure:<br>• Check Air Compressors<br>• Check Air Dryers<br>• Check piping integrity. | |
| NOTE<br>The CVCS Boronometer will be inoperable until instrument air pressure is restored. | |
| B12. IF PRZR level continues rising, AND instrument air pressure cannot be restored, THEN place the Reactor Head Vent System letdown path in service. | |
| B13. IF the Main Turbine turning gear disengages or needs to be engaged, THEN initiate 13800, MAIN TURBINE OPERATION to re-engage/engage turning gear. | |
| B14. Correct the cause of the loss of air pressure. | B14. Maintain Mode 3 conditions. |
| B15. Establish normal instrument air header pressure. | B15. Return to Step B1. |
| B16. Open CNMT Instrument Air Header Isolation Valves using HV-9378A and HV-9378B. | |

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
| --- | --- |
| B17. Establish normal charging, letdown and RCP seal injection flow by initiating 13006, CVCS STARTUP AND NORMAL OPERATION. | |
| B18. Locally reset and open the following Instrument Air and Service Air System trip valves:<br>a. Turbine Building Instrument Air Isolation Valve PV-19414 by initiating 13711, INSTRUMENT AIR SYSTEM.<br>b. Service Air Isolation PV-9375 by initiating 13710, SERVICE AIR SYSTEM. | |
| B19. Continue operation in accordance with the Unit Operating Procedure currently in effect. | |

END OF SUB-PROCEDURE TEXT

## C. LOSS OF INSTRUMENT AIR IN MODES 4, 5 OR 6

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
| --- | --- |
| C1. Verify all available air compressors for the affected unit - Running. | C1. Start all available air compressors for the affected unit. |
| C2. Check if control of swing compressor is set to affected unit -<br><br>IF control is set to the affected unit,<br>THEN start swing compressor. | C2. IF the swing compressor is not running to support unaffected unit,<br>THEN:<br><br>a. Dispatch operator to verify for the affected unit:<br><br>UNIT 1<br><br>• Service Air Receiver 504 to Air Dryer Isolation Valve 1-2401-U4-510 open<br>• Service Air Unit 1 to Unit 2 Header Isolation Valve 2-2401-U4-510 shut<br>• Unit 1/Unit 2 Control Transfer Switch A-HS-19458 in "UNIT 1" position<br><br>UNIT 2<br><br>• Valve 1-2401-U4-510 shut<br>• Valve 2-2401-U4-510 open<br>• Switch A-HS-19458 in "UNIT 2" position<br><br>b. Start swing compressor. |

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
| --- | --- |

NOTE

Loss of Instrument Air will cause the PD Pump to fail to maximum speed. Loss of Service Air will cause failure of the Fuel Transfer Canal and/or Cask Loading Pit gate seal assemblies if valved in to Service Air Header.

| | | |
| --- | --- | --- |
| C3. | Monitor Instrument Air Header pressure on PI-9361 - Less Than 100 psig. | C3. Go to Step C10. |
| C4. | If necessary, dispatch an operator to place Instrument Air Dryers in the Two Chamber/Full Flow mode per 13711, INSTRUMENT AIR SYSTEM. | |

CAUTION

Loss of instrument air pressure will cause the RHR HX outlet valves to fail full open and the HX bypass valves to fail fully closed.

| | | |
| --- | --- | --- |
| C5. | Trip one RHR Pump if two are running. | |
| C6. | IF in Mode 6, suspend all fuel movement. | |
| C7. | IF the RCS is solid THEN trip all charging pumps. | C7. IF the RCS is not solid, THEN establish charging per Attachment A, Establishing Charging Without Instrument Air. |

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
| --- | --- |
| C8. IF any RCPs are running, THEN monitor No. 1 seal leakoff temperature and flow until charging pump is restarted. | |
| C9. IF RCS temperature is falling rapidly, THEN trip the running RHR Pump. | C9. Reduce CCW flow to the operating RHR Train. |

ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED

NOTE

As the RCS temperature drops to 250°F, the RHR flow may be increased gradually until valve(s) 1205-U6-019 (020) is(are) fully opened.

C10 IF RCS temperature rises above 325°F

-OR-

IF, in Mode 6 and RCS temperature rises above 185°F
THEN place A(B) train of RHR cooling in service:

a. Dispatch operator and establish communication at RHR Pump Discharge 1205-U6-019 (020) and flow indicators FIS-0610, (0611).

b. Unlock and Throttle 1205-U6-019 (020) to two turns open and then start RHR Pump A (B).

c. Operate 1205-U6-019 (020) to maintain:

- RCS cooldown rate - LESS THAN 100°F/HR.
- RHR flow rate - GREATER THAN 750 GPM.
- CCW temperature at RHR exchangers - LESS than 195°F. The annunciator A01 of ALB61, NSCW CCW ACCW TRAIN A TEMP ALARM (A02 of ALB61, NSCW CCW ACCW TRAIN B TEMP ALARM) must not be actuated.

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
| --- | --- |
| C11. IF the Main Turbine turning gear disengages or needs to be engaged, THEN initiate 13800, MAIN TURBINE OPERATION, to re-engage/engage turning gear. | |
| C12 IF header pressure is below 70 psig, THEN dispatch an operator to ensure Turbing Building Instrument Air Isolation Valve PV-19414 is closed. | |
| C13. Investigate the cause of low instrument air pressure:<br>• Check Air Compressors<br>• Check Air Dryers<br>• Check piping integrity. | |
| C14. Correct the cause of the loss of air pressure. | C14. Maintain stable RCS conditions until a source of instrument air is established. |
| C15. Establish normal instrument air header pressure. | C15. Return to Step C1. |
| C16. Open CNMT Instrument Air Isolation Valves HV-9378A or HV-9378B. | |
| C17. If necessary, place the non-running RHR Train in service by initiating 13011, RESIDUAL HEAT REMOVAL SYSTEM. | |

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
| --- | --- |

C18. Establish normal charging and RCP Seal injection flow by initiating 13006, CVCS STARTUP AND NORMAL OPERATION.

C19. Establish normal letdown flow:

- From CVCS

-OR-

- From RHR

C20. Locally reset and open the following Instrument Air and Service Air System trip valves:

a. Turbine Building Instrument Air Isolation PV-19414 by initiating 13711, INSTRUMENT AIR SYSTEM.

b. Service Air Isolation PV-9375 by initiating 13710, SERVICE AIR SYSTEM.

C21. Align the CVCS System as required by the Unit Operating Procedure currently in effect.

C22. Continue operations.

END OF PROCEDURE TEXT

ATTACHMENT A

ESTABLISHING CHARGING WITHOUT INSTRUMENT AIR

A. Establish Charging With Train A Emergency Bus Energized:

1. Verify Train A CCP - RUNNING.

2. Verify Train A charging isolation valves - OPEN:

   - HV-8116
   - HV-0190A
   - HV-8105 (locally verify if Train B De-energized)

3. Shut the following charging isolation valves:

   - HV-8485A
   - HV-8106

4. Dispatch local operators to maintain 8 to 13 gpm seal injection flow by throttling OPEN:

| UNIT 1 | UNIT 2 |
| --- | --- |
| 1-1208-U6-152 | 2-1208-U6-152 |

5. Maintain desired charging flow using HV-0190A.

ATTACHMENT A (Cont'd.)

B. Establish Charging With Train B Emergency Bus Energized:

1. Verify Train B CCP - RUNNING.
2. Verify Train B charging isolation valve HV-0190B - OPEN.
3. Verify Train B BIT outlet isolation valve HV-8801B - OPEN.
4. Shut the following charging isolation valves:
   - HV-8438
   - HV-8485B
   - HV-8105
5. Dispatch local operators to maintain 8 to 13 gpm seal injection flow by throttling OPEN:

| UNIT 1 | UNIT 2 |
| --- | --- |
| 1-1208-U6-151 | 2-1208-U6-151 |

6. Maintain desired charging flow using HV-0190B.

END OF ATTACHMENT A