

INFORMATION ONLY
Nuclear Power Company
PROCEDURE PROCESS RECORD
MASTER FILE

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PREPARATION

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Cross-Disciplinary Review By _____ N/R WM by King

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By _____ (SRO) Date _____

By _____ Date _____

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(9) Comments (For procedure reissue indicate whether additional changes, other than previously approved changes, are included. Attach additional pages, if necessary.)

Additional Changes Included. Yes
 No

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If "yes", attach detailed explanation. No

Completion

(12) Date(s) Performed _____

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Yes N/A Check lists and/or blanks properly initialed, signed, dated or filled in N/A or N/R, as appropriate?

Yes N/A Listed enclosures attached?

Yes N/A Data sheets attached, completed, dated and signed?

Yes N/A Charts, graphs, etc. attached and properly dated, identified and marked?

Yes N/A Procedure requirements met?

Verified By _____ Date _____

(14) Procedure Completion Approved _____ Date _____

(15) Remarks (attach additional pages, if necessary)

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Unit 3
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LOSS OF LOW PRESSURE INJECTION SYSTEM AP/3/A/1700/07

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OCONEE NUCLEAR STATION
LOSS OF LOW PRESSURE INJECTION SYSTEM
AP/3/A/1700/07

CASE A

Failure Of One Train Of The LPI System During ECCS Operation

1.0 Purpose

This case of this procedure provides the actions necessary following failure of one train of the LPI system during ECCS operation to restore flow to both LPI Hdrs, if possible.

2.0 Symptoms

- "LP INJECTION LOOP A FLOW HIGH/LOW" statalarm (3SA-3, C-8)
- "LP INJECTION LOOP B FLOW HIGH/LOW" statalarm (3SA-3, C-9)
- Failure of 3LP-17 or 3LP-18 to "OPEN."

3.0 Automatic Systems Actions

None

LOSS OF LOW PRESSURE INJECTION SYSTEM
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CASE A

Failure Of One Train Of The LPI System During ECCS Operation

Immediate Manual Actions

4.0 Immediate Manual Actions

NOTE Manual actions are required within 15 minutes of failure.

____ 4.1 IF an LP Injection valve failed to automatically open:
• 3LP-17 ('3A' LP Injection)
• 3LP-18 ('3B' LP Injection),

AND CANNOT be remotely operated,
THEN send an Operator to open the valve(s) manually.

____ 4.2 IF an LPI pump failed to automatically start:
• '3A' LPI pump
• '3B' LPI pump,

THEN start the LPI pump.

LOSS OF LOW PRESSURE INJECTION SYSTEM
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CASE A

Failure Of One Train Of The LPI System During ECCS Operation

Subsequent Actions

5.0 Subsequent Actions

5.1 Verify that the LPI System is lined up for ES conditions:

- REFER TO OP/3/A/1104/04, LOW PRESSURE INJECTION SYSTEM.

5.2 IF an LPI pump fails to start,
AND '3C' LPI pump is available,
THEN open the following valves:

- 3LP-6 ('3C' LPI Pump Suction ('A' Hdr))
- 3LP-7 ('3C' LPI Pump Suction ('B' Hdr))

and

start '3C' LPI pump.

5.2.1 IF the '3A' LPI pump is off,
THEN open 3LP-9 ('3C' LPIP Disch to '3A' LPI Hdr),
and
throttle 3LP-12 ('3A' LPI Cooler Outlet):

- Establish \approx 3000 gpm flow in 'A' header.

5.2.2 IF the '3B' LPI pump is off,
THEN open 3LP-10 ('3C' LPIP Disch to '3B' LPI Hdr)
and
throttle 3LP-14 ('3B' LPI Cooler Outlet):

- Establish \approx 3000 gpm in 'B' header.

LOSS OF LOW PRESSURE INJECTION SYSTEM
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CASE A

Failure Of One Train Of The LPI System During ECCS Operation

Subsequent Actions

- ____ 5.3 IF only one LPI pump is operating,
THEN open the following valves:
- 3LP-9 ('3C' LPIP Disch to '3A' LPI Hdr)
 - 3LP-10 ('3C' LPIP Disch to '3B' LPI Hdr).
- ____ 5.3.1 Throttle open the following valves to establish \approx 1500
gpm in each Hdr:
- 3LP-12 ('3A' LPI Cooler Outlet)
 - 3LP-14 ('3B' LPI Cooler Outlet).
- ____ 5.4 IF all LPI pumps CANNOT operate,
THEN attempt to repair the LPI system,
and
return LPI system to normal ECCS operation.

LOSS OF LOW PRESSURE INJECTION SYSTEM
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CASE A

Failure Of One Train Of The LPI System During ECCS Operation

Subsequent Actions

CAUTION: If only one LPI cooler is operable, then \approx 5000 to 5800 gpm LPI and \approx 5500 gpm LPSW flow must be established through the operable cooler immediately after swapping LPI pump suction from the BWST to the RB EMER Sump to provide adequate core cooldown rate and maintain RB environmental qualification criteria for RB equipment protection.

5.5 IF only one LPI cooler is operable
THEN open the following valves:

- 3LP-9 ('3C' LPIP Disch to '3A' LPI Hdr)
- 3LP-10 ('3C' LPIP Disch to '3B' LPI Hdr).

5.5.1 IF an LPI line break exists,
THEN close the following valve on the affected Hdr:

- 3LP-11 ('3A' LPI Cooler Inlet)
- 3LP-13 ('3B' LPI Cooler Inlet).

5.5.2 Verify two LPI pumps running.

5.5.3 IF '3A' cooler is operable,
THEN isolate the '3B' cooler:

- close 3LP-13 ('3B' LPI Cooler Inlet)
- close 3LP-14 ('3B' LPI Cooler Outlet),
AND throttle 3LP-12 ('3A' LPI Cooler Outlet) to
establish \approx 5000 to 5800 gpm.

5.5.3.1 Increase LPSW flow to the '3A' LPI Cooler to
 \approx 5500 gpm:

- Throttle 3LPSW-405 ('3A' LPI Clr
Outlet Cont Vlv).

LOSS OF LOW PRESSURE INJECTION SYSTEM
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CASE A

Failure Of One Train Of The LPI System During ECCS Operation

Subsequent Actions

- 5.5.4 IF '3B' cooler is operable,
 THEN isolate the '3A' cooler:
- close 3LP-11 ('3A' LPI Cooler Inlet)
 - close 3LP-12 ('3A' LPI Cooler Outlet),
- AND throttle 3LP-14 ('3B' LPI Cooler Outlet) to
 establish \approx 5000 to 5800 gpm.
- 5.5.4.1 Increase LPSW flow the '3B' LPI Cooler to
 \approx 5500 gpm:
- Throttle 3LPSW-404 ('3B' LPI Clr
 Outlet Cont Vlv).
- 5.6 IF one RB EMER Sump suction line is NOT operable:
- 3LP-19 ('3A' Rx Bldg Suction)
 - 3LP-20 ('3B' Rx Bldg Suction),
- AND LPI suction must be swapped to the RB EMER Sump
 from the BWST,
- THEN secure the following to provide adequate NPSH for the LPI
 pumps:
- '3A' RBS pump
 - '3B' RBS pump.
- 5.6.1 Verify RBCUs operation:
- All RBCUs in "LOW" speed
 - LPSW flow \geq 1400 gpm to each RBCU.

END

LOSS OF LOW PRESSURE INJECTION SYSTEM
AP/3/A/1700/07

CASE B

Loss Of Low Pressure Injection System During Decay Heat Removal

1.0 Purpose

This case of this procedure provides the actions necessary to reestablish core cooling following a loss of the LPI system during decay heat removal.

2.0 Symptoms

- "LP DECAY HEAT LOOP A FLOW LOW" statalarm (3SA-3, A-8)
- "LP DECAY HEAT LOOP B FLOW LOW" statalarm (3SA-3, A-9)
- LP cooler outlet temperature increasing
- RCS incore temperature increasing

- "LP INJECTION PUMP A DIFF PRESS LOW" statalarm (3SA-1, C-12)
- "LP INJECTION PUMP B DIFF PRESS LOW" statalarm (3SA-1, D-12)
- "LP INJECTION PUMP C DIFF PRESS LOW" statalarm (3SA-1, E-12)
- LPI pump(s) tripped.

3.0 Automatic Systems Actions

None

LOSS OF LOW PRESSURE INJECTION SYSTEM
AP/3/A/1700/07

CASE B

Loss Of Low Pressure Injection System During Decay Heat Removal

Immediate Manual Actions

4.0 Immediate Manual Actions

- 4.1 IF LPI pump flow has degraded:
- LPI pump $\Delta P < 130$ psid
 - LPI decay heat flow < 1000 gpm/hdr
 - LPI pump motor amps are fluctuating,
- THEN trip the running LPI pump.

LOSS OF LOW PRESSURE INJECTION SYSTEM
AP/3/A/1700/07

CASE B

Loss Of Low Pressure Injection System During Decay Heat Removal

Subsequent Actions

5.0 Subsequent Actions

___ 5.1 Verify the LPI Decay Heat Removal valve lineup:

- REFER TO OP/3/A/1104/04, LOW PRESSURE INJECTION SYSTEM.

NOTE 5.2 The accuracy of LT-5 is affected by RB and RCS pressure.

___ 5.2 Verify the RCS level is > 10" on LT-5.

___ 5.2.1 IF RCS level is < 10" on LT-5,
THEN stop any reduction in RCS level,
AND make up to the RCS:

- Ensure > 1% SDM.

NOTE 5.3 An LPI pump can experience cavitation if extended operation with < 800 gpm is allowed or adequate NPSH is not maintained.

___ 5.3 IF the LPI pump did NOT experience "cavitation,"
THEN start the STBY LPI pump:

- IF NO LPI pump is available,
THEN GO TO Step 5.6.

LOSS OF LOW PRESSURE INJECTION SYSTEM
AP/3/A/1700/07

CASE B

Loss Of Low Pressure Injection System During Decay Heat Removal

Subsequent Actions

CAUTION 5.4 The RCS will overflow to the RB if the RCS is opened and an LPI flowpath is aligned from the BWST to the RCS.

___ 5.4 IF the LPI pump has experienced "cavitation,"
THEN vent the LPI pumps:

___ 5.4.1 Open one of the following valves:

- 3LP-21 ('3A' LPI BWST Suction).
- 3LP-22 ('3B' LPI BWST Suction).

___ 5.4.2 Send an Operator to open the following valves:

- 3LWD-369 (LPI pump '3A' vent)
- 3LWD-373 (LPI pump '3B' vent)
- 3LWD-371 (LPI pump '3C' vent).

___ 5.4.3 WHEN a solid stream of water is visible in the sight glasses,

THEN close the following valves:

- 3LWD-369 (LPI pump '3A' vent)
- 3LWD-373 (LPI pump '3B' vent)
- 3LWD-371 (LPI pump '3C' vent).

___ 5.4.4 Start an LPI pump:

- IF NO LPI pumps are available,
THEN GO TO Step 5.6.

LOSS OF LOW PRESSURE INJECTION SYSTEM
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CASE B

Loss Of Low Pressure Injection System During Decay Heat Removal

Subsequent Actions

- 5.4.5 Close the following valves:
- 3LP-21 ('3A' LPI BWST Suction)
 - 3LP-22 ('3B' LPI BWST Suction).
- 5.4.6 Verify proper LPI pump parameters:
- LPI pump $\Delta P > 130$ psid
 - LPI decay heat flow > 1000 gpm/hr
 - LPI pump motor amps are stable.
- 5.5 IF a loss of RCS inventory during LPI decay heat removal has occurred,
THEN initiate makeup to the RCS:
- Ensure $> 1\%$ SDM,
- AND secure any draining of the RCS:
- IF the RCS is filled,
THEN maintain PZR level.
 - IF the RCS is drained,
OR the RCS is opened,
THEN maintain $> 10''$ on LT-5.
- 5.5.1 IF loss of inventory is due to a leak,
THEN determine the leak location,
and
isolate the leak, if possible.

LOSS OF LOW PRESSURE INJECTION SYSTEM
AP/3/A/1700/07

CASE B

Loss Of Low Pressure Injection System During Decay Heat Removal

Subsequent Actions

CAUTION 5.5.4.1 Do not allow an LPI pump to "cavitate." The leak in the RB may not be large enough to maintain sufficient sump level for LPI pump NPSH.

_____ 5.5.4.1 WHEN RB level > 3.5 ft,
THEN swap LPI pump suction to the RB EMER Sump:

- open the following valves:
 - 3LP-19 ('3A' Rx Bldg Suction)
 - 3LP-20 ('3B' Rx Bldg Suction)

and

close the following valves:

- 3LP-1 (LPI Return Block From RCS)
- 3LP-2 (LPI Return Block)
- 3LP-21 ('3A' LPI BWST Suction)
- 3LP-22 ('3B' LPI BWST Suction).

_____ 5.5.4.2 IF the RB level < 3.5 ft,
THEN cycle the LPI pump to allow the RB level to reestablish > 3.5 ft:

- Maintain LPI pump NPSH
- Maintain LPI flow.

LOSS OF LOW PRESSURE INJECTION SYSTEM
AP/3/A/1700/07

CASE B

Loss Of Low Pressure Injection System During Decay Heat Removal

Subsequent Actions

NOTE 5.6 Sustained loss of LPI decay heat removal during shutdown conditions, meets the criterion for an Alert condition. The TSC should be consulted whenever an alternate means of core cooling is required.

____ 5.6 IF NO LPI decay heat removal is available,
THEN perform the following:

____ 5.6.1 IF the RCS is filled,
AND RCS can be pressurized,
THEN perform the following:

____ 5.6.1.1 Close the following valves:

- 3LP-1 (LPI Return Block From RCS)
- 3LP-2 (LPI Return Block)
- 3LP-3 (LPI Hot Leg Suction).

____ 5.6.1.2 Align for HPI makeup from the BWST:

- Open one HPI suction valve from the BWST:
 - 3HP-24 ('3A' HPI BWST Suction)
 - 3HP-25 ('3B' HPI BWST Suction).

____ 5.6.1.3 Start the '3A' or '3B' HPI pump.

LOSS OF LOW PRESSURE INJECTION SYSTEM
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CASE B

Loss Of Low Pressure Injection System During Decay Heat Removal

Subsequent Actions

- ___ 5.6.1.4 Throttle 3HP-120 (RC Volume Control) to establish a PZR level.
- ___ 5.6.1.5 Establish RCS flow by one of the following:
- Increase RCS pressure above RCP NPSH and start one RCP:
 - REFER TO OP/3/A/1103/06, RCP OPERATION.
 - Establish natural circulation.
- ___ 5.6.1.6 Initiate FDW flow and establish proper SG level:
- 30" XSUR with RCP
 - 240" XSUR without RCP.
- ___ 5.6.1.7 Maintain RCS cold leg temperature < 200°F:
- IF condenser vacuum exists,
THEN use the TBVs,
IF NOT,
THEN use the Atmospheric Dump Valves:
 - REFER TO OP/0/A/1102/25, SHUTDOWN FOLLOWING A FIRE.

LOSS OF LOW PRESSURE INJECTION SYSTEM
AP/3/A/1700/07

CASE B

Loss Of Low Pressure Injection System During Decay Heat Removal

Subsequent Actions

____ 5.6.1.8 IF primary to secondary heat transfer
CANNOT be established,
THEN establish RCS pressure at \approx 200 psig,
AND open the following valves to align
HPI suction from the LPI system:

- 3LP-1 (LPI Return Block From RCS)
- 3LP-2 (LPI Return Block)
- 3LP-3 (LPI Hot Leg Suction)
- 3LP-11 ('3A' LPI Cooler Inlet)
- 3LP-12 ('3A' LPI Cooler Outlet)
- 3LP-15 ('3A' LPI to HPI and RBS).

____ 5.6.1.9 Limit HPI flow to \leq 500 gpm with the '3A' or
'3B' HPI pump operating.

____ 5.6.1.10 Establish primary to secondary heat transfer
as soon as possible since HPI flow alone may
have insufficient capacity to remove decay
heat.

CAUTION 5.6.2 The RCS can overflow to the RB if the RCS is opened and
makeup is initiated.

____ 5.6.2 IF the RCS is opened,
THEN evacuate the RB,
AND establish Containment Integrity:

- REFER TO PT/3/A/115/08, REACTOR BUILDING
CONTAINMENT ISOLATION AND VERIFICATION.

LOSS OF LOW PRESSURE INJECTION SYSTEM
AP/3/A/1700/07

CASE B

Loss Of Low Pressure Injection System During Decay Heat Removal

Subsequent Actions

5.6.2.1 Align for HPI makeup from the BWST:

- Open one HPI suction valve from the BWST:
 - 3HP-24 ('3A' HPI BWST Suction)
 - 3HP-25 ('3B' HPI BWST Suction).

5.6.2.2 Start the '3A' or '3B' HPI pump.

5.6.2.3 Throttle 3HP-120 (RC Volume Control):

- Maintain RCS inventory if CETCs are NOT available.
- Maintain RCS temperature < 200 °F if CETCs are available.
- Minimize RCS overflow to the RB.

5.6.3 IF The Fuel Transfer Canal is full,
THEN use the SF Coolers to maintain RCS temperature:

- REFER TO OP/3/A/1104/06, SPENT FUEL COOLING SYSTEM.

END