# DOCUMENT TRANSMITTAL FORM 75689
## FOR DOCUMENTS TRANSMITTED TO DC DESK(NRC)*

DATE: 03 JUL 1992
BATCH: 100

| DOCUMENT NUMBER | SHEET NUMBER | REVISION NUMBER | COPY NUMBER |
|---|---|---|---|
| AP 790 | | 06 | 7 |
| AP 380 | | 20 | 7 |

INSTRUCTIONS TO THE ADDRESSEE

COMPLETE EACH OF THE INSTRUCTIONS BELOW WHICH ARE MARKED WITH AN " X "

_X_ (1) VERIFY THE DOCUMENTS RECEIVED AGREE WITH THE ABOVE DESCRIPTION
_X_ (2) INCORPORATE THE TRANSMITTED DOCUMENTS INTO YOUR FILES
_X_ (3) DESTROY DOCUMENTS OR PORTIONS OF DOCUMENTS SUPERSEDED BY THE ABOVE
_X_ (4) SIGN AND DATE IN THE SPACES BELOW INDICATING THAT YOU COMPLETED THESE INSTRUCTIONS.
___ (5) SIGN BELOW INDICATING THAT YOU HAVE READ AND UNDERSTOOD THE CHANGES AS IDENTIFIED
_X_ (6) RETURN TO DOCUMENT CONTROL, CRYSTAL RIVER UNIT 3, MAC# NA1C___
NR2A_X_ SA1G___ FLORIDA POWER CORP., P.O. BOX 219
CRYSTAL RIVER FLA. 32623
___ (7) QUALITY PROGRAMS PERSONNEL HAVE READ AND UNDERSTOOD THE CHANGES TO THE AFFECTED QAP'S

SIGNATURE OF ADDRESSEE _____ DATE _____

INDEPENDENT VERIFICATION _____ DATE _____ (OPS)



A045

# STATION BLACKOUT

## 1.0 ENTRY CONDITIONS

IF a loss of off-site power occurs during Modes 1 thru 4

AND neither 4160V ES buses can be energized.

THEN use this procedure.

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## 2.0 IMMEDIATE ACTIONS

| ACTIONS | DETAILS |
|---|---|

Note

There are no Immediate Actions in this procedure.

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## 3.0 FOLLOW-UP ACTIONS

| ACTIONS | DETAILS |
|---|---|
| 3.1 ___ Minimize RCS inventory loss. | o Close MUV-49. Valve position indication is available at the ES-B panel.<br>o Close MUV-253<br>o Contact Chemistry and ensure all sampling of the primary system is stopped. |
| 3.2 ___ Ensure core cooling. | o EFP-2 started<br>o EFIC OTSG level control is selected to 65%<br>o EFW flow exists to both OTSGs. |

Note

Neutron flux recorders will not be operable. Use edgewise meters for monitoring neutron flux levels.

| | |
|---|---|
| 3.3 ___ Verify the reactor is shutdown. | o IR flux decreasing.<br>o SR flux decreasing.<br>o SR flux at shutdown level and not increasing. |
| 3.4 ___ Secure DC motors at the Main Control Board that are not needed by placing their control switches in Pull-to-lock. | ___ MUP-3A, MUP A B/U LUBE OIL PP<br>___ MUP-3B, MUP B B/U LURE OIL PP<br>___ MUP-3C, MUP C B/U LUBE OIL PP<br>___ RCP-3A, RCP A DC OIL LIFT PP<br>___ RCP-3B, RCP B DC OIL LIFT PP<br>___ RCP-3C, RCP C DC OIL LIFT PP<br>___ RCP-3D, RCP D DC OIL LIFT PP |

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| | ACTIONS | DETAILS |
|---|---|---|
| 3.5 ___ | Actuate MS line isolation on both OTSGs. | o Depress "SG MAIN STM ISOLATION" pushbuttons.<br>o Verify all 4 MSIVs closed by observing status lights on PSA panel. |

Note

In-plant communications should be made with the hand-held radios, on Channel 11 during the performance of this procedure.

| | | |
|---|---|---|
| 3.6 ___ | Notify SOTA of plant conditions. | |
| 3.7 ___ | Notify available operator to observe EFP-2. | Locally observe EFP-2 performance and report indications of abnormal pump/turbine operation. |
| 3.8 ___ | Continue attempts to restore AC power to the 4160 ES buses. | o Attempt to restore operation.<br>o Determine status of 230KV Switchyard<br>o Off-Site Power Source Xfmr<br>o Unit 3 Startup Xfmr<br>o Determine status of 500KV switchyard to establish backfeed. |
| 3.9 ___ | IF, at any time while performing this procedure, 4160V ES bus power is available, THEN GO TO Step 3.23 in this procedure. | |

Table 1: Tsat Monitor Adequate Subcooling Margin

| Reactor Coolant | MARGIN |
|---|---|
| > 1500 psig | 30°F |
| ≤ 1500 to > 250 psig | 50°F |
| ≤ 250 to > 150 psig | 70°F |
| ≤ 150 psig | SPDS |
| ≤ 200°F | N/A |

| |
|---|
| 3.9 IF 4160V ES bus power is available,<br>THEN GO TO Step 3.23 in this procedure. |

| | ACTIONS | DETAILS |
|---|---|---|
| 3.10 ___ | IF, at any time while performing this procedure, adequate subcooling margin does NOT exist, THEN:<br>o Raise OTSG levels to 95% using EFW.<br>o Immediately begin a cooldown at the maximum achievable rate. | o See Table 1 for adequate subcooling margins.<br>o Depress "95%" level select pushbutton on both OTSGs.<br>o There are no applicable cooldown rate limits for this cooldown. |

NOTE

High Point Vent Valves should NOT be opened during performance of this procedure unless specifically directed.

NOTE

The PORV should remain closed during performance of this procedure unless specifically directed otherwise.

| | | |
|---|---|---|
| 3.11 ___ | Select PORV, RCV-10, to CLOSE. | ICS panel control switch. |

| | | |
|---|---|---|
| 3.12 ___ | IF, at any time while performing this procedure, RCS PRESS increases to ≈ 2400 psig THEN manually open rate the PORV to reduce RCS PRESS based on subcooling.<br><br>IF the PORV is NOT available, THEN allow RCS PRESS to increase to the PZR Safety Valve setpoint of 2500 psig. | o IF adequate subcooling margin does NOT exist, THEN reduce RCS PRESS until $T_{incore} \approx 50°F > T_{sat}$ of the OTSG.<br>o IF adequate subcooling margin exists, THEN reduce RCS PRESS until:<br>o RCS PRESS ≈ 100 psig above the adequate subcooling margin curve<br><br>OR<br><br>o RCS PRESS ≈ 1600 psig |

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| ≤ 1500 to > 250 psig | 50°F |
| ≤ 250 to > 150 psig | 70°F |
| ≤ 150 psig | SPDS |
| ≤ 200°F | N/A |

3.9 IF 4160V ES bus power is available,
THEN GO TO Step 3.23 in this procedure.

3.10 IF adequate subcooling margin does NOT exist,
THEN raise OTSG levels to 95% with EFW.
AND begin a cooldown at maximum rate.

3.12 IF RCS PRESS increases to ≈ 2400 psig,
THEN manually open the PORV to reduce RCS PRESS based on subcooling.

| ACTIONS | DETAILS |
|---|---|
| 3.13 ___ Vent main generator $H_2$ pressure to ≈ 0 psig. | Notify available operator to perform the following:<br>1 ___ Close $H_2$ isolation valves:<br>o GGV-221 o GGV-214<br>2 ___ Open $H_2$ vent valves:<br>o GGV-232 o GGV-274<br>Valves located on 95' TB at $H_2$ manifold area. |
| 3.14 ___ Control EFW flow to maintain RCS TEMP and minimize PZR outsurge. | |
| 3.15 ___ Provide cooling to the electrical equipment in the Control Complex | 1 ___ Ensure the following doors are open and remain open until Control Complex ventilation is restored.<br>o All Annunciator cabinet doors<br>o All ICS cabinet doors<br>o All NNI cabinet doors<br>o All EFIC cabinet doors<br>o All doors on the 145 ft. elevation leading from the Control Room to the Turbine Building.<br>2 ___ IF Control Room temperature exceeds 105°F, THEN remove Control Room ceiling tiles to maintain Control Room ≤ 110°F. |

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| Reactor Coolant | MARGIN |
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| > 1500 psig | 30°F |
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| ≤ 250 to > 150 psig | 70°F |
| ≤ 150 psig | SPDS |
| ≤ 200°F | N/A |

3.9 IF 4160V ES bus power is available,
THEN GO TO Step 3.23 in this procedure.

3.10 IF adequate subcooling margin does NOT exist,
THEN raise OTSG levels to 95% with EFW.
AND begin a cooldown at maximum rate.

3.12 IF RCS PRESS increases to ≈ 2400 psig,
THEN manually open the PORV to reduce RCS PRESS based on subcooling.

| | ACTIONS | DETAILS |
|---|---|---|
| 3.16 ___ | IF, at any time, while performing this procedure, OTSG PRESS decreases to ≤ 100 psig AND Units 1/2 steam is available, THEN supply EFP-2 from Units 1/2 steam. | Perform Enclosure 1 to supply EFP-2 from Units 1/2 steam. |
| 3.17 ___ | IF instrument air is not available. THEN align $N_2$ to the ADVs | o Close $N_2$ vent valve NGV-324.<br>o Open $N_2$ supply valve NGV-312. |
| 3.18 ___ | Control OTSG PRESS to prevent cooldown of the RCS. | |
| 3.19 ___ | Place EFP-1 control switch in Pull-to-lock. | Provides for controlled start-up following power restoration. |

Note

FWP-5A and FWP-5B should be operated for 30 minutes following event initiation.

| | | |
|---|---|---|
| 3.20 ___ | IF power restoration has not occurred, THEN stop FWP lube oil pumps. | 1 ___ Place FWP-5A in Pull-to-lock.<br>2 ___ Place FWP-5B in Pull-to-lock. |
| 3.21 ___ | De-energize plant computer Invertor VBIT-1E. | 1 ___ Open Invertor "AC Input" Bkr.<br>2 ___ Open Invertor "AC Output" Bkr.<br>3 ___ Open Invertor "Battery Input" Bkr. |

Table 1: Tsat Monitor Adequate Subcooling Margin

| Reactor Coolant | MARGIN |
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| > 1500 psig | 30°F |
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| ≤ 250 to > 150 psig | 70°F |
| ≤ 150 psig | SPDS |
| ≤ 200°F | N/A |

3.9 IF 4160V ES bus power is available,
THEN GO TO Step 3.23 in this procedure.

3.10 IF adequate subcooling margin does NOT exist,
THEN raise OTSG levels to 95% with EFW.
AND begin a cooldown at maximum rate.

3.12 IF RCS PRESS increases to ≈ 2400 psig,
THEN manually open the PORV to reduce RCS PRESS based on subcooling.

3.16 IF OTSG PRESS decreases to ≤ 100 psig
AND Units 1/2 steam is available,
THEN supply EFP-2 from Units 1/2 steam.

| ACTIONS | DETAILS |
|---|---|
| 3.22 ___ WHEN main generator $H_2$ pressure has decreased to ≈ 0 psig, THEN stop TBP-3 and TBP-10 AND open DPDP switches for these pumps. | o Use local $H_2$ pressure indication, TB-156-PI, located on 95' TB.<br>1 ___ Place TBP-3 control switch in Pull-to-lock.<br>2 ___ Open DPDP 1C, switches 2 and 16.<br>3 ___ Open DPDP 3B, switches 17 and 13. |
| Continue on in this procedure. | |

Note

Opening HPI pump Bkrs provides for controlled start-up following power restoration.

| | |
|---|---|
| 3.23 ___ IF an ES actuation has occurred prior to energizing the 4160V ES buses. THEN ensure ES is bypassed or reset AND ensure HPI pump Bkrs are open | 1 ___ Ensure ES is bypassed or reset<br>___ HPI bypassed or reset<br>___ LPI bypassed or reset<br>___ RBIC bypassed or reset<br>2 ___ Position the following control switches to "STOP" then "NORM-AFT-STOP"<br>___ MUP-1A<br>___ MUP-1B<br>___ MUP-1C |

3.24 ___ WHEN ES 4160V power is available, THEN continue this procedure.

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| ≤ 250 to > 150 psig | 70°F |
| ≤ 150 psig | SPDS |
| ≤ 200°F | N/A |

3.9 IF 4160V ES bus power is available,
THEN GO TO Step 3.23 in this procedure.

3.10 IF adequate subcooling margin does NOT exist,
THEN raise OTSG levels to 95% with EFW.
AND begin a cooldown at maximum rate.

3.12 IF RCS PRESS increases to ≈ 2400 psig,
THEN manually open the PORV to reduce RCS PRESS based on subcooling.

3.16 IF OTSG PRESS decreases to ≤ 100 psig
AND Units 1/2 steam is available,
THEN supply EFP-2 from Units 1/2 steam.

| ACTIONS | DETAILS |
|---|---|

Note

If the A ES 4160V ES/UV Undervoltage Lockout has actuated, it will be necessary to defeat this lockout by opening Switch AY, located in ES 4160V Bus A Cubicle 3A13, Dummy Bkr, and reset the Undervoltage Lockout.

3.25 ___ Restore power to ES 4160V A Bus.

1 ___ Ensure switchgear room is cleared prior to energizing the bus.

2 ___ Close one of the following feeders by selecting CLOSE position for ≈ 10 seconds:

- o 3211, Unit 3 Offsite Power Transformer,

  OR

- o 3205, Unit 3 Startup Transformer,

  OR

- o 3209, If EDG-1A is operating at rated voltage and speed.

3 ___ IF Switch AY in Cubicle 3A13, Dummy Bkr, is open, THEN close the switch.

4 ___ IF EDG is supplying the bus, THEN CONCURRENTLY PERFORM AP-770, Emergency Diesel Generator Actuation, beginning with Step 3.8.

Table 1: Tsat Monitor Adequate Subcooling Margin

| Reactor Coolant | MARGIN |
|---|---|
| > 1500 psig | 30°F |
| ≤ 1500 to > 250 psig | 50°F |
| ≤ 250 to > 150 psig | 70°F |
| ≤ 150 psig | SPDS |
| ≤ 200°F | N/A |

3.10 IF adequate subcooling margin does NOT exist,
THEN raise OTSG levels to 95% with EFW.
AND begin a cooldown at maximum rate.

3.12 IF RCS PRESS increases to ≈ 2400 psig,
THEN manually open the PORV to reduce RCS PRESS based on subcooling.

3.16 IF OTSG PRESS decreases to ≤ 100 psig
AND Units 1/2 steam is available,
THEN supply EFP-2 from Units 1/2 steam.

| ACTIONS | DETAILS |
|---|---|
| **Note**<br>If the B ES 4160V ES/UV Undervoltage Lockout has actuated, it will be necessary to defeat this lockout by opening Switch AY, located in ES 4160V Bus B Cubicle 3B2, Dummy Bkr, and reset the Undervoltage Lockout. | |
| 3.26 ___ Restore power to ES 4160V B Bus. | 1 ___ Ensure switchgear room is cleared prior to energizing the bus.<br>2 ___ Close one of the following feeders by selecting CLOSE position for ≈ 10 seconds:<br>o 3212, Unit 3 Offsite Power Transformer,<br>OR<br>o 3206, Unit 3 Startup Transformer,<br>OR<br>o 3210, If EDG-1B is operating at rated voltage and speed.<br>3 ___ IF Switch AY in Cubicle 3B2, Dummy Bkr, is open, THEN close the switch.<br>4 ___ IF EDG is supplying the bus, THEN CONCURRENTLY PERFORM AP-770, Emergency Diesel Generator Actuation, beginning with Step 3.8. |

Table 1: Tsat Monitor Adequate Subcooling Margin

| Reactor Coolant | MARGIN |
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| > 1500 psig | 30°F |
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| ≤ 150 psig | SPDS |
| ≤ 200°F | N/A |

3.10 IF adequate subcooling margin does NOT exist,
THEN raise OTSG levels to 95% with EFW.
AND begin a cooldown at maximum rate.

3.12 IF RCS PRESS increases to ≈ 2400 psig,
THEN manually open the PORV to reduce RCS PRESS based on subcooling.

3.16 IF OTSG PRESS decreases to ≤ 100 psig
AND Units 1/2 steam is available,
THEN supply EFP-2 from Units 1/2 steam.

| ACTIONS | DETAILS |
|---|---|
| 3.27 ___ IF any ES 480V bus is de-energized, THEN energize the de-energized bus or busses. | o ES 480V Bus 3A:<br>1 IF UV lockout relays are tripped, THEN reset the lockout relays located behind the MCB.<br>1 ___ 8627/ESA<br>2 ___ 86X27/ESA<br>2 ___ Close Bkr 3221.<br>3 ___ Close Bkr 3311.<br>o ES 480V Bus 3B:<br>1 ___ IF UV lockout relay is tripped, THEN reset the lockout relay located behind the MCB.<br>o ___ 8627/ESB<br>2 ___ Close Bkr 3220.<br>3 ___ Close Bkr 3310. |
| 3.28 ___ Ensure all ES 480V MCCs are energized. | ___ ES MCC 3A1<br>___ ES MCC 3A2<br>___ ES MCC 3A3<br>___ ES MCC 3B1<br>___ ES MCC 3B2<br>___ ES MCC 3B3<br>___ ES MCC 3AB |

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| ≤ 250 to > 150 psig | 70°F |
| ≤ 150 psig | SPDS |
| ≤ 200°F | N/A |

3.10 IF adequate subcooling margin does NOT exist,
THEN raise OTSG levels to 95% with EFW.
AND begin a cooldown at maximum rate.

3.12 IF RCS PRESS increases to ≈ 2400 psig,
THEN manually open the PORV to reduce RCS PRESS based on subcooling.

3.16 IF OTSG PRESS decreases to ≤ 100 psig
AND Units 1/2 steam is available,
THEN supply EFP-2 from Units 1/2 steam.

3.0 FOLLOW-UP ACTIONS (CONT'D)

| | ACTIONS | DETAILS |
|---|---|---|
| 3.29 ___ | Ensure SW and RW cooling water systems are operating. | o ___ SWP-1A or SWP-1B<br>o ___ RWP-2A or RWP-2B |
| 3.30 ___ | IF EFW is required, THEN start EFP-1 AND CONCURRENTLY PERFORM AP-450, Emergency Feedwater Actuation, beginning with Step 3.9. | o ___ Start EFP-1 from the Main Control Room. |
| 3.31 ___ | IF EFP-2 is NOT required, THEN stop EFP-2. | Close ASV-5 and ASV-204. |
| 3.32 ___ | IF adequate subcooling margin exists, THEN GO TO Step 3.35 in this procedure. | |

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| ≤ 150 psig | SPDS |
| ≤ 200°F | N/A |

3.9 IF adequate subcooling margin does NOT exist,
THEN raise OTSG levels to 95% with EFW.
AND begin a cooldown at maximum rate.

3.11 IF RCS PRESS increases to ≈ 2400 psig,
THEN manually open the PORV to reduce RCS PRESS based on subcooling.

3.16 IF OTSG PRESS decreases to ≤ 100 psig
AND Units 1/2 steam is available,
THEN supply EFP-2 from Units 1/2 steam.

| ACTIONS | DETAILS |
|---|---|
| 3.33 ___ Establish HPI flow. | 1 ___ Ensure MUV-16, Seal Injection Control Valve is closed.<br>2 ___ Verify "SWGR TRANSF PERMIT" light is lit.<br>3 ___ Ensure MUP control switch is selected to NORM-AFT-STOP.<br>4 ___ Ensure BWST suction is open.<br>o MUV-73 o MUV-58<br>5 ___ Ensure MUP recirc valves are open:<br>o MUV-53 o MUV-257<br>6 ___ Ensure Main Lube Oil Pump is operating.<br>7 ___ Ensure Main Gear Oil Pump is operating.<br>8 ___ Start MUP.<br>9 ___ Establish HPI using all 4 injection lines. |

3.34 ___ GO TO 1 of the following procedures based on $T_{incore}$

| $T_{incore}$ | Procedure |
|---|---|
| < Adequate Subcooling Margin | AP-380, ESA beginning with Step 3.5 |
| Superheated | EP-290, ICC beginning with Step 3.1 |

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| ≤ 150 psig | SPDS |
| ≤ 200°F | N/A |

3.10 IF adequate subcooling margin does NOT exist,
THEN raise OTSG levels to 95% with EFW.
AND begin a cooldown at maximum rate.

3.12 IF RCS PRESS increases to ≈ 2400 psig,
THEN manually open the PORV to reduce RCS PRESS based on subcooling.

3.16 IF OTSG PRESS decreases to ≤ 100 psig
AND Units 1/2 steam is available,
THEN supply EFP-2 from Units 1/2 steam.

| ACTIONS | DETAILS |
|---|---|
| 3.35 ___ IF adequate subcooling margin exists, THEN CONCURRENTLY PERFORM AP-530, Natural Circulation, beginning with Step 3.4. | See Table 1 for adequate subcooling margins. |

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CAUTION

Ensure cooling water is supplied to MUP prior to starting.

**********

3.36 ___ IF MUP is required THEN start 1 MUP AND establish RCP Seal Injection and Make-up.

1 ___ Ensure closed MUV-16, Seal Injection Control Valve.

2 ___ Ensure closed MUV-31, PZR Level Control Valve.

3 ___ Verify "SWGR TRANSF PERMIT" light is lit for desired MUP to be started.

4 ___ Ensure MUP Main Lube Oil Pump running.

5 ___ Start MUP Main Gear Oil Pump.

6 ___ Ensure respective suction valves are opened.

7 ___ Start desired MUP.

8 ___ Ensure open MUV-18, Seal Injection Block Valve.

9 ___ Throttle open MUV-16 to obtain 2 gpm/RCP.

10 ___ Ensure open MUV-253, RCPs Controlled Bleed-off MOV.

11 ___ Throttle open MUV-16 over a 30 min period to establish ≈ 10 gpm/RCP.

12 ___ Operate MUV-31 to obtain desired PZR level.

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| ≤ 150 psig | SPDS |
| ≤ 200°F | N/A |

3.10 IF adequate subcooling margin does NOT exist,
THEN raise OTSG levels to 95% with EFW.
AND begin a cooldown at maximum rate.

3.12 IF RCS PRESS increases to ≈ 2400 psig,
THEN manually open the PORV to reduce RCS PRESS based on subcooling.

3.16 IF OTSG PRESS decreases to ≤ 100 psig
AND Units 1/2 steam is available,
THEN supply EFP-2 from Units 1/2 steam.

| ACTIONS | DETAILS |
|---|---|
| 3.37 ___ IF RCS make-up is established, AND RCS letdown is desired, THEN restore RCS letdown. | 1 ___ Ensure the following valves are closed:<br>o ___ MUV-49<br>o ___ MUV-50<br>c ___ MUV-51<br>2 ___ Place desired letdown coolers in service:<br>1 ___ Ensure SW cooling<br>2 ___ Ensure MU inlet and outlet valves are open<br>3 ___ Restore letdown flow:<br>1 ___ Open MUV-49<br>2 ___ Throttle Open MUV-51 to establish ≈ 2.5 gpm each minute for 20 minutes<br>3 ___ Allow letdown temperature to stabilize for ≈ 10 minutes<br>4 ___ Open MUV-50<br>5 ___ Throttle MUV-51 to establish desired letdown flow. |
| 3.38 ___ Energize plant computer Invertor VBIT-1E. | 1 ___ Close Invertor "Battery Input" Bkr.<br>2 ___ Close Invertor "AC Output" Bkr.<br>3 ___ Close Invertor "AC Input" Bkr.<br>4 ___ Verify normal Invertor AC output voltage of approximately 120V. |

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|---|---|
| > 1500 psig | 30°F |
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| ≤ 250 to > 150 psig | 70°F |
| ≤ 150 psig | SPDS |
| ≤ 200°F | N/A |

3.10 IF adequate subcooling margin does NOT exist,
THEN raise OTSG levels to 95% with EFW.
AND begin a cooldown at maximum rate.

3.12 IF RCS PRESS increases to ≈ 2400 psig,
THEN manually open the PORV to reduce RCS PRESS based on subcooling.

3.16 IF OTSG PRESS decreases to ≤ 100 psig
AND Units 1/2 steam is available,
THEN supply EFP-2 from Units 1/2 steam.

3.0 FOLLOW-UP ACTIONS (CONT'D)

| ACTIONS | | DETAILS |
|---|---|---|
| 3.39 ___ | Determine the operability of balance of plant equipment and restore plant systems as required. | GO TO appropriate OPs for plant systems operational guidance. |

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Enclosure 1

Supplying EFP-2 From Units 1/2 Steam

1. ___ Perform valve alignment for ASDT 1 & 2.

o ASDT-1 valve alignment:

___ Open ASV-93, Root Isol.
___ Open ASV-118, Inlet.
___ Close ASV-117, Outlet.
___ Fully open ASV-109 and blowdown through orificed cap as required.
___ Close ASV-101, Bypass.

o ASDT-2 valve alignment:

___ Open ASV-94, Root Isol.
___ Open ASV-120, Inlet.
___ Close ASV-119, Outlet.
___ Fully open ASV-110 and blowdown through orificed cap as required.
___ Close ASV-102, Bypass.

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2. ___ IF steam line up to ASV-18 is NOT warmed, THEN notify Unit 1/2 Control Room to start warmup & pressurization of steam line up to ASV-18.

Ensure Auxiliary Steam Tie-line is drained of condensate prior to opening ASV-18.

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3. ___ Perform warmup & pressurization between ASV-18 and ASV-16

1 ___ Close the following ASV isolation valves:

___ ASV-15
___ ASV-183
___ ASV-16

2 ___ Throttle open ASV-18 one turn off closed seat.

3 ___ Ensure condensate removal via ASDT-1.

4 ___ WHEN steam PRESS is equalized around ASV-18, THEN open ASV-18.

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Supplying EFP-2 From Units 1/2 Steam

4. ___ Perform warmup & pressurization of Auxiliary Steam Line to EFP-2.

1 ___ Ensure closed ASV-33.

2 ___ Open ASV-23.

3 ___ Throttle open ASV-15 one turn off closed seat.

4 ___ WHEN steam PRESS is equalized around ASV-15, THEN open ASV-15.

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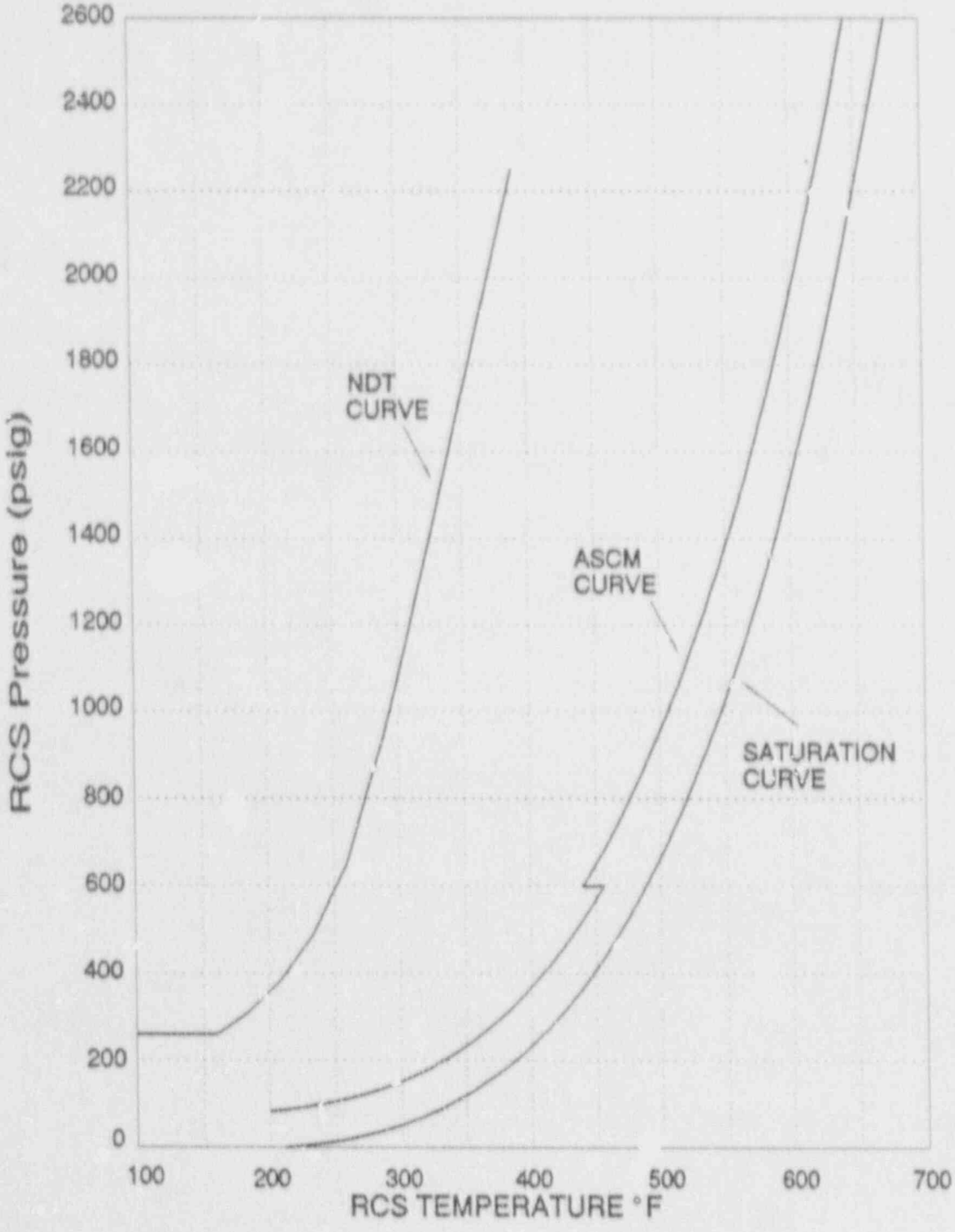
Enclosure 2

Cooldown Curves




Acceptable region is:

- o below and to the right of the NDT curve
- o above and to the left of the Adequate Subcooling Margin curve

# ENGINEERED SAFEGUARDS ACTUATION

## 1.0 ENTRY CONDITIONS

IF any of the following conditions exist:

- o Manual ES Actuation,
- o RCS PRESS is < 1500 PSIG,
- o RB PRESS is > 4 PSIG,

THEN use this procedure.

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## 2.0 IMMEDIATE ACTIONS

| ACTIONS | DETAILS |
|---|---|

2.1 Ensure ES status lights are blue for the actuated systems.

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CAUTION

IF RCPs have NOT been stopped within 2 min from the time that adequate subcooling margin was lost,
THEN RCPs must remain running to prevent core damage.

**********

2.2 Verify adequate subcooling margin.

IF adequate subcooling margin does NOT exist,
THEN stop all RCPs.

Adequate Subcooling Margin

| Reactor Coolant | MARGIN |
|---|---|
| > 1500 PSIG | 30°F |
| ≤ 1500 to > 250 PSIG | 50°F |
| ≤ 250 to > 150 PSIG | 70°F |
| ≤ 150 PSIG | SPDS |
| ≤ 200°F | N/A |

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## 3.0 FOLLOW-UP ACTIONS

| ACTIONS | DETAILS |
|---|---|
| 3.1 ___ Notify SOTA of plant conditions. | |
| 3.2 ___ CONCURRENTLY PERFORM VP-580, Plant Safety Verification Procedure, beginning with Step 1.1. | |

Table 1: Tsat Monitor Adequate Subcooling Margin

| Reactor Coolant | MARGIN |
|---|---|
| > 1500 PSIG | 30°F |
| ≤ 1500 to > 250 PSIG | 50°F |
| ≤ 250 to > 150 PSIG | 70°F |
| ≤ 150 PSIG | SPDS |
| ≤ 200°F | N/A |

| ACTIONS | DETAILS |
|---|---|

**********

CAUTION

IF RCPs have NOT been stopped within 2 min from the time that adequate subcooling margin was lost,
THEN RCPs must remain running to prevent core damage.

**********

| | |
|---|---|
| 3.3 IF, at any time while performing this procedure, adequate subcooling margin does NOT exist, THEN: | See Table 1 for adequate subcooling margins. |
| ___ Stop all RCPs, | Stop all RCPs and ensure Oil Lift pumps start. |
| ___ Raise OTSG levels to 95% using EFW, | Raise OTSG level to 95%:<br>1. Ensure both EFW trains are initiated.<br>2. Depress "95%" level select pushbuttons on OTSG A and B. |
| ___ Start full HPI. | Start full HPI:<br>1. ___ Open MUP suction valves from BWST:<br>o MUV-73 o MUV-58<br>2. ___ Ensure ≥ 2 MUPs and their cooling water pumps are operating.<br>3. Open all 4 HPI valves:<br>___ MUV-23 ___ MUV-24<br>___ MUV-25 ___ MUV-26. |

Table 1: Tsat Monitor Adequate Subcooling Margin

| Reactor Coolant | MARGIN |
|---|---|
| > 1500 PSIG | 30°F |
| ≤ 1500 to > 250 PSIG | 50°F |
| ≤ 250 to > 150 PSIG | 70°F |
| ≤ 150 PSIG | SPDS |
| ≤ 200°F | N/A |

3.3 IF adequate subcooling margin does NOT exist, THEN:

- o Within 2 min, stop all RCPs,
- o Raise OTSG levels to 95% using EFW,
- o Start full HPI.

| ACTIONS | DETAILS |
|---|---|
| 3.4 ___ IF adequate subcooling margin does NOT exist, AND all RCPs have NOT been stopped within 2 min, THEN reduce operating RCPs to 1/loop. | |

NOTE

IF HPI flow is ≥ 200 gpm for any nozzle, as indicated on the narrow range HPI flow instrument,
THEN use the wide range HPI flow instrument for that nozzle on ES Section of Main Control Board.

3.5 ___ IF at anytime while performing this procedure an HPI actuation is present, THEN bypass HPI actuation, AND balance HPI flows.

1. Select the following to "BYPASS" on both A and B HPI channels:

   ___ "HPI RC1"

   ___ "HPI RC2"

   ___ "HPI RC3"

2. Close MUV-27.

3. IF 1 HPI line flow indicates off scale high as indicated on the narrow range HPI flow instrument and is verified to be a high flow condition using the wide range indication,
   THEN isolate the high line, AND balance the other 3 lines.

   IF NOT,
   THEN balance all 4 HPI lines.

Table 1: Tsat Monitor Adequate Subcooling Margin

| Reactor Coolant | MARGIN |
|---|---|
| > 1500 PSIG | 30°F |
| ≤ 1500 to > 250 PSIG | 50°F |
| ≤ 250 to > 150 PSIG | 70°F |
| ≤ 150 PSIG | SPDS |
| ≤ 200°F | N/A |

3.3 IF adequate subcooling margin does NOT exist, THEN:

- o Within 2 min, stop all RCPs,
- o Raise OTSG levels to 95% using EFW,
- o Start full HPI.

| ACTIONS | DETAILS |
|---|---|

NOTE

LPI will not automatically actuate at 4 PSIG RB PRESS during a loss of off-site power.

| | | |
|---|---|---|
| 3.6 | ____ IF, at anytime while performing this procedure, LPI actuation is present,<br><br>AND RCS pressure is > 500 PSIG<br><br>THEN:<br><br>____ Stop both LPI pumps.<br><br>____ Go to step 3.10 of this procedure. | 1. Reset LPI bistables:<br><br>___ RC4 in ACT. CHAN. CAB #1<br>___ RC5 in ACT. CHAN. CAB #2<br>___ RC6 in ACT. CHAN. CAB #3<br><br>2. STOP DHP-1A and DHP-1B |
| 3.7 | IF, at anytime while performing this procedure, LPI actuation is present, AND RCS pressure is < 500 PSIG AND LPI flow is > 300 GPM / pump<br>THEN:<br><br>___ Ensure proper operation<br><br>___ Bypass LPI actuation<br><br>___ Go to step 3.10 of this procedure. | o Ensure DHV-110 and DHV-111 are operating properly.<br><br>o Select the following to "BYPASS" on both A and B channels:<br><br>___ "LPI RC4"<br>___ "LPI RC5"<br>___ "LPI RC6" |

Table 1: Tsat Monitor Adequate Subcooling Margin

| Reactor Coolant | MARGIN |
|---|---|
| > 1500 PSIG | 30°F |
| ≤ 1500 to > 250 PSIG | 50°F |
| ≤ 250 to > 150 PSIG | 70°F |
| ≤ 150 PSIG | SPDS |
| ≤ 200°F | N/A |

3.3 IF adequate subcooling margin does NOT exist, THEN:

- o Within 2 min, stop all RCPs,
- o Raise OTSG levels to 95% using EFW,
- o Start full HPI.

| ACTIONS | DETAILS |
|---|---|

NOTE

RCS pressure > 100 psig or LPI flow > 2,000 gpm could produce a DP > 100 psid across DHV-7 & 8. DHV-7 & 8 may not open under these high DP conditions.

3.8 IF at any time in this procedure ONE LPI pump is unavailable AND LPI flow through BOTH LPI trains is desired THEN crossite the LPI trains

1.___ Ensure one LPI train is in operation.

2.___ Close the flow control valve on the unavailable LPI pump.

3.___ Reduce the DP across DHV-7 and DHV-8 with any of the following methods

- o___ Ensure RCS pressure is <100 psig
- o___ Adjust the flow control valve on the operating LPI pump for < 2,000 gpm

4.___ Open the crosstie valves:

- o___ DHV-7
- o___ DHV-8

5.___ Balance flows to the LPI trains

- o___ Monitor DH-38-FI for crossover flow.
- o___ Throttle DHV-5 and DHV-6 to balance flows.
- o___ Adjust the flow control valve on the operating LPI pump for the desired total flow.

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| ACTIONS | DETAILS |
|---|---|
| 3.9 ___ IF, at anytime while performing this procedure, LPI has or should have actuated, AND LPI flow is < 300 gpm/pump, THEN perform the following: | o Select both A and B channels to "BYPASS":<br>___ "LPI RC4"<br>___ "LPI RC5"<br>___ "LPI RC6" |
| 1 ___ Ensure LPI status lights are blue | o Increase LPI flow as follows:<br>After performing each step determine if LPI flow is > 300 gpm/pump. |
| 2 ___ Ensure LPI is bypassed | |
| 3 ___ Increase LPI flow | |
| 4 ___ GO TO Step 3.10 | IF LPI flow develops > 300 gpm/pump, THEN GO TO Step 3.10 of this procedure. |
| | 1 ___ Ensure DHV-110 and DHV-111 are open. |
| | 2 ___ Open the PORV, RCV-10. |
| | 3 ___ Perform Step 3.13 in this procedure to align HPI suction from LPI, THEN RETURN TO this step. |
| | 4 ___ Open High Point vents: |

| PZR vents | |
|---|---|
| RCV-159 | RCV-160 |
| Hot Leg vents | |
| A-Loop | B-Loop |
| RCV-157 | RCV-163 |
| RCV-158 | RCV-164 |

Table 1: Tsat Monitor Adequate Subcooling Margin

| Reactor Coolant | MARGIN |
|---|---|
| > 1500 PSIG | 30°F |
| ≤ 1500 to > 250 PSIG | 50°F |
| ≤ 250 to > 150 PSIG | 70°F |
| ≤ 150 PSIG | SPDS |
| ≤ 200°F | N/A |

3.3 IF adequate subcooling margin does NOT exist, THEN:

- o Within 2 min, stop all RCPs,
- o Raise OTSG levels to 95% using EFW,
- o Start full HPI.

| ACTIONS | DETAILS |
|---|---|

NOTE

Only 2 out of 3 RB isolation actuation channels will bypass.

3.10 ___ IF RBIC actuation is present, THEN perform the following:

1 ___ Ensure all RBIC status lights are blue

2 ___ Bypass RBIC

3 ___ IF RCPs are running, THEN restore RCP services.

o Select "BYPASS" on both A and B channels of RBIC:

___ "RB ISO RB1"

___ "RB ISO RB2"

___ "RB ISO RB3"

o Restore RCP services:

1 ___ Select OPEN on the "ES TRAIN (B) NON-ESSEN. VALVES" switch

2 ___ Open RCP controlled bleed-off valves:

___ MUV-253

___ MUV-258 ___ MUV-259

___ MUV-260 ___ MUV-261

Table 1: Tsat Monitor Adequate Subcooling Margin

| Reactor Coolant | MARGIN |
|---|---|
| > 1500 PSIG | 30°F |
| ≤ 1500 to > 250 PSIG | 50°F |
| ≤ 250 to > 150 PSIG | 70°F |
| ≤ 150 PSIG | SPDS |
| ≤ 200°F | N/A |

3.3 IF adequate subcooling margin does NOT exist, THEN:

- o Within 2 min, stop all RCPs,
- o Raise OTSG levels to 95% using EFW,
- o Start full HPI.

## 3.0 FOLLOW-UP ACTIONS (CONT'D)

| ACTIONS | DETAILS |
|---|---|
| 3.11 ___ IF RB Spray actuation is present, THEN ensure proper RB Spray flow AND isolate BST-1 as required. | o Ensure BSV-3 and BSV-4 are regulating flow at 1500 to 1600 gpm.<br>o IF either BSP does NOT start, THEN close discharge valve on affected pump:<br>o BSP-1A: BSV-3<br>o BSP-1B: BSV-4<br>o IF RCS PRESS > 200 PSIG, THEN isolate BST-1.<br>o Close BSV-11 and BSV-12 |

Table 1: Tsat Monitor Adequate Subcooling Margin

| Reactor Coolant | MARGIN |
|---|---|
| > 1500 PSIG | 30°F |
| ≤ 15 to > 250 PSIG | 50°F |
| ≤ 250 to > 150 PSIG | 70°F |
| ≤ 150 PSIG | SPDS |
| ≤ 200°F | N/A |

3.3 IF adequate subcooling margin does NOT exist, THEN:

- o Within 2 min, stop all RCPs,
- o Raise OTSG levels to 95% using EFW,
- o Start full HPI.

| ACTIONS | DETAILS |
|---|---|

**********

CAUTION

Steps 3.12 and 3.13 must be completed to prevent RB WATER LEVEL from reaching 5' to preclude degrading instrument transmitters.

**********

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CAUTION

Due to MUV-62 being normally closed, both DH trains are required to be in operation to ensure suction to all MUPs.

**********

3.12 ___ IF at any time while performing this procedure, RB WATER LEVEL indicates ≥ 2.2', THEN transfer LPI pump suction from the BWST to the RB sump AND isolate BST-1.

1. ___ Ensure flow exists in both LPI trains
2. ___ Throttle LPI flow for each running LPI pump to ≈ 2000 gpm using DHV-5 and DHV-6
3. ___ Ensure 1200 gpm and "LOCAL" are selected for:
   - o BSV-3
   - o BSV-4
4. ___ Open RB sump outlet valves:
   - o DHV-42
   - o DHV-43
5. ___ WHEN RB sump outlet valves indicate open, THEN close BWST outlet valves:
   - o DHV-34
   - o DHV-35
6. ___ Close BST-1 outlet valves:
   - o BSV-12
   - o BSV-11

Table 1: Tsat Monitor Adequate Subcooling Margin

| Reactor Coolant | MARGIN |
|---|---|
| > 1500 PSIG | 30°F |
| ≤ 1500 to > 250 PSIG | 50°F |
| ≤ 250 to > 150 PSIG | 70°F |
| ≤ 150 PSIG | SPDS |
| ≤ 200°F | N/A |

3.3 IF adequate subcooling margin does NOT exist, THEN:

- o Within 2 min, stop all RCPs,
- o Raise OTSG levels to 95% using EFW,
- o Start full HPI.

| ACTIONS | DETAILS |
|---|---|

**********

CAUTION

Due to MUV-62 being normally closed, both DH trains are required to be in operation to ensure suction to all MUPs.

**********

| | | |
|---|---|---|
| 3.13 ___ | WHEN LPI suction is aligned to the RB sump, OR as directed by Step 3.9, THEN establish HPI suction from LPI.<br><br>Continue on in this procedure. | 1. ___ Open:<br>o DHV-11<br>o DHV-12<br>2. ___ Close:<br>o MUV-73<br>o MUV-58 |

NOTE

IF loss of subcooling was due to an overcooling event, THEN OTSG PRESS control should be regained prior to raising OTSG level.

| | | |
|---|---|---|
| 3.14 ___ | IF ES actuation is due to an overcooling event, THEN determine cause, AND stop overcooling. | Observe for:<br>o Low OTSG PRESS,<br>o High OTSG level,<br>o High MFW or EFW flow.<br>o SPDS trace indicating overcooling. |

Table 1: Tsat Monitor Adequate Subcooling Margin

| Reactor Coolant | MARGIN |
|---|---|
| > 1500 PSIG | 30°F |
| ≤ 1500 to > 250 PSIG | 50°F |
| ≤ 250 to > 150 PSIG | 70°F |
| ≤ 150 PSIG | SPDS |
| ≤ 200°F | N/A |

3.3 IF adequate subcooling margin does NOT exist, THEN:

- o Within 2 min, stop all RCPs,
- o Raise OTSG levels to 95% using EFW,
- o Start full HPI.

3.12 IF RB WATER LEVEL indicates ≥ 2'2"
3.13 THEN transfer LPI suction to RB sump AND establish HPI suction from LPI.

Table 2: Required OTSG Levels

| Condition | Level |
|---|---|
| Inadequate subcooling margin | 95% |
| No RCPs and adequate subcooling margin | 65% |
| RCPs and adequate subcooling margin | Low Level Limits |

| ACTIONS | DETAILS |
|---|---|
| 3.15 ___ Isolate possible sources of low RCS PRESS. | 1. Isolate the following:<br>o IF the PORV is NOT required to be opened, THEN close RCV-11, PORV block.<br>o Close the following letdown coolers inlet valves:<br>___ MUV-38,<br>___ MUV-39,<br>___ MUV-498.<br>o Close RCV-13, PZR spray block valve.<br>o Ensure DHV-3 is closed.<br>2. Reopen RCV-11 while observing RCS PRESS.<br>3. IF desired, THEN restore letdown path while observing RCS PRESS.<br>4. IF desired, THEN open RCV-13, PZR spray block valve, while observing RCS PRESS. |

Table 1: Tsat Monitor Adequate Subcooling Margin

| Reactor Coolant | MARGIN |
|---|---|
| > 1500 PSIG | 30°F |
| ≤ 1500 to > 250 PSIG | 50°F |
| ≤ 250 to > 150 PSIG | 70°F |
| ≤ 150 PSIG | SPDS |
| ≤ 200°F | N/A |

3.3 IF adequate subcooling margin does NOT exist, THEN:

- o Within 2 min, stop all RCPs,
- o Raise OTSG levels to 95% using EFW,
- o Start full HPI.

3.12 IF RB WATER LEVEL indicates ≥ 2'2"
3.13 THEN transfer LPI suction to RB sump AND establish HPI suction from LPI.

Table 2: Required OTSG Levels

| Condition | Level |
|---|---|
| Inadequate subcooling margin | 95% |
| No RCPs and adequate subcooling margin | 95% |
| RCPs and adequate subcooling margin | Low Level Limits |

| ACTIONS | DETAILS |
|---|---|

**********

CAUTION

IF adequate subcooling margin does NOT exist,
THEN OTSG levels must continuously increase until 95% is reached to ensure adequate heat removal.

**********

**********

CAUTION

IF adequate subcooling margin does NOT exist,
AND EFIC level control is in manual,
THEN EFW flow must be maintained > 200 gpm to each OTSG that is being controlled in manual to ensure adequate heat removal.

**********

NOTE

High RB TEMP may cause level instrumentation located inside the RB to read 10% higher than actual.

NOTE

EFP-1 will automatically trip upon actuation of LPI coincident with a loss of off-site power.

NOTE

EFIC control valves will not feed the OTSG until the EFIC setpoint ramps up to meet actual OTSG level.

| | | |
|---|---|---|
| 3.16 ___ | Ensure EFW is actuated and selected to required OTSG setpoint. | See Table 2 for required OTSG levels. |
| | IF EFW and MFW are NOT available,<br>THEN GO TO Step 3.42 in this procedure. | Begin HPI/PORV cooling. |
| | IF EFW is NOT available,<br>THEN CONCURRENTLY PERFORM AP-450, EFW Actuation, beginning with Step 3.9. | |

Table 1: Tsat Monitor Adequate Subcooling Margin

| Reactor Coolant | MARGIN |
|---|---|
| > 1500 PSIG | 30°F |
| ≤ 1500 to > 250 PSIG | 50°F |
| ≤ 250 to > 150 PSIG | 70°F |
| ≤ 150 PSIG | SPDS |
| ≤ 200°F | N/A |

3.3 IF adequate subcooling margin does NOT exist, THEN:

- o Within 2 min, stop all RCPs,
- o Raise OTSG levels to 95% using EFW,
- o Start full HPI.

3.12 IF RB WATER LEVEL indicates ≥ 2'2"
3.13 THEN transfer LPI suction to RB sump AND establish HPI suction from LPI.

Table 2: Required OTSG Levels

| Condition | Level |
|---|---|
| Inadequate subcooling margin | 95% |
| No RCPs and adequate subcooling margin | 65% |
| RCPs and adequate subcooling margin | Low Level Limits |

| ACTIONS | DETAILS |
|---|---|
| 3.17 ___ IF CFTs have emptied, THEN isolate CFTs, AND GO TO Step 3.34 in this procedure. | 1. Notify AB operator to remove locks and close Bkrs for CFT isolation valves at ES MCC-3AB:<br>o CFV-5 o CFV-6<br>2. Close:<br>o CFV-5 o CFV-6 |
| 3.18 ___ IF at any time while performing this procedure, RCS PRESS is > 2400 PSIG, THEN reduce RCS PRESS based on subcooling margin. | IF adequate subcooling margin does NOT exist, THEN open PORV to reduce RCS PRESS until Tincore ≈ 50°F > OTSG Tsat.<br>IF adequate subcooling margin exists, THEN open PORV to reduce RCS PRESS until:<br>o RC PRESS ≈ 100 PSIG > adequate subcooling margin curve<br>OR<br>o RCS PRESS ≈ 1600 PSIG |
| IF PORV is NOT available, THEN use PZR vents to lower RCS PRESS. | o PZR vents:<br>o RCV-159 o RCV-160. |

Table 1: Tsat Monitor Adequate Subcooling Margin

| Reactor Coolant | MARGIN |
|---|---|
| > 1500 PSIG | 30°F |
| ≤ 1500 to > 250 PSIG | 50°F |
| ≤ 250 to > 150 PSIG | 70°F |
| ≤ 150 PSIG | SPDS |
| ≤ 200°F | N/A |

3.3 IF adequate subcooling margin does NOT exist, THEN:

- o Within 2 min, stop all RCPs,
- o Raise OTSG levels to 95% using EFW,
- o Start full HPI.

3.12 IF RB WATER LEVEL indicates ≥ 2'2"
3.13 THEN transfer LPI suction to RB sump AND establish HPI suction from LPI.

Table 2: Required OTSG Levels

| Condition | Level |
|---|---|
| Inadequate subcooling margin | 95% |
| No RCPs and adequate subcooling margin | 67% |
| RCPs and adequate subcooling margin | Low Level Limits |

3.18 IF RCS PRESS is > 2400 PSIG, THEN reduce RC PRESS based on subcooling margin.

| ACTIONS | DETAILS |
|---|---|

**********

CAUTION

HPI flows must not be throttled to < 100 gpm/pump with MUP recirc valves closed, to prevent pump damage.

**********

3.19 ___ IF HPI throttle requirements are met, THEN throttle HPI as required.

- o MUP recirc valve operation:
  - o MUP recirc valves are NOT required to be open when throttling HPI to prevent pump runout.
  - o MUP recirc valves must be opened prior to throttling HPI to < 100 gpm/pump.
  - o MUP recirc valves:
    - o MUV-53 o MUV-257.
  - o HPI throttle requirements:
    - o HPI must be throttled to maintain subcooling margin < 100°F when no RCPs are operating.
    - o IF adequate subcooling exists based on incores, THEN HPI must be throttled to maintain RCS PRESS and TEMP below the NDT curve, see SPDS or Enclosure 2.
    - o HPI must be throttled to maintain HPI flow < 540 gpm/pump.
    - o HPI should be throttled to maintain PZR level 80" to 220" WHEN adequate subcooling margin exists based on incores.
    - o HPI may be throttled when adequate subcooling margin exists based on incores.

Table 1: Tsat Monitor Adequate Subcooling Margin

| Reactor Coolant | MARGIN |
|---|---|
| > 1500 PSIG | 30°F |
| ≤ 1500 to > 250 PSIG | 50°F |
| ≤ 250 to > 150 PSIG | 70°F |
| ≤ 150 PSIG | SPDS |
| ≤ 200°F | N/A |

3.3 IF adequate subcooling margin does NOT exist, THEN:

- o Within 2 min, stop all RCPs,
- o Raise OTSG levels to 95% using EFW,
- o Start full HPI.

3.12 IF RB WATER LEVEL indicates ≥ 2'2"
3.13 THEN transfer LPI suction to RB sump AND establish HPI suction from LPI.

3.18 IF RCS PRESS is > 2400 PSIG, THEN reduce RC PRESS based on subcooling margin.

3.19 IF HPI throttle requirements are met, THEN throttle HPI flows as required.

- o HPI must be throttled to maintain subcooling margin < 100°F when no RCPs are operating.
- o IF adequate subcooling margin exists based on incores THEN HPI must be throttled to maintain RCS PRESS and TEMP below NOT curve.
- o HPI must be throttled to maintain HPI flow < 540 gpm/pump.
- o HPI should be throttled to maintain PZR level 80" to 220" WHEN adequate subcooling margin exists based on incores.
- o HPI may be throttled when adequate subcooling margin exists based on incores.

| ACTIONS | DETAILS |
|---|---|
| 3.20 ___ WHEN either OTSG PRESS is between 725 and 600 PSIG, THEN bypass EFIC MS and MFW isolation actuations.<br><br>Continue on in this procedure. | Depress "< 725 PSI OTSG PRESS EFIC ACT. BYPASS" pushbuttons:<br>___ Channel A ___ Channel B<br>___ Channel C ___ Channel D. |

Note

Subcooling margin should be closely observed after starting each RCP.

3.21 ___ IF, at any time while performing this procedure, RCPs are available, AND ≥1 OTSG is available, THEN start 1 RCP in each loop.
OR 2 RCPs in 1 loop

IF RCPs are available, AND OTSGs are NOT available, THEN start 1 RCP.

- RCPs are available when all the following exist:
  - RCP start permissives are met,
  - RCS PRESS and TEMP are above RCP NPSH curves, see SPDS or Enclosure 1,
  - Adequate subcooling margin, see Table 1.
- OTSGs are available when all the following exist:
  - EFW or MFW or AFW available,
  - TBVs or ADVs available,
  - OTSG integrity.
- Establish RCP-1B operating for maximum PZR spray.

3.3 IF adequate subcooling margin does NOT exist, THEN:

- o Within 2 min, stop all RCPs,
- o Raise OTSG levels to 95% using EFW,
- o Start full HPI.

3.12 IF RB WATER LEVEL indicates ≥ 2'2"
3.13 THEN transfer LPI suction to RB sump
AND establish HPI suction from LPI.

3.18 IF RCS PRESS is > 2400 PSIG,
THEN reduce RC PRESS based on subcooling margin.

3.19 IF HPI throttle requirements are met,
THEN throttle HPI flows as required.

- o HPI must be throttled to maintain subcooling margin < 100°F when no RCPs are operating.
- o IF adequate subcooling margin exists based on incores THEN HPI must be throttled to maintain RCS PRESS and TEMP below NDT curve.
- o HPI must be throttled to maintain HPI flow < 540 gpm/pump.
- o HPI should be throttled to maintain PZR level 80" to 220" WHEN adequate subcooling margin exists based on incores.
- o HPI may be throttled when adequate subcooling margin exists based on incores.

3.21 IF RCPs are available,
AND OTSGs are available,
THEN start 1 RCP in each loop.

IF RCPs are available,
AND OTSGs are NOT available,
THEN start 1 RCP.

| | ACTIONS | DETAILS |
|---|---|---|
| 3.22 ___ | IF at any time while performing this procedure, adequate subcooling margin is established, AND Nat Circ is desired, THEN CONCURRENTLY PERFORM AP-530, Nat Circ, beginning at Step 3.5. | Nat Circ is desired when all of the following conditions exist:<br>o RCPs are NOT available,<br>o ≥ 1 OTSG is available. |
| 3.23 ___ | Establish and maintain OTSG Tsat 40 to 60°F below incore TEMP until OTSG heat removal is established. | Lower OTSG PRESS using TBVs or ADVs. |
| 3.24 ___ | IF adequate subcooling margin does NOT exist, AND RCS cooldown rate is < desired, THEN determine if RCPs should be bumped. | RCPs should be bumped when all of the following conditions exist:<br>o RCS cooldown rate is < desired.<br>o RCP power is available.<br>o All RCP start permissives are met. |

3.3 IF adequate subcooling margin does NOT exist, THEN:

- o Within 2 min, stop all RCPs,
- o Raise OTSG levels to 95% using EFW,
- o Start full HPI.

3.12 IF RB WATER LEVEL indicates ≥ 2'2"
3.13 THEN transfer LPI suction to RB sump AND establish HPI suction from LPI.

3.18 IF RCS PRESS is > 2400 PSIG, THEN reduce RC PRESS based on subcooling margin.

3.19 IF HPI throttle requirements are met, THEN throttle HPI flows as required.

- o HPI must be throttled to maintain subcooling margin < 100°F when no RCPs are operating.
- o IF adequate subcooling margin exists based on incores THEN HPI must be throttled to maintain RCS PRESS and TEMP below NDT curve.
- o HPI must be throttled to maintain HPI flow < 540 gpm/pump.
- o HPI should be throttled to maintain PZR level 80" to 220" WHEN adequate subcooling margin exists based on incores.
- o HPI may be throttled when adequate subcooling margin exists based on incores.

3.21 IF RCPs are available, AND OTSGs are available, THEN start 1 RCP in each loop.

IF RCPs are available, AND OTSGs are NOT available, THEN start 1 RCP.

| ACTIONS | DETAILS |
|---|---|
| NOTE<br>HPI flow may affect the indications of Nat Circ. | |
| NOTE<br>Subcooling margin should be closely observed after each RCP bump. | |
| NOTE<br>EFIC will automatically select low level limit control of OTSG level when any RCP is started. | |
| NOTE<br>Bumping RCPs may result in OTSG pressure swings which could cause MS/MFW isolation actuation. | |
| 3.25 ___ IF RCPs should be bumped, THEN bump RCPs at ≈ 15 min intervals and observe for saturated Nat Circ after each bump. | o To bump a RCP, start it, wait for current to drop off to normal, then stop it.<br>o First RCP bump should be in the loop with the highest OTSG level.<br>o Balance the bumps between available RCPs.<br>o Record the times of the RCP bumps.<br>_____ _____<br>_____ _____<br>o Indications of saturated Nat Circ are:<br>o Tc ≈ Tsat of OTSG,<br>o Tc and incores lower when OTSG PRESS is lowered. |

3.3 IF adequate subcooling margin does NOT exist, THEN:

- o Within 2 min, stop all RCPs,
- o Raise OTSG levels to 95% using EFW,
- o Start full HPI.

3.12 IF RB WATER LEVEL indicates ≥ 2'2"
3.13 THEN transfer LPI suction to RB sump AND establish HPI suction from LPI.

3.18 IF RCS PRESS is > 2400 PSIG, THEN reduce RC PRESS based on subcooling margin.

3.19 IF HPI throttle requirements are met, THEN throttle HPI flows as required.

- o HPI must be throttled to maintain subcooling margin < 100°F when no RCPs are operating.
- o IF adequate subcooling margin exists based on incores THEN HPI must be throttled to maintain RCS PRESS and TEMP below NDT curve.
- o HPI must be throttled to maintain HPI flow < 540 gpm/pump.
- o HPI should be throttled to maintain PZR level 80" to 220" WHEN adequate subcooling margin exists based on incores.
- o HPI may be throttled when adequate subcooling margin exists based on incores.

3.21 IF RCPs are available, AND OTSGs are available, THEN start 1 RCP in each loop.

IF RCPs are available, AND OTSGs are NOT available, THEN start 1 RCP.

| ACTIONS | DETAILS |
|---|---|
| 3.26 ___ IF OTSG heat removal is established, THEN ensure PORV is closed, AND ensure PZR vents are closed. | 1. Ensure PORV is closed.<br>2. Verify PORV closed using ultrasonic flow indication.<br>3. Ensure PZR vents are closed<br>o RCV-159<br>o RCV-160. |

**********

CAUTION

HPI flow must not be throttled to < 100 gpm/pump with MUP recirc valves closed, to prevent pump damage.

**********

3.27 ___ IF RCS cooldown can be controlled, THEN maintain RCS cooldown within limits.

RCS Cooldown Rate Limits:

| | RCS TEMP °F | LIMIT |
|---|---|---|
| Normal | > 280 | ≤ 50°F ½hr |
| | 280 to 150 | ≤ 25°F ½hr |
| | ≤ 150 | ≤ 10°F/hr |
| Nat Circ | > 280 | ≤ 10°F/hr |
| | 280 to 150 | ≤ 5°F/hr |
| | ≤ 150 | ≤ 2.5°F/hr |
| | Enclosure 3 | ≤ 50°F/hr |
| OTSG Tube Leak | Refer to EP-390 Table 3 | |

Maintain RCS cooldown rate:
- o Throttle TBVs or ADVs.
- o Throttle EFIC control valves.
- o IF adequate subcooling margin exists, THEN throttle HPI flows.

3.3 IF adequate subcooling margin does NOT exist, THEN:

- o Within 2 min, stop all RCPs,
- o Raise OTSG levels to 95% using EFW,
- o Start full HPI.

3.12 IF RB WATER LEVEL indicates ≥ 2'2"
3.13 THEN transfer LPI suction to RB sump AND establish HPI suction from LPI.

3.18 IF RCS PRESS is > 2400 PSIG, THEN reduce RC PRESS based on subcooling margin.

3.19 IF HPI throttle requirements are met, THEN throttle HPI flows as required.

- o HPI must be throttled to maintain subcooling margin < 100°F when no RCPs are operating.
- o IF adequate subcooling margin exists based on incores THEN HPI must be throttled to maintain RCS PRESS and TEMP below NDT curve.
- o HPI must be throttled to maintain HPI flow < 540 gpm/pump.
- o HPI should be throttled to maintain PZR level 80" to 220" WHEN adequate subcooling margin exists based on incores.
- o HPI may be throttled when adequate subcooling margin exists based on incores.

3.21 IF RCPs are available, AND OTSGs are available, THEN start 1 RCP in each loop.

IF RCPs are available, AND OTSGs are NOT available, THEN start 1 RCP.

| ACTIONS | DETAILS |
|---|---|
| 3.28 ___ IF RCS PRESS lowers to 700 PSIG, AND adequate subcooling margin exists, THEN isolate CFTs, AND bypass LPI actuation. | 1. ___ Notify AB Operator to remove locks and close Bkrs for CFT isolation valves at ES MCC 3AB.<br>2. ___ Close:<br>o CFV-5 o CFV-6.<br>3. Select the following to "BYPASS" on both A and B LPI channels:<br>___ LPI RC4,<br>___ LPI RC5,<br>___ LPI RC6. |

3.3 IF adequate subcooling margin does NOT exist, THEN:

- o Within 2 min, stop all RCPs,
- o Raise OTSG levels to 95% using EFW,
- o Start full HPI.

3.12 IF RB WATER LEVEL indicates ≥ 2'2"
3.13 THEN transfer LPI suction to RB sump AND establish HPI suction from LPI.

3.18 IF RCS PRESS is > 2400 PSIG, THEN reduce RC PRESS based on subcooling margin.

3.19 IF HPI throttle requirements are met, THEN throttle HPI flows as required.

- o HPI must be throttled to maintain subcooling margin < 100°F when no RCPs are operating.
- o IF adequate subcooling margin exists based on incores THEN HPI must be throttled to maintain RCS PRESS and TEMP below NDT curve.
- o HPI must be throttled to maintain HPI flow < 540 gpm/pump.
- o HPI should be throttled to maintain PZR level 80" to 220" WHEN adequate subcooling margin exists based on incores.
- o HPI may be throttled when adequate subcooling margin exists based on incores.

3.21 IF RCPs are available, AND OTSGs are available, THEN start 1 RCP in each loop.

IF RCPs are available, AND OTSGs are NOT available, THEN start 1 RCP.

| ACTIONS | DETAILS |
|---|---|
| 3.29 ___ IF conditions exist to stop HPI, THEN: | o Stop HPI if all of the following conditions exist:<br>o Adequate subcooling margin,<br>o PZR level is ≥ 50",<br>o OTSG heat removal,<br>o Leak is within normal make-up capabilities. |
| 1. ___ Ensure PORV closed, | o PORV is RCV-10 |
| 2. ___ Ensure PZR vents are closed, | o PZR vents:<br>o RCV-159 o RCV-160 |
| 3. ___ Stop HPI. | o Stop HPI:<br>1. ___ Ensure MUV 27 is open,<br>2. ___ Ensure MUP recirc valves are open,<br>o MUV-53 o MUV-257<br>3. ___ Close all HPI injection valves:<br>___ MUV-23 ___ MUV-24<br>___ MUV-25 ___ MUV-26<br>4. ___ Ensure ≥ 1 MUP in service. |

3.30 ___ IF EF Tank is < 3 ft, THEN CONCURRENTLY PERFORM AP-450, EFW Actuation, beginning with Step 3.18.

3.31 ___ IF PZR bubble is desired, THEN refer to OP-305, Operation of the PZR, Section 4.2.

3.3 IF adequate subcooling margin does NOT exist, THEN:

- o Within 2 min, stop all RCPs,
- o Raise OTSG levels to 95% using EFW,
- o Start full HPI.

3.12 IF RB WATER LEVEL indicates ≥ 2'2"
3.13 THEN transfer LPI suction to RB sump AND establish HPI suction from LPI.

3.18 IF RCS PRESS is > 2400 PSIG, THEN reduce RC PRESS based on subcooling margin.

3.19 IF HPI throttle requirements are met, THEN throttle HPI flows as required.

- o HPI must be throttled to maintain subcooling margin < 100°F when no RCPs are operating.
- o IF adequate subcooling margin exists based on incores THEN HPI must be throttled to maintain RCS PRESS and TEMP below NDT curve.
- o HPI must be throttled to maintain HPI flow < 540 gpm/pump.
- o HPI should be throttled to maintain PZR level 80" to 220" WHEN adequate subcooling margin exists based on incores.
- o HPI may be throttled when adequate subcooling margin exists based on incores.

3.21 IF RCPs are available, AND OTSGs are available, THEN start 1 RCP in each loop.

IF RCPs are available, AND OTSGs are NOT available, THEN start 1 RCP.

| ACTIONS | DETAILS |
|---|---|
| 3.32 ___ IF cooldown is on 1 OTSG, THEN ensure tube to shell $\Delta T < 100°F$ on isolated OTSG. | o Tube to Shell $\Delta T$ equals Avg of 5 OTSG shell thermocouples minus Tc.<br>o Computer points are R-773 and R-774.<br>o Feed and steam OTSG to maintain tube to shell $\Delta T$ within limits. |
| 3.33 ___ IF EDGs are NOT energizing the ES busses, THEN stop EDGs. | 1. ___ Ensure HPI is bypassed or reset<br>2. ___ Depress the STOP pushbutton for the affected EDGs |
| 3.34 ___ IF boron concentration of RB sump could have been diluted by significant steam or FW leaks in the RB, THEN notify Chemistry to sample RB Sump. | |

3.3 IF adequate subcooling margin does NOT exist, THEN:

- o Within 2 min, stop all RCPs,
- o Raise OTSG levels to 95% using EFW,
- o Start full HPI.

3.12 IF RB WATER LEVEL indicates ≥ 2'2"
3.13 THEN transfer LPI suction to RB sump
AND establish HPI suction from LPI.

3.18 IF RCS PRESS is > 2400 PSIG,
THEN reduce RC PRESS based on subcooling margin.

3.19 IF HPI throttle requirements are met,
THEN throttle HPI flows as required.

- o HPI must be throttled to maintain subcooling margin < 100°F when no RCPs are operating.
- o IF adequate subcooling margin exists based on incores THEN HPI must be throttled to maintain RCS PRESS and TEMP below NDT curve.
- o HPI must be throttled to maintain HPI flow < 540 gpm/pump.
- o HPI should be throttled to maintain PZR level 80" to 220" WHEN adequate subcooling margin exists based on incores.
- o HPI may be throttled when adequate subcooling margin exists based on incores.

3.21 IF RCPs are available,
AND OTSGs are available,
THEN start 1 RCP in each loop.

IF RCPs are available,
AND OTSGs are NOT available,
THEN start 1 RCP.

| ACTIONS | DETAILS |
|---|---|

**********

CAUTION

HPI flow must NOT be throttled < 100 gpm/pump with MUP recirc valves closed, to prevent pump damage.

**********

3.35 ___ IF LPI flow is > 1000 gpm per injection line for for ≥ 20 min THEN:

___ Stop HPI,

Stop HPI:

1. ___ Stop all MUPs
2. ___ Close all HPI injection valves:

   ___ MUV-23 ___ MUV-24
   ___ MUV-25 ___ MUV-26

3. ___ Open MUP recirc valves:

   o MUV-53 o MUV-257

___ Ensure PORV is closed,

___ Select PORV to "Low Range",

___ Isolate CFTs.

Isolate CFTs:

1. Notify AB operator to remove locks and close Bkrs for CFT isolation valves at ES MCC 3AB:

   o CFV-5 o CFV-6.

2. Close:

   o CFV-5 o CFV-6.

___ Ensure all high point vents are closed.

Ensure closed:

___ RCV-159 ___ RCV-160

___ RCV-157 ___ RCV-158

___ RCV-163 ___ RCV-164.

3.3 IF adequate subcooling margin does NOT exist,
THEN:

- o Within 2 min, stop all RCPs,
- o Raise OTSG levels to 95% using EFW,
- o Start full HPI.

3.12 IF RB WATER LEVEL indicates ≥ 2'2"
3.13 THEN transfer LPI suction to RB sump
AND establish HPI suction from LPI.

3.18 IF RCS PRESS is > 2400 PSIG,
THEN reduce RC PRESS based on subcooling margin.

3.19 IF HPI throttle requirements are met,
THEN throttle HPI flows as required.

- o HPI must be throttled to maintain subcooling margin < 100°F when no RCPs are operating.
- o IF adequate subcooling margin exists based on incores THEN HPI must be throttled to maintain RCS PRESS and TEMP below NDT curve.
- o HPI must be throttled to maintain HPI flow < 540 gpm/pump.
- o HPI should be throttled to maintain PZR level 80" to 220" WHEN adequate subcooling margin exists based on incores.
- o HPI may be throttled when adequate subcooling margin exists based on incores.

3.21 IF RCPs are available,
AND OTSGs are available,
THEN start 1 RCP in each loop.

IF RCPs are available,
AND OTSGs are NOT available,
THEN start 1 RCP.

| ACTIONS | DETAILS |
|---|---|
| 3.36 ___ IF adequate subcooling margin exist, AND both LPI trains are available, THEN establish 1 LPI train in the DHR mode. | Refer to OP-404, Decay Heat Removal System, Section 4.12. |

3.37 ___ WHEN LPI or DHR is supplying core cooling, THEN stop OTSG cooling.

Continue on in this procedure.

1. ___ Stop MFW, EFW and AFW pumps
2. ___ Ensure the following valves are closed:

| VALVE | A OTSG | B OTSG |
|---|---|---|
| MBV | FWV-30 | FWV-29 |
| LLBV | FWV-31 | FWV-32 |
| SUCV | FWV-40 | FWV-39 |
| Ms to MSRs | FWV-55 | FWV-56 |
| MS to TBVs AND MFWPs | MSV-53 | MSV-54 |
| EFW BLOCK VALVES | EFV-11<br>EFV-14 | EFV-32<br>EFV-33 |
| AFW Iso. VALVES | FWV-222 | FWV-223 |

3.38 ___ WHEN RB PRESS is < 10 PSIG and not rising, THEN stop RB spray.

Continue on in this procedure.

1. ___ Stop BSP-1A and BSP-1B.
2. ___ Select LOCAL/MANUAL, THEN close control valves:
   - o ___ BSV-3
   - o ___ BSV-4
3. ___ Depress "HPI SEAL IN RESET" pushbuttons on both ES channels.
4. ___ IF RB PRESS increases to 10 PSIG, THEN reestablish RB spray.

3.3 IF adequate subcooling margin does NOT exist, THEN:

- o Within 2 min, stop all RCPs,
- o Raise OTSG levels to 95% using EFW,
- o Start full HPI.

3.12 IF RB WATER LEVEL indicates ≥ 2'2"
3.13 THEN transfer LPI suction to RB sump AND establish HPI suction from LPI.

3.18 IF RCS PRESS is > 2400 PSIG, THEN reduce RC PRESS based on subcooling margin.

3.19 IF HPI throttle requirements are met, THEN throttle HPI flows as required.

- o HPI must be throttled to maintain subcooling margin < 100°F when no RCPs are operating.
- o IF adequate subcooling margin exists based on incores THEN HPI must be throttled to maintain RCS PRESS and TEMP below NDT curve.
- o HPI must be throttled to maintain HPI flow < 540 gpm/pump.
- o HPI should be throttled to maintain PZR level 80" to 220" WHEN adequate subcooling margin exists based on incores.
- o HPI may be throttled when adequate subcooling margin exists based on incores.

3.21 IF RCPs are available, AND OTSGs are available, THEN start 1 RCP in each loop.

IF RCPs are available, AND OTSGs are NOT available, THEN start 1 RCP.

| ACTIONS | DETAILS |
|---|---|
| NOTE<br>RB Cooling Fans should stay in operation until RB $H_2$ levels are known, in order to provide mixing of RB atmosphere. | |
| 3.39 ___ Notify Operator to begin monitoring RB atmosphere $H_2$ level. | Refer to EM-308, Post Accident monitoring of the RB Atmosphere. |
| 3.40 ___ WHEN RB PRESS < 4 PSIG, THEN ensure RB isolation is reset. | Select the following to "RESET" on both A and B channels:<br>___ "RB ISO Rb1"<br>___ "RB ISO RB2"<br>___ "RB ISO RB3" |
| 3.41 ___ GO TO applicable procedure based on subcooling margin:<br><br>IF adequate subcooling margin exists, THEN GO TO OP-209, Plant Cooldown.<br><br>IF adequate subcooling does NOT exist, THEN GO TO OP-404, Decay Heat Removal System, Section 4.13, to establish long term core cooling. | |

3.3 IF adequate subcooling margin does NOT exist,
THEN:

- o Within 2 min, stop all RCPs,
- o Raise OTSG levels to 95% using EFW,
- o Start full HPI.

3.12 IF RB WATER LEVEL indicates ≥ 2'2"
3.13 THEN transfer LPI suction to RB sump
AND establish HPI suction from LPI.

3.18 IF RCS PRESS is > 2400 PSIG,
THEN reduce RC PRESS based on subcooling margin.

3.19 IF HPI throttle requirements are met,
THEN throttle HPI flows as required.

- o HPI must be throttled to maintain subcooling margin < 100°F when no RCPs are operating.
- o IF adequate subcooling margin exists based on incores THEN HPI must be throttled to maintain RCS PRESS and TEMP below NDT curve.
- o HPI must be throttled to maintain HPI flow < 540 gpm/pump.
- o HPI should be throttled to maintain PZR level 80" to 220" WHEN adequate subcooling margin exists based on incores.
- o HPI may be throttled when adequate subcooling margin exists based on incores.

3.21 IF RCPs are available,
AND OTSGs are available,
THEN start 1 RCP in each loop.

IF RCPs are available,
AND OTSGs are NOT available,
THEN start 1 RCP.

| ACTIONS | DETAILS |
|---|---|

Note

The following steps are to initiate HPI/PORV cooling.

Note

Steps establishing HPI/PORV cooling and AFW may be performed concurrently.

**********

CAUTION

HPI cooling must be established prior to any opening of the PORV.

**********

3.42 ___ Start full HPI.

1. Open MUP suctions from the BWST:

   o MUV-58 o MUV-73.

2. Ensure ≥ 2 MUPs and their cooling water pumps are running.

3. Open HPI Valves:

   ___ MUV-23 ___ MUV-24

   ___ MUV-25 ___ MUV-26.

4. Balance flow between available injection lines.

3.3 IF adequate subcooling margin does NOT exist,
THEN:

- o Within 2 min, stop all RCPs,
- o Raise OTSG levels to 95% using EFW,
- o Start full HPI.

3.12 IF RB WATER LEVEL indicates ≥ 2'2"
3.13 THEN transfer LPI suction to RB sump
AND establish HPI suction from LPI.

3.18 IF RCS PRESS is > 2400 PSIG,
THEN reduce RC PRESS based on subcooling margin.

3.19 IF HPI throttle requirements are met,
THEN throttle HPI flows as required.

- o HPI must be throttled to maintain subcooling margin < 100°F when no RCPs are operating.
- o IF adequate subcooling margin exists based on incores THEN HPI must be throttled to maintain RCS PRESS and TEMP below NDT curve.
- o HPI must be throttled to maintain HPI flow < 540 gpm/pump.
- o HPI should be throttled to maintain PZR level 80" to 220" WHEN adequate subcooling margin exists based on incores.
- o HPI may be throttled when adequate subcooling margin exists based on incores.

3.21 IF RCPs are available,
AND OTSGs are available,
THEN start 1 RCP in each loop.

IF RCPs are available,
AND OTSGs are NOT available,
THEN start 1 RCP.

| ACTIONS | DETAILS |
|---|---|
| 3.43 ___ IF OTSG heat removal is NOT available, AND only 1 MUP is available, THEN open the PORV to increase HPI flow. | o PORV should be left open until any of the following conditions exist:<br>o HPI can be stopped,<br>o OTSG heat removal is established. |
| IF PORV is NOT available, THEN use PZR vents. | o PZR vents:<br>o RCV-159 o RCV-160. |

NOTE

≥ 1 OTSG should be ≥ 6" prior to closing the PORV.

| | |
|---|---|
| 3.44 ___ Open the PORV before exceeding RCS PRESS limits.<br>IF PORV is NOT available, THEN open the PZR vents. | 1. ___ Ensure RCV-11, PORV block, is open.<br>2. ___ Open PORV before:<br>o Exceeding PTS limits,<br>o Exceeding NDT limits,<br>o Exceeding 2400 PSIG.<br>3. ___ Verify PORV is open using ultrasonic indications.<br>o Maintain PORV or PZR vents open until OTSG heat removal is established or LPI is providing core cooling.<br>o PZR vents:<br>o RCV-159 o RCV-160. |

| ACTIONS | DETAILS |
|---|---|
| Note<br><br>AFW is supplied to the OTSG's via the EFW nozzles. The normal suction for AFW is the CST, EFT-2 and the Hotwell are alternate sources. Guidance for swapping to the alternate suction sources is contained in OP-605 | |
| 3.45 IF AFW is available THEN start AFW | o ___ Start FWP-7<br><br>o ___ Open FWV-222 (A OTSG manual Isolation location 119' IB)<br><br>o ___ Open FWV-223 (B OTSG manual Isolation location 119' IB)<br><br>o ___ Control FWV-216 and FWV-217 for desired flow and OTSG level.<br><br>o ___ AFW flow requirements (including recirc flow) are:<br><br>< 940 gpm (pump run-out)<br><br>> 240 gpm (min flow) |
| 3.46 ___ IF >1 RCP is operint, THEN reduce operating RCPs to 1. | Maintain RCP-1B operating to maximize PZR spray. |

3.3 IF adequate subcooling margin does NOT exist,
THEN:

- o Within 2 min, stop all RCPs,
- o Raise OTSG levels to 95% using EFW,
- o Start full HPI.

3.12 IF RB WATER LEVEL indicates ≥ 2'2"
3.13 THEN transfer LPI suction to RB sump
AND establish HPI suction from LPI.

3.18 IF RCS PRESS is > 2400 PSIG,
THEN reduce RC PRESS based on subcooling margin.

3.19 IF HPI throttle requirements are met,
THEN throttle HPI flows as required.

- o HPI must be throttled to maintain subcooling margin < 100°F when no RCPs are operating.
- o IF adequate subcooling margin exists based on incores THEN HPI must be throttled to maintain RCS PRESS and TEMP below NDT curve.
- o HPI must be throttled to maintain HPI flow < 540 gpm/pump.
- o HPI should be throttled to maintain PZR level 80" to 220" WHEN adequate subcooling margin exists based on incores.
- o HPI may be throttled when adequate subcooling margin exists based on incores.

3.21 IF RCPs are available,
AND OTSGs are available,
THEN start 1 RCP in each loop.

IF RCPs are available,
AND OTSGs are NOT available,
THEN start 1 RCP.

| | ACTIONS | DETAILS |
|---|---|---|
| 3.47 ___ | WHEN RCS is < 1700 PSIG, THEN bypass HPI.<br><br>Continue on in this procedure. | Bypass HPI by selecting the following to "BYPASS" on both A and B channels:<br><br>___ "HPI RC1",<br><br>___ "HPI RC2",<br><br>___ "HPI RC3". |

---

3.48 ___ Select both RB sump pumps to "PULL TO LOCK".

3.3 IF adequate subcooling margin does NOT exist,
THEN:

- o Within 2 min, stop all RCPs,
- o Raise OTSG levels to 95% using EFW,
- o Start two HPI.

3.12 IF RB WATER LEVEL indicates ≥ 2'2"
3.13 THEN transfer LPI suction to RB sump
AND establish HPI suction from LPI.

3.18 IF RCS PRESS is > 2400 PSIG,
THEN reduce RC PRESS based on subcooling margin.

3.19 IF HPI throttle requirements are met,
THEN throttle HPI flows as required.

- o HPI must be throttled to maintain subcooling margin < 100°F when no RCPs are operating.
- o IF adequate subcooling margin exists based on incores THEN HPI must be throttled to maintain RCS PRESS and TEMP below NDT curve.
- o HPI must be throttled to maintain HPI flow < 540 gpm/pump.
- o HPI should be throttled to maintain PZR level 80 to 220" WHEN adequate subcooling margin exists based on incores.
- o HPI may be throttled when adequate subcooling margin exists based on incores.

3.21 IF RCPs are available,
AND OTSGs are available,
THEN start 1 RCP in each loop.

IF RCPs are available,
AND OTSGs are NOT available,
THEN start 1 RCP.

| ACTIONS | DETAILS |
|---|---|
| 3.49 ___ Establish RB cooling. | o Ensure all RB cooling fans are operating in slow speed.<br>o Ensure RB cooling fans are on SW cooling. |

NOTE

WHEN RCS TEMP < 425°F AND OTSG PRESS < 400 PSIG,
THEN MFWBPs may be used to recover from HPI/PORV cooling.

NOTE

HPI bistables may need to be reset prior to or during recovery from HPI/PORV cooling to prevent an inadvertent HPI actuation.

3.50 ___ Ensure feedwater valves are aligned to prevent inadvertently feeding an OTSG.

Ensure the following valves are closed:

| Valve Ident. | A-OTSG | B-OTSG |
|---|---|---|
| Main Block | FWV-30 | FWV-29 |
| LL Block | FWV-31 | FWV-32 |
| LL Control | FWV-37 | FWV-38 |
| SU Control | FWV-40 | FWV-39 |

| ACTIONS | DETAILS |
|---|---|

**********

CAUTION

During the transition from AFW to EFW, flow to the high nozzles should be maintained < 1400 gpm per OTSG to prevent exceeding OTSG cross flow limits.

**********

3.51 ___ WHEN MFW or EFW become available, THEN CONCURRENTLY PERFORM AP-450, EFW Actuation, beginning with Step 3.9.

Continue on in this procedure.

---

3.52 IF AFW is running AND EFW or MFW has been established THEN stop AFW

- o ___ Close FWV-216 and FWV-217, (AFW control valves)
- o ___ Stop FWP-7
- o ___ Close FWV-222 (A OTSG manual Isolation location 119' IB)
- o ___ Close FWV-223 (B OTSG manual Isolation location 119' IB)

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3.53 ___ GO TO Step 3.19 in this procedure.

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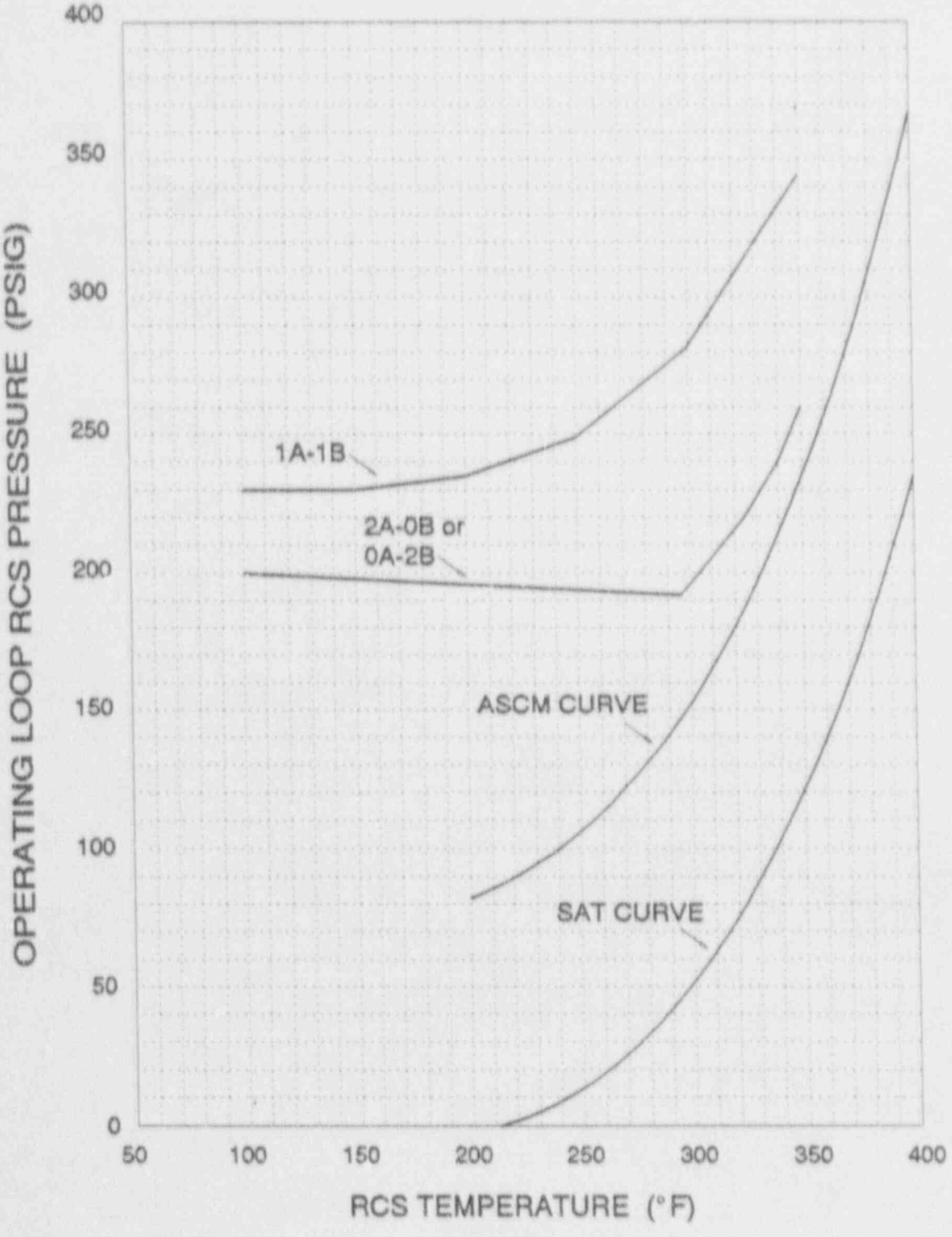
Enclosure 1

RCP NPSH Curves




The acceptable region is above the applicable NPSH curve.

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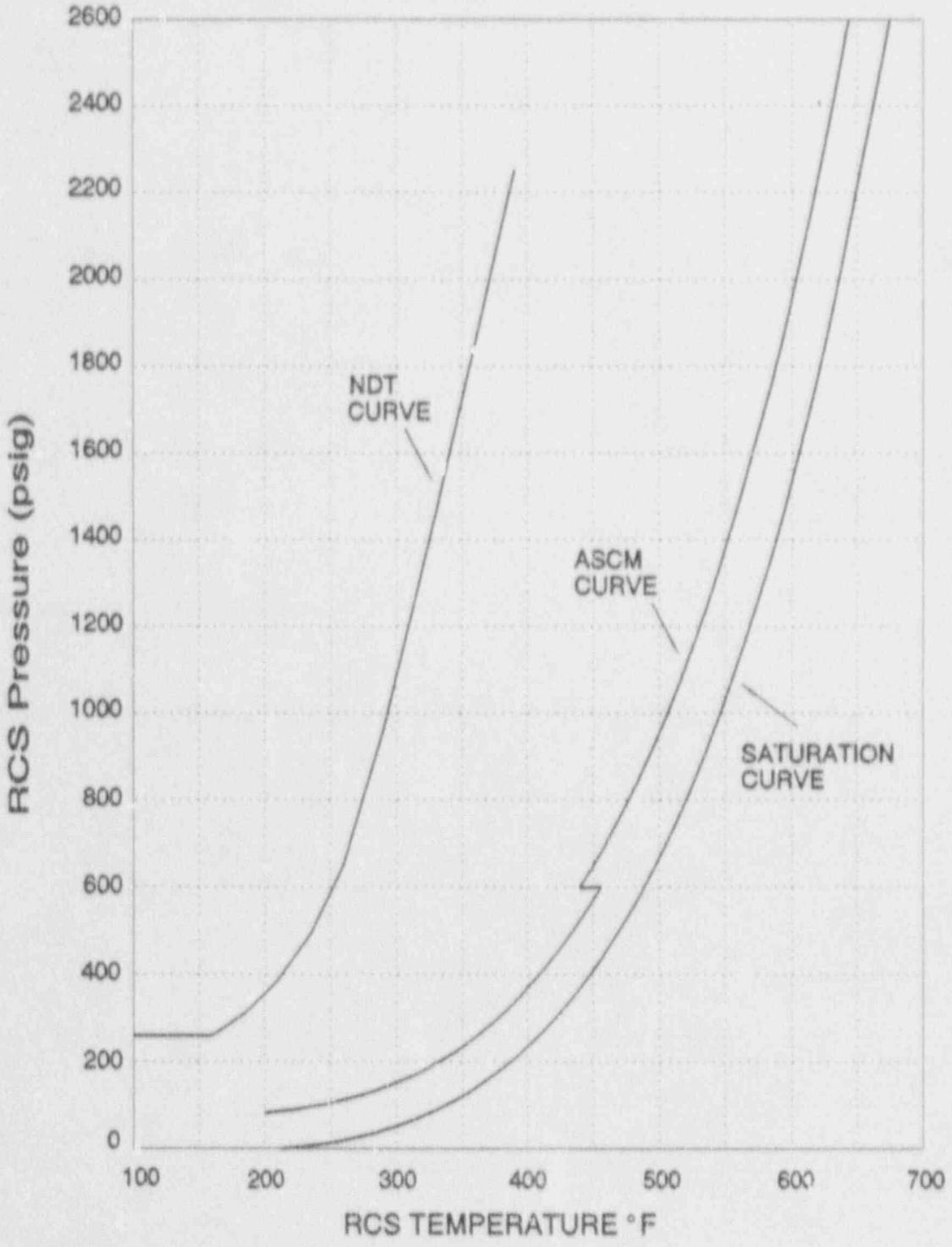
Enclosure 2

Cooldown Curves




Acceptable region is:

- o below and to the right of the NDT curve
- o above and to the left of the ASCM curve

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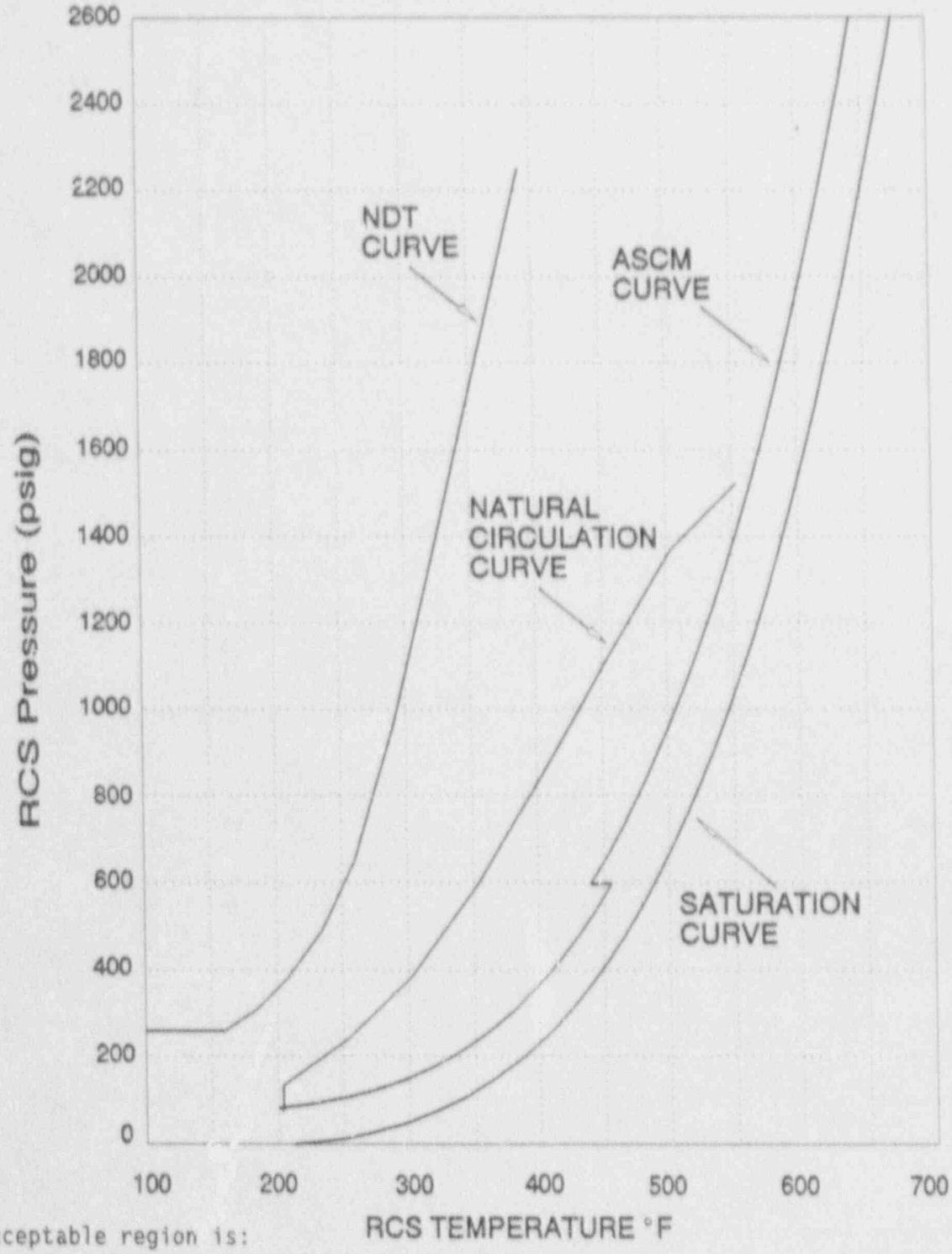
Enclosure 3

Natural Circulation Cooldown Curve > 10°F/hr




Acceptable region is:

- o below and to the right of the NDT curve
- o above and to the left of the Natural Circulation curve
- o above and to the left of the ASCM curve