Form 34731 (R5-88)

Duke Power Company
PROCEDURE PROCESS RECORD

(1) ID No. OP/1/A/1102/10
Change(s) 83 to 83 Incorporated

PREPARATION

(2) Station Oconee Nuclear Station

(3) Procedure Title Controlling Procedure For Unit Shutdown

(4) Prepared By Edward Barker Date 2-10-89

(5) Reviewed By T. Barker Date 2-10-89

Cross-Disciplinary Review By N/R JC

(6) Temporary Approval *(if necessary)*

By (SRO) Date

By Date

(7) Approved By R L Sweigart Date 2-10-89

(8) Miscellaneous

Reviewed/Approved By Date

Reviewed/Approved By Date

(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

(10) Compared with Control Copy Date

(11) Requires change to FSAR not identified in 10CFR50.59 evaluation? ☐ Yes
If "yes", attach detailed explanation. ☒ No

Completion

(12) Date(s) Performed

(13) Procedure Completion Verification

☐ 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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Date/Time _____

DUKE POWER COMPANY

OCONEE NUCLEAR STATION

CONTROLLING PROCEDURE FOR UNIT SHUTDOWN

1.0 Purpose

The purpose of this procedure is to outline the steps necessary to take the Plant from an operating condition of ~15% Reactor power to a cold shutdown condition. This procedure may be used for shutting down from conditions other than the above, but all steps must be verified and signed off to prevent possible omission.

2.0 Limitations and Precautions

2.1 When the body of a controlling procedure refers to another procedure or a section of another procedure, that procedure or section must be completed, reviewed by the Unit Supervisor and signed as complete by the Unit Supervisor prior to proceeding with the controlling procedure. This will be documented by the Supervisor signing that step in the controlling procedure.

2.2 Cooldown rate of the RC system will not exceed the limits established per Enclosure 4.5 (RCS P/T Limitations).

2.3 Before establishing any new Reactor Coolant pressure or temperature plateau, ensure that at least 1.0% $\Delta k/k$ shutdown is available for the new Reactor Coolant pressure and temperature with Group 1 at 50% withdrawn per PT/1/A/1103/15 (Reactivity Balance).

2.4 Condenser effluent temperature shall not decrease more than 6°F per hour during the Winter and 10°F per hour during the Spring, Summer, and Fall.

2.5 When a limiting condition for operation, Section 3.0 of the Technical Specification is not met, the rate of shutdown will be determined by Operations such that the required condition is achieved in a controlled manner within the time specified. If conditions dictate, a faster shutdown rate should be used up to and including a Reactor Trip. (Reference OMP 1-4)

2.6 Maintain RCS Pressure and Pressurizer Level within the restrictions of Enclosure 4.11 (Low Temperature Over Pressure Protection) when RCS Temperature $\leq$ 325°F.

2.7 If continuous venting of the Pressurizer or Pressurizer sampling is in progress, RCS low range pressure transmitter may give erroneous indication of true RCS pressure.

2.8 All number steps are critical path steps. All steps that follow a bullet (•) are parallel steps that need to be done along with the critical path step but not in any sequence. Before going to the next critical path step, all parallel steps should be completed unless otherwise stated.

2.9 If either SG level decreases to $\leq$ 15 inches, then manually trip the Reactor.

2.10 If both Main Feedwater pumps trip, manually trip the Reactor.

2.11 When a motor-operated valve fails to operate remotely, it will be necessary to operate this valve using a Work Request and I&E procedure. This process will be used unless an SRO determines that conditions exist which require the valve to be operated immediately from the breaker contactor. The malfunctioning valve should be noted in the RO log.

2.12 When the RCS temperature is $\leq$ 325°F, then the following low temperature over pressure protection shall exist:

2.12.1 Both A and B HPI trains shall be inoperable by:

1) For HPI Train A the following valves tagged closed and breakers tagged open:

1HP-26 (1A HP Injection)

1HP-409 (1HP-27 Bypass)

1HP-410 (1HP-26 Bypass)

OR

HPI pumps 1A and 1B breakers tagged open.

2) For HPI Train B:

1HP-27 (1B HP Injection) and 1HP-409 (1HP-27 Bypass) tagged closed and breakers tagged open

OR

HPI pump 1C breaker tagged open.

2.13 IF LOW is selected on the PORV and the RCS Low Range Pressure Transmitter becomes inoperable, then the PORV is inoperable.

The following are conditions that will make the PORV inoperable:

1) 1RC-4 (Pzr Relief Block) shut
2) PORV Selector Switch to HIGH
3) RCS Low Range Pressure Transmitter inoperable or valved out.
4) Continuous venting of the Pressurizer or Pressurizer sampling is in progress.

3.0 Procedure

3.1 Perform the following as applicable:

Enclosure 4.1 (Shutdown to Hot Shutdown Conditions)

Enclosure 4.2 (Hot Shutdown Conditions to 250°F/350 PSI Conditions)

Enclosure 4.3 (250°F/350 PSI Conditions to Cold Shutdown)

4.0 Enclosures

4.1 Shutdown to Hot Shutdown Conditions

4.2 Hot Shutdown Conditions to 250°F/350 PSI Conditions

4.3 250°F/350 PSI Conditions to Cold Shutdown

4.4 Steam Trap Bypasses or Steam Drains Valve Checklist

4.5 RCS P/T Limitations

4.6 Procedure for Subcooling the Hot Leg Following Pressurizer Outsurge

4.7 Lowering Pressurizer Level without RCP's Operating

4.8 Pressurizer Cooldown

4.9 Shutdown Equipment Tagging List

4.10 Controlling Procedure for H_2O_2 Addition to the RCS

4.10A RCS P/T Limitations

4.11 Low Temperature Over Pressure Protection

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ENCLOSURE 4.1

SHUTDOWN TO HOT SHUTDOWN CONDITIONS

	Date Init./Time	Verify Date Init./Time
1.0 Initial Conditions		
1.1 Reactor operating ~ 15% power (~ 135 MWE).	_____	
1.2 If the RC system or the HPI system is to be opened for maintenance, commence degassification per OP/1/A/1102/12 (Degassification of RC System and Pressurizer).	_____	
1.3 Auxiliary steam header pressurized.	_____	
1.4 NRC notified per the requirements of OMP 1-10 (Usage and Testing of the Emergency Notification System (Red Phone)).	_____	
1.5 Procedure Limits and Precautions have been reviewed.	_____	
2.0 Procedure Date Procedure Started_____.		
2.1 At ~ 135 MWE, perform the following:		
1. Close the following valves:		
1HD-67 ("A" FSRH Drain Tank Control Outlet).	_____	
1HD-82 ("B" FSRH Drain Tank Control Outlet).	_____	
1HPE-36 ("C" Bleed Supply).	_____	
1LPE-10 ("D" Heaters Bleed Inlet).	_____	
1HPE-6 (1A1 Htr. Bleed Inlet).	_____	
1HPE-10 (1A2 Htr. Bleed Inlet).	_____	
1HPE-24 (1B1 Htr. Bleed Inlet).	_____	
1HPE-28 (1B2 Htr. Bleed Inlet).	_____	

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ENCLOSURE 4.1
SHUTDOWN TO HOT SHUTDOWN CONDITIONS

	Date Init./Time	Verify Date Init./Time

2. If power decrease is NOT for a Steam Generator tube leak, valve in Auxiliary Steam to "E" Heaters as follows:

   1. Verify desuperheater in service and setpoint @ 280°F. _____

   2. Close the following valves:

      1LPE-32 ("E" Bleed Line #1 Isolation). _____

      1LPE-34 ("E" Bleed Line #2 Isolation). _____

   3. Open 1AS-34 ("E" FDW Heater Aux. Steam Supply). _____

NOTE: (4) Maximum allowable "E" heater pressure is 50 psig.

   4. Throttle open 1AS-35 ("E" FDW Htr. Auxiliary Steam Supply Control) to obtain desired steam flow to "E" Heaters to maintain a minimum of 185°F FDW temperature to OTSGs. _____

3. Ensure the GENERATOR TURBINE/REACTOR CHANNEL TRIP BYPASS statalarm is on prior to tripping the Turbine.

4. Place the Turbine Header Pressure Control Station in HAND and commence shutting down the Turbine-Generator per OP/1/A/1106/01 (Turbine-Generator). _____

Unit Supervisor_____

OP/1/A/1102/10
ENCLOSURE 4.1
SHUTDOWN TO HOT SHUTDOWN CONDITIONS

	Date Init./Time	Verify Date Init./Time

2.2 After tripping the Turbine, shutdown the MSRH per OP/1/A/1106/14 (Moisture Separator Reheater). _____

Unit Supervisor _____

- After tripping the Turbine, verify that computer point D1626 (EHC Emerg. Trip) prints out and is recorded in the Unit Supervisor's Log. _____
- Record the time the Turbine tripped (per the typer for Computer Point D1626) in the Unit Supervisor's Log. _____

Unit Supervisor _____

2.3 Place the Reactor Control Station in MANUAL at the Diamond Control Station and reduce reactor power while controlling cooldown to 532°F. _____

- Open the following valves to supply minimum flow to the Steam Generators as required to prevent water hammer in the feedwater header:

  1FDW-127 (Normal FDW Header "1A" Drain Isolation). _____

  1FDW-216 (Normal FDW Header "1B" Drain Isolation). _____

  1FDW-237 (S/G "1B" FDW Header Drain). _____
- Complete Enclosure 4.4 (Steam Trap Bypass or Steam Drains Valve Checklist). _____

OP/1/A/1102/10
ENCLOSURE 4.1
SHUTDOWN TO HOT SHUTDOWN CONDITIONS

	Date Init./Time	Verify Date Init./Time
• If Unit Shutdown is for Steam Generator Tube leak repair, isolate the FDW valves and the Turbine Bypass Valves on the affected S/G when T_{ave} is $\leq$ 532°F. Refer to OP/0/A/1106/31 (Control of Secondary Contamination) and Emergency Operating Procedure for additional instructions.	_____	_____
• Transfer Auxiliary Steam supply to CSAE's by:		
Opening 1AS-40 (AS to CSAE).	_____	_____
Closing 1MS-47 (MS to CSAE).	_____	
• Place FW Master "A" and "B" Control Stations in MANUAL and decrease control stations to 0%.	_____	
• Place the following control switches in the CLOSED position:		
1FDW-31 (1A Main FDW Block).	_____	
1FDW-40 (1B Main FDW Block).	_____	
• Line up generator hydrogen analyzer for off line operation as follows:		
1. Position 1H-55 (Solenoid Valve) to Vent Open Position by pressing VENT OPEN Pushbutton on front of Hydrogen Panel.	_____	

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ENCLOSURE 4.1
SHUTDOWN TO HOT SHUTDOWN CONDITIONS

	Date Init./Time	Verify Date Init./Time
2. Adjust 1H-53 (Purity Analyzer Vent) to give 1 SCFH flow through Gas Analyzer Flowrator.		
• At approximately lowest power and Reactor critical, record in the RO Log:		
Time.		
Group 1-8 rod positions.		
RCS boron concentration.		
RCS average temperature.		
• Use the Diamond Control Station and insert the CRD's per OP/0/A/1105/09 (Control Rod Drive System).		
Leave Group 1 withdrawn to 50% to provide ~ 0.5% $\Delta k/k$ for negative insertion.		
• Have I&E reset RPS Channels A, B, C, and D overpower trip setpoints to ~ 4%.		

NOTE: The shutdown may continue.

• Position Group 8 per PT/1/A/1103/15 (Reactivity Balance). Enclosure 13.18 (Required Group 8 Position).		

NOTE: CRD Group #8 should be inserted last. CRD trip times may be performed at this time.

• Verify power supply on and Source Range Channels indication available at ~ 10^{-9} amps on Intermediate Range.		

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Date/Time _____

OP/1/A/1102/10

ENCLOSURE 4.2

HOT SHUTDOWN CONDITIONS TO 250°F/350 PSI CONDITIONS

	Date Init./Time	Verify Date Init./Time
1.0 Initial Conditions		
1.1 Enclosure 4.1 (Shutdown to Hot Shutdown Conditions) completed.	_____	
1.2 Procedure Limits and Precautions have been reviewed.	_____	
2.0 Procedure		
2.1 Go to one RC pump per loop operation per OP/1/A/1103/06 (RCP operation).	_____	
Unit Supervisor _____		
• If hot blowdown of the Steam Generators is desired during Unit Shutdown, perform the following:		
1. OPEN the following valves:		
1FDW-144 (SG "1A" Shell Bottom Drain).	_____	
1FDW-334 (SG "1A" Drain Block).	_____	
1FDW-209 (SG "1B" Shell Bottom Drain).	_____	
1FDW-335 (SG "1B" Drain Block).	_____	
1FDW-103 (1A SG Shell Drain Block).	_____	
1FDW-104 (1A SG Shell Drain Block).	_____	
2. Slowly open 1FDW-242 (SG Drain to Condenser Ctrl) to control blowdown flow rate from the SG's to the condenser.	_____	

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ENCLOSURE 4.2
HOT SHUTDOWN CONDITIONS TO 250°F/350 PSI CONDITIONS

	Date Init./Time	Verify Date Init./Time

3. Maintain SG at 25 inches on the startup range.

NOTE (3): The shutdown may continue.

2.2 Plot an RCS Boron versus RCS Temperature for 1% Δk/k SG margin curve per PT/1/A/1103/15 (Reactivity Balance Calculation). _____

2.3 Borate the RC system per OP/1/A/1103/04 (Soluble Poison Control) to maintain greater than 1% Δk/k shutdown margin with worse case stuck rod fully withdrawn as determined in PT/1/A/1103/15 (Reactivity Balance). _____

Unit Supervisor _____

- If the length of the shutdown is not known, run a Xenon profile from time of shutdown to Xenon ~ 0%. _____
  1) Borate the RCS, as necessary, to maintain 1% Δk/k shutdown margin. _____
  2) Calculate the shutdown margin every 12 hours and borate for Xenon decay.
- Set the Source Range 1NI-1 and 1NI-2 Reactor Building Evacuation Alarm Bistable setpoint 1/2 decade above source level. _____
- Enable the REACTOR BUILDING EVACUATION Alarm. _____

OP/1/A/1102/10
ENCLOSURE 4.2
HOT SHUTDOWN CONDITIONS TO 250°F/350 PSI CONDITIONS

	Date Init./Time	Verify Date Init./Time
CAUTION: RC Pressure versus Temperature and cooldown rates must be maintained within the specified limits of Enclosure 4.5 (RCS P/T Limitations).		
• Place the Turbine Bypass valves in MANUAL.	_____	
• Adjust Turbine Bypass valves to give the desired cooldown rate.	_____	
• De-energize the Pressurizer Heaters and use 1RC-1 (Spray Control valve) to depressurize the RC System.	_____	
• When Main Feedwater Pump(s) discharge pressure is 800 psig, perform the following:		
1. Close from the manual loader and place the Auto/Manual switches in the MANUAL position:		
1FDW-315 (EFWDP Disch. to S/G "1A" Control).	_____	_____
1FDW-316 (EFWDP Disch. to S/G "1B" Control).	_____	_____
2. Place the following control switches in the TRIPPED position:		
"1A" MDEFDWP.	_____	_____
"1B" MDEFDWP.	_____	_____
3. Place 1MS-93 (TDEFDWP Control Switch) in the LOCKOUT position.	_____	_____

OP/1/A/1102/10
ENCLOSURE 4.2
HOT SHUTDOWN CONDITIONS TO 250°F/350 PSI CONDITIONS

	Date Init./Time	Verify Date Init./Time
4. Place the following valve switches as indicated:		
OPEN 1FDW-36 (1A SG Norm SU FDW Hdr).	_____	
OPEN 1FDW-45 (1B SG Norm SU FDW Hdr).	_____	
CLOSE 1FDW-38 (1A SG EFDW Header).	_____	
CLOSE 1FDW-47 (1B SG EFDW Header).	_____	

• When feedwater is ~ 180°F go to Feedwater Cleanup as follows:

1. Close 1FDW-71 (FDW Cleanup to Condenser).	_____	
2. Close 1SD-17 (Turb Byp Line "A" Stm Drn to Trench).	_____	
3. Open 1FDW-84 (FDW Cleanup Bypass Block).	_____	
4. Close 1FDW-82 (FDW Cleanup Control Valve).	_____	
5. Open 1FDW-75 (1A SG FDW Cleanup Bypass).	_____	
6. Open 1FDW-77 (1B SG FDW Cleanup Bypass).	_____	
7. When 1FDW-75 (1A SG FDW Cleanup Bypass) and 1FDW-77 (1B SG FDW Cleanup Bypass) are open,		
Open 1FDW-200 (1FDW-76 Bypass).	_____	
8. When 1FDW-200 (1FDW-76 Bypass) is open,		
Open 1FDW-74 (1A SG FDW Cleanup Bypass).	_____	
Open 1FDW-76 (1B SG FDW Cleanup Bypass)	_____	

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ENCLOSURE 4.2
HOT SHUTDOWN CONDITIONS TO 250°F/350 PSI CONDITIONS

	Date Init./Time	Verify Date Init./Time
9. When 1FDW-74 (1A SG FDW Cleanup Bypass). and 1FDW-76 (1B SG FDW Cleanup Bypass) are open, Throttle open 1FDW-82 (FDW Cleanup Control Valve).	_____	
10. Maintain ~ 2300 gpm total feedwater flow as read on computer point A0156 (CBP Header Flow) or recorder R-304 OR 1×10^6 LBM/Hr as read on running FWP discharge flow recorder or gauge.	_____	
• When Feedwater temperature is ~ 180°F and only if condensate system is to be taken out of service: Bypass High Pressure Heaters.	_____	
Place steam or nitrogen blanket on 1A2 Heater per OP/1/A/1106/03 (1A2 HP Heater Blanketing (Steam or Nitrogen)).	_____	
Unit Supervisor _____		
2.4 When the Reactor Coolant pressure reaches 1850 to 1820 psig insert Safety Rod Group 1.	_____	
• When the Main Steam pressure decreases below 550 psig, stop the second Feedwater Pump per OP/1/A/1106/02 (Condensate and Feedwater System).	_____	
Unit Supervisor _____		

OP/1/A/1102/10
ENCLOSURE 4.2
HOT SHUTDOWN CONDITIONS TO 250°F/350 PSI CONDITIONS

	Date Init./Time	Verify Date Init./Time
2.5 When Reactor Coolant pressure decreases to ~ 1700 psig, bypass ES Channel 1 and 2:		
ES Channel 1 bypassed	_____	_____
ES Channel 2 bypassed	_____	_____
2.6 When Reactor Coolant pressure is ~ 1700 psig:		
1) Verify nuclear overpower trip setpoints are reset to ~ 4% on RPS channels A, B, C, and D.	_____	_____
2) Initiate SHUTDOWN BYPASS for the following:		
RPS Channel A	_____	_____
RPS Channel B	_____	_____
RPS Channel C	_____	_____
RPS Channel D	_____	_____
2.7 Reset CRD Breakers and withdraw Control Rod Group 1 to 50% per OP/0/A/1105/09 (Control Rod Drive System) to provide ~ 0.5% Δk/k for negative insertion.	_____	
• Throttle 1HP-277 (Seal Return Valve) to maintain ~ 60 psig backpressure as read on local pressure gauge PG-102.	_____	
• Open 1HP-275 (RCP Seal #1 Bypass) only if RC Pump bearing temperatures or leakoff temperatures approach their alarm levels, and only then if RCS pressure is less than 1000 psig and #1 seal leakoff flow on any pump is less than 1 gpm.	_____	

OP/1/A/1102/10
ENCLOSURE 4.2
HOT SHUTDOWN CONDITIONS TO 250°F/350 PSI CONDITIONS

	Date Init./Time	Verify Date Init./Time
2.8 When Reactor Coolant pressure decreases below 900 psig, bypass ES Channels 3 and 4 before pressure decreases to 600 psig:	_____	_____
ES Channel 3 bypassed	_____	_____
ES Channel 4 bypassed	_____	_____

NOTE (2.9): RC system temperature shall not be reduced below 325°F until CF system pressure is < 350 psig.

2.9 When RC system pressure reaches approximately 700 psig:

Remove Core Flood System from ES conditions per OP/1/A/1104/01 (Core Flood System). _____

Unit Supervisor _____

• Open 1LPSW-563 (Inside R.B. Hose Rack Isolation).	_____	_____
Open 1LPSW-564 (Inside R.B. Hose Rack Isolation).	_____	_____
• When the RC system temperature is < 350 °F but > 325°F, perform the following:		
1. Close or verify closed:		
1HP-26 (1A HP Injection).	_____	_____
1HP-27 (1B HP Injection).	_____	_____
1HP-409 (1HP-27 Bypass).	_____	_____
1HP-410 (1HP-26 Bypass).	_____	_____

OP/1/A/1102/10
ENCLOSURE 4.2
HOT SHUTDOWN CONDITIONS TO 250°F/350 PSI CONDITIONS

	Date Init./Time	Verify Date Init./Time
2. White tag the following motor operator breakers in the open position:		
1HP-26 BKR Open.	_____	_____
White Tag Number _____		
1HP-27 BKR Open.	_____	_____
White Tag Number _____		
1HP-409 BKR Open.	_____	_____
White Tag Number _____		
1HP-410 BKR Open.	_____	_____
White Tag Number _____		
3. White tag the following handwheels closed:		
1HP-26 handwheel closed.	_____	_____
White Tag Number _____		
1HP-27 handwheel closed.	_____	_____
White Tag Number _____		
1HP-409 handwheel closed.	_____	_____
White Tag Number _____		
1HP-410 handwheel closed.	_____	_____
White Tag Number _____		

OP/1/A/1102/10
ENCLOSURE 4.2
HOT SHUTDOWN CONDITIONS TO 250°F/350 PSI CONDITIONS

	Date Init./Time	Verify Date Init./Time
4. White tag Unit 1 SSF-RC Makeup Pump Breaker 600V MCC 1XSF-4C open.	_____	_____
5. Establish a dedicated LTOP Operator per Enclosure 4.11 (Low Temperature Over Pressure Protection).	_____	
2.10 Continue the decrease of RC system pressure to 500 psig. Insert control rod Group #1.	_____	
• If shutdown is for a Refueling Outage, then position Group 8 at 0% (NOT inlimit).	_____	
Trip the Control Rod Drive system.	_____	
NOTE: (2.11) The shutdown may continue.		
2.11 When RC system pressure decreases to < 600 psig (but > 400 psig)		
AND		
RCS Temperature is < 350°F (but > 325°F), have the Instrument Department valve in the RC system Low Range Pressure indicator.	_____	
1) Place the Low Range Pressure indicator in service by opening:		
1RC-6 (Press. Water Sample (Bldg. Isol.) Pen.(1)).	_____	
1RC-7 (Press. Sample (Bldg. Isol.) Pen.(1)).	_____	
2) Verify 1RC-4 (Pzr Relief Block) is open.	_____	_____

OP/1/A/1102/10
ENCLOSURE 4.2
HOT SHUTDOWN CONDITIONS TO 250°F/350 PSI CONDITIONS

	Date Init./Time	Verify Date Init./Time
CAUTION: If the RCS Low Range Pressure Transmitter is inoperable, then the PORV is inoperable. (3)		
3) When the RCS pressure < 450 psig (but > 400 psig) AND RCS temperature is < 350°F (but > 325°F), select LOW on the 1RC-66 Setpoint Selector.	_____	_____
4) Immediately check Quench Tank temperature, pressure, and Pressurizer Relief Valves Flow Monitor in case 1RC-66 (Press. Power Operated Relief Valve) lifts unexpectedly.	_____	
5) Verify Pressurizer level ≤ 220 inches.	_____	
2.12 Sample the RC system and determine that the required boron concentration to maintain shutdown margin at ambient temperature and Xenon free core is in the Reactor Coolant system.	_____	_____
2.13 If the length of shutdown is not known to be longer than the time for Xenon decay to ~ 0%, calculate the shutdown margin every 12 hours and borate for Xenon decay to maintain 1% Δk/k shutdown margin.		
2.14 When Reactor Coolant Temperature (Tc) is 325 to 300°F:		
1. Secure Steam Generator hot blowdown as follows:		
Close 1FDW-242 (Hot Blowdown Controller to the Condenser).	_____	_____
Close 1FDW-103 (1A SG Shell Drain Block).	_____	_____
Close 1FDW-104 (1B SG Shell Drain Block).	_____	_____

OP/1/A/1102/10
ENCLOSURE 4.2
HOT SHUTDOWN CONDITIONS TO 250°F/350 PSI CONDITIONS

	Date Init./Time	Verify Date Init./Time
2. If directed by the Unit Operating Engineer, begin hot soak per OP/1/A/1106/08 (Steam Generator Secondary, Fill, Drain and Layup).	_____	
2.15 If shutdown is for CRD stator replacement, maintain RCS temperature at ~ 300°F, RCS pressure ~ 350 psig.	_____	
2.16 Continue cooldown to 250°F/350 psi.	_____	

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Date/Time _____

OP/1/A/1102/10

ENCLOSURE 4.3

250°F/350 PSI CONDITIONS TO COLD SHUTDOWN

	Date Init./Time	Verify Date Init./Time

1.0 Initial Conditions

1.1 Completed Enclosure 4.2 (Hot Shutdown Conditions to 250°F/350 PSI Conditions). _____

1.2 Procedure Limits and Precautions have been reviewed. _____

2.0 Procedure

2.1 Slowly start to decrease the Pressurizer level control setpoint to 100 inches. _____

NOTE: (2.1) The cooldown may continue.

CAUTION: Seal #1 ΔP must be maintained > 275 psi.

- As the RC system pressure decreases to the point where the 275 psi ΔP limit is approached on Seal #1 of the RC pumps, perform the following:

  Open 1GWD-19 (LDST Vent) to reduce the back pressure on the seal return. _____

  OR

  Open 1LWD-250 (Seal Return Filter Drain). _____

  Open 1LWD-461 (Seal Return Filter Drain Block). _____

  Close 1HP-279 (Seal Return Filter Outlet). _____

OP/1/A/1102/10
ENCLOSURE 4.3
250°F/350 PSI CONDITIONS TO COLD SHUTDOWN

	Date Init./Time	Verify Date Init./Time
• When the RC system pressure is < 350 psig and RC temperature < 250°F, secure the Reactor Building Spray system per OP/0/A/1104/05 (Reactor Building Spray System).	_____	
Unit Supervisor _____		
• When the RC system pressure is reduced ≤ 350 psig and < 250°F, refer to OP/1/A/1104/04 (Low Pressure Injection System) and valve in the Low Pressure Injection system in the Switchover mode per RC System Cooldown Enclosure.	_____	
Unit Supervisor _____		
• Have I&E connect trend recorders to sense LPI cooler outlet temperatures.	_____	
• Verify LPI cooler outlet temperature recorder is in operation and agrees with LPI cooler outlet temperature gauges.	_____	_____
• When RCS is < 250°F and < 350 psig place the purge system in operation per the following:		
1. If going to cold shutdown for refueling, then verify Performance has performed "As Found Leak Rate Test" per PT/1/A/0150/27 (Local Type B Leak Rate of Penetrations 19 and 20).	_____	
2. Close in the following breakers:		
1PR-1 (RB Purge Outlet).	_____	
1PR-6 (RB Purge Inlet).	_____	

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ENCLOSURE 4.3
250°F/350 PSI CONDITIONS TO COLD SHUTDOWN

	Date Init./Time	Verify Date Init./Time
3. Contact I&E to install the links on the following per IP/0/A/310/22 (P.R. valves 2, 3, 4 and 5 Close and Open Links Procedure).		
1PR-2 (RB Purge Outlet).		I&E
1PR-3 (RB Purge Controller).		I&E
1PR-4 (RB Purge Inlet).		I&E
1PR-5 (RB Purge Inlet).		I&E

NOTE: (4) If RCS pressure < 300 psig or RCS temperature < 200°F, the stroke test is not required.

4. If RCS temperature is ≥ 200°F when power is restored to the RB purge valves, contact Performance to do valve stroke testing of 1PR-1 through 1PR-6. _____

5. Start R.B. Purge System per OP/0/A/1102/14 (R.B. Purge System). _____

NOTE: The shutdown may continue.

2.2 When RC pressure is ≤ 314 psig and ≤ 246°F RC temperature:

Start LPI pump "A" or "C" per RC System Cooldown Enclosure in OP/1/A/1104/04 (Low Pressure Injection System). _____

Slowly open 1LP-69 (LPI Switchover Flow Controller) until "B" header temperature has stabilized. _____

2.3 Establish 3000 gpm flow in "B" line, using 1LP-69 (Switchover Mode Control). _____

Select ON on Low Flow Alarm Block Switch. _____

OP/1/A/1102/10
ENCLOSURE 4.3
250°F/350 PSI CONDITIONS TO COLD SHUTDOWN

	Date Init./Time	Verify Date Init./Time
• After the LPI system is in service, sample the RCS to ensure required shutdown boron concentration is being maintained.	_____	
• Establish LPSW to LPI Coolers by the following:		
1. Close 1LPSW-251 (1A LPI Clr Outlet Byp Vlv).	_____	
Close 1LPSW-252 (1B LPI Clr Outlet Byp Vlv).	_____	
2. Open 1LPSW-4 (1A LPI Cooler Outlet).	_____	
Open 1LPSW-5 (1B LPI Cooler Outlet).	_____	

CAUTION: Do not exceed 6000 gpm LPSW flow thru cooler.
(3)

3. Throttle open 1LPSW-252 (1B LPI Clr Outlet Byp Vlv) to cooldown and depressurize the RCS per limits of Enclosure 4.5 (RCS P/T Limitations).	_____	_____
• If Steam Generator Hot Soak is being performed, then maintain the following:		
1. Maintain RCS temp between 225-246°F.	_____	
2. RCS pressure should be < 314 psig but > RCP requirements when Steam Generator Hot Soak is complete.	_____	

NOTE: This temperature/pressure region will allow continued RCP operation while the LPI System is lined up in the Switchover Cooling Mode.

3. If necessary, maintain requirements for RCPs by energizing Pressurizer Heaters.	_____	

OP/1/A/1102/10
ENCLOSURE 4.3
250°F/350 PSI CONDITIONS TO COLD SHUTDOWN

		Date Init./Time	Verify Date Init./Time
CAUTION: (2.4)	1) Securing all but one RCP must be done prior to going below 200°F as per Enclosure 4.5 (RCS P/T Limitations Curve) to minimize stresses created on the Reactor Vessel in the cooldown process.		
	2) Cooldown rate should be monitored to prevent exceeding cooldown limits when securing RCP's due to removal of pump heat.		
2.4	After LPI flow has been established and Steam Generator Hot Soak is complete if performed, stop all RC pumps except the RC pump supplying Pressurizer Spray per CP/1/A/1103/06 (RCP Operation) before cooling RCS below 200°F.		
	Unit Supervisor _____		
2.5	When RC pumps have been stopped for 30 minutes, isolate the LPSW to the idle RC pump motors per OP/1/A/1103/06 (RC Pump Operation).	_____	
2.6	Throttle 1LPSW-252 (1B LPI Clr Outlet Byp Vlv) to establish proper cooldown rates per Enclosure 4.5 (RCS P/T Limitations).	_____	
2.7	When RCS Temperature is < 200°F, perform the following:		
2.7.1	Secure SG(s) as follows:		
	• Close Turbine Bypass Valves.	_____	
	• Close the following valves:		
	1FDW-127 (Normal FDW Header "1A" Drain Isolation).	_____	
	1FDW-216 (Normal FDW Header "1B" Drain Isolation).	_____	
	1FDW-237 (S/G "1B" FDW Header Drain).	_____	

OP/1/A/1102/10
ENCLOSURE 4.3
250°F/350 PSI CONDITIONS TO COLD SHUTDOWN

		Date Init./Time	Verify Date Init./Time
2.7.2	Determine if SG wet or dry layup is desired and implement at this time per OP/1/A/1106/08 (Steam Generator Fill, Drain and Layup). _____ Unit Supervisor _____		
2.7.3	Shutdown secondary systems per OP/1/A/1106/02 (Condensate and Feedwater System). _____ Unit Supervisor _____		
2.7.4	If required, when the RCS reaches ~ 180°F, stop the RCS cooldown and perform Enclosure 4.10 (Controlling Procedure for H_2O_2 Addition to the RCS).	_____	
2.8	Cooldown until T_H is reduced to approximately 150°F.	_____	
2.9	Verify pressurizer level has reached 100 inches.	_____	
2.10	Before securing the last RCP, perform the following:		
•	Line up to use HPI system for Auxiliary Spray as follows:		
1.	Verify 1HP-355 (Aux. PZR Spray Flow Control) closed.	_____	_____
2.	Verify 1HP-473 (Aux Pzr Spray Flow Control Bypass) closed.	_____	_____
3.	Close 1HP-241 (Loop "A1" and "A2" Nozzle Warming Throttle).	_____	_____
4.	Open 1HP-472 (Aux. PZR Spray Flow Block).	_____	_____

OP/1/A/1102/10
ENCLOSURE 4.3
250°F/350 PSI CONDITIONS TO COLD SHUTDOWN

	Date Init./Time	Verify Date Init./Time
• Close the following Feedwater Startup Blocks:		
1FDW-33 (A SU FDW Block).	_____	
1FDW-42 (B SU FDW Block).	_____	
• Adjust LPI cooler outlet temperature to be ~ the same as T_{cold}.	_____	_____

NOTE (2.11): The step change in temperature indication resulting from stopping the final RCP (utilizing T_c with RCP on, LPI cooler outlet temperature with RCP off) must be factored in when determining the cooldown rate per Enclosure 4.5 (RCS P/T Limitations).

2.11 Stop the last RC pump per OP/1/A/1103/06 (RCP Operation). _____

Unit Supervisor _____

- Adjust 1LPSW-252 (1B LPI Clr Outlet Byp Vlv) to re-initiate RCS cooldown after all RCPs stopped. _____

NOTE: Use LPI cooler outlet temperature as RCS temperature. Cooldown rates are extremely restrictive <150°F. Maintain limits per Enc. 4.5 (RCS P/T Limitations).

- After RC pumps have been secured and if #1 leakoff was routed to Waste Disposal System:

Open 1HP-279 (Seal Return Filter Outlet). _____

Close 1LWD-250 (Seal Return Filter Drain). _____

Close 1LWD-461 (Seal Return Filter Drain Block). _____

OP/1/A/1102/10
ENCLOSURE 4.3
250°F/350 PSI CONDITIONS TO COLD SHUTDOWN

	Date Init./Time	Verify Date Init./Time
• Open when RCS Pressure is < 300 PSIG:		
1LWD-443 (East Penetration Room Floor Drain).	_____	
1LWD-444 (West Penetration Room Floor Drain).	_____	
2.12 Commence cooldown of the pressurizer per Enclosure 4.8 (Pressurizer Cooldown).	_____	
• When the RC system pressure is less than 125 psig, transfer the LPI system from the SWITCHOVER MODE to the NORMAL MODE of operation per OP/1/A/1104/04 (Low Pressure Injection System).	_____	

NOTE: Either "1A" or "1C" LPI pump can be operating in conjunction with '1B' LPI pump.

Unit Supervisor _____

• After all RC pumps have been stopped and the RC system pressure is < 100 psig and temperature < 190°F:		
1. Close the following valves:		
1HP-20 (RC Pump Seal Return).	_____	
1HP-226 (RCP 1A2 RCP Seal Return Stop).	_____	
1HP-228 (RCP 1A1 RCP Seal Return Stop).	_____	
1HP-230 (RCP 1B2 RCP Seal Return Stop).	_____	
1HP-232 (RCP 1B1 RCP Seal Return Stop).	_____	
2. Place standby HPI pump in the OFF position.	_____	

OP/1/A/1102/10
ENCLOSURE 4.3
250°F/350 PSI CONDITIONS TO COLD SHUTDOWN

	Date Init./Time	Verify Date Init./Time
3. Place 1HP-31 (RCP Seal Flow Control) in HAND and close.		
4. Open 1HP-42 (Letdown Orifice Manual Bypass) as required to maintain letdown flow.		
5. Leave a HPI pump on for Pressurizer auxiliary spray flow and/or purification, degassification operation.		
• Stop the Reactor Vessel Head Cooling Fans by opening the following breakers: Even Reactor Vessel Head Cooling Fans breakers (located on WR2 RB-3).		
Odd Reactor Vessel Head Cooling Fans breakers (located on ER2 RB-3).		

2.13 When Pressurizer temperature is < 200°F, perform the following:

1. Line up letdown flow to 1A BHUT as follows:		
Verify open 1CS-41 (1A RC BHUT Inlet).		
Open 1CS-26 (Letdown to RC BHUT).		
Position 1HP-14 (LDST Bypass) to [illegible] position.		
2. Adjust letdown flow to lower Pressurizer level to ~ 115 inches.		
3. Maintain Pressurizer nitrogen overpressure at 30 psi per OP/0/A/1103/05 (Pressurizer Operation) while lowering level.		

OP/1/A/1102/10
ENCLOSURE 4.3
250°F/350 PSI CONDITIONS TO COLD SHUTDOWN

	Date Init./Time	Verify Date Init./Time
4. After Pressurizer level is adjusted to ~ 115 inches, perform the following:		
1. Close 1HP-5 (Letdown Isolation).	_____	
2. When 1HP-5 (Letdown Isolation) is closed, notify Chemistry Department that the normal RCS sample line is isolated.	_____	
3. Position 1HP-14 (LDST Bypass) to NORMAL.	_____	
4. Close 1CS-26 (Letdown to RC BHUT).	_____	
5. Stop the HPI Pump.	_____	
5. Secure Pressurizer Auxiliary Spray by performing the following:		
1. Close 1HP-355 (Aux. PZR Spray Flow Control).	_____	_____
2. Verify closed 1HP-473 (Aux Pzr Spray Bypass).	_____	_____
3. Close 1HP-472 (Aux. PZR Spray Flow Block).	_____	_____
6. Rack out and white tag the HPI Pump breakers (for Low Temperature Over Pressure Protection):		
1A HPI pump breaker racked out and white tagged	_____	_____
1B HPI pump breaker racked out and white tagged	_____	_____
1C HPI pump breaker racked out and white tagged	_____	_____

OP/1/A/1102/10
ENCLOSURE 4.3
250°F/350 PSI CONDITIONS TO COLD SHUTDOWN

	Date Init./Time	Verify Date Init./Time

CAUTION: (2.14) When depressurizing and draining the RC system, the NPSH for the LPI pumps and decay heat flow are affected. Flow must be monitored and regulated to prevent excess flow and pump cavitation.

2.14 When RC temperature is reduced to 160°F as read on LP pump suction and the Pressurizer temperature is ≤ 200°F, go to one LP pump operation per OP/1/A/1104/04 (Low Pressure Injection System). _____

- Reduce total LPI flow to ≤ 3000 GPM with one LPI Pump. _____

NOTE: To save wear on '1A' or '1B' LPI pumps, the use of '1C' LPI pump is preferred.

- Place the LPI system in purification per OP/1/A/1104/04 (Low Pressure Injection System) at this time. _____
- Adjust the RC System to the desired level for refueling or component repair. Refer to OP/1/A/1103/11 (Draining and Nitrogen Purging the RC System). _____

Unit Supervisor _____

NOTE: (2.15) This is to ensure equipment is not inadvertently operated while shutdown.

2.15 If directed by the Unit Operation Engineer when the Unit is being shutdown for Refueling, red tag the equipment listed on Enclosure 4.9 (Shutdown Equipment Tagging List) to the Unit Supervisor. _____

Unit Operating Engineer Contacted _____

Date/Time _____

OP/1/A/1102/10
ENCLOSURE 4.4
STEAM TRAP BYPASSES OR STEAM DRAINS

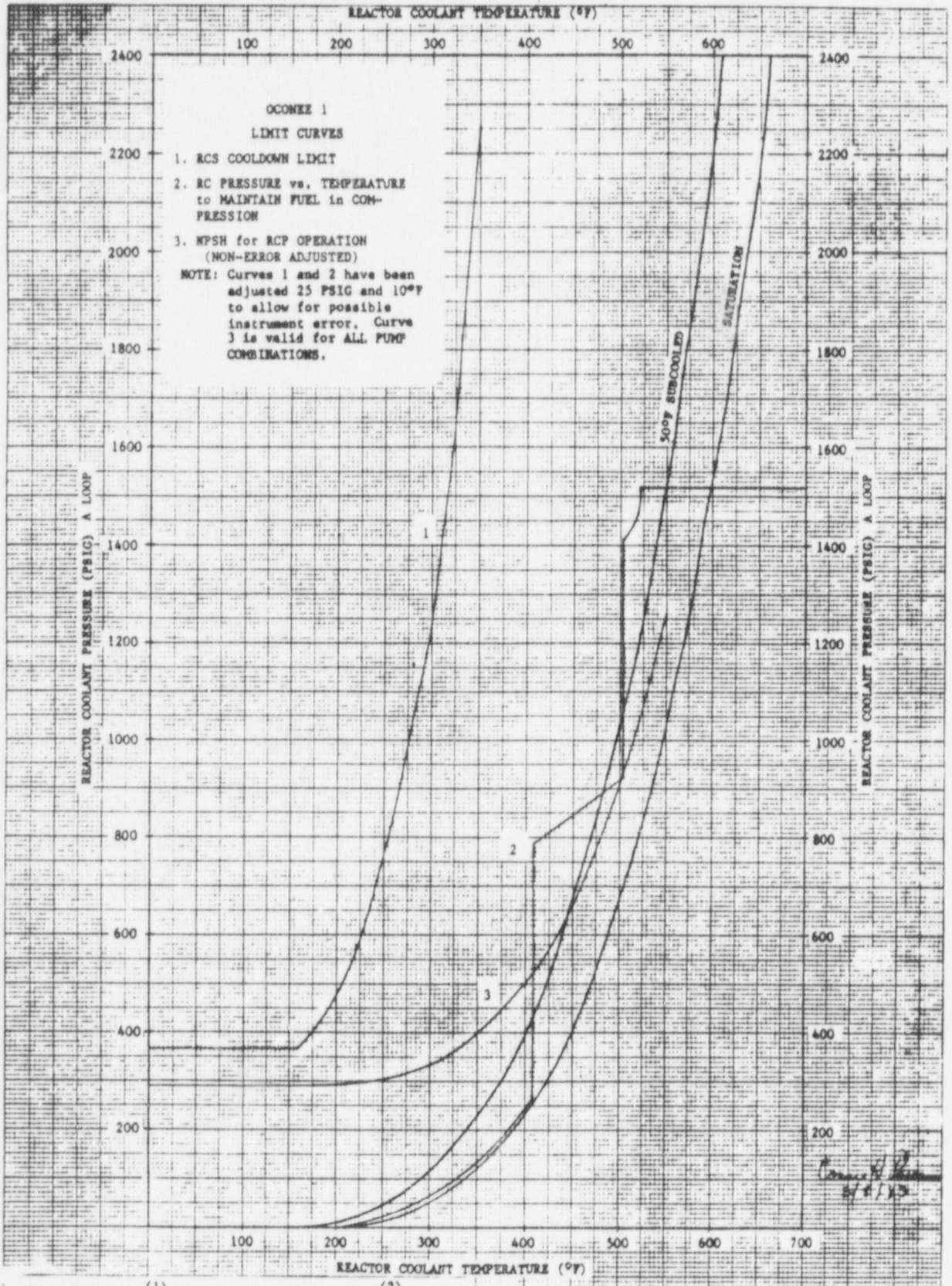
VALVE CHECKLIST

VALVE NO.	VALVE NAME	LOCATION	BT	POSITION	INITIAL
1SD-187	A Bld to A Htrs Stm Trap Byp	CR		Open	
1SD-199	A Bld to A Htrs Stm Trap Byp 3	CR		Open	
1SD-217	B Bld to B Htrs Stm Trap Byp 1	CR		Open	
1SD-222	B Bld to B Htrs Stm Trap Byp 2	CR		Open	
1SD-246	C Bld to C Htrs Stm Trap Byp 2	CR		Open	
1SD-264	D Bld From A LP Turb Stm Trap Byp 1	CR		Open	
1SD-288	D Bld From A LP Turb Stm Trap Byp 3	CR		Open	
1SD-294	D Bld From B LP Turb Stm Trap Byp 2	CR		Open	
1SD-276	D Bld From C LP Turb Stm Trap Byp 1	CR		Open	
1SD-312	D Bld From C LP Turb Stm Trap Byp 3	CR		Open	
1SD-208	D Bld to D Htrs Stm Trap Byp	CR		Open	
1SD-408	E Bld Lower Line Stm Trap Byp 2	CR		Open	
1SD-402	E Bld Lower Line Stm Trap Byp	CR		Open	
1SD-193	A Bld to A Htrs Stm Trap Byp 2	CR		Open	
1SD-182	A Bld to A Htrs Stm Trap Byp 4	CR		Open	
1SD-228	B Bld to B Htrs Stm Trap Byp 3	CR		Open	
1SD-234	B Bld to B Htrs Stm Trap Byp 4	CR		Open	
1SD-240	C Bld to C Htrs Stm Trap Byp 1	CR		Open	
1SD-252	C Bld to C Htrs Stm Trap Byp 3	CR		Open	
1SD-282	D Bld From A LP Turb Stm Trap Byp 2	CR		Open	
1SD-270	D Bld From B LP Turb Stm Trap Byp 1	CR		Open	
1SD-300	D Bld From B LP Turb Stm Trap Byp 3	CR		Open	
1SD-306	D Bld From C LP Turb Stm Trap Byp 2	CR		Open	
1SD-318	D Bld Hdr Stm Trap Byp	CR		Open	

OP/1/A/1102/10
ENCLOSURE 4.4
STEAM TRAP BYPASSES OR STEAM DRAINS

VALVE CHECKLIST

VALVE NO.	VALVE NAME	LOCATION	BT	POSITION	INITIAL
1SD-390	E Bld Upper Line Stm Trap Byp	CR		Open	
1SD-396	E Bld Lower Line Stm Trap Byp	CR		Open	
1SD-273	Comb. Ctrl Vlv Before Seat Drn	CR		Open	
1SD-284	#2 Ctrl Vlv Lead Stm Drn	CR		Open	
1SD-285	#1 Ctrl Vlv Lead Stm Drn	CR		Open	



RC TEMPERATURE (1)	MAXIMUM COOLDOWN RATE (2)
T > 280°F	≤ 45°F in any ½ hour period
150°F < T < 280°F	≤ 20°F in any ½ hour period
T < 150°F	≤ 9°F in any 1 hour period
RCS depressurized (3)	≤ 45°F in any 1 hour period

(1) RC temperature is cold leg temperature if one or more RCS pumps are in operation or if on natural circulation cooldown; otherwise it is the LPI cooler outlet temperature.

(2) These rate limits must be applied to the change in temperature indication from cold leg temperature to LPI cooler outlet temperature per Note (1).

(3) RCS is depressurized when all three of the following conditions exist:

a) RCS temperature < 200°F,
b) RCS pressure < 50 psig,
c) All RC Pumps off,

The maximum cooldown rate shall be relaxed to ≤ 45°F in any 1 hour period.

RC TEMPERATURE	ALLOWED PUMP COMBINATIONS
> 270°F	Any
270 - 200°F	No more than 1 pump per loop
< 200°F	No more than 1 pump

Checked Control Copy _____

Date/Time _____

OP/1/A/1102/10
ENCLOSURE 4.5
RCS P/T Limitations

Checked Control Copy _____

Date/Time _____

OP/1/A/1102/10

ENCLOSURE 4.6

PROCEDURE FOR SUBCOOLING THE HOT LEG FOLLOWING PRESSURIZER OUTSURGE

	Date Init./Time	Verify Date Init./Time
1.0 Initial Conditions		
1.1 RCS pressure decreased below Hot Leg Saturation Temperature as indicated by rapid increase in pressurizer level.	_____	
1.2 RCP's secured.	_____	
1.3 LPI system in operation.	_____	
1.4 FDW system available.	_____	
1.5 Procedure Limits and Precautions have been reviewed.	_____	
2.0 Procedure When Pressurizer Temp. > 275°F		
2.1 Close 1HP-355 (HPI Auxiliary Spray Flow Control) to secure auxiliary spray.	_____	_____
Verify closed 1HP-473 (Aux Pzr Spray Bypass).	_____	_____
2.2 Energize Pressurizer Heaters to increase RCS pressure to minimum RCP NPSH per Enclosure 4.5 (RCS P/T Limitations).	_____	
2.3 Start a RC pump per OP/1/A/1103/06. (RCP Operation).	_____	
Unit Supervisor _____		
2.4 Stabilize or reduce hot leg temperatures at approximately 150°F or less without violating the limits of Enclosure 4.5 (RCS P/T Limitations).	_____	

OP/1/A/1102/10
ENCLOSURE 4.6
PROCEDURE FOR SUBCOOLING THE HOT LEG FOLLOWING PRESSURIZER OUTSURGE

		Date Init./Time	Verify Date Init./Time
2.5	Reduce Pressurizer level to 100 inches.	_____	_____
2.6	Adjust LPI cooler outlet temperature to be ~ the same as T_{cold}.	_____	_____
2.7	Stop the RC pump per OP/1/A/1103/06 (RCP Operations).	_____	

NOTE (2.7): The step change in temperature indication resulting from stopping the final RCP (utilizing T_c with RCP on, LPI cooler outlet temperature with RCP off) must be factored in when determining the cooldown rate per Enclosure 4.5 (RCS P/T Limitations).

Unit Supervisor _____

2.8 Commence cooldown of the Pressurizer per Enclosure 4.8 (Pressurizer Cooldown). _____

3.0 Procedure When Pressurizer Temp is < 275°F

3.1 Establish nitrogen overpressure on the Pressurizer as follows:

3.1.1	Close the following valves to prevent Quench Tank from pressurizing.		
	1N-116 (Quench Tank Supply).	_____	_____
	1N-121 (High Pressure Supply to Pressurizer).	_____	_____
	1GWD-16 (Pressurizer Vent Block).	_____	_____
3.1.2	Open the following valves:		
	1GWD-18 (Pressurizer Vent and N_2 Isolation).	_____	
	1N-110 (Reactor Bldg. Low Press Header Supply).	_____	

OP/1/A/1102/10
ENCLOSURE 4.6
PROCEDURE FOR SUBCOOLING THE HOT LEG FOLLOWING PRESSURIZER OUTSURGE

		Date Init./Time	Verify Date Init./Time
	Remove White Tag and open:		
	1N-119 (Steam Generator Pressurizer Block).	_____	_____
	1N-161 (Pressurizer Supply).	_____	_____
3.1.3	Throttle open 1GWD-17 (Pzr Vent) to establish nitgogen over pressure.	_____	

CAUTION: Do not exceed 45 psig RCS Pressure.
(3.1.4)

3.1.4	Increase pressure until bubble in the hot leg is collapsed as indicated by a decrease in Pressurizer level.	_____

3.2 Line up "1A" SG for feed and bleed as follows:

1.	Open the following:	
	1FDW-141 (SG "1A" Bottom Drain).	_____
	1FDW-142 (SG "1A" Bottom Drain).	_____
	1FDW-143 (SG "1A" Bottom Drain).	_____
	1FDW-144 (SG "1A" Bottom Drain).	_____
	1FDW-334 (SG Shell Drain Hdr. Block).	_____
	1FDW-103 (1A SG Shell Drain Block).	_____
2.	Drain the "1A" SG to ~ 70% full range.	_____
3.	Line up feedwater from another Unit to the "1A" SG per OP/1/A/1106/08 (Steam Generator Fill, Drain and Layup).	_____

Unit Supervisor _____

OP/1/A/1102/10
ENCLOSURE 4.6
PROCEDURE FOR SUBCOOLING THE HOT LEG FOLLOWING PRESSURIZER OUTSURGE

	Date Init./Time	Verify Date Init./Time
3.3 Feed and bleed the "1A" SG between ~ 70% and ~ 90% full range by performing the following:		
Throttle open 1FDW-35 (1A Startup FDW Control).	_____	
Throttle open 1FDW-242 (SG Drain to Condenser Ctrl).	_____	
3.4 Cooldown the "A" hot leg to < 200° then close:		
1FDW-35 (1A Startup FDW Control).	_____	
1FDW-242 (SG Drain to Condenser Ctrl).	_____	
3.5 Stop feed and bleed of "1A" SG as follows:		
1. Close the following valves:		
1FDW-141 (SG "1A" Bottom Drain).	_____	
1FDW-142 (SG "1A" Bottom Drain).	_____	
1FDW-143 (SG "1A" Bottom Drain).	_____	
1FDW-144 (SG "1A" Bottom Drain).	_____	
1FDW-334 (SG Shell Drain Hdr. Block).	_____	
Close 1FDW-103 (1A SG Shell Drain Block).	_____	
2. Return to normal the feedwater lineup that supplied FDW from another unit per OP/1/A/1106/08 (Steam Generator Fill, Drain Layup).	_____	
Unit Supervisor _____		
3.6 Continue with Pressurizer cooldown per Enclosure 4.8 (Pressurizer Cooldown).	_____	

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Date/Time _____

OP/1/A/1102/10

ENCLOSURE 4.7

LOWERING PRESSURIZER LEVEL WITHOUT RCP'S OPERATING

(This procedure aligns RCS letdown from the LPI to the LDST. This flowpath is to decrease pressurizer level while minimizing RCS hot leg temperature increase).

	Date Init./Time	Verify Date Init./Time
1.0 Initial Conditions		
1.1 It is desired to reduce Pressurizer level.	_____	
1.2 RCP's OFF.	_____	
1.3 LPI system in operation with flow through the 'B' loop.	_____	
1.4 HPI available for makeup and auxiliary spray.	_____	
1.5 Procedure Limits and Precautions have been reviewed.	_____	
2.0 Procedure		
2.1 Open 1HP-13 (Purification IX Bypass).	_____	
Place 1HP-14 (LDST Bypass) in the NORMAL position.	_____	
2.2 Close or verify closed the following valves:		
1HP-120 (RC Volume Control).	_____	
1HP-8 (Purification IX Inlet).	_____	
1HP-9/1HP-11 (Spare Purification IX Isolations).	_____	

OP/1/A/1102/10
ENCLOSURE 4.7
LOWERING PRESSURIZER LEVEL WITHOUT RCP'S OPERATING

		Date Init./Time	Verify Date Init./Time
CAUTION: (2.3)	Do not let letdown pressure exceed 125 psig in letdown line.		
2.3	Before Pressurizer level reaches 315 inches, simultaneously:		
	Close 1HP-5 (Letdown Isolation).	_____	
	Throttle open 1LP-96 (LP Supply to Purification Demineralizer Block) until Pressurizer level begins to decrease.	_____	
NOTE: (2.4)	Do not go below 100 inches in Pressurizer.		
2.4	Slowly decrease Pressurizer level until hot leg temperature reaches 200°F or Pressurizer level approaches 100 inches.	_____	
2.5	When Pressurizer reaches desired level, close 1LP-96 (LP Supply to Purification Demineralizer Block).	_____	_____
2.6	If Pressurizer temp is > 200°F, then open 1HP-5 (Letdown Isolation).	_____	
2.7	Re-establish Pressurizer cooldown per Enclosure 4.8 (Pressurizer Cooldown).	_____	

Checked Control Copy _____

Date/Time _____ _____

OP/1/A/1102/10

ENCLOSURE 4.8

PRESSURIZER COOLDOWN

	Date Init./Time	Verify Date Init./Time

1.0 Initial Conditions

1.1 Auxiliary spray is lined up to the Pressurizer per Enclosure 4.3 (250°F/350 PSI Condition to Cold Shutdown). _____

1.2 Verify the following:

- All RCP's OFF. _____
- RCS pressure approximately 300 psig. _____
- PZR level approximately 100 inches. _____
- All PZR heaters off.

  Htr. Bank #1 _____

  Htr. Bank #2 _____

  Htr. Bank #3 _____

  Htr. Bank #4 _____

1.3 At least 50 inches level in 1A BHUT with Boron concentration $\geq$ concentration required to maintain 1% $\Delta K/K$ shutdown margin. _____

1.4 A minimum of one GWD Tank available. _____

1.5 Procedure Limits and Precautions have been reviewed. _____

2.0 Procedure

2.1 Refer to Enclosure 4.11 (Low Temperature Over Pressure Protection).

OP/1/A/1102/10
ENCLOSURE 4.8
PRESSURIZER COOLDOWN

		Date Init./Time	Verify Date Init./Time
2.2	Open and white tag the following Pressurizer Heater Breakers:		
	Pzr Htr. Group B Bkr. (1XSF-3B)	_____	
	Pzr Htr. Group C Bkr. (1XI-2A)	_____	
	Pzr Htr. Group D Bkr. (1XJ-2A)	_____	
	Pzr Htr. Group E Bkr. (1XH-3A)	_____	
	Pzr Htr. Group F Bkr (1XI-3A)	_____	
	Pzr Htr. Group G Bkr. (1XJ-3A)	_____	
	Pzr Htr. Group H Bkr. (1XH-4A)	_____	
	Pzr Htr. Group I Bkr. (1XI-4A)	_____	
	Pzr Htr. Group J Bkr. (1XJ-4A)	_____	
	Pzr Htr. Group A and K Bkr. (1XK-1A)	_____	
2.3	After Pzr Htrs breakers are tagged open, reduce Pzr level to 80 inches.	_____	
2.4	Drain Quench Tank to a level of 80 inches and place in recirculation per OP/1/A/1104/17 (Quench Tank Operation).	_____	
2.5	Close 1RC-3 (Spray Control Outlet Block).	_____	
	Place 1HP-120 (Makeup Volume Control) in MANUAL and closed.	_____	
	Throttle letdown flow to match RCP seal flow.	_____	

OP/1/A/1102/10
ENCLOSURE 4.8
PRESSURIZER COOLDOWN

	Date Init./Time	Verify Date Init./Time

CAUTION (2.6): Do not exceed a 90°F/hr. cooldown rate in the Pressurizer. Enclosure 4.11 (Low Temperature Over Pressure Protection) is to be used for Pressurizer level restrictions.

2.6 Throttle open 1HP-355 (HPI Aux. Spray Flow Control) to commence Pressurizer Cooldown/Depressurization. _____

2.6.1 Verify the following restrictions are maintained:

1. When RCS Temp. < 220°F and RCS Press. ≤ 100 psig:
   - PZR shall be ≤ 315 inches
2. When RCS Temp. < 220°F and RCS Press. > 100 psig:
   - PZR shall be ≤ 220 inches
   - RCS Press. shall be ≤ 350 psig
3. When RCS Temp. > 220°F but < 325°F:
   - PZR shall be ≤ 260 inches

NOTE (2.6.2): Cooldown rate will decrease by itself due to lower ΔT between Pressurizer and RCS.

2.6.2 Attempt to achieve ~ 80°F/hr cooldown rate the first hour.

2.6.3 Readjust letdown flow to match RCP seal flow as RCS pressure decreases.

OP/1/A/1102/10
ENCLOSURE 4.8
PRESSURIZER COOLDOWN

	Date Init./Time	Verify Date Init./Time

NOTE (2.7): 1HP-120 (RC Volume Control) is to be used only to minimize the affects of PZR outsurge on RCS hot leg temperature, NOT to increase PZR level. Any increase in PZR level should be due to Auxiliary Spray flow.

2.7 Throttle open 1HP-120 (RC Volume Control) only as necessary to maintain PZR surge line temperature (Comp. Pt. A1454) subcooled for the existing RCS pressure and hot leg temperature < 190°F. _____

NOTE (2.8): When RCS pressure is reduced to 30 psig, pressure will be maintained by nitrogen control per OP/0/A/1103/05 (Pressurizer Operation).

2.8 When RCS pressure is approximately 200 psig, commence lineup to maintain RCS pressure control by nitrogen overpressure per OP/0/A/1103/05 (Pressurizer Operation). _____

Unit Supervisor _____

2.9 When Pressurizer level reaches 220 inches, check RCS pressure:

1. If RCS pressure is less than 100 psig, continue with the cooldown. _____
2. If RCS pressure is greater than 100 psig, go to Enclosure 4.7 (Lowering Pressurizer Level Without RCP's Operating) to lower pressurizer level. _____

2.10 If Pressurizer level reaches 315 inches, and Pressurizer temperature is > 300°F, go to Enclosure 4.7 (Lowering Pressurizer Level Without RCP's Oeprating) to lower Pressurizer level. _____

OP/1/A/1102/10
ENCLOSURE 4.8
PRESSURIZER COOLDOWN

	Date Init./Time	Verify Date Init./Time
2.11 When Pressurizer temperature is $\leq$ 300°F, establish communication in the Reactor Building at 1RC-17 (Surge Line Drain) and 1RC-18 (Surge Line Drain Block).	_____	_____
2.12 Place '1A' BHUT in recirculation.	_____	_____
2.13 Open 1RC-18 (Surge Line Drain Block).	_____	_____
NOTE: (2.14) This allows a Pressurizer outsurge flowpath to other than the RCS Hot Legs. Attempt to maintain constant pressurizer level; however, a very slow increase in level is acceptable.		
2.14 Open 1RC-17 (Surge Line Drain) to compensate for Auxiliary Spray Flow.	_____	
NOTE: (2.14.1) This is to break up any crud that may be accumulated.		
2.14.1 If necessary to achieve flow through the Surge Line Drain, then mechanical agitate the piping around 1RC-17 and 1RC-18.	_____	
2.15 Maintain Quench Tank Level between 80 and 125 inches per OP/1/A/1104/17 (Quench Tank Operation).	_____	
CAUTION: (2.16) The outsurge of hot Pressurizer water into the hot leg has the potential for causing a steam bubble in the hot leg.		
2.16 If saturated conditions occur in the hot leg which is indicated by hot leg temperature above the saturation temperature and a rapid increase in Pressurizer level, refer to Enclosure 4.6 (Procedure for Subcooling the Hot Leg Following a Pressurizer Outsurge).	_____	

OP/1/A/1102/10
ENCLOSURE 4.8
PRESSURIZER COOLDOWN

	Date Init./Time	Verify Date Init./Time
2.17 If Pressurizer temperature is not less than 200° when Pressurizer level reaches 315 inches, perform the following:		
1. Close 1HP-355 (HP Aux. Spray Flow Control).	_____	
Continue to lower Pressurizer level through the Surge line Drain Valves.	_____	
Continue to use 1HP-120 (RC Volume Control) only to minimize Pressurizer outsurge, not to increase pressurizer level.	_____	
Continue to match letdown flow to seal flow to minimize insurge.	_____	
2. When pressurizer level has decreased to ~ 200 inches, throttle open 1HP-355 (HP Aux. Spray Flow Control) to commence Pressurizer cooldown and depressurization.	_____	
3. If pressurizer level reaches 315 inches again before Pressurizer temperature is $\leq$ 200°, perform Steps 2.14.1 and 2.14.2.	_____	
2.18 When Pressurizer temperature is $\leq$ 200°F close:		
1RC-17 (Surge Line Drain).	_____	
1RC-18 (Surge Line Drain Block).	_____	
1HP-355 (HPI Aux. Spray Flow Control).	_____	
1HP-120 (Makeup Volume Control).	_____	
2.19 Remove '1A' BHUT from recirculation.	_____	
2.20 Proceed with cooldown per Enclosure 4.3 (250°F/350 PSI Conditions to Cold Shutdown).	_____	

SHUTDOWN EQUIPMENT TAGGING LIST

Date/Time _____

ELECTRICAL CHECKLIST

COMPONENT NUMBER	COMPONENT NAME	LOCATION	TAGGED ID TAG	TAGGED POSITION	INITIAL
	1A HPI Pump Motor Bkr.	1TC		Racked Out	
	1B HPI Pump Motor Bkr.	1TE		Racked Out	
	1C HPI Pump Motor Bkr.	1TD		Racked Out	
	1A MDEFDWP Motor Bkr.	1TD		Racked Out	
	1B MDEFDWP Motor Bkr.	1TE		Racked Out	
	1E1 Heater Drain Pump Motor Bkr.	1TE		Racked Out	
	1E2 Heater Drain Pump Motor Bkr.	1TD		Racked Out	
	1D1 Heater Drain Pump Motor Bkr.	1TE		Racked Out	
	1D2 Heater Drain Pump Motor Bkr.	1TD		Racked Out	
	1A CBP Motor Bkr.	1TC		Racked Out	
	1B CBP Motor Bkr.	1TD		Racked Out	
	1C CBP Motor Bkr.	1TE		Racked Out	
	1A HWP Motor Bkr.	1TC		Racked Out	
	1B HWP Motor Bkr.	1TD		Racked Out	
	1C HWP Motor Bkr.	1TE		Racked Out	
	1A1 RCP Motor Bkr.	1TA		Racked Out	
	1A2 RCP Motor Bkr.	1TB		Racked Out	
	1B1 RCP Motor Bkr.	1TA		Racked Out	
	1B2 RCP Motor Bkr.	1TB		Racked Out	
	Unit 1 Steam Pack Exh. Motor Bkr.	1XA		Racked Out	
	CSAE Off-Gas Blower Motor Bkr.	1XGA		Racked Out	
	1A EHC Pump Motor Bkr.	1XA		Racked Out	
	1B EHC Pump Motor Bkr.	1XGB		Racked Out	

ELECTRICAL CHECKLIST

COMPONENT NUMBER	COMPONENT NAME	LOCATION	TAGGED ID TAG	TAGGED POSITION	INITIAL
	Pzr. Htr. Group B Bkr.	1XSF-3B		Open	
	Pzr. Htr. Group E Bkr.	1XH-3A		Open	
	Pzr. Htr. Group H Bkr.	1XH-4A		Open	
	Pzr. Htr. Group C Bkr.	1XI-2A		Open	
	Pzr. Htr. Group F Bkr.	1XI-3A		Open	
	Pzr. Htr. Group I Bkr.	1XI-4A		Open	
	Pzr. Htr. Group D Bkr.	1XJ-2A		Open	
	Pzr. Htr. Group G Bkr.	1XJ-3A		Open	
	Pzr. Htr. Group J Bkr.	1XJ-4A		Open	
	PZR Htr. Group A & Group K Bkr.	1XK-1A		Open	
PNLBD Gp. A Main BKR	PZR Htr. Group A Main Bkr.	R-2F-S of Elev.		Open	
PNLBD Gp. B Main BKR	PZR Htr. Group B Main Bkr.	R-1F-Emerg. Hatch		Open	
PNLBD Gp. C Main BKR	PZR Htr. Group C Main Bkr.	R-2F-S of Elev.		Open	
PNLBD Gp. D Main BKR	PZR Htr. Group D Main Bkr.	R-2F-S of Elev.		Open	
PNLBD Gp. E Main BKR	PZR Htr. Group E Main Bkr.	R-2F-S of Elev.		Open	
PNLBD Gp. F Main BKR	PZR Htr. Group F Main Bkr.	R-2F-S of Elev.		Open	
PNLBD Gp. G Main BKR	PZR Htr. Group G Main Bkr.	R-2F-S of Elev.		Open	
PNLBD Gp. H Main BKR	PZR Htr. Group H Main Bkr.	R-2F-S of Elev.		Open	
PNLBD Gp. I Main BKR	PZR Htr. Group I Main Bkr.	R-2F-S of Elev.		Open	
PNLBD Gp. J Main BKR	PZR Htr. Group J Main Bkr.	R-2F-S of Elev.		Open	
PNLBD Gp. K Main BKR	PZR Htr. Group K Main Bkr.	R-2F-S of Elev.		Open	

ELECTRICAL CHECKLIST

COMPONENT NUMBER	COMPONENT NAME	LOCATION	TAGGED ID TAG	TAGGED POSITION	INITIAL
1AS-40 Bkr.	Aux. Steam Supply to CSAE'S	1XC		Open	
1AS-34 Bkr.	Aux. Steam Supply to 'E' Htrs.	1XGA		Open	
1AS-8 Bkr.	Steam Seal Regulator Steam Supply	1XA		Open	
1AS-102 Bkr.	FWPT Aux. Steam Supply Block	1XGA		Open	
1HP-24 Bkr.	BWST Supply to HPI	1XS1		Open	
1HP-25 Bkr.	BWST Supply to HPI	1XS2		Open	
1AS-11 Bkr.	AS to MSRH	1XA		Open	

ENCLOSURE 4.9
SHUTDOWN EQUIPMENT TAGGING LIST

VALVE CHECKLIST

VALVE NO.	VALVE NAME	LOCATION	TAGGED BT	POSITION	INITIAL
1AS-38	TDEFDWPT Auxiliary Steam Supply	T-1-C19 West		Closed	
1MS-90	Main Steam to TDEFDWPT	T-1-D19/ East/D20		Closed	
1AS-34	Aux. Steam Supply to 'E' Heaters	T-3-L18		Handwheel Closed	
1AS-40	Aux. Steam Supply to CSAE's	T-3-B25		Handwheel Closed	
1AS-8	Steam Seal Regulator Steam Supply	T-3-E15		Handwheel Closed	
1AS-102	FWPT Aux. Steam Supply Block	T-3-J21		Handwheel Closed	
1HP-24	BWST Supply to HPI	A-1-HPI Hatch Area		Handwheel Closed	
1HP-25	BWST Supply to HPI	A-1-HPI Hatch Area		Handwheel Closed	
1MS-127	MS to AS Supply	T-3-L15		Closed	
1MS-130	MS to AS Supply	T-3-L15		Closed	
1MS-131	MS to AS Supply	T-3-L15		Closed	
1AS-11	AS to MSRH	T-1-E14		Handwheel Closed	
1HPE-34	'C' Bleed to Plant Heating	T-3-F15		Closed	
1AS-145	PH to FWPT Pumping Trap	T-1-D24		Closed	
1AS-306	PH to Bypass Line Pumping Trap	T-1-G20		Closed	
1AS-107	HP FDW Heater Blanket	T-1-M19		Closed	

Checked Control Copy _____

Date/Time _____

OP/1/A/1102/10

ENCLOSURE 4.10

CONTROLLING PROCEDURE FOR H_2O_2 ADDITION TO THE RCS

	Date Init./Time
1.0 Initial Conditions	
1.1 RCS temperature is 195°-140°F.	_____
1.2 Pressurizer level is ~ 220 inches.	_____
1.3 LDST level is ~ 55 inches.	_____
1.4 A RCP is in operation.	_____
1.5 Ensure Unit 1 Purification IX is in service and/or Unit 1&2 Spare Purification IX is in service and boron saturated to RCS boron concentration.	_____
1.6 Limits and Precautions have been reviewed.	_____

2.0 Procedure

NOTE (2.0): RCS temperature of 195°-140°F shall be maintained throughout this enclosure. For this enclosure, the RCS heatup curves, shown on Enclosure 4.10A (RCS P/T Limitations), are to be used.

NOTE (2.1): Letdown flow should be maintained at ~ 120 gpm when one IX in service or ~ 140 to 150 gpm when both IXs in service.

2.1 Increase letdown flow to ~ 120 gpm or 140 to 150 gpm if both IXs in service.

2.2 If required to maintain letdown flow at ~ 120 gpm, or 140 to 150 (if both IXs are in service), open 1HP-42 (Letdown Orifice Manual Bypass). _____

2.3 Notify Chemistry to begin their H_2O_2 additions per CP/0/A/2002/10 (Addition of Hydrogen Peroxide to the Reactor Coolant System). _____

OP/1/A/1102/13
ENCLOSURE 4.10
CONTROLLING PROCEDURE FOR H_2O_2 ADDITION TO THE RCS

Date
Init./Time

2.4 Contact Health Physics to begin their survey program applying to induced crudbursts, listed in H.P. Section Manual 6.2. _____

2.5 Close ERC-1 (Spray Control). _____

CAUTION (2.6) RCS temperature 180°-160° shall be maintained during the running of two RCPs. Should it not be possible to maintain RCS temperature within this range while running two RCPs, or a RCS temperature decrease of > 10°F has been observed, secure one of the RCPs and refer to RCS cooldown curves.

At the Shift Supervisor's discretion the Unit may be returned to one RCP operation at any time during this procedure.

NOTE: (2.6) The RCS may be allowed to heat up to ~ 180°F, but do not cooldown the RCS with two RC pumps running.

2.6 Perform the following:

1) Cooldown the RCS to ~ 160°F. _____

2) Start a second RC Pump per OP/1/A/1103/06 (Reactor Coolant Pump Operation). _____

3) Maintain RCS temperature. _____

2.7 Start and stop RCPs during this procedure as directed by the Unit Operation Engineer or the Shift Engineer per OP/1/A/1103/06 (Reactor Coolant Pump Operation).

2.8 When notified by Chemistry that the crudburst is complete:

- Notify Health Physics S and C group that the crudburst evolution is complete. _____

OP/1/A/1102/10
ENCLOSURE 4.10
CONTROLLING PROCEDURE FOR H_2O_2 ADDITION TO THE RCS

Date
Init./Time

- Continue with Unit Shutdown per Enclosure 4.3 (250°F/350 psi Conditions to Cold Shutdown), of OP/1/A/1102/10 (Controlling Procedure for Unit Shutdown). _____

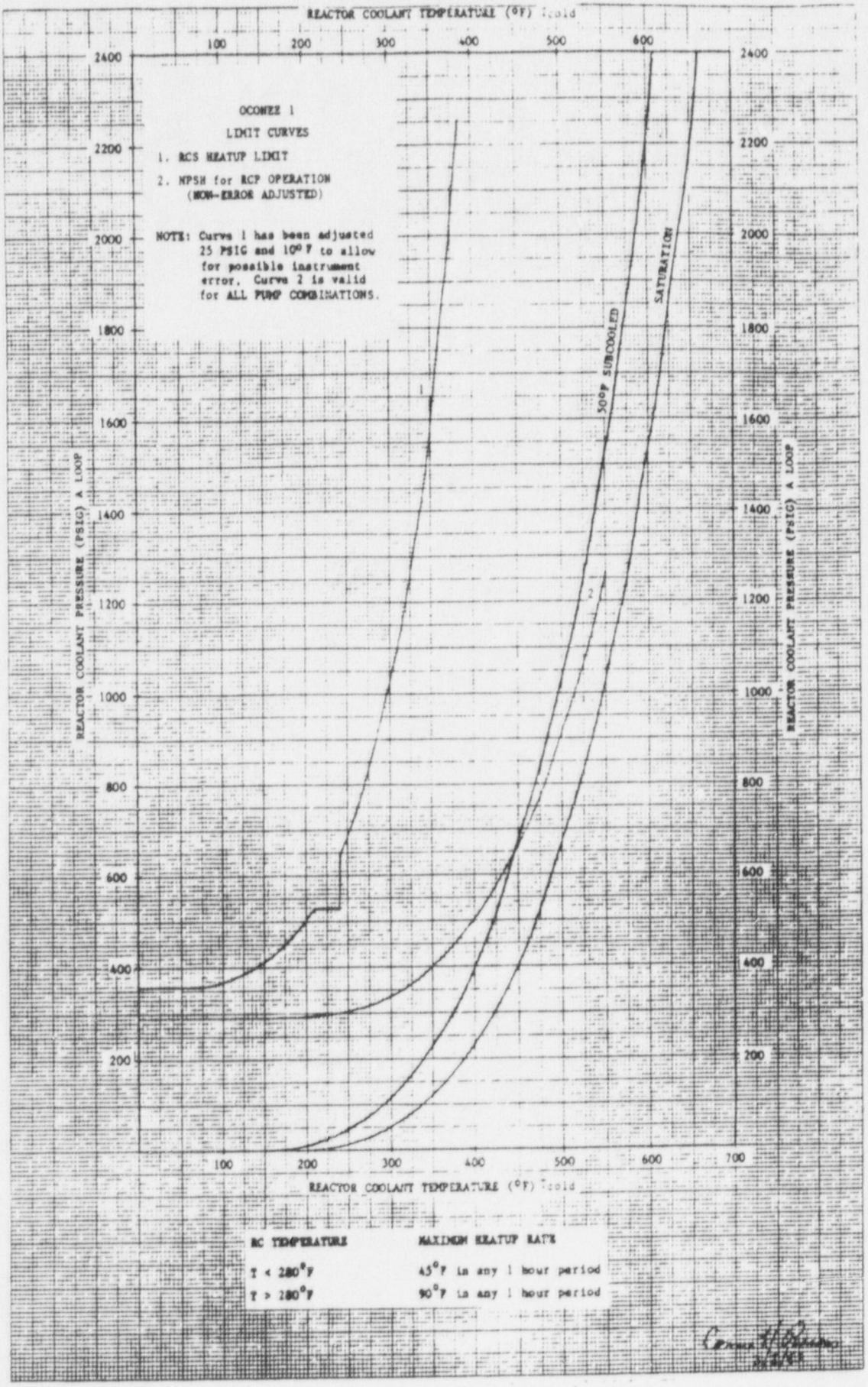
2.9 Remove one of the Purification IXs from service per OP/1/A/1104/02 (High Pressure Injection System). _____

2.10 Position 1HP-42 (Letdown Orifice Manual Bypass) as necessary to maintain letdown flow. _____

OP/1/A/1102/10

ENCLOSURE 4.10A

RCS P/T LIMITATIONS



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Date/Time _____

OP/1/A/1102/10

ENCLOSURE 4.11

LOW TEMPERATURE OVERPRESSURE PROTECTION (LTOP)

1.0 Initial Conditions

1.1 Dedicated LTOP Operator is required whenever RCS Temperature < 325°F and an HPI Pump is operating.

1.2 LTOP Operator is an RO or SRO.

1.3 Prevention of low temperature overpressurization due to 1HP-120 (RC Volume Control) failing open is the only responsibility and duty of the LTOP Operator.

2.0 Procedure

2.1 Surveillance Requirements:

2.1.1 Continuously monitor the following indications to detect excessive RCS makeup flow due to 1HP-120 (RC Volume Control) failing open:

RCS Pressure

Pressurizer Level

2.1.2 Verify the following restrictions are maintained:

1. When RCS Temp. < 220°F and RCS Press. ≤ 100 psig:
   - PZR shall be ≤ 315 inches
2. When RCS Temp. < 220°F and RCS Press. > 100 psig:
   - PZR shall be ≤ 220 inches
   - RCS Press. shall be ≤ 350 psig
3. When RCS Temp. > 220°F but < 325°F:
   - PZR shall be ≤ 260 inches

2.1.5 Prior to turning over LTOP responsibility to another individual, ensure the new LTOP Operator has reviewed this entire procedure.

LOW TEMPERATURE OVERPRESSURE PROTECTION (LTOP)

2.2 LTOP Operator Actions For Excessive RCS Makeup Flow:

2.2.1 If 1HP-120 (RC Volume Control) fails open:

1. Start 1B HPI Pump.
2. Stop 1A HPI Pump.
3. Close 1HP-115 (Pump "A" & "B" Discharge Hdr Separation).
4. If 1HP-115 (Pump "A" & "B" Discharge Hdr Separation) fails to close, stop all HPI Pumps to prevent exceeding 1RC-66 (PORV) Setpoint and RCS P/T Limits.