October 11, 2005 10 CFR 50.55a

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

Palisades Nuclear Plant
Docket 50-255
License No. DPR-20

Response to Request for Additional Information Related to Request to Extend the Third 10-Year ISI Interval for Reactor Vessel Weld Examination

By letter dated March 31, 2005, Nuclear Management Company, LLC (NMC) requested Nuclear Regulatory Commission (NRC) approval, pursuant to 10 CFR 50.55a(a)(3)(i), for the use of an alternative to the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, paragraph IWB-2412, Inspection Program B, at the Palisades Nuclear Plant (PNP).

By letter dated August 23, 2005, the NRC issued a request for additional information (RAI) on the subject relief request. Enclosure 1 provides the NMC response for PNP.

Summary of Commitments

This letter contains no new commitments and no revisions to existing commitments.

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Site Vice President, Palisades Nuclear Plant
Nuclear Management Company, LLC

Enclosure (1)
Attachments (4)

CC Administrator, Region III, USNRC
Project Manager, Palisades, USNRC
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A047

ENCLOSURE 1
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
PALISADES NUCLEAR PLANT

NRC Request

In its March 31, 2005, request for authorization to extend the third 10-year ISI interval for reactor vessel examinations, Nuclear Management Company (NMC) stated that the technical justification for its request is consistent with the guidance provided in a January 27, 2005, letter from the NRC to Westinghouse Electric Company (Summary of Teleconference with the Westinghouse Owners Group Regarding Potential One Cycle Relief of Reactor Pressure Vessel Shell Weld Inspections at Pressurized Water Reactors Related to WCAP-16168-NP, "Risk Informed Extension of Reactor Vessel In-Service Inspection Intervals"). Item number six of this guidance says the following:

> *The licensee could then provide a discussion of how, based on its plant operational experience, fleet-wide operational experience and plant characteristics, the likelihood of an event (in particular, a significant pressurized thermal shock event) over the next operating cycle which could challenge the integrity of the reactor pressure vessel (RPV), if a flaw was present, is very low.*

NMC's submittal includes general statements indicating that the likelihood of pressurized thermal shock (PTS) events is small, and briefly describes a Palisades operating procedure that provides guidance on the preferred water temperature in the safety injection refueling water tank (SIRWT). The guidance recommends that the water in the SIRWT be maintained above 80 degrees to reduce the likelihood of a severe PTS event.

The NRC staff is re-evaluating the risk from PTS events in a study done to develop a technical basis for revising Title 10 of the Code of Federal Regulations, (10 CFR) Part 50, Section 61. Although the NRC staff has not yet completed its evaluation, the current results indicate that the three types of accident sequences shown below cause the more severe PTS events and thereby dominate the risk. Please describe the characteristics of your plant (design and operating procedures) that assure that the likelihood of a severe PTS event over the next operating cycle, which could challenge the integrity of the RPV if a flaw was present, is very low for the following accident sequences:

Sequence 1

Any transient with reactor trip followed by one stuck-open pressurizer safety relief valve that re-closes after about 1 hour. Severe PTS events also require the failure to properly control high-head injection.

Sequence 2

Large loss of secondary steam from steam line break or stuck-open atmospheric dump valves. Severe PTS events also require the failure to properly control auxiliary feedwater flow rate and destination (e.g., away from affected steam generators), and failure to properly control high-pressure injection.

Sequence 3

Four-to-nine-inch loss-of-coolant accidents. Severity of PTS event depends on break location (worst location appears to be in the pressurizer line) and primary injection systems flowrate and water temperature.

NMC Response

The Palisades Nuclear Plant (PNP) has design characteristics that assure the likelihood of a severe PTS event over the next operating cycle, which would challenge the integrity of the RPV if a flaw is present, is very low for the following accident sequences. The PNP high pressure safety injection (HPSI) pump's design shutoff head is low, which limits the pressure challenge in the described sequences below. In addition, the PNP nominal pressurizer operating design value of 2060 psia is about 150 psi less than other operating pressurized water reactors (PWRs). Therefore, the likelihood of challenging a pressurizer safety relief valve (SRV) is less than that for other PWRs. Furthermore, the PNP pressure and temperature curves are based on Appendix G pressure and temperature limits and utilize a 200 degree subcooling limit. The 200 degree subcooling curve provides extra margin in regard to PTS.

The PNP has operating procedures that assure the likelihood of a severe PTS event over the next operating cycle, which would challenge the integrity of the RPV if a flaw is present, is very low for the following accident sequences. The PNP operator response to each of the listed sequences would be in accordance with the PNP Emergency Operating Procedures (EOPs). The EOPs are based on the Westinghouse Owners Group (WOG) CEN-152, "Emergency Procedure Guidelines," for Combustion Engineering (CE) nuclear steam supply system (NSSS) plants.

Sequence 1

This event is characterized as a vapor space loss-of-coolant accident (LOCA). Upon receipt of a reactor trip, the operators would implement EOP-1.0, "Standard Post Trip Actions," provided as Attachment 1, followed by entry into EOP-4.0, "Loss of Coolant Accident Recovery," provided as Attachment 2.

In order to minimize the risk for a PTS event, the operators control PCS temperature, and PCS pressure within the limits of EOP Supplement 1, "Pressure Temperature Limit Curves," provided as Attachment 4.

PCS temperature is controlled by steaming the steam generators in accordance with EOP-4.0, Step 22. This removes energy from the PCS that could potentially cause PCS pressure to raise leading to a PTS event.

Parameters are continuously monitored to determine if safety injection (SI) and charging pump flow can be throttled or stopped. EOP-4.0, Step 4.25 (a continuously applicable step) provides SI throttle criteria. Step 4.33 provides the instructions for throttling SI and controlling charging and letdown. If HPSI pumps and charging pumps were started by an SI actuation signal, then this step is used to reduce or stop HPSI or charging flow

to reduce the chances of over pressurizing the PCS and low temperature stressing of the reactor vessel.

Once the pressurizer SRV closes, and the SI throttle criteria is verified, EOP-4.0 provides several steps to control primary coolant system (PCS) inventory in order to prevent a PTS event.

Step 4.32 re-establishes letdown if it was isolated in order to control PCS inventory. The control of letdown in a solid condition provides the operator a method to control PCS pressure within EOP Supplement 1 limits.

Step 4.34 (a continuously applicable step) provides contingency actions to address over-subcooling or pressurizer pressure greater than the limits of EOP Supplement 1 The concern for PTS is minimized by staying below the upper subcooled limits shown in EOP Supplement 1.

Step 4.70 provides contingency actions should the subsequent closing of the SRV result in water solid conditions in the PCS. The goal of this step is to maintain the PCS within the limits of EOP Supplement 1, by controlling PCS temperature and pressure with the steam generators, and by controlling HPSI, charging, and letdown flow.

Sequence 2

This event is characterized as an excess steam demand event (ESDE.) Upon receipt of a reactor trip, the operators would implement EOP-1.0, "Standard Post Trip Actions," followed by entry into EOP-6.0, "Excess Steam Demand Event," provided as Attachment 3.

During performance of the standard post trip actions (SPTA), PCS heat removal safety function acceptance criteria are evaluated in Step 4.8. Contingency action, Step 4.8.a.3, requires that, if a steam generator (SG) has an indication of an ESDE, feedwater flow to the affected SG be secured. This supports the strategy outlined in CEN-152, that the operator should not feed a suspected faulted steam generator. Upon entering EOP-6.0, identification and isolation of the affected SG is again addressed in steps 13, 14, and 15. Feedwater is isolated to the affected SG to limit the inventory available to boil off, thus limiting or stopping uncontrolled plant cooldown and stabilizing the plant.

The SI throttle criteria are verified in EOP-6.0, Step 4.17 (a continuously applicable step) and throttling is addressed in Step 4.18. If HPSI pumps and charging pumps were started by an SI actuation signal, then this step is used to limit or stop HPSI or charging flow to reduce the chances of over pressurizing the PCS and low temperature stressing the reactor vessel.

As outlined in Step 4.23 (a continuously applicable step) PCS pressure is maintained within the limits of EOP Supplement 1. The concern for PTS is minimized by staying below the upper subcooled limits shown in EOP Supplement 1. Contingency actions listed in Step 4.23.1, address over-subcooled conditions in the PCS. These include controlling HPSI, charging, and letdown flows, reducing PCS pressure, and controlling

PCS cooldown rate in order to restore PCS temperature and pressure within the limits of EOP Supplement 1, thereby minimizing PTS concerns.

Sequence 3

A LOCA is an accident which is caused by a break in the PCS pressure boundary. The break can be as large as a double ended guillotine break in the hot leg, or as small as a break which results in a loss of PCS fluid at a rate that is just in excess of the available charging capacity of the plant.

Small and large break LOCAs differ in their effect on the post-LOCA PCS heat removal process. For a large break LOCA, the only path necessary for PCS heat removal, in both the short and long term, is the break flow with core boil off. For small breaks, heat removal via the flow out the break is not sufficient to provide cooling and, therefore, SG heat removal is required. The emergency procedure guidelines take this into account with the decisions that must be made. Although distinct small and large break LOCA information is contained in the bases section of EOP-4.0, the action steps to be used during the actual emergency do not require the operator to distinguish between break sizes.

There are two paths initially available for PCS heat removal: heat transfer to the secondary side via the SGs, and heat transfer via the fluid flowing out the break. Large break LOCAs have sufficient fluid flowing out the break to provide adequate heat removal without relying on the SGs. Small break LOCAs do not have sufficient fluid flowing out of the break to provide adequate heat removal. Therefore, SG heat removal is required in addition to break flow for adequate heat removal. Because the LOCA EOP does not distinguish between large and small break LOCAs, SG heat removal capability is required at all times during a LOCA (EOP-4.0, Step 22.) Steaming the SGs removes energy from the PCS that could potentially cause PCS pressure to raise leading to a PTS event.

Parameters are continuously monitored to determine if SI and charging pump flow can be throttled or stopped. EOP-4.0, Step 4.25 (a continuously applicable step) provides SI throttle criteria. Step 4.33 provides the instructions for throttling SI and controlling charging and letdown. If HPSI pumps and charging pumps were started by an SI actuation signal, then this step is used to reduce or stop HPSI or charging flow to reduce the chances of over pressurizing the PCS and low temperature stressing of the reactor vessel.

Step 4.34 (a continuously applicable step) provides contingency actions to address over-subcooling or pressurizer pressure greater than the limits of EOP Supplement 1. The concern for PTS is minimized by staying below the upper subcooled limits shown in EOP Supplement 1. Contingency actions listed in Step 4.34.1 address over-subcooled conditions in the PCS, including throttling SI flows.

A break location in the pressurizer surge line could impact the ability of the operator to determine if SI throttle criteria are met due to either the inability to refill the pressurizer or lack of PCS pressure indication. If SI throttle criteria cannot be verified, then the operator would continue to maintain full SI flow, while aggressively steaming the SGs to remove heat from the PCS (EOP-4.0, Step 22.)

ATTACHMENT 1

EOP-1, "STANDARD POST TRIP ACTIONS"

25 Pages Follow (Procedure Attachments not included)

STANDARD POST-TRIP ACTIONS

[signature]	/	1/29/02
Procedure Sponsor		Date
GGPalmisano	/	1/2/02
Technical Reviewer		Date
GWSleeper	/	1/1/01
User Reviewer		Date

TITLE: STANDARD POST-TRIP ACTIONS

USER ALERT
CONTINUOUS USE PROCEDURE

Read each step of the procedure prior to performing that step. When sign-offs are required, sign off each step as complete before proceeding to the next step.

1.0 PURPOSE

This procedure provides the immediate actions which must be accomplished after a Reactor trip has occurred or should have occurred. These actions are necessary to ensure that the plant is placed in a stable, safe condition or that the plant is configured to respond to a continuing emergency.

End of Section 1.0

2.0 ENTRY CONDITIONS

Standard Post Trip Actions may be entered when ANY of the following symptom(s) of a Reactor Trip exist:

1. Reactor Trip alarm (EK-0972).
2. Control Rod bottom lights on.
3. Rapid reduction of Reactor power.
4. Red trip lights lit on Clutch Power Supplies 1 through 4.
5. RPS trip logic lights on.
6. RPS trip setpoint(s) exceeded.
7. Licensed operator evaluation indicates conditions warrant a Reactor trip.

End of Section 2.0

3.0 EXIT CONDITIONS

SPTAs may be exited when ANY of the following conditions exist:

1. IF ALL safety function acceptance criteria are met,
   AND NO contingency actions were performed,
   THEN **GO TO** EOP-2.0 "Reactor Trip Recovery."

2. IF ANY safety function acceptance criteria are NOT met,
   OR ANY contingency action was taken,
   THEN **GO TO** Attachment 1, "Event Diagnostic Flow Chart" to diagnose the event.

End of Section 3.0

TITLE: STANDARD POST-TRIP ACTIONS

4.0 IMMEDIATE ACTIONS

☑ INSTRUCTIONS	☑ CONTINGENCY ACTIONS
Record Time of Reactor Trip _____	
1. **DETERMINE** that **Reactivity Control** acceptance criteria met:	
☐ a. **VERIFY** Reactor power lowering.	☐ a.1. **PERFORM** ANY of the following: • **PUSH** BOTH REACTOR TRIP pushbuttons on EC-02 and EC-06. • **OPEN** CRD Clutch Power Feeder Breakers 42-1RPS and 42-2RPS. • **PLACE** ALL CRD clutch power toggle switches to CLUTCH OFF.
☐ b. **VERIFY** negative startup rate.	
☐ c. **VERIFY** a maximum of one full length Control Rod NOT fully inserted.	☐ c.1. **COMMENCE** emergency boration.

TITLE: STANDARD POST-TRIP ACTIONS

☑ INSTRUCTIONS	☑ CONTINGENCY ACTIONS
2. **DETERMINE** that Main Turbine-Generator acceptance criteria are met:	
☐ a. **VERIFY** Main Turbine is tripped.	☐ a.1. IF plant was operating at power AND the MSIVs are open, THEN **PERFORM** ANY of the following: 1) **MANUALLY TRIP** Main Turbine at Control Panel C-01 (preferred). 2) **CLOSE** BOTH MSIVs. • CV-0510 ('A' S/G) • CV-0501 ('B' S/G)
☐ b. **VERIFY** that the Main Generator is disconnected from grid by ANY of the following: • Main Generator Output Breakers open. o 25F7 o 25H9 • MOD 26H5 open.	☐ b.1. **PERFORM** ANY of the following: 1) **OPEN** Main Generator Output Breakers at Control Panel C-01. • 25F7 • 25H9 2) **CONNECT** jumper between terminals 1 and 10 on Relay 487U (Y Phase) inside Panel C-04.

TITLE: STANDARD POST-TRIP ACTIONS

☑ INSTRUCTIONS	☑ CONTINGENCY ACTIONS
3. **CONTROL** the Feedwater System as follows:	
☐ a. **PLACE** ALL operating Main Feed Pump Individual Speed Controllers to MAN. • HIC-0526 • HIC-0529	
☐ b. IF BOTH Main Feed Pumps are operating, THEN **RAMP** ONE Main Feed Pump to minimum speed.	☐ b.1. IF a Main Feed Pump's speed can NOT be lowered, THEN **TRIP** the Main Feed Pump.
☐ c. WHEN T_{AVE} lowers towards 525°F (535°F preferred), THEN **RAMP** the remaining Main Feed Pump to minimum speed.	☐ c.1. IF a Main Feed Pump's speed can NOT be lowered, THEN **TRIP** the Main Feed Pump.
☐ d. **ENSURE CLOSED** ALL Main Feed Regulating Valves and ALL Bypass Feed Regulating Valves for BOTH S/Gs: • CV-0701 ('A' S/G) • CV-0735 ('A' S/G) • CV-0703 ('B' S/G) • CV-0734 ('B' S/G)	☐ d.1. IF ALL Main Feed Regulating Valves AND ALL Bypass Feed Regulating Valves can NOT be closed, THEN **TRIP** the operating Main Feed Pumps.

TITLE: STANDARD POST-TRIP ACTIONS

☑ INSTRUCTIONS	☑ CONTINGENCY ACTIONS
4. **DETERMINE** that **Vital Auxiliaries-Electric** acceptance criteria are met:	
a. **VERIFY** that station loads have transferred to offsite electrical power such that ALL of the following conditions exist:	
☐ 1) Buses 1C and 1D energized.	☐ 1.1) **ENSURE** D/G started for bus NOT energized. • 1-1 D/G (Bus 1C) • 1-2 D/G (Bus 1D)
	☐ 1.2) **ENSURE** associated D/G output breaker closed (one attempt only) • Bus 1C (D/G 1-1): 152-107 • Bus 1D (D/G 1-2): 152-213
☐ 2) IF SIAS is NOT actuated, THEN Bus 1E is energized.	
☐ 3) Buses 1A and 1B are energized.	
☐ 4) Y01 is energized.	

(continue)

☑ INSTRUCTIONS ☑ CONTINGENCY ACTIONS

4. **(continued)**

NOTE: The following indications can be used for status of DC power:

DC Bus	Indication
D11A	P-8A Control Power
D11-1	CV-0510 MSIV
D11-2	K-7A Trip Power
D21A	P-8C Control Power
D21-1	CV-0501 MSIV
D21-2	K-7B Trip Power

❑ 5) ALL of the following DC Buses are energized:

- Left Channel DC Buses
  - D11A
  - D11-1
  - D11-2
- Right Channel DC Buses
  - D21A
  - D21-1
  - D21-2

❑ 6) At least 3 of 4 Preferred AC Buses are energized.

- Y10
- Y20
- Y30
- Y40

TITLE: STANDARD POST-TRIP ACTIONS

☑ INSTRUCTIONS

5. **DETERMINE** that **PCS Inventory Control** acceptance criteria are met:

☐ a. **VERIFY** BOTH of the following conditions exist:

- Pressurizer (PZR) level between 20% and 85%
- PZR level trending to between 42% and 57%

NOTE: Determine PCS subcooling using T_H with forced circulation and the Average of Qualified CETs with natural circulation.

☐ b. **VERIFY** PCS at least 25°F subcooled.

☑ CONTINGENCY ACTIONS

☐ 5.1. IF PLCS does NOT respond, THEN **RESTORE** AND **MAINTAIN** PZR level between 42% and 57%:

a. **OPERATE** PZR Level Control System (PLCS).

b. **MANUALLY OPERATE** Charging and Letdown.

TITLE: STANDARD POST-TRIP ACTIONS

☑ INSTRUCTIONS

☐ 6. **DETERMINE** that **PCS Pressure Control** acceptance criteria are met by verifying that BOTH of the following conditions exist:

- PZR pressure between 1650 and 2185 psia
- PZR pressure trending toward 2010 and 2100 psia

☑ CONTINGENCY ACTIONS

☐ 6.1. IF PPCS is NOT operating properly, THEN **RESTORE** AND **MAINTAIN** PZR pressure within the limits of EOP Supplement 1:

a. **OPERATE** PZR Pressure Control System.

b. **MANUALLY OPERATE** PZR heaters and PZR spray.

☐ 6.2. IF PZR pressure is less than 1605 psia, THEN **PERFORM** the following:

a. **VERIFY** SIAS initiated ("SAFETY INJ INITIATED" EK-1342 in alarm) OR **PUSH** left and right INJECTION INITIATE pushbuttons on EC-13.

- PB1-1
- PB1-2

b. **ENSURE** ALL available HPSI and LPSI pumps operating with the associated loop isolation valves open.

☐ 6.3. IF PZR pressure is less than 1300 psia, THEN **STOP** PCPs as needed to establish one PCP operating in each loop.

☐ 6.4. IF PZR pressure is less than minimum PCP operation limits of EOP Supplement 1, THEN **STOP** ALL PCPs.

TITLE: STANDARD POST-TRIP ACTIONS

☑ INSTRUCTIONS

7. **DETERMINE** that **Core Heat Removal** acceptance criteria are met:

☐ a. **VERIFY** at least one PCP is operating.

☐ b. **VERIFY** Loop ΔT (T_H-T_C) is less than 10°F.

NOTE: Determine PCS subcooling using T_H with forced circulation and average of qualified CETs with natural circulation.

☐ c. **VERIFY** PCS at least 25°F subcooled.

☑ CONTINGENCY ACTIONS

☑ INSTRUCTIONS	☑ CONTINGENCY ACTIONS
8. **DETERMINE** that **PCS Heat Removal** acceptance criteria are met:	
☐ a. **VERIFY** at least one S/G has BOTH of the following: • Level between 5% and 70% • Feedwater available to maintain S/G level	☐ a.1. For low level, **ENSURE** at least one S/G has feedwater flow of at least 165 gpm. ☐ a.2. For high level, **REDUCE** feedwater flow to the affected S/G. ☐ a.3. IF one S/G has indication of an ESDE or SGTR, THEN **SECURE** feedwater flow to the affected S/G.
☐ b. **VERIFY** that T_{AVE} is between 525°F and 540°F.	☐ b.1. IF T_{AVE} is greater than 540°F, THEN **RESTORE** T_{AVE} to between 525°F and 540°F using ANY of the following: • Turbine Bypass Valve (preferred) • Atmospheric Steam Dump Valves

(continue)

(continue)

TITLE: STANDARD POST-TRIP ACTIONS

☑ INSTRUCTIONS	☑ CONTINGENCY ACTIONS
8. **(continued)**	**(continued)**
	☐ b.2. IF T_{AVE} is less than 525°F, THEN **PERFORM** BOTH of the following: 1) **ENSURE** Feedwater flow is NOT excessive. 2) **RESTORE** T_{AVE} to between 525°F and 540°F using ANY of the following: • Turbine Bypass Valve (preferred) • Atmospheric Steam Dump Valves
☐ c. **VERIFY** BOTH S/G pressures are between 800 psia and 970 psia.	☐ c.1. IF either S/G pressure is greater than 970 psia, THEN **RESTORE** S/G pressure to less than 970 psia using ANY of the following: • Turbine Bypass Valve (preferred) • Atmospheric Steam Dump Valves

(continue) **(continue)**

TITLE: STANDARD POST-TRIP ACTIONS

☑ INSTRUCTIONS

8. (continued)

☑ CONTINGENCY ACTIONS

(continued)

☐ c.2. IF either S/G pressure is less than 800 psia,
THEN **PERFORM** ALL of the following:

1) **ENSURE** that the Turbine Bypass Valve is closed.

2) **ENSURE** that the Atmospheric Steam Dump Valves are closed.

3) **CLOSE** BOTH MSIVs.

- CV-0510 ('A' S/G)
- CV-0501 ('B' S/G)

☐ c.3. IF either S/G pressure is less than 500 psia,
THEN **ENSURE CLOSED** the following valves:

1) BOTH MSIVs.

- CV-0510 ('A' S/G)
- CV-0501 ('B' S/G)

2) Main Feed Regulating Valve and Bypass Feed Regulating Valve on affected S/G only:

- CV-0701 ('A' S/G)
- CV-0735 ('A' S/G)

- CV-0703 ('B' S/G)
- CV-0734 ('B' S/G)

TITLE: STANDARD POST-TRIP ACTIONS

☑ INSTRUCTIONS	☑ CONTINGENCY ACTIONS
9. **DETERMINE** that **Containment Isolation** acceptance criteria are met:	
☐ a. **VERIFY** containment pressure less than 0.85 psig. • PIA-1814 • PIA-1815	☐ a.1. IF Containment pressure is greater than or equal to 4.0 psig, THEN **PERFORM** ALL of the following: 1) **VERIFY** Containment Isolation Signal initiated ("CIS INITIATED" EK-1126 in alarm) OR **PUSH** left and right HIGH RADIATION INITIATE pushbuttons on EC-13. • CHRL-CS • CHRR-CS 2) **ENSURE CLOSED** the following: • BOTH MSIVs: o CV-0510 ('A' S/G) o CV-0501 ('B' S/G) • Main Feed Reg Valves: o CV-0701 ('A' S/G) o CV-0703 ('B' S/G) • Bypass Feed Reg Valves: o CV-0735 ('A' S/G) o CV-0734 ('B' S/G)

(continue)

(continue)

TITLE: STANDARD POST-TRIP ACTIONS

☑ INSTRUCTIONS	☑ CONTINGENCY ACTIONS
9. (continued)	(continued)

- CCW Isolation Valves:
  - CV-0910, (KEY: 337)
  - CV-0911, (KEY: 338)
  - CV-0940, (KEY: 336)

3) **ENSURE** SIAS initiated by performing the following:

a. **VERIFY** "SAFETY INJ INITIATED" EK-1342 alarmed OR **PUSH** left and right INJECTION INITIATE pushbuttons on EC-13.

- PB1-1
- PB1-2

b. **ENSURE** ALL available HPSI and LPSI pumps operating with the associated loop isolation valves open.

(continue)

TITLE: STANDARD POST-TRIP ACTIONS

☑ INSTRUCTIONS	☑ CONTINGENCY ACTIONS
9. (continued)	
☐ b. **VERIFY** Containment Area Monitor alarms clear and NO unexplained rise. • RIA-1805 • RIA-1806 • RIA-1807 • RIA-1808	☐ b.1. IF Containment radiation level is greater than 1 x 10^1 R/hr on ANY Containment Area Monitor, THEN **PERFORM** BOTH of the following: 1) **VERIFY** Containment Isolation Signal initiated ("CIS INITIATED" EK-1126 in alarm) OR **PUSH** left and right HIGH RADIATION INITIATE pushbuttons on EC-13. • CHRL-CS • CHRR-CS 2) **CORROBORATE** Containment Area Monitor readings by comparing to Containment High Range Monitor readings. • RIA-2321 • RIA-2322
☐ c. **VERIFY** Condenser Off Gas Monitor RIA-0631 alarm clear and NO unexplained rise.	
☐ d. **VERIFY** Main Steam Line Monitor alarms clear and NO unexplained rise. • RIA-2323 • RIA-2324	

TITLE: STANDARD POST-TRIP ACTIONS

☑ INSTRUCTIONS

10. **DETERMINE** that **Containment Atmosphere** acceptance criteria are met:

☐ a. **VERIFY** Containment temperature less than 125°F.

☐ b. **VERIFY** Containment pressure less than 0.85 psig.

- PIA-1814
- PIA-1815

(continue)

☑ CONTINGENCY ACTIONS

☐ 10.1. **ENSURE** the Containment Air Coolers are in operation as follows:

a. IF SIAS is NOT present, THEN **ENSURE OPERATING** ALL available Containment Air Cooler fans.

- V-1A and V-1B
- V-2A and V-2B
- V-3A and V-3B
- V-4A and V-4B

b. **OPEN** Containment Air Cooler high capacity outlet valves as Service Water System capacity permits:

- CV-0867 ☼
- CV-0861
- CV-0864
- CV-0873

☐ 10.2. IF Containment pressure is greater than or equal to 4.0 psig, THEN **PERFORM** ALL of the following:

a. **ENSURE OPERATING** ALL available Containment Air Cooler 'A' fans.

- V-1A
- V-2A
- V-3A
- V-4A

(continue)

☼ CV-0869 VHX-4 Inlet Valve will be closed if a SIAS has occurred

TITLE: STANDARD POST-TRIP ACTIONS

☑	INSTRUCTIONS	☑	CONTINGENCY ACTIONS
10.	(continued)		(continued)
			b. **ENSURE OPEN** ALL available Containment Spray Valves.
			c. **ENSURE** ALL available Containment Spray Pumps are operating.

TITLE: STANDARD POST-TRIP ACTIONS

☑ INSTRUCTIONS	☑ CONTINGENCY ACTIONS
11. **DETERMINE** that **Vital Auxiliaries-Water** acceptance criteria met by performing ALL of the following:	
☐ a. **VERIFY** at least two Service Water Pumps operating.	☐ a.1. **START** available Service Water Pumps.
☐ b. **VERIFY** BOTH Critical SW Headers in operation with pressures greater than 42 psig.	☐ b.1. **START** available Service Water Pumps. ☐ b.2. IF SW Header pressure is less than 42 psig, AND SIAS is NOT present, THEN **PERFORM** BOTH of the following: 1) **ENSURE CLOSED** Containment Air Cooler high capacity valves as necessary to raise SW Header pressure greater than 42 psig. • CV-0867 • CV-0861 • CV-0864 • CV-0873 2) IF SW Header pressure is less than 42 psig following the closing of containment Air Cooler high capacity valves, THEN **ENSURE CLOSED** Non-critical SW Isolation valve CV-1359.
☐ c. **VERIFY OPERATING** at least one CCW Pump.	☐ c.1. **START** available CCW Pumps.

TITLE: STANDARD POST-TRIP ACTIONS

☑	INSTRUCTIONS	☑	CONTINGENCY ACTIONS
☐ 12.	**DETERMINE** that **Vital Auxiliaries-Air** acceptance criteria met by verifying Instrument Air pressure greater than 85 psig.	☐ 12.1.	**START** available Instrument Air Compressors as necessary.
		☐ 12.2.	IF Feedwater Purity Building Air supply is available, THEN **OPEN** FWP Air Cross-tie Valve, CV-1221 as necessary.

End of Section 4.0

TITLE: STANDARD POST-TRIP ACTIONS

5.0 OPERATOR ACTIONS

☑ INSTRUCTIONS ☑ CONTINGENCY ACTIONS

1. WHEN SIRWT level is less than or equal to 25%, THEN:

☐ a. Prior to RAS, **PERFORM** Pre-RAS actions. Refer to EOP Supplement 42.

☐ b. IF RAS occurs, THEN **PERFORM** Post-RAS actions. Refer to EOP Supplement 42.

CAUTION

Each D/G is limited to a 2500 KW continuous load rating and a 2750 KW two-hour load rating. Operation of VC-10 (VC-11) will draw approximately 44 KW.

☐ 2. **ENSURE** CR HVAC is aligned for Emergency Mode Operation within 20 minutes of the time of the Reactor Trip by performing the following:

a. **ENSURE** at least one Air Filter Unit Fan associated with an operating train is ON:

- V-26A
- V-26B

b. **ENSURE OFF** the following fans:

- V-94 Purge Fan
- V-47 Switchgear Exhaust Fan

TITLE: STANDARD POST-TRIP ACTIONS

5.0 OPERATOR ACTIONS

☑ INSTRUCTIONS	☑ CONTINGENCY ACTIONS
3. **VERIFY** BOTH of the following:	
☐ a. At least one Condensate Pump operating.	
☐ b. At least one Cooling Tower Pump operating.	
☐ 4. IF an SIAS has initiated, THEN **PERFORM** EOP Supplement 5 "Checklist for Safeguards Equipment Following SIAS."	
☐ 5. IF a CHP or CHR has initiated, THEN **PERFORM** EOP Supplement 6 "Checklist for Containment Isolation and CCW Restoration to Containment."	
☐ 6. **COMMENCE** Emergency Shutdown Checklist. Refer to GOP-10, "Balance of Plant Actions Following a Reactor Trip."	
☐ 7. IF Reactor trip was due to Equipment Fire, THEN **REFER TO** ONP-25.1, "Fire Which Threatens Safety Related Equipment."	
☐ 8. IF the MSIV AND MSIV bypass valves are closed, THEN **ENSURE TRIPPED** BOTH Main Feed Pumps.	
	☐ 3.1. **CLOSE** BOTH MSIVs. • CV-0510 • CV-0501

TITLE: STANDARD POST-TRIP ACTIONS

5.0 OPERATOR ACTIONS

☑ INSTRUCTIONS	☑ CONTINGENCY ACTIONS

☐ 9. IF ALL of the following conditions exist:

- ALL safety function acceptance criteria met
- No contingency action was taken
- Control Room is habitable,

THEN **GO TO** EOP-2.0, "Reactor Trip Recovery."

☐ 10. IF ANY of the following conditions exist:

- ANY safety function acceptance criteria NOT met
- ANY contingency action was taken
- Control Room is NOT habitable,

THEN **REFER TO** Attachment 1, "Event Diagnostic Flow Chart" AND **DIAGNOSE** the event.

End of Section 5.0

ATTACHMENT 2

EOP-4, "LOSS OF COOLANT ACCIDENT RECOVERY"

110 Pages Follow (Procedure Attachments not included)

PALISADES NUCLEAR PLANT EMERGENCY OPERATING PROCEDURE	Proc No	EOP-4.0
	Revision	16
	Issued Date	1/6/05

LOSS OF COOLANT ACCIDENT RECOVERY

RLTucker	/ 1/5/05
Procedure Sponsor	Date
GGShaffer	/ 10/22/04
Technical Reviewer	Date
DCampbell	/ 10/26/04
User Reviewer	Date

TITLE: LOSS OF COOLANT ACCIDENT RECOVERY

USER ALERT
CONTINUOUS USE PROCEDURE

Read each step of the procedure prior to performing that step. When sign-offs are required, sign off each step as complete before proceeding to the next step.

1.0 PURPOSE

This procedure provides operator actions which must be accomplished in the event of a Loss of Coolant Accident (LOCA) when the Shutdown Cooling System is NOT initially in service. These actions are necessary to ensure that the Plant is placed in a stable condition. The goals of this procedure are to mitigate the effects of a LOCA, isolate the break (if possible), and to establish long term cooling using the Safety Injection System or the Shutdown Cooling System. This procedure achieves these goals while maintaining adequate core cooling and minimizing radiological releases to the environment.

End of Section 1.0

2.0 ENTRY CONDITIONS

1. EOP-1.0, "Standard Post Trip Actions," has been performed.

   OR

   The event initiated from a lower mode when the Shutdown Cooling System is NOT initially in service.

2. Plant conditions indicate that a LOCA has occurred as indicated by ANY of the following:

   a. Abnormal Pressurizer level change (low or high)

   b. Pressurizer pressure low for existing plant conditions

   c. SIAS automatically activated

   d. Standby Charging Pumps start

   e. CHP or CHR alarms

   f. Containment pressure, temperature or humidity high

   g. Containment Sump level rising

   h. Quench Tank level, temperature, or pressure high

   I. Volume Control Tank level dropping

End of Section 2.0

3.0 EXIT CONDITIONS

1. The diagnosis of a LOCA is NOT confirmed.

OR

2. ANY of the Safety Function Status Check Sheet acceptance criteria are NOT satisfied
AND corrective actions to restore the safety function are NOT effective.

OR

3. The Loss of Coolant Accident Recovery procedure has accomplished its purpose by satisfying ALL of the following:

   a. ALL Safety Function Status Check Sheet acceptance criteria are being satisfied

   b. Shutdown Cooling entry conditions are satisfied

      OR

      The break has been isolated

      OR

      The PCS is in long term cooling

   c. An appropriate approved plant procedure can be implemented

End of Section 3.0

4.0 OPERATOR ACTIONS

INSTRUCTIONS	CONTINGENCY ACTIONS

CAUTION

During degraded Containment conditions, the operator should not rely on any single instrument indication due to large instrument errors. Alternate/additional instrumentation should be used to confirm trending of PCS conditions.

© 1. **CONFIRM** proper event diagnosis by performing ALL of the following:

a. **VERIFY** Attachment 1, "Safety Function Status Check Sheet" acceptance criteria:

1) Are satisfied at intervals of approximately fifteen minutes.

OR

2) Corrective actions to restore Attachment 1, "Safety Function Status Check Sheet," acceptance criteria are effective.

1.1. **GO TO** ONE of the following:

- EOP-1.0, "Standard Post Trip Actions," Attachment 1, "Event Diagnostic Flowchart" AND **RE-DIAGNOSE** the event.
- For events initiated from a lower mode, **GO TO** the EOP considered appropriate by the Shift Supervisor.
- EOP-9.0, "Functional Recovery Procedure."

(continue)

INSTRUCTIONS	CONTINGENCY ACTIONS
1. **(continued)**	
b. IF ALL of the following conditions exist: • Steam Generator Blowdown Monitor, RIA-0707, has NOT alarmed • SIAS has NOT occurred OR has been reset • CHP and CHR signals are NOT present, THEN **SAMPLE** S/Gs for activity and Lithium AND **VERIFY** sample results do NOT indicate a SGTR.	
c. Observation of NO abnormal S/G level rise (NOT attributable to feed flow or swell).	
© 2. **REFER TO** the Site Emergency Plan AND **CLASSIFY** the event per EI-1, "Activation of the Site Emergency Plan/Emergency Classification."	
3. **OPEN** the placekeeper AND **RECORD** the time of EOP entry.	
4. IF PZR pressure is less than or equal to 1605 psia OR Containment pressure is greater than or equal to 4.0 psig, THEN **VERIFY** "SAFETY INJ INITIATED" (EK-1342) is alarmed.	4.1. **PUSH** BOTH left and right INJECTION INITIATE pushbuttons on EC-13. • PB1-1 • PB1-2

INSTRUCTIONS	CONTINGENCY ACTIONS
5. IF SIAS is present, THEN **PERFORM** ALL of the following:	
a. **ENSURE** available safeguards equipment operated or operating. Refer to EOP Supplement 5.	
b. **VERIFY** at least minimum SI flow. Refer to EOP Supplement 4.	b.1. IF SI flow is NOT within the limits of EOP Supplement 4, THEN **PERFORM** ANY of the following to restore SI flow: 1) **ENSURE** electrical power available to SI pumps and valves. 2) **ENSURE** correct SI valve lineup. 3) **ENSURE** adequate SI pump seal cooling. 4) **START** additional SI pumps as needed until SI flow is within the limits of EOP Supplement 4.
c. IF Letdown Orifice Stop Valves are closed, THEN **PLACE** handswitches in the CLOSE position: • HS-2003 • HS-2004 • HS-2005	

INSTRUCTIONS	CONTINGENCY ACTIONS
NOTE: P-50A and P-50B shall not be operated simultaneously when T_c is less than 300°F.	
6. IF PZR pressure lowers to less than 1300 psia AND SIAS is initiated, THEN **PERFORM** BOTH of the following: a. **ENSURE** one PCP is stopped in each loop. b. IF PCS is less than 25°F subcooled, THEN **ENSURE** ALL PCPs stopped.	
7. WHEN PCS temperature lowers, THEN **ENSURE** PCPs configured as follows:	

PCS T_c	MAXIMUM OPERATING PCPs
<450°F	3
<300°F	2

8. IF PCPs are operating, THEN **VERIFY** PCP operating limits are satisfied. Refer to EOP Supplement 1.	8.1. **STOP** PCPs which do NOT satisfy PCP operating limits.

INSTRUCTIONS	CONTINGENCY ACTIONS
9. IF open, THEN **CLOSE** CWRTs Vent Valves: • CV-1064 • CV-1065	
10. **ISOLATE** the LOCA by performing ALL of the following:	
a. IF PZR pressure is less than 2100 psia, THEN **VERIFY** BOTH PORVs are closed.	a.1. **CLOSE** the PORV block valves: • MO-1042A • MO-1043A
b. **ENSURE CLOSED** Letdown Stop Valves: • CV-2001 • CV-2009	
c. **ENSURE CLOSED** PCS Sample Isolation Valves: • CV-1910 • CV-1911	
d. **ENSURE CLOSED** Reactor Vessel and PZR Vent Valves on C-11A: • PRV-1067 • PRV-1068 • PRV-1069 • PRV-1070	

(continue)

INSTRUCTIONS	CONTINGENCY ACTIONS
10. **(continued)**	
e. **VERIFY** BOTH of the following conditions exist: • CCW Radiation Monitor, RIA-0915, alarm clear • "COMPONENT CLG SURGE TANK T-3 HI-LO LEVEL" (EK-1172) is clear	e.1. IF PCS to CCW leak is evident, THEN **PERFORM** ALL of the following: 1) **LOCATE** the leak. Refer to ONP-23.1, "Primary Coolant Leak." 2) **ISOLATE** the leak. Refer to ONP-23.1, "Primary Coolant Leak." 3) IF CCW was isolated to any operating PCP, THEN **SECURE** the affected PCP(s).
f. **VERIFY** PZR Relief Valve(s) NOT lifting by the following: • Observation of Acoustic Monitor Panel indications on C-11A • PZR Relief Valve Discharge Temperature indicators on C-12 • Observation of Quench Tank temperature, pressure and level	f.1. **REDUCE** PCS pressure to less than 1800 psia.

INSTRUCTIONS	CONTINGENCY ACTIONS
11. IF LOCA is outside of containment as indicated by ANY of the following: • Abnormal rise in Auxiliary Building Area Monitors. • Abnormal rise in East or West ESS Room Sump levels. • Abnormal rise in Dirty Waste Drain Tanks level THEN **PERFORM** ALL of the following: a. **LOCATE** AND **ISOLATE** the leak. b. **ENSURE** applicable areas of the Auxiliary Building are isolated by performing the following: 1) IF any of the following alarms have annunciated, • EK-1364, Gaseous Waste Monitoring Hi Radiation • EK-1366, Plant Area Monitoring Hi Radiation	

(continue)

INSTRUCTIONS	CONTINGENCY ACTIONS
11. **(continued)** THEN **REFER TO** ARP-8, "Safeguards Safety Injection and Isolation Scheme EK-13 (EC-13)" AND **PERFORM** Corrective Actions for any alarming monitors listed. 2) **NOTIFY** plant personnel to stay clear of the affected areas of the Auxiliary Building. c. **INITIATE** actions to makeup to the SIRWT. Refer to one of the following: • SOP-2A, "Chemical & Volume Control System Charging & Letdown" • SOP-17A, "Clean Radioactive Waste System" d. **MANUALLY INITIATE** CIS by pushing left or right HIGH RADIATION INITIATE pushbuttons on EC-13 AND **PERFORM** EOP Supplement 6. • CHRL-CS • CHRR-CS e. **NOTIFY** the TSC.	

INSTRUCTIONS	CONTINGENCY ACTIONS
12. **PLACE** at least one Hydrogen Monitor in operation, ensuring the appropriate Key Switch in the "ACCI" position. Refer to SOP-38, "Gaseous Process Monitoring System."	
13. IF ANY of the following conditions exist: • Containment pressure is greater than or equal to 4.0 psig • Any operable Containment Radiation Monitor rises to 1×10^1 R/hr, THEN **PERFORM** ALL of the following:	
a. **VERIFY** "CIS INITIATED" (EK-1126) is alarmed.	a.1. **MANUALLY INITIATE** CIS by pushing left or right HIGH RADIATION INITIATE pushbutton on EC-13. • CHRL-CS • CHRR-CS
b. **VERIFY** Containment Isolation. Refer to EOP Supplement 6.	b.1. **CLOSE** valves that failed to automatically operate.

INSTRUCTIONS	CONTINGENCY ACTIONS
14. IF Containment pressure is greater than or equal to 4.0 psig, THEN **PERFORM** ALL of the following:	
a. **VERIFY** Containment Spray alignment AND at least minimal acceptable spray flow per following table:	a.1. **OPEN** available Containment Spray valves to obtain required configuration and at least minimum flow. • CV-3001 • CV-3002 AND **START** available Containment Spray pumps • P-54A • P-54B • P-54C

NUMBER OF RUNNING CS PUMPS	NUMBER OF OPEN CS VALVES	CS FLOW MUST BE AT LEAST:
RAS NOT Present		
1	at least 1	2185 gpm total
2 or 3	2	2939 gpm total
RAS Present		
1	1	1525 gpm
2 or 3	2	3100 gpm total

b. **ENSURE** at least one Containment Air Cooler Accident Fan operating.

- V-1A
- V-2A
- V-3A
- V-4A

INSTRUCTIONS

CONTINGENCY ACTIONS

CAUTION

Operation of PCPs should be minimized when seal cooling is NOT present or controlled bleedoff is isolated.

15. IF PCP seal cooling is unavailable, THEN **PERFORM** ALL of the following:

    a. **CLOSE** PCP Controlled Bleedoff valves:

    - CV-2083
    - CV-2099

    b. **CLOSE** PCP Controlled Bleedoff Relief Stop, CV-2191.

    c. **RESTORE** PCP seal cooling. Refer to ONP-6.2, "Loss of Component Cooling."

INSTRUCTIONS

CONTINGENCY ACTIONS

CAUTION

Continued operation of the sprays after pressure has been reduced to an acceptable level increases the possibility of wetting electrical connectors (which may result in electrical grounds, shorts and other malfunctions) and containment sump screen clogging.

© 16. IF the Containment Spray System is operating,
AND ALL of the following conditions are satisfied:

Parameter	Condition
Containment pressure	less than 3 psig
Containment Spray operation	NOT required for CTMT ambient cooling
	NOT required for HPSI subcooling
	NOTE: These conditions must be met prior to securing the last Containment Spray pump.
	NOT needed for iodine removal as determined by Chemistry OR ALL of the following: • Containment high range Gamma monitors read less than 1800 R/Hr • Containment isolated per EOP Supplement 6 • less than one hour has elapsed since reactor trip

(Continue)

INSTRUCTIONS	CONTINGENCY ACTIONS
16. **(Continued)**	
THEN **STOP** spray pumps one at a time, waiting to see the effect of reduced spray flow as follows:	
a. IF three Containment Spray Pumps are operating, THEN **STOP** one Containment Spray Pump as directed by the CRS.	a.1. IF Containment Pressure rises to 3 to 4 psig AND two Containment Spray Pumps operating, THEN **START** Containment Spray Pump.
b. IF Containment pressure is less than 3 psig, AND two Containment Spray Pumps are operating, THEN **PERFORM** the following as directed by the CRS: 1) **CLOSE** one Containment Spray Valve as follows: a) **PLACE** one CHP Bypass Switch to BYPASS: • HS-3001C, CV-3001 (Key: 397) • HS-3002C, CV-3002 (Key : 396) b) **ENSURE CLOSED** associated Containment Spray Valve: • CV-3001 • CV-3002	b.1. IF Containment Pressure rises to 3 to 4 psig AND one Containment Spray Pump operating, THEN 1) **START** Containment Spray Pump. 2) **OPEN** Containment Spray Valve.

(Continue)

INSTRUCTIONS	CONTINGENCY ACTIONS
16. **(Continued)**	
2) **STOP** one Containment Spray Pump.	
c. IF Containment pressure is less than 3 psig AND one Containment Spray Pump is operating, THEN **STOP** the Containment Spray Pump as directed by the CRS.	c.1. IF Containment Pressure rises to 3 to 4 psig AND no Containment Spray Pump operating, THEN 1) Ensure one Containment Spray Valve open. 2) **START** Containment Spray Pump.
d. WHEN ALL Containment Spray Pumps have been stopped, THEN **ENSURE CLOSED** BOTH Containment Spray Valves.	
1) **ENSURE** BOTH CHP Bypass Switches in BYPASS: • HS-3001C, CV-3001 Bypass (Key: 397) • HS-3002C, CV-3002 Bypass (Key: 396)	
2) **ENSURE CLOSED** BOTH Conatinment Spray Valves: • CV-3001 • CV-3002	

INSTRUCTIONS

CONTINGENCY ACTIONS

17. WHEN all Containment Spray Pumps have been stopped, THEN **PERFORM** ALL of the following:

    a. IF MFW or Condensate pumps are operating AND feedwater from these sources is NOT desired, THEN **PLACE** ALL of the following controllers in MANUAL AND **CLOSE**:

        1) Feedwater Regulating Valves

            - LIC-0701 ('A' S/G)
            - LIC-0703 ('B' S/G)

        2) Feedwater Regulating Bypass Valves

            - LIC-0735 ('A' S/G)
            - LIC-0734 ('B' S/G)

    b. IF CCW to containment has NOT been restored, THEN **PLACE** the following CCW valve keyswitches to CLOSE:

CCW Valve	Keyswitch	Key
CV-0910	HS-0910	337
CV-0911	HS-0911	338
CV-0940	HS-0940	336

(Continue)

INSTRUCTIONS	CONTINGENCY ACTIONS
17. (Continued)	
NOTE: Automatic reinitiation of spray will not occur until after SIAS has been reset.	
c. **RESET** CHP circuits by pushing left and right HIGH PRESSURE RESET pushbuttons on C-13 • CHPL - Reset • CHPR - Reset	
d. WHEN CHP has been reset, THEN **ENSURE** both Containment Spray Valve CHP Bypass Keyswitches are in NORMAL: • HS-3001C • HS-3002C	

INSTRUCTIONS	CONTINGENCY ACTIONS
18. **VERIFY** BOTH of the following: • At least one Cooling Tower Pump operating o P-39A o P-39B • At least one Condensate Pump operating o P-2A o P-2B	18.1. **ENSURE CLOSED** BOTH MSIVs: • CV-0510 ('A' S/G) • CV-0501 ('B' S/G) 18.2. **ENSURE CLOSED** from the Control Room BOTH MSIV Bypass valves: • MO-0510 ('A' S/G) • MO-0501 ('B' S/G) a. IF ANY MSIV Bypass valves were open when power/position indication was lost, THEN **LOCALLY CLOSE** ANY open MSIV Bypass valve. b. **ENSURE CLOSED** ALL S/G Blowdown Valves:

'A' S/G	'B' S/G
CV-0739	CV-0738
CV-0771	CV-0770
CV-0767	CV-0768

19. IF the LOCA is isolated, THEN **GO TO** Step 64.

INSTRUCTIONS	CONTINGENCY ACTIONS

CAUTION

Each D/G is limited to a 2500 KW continuous load rating and a 2750 KW two-hour load rating. Operation of VC-10 (VC-11) will draw approximately 44 KW.

20. **ENSURE** at least one train of CR HVAC in Emergency Mode. Refer to SOP-24, "Ventilation and Air Conditioning System."

NOTE: IF emergency boration is in progress, THEN cooldown may commence/continue while the required shutdown margin value is calculated.

© 21. **VERIFY** PCS boron concentration greater than or equal to required boron concentration as verified by sample or hand calculation. Refer to EOP Supplement 35.

a. IF Emergency boration is in progress
AND PCS boron concentration is greater than or equal to required boron concentration,
THEN **SECURE** emergency boration. Refer to EOP Supplement 40.

21.1. IF PCS boron concentration is less than required boron concentration,
THEN **PERFORM** BOTH of the following:

a. **ENSURE** emergency boration is in progress.

b. WHEN required boron concentration is reached,
THEN **SECURE** emergency boration. Refer to EOP Supplement 40.

INSTRUCTIONS

CONTINGENCY ACTIONS

CAUTION

A maximum PZR cooldown rate of 200°F/Hr and a maximum PZR Spray ΔT (PZR vapor temp - spray temp) of 350°F should be observed to prevent damage to the PZR or Spray Nozzle.

NOTE: PZR level indication decalibration will occur during cooldown. Correction curves in EOP Supplement 9, "Pressurizer Level Corrections Hot Calibrated" or EOP Supplement 10, "Pressurizer Level Corrections Cold Calibrated" should be used.

NOTE: S/G level indication decalibration will occur during cooldown. Correction curves in EOP Supplement 11, "S/G Level Correction" should be used.

NOTE: Steam flow through two of the four Atmospheric Steam Dump Valves should be adequate to establish an initial cooldown rate of 75°F/hr.

NOTE: P-50A and P-50B shall not be operated simultaneously when T_c is less than 300°F.

(continue)

INSTRUCTIONS	CONTINGENCY ACTIONS
22. **(continued)**	
22. **COMMENCE** steaming S/Gs as follows:	
a. **REFER TO** the following: • EOP Supplement 1, Pressure and Temperature Limit Curves • EOP Supplement 33, PCS Heatup/Cooldown Rate Data	
b. IF safety injection flow is causing a cooldown in excess of required limits, THEN **OPERATE** the Turbine Bypass Valve to maintain all of the following as applicable: • S/Gs within 50 psi of Psat for Average of Qualified CETs • As required to establish or support natural circulation • As required to establish or support two phase natural circulation	b.1. **OPERATE** Atmospheric Steam Dump Valves. 1) IF desired to enhance temperature control, THEN **ISOLATE** two Atmospheric Steam Dump Valves. Refer to Table 22-1.

(Continue)

INSTRUCTIONS	CONTINGENCY ACTIONS
22. **(Continued)**	
c. WHEN PCS cooldown rate can be controlled within required limits, THEN **OPERATE** the Turbine Bypass Valve to cooldown at the maximum allowed rate.	c.1. **OPERATE** Atmospheric Steam Dump Valves. 1) IF desired to enhance temperature control, THEN **ISOLATE** two Atmospheric Steam Dump Valves. Refer to Table 22-1.

Table 22-1

'A' S/G	MV-MS101, ASDV CV-0782 Inlet OR MV-CA782, A/S to CV-0782
	MV-MS103, ASDV CV-0781 Inlet OR MV-CA781, A/S to CV-0781
'B' S/G	MV-MS102, ASDV CV-0779 Inlet OR MV-CA779, A/S to CV-0779
	MV-MS104, ASDV CV-0780 Inlet OR MV-CA780, A/S to CV-0780

CAUTION

Operating P-50A and P-50B simultaneously when T_c is less than 300°F is prohibited by Techncial Specifications.

d. **ENSURE** not more than two PCPs operating (preferably one in each loop.)

INSTRUCTIONS	CONTINGENCY ACTIONS

23. IF BOTH of the following conditions exist for each S/G:

    - At least three of four S/G pressure sigmas indicate between 510 and 550 psia (indicators between alarm flags)
    - A controlled cooldown is in progress

    THEN **BLOCK** MSIS for the S/G meeting the above conditions by performing ALL the following:

    a. **BLOCK** MSIV closure signal for the applicable S/G by pushing the appropriate pushbutton on Control Panel C-01:
        - HS/LPE-50A ('A' S/G)
        - HS/LPE-50B ('B' S/G)

    b. **VERIFY** "STEAM GEN VALVES ISOLATION LOCKOUT" (EK-0970) is alarmed.

    c. **ENSURE CLOSED** BOTH Main Feed Reg Valves:
        - CV-0701 ('A' S/G)
        - CV-0703 ('B' S/G)

    d. **ENSURE CLOSED** BOTH Bypass Feed Reg Valves:
        - CV-0735 ('A' S/G)
        - CV-0734 ('B' S/G)

INSTRUCTIONS	CONTINGENCY ACTIONS
NOTE: Use the following instruments to determine spray nozzle ΔT: • PZR Vapor Phase Temperature, TI-0101 • Spray line temperature, TIA-0103 or TIA-0104 (use the lowest temperature if using main sprays) • Charging line temperature, TI-0212 (if using Auxiliary Spray)	
© 24. **RECORD** each occurrence of PZR Spray operation with a ΔT (PZR vapor phase temp minus spray temp) greater than 200°F in the Narrative Log.	

INSTRUCTIONS

CONTINGENCY ACTIONS

NOTE: Use ANY of the following to determine Average of Qualified CETs:

- PPC point "KCETA" (Average of Qualified CETs)
- PPC Incore Qualified CET Map (PPC page 313)
- Manual calculation. Refer to SOP-34, "Plant Process Computer (PPC) System."

© 25. **VERIFY** SI Pump throttling criteria are satisfied by ALL of the following:

a. Based on the Average of Qualified CETs, PCS subcooling meets ONE of the following:

- At least 25°F subcooled for non-degraded Containment conditions
- Greater than the minimum subcooling curve on EOP Supplement 1 for degraded Containment conditions

b. Corrected PZR level is greater than 20% (40% for degraded Containment) and controlled. **REFER TO** EOP Supplements 9 and 10.

(continue)

25.1. IF ANY of the SI Pump throttling criteria can NOT be maintained, THEN **RAISE** HPSI flow AND **START** HPSI Pumps as necessary.

PUMP	VALVE	
	NUMBER	DESCRIPTION
Train 1		
P-66B	MO-3009	HPSI Train 1 to Loop 1B
	MO-3011	HPSI Train 1 to Loop 2A
	MO-3007	HPSI Train 1 to Loop 1A
	MO-3013	HPSI Train 1 to Loop 2B
Train 2		
P-66A	MO-3066	HPSI Train 2 to Loop 1B
	MO-3064	HPSI Train 2 to Loop 2A
	MO-3068	HPSI Train 2 to Loop 1A
	MO-3062	HPSI Train 2 to Loop 2B

INSTRUCTIONS

CONTINGENCY ACTIONS

25. **(continued)**

c. At least one S/G is available for PCS heat removal with corrected level being maintained or being restored to between 60% and 70%.
REFER TO EOP Supplement 11.

d. Operable RVLMS channels indicate greater than 102 inches above the bottom of fuel alignment plate (621' 8").

NOTE: Reactor Vessel Upper Head voiding resulting from controlled PCS pressure reductions is not expected to result in safety functions being jeopardized.

© 26. **COMMENCE** depressurization of the PCS to 270 psia by performing ANY of the following:

a. **OPERATE** PZR heaters and Main or Auxiliary PZR sprays.

b. IF SI Pump throttling criteria are met,
THEN **PERFORM** ANY of the following:

1) **CONTROL** Charging and Letdown.

2) **THROTTLE** HPSI flow.

INSTRUCTIONS

CONTINGENCY ACTIONS

27. IF ALL of the following conditions exist:

- PZR pressure is less than 1687 psia
- SIAS is NOT actuated or blocked
- "Safety Injection Signal Block Permit" (EK-1369) is alarmed
- A controlled cooldown and/or controlled depressurization is in progress,

THEN **BLOCK** SIAS by performing ALL of the following:

a. **PLACE** AND **HOLD** SIAS block handswitch PB3-1 to BLOCK.

1) **VERIFY** the following annunciator in alarm:

- "SAFETY INJ BLOCK RELAY SI-1" (EK-1337)

2) **RELEASE** SIAS block handswitch PB3-1.

(continue)

INSTRUCTIONS

CONTINGENCY ACTIONS

27. **(continued)**

b. **PLACE** AND **HOLD** SIAS block handswitch PB3-2 to BLOCK.

1) **VERIFY** the following annunciators in alarm:

- "SAFETY INJ BLOCK RELAY SI-2" (EK-1338)
- "SAFETY INJ BLOCKED" (EK-1339)

2) **RELEASE** SIAS block handswitch PB3-2.

28. IF HPSI Pumps are operating AND SI Pump throttling criteria are satisfied,
THEN **THROTTLE** HPSI flow OR **STOP** one HPSI Pump at a time.

PUMP	VALVE	
	NUMBER	DESCRIPTION
Train 1		
P-66B	MO-3009	HPSI Train 1 to Loop 1B
	MO-3011	HPSI Train 1 to Loop 2A
	MO-3007	HPSI Train 1 to Loop 1A
	MO-3013	HPSI Train 1 to Loop 2B
Train 2		
P-66A	MO-3066	HPSI Train 2 to Loop 1B
	MO-3064	HPSI Train 2 to Loop 2A
	MO-3068	HPSI Train 2 to Loop 1A
	MO-3062	HPSI Train 2 to Loop 2B

INSTRUCTIONS

CONTINGENCY ACTIONS

29. IF LPSI Pumps are operating AND PZR pressure is being controlled greater than 200 psia, THEN **PERFORM** BOTH of the following:

    a. **STOP** the operating LPSI Pumps:

    - P-67A
    - P-67B

    b. **CLOSE** the LPSI injection valves:

    - MO-3008 LPSI Loop 1A
    - MO-3010 LPSI Loop 1B
    - MO-3012 LPSI Loop 2A
    - MO-3014 LPSI Loop 2B

30. IF PZR pressure lowers to less than 200 psia AND LPSI pumps have been stopped, THEN **PERFORM** BOTH of the following:

    a. **ENSURE OPERATING** ALL available LPSI pumps:

    - P-67A
    - P-67B

    b. **ENSURE OPEN** LPSI injection valves:

    - MO-3008 LPSI Loop 1A
    - MO-3010 LPSI Loop 1B
    - MO-3012 LPSI Loop 2A
    - MO-3014 LPSI Loop 2B

INSTRUCTIONS	CONTINGENCY ACTIONS
© 31. As resources permit, **INITIATE** preparations for either of the following: a. Post-RAS injection from Spent Fuel Pool. Refer to EOP Supplement 44. b. Refill of SIRW Post-RAS. Refer to EOP Supplement 43.	
32. IF Letdown is isolated AND BOTH of the following conditions exist: • SI Pump throttling criteria are met • Letdown is needed or desired, THEN **RESTORE** Letdown. Refer to EOP Supplement 27.	

INSTRUCTIONS

CONTINGENCY ACTIONS

NOTE: PZR level instrument de-calibration occurs due to PCS pressure and containment temperature changes. Level correction is per EOP Supplements 9 and 10.

NOTE: IF the PCS is in a water solid condition for PCS Pressure Control,
THEN the PZR level limit of 85% may be exceeded.

NOTE: PZR level should be maintained greater than 36% (40% for degraded Containment) to have continued availability of PZR Heaters.

33. IF SI Pump throttling criteria are met,
THEN **MAINTAIN** corrected PZR level between 20% and 85% (42% to 57% preferred) by performing ANY of the following:

    a. **THROTTLE** HPSI flow.

    b. **CONTROL** Charging and Letdown.

(continue)

INSTRUCTIONS	CONTINGENCY ACTIONS
33. **(continued)**	
	NOTE: IF an interruption in boration via Charging Pump to HPSI Train 2 occurs, THEN a different SI cold leg injection nozzle should be used when restoring flow.
1) **ENSURE** normal charging path aligned as follows:	1.1) IF the normal charging path is NOT available AND HPSI Train 2 is available, THEN **CHARGE** to the PCS via the HPSI header by performing ALL of the following:
a) **OPEN** Charging Line Stop Valve, CV-2111.	1) **STOP** ALL Charging Pumps.
b) **OPEN** at least one Charging Stop Valve: • CV-2113 • CV-2115	2) **CLOSE** Charging Line Stop Valve, CV-2111.
c) IF BOTH Charging Stop Valves fail to open THEN **ENSURE** greater than 33 gpm flow through CK-CVC2112.	3) **CLOSE** Letdown Orifice Stop Valves: • CV-2003 • CV-2004 • CV-2005
	4) **CLOSE** Letdown Containment Isolation Valve CV-2009.
	5) **ENSURE CLOSED** HPSI Pump B Discharge to Train 2, CV-3018.
(continue)	**(continue)**

	INSTRUCTIONS	CONTINGENCY ACTIONS
33.	**(continued)**	**(continued)**

6) **OPEN** ONE HPSI Train 2 Injection Valve:

- MO-3062
- MO-3064
- MO-3066
- MO-3068

7) **PLACE** SIT Pressure Indicating Controller associated with valve opened above to MANUAL AND **CLOSE**:

- PIC-0338, MO-3062
- PIC-0347, MO-3064
- PIC-0346, MO-3066
- PIC-0342, MO-3068

8) **OPEN** Charging Pump Discharge to Train 2, MO-3072.

9) **START** Charging pumps as necessary to control PZR level.

INSTRUCTIONS

© 34. **MAINTAIN** PCS pressure within the limits of EOP Supplement 1 by performing ANY of the following:

a. **CONTROL** the following:

- PZR heaters
- Main Spray
- Auxiliary Spray (Supplement 37)

b. IF SI Pump throttling criteria are met,
THEN **CONTROL** HPSI, Charging, and Letdown flows.

(continue)

CONTINGENCY ACTIONS

34.1. IF the PCS is oversubcooled OR PZR pressure is greater than the maximum limits of EOP Supplement 1,
THEN **PERFORM** ANY of the following to restore subcooling or PCS pressure to within the appropriate limit:

a. **OPERATE** available S/G(s) to stop the cooldown
AND **STABILIZE** Qualified CET temperatures and Loop T_Cs.

b. **OPERATE** the following to lower PZR pressure within allowable limits:

- Main Spray
- Auxiliary Spray (Supplement 37)

c. IF SI Pump throttling criteria are met,
THEN **CONTROL** HPSI, Charging, and Letdown flows.

34.2. IF PCS cooldown rate exceeds Technical Specification limits,
THEN **PERFORM** ANY of the following to restore the cooldown rate to within Technical Specification limits:

a. **OPERATE** available S/G(s) to stop the cooldown
AND **STABILIZE** Qualified CET temperatures and Loop T_Cs.

(continue)

INSTRUCTIONS	CONTINGENCY ACTIONS
34. **(continued)**	**(continued)**
	b. **OPERATE** the following to maintain PZR pressure within limits of EOP Supplement 1: • PZR heaters • Main Spray • Auxiliary Spray (Supplement 37) • Letdown
	c. As directed by the Shift Supervisor, **CONTINUE** the PCS cooldown at less than or equal to Technical Specification limits. Refer to EOP Supplement 33.
© 35. **ENSURE** at least one S/G has corrected level being maintained or being restored to between 60% and 70%. Refer to EOP Supplement 11.	

INSTRUCTIONS	CONTINGENCY ACTIONS
© 36. **PERFORM** ALL of the following:	
a. **CALCULATE** minimum PCS cooldown rate. Refer to EOP Supplement 2.	
b. **VERIFY** BOTH of the following: • The calculated cooldown rate does NOT exceed Technical Specification limits. • The calculated cooldown rate is achievable with the existing PCS heat removal path.	b.1. IF additional sources of inventory which allow the requirements to be met are NOT available, THEN **GO TO** EOP-9.0, "Functional Recovery Procedure."

INSTRUCTIONS	CONTINGENCY ACTIONS
© 37. **MONITOR** for formation of PCS voiding as indicated by ANY of the following: • Indicated Charging and Letdown flows do NOT correspond to PZR level trend. • PZR level rising significantly faster than trend expected from Auxiliary Spray flow. • Core ΔT (Average of Qualified CETs - T_C) or Loop ΔT (T_H - T_C) rising for same secondary steaming and Auxiliary Feed rates. • Any operable PCS temperature indication is less than 25°F subcooled. • Operable RVLMS indicates voiding in the Reactor Vessel.	
38. IF PCS voiding is indicated AND ANY of the following exist: • PCS pressure reduction is inhibited • PCS heat removal is inhibited • The Shift Supervisor directs void elimination, THEN **PERFORM** void elimination actions. Refer to EOP Supplement 26.	

TITLE: LOSS OF COOLANT ACCIDENT RECOVERY

INSTRUCTIONS

39. IF ANY of the following AC or DC buses are NOT energized, THEN **RESTORE** power to the affected buses. Refer to the following applicable procedure:

BUS	PROCEDURE
1C or 1D	EOP Supplement 29
1E with No SIAS	EOP Supplement 29
1E with SIAS	SOP-30
Y10	ONP-24.1, "Loss of Preferred AC Bus Y10"
Y20	ONP-24.2, "Loss of Preferred AC Bus Y20"
Y30	ONP-24.3, "Loss of Preferred AC Bus Y30"
Y40	ONP-24.4, "Loss of Preferred AC Bus Y40"
Y01	ONP-24.5, "Loss of Instrument AC Bus Y01"
Any DC Bus	ONP-2.3, "Loss of DC Power"

CONTINGENCY ACTIONS

39.1. IF Bus 1D and Bus 1E are NOT energized, THEN as resources permit, **PROVIDE** power to PZR Heaters from Bus 1C. Refer to ONP-2.1, "Loss of AC Power," Attachment 1.

INSTRUCTIONS	CONTINGENCY ACTIONS
40. IF offsite power was lost AND offsite power is available, THEN **RESTORE** power to plant equipment by performing ALL of the following: a. IF NONE of the following are energized: • 'R' Bus • 'F' Bus • Cook 1 Line, THEN **INITIATE** actions to restore power to 'F' or 'R' Bus, as available. Refer to EOP Supplement 21. b. WHEN ANY of the following are energized: • 'R' Bus • 'F' Bus • Cook 1 Line, THEN **INITIATE** actions to restore Plant power. Refer to EOP Supplement 29.	

(continue)

INSTRUCTIONS

CONTINGENCY ACTIONS

40. **(continued)**

c. **RESTORE** power to the affected bus(es). Refer to the following applicable procedure:

BUS	PROCEDURE
1E (without SIS)	EOP Supplement 29
1E (with SIS)	SOP-30
1A or 1B	ONP-2.1, "Loss of AC Power"

d. **RESTART** plant equipment as desired.

INSTRUCTIONS

CONTINGENCY ACTIONS

CAUTION

Each D/G is limited to the following load rating:

- 2500 KW continuous
- 2750 KW two hours per 24 hour period

41. WHEN 2400V Bus 1C or Bus 1D is energized,
THEN as resources permit,
ENERGIZE Plant buses by performing ALL of the following:

a. IF Bus 1C is energized,
THEN **PERFORM** ALL of the following:

1) **ENSURE CLOSED** the following breakers:

- 152-115 (Bus 1C to Transformers 11 and 19)
- 152-108 (Bus 1C to Transformer 13)

41.1. IF equipment needed to maintain Safety Functions is available from a de-energized 2400V Vital Bus
AND a power supply is available,
THEN **ENERGIZE** the bus
AND **RESTORE** the needed equipment.

(continue)

INSTRUCTIONS	CONTINGENCY ACTIONS
41. **(continued)**	
2) **ENSURE** 480V MCCs are energized as appropriate: • MCC 1: 52-1906 (Bus 19) • MCC 3: 52-1301 (Bus 13) • MCC 7: 52-1103 (Bus 11)	
b. IF Bus 1D is energized, THEN **PERFORM** the following:	
1) **ENSURE CLOSED** 152-201 (Bus 1D to Transformers 12 and 20)	
2) **ENSURE** 480V MCCs energized as appropriate: • MCC 2: 52-2006 (Bus 20) • MCC 8: 52-1201 (Bus 12)	

(continue)

INSTRUCTIONS	CONTINGENCY ACTIONS
41. **(continued)**	
NOTE: IF only one MCC is available (MCC 1 or MCC 2), THEN BOTH vital DC Buses should be powered from the two Battery Chargers supplied by the same energized MCC.	
c. **ENSURE CLOSED** Battery Charger Feeder Breakers from available MCCs: 1) MCC 1 • Charger No 1 Feeder 52-146 • Charger No 4 Feeder 52-186 2) MCC 2 • Charger No 2 Feeder 52-225 • Charger No 3 Feeder 52-285	
d. **VERIFY** 125V DC Buses D10 and D20 are powered by a Battery Charger.	d.1. **PLACE** Battery Chargers in operation. Refer to SOP-30, "Station Power."

INSTRUCTIONS	CONTINGENCY ACTIONS
42. IF ALL PCPs are stopped, THEN **VERIFY** natural circulation flow in at least one PCS loop by ALL of the following: • Core ΔT less than 50°F (Average of Qualified CETs minus T_C) • Loop T_Hs and Loop T_Cs constant or lowering • Average of Qualified CETs at least 25°F subcooled • Difference between Loop T_H and Average of Qualified CETs is less than or equal to 15°F	42.1. **ENSURE** proper control of S/G feeding and steaming rates.
43. IF ALL PCPs are stopped, AND natural circulation criteria are NOT satisfied, THEN **ENSURE** ALL of the following conditions exist: • All available Charging pumps are operating • SI flow is within the limits of EOP Supplement 4 • At least one S/G is available for removing heat from PCS with level being maintained or restored to between 60% and 70% • Average of Qualified CETs is less than superheated	

INSTRUCTIONS	CONTINGENCY ACTIONS
44. WHEN BOTH of the following conditions exist: • PZR Pressure within limits of EOP Supplement 1 • PCS Cooldown rate is within required limits THEN **PLACE** LTOP in service as follows: a. **ENSURE OPEN** PORV Isolation Valves. Refer to SOP-1B, "Primary Coolant System - Cooldown," Attachment 6. b. **PLACE** BOTH of the following PORV LTOP enable keyswitches to ENABLE: • HS-0105A (Key: 1) • HS-0105B (Key: 4) c. **PLACE** BOTH of the following PORV Handswitches to AUTO: • HS-1042B • HS-1043B d. **MAINTAIN** PZR pressure within limits of EOP Supplement 1.	
45. WHEN PCP restart is desired, THEN **RESTART** desired PCPs. Refer to EOP Supplement 3.	

INSTRUCTIONS	CONTINGENCY ACTIONS
46. WHEN required shutdown boron concentration has been established (approximately 30 to 45 minutes using all charging pumps), THEN **ALIGN** Charging Pump suction to SIRWT. Refer to EOP Supplement 40.	
© 47. **VERIFY** the containment sump level is rising as the SIRWT level is lowering.	47.1. IF Containment Sump level is NOT rising as SIRWT level lowers, THEN **PERFORM** ALL of the following: a. **CONFIRM** the LOCA is outside containment. b. **INITIATE** actions to makeup to the SIRWT. Refer to one of the following: • SOP-2A, "Chemical & Volume Control System Charging & Letdown" • SOP-17A, "Clean Radioactive Waste System" c. IF "CIS INITIATED" (EK-1126) is clear, THEN **MANUALLY INITIATE** CIS by pushing left or right HIGH RADIATION INITIATE pushbuttons on EC-13 AND **PERFORM** EOP Supplement 6. • CHRL-CS • CHRR-CS d. **NOTIFY** the TSC.

INSTRUCTIONS

CONTINGENCY ACTIONS

48. WHEN SIRWT level less than or equal to 25%,
THEN prior to RAS, **PERFORM** Pre-RAS Actions. Refer to EOP Supplement 42.

CAUTION

Each D/G is limited to a 2500 KW continuous load rating and a 2750 KW two-hour load rating. Operation of VC-10 (VC-11) will draw approximately 44 KW.

49. IF Control Room HVAC Compressor VC-10 or VC-11 tripped on high temperature due to low SW flow,
THEN **RESET** AND **START** VC-10 or VC-11.

INSTRUCTIONS

CONTINGENCY ACTIONS

NOTE: Subsequent to the actions in Step 50, the TSC must approve closure of ANY of the failed open valves.

50. WHEN Containment water level approaches the level specified below, THEN **ENSURE OPEN** the following valves
AND **OPEN** associated breakers:

Cntmt Water Level	Valve		
	Number	Bkr	Description
595' 9"	MCC No. 1		
	MO-3008	52-141	LPSI Loop 1A
	MO-3010	52-147	LPSI Loop 1B
	MCC No. 2		
	MO-3012	52-247	LPSI Loop 2A
	MO-3014	52-251	LPSI Loop 2B
596' 4"	MCC No. 1		
	MO-3009	52-197	HPSI Train 1 to Loop 1B
	MO-3011	52-157	HPSI Train 1 to Loop 2A
	MO-3007	52-137	HPSI Train 1 to Loop 1A
	MO-3013	52-151	HPSI Train 1 to Loop 2B
	MCC No. 2		
	MO-3066	52-257	HPSI Train 2 to Loop 1B
	MO-3064	52-237	HPSI Train 2 to Loop 2A
	MO-3068	52-261	HPSI Train 2 to Loop 1A
	MO-3062	52-241	HPSI Train 2 to Loop 2B

INSTRUCTIONS

CONTINGENCY ACTIONS

CAUTION

Premature initiation of RAS can lead to insufficient Containment Sump inventory for SI Pump operation. Minimum Containment Water level of 594' 1" is necessary for adequate ESS pump NPSH.

51. WHEN BOTH of the following conditions exist:

    - LOCA inside Containment
    - SIRWT level lowers to less than 2%

    THEN **REFER TO** EOP Supplement 42
    AND **PERFORM** the following:

    a. Post-RAS actions

    b. **MONITOR** for indications of sump screen clogging.

52. IF Containment Water level is less than 594' 1" following a RAS, THEN **CONSULT** with TSC for additional guidance.

INSTRUCTIONS	CONTINGENCY ACTIONS
53. IF RAS is initiated, THEN **PERFORM** the following:	
a. IF BOTH HPSI Pumps are operating, THEN **VERIFY** total HPSI Pump flow greater than 100 gpm.	a.1. IF total HPSI Pump flow less than 100 gpm, THEN **PERFORM** ALL of the following: 1) **STOP** ALL Charging Pumps. Refer to EOP Supplement 39, "Alternate Methods of Reducing PCS Pressure," as needed to control PZR pressure. 2) IF total HPSI Pump still has flow less than 100 gpm, THEN **STOP** one HPSI Pump.
b. IF one HPSI Pump is operating, THEN **VERIFY** the operating HPSI Pump has flow greater than 50 gpm.	b.1. IF the operating HPSI Pump has flow less than 50 gpm, THEN **PERFORM** ALL of the following: 1) **STOP** ALL Charging Pumps. Refer to EOP Supplement 39, "Alternate Methods of Reducing PCS Pressure," as needed to control PZR pressure. 2) IF the operating HPSI Pump still has flow less than 50 gpm, THEN **STOP** the HPSI Pump. 3) **CONSULT** with the TSC for further guidance.

INSTRUCTIONS	CONTINGENCY ACTIONS
© 54. IF containment sump screen clogging is indicated, THEN **PERFORM** the following:	
a. IF 3 Containment Spray Pumps are operating, THEN **STOP** one Containment Spray Pump (P-54B or P-54C preferred.)	
b. **THROTTLE** HPSI flow to achieve 200 to 250 gpm flow to each operating train using either Option 1 or Option 2:	b.1. IF HPSI loop isolation valves are de-energized, THEN **PERFORM** the following: 1) **STOP** one HPSI pump. 2) **ENERGIZE** and **CLOSE** two HPSI loop isolation valves associated with the operating HPSI pump (Refer to Option 1 or 2).

(Continue) **(Continue)**

INSTRUCTIONS

CONTINGENCY ACTIONS

54. (Continued)

(Continued)

OPTION 1		
POSITION	NUMBER	DESCRIPTION
Train 1 (P-66B)		
Closed	MO-3009	HPSI Trn 1 to Loop 1B
Closed	MO-3013	HPSI Trn 1 to Loop 2B
Throttled	MO-3011	HPSI Trn 1 to Loop 2A
Throttled	MO-3007	HPSI Trn 1 to Loop 1A
Train 2 (P-66A)		
Closed	MO-3064	HPSI Trn 2 to Loop 2A
Closed	MO-3068	HPSI Trn 2 to Loop 1A
Throttled	MO-3066	HPSI Trn 2 to Loop 1B
Throttled	MO-3062	HPSI Trn 2 to Loop 2B

OPTION 2		
POSITION	NUMBER	DESCRIPTION
Train 1 (P-66B)		
Closed	MO-3011	HPSI Trn 1 to Loop 2A
Closed	MO-3007	HPSI Trn 1 to Loop 1A
Throttled	MO-3009	HPSI Trn 1 to Loop 1B
Throttled	MO-3013	HPSI Trn 1 to Loop 2B
Train 2 (P-66A)		
Closed	MO-3066	HPSI Trn 2 to Loop 1B
Closed	MO-3062	HPSI Trn 2 to Loop 2B
Throttled	MO-3064	HPSI Trn 2 to Loop 2A
Throttled	MO-3068	HPSI Trn 2 to Loop 1A

OPTION 1		
BKR	NUMBER	DESCRIPTION
Train 1 (P-66B)		
52-197	MO-3009	HPSI Trn 1 to Loop 1B
52-151	MO-3013	HPSI Trn 1 to Loop 2B
Train 2 (P-66A)		
52-237	MO-3064	HPSI Trn 2 to Loop 2A
52-261	MO-3068	HPSI Trn 2 to Loop 1A

OPTION 2		
BKR	NUMBER	DESCRIPTION
Train 1 (P-66B)		
52-157	MO-3011	HPSI Trn 1 to Loop 2A
52-137	MO-3007	HPSI Trn 1 to Loop 1A
Train 2 (P-66A)		
52-257	MO-3066	HPSI Trn 2 to Loop 1B
52-241	MO-3062	HPSI Trn 2 to Loop 2B

(Continue)

INSTRUCTIONS	CONTINGENCY ACTIONS
54. **(Continued)**	
c. **STOP** remaining operating Containment Spray Pumps as follows:	
1) IF containment pressure greater than 4 psig OR CHP NOT reset, THEN **CLOSE** one containment spray valve.	
a) **PLACE** one CHP Bypass Switch to BYPASS: • HS-3001C, CV-3001 (Key: 397) • HS-3002C, CV-3002 (Key : 396)	
b) **ENSURE CLOSED** associated Containment Spray Valve: • CV-3001 • CV-3002	
2) **STOP** all Containment Spray Pumps. • P-54A • P-54B • P-54C	

(Continue)

INSTRUCTIONS	CONTINGENCY ACTIONS
54. **(Continued)**	
3) **ENSURE** BOTH CHP Bypass Switches in BYPASS. • HS-3001C, CV-3001 (Key: 397) • HS-3002C, CV-3002 (Key : 396)	
4) **ENSURE CLOSED** BOTH Containment Spray Valves: • CV-3001 • CV-3002	
d. **MONITOR** HPSI pump for improved or stable performance.	d.1. IF HPSI pump performance does NOT improve, THEN **PERFORM** the following: 1) IF HPSI loop isolation valves are energized, THEN **THROTTLE** HPSI flow to 50 to 100 gpm on each operating train (low in the band preferred.) 2) IF HPSI pump performance is NOT improved, THEN **STOP** HPSI pump. 3) IF HPSI pump performance improves, THEN **RAISE** flow to a point where stable pump performance can be maintained.

(Continue)

INSTRUCTIONS

CONTINGENCY ACTIONS

54. **(Continued)**

e. **NOTIFY** TSC to begin monitoring for SAMG entry conditions.

f. **GO TO** EOP-9.0

55. **PLACE** the following ESS Room Sump Pump handswitches in OFF AND **CAUTION TAG** "Do Not Use - LOCA in Progress":

- East P-72A (42-165ASS)
- East P-72B (42-165BSS)
- West P-73A (42-155ASS)
- West P-73B (42-155BSS)

56. IF Charging Pump suction is aligned to the SIRWT AND RAS has initiated, THEN **PERFORM** ALL of the following:

a. **STOP** ALL Charging Pumps:

- P-55A
- P-55B
- P-55C

b. **RACK OUT** ALL Charging Pump breakers:

CHARGING PUMP	BREAKER
P-55A	52-1205
P-55B	52-1308 52-1206
P-55C	52-1105

(continue)

INSTRUCTIONS

CONTINGENCY ACTIONS

56. **(continued)**

c. **PLACE** a Caution Tag on their handswitches that reads "Do NOT Use - No suction source available"

- 52-1205CS
- 52-1206CS
- 52-1105CS

57. IF ALL operable Containment Area Radiation Monitors indicate less than 1×10^1 R/hr
AND Containment pressure is less than 3.0 psig,
THEN **RESET** CHR by pushing the following:

- The RESET pushbutton on each Containment Area Radiation Monitor.
- BOTH left and right HIGH RADIATION RESET pushbuttons on C-13.

INSTRUCTIONS

58. IF PZR pressure is between 350 psia and 300 psia as read on PI-0104 (NR) or PR-0125 and controlled
AND a controlled cooldown is in progress,
THEN **ISOLATE** SITs as follows:

a. **UNLOCK** AND **CLOSE** the following breakers:

BREAKER	OUTLET VALVE	SIT
52-2129	MO-3041	T-82A
52-2329	MO-3045	T-82B
52-2229	MO-3049	T-82C
52-2429	MO-3052	T-82D

KEY: 190

b. **CLOSE** the following SIT Outlet Valves:

BREAKER	OUTLET VALVE	KEY
52-2129	MO-3041	98
52-2329	MO-3045	99
52-2229	MO-3049	100
52-2429	MO-3052	101

(continue)

CONTINGENCY ACTIONS

NOTE: Failure of Instrument Air to containment will prevent venting the SITs.

58.1. IF ANY SIT could NOT be isolated, THEN **VENT** the unisolated SIT using ONE of the following:

a. **VENT** to containment as follows:

1) **ENSURE CLOSED** CWRT Vent Isolation Valves:

- CV-1064
- CV-1065

2) **VENT** each unisolated SIT one tank at a time by opening the Vent Valve and closing when tank is vented.

SIT	VENT VALVE
T-82A	CV-3067
T-82B	CV-3065
T-82C	CV-3063
T-82D	CV-3051

(continue)

INSTRUCTIONS	CONTINGENCY ACTIONS
58. **(continued)**	**(continued)**

3) WHEN ALL the following conditions are met:

- Unisolated SITs are vented and their associated vent valve closed
- Plant conditions allow venting containment

THEN **OPEN** CWRT Vent Isolation Valves:

- CV-1064
- CV-1065

b. **VENT** unisolated SITs via Clean Waste Receiver Tank Header per SOP-3, "Safety Injection and Shutdown Cooling System."

INSTRUCTIONS

59. IF the elapsed time from event initiation (EOP Entry) is 5.5 hours AND Shutdown Cooling will NOT be in service prior to 6.5 hours after event initiation (EOP Entry) AND ANY of the following conditions are satisfied:

- Based on the Average of Qualified CETs, PCS subcooling meets ONE of the following:
  - Less than 25°F subcooled for non-degraded Containment conditions
  - Less than the minimum subcooling curve on EOP Supplement 1 for degraded Containment conditions
- Corrected PZR level is less than 20% (40% for degraded Containment) (Refer to EOP Supplements 9 and 10)
- Operable RVLMS channels indicate less than 102 inches above the bottom of fuel alignment plate,

THEN **ESTABLISH** simultaneous hot and cold leg injection by performing ALL of the following in the order listed:

CONTINGENCY ACTIONS

59.1. IF hot leg injection can NOT be established via the normal path, THEN **INITIATE** hot leg injection via HPSI flow through the PZR. Refer to EOP Supplement 20.

(continue)

INSTRUCTIONS

CONTINGENCY ACTIONS

59. **(continued)**

a. **CLOSE** HPSI Train 2 to Cold Leg Valve, MO-3080. (KEY: 117)

b. **OPEN** HPSI Train 2 to Hot Leg Valve, MO-3082. (KEY: 118)

c. **CLOSE** HPSI Train 1 to Cold Leg Valve, MO-3081. (KEY:115)

d. **OPEN** HPSI Train 1 to Hot Leg Valve, MO-3083. (KEY: 116)

e. IF HPSI Train 2 is in operation, THEN **VERIFY** HPSI flow to Loop 1 hot leg on FI-0316A.

f. IF HPSI Train 1 is in operation, THEN **VERIFY** HPSI flow to Loop 1 hot leg on FI-0317A.

g. **OBSERVE** HPSI flow to PCS cold legs on the following indicators:

- FI-0308A
- FI-0310A
- FI-0312A
- FI-0313A

(continue)

INSTRUCTIONS	CONTINGENCY ACTIONS
59. **(continued)**	
h. **VERIFY** total HPSI flow to Loop 1 hot leg is approximately equal to total HPSI flow to cold legs. • FI-0316A • FI-0317A	
i. **VERIFY** the following: • Total HPSI flow is within acceptable limits. Refer to EOP Supplement 4. • Containment spray flow is within acceptable limits. Refer to SFSC, Table CA.	

INSTRUCTIONS

CONTINGENCY ACTIONS

60. IF measured Containment hydrogen concentration is between 1% and 3%,
THEN **PERFORM** ALL the following:

CAUTION

Each D/G is limited to a 2500 KW continuous load rating and a 2750 KW two-hour load rating. A hydrogen recombiner will draw a maximum of 75 KW.

a. **PLACE** at least one Hydrogen Recombiner in service. Refer to SOP-5, "Containment Air Cooling and Hydrogen Recombining System."

b. **OPEN** MCC 9 Feeder Breaker, 52-1304.

LOCATION: On Bus 13

61. IF SI Pump Throttling criteria are satisfied,
THEN **RESET** SIAS. Refer to SOP-3, "Safety Injection and Shutdown Cooling System," Attachment 4.

INSTRUCTIONS

CONTINGENCY ACTIONS

62. WHEN ALL of the following Shutdown Cooling System entry conditions are met:

- PCS parameters are acceptable for existing Containment conditions:

Parameter	Containment Less Than 175°F AND Less Than 3 psig at all times during the event	Containment Greater Than or Equal To 175°F OR Greater Than or Equal To 3 psig at any time during the event
PCS Pressure	Less Than 270 psia	REFER TO EOP Supplement 1
PZR Level	Greater than 36% and controlled	Greater than 40% and controlled
Avg of Qualified CETs Subcooling	Greater than 25°F	REFER TO EOP Supplement 1
Avg of Qualified CETs and Loop T_{HS} Temperature	Less than 300°F	REFER TO EOP Supplement 1

- TSC has determined that PCS activity is acceptable for circulation outside Containment.

- Containment Spray Pumps are NOT in use for Containment Atmosphere safety function.

- Shutdown Cooling System monitoring equipment power is available from Y01.

OR

(Continue)

INSTRUCTIONS	CONTINGENCY ACTIONS

62. **(Continued)**
 	
Alternate measures for loss of Y01 are established. **REFER TO** ONP-17, "Loss of Shutdown Cooling."
 	
• LTOP operable.
 	
• Power to the following Shutdown Cooling Return Valves is available:
 	
  ○ MO-3015 (MCC-1)
  ○ MO-3016 (MCC-2)
 	
  OR
 	
  Access to Containment is acceptable for manual valve operation.
 	
THEN **PERFORM** the following:	

(continue)

INSTRUCTIONS

CONTINGENCY ACTIONS

62. **(continued)**

a. IF hot leg injection is in use, THEN **SECURE** hot leg injection as follows:

1) **CLOSE** HPSI Train 2 to Hot Leg Valve, MO-3082. (KEY: 118)

2) **OPEN** HPSI Train 2 to Cold Leg Valve, MO-3080. (KEY: 117)

3) **CLOSE** HPSI Train 1 to Hot Leg Valve, MO-3083. (KEY: 116)

4) **OPEN** HPSI Train 1 to Cold Leg Valve, MO-3081. (KEY: 115)

b. **STOP** operating HPSI and LPSI Pumps.

c. **ENSURE** SIAS is reset. Refer to SOP-3, "Safety Injection and Shutdown Cooling System," Attachment 4.

d. **GO TO** GOP-9, "Mode 3 ≥ 525 °F to Mode 4 or Mode 5" or TSC/PRC approved procedure.

63. IF SDC entry conditions can NOT be established, THEN **MAINTAIN** long-term cooling.

INSTRUCTIONS

CONTINGENCY ACTIONS

64. IF the LOCA is isolated, THEN **PERFORM** Steps 65 through 96.

NOTE: Use ANY of the following to determine Average of Qualified CETs:

- PPC point "KCETA" (Average of Qualified CETs)
- PPC Incore Qualified CET Map (PPC page 313)
- Manual calculation. Refer to SOP-34, "Plant Process Computer (PPC) System."

© 65. **VERIFY** SI Pump throttling criteria are satisfied by ALL of the following:

a. Based on the Average of Qualified CETs, PCS subcooling meets ONE of the following:

- At least 25°F subcooled for non-degraded Containment conditions
- Greater than the minimum subcooling curve on EOP Supplement 1 for degraded Containment conditions

65.1. IF ANY of the SI Pump throttling criteria can NOT be maintained, THEN **RAISE** HPSI flow AND **START** HPSI Pumps as necessary.

PUMP	VALVE	
	NUMBER	DESCRIPTION
Train 1		
P-66B	MO-3009	HPSI Train 1 to Loop 1B
	MO-3011	HPSI Train 1 to Loop 2A
	MO-3007	HPSI Train 1 to Loop 1A
	MO-3013	HPSI Train 1 to Loop 2B
Train 2		
P-66A	MO-3066	HPSI Train 2 to Loop 1B
	MO-3064	HPSI Train 2 to Loop 2A
	MO-3068	HPSI Train 2 to Loop 1A
	MO-3062	HPSI Train 2 to Loop 2B

(continue)

INSTRUCTIONS

CONTINGENCY ACTIONS

65. **(continued)**

b. Corrected PZR level is greater than 20% (40% for degraded Containment) and controlled. **REFER TO** EOP Supplements 9 and 10.

c. At least one S/G is available for PCS heat removal with corrected level being maintained or being restored to between 60% and 70%. **REFER TO** EOP Supplement 11.

d. Operable RVLMS channels indicate greater than 102 inches above the bottom of fuel alignment plate (621' 8").

INSTRUCTIONS

CONTINGENCY ACTIONS

66. IF HPSI Pumps are operating AND SI Pump throttling criteria are satisfied,
THEN **THROTTLE** HPSI flow
OR **STOP** one HPSI Pump at a time.

PUMP	VALVE	
	NUMBER	DESCRIPTION
Train 1		
P-66B	MO-3009	HPSI Train 1 to Loop 1B
	MO-3011	HPSI Train 1 to Loop 2A
	MO-3007	HPSI Train 1 to Loop 1A
	MO-3013	HPSI Train 1 to Loop 2B
Train 2		
P-66A	MO-3066	HPSI Train 2 to Loop 1B
	MO-3064	HPSI Train 2 to Loop 2A
	MO-3068	HPSI Train 2 to Loop 1A
	MO-3062	HPSI Train 2 to Loop 2B

INSTRUCTIONS	CONTINGENCY ACTIONS
67. IF LPSI Pumps are operating AND PZR pressure is being controlled greater than 200 psia, THEN **PERFORM** BOTH of the following: a. **STOP** the operating LPSI Pumps: • P-67A • P-67B b. **CLOSE** the LPSI injection valves: • MO-3008 LPSI Loop 1A • MO-3010 LPSI Loop 1B • MO-3012 LPSI Loop 2A • MO-3014 LPSI Loop 2B	
68. IF PZR pressure lowers to less than 200 psia AND LPSI pumps have been stopped, THEN **PERFORM** BOTH of the following: a. **ENSURE OPERATING** ALL available LPSI pumps: • P-67A • P-67B b. **ENSURE OPEN** LPSI injection valves: • MO-3008 LPSI Loop 1A • MO-3010 LPSI Loop 1B • MO-3012 LPSI Loop 2A • MO-3014 LPSI Loop 2B	

INSTRUCTIONS	CONTINGENCY ACTIONS
69. IF Letdown is isolated AND BOTH of the following conditions exist: • SI Pump throttling criteria are met • Letdown is needed or desired, THEN **RESTORE** Letdown. Refer to EOP Supplement 27.	
© 70. **VERIFY** the PCS is NOT in a water solid condition as indicated by BOTH of the following: a. No exaggerated or severe pressure response to PCS inventory or temperature changes. b. ANY of the following: • Corrected PZR level is less than 100%. **REFER TO** EOP Supplements 9 and 10 • RVLMS indicates voiding	70.1. IF water solid PCS condition is indicated, THEN **MAINTAIN** the PCS within the limits of EOP Supplement 1 by ANY of the following: a. **OPERATE** available S/G(s) to control the cooldown AND **STABILIZE** Qualified CET temperatures and Loop T_cs. b. IF SI Pump throttling criteria are met, THEN **CONTROL** HPSI, Charging, and Letdown flows.

INSTRUCTIONS	CONTINGENCY ACTIONS

71. IF it is desired to draw a bubble in the PZR,
THEN **PERFORM** ALL of the following:

a. **ENSURE ENERGIZED** ALL available PZR heaters.

b. IF ANY of the following conditions exist:

- Both S/G pressures can be maintained below the existing PCS pressure
- At least one PCP is operating

THEN **PERFORM** ALL of the following to reduce PCS pressure:

1) IF SI Pump throttling criteria are met,
THEN **CONTROL** Charging, Letdown, and HPSI flow.

2) **INITIATE** PCS cooldown within Technical Specification limits.

3) **MONITOR** the PCS cooldown rate using PPC. Refer to EOP Supplement 33.

(continue)

INSTRUCTIONS

CONTINGENCY ACTIONS

71. **(continued)**

4) **MAINTAIN** PCS temperature and pressure within the limits of EOP Supplement 1.

5) **MAINTAIN** 25°F subcooling.

c. IF a bubble forms in the Reactor Vessel Upper Head region, THEN **PERFORM** BOTH of the following:

1) **CONTROL** Charging, Letdown, and HPSI flow to maintain PCS level greater than the 102 inches above the bottom of fuel alignment plate (621' 8").

2) **CONTINUE** efforts to draw a bubble in the PZR.

72. IF SI Pump throttling criteria are met,
THEN **MAINTAIN** corrected PZR level between 20% and 85% (42% to 57% preferred) by performing ANY of the following (Refer to EOP Supplements 9 and 10):

a. **CONTROL** Charging and Letdown.

b. **THROTTLE** HPSI flow.

INSTRUCTIONS

© 73. **MAINTAIN** PCS pressure within the limits of EOP Supplement 1 by performing ANY of the following:

a. **CONTROL** the following:

- PZR heaters
- Main Spray
- Auxiliary Spray (Supplement 37)

b. IF SI Pump throttling criteria are met,
THEN **CONTROL** HPSI, Charging, and Letdown flows.

(continue)

CONTINGENCY ACTIONS

73.1. IF the PCS is oversubcooled OR PZR pressure is greater than the maximum limits of EOP Supplement 1,
THEN **PERFORM** ANY of the following to restore subcooling or PCS pressure to within the appropriate limit:

a. **OPERATE** available S/G(s) to stop the cooldown
AND **STABILIZE** Qualified CET temperatures and Loop T_cs.

b. **OPERATE** the following to lower PZR pressure within allowable limits:

- Main Spray
- Auxiliary Spray (Supplement 37)

c. IF SI Pump throttling criteria are met,
THEN **CONTROL** HPSI, Charging, and Letdown flows.

73.2. IF PCS cooldown rate exceeds Technical Specification limits,
THEN **PERFORM** ANY of the following to restore the cooldown rate to within Technical Specification limits:

a. **OPERATE** available S/G(s) to stop the cooldown
AND **STABILIZE** Qualified CET temperatures and Loop T_cs.

(continue)

INSTRUCTIONS	CONTINGENCY ACTIONS
73. **(continued)**	**(continued)**
	b. **OPERATE** the following to maintain PZR pressure within limits of EOP Supplement 1: • PZR heaters • Main Spray • Auxiliary Spray (Supplement 37) • Letdown
	c. As directed by the Shift Supervisor, **CONTINUE** the PCS cooldown at less than or equal to Technical Specification limits. Refer to EOP Supplement 33.
© 74. **ENSURE** at least one S/G has corrected level being maintained or being restored to between 60% and 70%. Refer to EOP Supplement 11.	

INSTRUCTIONS	CONTINGENCY ACTIONS
© 75. **PERFORM** ALL of the following:	
a. **CALCULATE** minimum PCS cooldown rate. Refer to EOP Supplement 2.	
b. Verify BOTH of the following: • The calculated cooldown rate does NOT exceed Technical Specification limits. • The calculated cooldown rate is achievable with the existing PCS heat removal path.	b.1. IF additional sources of inventory which allow the requirements to be met are NOT available, THEN **GO TO** EOP-9.0, "Functional Recovery Procedure."
76. **EVALUATE** the need for a plant cooldown based on ALL of the following: • Technical Specifications require plant cooldown • Plant equipment repair requires plant cooldown • Availability of Auxiliary systems • Available Feedwater reserve inventory • The Shift Supervisor deems plant cooldown is necessary	
77. IF a plant cooldown is NOT required, THEN **GO TO** Step 87 .	

INSTRUCTIONS	CONTINGENCY ACTIONS
NOTE: IF emergency boration is in progress, THEN cooldown may commence/continue while the required shutdown margin value is calculated.	
© 78. **VERIFY** PCS boron concentration greater than or equal to required boron concentration as verified by sample or hand calculation. Refer to EOP Supplement 35.	78.1. IF PCS boron concentration is less than required boron concentration, THEN **PERFORM** BOTH of the following: a. **ENSURE** emergency boration is in progress. b. WHEN required boron concentration is reached, THEN **SECURE** emergency boration. Refer to EOP Supplement 40.
a. IF Emergency boration is in progress AND PCS boron concentration is greater than or equal to required boron concentration, THEN **SECURE** emergency boration. Refer to EOP Supplement 40.	

INSTRUCTIONS

CONTINGENCY ACTIONS

CAUTION

A maximum PZR cooldown rate of 200°F/Hr and a maximum PZR Spray ΔT (PZR vapor temp - spray temp) of 350°F should be observed to prevent damage to the PZR or Spray Nozzle.

NOTE: PZR level indication decalibration will occur during cooldown. Correction curves in EOP Supplement 9, "Pressurizer Level Corrections Hot Calibrated" or EOP Supplement 10, "Pressurizer Level Corrections Cold Calibrated" should be used.

NOTE: S/G level indication decalibration will occur during cooldown. Correction curves in EOP Supplement 11, "S/G Level Correction" should be used.

NOTE: Steam flow through two of the four Atmospheric Steam Dump Valves should be adequate to establish an initial cooldown rate of 75°F/hr.

(continue)

INSTRUCTIONS	CONTINGENCY ACTIONS
79. **(continued)**	
© 79. **COMMENCE** steaming S/Gs as follows:	
a. **REFER TO** the following: • EOP Supplement 1, Pressure and Temperature Limit Curves • EOP Supplement 33, PCS Heatup/Cooldown Rate Data	
b. IF safety injection flow is causing a cooldown in excess of required limits, THEN **OPERATE** the Turbine Bypass Valve to maintain all of the following as applicable: • S/Gs within 50 psi of Psat for Average of Qualified CETs • As required to establish or support natural circulation • As required to establish or support two phase natural circulation	b.1. **OPERATE** Atmospheric Steam Dump Valves. 1) IF desired to enhance temperature control, THEN **ISOLATE** two Atmospheric Steam Dump Valves. Refer to Table 79-1.

(Continue)

INSTRUCTIONS

CONTINGENCY ACTIONS

79. **(Continued)**

c. WHEN PCS cooldown rate can be controlled within required limits, THEN **OPERATE** the Turbine Bypass Valve to cooldown at the maximum allowed rate.

c.1. **OPERATE** Atmospheric Steam Dump Valves.

1) IF desired to enhance temperature control, THEN **ISOLATE** two Atmospheric Steam Dump Valves. Refer to Table 79-1.

Table 79-1

'A' S/G	MV-MS101, ASDV CV-0782 Inlet OR MV-CA782, A/S to CV-0782
	MV-MS103, ASDV CV-0781 Inlet OR MV-CA781, A/S to CV-0781
'B' S/G	MV-MS102, ASDV CV-0779 Inlet OR MV-CA779, A/S to CV-0779
	MV-MS104, ASDV CV-0780 Inlet OR MV-CA780, A/S to CV-0780

CAUTION

Operating P-50A and P-50B simultaneously when T_c is less than 300°F is prohibited by Techncial Specifications.

d. **ENSURE** not more than two PCPs operating (preferably one in each loop.)

INSTRUCTIONS

CONTINGENCY ACTIONS

80. WHEN BOTH of the following conditions exist:

- PZR Pressure within limits of EOP Supplement 1
- PCS Cooldown rate is within required limits

THEN **PLACE** LTOP in service as follows:

a. **ENSURE OPEN** PORV Isolation Valves. Refer to SOP-1B, "Primary Coolant System - Cooldown," Attachment 6.

b. **PLACE** BOTH of the following PORV LTOP enable keyswitches to ENABLE:

- HS-0105A (Key: 1)
- HS-0105B (Key: 4)

c. **PLACE** BOTH of the following PORV Handswitches to AUTO:

- HS-1042B
- HS-1043B

d. **MAINTAIN** PZR pressure within limits of EOP Supplement 1.

INSTRUCTIONS	CONTINGENCY ACTIONS
NOTE: Use the following instruments to determine spray nozzle ΔT: • PZR Vapor Phase Temperature, TI-0101 • Spray line temperature, TIA-0103 or TIA-0104 (use the lowest temperature if using main sprays) • Charging line temperature, TI-0212 (if using Auxiliary Spray)	
© 81. **RECORD** each occurrence of PZR Spray operation with a ΔT (PZR vapor phase temp minus spray temp) greater than 200°F in the Narrative Log.	

INSTRUCTIONS	CONTINGENCY ACTIONS
NOTE: Reactor Vessel Upper Head voiding resulting from controlled PCS pressure reductions is not expected to result in safety functions being jeopardized.	
© 82. **COMMENCE** depressurization of the PCS to 270 psia by performing ANY of the following:	
a. **OPERATE** PZR heaters and Main or Auxiliary PZR sprays.	
b. IF SI Pump throttling criteria are met, THEN **PERFORM** ANY of the following:	
1) **CONTROL** Charging and Letdown.	
2) **THROTTLE** HPSI flow.	

INSTRUCTIONS

CONTINGENCY ACTIONS

83. IF BOTH of the following conditions exist for each S/G:

- At least three of four S/G pressure sigmas indicate between 510 and 550 psia (indicators between alarm flags)
- A controlled cooldown is in progress

THEN **BLOCK** MSIS for the S/G meeting the above conditions by performing ALL the following:

a. **BLOCK** MSIV closure signal for the applicable S/G by pushing the appropriate pushbutton on Control Panel C-01:

- HS/LPE-50A ('A' S/G)
- HS/LPE-50B ('B' S/G)

b. **VERIFY** "STEAM GEN VALVES ISOLATION LOCKOUT" (EK-0970) is alarmed.

c. **ENSURE CLOSED** BOTH Main Feed Reg Valves:

- CV-0701 ('A' S/G)
- CV-0703 ('B' S/G)

d. **ENSURE CLOSED** BOTH Bypass Feed Reg Valves:

- CV-0735 ('A' S/G)
- CV-0734 ('B' S/G)

INSTRUCTIONS	CONTINGENCY ACTIONS

84. IF ALL of the following conditions exist:

- PZR pressure is less than 1687 psia
- SIAS is NOT actuated or blocked
- "Safety Injection Signal Block Permit" (EK-1369) is alarmed
- A controlled cooldown and/or controlled depressurization is in progress,

THEN **BLOCK** SIAS by performing ALL of the following:

a. **PLACE** AND **HOLD** SIAS block handswitch PB3-1 to BLOCK.

1) **VERIFY** the following annunciator in alarm:

- "SAFETY INJ BLOCK RELAY SI-1" (EK-1337)

2) **RELEASE** SIAS block handswitch PB3-1.

(continue)

INSTRUCTIONS	CONTINGENCY ACTIONS
84. **(continued)**	
b. **PLACE** AND **HOLD** SIAS block handswitch PB3-2 to BLOCK.	
1) **VERIFY** the following annunciators in alarm:	
• "SAFETY INJ BLOCK RELAY SI-2" (EK-1338)	
• "SAFETY INJ BLOCKED" (EK-1339)	
2) **RELEASE** SIAS block handswitch PB3-2.	

INSTRUCTIONS	CONTINGENCY ACTIONS
© 85. **MONITOR** for formation of PCS voiding as indicated by ANY of the following: • Indicated Charging and Letdown flows do NOT correspond to PZR level trend. • PZR level rising significantly faster than trend expected from Auxiliary Spray flow. • Core ΔT (Average of Qualified CETs - T_C) or Loop ΔT (T_H - T_C) rising for same secondary steaming and Auxiliary Feed rates. • Any operable PCS temperature indication is less than 25°F subcooled. • Operable RVLMS indicates voiding in the Reactor Vessel.	
86. IF PCS voiding is indicated AND ANY of the following exist: • PCS pressure reduction is inhibited • PCS heat removal is inhibited • The Shift Supervisor directs void elimination, THEN **PERFORM** void elimination actions. Refer to EOP Supplement 26.	

INSTRUCTIONS

87. IF ANY of the following AC or DC buses are NOT energized, THEN **RESTORE** power to the affected buses. Refer to the following applicable procedure:

BUS	PROCEDURE
1C or 1D	EOP Supplement 29
1E with No SIAS	EOP Supplement 29
1E with SIAS	SOP-30
Y10	ONP-24.1, "Loss of Preferred AC Bus Y10"
Y20	ONP-24.2, "Loss of Preferred AC Bus Y20"
Y30	ONP-24.3, "Loss of Preferred AC Bus Y30"
Y40	ONP-24.4, "Loss of Preferred AC Bus Y40"
Y01	ONP-24.5, "Loss of Instrument AC Bus Y01"
Any DC Bus	ONP-2.3, "Loss of DC Power"

CONTINGENCY ACTIONS

87.1. IF Bus 1D and Bus 1E are NOT energized, THEN as resources permit, **PROVIDE** power to PZR Heaters from Bus 1C. Refer to ONP-2.1, "Loss of AC Power," Attachment 1.

INSTRUCTIONS	CONTINGENCY ACTIONS
88. IF offsite power was lost AND offsite power is available, THEN **RESTORE** power to plant equipment by performing ALL of the following: a. IF NONE of the following are energized: • 'R' Bus • 'F' Bus • Cook 1 Line, THEN **INITIATE** actions to restore power to 'F' or 'R' Bus, as available. Refer to EOP Supplement 21. b. WHEN ANY of the following are energized: • 'R' Bus • 'F' Bus • Cook 1 Line, THEN **INITIATE** actions to restore Plant power. Refer to EOP Supplement 29.	

(continue)

INSTRUCTIONS

CONTINGENCY ACTIONS

88. **(continued)**

c. **RESTORE** power to the affected bus(es). Refer to the following applicable procedure:

BUS	PROCEDURE
1E (without SIS)	EOP Supplement 29
1E (with SIS)	SOP-30
1A or 1B	ONP-2.1, "Loss of AC Power"

d. **RESTART** plant equipment as desired.

INSTRUCTIONS

CONTINGENCY ACTIONS

CAUTION

Each D/G is limited to the following load rating:

- 2500 KW continuous
- 2750 KW two hours per 24 hour period

89. WHEN 2400V Bus 1C or Bus 1D is energized,
THEN as resources permit,
ENERGIZE Plant buses by performing ALL of the following:

89.1. IF equipment needed to maintain Safety Functions is available from a de-energized 2400V Vital Bus
AND a power supply is available,
THEN **ENERGIZE** the bus
AND **RESTORE** the needed equipment.

a. IF Bus 1C is energized,
THEN **PERFORM** ALL of the following:

1) **ENSURE CLOSED** the following breakers:

- 152-115 (Bus 1C to Transformers 11 and 19)
- 152-108 (Bus 1C to Transformer 13)

(continue)

INSTRUCTIONS | CONTINGENCY ACTIONS

89. **(continued)**

2) **ENSURE** 480V MCCs are energized as appropriate:

- MCC 1: 52-1906 (Bus 19)
- MCC 3: 52-1301 (Bus 13)
- MCC 7: 52-1103 (Bus 11)

b. IF Bus 1D is energized, THEN **PERFORM** the following:

1) **ENSURE CLOSED** 152-201 (Bus 1D to Transformers 12 and 20)

2) **ENSURE** 480V MCCs energized as appropriate:

- MCC 2: 52-2006 (Bus 20)
- MCC 8: 52-1201 (Bus 12)

(continue)

INSTRUCTIONS	CONTINGENCY ACTIONS
89. **(continued)**	
NOTE: IF only one MCC is available (MCC 1 or MCC 2), THEN BOTH vital DC Buses should be powered from the two Battery Chargers supplied by the same energized MCC.	
c. **ENSURE CLOSED** Battery Charger Feeder Breakers from available MCCs: 1) MCC 1 • Charger No 1 Feeder 52-146 • Charger No 4 Feeder 52-186 2) MCC 2 • Charger No 2 Feeder 52-225 • Charger No 3 Feeder 52-285	
d. **VERIFY** 125V DC Buses D10 and D20 are powered by a Battery Charger.	d.1. **PLACE** Battery Chargers in operation. Refer to SOP-30, "Station Power."

INSTRUCTIONS

90. IF ALL PCPs are stopped, THEN **VERIFY** natural circulation flow in at least one PCS loop by ALL of the following:

- Core ΔT less than 50°F (Average of Qualified CETs minus T_C)
- Loop T_Hs and Loop T_Cs constant or lowering
- Average of Qualified CETs at least 25°F subcooled
- Difference between Loop T_H and Average of Qualified CETs is less than or equal to 15°F

91. WHEN PCP restart is desired, THEN **RESTART** desired PCPs. Refer to EOP Supplement 3.

92. IF a plant cooldown is NOT in progress, THEN **GO TO** a TSC approved procedure.

CONTINGENCY ACTIONS

90.1. **ENSURE** proper control of S/G feeding and steaming rates.

INSTRUCTIONS

93. IF PZR pressure is between 350 psia and 300 psia as read on PI-0104 (NR) or PR-0125 and controlled
AND a controlled cooldown is in progress,
THEN **ISOLATE** SITs as follows:

a. **UNLOCK** AND **CLOSE** the following breakers:

BREAKER	OUTLET VALVE	SIT
52-2129	MO-3041	T-82A
52-2329	MO-3045	T-82B
52-2229	MO-3049	T-82C
52-2429	MO-3052	T-82D

KEY: 190

b. **CLOSE** the following SIT Outlet Valves:

BREAKER	OUTLET VALVE	KEY
52-2129	MO-3041	98
52-2329	MO-3045	99
52-2229	MO-3049	100
52-2429	MO-3052	101

(continue)

CONTINGENCY ACTIONS

NOTE: Failure of Instrument Air to containment will prevent venting the SITs.

93.1. IF ANY SIT could NOT be isolated, THEN **VENT** the unisolated SIT using ONE of the following:

a. **VENT** to containment as follows:

1) **ENSURE CLOSED** CWRT Vent Isolation Valves:

- CV-1064
- CV-1065

2) **VENT** each unisolated SIT one tank at a time by opening the Vent Valve and closing when tank is vented.

SIT	VENT VALVE
T-82A	CV-3067
T-82B	CV-3065
T-82C	CV-3063
T-82D	CV-3051

(continue)

INSTRUCTIONS	CONTINGENCY ACTIONS
93. **(continued)**	**(continued)**

3) WHEN ALL the following conditions are met:

- Unisolated SITs are vented and their associated vent valve closed
- Plant conditions allow venting containment

THEN **OPEN** CWRT Vent Isolation Valves:

- CV-1064
- CV-1065

b. **VENT** unisolated SITs Via Clean Waste Receiver Tank Header per SOP-3, "Safety Injection and Shutdown Cooling System."

INSTRUCTIONS	CONTINGENCY ACTIONS
94. IF a SIAS or CHR signal is actuated AND is no longer needed, THEN **RESET** the signal as follows:	
a. IF SI Pump throttling criteria are satisfied AND Containment pressure is less than 3.0 psig, THEN **RESET** SIAS. Refer to SOP-3, "Safety Injection and Shutdown Cooling System," Attachment 4.	
b. IF ALL operable Containment Area Radiation Monitors indicate less than 1×10^{1} R/hr THEN **RESET** CHR by pushing BOTH left and right HIGH RADIATION RESET pushbuttons on C-13.	

INSTRUCTIONS

CONTINGENCY ACTIONS

95. IF ALL of the following conditions are met:

- T_c is below 325°F AND prior to T_cs less than 300°F
- SI Pump throttling criteria are met
- HPSI pumps are NOT required for inventory control
- A cooldown is in progress,

THEN **DISABLE** BOTH HPSI pumps by removing Control Power fuses and fuse holders from the following breakers:

- 152-207, HP Safety Injection Pump P-66A

  LOCATION: 'D' Bus

- 152-113, HP Safety Injection Pump P-66B

  LOCATION: 'C' Bus

INSTRUCTIONS

CONTINGENCY ACTIONS

96. WHEN ALL of the following Shutdown Cooling System entry conditions are met:

- PCS parameters are acceptable for existing Containment conditions:

Parameter	Containment Less Than 175°F AND Less Than 3 psig at all times during the event	Containment Greater Than or Equal To 175°F OR Greater Than or Equal To 3 psig at any time during the event
PCS Pressure	Less Than 270 psia	REFER TO EOP Supplement 1
PZR Level (corrected)	Greater Than 36% and controlled	Greater than 40% and controlled
Avg of Qualified CETs Subcooling	Greater Than 25°F	REFER TO EOP Supplement 1
Avg of Qualified CETs and Loop T_Hs Temperature	Less Than 300°F	REFER TO EOP Supplement 1

- TSC has determined that PCS activity is acceptable for circulation outside Containment.

- Containment Spray Pumps are not in use for Containment Atmosphere safety function.

(continue)

INSTRUCTIONS	CONTINGENCY ACTIONS
96. **(continued)** • Shutdown Cooling System monitoring equipment power is available from Y01 OR Alternate measures for loss of Y01 are established per ONP-17, "Loss of Shutdown Cooling." • LTOP is operable. • Power to the following Shutdown Cooling Return Valves is available: o MO-3015 (MCC-1) o MO-3016 (MCC-2) OR Access to Containment is acceptable for manual valve operation, THEN **GO TO** GOP-9, "Mode 3≥ 525°F To Mode 4 or Mode 5" or TSC/PRC approved procedure.	

End Of Section 4.0

5.0 **PLACEKEEPER**

EOP ENTRY TIME: _____ **TIME OF SIAS:** _____

STEP	INSTRUCTIONS	PAGE	START	DONE
4.	Verify SIAS initiated	5	_____	_____
5.	Ensure adequate SI flow and safeguards equipment status	6	_____	_____
6.	If PZR pressure lowers to less than 1300 psia then establish one PCP per loop or if PCS subcooling is less than 25°F subcooled, then trip all PCPs	7	_____	_____
7.	Ensure proper PCP configuration as PCS temperature lowers	7	_____	_____
8.	Verify operating limits for any running PCP	7	_____	_____
9.	If open, then close CWRTs vent valves.	8	_____	_____
10.	Isolate the LOCA	8	_____	_____
11.	If the LOCA is outside of Containment, isolate the leak and initiate CIS	10	_____	_____
12.	Place Hydrogen Monitor in service	12	_____	_____
13.	If the Containment has pressure greater than or equal to 4.0 psig or has high radiation, ensure Containment Isolation signal initiated	12	_____	_____
14.	If the Containment pressure is greater than or equal to 4.0 psig, verify available Containment Spray Pumps running	13	_____	_____
15.	If PCP seal cooling is lost, isolate seal leakoff and restore PCP seal cooling	14	_____	_____
16.	Secure Containment Spray	15	_____	©
17.	Reset CHP	18	_____	_____

5.0 **PLACEKEEPER**

STEP	INSTRUCTIONS	PAGE	START	DONE
18.	Verify condenser cooling or isolate steam to condenser	20	_____	_____
19.	If the LOCA is isolated, go to Step 64	20	_____	_____
20.	Ensure at least one train of CR HVAC in Emergency Mode.	21	_____	_____
21.	Verify PCS boron concentration greater than or equal to required boron concentration.	21	_____	©
22.	Commence steaming S/G(s)	23	_____	_____
23.	When Main Steam pressure is between 510 and 550 psia, block MSIS	25	_____	_____
24.	Record each occurrence of PZR spray with ΔT greater than 200°F	26	_____	©
25.	Verify SI Pump throttling criteria are satisfied	27	_____	©
26.	Commence depressurizing the PCS to 270 psia	28	_____	©
27.	When PZR pressure is less than 1687 psia and SIAS is not actuated, BLOCK SIAS	29	_____	_____
28.	If HPSI Pumps are operating and SI Pump throttling criteria are satisfied, throttle HPSI flow or stop pumps	30	_____	_____
29.	If LPSI Pumps are operating and PZR pressure is being controlled greater than 200 psia, stop pumps and close valves	31	_____	_____
30.	If PZR pressure lowers uncontrollably to less than 200 psia and LPSI Pumps have been stopped, restart LPSI pumps and open valves	31	_____	_____
31.	As resources permit, prepare post-RAS injection sources.	32	_____	©

5.0 **PLACEKEEPER**

STEP	INSTRUCTIONS	PAGE	START	DONE
32.	If Letdown is isolated and conditions allow, restore Letdown	32	_____	_____
33.	If SI Pump throttling criteria are met, then maintain PZR level between 20% and 85% (42% to 57% preferred)	33	_____	_____
34.	Maintain PCS pressure within the limits of EOP Supplement 1	36	_____	©
35.	Ensure at least one S/G has corrected level being maintained or restored to between 60% and 70%	37	_____	©
36.	Verify calculated cooldown rate does not exceed Technical Specification limits and the cooldown is achievable with the existing PCS heat removal path	38	_____	©
37.	Monitor PCS for void formation	39	_____	©
38.	If PCS voiding is indicated, perform void elimination	39	_____	_____
39.	If any vital AC or DC buses are not energized, restore power to affected buses	40	_____	_____
40.	If offsite power was lost and is available, restore power to plant equipment	41	_____	_____
41.	When 2400V Bus 1C or 1D is energized, then energize Plant buses	43	_____	_____
42.	Verify natural circulation flow in at least one loop	46	_____	_____
43.	Verify two phase natural circulation	46	_____	_____
44.	Place LTOP in service	47	_____	_____

5.0 **PLACEKEEPER**

STEP	INSTRUCTIONS	PAGE	START	DONE
45.	If desired, restart PCPs	47	_____	_____
46.	When cold shutdown boron concentration is established, swap Charging pump suction from the BASTs to the SIRWT	48	_____	_____
47.	Verify Containment Sump level rises as the SIRWT level drops	48	_____	©
48.	When SIRWT level less than or equal to 25%, then prior to RAS, perform Pre-RAS Actions.	49	_____	_____
49.	If VC-10 or VC-11 trip on high temperature due to low SW flow, reset and start VC-10 or VC-11	49	_____	_____
50.	When Containment water level approaches SI valve elevations, open and disable SI valves	50	_____	_____
	▸▸▸▸▸▸▸▸▸▸▸▸▸▸▸ **RAS STEPS 51 to 56** ◂◂◂◂◂◂◂◂◂◂◂◂◂◂◂			
51.	When SIRWT level lowers to below 2% and LOCA is inside Containment, then perform Post-RAS Actions.	51	_____	_____
52.	If Containment water level is less than 594' 1" following a RAS, consult with the TSC for additional guidance	51	_____	_____
53.	If RAS is initiated, ensure adequate HPSI pump flow	52	_____	_____
54.	Actions for when sump screen clogging is indicated.	53	_____	©
55.	Place ESS Room Sump Pumps in OFF and add caution tag	57	_____	_____
56.	If Charging Pump suction is aligned to the SIRWT and RAS has initiated then, disable the Charging Pumps and add caution tag	57	_____	_____

5.0 **PLACEKEEPER**

STEP	INSTRUCTIONS	PAGE	START	DONE
57.	If Containment Area Radiation Monitors indicate less than 1 x 10^1 R/hr and Containment pressure is less than 3.0 psig, reset CHR	58	_____	_____
58.	If PZR pressure is between 350 psia and 300 psia and a cooldown is in progress, isolate SITs	59	_____	_____
59.	If the elapsed time from the start of the LOCA is 5.5 hours and SDC will not be inservice prior to 6.5 hours after the LOCA and any HPSI throttle criteria are not met, initiate hot leg injection	61	_____	_____
60.	If Containment hydrogen concentration is between 1% and 3%, place at least one Hydrogen Recombiner in service	64	_____	_____
61.	Reset SIAS	64	_____	_____
62.	If SDC entry conditions are met, go to GOP-9	65	_____	_____
63.	If SDC entry conditions can not be established, maintain long-term cooling	67	_____	_____
	▸▸▸▸▸▸▸▸▸▸▸▸▸ **Isolated LOCA steps 64 to 96** ◂◂◂◂◂◂◂◂◂◂◂◂◂			
64.	If the LOCA is isolated, perform Steps 65 through 96	68	_____	_____
65.	Verify SI Pump throttling criteria are satisfied	68	_____	©
66.	If HPSI Pumps are operating and SI Pump throttling criteria are satisfied, throttle HPSI flow or stop pumps	70	_____	_____
67.	If LPSI Pumps are operating and PZR pressure is being controlled greater than 200 psia, stop pumps and close valves	71	_____	_____

5.0 **PLACEKEEPER**

STEP	INSTRUCTIONS	PAGE	START	DONE
68.	If PZR pressure lowers uncontrollably to less than 200 psia and LPSI Pumps have been stopped, restart LPSI pumps and open valves	71	_____	_____
69.	If Letdown is isolated and conditions allow, restore Letdown	72	_____	_____
70.	Verify the PCS is not in a water solid condition	72	_____	©
71.	If it is desired to draw a bubble in the PZR, perform the actions to draw a bubble in the PZR	73	_____	_____
72.	If SI Pump throttling criteria are met, maintain corrected PZR level between 20% and 85% using Charging, Letdown and HPSI	74	_____	_____
73.	Maintain PCS pressure within the limits of EOP Supplement 1	75	_____	©
74.	Ensure at least one S/G has corrected level being maintained or restored to between 60% and 70%	76	_____	©
75.	Verify calculated cooldown rate does not exceed Technical Specification limits and the cooldown is achievable with the existing PCS heat removal path	77	_____	©
76.	Evaluate the need for a plant cooldown	77	_____	✋
77.	Routing step if plant cooldown not required	77	_____	_____
78.	Verify PCS boron concentration greater than or equal to cold shutdown boron concentration	78	_____	©
79.	Commence steaming S/G(s)	79	_____	©
80.	When PZR Pressure and PCS cooldown within limits, then place LTOP in service.	82	_____	_____

5.0 **PLACEKEEPER**

STEP	INSTRUCTIONS	PAGE	START	DONE
81.	Record each occurrence of PZR spray with ΔT greater than 200°F	83	_____	©
82.	Commence depressurizing the PCS to 270 psia	84	_____	©
83.	When Main Steam pressure is between 510 and 550 psia, block MSIS	85	_____	_____
84.	When PZR pressure is less than 1687 psia and SIAS is not actuated, BLOCK SIAS	86	_____	_____
85.	Monitor PCS for void formation	88	_____	©
86.	If PCS voiding is indicated, perform void elimination	88	_____	_____
87.	If any vital AC or DC buses are not energized, restore power to affected buses	89	_____	_____
88.	If offsite power was lost and is available, restore power to plant equipment	90	_____	_____
89.	When 2400V Bus 1C or 1D is energized, then energize Plant buses	92	_____	_____
90.	Verify natural circulation flow in at least one loop	95	_____	_____
91.	If desired, restart PCPs	95	_____	_____
92.	Seek TSC guidance if plant cooldown not in progress	95	_____	_____
93.	If PZR pressure is between 350 psia and 300 psia and a cooldown is in progress, isolate SITs	96	_____	_____
94.	Reset unnecessary safety actuation signals	98	_____	_____

5.0 **PLACEKEEPER**

STEP	INSTRUCTIONS	PAGE	START	DONE
95.	Disable both HPSI pumps when listed conditions are met	99	_____	_____
96.	When all shutdown cooling system entry conditions are met, exit this procedure	100	_____	_____

END OF SECTION 5.0

ATTACHMENT 3

EOP-6, "EXCESS STEAM DEMAND EVENT"

70 Pages Follow (Procedure Attachments not included)

PALISADES NUCLEAR PLANT EMERGENCY OPERATING PROCEDURE	Proc No	EOP-6.0
	Revision	14
	Issued Date	8/19/04

EXCESS STEAM DEMAND EVENT

RLTucker	8/19/04
Procedure Sponsor	Date
GGPalmisano	10/9/03
Technical Reviewer	Date
DCampbell	10/9/03
User Reviewer	Date

TITLE: EXCESS STEAM DEMAND EVENT

USER ALERT
CONTINUOUS USE PROCEDURE

Read each step of the procedure prior to performing that step. When sign-offs are required, sign off each step as complete before proceeding to the next step.

1.0 PURPOSE

This procedure provides operator actions which must be accomplished in the event of an Excess Steam Demand Event (ESDE). These actions are necessary to ensure that the Plant is placed in a safe, stable condition.

The goal of this procedure is to safely establish a plant condition that will allow the implementation of an appropriate existing procedure or a procedure provided by the Plant Technical Support Center for operation of the plant in hot shutdown or below.

End of Section 1.0

2.0 ENTRY CONDITIONS

1. EOP 1.0, "Standard Post Trip Actions," has been performed.

   OR

   The event initiated from a lower mode when the Shutdown Cooling System is NOT initially in service.

2. Plant conditions indicate an Excess Steam Demand Event has occurred. ANY of the following may be present:

   a. Loud noise indicative of a high energy steam line break.

   b. Lowering PCS T_{AVE}.

   c. Steam flow/feed flow mismatch.

   d. Rise in feedwater flow.

   e. Possible rise in Containment temperature, humidity, and Containment Sump level, with no significant radiation level increase on Containment Hi Range radiation monitors (Containment Area Monitors may fail high due to high temperature and humidity conditions).

   f. Low pressure in affected S/G(s) following MSIV closure.

   g. Possible rise in reactor power.

End of Section 2.0

3.0 EXIT CONDITIONS

1. The diagnosis of an Excess Steam Demand Event is NOT confirmed.

OR

2. ANY of the Safety Function Status Check Sheet acceptance criteria are NOT satisfied
AND corrective actions to restore the safety function are NOT effective.

OR

3. The Excess Steam Demand Event procedure has accomplished its purpose by satisfying ALL of the following:

   a. All Safety Function Status Check acceptance criteria are being satisfied.

   b. Shutdown Cooling Entry conditions are satisfied or a cooldown is NOT required and maintaining the plant in Hot Shutdown condition is desired.

   c. An appropriate, approved procedure to implement exists or has been approved by the plant Technical Support Center.

End of Section 3.0

4.0 OPERATOR ACTIONS

INSTRUCTIONS

CONTINGENCY ACTIONS

CAUTION

During degraded Containment conditions, the operator should not rely on any single instrument indication due to large instrument errors. Alternate/additional instrumentation should be used to confirm trending of PCS conditions.

© 1. **CONFIRM** proper event diagnosis by performing ALL of the following:

a. **VERIFY** Attachment 1, "Safety Function Status Check Sheet" acceptance criteria:

1) Are satisfied at intervals of approximately fifteen minutes.

OR

2) Corrective actions to restore Attachment 1, "Safety Function Status Check Sheet," acceptance criteria are effective.

1.1. **GO TO** ONE of the following:

- EOP-1.0, "Standard Post Trip Actions," Attachment 1, "Event Diagnostic Flowchart" AND **RE-DIAGNOSE** the event.
- For events initiated from a lower mode, **GO TO** the EOP considered appropriate by the Shift Supervisor.
- EOP-9.0, "Functional Recovery Procedure."

(continue)

INSTRUCTIONS	CONTINGENCY ACTIONS
1. **(continued)**	
b. IF ALL of the following conditions exist: • Steam Generator Blowdown Monitor, RIA-0707, has NOT alarmed • SIAS has NOT occurred OR has been reset • CHP and CHR signals are NOT present, THEN **SAMPLE** S/Gs for activity and Lithium AND **VERIFY** sample results do NOT indicate a SGTR.	
c. Observation of NO abnormal S/G level rise (NOT attributable to feed flow or swell).	
© 2. **REFER TO** the Site Emergency Plan AND **CLASSIFY** the event per EI-1, "Activation of the Site Emergency Plan/Emergency Classification."	
3. **OPEN** the placekeeper AND **RECORD** the time of EOP entry.	
4. IF PZR pressure is less than or equal to 1605 psia OR Containment pressure is greater than or equal to 4.0 psig, THEN **VERIFY** "SAFETY INJ INITIATED" (EK-1342) is alarmed.	4.1. **PUSH** BOTH left and right INJECTION INITIATE pushbuttons on EC-13. • PB1-1 • PB1-2

INSTRUCTIONS	CONTINGENCY ACTIONS
5. IF SIAS is present, THEN **PERFORM** ALL of the following:	
a. **ENSURE** available safeguards equipment operated or operating. Refer to EOP Supplement 5.	
b. **VERIFY** at least minimum SI flow. Refer to EOP Supplement 4.	b.1. IF SI flow is NOT within the limits of EOP Supplement 4, THEN **PERFORM** ANY of the following to restore SI flow: 1) **ENSURE** electrical power available to SI pumps and valves. 2) **ENSURE** correct SI valve lineup. 3) **ENSURE** adequate SI pump seal cooling. 4) **START** additional SI pumps as needed until SI flow is within the limits of EOP Supplement 4.
c. IF Letdown Orifice Stop Valves are closed, THEN **PLACE** handswitches in the CLOSE position: • HS-2003 • HS-2004 • HS-2005	

INSTRUCTIONS

CONTINGENCY ACTIONS

NOTE: Failure to close MSIV and MSIV bypass valves on the unaffected S/G will result in steaming the unaffected S/G through the break.

6. **ENSURE** MSIVs and MSIV Bypass Valves are closed:

S/G	VALVE	DESCRIPTION
'A'	CV-0510	MSIV
	MO-0510	MSIV BYPASS
'B'	CV-0501	MSIV
	MO-0501	MSIV BYPASS

NOTE: P-50A and P-50B shall not be operated simultaneously when T_c is less than 300°F.

7. IF PZR pressure lowers to less than 1300 psia
AND SIAS is initiated,
THEN **PERFORM** BOTH of the following:

   a. **ENSURE** one PCP is stopped in each loop.

   b. IF PCS is less than 25°F subcooled,
   THEN **ENSURE** ALL PCPs stopped.

INSTRUCTIONS

CONTINGENCY ACTIONS

8. **COMMENCE** emergency boration to establish PCS boron concentration greater than or equal to the boron concentration needed for T_{AVE} greater than 525°F as verified by sample or hand calculation. Refer to EOP Supplement 35.

   a. WHEN PCS boron concentration is greater than or equal to the required boron concentration, THEN emergency boration may be secured. **REFER TO** EOP Supplement 40.

9. WHEN PCS temperature lowers, THEN **ENSURE** PCPs configured as follows:

PCS T_c	MAXIMUM OPERATING PCPs
<450°F	3
<300°F	2

10. IF PCPs are operating, THEN **VERIFY** PCP operating limits are satisfied. Refer to EOP Supplement 1.

10.1. **STOP** PCPs which do NOT satisfy PCP operating limits.

TITLE: EXCESS STEAM DEMAND EVENT

INSTRUCTIONS

11. **VERIFY** BOTH of the following:

    - At least one Cooling Tower Pump operating
        - P-39A
        - P-39B
    - At least one Condensate Pump operating
        - P-2A
        - P-2B

CONTINGENCY ACTIONS

11.1. **ENSURE CLOSED** BOTH MSIVs:

- CV-0510 ('A' S/G)
- CV-0501 ('B' S/G)

11.2. **ENSURE CLOSED** from the Control Room BOTH MSIV Bypass valves:

- MO-0510 ('A' S/G)
- MO-0501 ('B' S/G)

a. IF ANY MSIV Bypass valves were open when power/position indication was lost, THEN **LOCALLY CLOSE** ANY open MSIV Bypass valve.

b. **ENSURE CLOSED** ALL S/G Blowdown Valves:

'A' S/G	'B' S/G
CV-0739	CV-0738
CV-0771	CV-0770
CV-0767	CV-0768

INSTRUCTIONS | CONTINGENCY ACTIONS

CAUTION

Each D/G is limited to a 2500 KW continuous load rating and a 2750 KW two-hour load rating. Operation of VC-10 (VC-11) will draw approximately 44 KW.

12. **ENSURE** at least one train of CR HVAC in Emergency Mode. Refer to SOP-24, "Ventilation and Air Conditioning System."

© 13. **DETERMINE** the most affected S/G by considering ALL of the following:

- High steam flow from S/G
- Lowering S/G pressure
- Lowering S/G level
- Lowering Loop T_c temperature

INSTRUCTIONS

CONTINGENCY ACTIONS

NOTE: Maintenance of heat removal via the least affected S/G during dual events (SGTR/SGTR, ESD/ESD, or SGTR/ESD combinations) is preferable to isolation of both S/Gs and going to once-through-cooling.

14. IF MSIS has NOT isolated the leak, THEN **ISOLATE** the most affected steam generator. Refer to the following applicable EOP supplement:

    - EOP Supplement 17 ('A' S/G)
    - EOP Supplement 18 ('B' S/G)

INSTRUCTIONS

15. **VERIFY** the correct S/G is isolated by comparing ALL of the following:

    - S/G pressures
    - S/G levels
    - PCS Loop T_C temperatures

CONTINGENCY ACTIONS

15.1. IF the wrong S/G was isolated, THEN **PERFORM** ALL of the following on the least affected S/G:

a. **OPEN** the Atmospheric Steam Dump Valve air supply valves and manual isolation valves. Refer to the following applicable EOP Supplement:

- EOP Supplement 17 ('A' S/G)
- EOP Supplement 18 ('B' S/G)

b. **ESTABLISH** Auxiliary Feedwater flow through ANY associated AFW valve:

'A' S/G	'B' S/G
CV-0737A CV-0749	CV-0736A CV-0727

15.2. **GO TO** Step 14 to isolate the affected S/G.

INSTRUCTIONS

CONTINGENCY ACTIONS

CAUTION

When ALL PCPs are stopped, steaming the least affected S/G must occur prior to dryout of the most affected S/G to prevent lifting PZR Code Safety Valves or Pressurized Thermal Shock rupture of the PCS.

© 16. **STABILIZE** PCS temperature as follows:

a. **MAINTAIN** level in the least affected S/G between 60% and 70%.

b. IF the steam leak is isolated, THEN **ESTABLISH** steam flow from BOTH S/Gs using the Atmospheric Steam Dump Valves.

(continue)

INSTRUCTIONS | CONTINGENCY ACTIONS

16. (continued)

WARNING

IF Containment pressure is higher than the most affected S/G pressure AND the ESDE is inside of containment, THEN opening of the ASDVs on the most affected S/G will provide a direct release path to the environment.

NOTE: Steaming BOTH S/Gs using ASDVs is permitted prior to isolation of the most affected S/G if necessary to control temperature /pressure of the least affected S/G.

c. IF the steam leak is NOT isolated,
THEN **STEAM** the least affected S/G as necessary to maintain the following, as applicable:

- WHEN T_cs in the affected loop are lowering,
THEN **MAINTAIN** the least affected S/G pressure within 50 psid above the most affected S/G pressure

- WHEN T_cs in the affected loop are NOT lowering,
THEN **STABILIZE** PCS T_cs using the least affected S/G

INSTRUCTIONS

CONTINGENCY ACTIONS

NOTE: Use ANY of the following to determine Average of Qualified CETs:

- PPC point "KCETA" (Average of Qualified CETs)
- PPC Incore Qualified CET Map (PPC page 313)
- Manual calculation. Refer to SOP-34, "Plant Process Computer (PPC) System."

© 17. **VERIFY** SI Pump throttling criteria are satisfied by ALL of the following:

a. Based on the Average of Qualified CETs, PCS subcooling meets ONE of the following:

- At least 25°F subcooled for non-degraded Containment conditions
- Greater than the minimum subcooling curve on EOP Supplement 1 for degraded Containment conditions

b. Corrected PZR level is greater than 20% (40% for degraded Containment) and controlled. **REFER TO** EOP Supplements 9 and 10.

17.1. IF ANY of the SI Pump throttling criteria can NOT be maintained, THEN **RAISE** HPSI flow AND **START** HPSI Pumps as necessary.

PUMP	VALVE	
	NUMBER	DESCRIPTION
Train 1		
P-66B	MO-3009	HPSI Train 1 to Loop 1B
	MO-3011	HPSI Train 1 to Loop 2A
	MO-3007	HPSI Train 1 to Loop 1A
	MO-3013	HPSI Train 1 to Loop 2B
Train 2		
P-66A	MO-3066	HPSI Train 2 to Loop 1B
	MO-3064	HPSI Train 2 to Loop 2A
	MO-3068	HPSI Train 2 to Loop 1A
	MO-3062	HPSI Train 2 to Loop 2B

(continue)

INSTRUCTIONS

CONTINGENCY ACTIONS

17. **(continued)**

c. At least one S/G is available for PCS heat removal with corrected level being maintained or being restored to between 60% and 70%.
REFER TO EOP Supplement 11.

d. Operable RVLMS channels indicate greater than 102 inches above the bottom of fuel alignment plate (621' 8").

18. IF HPSI Pumps are operating AND SI Pump throttling criteria are satisfied,
THEN **THROTTLE** HPSI flow
OR **STOP** one HPSI Pump at a time.

PUMP	VALVE	
	NUMBER	DESCRIPTION
Train 1		
P-66B	MO-3009	HPSI Train 1 to Loop 1B
	MO-3011	HPSI Train 1 to Loop 2A
	MO-3007	HPSI Train 1 to Loop 1A
	MO-3013	HPSI Train 1 to Loop 2B
Train 2		
P-66A	MO-3066	HPSI Train 2 to Loop 1B
	MO-3064	HPSI Train 2 to Loop 2A
	MO-3068	HPSI Train 2 to Loop 1A
	MO-3062	HPSI Train 2 to Loop 2B

INSTRUCTIONS

CONTINGENCY ACTIONS

19. IF LPSI Pumps are operating AND PZR pressure is being controlled greater than 200 psia, THEN **PERFORM** BOTH of the following:

    a. **STOP** the operating LPSI Pumps:

    - P-67A
    - P-67B

    b. **CLOSE** the LPSI injection valves:

    - MO-3008 LPSI Loop 1A
    - MO-3010 LPSI Loop 1B
    - MO-3012 LPSI Loop 2A
    - MO-3014 LPSI Loop 2B

20. IF PZR pressure lowers to less than 200 psia AND LPSI pumps have been stopped, THEN **PERFORM** BOTH of the following:

    a. **ENSURE OPERATING** ALL available LPSI pumps:

    - P-67A
    - P-67B

    b. **ENSURE OPEN** LPSI injection valves:

    - MO-3008 LPSI Loop 1A
    - MO-3010 LPSI Loop 1B
    - MO-3012 LPSI Loop 2A
    - MO-3014 LPSI Loop 2B

INSTRUCTIONS

CONTINGENCY ACTIONS

NOTE: Failure to maintain greater than 100 gpm AFW flow to at least one S/G will result in an automatic start of the next available AFW pump if the pump controls are in Auto.

© 21. **ENSURE** the least affected S/G has corrected level being maintained or being restored to between 60% and 70%. Refer to EOP Supplement 11.

NOTE: Use the following instruments to determine spray nozzle ΔT:

- PZR Vapor Phase Temperature, TI-0101
- Spray line temperature, TIA-0103 or TIA-0104 (use the lowest temperature if using main sprays)
- Charging line temperature, TI-0212 (if using Auxiliary Spray)

© 22. **RECORD** each occurrence of PZR Spray operation with a ΔT (PZR vapor phase temp minus spray temp) greater than 200°F in the Reactor Logbook.

INSTRUCTIONS	CONTINGENCY ACTIONS
© 23. **MAINTAIN** PCS pressure within the limits of EOP Supplement 1 by performing ANY of the following: a. **CONTROL** the following: • PZR heaters • Main Spray • Auxiliary Spray (Supplement 37) b. IF SI Pump throttling criteria are met, THEN **CONTROL** HPSI, Charging, and Letdown flows.	23.1. IF the PCS is oversubcooled OR PZR pressure is greater than the maximum limits of EOP Supplement 1, THEN **PERFORM** ANY of the following to restore subcooling or PCS pressure to within the appropriate limit: a. **OPERATE** available S/G(s) to stop the cooldown AND **STABILIZE** Qualified CET temperatures and Loop T_cs. b. **OPERATE** the following to lower PZR pressure within allowable limits: • Main Spray • Auxiliary Spray (Supplement 37) c. IF SI Pump throttling criteria are met, THEN **CONTROL** HPSI, Charging, and Letdown flows.

(continue) **(continue)**

INSTRUCTIONS	CONTINGENCY ACTIONS
23. (continued)	(continued)

d. IF ALL of the following conditions are met:

- Above actions to lower PCS pressure are NOT effective
- PORVs are required to open to reduce PCS pressure
- PZR level is less than 85%

THEN **PERFORM** BOTH of the following:

1) **OPEN** PORV Isolation Valves:
   - MO-1042A
   - MO-1043A

CAUTION

Rupture of the Quench Tank rupture disk is likely during any sustained opening of PORVs. This would result in rising Containment atmosphere temperature and pressure. Quench Tank temperature and pressure should be monitored during PORV operation.

2) **CYCLE** the PORVs as necessary to maintain BOTH of the following:

(continue)

(continue)

INSTRUCTIONS	CONTINGENCY ACTIONS
23. **(continued)**	**(continued)** • PZR corrected level less than 85% (**REFER TO** EOP Supplements 9 and 10) • PZR pressure within the limits of EOP Supplement 1. 3) IF ALL of the following PORV closing criteria are met: • PZR pressure is less than 2100 psia • PZR pressure is less than the maximum limits of EOP Supplement 1 • PORVs are NOT required open to reduce PZR pressure, THEN **CLOSE** the PORVs: • PRV-1042B • PRV-1043B 4) IF the PORV closing criteria are met AND either PORV will NOT close, THEN **CLOSE** associated PORV Isolation Valve: • MO-1042A • MO-1043A
(continue)	**(continue)**

	INSTRUCTIONS	CONTINGENCY ACTIONS
23.	(continued)	(continued)

5) **ENSURE** started the following containment cooling fans:

   a) ALL available Containment Air Cooler 'A' fans for ALL available Containment Air Coolers.

   b) IF SIAS not present, THEN ALL available Containment Air Cooler 'B' fans for ALL available Containment Air Coolers.

6) IF ANY of the following conditions exist:

   - Containment pressure is greater than or equal to 4.0 psig.
   - Any operable CONTAINMENT Radiation Monitor rises to 1×10^1 R/hr,

   THEN **PERFORM** ALL of the following:

(continue) (continue)

INSTRUCTIONS	CONTINGENCY ACTIONS
23. (continued)	(continued)
	a) **VERIFY** "CIS INITIATED" (EK-1126) is alarmed OR **MANUALLY INITIATE** CIS by pushing left or right HIGH RADIATION INITIATE pushbuttons on EC-13: • CHRL-CS • CHRR-CS
	b) **VERIFY** Containment Isolation. Refer to EOP Supplement 6.
	7) IF the Pressure Control safety function is still in jeopardy, THEN **GO TO** EOP-9.0.
	23.2. IF PCS cooldown rate exceeds Technical Specification limits, THEN **PERFORM** ANY of the following to restore the cooldown rate to within Technical Specification limits: a. **OPERATE** available S/G(s) to stop the cooldown AND **STABILIZE** Qualified CET temperatures and Loop T_Cs.
(continue)	(continue)

INSTRUCTIONS	CONTINGENCY ACTIONS
23. **(continued)**	**(continued)**
	b. **OPERATE** the following to maintain PZR pressure within limits of EOP Supplement 1: • PZR heaters • Main Spray • Auxiliary Spray (Supplement 37) • Letdown
	c. As directed by the Shift Supervisor, **CONTINUE** the PCS cooldown at less than or equal to Technical Specification limits. Refer to EOP Supplement 33.
24. **PLACE** at least one Hydrogen Monitor in operation, ensuring the appropriate Key Switch in the "ACCI" position. Refer to SOP-38, "Gaseous Process Monitoring System."	

INSTRUCTIONS	CONTINGENCY ACTIONS
25. IF ANY of the following conditions exist: • Containment pressure is greater than or equal to 4.0 psig • Any operable Containment Radiation Monitor rises to 1×10^1 R/hr, THEN **PERFORM** ALL of the following:	
a. **VERIFY** "CIS INITIATED" (EK-1126) is alarmed.	a.1. **MANUALLY INITIATE** CIS by pushing left or right HIGH RADIATION INITIATE pushbutton on EC-13. • CHRL-CS • CHRR-CS
b. **VERIFY** Containment Isolation. Refer to EOP Supplement 6.	b.1. **CLOSE** valves that failed to automatically operate.

INSTRUCTIONS

26. IF Containment pressure is greater than or equal to 4.0 psig, THEN **PERFORM** ALL of the following:

a. **VERIFY** Containment Spray alignment AND at least minimal acceptable spray flow per following table:

NUMBER OF RUNNING CS PUMPS	NUMBER OF OPEN CS VALVES	CS FLOW MUST BE AT LEAST:
RAS NOT Present		
1	at least 1	2185 gpm total
2 or 3	2	2939 gpm total
RAS Present		
1	1	1540 gpm
2 or 3	2	3113 gpm total

b. **ENSURE** at least one Containment Air Cooler Accident Fan operating.

- V-1A
- V-2A
- V-3A
- V-4A

CONTINGENCY ACTIONS

a.1. **OPEN** available Containment Spray valves to obtain required configuration and at least minimum flow.

- CV-3001
- CV-3002

AND

START available Containment Spray pumps

- P-54A
- P-54B
- P-54C

INSTRUCTIONS

CONTINGENCY ACTIONS

27. IF Containment pressure rises to greater than or equal to 35 psia AND CCW Containment Isolation Valves were opened, THEN **PLACE** the following CCW Containment Isolation Valve keyswitches to CLOSE:

CCW Valve	Keyswitch	Key
CV-0910	HS-0910	337
CV-0911	HS-0911	338
CV-0940	HS-0940	336

CAUTION

Operation of PCPs should be minimized when seal cooling is NOT present or controlled bleedoff is isolated.

28. IF PCP seal cooling is unavailable, THEN **PERFORM** ALL of the following:

    a. **CLOSE** PCP Controlled Bleedoff valves:

    - CV-2083
    - CV-2099

    b. **CLOSE** PCP Controlled Bleedoff Relief Stop, CV-2191.

    c. **RESTORE** PCP seal cooling. Refer to ONP-6.2, "Loss of Component Cooling."

INSTRUCTIONS	CONTINGENCY ACTIONS
© 29. **VERIFY** the containment sump level is rising as the SIRWT level is lowering.	29.1. IF Containment Sump level is NOT rising as SIRWT level lowers, THEN **PERFORM** BOTH of the following: a. **INITIATE** actions to makeup to the SIRWT. Refer to ONE of the following: • SOP-2A, "Chemical & Volume Control System Charging & Letdown" • SOP-17A, "Clean Radioactive Waste System" b. IF "CIS INITIATED" (EK-1126) is clear, THEN **MANUALLY INITIATE** CIS by pushing left or right HIGH RADIATION INITIATE pushbuttons on EC-13.
30. WHEN SIRWT level less than or equal to 25%, THEN prior to RAS, **PERFORM** Pre-RAS Actions. Refer to EOP Supplement 42.	

INSTRUCTIONS CONTINGENCY ACTIONS

CAUTION

Premature initiation of RAS can lead to insufficient Containment Sump inventory for SI Pump operation. Minimum Containment Water level of 594' 1" is necessary for adequate ESS pump NPSH.

31. WHEN SIRWT level lowers to below 2%,
THEN **PERFORM** Post-RAS Actions. Refer to EOP Supplement 42.

INSTRUCTIONS

CONTINGENCY ACTIONS

32. IF Charging Pump suction is aligned to the SIRWT AND RAS has initiated, THEN **PERFORM** ALL of the following:

a. **STOP** ALL Charging Pumps:

- P-55A
- P-55B
- P-55C

b. **RACK OUT** ALL Charging Pump breakers:

CHARGING PUMP	BREAKER
P-55A	52-1205
P-55B	52-1308 52-1206
P-55C	52-1105

c. **PLACE** a Caution Tag on their handswitches that reads "Do NOT Use - No suction source available"

- 52-1205CS
- 52-1206CS
- 52-1105CS

INSTRUCTIONS	CONTINGENCY ACTIONS

33. WHEN Containment pressure is less than 3.0 psig,
AND CHP has initiated,
THEN **PERFORM** ALL of the following:

a. IF CV-3001, Containment Spray Valve, is open,
THEN **PLACE** HS-3001A to the OPEN position.

b. IF CV-3002, Containment Spray Valve, is open,
THEN **PLACE** HS-3002A to the OPEN position.

c. IF MFW or Condensate pumps are operating
AND feedwater from these sources is NOT desired,
THEN **PLACE** ALL of the following controllers in MANUAL
AND **CLOSE**:

1) Feedwater Regulating Valves

- LIC-0701 ('A' S/G)
- LIC-0703 ('B' S/G)

2) Feedwater Regulating Bypass Valves

- LIC-0735 ('A' S/G)
- LIC-0734 ('B' S/G)

(continue)

INSTRUCTIONS | CONTINGENCY ACTIONS

33. (continued)

d. IF CCW to containment has NOT been restored, THEN **PLACE** the following CCW valve keyswitches to CLOSE:

CCW Valve	Keyswitch	Key
CV-0910	HS-0910	337
CV-0911	HS-0911	338
CV-0940	HS-0940	336

NOTE: Automatic reinitiation of spray will not occur until after SIAS has been reset.

e. **RESET** CHP circuits by pushing left and right HIGH PRESSURE RESET pushbuttons on C-13

- CHPL - Reset
- CHPR - Reset

INSTRUCTIONS CONTINGENCY ACTIONS

CAUTION

Continued operation of the sprays after pressure has been reduced to an acceptable level increases the possibility of wetting electrical connectors which may result in electrical grounds, shorts and other malfunctions.

34. IF the Containment Spray System is operating,
AND ALL of the following conditions are satisfied:

Parameter	Condition
Containment pressure	less than 3 psig
Containment Spray operation	NOT required for CTMT ambient cooling
	NOT required for HPSI subcooling
	NOTE: These conditions must be met prior to securing the last Containment Spray pump.
	NOT needed for iodine removal as determined by Chemistry OR ALL of the following: • Containment high range Gamma monitors read less than 1800 R/Hr • Containment isolated per EOP Supplement 6 • less than one hour has elapsed since reactor trip

(continue)

INSTRUCTIONS

CONTINGENCY ACTIONS

34. (continued)

THEN Containment Spray Pumps may be secured by performing the following:

NOTE: Securing spray pumps one at a time and waiting a short period to see the effect of reduced sprays will aid in the determination of the need for continued spray.

a. IF three Containment Spray Pumps are operating, THEN **STOP** one Containment Spray Pump as directed by the Shift Supervisor.

b. IF two Containment Spray Pumps are operating, THEN **PERFORM** the following as directed by the Shift Supervisor:

1) **CLOSE** one Containment Spray Valve.

- CV-3001
- CV-3002

2) **STOP** one Containment Spray Pump.

c. IF one Containment Spray Pump is operating, THEN **STOP** the Containment Spray Pump as directed by the Shift Supervisor.

(continue)

INSTRUCTIONS

CONTINGENCY ACTIONS

34. **(continued)**

d. WHEN ALL Containment Spray Pumps have been stopped, THEN **ENSURE CLOSED** BOTH Containment Spray Valves.

- CV-3001
- CV-3002

e. IF CHP has been reset, THEN **ENSURE** both Containment Spray Valve CHP Bypass Keyswitches are in NORMAL:

- HS-3001C
- HS-3002C

35. IF ALL operable Containment Area Radiation Monitors indicate less than 1×10^1 R/hr AND Containment pressure is less than 3.0 psig, THEN **RESET** CHR by pushing the following:

- The RESET pushbutton on each Containment Area Radiation Monitor.
- BOTH left and right HIGH RADIATION RESET pushbuttons on C-13.

INSTRUCTIONS

CONTINGENCY ACTIONS

NOTE: Subsequent to the actions in Step 36, the TSC must approve closure of ANY of the failed open valves.

36. WHEN Containment water level approaches the level specified below, THEN **ENSURE OPEN** the following valves
AND **OPEN** associated breakers:

Cntmt Water Level	Valve		
	Number	Bkr	Description
595' 9"	MCC No. 1		
	MO-3008	52-141	LPSI Loop 1A
	MO-3010	52-147	LPSI Loop 1B
	MCC No. 2		
	MO-3012	52-247	LPSI Loop 2A
	MO-3014	52-251	LPSI Loop 2B
596' 4"	MCC No. 1		
	MO-3009	52-197	HPSI Train 1 to Loop 1B
	MO-3011	52-157	HPSI Train 1 to Loop 2A
	MO-3007	52-137	HPSI Train 1 to Loop 1A
	MO-3013	52-151	HPSI Train 1 to Loop 2B
	MCC No. 2		
	MO-3066	52-257	HPSI Train 2 to Loop 1B
	MO-3064	52-237	HPSI Train 2 to Loop 2A
	MO-3068	52-261	HPSI Train 2 to Loop 1A
	MO-3062	52-241	HPSI Train 2 to Loop 2B

INSTRUCTIONS	CONTINGENCY ACTIONS

37. IF Letdown is isolated AND BOTH of the following conditions exist:

    - SI Pump throttling criteria are met
    - Letdown is needed or desired,

    THEN **RESTORE** Letdown. Refer to EOP Supplement 27.

38. IF ANY of the following criteria are met:

    - PCS boron concentration is at the required shutdown boron concentration based on sample or hand calculation. **REFER TO** EOP Supplement 35.
    - "CONCENTRATED BORIC ACID TANK LO-LO LEVEL" (EK-0716 and EK-0722) are alarmed.

    THEN **ALIGN** the Charging Pump suction to the VCT (if Letdown is in service) or SIRWT as directed by the Shift Supervisor. Refer to EOP Supplement 40.

INSTRUCTIONS

© 39. **VERIFY** the PCS is NOT in a water solid condition as indicated by BOTH of the following:

a. No exaggerated or severe pressure response to PCS inventory or temperature changes.

b. ANY of the following:

- Corrected PZR level is less than 100%. **REFER TO** EOP Supplements 9 and 10
- RVLMS indicates voiding

40. IF it is desired to draw a bubble in the PZR,
THEN **PERFORM** ALL of the following:

a. **ENSURE ENERGIZED** ALL available PZR heaters.

b. IF ANY of the following conditions exist:

- Both S/G pressures can be maintained below the existing PCS pressure
- At least one PCP is operating

THEN **PERFORM** ALL of the following to reduce PCS pressure:

(continue)

CONTINGENCY ACTIONS

39.1. IF water solid PCS condition is indicated,
THEN **MAINTAIN** the PCS within the limits of EOP Supplement 1 by ANY of the following:

a. **OPERATE** available S/G(s) to control the cooldown
AND **STABILIZE** Qualified CET temperatures and Loop T_cs.

b. IF SI Pump throttling criteria are met,
THEN **CONTROL** HPSI, Charging, and Letdown flows.

INSTRUCTIONS

CONTINGENCY ACTIONS

40. (continued)

1) IF SI Pump throttling criteria are met, THEN **CONTROL** Charging, Letdown, and HPSI flow.

2) **INITIATE** PCS cooldown within Technical Specification limits.

3) **MONITOR** the PCS cooldown rate using PPC. Refer to EOP Supplement 33.

4) **MAINTAIN** PCS temperature and pressure within the limits of EOP Supplement 1.

5) **MAINTAIN** 25°F subcooling.

c. IF a bubble forms in the Reactor Vessel Upper Head region, THEN **PERFORM** BOTH of the following:

1) **CONTROL** Charging, Letdown, and HPSI flow to maintain PCS level greater than the 102 inches above the bottom of fuel alignment plate (621' 8").

2) **CONTINUE** efforts to draw a bubble in the PZR.

TITLE: EXCESS STEAM DEMAND EVENT

INSTRUCTIONS

CONTINGENCY ACTIONS

NOTE: PZR level instrument de-calibration occurs due to PCS pressure and containment temperature changes. Level correction is per EOP Supplements 9 and 10.

NOTE: IF the PCS is in a water solid condition for PCS Pressure Control,
THEN the PZR level limit of 85% may be exceeded.

NOTE: PZR level should be maintained greater than 36% (40% for degraded Containment) to have continued availability of PZR Heaters.

41. IF SI Pump throttling criteria are met,
THEN **MAINTAIN** corrected PZR level between 20% and 85% (42% to 57% preferred) by performing ANY of the following:

    a. **THROTTLE** HPSI flow.

    b. **CONTROL** Charging and Letdown.

(continue)

INSTRUCTIONS	CONTINGENCY ACTIONS
41. **(continued)**	
	NOTE: IF an interruption in boration via Charging Pump to HPSI Train 2 occurs, THEN a different SI cold leg injection nozzle should be used when restoring flow.
1) **ENSURE** normal charging path aligned as follows:	1.1) IF the normal charging path is NOT available AND HPSI Train 2 is available, THEN **CHARGE** to the PCS via the HPSI header by performing ALL of the following:
a) **OPEN** Charging Line Stop Valve, CV-2111.	1) **STOP** ALL Charging Pumps.
b) **OPEN** at least one Charging Stop Valve: • CV-2113 • CV-2115	2) **CLOSE** Charging Line Stop Valve, CV-2111.
c) IF BOTH Charging Stop Valves fail to open THEN **ENSURE** greater than 33 gpm flow through CK-CVC2112.	3) **CLOSE** Letdown Orifice Stop Valves: • CV-2003 • CV-2004 • CV-2005
	4) **CLOSE** Letdown Containment Isolation Valve CV-2009.
	5) **ENSURE CLOSED** HPSI Pump B Discharge to Train 2, CV-3018.

(continue) **(continue)**

	INSTRUCTIONS	CONTINGENCY ACTIONS
41.	(continued)	(continued)

6) **OPEN** ONE HPSI Train 2 Injection Valve:

- MO-3062
- MO-3064
- MO-3066
- MO-3068

7) **PLACE** SIT Pressure Indicating Controller associated with valve opened above to MANUAL AND **CLOSE**:

- PIC-0338, MO-3062
- PIC-0347, MO-3064
- PIC-0346, MO-3066
- PIC-0342, MO-3068

8) **OPEN** Charging Pump Discharge to Train 2, MO-3072.

9) **START** Charging pumps as necessary to control PZR level.

INSTRUCTIONS

42. IF ANY of the following AC or DC buses are NOT energized, THEN **RESTORE** power to the affected buses. Refer to the following applicable procedure:

BUS	PROCEDURE
1C or 1D	EOP Supplement 29
1E with No SIAS	EOP Supplement 29
1E with SIAS	SOP-30
Y10	ONP-24.1, "Loss of Preferred AC Bus Y10"
Y20	ONP-24.2, "Loss of Preferred AC Bus Y20"
Y30	ONP-24.3, "Loss of Preferred AC Bus Y30"
Y40	ONP-24.4, "Loss of Preferred AC Bus Y40"
Y01	ONP-24.5, "Loss of Instrument AC Bus Y01"
Any DC Bus	ONP-2.3, "Loss of DC Power"

CONTINGENCY ACTIONS

42.1. IF Bus 1D and Bus 1E are NOT energized, THEN as resources permit, **PROVIDE** power to PZR Heaters from Bus 1C. Refer to ONP-2.1, "Loss of AC Power," Attachment 1.

INSTRUCTIONS	CONTINGENCY ACTIONS
43. IF offsite power was lost AND offsite power is available, THEN **RESTORE** power to plant equipment by performing ALL of the following: a. IF NONE of the following are energized: • 'R' Bus • 'F' Bus • Cook 1 Line, THEN **INITIATE** actions to restore power to 'F' or 'R' Bus, as available. Refer to EOP Supplement 21. b. WHEN ANY of the following are energized: • 'R' Bus • 'F' Bus • Cook 1 Line, THEN **INITIATE** actions to restore Plant power. Refer to EOP Supplement 29.	

(continue)

INSTRUCTIONS | CONTINGENCY ACTIONS

43. (continued)

c. **RESTORE** power to the affected bus(es). Refer to the following applicable procedure:

BUS	PROCEDURE
1E (without SIS)	EOP Supplement 29
1E (with SIS)	SOP-30
1A or 1B	ONP-2.1, "Loss of AC Power"

d. **RESTART** plant equipment as desired.

INSTRUCTIONS

CONTINGENCY ACTIONS

CAUTION

Each D/G is limited to the following load rating:

- 2500 KW continuous
- 2750 KW two hours per 24 hour period

44. WHEN 2400V Bus 1C or Bus 1D is energized,
THEN as resources permit,
ENERGIZE Plant buses by performing ALL of the following:

44.1. IF equipment needed to maintain Safety Functions is available from a de-energized 2400V Vital Bus
AND a power supply is available,
THEN **ENERGIZE** the bus
AND **RESTORE** the needed equipment.

a. IF Bus 1C is energized,
THEN **PERFORM** ALL of the following:

1) **ENSURE CLOSED** the following breakers:

- 152-115 (Bus 1C to Transformers 11 and 19)
- 152-108 (Bus 1C to Transformer 13)

(continue)

INSTRUCTIONS | CONTINGENCY ACTIONS

44. **(continued)**

2) **ENSURE** 480V MCCs are energized as appropriate:

- MCC 1: 52-1906 (Bus 19)
- MCC 3: 52-1301 (Bus 13)
- MCC 7: 52-1103 (Bus 11)

b. IF Bus 1D is energized, THEN **PERFORM** the following:

1) **ENSURE CLOSED** 152-201 (Bus 1D to Transformers 12 and 20)

2) **ENSURE** 480V MCCs energized as appropriate:

- MCC 2: 52-2006 (Bus 20)
- MCC 8: 52-1201 (Bus 12)

(continue)

INSTRUCTIONS	CONTINGENCY ACTIONS
44. (continued)	
NOTE: IF only one MCC is available (MCC 1 or MCC 2), THEN BOTH vital DC Buses should be powered from the two Battery Chargers supplied by the same energized MCC.	
c. **ENSURE CLOSED** Battery Charger Feeder Breakers from available MCCs: 1) MCC 1 • Charger No 1 Feeder 52-146 • Charger No 4 Feeder 52-186 2) MCC 2 • Charger No 2 Feeder 52-225 • Charger No 3 Feeder 52-285	
d. **VERIFY** 125V DC Buses D10 and D20 are powered by a Battery Charger.	d.1. **PLACE** Battery Chargers in operation. Refer to SOP-30, "Station Power."
45. WHEN PCP restart is desired, THEN **RESTART** desired PCPs. Refer to EOP Supplement 3.	

INSTRUCTIONS	CONTINGENCY ACTIONS
46. IF ALL PCPs are stopped, THEN **VERIFY** natural circulation flow in at least one PCS loop by ALL of the following: • Core ΔT less than 50°F (Average of Qualified CETs minus T_C) • Loop T_Hs and Loop T_Cs constant or lowering • Average of Qualified CETs at least 25°F subcooled • Difference between Loop T_H and Average of Qualified CETs is less than or equal to 15°F	46.1. **ENSURE** proper control of S/G feeding and steaming rates.
47. IF ALL PCPs are stopped, AND natural circulation criteria are NOT satisfied, THEN **ENSURE** ALL of the following conditions exist: • All available Charging pumps are operating • SI flow is within the limits of EOP Supplement 4 • At least one S/G is available for removing heat from PCS with level being maintained or restored to between 60% and 70% • Average of Qualified CETs is less than superheated	

INSTRUCTIONS

CONTINGENCY ACTIONS

48. IF measured Containment hydrogen concentration is between 1% and 3%, THEN **PERFORM** ALL the following:

CAUTION

Each D/G is limited to a 2500 KW continuous load rating and a 2750 KW two-hour load rating. A hydrogen recombiner will draw a maximum of 75 KW.

a. **PLACE** at least one Hydrogen Recombiner in service. Refer to SOP-5, "Containment Air Cooling and Hydrogen Recombining System."

b. **OPEN** MCC 9 Feeder Breaker, 52-1304.

LOCATION: On Bus 13

INSTRUCTIONS	CONTINGENCY ACTIONS
© 49. **PERFORM** ALL of the following:	
a. **CALCULATE** minimum PCS cooldown rate. Refer to EOP Supplement 2.	
b. **VERIFY** BOTH of the following: • The calculated cooldown rate does NOT exceed Technical Specification limits. • The calculated cooldown rate is achievable with the existing PCS heat removal path.	b.1. IF additional sources of inventory which allow the requirements to be met are NOT available, THEN **GO TO** EOP-9.0, "Functional Recovery Procedure."
50. **EVALUATE** the need for a plant cooldown based on ALL of the following: • Technical Specifications require plant cooldown • Plant equipment repair requires plant cooldown • Availability of Auxiliary systems • Available Feedwater reserve inventory • The Shift Supervisor deems plant cooldown is necessary	

INSTRUCTIONS	CONTINGENCY ACTIONS
51. IF plant cooldown is NOT desired, THEN **PERFORM** ANY of the following: • **MAINTAIN** the plant in a stabilized condition. • **GO TO** an alternate TSC/PRC approved procedure. **NOTE**: IF emergency boration is in progress, THEN cooldown may commence/continue while the required shutdown margin value is calculated.	
© 52. **VERIFY** PCS boron concentration greater than or equal to required boron concentration as verified by sample or hand calculation. Refer to EOP Supplement 35. a. IF Emergency boration is in progress AND PCS boron concentration is greater than or equal to required boron concentration, THEN **SECURE** emergency boration. Refer to EOP Supplement 40.	52.1. IF PCS boron concentration is less than required boron concentration, THEN **PERFORM** BOTH of the following: a. **ENSURE** emergency boration is in progress. b. WHEN required boron concentration is reached, THEN **SECURE** emergency boration. Refer to EOP Supplement 40.

INSTRUCTIONS	CONTINGENCY ACTIONS

53. WHEN BOTH of the following conditions exist:

- PZR Pressure within limits of EOP Supplement 1
- PCS Cooldown rate is within required limits

THEN **PLACE** LTOP in service as follows:

a. **ENSURE OPEN** PORV Isolation Valves. Refer to SOP-1B, "Primary Coolant System - Cooldown," Attachment 6.

b. **PLACE** BOTH of the following PORV LTOP enable keyswitches to ENABLE:

- HS-0105A (Key: 1)
- HS-0105B (Key: 4)

c. **PLACE** BOTH of the following PORV Handswitches to AUTO:

- HS-1042B
- HS-1043B

d. **MAINTAIN** PZR pressure within limits of EOP Supplement 1.

INSTRUCTIONS

CONTINGENCY ACTIONS

CAUTION

A maximum PZR cooldown rate of 200°F/Hr and a maximum PZR Spray ΔT (PZR vapor temp - spray temp) of 350°F should be observed to prevent damage to the PZR or Spray Nozzle.

NOTE: PZR level indication decalibration will occur during cooldown. Correction curves in EOP Supplement 9, "Pressurizer Level Corrections Hot Calibrated" or EOP Supplement 10, "Pressurizer Level Corrections Cold Calibrated" should be used.

NOTE: Reactor Vessel Upper Head voiding resulting from controlled PCS pressure reductions is not expected to result in safety functions being jeopardized.

NOTE: Steam flow through two of the four Atmospheric Steam Dump Valves should be adequate to establish an initial cooldown rate of 75°F/hr.

54. **COOLDOWN** by performing the following:

a. **DETERMINE** the PCS cooldown rate since event initiation using EOP Supplement 33.

(continue)

INSTRUCTIONS

CONTINGENCY ACTIONS

54. **(continued)**

b. WHEN the PCS cooldown rate is within required limits, THEN **COMMENCE** a cooldown within the required limits using the Atmospheric Steam Dump Valves.

NOTE: P-50A and P-50B shall not be operated simultaneously when T_C is less than 300°F.

c. **ENSURE** not more than two PCPs operating (preferably one pump in each loop).

d. **MONITOR** the PCS cooldown rate. Refer to EOP Supplement 33.

55. **MAXIMIZE** PZR spray flow while controlling PCS pressure by using PZR heaters to equalize PCS and PZR boron concentration.

56. IF the PCS is to be opened AND PCS activity is acceptable for flow outside of containment, THEN **DEGASIFY** the PCS. Refer to SOP-2A, "Chemical And Volume Control System Charging And Letdown; Concentrated Boric Acid."

INSTRUCTIONS

CONTINGENCY ACTIONS

57. IF BOTH of the following conditions exist for each S/G:

- At least three of four S/G pressure sigmas indicate between 510 and 550 psia (indicators between alarm flags)
- A controlled cooldown is in progress

THEN **BLOCK** MSIS for the S/G meeting the above conditions by performing ALL the following:

a. **BLOCK** MSIV closure signal for the applicable S/G by pushing the appropriate pushbutton on Control Panel C-01:

- HS/LPE-50A ('A' S/G)
- HS/LPE-50B ('B' S/G)

b. **VERIFY** "STEAM GEN VALVES ISOLATION LOCKOUT" (EK-0970) is alarmed.

c. **ENSURE CLOSED** BOTH Main Feed Reg Valves:

- CV-0701 ('A' S/G)
- CV-0703 ('B' S/G)

d. **ENSURE CLOSED** BOTH Bypass Feed Reg Valves:

- CV-0735 ('A' S/G)
- CV-0734 ('B' S/G)

INSTRUCTIONS	CONTINGENCY ACTIONS

58. IF ALL of the following conditions exist:

- PZR pressure is less than 1687 psia
- SIAS is NOT actuated or blocked
- "Safety Injection Signal Block Permit" (EK-1369) is alarmed
- A controlled cooldown and/or controlled depressurization is in progress,

THEN **BLOCK** SIAS by performing ALL of the following:

a. **PLACE** AND **HOLD** SIAS block handswitch PB3-1 to BLOCK.

1) **VERIFY** the following annunciator in alarm:

- "SAFETY INJ BLOCK RELAY SI-1" (EK-1337)

2) **RELEASE** SIAS block handswitch PB3-1.

(continue)

INSTRUCTIONS | CONTINGENCY ACTIONS

58. **(continued)**

b. **PLACE** AND **HOLD** SIAS block handswitch PB3-2 to BLOCK.

1) **VERIFY** the following annunciators in alarm:

- "SAFETY INJ BLOCK RELAY SI-2" (EK-1338)
- "SAFETY INJ BLOCKED" (EK-1339)

2) **RELEASE** SIAS block handswitch PB3-2.

© 59. **MONITOR** for formation of PCS voiding as indicated by ANY of the following:

- Indicated Charging and Letdown flows do NOT correspond to PZR level trend.
- PZR level rising significantly faster than trend expected from Auxiliary Spray flow.
- Core ΔT (Average of Qualified CETs - T_C) or Loop ΔT (T_H - T_C) rising for same secondary steaming and Auxiliary Feed rates.
- Any operable PCS temperature indication is less than 25°F subcooled.
- Operable RVLMS indicates voiding in the Reactor Vessel.

INSTRUCTIONS	CONTINGENCY ACTIONS
60. IF PCS voiding is indicated AND ANY of the following exist: • PCS pressure reduction is inhibited • PCS heat removal is inhibited • The Shift Supervisor directs void elimination, THEN **PERFORM** void elimination actions. Refer to EOP Supplement 26.	

INSTRUCTIONS

61. IF PZR pressure is between 350 psia and 300 psia as read on PI-0104 (NR) or PR-0125 and controlled
AND a controlled cooldown is in progress,
THEN **ISOLATE** SITs as follows:

a. **UNLOCK** AND **CLOSE** the following breakers:

BREAKER	OUTLET VALVE	SIT
52-2129	MO-3041	T-82A
52-2329	MO-3045	T-82B
52-2229	MO-3049	T-82C
52-2429	MO-3052	T-82D

KEY: Locked Valve Key

b. **CLOSE** the following SIT Outlet Valves:

BREAKER	OUTLET VALVE	KEY
52-2129	MO-3041	98
52-2329	MO-3045	99
52-2229	MO-3049	100
52-2429	MO-3052	101

(continue)

CONTINGENCY ACTIONS

NOTE: Failure of Instrument Air to containment will prevent venting the SITs.

61.1. IF ANY SIT could NOT be isolated, THEN **VENT** the unisolated SIT using ONE of the following:

a. **VENT** to containment as follows:

1) **ENSURE CLOSED** CWRT Vent Isolation Valves:

- CV-1064
- CV-1065

2) **VENT** each unisolated SIT one tank at a time by opening the Vent Valve and closing when tank is vented.

SIT	VENT VALVE
T-82A	CV-3067
T-82B	CV-3065
T-82C	CV-3063
T-82D	CV-3051

3) WHEN ALL the following conditions are met:

- Unisolated SITs are vented and their associated vent valve closed
- Plant conditions allow venting containment

(continue)

	INSTRUCTIONS	CONTINGENCY ACTIONS
61.	**(continued)**	**(continued)** THEN **OPEN** CWRT Vent Isolation Valves: • CV-1064 • CV-1065 b. **VENT** unisolated SITs via Clean Waste Receiver Tank Header per SOP-3, "Safety Injection and Shutdown Cooling System."

INSTRUCTIONS

CONTINGENCY ACTIONS

62. IF ALL of the following conditions are met:

- T_c is below 325°F AND prior to T_cs less than 300°F
- SI Pump throttling criteria are met
- HPSI pumps are NOT required for inventory control
- A cooldown is in progress,

THEN **DISABLE** BOTH HPSI pumps by removing Control Power fuses and fuse holders from the following breakers:

- 152-207, HP Safety Injection Pump P-66A

  LOCATION: 'D' Bus

- 152-113, HP Safety Injection Pump P-66B

  LOCATION: 'C' Bus

63. IF SI Pump Throttling criteria are satisfied,
THEN **RESET** SIAS. Refer to SOP-3, "Safety Injection and Shutdown Cooling System," Attachment 4.

INSTRUCTIONS

CONTINGENCY ACTIONS

64. WHEN ALL of the following Shutdown Cooling System entry conditions are met:

- PCS parameters are acceptable for existing Containment conditions:

Parameter	Containment Less Than 175°F AND Less Than 3 psig at all times during the event	Containment Greater Than or Equal To 175°F OR Greater Than or Equal To 3 psig at any time during the event
PCS Pressure	Less Than 270 psia	REFER TO EOP Supplement 1
PZR Level (corrected)	Greater Than 36% and controlled	Greater than 40% and controlled
Avg of Qualified CETs Subcooling	Greater Than 25°F	REFER TO EOP Supplement 1
Avg of Qualified CETs and Loop T_Hs Temperature	Less Than 300°F	REFER TO EOP Supplement 1

- TSC has determined that PCS activity is acceptable for circulation outside Containment.
- Containment Spray Pumps are not in use for Containment Atmosphere safety function.
- Shutdown Cooling System monitoring equipment power is available from Y01

(continue)

INSTRUCTIONS	CONTINGENCY ACTIONS

64. (continued)
 	
OR
 	
Alternate measures for loss of Y01 are established per ONP-17, "Loss of Shutdown Cooling."
 	
• LTOP is operable.
 	
• Power to the following Shutdown Cooling Return Valves is available:
 	
  ○ MO-3015 (MCC-1)
  ○ MO-3016 (MCC-2)
 	
OR
 	
Access to Containment is acceptable for manual valve operation,
 	
THEN **GO TO** GOP-9, "Plant Cooldown From Hot Standby/Shutdown" or TSC/PRC approved procedure.	

End of Section 4.0

TITLE: EXCESS STEAM DEMAND EVENT

5.0 **PLACEKEEPER**

EOP ENTRY TIME: _____

STEP	INSTRUCTIONS	PAGE	START	DONE
4.	Verify SIAS initiated	5	_____	_____
5.	Ensure adequate SI flow and safeguards equipment status	6	_____	_____
6.	Ensure MSIVs and MSIV Bypass Valves are closed	7	_____	_____
7.	If PZR pressure lowers to less than 1300 psia then establish one PCP per loop or if PCS subcooling is less than 25°F subcooled, then trip all PCPs	7	_____	_____
8.	Determine required margin boron concentration	8	_____	_____
9.	Ensure proper PCP configuration as PCS temperature lowers	8	_____	_____
10.	Verify operating limits for any running PCP	8	_____	_____
11.	Verify condenser cooling or isolate steam to condenser	9	_____	_____
12.	Ensure at least one train of CR HVAC in Emergency Mode.	10	_____	_____
13.	Determine the most affected S/G	10	_____	©
14.	Isolate the most affected steam generator	11	_____	_____
15.	Verify the correct S/G is isolated	12	_____	_____
16.	Stabilize PCS temperature	13	_____	©
17.	Verify SI Pump throttling criteria are satisfied	15	_____	©
18.	If HPSI Pumps are operating and SI Pump throttling criteria are satisfied, throttle HPSI flow or stop pumps	16	_____	_____

5.0 **PLACEKEEPER**

EOP ENTRY TIME: _____

STEP	INSTRUCTIONS	PAGE	START	DONE
19.	If LPSI Pumps are operating and PZR pressure is being controlled greater than 200 psia, stop pumps and close valves	17	_____	_____
20.	If PZR pressure lowers uncontrollably to less than 200 psia and LPSI Pumps have been stopped, restart LPSI pumps and open valves	17	_____	_____
21.	Ensure the least affected S/G has level being maintained or being restored to between 60% and 70%	18	_____	©
22.	Record each occurrence of PZR spray with ΔT greater than 200°F	18	_____	©
23.	Maintain PCS pressure within the limits of EOP Supplement 1	19	_____	©
24.	Place Hydrogen Monitor in service	24	_____	_____
25.	If the Containment has pressure greater than or equal to 4.0 psig or has high radiation, ensure Containment Isolation signal initiated	25	_____	_____
26.	If the Containment pressure is greater than or equal to 4.0 psig, verify available Containment Spray Pumps running	26	_____	_____
27.	If Containment pressure rises to greater than or equal to 35 psia, then close the CCW containment isolation valves	27	_____	_____
28.	If PCP seal cooling is lost, isolate seal leakoff and restore PCP seal cooling	27	_____	_____
29.	Verify Containment Sump level rises as the SIRWT level drops	28	_____	©

5.0 **PLACEKEEPER**

EOP ENTRY TIME: _____

STEP	INSTRUCTIONS	PAGE	START	DONE
30.	When SIRWT level less than or equal to 25%, then prior to RAS, perform Pre-RAS Actions.	28	_____	_____
31.	When SIRWT level lowers to below 2%, then perform Post-RAS Actions.	29	_____	_____
32.	If Charging Pump suction is aligned to the SIRWT and RAS has initiated then, disable the Charging Pumps and add caution tag	30	_____	_____
33.	When Containment pressure is less than 3.0 psig and CHP has initiated, align components and reset CHP	31	_____	_____
34.	If Containment Spray System is operating and conditions are satisfied, secure Containment Spray	33	_____	_____
35.	If Containment Area Radiation Monitors indicate less than 1×10^1 R/hr and Containment pressure is less than 3.0 psig, reset CHR	35	_____	_____
36.	When Containment water level approaches SI valve elevations, open and disable SI valves	36	_____	_____
37.	If Letdown is isolated and conditions allow, restore Letdown	37	_____	_____
38.	If requirements are met, then establish charging pump suction from the VCT or SIRWT	37	_____	_____
39.	Verify the PCS is not in a water solid condition	38	_____	©
40.	If it is desired to draw a bubble in the PZR, perform the actions to draw a bubble in the PZR	38	_____	_____
41.	If SI Pump throttling criteria are met, then maintain PZR level between 20% and 85% (42% to 57% preferred)	40	_____	_____

5.0 PLACEKEEPER

EOP ENTRY TIME: _____

STEP	INSTRUCTIONS	PAGE	START	DONE
42.	If any vital AC or DC buses are not energized, restore power to affected buses	43	_____	_____
43.	If offsite power was lost and is available, restore power to plant equipment	44	_____	_____
44.	When 2400V Bus 1C or 1D is energized, then energize Plant buses	46	_____	_____
45.	If desired, restart PCPs	48	_____	_____
46.	Verify natural circulation flow in at least one loop	49	_____	_____
47.	Verify two phase natural circulation	49	_____	_____
48.	If Containment hydrogen concentration is between 1% and 3%, place at least one Hydrogen Recombiner in service	50	_____	_____
49.	Verify calculated cooldown rate does not exceed Technical Specification limits and the cooldown is achievable with the existing PCS heat removal path	51	_____	©
50.	Evaluate the need for a plant cooldown	51	_____	✋
51.	Determine alternatives if plant cooldown is not desired	52	_____	✋
52.	Verify PCS boron concentration greater than or equal to required boron concentration.	52	_____	©
53.	When PZR Pressure and PCS Cooldown rate within required limits, place LTOP in service.	53	_____	_____
54.	Commence a PCS cooldown	54	_____	_____
55.	Maximize PZR spray flow while controlling PCS pressure by using PZR heaters to equalize PCS and PZR boron concentration	55	_____	_____

© = Continuously applicable step ✋= Hold Point

5.0 **PLACEKEEPER**

EOP ENTRY TIME: _____

STEP	INSTRUCTIONS	PAGE	START	DONE
56.	If the PCS will be opened and PCS activity allows, then lineup for PCS degasification	55	_____	_____
57.	When Main Steam pressure is between 510 and 550 psia, block MSIS	56	_____	_____
58.	When PZR pressure is less than 1687 psia and SIAS is not actuated, BLOCK SIAS	57	_____	_____
59.	Monitor PCS for void formation	58	_____	©
60.	If PCS voiding is indicated, perform void elimination	59	_____	_____
61.	If PZR pressure is between 350 psia and 300 psia and a cooldown is in progress, isolate SITs	60	_____	_____
62.	Disable both HPSI pumps when listed conditions are met	62	_____	_____
63.	Reset SIAS	62	_____	_____
64.	When all shutdown cooling system entry conditions are met, exit this procedure	63	_____	_____

End of Section 5.0

ATTACHMENT 4

EOP SUPPLEMENT 1, "PRESSURE TEMPERATURE LIMIT CURVES"

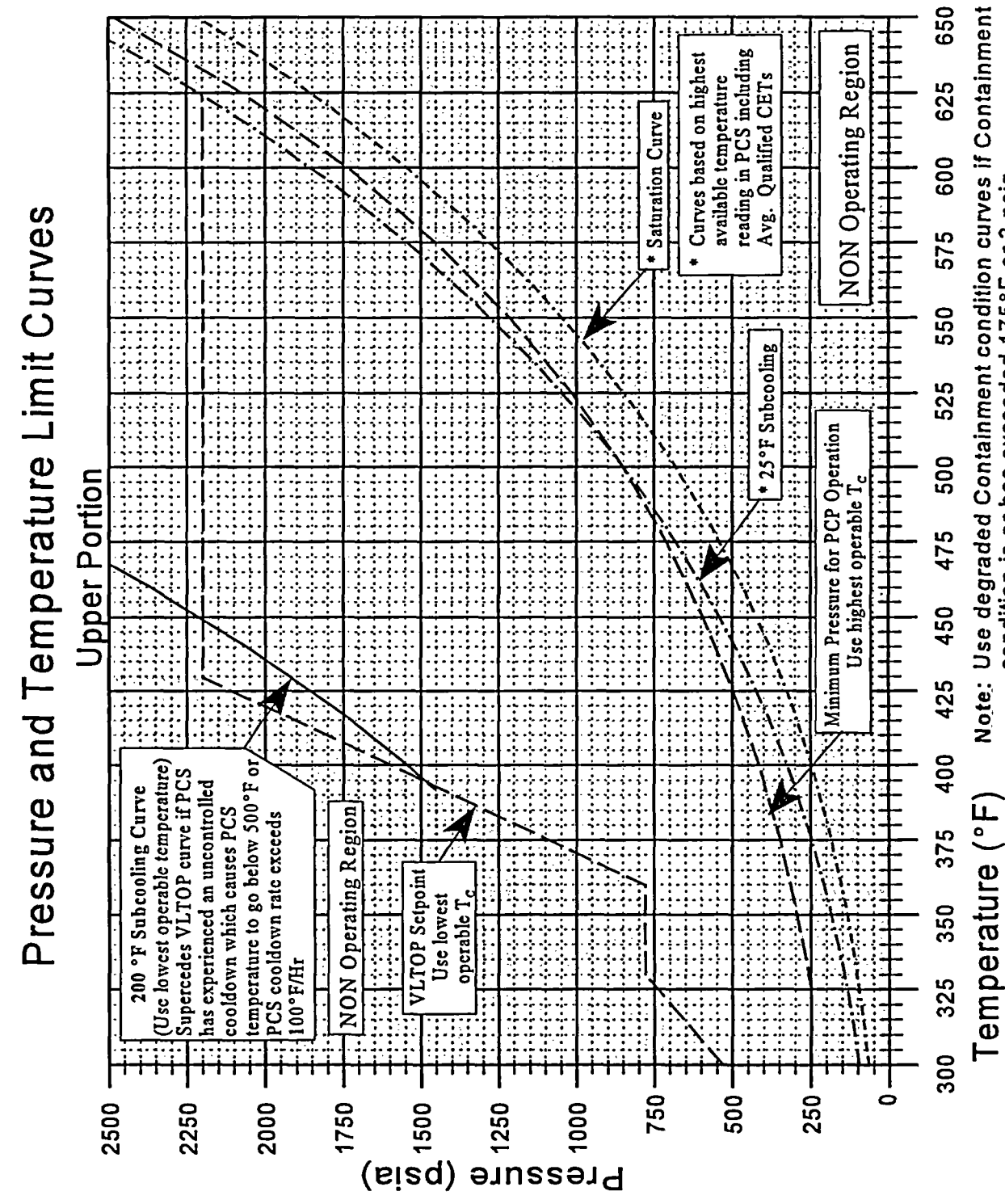
5 Pages Follow

PALISADES NUCLEAR PLANT

PALISADES NUCLEAR PLANT EMERGENCY OPERATING PROCEDURE

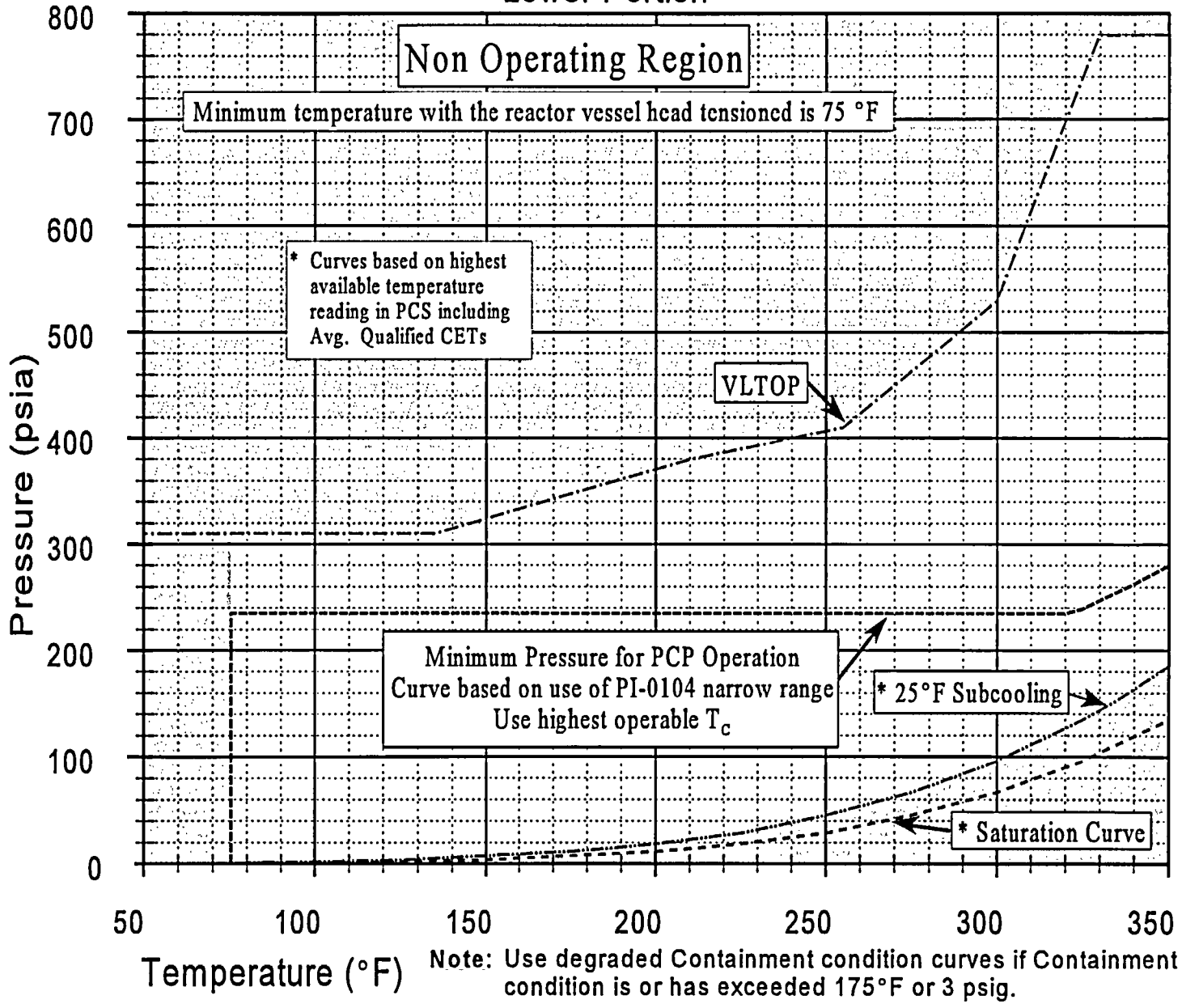
Proc No	EOP Supplement
Supplement	1
Revision	5
Page	1 of 5

TITLE: Pressure Temperature Limit Curves



Pressure and Temperature Limit Curves

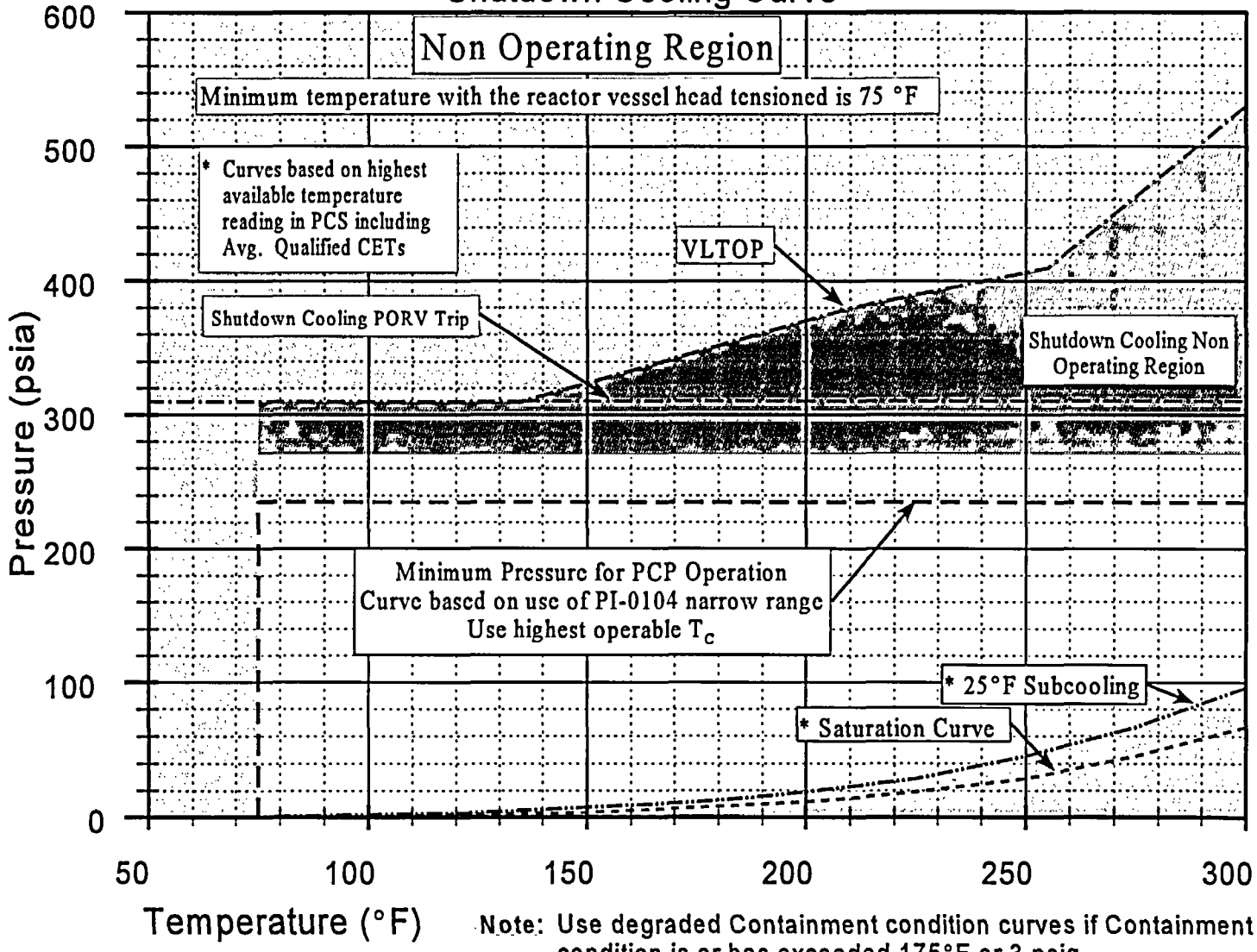
Lower Portion



Note: Use degraded Containment condition curves if Containment condition is or has exceeded 175°F or 3 psig.

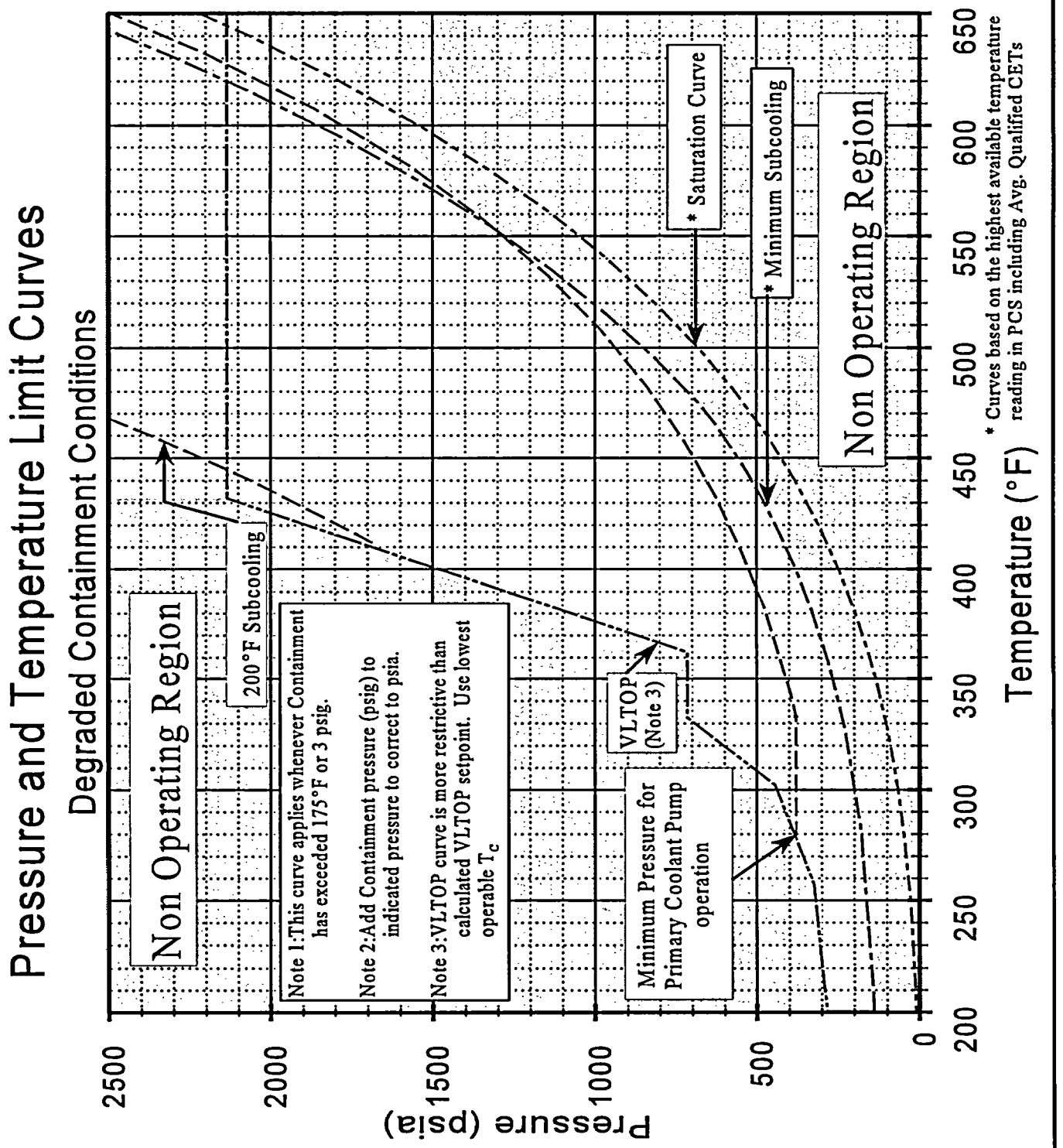
Pressure and Temperature Limit Curves

Shutdown Cooling Curve



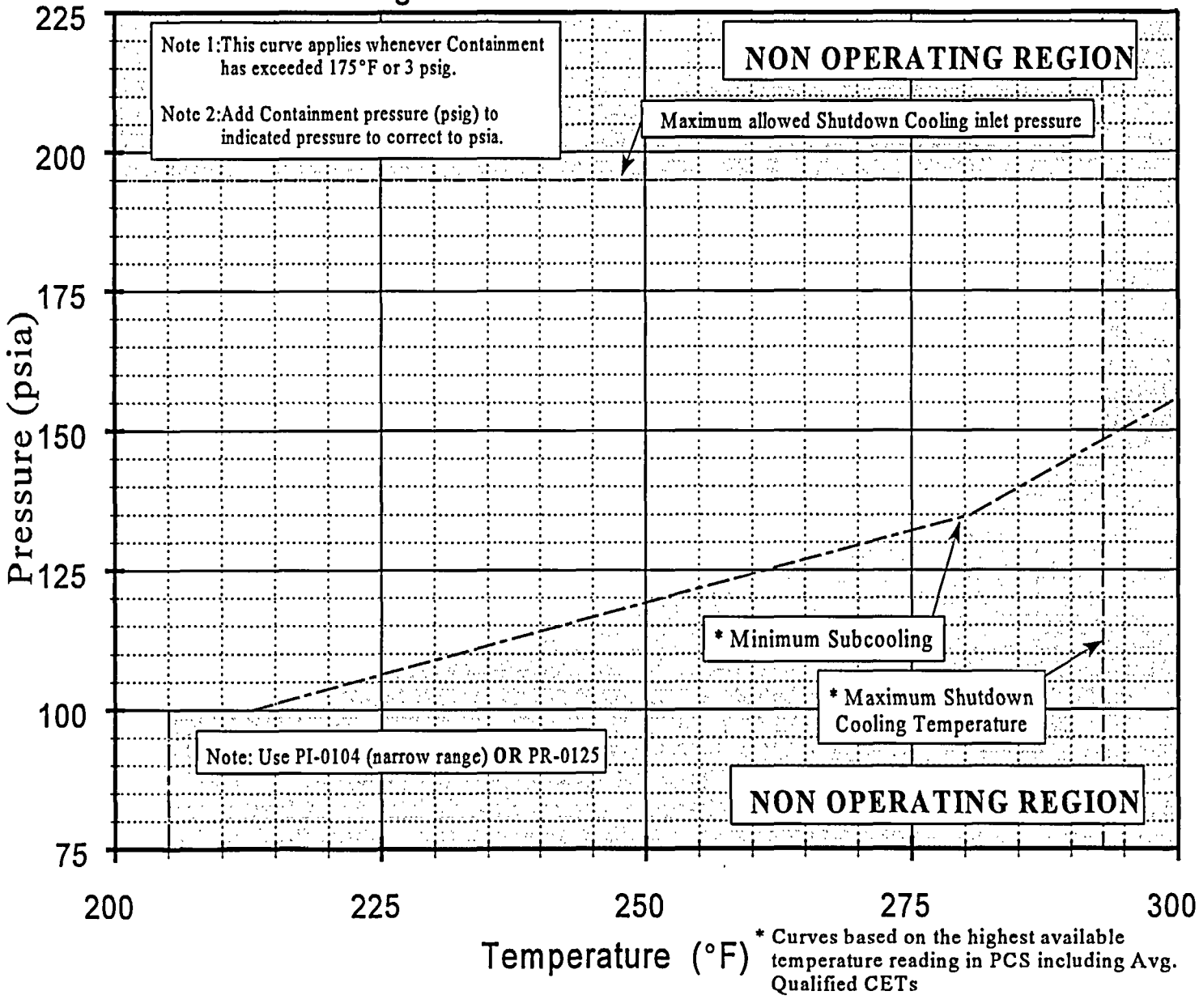
Note: Use degraded Containment condition curves if Containment condition is or has exceeded 175°F or 3 psig.

TITLE: Pressure Temperature Limit Curves



Shutdown Cooling Entry Window

For Degraded Containment Conditions



* Curves based on the highest available temperature reading in PCS including Avg. Qualified CETs

TITLE: Pressure Temperature Limit Curves

PALISADES NUCLEAR PLANT
EMERGENCY OPERATING PROCEDURE

Proc No EOP Supplement	Supplement	Revision	Page
	1	5	5 of 5