EOP-0 Rev. 1/Unit 1 Page 1 of 13

CALVERT CLIFFS NUCLEAR POWER PLANT

.

EOP-O POST-TRIP IMMEDIATE ACTIONS

REVISION 1

	SIGNATURE	DATE
PREPARED BY;	- Cames K. Shooms	1 12/18/87
VERIFIED BY;	2. Vet	12.18.87
POSRC;	MEETING # 98.7	1 2.10.88
APPROVED BY;	ABL emen	1 2-10-88

8809220245 880909 PDR ADOCK 05000317 FDR

. -

Manager-Nuclear Operations or General Supervisor-Operations if POSRC review is not required

×.

EOP-0 Rev. 1/Unit 1 Page 2 of 13

LIST OF EFFECTIVE PAGES

PAGE	NUMBER	REVISION
	1	1
	2	1
	3	1
	4	1
	5	1
	6	1
	7	. 1
	8	1
	9	1
1	10	1
. 1	11	1
1	12	1
. 1	13	1

EOP-0 Rev. 1/Unit 1 Page 3 of 13

POST-TRIP IMMEDIATE ACTIONS

I. PRECAUTIONS

- A. Do not adopt manual operation of automatically controlled systems unless a malfunction is apparent or automatic system operation will not support the maintenance of a safet, function.
- B. Systems shifted to manual operation must be monitored frequently to ensure correct operation.
- C. At least two independent indications should be used, when available, to evaluate and corroborate a specific plant condition since an incident could induce inconsistencies between instruments.
- D. If a pump or component tails, the cause of the failure should be determined prior to restarting or starting a standby pump or component to prevent a common failure.

II. ENTRY CONDITIONS

The below listing constitutes the most immediate and reliable indication of a reactor trip:

- A. Reactor Trip Bus U/V Relay Trip alarm.
- B. CEA Trip Circuit Breaker(s) Trip alarm(s).
- C. Rapidly decreasing Generator output.
- D. Protective Channel Trip alarm.
- E. RPS Trip Bistable Lights lit.

				EOP-0 Rev. 1/Unit 1 Page 4 of 13
111	ι.	IMMFDIATE ACTIONS	1	ALTERNATE ACTIONS
A.	MON	ITOR REACTIVITY CONTROL:	†	
	1.	Depress one set of Manual Reactor Trip Buttons		
	2.	Ensure prompt drop in NI power.	2.1	<u>IF</u> reactor <u>NOT</u> tripped, <u>THEN</u> de-energize CEDM Motor Generator Sets:
				a. Open feeder breaker to 12A 480V Bus.
				 Den feeder breaker to 13A 480V Bus.
				c. Open tie breakers to 12A and 13A 480V Buses.
	3.	Ensure all CEAs fully inserted.	3.1	IF one CEA fails to fully insert, THEN borate 200 ppm:
				a. Open Boric Acid Direct Makeup Valve, 1-CVC-514-MOV.
				b Start a Boric Acid Pump.
				c. Start all available Charging Pumps.
			3.2	<u>IF</u> more than one CEA fails to fully insert, <u>THEN</u> borate the RCS to 2300 ppm.
в.	MON	ITOR RCS PRESSURE AND ENTURY CONTROL:	1	
	1.	Ensure pressurizer level stabilizes between 8C and 180 inches.	1.1	Operate charging and letdown to restore pressurizer level.
•				

EOP-O Rev. 1/Unit Page 5 of 13

III. IMMEDIATE ACTIONS

2. Ensure pressurizer pressure stabilizes between 1850 and 2275 PSIA. ALTERNATE ACTIONS

- 2.1 Operate heaters and sprays to restore pressurizer pressure.
- 2.2 Verify PORVs open at 2400 PSIA and shut by 2300 PSIA.
- 2.3 <u>IF</u> RCS pressure decreases to 1725 PSIA, THEN verify SIAS actuation.
- 2.4 Implement RCP trip strategy:
 - a. <u>IF</u> RCS pressure decreases to 1725 PSIA, <u>THEN</u> trip 11A and 12B RCPs OR trip 11B and 12A RCPs.
 - b. <u>IF</u> positive LOCA indications exist:
 - (1) RCS subcooling less than 30°F.
 - (2) Steady S/G pressure.
 - (3) S/G Blowdown RMS alarms clear, <u>OR</u> Main Vent Gaseous RMS (1-RI-5415) alarm clear.

AND RCS pressure decreases to less than 1300 PSIA, THEN trip all RCPs.

- c. <u>IF</u> RCS temperature and pressure are less than the minimum pump operating limits per the RCP curve on Attachment (1), **THEN** trip all RCPs.
- d. <u>IF</u> CIS has actuated, <u>THEN</u> trip all RCPs.

 insure RCS subcooling greater than 30°F.

EOP-0 Rev. 1/Unit 1 Page 6 of 13

II. IMMEDIATE ACTIONS		ALTERNATE ACTIONS	
. MON REM	NITOR CORE AND RCS HEAT NOVAL:		
1.	Ensure both S/G levels above (-)170 inches.	1.1	IF S/G level decreases to (-)170 inches, THEN verify AFAS actuation.
	Ensure feed rate is maintaining a constant level or controlled increase in	2.1	IF feed flow is lost OR excessive, THEN perform the following:
	S/G level.		a Trip the S/G Feed Pumps.
			b. Shut the S/G Feedwater Isolation Valves.
			c. Initiate AFW when feed flow required.
3.	Ensure proper operation of Turbine Bypass and Atmospheric Dump Valves:	3.1	Operate Turbine Bypass or Atmospheric Dump Valves to restore S/G pressure and Tcold.
	a. S/G pressures stabilize batween 850 and 920 PSIA.	3.2	IF S/G pressure decreases to 800 PSIA, THEN shut both MSIVs.
	b. Tcold stabilizes between 525 and 535°F.	3.3	IF S/G pressure decreases to 685 PSIA, THEN verify SGIS actuation.
. MOI	NITOR VITAL AUXILIARIES.	-	
1.	Ensure 11 or 14 4KV Bus energized.	1.1	IF both 4KV vital buses are de-energized, THEN start 11 or 12 D/G AND close the associated D/G output breaker.

			EOP-0 Rev. 1/Unit 1 Page 7 of 13
111	. IMMEDIATE ACTIONS	Δ	LTERNATE ACTIONS
		1.2	<u>IF</u> the \dot{D}/G fails to load, <u>THEN</u> perform the following:
			a. Verify D/G output breaker open.
			b. Place the 4KV Bus LOCI/SD Sequencer Manual Initiate Keyswitch in ON.
			c. Close the alternate 4KV feeder breaker.
Ε.	MONITOR NORMAL CONTAINMENT ENVIRONMENT:		
	 Ensure containment pressure less than 0.7 PSIG. 	1.1	IF containment pressure increases to 2.8 PSIG, THEN verify DSFAS actuation:
•			a. SIAS.
			b. CIS AND trip all RCPs.
		1.2	<u>IF</u> containment pressure increases to 4.25 PSIG, <u>THEN</u> verify CSAS actuation.
	2. Ensure containment temperature less than 120°F.		
	 Ensure containment radiation monitor alarms clear. 		
F.	MONITOR NORMAL RADIATION LEVELS EXTERNAL TO CONTAINMENT:		
	 Ensure Main Vent Gaseous RMS (1-RI-5415) alarm clear. 		
)	 Ensure Condenser Off-Gas and S/G Blowdown RMS alarms clear. 	2.1	IF Condenser Off-Gas <u>OR</u> S/G Blowdown RMS alarm(s) received, THEN secure S/G Blowdown.
		1912	



EOP-0 Rev. 1/Unit 1 Page 9 of 13

11

BREAK IDENTIFICATION CHART

PRESSURIZER LEVEL CHANGING AND PRESSURIZER PRESSURE RAPIDLY DECREASING

1



.

EOP-0 Rev. 1/Unit 1 Page 10 of 13

IV. INITIAL SAFETY FUNCTION STATUS CHECK

- A. The STA (or person designated by the STA) will perform the safety function status check on entry into this procedure.
- B. Immediately notify Shift Supervisor or Control Room Supervisor if any safety function criteria is not being satisfied.
- C. Notify the Control Room Supervisor and Control Room Operator when initial status check is completed.
- D. Review and verify that safety function acceptance criteria are satisfied.

REACTIVITY CONTROL PARAMETERS		SAFETY FUNCTION ACCEPTANCE CRITERIA		
		CRITERIA	STATUS CHECK	
) a .	. WRNI power	less than 5%		
b	SUR (DPM)	negative		
c,	CEA status	all inserted		
	or	or		
	Boration status (GPM)	greater than 40		

EOP-0 Rev. 1/Unit 1 Page 11 of 13

RC	S PRESSURE AND	SAFETY FUNCTION ACCEPTA	NCE CRITERIA
PA	RAMETERS	CRITERIA	STATUS CHECK
a.	Pressurizer pressure (PSIA)	1850 to 2275	
ь.	Pressurizer level (inches)	80 to 180	
c.	RCS subcooling (°F)	greater than 30	

CORE AND RCS HEAT SAFETY FUNCTION ACCEPTANCE CRITERIA REMOVAL CRITERIA PARAMETERS STATUS CHECK a. RCS Tcold (°F) 525 to 535 b. Thot minus Toold (°F) less than 10 c. # RCPs operating 1 or 2 per loop d. S/G pressure 850 to 920 (PSIA) e. S/G level (-)170 to (+)30 (inches)

EOP-O Rev. 1/Unit 1 Page 12 of 13

ITAL	SAFETY FUNCTION ACCEPTANCE CRITERIA		
JXILIARIES	CRITERIA	STATUS CHECK	
. 4KV vital buses 11 or 14	energized		
. Instrument Air pressure (PSIG)	greater than 88		
. Component Cooling (# pumps running)	1 or 2		
. Saltwater (# pumps running)	1 or 2 .		
. Service Water (# pumps running)	1 or 2		
. 125V DC buses 11, 12, 21, 22	energized		
. 120V AC vital buses 11, 12, 13, 14	energized		
. 208/120V Instrument Bus 11 or 12	energized		
IORMAL CONTAINMENT	SAFETY FUNCTION ACC	CEPTANCE CRITERIA	
ARAMETERS	CRITERIA	STATUS CHECK	
. Containment pressure (PSIG)	less than 0.7		
Containment temperature (°F)	less than 120		
Containment	less than 4		
Tever (THORSES)			

EOP-0 Rev. 1/Unit 1 Page 13 of 13

.

. •

.

NORMAL RADIATION	SAFETY FUNCTION ACCEPTANCE CRITERIA		
TO CONTAINMENT	CRITERIA	STATUS CHECK	
a. Noble Gas Monitor	alarm clear		
b. Condenser Off-Gas RMS	alarm clear		
c. S/G B/D RMS	alarm clear		
d. Main Vent Gaseous RMS (1-RI-5415)	alarm clear		

0-0

15

EOP-0 Rev. 1/Unit 2 Page 1 of 13

CALVERT CLIFFS NUCLEAR POWER PLANT

EOP-O POST-TRIP IMMEDIATE ACTIONS

REVISION 1

DOUDLOCK DV	SIGNATURE	DATE 12-18-87
PREPARED BY;	- the Xathal	
VERIFIED BY;	James Prooms	1 12/18/87
POSRC;	MEETING # 88-7	/ 2.10.88
APPROVED BY;	ARLemon	/ 2.10.88
	Manager-Nuclear Operations or Operations if POSRC review is	General Supervisor- not required

EOP-0 Rev. 1/Unit 2 Page 2 of 13

LIST OF EFFECTIVE PAGES

AGE	NUMBER	REVISION
	1	:
	2	1
	3	1
	4	1
	5	1
	6	1
	7	1
	8	1
	9	1
	10	1
	11	1
	12	1
	13	1

EOP-0 Rev. 1/Unit 2 Page 3 of 13

POST-TRIP IMMEDIATE ACTIONS

I. PRECAUTIONS

- A. Do not adopt manual operation of automatically controlled systems unless a m function is apparent or automatic sistem operation will not upport the maintenance of a safety function.
- B. Systems shifted to manual operation must be monitored frequently to ensure correct operation.
- C. At least two independent indications should be used, when available, to evaluate and corroborate a specific plant condition since an incident could induce inconsistencies between instruments.
- D. If a pump or component fails, the cause of the failure should be determined prior to restarting or starting a standby pump or component to prevent a common failure.

II. ENTRY CONDITIONS

The below listing constitutes the most immediate and reliable indication of a reactor trip:

- A. Reactor Trip Bus U/V Relay Trip alarm.
- B. CEA Trip Circuit Breaker(s) Trip alarm(s).
- C. Rapidly decreasing Generator output.
- D. Protective Channel Trip alarm.
- E. RPS Trip Bistable Lights lit.

		EOP-0 Rev. 1/Unit 2 Page 4 of 13
III	. IMMEDIATE ACTIONS	ALTERNATE ACTIONS
A.	MONITOR REACTIVITY CONTROL:	
	 Depress one set of Manual Reactor Trip Buttons. 	
	 Ensure prompt drop in NI power. 	2.1 <u>IF</u> reactor <u>NOT</u> tripped, <u>THEN</u> de-energize CEDM Motor Generator Sets:
		a. Open feeder breaker to 22A 480V Bus.
		b. Open feeder breaker to 23A 480V Bus.
		c. Open tie breakers to 22A and 23A 480V Buses.
	 Ensure all CEAs fully inserted. 	3.1 <u>IF</u> one CEA fails to fully insert, <u>THEN</u> borate 200 ppm:
-		a. Open Boric Acid Direct Makeup Valve, 2-CVC-514-MOV.
		b. Start a Boric Acid Pump.
		c. Start all available Charging Pumps.
		3.2 <u>IF</u> more than one CEA fails to fully insert, <u>THEN</u> borate the RCS to 2300 ppm.
в.	MONITOR RCS PRESSURE AND INVENTORY CONTROL:	
	 Ensure pressurizer level stabilizes between 80 and 180 inches. 	1.1 Operate charging and letdown to restore pressurizer level.

EOP-O Rev. 1/Unit 2 Page 5 of 13

LII. IMMEDIATE ACTIONS

2. Ensure pressurizer pressure stabilizes between 1850 and 2275 PSIA. ALTERNATE ACTIONS

- Operate heaters and sprays to restore pressurizer pressure.
- 2.2 Verify PORVs open at 2400 PSIA and shut by 2300 PSIA.
- 2.3 <u>IF</u> RCS pressure decreases to 1725 PSIA, THEN verify SIAS actuation.
- 2.4 Implement RCP trip strategy:
 - a. <u>IF</u> RCS pressure decreases to 1725 PSIA, <u>THEN</u> trip 21A and 22B RCPs OR trip 21B and 22A RCPs.
 - b. <u>IF</u> positive LOCA indications exist:

5

- (1) RCS subcooling less than 30°F.
- (2) Steady S/G pressure.
- (3) S/G Blowdown RMS alarms clear, <u>OR</u> Main Vent Gaseous RMS (2-RI-5415) alarm clear.

AND RCS pressure decreases to less than 1300 PSIA, THEN trip all RCPs.

- c. <u>IF</u> RCS temperature and pressure are less than the minimum pump operating limits per the RCP curve on Attachment (1), THEN trip all RCPs.
- <u>IF</u> CIS has actuated, <u>THEN</u> trip all RCPs.

 Ensure KCS subcooling greater than 30°F.

			EOP-0 Rev. 1/Unit 2 Page 6 of 13
•	IMMEDIATE ACTIONS	A	LTERNATE ACTIONS
MON	ITOR CORE AND RCS HEAT OVAL:		
1.	Ensure both S/G levels above (-)170 inches.	1.1	<u>JF</u> S/G level decreases to (-)170 inches. <u>THEN</u> verify AFAS actuation.
2.	Ensure feed rate is maintaining a constant level or controlled increase in S/G level.	2.1	<pre>IF feed flow is lost OR excessive, THEN perform the following: a. Trip the S/G Feed Pumps. b. Shut the S/G Feedwater Isolation Valves.</pre>
			c. Initiate AFW when feed flow required.
3.	Ensure proper operation of Turbine Bypass and Atmospheric Dump Valves:	3.1	Operate Turbine Bypass or Atmospheric Dump Valves to restore S/G pressure and Tcold.
	a. S/G pressures stabilize between 850 and 920 PSIA.	3.2	IF S/G pressure decreases to 800 FSIA, THEN shut both MSIVs.
	b. Tcold stabilizes between 525 and 535°F.	3.3	IF S/G pressure decreases to 685 PSIA, THEN verify SGIS actuation.
MON	NITOR VITAL AUXILIARIES.	-	
1.	Ensure 21 or 24 4KV Bus energized.	1.1	<u>IF</u> both 4KV vital buses are de-energized, <u>THEN</u> start 21 or 12 D/G <u>AND</u> close the associated D/G output breaker.
	MON REM 1. 2.	 IMMEDIATE ACTIONS MONITOR CORE AND RCS HEAT REMOVAL: Ensure both S/G levels above (-)170 inches. Ensure feed rate is maintaining a constant level or controlled increase in S/G level. Ensure proper operation of Turbine Bypass and Atmospheric Dump Valves: a. S/G pressures stabilize between 850 and 920 PSIA. b. Tcold stabilizes between 525 and 535°F. MONITOR VITAL AUXILIARIES. Ensure 21 or 24 4KV Bus energized. 	IMMEDIATE ACTIONS A MONNTOR CORE AND RCS HEAT REMOVAL: 1.1 1. Ensure both 5/G levels above (-)170 inches. 1.1 2. Ensure feed rate is maintaining a constant level or controlled increase in S/C level. 2.1 3. Ensure proper operation of Turbine Bypass and Atmospheric Dump Valves: 3.1 a. S/G pressures stabilize between 850 and 920 PSIA. 3.2 b. Tcold stabilizes between 525 and 535°F. 3.3 MONITOR VITAL AUXILIARIES. 1.1

			EOP-0 Rev. 1/Unit 2 Page 7 of 13
III	IMMEDIATE ACTIONS	۸	LTERNATE ACTIONS
		1.2	IF the D/G fails to load, THEN perform the following:
			a. Verify D/G output breaker open.
			b. Place the 4KV Bus LOCI/SD Sequencer Manual Initiate Keyswitch in ON.
			c. Close the alternate 4KV feeder breaker.
Ε.	MONITOR NORMAL CONTAINMENT ENVIRONMENT:		•
	 Ensure containment pressure less than 0.7 PSIG. 	1.1	IF containment pressure increases to 2.8 PSIG, THEN verify ESFAS actuation:
			a. SIAS.
T			b. CIS AND trip all RCPs.
		1.2	<u>IF</u> containment pressure increases to 4.25 PSIG, <u>THEN</u> verify CSAS actuation.
	 Ensure containment temperature less than 120°F. 		
	 Ensure containment radiation monitor alarms clear. 		
Ξ.	MONITOR NORMAL RADIATION LEVELS EXTERNAL TO CONTAINMENT:		
	 Ensure Main Vent Gaseous RMS (2-RI-5415) alarm clear. 		
	 Ensure Condenser Off-Gas and S/G Blowdown RMS alarms clear. 	2.1	IF Condenser Off-Gas OR S/G Blowdown RMS alarm(s) received, THEN secure S/G Blowdown.



EOP-O Rev. 1/Unit 2 Page 9 of 13

BREAK IDENTIFICATION CHART

PRESSURIZER LEVEL CHANGING AND PRESSURIZER PRESSURE RAPIDLY DECREASING



ECP-0 Rev. 1/Unit 2 Page 10 of 13

IV. INITIAL SAFETY FUNCTION STATUS CHECK

- A. The STA (or person designated by the STA) will perform the safety function status check on entry into this procedure.
- B. Immediately notify Shift Supervisor or Control Room Supervisor if any safety function criteria is not being satisfied.
- C. Notify the Control Room Supervisor and Control Room Operator when initial status check is completed.
- D. Review and verify that safety function acceptance criteria are satisfied.

REACTIVITY	SAFETY FUNCTION ACCEPTANCE CRITERIA		
CONTROL PARAMETERS	CRITERIA STATUS CHE		
a. WRNI power	less than 5%		
b. SUR (DPM)	negative		
c. CEA status	all inserted		
or	or		
Boration status (GPM)	greater than 40		

EOP-0 Rav. 1/Unit 2 Page 11 of 13

RC	S PRESSURE AND	SAFETY FUNCTION ACCEFT	ANCE CRITERIA
IN FA	VENTORY RAMETERS	CRITERIA	STATUS CHECK
a.	Pressurizer pressure (PSIA)	1850 to 2275	
ь.	Pressurizer level (inches)	80 to 180	
с.	RCS subcooling (°F)	greater than 30	

PARAMETERS		CRITERIA	STATUS CHECK
a.	RCS Tcold (F)	525 to 535	
ь.	Thot minus Tcold ([°] F)	less than 10	
c.	# RCPs operating per loop	1 or 2	
d.	S/G pressure (PSIA)	850 to 920	
е.	S/G level (inches)	(-)170 to (+)30	

.

EOP-0 Rev. 1/Unit 2 Paga 12 of 13

VITAL	SAFETY FUNCTION ACCEPTANCE CRITERIA		
AUXILIARIES	CRITERIA	STATUS CHECK	
A. 4KV vital buses 21 or 24	energized		
). Instrument Air pressure (PSIG)	greater than 88		
<pre>. Component Cooling (# pumps running)</pre>	1 or 2		
l. Saltwater (# pumps running)	1 or 2 .		
. Service Water (# pumps running)	1 or 2		
. 125V DC buses 11, 12, 21, 22	energized		
1. 120V AC vital buses 21, 22, 23, 24	energized		
1. 208/120V Instrument Bus 21 or 22	energized		
NORMAL CONTAINMENT	SAFETY FUNCTION ACC	CEPTANCE CRITERIA	
ENVIRONMENT PARAMETERS	CRITERIA	STATUS CHECK	
a. Containment pressure (PSIG)	less than 0.7		
Containment temperature (^o F)	less than 120		
c. Containment level (inches)	less than 4		
d. Containment radiation	alarms clear		

EOP-0 Rev. 1/Unit 2 Page 13 of 13

1

NORMAL RADIATION	SAFETT FUNCTION ACCEPTANCE ONTERIN			
TO CONTAINMENT	CRITERIA	STATUS CHECK		
a. Noble Gas Monitor	alarm clear			
b. Condenser Off-Gas RMS	alarm clear			
c. S/G B/D RMS	alarm clear			
d. Main Vent Gaseous RMS (2-RI-5415)	alarm clear	Management - Management		

EOP-1 Rev. 1/Unit 1 Page 1 of 14

CALVERT CLIFFS NUCLEAR POWER PLANT

EOP-1 REACTOR TRIP

REVISION 1

DATE SIGNATURE 12/18/87 Amés PREPARED BY: Anov. 2-18-9 VERIFIED BY: 88-01-5 MEETING # 88-7 POSRC; 1 2-10-89 APPROVED BY; Managér-Nuclear Operations or General Supervisor-

Operations if POSRC review is not required

EOP-1 Rev. 1/Unit 1 Page 2 of 14

LIST OF LEFECTIVE PAGES

PAGE	NUMBER	REVISION
	1	1
	2	1
	3	1
	4	1
	5	1
	6	1
	7	1 1
	8	1
	9	1
	10	1
	11	1
	12	1
	13	1
	14	1

EOP-1 Rev. 1/Unit 1 Page 3 of 14

REACTOR TRIP

I. PRECAUTIONS

- A. Do not adopt manual operation of automatically controlled systems unless a malfunction is apparent or automatic system operation will not support the maintenance of a safety function.
- B. Systems shifted to manual operation must be monitored frequently to ensure correct operation.
- C. At least two independent indications should be used, when available, to evaluate and corroborate a specific plant condition since an incident could induce inconsistencies between instruments.
- D. If a pump or component fails, the cause of the failure should be determined prior to restarting or starting a standby pump or component to prevent a common failure.

II. ENTRY CONDITIONS

- A. Post-Trip Immediate Actions are completed.
- B. Safety Functions are within Acceptance Criteria of EOP-O.

		EOP-1 Rev. 1/Unit 1 Page 4 of 14
5	. RECOVERY ACTIONS	ALTERNATE ACTIONS
۸.	VERIFY POST-TRIP IMMEDIATE ACTIONS COMPLETED.	
3.	COMMENCE INTERMEDIATE SAFETY FUNCTION STATUS CHECK.	
e.	ONFIRM TURBINE TRIP:	
	 Check Turbine Stop Valves shut and speed decreasing. 	1.1 Depress Turbine Trip Button.
	 Check Turbine Generator output breakers open: 	2.1 <u>IF</u> an output breaker remains closed <u>AND</u> unable to confirm
	a. 11 Generator Bus Breaker, 552-22.	THEN shut both MSIVs.
	b. 11 Generator Tie Breaker, 552-23.	
	 Verify 11 Generator Field Breaker open. 	
	 Verify 11 Exciter Field Breaker open. 	
D.	RESTORE NORMAL PRESSURIZER LEVEL.	
	 Verify charging and letdown flow restoring pressurizer level to between 130 and 180 inches. 	
)		

EOP-1 Rev. 1/Unit 1 Page 5 of 14

Qa

-

Page 5 of 14 ALTERNATE ACTIONS
 1.1 <u>IF</u> Toold decreases to 525°F, <u>THEN</u> perform the following: a. Shut S/G Blowdown Valves: 1-BD-4010-CV 1-BD-4011-CV 1-BD-4013-CV b. Shut upstream drains by placing handswitch 1-HS-6622 in CLOSE. 1.2 <u>IF</u> Toold decreases to 518°F (800 PSIA S/G pressure), <u>THEN</u> perform the following: a. Shut both MSIVs. <u>CAUTION</u> - D/G supplying power to 13 AFW Pump flow limit is 300 GPM; otherwise, flow limit is 575 GPM. b. Start 13 AFW Pump. c. Shift Gland Seal to Auxiliary Steam by performing the following: (1) Verify Auxiliary Steam available.

the s

1.20

..

EOP-1 Rev. 1/Unit 1 Page 6 of 14 ALTERNATE ACTIONS III. RECOVERY ACTIONS (2) Open Aux Steam To Gland Seal Valve, 1-TGS-4678-MOV. (3) Shut Main Steam To Cland Seal Valve, 1-TGS-4659-MOV. 2. Verify MSR Second Stage Steam Source Valves shut: 1-MS-4025-MOV 1-MS-4026-MOV 3. Verify Main Feed Regulating Valves shut and S/G feed rate allowing proper temperature control. G. RESTORE NORMAL S/G WATER LEVEL: - CAUTION -Severe waterhammer may occur if Main Feed Ring is allowed to drain then subsequently refilled. 1. Establish a shutdown feed system lineup: 1.a.1. IF S/G Feed Pump NOT a. One operating S/G available, Feed Pump. THEN perform the following: - CAUTION -D/G supplying power to 13 AFW Pump flow limit is 300 GM; otherwise, flow limit is 573 GPM. a. Start an AFW Pump. b. Shut S/G Feedwater Isciation Valves: 1-FW-4516-MOV 1-FW-4517-MOV

EOP-1 Rev. 1/Unit 1 Page 7 of 14

III. RECOVERY ACTIONS

- One operating Condensate Booster Pump.
- One operating Condensate Pump.
- d. Both Heater Drain Pumps secured.
- 2. Ensure Main Feed rate:
 - a. Slowly increasing S/G level.
 - b. Maintaining Toold between 525 and 535°F.

- WHEN manual control of feed flow rate desired OR S/G levels between (-)24 and (+)30 inches, THEN perform the following:
 - a. Depress Feed Regulating Bypass Valve Reset Buttons.
 - Adjust Feed Regulating Bypass Valves to raise S/G levels to approximately 0 inches.
- WHEN S/G levels are 0 inches, THEN shift Feed Regulating Bypass Controllers to AUTO.
- 5. <u>IF S/G level exceeds (+)30</u> inches during the recovery, <u>THEN iscalate appropriate</u> feed sain:
 - a. Ant appropriate Feed Segulating Bypass Valve.
 - b. Shut appropriate Main Feed Regulating Valve.
 - c. Shut appropriate S/G Feedwater Isolation Valve.

ALTERNATE ACTIONS

- 2.1 Operate AFW to:
 - a. Slowly raise S/G level to between 0 f.d (+)30 inches.
 - b. Maintain Tcold between 525 and 535 F.
- 2.2 WHEN S/G level is between O and (+)30 inches AND Main Feed is available, THEN initiate Main Feed.

5.1 IF operating AFW AND S/G level exceeds (+) 30 inches, THEN shut appropriate AFW Flow Control Valves:

3 5 10 200	3 3	8 10	м.
11 5/6	14	2/0	2
AN		a second to be a second of	

1-AFW-4511-CV 1-AFW 1-AFW-4525-CV 1-AFW

1-AFW-4512-CV 1-AFW-4535-CV

EOP-1 Rev. 1/Unit 1 Page 8 of 14

RECOVERY ACTIONS 6.1 IF S/G level siceeds 6. (+)50 inches AND increasing, THEN trip both S/G Feed Pumps.

7. IF S/G level exceeds (+)63.5 inches, THEN shut appropriate MS_V.

III.

8. WHEN recovery from high level condition accomplished, THEN establish Main Feed OR AFW flow.

ENSURE SAFE TURBINE COASTDOWN:

- 1. Start Turning Gear Oil Pump.
- 2. Start Motor Suction Pump.
- 3 Start Turbine Oil Lift Pumps.
- 4. Start computer typed trend blocks 1 and 2 (turbine bearing temperatures) on a 1 minute update frequency.
- 5. Continue Main Turbine shutdown per OI-43A.

I. VERIFY FINAL SAFETY FUNCTION STATUS CHECK SATISFACTORY AND COMPLETE ADMINISTRATIVE POST-TRIP ACTIONS.

ALTERNATE ACTIONS

IF operating AFW AND S/G level exceeds (+)50 inches, THEN shut appropriate A"W Block valves:

11 5/6 16 5/0	11	S/G		12 S/G
---------------	----	-----	--	--------

1-AFW-4520-2V	1-AFW-4530-CV
1-AFW-4521-CV	1-AFW-4531-CV
1-AFW-4522-CV	1-AFW-4532-CV
1-AFW-4523-CV	1-AFW-4533-CV

EOP-1 Rev. 1/Unit 1 Fage 9 of 14

8

J. ADMINISTRATIVE POST-TRIP ACTIONS:

- NOTE -

The following actions may be accomplished whenever feasible. They may be done in any order.

- ___ 1. Perform notifications per CCI-118.
- ____ 2. Notify ESO of trip.
- 3. Request RCS boron sample.
 - 4. Perform shutdown margin calculation per NEOG 2 and 7.
 - 5. Document trip in transient log.
 - 6. Recall post-trip review (preferably within 30 minutes of trip).
 - 7. .erform post-trip review per CCI-111.
 - 8. Implement Reactor Trip Recovery (AOP-8) or appropriate operating procedures.

END OF SECTION III.

EOP-1 Rev. 1/Unit 1 Page 10 of 14

...

IV. SAFETY FUNCTION STATUS CHECK

-

10. 22.

- A. The STA (or person designated by STA) will perform the intermediate and final safety function checks respectively on entry and prior to exiting from this procedure.
- B. Perform intermediate safety function status checks at 10 minute intervals until plant conditions stabilize.
- C. Immediately notify Shift Supervisor or Control Room Supervisor if any safety function criteria is not being satisfied.
- D. Review data and verify that safety function acceptance criteria are satisfied.
- E. When ZOP completed, then perform final safety function check.

1	RE	ACTIVITY CONTROL	SAFETY FUNCTION ACCEPTANCE CRITERIA			
	TARAPETERS	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK	
)	а.	WRNI power	less than 3%		less than 1%	
	b.	SUR (DPM)	negative		0	
	с.	CEA status	all inserted	*********	all inserted	
		or				
		Boration status:				
		concentration	increasing	*********	appropriate S/D margin	
		BAST level	decreasing	*********	N/A	N/A
EOP-1 Rev. 1/Unit 1 Page 11 of 14

ť

k

RC	S PRESSURE AND	SAFETY	SAFETY FUNCTION ACCEPTANCE		
PA	RAMETEPS	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL
а.	Pressurizer pressure (PSIA)	1850 to 2275		2225 to 2275	
b.	Pressurizer pressure trend (PSIA)	trending towards 2250		N/A	
c.	Pressurizer level (inches)	101 to 180		130 to 180	
d.	Pressurizer level trend (inches)	trending Lowards 160		N/A	
е.	RCS subcooling (°F)	30 to 140		30 to 140	******
CORE	RE AND RCS HEAT	SAFETY FUNCTION ACCEPTANCE CRITERIA			
		CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL
а.	RCS Tcold ([°] F)	525 to 535	*******	530 to 535	
b.	Thot minus Tcold (°F)	less than 5	**********	less than 5	
c.	<pre># RCPs operating per loop</pre>	1 or 2		1 or 2	
d.	S/G pressure (PSIA)	850 to 920		885 to 920	
е.	S/G level (inches)	(-)170 to (+)3	30	(-)24 to (+)30	<u> </u>
f.	S/G level trend (inches)	trending towards O		trending towards 0	

61-

....

¢

1

80

22

EOP-1 Rev. 1/Unit 1 Page 12 of 14

ŝ

-

7

VITAL AUXILIARIES		TAL AUXILIARIES	SAFETY FUNCTION ACCEPTANCE CRITERIA				
			CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK	
	а.	4KV vital buses 11 or 14	energized		energized		
	b.	Instrument Air pressure (PSIG)	greater than 88		greater than 88		
	c.	Component Cooling (# pumps running)	1 or 2		1 or 2		
	d.	Saltwater (# pumps running)	1 or 2		1 or 2		
	е.	Service Water (# pumps running)	1 or 2		1 or 2		
	f.	125V DC buses 11, 12, 21, 22	energized		energized		
	g.	120V AC vital buses 11, 12, 13, 14	energized		energized		
	h.	Condenser vacuum (IN Hg)	greater than 20		greater than 20		

1

.

EOP-1 Rev. 1/Unit 1 Fage 13 of 14

.

NORMAL CONTAINMENT ENVIRONMENT PARAMETERS		SAFETY FUNCTION ACCEPTANCE CRITERIA				
		CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK	
a	. Containment pressure (PSIG)	less than 0.7		less than 0.7		
b	. Containment temperature (°F)	less than 120		less than 120		
c	. Containment Gaseous Radiation RMS	alarm clear	i	alarm clear		
d	. Containment level (inches)	less than 4		less than 4		

EOP-1 Rev. 1/Unit 1 Page 14 of 14

LEVELS EXTERNAL TO CONTAINMENT		CRITERIA	INTERMEDIATE	CRIT	ERIA	FINA
		ONTIDATA	CHECK			CHECH
a.	Noble Gas Monitor	alarm clear		alarm	clear	
b.	Condenser Off-Gas RMS	alarm clear		alarm	clear	
c,	S/G B/D RMS	alarm clear		alarm	clear	-
d.	Main Vent Gaseous RMS (1-RI-5415)	alarm clear		alarm	clear	
	S	NUMBER		COMPLETE TIME	AT	
		1			_ 0	
		2			-	
		3			-	
		4				
					-	
					_	

f

EOP-1 Rev. 1/Unit 2 Page 1 of 14

.

٠

CALVERT CLIFFS NUCLEAR POWER PLANT

EOP-1 REACTOR TRIP

REVISION 1

PREPARED BY;	SIGNATURE	DATE 12.18.87
VERIFIED BY;	James K. Shooms	1 12/18/87
POSRC;	MEETING # 98-7	1 2-10-88
APPROVED BY;	Manager-Nuclear Operations or Operations if POSRC review is	/ 2-10-8% General Supervisor- not required

.

.

EOP-1 Rev. 1/Unit 2 Page 2 of 14

LIST OF EFFECTIVE PAGES

AGE	NUMBER	REVISION
	1	1
	3	1
	3	1
	4	1
	5	1
	6	1
	7	' 1
	8	1
	9	1
	10	1
	11	1
	12	1
	13	1
	14	1

EOP-1 Rev. 1/Unit 2 Page 3 of 14

REACTOR TRIP

I. PRECAUTIONS

- A. Do not adopt manual operation of automatically controlled systems unless a malfunction is apparent or automatic system operation will not support the maintenance of a safety function.
- B. Systems shifted to manual operation must be monitored frequently to ensure correct operation.
- C. At least two independent indications should be used, when available, to evaluate and corroborate a specific plant condition since an incident could induce inconsistencies between instruments.
- D. If a pump or component fails, the cause of the failure should be determined prior to restarting or starting a standby pump or component to prevent a common failure.

II. ENTRY CONDITIONS

- A. Post-Trip Immediate Actions are completed.
- B. Safety Functions are within Acceptance Criteria of EOP-0.

5	. RECOVERY ACTIONS	EOP-1 Rev. 1/Unit 2 Page 4 of 14 ALTERNATE ACTIONS
Α.	VERIFY POST-TRIP IMMEDIATE ACTIONS COMPLETED.	
в.	COMMENCE INTERMEDIATE SAFETY FUNCTION STATUS CHECK.	
с.	CONFIRM TURBINE TRIP:	
	 Check Turbine Throttle Valves shut and speed decreasing. 	1.1 ,Depress Turbine Trip Button.
	 Check Turbine Generator output breakers open: a. 21 Generator Bus Breaker, 552-61. 	2.1 <u>IF</u> an output breaker remains closed <u>AND</u> unable to confirm Turbine Throttle Valves shut, <u>THEN</u> shut both MSIVs.
,	 b. 21 Generator Tie Breaker, 552-63. Verify 23 Freiter Field 	
	Breaker open.	
D.	RESTORE NORMAL PRESSURIZER LEVEL.	
	 Verify charging and letdown flow restoring pressurizer level to between 130 and 180 inches. 	
•		

EOP-1 Rev. 1/Unit 2 Page 5 of 14

Page 5 of 14 ALTERNATE ACTIONS RECOVERY ACTIONS III. RESTORE NORMAL PRESSURIZER Ε. PRESSURE. Vorify heaters or sprays 1. restoring pressurizer pressure to between 2225 and 2275 PSIA. F. MAINTAIN Toold BETWEEN 525 AND 535 F: 1.1 . IF Toold decreases to 525°F, Verify proper operation of 1. THEN perform the following: Turbine Bypass and Atmospheric Dump Valves. a. Shut S/G Blowdown Valves: 2-BD-4010-CV 2-BD-4011-CV 2-BD-4012-CV 2-BD-4013-CV Shut upstream drains by b. . placing handswitch 2-HS-6622 in CLOSE. 1.2 IF Tcold decreases to 518°F (800 PSIA S/G pressure), THEN perform the following: a. Shut both MSIVs. - CAUTION -D/G supplying power to 23 AFW Pump flow limit is 300 GPM; otherwise, flow limit is 575 GPM. b. Start 23 AFW Pump. Shift Gland Seal to C. Auxiliary Steam by performing the following: (1) Verify Auxiliary Steam available.

EOP-1 Rev. 1/Unit 2 Page 6 of 14

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

- (2) Open Aux Steam To Gland Seal Valve, 2-TGS-4684-MOV.
- (3) Shut Main Steam To Gland Seal Valve, 2-TGS-4659-MOV.

 Depress Reset Button on MSR Control Panel and verify Second Stage Steam Source Valves shut:

> 2-MS-4017-CV 2-MS-4018-CV 2-MS-4019-CV 2-MS-4020-CV

 Verify Main Feed Regulating Valves shut and S/G feed rate allowing proper temperature control.

RESTORE NORMAL S/G WATER LEVEL:

- CAUTION -

Severe waterhammer may occur if Main Feed Ring is allowed to drain then subsequently refilled.

- Establish a shutdown feed system lineup:
 - One operating S/G Feed Pump.

1.a.1. IF S/G Feed Pump NOT
 available,
 THEN perform the following:

- CAUTION -

D/G supplying power to 23 AFW Pump flow limit is 300 GPM; otherwise, flow limit is 575 GPM.

- a. Start an AFW Pump.
- b. Shut S/G Feedwater Isolation Valves:

2-FN-4516-MOV 2-FW-4517-MOV

EOP-1 Rev. 1/Unit 2 Page 7 of 14

111. RECOVERY ACTIONS

- One operating Condensate Booster Pump.
- One operating Condensate Pump.
- d. Both Heater Drain Pumps secured.
- 2. Ensure Main Feed rate:
 - a. Slowly increasing S/G level.
 - b. Maintaining Toold between 525 and 535°F.

- <u>hHEN</u> manual control of feed flow rate desired <u>OR</u> S/G levels between (-)24 and (+)30 inches, <u>THEN</u> perform the following:
 - Depress Feed Regulating Bypass Valve Reset Buttons.
 - Adjust Feed Regulating Bypass Valves to raise S/G levels to approximately O inches.
- WHEN S/G levels are 0 inches, <u>THEN</u> shift Feed Regulating Bypass Controllers to AUTO.
- <u>IF</u> S/G level exceeds (+)30 inches during the recovery, <u>THEN</u> isolate appropriate feed train:
 - a. Shut appropriate Feed Regulating Bypass Valve.
 - Shut appropriate Main Feed Regulating Valve.
 - c. Shut appropriate S/G Feedwater Isolation Valve.

ALTERNATE ACTIONS

- 2.1 Operate AFW tc:
 - a. Slowly raise S/G level to between 0 and (+)30 inches.

i ...

- b. Maintain Tcold between 525 and 535 F.
- 2.2 <u>WHEN</u> S/G level is between O and (+)30 inches <u>AND</u> Main Feed is available, THEN initiate Main Feed.

5.1 <u>IF</u> operating AFW <u>AND</u> S/G level exceeds (+) 30 inches, <u>THEN</u> shut appropriate AFW Flow Control Valves:

21 S/G	22	S/	G
--------	----	----	---

2-AFW-4511-CV	2-AFW-4512-CV
2-AFW-4525-CV	2-AFW-4535-CV

EOP-1 Rev. 1/Unit 2 Page 8 of 14

111.		RECOVERY ACTIONS		LTERNATE ACTIONS	
	6.	<pre>IF S/G level exceeds (+)50 inches AND increasing, THEN trip both S/G Feed Pumps.</pre>	6.1	IF operating AF level exceeds (<u>THEN</u> shut appro Block valves:	W AND S/G +)50 inches, priate AFW
			1	21 S/G	22 S/G
				2-AFW-4520-CV 2-AFW-4521-CV 2-AFW-4522-CV 2-AFW-4523-CV	2-AFW-4530-CV 2-AFW-4531-CV 2-AFW-4532-CV 2-AFW-4533-CV
	7.	<pre>IF S/G level exceeds (+)63.5 inches, THEN shut appropriate MSIV.</pre>			
	а.	WHEN recovery from high level condition accomplie 'd, THEN establish Main Feed OR AFW flow.			
	ENS	URE SAFE TURBINE COASTDOWN:			
	1.	Start Bearing Oil Pump.			
	2.	Start Turbine Oil Lift Pump.	1.5		
	3.	Start computer group display #1 (turbine bearing temperatures) on a 1 minute update frequency.			
	4.	Continue Main Turbine shutdown per OI-43A.			
Ι.	VEF ST/ CON	RIFY FINAL SAFETY FUNCTION ATUS CHECK SATISFACTORY AND MPLETE ADMINISTRATIVE POST-TRIP FIONS.			
			1.1	A CONTRACTOR OF A	al a barrieta

EOP-1 Rev. 1/Unit 2 Page 9 cf 14 4

10

10

J. ADMINISTRATIVE POST-TRIP ACTIONS:

J

.

- NOTE -

The following actions may be accomplished whenever feasible. They may be done in any order.

- 1. Perform notifications per CCI-118.
- Notify ESO of trip.
- Request RCS boron sample.
- 4. Perform shutdown margin calculation per NEOU 9 and 11.
- Document trip in transient log.
 - Recall post-trip review (pref. sably within 30 minutes of trip).
 - 7. Perform post-trip review per CCI-111.
 - 8. Implement Reactor Trip Recovery (AOP-8) or appropriate operating procedures.

END OF SECTION I'I.

EOP-1 Rev. 1/Unit 2 Page 10 of 14

IV. SAFETY FUNCTION STATUS CHECK

- A. The STA (or person designated by STA) will perform the intermediate and final safety function checks respectively on entry and prior to exiting from this procedure.
- B. Perform intermediate safety function status checks at 10 minute intervals until plant conditions stabilize.
- C. Immediately notify Shift Supervisor or Control Room Supervisor if any safety function criteria is not being satisfied.
- D. Review data and verify that safety function acceptance criteria are satisfied.
- E. When EOP completed, then perform final safety function check.

REACTIVITY CONTROL	SAFETY FUNCTION ACCEPTANCE CRITERIA			
PARAMETERS	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK
a. WRNI power	less than 3%	*********	less than 1%	
b. SUR (DPM)	negative		0	
c. CEA status	all inserted	*********	all inserted	
or				
Boration status:			appropriate	
concentration	increasing		S/D margin	
BAST level	decreasing	*********	N/A	N/A

EOP-1 Rev. 1/Unit 2 Page 11 of 14 SAFETY FUNCTION ACCEPTANCE URITERIA RCS PRESSURE AND INVENTORY INTERMEDIATE CRICERIA FINAL CRITERIA PARAMETERS CHECK CHECK a. Pressurizer 2225 to 2275 1850 to 2275 pressure (PSIA) trending b. Pressurizer N/A pressure trend towards 2250 (PSIA) c. Pressurizer level 130 to 180 101 to 180 (inches) d. Pressurizer level trending N/A towards 160 trend (inches) -----30 to 140 e. RCS subcooling 30 to 140 (°F) SAFETY FUNCTION ACCEPTANCE CRITERIA CORE AND RCS HEAT REMOVAL PARAMETERS CRITERIA FINAL INTERMEDIATE CRITERIA CHECK CHECK a. RCS Tcold (°F) 530 to 535 525 to 535 b. Thot minus Tcold less than 5 less than 5 (F) c. # RCPs operating 1 or 2 1 or 2 per loop d. S/G pressure 885 to 920 850 to 920 (PSIA) ____ e. S/G level (-)170 to (+)30 (-)24 to (+)30 (inches) trending trending f. S/G level trend towards O towards 0 (inches) and the second second second second

EOP-1 Rev. 1/Unit 2 Page 12 of 14

**

V1	TAL AUXILIARIES	SAFETY FUNCTION ACCEPTANCE CRITERIA			
		CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK
а.	4KV vital buses 21 or 24	energized		energized	New York, State
b.	Instrument Air pressure (PSIG)	greater than 88		greater than 88	
с.	Component Cooling (# pumps running)	1 or 2		1 or 2	
d.	Saltwater (# pumps running)	1 or 2	1	l or 2	1
е.	Service Water (# pumps running)	1 or 2	*********	l or 2	-
f.	125V DC buses 11, 12, 21, 22	energized		energized	-
g.	120V AC vital buses 21, 22, 23, 24	energized	*********	energized	
h.	Condenser vacuum (IN Hg)	greater than 20		greater than 20	

EOP-1 Rev. 1/Unit 2 Page 13 of 14

s.

NORMAL CONTAINMENT ENVIRONMENT PARAMETERS		SAFETY	FUNCTION ACCEN	PTANCE CRITERIA	
		CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK
а.	Containment pressure (PSIG)	less than 0.7		less than 0.7	
b.	Containment temperature (^O F)	less than 120		less than 120	-
с.	Containment Gaseous Radiation RMS	alarm clear		alarm clear	
d.	Containment level (inches)	less than 4		less than 4	*****

EOP-1 Rev. 1/Unit 2 Page 14 of 14

NORMAL RADIATION LEVELS EXTERNAL TO CONTAINMENT		SAFETY FUNCTION ACCEPTANCE CRITER				۱	
		CRITERIA	INTERMEDIATE CHECK	CRITERIA		FINAL CHECK	
a .	Noble Gas Monitor	alarm clear		alarm	clear		
b.	Condenser Off-Gas RMS	alarm clear		alarm	clear		
с.	S/G B/D RMS	alarm clear		alarm	clear		
d.	Main Vent Gaseo RMS (2-RI-5415)	us alarm clear	•	alarm	clear		
		STATUS CHECK NUMBER		COMPLETE TIME	лт		
		1			49.1		
	•	2			4		
		3			4		
		4			_		
					- 2007 		
				some dense income			
				-			

EOP-2 Rev. 1/Unit 1 Page 1 of 27

CALVERT CLIFFS NUCLEAR POWER PLANT

EOP-2 LOSS OF OFFSITE POWER

REVISION 1

SIGNATURE

1

DATE

PREPARED BY;	Jamps V. Strooms	112/18/87
VERIFIED BY;	In reght	12-18-87
POSRC;	MEETING # 88-7	1 2-10-88
APPROVED BY;	Manager-Nuclear Operations or Manager-Nuclear Operations or	General Supervisor-

EOP-2 Rev. 1/Unit 1 Page 2 of 27

LIST OF EFFECTIVE PAGES

EOP-2 Rev. 1/Unit 1 Page 3 of 27

LOSS OF OFFSITE POWER

I. PRECAUTIONS

- A. Do not adopt manual operation of automatically controlled systems unless a malfunction is apparent or automatic system operation will not support the maintenance of a safety function.
- B. Systems shifted to manual operation must be monitored frequently to ensure correct operation.
- C. At least two independent indications should be used, when available, to evaluate and corroborate a specific plant condition since an incident could induce inconsistencies between instruments.
- D. In Natural Circulation, increased loop transport time causes a 5 to 10 minute delay in temperature responses to a plant change. Pressurizer level and pressure responses typically provide better indication of RCS response during this period.
- E. If cooling down with a S/G isolated, an inverted delta T (Tcold higher than Thot) may be observed in the idle loop. This is due to a small amount of reverse heat transfer in the isolated S/G. The inverted delta T is not expected to have any significant effect on natural circulation flow in the operating S/G loop.
- F. The concentration of boron in RCS makeup water should be consistent with maintaining the required shutdown margin.
- G. Minimize the number of cycles of pressurizer auxiliary spray when the temperature differential is greater than 400°F.
- H. Excessive Diesel Generator loading can result if a SIAS is received and the LOCI sequencer actuates. Non-vital loads should be manually shed immediately upon receiving a SIAS.
- If a pump or component fails, the cause of the failure should be determined prior to restarting or starting a standby pump or component to prevent a common failure.

EOP-2 Rev. 1/Unit 1 Page 4 of 27

II. ENTRY CONDITIONS

The presence of one or more of the following conditions indicates that a Loss Of Offsite Power may have occurred:

- A. Momentary loss of Control Room lighting on both Units.
- B. 500KV Red and Black Bus power avai!able lights de-energized.
- C. Diesel Generators running.
- D. 12 and 22 Service Bus 13KV power available lights de-energized.
- E. No RCPs running on either Unit.
- F. Reactor Trip due to RCS low flow.

EOP-2 Rev. 1/Unit 1 Page 5 of 27

....

b ¹¹¹	. RECOVERY ACTICNS	ALTERNATE ACTIONS		
Α.	VERIFY POST-TRIP IMMEDIATE ACTIONS COMPLETED.			
в.	COMMENCE INTERMEDIATE SAFETY FUNCTION STATUS CHECK.			
c.	DETERMINE APPROPRIATE EMERGENCY RESPONSE ACLIONS PER THE ERPIP.			
ŋ.	FROTECT RCS FROM EXCESSIVE COOLDOWN AND CONDENSER FROM OVERPRESSURE:			
	 Shut both MSIVs. Shut S/G Blowdown Valves: 1-BD-4010-CV 1-BD-4011-CV 1-BD-4012-CV 1-BD-4013-CV 			
Ε.	ESTABLISH S/G HEAT SINK:			
	 Establish S/G heat removal: a Shift Atmospheric Dump Controller to MANUAL. 	-NOTE- Atmospheric Dump Valves are reverse acting, i.e., clockwise to open, counterclockwise to shut.		
	b. Operate Atmospheric Dump Valves to return Tcold to between 520 and 530°F.	1.b.1 IF Atmospheric Dump Valves will NOT operate from Control Room, THEN locally operate Atmospheric Dump Valves on 45 ft Aux Building.		

.

EOP-2 Rev. 1/Unit 1 Page 6 of 27

I. R	ECOVERY ACTIONS	AL	TERNATE ACTIONS	
	김희희 중 한 것은 것 같은 것		- CAUTION -	
2.	Establish feedwater flow to S/Gs:	13 AF	Pump flow limit is 300 GPM powered from D/C.	
	a. Start 11 or 12 AFW Pump by opening AFW Steam Supply Valves:	2.a.1	<u>IF</u> steam driven pumps <u>NOT</u> available, <u>THEN</u> start 13 AFW Pump.	
	1-MS-4070-CV 1-MS-4071-CV			
	 b. Adjust AFW Flow Control Valves to restore and maintain S/G levels between (-)170 and (+) 30 inches and trending towards 0 inches. 			
RES	RESTORE COMPONENT COOLING FLOW:			
1.	IF RCP lower seal temperature less than 280°F, THEN start a Component Cooling Pump.	1.1	<pre>IF seal temperature above 230°F, THEN perform the following: a. Shut Component Cooling Supply Containment Isolation Valve, 1-CC-3832-CV.</pre>	
			 b. Start a Component Cooling Pump. 	
2.	Verify Component Cooling Heat Exchanger on service is being supplied from an operating Saltwater Header.			
		1. 1.		

EOP-2 Rev. 1/Unit 1 Page 7 of 27

RECOVERY ACTIONS	ALTERNATE ACTIONS		
URCES TO ELECTRICAL SYSTEM:			
 - CAUTION - f only one D/G is available. tarting additional loads may ause an overload condition. Iternate operation of equipment ay be required to prevent this ondition. Align 12 D/G to Unit with largest power requirement or with redundant safety related equipment out of service. Consider use of SMECO Tie for supplying loads per OI-27E. 			
 Service Water Pump(s). Saltwater Pump(s). Instrument Air Compressor. 11 or 12 Control Room Ventilation. Switchgear Room Ventilation. 			
	AIGN OTHER AVAILABLE POWER URCES TO ELECTRICAL SYSTEM: - CAUTION - Conly one D/G is available. Carting additional loads may use an overload condition. Cernate operation of equipment by be required to prevent this ondition. Align 12 D/G to Unit with largest power requirement or with redundant safety related equipment out of service. Consider use of SMECO Tie for supplying loads per OI-27E. ERIFY SHUTDOWN SEQUENCER LOADS PERATING: Service Water Pump(s). Instrument Air Compressor. 11 or 12 Control Room Ventilation. Switchgear Room Ventilation. F STEAM DRIVEN AFW PUMP A CAILABLE,		

EOP-2 Rev. 1/Unit 1 Page 8 of 27

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

*

1.	Verify S/G Feed Pumps tripped.	
2.	Place Condensate Booster Pumps in PULL-TO-LOCK.	
3.	Place Condensate Pumps in PULL-TO-LOCK.	
4.	Place Heater Drain Pumps in PULL-TO-LOCK.	
5.	Shut S/G Feedwater Isolation Valves:	
	1-FW-4516-MOV 1-FW-4517-MOV	
CON	NFIRM NATURAL CIRCULATION AT LEAST ONE LOOP:	
	- NOTE -	
Wid fro Att	de range Thot may be obtained om Subcooled Margin Monitor per tachment (10).	
1.	Thot minus Tcold between 10 and 50°F.	
2.	Tcold constant or decreasing.	
з.	Thot constant or decreasing.	

5. Steaming rate affects primary temperature.

EOP-2 Rev. 1/Unit 1 Page 9 of 27

LII. RECOVERY ACTIONS

ALTERNATE ACTIONS

- L. RESTORE REACTOR MCCs AND INSTRUMENT BUSES:
 - 1. IF 11 4KV Bus is energized AND 14 4KV Bus is NOT energized, THEN tie MCC-104 to MCC-114:
 - Open MCC-104 Main Feeder Breaker, 52-10401.
 - b. Close MCC-104 Tie Bres'er, 52-10420.
 - c. Close MCC-114 Tie Breaker, 52-11420.
 - 2. <u>IF</u> 14 4KV Bus is energized <u>AND</u> 11 4KV Bus is <u>NOT</u> energized, <u>THEN</u> tie MCC-114 to MCC-104:
 - a. Open MCC-114 Main Feeder Breaker, 52-11401.
 - Close MCC-114 Tie Breaker, 52-11420.
 - c. Close MCC-104 Tie Breaker, 52-10420.
- M. MAINTAIN PRESSURIZER LEVEL BETWEEN 101 AND 180 INCHES:
 - 1. Open Loop Charging Valves:
 - 1-CVC-518-CV 1-CVC-519-CV
 - Shut Auxiliary Spray Valve, 1-CVC-517-CV.

EOP-2 Rev. 1/Unit 1 Page 10 of 27

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

- 3. Verify at least one Charging Pump operating.
- Shift Letdown Control Valve Controller, 1-HIC-110, to MANUAL.
- Adjust controller to shut Letdown Control Valves.
- 6. Open Letdown Isolation Valves:

1-CVC-513-CV 1-CVC-516-CV

- NOTE -

Degasifier Pumps are powered from non-vital power supply. Excessive diversion may cause Degasifier to overfill.

- 7. Slowly open the Letdown Control Valve noting the increase in letdown pressure as read on 1-PIC-201, until 1-PIC-201 takes control of the Letdown Backpressure Regulating Valve.
- Allow temperatures to stabilize, then shift 1-HIC-110 to AUTO.

N. RESTORE RCS PRESSURE TO BETWEEN 2225 AND 2300 PSIA:

- Operate 11 or 13 Backup Heaters as necessary to raise RCS pressure:
 - a. Charge closing spring using manual lever st 480V breakers 52-1127 and 52-1427.
 - Push the PUSH-TO-CLOSE button on breaker fronts.

EOP-2 Rev. 1/Unit 1 Page 11 of 27

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

- <u>IF</u> pressure exceeds 2300 PSIA, <u>THEN</u> initiate Auxiliary Spray:
 - a. Record temperature differential between Pressurizer and Regenerative Heat Exchanger Outlet.
 - Open Auxiliary Spray Valve, 1-CVC-517-CV.
 - c. Shut Loop Charging Valves:

1-CVC-518-CV 1-CVC-519-CV

d. Shift 1-HIC-100 to MANUAL and shut Pressurizer Spray Valves:

> 1-RC-100E-CV 1-RC-100F-CV

- O. MAINTAIN RCS SUBCOOLING BETWEEN 30 AND 140°F:
 - Raise subcooling by any of the following:
 - a. Securing Auxiliary Spray.
 - Energizing Pressurizer Heaters.
 - Lower subcooling by any of the following:
 - Securing Pressurizer Heaters.
 - Initiating Auxiliary Spray.

EOP-2	2		
Rev.	1/1	Jnit	t 1
Page	12	of	27

TI. RECOVERY ACTIONS				ALTE	RNATE ACTIONS
•	VERIFY EMERCENCY DC PUMP OPERATION:				
	1.	Turbine Emergency Oil Pump.			
	2.	Emergency H ₂ Seal Oil Pump.			
	3.	S/G Feed Sump Emergency Oil Pumps.			
•	IF THE	RCS COOLDOWN IS EXPECTED, N COMMENCE RCS BORATION:			
	1.	Shut VCT Makeup Valve, 1-CVC-512-CV.		4	
	2.	Open Boric Acid Direct Makeup Valve, 1-CVC-514-MOV.			
	3.	Start a Boric Acid Pump.	3.1	IF ava THE	Boric Acid Pumps <u>NOT</u> ilable, N establish gravity feed:
				a.	Open BAST Gravity Feed Valves:
					1-CVC-508-MOV 1-CVC-509-MOV
				b.	Shut VCT Outlet Valve, 1-CVC-501-MOV.
	4.	Start all available Charging Pumps.			
	5.	WHEN shutdown margin requirement of NEOG-7 is achieved, THEN secure boration:			
		a. Open VCT Outlet Valve, 1-CVC-501-MOV.			
		b. Stop Boric Acid Pump(s).			

EOP-2 Rev. 1/Unit 1 Page 13 of 27

III. RECOVERY ACTIONS

- c. Shut Boric Acid Direct Makeup Valve, 1-CVC-514-MOV.
- d. Shut BAST Gravity Feed Valves:

1-CVC-508-MOV 1-CVC-509-MOV

R. ENERGIZE SUPPORT EQUIPMENT AS NECESSARY TO FACILITATE SHUTDOWN AND VERIFY LOAD REMAINS WITHIN RATINGS:

- CAUTION -

If the following load limits can be maintained, actuation of the LOCI Sequencer will not cause a D/G overload condition:

without 13 AFW Pump - 1400 KW with 13 AFW Pump - 1800 KW

These limits may be exceeded if additional power is required to safely, efficiently shut down the plant. The D/G should not be operated above 3250 KW.

- CAUTION -

SMECO load limit is 260 AMPS.

- 1. Start a Main Exhaust Fan.
- Start a Cavity Cooling Fan as needed to maintain cavity cooling temperature below 200°F.
- Start Containment Air Cooler(s) in LOW as necessary to maintain containment temperature below 120°F.

ALTERNATE ACTIONS

EOP-2 Rev. 1/Unit 1 Page 14 of 27

III RECOVERY ACTIONS

ALTERNATE ACTIONS

- 4. <u>IF</u> "SFP LEVEL TEMP HI" alarm received <u>THEN</u> start Spent Fuel Pool Cooling Pump(s).
- Strip MCC-101AT and MCC-101BT cf all loads, by opening individual MCC breakers.
- 6. <u>IF</u> 11 4KV Bus is energized <u>AND</u> 14 4KV Bus is <u>NOT</u> energized, <u>THEN</u> tie MCC-101BT to MCC-101AT:
 - a. Close MCC-101AT Feeder Breaker, 52-1109.
 - b. Open MCC-101BT Main Feeder Breaker, 52-10141.
 - c. Close Tie Breakers:

52-10120 52-10160

- d. Energize loads per step R.9, page 15.
- 7. <u>IF</u> 14 4KV Bus is energized <u>AND</u> 11 4KV Bus is <u>NOT</u> energized, <u>THEN</u> tis MCC-101AT to MCC-101BT:
 - a. Close MCC-101BT Feeder Breaker, 52-1419.
 - b. Open MCC-101AT Main Feeder Breaker, 52-10101.
 - c. Close Tie Breakers:

52-10120 52-10160

 Energize loads per step R.9, page 15.

EOP-2 Rev. 1/Unit 1 Page 15 of 27

. 9

III. RECOVERY ACTIONS

- ALTERNATE ACTIONS
- 8. <u>IF</u> both 11 <u>AND</u> 14 4KV Buses are energized, <u>THEN</u> energize MCC-101AT and MCC-101BT:
 - a. Close MCC-101AT Feeder Breaker, 52-1109.
 - b. Close MCC-101BT Feeder Breaker, 52-1419.
 - c. Energize loads per step R.9, page 15.
- 9. Energize MCC-10 AT and MCC-101BT loads:
 - Turbine Building Lighting Transformer Breaker, 52-10103.
 - b. Turning Gear Oil Pump Breaker, 52-10102.
 - c. Turbine Oil Lift Pump Breakers:

52-10106 52-10107 52-10108

52-10109 52-10110

- d. Turbine Turning Gear Piggyback Motor and Turning Gear Motor Breaker, 52-10105.
- e. Technical Support Center HVAC Breaker, 52-10111.
- f. Distribution Panel 11 Breaker, 52-10116.
- g. Telephone Transformer Breaker, 52-10118.
- h. SRW Pump Room Vent Fan, 52-10124 (Restart SRW Pump Room Ventilation, per OI-15).

EOP-2 Rev. 1/Unit 1 Page 16 of 27

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

- 11 S/G Feed Pump Turning Gear Breaker, 52-10121.
- j. Technical Support Center Computer Breaker, 52-10122.
- k. Turbine Oil Lift Pump Breakers:

52-10146 52-10147 52-10148 52-10149

- AFW Pump Room Air Conditioner Breaker, 52-10150.
- m. 12 S/G Feed Pump Turning Gear Breaker, 52-10161.
- n. Distribution Panel 111 Breaker, 52-10162.
- 10. <u>IF</u> emergency power requested by Security, <u>THEN</u> place disconnect switch 2Y211, located on the North wall of Unit 2 27 ft Switchgear Room, in the EMERGENCY position.

S. MINIMIZE 250V DC BATTERY DISCHARGE:

- Energize 15 or 25 Battery Charger on 13 250V DC Bus.
- Ensure Main Turbine has stopped rotating or is on Turning Gear.
- Verify Turning Gear Oil Pump running.
- Stop Turbine Emergency Oil Pump and place handswitch in AUTO.

EOP-2 Rev. 1/Unit 1 Page 17 of 27

	. RECOVERY ACTIONS	ALTERNATE ACTIONS
	5. <u>IF</u> bearing oil header pressure less than 25 PSIG, <u>THEN</u> start Turbine Emergency Oil Pump	
r.	LOWER MAIN GENERATOR HYDROGEN PRESSURE TO 2 PSIG:	
υ.	 Align Two-Position Valve, 1-G-O1, to VENT position. Throttle open Generator Vent Line Isolation Valve, 1-G-O3. WHEN Main Generator hydrogen pressure is vented to 2 PSIG, THEN perform the following: a. Shut 1-G-O3. b. Secure Emergency H₂ Seal Oil Pump. IF LOCI SEQUENCER IS ACTUATED AND TURBINE MCCs ARE BEING SUPPLIED BY D/G, THEN DE-ENERGIZE MCC-101AT AND MCC-101BT. 	
	 IF rap' 'G load reduction needed THEN Parrorm the following: Open 11A 480V Bus Feeder Breaker, 52-1112. Open 14B 480V Bus Feeder Breaker, 52-1413. Locally open NCC-101AT Main Feeder Breaker, 52-10101. Locally open MCC-101BT Main Feeder Breaker, 52-10141. 	 1.1 <u>IF</u> rapid D/G load reduction <u>NOT</u> needed, <u>THEN</u> perform the following locally: a. Open MCC-101AT Main Feeder Breaker, 52-10101. b. Open MCC-101BT Main Feeder Breaker, 52-10141.

 RECOVERY ACTIONS e. Close 11A 480V Bus Feeder Breaker, 52-1112. f. Close 14B 480V Bus Feeder Breaker, 52-1413. 			AL	TERNATE ACTIO	EOP-2 Rev. 1/Unit 1 Page 18 of 27
MAI 100	NTAI	N VCT LEVEL BETWEEN 60 AND HES:			
1.	WHE THE suc	N VCT makeup required, N shift Charging Pump tion to RWT:			
	a.	Open RWT To Charging Pump Suction Valve, 1-CVC-504-MOV.	1		
	ò.	Observe VCT level increasing.	1.b.1	IF VCT level THEN shut VC 1-CVC-501-MO	NOT increasing T Outlet Valve, V.
	c.	Ensure Charging Pump(s) AMPS steady.			
2.	WHE inc THE suc	N VCT increases to 100 hes, N shift Charging Pump tion to VCT:			
	а.	Open VCT Outlet Valve, 1-CVC-501-MOV.			
	b.	Shut RWT To Charging Pump Suction Valve, 1-CVC-504-MOV.			
			1.1		

-
EOP-2 Rev. 1/Unit 1 Page 19 of 27

4

LII. RECOVERY ACTIONS

ALTERNATE ACTIONS

W. IF FORCED CIRCULATION DESIRED AND PUMP RESTART CRITERIA MET, THEN RESTART KCPS WHEN POWER AVAILABLE:

- CAUTION -

Uncontrolled restoration of cooling to hot RCP seals may cause degradation of the metallic seating surfaces by thermal shock.

- 1. IF Component Cooling is isolated to RCP seals, THEN reduce RCP lower seal temperature below 280°F prior to initiating full cooling flow to the RCPs:
 - a. Shut Component Cooling Supply Containment Manual Isolation Valve, 1-CC-284, located in 5 ft East Penetration Room.
 - b. Open Component Cooling Containment Isolation Valves:

1-CC-3832-CV 1-CC-3833-CV

0

- c. Slowly open 1-CC-284 to throttle component cooling flow until lower seal temperatures are less than 280°F.
- d. <u>WHEN</u> lower seal temperatures are less than 280°F, THEN fully open 1-CC-284.
- <u>IF</u> an RCP lower seal temperature exceeded 280°F, <u>THEN</u> an engineering evaluation is required prior to restarting that RCP.

s "

EOP-2 Rev. 1/Unit 1 Page 20 of 27

LII. RECOVERY ACTIONS

ALTERNATE ACTIONS

- 3. Raise pressurizer level to at least 155 inches.
- 4. Lower Tcold to less than 525°F.
- 5. Verify RCP restart criteria:
 - a. RCS subcooling greater than 30°F.
 - b. At least one S/G available for heat removal.
 - c. Pressurizer level greater than 155 inches and stable.
 - d. Tcold less than 525°F.
 - e. RCS temperature and pressure greater than the minimum operating limits per RCP curve on Attachment (1).

- NOTE -

Starting an RCP may cause a pressurizer level transient.

- 6. WHEN RCP restart criteria are mat, <u>THEN</u> start one RCP in a loop with an operable 5/G:
 - Verify "COMPT CLG FLOW LO" alarm clear.
 - b. Start Oil Lift Pump.
 - c. Insert RCP sync stick.

d. Start one RCP.

EOP-2 Rev. 1/Unit 1 Page 21 of 27

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

e. Monitor RCP running current:

Tavg

- Current
- 525 to 572°F 238 to 210 AMPS and steady
- 210 to 525°F 264 to 238 AMPS and steady
 - Monitor RCP seal parameters following pump restart.
 - Allow backflow to equalize temperatures in opposite loop.
 - Start second RCP in opposite loop per steps W.6 and W.7, pages 20 and 21.
- 10. Secure Auxiliary Spray:
 - a. Open Loop Charging Valves:

1-CVC-518-CV 1-CVC-519-CV

- b. Shut Auxiliary Spray Valve, 1-CVC-517-CV.
- c. Shift Pressurizer Spray Controller, 1-HIC-100, to AUTO.
- 11. WHEN RCPs restarted, THEN implement appropriate operating procedure AND complete administrative post-trip actions of this procedure.

EOP-2 Rev. 1/Unit 1 Page 22 of 27

LIII. RECOVERY ACTIONS

ALTERNATE ACTIONS

x.	DETERMINE	TIME	UNTIL	COOLDOWN
	REQUIRED:			

- Determine total CST water available for use as makeup.
- Determine time until commencement of required cooldown per Attachment (11).
- 3. <u>IF</u> RCS cooldown required, <u>THEN</u> implement Natural Circulation Cooldown (AOF-3F) <u>AND</u> complete administrative post-trip actions of this procedure.
- 3.1 <u>IF</u> RCS cooldown <u>NOT</u> required, <u>THEN</u> implement Loss Of Flow/Natural Circulation (AOP-3E) <u>AND</u> complete administrative post-trip actions of this procedure.

EOP-2 Rev. 1/Unit 1 Page 23 of 27

Y. ADMINISTRATIVE POST-TRIP ACTIONS:

- NOTE -

The following actions may be accomplished whenever feasible. They may be done in any order.

- 1. Refer to ERPIP to determine appropriate emergency response actions.
- 2. Perform notifications per CCI-118.
- 3. Notify ESO of trip.
- 4. Request RCS Boron and Iodine sample.
- 5. Perform shutdown margin calculation per NEOG 2 and 7.
- 6. Complete transient log entries per CCI-301.
- Recall post-trip reliew (preferably within 30 minutes of trip).
- 8. Perform post-trip review per CCI-111.
- 9. Monitor turbine bearing temperatures.
- 10. Continue Main Turbine Shutdown per applicable step of OI-43A.

END OF SECTION III.

EOP-2 Rev. 1/Unit 1 Page 24 of 27

IV. SAFETY FUNCTION STATUS CHECK

- A. The STA (or person designated by STA) will perform the intermediate and final safety function checks respectively on entry and prior to exiting from this procedure.
- B. Perform intermediate safety function status checks at 10 minute intervals until plant conditions stabilize.
- C. Immediately notify Shift Supervisor or Control Room Supervisor if any safety function criteria is not being satisfied.
- D. Review data and verify that safety function acceptance criteria are satisfied.
- E. When EOP completed, then perform final safety function check.

REACTIVITY CONTROL		SAFETY FUNCTION ACCEPTANCE CRITERIA			
P	ARAMEIERS	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK
a	, WRNI power	less than 3%		less than 1%	
b	. SUR (DPM)	negative		0	
C	. CEA status	all inserted		all inserted	
	or				
	Boration status:			ennversiete	
	concentration	increasing		S/D margin	-
	BAST level	decreasing	*********	N/A	_N/A

Rev. 1/Unit 1 Page 25 of 27 SAFETY FUNCTION ACCEPTANCE CRITERIA RCS PRESSURE AND INVENTORY PARAMETERS CRITERIA FINAL INTERMEDIATE CRITERIA CHECK CHECK a. Pressurizer 2225 to 2300 pressure (PSIA) 1850 to 2300 b. Pressurizer 130 to 180 level (inches) 101 to 250 ----c. RCS subcooling 30 to 140 (°F) 30 to 140 _____ SAFETY FUNCTION ACCEPTANCE CRITERIA CORE AND RCS HEAT REMOVAL PARAMETERS FINAL CRITERIA INTERMEDIATE CRITERIA CHECK CHECK a. RCS Tcold (°F) 515 to 535 520 to 535 ---less than 560 b. CET (°F) (1) less than 560 c. Thot minus Tcold (°F): Natural 10 to 50 Circulation 10 to 50 Forced N/A less than 5 N/A Circulation d. S/G pressure 850 to 920 785 to 920 (PSIA) (-)170 to (-)24 to e. 3/G level (+)30 (+)30 (inches) f. S/G level trending trending trend (inches) towards 0 towards 0 g. Condensate Storage Tank greater than 5 greater than 5 level (ft)

EOP-2

 CET temperatures may be greater than 560°F while Natural Circulation is being established.

EOP-2 Rev. 1/Unit 1 Page 26 of 27

 $_{e^{\frac{1}{2}}}$

		CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL
a.	4KV vital buses 11 or 14	energized		energized	
b.	Instrument Air pressure (PSIG)	greater than 88		greater than 88	
c.	Component Cooling (# Pumps running)	1 or 2		1 or 2	
d.	Component Cooling Head Tank level (inches) (2)	greater than 20		greater than 20	
e.	Saltwater (# Pumps running)	1 or 2	**********	1 or 2	
f.	Service Water (# Pumps running)	1 or 2	**********	1 or 2	
g.	Service Water Head Tank level (inches) (2)	greater than 30		greater than 30	
h.	125V DC buses 11, 12, 21, 22	energized		energized	
i.	120V AC vital buses 11, 12, 13, 14	energized		energized	

(2) Refer to OI-15 and OI-16 for filling head tanks.

EOP-2 Rev. 1/Unit 1 Page 27 of 27

100	TAINMENT				
ENVIRONMENT PARAMETERS		CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK
a .	Containment pressure (PSIG)	less than 0.7		less than 0.7	
ь.	Containment temperature (°F)	less than 120		less than 120	
с.	Containment level (inches)	less than 4	·····;·	less than 4	
NOI	RMAL RADIATION VELS EXTERNAL	SAFET	Y FUNCTION ACCEP	TANCE CRITERIA	ETNA
то	CONTAINMENT	CRITERIA	CHECK	CRITERIA	CHECH
a.	Noble Gas Monitor	alarm clear		alarm clear	
	STATUS NUM	CHECK BER	COMPLETE AT TIME		
	1	_			
	2				
	34				
			and the second second second second		
	and the second se		Alternative statements and an end of the statement		

100

EOP-2 Rev. 1/Unit 2 Page 1 of 27

CALVERT CLIFFS NUCLEAR POWER PLANT

EOP-2 LOSS OF OFFSITE POWER

REVISION 1

1

	A	DATE
PREPARED BY;	Thestander	,12-18-87
VERIFIED BY;	James V. Arooms	112/13/87
POSRC;	MEETING # 88-	1 2-10-88
APPROVED BY;	AR Lemon Manager-Nuclear Operations or	/ Z-10-88 General Supervisor-

EOP-2 Rev. 1/Unit 2 Page 2 of 27

LIST OF EFFECTIVE PAGES

PAGE NUMBER

C)

REVISION

111

1

1111

1111

1

1

1111111111

.

*



4

EOP-2 Rev. 1/Unit 2 Page 3 of 27

LOSS OF OFFSITE POWER

I. PRECAUTIONS

- A. Do not adopt manual operation of automatically controlled systems unless a malfunction is apparent or automatic system operation will not support the maintenance of a safety function.
- B. Systems shifted to manual operation must be monitored frequently to ensure correct operation.
- C. At least two independent indications should be used, when available, to evaluate and corroborate a specific plant condition since an incident could induce inconsistencies between instruments.
- D. In Natural Circulation, increased loop transport time causes a 5 to 10 minute delay in temperature responses to a plant change. Pressurizer level and pressure responses typically provide better indication of RCS response during this period.
- E. If cooling down with a S/G isolated, an inverted delta T (Tcold higher than Thot) may be observed in the idle loop. This is due to a small amount of reverse heat transfer in the isolated S/G. The inverted delta T is not expected to have any significant effect on natural circulation flow in the operating S/G loop.
- F. The concentration of boron in RCS makeup water should be consistent with maintaining the required shutdown margin.
- G. Minimize the number of cycles of pressurizer auxiliary spray when the temperature differential is greater than 400°F.
- H. Excessive Diesel Generator loading can result if a SIAS is received and the LOCI sequencer actuates. Non-vital loads should be manually shed immediately upon receiving a SIAS.
- If a pump or component fails, the cause of the failure should be determined prior to restarting or starting a standby pump or component to prevent a common failure.

EOP-2 Rev. 1/Unit 2 Page 4 of 27

II. ENTRY CONDITIONS

The presence of one or more of the following conditions indicates that a Loss Of Offsite Power may have occurred:

- A. Momentary loss of Control Room lighting on both Units.
- B. 500KV Red and Black Bus power available lights de-energized.
- C. Diesel Generators running.
- D. 12 and 22 Service Bus 13KV power available lights de-energized.
- E. No RCPs running on either Unit.
- F. Reactor Trip due to RCS low flow.

EOP-2 Rev. 1/Unit 2 Page 5 of 27

5	. RECOVERY ACTIONS	ALTEPNATE ACTIONS
A.	VERIFY POST-TRIP IMMEDIATE ACTIONS COMPLETED.	
в.	COMMENCE INTERMEDIATE SAFETY FUNCTION STATUS CHECK.	
c.	DETERMINE APPROPRIATE EMERGENCY RESPONSE ACTIONS FER THE ERFIP.	
D.	PROTECT RCS FROM EXCESSIVE COOLDOWN AND CONDENSER FROM OVERPRESSURE:	
	 Shut both MSIVs. Shut S/G Blowdowr Valves. 2-BD-4010-CV 2-BD-4011-CV 2-BD-4011-CV 2-BD-4012-CV 2-ED-4013-CV 	
Ε.	ESTABLISH S/G HEAT SINK:	
	 Establish S/G heat removal: a. Shift Atmospheric Dump Controller to MANUAL. b. Operate Atmospheric Dump Valves to return Tcold b. Tcold 	-NOTE- Atmospheric Dump Valves are reverse acting, i.e., clockwise to open, counterclockwise to shut. 1.b.1 IF Atmospheric Dump Valves will NOT operate from Control Room
P	to between 570 and 550 F.	THEN locally operate Atmospheric Dump Valves on 45 ft Aux Building.

EOP-2 Rev. 1/Unit 2 Page 6 of 27

eedwater flow to	23 AFW	- <u>CAUTION</u> - Pump flow limit is 300 GPM
eedwater flow to	23 AFW	Pump flow limit is 300 GPM
1 or 22 AFW Pump		powered from D/G.
ing AFW Steam Valves:	2.a.1	IF steam driven pumps NOT available, THEN start 23 AFW Pump.
70-CV 71-CV		
AFW Flow Control to restore and in S/G levels (-)170 and (+) les and trending 0 inches.		
ENT COOLING FLOW:	-	
er seal temperature 280°F, a Component Cooling	1.1	<pre>IF seal temperature above 280°F, THEN perform the following: a. Shut Component Cooling Supply Containment Isolation Valve, 2-CC-3832-CV.</pre>
		b. Start a Component Cooling Pump.
ponent Cooling Heat on service is being rom an operating Header.		
	<pre>ing AFW Steam Valves:)70-CV)71-CV AFW Flow Control to restore and in S/G levels 1 (-)170 and (+) hes and trending 5 0 inches. ENT COOLING FLOW: er seal temperature 280°F, a Component Cooling Header. ponent Cooling Heat on service is being rom an operating Header.</pre>	<pre>ing AFW Steam Valves:)70-CV)71-CV AFW Flow Control to restore and in S/G levels h (-)170 and (+) hes and trending s 0 inches. ENT COOLING FLOW: er geal temperature 280°F, a Component Cooling ponent Cooling Heat on service is being rom an operating Header.</pre>

EOF-2 Rev. 1/Unit 2 Page 7 of 27

EOP-2 Rev. 1/Unit 2 Page 8 of 27

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

J. SECURE MAIN FEED :

- 1. Verify S/G Feed Pumps tripped.
- Place Condensate Booster Pumps in PULL-TO-LOCK.
- Place Condensate Pumps in PULL-TO-LOCK.
- Place Heater Drain Pumps in PULL-TO-LOCK.
- 5. Shut S/G Feedwater Isolation Valves:

2-FW-4516-MOV 2-FW-4517-MOV

CONFIRM NATURAL CIRCULATION IN AT LEAST WE LOOP:

- NOTE -

Wide range Thot may be obtained from Eubcooled Margin Monitor per Attachment (10).

- 1. Thot minus Toold between and 50°F.
- 2. Tcold constant or decreasing.
- 3. Thot constant or decreasing.
- CET temperatures consistent with Thot.
- Steaming rate affects primary temperature.

EOP-2 Rev. 1/Unit 2 Page 9 of 27

III. RECOVERY ACTIONS

ATTERNATE ACTIONS

- L. RESTORE REACTOR MCCs AND INSTRUMENT BUSES:
 - <u>IF</u> 24 4KV Bus is energized <u>AND</u> 21 4KV Bus is <u>NOT</u> energized, <u>THEN</u> tie MCC-214 to MCC-204:
 - Open MCC-214 Main Feeder Breaker, 52-21401.
 - Close MCC-214 Tie Breaker, 52-21420.
 - c. Close MCC-204 Tic Breaker, 52-2042C.
 - 2. <u>IF</u> 21 4KV Bus is energized <u>AND</u> 24 4KV Bus is <u>NOT</u> chergized, <u>THEN</u> tie MCC-204 to MCC-214:
 - Open MCC-204 Main Feeder Breaker, 52-20401.
 - b. Close MCC-204 Tie Breaker, 52-20420.
 - c. Close MCC-214 Tie Breaker, 52-21420.
- M. MAINTAIN PRESSURIZER LEVEL BETWEEN 101 AND 180 INCHES:
 - 1. Open Loop Charging Valves:
 - 2-CVC-519-CV 2-CVC-519-CV
 - Shut Auxiliary Spray Valve, 2-CVC-517-CV.

EOP-2 Rev. 1/Unit 2 Pags 10 of 27

III. RECOVERY ACTIONS

3.

- Verify at least one Charging
- Pump operating.
- Shift Letdown Control Valve Controller, 2-HIC-110, to MANUAL.
- Adjust controller to shut Letdown Control Valves.
- 6. Open Letdown Isolation Valves:

2-CVC-515-CV 2-CVC-516-CV

- NOTE -

Degasifier Pumps are powered from non-vital power supply. Excessive diversion may cause Degasifier to overfill.

- Slowly open the Letdown Control Valve noting the increase in letdown pressure as road on 2-PIC-201, until 2-PIC-201 takes control of the Letdown Backpressure Regulating Valve.
- Allow temperatures to stabilize, then shift 2-HIC-110 to AUTO.
- N. RESTORE RCS PRESSURE TO BETWEEN 2225 AND 2300 PSIA:
 - Operate 21 or 23 Backup Heaters as necessary to raise RCS pressure:
 - a. Charge closing spring using manual lever at 480V breakers 52-2127 and 52-2427.
 - b. Fush the PUSH-TO-CLOSE button on breaker fronts.

ALTERNATE ACTIONS

EOP-2 Rev. 1/Unit 2 Page 11 of 27

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

 \tilde{a}

- <u>IF</u> pressure exceeds 2300 PSIA, <u>THEN</u> initiate Auxiliary Spray:
 - a. Record temperature differential between Pressurizer and Regenerative Heat Exchanger Outlet.
 - Open Auxiliary Spray Valve, 2-CVC-517-CV.
 - c. Shut Loop Charging Valves:

2-CVC-518-CV 2-CVC-519-CV

d. Shift 2-HIC-100 to MANUAL and shut Pressurizer Spray Valves:

> 2-RC-100E-CV 2-RC-100F-CV

- 0. MAINTAIN RUS SUBCOOLING BETWEEN 30 AND 140°F:
 - Raise subcooling by any of the following:
 - a. Securing Auxiliary Spray.
 - Energizing Pressurizer Heaters.
 - Lower subcooling by any of the following:
 - a. Securing Pressurizer Heaters.
 - Initiating Auxiliary Spray.

					EOP-2 Rev. 1/Unit 2 Page 12 of 27
111	LII. RECOVERY ACTIONS			ALTE	RNATE ACTIONS
P .	VERI	FY EMERGENCY DC PUMP OPERATION:			
	1.	Turbine Emergency Oil Pump.			
	2.	Emergency Air Side Seal Oil Pump.			
	3.	S/G Feed Pump Emergency Oil Pumps.			
Q.	IF THE	RCS COOLDOWN IS EXPECTED, COMMENCE RCS BORATION:			
	1.	Shut VCT Makeup Valve, 2-CVC-512-CV.			
	2.	Open Boric Acid Direct Makeup Valve, 2-CVC-514-MOV.			
P	3.	Start a Boric Acid Pump.	3.1	IF ava THE	Boric Acid Pumps <u>NOT</u> ilable, N establish gravity feed:
				а.	Open BAST Gravity Feed Valves:
					2-CVC-508-140V 2-CVC-509-MOV
				b.	Shut VCT Outlet Valve, 2-CVC-501-MOV.
	4.	Start all available Charging Pumps.			
	5.	WHEN shutdown margin requirement of NEOG-11 is achieved, T.TEN secure boration:			
		a. Open VCT Outlet Valve, 2-CVC-501-MOV.			
		b. Stop Boric Acid Pump(s).	1		

EOP-2 Rev. 1/Unit 2 Page 13 of 27

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

- c. Shut Boric Acid Direct Makeup Valve, 2-CVC-514-MOV.
- d. Shut BAST Gravity Feed Valves:

2-CVC-508-MOV 2-CVC-509-MOV

R. ENERGIZE SUPPORT EQUIPMENT AS NECESSARY TO FACILITATE SHUTDOWN AND VERIFY LOAD REMAINS WITHIN RATINGS:

- CAUTION -

If the following load limits can be maintained, actuation of the LOCI Sequencer will not cause a D/G overload condition:

without 23 AFW Pump - 1400 KW with 23 AFW Pump - 1800 KW

These limits may be exceeded if additional power is required to safely, efficiently shut down the plant. The D/G should not be operated above 3250 KW.

- CAUTION -

SMECO load limit is 260 AMPS.

- 1. Scart a Main Exhaust Fan.
- Start a Cavity Cooling Fan as needed to maintain cavity cooling temperature below 200°F.
- Start Containment Air Cooler(s) in LOW as necessary to maintain containment temperature below 120°F.

EOP-2 Rev. 1/Unit 2 Fage 14 of 27

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

- <u>IF</u> "SFP LEVEL TEMP HI" alarm received, <u>THEN</u> start Spent Fuel Pool Cooling Pump(s).
- Strip MCC-201AT and MCC-201BT of all loads, by opening individual MCC breakers.
- 6. <u>IF 24 4KV</u> Bus is energized <u>AND</u> 21 4KV Bus is <u>NOT</u> energized, <u>THEN</u> tie MCC-201AT to MCC-201BT:
 - a. Close MCC-201BT Feeder Breaker, 52-2419.
 - b. Open MCC-201AT Main Feeder Breaker, 52-20101.
 - c. Close Tie Breakers:

52-20120 52-20160

- Energize loads per step R.9, page 15.
- 7. <u>IF</u> 21 4KV Bus is energized <u>AND</u> 24 4KV Bus is <u>NOT</u> energized, <u>THEN</u> tie MCC-?DIBT to MCC-201AT:
 - Close MCC-201AT Feeder Breaker, 52-2109.
 - b. Open MCC-201BT Main Feeder Breaker, 52-20141.
 - c. Close Tie Breakers:

52-20130 52-20160

d. Energize loads per step R.9, page 15.

EOP-2 Rev. 1/Unit 2 Page 15 of 27

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

- E. <u>IF</u> both 21 <u>AND</u> 24 4KV Buses are energized, <u>THEN</u> energize MCC-201AT and MCC-201BT:
 - Close MCC-201AT Feeder Breaker, 52-2109.
 - b. Close MCC-201BT Feeder Breaker, 52-2419.
 - c. Energize loads per step R.9, page 15.
- 9. Energize MCC-201AT and MCC-201BT loads:
 - Turbine Building Lighting Transformer Breaker, 52-20103.
 - b. Turbine Oil Lift Pump Breaker, 52-20106.
 - Turbine Turning Gear Motor Breaker, 52-20105.
 - Distribution Panel 21 Breaker, 52-20116.
 - e. 21 S/G Feed Pump Turning Gear Breaker, 52-20121.
 - f. AFW Pump Room Air Conditioner Breaker, 52-20150.
 - g. 22 S/G Feed Pump Turning Gear Broaker, 52-20161.
 - h. Distribution Panel 211 Breaker, 52-20162.
 - i. SRW Pump Room Vent Fan, 52-20149 (Festart SRW Pump Room Ventilation, per OI-15).

EOP-2 Rev. 1/Unit 2 Page 16 of 27

.

III. RECOVERY ACTIONS

10

.

ø

0

CCOM CR 88-1145

ALTERNATE ACTIONS

10. IF emergency power requested by Security, <u>THEN</u> place disconnect switch 2Y211, located on the North wall of Unit 2 27 ft Switchgear Room, in the EMERGENCY position.

- S. MINIMIZE 250V DC BATTERY DISCHARGE:
 - Energize 15 or 25 Battery Charger on 13 250V DC Bus.
 - Ensure Main Turbine has stopped rotating or is on Turning Gear.
 - Verify Bearing Oil Pump running.
 - Stop Turbine Emergency Oil Pump and place handswitch in AUTO.
 - <u>IF</u> bearing oil header pressure less than 15 PSIG, <u>THEN</u> start Turbine Emergency Oil Pump.

EOP-2 Rev. 1/Unit 2 Page 17 of 27

LOWER	MAIN GENERATOR HYDROGEN	ALTERNATE ACTIONS
1. The 2- 2. WE pr The a. b. 1. IF LOO AND TO SUPPL: THEN I AND MO 1. II no The a b c d d e	 And To 2 Parts. Another open Generator Bottom of To Atmosphere Valve,G-06. Another Sectors and the sector of th	1.1 IF rapid D/G load reduction NOT needed, THEN perform the following locally: a. Open MCC-201AT Main Feeder Breaker, 52-20101. b. Open MCC-201BT Main Feeder Breaker, 52-20141.
f	Close 24B 480V Bus Feeder Breaker, 52-2413.	

	. <u>R</u>	ECOVERY ACTIONS	EOP-2 Rev. 1/Unit 2 Page 18 of 27 ALTERNATE ACTIONS
٧.	MAI 100	NTAIN VCT LEVEL BETWEEN 60 AND INCHES:	
	1.	WHEN VCT makeup required, THEN shift Charging Pump suction to RWT: a. Open RWT To Charging Pump Suction Valve, 2. CVC-504-MOV	
		b. Observe VCT level increasing.	1.b.: <u>IF VCT level NOT</u> increasing, <u>THEN</u> shut VCT Outlet Valve, 2-CVC-501-MOV.
		 Ensure Charging Pump(s) AMPS steady. 	
	2.	<pre>WHEN VCT increases to 100 inches, THEN shift Charging Pump suction to VCT: a. Open VCT Outlet Valve, 2-CVC-501-MOV. b. Shut RWT To Charging Pump Suction Valve, 2-CVC-504-MOV.</pre>	

EOP-2 Rev. 1/Unit 2 Page 19 of 27

LII. RECOVERY ACTIONS

ALTERNATE ACTIONS

W. IF FORCED CIRCULATION DESIRED AND PUMP RESTART CRITERIA MET, THEN RESTART RCPs WHEN POWER AVAILABLE:

- CAUTION -

Uncontrolled restoration of cooling to hot RCP seals may cause degradation of the metallic seating surfaces by thermal shock.

- <u>IF</u> Component Cooling is isolated to RCP seals, <u>THEN</u> reduce RCP lower seal temperature below 280°F prior to initiating full cooling flow to the RCPs:
 - a. Shut Component Cooling Supply Containment Manual Isolation Valve, 2-CC-284, located in 5 ft East Penetration Room.
 - b. Open Component Cooling Containment Isolation Valves:

2-CC-3832-CV 2-CC-3833-CV

- c. Slowly open 2-CC-284 to throttle component cooling flow until lower seal temperatures are less than 280°F.
- d. <u>WHEN</u> lower seal temperatures are less than 280°F, THEN fully open 2-CC-284.
- <u>IF</u> an RCP lower seal temperature exceeded 280°F, <u>THEN</u> an engineering evaluation is required prior to restarting that RCP.

EOP-2 Rev. 1/Unit 2 Page 20 of 27

ALTERNATE ACTIONS

2

III. RECOVERY ACTIONS

- Raise pressurizer level to at least 155 inches.
- 4. Lower Tcold to less than 525°F.
- 5. Verify RCP restart criteria:
 - RCS subcooling greater than 30°F.
 - b. At least one S/G available for heat removal.
 - Pressurizer level greater than 155 inches and stable.
 - d. "cold less than 525°F.
 - e. RCS temperature and pressure greater than the minimum operating limits per RCP curve on Attachment (1).

- NOTE -

Starting an RCP may cause a pressurizer level transient.

- 6. <u>WHEN</u> RCP restart criteria are met, <u>THEN</u> start one RCP in a loop with an operable S/G:
 - Verify "COMPT CLG FLOW LO" alarm clear.
 - b. Start Oil Lift Pump.
 - c. Insert RCP sync stick.
 - d. Start one RCP.

EOP-2 Rev. 1/Unit 2 Page 21 of 27

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

e. Monitor RCP running current:

Tavg Current

- 525 to 572°F 238 to 210 AMPS and steady
- 210 to 525°F 264 to 238 AMPS and steady
 - Monitor RCP seal parameters following pump restart.
 - Allow backflow to equalize temperatures in opposite loop.
 - Start second RCP in opposite loop per steps W.6 and W.7, pages 20 and 21.
- 10. Secure Auxiliary Spray:
 - a. Open Loop Charging Valves:

2-CVC-518-CV 2-CVC-519-CV

- b. Shut Auxiliary Spray Valve, 2-CVC-517-CV.
- c. Shift Pressurizer Spray Controller, 2-HIC-100, to AUTO.
- 11. WHEN RCPs restarted, <u>THEN</u> implement appropriate operating procedure <u>AND</u> complete administrative post-trip actions of this procedure.

1 1.	RECOVERY ACTIONS	EOP 2 Rev. 1/Unit 2 Page 22 of 27 ALTERNATE ACTIONS				
. DI RI	ETERMINE TIME UNTIL COOLDOWN EQUIRED:					
1	Determine total CST water available for use as makeup.					
2	Determine time until commencement of required cooldown per Attachment (11).					
3	IF RCS cooldown required, THEN implement Natural Circulation Cooldown (AOF-3F) AND complete administrative post-trip actions of this procedure.	3.1	IF RCS cooldown NOT required, THEN implement Loss Of Flow/Natural Circulation (AOP-3E) AND complete administrative post-trip actions of this procedure.			

EOP-2 Rev. 1/Unit 2 Page 23 of 27

Y. ADMINISTRATIVE POST-TRIP ACTIONS:

- NOTE -

The following actions may be accomplished whenever feasible. They may be done in any order.

- 1. Refer to ERFIP to determine appropriate emergency response actions.
- 2. Perform notifications per CCI-118.
- 3. Notify ESO of trip.
- 4. Request RCS Boron and Iodine sample.
- 5. Perform shutdown margin calculation per NEOG 9 and 11.
- 6. Complete transient log entries per CCI-301.
- Recall post-trip review (preferably within 30 minutes of trip).
- 8. Perform post-trip review per CCI-111.
- 9. Monitor turbine bearing temperatures.
- 10. Continue Main Turbine Shutdown per applicable step of OI-43A.

END OF SECTION III.

EOP-2 Rev. 1/Unit 2 Page 24 of 27

IV. SAFETY FUNCTION STATUS CHECK

- A. The STA (or person designated by STA) will perform the intermediate and final safety function checks respectively on entry and prior to exiting from this procedure.
- B. Perform intermediate safety function status checks at 10 minute intervals until plant conditions stabilize.
- C. Immediately notify Shift Supervisor or Control Room Supervisor if why safety function criteria is not being satisfied.
- D. Review data and verify that safety function acceptance criteria are satisfied.
- E. When EOP completed, then perform final safety function check.

REACTIVITY CONTROL		ACTIVITY CONTROL	SAFETY FUNCTION ACCEPTAMCE CRITERIA						
	PARAMETERS		CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK			
,	а.	WRNI power	less than 3%	**********	less than 1%				
	b.	SUR (DPM)	negative	**********	0				
	с.	CEA status	all inserted		all inserted	-			
		or							
		Boration status:			appropriate				
		concertratio"	increasing	*********	S/D margin				
		BAST level	decreasing	*********	N/A	N/A			

EOP-2 Rev. 1/Unit 2 Page 25 of 27

IN	INVENTORY PARAMETERS							ETAILT
		CRI	TEI	RIA	INTERMEDIATE CHECK	CR	ITERIA	CHECK
a .	Pressurizer pressure (PSIA)	1850	20	2300		2225	to 2300	
ь.	Pressurizer level (inches)	101	to	250		130	to 180	
с.	RCS subcooling (F)	30	to	140		30	to 140	
CO	RE AND RCS HEAT	SAFETY FUNCTION ACCEPTANCE CRITERIA						
REI	EMOVAL PARAMETERS	CP	ITE	RIA	INTERMEDIATE CHECK	CR	ITERIA	FINAL
a.	RCS Tcold (^O F)	515	to	535		520	to 535	
b.	CET (°F) (1)	less	th	an 560		less	than 560	****
с.	Thot minus Tcold (°F):							
	Natural Circulation	10	to	50		10	to 50	-
	Forced Circulation		N/	A	N/A	les	s than 5	
d.	S/G pressure (PSIA)	785	to	920		850	to 920	
е.	S/G level (inches)	(-	(-)170 to (+)30			(-)24 to (+)30	
£.	S/G level trend (inches)	tr	end war	ing ds 0		tr	ending wards 0	
g.	Condensate Storage Tank level (ft)	great	er	than 5		great	er than 5	-

(1) CET temperatures may be greater than 560°F while Natural Circulation is being established.

EOP-2 Rev. 1/Unit 2 Page 26 of 27

		and the second	and the second se	And the second	of the local division of the local divisiono				
VITAL AUXILIARIES		SAFETY FUNCTION ACCEPTANCE CRITERIA							
		CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK				
а.	4KV vital buses 21 or 24	energized		energized					
b.	Instrument Air pressure (PSIG)	greater than 88		greater than 88					
c.	Component Cooling (# Pumps running)	1 or 2		1 or 2	-				
d.	Component Cooling Head Tank level (inches) (2)	greater than 20		greater than 20					
ε.	Saltwater (# Pumps running)	1 or 2		1 or 2					
f .	Service Water (# Pumps running)	1 or 2		1 or 2					
g.	Service Water Head Tank level (inches) (2)	greater than 30		greater than 30	-				
h.	125V DC buses 11, 12, 21, 22	energized		energized					
i.	120V AC vital buses 21, 22, 23, 24	energized		energized					

(2) Refer to OI-15 and OI-16 for filling head tanks.

EOP-2 Rev. 1/Unit 2 Page 27 of 27 SAFETY FUNCTION ACCEPTANCE CRITERIA FINAL CRITERIA INTERMEDIATE CRITERIA CHECK CHECK pressure (PSIG) less than 0.7 less than 0.7 less than 120 temperature less than 120 less than 4 140 SAFETY FUNCTION ACCEPTANCE CRITERIA CRITERIA INTERMEDIATE CRITERIA FINAL CHECK CHECK alarm clear COMPLETE AT

less than 4 c. Containment level (inches) HORMAL RADIATION LEVELS EXTERNAL TO CONTAINMENT a. Noble Gas alarm clear Monitor STATUS CHECK TIME NUMBER 1 2 3 4

NORMAL

CONTAINMENT

ENVIRONMENT

a. Containment

b. Containment

(°F)

PARAMETERS
EOP-3 Rev. 1/Unit 1 Page 1 of 40

CALVERT CLIFFS NUCLEAR POWER PLANT

EOP-3 TOTAL LOSS OF ALL FEEDWATER

REVISION 1

SIGNATURE

1

1

DATE

PREPARED I	BY;	James V. Swomp.	1 12/18/87
VERIFIED I	BY; <	2 Armital	, 12-18-87
POSRC;		MEETING # 88.7	1 2-10-88
AP ROVED	ΒY;	Anager-Nuclear Operations or Operations if POSRC review is	General Supervisor- not required

.

EOP-3 Rev. 1/Unit 1 Page 2 of 40

LIST OF EFFECTIVE PAGES

PAGE NUMBER

REVISION

111

1111111

1111

11111

11:11

1111

1111

1

1 1

5

EOP-3 Rev. 1/Unit 1 Page 3 of 40

TOTAL LOSS OF ALL FEEDWATER

I. PRECAUTIONS

- A. Do not adopt manual operation of automatically controlled systems unless a malfunction is apparent or automatic system operation will not support the maintenance of a safety function.
- B. Systems shifted to manual operation must be monitored frequently to ensure correct operation.
- C. At least two independent indications should be used, when available, to evaluate and corroborate a specific plant condition since an incident could induce inconsistencies between instruments.
- D. Solid operation of the RCS should only be attempted in order to maintain a subcooled margin of 30°F.
- E. If solid operation of the RCS is undertaken, any functions or actions directly affecting makeup, letdown, system heatup or cooldown should be closely monitored to avoid rapid pressure excursions.
- F. Feedwater should not be added to a dry S/G if the other S/G still contains water. If both S/Gs become dry, refill only one S/G to reinitiate Natural Circulation.
- G. Minimize the number of cycles of pressurizer auxiliary spray when the temperature differential is greater than 400°F.
- H. In Natural Circulation, increased loop transport time causes a 5 to 10 minute delay in temperature responses to a plant change. Pressurizer level and pressure responses, if available, typically provide better indication of RCS response during this period.
- I. S/G pressure, pressurizer pressure, and containment temperature affect the level indication for the S/Gs and Pressurizer. Attachments (8) and (9) contain the corrected S/G and pressurizer levels for various S/G pressures, pressurizer pressures, and containment temperatures.
- J. If a pump or component fails, the cause of the failure should be determined prior to restarting or starting a standby pump or component to prevent a common failure.

EOP-3 Rev. 1/Unit 1 Page 4 of 40

II. ENTRY CONDITIONS

The presence of one or more of the following conditions indicates that a Total Loss Of All Feedwater may have occurred:

- A. Loss of Condensate Storage Tank inventory.
- B. Loss of Condenser Hotwell level.
- C. Low suction or discharge pressure for either the Condensate, Condensate Booster, or S/G Feed Pumps.
- D. S/G Turbine Tripped alarm on both S/G Feed Pumps.
- E. Low suction or discharge pressure for the AFW Pumps.
- F. Motor System No Flow alarm for AFW.
- G. Turbine System No Flow alarm for AFW.

) ''	RECOVERY ACTIONS	EOP-3 Rev. 1/Unit 1 Page 5 of 40 ALTERNATE ACTIONS
Α.	VERIFY POST-TRIP IMMEDIATE ACTIONS COMPLETED.	
в.	COMMENCE INTERMEDIATE SAFETY FUNCTION STATUS CHECK.	
c.	ERFIF REQUIRES THAT A SITE EMERGENCY BE DECLARED IF TOTAL LOSS OF MAIN AND AUXILIARY FEEDWATER EXISTS FOR LONGER THAN TEN MINUTES.	
D.	TRIP ALL RCPs.	
Ε.	MINIMIZE S/G INVENTORY LOSS.	
	<pre>1. Shut S/G Blowdown Valves:</pre>	
F .	COMMENCE RCS BORATION:	
	 Shut VCT Makeup Valve, 1-CVC-512-CV. Open Boric Acid Direct Makeup Valve, 1-CVC-514-MOV. 	

l

EOP-3 Rev. 1/Unit 1 Page 6 of 40

		1.1.1.1	Page 6 of 40
511.	RECOVERY ACTIONS	N	LTERNATE ACTIONS
3	. Start a Boric Acid Pump.	3.1	IF Boric Atid Pumps NOT available, THEN establish gravity feed:
			a. Open BAST Gravity Feed Valves:
			1-CVC-508-MOV 1-CVC-509-MOV
			b. Shut VCT Outlet Valva, 1-CVC-501-MOV.
4	. Start all available Charging Pumps.		
5	. Continue boration until a total 65 inch decrease in BAST level(s) is achieved, or shutdown margin requirement of NEOG-7 is achieved.		
ES CO	STABLISH NATURAL CIRCULATION AND OOL DOWN RCS:		
1.	. Block ESFAS actuation:		
	a. WHEN "SGIS A(B) BLOCK PERMITTED" alarm(s)	1.a.1	IF SGIS actuates, THEN reset SGIS:
	THEN block SGIS A(B).		a. Place Condensate Booster Pumps in FVLL-TO-LOCK.
			b. Match handswitches per SGIS Verification Checklist, Attachment (7).
			c. Block SGIS.
			d. Reset SGIS signal.

EOP-3 Rev. 1/Unit 1 Page 7 of 40

-

0

.9

RECOVERY ACTIONS

ALTERNATE ACTIONS

e. Open S/G Feedwater Isolation Valves:

> 1-FW-4516-MOV 1-2W-4517-MOV

f. Start a Condensate Booster Pump.

8

. 0

- b. <u>WHEN</u> "PRSR PRESS BLOCK A(B) PERMITTED" alarm(s) received, <u>THEN</u> block SIAS A(B).
- Commence cooldown by throttling Turbine Bypass or Atmospheric Dump Valves while maintaining:
 - a. Less than 100°F/h RCS cooldown rate.
 - b. Pressurizer level between 50 and 180 inches.
- 3. Shut Letdown Isolation Valves:

1-CVC-515-CV 1-CVC-516-CV

- Maintain RCS subcooling between 30 and 14C°F:
 - a. Raise subcooling by:
 - Energizing Pressurizer Heaters.
 - (2) Increasing cooldown rate.
 - b. Lower subcooling by initiating Auxiliary Spray:
 - (1) Record temperature differential between Pressurizer and Regenerative Heat Exchanger Outlet.

211.

2.

.

3

EOP-3 Rev. 1/Unit 1 Page 8 of 40

ALTERNATE ACTIONS

III. RECOVERY ACTIONS

- (2) Open Auxiliary Sp. Valve, 1-CVC-517-CV
- (3) Shut Loop Charging Valves:

1-CVC-518-CV 1-CVC-519-CV

(4) Shift 1-HIC-100 to MALTUAL and shut Pressurizer Spray Valves:

> 1-RC-100E-CV 1-RC-100F-CV

5. Confirm Natural Circulation in at least one loop:

- NOTE -

Wide range Thot may be obtained from Subcooled Margin Monitor per Attachment (10).

- a. Thot minug Tcold between 10 and 50°F.
- b. Tcold constant or decreasing.
- c. Thot constant or decreasing.
- d. CET temperatures consistent with Thot.
- e. Steaming rate affects primary temperature.

6. IF either S/G level decreases to (-)350 inches before Main Feed or AFW can be restored, THEN proceed to step J, page 13 AND continue efforts to restore Main Feed or AFW.

EOF-3				
Rev.	1/	Uni	t	1
Page	9	of	40	

H. ATTEMPT TO ESTABLISH AFW FLOW	Page 9 of 40 ALTERNATE ACTIONS		
 AllEMPT TO ESTABLISH MAN FROM TO S/Gs: Confirm 12 CST operable: a. Ensure 12 CST level greater than 5 ft. b. Open 12 CST Unit 1 AFW Pump Suction Valve, 1-AFW-161. 	-CAUTION- Before transferring AFW Pump suction to an alternate supply the possibility of suction line or CST rupture should be considered. 1.1 IF 12 CST NOT operable, THEN line up 11 CST as alternate suction supply: a. Locally open 11 CST AFW Pump Suction Valves: 1-AFW-131 1-AFW-167 b. Locally shut 12 CST Unit 1 AFW Pump Suction Valve, 1-AFW-161. c. Confirm normal CST level response. -NOTE- The following step will cause CST levels to equalize. 1.2 IF 11 CST NOT available, THEN line up 21 CST as alternate suction Supply: a. tally open 21 CST AFW - action Valves: -AFW-167 b. Locally open 12 CST AFW - More 12 b. Locally open 12 CST AFW Pump Suction Valves: 1-AFW-161 2-AFW-161 2-AFW-161		

EOP-3 Rev. 1/Unit 1 Page 10 of 40

II. RECOVERY ACTIONS

- Ensure normal AFW flowpath available:
 - a. Open all motor and steam driven train AFW Block Valves:

<u>11 S/G</u> 1-AFW-4520-CV 1-AFW-4521-CV 1-AFW-4521-CV 1-AFW-4531-CV 1-AFW-4532-CV 1-AFW-4532-CV

1-AFW-4523-CV 1-AFW-4533-CV

b. Open AFW Flow Control Valves:

<u>11 S/G</u> <u>12 S/G</u>

1-AFW-4511-CV 1-AFW-4512-CV 1-AFW-4525-CV 1-AFW-4535-CV

3. Start Unit 1 AFW Pumps:

- CAUTION -

D/G supplying power to 13 AFW Pump flow limit is 300 GPM; otherwise, flow limit is 575 GPM.

- a. Start 13 AFW Pump:
 - Place 13 AFW Pump Hanúswitch in START.

ALTERNATE ACTIONS

- 2.a.1 <u>IF</u> AFW Block Valve(s) will <u>NOT</u> open from Control Room, <u>THEN</u> locally open valve(s) using Hand Transfer Station(s) on North wall of SRW Room.
- 2.b.1 IF AFW Flow Control Valve(s) will <u>NOT</u> open, <u>THEN</u> locally throttle open bypass valve(s):
 - a. 1511-CV 11 S/G Bypass Valve, 1-AFW-163, located in 27 ft East Penetration Room.

1

- b. 4525-CV 11 S/G Bypass Valve, 1-AFW-195, located in SKW Room.
- c. 4512-CV 12 S/G Bypass Valve, 1-AFW-165, located in 27 ft East Penetration 'com.
- d. 4535-CV 12 S/G Bypass Valve, 1-AFW-196, located in SRW Room.
- 3.1 <u>IF</u> unable to feed S/Gs with Unit 1 AFW Pumps, <u>THEN</u> establish Unit 2 to Unit 1 cross connect operation:
 - a. Shut Jnit 2 motor train AFW Block Valves:

2-AFW-4522-CV 2-AFW-4523-CV 2-AFW-4532-CV 2-AFW-4533-CV

EOP-3 Rev. 1/Unit 1 Page 11 of 40

RECOVERY ACTIONS

- (2) Ensure normal pump running current of 60 to 70 AMPS.
- (3) Verify 13 AFW Pump flow of 150 GPM per S/G.

b. Start 11 or 12 AFW Pump:

(1) Open 11 and 12 AFW
 Pump Turbine Throttle/
 Stop Valves:

1-MS-3986 1-MS-3988

(2) Open 11 and 12 AFW
 Pump Main Steam
 Supply Valves:

1-MS-109 1-MS-107

(3) Open 11 or 12 S/G AFW Steam Supply Valves:

> 1-MS-4070-CV 1-MS-4071-CV

- (4) Verify 11 or 12 AFW Pump discharge pressure approximately 100 PSI greater than S/G pressure.
- (5) Verify 11 or 12 AFW Pump flow of 150 GPM per S/C
- Ensure normal or emergency AFW Room Ventilation operable.
- IF AFW restored,
 <u>THEN</u> proceed to appropriate step:
 - Once Through Core Couling in progress, proceed to step N, page 20.
 - b. Once Through Core Cooling NOT in progress, proched to step V, page 30.

ALTERNATE ACTIONS

b. Open Unit 2 To Unit 1 AFW Cross Connect Valve, 2-AFW-4550-CV.

- CAUTION -

D/G Supplying power to 23 AFW Fump flow limit is 300 G M, otherwise, flow limit is 575 GPM

c. Start 23 AFW Pump:

- (1) Place 23 AFW Pump Handswitch in START.
- (2) Ensure normal pump running current of 60 to 70 AMPS.
- (3) Maintain 150 GPM flow to each S/G using Unit 1 AFW Flow Control Valves:

1-AFW-4525-CV 1-AFW-4535-CV

4.1 <u>IF AFW NOT</u> restored, <u>THEN</u> proceed to step 1, page 12.

III.

EOP-3 Rev. 1/Unit 1 Page 12 of 40

III. RECOVERY ACTIONS

ALTERNINE ACTIONS

- I. PREPARE TO FEED S/G WITH CONDENSATE BOOSTER PUMP:
 - Open S/G Feedwater Isolation Valves.
 - Shut Main Feed Regulating Valves.
 - Depress Feed Regulating Bypass Valve Reset Buttons.
 - Manually adjust Feed Regulating Bypass Valve Controllers to 30% output.
 - Open Condensate Precoat Filter and Condensate Demin Bypass Valves.
 - Verify one Condensate Pump running.
 - Verify one Condensate Booster Pump running.
 - Place Heater Drain Pump Handswitches in PULL-TO-LOCK.

- NOTE -

Feedwater flow to S/Gs should start when S/G pressure decreases to approximately 500 PSIA.

- 9. Monitor feedwater flow to S/G:
 - a. Main Feed Regulating Valve Differential Pressure Controller indicates greater than 0.
 - b. S/G level constant or increasing.

EOP-3 Rev. 1/Unit 1 Page 13 of 40

III. RECOVERY ACTIONS

- 10. <u>IF</u> Condensate Booster Pump flow restored, <u>THEN</u> proceed to appropriate step:
 - a. Once Through Core Cooling in progress, proceed to step N, page 20.
 - b. Once Through Core Cooling <u>NOT</u> in progress, proceed to step V, page 30.
- J. ISOLATE S/Gs IN PREPARATION FOR ONCE THROUGH CORE COOLING:
 - WHEN the first S/G decreases to (-)350 inches, THEN isolate that S/G:
 - a. For S/G to be isolated, shut the motor and steam driven train AFW Block Valves:

11 S/G or 12 S/G

1-AFW-4520-CV 1-AFW-4521-CV 1-AFW-4521-CV 1-AFW-4531-CV 1-AFW-4532-CV 1-AFW-4532-CV 1-AFW-4533-CV

- b. For S/G remaining to be steamed, place the motor and steam driven train AFW Block Valve Handswitches in OPEN.
- c. For S/G to be isolated, shut the AFW Steam Supply Valve.

11 S/G or 12 S/G

1-MS-4070-CV 1-MS-4071-CV

ALTERNATE ACTIONS

10.1 <u>IF</u> Condensate Booster Pump will <u>NOT</u> feed S/G, <u>THEN</u> proceed to step J, page 13.

EOP-3 Rev. 1/Unit 1 Page 14 of 40

III. PECOVERY ACTIONS

- d. For S/G to be isolated, shut the Atmospheric Dump Valve using the Hand Transfer Valves on the West wall of the Unit 1 45 ft Switchgear Room:
 - Verify 1C43 Atmospheric Dump Controllers at 0% output.
 - (2) Align Hand Transfer Valves to 1C43 position:

11 5/6 01	12	5/6	
-----------	----	-----	--

1-HV-3938A	1-HV-3939A
1-HV-3938B	1-HV-3939B

- e. For S/G to be isolated, shut the MSIV.
- Shut upstream drains by placing handswitch 1-HS-6622 in CLOSE.
- Continue to steam unisolated S/G, attempting to maintain CET temperatures constant or decreasing using Turbine Bypass Valve(s).
- 3. WHEN the remaining S/C level decreases to (-)375 inches OR CET temperatures begin to increase, THEN isolate both S/Gs:

11 S/G

a. Shut the motor and steam driven train AFW Block Valves:

1-AFW-4520-CV 1-AFW-4521-CV 1-AFW-4521-CV 1-AFW-4531-CV 1-AFW-4532-CV 1-AFW-4532-CV 1-AFW-4533-CV

12 S/G

ALTERNATE ACTIONS

1.d.1 IF Atmospheric Dump Valve
will NOT shut from 1C43,
THEN shut Atmospheric Dump
Manual Isolation Valve.

11 S/G	or	12 S/G
1-MS-101		1-MS-104

2.1 <u>IF</u> Turbine Bypass Valves unavailable, <u>THEN</u> iontinue to steam unisolated S/G using Atmospheric Dump Valve.

EOP-3 Rev. 1/Unit 1 Page 15 of 40



 Shift Letdown Control Valve Controller, 1-HIC-110, to MANUAL and shut Letdown Control Valves:

> 1-CVC-110P-CV 1-CVC-110Q-CV

EOP-3 Rev. 1/Unit 1 Page 16 of 40

RECOVERY ACTIONS

II.

.

- ALTERNATE ACTIONS
- Start all available Charging Pumps.
- Open Main and Aux HPSI Header Valves:

 1-SI-616-MOV
 1-SI-617-MOV

 1-SI-626-MOV
 1-SI-627-MOV

 1-SI-636-MOV
 1-SI-637-MOV

 1-SI-646-MOV
 1-SI-647-MOV

- 5. Start 11 and 13 HPSI Fumps.
- De-energize the Pressurizer Heaters by placing all handswitches in OFF.
- Start all available Containment A = Coolers in NIGH with maximum SRW flow.
- 8. Open both PCRVs:
 - a. <u>WHEN</u> "PRSR PRESS BLOCK A(B) PERMITTE: " alarm(s) received, THEN block SIAS A(B).
 - b. Verify both PORV Block Valves open.
 - Pull two High Pressurizer Pressure Trip Units.
 - d. Verify PORVs open.

EOP-3 Rev. 1/Unit 1 Page 17 of 40

III. RECEVERY ACTIONS

ALTERNATE ACTIONS

9. <u>IF</u> containment pressure increases to 2.8 PSIG, <u>THEN</u> verify ESFAS actuation <u>AND</u> commence Verification Checklists:

a. SIAS per Attachment (2).

b. CIS per Attachment (4).

- 10. <u>IF</u> containment pressure increases to 4.25 PSIG, <u>THEN</u> verify CSAS actuation <u>AND</u> commence Verification Checklist, Attachment (3).
- Confirm initiation of Once Through Core Cooling.
 - a. WHEN RCS pressure is less than 1270 PSIA, THEN ensure HPSI flow AND CET temperatures constant or decreasing.
- 12. Using CET temporatures, maintain subcooling between 30 and 140°F per Attachment (1) by throttling HPSI flow:
 - Lower subcooling by lowering HPSI flow.
 - Baise subcooling by raising HPSI flow.
- Continue cooldown using Once Through Core Cooling until feedwater restored or shutdown cooling entry conditions are established.

- NOTE -

Additional guidance for feeding S/Gs is given in the Core and RCS Heat Removal section of EOP-8.

 Continue efforts to restore Main Feed or AFW.

LII. RECOVERY ACTIONS	EOP-3 Rev. 1/Unit 1 Page 18 of 40 ALTERNATE ACTIONS		
L. WHEN RCS BORATION COMPLETE, THEN SHIFT CHARGING PUMP SUCTION SUPPLY TO MAKEUP SUPPLY WITH A LOWER BORIC ACID CONCENTRATION.			
 IF SIAS actuated, THEN perform the following: Open RWT To Charging Pump Suction Valve, 1-CVC-504-MOV. Shut VCT Outlet Valve, 1-CVC-501-MOV. Place Boric Acid Pumps in PULL-TO-LOCK. Ensure Charging Pump AMPS steady. 	 1.1 IF SIAS NOT actuated, THEN line up Charging Pump suction to VCT: a. Determine blend required to maintain shutdown boron concentration per NEOG-7. b. Open VCT Outlet Valve, 1-CVC-S01-MOV. c. Secure Boric Acid Pump(s). d. Shut Boric Acid Direct Makeup Valve, 1-CVC-514-MOV. e. Shut BAST Gravity Feed Valves: 1-CVC-508-MOV 1-CVC-509-MOV OR line up Charging Pump suction to RWT: a. Open RWT To Charging Pump Suction Valve, 1-CVC-504-MOV. b. Shut VCT Outlet Valve, 1-CVC-501-MOV. b. Shut Boric Acid Direct Makeup Valve, 1-CVC-501-MOV. d. Shut Boric Acid Direct Makeup Valve, 1-CVC-514-MOV. d. Secure Boric Acid Pump(s) 		

EOP-3 Rev. 1/Unit 1 Page 19 of 40



a. <u>IF</u> 11 HPSI Pump cavitating, <u>THEN</u> open 11 SDC HX To HPSI Suction Valve, 1-SI-663-MOV <u>AND</u> start 11 Containment Spray Pump.

EOP-3 Rev. 1/Unit 1 Page 20 of 40

LII. RECOVERY ACTIONS

ALTERNATE ACTIONS

 b. <u>IF</u> 13 HPSI Pump cavitating, <u>THEN</u> open 12 SDC HX To HPSI Suction Valve, 1-SI-662-MOV <u>AND</u> start 12 Containment Spray Pump.

- 7. Commence ECCS Pump Room cooling:
 - Open ECCS Pump Room Air Cooler Saltwater Valves:

1-SW-5170-CV 1-SW-5171-CV 1-SW-5173-CV

- b. Start 11 and 12 ECCS Pump Room Cooling Fans.
- Adjust saltwater flow to maintain SRW and component cooling temperatures.
- 9. <u>IF</u> Charging Pumps are aligned with suction from RWT <u>AND</u> HPSI Pumps maintaining RCS inventory, <u>THEN</u> place Charging Pumps in PULL-TO-LOCK.
- N. <u>IF</u> FEEDWATER AVAILABLE <u>AND</u> ONCE THROUGH CORE COOLING IN PROGRESS, THEN EVALUATE FEEDING S/G:
 - <u>IF</u> decision made to feed S/G, <u>THEN</u> establish secondary heat sink in S/G with highest level.

- CAUTION -

If voids exist in the S/C tubes, a rapid RCS pressure reduction will occur when the voids collapse. 1.1 <u>IF</u> decision made <u>NOT</u> to feed S/G, <u>THEN</u> continue Once Through Core Cooling until Shutdown

Cooling can be used.

EOP-3 Rev. 1/Unit 1 Page 21 of 40

RECOVERY ACTIONS III.

ALTERNATE ACTIONS

- Throttle Auxiliary Feedwater 2. CCOM CR flow to less than 150 GPM OR 88-1214 throttle Main Feedwater flow to minimum by cracking the Feed Regulating Bypass Valve off its shut seat.
 - 3. WHEN S/G level increases OR continuous feed has been maintained for 5 minutes, THEN slowly raise feed rate to raise 3/G level to greater than (-)250 inches and tranding toward 0 inches.
 - 4. Align Atmospheric Dump Valve for S/G with highest level to 1CO3 and Atmospheric Dump Valve for S/G with lowest level to 1C43.
 - 5. Adjust Atmospheric Dump Valve to establish watural Circulation.

- CAUTION -

The RCS may be solid. Any action involving RCS cooldown or heatup should be closely monitored to prevent rapid pressure excursions.

- WHEN secondary heat sink 6. established, THEN secure Once Through Core Cooling:
 - Operate HPSI and Charging a. Pumps as necessary to maintain RCS subcooling between 30 and 140°F.
 - Shut both PORVs: b.
 - (1) Insert High Pressurizer Pressure Trip Units that were previously pulled.
 - (2) Ensure "PORV ENERGIZED" alarm clear.







EOP-3 Rev. 1/Unit 1 Page 12 of 40

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

7. Confirm Natural Circulation:

- NOTE -

Wide range Thot may be obtained from Subcooled Margin Monitor per Attachment (10).

- a. Thot minus Toold between 10 and 50°F.
- b. Tcold constant or decreasing.
- c. Thot constant or decreasing.
- d. CET temperatures consistent with Thot.
- Steaming rate affects primary temperature.
- Monitor for Core and RCS voiding:
 - CAUTION -

Potential for void formation increases rapidly when pressure decreases below 1500 PSIA.

- Letdown flow greater than charging flow.
- b. Rapid unexplained increase in pressurizer level during an RCS pressure reduction.
- Loss of subcooled margin as determined using CET temperatures.
- d. "REACTOR VESSEL WATER LEVEL LOW" alarm.

EOP-3 Rev. 1/Unit 1 Page 23 of 40

ALTERNATE ACTIONS

III. RECOVERY ACTIONS

- 9. <u>IF</u> voiding inhibits heat removal, <u>THEN</u> reduce or eliminate voided area:
 - a. Shut Letdown Isolation Valve, 1-CVC-515-CV.

-CAUTION-

The potential exists for pressurized thermal shock from an excessive cooldown rate followed by a represeurization.

- b. Pressurize RCS to maintain subcooling as near 140°F as practical.
- c. <u>IF</u> voiding occurs in the S/G Tubes (saturation pressure of S/G greater than saturation pressure of RCS), <u>THEN</u> cool the S/G by raising any of the following:
 - (1) Steaming rate.
 - (2) Feed rate.
 - (3) S/G Blowdown rate.

AND maintaining less than 100°F/h cooldown rate.

- CAUTION -

Technical Specifications require MPT protection when Tcold less than 275°F.

 Continue RCS cooldown until able to initiate Shutdown Cooling. 9.b.1 IF pressurizing the RCS does <u>NOT</u> restore heat removal, <u>THEN</u> operate Reactor Vessel Vent Valves per OI-1G.

EOP-3			
Rev.	1/1	Jnit	: 1
Page	24	of	40

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

- O. RESTORE CONTAINMENT ENVIRONMENT:
 - Direct Chemistry to place Hydrogen Monitors in service.
 - <u>IF</u> hydrogen concentration increases to 1%, <u>THEN</u> start Hydrogen Recombiners per OI-41A.
 - Meintain Iodine Filter Fans running.
 - WHEN containment pressure less than 4.0 PSIG, THEN perform the following:
 - a. Reset CSAS signal.
 - Secure one Containment Spray Pump.
 - c. Verify all Containment Air Coolers operating to maintain containment temperature less than 120°F.
 - Restore equipment per CSAS Verification Checklist, Attachment (3), to desired condition.
 - WHEN containment pressure less than 2.8 PSIG, THEN perform the following:
 - Block pressurizer pressure signals and reset SIAS signal.
 - b. Reset CIS signal.
 - Secure remaining Containment Spray Fump.
 - d. Restore equipment per SIAS and CIS Verification Checklists, Attachments (2) and (4), to desired condition.

RECOVERY ACTIONS	EOP-3 Rev. 1/Unit 1 Page 25 of 40 <u>ALTERNATE ACTIONS</u>	
N CET TEMPERATURES LESS THAN F AND RADIATION LEVELS PERMIT, N INITIATE SHUTDOWN COOLING:		
WHEN RCS pressure less than 300 PSIA, THEN shut SI Tank Outlet Valves: 1-SI-614-MOV 1-SI-624-MOV 1-SI-634-MOV 1-SI-644-MOV		
 Lower KCS pressure to less than 250 PSIA by throttling HPSI flow while maintaining: a. Greater than 30°F subcooling using CET temperatures. b. Greater than 30 GPM flow per operating HPSI Pump. 	 2.1 , <u>IF</u> voiding prevents depressurization to 250 PSIA, <u>THEN</u> attempt to eliminate voids: a. Alternately pressurize and depressurize RCS by throttling HPSI flow. b. Operate Reactor Vessel Vent Valves per OI-1G. 	
WHEN RCS pressure less than 250 PSIA AND containment pressure less than 4.0 PSIG, THEN initiate Shutdown Cooling per OI-3.	3.1 <u>IF</u> unable to initiate Shutdown Cooling, <u>THEN</u> continue Once Through Core Cooling until able to initiate Shutdown Cooling <u>OR</u> Feedwater available.	
	<pre>RECOVERY ACTIONS N CET TEMPERATURES LESS THAN F AND RADIATION LEVELS PERMIT, N INITIATE SHUTDOWN COOLING: WHEN RCS pressure less than 300 PSIA, THEN shut SI Tank Outlet Valves: 1-SI-614-MOV 1-SI-624-MOV 1-SI-634-MOV 1-SI-644-MOV Lower kCS pressure to less than 250 PSIA by throttling HPSI flow while maintaining: a. Greater than 30°F subcooling using CET temperatures. b. Greater than 30 GPM flow per operating HPSI Pump. WHEN RCS pressure less than 250 PSIA AND containment pressure less than 4.0 PSIG, THEN initiate Shutdown Cooling per OI-3.</pre>	

EOP-3 Rev. 1/Unit 1 Page 26 of 40

ALTERNATE ACTIONS

RECOVERY ACTIONS

III.

- CAUTION -

The RCS may be solid. Any action involving RCS cooldown or heatup should be closely monitored to prevent rapid pressure excursions.

- WHEN Shutdown Cooling flow is established, <u>THEN</u> secure Once Through Core Cooling:
 - a. Operate HPSI or Charging Pumps as necessary to maintain RCS pressure between 150 and 250 PSIA until CVCS letdown available.
 - CAUTION -

Technical specifications require MPT protection when Tcold less than 275°F.

- b. Shut both PORVs:
 - Insert High Pressurizer Pressure Trip Units that were previously pulled.
 - (2) Ensure "PORV ENERGIZED" alarm clear.
- Q. RESTORE SERVICE WATER TO TURBINE BUILDING:
 - Verify 21 Plant Air Compressor operating.
 - Shut Plant Air To Plant Air Header Valve, 1-PA-2059-CV.

EOP-3				
Rev.	1/	Uni	t	1
Page	27	of	1	40



EOP-3 Rev. 1/Unit 1 Page 28 of 40

6

III. RECOVERY ACTIONS ALTERNATE ACTIONS RESTORE LETDOWN FLOW: Т. 1. Verify charging flowpath through Loop Charging Valves or Auxiliary Spray Valve. Verify at least one Charging 2. Pump operating. Shift Letdown Control Valve 3. Controller, 1-HIC-110, to MANUAL. 4. Adjust controller to shut Letdown Control Valves. 5. Open Letdown Isolation Valves: 1-CVC-515-CV 1-CVC-516-CV -CAUTION-The setpoint of 1-PIC-201 must be above the saturation pressure for the letdown outlet temperature of the Regenerative Heat Exchanger. 6. Adjust the setpoint on 1-PIC-201 and adjust 1-HIC-110 to maintain desired RCS pressure. DRAW PRESSURIZER BUBBLE IF DESIRED: U. 1. Adjust steaming rate or Shutdown Cooling to stabilize Tcold. 2. Heat up Pressurizer by energizing Backup and Proportional Heaters. 3. Adjust letdown flow and Toold to maintain RCS subcooling between 30 and 140°F.

0

EOP-3 Rev. 1/Unit 1 Page 29 of 40

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

- WHEM pressurizer temperature exceeds CET temperatures by 50°F,
 THEN maximize letdown:
 - a. Lower the setpoint on Letdown Backpressure Regulator Controller to obtain letdown flow of 100 GPM.
 - b. Secure Charging Pump(s) as needed to increase effective letdown.
- 5. WHEN saturation pressure for the existing pressurizer temperature is reached, <u>THEN</u> confirm bubble formation by observing steady pressurizer pressure.
- Using CET temperatures, maintain subcooling between 30 and 140°F per Attachment (1) by operating:
 - a. Backup and Propertional Heater(s).
 - b. Auxiliary Spray.
- Maintain pressurizer level between 101 and 180 inches by operating:
 - a. Charging flow.
 - b. Letdown flow.

EOP-3			
Rov.	1/0	nit	1
Page	30	of	40

V. IF FEEDWATER AVAILABLE AND SHUTDOWN COOLING NOT OPERATING, THEN EVALUATE NEED FOR FORCED OR NATURAL CIRCULATION:		RECOVERY ACTIONS	Page 30 of 40 ALTERNATE ACTIONS		
		FEEDWATER AVAILABLE AND TDOWN COOLING NOT OPERATING, N EVALUATE NEED FOR FORCED NATURAL CIRCULATION:			
	1.	WHEN RCPs available AND Forced Circulation desired THEN start RCPs per steps 2-12.	1.1 <u>IF</u> RCPs <u>NOT</u> available <u>OR</u> Natural Circulation desired, <u>THEN</u> implement Natural Circulation (AOP-3E) <u>AND</u> complete administrative post-trip actions.		
	2.	IF RCPs exposed to excessive moisture, THEN consider meggering RCP motor.			
		- CAUTION -			
6	Unc coo deg sea	controlled restoration of ling to hot RCP seals may cause gradation of the metallic uting surfaces by thermal shock.			
	3.	IF Component Cooling is isolated to RCP seals, THEN reduce RCP lower seal temperature below 280°F prior to initiating full cooling flow to the RCPs:			
		a. Shut Component Cooling Supply Containment Manual Isolation Valve, 1-CC-284, located in 5 ft East Penetration Room.			
		b. Verify CIS reset.			
		c. Open Component Cooling Containment Isolation Valves:			
		1-CC-3832-CV 1-CC-3833-CV			

EOP-3 Rev. 1/Unit 1 Page 31 of 40

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

- d. Slowly open 1-CC-284 to throttle component cooling flow until lower seal temperatures are less than 280°F.
- e. <u>WHEN</u> lower seal temperatures are less than 280°F, THEN fully open 1-CC-284.
- <u>IF</u> an RCP lower seal temperature exceeded 280°F, <u>THEN</u> an engineering evaluation is required prior to restarting that RCP.
- Raise pressurizer level to at least 155 inches.
- 6. Verify RCP restart criteria:
 - a. RCS subcooling greater than 30°F.
 - b. At least one S/G available for heat removal.
 - Pressurizer level greater than 155 inches and stable.
 - d. Tcold less than 525°F.
 - e. RCS temperature and pressure greater than the minimum operating limits per the RCP curve on Attachment (1).

EOP-3 Rev. 1/Unit 1 Page 32 of 40

ALTERNATE ACTIONS

III. RECOVERY ACTIONS

- NOTE -

Starting an RCP may cause a pressurizer level transient.

- 7. WHEN RCP restart criteria are met, THEN start one RCP in a loop with an operable S/G:
 - Verify "COMPT CLG FLOW LO" alarm clear.
 - b. Start Oil Lift Pump.
 - c. Insert RCP sync stick.
 - d. Start one RCP.

Tavg

4

 $\hat{\mathbf{z}}$

e. Monitor RCP running current:

Current

525 to 572°F 238 to 210 AMPS and steady

210 to 525°F 264 to 238 AMPS and steady

- <u>IF</u> pressurizer level decreases, <u>THEN</u> start Charging or HPSI Pump(s) as necessary to restore <u>AND</u> maintain level greater than 155 inches.
- Monitor RCP seal parameters following pump restart.
- Allow backflow to equalize temperatures in opposite loop.
- Start second RCP in opposite loop per Step V.7 and V.9, page 32.

ñ,

EOP-3 Rev. 1/Unit 1 Page 33 of 40

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

5

s,

- 12. Secure Auxiliary Spray:
 - a. Of en Loop Charging Valves:

1-CVC-518-CV 1-CVC-519-CV

- Shut Auxiliary Spray Valve, 1-CVC-517-CV.
- c. Shift Pressurizer Spray Controller, 1-HIC-100, to AUTO.

W. COMPLETE ADMINISTRATIVE POST-TRIP ACTIONS AND IMPLEMENT APPROPRIATE OPERATING PROCEDURE.

.

EOP-3 Rev. 1/Un/t 1 Page 34 o. 40

X. ADMINISTRATIVE POST-TRIP ACTIONS:

- MO'E -

The following actions may be accomplished whenever feasible. They may be done in any order.

- Refer to ERPIP to determine appropriate emergency response actions.
- Perform notifications per CCI-118.
 - ____ 3. Notify ESO of trip.
 - 4. Request RCS Boron and Iodine sample.
 - 5. Perform shutdown margin calculation per NEOG 2 and 7.
 - 6. Complete transient log entries per CCI-301.
 - 7. Recall post-trip review (preferably within 30 minutes of trip).
 - _ 8. Perform post-trip review per CCI-111.
 - 9. Monitor turbine bearing temperatures.
 - Continue Main Turbine shutdown per applicable step of CI-43A.

END OF SECTION .

EOP-3 Rev. 1/Unit 1 Page 35 of 40

IV. SAFETY FUNCTION STATUS CHECK

- A. The STA (or person designated by STA) will perform the intermediate and final safety function checks respectively on entry and prior to exiting from this procedure.
- B. Perform intermediate safety function status check at 10 minute intervals until plant conditions stabilize.
- C. Immediately notify Shift Supervisor or Control Room Supervisor if any safety function criteria is not being satisfied.
- D. Review data and verify that safety function acceptance criteria are satisfied.
- E. When EOP completed, then perform final safety function check.

REACTIVITY	SAFETY FUNCTION ACCEPTANCE CRITERIA			
PARAMETERS	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK
a. WRNI power	less than 3%		less than 2%	
b. SUR (DPM)	negativa		o	
c. CEA status	all inserted		all inserted	
or				
oration status:				
concentration	increasing	*********	appropriate S/D margin	-
BAST level	decreasing	*********	N/A	N/A

EOP-3 Rev. 1/Unit 1 Page 36 of 40

Sec.

RCS PRESSURE SAFETY FUNCTION ACCEPTANCE CRITERIA AND INVENTORY PARAMETERS CRITERIA INTERMEDIATE CRITERIA FINAL CHECK CHECK a. Pressurizer 1000 to 2350 less than 2300 pressure (PSIA) 50 to 350 b. L'ressurizer 101 to 180 la calence a se level (inches) c. RCS subcooling 30 to 140 (F) 30 to 140 e e e e e le le rece If PORVs were opened, once an hour m nitor the following: d. Quench Tank parameters: level (inches) constant temperature (°F) or pressure (PSIG) decreasing constant or decreasing e. CORV discharge piping temperature (°F) (computer points T107, T108) decreasing decreasing -----

88-1173

CCOM CR
EOP-3 Rev. 1/Unit 1 Page 37 of 40

.

CORE AND RCS		SAFETY FUNCTION ACCEPTANCE CRITERIA					
PA	RAMETERS	CRI	TERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK	
а.	RCS Tcold (^O F)	less	than 540		less than 535		
ь.	CET (°F)	less	than 560		less than 540		
с.	Thot minus Tcold (°F)						
	Natural Circulation	10	to 50		10 to 50	-	
	Forced Circulation	less	than 10		less than 5		
d.	S/G pressure	less	chan 960		less than 920		
е.	S/G level (inches)	(-)4	00 to +)30		(-)24 to (+)30		
£.	Condensate Storage Tank level (ft)	greate	r than 5		greater than 5 and increasing		

EOP-3 Rev. 1/Unit 1 Page 38 of 40

¢

14

**

6

.

SAFETY FUNCTION ACCEPTANCE CRITERIA

VITAL AUXIL	IARIES	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK
a. 4K	V vital buses or 14	energized		energized	
b. Ins	strument Air essure (FSIC)	greater than 88		greater than 88	
c. Con (#	mponent Cooling pumps running)	1 or 2		1 or 2	
d. Sal (#	ltwater pumps running)	1 or 2		1 or 2	10
e. Ser (#	rvice Water pumps running)	1 07 2		1 cr 2	
f 125 11,	5V DC buses , 12, 21, 22	energized		energized	
g. 120	OV AC vital				
11,	, 12, 13, 14	energized		energized	

ų

.

- ..

.

0

.

-69

EOP-3 Rev. 1/Unit 1 Page 39 of 40

60

61

-

67

1.0

à

NORMAL CONTAINMENT ENVIRONMENT PARAMETERS		SAFETY FUNCTION ACCEPTANCE CRITERIA					
		CRITERIA		INTERMEDIATE CHECK	CRITERIA		FINAL CHECX
a. Cortainme pressure (PSIG)	ent	less than	50		lass than	2.8	
b. Containme temperatu (°F)	ire	less than	276		less than	220	
c. Containme High Rang Radiation Monitor	ent re	alarm clear			alarm clear		
d. Hydrogen concentra	tion	N/A		N/A	less than	2%	

- 0 0

à

10

EOP-3 Rev. 1/Unit 1 Page 40 of 40

NO	RMAL RADIATION	SAFETY F	JNCTION ACCEPTANC	E CRITERIA	
TO	CONTAINMENT	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK
a.	Noble Gas Monitor	alarm clear		alarm	
h.	Condenser Off-Gas RMS	alarm clear		alarm clear	
с.	S/G B/D RMS	alarm clear		alarm	
d.	Main Vent Gaseous RMS (1-RI-5415)	alarm clear		alarm clear	

51	ΓA	TU	5	C	H	EC	K	
		NU	MB	Ε	R			

1

20

.

4

R

COMPLETE AT TIME

2 3 ____4

EOP-3 Rev. 1/Unit 2 Page 1 of 40

CALVERT CLIFFS NUCLEAR POWER PLANT

.....

.

a

.

EOP-3 TOTAL LOSS OF ALL FEEDWATER

REVISION 1

6	SIGNATURE	DATE
PREPARED BY;	An Junior tak	, 12-18-87
VERIFIED BY;	James V. Shooms	1 12/18/87
POSRC;	MEETING # 83-7	1 2.10.83
APPROVED BY;	Manager-Nuclear Operations or Operations if POSEC review is	Z-10-88 General Supervisor- not required

.

EOP-3 Rev. 1/Unit 2 Page 2 of 40

.

: :0

ø

LIST OF EFFECTIVE PAGES

PAGE NUMBER

.

.

REVISION

. .

.

.

EOP-3 Rev. 1/Unit 2 Page 3 of 40

TOTAL LOSS OF ALL FEEDWATER

I. PRECAUTIONS

.....

- A. Do not adopt manual operation of automatically controlled systems unless a malfunction is apparent or automatic system operation will not support the maintenance of a safety function.
- B. Systems shifted to manual operation must be monitored frequently to ensure correct operation.
- C. At least two independent indications should be used, when available, to evaluate and corroborate a specific plant condition since an incident could induce inconsistencies between instruments.
- D. Solid operation of the RCS should only be attempted in order to maintain a subcooled margin of 30°F.
- E. If solid operation of the RCS is undertaken, any functions or actions directly affecting makeup, letdown, system heatup or cooldown should be closely monitored to avoid rapid pressure excursions.
- F. Feedwater should not be added to a dry S/G if the other S/G still contains water. If both S/Gs become dry, refill only one S/G to reinitiate Natural Circulation.
- G. Minimize the number of cycles of pressurizer auxiliary spray when the temperature differential is greater than 400°F.
- H. In Natural Circulation, increased loop transport time causes a 5 to 10 minute delay in temperature responses to a plant change. Pressurizer level and pressure responses, if available, typically provide better indication of RCS response uring this period.
- I. S/G pressure, pressurizer pressure, and containment temperature affect the level indication for the S/Gs and Pressurizer. Attachments (8) and (9) contain the corrected S/G and pressurizer levels for various S/G pressures, pressurizer pressures, and containment temperatures.
- J. If a pump or component fails, the cause of the failure should be determined prior to restarting or starting a standby pump or component to prevent a common failure.

ECP-3 Rev. 1/Unit 2 Page 4 of 40

II. ELTRY CONDITIONS

Đ

The presence of one or more of the following conditions indicates that a Total Loss Of All Feedwater may have occurred:

- A. Loss of Condensate Storage Tank inventory.
- B. Loss of Condenser Hotwell level.
- C. Low suction or discharge pressure for either the Condensate, Condensate Booster, or S/G Feed Pumps.
- D. S/G Turbine Tripped alarm on both S/G Feed Pumps.
- E. Low suction or discharge pressure for the AFW Pumps.
- F. Motor System No Flow alarm for AFW.

G. Turbine System No Flow alarm for AFW.

		EOP-3 Rev. 1/Unit 2 Page 5 of 40
111	. RECOVERY ACTIONS	ALTERNATE ACTIONS
A.	VERIFY POST-TRIP IMMEDIATE ACTIONS COMPLETED.	
B.	COMMENCE INTERMEDIATE SAFETY FUNCTION STATUS CHECK.	
c.	ERFIP REQUIRES THAT A SITE EMERGENCY EE DECLARED IF TOTAL LOSS OF MAIN AND AUXILIARY FEEDWATER EXISTS FOR LONGER THAN TEN MINUTES.	
D.	TRIP ALL RCPs.	
Ε.	MINIMIZE S/G INVENTORY LOSS.	
	 Shut S/G Blowdown Valves: 2-BD-4010-CV 2-BD-4011-CV 2-BD-4012-CV 2-BD-4013-CV Depress Reset Button on MSR Control Panel to shut Second Stage Steam Source Valves: 2-MS-4017-CV 2-MS-4018-CV 2-MS-4019-CV 2-MS-4020-CV 	
26	COMMENCE RCS BORATION:	
T	 Shut VCT Makeup Volve, 2-CVC-512-CV. 	

EOF-3 Rev. 1/Unit 2 Page 6 of 40

	RECOVERY ACTIONS	A	LTERN	ATL ACTIONS
2.	Open Boric Acid Direct Makeup Valve, 2-CVC-514-MOV.			
3.	Start a Boric Acid Pump.	3.1	IF B avai THEN	oric Acid Pumps <u>NOT</u> lable, establish gravity feed:
			а.	Open BAST Cravity Feed Valves:
				2-CVC-508-MOV 2-CVC-509-MOV
	이 같은 것은 것이 같아요.		h.	Shut VCT Outlet Valve, 2-CVC-501-MOV.
4.	Start all available Charging Pumps.			
5.	Continue boration until a total 65 inch decrease in BAST level(s) is achieved, or shutdown margin requirement of NEOG-11 is achieved.			
	the contradiction of the contradiction and the second strategies in the second second second second second second			
EST COC	TABLISH NATURAL CIRCULATION AND DL DOWN RCS:			
EST COO	Block ESFAS actuation:			
ES7 COC	ABLISH NATURAL CIRCULATION AND DL DOWN RCS: Block ESFAS actuation: a. WHEN "SGIS A(B) BLOCK PERMITTED" alarm(s)	1.a.	1 II	SGIS actuates, IEN reset SGIS:
ES7 COC 1.	ABLISH NATURAL CIRCULATION AND DL DOWN RCS: Block ESFAS actuation: a. WHEN "SGIS A(B) BLOCK PERMITTED" alarm(s) received, THEN block SGIS A(B).	1.a.	1 II TI a.	SGIS actuates, IEN reset SGIS: Place Condensate Booster Pumps in PULL-TO-LOCK.
ES7 COC 1.	ABLISH NATURAL CIRCULATION AND DL DOWN RCS: Block ESFAS actuation: a. WHEN "SGIS A(B) BLOCK PERMITTED" alarm(s) received, THEN block SGIS A(B).	1.a.	l II TI a. b.	SGIS actuates, IEN reset SGIS: Place Condensate Booster Pumps in PULL-TO-LOCK. Match handswitches per SGIS Verification Checklist, Attachment (7).
ES7 COC 1.	ABLISH NATURAL CIRCULATION AND DL DOWN RCS: Block ESFAS actuation: a. WHEN "SGIS A(B) BLOCK PERMITTED" alarm(s) received, THEN block SGIS A(B).	1.a.	1 II a. b.	SGIS actuates, IEN reset SGIS: Place Condensate Booster Pumps in PULL-TO-LOCK. Match handswitches per SGIS Verification Checklist, Attachment (7). Block SGIS.

EOP-3 Rev. 1/Unit 2 Page 7 of 40

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

e. Open S/G Feedwater Isolation Valves:

> 2-FW-4516-MOV 2-FW-4517-MOV

f. Start a Condensate Booster Pump.

- b. <u>WHEN</u> "PRSP PRESS BLOCK A(B) PERMITTED" alarm(s) received, THEN block SIAS A(B).
- Commence cooldown by throttling Turbine Bypass or Atmospheric Dump Valves while maintaining:
 - a. Less than 100°F/h RCS cooldown rate.
 - b. Pressurizer level between 50 and 180 inches.

3. Shut Letdown Isolation Valv.s:

2-CVC-515-CV 2-CVC-516-CV

- Maintain RCS subcooling between 30 and 140°F:
 - a. Raise subcooling by:
 - Energizing Pressurizer Heaters.
 - (2) Increasing cooldown rate.
 - b. Lower subcooling by initiating Auxiliary Spray:
 - Record temperature differential between Pressurizer and Regenerative Heat Exchanger Outlet.

EOP-3 Rev. 1/Unit 2 Page 8 of 40

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

- (2) Open Auxiliary Spray Valve, 2-CVC-517-CV.
- (3) Shut Loop Charging Valves:

2-CVC-518-CV 2-CVC-519-CV

(4) Shift 2-HIC-100 to MANUAL and shut Pressurizer Spray Valves:

> 2-RC-100E-CV 2-RC-100F-CV

 Confirm Natural Circulation in at least one loop:

- NOTE -

Wide : ange Thot may be obtained from Subcooled Margin Monitor per Attachment (10).

- a. Thot minus Tcold between 10 and 50°F.
- b. Tcold constant or decreasing.
- c. Thot constant or decreasing.
- CET temperatures consistent with Thot.
- Steaming rate affects primary temperature.
- <u>IF</u> either S/G level decreases to (-)350 inches before Main Feed or AFW can be restored, <u>THEN</u> proceed to step J, page 13 <u>AND</u> continue efforts to restore Main Feed or AFW.

EOP-3 Rev. 1/Unit 2 Page 9 of 40

-

ių.

48

EII. RECOVERY ACTIO	<u>NS</u>	Page 9 of 40 ALTERNATE ACTIONS			
H. ATTEMPT TO ESTABLE TO S/Gs:	SH AFW FLOW				
 Confirm 12 CST a. Ensure 12 greater th b. Open 12 CS Pump Sucti 2-AFW-161. 	Coperable: CST level han 5 ft. ST Jnit 2 AFW ion Valve,	 -CAUTION- Before transferring AFW Pump suction to an alternate supply the possibility of suction line or cost rupture should be considered. 1.1 If 12 CST NOT operable, THEN line up 21 CST as alternate suction supply: a. Locally open 21 CST AFW Pump Suction Valves. 2-AFW-131 2-AFW 161. b. Locally shut 12 CST int 2 AFW Pump Suction Valves. 2-AFW-161. c. Confirm normal CST level response. 1.2 If 21 CST NOT available, THEN line up 11 CST as alternate suction supply: a. Locally open 11 CST AFW Pump Suction Valves. 1.4FW-161 b. Locally open 12 CST AFW Pump Suction Valves. 1.4FW-161 c. Confirm normal CST Level 2-AFW-161. 			

.

1

EOP-3 Rev. 1/Unit 2 Page 10 of 40

III. RECOVERY ACTIONS

- Ensure normal AFW flowpath available:
 - Open all motor and steam driven train AFW Block Valves:

21 S/G 22 S/G

2-AFW-4520-CV 2-AFW-4521-CV 2-AFW-4521-CV 2-AFW-4522-CV 2-AFW-4531-CV 2-AFW-4522-CV 2-AFW-4532-CV 2-AFW-4533-CV

b. Open AFW Flow Control Valves:

21 S/G 22 S/G

2	-AFW-4511	-CV	2-AFW4	45	12-CV
2	-AFW-4525	-CV	2-AFW-4	45	35-07

3. Start Unit 2 AFW Pumps:

- CAUTION -

D/G supplying power to 23 AFW Pump flow limit is 300 GPM; otherwise, flow limit is 575 GPM.

- a. Start 23 AFW Pump:
 - Place 23 AFW Pump Handswitch in START.

LTERNATE ACTIONS

- 2.a.1 IF AFW Block Valve(s) will NOT open from Control Room, THEN locally pen valve(s) using Hand Transfer Station(s) on South wall of SRW Room.
- 2.b.1 <u>IF</u> AFW Flow Control Valve(s) will <u>NOT</u> open, <u>THEN</u> locally throttle open bypass valve(s):
 - A511-CV 21 S/G Bypass Valve, 2-AFW-163, located in 27 ft East Penetration Room.
 - b. 4525-CV 21 S/G Bypass Valve, 2-AFW-195, located in SRW Poom.
 - c. 4512-CV 22 S/G Bypass Valve, 2 AFW-165, located in 27 ft East Penetration Room.
 - d. 4535-CV 22 S/G Bypass Valve, 2-AFW-196, located in SRW Room.
- 3.1 <u>IF</u> unable to feed S/Gs with Unit 2 AFW Pumps, <u>TFEN</u> establish Unit 1 to Unit 2 closs connect operation:
 - a. Shut Unit 1 motor train AFW Block Valves:

1-AFW-4522-CV 1-AFW-4523-CV 1-AFW-4532-CV 1-AFW-4533-CV

EOP-3 Rev. 1/Unit 2 Page 11 of 40

III. RECOVERY ACTIONS

- (2) Ensure normal pump running current of 60 to 70 AMPS.
- (3) Verify 23 AFW Pump flow of 150 GPM per S/G.
- b. Start 21 or 22 AFW Fump:
 - (1) Open 21 and 22 AIW Pump Turbine Throttle/ Stop Valves:

2-MS-3986 2-MS-3988

(2) Open 21 and 22 AFW Fump Main Steam Supply Valves:

> 2-MS-109 2-MS-107

(3) Open 21 or 22 S/G AFW Steam Supply Valves:

> 2-MS-4070-CV 2-MS-4071-CV

- (4) Verify 21 or 22 AFW Pump discharge pressure approximately 100 PSI greater than S/G pressure.
- (5) Verify 21 or 22 AFW Pump flow of 150 GPM per S/G.
- Ensure normal or emergency AFW Room Ventilation. operable.
- IF AFW restored, <u>THEN</u> proceed to appropriate step:
 - a. Once Through Core Cooling in progress, proceed to stop N, page 20.
 - b. Once Through Core Cooling NOT in progress, proceed to step V, page 30.

ALTERNATE ACTIONS

b. Open Unit 1 To Unit 2 AFW Cross Connect Valve, 1-AFW-4550-CV.

- CAUTION -

D/G Supplying power to 13 AFW Pump flow limit is 300 GPM, otherwise, flow limit is 575 GPM

- c. Start 13 AFW Fump:
 - Place 13 AFW Pump Handswitch in START.
 - (2) Ensure normal pump running current of 60 to 70 AMPS.
 - (3) Maintain 150 GPM flow to each S/G using Unit 2 AFW Flow Control Valves:

2-AFW-4525-CV 2-AFW-4535-CV

4.1 IF AFW NOT restored, THEN proceed to step 1, page 12.

EOP-3 Rev. 1/Unit 2 Page 12 of 40

ALTERNATE ACTIONS

III. RECOVERY ACTIONS PREPARE TO FEED S/G WITH Ι. CONDENSATE BOOSTER PUMP: 1. Open S/G Feedwater Isolation Valves. Shut Main Feed Regulating 2. Valves. Depress Feed Regulating Bypass 3. Valve Reset Buttons. 4. Manually adjust Feed Regulating Bypass Valve Controllers to 30% output.

- 5. Open Condensate Precoat Filter and Cordensate Demin Bypass Valves.
- Verify one Condensate Pump б. running.
- Verify one Condensate Booster 7. Pump running.
- 8. Place Heater Drain Pump Handswitches in PULL-TO-LOCK.

- NOTE -

Feedwater flow to S/Gs should start when S/G pressure decreases to approximately 500 PSIA.

- 9. Monitor feedwater flow to S/G:
 - a. Main Feed Regulating Valve Differential Pressure Controller indicates greater than 0.
 - b. S/G level constant or increasing.

EOP-3 Rev. 1/Unit 2 Page 13 of 40

III. RECOVERY ACTIONS

- 10. IF Condensate Booster Pump flow restored, <u>THEN</u> proceed to appropriate step:
 - a. Once Through Core Cooling in progress proceed to step N, page 20.
 - b. Once Through Core Cooling <u>NOT</u> in progress, proceed to step V, page 30.
- J. ISOLATE S/GS IN PREPARATION FOR ONCE THROUGH CORE COOLING:
 - WHEN the first S/G decreases to (-)350 inches, THEN isolate that S/G:
 - a. For S/G to be isolated, shut the motor and steam driven train AFW Block Valves:
 - 21 S/G or 22 S/G

2-AFW-4520-CV 2-AFW-4530-CV 2-AFW-4521-CV 2-AFW-4531-CV 2-AFW-4522-CV 2-AFW-4532-CV 2-AFW-4523-CV 2-AFW-4533-CV

- b. For S/G remaining to be steamed, place the motor and steam driven train AFW Block Valve Handswitches in OPEN.
- c. For S/G to be isolated, shut the AFW Steam Supply Valve.

21 S/G or 22 S/G

2-MS-4070-CV 2-MS-4071-CV

ALTERNATE ACTIONS

10.1 <u>IF</u> Condensate Booster Pump will <u>NOT</u> feed 5/G, <u>THEN</u> proceed to step J, page 13.

EOP-3 Rev. 1/Unit 2 Page 14 of 40

2-MS-104

III. RECOVERY ACTIONS

- d. For S/G to be isolated, shut the Atmospheric Dump Valve using the Hand Transfer Valves on the West wall of the Unit 2 45 ft Switchgear Room:
 - Verify 2C43 Atmospheric Dump Controllers at 0% outpuc.
 - (2) Align Hand Transfer Valves to 2C43 position:

2.1	0 10	AT. 181	22 8/6	
21	3/0	OL.	66 0/0	
Station of	and the second s		P Residence and the Reserves of	

2-HV-3939A	2-HV-3938A
2-HV-3939B	2-HV-3938B

- e. For S/G to be isolated, shut the MSIV.
- f. Shut upstream drains by placing handswitch 2-HS-6622 in CLOSE.
- Continue to steam unisolated S/G, attempting to maintain CET temperatures constant or decreasing using Turbine Bypass Valve(s).
- MHEN the remaining S/G level decreases to (-)375 inches OR CET temperatures begin to increase, THEN isolate both S/Gs:
 - a. Shut the motor and steam driven train AFW Block Valves:

21 S/G 22 S/G

2-AFW-4520-CV 2-AFW-4521-CV 2-AFW-4521-CV 2-AFW-4531-CV 2-AFW-4532-CV 2-AFW-4532-CV 2-AFW-4533-CV

ALTERNATE ACTIONS

2-MS-101

1.d.1 <u>IF</u> Atmospheric Dump Valve will <u>NOT</u> shut from 2C43, <u>THEN</u> shut Atmospheric Dump Manual Isolation Valve.

21	S/G	or	2.2	S/G

2.1 <u>IF</u> Turbine Bypass Valves unavailable, <u>THEN</u> continue to steam unisolated S/G using Atmospheric Dump Valve.

EOP-3 Rev. 1/Unit 2 Page 15 of 40



EOP-3 Rev. 1/Unit 2 Page 16 of 40

ALTERNATE ACTIONS

RECOVERY ACTIONS

4

J

١

-

a,

67.8

III.

- Start all available Charging Pumps.
- Open Main and Aux HPSI Header Valves:

2-SI-616-MOV 2-SI-626-MOV 2-SI-626-MOV 2-SI-636-MOV 2-SI-636-MOV 2-SI-637-MOV 2-SI-646-MOV 2-SI-647-MOV

- 5. Start 21 and 23 HPSI Pumps.
- De-energize the Pressurizer Heaters by placing all handswitches in OFF.
- Start all available Containment Air Coolers in HIGH with maximum SRW flow.
- 8. Open both PORVII:
 - a. <u>WHEN</u> "PRSR PRESS BLOCK A(B) PERMITTED" alarm(s) received, THEN block SIAS A(B).
 - Verify both PORV Block Valves open.
 - Pull two Kigh Pressurizer Pressure Trip Units.
 - d. Verify PORVs open.

EOP-3 Rev. 1/Unit 2 Page 17 of 40

RECOVERY ACTIONS

ALTERNATE ACTIONS

9. <u>IF</u> containment pressure increases to 2.8 PSIG, <u>THEN</u> verify ESFAS actuation <u>AND</u> commence Verification Checklists:

a. SIAS per Attachment (2).

b. CIS per Attachment (4).

- <u>IF</u> containment pressure increases to 4.25 PSIG, <u>THEN</u> verify CSAS actuation <u>AND</u> commence Verification Checklist, Attachment (3).
- Confirm initiation of Once Through Core Cooling.
 - a. WHEN RCS pressure is less than 1270 PSIA, THEN ensure HPSI flow AND CET temperatures constant or decreasing.
- 12. Using CET temperatures, maintain subcooling between 30 and 140°F per Attachment (1) by throttling HPSI flow:
 - Lower subcooling by lowering HPSI flow.
 - b. Raise subcooling by raising HPSI flow.
- Continue cooldown using Once Through Core Cooling until feedwater restored or shutdown cooling entry conditions are established.

- NOTE -

Additional guidance for feeding S/Gs is given in the Core and RCS Heat Removal section of EOP-8.

 Continue efforts to restore Main Feed or AFW.

EOP-3 Rev. 1/Unit 2 Page 18 of 40 9 0

1

Ø

 IF SIAS actuated, THEN perform the following: Open RWT To Charging Pump Suction Valve, 2-CVC-504-MOV. Shut VCT Outlet Valve, 2-CVC-501-MOV. Place Boric Acid Pumps in PULL-TO-LOCK. Ensure Charging Pump AMPS steady. 	Rev. 1/Onit 2 Page 18 of 40 ALTERNATE ACTIONS		
	 1.1 IF SIAS NOT actuated, THEN line up Charging Pump suction to VCT: a. Determine blend required to maintain shutdown boron concentration per NEOG-11. b. Open VCT Outlet Valve, 2-CVC-501-MOV. c. Secure Boric Acid Pump(s). d. Shut Boric Acid Direct Makeup Valve, 2-CVC-514-MOV. e. Shut BAST Gravity Feed Valves: 2-CVC-508-MOV 2-CVC-509-MOV OB line up Charging Pump suction to RWT: a. Open RWT To Charging Fump Suction Valve, 2-CVC-504-MOV. b. Shut VCT Outlet Valve, 2-CVC-501-MOV. c. Shut Boric Acid Direct Makeup Valve, 2-CVC-514-MOV. d. Secure Boric Acid Fump(s). 		

4

2

l

.

EOP-3 Rev. 1/Unit 2 Page 19 of 40

RECOVERY ACTIONS

LII.

0

ALTERNATE ACTIONS

I. IF RWT LEVEL DECREASES TO BETWEEN 0.5 AND 1.0 FT OR "ACTUATION SYS RAS TRIFFED" ALARM RECEIVED, THEN VERIFY RAS ACTUATION:

 Place SI Pump Recirc Lockout Switches in ON.

- Commence RAS Verification Checklist, Attachment (6).
- 3. Shut RWT Outlet Valves:

2-SI-4142-MOV 2-SI-4143-MOV

- <u>IF</u> HPSI flow greater than 1000 GPM with two HPSI Pumps operating, <u>THEN</u> equally throttle HPSI flow to 1000 GPM.
- <u>IF</u> HPSI flow greater than 600 GPM with one HPSI Pump operating, <u>THEN</u> equally throttle HPSI flow to 600 GPM.

- CAUTION -

To prevent pump damage, minimum flow per operating HPSI Pump is 30 GPM.

- <u>IF</u> HPS1 Pump cavition occurs in recirculation mode, <u>THEN</u> throttle HPSI flow per Attachment (12).
- 6.1 <u>IF</u> Attachment (12) does <u>NOT</u> allow throttling HPSI flow, <u>THEN</u> align Containment Spray Pump(s) to HPSI Pump suction:

. ***

 a. <u>IF</u> 21 HPSI Pump cavitating, <u>THEN</u> open 21 SDC HX To HPSI Suction Valve, 2-SI-663-MOV <u>AND</u> start 21 Containment Spray Pump.







EOP-3 Rev. 1/Unit 2 Page 20 of 40

RECOVERY /	ACTI	ONS
------------	------	-----

ALTERNATE ACTIONS

 b. <u>IF</u> 23 HPSI Pump cavitating, <u>THEN</u> open 22 SDC HX To HPSI Suction Valve, 2-SI-662-MOV <u>AND</u> start 22 Containment Spray Pump.

- Commence ECCS Pump Room cooling:
 - a. Open ECCS Pump Room Air Cooler Saltwater Valves:

2-SW-5170-CV 2-SW-5171-CV 2-SW-5173-CV

- Start 21 and 22 ECCS Pump Room Cooling Fans.
- Adjust saltwater flow to maintain SRW and component cooling temperatures.
- 9. <u>IF</u> Charging Pumps are aligned with suction from RWT <u>AND</u> HPSI Pumps maintaining RCS inventory, <u>THEN</u> place Charging Pumps in PULL-TO-LOCK.
- N. IF FEEDWATER AVAILABLE AND ONCE THROUGH CORE COOLING IN PROGRESS, THEN EVALUATE FEEDING S/G:
 - IF decision made to feed S/G, THEN establish secondary heat sink in S/G with highest level.

- CAUTION -

If voids exist in the S/G tubes, a rapid RCS pressure reduction will occur when the voids collapse. 1.1 <u>IF</u> decision made <u>NOT</u> to feed S/G, <u>THEN</u> continue Once Through Core Cooling until Shutdown Cooling can be used.

EOP-3 Rev. 1/Unit 2 Page 21 of 40

RECOVERY ACTIONS III.

- CCOM CR 88-1214
- Throttle Auxiliary Feedwater 2. flow to less than 150 GPM OR throttle Main Feedwater flow to minimum by cracking the Feed Regulating Bypass Valve off its shut seat.
- WHEN S/G level increases OR 3. continuous feed has been maintained for 5 minutes, THEN slowly raise feed rate to raise S/G level to greater than (-)250 inches and trending toward O inches.
- Align Atmospheric Dump Valve 4. for S/G with highest level to 2003 and Atmospheric Dump Valve for S/G with lowest level to 2C43.
- Adjust Atmospheric Dump Valve 5. to establish Natural Circulation.

- CAUTION -

The RCS may be solid. Any action involving RCS cooldown or heatup should be closely monitored to prevent rapid pressure excursions.

- WHEN secondary heat sink 6. established, THEN secure Once Through Core Cooling:
 - a. Operate HPSI and Charging Pumps as necessary to maintain RCS subcooling between 30 and 140°F.
 - Shut both PORVs: b.
 - (1) Insert High Pressurizer Pressure Trip Units that were previously pulled.
 - (2) Ensure "PORV ENERGIZED" alarm clear.

ALTERNATE ACTIONS





EOP-3 Rev. 1/Unit 2 Page 22 of 40

RECOVERY ACTIONS

ALTERNATE ACTIONS

7. Confirm Natural Circulation:

- NOTE -

Wide range Thot may be obtained from Subcooled Margin Monitor per Attachment (10).

- a. Thot minus Tcold between 10 and 50°F.
- b. Tcold constant or decreasing.
- c. Thot constant or decreasing.
- CET temperatures consistent with Thot.
- Steaming rate affects primary temperature.
- Monitor for Core and RCS voiding:
 - CAUTION -

Potential for void formation increases rapidly when pressure decreases below 1500 PSIA.

- Letdown flow greater than charging flow.
- b. Rapid unexplained increase in pressurizer level during an RCS pressure reduction.
- Loss of subcooled margin as determined using CET temperatures.
- d. "REACTOR VESSEL WATER LEVEL LOW" alarm.

LII.

EOP-3 Rev. 1/Unit 2 Page 23 of 40

RECOVERY ACTIONS

- 9. <u>IF</u> voiding inhibits heat removal, <u>THEN</u> reduce or eliminate voided area:
 - a. Shut Letdown Isolation Valve, 2-CVC-515-CV.

-CAUTION-

The potential exists for pressurized thermal shock from an excessive cooldown rate followed by a repressurization.

- b. Pressurize RCS to maintain subcooling as near 140°F as practical.
- c. <u>IF</u> voiding occurs in the S/G Tubes (saturation pressure of S/G greater than saturation pressure of RCS), <u>THEN</u> cool the S/G by raising any of the following:
 - (1) Steaming rate.
 - (2) Feed rate.
 - (3) S/G Blowdown rate.

AND maintaining less than 100°F/h cooldown rate.

- CAUTION -

Technical Specifications require MPT protection when Tcold less than 275°F.

 Continue RC5 cooldown until able to initiate Shutdown Cooling. 9.b.1 <u>IF</u> pressurizing the RCS does <u>NOT</u> restore heat removal, <u>THEN</u> operate Reactor Vessel Vent Valves per OI-1G.

ALTERNATE ACTIONS

EOP-3 Rev. 1/Unit 2 Page 24 of 40

J ^{1.}	RECOVERY ACTIONS	ALTERNATE ACTIONS
O. RES	STORE CONTAINMENT ENVIRONMENT:	
1.	Direct Chemistry to place Hydrogen Monitors in service.	
2.	IF hydrogen concentration 'ncreases to 1%, ' <u>THEN</u> start Hydrogen Recombiners per OI-41A.	
3.	Maintain Iodine Filter Fans running.	
4.	WHEN containment pressure less than 4.0 PSIG, THEN perform the following:	
	a. Reset CSAS signal.	
	b. Secure one Containment Spray Pump.	
	c. Verify all Containment Air Coclers operating to maintain containment temperature less than 120°F.	
	 Restore equipment per CSAS Verification Checklist, Attachment (3), to desired condition. 	
5.	WHEN containment pressure less than 2.8 PSIG, THEN perform the following:	
	 Block pressurizer pressure signals and reset SIAS signal. 	
	b. Reset CIS signal.	
	c. Secure remaining Containment Spray Pump.	
	 Restore equipment per SIAS and CIS Verification Checklists, Attachments (2) and (4), to desired condition. 	
	The second se	

ECB-3			
Rev.	1/U	ni	t 2
Page	25	of	40

II. RECOVERY ACTIONS			ALTERNATE ACTIONS		
P. WHEN CET TEMPERATURES LESS THAN 300°F AND RADIATION LEVELS PERMIT, THEN INITIATE SHUTDOWN COOLING:					
1.	WHEN RCS pressure less than 300 PSIA, THEN shut SI Tank Outlet Valves: 2-SI-614-MOV 2-SI-624-MOV 2-SI-634-MOV 2-SI-644-MOV				
2.	 Lower RCS pressure to less than 250 PSIA by throttling HPSI flow while maintaining: a. Greater than 30°F subcooling using CET temperatures. b. Greater than 30 GPM flow per operating HPSI Pump. 	2.1	 <u>IF</u> voiding prevents depressurization to 250 PSIA, <u>THEN</u> attempt to eliminate voids: a. Alternately pressurize and depressurize RCS by throttling HPSI flow. b. Operate Reactor Vessel Vent Valves per OI-1G. 		
3.	WHEN RCS pressure less than 250 PSIA AND containment pressure less than 4.0 PSIG, THEN initiate Shutdown Cooling per OI-3.	3.1	<u>IF</u> unable to initiate Shutdown Cooling, <u>THEN</u> continue Once Through Core Cooling until able to initiate Shutdown Cooling <u>OR</u> Feedwater available.		

EOP-3 Rev. 1/Unit 2 Page 26 of 40

ALTERNATE ACTIONS

RECOVERY ACTIONS

- CAUTION -

The RCS may be solid. Any action involving RCS cooldown or heatup should be closely monitored to prevent rapid pressure excursions.

- WHEN Shutdown Cooling flow is established, THEN secure Once Through Core Cooling:
 - a. Operate HPSI or Charging Pumps as necessary to maintain RCS pressure between 150 and 250 PSIA until CVCS letdown available.
 - CAUTION -

Technical specifications require MPT protection when Tcold less than 275°F.

- b. Shut both PORVs:
 - Insert High Pressurizer Pressure Trip Units that were previously pulled.
 - (2) Ensure "PORV ENERGIZED" alarm clear.
- Q. RESTORE SERVICE WATER TO TURBINE BUILDING:
 - Verify 11 Plant Air Compressor operating.
 - Shut Plant Air To Plant Air Header Valve, 2-PA-2059-CV.

III.

EOP-3 Rev. 1/Unit 2 Page 27 of 40



EOP-3 Rev. 1/Unit 2 Page 28 of 40

1	•	RECOVERY ACTIONS	ALTERNATE ACTIONS
т.	RES	FORE LETDOWN FLOW:	
	1.	Verify charging flowpath through Loop Charging Valves or Auxiliary Spray Valve.	
	2.	Verify at least one Charging Pump operating.	
	з.	Shift Letdown Control Valve Controller, 2-HIC-110, to MANUAL.	
	4.	Adjust controller to shut Letdown Control Valves.	
	5.	Open Letdown Isolation Valves:	
		2-CVC-515-CV 2-CVC-516-CV	
		-CAUTION-	
	The abo the the	setpoint of 2-PIC-201 must be ve the saturation pressure for letdown outlet temperature of Regenerative Heat Exchanger. Adjust the setpoint on 2-PIC-201 and adjust 2-HIC-110 to maintain desired RCS pressure.	
	-		
υ.	DRA	W PRESSURIZER BUBBLE IF DESIRED:	
	1.	Adjust steaming rate or Shutdown Cooling to stabilize Toold.	
	2.	Heat up Pressurizer by energizing Backup and Proportional Heaters.	
•	3.	Adjust letdown flow and Tcold to maintain RCS subcooling between 30 and 140°F.	

EOP-3 Rev. 1/Unit 2 Page 29 of 40

LII. RECOVERY ACTIONS

ALTERNATE ACTIONS

- WHEN pressurizer temperature exceedr CET temperatures by 50°F,
 THEN maximize letdown:
 - Lower the setpoint on Letdown Backpressure Regulator Controller to obtain letdown flow of 100 GPM.
 - b. Secure Charging Pump(s) as needed to increase effective letdown.
 - 5. <u>WHEN</u> saturation pressure for the existing pressurizer temperature is reached, <u>THEN</u> confirm bubble formation by observing steady pressurizer pressure.
 - Using CET temperatures, maintain subcooling between 30 and 140°F per Attachment
 by operating:
 - Backup and Proportional Heater(s).
 - b. Auxiliary Spray.
 - Maintain pressurizer level between 101 and 180 inches by operating:
 - a. Charging flow.
 - b. Letdown flow.
| 5 | | RECO | OVERY ACTIONS | EOP-3
Rev. 1/Unit 2
Page 30 of 40
ALTERNATE ACTIONS |
|----|--------------------------|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| v. | IF
SHU
THE
OR | FEEDI
TDOWI
M EVI
NATUI | WATER AVAILABLE AND
N COOLING NOT OPERATING,
ALUATE NEED FOR FORCED
RAL CIRCULATION: | |
| | 1. | WHE
For
THE
2-1 | N RCPs available AND
ced Circulation desired
N start RCPs per steps
2. | 1.1 IF RCPs NOT available OR
Natural Circulation desired,
THEN implement Natural
Circulation (AOP-3E) AND
complete administrative
post-trip actions. |
| | 2. | IF
moi
THE
mot | RCPs exposed to excessive
sture,
N consider meggering RCP
or. | |
| | | | - CAUTION - | |
| • | Unc
coo
deg
sea | ontr
ling
rada
ting
IF | olled restoration of
to hot RCP seals may cause
tion of the metallic
surfaces by thermal shock.
Component Cooling is | |
| | | iso
THE
tem
to
flo | N reduce RCP seals,
N reduce RCP lower seal
operature below 280°F prior
initiating full cooling
ow to the RCPs: | |
| | | а. | Shut Component Cooling
Supply Containment Manual
Isolation Valve, 2-CC-234,
located in 5 ft East
Penetration Room. | |
| | | b. | Verify CIS reset. | |
| | | с. | Open Component Cooling
Containment Isolation
Valves: | |
| | | | 2-CC-3832-CV
2-CC-3833-CV | |
| | | | | |
| | | | | |

EOP-3 Rev. 1/Unit 2 Page 31 of 40

RECOVERY ACTIONS

II.

ALTERNATE ACTIONS

- d. Slowly open 2-CC-284 to throttle component cooling flow until lower seal temperatures are less than 280°F.
- e. <u>WHEN</u> lower seal temperatures are less than 280°F, THEN fully open 2-CC-284.
- <u>IF</u> an RCP lower seal temperature exceeded 280°F, <u>THEN</u> an engineering evaluation is required prior to restarting that RCP.
- Raise pressurizer level to nt least 155 inches.
- 6. Verify RCP restart criteria:
 - a. RCS subcooling greater than 30°F.
 - b. At least one S/G available for heat removal.
 - c. Pressurizer level greater than 155 inches and stable.
 - d. Tcold less than 525°F.
 - e. RCS temperature and pressure greater than the minimum operating limits per the RCP curve on Attachment (1).

EOP-3 Rev. 1/Unit 2 Page 32 of 40

RECOVERY ACTIONS

ALTERNATE ACTIONS

- NOTE -

Starting an RCP may cause a pressurizer level transient.

- 7. <u>WHEN</u> RCP restart criteria are met, <u>THEN</u> start one RCP in a loop with an operable S/G:
 - Verify "COMPT CLG FLOW LO" alarm clear.
 - b. Start Oil Lift Pump.
 - c. Insert RCP spin stick.
 - d. Start one RCP.
 - e. Monitor RCP running current:

Tavg

Current

525 to 572°F 138 to 210 AMPS and steady

210 to 525° 264 to 238 AMPS and steady

- IF pressurizer level decreases, THEN start Charging or HPSI Fump(s) as necessary to restore AND maintain level greater than 155 inches.
- Monitor RCP seal parameters following pump restart.
- Allow backflow to equalize temperatures in opposite loop.
- Start second RCP in opposite loop per Step V.7 and V.9, page 32.

EOP-3 Rev. 1/Unit 2 Page 33 of 40

LII. RECOVERY ACTIONS

ALTERNATE ACTIONS

- 12. Secure Auxiliary Spray:
 - a. Open Loop Charging Valves:

2-CVC-518-CV 2-CVC-519-CV

- Shut Auxiliary Spray Valve, 2-CVC-517-CV.
- c. Shift Pressurizer Spray Controller, 2-HIC-100, to AUTO.

W. COMPLETE ADMINISTRATIVE POST-TRIF ACTIONS AND IMPLEMENT APPROPRIATE OPERATING PROCEDURE.

EOP-3 Rev. 1/Unit 2 Page 34 of 40

X. ADMINISTRATIVE POST-TRIP ACTIONS:

- NOTE -

The following actions may be accomplished whenever feasible. They may be done in any order.

- Refer to ERPIP to determine appropriate emergency response accions.
- 2. Perform notifications per CCI-118.
 - 3. Notify ESO of trip.

4. Request RCS Boron and Iodine sample.

- 5. Perform shutdown margin calculation per NEOG 9 and 11
 - 6. Complete transient log entries per CCI-301.
 - Recall post-trip review (preferably within 30 minutes of trip).
- 8. Perform post-trip review per CCI-111.
- 9. Monitor turbine bearing temperatures.
- Continue Main Turbine shutdown per applicable step of OI-43A.

END OF SECTION III.

EOP-3 Rev. 1/Unit 2 Page 35 of 40

IV. SAFETY FUNCTION STATUS CHECK

- A. The STA (or person designated by STA) will perform the intermediate and final safety function checks respectively on entry and prior to exiting from this procedure.
- B. Perform intermediate safety function status check at 10 minute intervals until plant conditions stabilize.
- C. Immediately notify Shift Supervisor or Control Room Supervisor if any safety function criteria is not being satisfied.
- D. Review data and verify that safety function acceptance criteria are satisfied.
- E. When EOP completed, then perform final safety function check.

CONTROL PARAMETERS	CRITERIA	INTERMEDIATE	CRITERIA	FINAL
		CLIECK		onbor
a. WRNI power	less than 3%		less than 2%	
b. SUR (DPM)	negative		0	
c. CEA status	all inserted		all inserted	
or				
Boration status:				
concentration	increasing		appropriate S/D margin	
BAST level	decreasing	*********	N/A	N/A

EOP-3 Rev. 1/Unit 2 Page 36 of 40

RC	RCS PRESSURE AND INVENTORY PARAMETERS		SAFETY FUNCTION ACCEPTANCE CRITERIA				
PA			TE	RIA	INTERMEDIOTE CHECK	CRITEFAA	FINAL
а.	Pressurizer pressure (PSIA)	1000	to	2350	********	less than 2300	
ь.	Pressurizer level (inches)	50	to	350	******	101 to 180	
с.	RCS subcooling (°F)	30	to	140		30 to 140	
	If PORVs were opened, once an hour monitor the following:						
d.	Quench Tank parameters: level (inches) temperature (F) pressure (PSIG)	co dec	nst or rea	ant sing		constant or decreasing	
e.	PORV discharge piping temperature ([°] F) (computer points T107, T108)	dec	rea	sing		decreasing	

EOP-3 Rev. 1/Unit 2 Page 37 of 40

1

COF	RE AND RCS	SAFETY FUNCTION ACCEPTANCE CRITERIA				
HE/ PAF	AT REMOVAL RAMETERS	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK	
a.	RCS Tcold (°F)	less than 540		less than 535		
b.	CET ([°] F)	less than 560		less than 540		
с.	Thot minus Tcold (F)					
	Natural Circulation	10 to 50		10 to 50		
	Forced Circulation	less than 10		less than 5		
d.	S/G pressure	less than 960		less than 920	i an	
е.	S/G level (inches)	(-)400 to (+)30		(-)24 to (+)30		
f.	Condensate Storage Tank level (ft)	greater than 5	*******	greater than 5 and increasing		

EOP-3 Rev. 1/Unit 2 Page 38 of 40

		SAFETY FU	NCTION ACCEPTANC	E CRITERIA	
VITAL AUXILIARIES		CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK
a.,	4KV vital buses 21 or 24	energized		energized	
b.	Instrument Air pressure (PSIG)	greater than 88		greater than 88	
с.	Component Cooling (# pumps running)	1 or 2		1 or 2	
d.	Saltwater (# pumps running)	1 or 2		1 or 2	
е.	Service Water (# pumps running)	1 or 2	********	1 or 2	
f	125V DC buses 11, 12, 21, 22	energized	********	energized	-
g.	120V AC vital buses 21, 22, 23, 24	energized	********	energized	

EOP-3 Rev. 1/Unit 2 Page 39 of 40

NORMAL CONTAINMENT ENVIRONMENT PARAMETERS		SAFETY FUN	CTION ACCEPTAN	CE CRITERIA	
		CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK
а.	Containment pressure (PSIG)	less than 50		less than 2.8	
b.	Containment temperature (°F)	less than 276		less than 220	
c.	Containment High Range Radiation Monitor	alarm clear		alarm clear	
d.	Hydrogen concentration	N/A	UZA	less than 2%	

EOP-3 Rev. 1/Unit 2 Page 40 of 40

NOI	RMAL RADIATION	SAFETY	FUNCTION ACCEPTANCE	E CRITERIA	
TO	CONTAINMENT	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK
а.	Noble Gas Monitor	alarm clear		alarm clear	-
b.	Condenser Off-Gas RMS	alarm		alarm clear	
с.	S/G B/D RMS	alarm		alarm clear	
d.	Main Vent Gaseous RMS (2-RI-5415)	alarm		alarm	

STATUS CHECK NUMBER	COMPLETE AT TIME
1	
2	
3	
4	Name of Concession, and

EOP-4 Rev. 1/Unit 1 Page 1 of 31

CALVERT CLIFFS NUCLEAR POWER PLANT

EOF-4 EXCESS STEAM DEMAND

REVISION 1

	SIGNATURE	DATE
PREPARED BY;	James V. Grooms	1 12/18/87
VERIFIED BY;	Lingent	, 12-18-57
POSRC;	MEETING # 88 7	1 2-10-88
APPROVED BY	9-R Lemons	12-10-83

Manager-Nuclear Operations or General Supervisor-Operations if POSRC review is not required

÷

EOP-4 Rev. 1/Unit 1 Page 2 of 31

LIST OF EFFECTIVE PAGES

PAGE NUMBER

REVISION

 $-e^{\pm}$



EOP-4 Rev. 1/Unit 1 Page 3 of 31

EXCESS STEAM DEMAND

I. PRECAUTIONS

- A. Do not adopt manual operation of automatically controlled systems unless a malfunction is apparent or automatic system operation will not support the maintenance of a safety function.
- B. Systems shifted to manual operation must be monitored frequently to ensure correct operation.
- C. At least two independent indications should be used, when available, to evaluate and corroborate a specific plant condition since an incident could induce inconsistencies between instruments.
- D. High energy line break may cause erratic instrumentation response depending on the magnitude and location of the break.
- E. Minimize the number of cycles of pressurizer auxiliary spray when the emperature differential is greater than 400°F.
- F. In Natural Circulation, increased loop transport time causes a 5 to 10 minuto delay in temperature responses to a plant change. Pressurizer level and pressure responses, if available, typically provide better indication of RCS response during this period.
- G. S/G pressure, pressurizer pressure, and containment temperature affect the level indication for the S/Gs and Pressurizer. Attschments (8) and (9) contain the corrected S/G and pressurizer levels for various S/G pressures, pressurizer pressures, and containment temperatures.
- H. If a pump or component fails, the cause of the failure should be determined prior to restarting or starting a standby pump or component to provent a common failure.

EOP-4 Rev. 1/Unit 1 Page 4 of 31

II. ENTRY CONDITIONS

The presence of one or more of the following conditions indicates that an Excess Steam Demand may have occurred:

- A. Decrease in S/G pressure in one or both S/Gs.
- B. Reactor Trip on low S/G pressure.
- C. Reactor Trip on high containment pressure.
- D. Possible actuation of:
 - 1. SIAS 2. CIS 3. CSAS 4. SCIS
- E. Decrease in Tcold.

F. Loud noise and poor visibility in plant (location dependent).

÷

EOP-4	ł.			
Rev.	1,	/Uni	t	1
Page	5	of	33	1

	. RECOVERY ACTIONS	ATE ACTIONS
A.	VERIFY POST-TRIP IMMEDIATE ACTIONS COMPLETED.	
в.	COMMENCE INTERMEDIATE SAFETY FUNCTION STATUS CHECK.	
c.	DETERMINE APPROFRIATE EMERGENCY RESPONSE ACTIONS PER THE ERPIP.	
D.	ISOLATE BOTH S/Gs:	
	1. Shut both MSIVs.	
P	2. Shut S/G Feedwater Isolation Valves:	
	1-FW-4516-MOV 1-FW-4517-MOV	
	3. Shut MSIV Bypass Valves:	
	1-MS-4045-MOV 1-MS-4052-MOV	
	4. Shu: S/G Blowdown Valves:	
	1-BD-4010-CV 1-BD-4011-CV 1-BD-4012-CV 1-BD-4013-CV	

EOP-4 Rev. 1/Unit 1 Page 6 of 31

		Page 6 of 31
11 .	RECOVERY ACTIONS	ALTERNATE ACTIONS
5.	Shut AFW Steam Supply Valves by plucing handswitches in CLOSE:	
	1-MS-4070-CV 1-MS-4071-CV	
6.	Shut AFW Block Valves by placing handswitches in CLOSE:	
	11 S/G 12 S/G	
	1-AFW-4520-CV 1-AFW-4530-CV 1-AFW-4521-CV 1-AFW-4531-CV 1-AFW-4522-CV 1-AFW-4532-CV 1-AFW-4523-CV 1-AFW-4533-CV	
7.	Shut Atmospheric Dump Valves.	
8.	Shut upstream drains by placing handswitch 1-HS-6622 in CLOSE.	
E. MON	NITOR RCS DEPRESSURIZATION.	
1.	IF rapid depressurization to 1725 PSIA, THEN verify SIAS actuation AND the following actions:	1.1. <u>IF</u> RCS pressure is greater than 1725 PSIA <u>AND</u> SIAS <u>NOT</u> actuated, <u>THEN</u> block SIAS:
	Pumps running.	Header valves:
	b. 11 and 13 HPSI Pumps running.	1-SI-616-MOV 1-SI-617-MOV 1-SI-626-MOV 1-SI-627-MOV 1-SI-636-MOV 1-SI-637-MOV
	<pre>c. Main and Aux HPSI Header Valves open: 1-SI-616-MOV 1-SI-617-MOV 1-SI-626-MOV 1-SI-627-MOV 1-SI-636-MOV 1-SI-637-MOV 1-SI-646-MOV 1-SI-647-MOV</pre>	<pre>1-SI-646-MOV 1-SI-647-MOV b. Start 11 and 13 HPSI Pumps. c. MHEN "PRSR PRESS BLOCK A(B) PERMITTED" alarms(s) received, THEN block SIAS A(B).</pre>
·		

EOP-4 Rev. 1/Unit 1 Page 7 of 31

JII. RECOVERY ACTIONS

ALTERNATE ACTIONS

F. IMPLEMENT RCP TRIP STRATEGY:

- <u>IF</u> RCS pressure decreases to 1725 PSIA, <u>THEN</u> trip 11A and 12B RCPs <u>OR</u> trip 11B and 12A RCPs.
- IF positive LOCA indications exist:
 - a. R[®]S subcooling less than 30°F.
 - b. Steady S/G pressure.
 - c. S/G Blowdown RMS alarms clear <u>OR</u> Main Vent Gaseous RMS (1-RI-5415) alarm clear.

AND RCS pressure decreases to less than 1300 PSIA, THEN trip all RCPs.

- 3. <u>IF</u> RCS temper ture and pressure are less than the minimum pump operating limits per the RCP curve on Attachment (1), THEN trip 41, PCPs.
- <u>IF CIS has actuated</u>, <u>THEN trip all RCPs</u>.

G. MONITOR CONTAINMENT PRESSURE:

 <u>IF</u> CSAS <u>NOT</u> actuated, <u>THEN</u> start all available Containment Air Coolers in HIGH with maximum SRW flow.

EOP-4				
Rev.	1,	/Uni	t	1
Page	8	of	31	1



EOP-4 Rev. 1/Unit 1 Page 9 of 31

III. RECOVERY ACTIONS

- e. Shut VCT Outlet Valve, 1-CVC-501-MOV.
- f. All available Charging Pumps running.

 Continue boration until a total 65 inch decrease in BAST level(s) is achieved, or shutdown margin requirement of NEOG-7 is achieved.

I. IDENTIFY AFFECTED S/G.

 Compare the following parameters:

- a. S/G pressures.
- b. Tcold on both loops.
- c. S/G levels.

ALTERNATE ACTIONS

- 1.2 <u>IF</u> Boric Acid Pumps <u>NOT</u> available, THEN establish gravity feed:
 - a. Open BAST Gravity Feed Valves:

1-CVC-508-MOV 1-CVC-509-MOV

- b. Shut VCT Outlet Valve, 1-CVC-501-MOV.
- c. Start all available Charging Pumps.

EOP-4	ł		
Rev.	1/1	Jnit	: 1
Page	10	of	31

III. RECOVERY ACTIONS	ALTERNATE ACTIONS	
J. MAINTAIN HEAT SINK OPERABILITY OF UNAFFECTED S/G DURING BLOWDOWN PHASE:		
 For the affected S/G, shut the Atmospheric Dump Valve using the Hand Transfer Valves on the West wall of the Unit 1 45 ft Switchgear Room: 	1.1 <u>IF</u> Atmospheric Dump Valve will <u>NOT</u> shut from 1C43, <u>THEN</u> shut Atmospheric Dump Manual Isolation Valve. <u>11 S/G</u> or <u>12 S/G</u>	
a. Verify 1C43 Atmospheric Dump Controllers at 0% output.	1-MS-101 1-MS-104	
b. Align Hand Transfer Valves to 1C43 position:		
<u>11 S/G</u> or <u>12 S/G</u>		
1-HV-3938A 1-HV-3939A 1-HV-3938B 1-HV-3939B		
- <u>NOTE</u> -	- <u>NOTE</u> -	
Unaffected S/G temperature may be obtained by using the saturation temperature for the existing S/G pressure.	For steam breaks in Containment, resulting in small cooldown rates, the energy released to Containment may be reduced by use of S/G Blowdown on affected S/G.	
 <u>IF</u> RCS cooldown rate greater than or equal to 100°F/h <u>AND</u> CET temperatures less than unaffected S/G temperature, <u>THEN</u> cool unaffected S/G to within 25°F of CET temperatures: a. Open motor driven train 	 2.1 IF RCS cooldown rate less than 100°F/h, TEEN establish Natural Circulation using unaffected S/G: a. Open motor driven train AFW Block Valves on unaffected S/G: 	
unaffected S/G:	11 S/G or $12 S/G$	

1-AFW-4522-CV 1-AFW-4532-CV 1-AFW-4523-CV 1-AFW-4533-CV

1-AFW-4522-CV 1-AFW-4532-CV 1-AFW-4523-CV 1-AFW-4533-CV

11 S/G or 12 S/G

EOP-4 Rev. 1/Unit 1 Page 11 of 31

RECOVERY ACTIONS

III.

- CAUTION -

D/G supplying power to 13 AFW Pump flow limit is 300 G.M; otherwise, flow limit is 575 GPM.

b Start 13 AFW Pump.

- Adjust AFW Flow Control Valves to feed unaffected S/G.
 - 11 S/G or 12 S/G

1-AFW-4525-CV 1-AFW-4535-CV

- CAUTION -

CET temperatures must always be less than unaffected S/G temperature while affected S/G blowdown is in progress.

- d. Open Atmospheric Dump Valve as necessary to cool unaffected S/G to within 25°F of CET temperatures.
- e. Stabilize unaffected S/G level between (-)170 and (+)30 inches.
- K. RESTORE PRESSURIZER LEVEL TO BETWEEN 50 AND 110 INCHES DURING S/G BLOWDOWN:
 - 1. Verify letdown isolated.
 - <u>IF</u> RCS pressure less than 1270 PSIA, <u>THEN</u> verify HPSI flow to RCS per Attachment (12).

ALTERNATE ACTIONS

- CAUTION -

D/G supplying power to 13 AFW Pump flow limit is 300 GPM; otherwise flow limit is 575 GPM.

- b. Start 13 AFW Pump.
- c. Manually throttle open AFW Flow Control Valve.
 - 11 S/G or 12 S/G
- 1-AFW-4525-CV 1-AFW-4535-CV
- d. Open Atmospheric Dump Valve as necessary to cool unaffected S/G, while maintaining RCS cooldown rate less than 100°F/h.
- e. Stabilize unaffected S/G level between (-)170 and (+)30 inches.

EOP-4 Rev. 1/Unit 1 Page 12 of 31

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

- 3. <u>IF</u> additional HPSI flow required to control pressurizer level, <u>THEN</u> lower RCS pressure using Auxiliary Spray per step M, page 13.
- WHEN pressurizer level greater than 50 inches, <u>THEN</u> secure all but one Charging Pump.
- <u>IF</u> the following conditions exist:
 - a. At least 30°F subcooling.
 - b. Pressurizer level greater than 50 inches.
 - c. At least one S/G available for heat removal.
 - d. RVLMS indicates that the Core is covered.

THEN throttle HPSI flow to maintain pressurizer level between 50 and 110 inches.

- L. WHEN STEADY Toold INDICITES S/G BLOWDOWN COMPLETE OR COOLDOWN RATE LESS THAN 100°F/h, THEN ESTABLISH UNAFFECTED S/G AS A HEAT SINK:
 - Restore S/G wide range level to between (-)24 and (+)30 inches using 13 AFW Pump.
 - Open Atmospheric Dump Valve as necessary to cool unaffected S/G, while maintaining RCS cooldown rate lebs than 100°F/h.
 - Stabilize pressurizer level between 101 and 155 inches.

EOP-4	ł		
Rev.	1/1	Jnit	t 1
Page	13	of	31

	•	REC	OVERY ACTIONS	7	LTERNATE ACTIONS
1.	MAI 30	NTAI	N RCS SUBCOOLING BETWEEN		
	The preexc by 1.	pot ssur essi a re ope as sub IF RCS pre 350 THE AND a. b. c. d.	 - CAUTION - ential exists for ized thermal shock from an ve cooldown rate followed pressurization. rate Pressurizer Heaters necessary to maintain RCS cooling greater than 30°F. necessary to lower subcooling AND ssurizer level less than inches. M verify heaters secured initiate Auxiliary Spray: Place Instrument Air CIS Override Switch, 1-HS-2080A, in OVERRIDE. Open Cntmt Instrument Air Isolation MOV, 1-IA-2080-MOV. Record temperature differential between Pressurizer and Regonerative Heat Exchanger Outlet. Open Auxiliary Spray Valve, 1-CVC-517-CV. 	2.1	 IF pressurizer level greater than 350 inches AND RCS subcooling is greater than 140°F, THEN open PORV: a. Verify primary makeup path operable. b. Place both PORV Override Control Switches in OVERRIDE SHUT. - NOTE - The "PORV ENERGIZED" alarm will annunciate when two RPS trip units are pulled. The PORVs will not open. c. Pull two High Pressurizer Pressure Trip Units out on RPS. d. Place one PORV Override Control Switch in AUTO. e. IF second PORV needed to lower subcooling, THEN place the other PORV Override Control Switch in AUTO.
					f. WHEN subcooling less than

140°F, THEN perform the following:

EOP-4 Rev. 1/Unit 1 Page 14 of 31

RECOVERY ACTIONS

II.

e. Shut Loop Charging Valves:

1-CVC-518-CV 1-CVC-519-CV

- NOTE -

1-HS-2085 located on West wall of 27 ft Switchgear Room; Key #85 in Control Room Key Locker.

- f. Open Cntmt Instrument Air Supply CV, 1-IA-2085-CV, by momentarily placing 1-HS-2085 in OPEN.
- g. Shift 1-HIC-100 to MANUAL and shut Pressurizer Spray Valves:

1-RC-100E-CV 1-RC-100F-CV

- h. Maintain pressurizer cocldown rate less than 200°F/h.
- N. <u>IF</u> RCPs SECURED, <u>THEN</u> CONFIRM NATURAL CIRCULATION IN UNAFFECTED S/G LOOP:

- NOTE -

Wide range Thot may be obtained from Subcooled Margin Monitor per Attachment (10).

- Thot minus Tcold between 10 and 50°F.
- 2. Tcold constant or decreasing.
- 3. Thot constant or decreasing.
- CET temperatures consistent with Thot.
- Steaming rate affects primary temperature.

ALTERNATE ACTIONS

- Place the PORV Override Control Switches in OVERRIDE SHUT.
- (2) Insert High Pressurizer Pressure Trip Units that were previously pulled.
- (3) Ensure "PORV ENERGIZED" alarm clear.
- (4) <u>IF</u> Acoustic Monitor indicates flow through the PORV, <u>THEN</u> shut the PORV Block Valve.

EOP-4				
Rev.	1/1	Uni	t	1
Page	15	of	3	1

	. RECOVERY ACTIONS	ALTERNATE ACTIONS
0.	MONITOR FOR CORE AND RCS VOIDING:	
-	- CAUTION -	
	Potential for void formation increases rapidly when pressure decreases below 1500 PSIA.	
	 Letdown flow greater than charging flow. 	
	 Rapid unexplained increase in pressurizer level during an RCS pressure reduction. 	
	 Loss of subcooled margin as determined using CET temperatures. 	
	 "REACTOR VESSEL WATER LEVEL LOW" alarm. 	
P.	IF VOIDING INHIBITS HEAT REMOVAL, THEN REDUCE OR ELIMINATE VOIDED AREA:	
	1. Shut Letdown Isolation Valve, 1-CVC-515-CV.	
	- CAUTION -	
	The potential exists for pressurized thermal shock from an excessive cooldown rate followed by a repressurization.	
	 Pressurize the RCS to maintain subcooling as near 140°F as practical, by any of the following: 	2.1 <u>IF</u> pressurizing the RCS does <u>NOT</u> restore heat removal, <u>THEN</u> operate Reactor Vessel Vent Valves per OI-1G.
	- NOTE -	
	Pressurizer Backup Heater Banks 11 and 13 trip on U, \checkmark and SIAS.	

EOP-4 Rev. 1/Unit 1 Page 16 of 31

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

- a. Operate Pressurizer Heater(s).
- b. Operate Turbine Bypass or Atmospheric Dump Valves to maximize RCS cooldown, while maintaining cooldown rate less than 100°F/h.
- c. Raise HPSI flow to RCS.

- CAUTION -

If voids exist in the S/G tubes, a rapid RCS pressure reduction will occur when the voids collapse.

- 3. <u>IF</u> voiding occurs in the S/G tubes (saturation pressure of S/G greater than saturation pressure of RCS), <u>THEN</u> cool the S/G by raising any of the following:
 - a. Steaming rate.
 - b. Feed rate.
 - c. S/G Blowdown rate.

AND maintaining less than 100°F/h cooldown rate.

- Q. SECURE THE FOLLOWING SECONDARY PUMPS:
 - 1. Trip S/G Feed Pumps.
 - Place Condensate Booster Pumps in PULL-TO-LOCK.
 - Place 2 of the 3 Condensate Pumps in PULL-TO-LOCK.
 - 4. Secure Heater Drain Pumps.

II. RECOVERY ACTIONS	EOP-4 Rev. 1/Unit 1 Page 17 of 31 ALTERNATE ACTIONS
. WHEN RCS BORATION COMPLETE, THEN SHIFT CHARGING PUMP SUCTION SUPPLY TO MAKEUP SUPPLY WITH A LOWER BORIC ACID CONCENTRATION.	
 IF SIAS actuated, THEN perform the following: Open RWT To Charging Pump Suction Valve, 1-CVC-504-MOV. Shut VCT Outlet Valve, 1-CVC-501-MOV. Flace Boric Acid Pumps in PULL-TO-LOCK. Ensure Charging Pump AMPS steady. 	 1.1 IF SIAS NOT actuated, THEN line up Charging Pump suction to VCT: a. Determine blend requirements to maintain shutdown boron concentration per NEOG-7. b. Open VCT Outlet Valve, 1-CVC-501-MOV. c. Secure Boric Acid Direct Makeup Valve, 1-CVC-514-MOV. e. Shut BAST Gravity Feed Valves: 1-CVC-508-MOV 1-CVC-509-MOV OR line up Charging Pump suction to RWT: a. Open RWT To Charging Pump Suction Valve, 1-CVC-504-MOV. b. Shut VCT Outlet Valve, 1-CVC-504-MOV. c. Shut Boric Acid Direct Makeup Valve, 1-CVC-504-MOV. b. Shut VCT Outlet Valve, 1-CVC-504-MOV. d. Secure Boric Acid Direct Makeup Valve, 1-CVC-514-MOV. d. Secure Boric Acid Pumps(s).

EOP-4 Rev. 1/Unit 1 Fage 18 of 31

	RECOVERY ACTIONS	ALTERNATE ACTIONS
COM	MENCE ESFAS VERIFICATION CKLISTS:	
1.	SIAS Attachment (2).	
2.	CSAS Attachment (3).	
3.	CIS Attachment (4).	
4.	SGIS Attachment (7).	
RES	TORE CONTAINMENT ENVIRONMENT:	
1.	Direct Chemistry to place Hydrogen Monitors in service.	
2.	IF hydrogen concentration increases to 1%, <u>THEN</u> start Hydrogen Recombiners per OI-41A.	
3.	WHEN containment pressure less than 4.0 PSIG, THEN perform the following:	
	a. Reset CSAS signal.	
	b. Secure one Containment Spray Pump.	
	c. Verify all Containment Air Coolers operating to maintain containment temperature less than 120 F.	
	d. Restore equipment per CSAS Verification Checklist,	

EOP-4 Rev. 1/Unit 1 Page 19 of 31

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

- WHEN containment pressure less than 2.8 PSIG, THEN perform the following:
 - Block pressurizer pressure signals and reset SIAS signal.
 - b. Reset CIS signal.
 - Secure remaining Containment Spray Fump.
 - Restore equipment par SIAS and CIS Verification Checklists, Attachments (2) and (4), to desired condition.
- U. RESTORE SERVICE WATER TO TURBINE BUILDING:
 - Verify 21 Plant Air Compressor operating.
 - Shut Plant Air To Plant Air Header Valve, 1-PA-2059-CV.
 - Open Plant Air To Instrument Air Cross Connect Valve, 1-PA-2061-CV.
 - Open SRW Turbine Building Header Isolation Valves:

1-SRW-1600-CV 1-SRW-1637-CV 1-SRW-1638-CV 1-SRW-1639-CV

EOP-4	ł		
Rev.	1/1	Jnit	t 1
Page	20	of	31

RE	STORE INSTRUMENT AIR COMPRESSORS	
1.	IF high temperature alarm exists on the Instrument Air Compressors, THEN open the service water isolation valves by placing their handswitches in OPEN until temperature alarm clears.	
	11 OF 12	
2.	Start at least one Instrument Air Compressor.	
PE	ESTORE INSTRUMENT AIR TO ONTAINMENT:	
1.	Open Cntmt Instrument Air Isolation MOV, 1-IA-2080-MOV.	
	- <u>NOTE</u> -	
1- 27 11	-HS-2085 located on West wall of 7 ft Switchgear Room; Key #85 n Control Room Key Locker.	
2	. Open Cntmt Instrument Air Supply CV, 1-IA-2085-CV, by momentarily placing 1-HS-2085 in OPEN.	
RI	ESTORE LETDOWN FLOW:	
1	. Verify charging flowpath through Loop Charging Valves or Auxiliary Spray Valve.	

EOP-4	ł		
Rev.	1/1	Jnit	t 1
Page	21	of	31



EOP-4 Rev. 1/Unit 1 Page 22 of 31

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

- CAUTION -

Uncontrolled restoration of cooling to hot RCP seals may cause degradation of the metallic seating surfaces by thermal shock.

- 3. <u>IF</u> Component Cooling is isolated to RCP seals, <u>THEN</u> reduce RCP lower seal temperature below 280°F prior to initiating full cooling flow to the RCPs:
 - a. Shut Component Cooling Supply Containment Manual Isolation Valve, 1-CC-284, located in 5 ft East Penetration Room.
 - b. Verify CIS reset.
 - c. Open Component Cooling Containment Isolation Valves:

1-CC-3832-CV 1-CC-3833-CV

- d. Slowly open 1-CC-284 to throttle component cooling flow until lower seal temperatures are less than 280°F.
- e. <u>WHEN</u> lower seal temperatures are less than 280°F, THEN fully open 1-CC-284.
- <u>IF</u> an RCP lower seal temperature exceeded 280°F, <u>THEN</u> an engineering evaluation is required prior to restarting that RCP.
- Raise pressurizer level to at least 155 inches.

EOP-4 Rev. 1/Unit 1 Page 23 of 31

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

- 6. Verify RCP restart criteria:
 - a. RCS subcooling greater than 30°F.
 - b. At least one S/G available for heat removal.
 - Pressurizer level greater than 155 inches and stable,
 - d. Tcold less than 525°F.
 - e. RCS temperature and pressure greater than the minimum operating limits per the RCP curve on Attachment (1).
 - NOTE -

Starting an RCP may cause a pressurizer level transient.

 WHEN RCP restart criteria met, THEN start one RCP in a loop with an operable S/G:

- Verify "COMPT CLG FLOW LO" alarm clear.
- b. Start Oil Lift Pump.
- c. Insert RCP sync stick.
- d. Start one RCP.
- e. Monitor RCP running current:

Tavg Current

- 525 to 572°F 238 to 210 AMPS and steady
- 210 to 525°F 264 to 238 AMPS and steady

EOP-4 Rev. 1/Unit 1 Page 24 of 31

II. RECOVERY ACTIONS

ALTERNATE ACTIONS

- 8. <u>IF</u> pressurizer level decreases, <u>THEN</u> start Charging or HPSI Pump(s) as necessary to restore <u>AND</u> maintain level greater than 155 inches.
- Monitor RCP seal parameters following pump restart.
- Allow backflow to equalize temperatures in opposite loop.
- Start second RCP in opposite loop per step Y.7 and Y.9, pages 23 and 24.
- 12. Secure Auxiliary Spray:
 - a. Open Loop Charging Valves:

1-CVC-518-CV 1-CVC-519-CV

- b. Shut Auxiliary Spray Valve, 1-CVC-517-CV.
- c. Shift Pressurizer Spray Controller, 1-HIC-100, to AUTO.

Z. COMPLETE ADMINISTRATIVE POST-TRIP ACTIONS AND IMPLEMENT APPROPRIATE OPERATING PROCEDURE.

EOP-4 Rev. 1/Unit 1 Page 25 of 31

AA. ADMINISTRATIVE POST-TRIP ACTIONS:

- NOTE -

The following actions may be accomplished whenever feasible. They may be done in any order.

...

- Refer to ERPIP to determine appropriate emergency response actions.
- Perform notifications per CCI-118.
 - 3. Notify ESO of trip.
 - 4. Request RCS Boron and Iodine sample.
 - ____ 5. Perform shutdown margin calculation per NEOG 2 and 7.
 - 6. Complete transient log entries per CCI-301.
 - Recall post-trip review (preferably within 30 minutes of trip).
 - 8. Perform post-trip review per CCI-111.
 - 9. Monitor turbine bearing temperatures.
 - Continue Main Turbine shutdown per applicable step of OI-43A.

END OF SECTION II1.
EOF-4 Rev. 1/Unit 1 Page 26 of 31

IV. SAFETY FUNCTION STATUS CHECK

- A. The STA (or person designated by STA) will perform the intermediate and final safety functions checks respectively on entry and prior to exiting from this procedure.
- B. Perform intermediate safety function status check at 10 minute intervals until plant condicions stabilize.
- C. Immediately notify Shift Supervisor or Control Room Supervisor if any safety function criteria is not being satisfied.
- D. Review data and verify that safety function acceptance criteria are satisfied.
- E. When EOP completed, then perform final safety function check.

REACTIVITY	ACTIVITY SAFETY FUNCTION ACCEPTANCE CRITERIA			
PARAMETERS	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK
a. WRNI power	less than 8%		less than 2%	
b. SUR (DPM)	negative		0	
c. CEA status	all inserted		all inserted	
or				
Boration status:				
concentation	increasing	*********	appropriate S/D margin	
BAST level	decreasing		N/A	N/A

EOP-4 Rev. 1/Unit 1 Page 27 of 31

KUS PRESTURE		SAFETY FUNCTION ACCEPTANCE CRITERIA				
1.1	RIMET RS	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL	
x - 1	Pressurizer pressu: (PSIA)	300 to 1900		300 to 1900		
ь.	Pressurizer level (inches)	0 to 350		101 to 160		
c.	RCS subcooling $(^{\circ}F)$	30 to 140		30 to 140		
	ir PORVs were opened once an hour monitor the following:	,				
d	Quench Tank parameters: level (inches) temperature (F) pressure (PSIG)	conr*ant or decreasing		constant or decreasing		
e	PORV discharge piping temperature (°F) (computer points T107, T108)	decreasing	*********	decreasing		



CCOM CR 88-1174

EOP-4 Rev. 1/Unit 1 Page 28 of 31

2

C	ORE AND RCS	SAFETY FUR	SAFETY FUNCTION ACCEPTANCE CRITERIA				
PARAMETERS		CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK		
a	. RCS Tcold (^O F)	less than 515		less than 500_			
b	. CET (°F)	less than 565		less than 550_			
с	. Thot minus Tcold (°F)						
	Natural Circulation	10 to 50		10 to 50 _			
	Forced Circulation	less than 10		less than 5 _			
d	. Unaffected S/G pressure (PSIA)	150 to 900		greater than 50			
e	. Unaffected S/G level (inches)	(-)250 to (+)30		(-)24 to (+)30			
f	. Condensate Storage Tank level (ft)	greater than 5		greater than 5			

EOP-4 Rev. 1/Unit 1 Page 29 of 31

VITAL		TAL	SAFETY	FUNCTION ACCEPTAN	CE CRITERIA	
	AU	XILIARIES	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK
	а.	4KV vital buses 11 or 14	energized		energized	
	ь.	Instrument Air pressure (PSIG)	greater than 88		greater than 88	
	с.	Component Cooling (# pumps running)	1 or 2		1 or 2	
	d.	Saltwater (# pumps running)	1 or 2		1 or 2	
	е.	Service Water (# pumps running)	1 or 2		1 or 2	
)f.	125V DC buses 11, 12, 21, 22	energized		energized	
	g.	120V AC vital buses 11, 12, 13, 14	energized		energized	

EOP-4 Rev. 1/Unit 1 Page 30 of 31

2

NO	RMAL	SAFETY F	UNCTION ACCEPTAL	NCE CRITERIA	
EN	VIRONMENT RAMETERS	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK
а.	Containment pressure (PSIG)	less than 50		less than 2.8	
b.	Containmen'. temperature (°F)	less than 276		less than 220	
с.	Containment High Range Radiation Monitor	alarm clear		alarm clear	
d.	Hydrogen concentration	N/A	N/A	less than 2%	

EOP-4 Rev. 1/Unit 1 Page 31 of 31

1

NO	RMAL RADIATION SAFETY FUNCTION		FUNCTION ACCEPTAN	ACCEPTANCE CRITERIA		
TO	CONTAINMENT		CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK
a.	Noble Gas Monitor		alarm clear		alarm clear	
b.	Condenser Off-Gas RMS	(1)	a arm clear		alarm clear	
с.	S/G B/D RMS	(1)	alarm clear		alarm	
d.	Main Vent Gaseous RMS (1-RI-5415)		alarm clear	,	alarm clear	

 With MSIVs shut and S/G Blowdown isolated, request Chemistry to sample S/Gs for activity.

IME	NUMBER
	11
	2
-	3
	4
	4

EOP-4 Rev. 1/Unit 2 Page 1 of 31

CALVERT CLIFFS NUCLEAR POWER PLANT

EOP-4 EXCESS STEAM DEMAND

REVISION 1

	SIGNATURE	DATE
PREPARED BY;	Thankorf	,12.18-87
VERIFIED BY;	James V. Srooms	1 12/18/87
POSRC;	MEETING # 88.7	1 2-10-88
APPROVED BY;	Manager-Nuclear Operations or Operations if POSEC review is	Z-10-88 General Supervisor- not required

EOP-4 Rev. 1/Unit 2 Page 2 of 31

LIST OF EFFECTIVE PAGES

EOP-4 Rev. 1/Unit 2 Page 3 of 31

EXCESS STEAM DEMAND

I. PRECAUTIONS

- A. Do not adopt manual operation of automatically controlled systems unless a malfunction is apparent or automatic system operation will not support the maintenance of a safety function.
- B. Systems shifted to manual operation must be monitored frequently to ensure correct operation.
- C. At least two independent indications should be used, wher available, to evaluate and corroborate a specific plant condition since an incident could induce inconsistencies between instruments.
- D. High energy line break may cause erratic instrumentation response depending on the magnitude and location of the break.
- E. Minimize the number of cycles of pressurizer auxiliary spray when the temperature differential is greater than 400°F.
- F. In Natural Circulation, increased loop transport time causes a 5 to 10 minute delay in temperature responses to a plant change. Pressurizer level and pressure responses, if available, typically provide better indication of RCS response during this period.
- G. S/G pressure, pressurizer pressure, and containment temperature affect the level indication for the S/Gs and Pressurizer. Attachments (8) and (9) contain the corrected S/G and pressurizer levels for various S/7 pressures, pressurizer pressures, and containment temperatures.
- H. If a pump or component fails, the cause of the failure should be determined prior to restarting or starting a standby pump or component to prevent a common failure.

EOP-4 Rev. 1/Unit 2 Page 4 of 31

II. ENTRY CONDITIONS

The presence of one or more of the following conditions indicates that an Excess Steam Demand may have occurred:

- A. Decrease in S/G pressure in one or both S/Gs.
- B. Reactor Trip on low S/G pressure.
- C. Reactor Trip on high containment pressure.
- D. Possible actuation of:
 - 1. SIAS 2. CIS 3. CSAS 4. SGIS
- E. Decrease in Tcold.

F. Loud noise and poor visibility in plant (location dependent).

111	. RECOVERY ACTIONS	EOP-4 Rev. 1/Unit 2 Page 5 of 31 ALTERNATE ACTIONS
Α.	VERIFY POST-TRIP IMMEDIATE ACTIONS COMPLETED.	
в.	COMMENCE INTERMEDIATE SAFETY FUNCTION STATUS CHECK.	
с.	DETERMINE APPROPRIATE EMERGENCY RESPONSE ACTIONS PER THE ERPIP.	
D.	ISOLATE BOTH S/Gs:	
	 Shut both MSIVs. Shut S/G Feedwater Isolation Valves: 2-FW-4516-MOV 2-FW-4517-MOV Shut MSIV Bypass Valves: 2-MS-4045-MOV 2-MS-4052-MOV Shut S/G Blowdown Valves: 2-BD-4010-CV 2-BD-4010-CV 2-BD-4012-CV 2-BD-4013-CV 	
	2-BD-4010-CV 2-BD-4011-CV 2-BD-4012-CV 2-BD-4013-CV	

EOP-4 Rev. 1/Unit 2 Page 6 of 31

		raye e er er
11.	RECOVERY ACTIONS	ALTERNATE ACTIONS
5.	Shut AFW Steam Supply Valves by placing handswitches in CLOSE:	
	2-MS-4070-CV 2-MS-4071-CV	
6.	Shut AFW Block Valves by placing handswitches in CLOSE:	
	21 S/G 22 S/G	
	2-AFW-4520-CV 2-AFW-4521-CV 2-AFW-4521-CV 2-AFW-4522-CV 2-AFW-4522-CV 2-AFW-4523-CV 2-AFW-4533-CV	
7.	Shut Atmospheric Dump Valves.	승규는 것이 가격을 얻는 것들을 물었다.
8.	Shut upstream drains by placing handswitch 2-HS-6622 in CLOSE.	
E. MON	NITOR RCS DEPRESSURIZATION.	
1.	<pre>IF rapid depressurization to 1725 PSIA, THEN verify SIAS actuation AND the following actions: a. All available Charging Fumps running.</pre>	 1.1. <u>IF</u> RCS pressure is greater than 1725 PSIA <u>AND</u> SIAS <u>NOT</u> actuated, <u>THEN</u> block SIAS: a. Open Main and Aux HPSI Header valves:
	 b. 21 and 23 HPSI Pumps running. Main and Aux HPSI Header 	2-SI-616-MOV 2-SI-617-MOV 2-SI-626-MOV 2-SI-627-MOV 2-SI-636-MOV 2-SI-637-MOV 2-SI-646-MOV 2-SI-647-MOV
	Valves open: 2-SI-616-MOV 2-SI-617-MOV 2-SI-626-MOV 2-SI-627-MOV 2-SI-636-MOV 2-SI-637-MOV 2-SI-646-MOV 2-SI-647-MOV	 b. Start 21 and 23 HPSI Pumps. c. WHEN "PRSR PRESS BLOCK A(B) PERMITTED" alarms(s) received, THEN block SIAS A(B).

EOP-4 Rev. 1/Unit 2 Page 7 of 31



EOP-4		
Rev.	1/Unit 2	2
Page	8 of 31	



COM CR 88-1116

EOP-4 Rev. 1/Unit 2 Page 9 of 31

III. RECOVERY ACTIONS

- e. Shut VCT Outlet Valve, 2-CVC-501-MOV.
- f. All available Charging Fumps running.

 Continue boration until a total 65 inch decrease in BAST level(s) is achieved, or shutdown margin requirement of NFOG-11 is achieved.

IDENTIFY AFFECTED S/G.

 Compare the following parameters:

a. S/G pressures.

b. Tcold on both loops.

c. S/G levels.

ALTERNATE ACTIONS

- 1.2 <u>IF</u> Boric Acid Pumps <u>NOT</u> available, <u>THEN</u> establish gravity feed:
 - a. Open BAST Gravity Feed Valves:

2-CVC-508-MOV 2-CVC-509-MOV

b. Shut VCT Outlet Valve, 2-CVC-501-MOV.

c. Start all available Charging Pumps.

I. RECOVERY ACTIONS	ECP-4 Rev. 1/Unit 2 Page 10 of 31 ALTERNATE ACTIONS
MAINTAIN HEAT SINK OPERABILITY OF UNAFFECTED S/G DURING BLOWDOWN PHASE:	
 For the affected S/G, shut the Atmospheric Dump Valve using the Hand Transfer Valves on the West wall of the Unit 2 45 ft Switchgear Room: 	1.1 <u>IF</u> Atmospheric Dump Valve will <u>NOT</u> shut from 2C43, <u>THEN</u> shut Atmospheric Dump Manual Isolation Valve. <u>21 S/G</u> or <u>22 S/G</u>
 a. Verify 2C43 Atmospheric Dump Controllers at 0% output. 	2-MS-101 2-MS-104
 b. Align Hand Transfer Valves to 2C43 position: 21 S/G or 22 S/G 	
1-HV-3939A 1-HV-3938A 1-HV-3939B 1-HV-3938B	
- NOTE -	- NOTE -
Unaffected S/G temperature may be obtained by using the saturation temperature for the existing S/G pressure.	For steam breaks in Containment, resulting in small cooldown rates, the energy released to Containment may be reduced by use of S/G Blowdown on affected S/G.
2. <u>IF</u> RCS cooldown rate greater than or equal to 100° F/h <u>AND</u> CET temperatures less than unaffected S/G temperature, <u>THEN</u> cool unaffected S/G to within 25° F of CET temperatures:	 2.1 IF RCS cooldown rate less than 100°F/h, THEN establish Natural Circulation using unaffected S/G: a. Open motor driven train AFW Block Valves on unaffected S/G:
a. Open motor driven train AFW Block Valves on unaffected S/G:	21 S/G or 22 S/G 2-AFW-4522-CV 2-AFW-4532-CV 2-AFW-4522-CV 2-AFW-4532-CV
21 S/G or 22 S/G 2-AFW-4522-CV 2-AFW-4502-CV 2-AFW-4523-CV 2-AFW-4533-CV	2-AFN-4525-UV 2-AFN-4555-UV

EOP-4 Rev. 1/Unit 2 Page 11 of 31

RECOVERY ACTIONS

- CAUTION -

D/G supplying power to 23 AFW Pump flow limit is 300 GPM; otherwise, flow limit is 575 GPM.

b Start 23 AFW Pump.

 Adjust AFW Flow Concrol Valves to feed unaffected S/G.

21 S/G or 22 S/G

2-AFW-4525-CV 2-AFW-4535-CV

- CAUTION -

CET temperatures must always be less than unaffected S/G temperature while affected S/G blowdown is in progress.

- d. Open Atmospheric Dump Valve as necessary to cool unaffected S/G to within 25°F of CET temperatures.
- e. Stabilize unaffected S/G level between (-)170 and (+)30 inches.

K. RESTORE PRESSURIZER LEVEL TO BETWEEN 50 AND 110 INCHES DURING S/G BLOWDOWN:

1. Verify letdown isolated.

 <u>IF</u> RCS pressure less than 1270 PSIA, <u>THEN</u> verify HPSI flow to RCS per Attachment (12).

ALTERNATE ACTIONS

- CAUTION -

D/G supplying power to 23 AFW Pump flow limit is 300 GPM; otherwise flow limit is 575 GPM.

- b. Start 23 AFW Pump.
- c. Manually throttle open AFW Flow Control Valve.
 - 21 S/G or 22 S/G
- 2-AFW-4525-CV 2-AFW-4535-CV
- d. Open Atmospheric Dump Valve as necessary to cool unaffected S/G, while maintaining RCS cooldown rate less than 100°F/h.
- e. Stabilize unaffected S/G level between (-)170 and (+)30 inches.

UII.

EOP-4 Rev. 1/Unit 2 Page 12 of 31

. RECOVERY ACTIONS

ALTERNATE ACTIONS

- 3. <u>IF</u> additional HPSI flow required to control pressurizer level, <u>THEN</u> lower RCS pressure using Auxiliary Spray per step M, page 13.
- WHEN pressurizer level greater than 50 inches, THEN secure all but one Charging Pump.
- <u>IF</u> the following conditions exist:
 - a. At least 30°F subcooling.
 - b. Pressurizer level greater than 50 inches.
 - c. At least one S/G available for heat removal.
 - d. RVLMS indicates that the Core is covered.

THEN throttle HPSI flow to maintain pressurizer level between 50 and 110 inches.

- L. WHEN STEADY Toold INDICATES S/G BLOWDOWN COMPLETE OR COOLDOWN RATE LESS THAN 100°F/h, THEN ESTABLISH UNAFFECTED S/G AS A HEAT SINK:
 - Restore S/G wide range level to between (-)24 and (+)30 inches using 23 AFW Pump.
 - Open Atmospheric Dump Valve as necessary to cool unaffected S/G, while maintaining RCS cooldown rate less than 100°F/h.
 - Stabilize pressurizer level between 101 and 155 inches.

EOP-4			
Rev.	1/0	ni	t 2
Page	13	of	31

"	ι.	REC	OVERY ACTIONS	A.	LTERNATE ACTIONS
м.	MA I 30	NTA I AND	N RCS SUBCOOLING BETWEEN		
	30 The preexc by 1.	AND pot ssur essi a re ope as sub <u>IF</u> RCS pre 350 <u>THE</u> AND a.	- <u>CAUTION</u> - ential exists for ized thermal shock from an ve cooldown rate followed pressurization. rate Pressurizer Heaters necessary to maintain RCS cooling greater than 30°F. necessary to lower subcooling <u>AND</u> ssurizer level less than inches, N verify heaters secured initiate Auxiliary Spray: Flace Instrument Air C'S Override Switch, 2-HS-2080A, in OVERRIDE.	2.1	 IF pressurizer level greater than 350 inches AND RCS subcooling is greater than 140°F, THEN open PORV: a. Verify primary makeup path operable. b. Place both PORV Override Control Switches in ourselver cutty
		b.	Open Cntmt Instrument Air Isolation MOV, 2-IA-2080-MOV.		OVERRIDE SHUT. - <u>NOTE</u> -
		c. d.	Record temperature differential between Fressurizer and Regenerative Heat Exchanger Outlet. Open Auxiliary Spray		The "PORV ENERGIZED" alarm will annunciate when two RPS trip units are pulled. The PORVs will not open. c. Pull two High Pressurizer Pressure Trip Units out on RPS.
			Valve, 2-6vc-51/-6v.		 d. Place one PORV Override Control Switch in AUTO. e. IF second PORV needed to lower subcooling, THEN place the other PORV Override Control Switch in AUTO. f. WHEN subcooling less than 140 F, THEN perform the following:

EOP-4 Rev. 1/Unit 2 Page 14 of 31

III. RECOVERY ACTIONS

e. Shut Loop Charging Valves:

2-CVC-518-CV 2-CVC-519-CV

- NOTE -

2-HS-2085 located on West wall of 27 ft Switchgear Room; Key #80 in Control Room Key Locker.

- f. Open Cntmt Instrument Air Supply CV, 2-IA-2085-CV, by momentarily placing 2-HS-2085 in OPEN.
- g. Shift 2-HIC-100 to MANUAL and shut Pressurizer Spray Valves:

2-RC-100E-CV 2-RC-100F-CV

- h. Maintain pressurizer cooldown rate less than 200°F/h
- N. IF RCPs SECURED, THEN CONFIRM NATURAL CIRCULATION IN UNAFFECTED S/G LOOP:

- NOTE -

Wide range Thot may be obtained from Subcooled Margin Monitor per Attachment (10).

- Thot minus Tcold between 10 and 50°F.
- 2. Tcolu constant or decreasing.
- 3. Thot constant or decreasing.
- CET temperatures consistent with Thot.
- Steaming rate affects primary temperature.

ALTERNATE ACTIONS

- Place the PORV Override Control Switches in OVERRIDE SHUT.
- (2) Insert High Pressurizer Fressure Trip Units that were previously pulled.
- (3) Ensure "PORV ENERGIZED" alarm clear.
- (4) <u>IF</u> Acoustic Monitor indicates flow through the PORV, <u>THEN</u> shut the PORV Block Valve.

EOP-4 Rev. 1/Unit 2 5 of 31

PECOVERY ACTIONS	Page ALTERNATE ACTIONS	ĩ
RECOVERT ACTIONS		
MONITOR FOR CORE AND RCS VOIDING:		
- CAUTION -		
Potential for void formation increases rapidly when pressure decreases below 1500 PSIA.		
 Letdown flow greater than charging flow. 		
 Rapid unexplained increase in pressurizer level during an RCS pressure reduction. 		

- 3. Loss of subcooled margin as determined using CET temperatures.
- "REACTOR VESSEL WATER LEVEL 4. LOW" alarm.
- IF VOIDING INHIBITS HEAT REMOVAL, P . THEN REDUCE OR ELIMINATE VOIDED AREA:
 - Shut Latdown Isolation 1. Valve, 2-CVC-515-CV.

- CAUTION -

The potential exists for pressurized thermal shock from an excessive cooldown rate followed by a repressurization.

2. Pressurize the RCS to maintain subcooling as near 140°F as practical, by any of the following:

- NOTE -

Pressurizer Backup Heater Banks 21 and 23 trip on U/V and SIAS.

IF pressurizing the RCS 2.1 does NOT restore heat removal, THEN operate Reactor Vessel Vent Valves per OI-1G.

LII.

0.

EOP-4 Rev. 1/Unit 2 Page 16 of 31

LII. RECOVERY ACTIONS

ALTERNATE ACTIONS

- Operate Pressurizer Heater(s).
- b. Operate Turbine Bypass or Atmospheric Dump Valves to maximize RCS cooldown, while maintaining cooldown rate less than 100°F/h.
- c. Raise HPSI flow to RCS.

- CAUTION -

If voids exist in the S/G tubes, a rapid RCS pressure reduction will occur when the voids collapse.

- <u>IF</u> voiding occurs in the S/G tubes (saturation pressure of S/G greater than saturation pressure of RCS), <u>THEN</u> cool the S/G by raising any of the following:
 - a. Steaming rate.
 - b. Feed rate.
 - c. S/G Blowdown rate.

AND maintaining less than 100°F/h cooldown rate.

- Q. SECURE THE FOLLOWING SECONDARY PUMPS:
 - 1. Trip S/G Feed Pump#.
 - Place Condensate Booster Pumps in OULL-TO-LOCK.
 - Place 2 of the 3 Condensate Pumps in PULL-TO-LOCK.
 - 4. Secure Heater Drain Pumps.

111. <u>REC</u>	COVERY ACTIONS	EOP-4 Rev. 1/Unit 2 Page 17 of 31 ALTERNATE ACTIONS
R. WHEN RO THEN SI SUPPLY LOWER 1	CS BORATION COMPLETE, HIFT CHARGING PUMP SUCTION TO MAKEUP SUPPLY WITH A BORIC ACID CONCENTRATION.	
1. IF THE a. d.	SIAS actuated, EN perform the following: Open RWT To Charging Pump Suction Valve, 2-CVC-504-MOV. Shut VCT Outlet Valve, 2-CVC-501-MOV. Place Boric Acid Pumps in FULL-TO-LOCK. Ensure Charging Pump AMPS steady.	 1.1 IF SIAS NOT actuated, THEN line up Charging Pump suction to VCT: Determine blend requirements to maintain shutdown boron concentration per NEOG-11. Open VCT Outlet Valve, 2-CVC-501-MOV. Secure Boric Acid Pump(s). Shut Borir Acid Direct Makeup Valve, 2-CVC-514-MOV. Shut BAST Gravity Feed Valves: 2-CVC-508-MOV 2-CVC-509-MOV OE line up Charging Pump suction to EWT: Open RWT To Charging Pump Suction Valve, 2-CVC-504-MOV. Shut VCT Outlet Valve, 2-CVC-501-MOV. Shut Boric Acid Direct Makeup Valve, 2-CVC-514-MOV. Shut Boric Acid Direct Makeup Valve, 2-CVC-514-MOV. Shut Boric Acid Direct Makeup Valve, 2-CVC-514-MOV.

		RECOVERY ACTIONS	EOP-4 Rev. 1/Unit 2 Page 18 of 31 ALTERNATE ACTIONS
s.	CHE	CKLISTS:	
	1.	SIAS Attachment (2).	
	2.	CSAS Attachment (3).	
	3.	CIS Attachment (4).	
	4.	SGIS Attachment (7).	
T.	RES	TORE CONTAINMENT ENVIRONMENT:	
-	1.	Direct Chemistry to place Hydrogen Monitors in service.	
	2.	IF hydrogen concentration increases to 1%, THEN start Hydrogen Recombiners per OI-41A.	
	3.	WHEN containment pressure less than 4.0 PSIG, THEN perform the following:	
		a. Reset CSAS signal.	
		b. Secure one Containment Spray Pump.	
		c. Verify all Containment Air Coolers operating to maintain containment temperature less than 120°F.	
		d. Restore equipment per CSAS Verification Checklist, Attachment (3), to desired condition.	
			and the second

EOP-4 Rev. 1/Unit 2 Page 19 of 31

LII. RECOVERY ACTIONS

ALTERNATE ACTIONS

- WHEN containment pressure less than 2.8 PSIG, THEN perform the following:
 - Block pressurizer pressure signals and reset SIAS signal.
 - b. Reset CIS signal.
 - Secure remaining Containment Spray Pump.
 - d. Restore equipment per SIAS and CIS Verification Checklists, Attachments (2) and (4), to desired condition.
- U. RESTORE SERVICE WATER TO TURBINE BUILDING:
 - Verify 11 Plant Air Compressor operating.
 - Shut Plant Air To Plant Air Header Valve, 2-PA-2059-CV.
 - Open Plant Air To Instrument Air Cross Connect Valve, 2-PA-2061-CV.
 - Open SRW Turbine Building Header Isolation Valves:

2-SRW-1600-CV 2-SRW-1637-CV 2-SRW-1638-CV 2-SRW-1639-CV

EOP-4		
Rev.	1/Un	it 2
Page	20 0	f 31

) '''	. RECOVERY ACTIONS		ALTERNATE ACTIONS
۷.	RESTORE INSTRUMENT AIR TO SERVICE:	COMPRESSORS	
	 <u>IF</u> high temperature exists on the Inst Compressors, <u>THEN</u> open the serve isolation valves he their handswitches until temperature clears. <u>21</u> or 	re alarm rument Air vice water by placing s in OPEN alarm	
	2-HS-2063 2- 2. Start at least one Air Compressor.	HS-2065	
	RESTORE INSTRUMENT AIR CONTAINMENT:	R TO	
	 Open Cntmt Instrum Air Isolation MOV 2-IA-2080-MOV. - NOTE - 2-HS-2085 located on M 27 ft Switchgear Room in Control Room Key Located Open Cntmt Instrum Supply CV, 2-IA-2 momentarily placing in OPEN. 	west wall of , Key #80 ocker. ment Air 085-CV, by ng 2-HS-2085	
x.	FESTORE LETDOWN FLOW:		
	 Verify charging f through Loop Char Valves or Auxilia Valve. 	lowpath ging ry Spray	

EOP-4 Rev. 1/Unit 2 Page 21 of 31

		raye at or or
11.	RECOVERY ACTIONS	ALTERNATE ACTIONS
2	. Verify at least one Charging Fump operating.	
3	. Shift Letdown Control Valve Controller, 2-HIC-110, to MANUAL.	
4	. Adjust controller to shut Letdown Control Valves.	
5	. Open Letdown Isolation Valves:	
	2-CVC-515-CV 2-CVC-516-CV	
	-CAUTION-	
t t	The setpoint of 2-PIC-201 must be bove the saturation pressure for the letdown outlet temperature of the Regenerative Heat Exchanger.	
6	 Adjust the setpoint on 2-PIC-201 and adjust 2-HIC-110 to maintain desired pressurizer level. 	
	IF RCFS AVAILABLE, THEN EVALUATE NEED FOR FORCED OR NATURAL CIRCULATION:	
1	MHEN RCPs available AND Forced Circulation desired, THEN start RCPs per steps 2-12.	1.1 IF RCPs NOT available OR Natural Circulation desired, THEN implement Natural Circulation (AOP-3E) AND complete administrative post-trip actions.
	 <u>IF</u> RCPs exposed to excessive moisture, <u>THEN</u> consider meggering RCP motor. 	

EOP-4 Rev. 1/Unit 2 Page 22 of 31

RECOVERY ACTIONS

ALTERNATE ACTIONS

- CAUTION -

Uncontrolled restoration of cooling to hot RCP seals may cause degradation of the metallic seating surfaces by thermal shock.

- 3. <u>IF</u> Component Cooling is isolated to RCP seals, <u>THEN</u> reduce RCP lower seal temperature below 280°F prior to initiating full cooling flow to the RCPs:
 - a. Shut Component Cooling Supply Containment Manual Isolation Valve, 2-CC-284, located in 5 ft East Fenetration Room.
 - b. Verify CIS reset.
 - Containment Isolation
 Valves:

2-CC-3632-CV 2-CC-3833-CV

- d. Slowly open 2-CC-284 to throttle component cooling flow intil lower seal temperatures are less than 280°F.
- WHEN lower seal temperatures are less than 280°F, THEN fully open 2-CC-284.
- an P.: lower seal temperature exceeded 280°F, <u>THEN</u> an engineering evaluation is required prior to restarting that RCP.
- Raise pressurizer level to at least 155 inches.

LII.

EOP-4	ł.					
Rev.	1	/U	n	1	t	2
Page	2	3	0	£	3	1

LII. RECOVERY ACTIONS

ALTERNATE ACTIONS

- 6. Verify RCP restart criteria:
 - a. RCS subcooling greater than 30°F.
 - b. At least one S/G available for heat removal.
 - c. Pressurizer level greater than 155 inches and stable.
 - d. Tcold less than 525°F.
 - e. RCS temperature and pressure greater than the minimum operating limits per the RCP curve on Attachment (1).
 - NOTE -

Starting an RCF may cause a pressurizer level transient.

- WHEN RCP restart criteria met, THEN start one RCP in a loop with an operable S/G:
 - Verify "COMPT CLG FLOW LO" alarm clear.
 - b. Start Oil Lift Pump.
 - c. Insert RCP sync stick.
 - d. Start one RCF.
 - e. Monitor RCP running current:

Tavg Current

- 525 to 572°F 238 to 210 AMPS and steady
- 210 to 525°F 264 to 238 AMPS and steady

EOP-4 Rev. 1/Unit 2 Page 24 of 31

II. RECOVERY ACTIONS

ALTERNATE ACTIONS

- IF pressurizer level decreases, THEN start Charging or HPSI Pump(s) as necessary to restore AND maintain level greater than 155 inches.
- Monitor RCP seal parameters following pump restart.
- Allow backflow to equalize temperatures in opposite loop.
- Start second RCP in opposite loop per step Y.7 and Y.9, pages 23 and 24.
- 12. Secure Auxiliary Spray:
 - Open Loop Charging Valves:

2-CVC-518-CV 2-CVC-519-CV

- b. Shut Auxiliary Spray Valve, 2-CVC-517-CV.
- c. Shift Pressuriter
 Spray Controller,
 2-HIC-100, to AUTO.

Z. COMPLETE ADMINISTRATIVE POST-TRIP ACTIONS AND IMPLEMENT APPROPRIATE OPERATING PROCEDURE.

EOP-4 Rev. 1/Unit 2 Page 25 of 31

AA. ADMINISTRATIVE POST-TRIP ACTIONS:

- NOTE -

The following actions may be accomplished whenever feasible. They may be done in any order.

- Refer to ERFIP to determine appropriate emergency response actions.
- Perform notifications per CCI-118.
 - 3. Notify ESO of trip.
- 4. Request RCS Boron and Iodine sample.
- 5. Perform shutdown margin calculation per NEOG 9 and 11.
 - 6. Complete transient log entries per CCI-301.
 - Recall post-trip review (preferably within 30 minutes of trip).
- 8. Perform post-trip review per CCI-111.
- 9. Monitor turbine bearing temperatures.
 - 10. Continue Main Turbine shutdown per applicable step of 01-43A.

END OF SECTION III.

EOP-4 Rev. 1/Unit 2 Page 26 of 31

IV. SAFETY FUNCTION STATUS CHECK

2 C

- A. The STA (or person designated by STA) will perform the intermediate and final safety functions checks respectively on entry and prior to exiting from this procedure.
- B. Perform intermediate safety function status check at 10 minute intervals until plant conditions stabilize.
- C. Immediately notify Shift Supervisor or Control Room Supervisor if any safety function criteria is not being satisfied.
- D. Review data and verify that safety function acceptance criteria are satisfied.
- E. When EOP completed, then perform final safety function check.

ACTIVITY	SAFETY FUNCTION ACCEPTANCE CRITERIA					
NTROL ARAMETERS	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK		
WANI power	less than 8%		less than 2%			
SVR (DPM)	negative		0	-		
CEA status	all inserted		all inserted			
or						
Boration status:			appropriate			
concentation	increasing		S/D margin	-		
BAST level	decreasing	********	N/A	N/A		
	ACTIVITY NTROL RAMETERS WRNI power SUR (DPM) CEA status or Boration status: concentation BAST level	ACTIVITY SAFETY NTROL RAMETERS CRITERIA WRNI power less than 8% SUR (DFM) negative CEA status all inserted or Boration status: concentation increasing BAST level decreasing	ACTIVITY NATROL RAMETERS CRITERIA INTERMEDIATE CHECK WRNI power less than 8% WRNI power less than 8% SVR (DFM) negative all inserted or Boration status: concentation increasing BAST level decreasing	CRCTIVITY NARAMETERS CRITERIA RAMETERS CRITERIA RAMETERS CRITERIA CRITERIA INTERMEDIATE CRITERIA CRITERIA Iess than 8% less than 2% SVR (DFM) negative 0 CEA status all inserted all inserted or Boration status: concentation increasing		

EOP-4 Rev. 1/Unit 2 Page 27 of 31

CS PRESSURE	SAFETY FUNCTION ACCEPTANCE CRITERIA				
ARAMETERS	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK	
. Pressurizer pressure (PSIA)	300 to 1900		300 to 1900		
). Pressurizer level (inches)	0 to 350		101 to 160		
. RCS subcooling ($^{\circ}F$)	30 to 140		30 to 140		
If PORVs were opened, once an hour monitor the following:					
i. Quench Tank parameters: level (inches) temperature (F) pressure (PSIG)	constant or decreasing		constant or decreasing		
e. PORV discharge piping temperature (°F) (computer points T107, T108)	decreasing	*********	decreasing		
	CS PRESSURE ND INVENTORY ARAMETERS Pressurizer level (inches) RCS subcooling (^O F) If PORVs were opened, once an hour monitor the following: Quench Tank parameters: level (inches) temperature (^P F) pressure (PSIG) PORV discharge piping temperature (^O F) (computer points T107, T108)	CS PRESSURE ND INVENTORY ARAMETERS CRITERIA Pressurizer pressure (PSIA) 300 to 1900 Pressurizer level (inches) 0 to 350 RCS subcooling (^O F) 30 to 140 If PORVs were opened, once an hour monitor the following: Quench Tank parameters: level (inches) constant temperature (^O F) or pressure (PSIG) decreasing PORV discharge piping temperature (^O F) (computer points T107, T108) decreasing	CS PRESSURE ND INVENTORY ARAMETERS SAFETY FUNCTION ACCE INTERMEDIATE CRITERIA INTERMEDIATE CHECK I. Pressurizer pressure (PSIA) 300 to 1900 Pressurizer level (inches) 0 to 350 I. RCS subcooling (°F) 30 to 140 If PORVs were opened, once an hour monitor the following: . I. Quench Tank parameters: level (inches) constant or or pressure (PSIG) PORV discharge piping temperature (°F) (computer points T107, T108) decreasing	CS PRESSURE ND INVENTORY ARAMETERS SAFETY FUNCTION ACCEPTANCE CRITERS CRITERIA INTERMEDIATE CRITERIA CRITERIA CHECK Pressurizer pressure (PSIA) 300 to 1900 300 to 1900 Pressurizer level (inches) 0 to 350 101 to 160 RCS subcooling (°F) 30 to 140 30 to 140 If PORVs were opened, once an hour monitor the following: . . Quench Tank parameters: level (inches) constant or decreasing . . PRV discharge piping temperature (°F) (computer points TIO7, TIO8) decreasing . . decreasing 	

EOP-4 Rev. 1/Unit 2 Page 28 of 31

5

CON	RE AND RCS	SAFETY FUNCTION ACCEPTANCE CRITERIA					
HEAT REMOVAL PARAMETERS		CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK		
a.	RCS Tcold (°F)	less than 515		less than 500_			
b.	CET ([°] F)	less than 565		less than 550_			
c.	Thot minus Tcold (°F)						
	Natural Circulation	10 to 50		10 to 50 _			
	Forced Circulation	less than 10	*******	less than 5 _	-		
d.	Unaffected S/G pressure (PSIA)	150 to 900	*****	greater than 50 _			
e.	Unaffected S/G level (inches)	(-)250 to (+)30	******	(-)24 to (+)30			
£.	Condensate Storage Tank level (ft)	greater than 5	*******	greater than 5			

EOP-4 Rev. 1/Unit 2 Page 29 of 31

A	AUXILIARIES					
			CRITERIA	INTERMEDIATE	CRITERIA	CHECK
a. 4KV 21 o	4KV vital buses 21 or 24	energized	energized			
b	þ.,	Instrument Air pressure (PSIG)	greater than 88	*********	greater than 88	
¢		Component Cooling (# pumps running)	1 or 2	*********	1 or 2	
d	1.	Saltwater (# pumps running)	1 or 2		1 or 2	
*	e .	Service Water (# pumps running)	1 or 2		1 or 2	
D	£.	125V DC buses 11, 12, 21, 22	energized	********	energized	
4	g .	120V AC vital buses 21, 22, 23, 24	energized		energized	

EOP-4 Rev. 1/Unit 2 Page 30 of 31

NORMAL CONTAINMENT ENVIRONMENT PARAMETERS		SAFETY FUNCTION ACCEPTANCE CRITERIA				
		CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK	
а.	Containment pressure (PSIG)	less than 50		less than 2.8		
b.	Containment temperature (°F)	less than 276	*******	less than 220		
с.	Containment High Range Radiation Monitor	alarm clear		alarm clear		
d.	Hydrogen concentration	N/A	N/A	less than 2%		
EOP-4 Rev. 1/Unit 2 Page 31 of 31

NORMAL RADIATION			SAFETY FUNCTION ACCEPTANCE CRITERIA					
TO CONTAINMENT			CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK		
а.	Noble Gas Monitor		alarm clear		alarm clear			
b.	Condenser Off-Gas RMS	(1)	alarm		alarm clear			
с.	S/G B/D RMS	(1)	alarm		alarm			
d.	Main Vent Gaseous RMS (2-RI-5415)		alarm clear		alarm			

(1) With MSIVs shut and S/G Blowdown isolated, request Chemistry to sample S/Gs for activity.

> STATUS CHECK NUMBER

> > 2

4

3

COMPLETE AT TIME

EOP-5 Rev. 1/Unit 1 Page 1 of 41

1

CALVERT CLIFFS NUCLEAR POWER PLANT

EOP-5 LOSS O. COOLANT ACCIDENT

REVISION 1

	SIGNATURE	DATE
PREPARED BY;	James V. Strooms	1 12/18/37
VERIFIED BY;	Intartes	P , 12-18-87
POSRC;	MEETING # 88.7) / 2-10-88
APPROVED BY;	JA Fimons-	12-10-88

Manager-Nuclear Operations or General Supervisor-Operations if POSRC review is not required

×.

EOP-5 Rev. 1/Unit 1 Page 2 of 41

LIST OF EFFECTIVE PAGES

EOP-5 Rev. 1/Unit 1 Page 3 of 41

LOSS OF COOLANT ACCIDENT

I. PRECAUTIONS

- A. Do not adopt manual operation of automatically controlled systems unless a malfunction is apparent or automatic system operation will not support the maintenance of a safety function.
- B. Systems shifted to manual operation must be monitored frequently to ensure correct operation.
- C. At least two independent indications should be used, when available, to evaluate and corroborate a specific plant condition since an incident could induce inconsistencies between instruments.
- D. High energy line break may cause erratic instrumentation response depending on the magnitude and location of the break.
- E. ESFAS actuated safety features should only be overridden to support a threatened safety function or when directed by the procedure.
- F. During a LOCA, pressurizer level may not provide an accurate indication of RCS inventory due to the formation of voids. Pressurize level then combined with RCS subcooling will indicate the core is covered.
- G. For small breaks in the RCS where the S/Gs are important for heat removal, one S/G must be used for this purpose even if primary to secondary leaks are detected.
- H. Minimize the number of cycles of pressurizer auxiliary spray when the temperature differential is greater than 400°F.
- I. In Natural Circulation, increased loop transport time causes a 5 to 10 minute delay in temperature responses to a plant change. Pressurizer level and pressure responses, if available, typically provide better indication of RCS response during this period.
- J. S/G pressure, pressurizer pressure, and containment temperature affect the level indication for the S/Gs and Pressurizer. Attachments (8) and (9) contain the corrected S/G and pressurizer levels for various S/G pressures, pressurizer pressures, and containment temperatures.
- K. If a pump or component fails, the cause of the failure should be determined pr >r to restarting or starting a standby pump or component to prevent a common failure.

EOP-5 Rev. 1/Unit 1 Page 4 of 41

II. ENTRY CONDITIONS

The presence of one or more of the following conditions indicates that a Loss Of Coolant Accident may have occurred:

- A. Unexplained decreasing pressurizer level.
- B. Unexplained decreasing pros- " pressure.
- C. Loss of RCS subcooled margir.
- D. High containment radiation alarm.
- E. Increase in containment sump level.
- F. Increase in containment sump alarm frequency.

DI	. RECOVERY ACTIONS	EOP-5 Rev. 1/Unit 1 Page 5 of 41 <u>ALTERNATE ACTIONS</u>			
Α.	VERIFY POST-TRIP IMMEDIATE ACTIONS COMPLETED.				
в.	COMMENCE INTERMEDIATE SAFETY FUNCTION STATUS CHECK.				
c.	DETERMINE APPROPRIATE EMERGENCY RESPONSE ACTIONS PER THE ERPIP.				
Ð.	MONITOR RCS DEPRESSURIZATION.				
	 IF rapid depressurization to 1725 PSIA, THEN verify SIAS actuation AND the following actions: a. All available Charging Events supplied 	 1.1 <u>IF</u> RCS pressure is greater than 1725 PSIA <u>AND</u> SIAS <u>NOT</u> actuated, <u>THEN</u> attempt leak isolation: a. Shut Letdown Isolation Valves: 			
	b. 11 and 13 HPSI Pumps running.	1-CVC-515-CV 1-CVC-516-CV			
	c. Main and Aux HPSI Header Valves open:	b. Shut RCS Sample Isolation Valve, 1-PS-5464-CV.			
	1-SI-616-MOV 1-SI-626-MOV 1-SI-626-MOV 1-SI-636-MOV 1-SI-637-MOV 1-SI-646-MOV 1-SI-647-MOV	c. Shut Reactor Vessel Vent Valves: 1-RC-103-SV 1-RC-104-SV			
		d. Shut Pressurizer Vent Valves: 1-RC-105-SV 1-RC-106-SV			

EOP-5 Rev. 1/Unit 1 Page 6 of 41

RECOVERY ACTIONS

- ALTERNATE ACTIONS
 - e. <u>IF</u> PORV leakage is indicated by:
 - High Quench Tank parameters.
 - (2) High PORV discharge piping temperature, computer points T107 and T108.

CCOM CR 88-1175

- (3) Abnormal Acoustic
 - Monitor indication.

THEN shut PORV Block Valves:

- 1-RC-403-MOV 1-RC-405-MOV
- f. <u>IF</u> leak is isolated <u>AND</u> SIAS <u>NOT</u> actuated, <u>THEN</u> implement Reactor Trip (EOP-1) <u>AND</u> complete administrative post-trip actions step AC, page 35.
- 1.2 <u>IF</u> leak is <u>NOT</u> isolated <u>AND</u> RCS pressure still greater than 1725 PSIA, THEN block SIAS:
 - a. Open Main and Aux HPSI Header Valves:

1-SI-616-MOV 1-SI-617-MOV 1-SI-626-MOV 1-SI-627-MOV 1-SI-636-MOV 1-SI-637-MOV 1-SI-646-MOV 1-SI-647-MOV

- b. Start 11 and 13 HPSI Pumps.
- c. WHEN "PRSR PRESS BLOCK A(B) PERMITTED" alarm(s) received, THEN block SIAS A(B).

EOP-5 Rev. 1/Unit 1 Page 7 of 41

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

E. IMPLEMENT RCP TRIP STRATEGY:

- <u>IF</u> RCS pressure decreases to 1725 PSIA, <u>THEN</u> trip 11A and 12B RCPs OR trip 11B and 12A RCPs.
- <u>IF</u> positive LOCA indications exist:
 - a. RCS subcooling less than 30°F.
 - b. Steady S/G pressure.
 - c. S/G Blowdown RMS alarms clear <u>OR</u> Main Vent Gaseous RMS (1-RI-5415) alarm clear.

AND RCS pressure decreases to less than 1300 PSIA, THEN trip all RCPs.

3. <u>IF</u> RCS temperature and pressure are less than the minimum pump operating limits per the RCP curve on Attachment (1), THEN trip all RCPs.

 IF CIS has actuated, THEN trip all RCPs.

EOP-5				
Rev.	1/	Uni	t	1
Page	8	of	41	



EOP-5 Rev. 1/Unit 1 Page 9 of 41 ALTERNATE ACTIONS RECOVERY ACTIONS II. IF RCS PRESSURE DECREASES TO G. LESS THAN 225 PSIA, THEN VERIFY SAFETY INJECTION SYSTEM OPERATION: IF 11 or 13 HPSI Pump fails, 1.1 Verify HPSI and LPSI flow to 1. THEN start 12 HPSI Pump AND RCS per Attachments (12) and align to appropriate header. (13). 2. Verify SI Tanks discharging to RCS cold legs. Monitor containment pressure 3. per step K, page 13. Η. RESTORE NORMAL S/G WATER LEVEL: - CAUTION -Severe water hammer may occur if Main Feed Ring is allowed to drain then subsequently refilled. IF Main Feed available, 1.1 IF Main Feed NOT available, 1. THEN establish a shutdown THEN establish AFW as follows: feed system lineup: - CAUTION -One operating S/G Feed a. D/G supplying power to 13 AFW Pump. Pump flow limit is 300 GPM; One operating Condensate otherwise, flow limit is 575 GPM. b. Booster Pump. a. Start an AFW Pump. C. One operating Condensate b. Adjust AFW Flow Control Pump. Valves to maintain S/G Both Heater Drain Pumps levels between (-)170 and d. secured. (+)30 inches.

EOP-5 Rev. 1/Unit 1 Page 10 of 41

RECOVERY ACTIONS

II.

2.

WHEN manual control of feed flow rate desired <u>OR</u> S/G levels between (-)24 and

(+)30 inches, THEN perform the following:

- Depress Feed Regulating Bypass Valve Reset Buttons.
- Adjust Feed Regulating Bypass Valves to raise S/G levels to approximately 0 inches.
- WHEN S/G levels are 0 inches, THEN shift Feed Regulating Bypass Controllers to AUTO.
- I. <u>IF</u> RCS PRESSURE GREATER THAN 225 PSIA, <u>THEN</u> ESTABLISH COOLDOWN IN AT LEAST ONE LOOP:
 - WHEN "SGIS A(B) BLOCK PERMITTED" alarm(s) received, THEN block SGIS A(B).
 - Open Turbine Bypass or Atmospheric Dump Valves as necessary to maximize RCS cooldown, while maintaining cooldown rate less than 100°F/h.

ALTERNATE ACTIONS

EOP-5 Rev. 1/Unit 1 Page 11 of 41

ALTERNATE ACTIONS

. RECOVERY ACTIONS

3. <u>IF</u> RCPs are secured, <u>THEN</u> verify Natural Circulation:

- NOTE -

Wide range Thot may be obtained from Subcooled Margin Monitor per Attachment (10).

- a. Thot minus Tcold between 10 and 50°F.
- b. Tcold constant or decreasing.
- Thot constant or decreasing.
- d. CET temperatures consistent with Thot.
- e. Steaming rate affects primary temperature.
- Monitor for Core and RCS voiding:
 - CAUTION -

Potential for void formation increases rapidly when pressure decreases below 1500 PSIA.

- Letdown flow greater than charging flow.
- Bapid unexplained increase in pressurizer level during an RCS pressure reduction.
- Loss of subcooled margin as determined using CET temperatures.
- d. "REACTOR VESSEL WATER LEVEL LOW" alarm.

III.

EOP-5 Rev. 1/Unit 1 Page 12 of 41

LII. RECOVERY ACTIONS

- 5. <u>IF</u> voiding inhibits heat removal, <u>THEN</u> reduce or eliminate voided area:
 - a. Shut Letdown Isolation Valve, 1-CVC-515-CV.

- CAUTION -

The potential exists for pressurized thermal shock from an excessive cooldown rate followed by a repressurization.

- b. Pressurize the RCS to maintain subcooling as near 140°F as practical.
 - CAUTION -

If voids exist in the S/G Tubes, a rapid RCS pressure reduction will occur when the voids collapse.

> c. <u>IF</u> voiding occurs in the S/G tubes (saturation pressure of S/G greater than saturation pressure of RCS), <u>THEN</u> cool the S/G by raising any of the following:

- (1) Steaming rate.
- (2) Feed rate.
- (3) S/G Blowdown rate.

AND maintaining less than 100°F/h cooldown rate.

6. Continue cooldown to 300°F.

5.b.1 <u>IF</u> pressurizing the RCS does <u>NOT</u> restore heat removal <u>THEN</u> operate Reactor Vessel Vent Valves per OI-1G.

ALTERNATE ACTIONS

1 11.	RECOVERY ACTIONS	EOP-5 Rev. 1/Jnit 1 Page 13 of 41 ALTERNATE ACTIONS		
J. <u>IF</u> 127 <u>THP</u> PEF	RCS PRESSURE LESS THAN 70 PSIA, EN VERIFY HPSI FLOW TO RCS R ATTACHMENT (12).			
		J.1 <u>IF</u> 11 or 13 HPSI Pump fails, <u>THEN</u> start 12 HPSI Pump <u>AND</u> align to appropriate header.		
K. MOI	NITOR CONTAINMENT PRESSURE:			
1.	IF CSAS NOT actuated, THEN start all available Containment Air Coolers in HIGH with maximum SRW flow.			
2.	IF containment pressure increases to 2.0 PSIG AND still increasing, THEN start 11 and 12 Containment Spray Pumps and open both Cntmt Spray Header CVs.			
	<u>11</u> <u>12</u>			
12.0	1-SI-4150-CV 1-SI-4151-CV			
3.	IF contaiment pressure increases to 2.8 PSIG, THEN verify ESFAS actuation:			
	a. SIAS.			
	b. CIS AND trip all RCPs.			
4.	Verify SRW Pump Room Ventilation in service, per OI-15.			
5.	IF containment pressure increases to 4.25 PSIG, THEN verify CSAS actuation AND spray flow approximately 1350 GPM.			
1.1		a second s		

	. RECOVERY ACTIONS	EOP-5 Rev. 1/Unit 1 Page 14 of 41 ALTERNATE ACTIONS
L.	COMMENCE ESFAS VERIFICATION CHECKLISTS:	
м.	 SIAS Attachment (2). CSAS Attachment (3). CIS Attachment (4). MAINTAIN ECS SUBCOOLING	
	<pre>AND PRESSURIZER LEVEL: 1. Maintain subcooling between 30 and 140°F using CET temperatures. - <u>CAUTION</u> - The potential exists for</pre>	
	<pre>pressurized thermal shock from an excessive cooldown rate followed by a repressurization. 2. Raise subcooling by any of the following: - <u>NOTE</u> -</pre>	
	Pressurizer Backup Heater Banks 11 and 13 trip on U/V and SIAS. a. Operate Pressurizer Heater(s).	
	b. Operate Turbine Bypass or Atmospheric Dump Valves to maximize RCS cooldown, while maintaining cooldown rate less than 100°F/h.	2.b.1 <u>IF</u> unable to obtain desired cooldown rate with Turbine Bypass and Atmospheric Dump Valves, <u>THEN</u> use steam driven AFW Pump(s) to increase cooldown rate
0	c. Raise HPSI flow to RCS.	COOLGONII ZACCI

EOP-5 Rev. 1/Unit 1 Page 15 of 41

RECOVERY ACTIONS

- Lower subcooling by any of the following:
 - a. De-energize Pressurizer Heater(s).
 - b. Lower RCS cooldown rate.
 - c. <u>IF</u> the following conditions can be maintained:
 - (1) At least 30°F subcooling.
 - (2) Pressurizer level greater than 155 inches.
 - (3) At least one S/G available for heat removal.
 - (4) RVLMS indicates that the Core is covered.

THEN throttle HPSI flow or operate Charging Pumps as necessary to maintain subcooling between 30 and 140°F.

ALTERNATE ACTIONS

- 3.1 <u>IF</u> unable to lower subcooling, <u>THEN</u> initiate Auxiliary Spray:
 - Place Instrument Air CIS Override Switch, 1-HS-2080A, in OVERRIDE.
 - b. Open Cntmt Instrument Air Isolation MOV, 1-IA-2080-MOV.
 - c. Record temperature differential between Pressurizer and Regenerative Heat Exchanger Outlet.
 - Open Auxiliary Spray Valve, 1-CVC-517-CV.
 - e. Shut Loop Charging Valves:
 - 1-CVC-518-CV 1-CVC-519-CV

- NOTE -

1-HS-2085 located on West wall of 27 ft Switchgear Room; Key #85 in Control Room Key Locker.

- f. Open Cntmt Instrument Air Supply CV, 1-IA-2085-CV, by momentarily placing 1-HS-2085 in OPEN.
- g. Shift 1-HIC-100 to MANUAL and shut Pressurizer Spray Valves:

1-RC-100E-CV 1-RC-100F-CV

h. Maintain pressurizer cooldown rate less than 200°F/h.

EOP-5 Rev. 1/Unit 1 Page 16 of 41

RECOVERY ACTIONS

III.

ALTERNATE ACTIONS

3

- NOTE -

A break on top of Pressurizer will result in an uncontrollable increase in pressurizer level until Pressurizer is solid.

 Maintain pressurizer level between 101 and 160 inches.

- CAUTION -

Do not throttle HPSI flow unless 30°F subcooling can be maintained.

- a. <u>IF</u> the following conditions can be maintained:
 - (1) At least 30°F subcooling.
 - (2) Pressurizer level greater than 101 inches.
 - (3) At least one S/G available for heat removal.
 - (4) RVLMS indicates that the Core is covered.

THEN throttle HPSI flow or operate Charging Pumps as necessary to maintain pressurizer level between 101 and 160 inches.

EOP-5 Rev. 1/Unit 1 Page 17 of 41

N. WHEN RCS B THEN SHIFT SUPPLY TO LOWER BORI	I. <u>RECOVERY ACTIONS</u> <u>WHEN RCS BORATION COMPLETE,</u> <u>THEN SHIFT CHARGING PUMP SUCTION</u> SUPPLY TO MAKEUP SUPPLY WITH A LOWER BORIC ACID CONCENTRATION.			ALTERNATE ACTIONS			
1. IF SIA THEN P a. Op Sui 1-0 b. Shi 1-0 c. Pl in d. En AM e. En st	S actuated, erform the following: en RWT To Charging Pump ction Valve, CVC-504-MOV. ut VCT Outlet Valve, CVC-501-MOV. ace Boric Acid Pumps FULL-TO-LOCK. sure Charging Pump PS steady. sure BAST levels eady.	1.1	IF THE suc a. b. c. d. e. OR suc a. b. c. d.	SIAS NOT actuated, Ineup Charging Pump tion to VCT: Determine blend required to maintain shutdown boron concentration per NEOG-7. Open VCT Outlet Valve, 1-CVC-501-MOV. Secure Boric Acid Pump(s). Shut Boric Acid Direct Makeup Valve, 1-CVC-514-MOV. Shut BAST Gravity Feed Valves: 1-CVC-508-MOV 1-CVC-509-MOV lineup Charging Pump tion to RWT: Open RWT To Charging Pump Suction Valve, 1-CVC-504-MOV. Shut VCT Outlet Valve, 1-CVC-501-MOV. Shut Boric Acid Direct Makeup Valve, 1-CVC-514-MOV. Shut Boric Acid Direct Makeup Valve, 1-CVC-514-MOV. Secure Boric Acid Pump(s).			

EOP-5 Rev. 1/Unit 1 Page 18 of 41

I. RECOVERY ACTIONS

ALTERNATE ACTIONS

0. IF RWT LEVEL DECREASES TO BETWEEN 0.5 AND 1.0 FT <u>OR</u> "ACTUATION SYS RAS TRIPPED" ALARM RECEIVED, THEN VERIFY RAS ACTUATION:

> Place SI Pump Recirc Lockout Switches in ON.

 Commence RAS Verification Checklist, Attachment (6).

3. Shut RWT Outlet Valves:

1-SI-4142-MOV 1-SI-4143-MOV

- <u>IF</u> HPSI flow greater than 1000 GPM with two HPSI Pumps operating, <u>THEN</u> equally throttle HPSI flow to 1000 GPM.
- 5. <u>IF</u> HPSI flow greater than 600 GPM with one HPSI Pump operating, <u>THEN</u> equally throttle HPSI flow to 600 GPM.

- CAUTION -

To prevent pump damage, minimum flow per operating HPSI Fump is 30 GPM.

- <u>IF</u> HPSI Pump cavitation occurs in recirculation mode, <u>THEN</u> throttle HPSI flow per Attachment (12).
- 6.1 <u>IF</u> Attachment (12) does <u>NOT</u> allow throttling HPSI flow, <u>THEN</u> align Containment Spray Pump(s) to HPSI Pump suction:
 - a. <u>IF</u> 11(12) HPSI Pump cavitating, <u>THEN</u> open 11 SDC HX To HPSI Suction Valve, 1-SI-663-MOV <u>AND</u> start 11 Containment Spray Pump.

EOP-5 Rev. 1/Unit 1 Page 19 of 41

III. RECOVERY ACTIONS

- 7. Commence ECCS Pump Room cooling:
 - Open ECCS Pump Room Air Cooler Saltwater Valves:

1-SW-5170-CV 1-SW-5171-CV 1-SW-5173-CV

- b. Start 11 and 12 ECCS Pump Room Cooling Fans.
- Adjust saltwater flow to maintain SRW and component cooling temperatures.
- <u>IF</u> Charging Pumps are aligned with suction from RWT <u>AND</u> HPSI Pumps maintaining RCS inventory, <u>THEN</u> place Charging Pumps in PULL-TO-LOCK.
- P. RESTORE CONTAINMENT ENVIRONMENT:
 - Direct Chemistry to place Hydroger. Monitors in service.
 - <u>IF</u> hydrogen concentration increases to 1%, <u>THEN</u> start Hydrogen Recombiners per OI-41A.
 - Maintain Jodine Filter Fans running.

ALTERNATE ACTIONS

 b. <u>IF</u> 13 HPSI Pump cavitating, <u>THEN</u> open 12 SDC HX To HPSI Suction Valve, 1-SI-662-MOV <u>AND</u> start 12 Containment Spray Pump.

EOP-5 Rev. 1/Unit 1 Page 20 of 41

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

- WHEN containment pressure less than 4.0 PSIG, THEN perform the following:
 - a. Reset CSAS signal.
 - b. Secure one Containment Spray Pump.
 - c. Verify all Containment Air Coolers operating to maintain containment temperature less than 120°F.
 - Restore equipment per CSAS Verification Checklist, Attachment (3), to desired condition.
- WHEN containment pressure less than 2.8 PSIG, THEN perform the following:
 - a. Block pressurizer pressure signals and reset SIAS signal.
 - b. Reset CIS signal.
 - Secure remaining Containment Spray Pump.
 - Restore equipment per SIAS and CIS Verification Checklists, Attachments (2) and (4), to desired condition.

EOP-5 Rev. 1/Unit 1 Page 21 of 41

ALTERNATE ACTIONS LII. RECOVERY ACTIONS EVALUATE NEED FOR HPSI b. TERMINATION: 1. WHEN HPSI termination criteria met: a. At least 30°F subcooling. b. Pressurizer level greater than 155 inches and stable. c. At least one S/G available for heat removal. d. RVLMS indicates that the Core is covered. THEN HPSI Pump(s) may be secured. 2. IF HPSI termination criteria can NOT be maintained, THEN start 11 and 13 HPSI Pumps. R. RESTORE SERVICE WATER TO TURBINE BUILDING: 1. Verify 21 Plant Air Compressor operating. 2. Shut Plant Air To Plant Air Header Valve, 1-PA-2059-CV. 3. Open Plant Air To Instrument Air Cross Connect Valve, 1-PA-2061-CV. 4. Open SRW Turbine Building Header Isolation Valves: 1-SRW-1600-CV 1-SRW-1637-CV 1-SRW-1638-CV 1-SRW-1639-CV

EOP-5 Rev. 1/Unit 1 Page 22 of 41

RES	TORE INSTRUMENT AIR MPRESSORS TO SERVICE:	
1.	IF high temperature alarm exists on the Instrument Air Compressors, THEN open the service water isolation valves by placing their handswitches in OPEN until temperature alarm clears.	
	11 OF 12	같은 이 것은 이를 가장 같아. 밝혔다.
2.	Start at least one Instrument Air Compressor.	
RE	STORE INSTRUMENT AIR TO NTAINMENT:	
1.	Open Cntmt Instrument Air Isolation MOV, 1-IA-2080-MOV.	
	- NOTE -	
1- 27 in	HS-2085 located on West wall of ft Switchgear Room; Key #85 Control Room Key Locker.	
2.	Open Cntmt Instrument Air Supply CV, 1-IA-2085-CV, by momentarily placing 1-HS-2085 in OPEN.	
RE	STORE LETDOWN FLOW:	
1.	Verify charging flow path through Loop Charging Valves or Auxiliary Spray Valve.	

EOP-5 Rev. 1/Unit 1 Page 23 of 41

LII. RECOVERY ACTIONS

- ALTERNATE ACTIONS
- Verify at least one Charging Pump operating.
- Shift Letdown Control Valve Controller, 1-HIC-110, to MANUAL.
- Adjust controller to shut Letdown Control Valves.
- 5. Open Letdown Isolation Valves:

1-CVC-515-CV 1-CVC-516-CV

- CAUTION -

The setpoint of 1-PIC-201 must be above the saturation pressure for the letdown outlet temperature of the Regenerative Heat Exchanger.

- Adjust the setpoint on 1-PIC-201 and adjust 1-HIC-110 to maintain desired pressurizer level.
- V. <u>IF</u> FORCED CIRCULATION DESIRED <u>AND</u> PUMP RESTART CRITERIA MET, THEN START RCPs:
 - <u>IF</u> RCPs exposed to excessive moisture, <u>THEN</u> consider meggering RCP motor.

- CAUTION -

Uncontrolled restoration of cooling to hot RCP seals may cause degradation of the metallic seating surfaces by thermal shock.

EOP-5 Rev. 1/Unit 1 Page 24 of 41

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

- 2. <u>IF</u> Component Cooling is isolated to RCP seals, <u>THEN</u> reduce RCP lower seal temperature below 280°F prior to initiating full cooling flow to the RCPs:
 - a. Shut Component Cooling Supply Containment Manual Isolation Valve, 1-CC-284, located in 5 ft East Fenetration Room.
 - b. Verify CIS reset.
 - c. Open Component Cooling Containment Isolation Valves:

1-CC-3832-CV 1-CC-3833-CV

- d. Slowly open 1-CC-284 to throttle component cooling flow until lower seal temperatures are less than 280°F.
- e. <u>WHEN</u> lower seal temperatures are less than 280°F, THEN fully open 1-CC-284.
- <u>IF</u> an RCP lower seal temperature exceeded 280°F, <u>THEN</u> an engineering evaluation is required prior to restarting that RCP.
- Raise pressurizer level to at least 155 inches.
- 5. Verify RCP restart criteria:
 - a. RCS subcooling greater than 30°F.
 - b. At least one S/G available for heat removal.

EOP-5 Rev. 1/Unit 1 Page 25 of 41

RECOVERY ACTIONS

II.

ALTERNATE ACTIONS

- c. Pressurizer level greater than 155 inches and stable.
- d. Tcold less than 525°F.
- e. RCS temperature and pressure greater than the minimum operating limits per the RCP Curve on Attachment (1).

- NOTE -

Starting an RCP may cause a pressurizer level transient.

- WHEN RCP restart criteria are met, <u>THEN</u> start one RCP in a loop with an operable S/G:
 - Verify "COMPT CLG FLOW LO" alarm clear.
 - b. Start Oil Lift Pump.
 - c. Insert RCP sync stick.
 - d. Start one RCF.
 - e. Monitor RCP running current:

Tavg Current

525 to 572°F 238 to 210 AMPS and steady

210 to 525°F 264 to 238 AMPS and steady

- 7. IF pressurizer level decreases, THEN start Charging or HPSI Pump(s) as necessary to restore AND maintain level greater than 155 inches.
- Monitor RCP seal parameters following pump restart.

EOP-5 Rev. 1/Unit 1 Page 26 of 41

II. RECOVERY ACTIONS

ALTERNATE ACTIONS

- Allow backflow to equalize temperatures in opposite loop.
- Start second RCP in opposite loc step V.6 and V.8, par
- 1. Ser liary Spray:

Loop Charging

-40-518-CV ./C-519-CV

Snut Auxiliary Spray Valve, 1-CVC-517-CV.

c. Shift Pressurizer Spray Controller, 1-HIC-100, to AUTO.

WHEN RCS TEMPERATURE IS LESS THAN 330°F AND RCS PRESSURE IS LESS THAN 380 PSIA, THEN ESTABLISH MPT PROTECTION:

- CAUTION -

PORVs must be in MPT ENABLE before Tcold indication on T115 or T125 is less than 325°F.

- Manually reset 1-PY-103 and 1-PY-103-1 bistables by prensing the reset buttons located on 1C25A behind 1C06.
- Place both PORVs in the MPT ENABLE mode.
- Place both PORV Override Switches in OVERRIDE CLOSED position.

EOP-5 Rev. 1/Unit 1 Page 27 of 41

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

X. WHEN RCS TEMPERATURE IS LESS THAN 300°F AND RCS PRESSURE IS LESS THAN 300 PSIA, THEN PERFORM THE FOLLOWING:

- NOTE -

Cavity Cooling and CEDM Cooling aid in cooling Reactor Vessel Head if a void exists.

- <u>IF</u> Cavity Cooling and CEDM Cooling Fans available, <u>THEN</u> maintain Cavity Cooling and CEDM Cooling Fans running.
- 2. Shut SI Tank Outlet Valves:

1-SI-614-MOV 1-SI-624-MOV 1-SI-634-MOV 1-SI-644-MOV

 <u>IF</u> AFW <u>NOT</u> being used to feed S/Gs, <u>THEN</u> perform the following:

> a. Shut the motor and steam driven train AFW Block Valves:

> > 11 S/G

12 S/G

1-AFW-4520-CV	1-AFW-4530-CV
1-AFW-4521-CV	1-AFW-4531-CV
1-AFW-4522-CV	1-AFW-4532-CV
1-AFW-4523-CV	1-AFW-4533-CV

- b. Place 13 AFW Pump in PULL-TO-LOCK.
- c. Shut AFW Steam Supply Valves:

11 S/G 12 S/G

1-MS-4070-CV 1-MS-4071-CV

I. <u>RECOVERY ACTIONS</u> <u>IF CET SUBCOOLING LESS THAN 30°F,</u>			EOP-5 Rev. 1/Unit 1 Page 28 of 41 ALTERNATE ACTIONS		
THEN CO WITHIN ACTUATI	MMENCE CORE FLUSH 24 HOURS AFTER THE SIAS ON:				
 Lin Inj a. b. c. d. e. f. g. h. 	e up for Pressurizer ection: Open SI Discharge To Charging Header Core Flush Valve, 1-CVC-269-MOV. Shut Loop Charging Valves: 1-CVC-518-CV 1-CVC-519-CV Shut Pressurizer Spray Valves: 1-RC-100E-CV 1-RC-100F-CV Open HPSI Aux Header Isolation Valve, 1-SI-656-MOV. Open Auxiliary Spray Valve, 1-CVC-517-CV. Shut HPSI Main Header Cross Connect Valve, 1-SI-653-MOV. Shut Aux HPSI Header Valves: 1-SI-617-MOV 1-SI-627-MOV 1-SI-647-MOV 1-SI-647-MOV Start 11 or 12 HPSI Pump and maintain a minimum flow of 40 GPM.	1.1	IF Press NOT avai followin met: a. RCS 270 b. RCS cont less THEN lin Injection a. Plac Pump Swit b. Open Disc 1-Si 1-Si 1-Si d. Shut 1-Si 1-Si 1-Si 1-Si 1-Si 1-Si 1-Si	Aurizer Injection Lable AND the ng conditions are pressure less than PSIA. pressure minus tainment pressure than 160 PSID. The up for Hot Leg on: Ce 11 or 12 LPSI p RAS Override tch in OVERRIDE. A Cntmt Sump charge Valves: I-4144-MOV I-4145-MOV I -4145-MOV I Shutdown Cooling t Exchanger Recirc lation Valve, I-399-MOV. t LPSI Header Valves: I-615-MOV I-625-MOV I-635-MOV I-645-MOV	

EOP-5 Rev. 1/Unit 1 Page 29 of 41

III. RECOVERY ACTIONS

i. <u>IF</u> minimum flow can <u>NOT</u> be determined, <u>THEN</u> initiate Hot Leg Injection.

 WHEN Pressurizer Injection OR Hot Leg Injection in progress, balance flow by throttling Main HPSI Header Valves:

> 1-SI-616-MOV 1-SI-626-MOV 1-SI-636-MOV 1-SI-646-MOV

THEN maintain required flow to remove decay heat per Attachment (12).

 Ensure CET temperatures remain constant or decreasing.

ALTERNATE ACTIONS

- e. Verify RCS pressure less than 270 PSIA.
- f. Open Shutdown Cooling Suction Header Isolation Valves:

1-SI-651-MOV 1-SI-652-MOV

g. Start selected LPSI Pump.

h. Maintain a minimum flow of 40 GPM.

II. RECOVERY ACTIONS		EOP-5 Rev. 1/Unit 1 Page 30 of 41 ALTERNATE ACTIONS			
z.	WHE 300 THE	N CE	T TEMPERATURES LESS THAN ND RADIATION LEVELS PERMIT, MMENCE SHUTDOWN COOLING.		
	1.	IF con a. b.	all the following ditions exist: Pressurizer level less than 101 inches. RCS subcooling less than	1.1	IF pressurizer level greater than 101 inches AND RCS subcooling greater than 30°F, THEN initiate Shutdown Cooling per 0I-3. Operate HPSI and Charging
		c.	30°F. RCS pressure minus containme t pressure less than 160 PSID.		Fumps as necessary to maintain pressurizer level and pressure.
		THE Coc	N commence Shutdown oling as follows: Shut 11 Containment Spray Pump Discharge Valve,		
		b.	1-SI-314. Shut 12 Containment Spray Pump Discharge Valve, 2-SI-324.		
		с.	Shut 11 Shutdown Cooling Heat Exchanger Outlet To Spray Header Valve, 1-SI-319.		
		d.	Shut 12 Shurdown Cooling Heat Exchanger Outlet To Spray Header Valve, 1-SI-329.		
		е.	Open 11 Shutdown Cooling Heat Exchanger Inlet Cross Connect Valve, 1-SI-452.		
		f.	Open 11 Shutdown Cooling Heat Exchanger Outlet To RCS Valve, 1-SI-456.		
				1	

EOP-5 Rev. 1/Unit 1 Page 31 of 41

LII. RECOVERY ACTIONS

- g. Open 12 Shutdown Cooling Heat Exchanger Inlet Cross Connect Valve, 1-SI-453.
- h. Open 12 Shutdown Cooling Heat Exchanger Outlet to RCS Valve, 1-SI-457.
- i. Place second Component Cooling Heat Exchanger in service by opening appropriate Component Cooling Heat Exchanger Outlet Valve:

1-CC-3824-CV 1-CC-3826-CV

- Start second Component Cooling Pump.
- k. Open 11 Shutdown Cooling Heat Exchanger Component Cooling Outlet Valve, 1-CC-3828-CV.
- Open 12 Shutdown Cooling Heat Exchanger Component Cooling Outlet Valve, 1-CC-3830-CV.
- m. Open Shutdown Cooling Heat Exchanger Inlet Isolation, 1-SI-658-MOV.
- n. <u>IF</u> Hot Leg Injection being used for core flush, <u>THEN</u> shut 12A LPSI Header Valve, 1-SI-635-MOV.
- o. Open LPSI Header Valves:

1-SI-615-MOV 1-SI-625-MOV 1-SI-645-MOV

- p. Place keyswitch for 1-SI-306-CV in AUTO.
- q. Shift 1-FIC-306 to MANUAL with 5% open signal.

ALTERNATE ACTIONS

1.n.1 <u>IF</u> Hot Leg Injection <u>NOT</u> being us;d for core flush, <u>THEN</u> open 12A LPSI Header Valve, 1-SI-635-MOV.

EOP-5 Rev. 1/Unit 1 Page 32 of 41

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

r. Open Cntmt Sump Discharge Valve:

> 1-SI-4144-MOV 1-SI-4145-MOV

s. Shut SI Pump Mini Flow Isolations:

> 1-SI-659-MOV 1-SI-660-MOV

t. Ensure level indication exists on wide range containment level indicator 1-LI-4146.

- CAUTION -

The possibility of cavitation increases when taking suction from containment sump.

> u. <u>IF</u> LPSI Pump <u>NOT</u> operating, <u>THEN</u> clear RAS from one operable LPSI Pump by placing LPSI Pump RAS Override Switch in OVERRIDE <u>AND</u> start selected pump.

> > - CAUTION -

Cooldown limit changes from 100°F/h to 20°F/h at RCS temperature of 250°F.

- v. Adjust the rignal on 1-FIC-306 to raise flow to 3000 GPM, while maintaining cooldown rate within limits.
- W. Place keyswitch for 1-SI-657-CV in AUTO.

EOP-5 Rev. 1/Unit 1 Page 33 of 41

RECOVERY ACTIONS

III.

ALTERNATE ACTIONS

- CAUTION -

Do not exceed 12°F/m heatup rate or greater than 5000 GPM through one heat exchanger.

- x. Adjust Shutdown Cooling Temperature Control Valve, 1-SI-657-CV, to obtain 12°F/m heatup rate at Shutdown Cooling Heat Exchanger Outlet (1-TI-303X and 1-TI-303Y).
- y. <u>IF</u> desired RCS cooldown rate can <u>NOT</u> be maintained with one LPSI Pump, <u>THEN</u> start second LPSI Pump <u>AND</u> adjust 1-FIC-306 to 6000 GPM.
- z. Adjust Shutdown Cooling Temperature Control Valve, 1-SI-657-CV, to obtain desired cooldowr rate.
- AA. WHEN CET TEMPERATURES LESS THAN 200°F, THEN SECURE CORE FLUSH FLOWPATH:
 - <u>IF</u> HPSI Pump(s) <u>NOT</u> required for RCS pressure or level control, <u>THEN</u> secure HPSI Pump(s).
 - Shut SI Discharge To Charging Header Core Flush Valve, 1-CVC-269-MOV.
 - 3. Open Loop Charging Valves:

1-CVC-518-CV 1-CVC-519-CV

 Shut Auxiliary Spray Valve, 1-CVC-517-CV.

EOP-5 Rev. 1/Unit 1 Page 34 of 41

III. RECOVERY ACTIONS

- Shut Shutdown Cooling Heat Exchanger Recirc Isolation, 1-SI-399-MOV.
- Oper 12A LPSI Header Valve, 1-SI-635-MOV.
- AB. COMPLETE ADMINISTRATIVE POST-TRIP ACTIONS AND IMPLEMENT APPROPRIATE OPERATING PROCEDURE.

ALTERNATE ACTIONS

EOP-5 Rev. 1/Unit 1 Page 35 of 41

AC. ADMINISTRATIVE POST-TRIP ACTIONS:

- NOTE -

The following actions may be accomplished whenever feasible. They may be done in any order.

- 1. Refer to ERPIP to determine appropriate emergency response actions.
 - Perform notifications per CCI-118.
 - ___ 3. Notify ESO of trip.
 - 4. Request RCS Boron and Iodine sample.
 - ____ 5. Perform shutdown margin calculation per NEOG 2 and 7.
 - 6. Complete transient log entries per CCI-301.
 - 7. Recall post-trip review (preferably within 30 minutes of trip).
 - 8. Perform post-trip review per CCI-111.
 - 9. Monitor turbine bearing temperatures.
 - 10. Continue Main Turbine shutdown per applicable step of OI-43A.

END OF SECTION III.
EOP-5 Rev. 1/Unit 1 Page 36 of 41

IV. SAFETY FUNCTION STATUS CHECK

- A. The STA (or person designated by STA) will perform the intermediate and final safety function checks respectively on entry and prior to exiting from this procedure.
- B. Perform intermediate safety function status check at 10 minute intervals until plant conditions stabilize.
- C. Immediately notify Shift Supervisor or Control Room Supervisor if any safety function criteria is not being satisfied.
- D. Review data and verify that safety function acceptance criteria are satisfied.
- E. When EOP completed, then perform final safety function check.

REACTIVITY	SAFETY FUNCTION ACCEPTANCE CRITERIA				
PARAMETERS	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK	
a. WRNI power	less than 3%		less than 1%		
b. SUR (DPM)	negative		0		
c. CEA status	all inserted		all inserted		
or					
Boration status:					
concentation	increasing		appropriate S/D margin		
BAST level	decreasing	********	N/'A	N/A	

EOP-5 Rev. 1/Unit 1 Page 37 of 41 SAFETY FUNCTION ACCEPTANCE CRITERIA RCS PRESSURE AND INVENTORY CRITERIA INTERMEDIATE CRITERIA FINAL PARAMETERS CHECK CHECK a. Pressurizer less than 1900 pressure (PSIA) less than 1900 b. Pressurizer level (inches) (1) 0 to 160 0 to 160 c. RCS subcooling (°F) greater than 0 to 140 30 (1) A break at top of Pressurizer will result in solid pressurizer indication. This is an acceptable value provided the other parameters still indicate a LCCA.

EOP-5 Rev. 1/Unit 1 Page 38 of 41

CORE AND RCS		SAFETY FUNCTION ACCEPTANCE CRITERIA				
PA	RAMETERS	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK	
а.	CET (°F)	less than 700		less than 500_		
ь.	Thot minus Tcold (°F) (2)	10 to 50		10 to 50 _		
c.	S/G pressure (PSIA)	150 to 900		N/A _	N/A	
d.	S/G level (inches)	(-)170 to (+)30		(-)24 to (+)30 _		
е.	Cold Leg Injection (GPM)	greater than 40		greater than 40 _		
f.	Condensate Storage Tank level (ft)	greater than 5		greater than 5		
g.	Core flush established within 24 hours (GPM)	greater than 40		greater than 40		

(2) Thot and Tcold indication may be influenced by charging or SI temperatures during a large break LOCA. If this occurs Thot minus Tcold may be deleted from the check provided CET temperatures meet their acceptance criteria.

EOP-5 Rev. 1/Unit 1 Page 39 of 41

-	-	and the second state of th	many i wanted and the second second second second in the	and the second s	the second se	statement service and
VITAL		TAL	SAFETY FUNCTION ACCEPTANCE CRITERIA			
	AU.	AIDIMAIES	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK
	а.	4KV vital buses 11 or 14	energized		energized	
	b.	Instrument Air pressure (PSIG)	greater than 88		gleater than 88	
	с.	Component Cooling (# pumps running)	1 or 2		1 or 2	
	d.	Saltwater (# pumps running)	1 or 2		1 or 2	
	e.	Service Water (# pumps running)	1 or 2		1 or 2	
)	f.	125V DC buses 11, 12, 21, 22	energized		energized	
	g.	120V AC vital buses 11, 12, 13, 14	energized		energized	

EOP-5 Rev. 1/Unit 1 Page 40 of 41

4

NORMAL CONTAINMENT ENVIRONMENT PARAMETERS		SAFETY FUR	NCTION ACCEPTAL	NCE CRITERIA	
		CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK
a	. Containment pressure (PSIG)	less than 50		less than 2.8	
b	. Containment temperature (°F)	less than 276		less than 220	
с	. Containment High Range Radiation Monitor	alarm clear		alarm clear	
d	. Hydrogen concentration	N/A	N/A	less than 2%	

EOP-5 Rev. 1/Unit 1 Page 41 of 41

24

NORMAL RADIATION		RMAL RADIATION	SAFETY F	UNCTION ACCEPTAN	CE CRITERIA	
	TO	CONTAINMENT	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK
	а.	Noble Gas Monitor	alarm clear		alarm clear	
	b.	Condenser Off-Gas RMS	alarm clear		alarm clear	
	c.	S/G B/D RMS	alarm clear		alarm clear	
	d.	Main Vent Gaseous RMS (1-RI-5415)	alarm clear	·	alarm clear	

STATUS CHECK NUMBER

3

4

COMPLETE AT TIME

EOP-5 Rev. 1/Unit 2 Page 1 of 41

CALVERT CLIFFS NUCLEAR POWER PLANT

EOP-5 LOSS OF COOLANT ACCIDENT

REVISION 1

	SIGNATURE	DATE
PREPARED BY;	That	, 12-18-87
VERIFIED BY;	James V. Srooms	112/18/87
POSRC;	MEETING # 38-7	1 2-10-88
APPROVED BY;	Manager-Nuclear Operations or I	/ 2-10-98 General Supervisor- not required

EOP-5 Rev. 1/Unit 2 Page 2 of 41

LIST OF EFFECTIVE PAGES

EOP-5 Rev. 1/Unit 2 Page 3 of 41

LOSS OF COOLANT ACCIDENT

I. PRECAUTIONS

-

- A. Do not adopt manual operation of automatically controlled systems unless a malfunction is apparent or automatic system operation will not support the maintenance of a safety function.
- B. Systems shifted to manual operation must be monitored frequently to ensure correct operation.
- C. At least two independent indications should be used, when available, to evaluate and corroborate a specific plant condition since an incident could induce inconsistencies between instruments.
- D. High energy line break may cause erratic instrumentation response depending on the magnitude and location of the break.
- E. ESFAS actuated safety features should only be overridden to support a threatened safety function or when directed by the procedure.
- F. During a LOCA, pressurizer level may not provide an accurate indication of RCS inventory due to the formation of voids. Pressurizer level when combined with RCS subcooling will indicate that the core is covered.
- G. For small breaks in the RCS where the S/Gs are important for heat removal, one S/G must be used for this purpose even if primary to secondary leaks are detected.
- H. Minimize the number of cycles of pressurizer auxiliary spray when the temperature differential is greater than 400°F.
- I. In Natural Circulation, increased loop transport time causes a 5 to 10 minute delay in temperature responses to a plant change. Pressurizer level and pressure responses, if available, typically provide better indication of RCS response during this period.
- J. S/G pressure, pressurizer pressure, and containment temperature affect the level indication for the S/Gs and Pressurizer. Attachments (8) and (9) contain the corrected S/G and pressurizer levels for various S/G pressures, pressurizer pressures, and containment temperatures.
- K. If a pump or component fails, the cause of the failure should be determined prior to restarting or starting a standby pump or component to prevent a common failure.

EOP-5 Rev. 1/Unit 2 Page 4 of 41

II. ENTRY CONDITIONS

The presence of one or more of the following conditions indicates that a Loss Of Coolant Accident may have occurred:

- A. Unexplained decreasing pressurizer level.
- B. Unexplained decreasing pressurizer pressure.
- C. Loss of RCS subcooled margin.
- D. High containment radiation alarm.
- E. Increase in containment sump level.
- F. Increase in containment sump alarm frequency.

I	. RECOVERY ACTIONS	EOP-5 Rev. 1/Unit 2 Page 5 of 41 ALTERNATE ACTIONS
Α.	VERIFY POST-TRIP IMMEDIATE ACTIONS COMPLETED.	
в.	COMMENCE INTERMEDIATE SAFETY FUNCTION STATUS CHECK.	
с.	DETERMINE APPROPRIATE EMERGENCY RESPONSE ACTIONS PER THE ERPIP.	
D.	MONITOR RCS DEPRESSURIZATION.	
	 <u>IF</u> rapid depressurization to 1725 PSIA, <u>THEN</u> verify SIAS actuation <u>AND</u> the following actions: 	1.1 <u>IF</u> RCS pressure is greater than 1725 PSIA <u>AND</u> SIAS <u>NOT</u> actuated, <u>THEN</u> attempt leak isolation:
	a. All available Charging Pumps running.	a. Shut Letdown Isolation Valves:
	b. 21 and 23 HPSI Fumps running.	2-CVC-515-CV 2-CVC-516-CV
	c. Main and Aux HPSI Header Valves open:	b. Shut RCS Sample Isolation Valve, 2-PS-5464-CV.
	2-3I-616-MOV 2-SI-617-MOV 2-SI-626-MOV 2-SI-627-MOV	c. Shut Reactor Vessel Vent Valves:
	2-SI-636-MOV 2-SI-637-MOV 2-SI-646-MOV 2-SI-647-MOV	2-RC-103-SV 2-RC-104-SV
		d. Shut Pressurizer Vent Valves:
		2-RC-105-SV 2-RC-106-SV

EOP-5 Rev. 1/Unit 2 Page 6 of 41

ALTERNATE ACTIONS

- e. <u>IF</u> PORV leakage is indicated by:
 - High Quench Tank parameters.
 - (2) High FORV discharge piping temperature, computer points T107 and T108.
 - (3) Abnormal Acoustic Monitor indication.

THEN shut PORV Block Valves:

2-RC-403-MOV 2-RC-405-MOV

- f. <u>IF</u> leak is isolated <u>AND</u> SIAS <u>NOT</u> actuated, <u>THEN</u> implement Reactor Trip (EOP-1) <u>AND</u> complete administrative post-trip actions step AC, page 35.
- 1.2 <u>IF</u> leak is <u>NOT</u> isolated <u>AND</u> RCS pressure still greater than 1725 PSIA, THEN block SIAS:
 - Open Main and Aux HPSI Header Valves:

2-SI-616-MOV 2-SI-617-MOV 2-SI-626-MOV 2-SI-627-MOV 2-SI-636-MOV 2-SI-637-MOV 2-SI-646-MOV 2-SI-647-MOV

- b. Start 21 and 23 HPSI Pumps.
- c. <u>WHEN</u> "PRSR PRESS BLOCK A(B) PERMITTED" alarm(s) received, THEN block SIAS A(B).

II.

RECOVERY ACTIONS

EOP-5 Rev. 1/Unit 2 Page 7 of 41

ALTERNATE ACTIONS II. RECOVERY ACTIONS IMPLEMENT RCP TRIP STRATEGY: Ε. IF RCS pressure decreases to 1. 1725 PSIA, THEN trip 21A and 22B RCPs OR trip 21B and 22A RCPs. IF positive LOCA indications 2. exist: a. RCS subcooling less than 30°F. b. Steady S/G pressure. c. S/G Blowdown RMS alarms clear OR Main Vent Gaseous RMS (2-RI-5415) alarm clear. AND RCS pressure decreases to less than 1300 PSIA, THEN trip all RCPs. 3. IF RCS temperature and pressure are less than the minimum pump operating limits per the RCP curve on Attachment (1), THEN trip all RCPs. 4. IF CIS has actuated, THEN trip all RCPs.

EOP-5		
Rev.	1/Uni	t 2
Page	8 of	41

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

- F. VERIFY BORATION IN PROGRESS:
 - <u>IF</u> SIAS has actuated, <u>THEN</u> verify boration in progress:
 - a. Shut VCT Makeup Valve, 2-CVC-512-CV.
 - b. Open Boric Acid Direct Makeup Valve, 2-CVC-514-MOV.
 - c. Boric Acid Pumps running.
 - d. Open BAST Gravity Feed Valves:

2-CVC-508-MOV 2-CVC-509-MOV

- e. Shut VCT Outlet Valve, 2-CVC-501-MOV.
- All available Charging Pumps running.

 Continue boration until a total 65 inch decrease in BAST level(s) is achieved, or shutdown margin requirements of NEOG-11 is achieved.

- 1.1 IF SIAS NOT actuated, THEN commence boration:
 - a. Shut VCT Makeup Valve, 2-CVC-512-CV.
 - b. Open Boric Acid Direct Makeup Valve, 2-CVC-514-MOV.
 - c. Start a Boric Acid Pump.
 - .d. Start all available Charging Pumps.
- 1.2 <u>IF</u> Boric Acid Pumps <u>NOT</u> available, <u>THEN</u> establish gravity feed:
 - Open BAST Gravity Feed Valves:
 - 2-CVC-508-MOV 2-CVC-509-MOV
 - b. Shut VCT Outlet Valve, 2-CVC-501-MOV.
 - Start all available Charging Pumps.

III. RECOVERY ACTIONS	EOP-5 Rev. 1/Unit 2 Page 9 of 41 ALTERNATE ACTIONS
LESS THAN 225 PSIA, THEN VERIFY SAFETY INJECTION SYSTEM OPERATION:	
 Verify HPSI and LPSI flow to RCS per Attachments (12) and (13). Verify SI Tanks discharging to RCS cold legs. Monitor contairment pressure per step K, page 13. 	1.1 <u>IF</u> 21 or 23 HPSI Pump fails, <u>THEN</u> start 22 HP3I Pump <u>AND</u> align to appropriate header.
H. RESTORE NORMAL S/G WATER LEVEL:	
Severe water hammer may occur if Main Feed Ring is allowed to drain then subsequently refilled.	1.1 IF Main Feed NOT available,
1. <u>IF</u> Main Feed available, <u>THEN</u> establish a shutdown feed system lineup:	THEN establish AFW as follows: - CAUTION -
a. One operating S/G Feed Fump.	D/G supplying power to 23 AFW Pump flow limit is 300 GPM; otherwise, flow limit is 575 GPM.
Booster Pump.	a. Start an AFW Pump.
 d. Both Heater Drain Pumps secured. 	b. Adjust AFW Flow Control Valves to maintain S/G levels between (-)170 and (+)30 inches.

EOP-5 Rev. 1/Unit 2 Page 10 of 41

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

- 2. WHEN manual control of feed flow rate desired OR S/G levels between (-)24 and (+)30 inches, THEN perform the following:
 - Depress Feed Regulating Bypass Valve Reset Buttons.
 - b. Adjust Feed Regulating Bypass Valves to raise S/G levels to approximately 0 inches.
- WHEN S/G levels are 0 inches, THEN shift Feed Regulating Bypass Controllers to AUTO.
- I. <u>IF</u> RCS FRESSURE GREATER THAN 225 FSIA, <u>THEN</u> ESTABLISH COOLDOWN IN AT LEAST ONE LOOF:
 - WHEN "SGIS A(B) BLOCK PERMITTED" alarm(s) received, THEN block SGIS A(B).
 - Open Turbine Bypass or Atmospheric Dump Valves as necessary to maximize RCS cooldown, while maintaining cooldown rate less than 100°F/h.

EOP-5 Rev. 1/Unit 2 Page 11 of 41

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

 IF RCPs are secured, <u>THEN</u> verify Natural Circulation:

- NOTE -

Wide range Thot may be obtained from Subcooled Margin Monitor per Attachment (10).

- a. Thot minus Tcold between 10 and 50°F.
- b. Tcold constant or decreasing.
- c. Thot constant or decreasing.
- CET temperatures consistent with Thot.
- Steaming rate affects primary temperature.
- Monitor for Core and RCS voiding:
 - CAUTION -

Potential for void formation increases rapidly when pressure decreases below 1500 PSIA.

- Letdown flow greater than charging flow.
- b. Rapid unexplained increase in pressurizer level during an RCS pressure reduction.
- c. Loss of subcooled margin as determined using CET temperatures.
- d. "REACTOR VE"SEL WATER LEVEL LOW" alarm.

EOP-5 Rev. 1/Unit 2 Page 12 of 41

III. RECOVERY ACTIONS

- <u>IF</u> voiding inhibits heat removal, <u>THEN</u> reduce or eliminate voided area:
 - a. Shut Letdown Isolation Valve, 2-CVC-515-CV.

- CAUTION -

The potential exists for pressurized thermal shock from an excessive cooldown rate followed by a repressurization.

- Pressurize the RCS to maintain subcooling as near 140°F as practical.
 - CAUTION -

If voids exist in the S/G Tubes, a rapid RCS pressure reduction will occur when the voids collapse.

> c. <u>IF</u> voiding occurs in the S/G tubes (saturation pressure of S/G greater than saturation pressure of RCS), <u>THEN</u> cool the S/G by raising any of the following:

- (1) Steaming rate.
- (2) Feed rate.

(3) S/G Blowdown rate.

AND maintaining less than 100°F/h cooldown rate.

6. Continue cooldown to 300°F.

5.b.1 <u>IF</u> pressurizing the RCS does <u>NOT</u> restore heat removal, <u>THEN</u> operate Reactor Vessel Vent Valves per OI-1G.

ALTERNATE ACTIONS

EOP-5 Rev. 1/Unit 2 Page 13 of 41

J. <u>IF RCS PRESSURE LESS THAN</u> 1270 FSIA, <u>THEN VERIFY HPSI FLOW TO RCS</u> PER ATTACHMENT (12).			ALTERNATE ACTIONS		
			J.1	IF 21 or 23 HPSI Fump fails, THEN start 22 HPSI Fump AND align to appropriate header.	
к.	MON	ITOR CONTAINMENT PRESSURE:			
	1.	IF CSAS NOT actuated, THEN start all available Containment Air Coolers in HIGH with mammum SRW flow.			
	2.	IF containment pressure increases to 2.0 PSIG AND still increasing, THEN start 21 and 22 Containment Spray Pumps and open both Cntmt Spray Header CVs.			
		21 22			
		2-SI-4150-CV 2-SI-4151-CV			
	3.	IF contaiment pressure increases to 2.8 PSIG, THEN verify ESFAS actuation:			
		a. SIAS.			
		b. CIS AND trip all RCPs.			
	4.	Verify SRW Pump Room Ventilation in service, per OI-15.			
	5.	IF containment pressure increases to 4.25 PSIG, THEN verify CSAS actuation AND spray flow approximately			

EOP-5 Rev. 1/Unit 2 Page 14 of 41

III. RECOVERY ACTIONS		Page 14 of 41 ALTERNATE ACTIONS
L .	COMMENCE ESFAS VERIFICATION CHECKLISTS:	
	 SIAS Attachment (2). CSAS Attachment (3). CIS Attachment (4). 	
Μ.	MAINTAIN RCS SUBCOOLING AND PRESSURIZER LEVEL:	
	 Maintain subcooling between 30 and 140°F using CET temperatures. - CAUTION - The potential exists for freessurized thermal shock from a excessive cooldown rate followed by a repressurization. Raise subcooling by any of the following: - NOTE - Moressurizer Backup Heater Banks 1 and 23 trip on U/V and SIAS. Operate Pressurizer Heater(s). Operate Turbine Bypass or Atmospheric Dump Valves to maximize RCS cooldown while maintaining cooldown rate less than 100°F/n. Raise HPSI flow to RCS. 	2.b.1 IF unable to obtain desired cooldown rate with Turbine Bypass and Atmospheric Dump Valves, THEN use steam driven AFW Fump(s) to increase cooldown rate.

EOP-5 Rev. 1/Unit 2 Page 15 of 41

II. RECOVERY ACTIONS

- Lower subcooling by any of the following:
 - De-energize Pressurizer Heater(s).
 - b. Lower RCS cooldown rate.
 - c. <u>IF</u> the following conditions can be maintained:
 - At least 30°F subcooling.
 - (2) ...essurizer level greater than 155 inches.
 - (3) At least one S/G available for heat removal.
 - (4) RVLMS indicates that the Core is covered.

THEN throttle HPSI flow or operate Charging Pumps as nacessary to maintain subcooling between 30 and 140°F.

ALTERNATE ACTIONS

- 3.1 <u>IF</u> unable to lower subcooling, <u>THEN</u> initiate Auxiliary Spray:
 - a. Place Instrument Air CIS Override Switch, 2-HS-2080A, in OVERRIDE.
 - b. Open Cntmt Instrument Air Isolation MOV, 2-IA-2080-MOV.
 - c. Record temperature differential between Pressurizer and Regenerative Heat Exchanger Outlet.
 - Open Auxiliary Spray Valve, 2-CVC-517-CV.
 - e. Shut Loop Charging Valves:
 - 2-CVC-518-CV 2-CVC-519-CV

- NOTE -

2-HS-2085 located on West wall of 27 ft Switchgear Room; Key #80 in Control Room Key Locker.

- f. Open Cntmt Instrument Air Supply CV, 2-IA-2085-CV, by momentarily placing 2-HS-2085 in OPEN.
- g. Shift 2-HIC-100 to MANUAL and shut Pressurizer Spray Valves:

2-RC-100E-CV 2-RC-100F-CV

h. Maintain pressurizer cooldown rate less than 200°F/h.

EOP-5 Rev. 1/Unit 2 Page 16 of 41

RECOVERY ACTIONS

ALTERNATE ACTIONS

- NOTE -

A break on top of Pressurizer will result in an uncontrollable increase in pressurizer level until Pressurizer is solid.

 Maintain pressurizer level between 101 and 160 inches.

- CAUTION -

Do not throttle HPSI flow unless 30°F subcooling can be maintained.

- <u>IF</u> the following conditions can be maintained:
 - At least 30°F subcooling.
 - (2) Pressurizer level greater than 101 inches.
 - (3) At least one S/G available for heat removal.
 - (<) RVLMS indicates that the core is covered.

THEN throttle HPSI flow or operate Charving Pumps as necessary to maintain pressurizer level between 101 and 160 inches.

EOP-5	>		
Rev.	1/1	Jnit	: 2
Page	17	of	41

11	•	TEC	ECOVERY ACTIONS		ALTERNATE ACTIONS		
	WHE THE SUP LOW	N RC N SH PLY ER B	SE BORATION COMPLETE, HIFT CHARGING PUMP SUCTION TO MAKEUP SUPPLY WITH A BORIC ACID CONCENTRATION.				
	1.	IE THE	SIAS actuated, N perform the following: Open RWT To Charging Pump Suction Valve,	1.1	IF THE suc	SIAS NOT actuated, N lineup Charging Pump tion to VCT: Determine blend	
		b.	2-CVC-504-MOV. Shut VCT Outlet Valve, 2-CVC-501-MOV.			required to maintain shutdown boron concentration per NEOG-11.	
		с.	Place Boric Acid Pumps in PULL-TO-LOCK.		Ъ.	Open VCT Outlet Valve, 2-CVC-501-MOV.	
		d	Ensure Charging Pump AMPS steady.		с.	Secure Boric Acid Pump(s).	
•		е.	Ensure BAST levels steady.		d.	Shut Boric Acid Direct Makeup Valve, 2-CVC-514-MOV.	
					e.	Shut BAST Gravity Feed Valves:	
						2-CVC-508-MOV 2-CVC-509-MOV	
					OR	lineup Charging Fump ction to RWT:	
					a.	Open RWT To Charging Pump Sustion Valve, 2-CVC-504-MOV.	
					b.	Shut VCT Outlet Valve, 2-CVC-501-MOV.	
					с.	Shut Boric Acid Direct Makeup Valve, 2-CVC-514-MOV.	
					d.	Secure Boric Acid Pump(s).	

0

-7

.0

EOP-5 Rev. 1/Unit 2 Page 18 of 41

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

- 0. <u>IF</u> RWT LEVEL DECREASES TO BETWEEN 0.5 AND 1.0 FT <u>OR</u> "ACTUATION SYS RAS TRIPPED" ALARM RECEIVED, THEN VERIFY RAS ACTUATION:
 - Place SI Pump Recirc Lockout Switches in ON.
 - Commence RAS Verification Checklist, Attachment (6).
 - 3. Shut RWT Outlet Valves:

2-SI-4142-MOV 2-SI-4143-MOV

- <u>IF</u> HPSI flow greater than 1000 GPM with two HPSI Pumps operating, <u>THEN</u> equally throttle HPSI flow to 1000 GPM.
- 5. <u>IF</u> HPSI flow greater than 600 GPM with one HPSI Pump operating, <u>THEN</u> equally throttle HPSI flow to 600 GPM.

- CAUTION -

To prevent pump damage, minimum flow per operating HPSI Pump is 30 GPM.

- <u>IF</u> HPSI Pump cavitation occurs in recirculation mode, <u>THEN</u> throttle HPSI flow per Attachment (12).
- 6.1 <u>IF</u> Attachment (12) does <u>NOT</u> allow throttling HPSI flow, <u>THEN</u> align Containment Spray Pump(s) to HPSI Pump suction:

 a. <u>IF</u> 21(22) HPSI Pump cavitating, <u>THEN</u> open 21 SDC HX To HPSI Suction Valve, 2-SI-663-MOV <u>AND</u> start 21 Containment Spray Pump.

EOP-5 Rev. 1/Unit 2 Page 19 of 41

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

b. <u>IF</u> 23 HPSI Pump cavitating, <u>THEN</u> open 22 SDC HX To HPSI Suction Valve, 2-SI-662-MOV <u>AND</u> start 22 Containment Spray Pump.

- Commence ECCS Pump Room cooling:
 - Open ECCS Pump Room Air Cooler Saltwater Valves:

2-SW-5170-CV 2-SW-5171-CV 2-SW-5173-CV

- b. Start 21 and 22 ECCS Pump Room Cooling Fans.
- Adjust saltwater flow to maintain SRW and component cooling temperatures.
- 9. <u>IF</u> Charging Pumps are aligned with suction from RWT <u>AND</u> HPSI Pumps maintaining RCS in ontory, <u>THEN</u> place Charging Pumps in PULL-TO-LOCK.

P. RESTORE CONTAINMENT ENVIRONMENT:

- Direct Chemistry to place Hydrogen Monitors in service.
- <u>IF</u> hydrogen concentration increases to 1%, <u>THEN</u> start Hydrogen Recombiners per OI-41A.
- Maintain Iodine Filter Fans running.

EOP-5 Rev. 1/Unit 2 Page 20 of 41

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

- 4. WHEN containment pressure less than 4.0 PSIG, THEN perform the following:
 - a. Reset CSAS signal.
 - Secure one Containment Spray Pump.
 - c. Verify all Containment Air Coolers operating to maintain containment temperature less than 120°F.
 - d. Restore equipment per CSAS Verification Checklist, Attachment (3), to desired condition.
 - 5. WHEN containment pressure less than 2.8 PSIG, THEN perform the following:
 - a. Block pressurizer pressure signals and reset SIAS signal.
 - b. Reset CIS signal.
 - c. Secure remaining ' Containment Spray Pump.
 - d. Restore equipment per SIAS and CIS Verification Checklists, Attachments (2) and (4), to desired condition.

EOP-5 Rev. 1/Unit 2 Page 21 of 41

ALTERNATE ACTIONS



- Open Plant Air To Instrument Air Cross Connect Valve, 2-PA-2061-CV.
- Open SRW Turbine Building Header Isolation Valves:

2-SRW-1600-CV 2-SRW-1637-CV 2-SRW-1638-CV 2-SRW-1639-CV

EOP-5			
Rev.	1/1	Init	2
Page	22	of	41

LIII. RECOVERY ACTIONS

ALTERNATE ACTIONS

S. RESTORE INSTRUMENT AIR COMPRESSORS TO SERVICE:

> <u>IF</u> high temperature alarm exists on the Instrument Air Compressors, <u>THEN</u> open the service water isolation valves by placing their handswitches in OPEN until temperature alarm clears.

> > 21 or <u>22</u>

2-HS-2063 2-HS-2065

 Start at least one Instrument Air Compressor.

RESTORE INSTRUMENT AIR TO CONTAINMENT:

 Open Cntmt Instrument Air Isolation MOV, 2-IA-2080-MOV.

- NOTE -

2-HS-2085 located on West wall of 27 ft Switchgear Room; Key #80 in Control Room Key Locker.

 Open Cntmt Instrument Air Supply CV, 2-IA-2085-CV, by momentarily placing 2-HS-2085 in OPEN.

U. RESTORE LETDOWN FLOW:

 Verify charging flow path through Loop Charging Valves or Auxiliary Spray Valve.

EOP-5 Rev 1/Unit 2 Page 23 of 41

III. RECOVERY ACTIONS

- ALTERNATE ACTIONS
- 2. Verify at least one Charging Pump operating.
- Shift Letdown Control Valve Controller, 2-HIC-110, to MANUAL.
- Adjust controller to shut Letdown Control Valves.
- 5. Open Letdown Isolation Valves:

2-CVC-515-CV 2-CVC-516-CV

- CAUTION -

The setpoint of 2-PIC-201 must be above the saturation pressure for the letdown outlet temperature of the Regenerative Heat Exchanger.

- Adjust the setpoint on 2-PIC-201 and adjust 2-HIC-110 to maintain desired pressurizer level.
- V. IF FORCED CIRCULATION DESIRED AND PUMP RESTART CRITERIA MET, THEN START RCPs:
 - <u>IF</u> RCPs exposed to excessive moisture, <u>THEN</u> consider meggering RCP motor.

- CAUTION -

Uncontrolled restoration of cooling to hot RCP seals may cause degradation of the metallic seating surfaces by thermal shock.

EOP-5 Rev. 1/Unit 2 Page 24 of 41

I. RECOVERY ACTIONS

- 2. <u>IF</u> Component Cooling is isolated to RCP seals, <u>THEN</u> reduce RCP lower seal temperature below 280°F prior to initiating full cooling flow to the RCPs:
 - a. Shut Component Cooling Supply Containment Manual Isolation Valve, 2-CC-284, located in 5 ft East Penetration Room.
 - b. Verify CIS reset.
 - c. Open Component Cooling Containment Isolation Valves:

2-CC-3832-CV 2-CC-3833-CV

- d. Slowly open 2-CC-284 to throttle component cooling flow until lower seal temperatures are less than 280°F.
- e. WHEN lower seal temperatures are less than 280°F, THEN fully open 2-CC-284.
- 3. <u>IF</u> an RCP lower seal temperature exceeded 280°F, <u>THEN</u> an engineering evaluation is required prior to restarting that RCP.
- Raise pressurizer level to at least 155 inches.
- 5. Verify RCP restart criteria:
 - a. RCS subcooling greater than 30°F.
 - At least one S/G available for heat removal.

ALTERNATE ACTIONS

EOP-5 Rev. 1/Unit 2 Page 25 of 41

RECOVERY ACTIONS

UI.

ALTERNATE ACTIONS

- c. Pressurizer level greater than 155 inches and stable.
- d. Tcold less than 525°F.
- e. RCS temperature and pressure greater than the minimum operating limits per the RCP Curve on Attachment (1).

- NOTE -

Starting an RCP may cause a pressurizer level transient.

- WHEN RCP restart criteria are met, <u>THEN</u> start one RCP in a loop with an operable S/G:
 - Verify "COMPT CLG FLOW LO" alarm clear.
 - b. Start Oil Lift Pump.
 - c. Insert RCP sync stick.
 - d. Start one RCP.
 - e. Monitor RCP running current:

Tavg Current

- 525 to 572°F 238 to 210 AMPS and steady
- 210 to 525°F 264 to 238 AMPS and steady
- 7. <u>IF</u> pressurizer level decreases, <u>THEN</u> start Charging or HPSI Pump(s) as necessary to restore <u>AND</u> maintain level greater than 155 inches.
- Monitor RCP seal parameters following pump restart.

EOP-5 Rev. 1/Unit 2 Page 26 of 41

II. RECOVERY ACTIONS

- Allow backflow to equalize temperatures in opposite loop.
- Start second RCP in opposite loop per step V.6 and V.8, page 25.
- 11. Secure Auxiliary Spray:
 - a. Open Loop Charging Valves:

2-CVC-518-CV 2-CVC-519-CV

- b. Shut Auxiliary Spray Valve, 2-CVC-517-CV.
- c. Shift Pressurizer Spray Controller, 2-HIC-100, to AUTO.
- W. WHEN RCS TEMPERATURE IS LESS THAN 300°F AND RCS PRESSURE IS LESS THAN 300 PSIA, THEN PERFORM THE FOLLOWING:

- NOTE -

Cavity Cooling and CEDM Cooling aid in cooling Reactor Vessel Head if a void exists.

- <u>IF</u> Cavity Cooling and CEDM Cooling Fans available, <u>THEN</u> maintain Cavity Cooling and CEDM Cooling Fans running.
- 2. Shut SI Tank Outlet Valves:

2-SI-614-MOV 2-SI-624-MOV 2-SI-634-MOV 2-SI-644-MOV

ALTEPNATE ACTIONS

EOP-5 Rev. 1/Unit 2 Page 27 of 41

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

- <u>IF</u> AFW <u>NOT</u> being used to feed S/Gs,
 <u>THEN</u> perform the following:
 - a. Shut the motor and steam driven train AFW Block Valves:

21 S/G 22 S/G

2-AFW-4520-CV 2-AFW-4521-CV 2-AFW-4521-CV 2-AFW-4522-CV 2-AFW-4532-CV 2-AFW-4532-CV 2-AFW-4533-CV

- b. Place 23 AFW Pump in PULL-TO-LOCK.
- c. Shut AFW Steam Supply Valves:

22 S/G

2-MS-4070-CV 2-MS-4071-CV

X. WHEN RCS TEMPERATURE IS LESS THAN 280°F AND RCS PRESSURE IS LESS THAN 300 PSIA, THEN ESTABLISH MFT PROTECTION:

21 S/G

- CAUTION -

PORVs must be in MPT ENABLE before Tcold indication on T115 or T125 is less than 275°F.

- Place both PORVs in the MPT ENABLE mode.
- Place both FORV Override Switches in OVERRIDE CLOSED position.

11. <u>REC</u>	OVERY ACTIONS	EOP-5 Rev. 1/Unit 2 Page 28 of 41 ALTERNATE ACTIONS		
IF CET THEN CO WITHIN ACTUATI	SUBCOOLING LESS THAN 30 ⁰ F, MMENCE CORE FLUSH 24 HOURS AFTER THE SIAS ON:			
 Lir Inj a. b. c. d. e. f. g. h. 	he up for Pressurizer jection: Open SI Discharge To Charging Header Core Flush Valve, 2-CVC-269-MOV. Shut Loop Charging Valves: 2-CVC-518-CV 2-CVC-519-CV Shut Pressurizer Spray Valves: 2-RC-100E-CV 2-RC-100F-CV Open HPSI Aux Header Isolation Valve, 2-SI-656-MOV. Open Auxiliary Spray Valve, 2-CVC-517-CV. Shut HPSI Main Header Cross Connect Valve, 2-SI-653-MOV. Shut Aux HPSI Header Valves: 2-SI-653-MOV. Shut Aux HPSI Header Valves: 2-SI-617-MOV 2-SI-627-MOV 2-SI-647-MOV Start 21 or 22 HPSI Pump and maintain a minimum flow of 40 GPM.	 1.1 IF Pressurizer Injection NOT available AND the following conditions are met: a. RCS pressure less than 270 PSIA. b. RCS pressure minus containment pressure less than 160 PSID. THEN line up for Hot Leg Injection: a. Place 21 or 22 LPSI Pump RAS Override Switch in OVERRIDE. b. Open Cntmt Sump Discharge Valves: 2-SI-4144-MOV 2-SI-4145-MOV c. Open Shutdown Cooling Heat Exchanger Recirc Isolation Valve, 2-SI-399-MOV. d. Shut LPSI Header Valves: 2-SI-615-MOV 2-SI-645-MOV 2-SI-645-MOV 		

EOP-5 Rev. 1/Unit 2 Page 29 of 41

II. RECOVERY ACTIONS

i. <u>IF</u> minimum flow can <u>NOT</u> be determined, <u>THEN</u> initiate Hot Leg Injection.

 WHEN Pressurizer Injection OR Hot Leg Injection in progress, balance flow by throttling Main HPSI Header Valves:

> 2-SI-616-MOV 2-SI-626-MOV 2-SI-636-MOV 2-SI-646-MOV

THEN maintain required flow to remove decay heat per Attachment (12).

 Ensure CET temperatures remain constant or decreasing.

ALTERNATE ACTIONS

- e. Verify RCS pressure less than 270 PSIA.
- f. Open Shutdown Cooling Suction Header Isolation Valves:

2-SI-651-MOV 2-SI-652-MOV

- g. Start selected LPSI Pump.
- h. Maintain a minimum flow of 40 GPM.

MHEN CET TEMPERATURES LESS THAN 300 F AND RADIATION LEVELS PERMIT, THEN COMMENCE SHUTDOWN COOLING.			EOP-5 Rev. 1/Unit 2 Page 30 of 41 ALTERNATE ACTIONS		
EOP-5 Rev. 1/Unit 2 Page 31 of 41

RECOVERY ACTIONS

- g. Open 22 Shutdown Cooling Heat Exchanger Inlet Cross Connect Valve, 2-SI-453.
- h. Open 22 Shutdown Cooling Heat Exchanger Outlet to RCS Valve, 2-SI-457.
- i. Place second Component Cooling Heat Exchanger in service by opening appropriate Component Cooling Heat Exchanger Outlet Valve:

2-CC-3824-CV 2-CC-3826-CV

- j. Start second Component Cooling Pump.
- k. Open 21 Shutdown Cooling Heat Exchanger Component Cooling Outlet Valve, 2-CC-3828-CV.
- Open 22 Shutdown Cooling Heat Exchanger Component Cooling Outlet Valve, 2-CC-3830-CV.
- m. Open Shutdown Cooling Heat Exchanger Inlet Isolation, 2-SI-658-MOV.
- n. <u>IF</u> Hot Leg Injection being used for core flush, <u>THEN</u> shut 22B LPSI Header Valve, 2-SI-635-MOV.
- o. Open LPSI Header Valves:

2-SI-615-MOV 2-SI-625-MOV 2-SI-645-MOV

- p. Place keyswitch for 2-SI-306-CV in AUTO.
- q. Shift 2-FIC-306 to MANUAL with 5% open signal.

ALTERNATE ACTIONS

1.n.1 <u>IF</u> Hot Leg Injection <u>NOT</u> being used for core flush, <u>THEN</u> open 22B LPSI Header Valve, 2-SI-635-MOV.

III.

EOP-5 Rev. 1/Unit 2 Page 32 of 41

LII. RECOVERY ACTIONS

ALTERNATE ACTIONS

r. Open Cntmt Sump Discharge Valve:

> 2-SI-4144-MOV 2-SI-4145-MOV

s. Shut SI Pump Mini Flow Isolations:

> 2-SI-659-MOV 2-SI-660-MOV

t. Ensure level indication exists on wide range containment level indicator 2-LI-4146.

- CAUTION -

The possibility of cavitation increases when taking suction from containment sump.

> u. <u>IF</u> LPSI Pump <u>NOT</u> operating, <u>THEN</u> clear RAS from one operable LPSI Pump by placing LPSI Pump RAS Override Switch in OVERRIDE <u>AND</u> start selected pump.

> > - CAUTION -

Cooldown limit changes from 100°F/h to 20°F/h at RCS temperature of 250°F.

- v. Adjust the signal on 2-FIC-306 to raise flow to 3000 GPM, while maintaining cooldown rate within limits.
- w. Place keyswitch for 2-SI-657-CV in AUTO.

EOP-5 Rev. 1/Unit 2 Page 33 of 41

RECOVERY ACTIONS

Ι.

ALTERNATE ACTIONS

- CAUTION -

Do not exceed 12°F/m heatup rate or greater than 5000 GPM through one heat exchanger.

- x. Adjust Shutdown Cooling Temperature Control Valve, 2-SI-657-CV, to obtain 12°F/m heatup rate at Shutdown Cooling Heat Exchanger Outlet (2-TI-303X and 2-TI-303Y).
- Y. <u>IF</u> desired RCS cooldown rate can <u>NOT</u> be maintained with one LPSI Pump, <u>THEN</u> start second LPSI Pump <u>AND</u> adjust 2-FIC-306 to 6000 GPM.
- z. Adjust Shutdown Cooling Temperature Control Valve, 2-SI-657-CV, to obtain desired cooldown rate.
- AA. WHEN CET TEMPERATURES LESS THAN 200°F, THEN SECURE CORE FLUSH FLOWPATH:
 - <u>IF</u> HPSI Pump(s) <u>NOT</u> required for RCS pressure or level control, THEN secure HPSI Pump(s).
 - Shut SI Discharge To Charging Header Core Flush Valve, 2-CVC-269-MOV.
 - 3. Open Loop Charging Valves:

2-CVC-518-CV 2-CVC-519-CV

 Shut Auxiliary Spray Valve, 2-CVC-517-CV.

EOP-5	5		
Rev.	1/1	Jnit	t 2
Page	34	of	41

III. RECOVERY ACTIONS

- Shut Shutdown Cooling Heat Exchanger Recirc Isolation, 2-SI-399-MOV.
- Open 22B LPSI Header Valve, 2-SI-635-MOV.
- AB. COMPLETE ADMINISTRATIVE POST-TRIP ACTIONS AND IMPLEMENT APPROPRIATE OPERATING PROCEDURE.

ALTERNATE ACTIONS

EOP-5 Rev. 1/Unit 2 Page 35 of 41

1.

AC. ADMINISTRATIVE POST-TRIP ACTIONS:

- NOTE -

The following actions may be accomplished whenever feasible. They may be done in any order.

- Refer to ERPIP to determine appropriate emergency response actions.
- 2. Perform notifications per CCI-118.
 - Notify ESO of trip.
 - 4. Request RCS Boron and Iodine sample.
 - 5. Perform shutdown margin calculation per NEOG 9 and 11.
 - 6. Complete transient log entries per CCI-301.
 - 7. Recall post-trip review (preferably within 30 minutes of trip).
 - 8. Perform post-trip review per CCI-111.
 - 9. Monitor turbine bearing temperatures.
 - 10. Continue Main Turbine shutdown per applicable step of OI-43A.

END OF SECTION III.

EOP-5 Rev. 1/Unit 2 Page 36 of 41

IV. SAFETY FUNCTION STATUS CHECK

- A. The STA (or person designated by STA) will perform the intermediate and final safety function checks respectively on entry and prior to exiting from this procedure.
- B. Perform intermediate safety function status check at 10 minute intervals until plant conditions stabilize.
- C. Immediately notify Shift Supervisor or Control Room Supervisor if any safety function criteria is not being satisfied.
- D. Review data and verify that safety function acceptance criteria are satisfied.
- E. When EOP completed, then perform final safety function check.

REACTIVITY		SAFETY FUNCTION ACCEPTANCE CRITERIA			
PA	NTROL RAMETERS	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK
a.	WRNI power	less than 3%		less than 1%	
b.	SUR (DPM)	negative		ο.	
с.	CEA status	all inserted		all inserted	
	or				
	Boration status:			appropriate	
	concentation	increasing		S/D margin	
	BAST level	decreasing		N/A	N/A

EOP-5 Rev. 1/Unit 2 Page 37 of 41 SAFETY FUNCTION ACCEPTANCE CRITERIA RCS PRESSURE AND INVENTORY FINAL INTERMEDIATE CRITERIA CRITERIA PARAMETERS CHECK CHECK a. Pressurizer less than 1900 pressure (PSIA) less than 1900 b. Pressurizer level (inches) (1) 0 to 160 0 to 160 greater than c. RCS subcooling (°F) 30 0 to 140

 A break at top of Pressurizer will result in solid pressurizer indication. This is an acceptable value provided the other parameters still indicate a LOCA.

EOP-5 Rev. 1/Unit 2 Page 38 of 41

CORE AND RCS		RE AND RCS	SAFETY FUNCTION ACCEPTANCE CRITERIA			
	PAI	RAMETERS	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK
	а.	CET ([°] F)	less than 700		less than 500_	
	b.	Thot minus Tcold (°F) (2)	10 to 50		10 to 50 _	
	с.	S/G pressure (FSIA)	150 to 900		N/A _	N/A
	d.	S/G level (inches)	(-)170 to (+)30		(-)24 to (+)30 _	
	е.	Cold Leg Injection (GPM)	greater than 40		greater than 40 _	
	f.	Condensate Storage Tank level (ft)	greater than 5		greater than 5 _	
	g.	Core flush established within 24 hours (GPM)	greater than 40		greater than 40 _	

(2) Thot and Tcold indication may be influenced by charging or SI temperatures during a large break LOCA. If this occurs Thot minus Tcold may be deleted from the check provided CET temperatures meet their acceptance criteria.

EOP-5 Rev. 1/Unit 2 Page 39 of 41

2

VITAL		SAFETY FUNCTION ACCEPTANCE CRITERIA			
AU	XILIARIES	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK
a.	4KV vital buses 21 or 24	energized		energized	
b.	Instrument Air pressure (PSIG)	greater than 88		greater than 88	
с.	Component Cooling (# pumps running)	1 or 2		1 or 2	
d.	Saltwater (# pumps running)	1 or 2		1 or 2	
е.	Service Water (# pumps running)	1 or 2		1 or 2	
) f .	125V DC buses 11, 12, 21, 22	energized		energized	
g.	120V AC vital buses 21, 22, 23, 24	energized		energized	

EOP-5 Rev. 1/Unit 2 Page 40 of 41

CO	NTAINMENT				
EN	VIRONMENT RAMETERS	CRITERIA	INTERMEDIATE CHECK	CRI'IERIA	FINAL
a.	Containment pressure (PSIG)	less than 50		less than 2.8	
b.	Containment temperature (°F)	less than 276		less than 220	
с.	Containment High Range Radiation Monitor	alarm clear		alarm clear	
d.	Hydrogen concentration	N/A	N/A	less than 2%	

EOP-5 Rev. 1/Unit 2 Page 41 of 41

NORMAL RADIATION					
TO	CONTAINMENT	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK
a .	Noble Gas Monitor	alarm		alarm	
		clear		clear	
h	Condenser Off-Gas	alarm		alarm	
ω.	RMS	clear		clear	
~	S/G B/D RMS	alarm		alarm	
.	5/5 5/5 Mis	clear		clear	
	Main Vent Carpour	alarm	,	alarm	
α.	RMS (2-RI-5415)	clear		clear	

STATUS CHECK NUMBER	COMPLETE AT TIME
1	
2	
3	
4	
	-

EOP-6 Rev. 1/Unit 1 Page 1 of 37

CALVERT CLIFFS NUCLEAR POWER PLANT

EOP-6 STEAM GENERATOR TUBE RUPTURE

.

REVISION 1

SIGNATURE

	SIGNATURE	DATE
PREPARED BY;	James V. Strooms	112/13/87
VERIFIED BY;	2+rantat-	, 12-18-87
POSRC;	MEETING # 38-7	12-10-88
APPROVED BY;	Manager-Nuclear Operations or	Z-10-88 General Supervisor-
	Operations if POSRC review is	not required

EOP-6 Rev. 1/Unit 1 Fage 2 of 37

LIST OF EFFECTIVE PAGES

F

AGE NUMBER	REVISION
1	1
2	1
3	1
4	1
5	1
6	1
/	1
8	1
10	1
11	î
12	1
13	. 1
14	1
15	3
16	1
17	1
18	1
19	1
20	1
22	1
23	1
24	ĩ
25	1
26	1
27	1
28	1
29	1
30	1
31	1
32	1
34	1
35	1
36	î
37	ĩ
	_

EOP-6 Rev. 1/Unit 1 Page 3 of 37

STEAM GENERATOR TUBE RUPTURE

I. PRECAUTIONS

- A. Do not adopt manual operation of automatically controlled systems unless a malfunction is apparent or automatic system operation will not support the maintenance of a safety function.
- B. Systems shifted to manual must be monitored frequently to ensure correct operation.
- C. At least two independent indications should be used, when available, to evaluate and corroborate a specific plant condition since an incident could induce inconsistencies between instruments.
- D. If the damaged S/G has been isolated and the cooldown is proceeding via Natural Circulation, an inverted temperature differential may be observed in the idle loop. This condition will have no effect on natural circulation flow in the intact S/G.
- E. Minimize the number of cycles of pressurizer auxiliary spray when the temperature differential is greater than 400°F.
- F. If a pump or component fails, the cause of the failure should be determined prior to restarting or starting a standby pump or component to prevent a common failure.

II. ENTRY CONDITIONS

The presence of one or more of the following conditions indicates that a Steam Generator Tube Rupture may have occurred:

- A. Unexplained decrease in VCT level or pressurizor level.
- B. Condenser Off-Gas RMS alarm.
- C. S/G Blowdown RMS alarm.
- D. Main Steam Line RMS alarm.
- E. Main Vent RMS alarm.
- F. Decreasing pressurizer pressure.

ECP-6 Rev. 1/Unit 1 Page 4 of 37

III. RECOVERY ACTIONS		ALTERNATE ACTIONS
۸.	VERIFY POST-TRIP IMMEDIATE ACTIONS COMPLETED.	
3.	COMMENCE INTERMEDIATE SAFETY FUNCTION STATUS CHECK.	
	DETERMINE APPROPRIATE EMERGENCY RESPONSE ACTIONS PER THE ERPIP.	
).	MONITOR RCS DEPRESSURIZATION.	
	 IF rapid depressurization to 1725 PSIA, THEN verify SIAS actuation AND the following actions: a. All available Charging Pumps running. b. 11 and 13 HP3I Pumps running. c. Main and Aux HPSI Header Valves open: 1-SI-616-MOV 1-SI-617-MOV 1-SI-626-MOV 1-SI-617-MOV 1-SI-636-MOV 1-SI-637-MOV 1-SI-636-MOV 1-SI-637-MOV 1-SI-646-MOV 1-SI-647-MOV 	 1.1 IF RCS pressure is greater than 1725 PSIA AND SIAS NOT actuated, THEN block SIAS: a. Open Main and Aux HPSI Header Valves: 1-SI-616-MOV 1-SI-617-MOV 1-SI-626-MOV 1-SI-627-MOV 1-SI-636-MOV 1-SI-637-MOV 1-SI-646-MOV 1-SI-647-MOV 1-SI-646-MOV 1-SI-647-MOV b. Start 11 and 13 HPSI Pumps. c. WHEN "PRSR PRESS BLOCK A(B) PERMITTED" alarm(s) received, THEN block SIAS A(B).

1

9

ú

6

2 0

EOP-6 Rev. 1/Unit 1 Page 5 of 37

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

E. IMPLEMENT RCP TRIP STRATEGY:

- <u>IF</u> RCS pressure decreases to 1725 PSIA, <u>THEN</u> trip 11A and 12B RCPs <u>OR</u> trip 11B and 12A RCPs.
- 2. IF positive LOCA indications exist:
 - a. RCS subcooling less than 30°F.
 - b. Steady S/G pressure.
 - c. S/G Blowdown RMS alarms clear <u>OR</u> Main Vent Gaseous RMS (1-RI-5415) alarm clear.

AND RCS pressure decreases to less than 1300 PSIA, THFN trip all RCPs.

- <u>IF</u> RCS temperature and pressure are less than the minimum pump operating limits per the RCP curve on Attachment (1), THEN trip all RCPs.
- <u>IF</u> CIS has actuated, <u>THEN</u> trip all RCPs.

TT DECOURDY ACTIONS	EOP-6 Rev. 1/Unit 1 Page 6 of 37 ALTERNATE ACTIONS
III. RECOVERT ACTIONS	
F. DEPRESSURIZE RCS TO MAINTAIN SUBCOOLING BETWEEN 25 AND 35°F AND PRESSURIZER LEVEL BETWEEN 101 AND 160 INCHES:	
 Shift 1-HIC-100 to MANUAL and open Pressurizer Spray Valve, on leg with operating RCP, as necessary to maintain 	1.1 <u>IF</u> Pressurizer Spray Valves <u>NOT</u> effective, <u>THEN</u> initiate Auxiliary Spray:
subcooling between 25 and 35°F.	a. Record temperature differential between Pressurizer and Regenerative Heat Exchanger Outlet.
	b. Open Auxiliary Spray Valve, 1-CVC-517-CV.
	c. Shut Loop Charging Valves:
	1-CVC-518-CV 1-CVC-519-CV
	d. Shift 1-HIC-100 to MANUAL and shut Pressurizer Spray Valves:
	1-RC-100E-CV 1-RC-100F-CV
 WHEN RCS pressure less than 1270 PSIA, THEN verify HFSI flow per Attachment (12). 	

EOP-6 Rev. 1/Unit 1 Page 7 of 37

ALTERNATE ACTIONS

III. RECOVERY ACTIONS

- 3. <u>IF</u> the following conditions exist:
 - a. At least 25°F subcooling.
 - b. Pressurizer level greater than 101 inches.
 - c. At least one S/G available for heat removal.
 - RVLMS indicates that the Core is covered.

THEN throttle HPSI flow to maintain pressurizer level between 101 and 160 inches.

- <u>IF</u> RCS subcooling less than 25°F in an operating S/G loop, <u>THEN</u> raise RCS subcooling using one or more of the following actions:
 - a. Shut Pressurizer Spray Valves.
 - NOTE -

Pressurizer Backup Heater Banks 11 and 13 trip on U/V and SIAS.

- Energize Pressurizer Heaters.
- c. Raise RCS cooldown rate.
- 5. <u>IF</u> RCS subcooling greater than 35°F in an operating S/G loop, <u>THEN</u> lower RCS subcooling using one or more of the following actions:
 - De-energize Pressurizer Heaters.
 - Derate Pressurizer Spray Valve on leg with operating RCP.
 - c. Lower RCS cooldown rate.

5.b.1 Initiate Auxiliary Spray per step F.1.1, page 6.

III. RECOVERY ACTIONS	EOP-6 Rev. 1/Unit 1 Page 8 of 37 ALTERNATE ACTIONS		
G. COMMENCE RCS COOLDOWN TO LOWER That TO 515°F:			
 WHEN "SGIS A(B) BLOCK PERMITTED" alarm(s) received, THEN block SGIS A(B). 2. Commence cooldown to 515°F 	 1.1 IF SGIS actuates, <u>THEN</u> reset SGIS: a. Place Condensate Booster Pumps in PULL-TO-LOCK. b. Match handswitches per SGIS Verification Checklist, Attachment (7). c. Block SGIS. d. Reset SGIS signal. e. Open MSIVs. 2.1 IF Turbine Bypass Valves 		
by throttling Turbine Bypass Valves, while maintaining less than 100°F/h RCS cooldown rate.	 NOT available, THEN throttle Atmospheric Dump Valves to commence cooldown. 2.2 Record total time Atmospheric Dump Valve open, for dose calculations, prior to identifying and isolating affected S/G. 		
3. <u>IF</u> Turbine Bypass Valves available, <u>THEN</u> ensure Atmospheric Dump Valves are shut.			

EOP-6 Rev. 1/Unit 1

1 11.	RECOVERY ACTIONS	ALTERNATE ACTIONS			
H. VER	RIFY BORATION IN PROGRESS:				
1.	<pre>IF SIAS has actuated, THEN verify boration in progress: a. Shut VCT Makeup Valve, 1-CVC-512-CV. b. Open Boric Acid Direct Makeup Valve, 1-CVC-514-MOV. c. Boric Acid Pumps running. d. Open BAST Gravity Feed Valves: 1-CVC-508-MOV 1-CVC-509-MOV e. Shut VCT Outlet Valve, 1-CVC-501-MOV. f. All available Charging Fumps running.</pre>	 1.1 IF SIAS NOT actuated, THEN commence boration: a. Shut VCT Makeup Valve, 1-CVC-512-CV. b. Open Boric Acid Direct Makeup Valve, 1-CVC-514-MOV. c. Start a Boric Acid Pump. d. Start all available Charging Pumps. 1.2 IF Boric Acid Pumps NOT available, THEN establish gravity feed: a. Open BAST Gravity Feed Valves: 1-CVC-508-MOV 1-CVC-509-MOV b. Shut VCT Outlet Valve, 1-CVC-501-MOV. c. Start all available Charging Pumps. 			
2.	Continue boration until a total 65 inch decrease in BAST level(s) is achieved, or shutdown margin requirement of NEOG-7 is achieved.				

EOP-6 Rev. 1/Unit 1 Page 10 of 37

III. RECOVERY ACTIONS

Ι.

ALTERNATE ACTIONS

٩.

1

IDENTIFY AND CONFIRM AFFECTED S/G: Attempt to identify affected 1. S/G by comparing the following trends: Mismatch in feed flow a. prior to trip.

- b. Unexplained increase in S/G level prior to trip.
- c. Main Steam Line RMS.
- d. Post-trip S/G level changes.
- e. S/G samples.
- 2. Shut S/G Blowdown Valves:

1-BD-4010-CV 1-BD-4011-CV 1-BD-4012-CV 1-BD-4013-CV

Shut AFW Steam Supply Valves 3. by placing handswitches in CLOSE :

> 1-MS-4070-CV 1-MS-4071-CV

- 4. Secure Main Feed system:
 - a. Trip S/G Feed Pumps.
 - 17. Place Condensate Booster Pumps in PULL-TO-LOCK.
 - c. Place 2 of the 3 Condensate Pumps in FULL-TO-LOCK.
 - d. Secure Heater Drain Pumps.

EOP-6 Rev. 1/Unit 1 Page 11 of 37

ALTERNATE ACTIONS

e. Shut S/G Feedwater Isolation Valves:

> 1-FW-4516-MOV 1-FW-4517-MOV

- f. Shut Hotwell To CST Dump CV by shifting 1-LIC-4405 to MANUAL with 50% output.
- <u>IF</u> affected S/G <u>NOT</u> identified, <u>THEN</u> perform the following:
 - a. Shut motor driven train AFW Block Valves on both S/Gs:

11 S/G 12 S/G

1-AFW-4522-CV 1-AFW-4532-CV 1-AFW-4523-CV 1-AFW-4533-CV

- Monitor S/G levels to determine affected S/G.
- Direct Chemistry to sample S/Gs.
- Direct Rad Con to perform a radiological survey of main steam lines.
- 6. WHEN affected S/G identified OR if it is determined that both S/Gs are affected, OR if either S/G level decreases to -170 inches, THEN feed unaffected or least affected S/G per step J, page 12.

EOP-6 Rev. 1/Unit 1 Page 12 of 37

5 11.	RECOVERY ACTIONS	ALTERNATE ACTIONS			
J. FEED	UNAFFECTED S/G.				
1. D/G Pumj oth	Establish AFW flow to unaffected S/G using 13 AFW Pump: a. For the affected S/G, shut the motor driven train AFW Block Valves: <u>11 S/G</u> or <u>12 S/G</u> 1-AFW-4522-CV 1-AFW-4532-CV 1-AFW-4523-CV 1-AFW-4533-CV b. For the unaffected S/G, place the motor driven train AFW Block Valve Handswitches in OPEN. - <u>CAUTION</u> - Bupplying power to 13 AFW p flow limit is 300 GPM; erwise, flow ljmit is 575 GPM. c. Start 13 AFW Pump. d. Adjust AFW Flow Control Valve on unafiscted S/G to maintain S/G level between (-)24 and (+)30 inches. <u>11 S/G</u> or <u>12 S/G</u> 1-AFW-4525-CV 1-AFW-4535-CV	 1.1 IF 13 AFW Pump NOT available, THEN establish AFW flow to unaffected S/G using 11 or 12 AFW Pump: a. For the affected S/G, shut the steam driven train AFW Block Valves: <u>11 S/G</u> or <u>12 S/G</u> <u>1-AFW-4520-CV</u> <u>1-AFW-4530-CV</u> <u>1-AFW-4521-CV</u> <u>1-AFW-4531-CV</u> b. For the unaffected S/G, place the steam driven train AFW Block Valve Handswitches in OPEN. <u>CAUTION -</u> The following step could result in an unmonitored radiation release if performed improperly. C. For the unaffected S/G, open the AFW Steam Supply Valve. <u>11 S/G</u> or <u>12 S/G</u> 1-MS-4070-CV 1-MS-4071-CV Verify 11 or 12 AFW Pump discharge pressure approximately 100 PSI greater than unaffected S/G to maintain S/G level between (-)24 and (+)30 inches. <u>11 S/G</u> or <u>12 S/G</u> 			

			EOP-6 Rev. 1/Unit 1 Page 13 of 37			
III. RECOVERY ACTIONS			ALTERNATE ACTIONS			
к.	WHE	IN Thot DECREASES TO 515°F, IN ISOLATE AFFECTED S/G:				
	1.	For the affected S/G, shut the MSIV.				
	2.	For the affected S/G, shut S/G Feedwater Isolation Valve.				
		<u>11 S/G</u> or <u>12 S/G</u>				
		1-FW-4516-MOV 1-FW-4517-MOV				
	3.	For the affected S/G, shut the AFW Flow Control Valves:				
		<u>11 S/G</u> or <u>12 S/G</u>				
		1-AFW-4511-CV 1-AFW-4512-CV 1-AFW-4525-CV 1-AFW-4535-CV				
	4	For the affected S/G, shut the motor and steam driven train AFW Block Valves:				
		11 S/G or 12 S/G				
		1-AFW-4520-CV 1-AFW-4521-CV 1-AFW-4521-CV 1-AFW-4531-CV 1-AFW-4532-CV 1-AFW-4532-CV 1-AFW-4533-CV				
	5.	For the affected S/G, shut the AFW Steam Supply Valve.				
		11 S/G or 12 S/G	. · · · · · · · · · · · · · · · · · · ·			
		1-MS-4070-CV 1-MS-4071-CV				
	6.	For the affected S/G, shut the Atmospheric Dump Valve using the Hand Transfer Valves on the West wall of the Unit 1 45 ft Switchgear Room:	6.1 <u>IF</u> Atmospheric Dump Valve will <u>NOT</u> shut from 1C43, <u>THEN</u> shut Atmospheric Dump Manual Isolation Valve.			
,		 Verify 1C43 Atmospheric Dump Controllers at 0% output. 	<u>11 S/G</u> or <u>12 S/G</u> 1-MS-101 1-MS-104			

EOP-6 Rev. 1/Unit 1 Page 14 of 37

ALTERNATE ACTIONS

RECOVERY ACTIONS

b. Align Hand Transfer Valves to 1C43 position:

<u>11 S/G</u> or <u>12 S/G</u>

1-HV-3938A	1-HV-3939A
1-HV-3938B	1-HV-3939B

7. Shut MSIV Bypass Valves:

1-MS-4045-MOV 1-MS-4052-MOV

8. Shut S/G Blowdown Valves:

1-BD-4010-CV 1-BD-4011-CV 1-BD-4012-CV 1-BD-4013-CV

- Shut upstream drains by placing handswitch 1-HS-6622 in CLOSE.
- Verify locally, from the Auxiliary Building Roof, that S/G Safety Valves are shut.
- <u>IF</u> wrong S/G was isolated, <u>THEN</u> unicolate that S/G <u>AND</u> isolate proper S/G.
- 12. Maintain affected S/G level less than (+)30 inches and S/G pressure less than 900 PSIA per step W, page 25.

EOP-6	5		
Rev.	1/1	Jnit	t 1
Page	15	of	37

ALTERNATE ACTIONS

III. RECOVERY ACTIONS

L. <u>IF</u> RCPs SECURED, <u>THEN</u> CONFIRM NATURAL CIRCULATION IN UNAFFECTED S/G LOOP:

- NOTE -

Wide range Thot may be obtained from Subcooled Margin Monitor per Attachment (10).

- Thot minus Tcold between 10 and 50°F.
- 2. Tcold constant or decreasing.
- 3. Thot constant or decreasing.
- CET temperatures consistent with Thot.
- Steaming rate affects primary temperature.

M. MONITOR FOR CORE AND RCS VOIDING:

- CAUTION -

Potential for void formation increases rapidly when pressure decreases below 1500 PSIA.

- Letdown flow greater than charging flow.
- Rapid unexplained increase in pressurizer level during an RCS pressure reduction.
- Loss of subcooled margin as determined using CET temperatures.
- "REACTOR VESSEL WATER LEVEL LOW" alarm.

1 11	RECOVERY ACTIONS	EOP-6 Rev. 1/Unit 1 Page 16 of 37 ALTERNATE ACTIONS
N .	IF VOIDING INHIBITS HEAT REMOVAL, THEN REDUCE OR ELIMINATE VOIDED AREA:	
		2.1 IF pressurizing the RCS does NOT restore heat removal, THEN operate Reactor Vessel Vent Valves per OI-1G.

III. RECOVERY ACTIONS			EOP-6 Rev. 1/Unit 1 Page 17 of 37				
			ALTERNATE ACTIONS				
0. WHD	HEN AL	FFECTED S/G IS ISOLATED, ONTINUE RCS COOLDOWN AND SURIZATION:					
1	. Con thi Val len coo	ntinue cooldown by rottling Turbine Bypass lves, while maintaining ss than 100°F/h RCS oldown rate.	1.1	IF Turbine Bypass Valves NOT available, THEN throttle Atmospheric Dump Valve on unaffected S/G to continue RCS cooldown. IF unable to obtain desired cooldown rate, THEN start 11 or 12 AFW Pump			
2	. Dej RCI equ pre	pressurize RCS to maintain S pressure approximately ual to affected S/G essure.		,			
		- CAUTION -					
A 9 1 8 3	he RCS he RCI he RCI bcool 5°F.	pressure decreases below IA, NPSH requirements for Ps may require RCS ling to be greater than					
3	. WHI be THI	EN RCS pressure decreases low 900 PSIA, EN perform the following:					
	а.	Ensure RCP NPSH requirements are maintained per Attachment (1).					
	b.	Maintain subcooling as low as the RCP operating curve will allow.					
	c.	Evaluate starting a second RCP, in desired loop per step V., page 22; secure RCP in opposite loop to allow a lower minimum RCS pressure.					

EOP-6 Rev. 1/Unit 1 Page 18 of 37

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

Ε.						
 Maintain affected S/G pressure and level per step W, page 25. 						
	5.	Dire perf the	oct Chemistry and Rad Con to form periodic samples for following:			
		a.	RCS boron and activity.			
		b.	Both S/Gs for activity and boron.			
		c.	Turbine Building Sumps for activity.			
		d.	Condensate and CSTs for activity.			
		e.	Air samples and radiation surveys throughout plant to determine the spread of contamination.			
	WHE	IN RC	S BORATION COMPLETE,			
	THP	PPLY VER B	IFT CHARGING PUMP SUCTION TO MAKEUP SUPPLY WITH A ORIC ACID CONCENTRATION.			
	1.	IF THE	SIAS actuated. N perform the following:	1.1	IF S THEN Pump	SIAS <u>NOT</u> actuated, N line up Charging o suction to VCT:
		a. b.	Open RWT To Charging Pump Suction Valve, 1-CVC-504-MOV. Shut VCT Outlet Valve, 1-CVC-501-MOV.		а.	Determine blend required to maintain shutdown boron concentration per NEOG-7.
		с.	Place Boric Acid Pumps in PULL-TO-LOCK.		b.	Open VCT Outlet Valve, 1-CVC-501-MOV.
		d.	Ensure Charging Pump AMPS steady.		c.	Secure Boric Acid Pump(s).
		e.	Ensure BAST levels steady.		d.	Shut Boric Acid Direct Makeup Valve, 1-CVC-514-MOV.

	Rev. 1/Unit 1 Page 19 of 37
LII. RECOVERY ACTIONS	ALTERNATE ACTIONS
	e. Shut BAST Gravity Feed Valves:
	1-CVC-508-MOV 1-CVC-509-MOV
	OR line up Charging Pump suction to RWT:
	a. Open RWT To Charging Pump Suction Valve, 1-CVC-504-MOV.
	b. Shut VCT Outlet Valve, 1-CVC-501-MOV.
	.c. Shut Boric Acid Direct Makeup Valve, 1-CVC-514-MOV.
	d. Secure Boric Acid Pump(s).
. IF SIAS ACTUATED, THEN RESET SIAS:	
 Perform SIAS Verification Checklist, Attachment (2). 	
 Block pressurizer pressure signals and reset SIAS signal. 	
 Restore equipment per SIAS Verification Checklist, Attachment (2), to desired condition. 	
R. RESTORE SERVICE WATER TO TURBINE BUILDING:	
 Verify 21 Plant Air Compressor operating. 	
 Shut Plant Air To Plant Air Header Valve, 1-PA-2059-CV. 	
	and the second

EOP-6 Rev. 1/Unit 1 Page 20 of 37



ALTERNATE ACTIONS

 Open Plant Air To Instrument Air Cross Connect Valve, 1-PA-2061-CV.

 Open SRW Turbine Building Header Isolation Valves:

> 1-SRW-1600-CV 1-SRW-1637-CV 1-SRW-1638-CV 1-SRW-1639-CV

S. RESTORE INSTRUMENT AIR COMPRESSORS TO SERVICE:

> <u>IF</u> high temperature alarm exists on the Instrument Air Compressors, <u>THEN</u> open the service water isolation valves by placing their handswitches in OPEN until temperature alarm clears.

> > 11 or 12

1-HS-2063 1-HS-2065

- Start at least one Instrument Air Compressor.
- T. CONTAINMENT AIR TO CONTAINMENT:
 - Open Cntmt Instrument Air Isolation MOV, 1-IA-2080-MOV.

EOP-6 Rev. 1/Unit 1 Page 21 of 37

ALTERNATE ACTIONS

III. RECOVERY ACTIONS

- NOTE -

1-HS-2085 located on West wall of 27 ft Switchgear Room; Key #85 in Control Room Key Locker.

- Open Cntmt Instrument Air Supply CV, 1-IA-2085-CV, by momentarily placing 1-HS-2085 in OPEN.
- U. RESTORE LETDOWN FLOW:
 - Verify charging flowpath through Loop Charging Valves or Auxiliary Spray Valve.
 - Verify at least one Charging Pump operating.
 - Shift Letdown Control Valve Controller, 1-HIC-110, to MANUAL.
 - Adjust controller to shut Letdown Control Valves.
 - 5. Open Letdown Isolation Valves:

1-CVC-515-CV 1-CVC-516-CV

- CAUTION -

The setpoint of 1-PIC-201 must be above the saturation pressure for the letdown outlet temperature of the Regenerative Heat Exchanger.

 Adjust the setpoint on 1-PIC-201 and adjust 1-HIC-110 to maintain desired pressurizer level.

EOP-6 Rev. 1/Unit 1 Page 22 of 37

ALTERNATE ACTIONS

RECOVERY ACTIONS

V. <u>IF</u> PCPS WERE SECURED <u>AND</u> RCP RESTART CRITERIA MET, <u>THEN</u> RESTORE RUS FORCED CIRCULATION:

- CAUTION -

Uncontrolled restoration of cooling to hot RCP seals may cause degradation of the metallic seating surfaces by thermal shock.

- <u>IF</u> Component Cooling is isolated to RCP seals, <u>THEN</u> reduce RCP lower seal temperature below 280°F prior to initiating full cooling flow to the RCPs:
 - a. Shut Component Cooling Supply Containment Manual Isolation Valve, 1-CC-284, located in 5 ft East Fenetration Room.
 - b. Verify CIS reset.
 - c. Open Component Cooling Containment Isolation Valves:

1-CC-3832-CV 1-CC-3833-CV

- d. Slowly open 1-CC-284 to throttle component cooling flow until lower seal temperatures are less than 280°F.
- e. <u>WHEN</u> lower seal temperatures are less than 280°F, THEN fully open 1-CC-284.

III.

EOP-6 Rev. 1/Unit 1 Page 23 of 37

III. RECOVERY ACTIONS

- <u>IF</u> an RCP lower seal temperature exceeded 280°F, <u>THEN</u> an engineering evaluation is required prior to restarting that RCP.
- Raise pressurizer level to at least 155 inches.
- Verify RCP restart criteria:
 - RCS subcooling greater than 30°F.
 - b. At least one S/G available for heat removal.
 - c. Pressurizer level greater than 155 inches and stable.
 - d. Tcold less than 525°F.
 - e. RCS temperature and pressure greater than the minimum operating limits per the RCP curve on Attachment (1).
 - NOTE -

Starting an RCP may cause a pressurizer level transient.

- WHEN RCP restart criteria met, THEN start one RCP in a loop with an operable S/G:
 - a. Verify "COMPT CLG FLOW LO" alarm clear.
 - b. Start Oil Lift Pump.
 - c. Insert RCP sync ctick.
 - d. Start one RC:

ALTERNATE ACTIONS

EOP-6 Rev. 1/Unit 1 Page 24 of 37

ALTERNATE ACTIONS

RECOVERY ACTIONS

e. Verify RCP running current:

Tavg Current

525 to 572°F 238 to 210 AMPS and steady

210 to 525°F 264 to 238 AMPS and steady

- 6. IF pressurizer level decreases, THEN start Charging or HPSI Fump(s) as necessary to restore AND maintain level greater than 155 inches.
- 7. Monitor RCP seal parameters following pump restart.
- 8. Allow backflow to equalize temperatures in opposite loop.
- 9. Start second RCP in opposite loop per steps V.5 and V.7, pages 23 and 24.
- 10. Secure Auxiliary Spray:
 - a. Open Loop Charging Valves:

1-CVC-518-CV 1-CVC-519-CV

- b. Shut Auxiliary Spray Valve, 1-CVC-517-CV.
- c. Shift Pressurizer Spray Controller, 1-HIC-100, to AUTO.

III.

EOP-6 Rev. 1/Unit 1 Page 25 of 37

RECOVERY ACTIONS

W. PRESSURE AND LEVEL CONTROL OF AFFECTED S/G:

- NOTE -

The following methods for controlling affected S/G pressure and level are listed in preferred order and should be attempted in that order.

 Maintain affected S/G pressure approximately equal to RCS pressure and S/G level between (-)24 and (+)30 inches by:

- a. Steaming S/G to Condenser per step W.2, page 25.
- b. S/G Blowdown to Condenser per step W.3, page 27.
- c. S/G Blowdown to MWS per step W.4, page 29.
- d. Steaming S/G to atmosphere per step W.5, page 31.
- Filling S/G to MSIV per step W.6, page 32.
- Pressure and level control of affected S/G by steaming to Condenser:
 - Ensure condenser vacuum greater than 20 IN Hg.
 - b. Ensure at least one Condensate Demin in service.
 - c. Open Condensate Precoat Filter Bypuss Valve, 1-CD-5818-CV.
 - d. Shut Condensate Demin Bypass Valve, 1-CD-4439-MOV.

ALTERNATE ACTIONS

II.
EOP-6 Rev. 1/Unit 1 Page 26 of 37

ALTERNATE ACTIONS

III. RECOVERY ACTIONS

- e. Throttle open Feedwater Dump To Condenser Hotwell Valves, 1-FW-134 and 1-FW-135, to obtain maximum condensate flow through Condensate Demin.
- f. Shut Condenser High Level Dump CV Inlet Valve, 1-CD-232.
 - NOTE -

Maintaining S/G level above top of tube bundle provides a large decontamination factor due to the water covering the break.

- g. Maintain affected S/G level between (-)24 and (+)30 inches by operating AFW.
- h. Operate upstream drains using 1-HS-6622 as necessary to control affected S/G pressure.

- CAUTION -

Do not operate MSIV Bypass Valve on a S/G whose level exceeded (+)63.5 inches.

> <u>IF</u> additional steam flow desired, <u>THEN</u> operate MSIV Bypass Valve on affected S/G.

> > <u>11 S/G</u> or <u>12 S/G</u>

1-MS-4045-MOV 1-MS-4052-MOV

EOP-6 Rev. 1/Unit 1 Page 27 of 37

III. RECOVERY ACTIONS

 Pressure and level control of affected S/G by blowdown to Condenser:

- Ensure at least one Condensate Demin in service.
- b. Open Condensate Precoat Filter Bypass Valve, 1-CD-5818-CV.
- c. Shut Condensate Demin Bypass Valve, 1-CD-4439-MOV.
- d. Throttle open Feedwater Dump To Condenser Hotwell Valves, 1-FW-134 and 1-FW-135, to obtain maximum condensate flow through Condensate Demin.
- Shut Condenser High Level Dump CV Inlet Valve, 1-CD-232.
- f. Place S/G Blowdown Recovery System Radiation Monitor, 1-RE-4095, in RESET.
- g. Shut B/D Recovery Discharge To MWS, 1-BD-4097-CV.
- h. Shut B/D Recovery Discharge To Circ Water, 1-BD-4015-C¹¹
- Open B/D Recovery To Condenser, 1-BD-4096-CV.
- j. Shut S/G Combined B/D Header Throttle Valves:

1-BD-102 1-BD-104

ALTERNATE ACTIONS

EOP-6 Rev. 1/Unit 1 Page 28 of 37

ALTERNATE ACTIONS

III. RECOVERY ACTIONS

k. Open the affected S/G Bottom Blowdown Valve by placing handswitch in RAD TRIP OVERRIDE.

<u>11 S/G</u> or <u>12 S/G</u>

1-BD-4011-CV 1-BD-4013-CV

 Throttle open S/G Combined B/D Header Throttle Valve on affected S/G to obtain a blowdown flow of approximately 100 GPM.

11 S/G or 12 S/G

- 1-BD-102 1-BD-104
- m. Throttle SRW flow to 12 Blowdown Heat Exchanger to maintain a blowdown discharge temperature between 105 and 115 F using 12 B/D Heat Exchanger Discharge Valve, 1-SRW-522.

- NOTE -

Maintaining S/G level above top of tube bundle provides a large decontamination factor due to the water covering the break.

- n. Alternately lower and raise affected S/G level by:
 - (1) S/G Blowdown to Condenser to (-)24 inches.
 - (2) Operating AFW to (+)30 inches.

EOP-6 Rev. 1/Unit 1 Page 29 of 37

ALTERNATE ACTIONS

RECOVERY ACTIONS III.

- 4. Pressure and level control of affected S/G by blowdown to MWS:
 - a. Place S/G Blowdown Recovery System Radiation Monitor, 1-RE-4095, in PULSE CAL and bypass its alarm.
 - b. Open B/D Recovery Discharge To MWS, 1-BD-4097-CV.
 - c. Shut B/D Recovery Discharge To Circ Water, 1-BD-4015-CV.
 - d. Shut B/D Recovery To Condenser, 1-BD-4096-CV.
 - e. Shut S/G Combined B/D Header Throttle Valves:

1-BD-102 1-BD-104

f. Open the affected S/G Bottom Blowdown Valve by placing handswitch in RAD TRIP OVERRIDE.

11 S/G or 12 S/G

1-BD-4011-CV 1-BD-4013-CV

g. Throttle open S/J Combined B/D Header Throttle Valve on affected S/G to obtain a blowdown flow of approximately 100 GPM.

11 S/G or 12 S/G

1-BD-102 1-BD-104

EOP-6 Rev. 1/Unit 1 Page 30 of 37

ALTERNATE ACTIONS

III. RECOVERY ACTIONS

- h. Throttle SRW flow to 12 Blowdown Heat Exchanger to maintain a blowdown discharge temperature between 105 and 115°F using 12 B/D Heat Exchanger Discharge Valve, 1-SRW-522.
- Pump MWRT to RCWMT per OI-17D.
- Monitor MWRT level at 1C33.
- k. Throttle S/G blowdown rate to maintain a constant level in MWRT while pumping to RCWMT.

- NOTE -

Maintaining S/G level above top of tube bundle provides a large decontamination factor due to the water covering the break.

- Alternately lower and raise affected S/G level by:
 - S/G Blowdown to MWS to (-)24 inches.
 - (2) Operating AFW to (+)30 inches.

EOP-6 Rev. 1/Unit 1 Page 31 of 37

RECOVERY ACTIONS

II.

- CAUTION -

Do not operate Atmospheric Dump Valve on a S/G whose level exceeded (+)63.5 inches.

- Pressure and level control of affected S/G by steaming to atmosphere from 1C43:
 - Establish communications at 1C43.
 - b. Verify 1C43 Atmospher Dump Controllers at Coutput.
 - c. Verify Hand Transfer Valves for affected S/G are selected to 1C43 position:

1	11	S/	G	or	12	S/G

1-HV-3938A	1-HV-3939A
1-HV-3938B	1-HV-3939B

- NOTE -

Maintaining S/G level above top of tube bundle provides a large decontamination factor due to the water covering the break.

- d. Maintain affected S/G level between (-)24 and (+)30 inches by operating AFW.
- e. Adjust Atmospheric Dump from 1C43 as directed by Control Room Personnel to control affected S/G pressure.
- Record total time Atmospheric Dump Valve open, for dose calculations.

ALTERNATE ACTIONS

5.1 <u>IF</u> Atmospheric Dump was previously isolated, <u>THEN</u> throttle open Atmospheric Dump Manual Isolation Valve as directed by Control Room Personnel to control affected S/G pressure.

11 S/G or 12 3/G

1-MS-101 1-MS-104

- 5.2 Maintain affected S/G level between (-)24 and (+)30 inches by operating AFW.
- 5.3 Record total time Atmospheric Dump Valve open, for dose calculations.

EOP-6 Rev. 1/Unit 1 Page 32 of 37

ALTERNATE ACTIONS

.

P

.

.3

RECOVERY ACTIONS

II.

....

.

- 10⁻⁰

- 6. Affected S/G may be allowed to fill to MSIV provided the following conditions are maintained:
 - a. RCS pressure below 900 PSIA.
 - b. MSIVs, Atmospheric Dump Valves and MSIV Bypass Valves remain shut.

X. COLLETE ADMINISTRATIVE POST-TRIP ACTIONS AND IMPLEMENT APPROPRIATE OPERATING PROCEDURE.

EOP-6 Rev. 1/Unit 1 Page 33 of 37

Y. ADMINISTRATIVE POST-TRIP ACTIONS:

- NOTE -

The following actions may be accomplished whenever feasible. They may be done in any order.

- Refer to ERPIP to determine appropriate emergency response actions.
- 2. Perform notifications per CCI-118.
- _____ 3. Notify ESO of trip.
- 4. Request RCS Boron and Iodine sample.
- 5. Perform shutdown margin calculation per NEOG 2 and 7.
 - 6. Complete transient log entries per CCI-301.
- 7. Recall post-trip review (preferably within 30 minutes of trip).
 - 8. Perform post-trip review per CCI-111.
 - 9. Monitor turbine bearing temperatures.
 - 10. Continue Main Turbine shutdown per applicable step of OI-43A.

END OF SECTION III.

EOP-6 Rev. 1/Unit 1 Page 34 of 37

IV. SAFETY FUNCTION STATUS CHECK

.....

- A. The STA (or person designated by STA) will perform the intermediate and final safety function checks respectively on entry and prior to exiting from this procedure.
- B. Perform intermediate safety function status check at 10 minute intervals until plant conditions stabilize.
- C. Immediately notify Chift Supervisor or Control Room Supervisor if any safety function writeria is not being satisfied.
- D. Review data and verify that safety function acceptance criteria are satisfied.
- E. When EOP completed, then perform final safety function check.

REACTIVITY	SAFETY FUNCTION ACCEPTANCE CRITERIA				
PARAMETERS	CRITERIA	INTERMEDIATE CRITERIA CHECK		FINAL CHECK	
a. WRNI power	less than 3%		less than 1%		
b. SUR (DPM)	negative		0		
c. CEA status	all inserted		all inserted		
or					
Boration status:					
concentation	increasing		appropriate S/D margin		
BAST level	decreasing		N/A	N/A	

EOP-6 Rev. 1/Unit 1 Page 35 of 37

RCS PRESSURE AND INVENTORY	SAFETY FUNCTION ACCEPTANCE CRITERIA				
PARAMETERS	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK	
a. Pressurizer pressure (PSIA)	300 to 1900		greater than 300		
<pre>b. Pressurizer level (inches)</pre>	0 to 200		101 to 160		
c. RCS subcooling ($^{\circ}F$)	25 to 140		25 to 140		
		**			
CORE AND RCS HEAT REMOVAL	SAFETY FUI	NCTION ACCEPTAN	NCE CRITERIA		
PARAMETERS	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK	
a. RCS Tcold (^O F)	less than 535		300 to 515		
b. Thot minus Tcold (°F)					
Natural Circulation	10 to 50		10 to 50		
Forced Circulation	less than 10		less than 10		
c. Affected S/G pressure (PSIA)	less than 920		less than 900		
d. Affected S/G level (inches)	less than (+)30		less than (+)30		
e. Unaffected S/G pressure (PSIA)	70 to 920		70 to 730		
f. Unaffected S/G level (inches)	(-)170 to (+)30		(-)24 to (+)30		
g. Condensate Storage Tank level (ft)	greater than 5		greater than 5		

.

a

EOP-6 Rev. 1/Unit 1 Page 36 of 37

17

VITAL	SAFETY FU	NCTION ACCEPTA	NCE CRITERIA	RIA			
	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL			
a. 4KV vital buses 11 or 14	energized		energized				
b. Instrument Air pressure (PSIG)	greater chan 88		greater than 88				
c. Component Cooling (# pumps running)	1 or 2		1 or 2 _				
d. Saltwater (# pumps running)	1 or 2		1 or 2 _				
e. Service Water (# pumps running)	1 or 2		1 or 2 _				
f. 125V DC buses 11, 12, 21, 22	energized		energized _				
g. 120V AC vital buses 11, 12, 13, 14	energized		energized _				
NORMAL CONTA I NMENT	SAFETY FUN	NCTION ACCEPTAN	NCE CRITERIA				
ENVIRONMENT	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL			
a. Containment pressure (PSIG)	less than 0.7	*******	less than 0.7				
Containment temperature (°F)	less than 120		less than 120				
. Containment High Range Radiation	alarm						
Monitor	clear		clear				

3

EOP-6 Rev. 1/Unit 1 Page 37 of 37

NORMAL RADIATION SAFETY FUNCTION ACCEPTANCE CRITERIA LEVELS EXTERNAL TO CONTAINMENT CRITERIA INTERMEDIATE CRITERIA FINAL CHECK CHECK alarm a. Noble Gas Monitor (1) alarming clear b. Condenser Off-Gas (1) alarm RMS alarming clear alarm c. S/G B/D RMS (1) alarming clear d. Main Vent Gaseous (1) alarm RMS (1-RI-5415) alarming clear

(1) RMS alarms are break size and RCS activity dependent.

STATUS CHECK COMPLETE AT TIME

EOP-6 Rev. 1/Unit 2 Page 1 of 37

CALVERT CLIFFS NUCLEAR POWER PLANT

EOP-6 STEAM GENERATOR TUBE RUPTURE

REVISION 1

0	SIGNATURE	DATE
PREPARED BY;	In rent of	12-18-87
VERIFIED BY;	James V. Grooms	1 12/18/87
POSRC;	MEETING # 88-7	1 2-10-88
APPROVED BY;	Manager-Nuclear Operations o Operations if POSRC review i	r General Supervisor- s not required

.

EOP-6 Rev. 1, Thit 2 Fage 2 of 37

٩,

1 41

LIST OF EFFECTIVE PAGES

Y.

EOP-6 Rev. 1/Unit 2 Page 3 of 37

STEAM GENERATOR TUBE RUPTURE

I. PRECAUTIONS

- A. Do not adopt manual operation of automatically controlled systems unless a malfunction is apparent or automatic system operation will not support the maintenance of a safety function.
- B. Systems shifted to manual must be monitored frequently to ensure correct operation.
- C. At least two independent indications should be used, when available, to evaluate and corroborate a specific plant condition since an incident could induce inconsistencies between instruments.
- D. If the damaged S/G has been isolated and the cooldown is proceeding via Natural Circulation, an inverted temperature differential may be observed in the idle loop. This condition will have no effect on natural circulation flow in the intact S/G.
- E. Minimize the number of cycles of pressurizer auxiliary spray when the temperature differential is greater than 400 F.
- F. If a pump or component fails, the cause of the failure should be determined prior to restarting or starting a standby pump or component to prevent a common failure.

II. ENTRY CONDITIONS

The presence of one or more of the following conditions indicates that a Steam Generator Tube Rupture may have occurred:

- A. Unexplained decrease in VCT level or pressurizer level.
- B. Condenser Off-Gas RMS alarm.
- C. S/G Blowdown RMS alarm.
- D. Main Steam Line RMS alarm.
- E. Main Vent RMS alarm.
- F. Decreasing pressurizer pressure.

111	RECOVERY ACTION	EOP-6 Rev. 1/Unit 2 Page 4 of 37 <u>ALTERNATE ACTIONS</u>
Α.	VERIFY POST-TRIP IMMEDIATE ACTIONS COMPLETED.	
в.	COMMENCE INTERMEDIATE SAFETY FUNCTION STATUS CHECK.	
c.	DETERMINE APPROPRIATE EMERGENCY RESPONSE ACTIONS PER THE ERPIP.	
D.	 MONITOR RCS DEPRESSURIZATION. 1. IF rapid depressurization to 1725 PSIA, THEN verify SIAS actuation AND the following actions: a. All available Charging Pumps running. b. 21 and 23 HPSI Pumps running. c. Main and Aux HPSI Header Valves open: 	<pre>1.1 IF RCS pressure is greater than 1725 PSIA AND SIAS NOT actuated, THEN block SIAS: a. Open Main and Aux HPSI Header Valves: 2-SI-616-MOV 2-SI-617-MOV 2-SI-626-MOV 2-SI-627-MOV 2-SI-636-MOV 2-SI-627-MOV 2-SI-636-MOV 2-SI-637-MOV 2-SI-646-MOV 2-SI-647-MOV b. Start 21 and 23 HPSI Pumps.</pre>
	2-SI-626-MOV 2-SI-617-MOV 2-SI-626-MOV 2-SI-627-MOV 2-SI-636-MOV 2-SI-637-MOV 2-SI-646-MOV 2-SI-647-MOV	c. WHEN "PRSR PRESS BLOCK A(B) PERMITTED" alarm(s) received, THEN block SIAS A(B).

EOP-6 Rev. 1/Unit 2 Page 5 of 37

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

E. IMPLEMENT RCP TRIP STRATEGY:

- <u>IF</u> RCS pressure decreases to 1725 PSIA, <u>THEN</u> trip 21A and 22B RCPs OR trip 21B and 22A RCPs.
- <u>IF</u> positive LOCA indications exist:
 - a. RCS subcooling less than 30°F.
 - b. Steady S/G pressure.
 - c. S/G Blowdown RMS alarms clear <u>OR</u> Main Vent Gaseous RMS (2-RI-5415) alarm clear.

AND RCS pressure decreases to less than 1300 PSIA, THEN trip all RCPs.

- 3. <u>IF</u> RCS temperature and pressure are less than the minimum pump operating limits per the RCP curve on Attachment (1), THEN trip all RCPs.
- <u>IF</u> CIS has actuated, <u>THEN</u> trip all RCPs.

EOP-6 Rev. 1/Unit 2 Page 6 of 37

10

1

III. RECOVERY ACTIONS		ALTERNATE ACTIONS			
F.	DEP SUB AND 101	RESSURIZE RCS TO MAINTAIN COOLING BETWEEN 25 AND 35°F PRESSURIZER LEVEL BETWEEN AND 160 INCHES:			
	1.	Shift 2-HIC-100 to MANUAL and open Pressurizer Spray Valve, on leg with operating RCP, as necessary to maintain subcooling between 25 and 35 °F.	1.1	IF Val THE Spr a. b. c. d.	Pressurizer Spray Ves NOT effective, IN initiate Auxiliary ay: Record temperature differential between Pressurizer and Regenerative Heat Exchanger Outlet. Open Auxiliary Spray Valve, 2-CVC-517-CV. Shut Loop Charging Valves: 2-CVC-518-CV 2-CVC-519-CV Shift 2-HIC-100 to MANUAL and shut Pressurizer Spray Valves: 2-RC-100E-CV 2-RC-100F-CV

...

8

EOP-6 Rev. 1/Unit 2 Page 7 of 37

ALTERNATE ACTIONS

1.1

RECOVERY ACTIONS

- <u>IF</u> the following conditions exist:
 - a. At least 25°F subcooling.
 - b. Pressurizer level greater than 101 inches.
 - c. At least one S/G available for heat removal.
 - d. RVLMS indicates that the Core is covered.

THEN throttle HPSI flow to maintain pressurizer level between 101 and 160 inches.

- <u>IF</u> RCS subcooling less than 25°F in an operating S/G loop, <u>THEN</u> raise RCS subcooling using one or more of the following actions:
 - Shut Pressurizer Spray Valves.

- NOTE -

Pressurizer Backup Heater Banks 21 and 23 trip on U/V and SIAS.

- Energize Pressurizer Heaters.
- c. Raise RCS cooldown rate.
- 5. <u>IF</u> RCS subcooling greater than 35°F in an operating S/G loop, <u>THEN</u> lower RCS subcooling using one or more of the following actions:
 - De-energize Pressurizer Heaters.
 - b. Operate Pressurizer Spray Valve on leg with operating RCP.
 - c. Lower RCS cooldown rate.

5.b.1 Initiate Auxiliary Spray per step F.1.1, page 6.

111.

II. RECOVERY ACTIONS			EOP-6 Rev. 1/Unit 2 Page 8 of 37 ALTERNATE ACTIONS	
G.	COM	MENCE RCS COOLDOWN TO LOWER		
	1.	WHEN "SGIS A(B) BLOCK PERMITTED" alarm(s) received, THEN block SGIS A(B). Commence cooldown to 515°F by throttling Turbine Bypass Valves, while maintaining less than 100°F/h RCS	1.1	 IF SGIS actuates, THEN reset SGIS: a. Place Condensate Booster Pumps in PULL-TO-LOCK. b. Match handswitches per SGIS Verification Checklist, Attachment (7). c. Block SGIS. d. Reset SGIS signal. e. Open MSIVs. IF Turbine Bypass Valves NOT available, THEN throttle Atmospheric Dump Valves to commence cooldown.
	3.	IF Turbine Bypass Valves available, THEN ensure Atmospheric Dump Valves are shut.	2.2	Record total time Atmospheric Dump Valve open, for dose calculations, prior to identifying and isolating affected S/G.
		Dump valves ale shut.		

EOP-6 Rev. 1/Unit 2 Page 9 of 37

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

- H. VERIFY BORATION IN PROGRESS:
 - <u>IF</u> SIAS has actuated, <u>THEN</u> verify boration in progress:
 - a. Shut VCT Makeup Valve, 2-CVC-512-CV.
 - b. Open Boric Acid Direct Makeup Valve, 2-CVC-514-MOV.
 - c. Boric Acid Pumps running.
 - d. Open BAST Gravity Feed Valves:

2-CVC-508-MOV 2-CVC-509-MOV

- e. Shut VCT Outlet Valve, 2-CVC-501-NOV.
- f. All available Charging Pumps running.

 Continue boration until a total 65 inch decrease in BAST level(s) is achieved, or shutdown margin requirement of NEOG-11 is achieved.

- 1.1 <u>IF SIAS NOT</u> actuated, THEN commence boration:
 - a. Shut VCT Makeup Valve, 2-CVC-512-CV.
 - b. Open Boric Acid Direct Makeup Valve, 2-CVC-514-MOV.
 - c. Start a Boric Acid Pump.
 - d. Start all available Charging Pumps.
- 1.2 <u>IF</u> Boric Acid Pumps <u>NOT</u> available, <u>THEN</u> establish gravity feed:
 - a. Open BAST Gravity Feed Valves:

2-CVC-508-MOV 2-CVC-509-MOV

- b. Shut VCT Outlet Valve. 2-CVC-501-MOV.
- c. Start all available Charging Pumps.

EOP-6 Rev. 1/Unit 2 Page 10 of 37

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

- I. IDENTIFY AND CONFIRM AFFECTED S/G:
 - Attempt to identify affected S/G by comparing the following trends:
 - Mismatch in feed flow prior to trip.
 - Unexplained increase in S/G level prior to trip.
 - c. Main Steam Line RMS.
 - d. Post-trip S/G level changes.
 - e. S/G samples.
 - 2. Shut S/G Blowdown Valves:

2-BD-4010-CV 2-BD-4011-CV 2-BD-4012-CV 2-BD-4013-CV

 Shut AFW Steam Supply Valves by placing handswitches in CLOSE:

> 2-MS-4070-CV 2-MS-4071-CV

- 4. Secure Main Feed system:
 - a. Trip S/G Feed Pumps.
 - b. Place Condensate Booster Pumps in PULL-TO-LOCK.
 - c. Place 2 of the 3 Condensate Pumps in PULL-TO-LOCK.
 - d. Secure Heater Drain Pumps.

EOP-6 Rev. 1/Unit 2 Page 11 of 37

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

e. Shut S/G Feedwater Isolation Valves:

> 2-FW-4516-MOV 2-FW-4517-MOV

- f. Shut Hotwell To CST Dump CV by shifting 2-LIC-4405 to MANUAL with 50% output.
- <u>IF</u> affected S/G <u>NOT</u> identified, THEN perform the following:
 - a. Shut motor driven train AFW Block Valves on both S/Gs:

21 S/G 22 S/G

2-AFW-4522-CV 2-AFW-4532-CV 2-AFW-4523-CV 2-AFW-4533-CV

- Monitor S/G levels to determine affected S/G.
- Direct Chemistry to sample S/Gs.
- d. Direct Rad Con to perform a radiological survey of main steam lines.
- 6. WHEN affected S/G identified OR if it is determined that both S/Gs are affected, OR if either S/G level decreases to -170 inches, THEN feed unaffected or least affected S/G per step J, page 12.

EOP-6 Rev. 1/Unit 2 Page 12 of 37 ALTERNATE ACTIONS II. RECOVERY ACTIONS FEED UNAFFECTED S/G. J. IF 23 AFW Pump NOT available, 1.1 Establish AFW flow to 1. THEN establish AFW flow unaffected S/G using to unaffected S/G using 23 AFW Pump: 21 or 22 AFW Pump: For the affected S/G, shut a. For the affected S/G, shut the motor driven train a. the steam driven train AFW AFW Block Valves: Block Valves: 22 S/G or 21 S/G 22 S/G 21 S/G or 2-AFW-4532-CV 2-AFW-4522-CV 2-AFW-4530-CV 2-AFW-4520-CV 2-AFW-4533-CV 2-AFW-4523-CV 2-AFW-4521-CV 2-AFW-4531-CV For the unaffected S/G, b. b. For the unaffected S/G, place the motor driven place the steam driven train AFW Block Valve train AFW Block Valve Handswitches in OPEN. Handswitches in OPEN. - CAUTION -- CAUTION -D/G supplying power to 23 AFW The following step could result Pump flow limit is 300 GPM; in an unmonitored radiation otherwise, flow limit is 575 GPM. release if performed improperly. c. Start 23 AFW Pump. c. For the unaffected S/G, open the AFW Steam Supply Adjust AFW Flow Control d. . Valve. Valve on unaffected S/G to maintain S/G level 21 S/G or 22 S/G between (-)24 and (+)30 inches. 2-MS-4070-CV 2-MS-4071-CV 22 S/G or 21 S/G Verify 21 or 22 AFW Pump d. discharge pressure 2-AFW-4525-CV 2-AFW-4535-CV approximately 100 PSI greater than unaffected S/G pressure. Adjust AFW Flow Control e. . Valve on unaffected S/G to maintain S/G level between (-)24 and (+)30 inches. 22 S/G 21 S/G or 2-AFW-4511-CV 2-AFW-4512-CV

	RECOVERY ACTIONS	EOP-6 Rev. 1/Unit 2 Page 13 of 37 ALTERNATE ACTIONS
. WHE THE	N Thot DECREASES TO 515°F, N ISOLATE AFFECTED S/G:	
1.	For the affected S/G, shut the MSIV.	
2.	For the affected S/G, shut S/G Feedwater Isolation Valve.	
	21 S/G or 22 S/G	
	2-FW-4516-MOV 2-FW-4517-MOV	
3.	For the affected S/G, shut the AFW Flow Control Valves:	
	21 S/G or 22 S/G	
	2-AFW-4511-CV 2-AFW-4512-CV 2-AFW-4525-CV 2-AFW-4535-CV	
4.	For the affected S/G, shut the motor and steam driven train AFW Block Valves:	
	21 S/G or 22 S/G	
	2-AFW-4520-CV 2-AFW-4521-CV 2-AFW-4521-CV 2-AFW-4522-CV 2-AFW-4522-CV 2-AFW-4523-CV 2-AFW-4533-CV	
5.	For the affected S/G, shut the AFW Steam Supply Valve.	
	21 S/G or 22 S/G	
	2-MS-4070-CV 2-MS-4071-CV	
6.	For the affected S/G, shut the Atmospheric Dump Valve using the Hand Transfer Valves on the West wall of the Unit 2 45 ft Switchgear Room:	 6.1 <u>IF</u> Atmospheric Dump Valve will <u>NOT</u> shut from 2C43, <u>THEN</u> shut Atmospheric Dump Manual Isolation Valve. 21 S/G or 22 S/G
	 Verify 2C43 Atmospheric Dump Controllers at 0% output. 	2-MS 101 2-MS-104

EOP-6 Rev. 1/Unit 2 Page 14 of 37

ALTERNATE ACTIONS

III. RECOVERY ACTIONS

b. Align Hand Transfer Valves to 2C43 position:

21 S/G	or	22 S/G
--------	----	--------

2-HV-3939A	2-HV-3938A
2-HV-3939B	2-HV-3938B

7. Shut MSIV Bypass Valves:

2-MS-4045-MOV 2-MS-4052-MOV

8. Shut S/G Blowdown Valves:

2-BD-4010-CV 2-BD-4011-CV 2-BD-4012-CV 2-BD-4013-CV

- Shut upstream drains by placing handswitch 2-HS-6622 in CLOSE.
- Verify locally, from the Auxiliary Building Roof, that S/G Safety Valves are shut.
- IF wrong S/G was isolated, THEN unisolate that S/G AND isolate proper S/G.
- 12. Maintain affected S/G level less than (+)30 inches and S/G pressure less than 900 PSIA per step W, page 25.

EOP-6 Rev. 1/Unit 2 Page 15 of 37

III. RECOVERY ACTIONS

8

ALTERNATE ACTIONS

45

IF RCPs SECURED, THEN CONFIRM NATURAL CIRCULATION IN UNAFFECTED S/G LOOP:

- NOTE -

Wide range Thot may be obtained from Subcooled Margin Monitor per Attachment (10).

- 1. Thot minus Tcold between 10 and 50°F.
- 2. Tcold constant or decreasing.
- 3. Thot constant or decreasing.
- CET temperatures consistent with Thot.
- Steaming rate affects primary temperature.

M. MONITOR FOR CORE AND RCS VOIDING:

- CAUTION -

Potential for void formation increases rapidly when pressure decreases below 1500 PSIA.

- Letdown flow greater than charging flow.
- Rapid unexplained increase in pressurizer level during an RCS pressure reduction.
- Loss of subcooled margin as determined using CET temperatures.
- "REACTOR VESSEL WATER LEVEL LOW" alarm.

	EOP-6 Rev. 1/Unit 2 Page 16 of 37					
III. RECOVERY ACTIONS	ALTERNATE ACTIONS					
N. <u>IF</u> VOIDING INHIBITS HEAT REMOVAL, <u>TTUEN</u> REDUCE OR ELIMINATE VOIDED AREA:						
	2.1 . IF pressurizing the RCS does NOT restore heat removal, THEN operate Reactor Vessel Vent Valves per OI-1G.					

EOP-6 Rev. 1/Unit 2 Page 17 of 37

II. RECOVERY ACTIONS

- O. WHEN AFFECTED S/G IS ISOLATED, THEN CONTINUE RCS COOLDOWN AND DEPRESSURIZATION:
 - Continue cooldown by throttling Turbine Bypass Valves, while maintaining less than 100°F/h RCS cooldown rate.
 - Depressurize RCS to maintain RCS pressure approximately equal to affected S/G pressure.
 - CAUTION -

As RCS pressure decreases below 900 PSIA, NPSH requirements for the RCPs may require RCS subcooling to be greater than 35°F.

- WHEN RCS pressure decreases below 900 PSIA, THEN perform the following:
 - a. Ensure RCP NPSH requirements are maintained per Attachment (1).
 - b. Maintain subcooling as low as the RCP operating curve will allow.
 - c. Evaluate starting a second RCP, in desired loop per step V., page 22; secure RCP in opposite loop to allow a lower minimum RCS pressure.

ALTERNATE ACTIONS

- 1.1 IF Turbine Bypass Valves NOT available, THEN throttle Atmospheric Dump Valve on unaffected S/G to continue RCS cooldown.
- 1.2 <u>IF</u> unable to obtain desired cooldown rate, <u>THEN</u> start 21 or 22 AFW Pump per step J.1.1, page 12.

EOP-6 Rev. 1/Unit 2 Page 18 of 37 4

Г

1 11.	REC	RECOVERY ACTIONS			ALTERNATE ACTIONS				
4.	Mai pre ste	ntain affected S/G ssure and level per p W, page 25.							
5.	Dir per the	ect Chemistry and Rad Con to form periodic samples for following:							
	а.	RCS boron and activity.							
	b.	Both S/Gs for activity and boron.							
	с.	Turbine Building Sumps for activity.							
	d.	Condensate and CSTs for activity.							
	e.	Air samples and radiation surveys throughout plant to determine the spread of contamination.							
P. WH TH SU LO	EN RC EN SH PPLY WER B	S BORATION COMPLETE, IFT CHARGING PUMP SUCTION TO MAKEUP SUPPLY WITH A SORIC ACID CONCENTRATION.							
1.	IF THE	SIAS actuated, N perform the following:	1.1	IF THE Pum	SIAS <u>NOT</u> actuated, <u>N</u> line up Charging				
	a.	Open RWT To Charging Pump Suction Valve, 2-CVC-504-MOV.	a	a.	Determine blend required to maintain				
	b.	Shut VCT Outlet Valve, 2-CVC-501-MOV.			concentration per NEOG-11.				
	с.	Place Boric Acid Pumps in PULL-TO-LOCK.		b.	Open VCT Outlet Valve, 2-CVC-501-MOV.				
	d.	Ensure Charging Pump AMPS steady.		с.	Secure Boric Acid Pump(s).				
•	е.	Ensure BAST levels steady.		d.	Shut Boric Acid Direct Makeup Valve, 2-CVC-514-MOV.				

EOP-6 Rev. 1/Unit 2 Page 19 of 37

. .

111.	RECOVERY ACTIONS	ALTERNATE ACTIONS					
		e. Shut BAST Gravity Feed Valves:					
		2-CVC-508-MOV 2-CVC-509-MOV					
		OR line up Charging Pump suction to RWT:					
		a. Open RWT To Charging Pump Suction Valve, 2-CVC-504-MOV.					
		b. Shut VCT Outlet Valve, 2-CVC-501-MOV.					
	.c. Shut Boric Acid Direct. Makeup Valve, 2-CVC-514-MOV.						
		d. Secure Boric Acid Pump(s).					
). <u>11</u>	F SIAS ACTUATED, HEN RESET SIAS:						
1	. Perform SIAS Verification Checklist, Attachment (2).						
2	. Block pressurizer pressure signals and reset SIAS signal.						
3	. Restore equipment per SIAS Verification Checklist, Attachment (2), to desired condition.						
R. R. B	ESTORE SERVICE WATER TO TURBINE UILDING:						
1	. Verify 11 Plant Air Compressor operating.						
2	. Shut Plant Air To Plant Air Header Valve, 2-PA-2059-CV.						

Ø

4

EOP-6 Rev. 1/Unit 2 Page 20 of 37

.



EOP-6 Rev. 1/Unit 2 Page 21 of 37

RECOVERY ACTIONS

II.

ALTERNATE ACTIONS

- NOTE -

2-HS-2085 located on West wall of 27 ft Switchgear Room; Key #80 in Control Room Key Locker.

- Open Cntmt Instrument Air Supply CV, 2-IA-2085-CV, by momentarily placing 2-HS-2085 in OPEN.
- U. RESTORE LETDOWN FLOW:
 - Verify charging flowpath through Loop Charging Valves or Auxiliary Spray Valve.
 - Verify at least one Charging Pump operating.
 - Shift Letdown Control Valve Controller, 2-HIC-110, to MANUAL.
 - Adjust controller to shut Letdown Control Valves.
 - 5. Open Letdown Isolation Valves:

2-CVC-515-CV 2-CVC-516-CV

- CAUTION -

The setpoint of 2-PIC-201 must be above the saturation pressure for the letdown outlet temperature of the Regenerative Heat Exchanger.

 Adjust the setpoint on 2-PIC-201 and adjust 2-HIC-110 to maintain desired pressurizer level.

EOP-6 Rev. 1/Unit 2 Page 22 of 37

ALTERNATE ACTIONS

III. RECOVERY ACTIONS

V. <u>IF</u> RCPs WERE SECURED <u>AND</u> RCP RESTART CRITERIA MET, <u>THEN</u> RESTORE RCS FORCED CIRCULATION:

- CAUTION -

Uncontrolled restoration of cooling to hot RCP seals may cause degradation of the metall. seating surfaces by thermal shock.

- I. <u>IF</u> Component Cooling is isolated to RCP seals, <u>THEN</u> reduce RCP lower seal temperature below 280°F prior to initiating full cooling flow to the RCPs:
 - a. Shut Component Cooling Supply Containment Manual Isolation Valve, 2-CC-284, located in 5 ft East Penetration Room.
 - b. Verify CIS reset.
 - c. Open Component Cooling Containment Isolation Valves:

2-CC-3832-CV 2-CC-3833-CV

- d. Slowly open 2-CC-284 to throttle component cooling flow until lower seal temperatures are less than 280°F.
- e. WHEN lower seal temperatures are less than 280°F, THEN fully open 2-CC-284.

EOP-6 Rev. 1/Unit 2 Page 23 of 37

٥.

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

- <u>IF</u> an RCP lower seal temperature exceeded 280°F, <u>THEN</u> an engineering evaluation is required prior to restarting that RCP.
- Raise pressurizer level to at least 155 inches.
- Verify RCP restart criteria:
 - RCS subcooling greater than 30°F.
 - b. At least one S/G available for heat removal.
 - c. Pressurizer level greater than 155 inches and stable.
 - d. Tcold less than 525°F.
 - e. RCS temperature and pressure greater than the minimum operating limits per the RCP curve on Attachment (1).
 - NOTE -

Starting an RCP may cause a pressurizer level transient.

- WHEN RCP restart criteria met, THEN start one RCP in a loop with an operable S/G:
 - Verify "COMPT CLG FLOW LO" alarm clear.
 - b. Start Oil Lift Pump.
 - c. Insert RCP sync stick.
 - d. Start one RCP.

EOP-6 Rev. 1/Unit 2 Page 24 of 37

ALTERNATE ACTIONS

RECOVERY ACTIONS

Tavg

II.

j

]

67

e. Verify RCP running current:

Current

525	to	572°F	238	to	2	10	AMPS
			8	nd	ste	ead	ly

- 210 to 525°F 264 to 238 AMPS and steady
- 6. <u>IF</u> pressurizer level decreases, <u>THEN</u> start Charging or HPSI Pump(s) as necessary to restore <u>AND</u> maintain level greater than 155 inches.
- Monitor RCP seal parameters following pump restart.
- Allow backflow to equalize temperatures in opposite loop.
- Start second RCP in opposite loop per steps V.5 and V.7, pages 23 and 24.
- 10. Secure Auxiliary Spray:
 - a. Open Loop Charging Valves:

2-CVC-518-CV 2-CVC-519-CV

- b. Shut Auxiliary Spray Valve, 2-CVC-517-CV.
- c. Shift Pressurizer Spray Controller, 2-HIC-100, to AUTO.
EOP-6 Rev. 1/Unit 2 Page 25 of 37

ALTERNATE ACTIONS

.

III. RECOVERY ACTIONS

. G 11 71

W. PRESSURE AND LEVEL CONTROL OF AFFECTED S/G:

- NOTE -

The following methods for controlling affected S/G pressure and level are listed in preferred order and should be attempted in that order.

- Maintain affected S/G pressure approximately equal to RCS pressure and S/G level between (-)24 and (+)30 inches by:
 - a. Steaming S/G to Condenser per step W.2, page 25.
 - b. S/G Blowdown to Condenser per step %.3, page 27.
 - c. S/G Blowdown to MWS per step W.4, page 29.
 - d. Steaming S/G to atmosphere per step W.5, page 31.
 - Filling S/G to MSIV per step W.6, page 32.
- Pressure and level control of affected S/G by steaming to Condenser:
 - a. Ensure condenser vacuum greater than 20 IN Hg.
 - Ensure at least one Condensate Demin in service.
 - c. Open Condensate Precoat Filter Bypass Valve, 2-CD-5818-CV.
 - d. Shut Condensate Demin Bypass Valve, 2-CD-4439-MOV.

EOP-6 Rev. 1/Unit 2 Page 26 of 37

ALTERNATE ACTIONS

18

RECOVERY ACTIONS

- e. Throttle open Feedwater Dump To Condenser Hotwell Valves, 2-FW-134 and 2-FW-135, to obtain maximum condensate flow through Condensate Demin.
- f. Shut Condenser High Level Dump CV Inlet Valve, 2-CD-232.

- NOTE -

Maintaining S/G level above top of tube bundle provides a large decontamination factor due to the water covering the break.

- g. Maintain affected S/G level between (-)24 and (+)30 inches by operating AFW.
- h. Operate upstream drains using 2-HS-6622 as necessary to control affected S/G pressure.

- CAUTION -

Do not operate MSIV Bypass Valve on a S/G whose level exceeded (+)63.5 inches.

> i. <u>IF</u> additional steam flow desired, <u>THEN</u> operate MSIV Bypass Valve on affected S/G.

> > 21 S/G or 22 S/G

2-MS-4045-MOV 2-MS-4052-MOV

III.

.

]

EOP-6 Rev. 1/Unit 2 Page 27 of 37

ALTERNATE ACTIONS

14

III. RECOVERY ACTIONS

- Pressure and level control of affected S/G by blowdown to Condenser:
 - Ensure at least one Condensate Demin in service.
 - b. Open Condensate Precoat Filter Bypass Valve, 2-CD-5818-CV.
 - c. Shut Jondensate Demin Bypuss Valve 2-CD-4439-MOV.
 - d. Throttle open Feedwater Dump To Condenser Hotwell Valves, 2-FW-134 and 2-FW-135, to obtain maximum condensate flow through Condensate Demin.
 - Shut Condenser High Level Dump CV Inlet Valve, 2-CD-232.
 - f. Place S/G Blowdown Recovery System Radiation Monitor, 2-RE-4095, in RESET.
 - g. Shut B/D Recovery Discharge To MWS, 2-BD-4097-CV.
 - h. Shut B/D Recovery Discharge To Circ Water, 2-BD-4015-CV.
 - Open B/D Recovery To Condenser, 2-BD-4096-CV.
 - j. Shut S/G Combined B/D Header Throttle Valves:

2-BD-102 2-BD-104

÷

EOP-6 Rev. 1/Unit 2 Page 28 of 37

ALTERNATE ACTIONS

×.

RECOVERY ACTIONS

III.

k. Open the affected S/G Bottom Blowdown Valve by placing handswitch in RAD TRIP OVERRIDE.

21 S/G or 22 S/G

2-BD-4011-CV 2-BD-4013-CV

 Throttle open S/G Combined B/D Header Throttle Valve on affected S/G to obtain a blowdown flow of approximately 100 GPM.

21 S/G or 22 S/G

2-BD-102 2-BD-104

m. Throttle SRW flow to 22 Blowdown Heat Exchanger to maintain a blowdown discharge temperature between 105 and 115°F using 22 B/D Heat Exchanger Discharge Valve, 2-SRW-635.

- NOTE -

Maintaining S/G level above top of tube bundle provides a large decontamination factor due to the water covering the break.

- n. Alternately lower and raise affected S/G level by:
 - (1) S/G Blowdown to Condenser to (-)24 inches.
 - (2) Operating AFW to (+)30 inches.

EOF-6 Rev. 1/Unit 2 Page 29 of 37

ALTERNATE ACTIONS

III. RECOVERY ACTIONS

 Pressure and level control of affected S/G by blowdown to MWS:

- Place S/G Blowdown Recovery System Radiation Monitor, 2-RE-4095, in PULSE CAL and bypass its alarm.
- b. Open B/D Recovery Discharge To MWS, 2-BD-4097-CV.
- c. Shut B/D Recovery Discharge To Circ Water, 2-BD-4015-CV.
- d. Shut B/D Recovery To Condenser, 2-BD-4096-CV.
- e. Shut S/G Combined B/D Header Throttle Valves:

2-BD-102 2-ED-104

f. Open the affected S/G Bottom Blowdown Valve by placing handswitch in RAD TRIP OVERRIDE.

21 S/G or 22 S/G

2-BD-4011-CV 2-BD-4013-CV

g. Throt le open S/G Combined B/D Header Throttle Valve on affected S/G to obtain a blowdown flow of approximately 100 GPM.

21 S/G or 22 S/G

2-BD-102 2-BD-104

4

EOP-6 Rev. 1/Unit 2 Page 30 of 37

ALTERNATE ACTIONS

III. RECOVERY ACTIONS

- h. Throttle SRW flow to 22 Blowdown Heat Exchanger to maintain a blowdown discharge temperature between 105 and 115°F using 22 B/D Heat Exchanger Discharge Valve, 2-SRW-635.
- Pump MWRT to RCWMT per OI-17D.
- Monitor MWRT level at 1C33.
- k. Throttle S/G blowdown rate to maintain a constant level in MWRT while pumping to RCWMT.

- NOTE -

Maintaining S/G level above top of tube bundle provides a large decontamination factor due to the water covering the break.

- Alternately lower and raise affected S/G level by:
 - S/G Blowdown to MWS to (-)24 inches.
 - (2) Operating AFW to (+)30 inches.

EOP-6 Rev. 1/Unit 2 Page 31 of 37

III. RECOVERY ACTIONS

- CAUTION -

Do not operate Atmospheric Dump Valve on a S/G whose level exceeded (+)63.5 inches.

- Pressure and level control of affected S/G by steaming to atmosphere from 2C43:
 - Establish communications at 2C43.
 - b. Verify 2C43 Atmospheric Dump Controllers at 0% output.
 - c. Verify Hand Transfer Valves for affected S/G are selected to 2C43 position:
 - 21 S/G or 22 S/G

2-HV-3939A 2-HV-3938A 2-HV-3939B 2-HV-3938B

- NOTE -

Maintaining S/G level above top of tube bundle provides a large decontamination factor due to the water covering the break.

- d. Maintain affected S/G level between (-)24 and (+)30 inches by operating AFW.
- e. Adjust Atmospheric Dump from 2C43 as directed by Control Room Personnel to control affected S/G pressure.
- f. Record total time Atmospheric Dump Valve open, for dose calculations.

ALTERNATE ACTIONS

5.1 <u>IF</u> Atmospheric Dump was previously isolated, <u>THEN</u> throttle open Atmospheric Dump Manual Isolation Valve as directed by Control Room Personnel to control affected S/G pressure.

21 S/G or 22 S/G

2-MS-101 2-MS-104

- 5.2 Maintain affected S/G level between (-)24 and (+)30 inches by operating AFW.
- 5.3 Record total time Atmospheric Dump Valve open, for dose calculations.

EOP-6 Rev. 1/Unit 2 Page 32 of 37

LII. RECOVERY ACTIONS

 Affected S/G may be allowed to fill to MSIV provided the following conditions are maintained:

> a. RCS pressure below 900 PSIA.

b. MSIVs, Atmospheric Dump Valves and MSIV Bypass Valves remain shut.

X. COMPLETE ADMINISTRATIVE POST-TRIP ACTIONS AND IMPLEMENT APPROPRIATE OPERATING PROCEDURE.

ALTERNATE ACTIONS

EOP-6 Rev. 1/Unit 2 Page 33 of 37 .

Y. ADMINISTRATIVE POST-TRIP ACTIONS:

19

- NOTE -

The following actions may be accomplished whenever feasible. They may be done in any order.

- Refer to ERPIP to determine appropriate emergency response actions.
- Perform notifications per CC1-118.
- Notify ESO of trip.
 - 4. Request RCS Boron and Iodine sample.
- 5. Perform shutdown margin calculation per NEOG 9 and 11.
 - 6. Complete transient log entries per CCI-301.
- 7. Recall post-trip review (preferably within 30 minutes of trip).
 - 8. Perform post-trip review per CCI-ill.
- 9. Monitor turbine bearing temperatures.

10. Continue Main Turbine shutdown per applicable step of OI-43A.

END OF SECTION III.

EOP-6 Rev. 1/Unit 2 Page 34 of 37

1

IV. SAFETY FUNCTION STATUS CHECK

- A. The STA (or person designated by STA) will perform the intermediate and final safety function checks respectively on entry and prior to exiting from this procedure.
- B. Perform intermediate safety function status check at 10 minute intervals until plant conditions stabilize.
- C. Immediately notify Shift Supervisor or Control Room Supervisor if any safety function criteria is not being satisfied.
- D. Review data and verify that safety function acceptance criteria are satisfied.
- E. When EOP completed, then perform final safety function check.

FINAL CHECK
and the second second second second
-
-
N/A

EOP-6 Rev. 1/Unit 2 Page 35 of 37

RCS PRESSURE		SAFETY	FUNCTION ACCE	EPTANCE CRITER	A
PAI	RAMETERS	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK
а.	Pressurizer pressure (PSIA)	300 to 1900		greater than 300	
ь.	Pressurizer level (inches)	0 to 200		101 to 160	
с.	RCS subcooling ($^{\circ}F$)	25 to 140		25 to 140	
col	RE AND RCS	SAFETY FUI	NCTION ACCEPTA	NCE CRITERIA	
PA	AT REMOVAL RAMETERS	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK
а.	RCS Tcold (^O F)	less than 535		300 to 515	
b.	Thot minus Tcold (°F)				
	Natural Circulation	10 to 50		10 to 50	
	Forced Circulation	less than 10		less than 10	
с.	Affected S/G pressure (PSIA)	less than 920		less than 900	
d.	Affected S/G level (inches)	less than (+)30		less than (+)30	
ė.	Unaffected S/G pressure (PSIA)	70 to 920	*******	70 to 730	
f.	Unaffected S/G level (inches)	(-)170 to (+)30		(-)24 to (+)30	
g.	Condensate Storage Tank level (ft)	greater than 5	*******	greater than 5	

*

*

EOP-6 Rev. 1/Unit 2 Page 36 of 37 SAFETY FUNCTION ACCEPTANCE CRITERIA VITAL AUXILIARIES INTERMEDIATE CRITERIA FINAL CRITERIA CHECK CHECK a. 4KV vital buses energized energized 21 or 24 greater D. Instrument Air greater than 88 than 88 pressure (PSIG) c. Component Cooling 1 or 2 1 or 2 (# pumps running) d. Saltwater 1 or 2 1 01 2 (# pumps running) e. Service Water 1 or 2 (# pumps running) 1 or 2 ---------f. 125V DC buses energized energized 11, 12, 21, 22 g. 120V AC vital buses energized 21, 22, 23, 24 energized SAFETY FUNCTION ACCEPTANCE CRITERIA NORMAL CONTAINMENT FINAL INTERMEDIATE CRITERIA CRITERIA ENVIRONMENT CHECK CHECK PARAMETERS a. Contairment less than 0.7 pressure (PSIG) less than 0.7 ---b. Containment temperature less than 120 less than 120 (F) c. Containment High Range alarm alarm Radiation

clear

Monitor

clear

EOP-6 Rev. 1/Unit 2 Page 37 of 37

SAFETY FUNCTION ACCEPTANCE CRITERIA NORMAL RADIATION LEVELS EXTERNAL FINAL INTERMEDIATE CRITERIA CRITERIA TO CONTAINMENT CHECK CHECK alarm clear a. Noble Gas Monitor (1) alarming alarm b. Condenser Off-Gas (1) clear alarming RMS alarm clear c. S/G B/D RMS (1) alarming 16 alarm d. Main Vent Gaseous (1) clear alarming RMS (2-RI-5415)

(1) RMS alarms are break size and RCS activity dependent.

STATUS CHECK NUMBER	COMPLETE AT TIME
11	
2	
.3	
4	
	-

EOP-7 Rev. 1/Unit 1 Page 1 of 36

...

CALVERT CLIFFS NUCLEAR POWER PLANT

I

EOP-7 STATION BLACKOUT

1

REVISION 1

	SIGNATURE	DATE
PREPARED BY;	Michaelf Wass-	1 12.18-57
VERIPIED BY,	Lat in has	, 12-18-87
POSRC;	MEETING # 88-7	1 2-10-88
APPROVED BY;	Manager-Nuclear Operations or	Z-10-88 General Supervisor-

Operations if POSRC review is not required

EOP-7 Rev. 1/Unit 1 Page 2 of 36

LIST OF EFFECTIVE PAGES

EOP-7 Rev. 1/Unit 1 Page 3 of 36

STATION BLACKOUT

I. PRECATTIONS

- A. Do not adopt manual operation of automatically controlled systems unless a malfunction is apparent or automatic system operation will not support the maintenance of a safety function.
- B. Systems shifted to manual must be monitored frequently to ensure correct operation.
- C. At least two independent indications should be used, when available, to evaluate and corroborate a specific plant condition since an incident could induce inconsistencies between instruments.
- D. In Natural Circulation, increased loop transport time causes a 5 to 10 minute delay in temperature responses to a plant change. Pressurizer level and pressure responses typically provide better indication of RCS response during this period.
- E. If cooling down with a S/G isolated, an inverted delta T(Tcold higher than Thot) may be observed in the idle loop. This is due to a small amount of reverse heat transfer in the isolated S/G. The inverted delta T is not expected to have any significant effect on natural circulation flow in the operating S/G loop.
- F. The concentration of boron in RCS makeup water should be consistent with maintaining the required shutdown margin.
- G. Personnel should be prepared for the possibility of inadequate lighting in access areas and equipment rooms.
- H. Excessive Diesel Generator loading can result if a SIAS is received and the LOCI sequencer actuates. Non-vital loads should be manually shed immediately upon receiving a SIAS.
- If a pump or component fails, the cause of the failure should be determined prior to restarting or starting a standby pump or component to prevent a common failure.

EOP-7 Rev. 1/Unit 1 Page 4 of 36

II. ENTRY CONDITIONS

The presence of one or more of the following conditions indicates that a Station Blackout may have occurred:

- A. Loss of Control Room lighting on both Units.
- B. 500KV Red and Black Bus power available lights de-energized.
- C. Diesel Generators not loaded.
- D. No RCPs running on either Unit.
- E. All 4KV Unit bus power available lights de-energized.

EOP-7 Rev. 1/Unit 1 Page 5 of 36

.

	I. RECOVERY ACTIONS	ALTERNATE ACTIONS
Α.	VERIFY POST-TRIP IMMEDIATE ACTIONS COMPLETED.	
в.	COMMENCE INTERMEDIATE SAFETY FUNCTION STATUS CHECK.	
с.	DETERMINE AFPROPRIATE EMERGENCY RESPONSE ACTIONS PER THE ERPIP.	
D.	PROTECT RCS FROM EXCESSIVE COOLDOWN AND CONDENSER FROM OVERPRESSURE:	
	 Shut both MSIVs. Shut S/G Blowdown Valves: 1-BD-4010-CV 1-BD-4011-CV 1-BD-4012-CV 1-BD-4013-CV 	
Ε.	ESTABLISH S/G HEAT SINK:	
	 Establish S/G heat removal: a. Establish communications with an operator stationed to manually operate Atmospheric Dump Valves at the 45 ft level of the Auxiliary Building. 	
L		

Ś

١

1

EOP-7 Rev. 1/Unit 1 Page 6 of 36

III. RECOVERY ACTIONS

]

- NOTE -

Atmospheric Dump Valves are reverse acting, i.e., clockwise to open, counterclockwise to shut.

> b. Adjust Atmospheric Dump Valves to maintain S/G pressures between 850 and 920 PSIA.

> > 11 S/G 12 S/G

1-MS-3938-CV 1-MS-3939-CV

- Establish AFW flow to the S/Gs:
 - a. Start 11 or 12 AFW Pump by opening AFW Steam Supply Valves:

1-MS-4070-CV 1-MS-4071-CV

b. Adjust AFW Flow Control Valves to restore and maintain S/G levels between (-)170 and (+)30 inches and trending towards 0 inches.

- NOTE -

Turbine Building N₂ Storage Tanks may be used if Liquid N₂ System unavailable.

- c. Align nitrogen to supply AFW Flow Control Valves by opening the following valves located in SRW Room:
 - (1) N₂ Supply To AFW Amplifier Air System, N₂-105.
 - (2) AFW Amplifier Air System N₂ Backup Supply, 1-IA-182.

2.a.1 Start 11 or 12 AFW Pump by opening AFW Steam Supply Bypass Valves:

> 1-MS-102 1-MS-105

ALTERNATE ACTIONS

3

EOP-7 Rev. 1/Unit 1 Page 7 of 35

III. RECOVERY ACTIONS

ALTEPNATE ACTIONS

- d Assign an operator to control AFW discharge pressure locally:
 - Open AFW Pump Room double doors.
 - (2) Establish communications.
 - (3) Adjust turbine governor control knob to maintain AFW Pump discharge pressure 100 PSI greater than S/G pressure.
- F. CONFIRM NATURAL CIRCULATION IN AT LEAST ONE LOOP:

- NOTE -

Wide range Thot may be obtained from Subcooled Margin Monitor per Attachment (10).

- Thot minus Tcold between 10 and 50°F.
- 2. Tcold constant or decreasing.
- 3. Thot constant or decreasing.

- NOTE -

CET temperature may be read locally per AOP-7H.

- CET temperatures consistent with Thot.
- Steaming rate affects primary temperature.

EOP-7 Rev. 1/Unit 1 Page 8 of 36 .

11	1.	RECOVERY ACTIONS	ALTERNATE ACTIONS
G.	MIN	IMIZE RCS INVENTORY LOSS:	
10 × 11 m	1.	Shut Letdown Isolation Valves:	
		1-CVC-515-CV 1-CVC-516-CV	
	2.	Maintain an RCP Bleedoff flowpath:	
		a. Shut RCP Bleedoff Isolation Valves:	
		1-CVC-505-CV 1-CVC-506-CV	
		b. Open RCP Bleedoff RV Isolation, 1-CVC-507-CV.	
		c. Open RC Drain Tank Drain To Cntmt Floor Valve, 1-RCW-4258-SV.	
	3.	Shut RCS Sample Isolation Valve, 1-PS-5464-CV.	
	4.	Shut Reactor Vessel and Pressurizer Vent Valves:	
		1-RC-103-SV 1-RC-104-SV 1-RC-105-SV 1-RC-106-SV	
н.	VER	IFY EMERGENCY DC PUMP OPERATION:	
	1.	Turbine Smergency Oil Pump.	
	2.	Emergency H ₂ Seal Oil Pump.	
	3.	S/G Feed Pump Emergency Oil Pumps.	

EOP-7 Rev. 1/Unit 1 Page 9 of 36

.

N

Ī

١.

11	1.	REC	COVERY ACTIONS	ALTERNATE ACTIONS
	ALIGN ELECTRICAL SYSTEMS FOR POWER RESTORATION:			
	1.	Ope	n the following 13KV akers:	
		а.	U-4000-13 Feeder, 252-1101.	
		b.	U-4000-11 Feeder, 252-1102.	
		с.	U-4000-12 Feeder, 252-1103.	
		d.	Service Bus 11 Feeder, 252-1104.	
		е.	Tie Breaker Service Bus 11, 252-1105.	
	2.	Ope bre	n the following 4KV akers:	
		я.	11 4KV Bus Normal Feeder, 152-1115.	
		b.	11 4KV Bus Alternate Feeder, 152-1101.	
		с.	Switchyard Feeder, 152-1113.	
		d.	12 4KV Bus Normal Feeder, 152-1201.	
		е.	12 4KV Bus Alternate Feeder, 152-1209.	
		£.	13 4KV Bus Normal Feeder, 152-1311.	
		g.	13 4KV Bus Alternate Feeder, 152-1301.	
		h.	14 4KV Bus Normal Feeder, 152-1414.	
•		i.	14 4KV Bus Alternate Feeder, 152-1401.	

8

EOP-7 Rev. 1/Unit 1 Page 10 of 36

*

ſ



٦

EOP-7 Rev. 1/Unit 1 Page 11 of 36

÷

III. RECOVERY ACTIONS	ALTERNATE ACTIONS		
L. IF RCS SUBCOOLING DECREASES TO LESS THAN 30°F, THEN COOL DOWN TO MAINTAIN 30 TO 50°F SUBCOOLING, USING CET TEMPERATURES:			
 Operate AFW to maintain S/G levels between (-)170 and (+)30 inches. <u>- NOTE</u> - If two phase natural circulation is in progress, 30°F subcooling cannot be achieved. CET temperatures constant or decreasing indicates adequate core cooling. Operate Atmospheric Dump Valves to maintain 30 to 50°F subcooling. M. ALIGN BACKUP WATER SUPPLIES FOR AFW AS NECESSARY: 			
 <u>IF</u> 12 CST level decreases to 5 ft, <u>THEN</u> line up 11 CST as alternate suction supply: a. Locally open 11 CST AFW Pump Suction Valves: 1-AFW-131 1-AFW-167 	- NOTE - The following step will cause CST levels to equalize. 1.1 IF 11 CST NOT available, THEN line up 21 CST as alternate suction supply: a. Locally open 21 CST AFW Pump Suction Valves: 2-AFW-131 2-AFW-167		

68

-

EOP-7 Rev. 1/Unit 1 Page 12 of 36

٢

1

j.A

111.	RECOVERY ACTIONS	ALTERNATE ACTIONS
2.	 b. Locally shut 12 CST Unit 1 AFW Pump Suction Valve, 1-AFW-161. c. Confirm normal CST level response. IF DI Water Storage Tank level is greater than 10 ft, THEN gravity fill 12 CST by opening 12 CST Fill Valve, 0-DW-284. 	 b. Locally open 12 CST AFW Pump Suction Valves: 1-AFW-161 2-AFW-161 c. Confirm normal CST level response. 2.1 IF gravity fill of CST NOT effective, THEN connect fire hoses to fill CSTs.
N. EN	SURF CONTAINMENT INTEGRITY.	
0. RE: 4K	IF unable to ensure the Containment Normal Sump Drain Isolation Valves shut from the Control Room: 1-EAD-5462-MOV 1-EAD-5463-MOV THEN locally check valves shut.	
1.	Start 11 or 12 D/G per OI-21 and close the associated D/G output breaker.	 1.1 Restore power from the 500KV Switchyard per the applicable procedure: a. OI-28, 500KV Switchyard. b. OI-27B, 13KV System. c. OI-27C, 4KV System. 1.2 Restore power to 11 or 14 4KV Bus using SMECO feeder per OI-27E.

]

.

١

۱

-4

EOP-7			
Rev.	1/1	Jnit	: 1
Page	13	of	36

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

F. <u>WHEN</u> AT LEAST ONE VITAL 4KV BUS IS ENERGIZED, <u>THEN</u> VERIFY SHUTDOWN SEQUENCER LOADS OPERATING:

1. Service Water Pump(s).

Saltwater Pump(.).

3. Instrument Air Compressor.

 11 or 12 Control Room Ventilation.

5. Switchgear Room Ventilation.

Q. RESTORE REACTOR MCCs AND INSTRUMENT BUSES:

- <u>IF</u> 11 4KV Bus is energized <u>AND</u> 14 4KV Bus is <u>NOT</u> energized, <u>THEN</u> tie MCC-104 to MCC-114:
 - Open MCC-104 Main Feeder Breaker, 52-10401.
 - Close MCC-104 Tie Breaker, 52-10420.
 - Close MCC-114 Tie Breaker, 52-11420.
- 2. <u>IF</u> 14 4KV Bus is energized <u>AND</u> 11 4KV Bus is <u>NOT</u> energized, <u>THEN</u> tie MCC-114 to MCC-104:
 - Open MCC-114 Main Feeder Breaker, 52-11431.
 - Close MCC-114 Tie Breaker, 52-11420.
 - Close MCC-104 Tie Breaker, 52-10420.

EOP-7 Rev. 1/Unit 1 Page 14 of 36

7

PESTORE COMPONENT COOLING FLOW			TORE COMPONENT COOLING FLOW		
1.	<u>IF</u> RCF lower seal temperature above 280°F, <u>THEN</u> shut Component Cooling Supply Containment Isolation Valve, 1-CC-3832-CV <u>AND</u> start a Component Cooling Pump.	1.1	IF tha THI Cod	seal temperature less ar. 280°F, EN start a Component oling Pump.	
2.	Verify Component Cooling Heat Exchanger on service is being supplied from an operating Saltwater Header.				
COM	MENCE RCS BORATION:		•		
1.	Open Loop Charging Valves:				
	1-CVC-518-CV 1-CVC-519-CV				
2.	Shut Auxiliary Spray Valve, 1-CVC-517-CV.				
з.	Start all available Charging Fumps.				
4.	Shut VCT Makeup Valve, 1-CVC-512-CV.				
5.	Open Boric Acid Direct Makeup Valve, 1-CVC-514-MOV.				
6.	Start a Boric Acid Pump.	6.1	IF ava THE	Boric Acid Pumps <u>NOT</u> ilable, N establish gravity and	
		1	a.	Open BAST Gravity Feed Valves:	
				1-CVC-508-MOV 1-CVC-509-MOV	
		1	b.	Shut VCT Outlet Valve,	

.

.0

F

.

-6

.

E02-7 Rev. 1/Unit 1 Page 15 of 36

63



1.00

· .

EOP-7 Rev. 1/Unit 1 Page 16 of 36

A

Г

11	1 .	RECOVERY ACTIONS	ALTERNATE ACTIONS
v.	RES	STORE INSTRUMENT AIR TO NTAINMENT:	
	1. 1-H of in 2.	Open Cntmt Instrument Air Isolation MOV, 1-IA-2080-MOV. - NOTE - HS-2085 located on West wall 27 ft Switchgear Room; Key #85 Control Room Key Locker. Open Cntmt Instrument Air Supply CV, 1-IA-2085-CV,	
		by momentarily placing 1-HS-2085 in OPEN.	
₩.	RES	STORE LETDOW D BLEEDOFF FLOW:	
	1.	Open Loop Charging Valves:	
		1-CVC-518-CV 1-CVC-519-CV	
	2.	Shut Auxiliary Spray Valve, 1-CVC-517-CV.	
	3.	Verify at least one Charging Pump operating.	
	4.	Shift Letdown Control Valve Controller, 1-HIC-110, to MANUAL.	
	5.	Adjust controller to shut Letdown Control Valves.	
	6.	Open Letdown Isolation Valves:	
		1-CVC-515-CV 1-CVC-516-CV	

.

۰.

EOP-7 Rev. 1/Unit 1 Page 17 of 36

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

- NOTE -

Degasifier Pumps are powered from non-vital power supply. Excessive diversion may cause Degasifier to overfill.

- 7. Slowly open the Letdown Control Valve noting the increase in letdown pressure as read on 1-PIC-201, until 1-PIC-201 takes control of the Letdown Backpressure Regulating Valve.
- Allow temperatures to stabilize, then shift 1-HIC-110 to AUTO.
- Restore RCP Bleedoff flow to VCT:
 - a. Open RCP Eleedoff Isolation Valves:

1-CVC-505-CV 1-CVC-506-CV

b. Shut RC Drain Tank Drain To Cntmt Floor, 1-RCW-4258-SV.

EOP-7 Rev. 1/Unit 1 Page 18 of 36

Q.

٢

Г

49

MAINTAIN RCS SUBCOOLING BETWEEN 30 AND 140°F:				*
1.	Raise subcooling by any of the following:			
	a.	Secu	aring Auxiliary Spray.	
	b.	Oper Heat rais	rate il or 13 Backup ters as necessary to se RCS pressure:	
		(1)	Charge closing spring using manual lever at 480V breakers 52-1127 and 52-1427.	•
		(2)	Push the PUSH-TO-CLOSE button on breaker fronts.	
2.	Lower subcooling by any of the following:		bcooling by any of owing:	
	a.	Secu Heat	ring Pressurizer ers.	
	b.	Init Spra	iating Auxiliary y:	
		(1)	Record temperature differential between Pressurizer and Regenerative Heat Exchanger Outlet.	
		(2)	Open Auxiliary Spray Valve, 1-CVC-517-CV.	
		(3)	Shut Loop Charging Valves:	
			1-CVC-518-CV 1-CVC-519-CV	

•

- -

.

s

4 8

EOP-7 Rev. 1/Unit 1 Page 19 of 36

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

(4) Shift 1-HIC-100 to MANUAL and shut Pressurizer Spray Valves:

> 1-RC-100E-CV 1-RC-100F-CV

Y. MONITOR FOR CORE AND RCS VOIDING:

- CAUTION -

Potential for void formation increases rapidly when pressure decreases below 1500 FSIA.

- Letdown flow greater than charging flow.
- Rapid unexplained increase in pressurizer level during an RCS pressure reduction.
- Loss of subcooled margin as determined using CET temperatures.
- "REACTOR VESSEL WATER LEVEL LOW" alarm.

EOP-7 Rev. 1/Unit 1 Page 20 of 36

II. RECOVERY ACTIONS	ALTERNATE ACTIONS	
IF VOIDING INHIBITS HEAT REMOVAL, THEN REDUCE OR ELIMINATE VOIDED AREA:		
	2.1 . IF pressurizing the RCS does NOT restore heat removal, THEN operate Reactor Vessel Vent Valves per OI-1G.	

.

.

....

EOP-7 Rev. 1/Unit 1 Page 21 of 36

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

AA. ENERGIZE SUPPORT EQUIPMENT AS NECESSARY TO FACILITATE SHUTDOWN AND VERIFY LOAD REMAINS WITHIN RATINGS:

- CAUTION -

If the following load limits can be maintained, actuation of the LOCI Sequencer will not cause a D/G overload condition:

without 13 AFW Fump - 1400 KW with 13 AFW Fump - 1800 KW

These limits may be exceeded if additional power is required to safely, efficiently shut down the plant. The D/G should not be operated above 3250 KW.

- CAUTION -

SMECO load limit is 260 AMPS.

- 1. Start a Main Exhaust Fan.
- Start Containment Air Cooler(s) in LOW to maintain containment temperature below 120°F.
- Start a Cavity Cooling Fan to maintain cavity cooling temperature below 200°F.
- IF "SFP LEVEL TEMP HI" alarm received, <u>THEN</u> start Spent Fuel Pool Cooling Pump(s).
- Strip MCC-101AT and MCC-101BT of all loads, by opening individual MCC breakers.

EOP-7 Rev. 1/Unit 1 Page 22 of 36

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

- 6. <u>IF</u> 11 4KV Bus is energized <u>AND</u> 14 4KV Bus is <u>NOT</u> energized, <u>THEN</u> tie MCC-101BT to MCC-101AT:
 - Close MCC-101AT Feeder Breaker, 52-1109.
 - b. Open MCC-101BT Main Feeder Breaker, 52-10141.
 - c. Close Tie Breakers:

52-10120 52-10160

- Energize loads per step AA.9, page 23.
- 7. <u>IF</u> 14 4KV Bus is energized <u>AND</u> 11 4KV Bus is <u>NOT</u> energized, <u>THEN</u> tie MCC-101AT to MCC-101BT:
 - Close MCC-101BT Feeder Breaker, 52-1419.
 - b. Open MCC-101AT Main Feeder Breaker, 52-10101.
 - c. Cluse Tie Breakers:

52-10120 52-10160

d. Energize loads per step AA.9, page 23.

EOP-7 Rev. 1/Unit 1 Page 23 of 36

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

- IF both 11 AND 14 4KV Buses are energized, THEN energize MCC-101AT and MCC-101BT:
 - a. Close MCC-101AT Feeder Breaker, >2-1109.
 - b Close MCC-101BT Feeder Breaker, 52-1419.
 - c. Energize loads per step AA.9, page 23.
- Energize MCC-101AT and MCC-101BT loads:
 - Turbine Building Lighting Transformer Breaker, 52-10103.
 - b. Turning Gear Oil Pump Breaker, 52-10102.
 - c. Turbine Oil Lift Pump Breakers:

52-10106 52-10107 52-10108

52-10109 52-10110

- d. Turbine Turning Gear Piggyback Notor and Turning Gear Motor Breaker, 52-10105.
- e. Technical Support Center HVAC Breaker, 52-10111.
- f. Distribution Panel 11 Breaker, 52-10116.
- g. Telephone Transformer Breaker, 52-10118.
- h. 11 S/G Feed Pump Turning Gear Breaker, 52-10121.
EOP-7 Rev. 1/Unit 1 Page 24 of 36

II. RECOVERY ACTIONS

ALTERNATE ACTIONS

- i. SRW Pump Room Vent Fan, 52-10124 (Restart SRW Pump Room Ventilation, per OI-15).
- j. Technical Support Center Computer Breaker, 52-10122.
- k. Turbine Oil Lift Pump Breakers:

52-10146 52-10147 52-10148 52-10149

- AFW Pump Room Air Conditioner Breaker, 52-10150.
- m. 12 S/G Feed Pump Turning Cear Breaker, 52-10161.
- n. Distribution Panel 111 Breaker, 52-10162.
- 10. <u>IF</u> emergency power requested by Security, <u>THEN</u> place disconnect switch 2Y211, located on the North wall of Unit 2 27 ft Switchgear Room, in the EMERGENCY position.

AB. MINIMIZE 250V DC BATTERY DISCHARGE:

- Energize 15 or 25 Battery Charger on 13 250V DC Bus.
- Ensure Main Turbine has stopped rotating or is on Turning Gear.

.

 Verify Turning Gear Oil Pump running.

453

EOP-7 Rev. 1/Unit 1 Page 25 of 36 . .

-

111. RECOVERY ACTIONS

ALTERNATE ACTIONS

1

- Stop Turbine Emergency Oil Pump and place handswitch in AUTC.
- <u>IF</u> bearing oil header pressure less than 25 PSIG, <u>THEN</u> start Turbine Emergency Oil Pump.

AC. LOWER MAIN GENERATOR HYDROGEN PRESSURE TO 2 PSIG:

- Align Two-Position Valve, 1-G-01, to VENT position.
- Throttle open Generator Vent Line Isolation Valve, 1-G-03.
- WHEN Main Generator hydrogen pressure decreases to 2 PSIG, THEN perform the following:
 - a. Shut 1-G-03.
 - Secure Emergency H₂ Seal Oil Pump.

EOP-7 Rev. 1/Unit 1 Page 26 of 36

0

	Ι.	REC	COVERY ACTIONS	ALTERNATE ACTIONS
AD.	IF ANI SUF THE ANI	LOCI TUP PPLIE N DE MCC	I SEQUENCER IS ACTUATED RBINE MCCs ARE BEING ED BY D/G, E-ENERGIZE MCC-101AT C-101BT.	
AE.	1. MAI 100	IF nee THE a. b. c. d. d. f. f. NTAI	<pre>rapid D/G load reduction eded, IN perform the following: Open 11A 480V Bus Feeder Breaker, 52-1112. Open 14B 480V Bus Feeder Breaker, 52-1413. Locally open MCC-101AT Main Feeder Breaker, 52-10101. Locally open MCC-101BT Main Feeder Breaker, 52-10141. Close 11A 480V Bus Feeder Breaker, 52-1112. Close 14B 480V Bus Feeder Breaker 52-1413.</pre>	 1.1 IF rapid D/G load reduction NOT needed, THEN perform the following locally: a. Open MCC-101AT Main Feeder Breaker, 52-10101. b. Open MCC-101BT Main Feeder Breaker, 52-10141.
	1.	WHE THE suc a. b.	N VCT makeup required, N shift Charging Fump tion to RWT: Open RWT To Charging Pump Suction Valve, 1-CVC-504-MOV. Observe VCT level	1.b.1 IF VCT level NOT increasing,
Þ		с.	Ensure Charging Pump(s) AMPS steady.	THEN shut VCT Outlet Valve, 1-CVC-501-MOV.

1

EOP-7 Rev. 1/Unit 1 Page 27 of 36

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

ž.

- 2. <u>WHEN</u> VCT increases to 100 inches, <u>THEN</u> shift Charging Pump suction to VCT:
 - a. Open VCT Outlet Valve, 1-CVC-501-MOV.
 - Shut RWT To Charging Pump Suction Valve, 1-CVC-504-MOV.
- AF. IF FORCED CIRCULATION DESIRED AND FUMP RESTART CRITERIA MET, THEN RESTART RCPs WHEN POWER AVAILABLE:

- CAUTION -

Uncontrolled restoration of cooling to hot RCP seals may cause degradation of the metallic seating surfaces by thermal shock.

- 1. <u>IF</u> Component Cooling is isolated to RCP seals, <u>THEN</u> reduce RCP lower seal temperature below 280°F prior to initiating full cooling flow to the RCPs:
 - a. Shut Component Cooling Supply Containment Manual Isolation Valve, 1-CC-284, located in 5 ft East Penetration Room.
 - b. Open Component Cooling Containment Isolation Valves:

1-CC-3832-CV 1-CC-3833-CV

c. Slowly open 1-CC-284 to throttle component cooling flow until lower seal temperatures are less than 280°F.

EOP-7 Rev. 1/Unit 1 Page 28 of 36

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

- d. <u>WHEN</u> lower seal temperatures are less than 280°F, THEN fully open 1-CC-284.
- 2. <u>IF</u> an RCP lower seal temperature exceeded 280°F, <u>THEN</u> an engineering evaluation is required prior to restarting that RCP.
- Raise pressurizer level to at least 155 inches.
- Lower Tcold to less than 525°F.
- 5. Verify RCP restart criteria:
 - a. RCS subcooling greater than 30°F.
 - b. At least one S'C available for heat removel.
 - c. Pressurizer level greater than 155 inches and stable.
 - d. Tcold less than 525°F.
 - e. RCS temperature and pressure greater than the minimum operating limits per RCP curve on Attachment (1).

Starting an RCP may cause a pressurizer level transient.

- 6. WHEN RCP restart criteria are met, THEN start one RCP in a loop with an operable S/G:
 - Verify "COMPT CLG FLOW LO" alarm clear.

⁻ NOTE -

EOP-7 Rev. 1/Unit 1 Page 29 of 36 .

III. RECOVERY ACTIONS

- b. Start Oil Lift Pump.
- c. Insert RCP sync stick.
- d. Start one RCP.
- e. Monitor RCP running current:

Tavg Current

- 525 to 572°F 238 to 210 AMPS and steady
- 210 to 525°F 264 to 238 AMPS and steady
 - Monitor RCP seal parameters following pump restart.
 - Allow backflow to equalize temperatures in opposite loop.
- Start second RCP in opposite loop per steps AF.6 and AF.7, pages 28 and 29.
- 10. Secure Auxiliary Spray:
 - a. Open Loop Charging Valves:

1-CVC-518-CV 1-CVC-519-CV

- Shut Auxiliary Spray Valve, 1-CVC-517-CV.
- c. Shift Pressurizer Spray Controller, 1-HIC-100, to AUTO.

. .

11. <u>WHEN</u> RCPs restarted, <u>THEN</u> implement appropriate operating procedure <u>AND</u> complete administrative post-trip actions of this procedure. ALTERNATE ACTIONS

111	ι.	RECOVERY ACTIONS		EOP-7 Rev. 1/Unit 1 Page 30 of 36 ALTERNATE ACTIONS
AG.	DET REQ	ERMINE TIME UNTIL COOLDOWN		
	1.	Determine total water available for use as makeup.		
	2.	Determine time until commencement of required cooldown per Attachment (11).		
	3.	IF RCS cooldown required, THEN implement Natural Circulation Cooldown (AOP-3F) AND complete administrative post-trip actions of this procedure.	3.1	IF RCS cooldown NOT required, THEN implement Loss of Flow/Natural Circulation (AOP-3E) AND complete administrative post-trip actions of this procedure.

EOP-7 Rev. 1/Unit 1 Fage 31 of 36

AH. ADMI	NISTRATIVE	POST-TRIP	ACTIONS:
----------	------------	-----------	----------

- NOTE -

The following actions may be accomplished whenever feasible. They may be done in any order.

 Refer to ERPIP to determine appropriate emergency response actions.

- Perform notifications per CCI-118.
- 3. Notify ESO of trip.

4. Request RCS Boron and Iodine sample.

- 5. Perform shutdown margin calculation per NEOG 2 and 7.
- 6. Complete transient log entries per CCI-301.
 - Recall post-trip review (preferably within 30 minutes of trip).
 - 8. Perform post-trip review per CCI-111.
 - 9. Monitor turbine bearing temperatures.
 - Continue Main Turbine shutdown per applicable step of OI-43A.

END OF SECTION III.

EOP-7 Rev. 1/Unit 1 Page 32 of 36

IV. SAFETY FUNCTION STATUS CHECK

100

- A. The STA (or person designated by STA) will perform the intermediate and final safety function checks respectively on entry and prior to exiting from this procedure.
- B. Perform intermediate safety function status checks at 10 minute intervals until plant conditions stabilize.
- C. Immediately notify Shift Supervisor or Control Room Supervisor if any safety function criteria is not being satisfied.
- D. Review data and verify that safety function acceptance criteria are satisfied.
- E. When EOP completed, then perform final safety function check.

SAFETY FUNCTION ACCEPTANCE CRITERIA				
CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK	
less than 3%		less than 1% .		
negative		0		
all inserted		all inserted		
increasing		appropriate S/D margin		
decreasing		N/A	N/A	
	SAFET CRITERIA less than 3% negative all inserted increasing decreasing	SAFETY FUNCTION ACC CRITERIA INTERMEDIATE CHECK less than 3% negative all inserted increasing decreasing	SAFETY FUNCTION ACCEPTANCE CRITER CRITERIA INTERMEDIATE CRITERIA CHECK CHECK less than 3%	

EOP-7 Rev. 1/Unit 1 Page 33 of 36

RCS PRESSURE		SAFETY FUNCTION ACCEPTANCE CRITERIA				
PARAMETERS			CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK
a.	Pressurizer pressure (PSIA)		less than 2300		less than 2300	
b.	Pressurizer lev (inches)	el (1)	50 to 180		130 to 180	
c.	RCS subcooling (F)	(2)	30 to 140		30 to 140	

 Pressurizer level may decrease below 50 inches depending upon RCS leakrate and time power unavailable.

(2) RCS subcooling may decrease below 30°F depending upon RCS leakrate and time power unavailable. If CET temperatures remain less that or equal to saturation temperature, for existing RCS pressure, the the Core is covered.

EOP-7 Rev. 1/Unit 1 Page 34 of 36 .* CORE AND RCS SAFETY FUNCTION ACCEPTANCE CRITERIA HEAT REMOVAL PARAMETERS CRITERIA INTERMEDIATE CRITERIA FINAL CHECK CHECK a. RCS Tcold (°F) less than 545 less than 535 b. CET (^OF) (3) constant constant or decreasing or decreasing c. Thot minus Tcold (°F): Natural Circulation 10 to 50 10 to 50 Forced Circulation N/A less than 5 d. S/G pressure (PSIA) less than less than 1000 920 e. S/G level (inches) (-)170 to (-)24 to (+)30 (+)30 f. Condensate Storage Condensate Storage greater Tank level (ft) than 5 greater

(3) CET temperatures may increase while Natural Circulation is being established.

than 5

EOP-7 Rev. 1/Unit 1 Page 35 of 36

AUXILIARIES		CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL
а.	4KV vital buses 11 and 14 (4)	de-energized		one energized	
b.	Instrument Air pressure (PSIG) (4)	decreasing		greater than 88	
с,	Component Cooling (# pumps running)(4)	0		1 or 2	
d.	Component Cooling Head Tank level (inches) (5)	greater than 30		greater than 20	
e.	Saltwater (# pumps running)(4)	0		1 or 2	
£.	Service Water (# pumps running)(4)	0		1 or 2	
g.	Service Water Head Tank level (inches) (5)	greater than 30		greater than 30	
h.	125V DC buses 11, 12, 21, 22	energized		battery charger energized	
i.	120V AC vital buses 11, 12, 13, 14	energized		battery charger energized	

(4) Intermediate criteria based on initial conditions prior to restoration of a 4KV vital bus.

(5) Refer to OI-15 and OI-16 for filling head tanks.

EOP-7 Rev. 1/Unit 1 Page 36 of 36

ŕ

ĩ

201	TAINMENT	1			
PAI	VIRONMENT RAMETERS	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHEC
а.	Containment pressure (PSIG)	N/A	N/A	less than 0.7	
ь.	Containment temperature (°F)	N/A	N/A	less than 120	
c .	Containment level (inches)	N/A	'N/A	less than 4	
NOI	RMAL RADIATION	SAFETY	FUNCTION ACCEPTAN	NCE CRITERIA	
го	CONTAINMENT	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL
a .	Noble Gas Monitor (6)	alarm clear		alarm clear	
(6) Available when powe	r restored			
	STAT	TUS CHECK TUMBER	COMPLETE AT TIME	r	
	- 68 S S S	1			
	- 12 12 -	2			
	- 12	3			
	-	4			
	-				

EOP-7 Rev. 1/Unit. 2 Page 1 of 36

CALVERT CLIFFS NUCLEAR POWER PLANT

EOP-7 STATION BLACKOUT

REVISION 1

SIGNATURE

DATE

PREPARED BY;	Mil Wasen	1 12-18-57
VERIFIED BY:	James V. Groomy	112/18/87
POSRC	MEETING # 88-7	12-10-88
ADDROUGH BY.	OR 1.	1 2-10-83
APPROVED BI;	Manager-Nuclear Operations Operations if POSRC review	or General Supervisor- is not required

EOP-7 Rev. 1/Unit 2 Page 2 of 36

0

.

.

LIST OF EFFECTIVE PAGES

.

PAGE NUMBER	REVISION
1	1
2	1
3	1
4	1
5	1
6	1
7	1
8	1
9	1
10	1
11	1
12	. 1
13	1
14	1
15	1
16	1
17	1
18	1
19	1
20	1
21	1
22	1
23	1
24	1
25	1
26	1
27	1
28	ĩ
29	ĩ
30	î
31	î
32	1
33	î
34	1
35	1
36	1
30	A

EOP-7 Rev. 1/Unit 2 Page 3 of 36

STATION BLACKOUT

I. PRECAUTIONS

- A. Do not adopt manual operation of automatically controlled systems unless a malfunction is apparent or automatic system operation will not support the maintenance of a safety function.
- B. Systems shifted to manual must be monitored frequently to ensure correct operation.
- C. At least two independent indications should be used, when available, to evaluate and corroborate a specific plant condition since an incident could induce inconsistencies between instruments.
- D. In Natural Circulation, increased loop transport time causes a 5 to 10 minute delay in temperature responses to a plant change. Pressurizer level and pressure responses typically provide better indication of RCS response during this period.
- E. If cooling down with a S/G isolated, an inverted delta T(Tcold higher than Thot) may be observed in the idle loop. This is due to a small amount of reverse heat transfer in the isolated S/G. The inverted delta T is not expected to have any significant effect on natural circulation flow in the operating S/G loop.
- F. The concentration of boron in RCS makeup water should be consistent with maintaining the required shutdown margin.
- G. Personnel should be prepared for the possibility of inadequate lighting in access areas and equipment rooms.
- H. Excessive Diesel Generator loading can result if a SIAS is received and the LOCI sequencer actuates. Non-vital loads should be manually shed immediately upon receiving a SIAS.
- If a pump or component fails, the cause of the failure should be determined prior to restarting or starting a standby pump or component to prevent a common failure.

EOP-7 Rev. 1/Unit 2 Page 4 of 36

.

II. ENTRY CONDITIONS

The presence of one or more of the following conditions indicates that a Station Blackout may have occurred:

- A. Loss of Control Room lighting on both Units.
- B. 500KV Red and Black Bus power available lights de-energized.

18

- C. Diesel Generators not loaded.
- D. No RCPs running on either Unit.
- E. All 4KV Unit bus power available lights de-energized.

III. RECOVERY ACTIONS		EOP-7 Rev. 1/Unit Page 5 of 30 ALTERNATE ACTIONS		
Α.	VERIFY POST-TRIP IMMEDIATE ACTIONS COMPLETED.			
в.	COMMENCE INTERMEDIATE SAFETY FUNCTION STATUS CHECK.			
c.	DETERMINE APPROPRIATE EMERGENCY RESPONSE ACTIONS PER THE ERPIP.			
D.	PROTECT RCS FROM EXCESSIVE COOLDOWN AND CONDENSER FROM OVERPRESSURE:			
	 Shut both MSIVs. Shut S/G Blowdown Valves: 2-BD-4010-CV 2-BD-4011-CV 2-BD-4012-CV 2-BD-4012-CV 2-BD-4013-CV 			
E .	ESTABLISH S/G HEAT SINK: 1. Establish S/G heat removal: a. Establish communications with an operator stationed to manually operate Atmospheric Dump Valves at the 45 ft level of the Auxiliary Building.			

EOP-7 Rev. 1/Unit 2 Page 6 of 36

III. RECOVERY ACTIONS

.

0

- NOTE -

Atmospheric Dump Valves are reverse acting, i.e., clockwise to open, counterclockwise to shut.

> b. Adjust Atmospheric Dump Valves to maintain S/G pressures between 850 and 920 PSIA.

21 S/G 22 L G

2-MS-3939-CV 2-MS-3938 ·CV

- Establish AFW flow to the S/Gs:
 - a. Start 21 or 22 AFW Pump by opening AFW Steam Supply Valves:

2-MS-4070-CV 2-MS-407..-CV

b. Adjust AFW Flow Control Valves to restore and maintain S/G levels between (-)170 and (+)30 inches and trending towards 0 inches.

- NOTE -

Turbine Building N₂ Storage Tanks may be used if Liquid N₂ System unavailable.

- c. Align nitrogen to supply AFW Flow Control Valves by opening the following valves located in SRW Room:
 - (1) N₂ Supply To AFW Amplifier Air System, N₂-107.
 - (2) AFW Amplifier Air System N₂ Backup Supply, 2-IA-390.

ALTL. NATE ACTIONS

2.a.1 Start 21 or 22 AFW Pump by opening AFW Steam Supply Bypass Valves:

0

2-MS-102 2-MS-105

EOP-7 Rev. 1/Unit 2 Page 7 of 36

ALTERNATE ACTIONS

III. RECOVERY ACTIONS

- Assign an operator to control AFW discharge pressure locally:
 - Open AFW Pump Room double doors.
 - (2) Establish communications.
 - (3) Adjust turbine governor control knob to maintain AFW Pump discharge pressure 100 PSI greater than S/G pressure.
- F. CONFIRM NATURAL CIRCULATION IN AT LEAST ONE LOOP:

- NOTE -

Wide range Thot may be obtained from Subcooled Margin Monitor per Attachment (10).

 Thot minus Tcold between 10 and 50°F.

61

ø

- 2. Tcold constant or decreasing.
- 3. Thet constant or decreasing.

- NOTE -

CET temperature may be read locally per AOP-7H.

- CE1 temperatures consistent with Thot.
- Steaming rate affects primary temperature.

EOP-7 Rev. 1/Unit 2 Page 8 of 36

	1.	RECOVERY ACTIONS	ALIERNATE ACTIONS
3.	MIN	IMIZE RCS INVENTORY LOSS:	
	1.	Shut Letdown Isolation Valves:	
		2-CVC-515-CV 2-CVC-516-CV	
	2.	Maintain an RCP Bleedoff flowpath:	
		a. Shut RCP Bleedoff Isolation Valves:	
		2-CVC-505-CV 2-CVC-506-CV	
		b. Open RCP Bleedoff RV Isolation, 2-CVC-507-CV.	
		c. Open RC Drain Tank Drain To Cntmt Floor Valve, 2-RCW-4258-SV.	
1	3.	Shut RCS Sample Isolation Valve, 2-PS-5464-CV.	
	4.	Shut Reactor Vessel and Pressurizer Vent Valves:	
		2-RC-103-SV 2-RC-104-SV 2-RC-105-SV 2-RC-106-SV	
н.	VER	IFY EMERGENCY DC PUMP OPERATION	
	1.	Turbine Emergency Oil Pump.	
	2.	Emergency Air Side Seal Oil Pump.	
	3.	S/G Feed Pump Emergency Oil Pumps.	

)

¥

.

EOP-	7		
Rev.	1/	Uni	ti
Page	9	of	36

III. RECOVERY ACTIONS			OVERY ACTIONS	ALTERNATE ACTIONS		
I.	ALI RES	ALIGN ELECTRICAL SYSTEMS FOR POWER RESTORATION:				
	1.	Ope	n the following 13KV akers:			
		a.	U-4000-23 Feeder, 252-2101.			
		b.	U-4000-21 Feeder, 252-2102.			
		с.	U-4000-22 Feeder, 252-2103.			
		d.	Service Bus 21 Feeder, 252-2104.			
		е.	Tie Breaker Service Bus 21, 252-2105.			
•	2.	Ope bre	en the following 4KV makers:			
		а.	21 4KV Bus Normal Feeder, 152-2101.			
		b.	21 4KV Bus Alternate Feeder, 152-2115.			
		с.	Switchyard Feeder, 152-2113.			
		d.	22 4KV Bus Normal Feeder, 152-2201.			
		е.	22 4KV Bus Alternate Feeder, 152-2209.			
		f.	23 4KV Bus Normal Feeder, 152-2311.			
		g.	23 4KV Bus Alternate Feeder, 152-2301.			
		h.	24 4KV Bus Normal Feeder, 152-2401.			
-		i.	24 4KV Bus Alternate Feeder, 152-2414.			

EOP-7 Rev. 1/Unit 2 Page 10 of 36



J

No.

1

EOP-7 Rev. 1/Unit 2 Page 11 of 36

11 L.	I. <u>RECOVERY ACTIONS</u> IF RCS SUBCOOLING DECREASES TO LESS THAN 30°F, THEN COOL DOWN TO MAINTAIN 30 TO 50°F SUBCOOLING, USING	ALTERNATE ACTIONS
м.	<pre>CET TEMPERATURES: 1. Operate AFW to maintain S/G levels between (-)170 and (+)30 inches. - NOTE - If two phase natural circulation is in progress, 30°F subcooling cannot be achieved. CET temperatures constant or decreasing indicates adequate core cooling. 2. Operate Atmospheric Dump Valves to maintain 30 to 50°F subcooling. ALIGN BACKUP WATER SUPPLIES FOR AFW AS NECESSARY:</pre>	
	 IF 12 CST level decreases to 5 ft, THEN line up 21 CST as alternate suction supply: a. Locally open 21 CST AFW Fump Suction Valves: 2-AFW-131 2-AFW-167 	 NOTE - Shi following step will cause CST livels to equalize. 1.1 IF 21 CST NOT available, THEN line up 11 CST as alternate suction supply. a. Locally open 11 CST AFW Pump Suction Valves: 1-AFW-131 1-AFW-267

EOP-7 Rev. 1/Unit 2 Page 12 of 36

2.	 RECOVERY ACTIONS b. Locally shut 12 CST Unit 2 AFW Pump Suction Valve, 2-AFW-161. c. Confirm normal CST level response. IF DI Water Storage Tank level is greater than 10 ft, THEN gravity fill 12 CST by opening 12 CST Fill Valve, 0-DW-284. 	ALTERNATE ACTIONS b. Locally open 12 CST AFW Pump Suction Valves: 1-AFW-161 2-AFW-161 c. Confirm normal CST level response. 2.1 IF gravity fill of CST NOT effective, THEN connect fire hoses to fill CSTs.
N. ENS 1. 0. RE	SURE CONTAINMENT INTEGRITY. IF unable to ensure the Containment Normal Sump Drain Isolation Valves shut from the Control Room: 2-EAD-5462-MOV 2-EAD-5463-MOV THEN locally check valves shut. STORE POWER TO AT LEAST ONE	
1.	Start 21 or 12 D/G per OI-21 and close the associated D/G output breaker.	 1.1 Restore power from the 500KV Switchyard per the applicable procedure: a. 0I-28, 500KV Switchyard. b. 0I-27B, 13KV System. c. 0I-27C, 4KV System. 1.2 Restore power to 21 or 24 4KV Bus using SMECO feeder per 0I-27E.

EOP-7 Rev. 1/Unit 2 Page 13 of 36

1

G

	1.	RECOVERY ACTIONS	ALTERNATE ACTIONS
P.	WHE BUS THE LOA	N AT LEAST ONE VITAL 4KV IS ENERGIZED, N VERIFY SHUTDOWN SEQUENCER DS OPERATING:	
	1.	Service Water Pump(s).	
	2.	Saltwater Pump(s).	
	3.	Instrument Air Compressor.	
	4.	11 or 12 Control Room Ventilation.	
	5.	Switchgear Room Ventilation.	
Q.	RESTORE REACTOR MCCs AND INSTRUMENT BUSES:		
	1.	IF 24 4KV Bus is energized AND 21 4KV Bus is NOT energized, THEN tie MCC-214 to MCC-204:	
		a. Open MCC-214 Main Feeder Breaker, 52-21401.	
		b. Close MCC-214 Tie Breaker, 52-21420.	
		c. Close MCC-204 Tie Breaker, 52-20420.	
	2.	IF 21 4KV Bus is energized AND 24 4KV Bus is NOT energized, THEN tie MCC-204 to MCC-214:	
		a. Open MCC-204 Main Feeder Breaker, 52-20401.	
		b. Close MCC-204 Tie Breaker, 52-20420.	
D		c. Close MCC-214 Tie Breaker, 52-21420.	
			and the second second

١

EOP-7 Rev. 1/Unit 2 Page 14 of 36

		1.	이 같은 것은 것이 많은 것은
RES	TORE COMPONENT COOLING FLOW:		
1.	IF RCP lower seal temperature above 280°F, THEN shut Component Cooling Supply Containment Isolation Valve, 2-CC-3832-CV AND start a Component Cooling Pump.	1.1	IF seal temperature less than 280°F, THEN start a Component Cooling Pump.
2.	Verify Component Cooling Heat Exchanger on service is being supplied from an operating Saltwater Header.		
CON	MMENCE RCS BORATION:		
1.	Open Loop Charging Valves:		
	2-CVC-518-CV 2-CVC-519-CV		
2.	Shut Auxiliary Spray Valve, 2-CVC-517-CV.		
3.	Start all available Charging Pumps.		
4.	Shut VCT Makeup Valve, 2-CVC-512-CV.		
5.	Open Boric Acid Direct Makeup Valve, 2-CVC-514-MOV.		
6.	Start a Boric Acid Pump.	6.1	<u>IF</u> Boric Acid Fumps <u>NOT</u> available, <u>THEN</u> establish gravity feed:
			a. Open BAST Gravity Feed Valves:
			2 CVC-508-MOV 2-CVC-509-MOV

EOP-7 Rev. 1/Unit 2 Page 15 of 36



EOP-7 Rev. 1/Unit 2 Page 16 of 36

A.P.

III. RECOVERY ACTIONS

J

₩.

ALTERNATE ACTIONS

V. RESTORE INSTRUMENT AIR TO CONTAINMENT:

> Open Cntmt Instrument Air Isolation MOV, 2-IA-2080-MOV.

> > - NOTE -

2-HS-2085 located on West wall of 27 ft Switchgear Room; Key #80 in Control Room Key Locker.

 Open Cntmt Instrument Air Supply CV, 2-IA-2085-CV, by momentarily placing 2-HS-2085 in OPEN.

RESTORE LETDOWN AND BLEEDOFF FLOW:

1. Open Loop Charging Valves:

2-CVC-518-CV 2-CVC-519-CV

- Shut Auxiliary Spray Valve, 2-CVC-517-CV.
- Verify at least one Charging Pump operating.
- Shift Letdown Control Valve Controller, 2-HIC-110, to MANUAL.
- Adjust controller to shut Letdown Control Valves.
- 6. Open Letdown Isolation Valves:

2-CVC-515-CV 2-CVC-516-CV

EOP-7 Rev. 1/Unit 2 Page 17 of 36

.

1

III. RECOVERY ACTIONS

.

ALTERNATE ACTIONS

- NOTE -

Degasifier Pumps are powered from non-vital power supply. Excessive diversion may cause Degasifier to overfill.

- Slowly open the Letdown Control Valve noting the increase in letdown pressure as read on 2-PIC-201, until 2-PIC-201 takes control of the Letdown Backpressure Regulating Valve.
- Allow temperatures to stabilize, then shift 2-HIC-110 to AUTO.
- 9. Restore RCP Bleedoff flow to VCT:
 - a. Open RCP Bleedoff Isolation Valves:

2-CVC-505-CV 2-CVC-506-CV

b. Shut RC Drain Tank Drain To Cntmt Floor, 2-RCW-4258-SV.

EOP-7 Rev. 1/Unit 2 Page 18 of 36

1

ALTERNATE ACTIONS III. RECOVERY ACTIONS MAINTAIN RCS SUBCOOLING BETWEEN 30 AND 140°F: Χ. 1. Raise subcooling by any of the following: Securing Auxiliary Spray. a. b. Operate 21 or 23 Backup Heaters as necessary to raise RCS pressure: (1) Charge closing spring using manual lever at 480V breakers 52-2127 and 52-2427. (2) Fush the PUSH-TO-CLOSE button on breaker fronts. Lower subcooling by any cf the following: Securing Pressurizer a. Heaters. b. Initiating Auxiliary Spray: (1) Record temperature differential between Pressurizer and Regenerative Heat Exchanger Outlet. (2) Open Auxiliary Spray Valve, 2-CVC-517-CV. (3) Shut Loop Charging Valves: 2-CVC-518-CV 2-CVC-519-CV

-

.

EOP-7 Rev. 1/Unit 2 Page 19 of 36

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

(4) Shift 2-HIC-100 to MANUAL and shut Pressurizer Spray Valves:

> 2-RC-100E-CV 2-RC-100F-CV

Y. MONITOR FOR CORE AND RCS VOIDING:

- CAUTION -

Potential for void formation increases rapidly when pressure decreases below 1500 PSIA.

- Letdown flow greater than charging flow.
- Rapid unexplained increase in pressurizer level during an RCS pressure reduction.
- Loss of subcooled margin as determined using CET temperatures.
- "REACTOR VESSEL WATER LEVEL LOW" alarm.

III. RECOVE	RY ACTIONS	EOP-7 Rev. 1/Unit 2 Page 20 of 36 ALTERNATE ACTIONS	
Z. <u>IF</u> VOIDING <u>THEN</u> REDUC AREA:	INHIBITS HEAT REMOVAL, E OR ELIMINATE VOIDED		
 Shut L 2-CVC- The potent pressurize an excessi followed b Pressu mainta 140°F If voids e a rapid RC will occur collapse. <u>IF voi</u> S/G tu pressu satura <u>THEN o</u> raisin a. St <u>F</u> voi S/G tu pressu satura <u>THEN o</u> raisin a. St <u>F</u> voi S/G tu pressu satura <u>THEN o</u> raisin 	etdown Isolation Valve, 515-CV. CAUTION - Tial exists for the thermal shock from the cooldown rate by a repressurization. Trize the RCS to the subcooling as near as practical. CAUTION - exist in the S/G tubes, S pressure reduction then the voids Iding occurs in the thes (saturation the of S/G greater than ation pressure of RCS), tool the S/G by ing any of the following: teaming rate. Head rate. /G Blowdown rate. aintaining less than /h cooldown rate.	2.1 . IF pressurizing the RCS doe NOT restore heat removal, THEN operate Reactor Vessel Vent Valves per OI-1G.	5

EOP-7 Rev. 1/Unit 2 Page 21 of 36

٢

÷

110

	I. RECOVERY ACTIONS	ALTERNATE ACTIONS	
AA .	ENERGIZE SUPPORT EQUIPMENT AS NECESSARY TO FACILITATE SHUTDOWN AND VERIFY LOAD REMAINS WITHIN RATINGS:		
	- CAUTION -		
	If the following load limits can be maintained, actuation of the LOCI Sequencer will not cause a D/G over load condition:		
ŀ	v thout 23 AFW Pump - 1400 KW th 23 AFW Pump - 1800 KW		
	These limits may be exceeded if additional power is required to safely, efficiently shut down the plant. The D/G should not be operated above 3250 KW.		
	- CAUTION -	[1] · · · · · · · · · · · · · · · · · · ·	
	SMECO load limit is 260 AMPS.	김 사람이 다 물건을 잡히 가지?	
	1. Start a Main Exhaust Fan.		
	 Start Containment Air Cooler(s) in LOW to maintain containment temperature below 120°F. 		
	 Start a Cavity Cooling Fan to maintain cavity cooling temperature below 200°F. 		
	4. <u>IF</u> "SFP LEVEL TEMP HI" alarm received, <u>THEN</u> start Spent Fuel Pool Cooling Pump(s).		
	 Strip MCC-201AT and MCC-201BT of all loads, by opening individual MCC breakers. 		
1			
T			

A 1. 1. 1. 1.

]

.

EOP-7 Rev. 1/Unit 2 Page 22 of 36

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

- 6. <u>IF</u> 24 4KV Bus is energized <u>AND</u> 21 4KV Bus is <u>NOT</u> energized, <u>THEN</u> tie MCC-201AT to MCC-201BT:
 - Close MCC-201BT Feeder Breaker, 52-2419.
 - b. Open MCC-201AT Main Feeder Breaker, 52-20101.
 - c. Close Tie Breakers:

52-20120 52-20160

- d. Energize loads per step AA.9, page 23.
- 7. IF 21 4KV Bus is energized AND 24 4KV Bus is NOT energized, THEN tie MCC-201BT to MCC-201AT:
 - Close MCC-201AT Feeder Breaker, 52-2109.
 - b. Open MCC-201BT Main Feeder Breaker, 52-20141.
 - c. Close Tie Breakers:

52-20120 52-20160

 Energize loads per step AA.9, page 23.

EOP-7 Rev. 1/Unit 2 Page 23 of 36

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

- 8. <u>IF</u> both 21 <u>AND</u> 24 4KV Buses are energized, <u>THEN</u> energize MCC-201AT and MCC-201BT:
 - Close MCC-201AT Feeder Breaker, 52-2109.
 - b. Close MCC-201BT Feeder Breaker, 52-2419.
 - c. Energize loads per step AA.9, page 23.
- 9. Energize MCC-201AT and MCC-201BT loads:
 - Turbine Building Lighting Transformer Breaker, 52-20103.
 - b. Turbine Oil Lift Pump Breaker, 52-20106.
 - Turbine Turning Gear Motor Breaker, 52-20105.
 - Distribution Panel 21 Breaker, 52-20116.
 - e. 21 S/G Feed Pump Turning Gear Breaker, 52-20121.
 - f. AFW Pump Room Air Conditioner Breaker, 52-20150.
 - g. 22 S/G Feed Pump Turning Gear Breaker, 52-20161.
 - h. Distribution Panel 211 Breaker, 52-20162.
 - SRW Pump Room Vent Fan, 52-20149 (Restart SRW Pump Room Ventilation, per OI-15).

CCOM CR 88-1118
EOP-7 Rev. 1/Unit 2 Page 24 of 36

COM CR 88-1146

.

.

ALTERNATE ACTIONS

*

10. <u>IF</u> emergency power requested by Security, <u>THEN</u> place disconnect switch 2Y211, located on the North wall of Unit 2 27 ft Switchgear Room, in the EMERGENCY position.

AB. MINIMIZE 250V DC BATTERY DISCHARGE:

- Energize 15 or 25 Battery Charger on 13 250V DC Bus.
- Ensure Main Turbine has stopped rotating or is on Turning Gear.
- Verify Bearing Oil Pump running.
- Stop Turbine Emergency Oil Fump and place handswitch in AUTO.
- <u>IF</u> bearing oil header pressure less than 15 PSIG, <u>THEN</u> start Turbine Emergency Oil Pump.

EOP-7 Rev. 1/Unit 2 Page 25 of 36 4

III. RECOVERY ACTIONS		ALTERNATE ACTIONS		
C. LOWER M PRESSUR	MAIN GENERATOR HYDROGEN RE TO 2 PSIG:			
1. Thr Ver 2-0	ottle open Generator Bottom at To Atmosphere Valve, 3-06.			
2. WHEP pre THE a.	Main Generator hydrogen essure decreases to 2 PSIG, N perform the following: Shut 2-G-06.			
b.	Secure Emergency Air Side Seal Oil Pump.			
AD. IF LOCI AND TUP SUPPLIE THEN DE AND MCC	I SEQUENCER IS ACTUATED RBINE MCCS ARE BEING ED BY D/G, E-ENERGIZE MCC-201AT C-201BT.			
1. IF nee THU a. b. c. d. e.	<pre>rapid D/G load reduction eded, EN perform the following: Open 21A 480V Bus Feeder Breaker, 52-2112. Open 24B 480V Bus Feeder Breaker, 52-2413. Locally open MCC-201AT Main Feeder Breaker, 52-20101. Locally open MCC-201BT Main Feeder Breaker, 52-20141. Close 21A 480V Bus Feeder Breaker, 52-2112.</pre>	 1.1 IF rapid D/G load reduction NOT needed, THEN perform the following locally: a. Open MCC-201AT Main Feeder Breaker, 52-20101. b. Open MCC-201BT Main Feeder Breaker, 52-20141. 		

.

AE. MAINTAIN VCT LEVEL BETWEEN 60 AND 100 INCHES:		RECOVERY ACTIONS NTAIN VCT LEVEL BETWEEN 60 AND INCHES:	ECP-7 Rev. 1/Unit 2 Page 26 of 36 ALTERNATE ACTIONS
	1.	WHEN VCT makeup required, THEN shift Charging Pump suction to RWT:	
		Pump Suction Valve, 2-CVC-504-MOV.	
		b. Observe VCT level increasing.	1.b.1 <u>IF</u> VCT level <u>NOT</u> increasing, <u>THEN</u> shut VCT Outlet Valve, 2-CVC-501-MCV.
		 Ensure Charging Pump(s) AMPS steady. 	
	2.	WHEN VCT increases to 100 inches, THEN shift Charging Pump suction to VCT:	
-		a. Open VCT Outlet Valve, 2-CVC-501-MOV.	
		b. Shut RWT To Charging Pump Suction Valve, 2-CVC-504-MOV.	

EOF-7 Rev. 1/Unit 2 Page 27 of 36

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

AF. IF FORCED CIRCULATION DESIRED AND PUMP RESTART CRITERIA MET, THEN RESTART RCPs WHEN POWER AVAILABLE:

- CAUTION -

Uncontrolled restoration of cooling to hot RCP seals may cause degradation of the metallic seating surfaces by thermal shock.

- <u>IF</u> Component Cooling is isolated to RCP seals, <u>THEN</u> reduce RCP lower seal temperature below 280°F prior to initiating full cooling flow to the RCPs:
 - a. Shut Component Cooling Supply Containment Manual Isolation Valve, 2-CC-284, located in 5 ft East Penetration Room.
 - b. Open Component Cooling Containment Isolation Valves:

2-CC-3832-CV 2-CC 3633-CV

- Slowly open 2-CC-284 to throttle component cooling flow until lower seal temperatures are less than 280°F.
- d. <u>WHEN</u> lower seal temperatures are less than 280°F, THEN fully open 2-CC-284.

EOP-7 Rev. 1/Unit Page 28 of 36

III. RECOVERY ACTIONS

ALTERNATE ACTIONS

- <u>IF</u> an RCP lower seal temperature exceeded 280°F, <u>THEN</u> an engineering evaluation is required prior to restarting that RCP.
- Raise pressurizer level to at least 155 inches.
- Lower Tcold to less than 525°F.
- 5. Verify RCP restart criteria:
 - a. RCS subcooling greater than 30°F.
 - b. At least one S/G available for heat removal.
 - Pressurizer level greater than 155 inches and stable.
 - d. Tcold less than 525°F.
 - e. RCS temperature and pressure greater than the minimum operating limits per RCP curve on Attachment (1).

- NOTE -

Starting an RCP may cause a pressurizer level transient.

×

- 6. <u>WHEN</u> RCP restart criteria are met, <u>THEN</u> start one RCP in a loop with an operable S/G:
 - Verify "COMPT CLG FLOW LO" alarm clear.

EOP-7 Rev. 1/Unit 2 Page 29 of 36

III. RECOVERY ACTIONS

- ALTERNATE ACTIONS
- b. Start Oil Lift Pump.
- c. Insert RCP sync stick.
- d. Start one RCP.
- e. Monitor RCP running current:

Tavg

Current

- 525 to 572°F 238 to 210 AMPS and steady
- 210 to 525°F 264 to 238 AMPS and steady
 - Monitor RCP seal parameters following pump restart.
 - Allow backflow to equalize temperatures in opposite loop.
- Start second RCP in opposite loop per steps AF.6 and AF.7, pages 28 and 29.
- 10. Secure Auxiliary Spray:
 - a. Open Loop Charging Valves:

2-CVC-518-CV 2-CVC-519-CV

- b. Shut Auxiliary Spray Valve, 2-CVC-517-CV.
- c. Shift Pressurizer Spray Controller, 2-HIC-100, to AUTO.
- WHEN RCPs restarted, THEN implement appropriate operating procedure AND complete administrative post-trip actions of this procedure.

EOP-7 Rev. 1/Unit 2 Page 30 of 36

ALTERNATE ACTIONS III. RECOVERY ACTIONS AG. DETERMINE TIME UNTIL COOLDOWN REQUIRED: 1. Determine total water available for use as makeup. 2. Determine time until commencement of required cooldown per Attachment (11). 3.1 IF RCS cooldown NOT 3. IF RCS cooldown required, required, THEN implement Natural Circulation Cooldown (AOP-3F) THEN implement Loss of Flow/Natural Circulation AND complete admi. istrative (AOP-3E) AND complete post-trip actions of this administrative post-trip procedure. actions of this procedure.

EOP-7 Rev. 1/Unit 2 Page 31 of 35

8 T.T	A TAM T M T	CTDATTUE	DOCT_TDID	ACTIONS.
AM .	ADMINI	DIKUTIAD	LODI-THIL	UCTTONO!

- NOTE -

The following actions may be accomplished whenever feasible. They may be done in any order.

- Refer to ERPIP to determine appropriate emergency response actions.
- Perform notifications per CCI-118.
 - Notify ESO of trip.

4. Request RCS Boron and Iodine sample.

- 5. Perform shutdown margin calculation per NEOG 9 and 11.
 - 6. Complete transient log entries per CCI-301.
 - Recall post-trip review (preferably within 30 minutes of trip).
- B. Perform post-trip review per CCI-111.
 - 9. Monitor turbine bearing temperatures.
 - Continue Main Turbine shutdown per applicable step of OI-43A.

END OF SECTION III.

EOP-7 Rev. 1/Unit 2 Page 32 of 36

IV. SAFETY FUNCTION STATUS CHECK

- A. The STA (or person designated by STA) will perform the intermediate and final safety function checks respectively on entry and prior to exiting from this procedure.
- B. Perform intermediate safety function status checks at 10 minute intervals until plant conditions stabilize.
- C. Immediately notify Shift Supervisor or Control Room Supervisor if any safety function criteria is not being satisfied.
- D. Review data and verify that safety function acceptance cilteria are satisfied.
- E. When EOP completed, then perform final safety function check.

REACTIVITY	SAFETY FUNCTICN ACCEPTANCE CRITERIA		AI	
PARAMETERS	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK
a. WRNI power at RPS	less than 3%		less than 1%	10 - 10 - 10 - 10 - 10 - 10 - 10 - 10 -
b. SUR (DPM) at RPS	negative		0	
When Power Restored				
c. CEA status	all inserted		all inserted	
or				
Boration status:			appropriate	
concentation	increasing		S/D margin	
BAST level	decreasing	********	N/A	N/A

Rev. 1/Unit 2 Page 33 of 36 1 SAFETY FUNCTION ACCEPTANCE CRITERIA RCS PRESSURE AND INVENTORY FINAL CRITERIA INTERMEDIATE CRITERIA PARAMETERS CHECK CHECK less less a. Pressurizer than 2300 than 2300 pressure (PSIA) b. Pressurizer level 130 to 180 (1) 50 to 180 (inches) 30 to 140 c. RCS subcooling (°F) 30 to 140 (2)

EOP-7

 Pressurizer level may decrease below 50 inches depending upon RCS leakrate and time power unavailable.

(2) RCS subcooling may decrease below 30°F depending upon RCS leakrate and time power unavailable. If CET temperatures remain less than or equal to saturation temperature, for existing RCS pressure, then the Core is covered.

EOP-7 Rev. 1/Unit 2 Page 34 of 36

6

CORE AND RCS HEAT REMOVAL		RE AND RCS AT REMOVAL	SAFETY FUNCTION ACCEPTANCE				
	PARAMETERS		CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK	
	a.	RCS Tcold (^O F)	less than 545		less than 535_		
	b.	CET ([°] F) (3)	constant or decreasing		constant or decreasing_		
	с.	Thot minus Tcold (°F):					
		Natural Circulation	10 to 50		10 to 50 _		
		Forced Circulation	N/A		less than 5 _		
	d.	S/G pressure (PSIA)	less than 1000		less than 920 _		
)	е.	S/G level (inches)	(-)170 to (+)30		(-)24 to (+)30 _		
	f.	Condensate Storage Tank level (ft)	greater than 5		great . than 5 _		

(3) CET temperatures may increase while Natural Circulation is being established.

1

.

EOP-7 Rev. 1/Unit 2 Page 35 of 36

AUX	ILIARIES	CRITERIA	INTERMEDIATE	CRITERIA	FINAL
			CHECK		CHECK
a.	4KV vital buses	de-energized		one	
	21 and 24 (4)	de-energized		energreed	
ь.	Instrument Air			greater	
	pressure (PSIG) (4)	decreasing		than 88	
с.	Component Cooling				
	(# pumps running)(4)	0		1 or 2	
-1	Component Cooling				
α.	Head Tank level	greater than		greater	
	(inches) (5)	30		than 20	-
~	Saltuater				
e.	(# pumps running)(4)	0		1 or 2	
f.	Service Water	0		1 or 2	
	(# pumps running)(*)	v			
g.	Service Water				
	Head Tank level	greater than		greater	
	(inches) (5)	30		than 30	
				battery	
h.	125V DC buses			charger	
	11, 12, 21, 22	energized		energized	
i .	120V AC vital			battery	
-	buses			charger	
	21, 22, 23, 24	energized		energized	-

(4) Intermediate criteria based on initial conditions prior to restoration of a 4KV vital bus.

(5) Refer to OI-15 and OI-16 for filling head tanks.

EOP-7 Rev. 1/Unit 2 Page 36 of 36

NORMAL CONTAINMENT	SAFETY	FUNCTION ACCEPTAN	NCE CRITERIA	
ENVIRONMENT PARAMETERS	CKITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK
a. Containment pressure (PSIG)	N/A	N/A	less than 0.7	
Containment temperature (°F)	N/A	N/A	less than 120	
c. Containment level (inches)	N/A	· N/A	less than 4	
NORMAL RADIATION	SAFETY	FUNCTION ACCEPTAN	NCE CRITERIA	
TO CONTAINMENT	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL
a. Noble Gas Monito:	r (6) alar clear		alarm clear	
(6) Available when	power restored			
	STATUS CHECK NUMBER	COMPLETE AT TIME	5	
	1			
	2			
	3			
	4			

.

٩,

.

*

EOP-8 Rev. 1/Unit 1 Page 1 of 49

DATE

CALVERT CLIFFS NUCLEAR POWER PLANT

EOP-8 FUNCTIONAL RECOVERY PROCEDURE

REVISION 1

SIGNATURE 1 12/18/87 PREPARED BY; 12-18-8 VERIFIED BY; MEETING # 88-7 2-10-38 POSRC; 12-10-88 Manager-Nuclear Operations or General Supervisor-APPROVED BY; Operations if POSRC review is not required

EOP-8 Rev. 1/Unit 1 Page 2 of 49

LIST OF EFFECTIVE PAGES

.

÷

PAGE NUMBER	REVISION	PAGE NUMBER	REVISION
1	1	25	1
2	1	26	1
3	1	27	1
4	1	28	1
5	1	29	1
6	1	30	1
7	1	31	1
8	1	32	1
9	1	33	1
10	1	34	1
11	1	35	1
12	1	36	1
13	1	37	1
14	1	38	1
15	1	39	1
16	1	40	1
17	1	41	1
18	1	42	1
19	1	43	1
20	ī	44	1
21	ī	45	ĩ
22	ī	46	ĩ
23	ĩ	47	ĩ
24	ĩ	48	î
		49	1
		42	

.

EOP-8 Rev. 1/Unit 1 Page 3 of 49

I. ENTRY CONDITIONS

The operator should enter the Functional Recovery Procedure under the following circumstances:

A. EOP-O has been completed but an event diagnusis cannot be made.

OR

B. An event diagnosis has been made and one of the EOP-1 through 7 procedures has been implemented but one or more safety functions are not meeting their acceptance criteria and the reason for the violation has not been established.

OR

C. An event diagnosis has been made and one of the EOP-1 through 7 procedures has been implemented but a subset of parameters for a single safety function are not meeting their acceptance criteria and the Shift Supervisor desires to reference EOP-8 to obtain additional guidance for a specific problem.

For the conditions of A or B, EOP-8 should be implemented in its entirety. The safety functions with the out of spec acceptance criteria should be addressed first.

When EOP-8 is implemented, the safety function status check of EOP-8 should be implemented until an appropriate optimum recovery procedure is selected.

EOP-3 need not be implemented if the parameters of a safety function are outside of their acceptance criteria and:

1. Reason for the violation has been established,

AND

 Action has been identified that will return the parameter(s) to within their acceptance criteria,

AND

 The Shift Supervisor determines the recovery of the out of spec parameter(s) to within acceptance criteria to be imminent.

EOP-8 Rev. 1/Unit 1 Page 4 of 49

REACTIVITY CONTROL

I. PRECAUTIONS

- A. Do not adopt manual operation of automatically controlled systems unless a malfunction is apparent or automatic system operation will not support the maintenance of a safety function.
- B. Systems shifted to manual operation must be monitored frequently to ensure correct operation.
- C. At least two independent indications should be used, when available, to evaluate and corroborate a specific plant condition since an incident could induce inconsistencies between instruments.
- D. The operator should not leave reactivity control until this function is fulfilled. If necessary, other urgent safety functions may be pursued in parallel but attompts to establish reactivity control must be continued until the acceptance criteria are met.
- E. If possible, maintain RCS temperature greater than 515°F until reactivity control criteria are satisfied.
- F. The concentration of boron in RCS makeup water should be consistent with maintaining the required shutdown margin.
- G. When borating the RCS it is possible for a large difference in boron concentration to develop between the RCS and pressurizer fluids if main or auxiliary spray is not operated at intervals. If spray is unavailable, the RCS boron concentration should be increased by 50 ppm to maintain the required shutdown margin should a pressurizer outsurge occur.

EOP-8 Rev. 1/Unit 1 Page 5 of 49

1.20

. .0

21

II. REACTIVITY CONTROL ACCEPTANCE CRITERIA

- A. IF any of the following conditions exist:
 - 1. All CEAs inserted and WRNI power decreasing.
 - OR

2. RCS boration in progress and WRNI power decreasing.

OR

3. WRNI power less than 10^{-4} % and constant or decreasing. THEN Reactivity Control Safety Function is satisfied.

B. WHEN Reactivity Control Safety Function is satisfied, THEN proceed to the next safety function in jeopardy.

III. RECOVERY ACTIONS

A. INITIATE REACTOR SHUTDOWN BY CEA INSERTION:

- 1. Depress both sets of Manual Reactor Trip Buttons.
- OR
- 2. De-energize CEDM Motor Generator Sets:
 - a. Open feeder breaker to 12A 480V Bus.
 - b. Open feeder breaker to 13A 480V Bus.
 - c. Open tie breakers to 12A and 13A 490V Buses.
- OR
- 3. Depress local Emergency Trip Buttons on the Trip Circui. Breakers.

EOP-8 Rev. 1/Unit 1 Page 6 of 49

71

6

B. INITIATE REACTOR SHUTDOWN BY BORATION:

- 1. Establish charging flowpath to RCS:
 - a. Normal CVCS lineup:
 - (1) Open Loop Charging Valves:
 - 1-CVC-518-CV 1-CVC-519-CV
 - (2) <u>IF</u> Loop Charging Valves shut, <u>THEN</u> charging may continue through Loop Charging Valves Bypass Valve, 1-CVC-188.

OR

b. Charging through Aux HFSI Header:

- Open SI Discharge To Charging Header Core Flush Valve, 1-CVC-269-MOV.
- (2) Shut Charging Header Containment Isolation Valve, 1-CVC-183, located in ft West Penetration Room.
- (3) Shut HPSI Aux Header Isolation Valve, 1-SI-656-MOV.
- (4) Shut Letdown Isolation Valves:

1-CVC-515-CV 1-CVC-516-CV

- (5) Open any one of the four Aux HPSI Header Valves:
 - 1-SI-617-MOV 1-SI-627-MOV 1-SI-637-MOV 1-SI-647-MOV

2. Establish boric acid flowpath to Charging Pumps:

a. BAST Lineup:

- (1) Ensure BAST levels greater than zero.
- (2) Shut VCT Makeup Valve, 1-CVC-512-CV.
- (3) Open Boric Acid Direct Makeup Valve, 1-CVC-514-MOV.

EOP-8 Rev. 1/Unit 1 Page 7 of 49

.

(4) Open BAST Gravity Feed Valves:

1-CVC-508-MOV 1-CVC-509-MOV

- (5) Shut VCT Outlet Valve, 1-CVC-501-MOV.
- (6) Start Boric Acid Pumps.
- (7) Start all available Charging Pumps.
- (8) Ensure Charging Pump discharge pressure greater than RCS pressure.
- OR

b. RWT Lineup:

- (1) Ensure RWT level greater than 2 ft.
- (2) Open RWT To Charging Pump Suction Valve, 1-CVC-504-MOV.
- (3) Shut VCT Outlet Valve, 1-CVC-501-MOV.
- (4) Start all available Charging Pumps.
- (5) Ensure Charging Pump discharge pressure greater than RCS pressure.

....

EOP-8 Rev. 1/Unit 1 Page 8 of 49

RCS PRESSURE AND INVENTORY CONTROL

I. PRECAUTIONS

- A. Do not adopt manual operation of automatically controlled systems unless a malfunction is apparent or automatic system operation will not support the maintenance of a safety function.
- B. Systems shifted to manual operation must be monitored frequently to ensure correct operation.
- C. At least two independent indications should be used, when available, to evaluate and corroborate a specific plant condition since an incident could induce inconsistencies between instruments.
- D. Solid water operation of the Pressurizer should be avoided unless 30°F subcooling cannot be maintained. If the RCS is solid, closely monitor RCS makeup or letdown and avoid system heatup or cooldown rates which could induce rapid pressure excursions.
- E. Indications of high RCS inventory (high pressurizer level) may be caused by the displacement of water from voided areas of the RCS. Operation of letdown under these conditions may lower RCS pressure and, subsequently, increase RCS voiding.

EOP-8 Rev. 1/Unit 1 Page 9 of 49

II. RCS PRESSURE AND INVENTORY ACCEPTANCE CRITERIA

- A. IF either of the following conditions exist:
 - 1. RCS pressure and temperature are within the limits per Attachment (1) and:
 - a. Pressurizer level is between 35 and 250 inches.
 - B. RCS subcooling is greater than 30°F, using CET temperatures.
 - c. RVLMS indicates that the Core is covered.
 - OR
 - RCS pressure and temperature are within the limits per Attachment (1) and:
 - a. All available Charging Pumps running.
 - b. HPSI and LPSI Pumps are injecting water into RCS per Attachments (12) and (13).
 - c. RVLMS indicates that the Core is covered.

THEN RCS Pressure and Inventory Safety Function is satisfied.

B. WHEN RCS Pressure and Inventory Safety Function is satisfied, THEN proceed to the next safety function in jeopardy.

III. RECOVERY ACTIONS

- A. ENSURE AUTOMATIC CONTROL OF PRESSURIZER LEVEL AND PRESSURE:
 - 1. Manually operate control systems which are not providing correct automatic control of pressurizer level or pressure:
 - **IF** Pressurizer Level Control System <u>NOT</u> restoring level to 160 inches, <u>THEN</u> manually operate charging and letdown to stabilize level in indicating range.
 - b. <u>IF</u> Pressurizer Pressure Control System <u>NOT</u> restoring pressure to setpoint value, <u>THEN</u> manually operate heaters and sprays to maintain RCS subcooling between 30 and 140°F.

EOP-8 Rev. 1/Unit 1 Page 10 of 49

- 2. Ensure automatic protective actions occur:
 - a. Verify PORVs open at 2400 PSIA and shut by 2300 PSIA.
 - b. <u>IF</u> RCS pressure decreases to 1725 PSIA, <u>THEN</u> verify SIAS actuation <u>AND</u> commence SIAS Verification Checklist, Attachment (2).
 - c. <u>IF</u> RWT level decreases to between 0.5 and 1.0 ft <u>OR</u> "ACTUATION SYS RAS TRIPPED" alarm received, <u>THEN</u> verify RAS actuation <u>AND</u> commence RAS Verification Checklist, Attachment (6).
- B. MONITOR FOR RCF TRIP CRITERIA.
 - 1. Trip RCPs as indicated below:
 - a. <u>IF</u> RCS pressure decreases to 1725 PSIA, <u>THEN</u> trip 11A and 12B RCPs <u>OR</u> trip 11B and 12A RCPs.
 - b. <u>IF</u> RCS pressure decreases to less than 1300 PSIA, <u>THEN</u> trip all RCPs.
 - c. <u>IF</u> CIS has actuated, <u>THEN</u> trip all RCPs.
- C. MAINTAIN ADEQUATE WATER SUPPLY TO PUMPS CONTROLLING RCS INVENTORY:

- CAUTION -

Long term injection of concentrated boric acid could result in degraded core heat removal due to plating out the boron.

- 1. Charging Pumps aligned to BASTs using Boric Acid Pumps:
 - a. Shut VCT Makeup Valve, 1-CVC-512-CV.
 - b. Open Boric Acid Direct Makeup Valve, 1-CVC-514-MOV.
 - c. Start a Boric Acid Pump.

EOP-8 Rev. 1/Unit 1 Page 11 of 49

2. Charging Pumps aligned to BAST3 using gravity feed:

- a. Shut VCT Makeup Valve, 1-CVC-512-CV.
- b. Open BAST Gravity Feed Valves:

1-CVC-508-MOV 1-CVC-509-MOV

c. Shut VCT Outlet Valve, 1-CVC-501-MOV.

OR

3. Charging Pumps aligned to VCT:

a. Ensure VCT level greater than 50 inches.

b. Open VCT Outlet Valve, 1-CVC-501-MOV.

OR

4. Charging Pumps aligned to RWT:

 Open RWT To Charging Pump Suction Valve, 1-CVC-504-MOV.

b. Shut VCT Outlet Valve, 1-CVC-501-MOV.

c. Shut Boric Acid Direct Makeup Valve, 1-CVC-514-MOV.

.

d. Secure Boric Acid Pumps.

OR

5. HPSI and LPSI Pumps aligned to RWT:

a. Open RWT Outlet Valves:

1-SI-4142-MOV 1-SI-4143-MOV

b. Ensure RWT level greater than 4 ft.

EOP-8 Rev. 1/Unit 1 Page 12 of 49

120

*

.

1.0

6. HPSI and LPSI Pumps aligned to containment sump:

- a. Monitor containment water level to ensure adequate suction water supply.
- b. Place SI Fump Mini Flow Lockout Switches in ON.
- c. Commence RAS Verification Checklist, Attachment (6).
- d. Shut RWT Outlet valves:

1-SI-4142-MOV 1-SI-4143-MOV

- D. MAINTAIN AT LEAST ONE RCS MAKEUP PATH:
 - 1. Normal charging path:
 - a. Open Loop Charging Valves:

1-CVC-518-CV 1-CVC-519-CV

b. <u>IF</u> Loop Charging Valves shut, <u>THEN</u> charging may continue through Loop Charging Valves Bypass Valve, 1-CVC-188.

OR

2. Charging through Aux HPSI Header:

- a. Open SI Discharge To Charging Header Core Flush Valve, 1-CVC-269-MOV.
- b. Shut Charging Header Containment Isolation Valve, 1-CVC-183, located in 27 ft West Penetration Room.
- c. Shut HPSI Aux Header Isolation Valve, 1-SI-656-MOV.
- d. Shut Letdown Isolation Valves:

1-CVC-515-CV 1-CVC-516-CV

EOP-8 Rev. 1/Unit 1 Page 13 of 49

e. Open any one of the four Aux HPSI Header Valves:

1-SI-617-MOV 1-SI-627-MOV 1-SI-637-MOV 1-SI-647-MOV

OR

3. HPSI Pump makeup to RCS in SIAS or RAS mode:

- a. Check RCS pressure less than 1270 PSIA.
- b. <u>IF</u> RCS pressure greater than 1270 PSIA, <u>THEN</u> depressurize per guidelines in step F.<u>2</u>.e., page 18.

c. Open Main and Aux HPSI Header Valves:

1-SI-616-MOV	1-SI-617-MOV
1-SI-626-MOV	1-SI-627-MOV
1-SI-636-MOV	1-SI-637-MOV
1-SI-646-MOV	1-SI-647-MOV

OR

4. LPSI Pump makeup.

a. Check RCS pressure less than 180 PSIA.

b. Open LPSI Header Valves:

1-SI-615-MOV 1-SI-625-MOV 1-SI-635-MOV 1-SI-645-MOV

E. ESTABLISH AND MAINTAIN RCS MAKEUP FLOW:

1. Charging Pump makeup:

- a. Start all available Charging Pumps.
- Ensure Charging Pump discharge pressure greater than RCS pressure.
- c. Ensure pump running current between 75 and 95 AMPS.

EOP-8 Rev. 1/Unit 1 Page 14 of 49

- 2. HPSI Pump makeup in SIAS mode:
 - a. Start 11 and 13 HPSI Pumps.
 - b. <u>IF</u> 11 or 13 HPSI Pump fails, <u>THEN</u> start 12 HPSI Pump <u>AND</u> align to appropriate header.
 - c. Verify HPSI flow per Attachment (12).

OR

- 3. HPSI Pump makeup in RAS mode:
 - a. Start 11 or 13 HPSI Pumps.
 - <u>IF</u> HPSI flow greater than 1000 GPM with two HPSI Pumps operating, THEN equally throttle HPSI flow to 1000 GPM.
 - <u>IF</u> HPSI flow greater than 600 GPM with one HPSI Pump operating,
 THEN equally throttle HPSI flow to 600 GPM.

- CAUTION -

To prevent pump damage, minimum flow per operating HPSI Pump is 30 GPM.

- d. <u>IF</u> HFSI Pump cavitation occurs in recirculation mode, <u>THEN</u> throttle HPSI flow per Attachment (12).
- <u>IF</u> Attachment (12) does <u>NOT</u> allow throttling HPSI flow,
 <u>THEN</u> align Containment Spray Pump(s) to HPSI Pump suction:
 - (1) IF 11 HPSI Pump cavitating, <u>THEN</u> open 11 SDC HX To HPSI Suction Valve, 1-SI-653-MOV AND start 11 Containment Spray Pump.
 - (2) <u>IF</u> 13 HPSI Pump cavitating, <u>THEN</u> open 12 SDC HM TO HPSI Suction Valve, 1-SI-662-MOV AND start 12 Containment Spray Pump.

EOP-8 Rev. 1/Unit 1 Page 15 of 49

2

٩.

3.1

- 4. LPSI Pump makeup:
 - a. Place 11 or 12 LPSI Pump RAS Override Switch in OVERRIDE.
 - b. Start selected LPSI Pump.
 - c. Verify LPSI flow per Attachment (13).

F. MAINTAIN SUBCOOLED MARGIN BETWEEN 30 AND 140°F:

-CAUTION-

The potential exists for pressurized thermal shock from an excessive cooldown rate followed by a repressurization.

1. Raise subcooling by any of the following:

-NOTE-

Pressurize: Backup Heater Banks 11 and 13 trip on U/V and SIAS.

a. Energize Pressurizer Heater(s).

OR

b. Operate Turbine Bypass or Atmospheric Dump Valves to maximize RCS cooldown, while maintaining cooldown rate less than 100°F/h.

OR

c. <u>IF</u> unable to obtain desired cooldown rate with Turbine Bypass and Atmospheric Dump Valves, <u>THEN</u> use steam driven AFW Pump(s) to increase cooldown rate.

OR

d. Raise HPSI flow to RCS.

EOP-8 Rev. 1/Unit 1 Page 16 of 49

- e. Charging system pressurization:
 - Charge as necessary to maintain at least 30°F subcooling.
 - (2) <u>IF</u> high pressurizer level secures backup Charging Pumps <u>AND</u> more than one Charging Pump required, <u>THEN</u> locally initiate SIAS A6 and B6 <u>AND</u> secure Boric Acid Pump as needed.
 - (3) Secure Charging Pumps not required to maintain subcooling.
- OR
- f. Solid plant pressurization:
 - (1) Station a dedicated pressure control watch at the 1005 and 1006 panels.
 - (2) Verify letdown flowpath operable.
 - (3) Secure all but one Charging Pump by placing in PULL-TO-LOCK.
 - (4) Charge as necessary with remaining pump to maintain a minimum 30°F subcooling.
 - (5) Closely monitor makeup or draining and any heatup or cooldown to avoid rapid pressure excursions.
- 2. Lower subcooling by any of the following:
 - a. De-energize Pressurizer Heater(s).

OR

b. Lower RCS cooldown rate.

EOP-8 Rev. 1/Unit 1 Page 17 of 49

- c. IF the following conditions can be maintained:
 - (1) At least 30°F subcooling.
 - (2) Pressurizer level greater than 101 inches.
 - (3) At least one S/G available for heat removal.
 - (4) RVLMS indicates that the Core is covered.

THEN throttle HPSI or charging flow as necessary to maintain subcooling between 30 and 140°F.

OR

d. Initiate Auxiliary Spray:

- Place Instrument Air CIS Override Switch, 1-HS-2080A, in OVERRIDE.
- (2) Open Cntmt Instrument Air Isolation MOV, 1-IA-2080-MOV.
- (3) Record temperature differential between Pressurizer and Regenerative Heat Exchanger Outlet.
- (4) Open Auxiliary Spray Valve, 1-CVC-517-CV.
- (5) Shut Loop Charging Valves:

1-CVC-518-CV 1-CVC-519-CV

-NOTE-

1-HS-2085 located on West wall of 27 ft Switchgear Room; Key #85 in Control Room Key Locker.

- (6) Open Cntmt Instrument Air Supply CV, 1-IA-2025-CV, by momentarily placing 1-HS-2085 in OPEN.
- (7) Shift Pressurizer Spray Valve Controller, 1-HIC-100, to MANUAL and shut Pressurizer Spray Valves:

1-RC-100E-CV 1-RC-100F-CV

EOP-8 Rev. 1/Unit 1 Page 18 of 49

- (8) Maintain pressurizer cooldown rate less than 200°F/h.
- OR
- e. PORV depressurization:
 - Shift Letdown Control Valve Controller, 1-HIC-110, to MANUAL and shut Letdown Control Valves:

1-CVC-110P-CV 1-CVC-110Q-CV

- (2) De-energize the Pressurizer Heaters by placing all handswitches in OFF.
- (3) Start all available, Containment Air Coolers in HIGH with maximum SRW flow.
- (4) Open Main and Aux HPSI Header Valves:

1-SI-616-MOV	1-SI-617-MOV
1-SI-626-MOV	1-SI-627-MOV
1-SI-636-MOV	1-SI-637-MOV
1-SI-646-MOV	1-SI-647-MOV

- (5) Verify both PORV Block Valves open.
- (6) Start all available Charging Pumps.
- (7) Start 11 and 13 HPSI Pumps.
- (8) Pull two High Pressurizer Pressure Trip Units.
- (9) Verify PORVs open.
- (10) WHEN subcooling less than 140°F, <u>THEN</u> insert High Pressurizer Pressure Trip Units that were previously pulled <u>AND</u> ensure "PORV ENERGIZED" alarm clear.

G.

VERIFY RCS TEMPERATURE AND PRESSURE WITHIN THE LIMITS PER ATTACHMENT (1).

EOP-8 Rev. 1/Unit 1 Page 19 of 49

CORE AND RCS HEAT REMOVAL

I. PRECAUTIONS

- A. Do not adopt manual operation of automatically controlled systems unless a malfunction is apparent or automatic system operation will not support the maintenance of a safety function.
- B. Systems shifted to manual operation must be monitored frequently to ensure correct operation.
- C. At least two independent indications should be used, when available, to evaluate and corroborate a specific plant condition since an incident could induce inconsistencies between instruments.
- D. If an initial RCS cooldown rate exceeds Technical Specification limits, the potential exists for pressurized thermal shock of the Reactor Vessel unless post accident pressure and temperature limits are restored and maintained.
- E. If both S/Gs boil dry, only attempt to refill one S/G to reinitiate core cooling.
- F. In Natural Circulation, increased loop transport time causes a 5 to 10 minute delay in temperature responses to a plant change. Pressurizer level and pressure responses, if available, typically provide better indication of RCS response during this period.
- G. If cooling down with a S/G isolated, an inverted delta T (Tcold higher than Thot) may be observed in the idle loop. This is due to a small amount of reverse heat transfer in the isolated S/G. The inverted delta T is not expected to have any significant affect on natural circulation flow in the operating S/G loop.

EOP-8 Rev. 1/Unit 1 Page 20 of 49

II. CORE AND RCS HEAT REMOVAL ACCEPTANCE CRITERIA

- A. IF any of the following conditions exist:
 - One S/G with level between (-)250 and (+)50 inches and trending toward zero and:
 - a. RCS flow by Forced Flow or Natural Circulation.
 - b. RCS subcooling greater than 30°F using CETs.
 - c. CET temperatures constant or decreasing.
 - d. RVLMS indicates that the Core is covered.
 - OR
 - One S/G with feedwater flow greater than 150 GPM and level being restored and:
 - a. RCS flow by Forced Flow or Natural Circulation.
 - b. RCS subcooling greater than 30°F using CETs.
 - c. CET temperatures constant or decreasing.
 - d. RVLMS indicates that the Core is covered.
 - OR
 - 3. HPSI or LPSI Pumps injecting water into RCS and CET temperatures constant or decreasing.
 - OR
 - 4. Once Through Core Cooling in progress and CET temperatures constant or decreasing.

THEN Core and RCS Heat Removal Safety Function is satisfied.

B. WHEN Core and RCS Heat Removal Safety Function is satisfied, THEN proceed to the next safety function in jeopardy.

EOP-8 Rev. 1/Unit 1 Page 21 of 49

5

III. RECOVERY ACTIONS

 a. Shut both MSIVs. b. Shut S/G Feedwater Isolation Valves: I-FW-4516-MOV FW-4517-MOV c. Shut MSIV Bypass Valves¹: I-MS-4045-MOV MS-4052-MOV d. Shut AFW Steam Supply Valves by placing handswitch in CLOSE: I-MS-4070-CV I-MS-4071-CV e. Shut AFW Block Valves by placing handswitches in CLOSE: ISOC AFW-4520-CV AFW-4520-CV AFW-4521-CV AFW-4521-CV AFW-4521-CV AFW-4523-CV f. Shut upstream drains by placing handswitch 1-HS-66 in CLOSE: Shut S/G Blowdown Valves: BD-4010-CV BD-4011-CV BD-4013-CV 	1.	IF THE	an uncontrolled co IN isolate both S/G	oldown occurs, s:
 b. Shut S/G Feedwater Isolation Valves: 1-FW-4516-MOV 1-FW-4517-MOV c. Shut MSIV Bypass Valves¹: 1-MS-4045-MOV 1-MS-4052-MOV d. Shut AFW Steam Supply Valves by placing handswitch in CLOSE: 1-MS-4070-CV 1-MS-4071-CV e. Shut AFW Block Valves by placing handswitches in CLOSE: <u>11 S/G</u> <u>12 S/G</u> 1-AFW-4520-CV 1-AFW-4521-CV 1-AFW-4521-CV 1-AFW-4521-CV 1-AFW-4522-CV 1-AFW-4522-CV 1-AFW-4523-CV f. Shut upstream drains by placing handswitch 1-HS-66 in CLOSE. g. Shut S/G Blowdown Valves: 1-BD-4010-CV 1-BD-4011-CV 1-BD-4013-CV b. Shut Atsochemic Duen Values 		a,	Shut both MSIVs.	
<pre>1-FW-4516-MOV 1-FW-4517-MOV c. Shut MSIV Bypass Valves: 1-MS-4045-MOV 1-MS-4052-MOV d. Shut AFW Steam Supply Valves by placing handswitch in CLOSE: 1-MS-4070-CV 1-MS-4071-CV e. Shut AFW Block Valves by placing handswitches in CLOSE: <u>11 S/G 12 S/G</u> 1-AFW-4520-CV 1-AFW-4530-CV 1-AFW-4521-CV 1-AFW-4531-CV 1-AFW-4522-CV 1-AFW-4531-CV 1-AFW-4522-CV 1-AFW-4533-CV f. Shut upstream drains by placing handswitch 1-HS-66 in CLOSE. g. Shut S/G Blowdown Valves: 1-BD-4010-CV 1-BD-4012-CV 1-BD-4012-CV 1-BD-4012-CV</pre>		b.	Shut S/G Feedwate	r Isolation Valves:
 c. Shut MSIV Bypass Valves¹: 1-MS-4045-MOV 1-MS-4052-MOV d. Shut AFW Steam Supply Valves by placing handswitch in CLOSE: 1-MS-4070-CV 1-MS-4071-CV e. Shut AFW Block Valves by placing handswitches in CLOSE: <u>11 S/G</u> <u>12 S/G</u> 1-AFW-4520-CV <u>1-AFW-4530-CV</u> 1-AFW-4521-CV <u>1-AFW-4531-CV</u> 1-AFW-4522-CV <u>1-AFW-4532-CV</u> 1-AFW-4523-CV <u>1-AFW-4533-CV</u> f. Shut upstream drains by placing handswitch 1-HS-66 in CLOSE. g. Shut S/G Blowdown Valves: 1-BD-4010-CV 1-BD-4012-CV 1-BD-4013-CV b. Shut Atsoephonic Dump Values 			1-FW-4516-MOV 1-FW-4517-MOV	
<pre>1-MS-4045-MOV 1-MS-4052-MOV d. Shut AFW Steam Supply Valves by placing handswitch in CLOSE: 1-MS-4070-CV 1-MS-4071-CV e. Shut AFW Block Valves by placing handswitches in CLOSE: <u>11 S/G</u> <u>12 S/G</u> 1-AFW-4520-CV 1-AFW-4530-CV 1-AFW-4521-CV 1-AFW-4531-CV 1-AFW-4522-CV 1-AFW-4532-CV 1-AFW-4523-CV 1-AFW-4533-CV f. Shut upstream drains by placing handswitch 1-HS-66 in CLOSE. g. Shut S/G Blowdown Valves: 1-BD-4010-CV 1-BD-4011-CV 1-BD-4013-CV</pre>		с.	Shut MSIV Bypass	Valves
 d. Shut AFW Steam Supply Valves by placing handswitch in CLOSE: 1-MS-4070-CV 1-MS-4071-CV e. Shut AFW Block Valves by placing handswitches in CLOSE: <u>11 S/G</u> <u>12 S/G</u> 1-AFW-4520-CV 1-AFW-4530-CV 1-AFW-4521-CV 1-AFW-4531-CV 1-AFW-4522-CV 1-AFW-4532-CV 1-AFW-4523-CV 1-AFW-4533-CV f. Shut upstream drains by placing handswitch 1-HS-66 in CLOSE. g. Shut S/G Blowdown Valves: 1-BD-4010-CV 1-BD-4011-CV 1-BD-4012-CV 1-BD-4013-CV 			1-MS-4045-MOV 1-MS-4052-MOV	
<pre>1-MS-4070-CV 1-MS-4071-CV e. Shut AFW Block Valves by placing handswitches in CLOSE: <u>11 S/G</u> <u>12 S/G</u> 1-AFW-4520-CV 1-AFW-4530-CV 1-AFW-4521-CV 1-AFW-4531-CV 1-AFW-4522-CV 1-AFW-4532-CV 1-AFW-4523-CV 1-AFW-4533-CV f. Shut upstream drains by placing handswitch 1-HS-66 in CLOSE. g. Shut S/G Blowdown Valves: 1-BD-4010-CV 1-BD-4011-CV 1-BD-4012-CV 1-BD-4013-CV</pre>		d.	Shut AFW Steam Su in CLOSE:	pply Valves by placing handswitches
 e. Shut AFW Block Valves by placing handswitches in CLOSE: <u>11 S/G</u> <u>12 S/G</u> 1-AFW-4520-CV 1-AFW-4530-CV 1-AFW-4521-CV 1-AFW-4531-CV 1-AFW-4522-CV 1-AFW-4532-CV 1-AFW-4523-CV 1-AFW-4533-CV f. Shut upstream drains by placing handswitch 1-HS-66 in CLOSE. g. Shut S/G Blowdown Valves: 1-BD-4010-CV 1-BD-4011-CV 1-BD-4012-CV 1-BD-4013-CV b. Shut Atmospheric Dump Values			1-MS-4070-CV 1-MS-4071-CV	
11 S/G 12 S/G 1-AFW-4520-CV 1-AFW-4530-CV 1-AFW-4521-CV 1-AFW-4531-CV 1-AFW-4522-CV 1-AFW-4532-CV 1-AFW-4523-CV 1-AFW-4533-CV f. Shut upstream drains by placing handswitch 1-HS-66 in CLOSE. g. Shut S/G Blowdown Valves: 1-BD-4010-CV 1-BD-4011-CV 1-BD-4012-CV 1-BD-4013-CV		е.	Shut AFW Block Va CLOSE:	lves by placing handswitches in
<pre>1-AFW-4520-CV 1-AFW-4530-CV 1-AFW-4521-CV 1-AFW-4531-CV 1-AFW-4522-CV 1-AFW-4532-CV 1-AFW-4523-CV 1-AFW-4533-CV f. Shut upstream drains by placing handswitch 1-HS-66 in CLOSE. g. Shut S/G Blowdown Valves: 1-BD-4010-CV 1-BD-4011-CV 1-BD-4011-CV 1-BD-4012-CV 1-BD-4013-CV</pre>			11 3/G	12 S/G
f. Shut upstream drains by placing handswitch 1-HS-66 in CLOSE. g. Shut S/G Blowdown Valves: 1-BD-4010-CV 1-BD-4011-CV 1-BD-4012-CV 1-BD-4013-CV b. Shut Atmospheric Dump Valves			1-AFW-4520-CV 1-AFW-4521-CV 1-AFW-4522-CV 1-AFW-4523-CV	1-AFW-4530-CV 1-AFW-4531-CV 1-AFW-4532-CV 1-AFW-4533-CV
g. Shut S/G Blowdown Valves: 1-BD-4010-CV 1-BD-4011-CV 1-BD-4012-CV 1-BD-4013-CV		£.	Shut upstream dra in CLOSE.	ins by placing handswitch 1-HS-6622
1-BD-4010-CV 1-BD-4011-CV 1-BD-4012-CV 1-BD-4013-CV		g,	Shut S/G Blowdown	Valves:
h Chut Atmospheric Dump Values			1-BD-4010-CV 1-BD-4011-CV 1-BD-4012-CV 1-BD-4013-CV	
n. Shuc Acmospheric Dump varves.		h.	Shut Atmospheric	Dump Valves.

EOP-8 Rev. 1/Unit 1 Page 22 of 49

- i. <u>IF</u> one S/G has a steam line rupture, <u>THEN</u> maintain unaffected S/G operability during blowdown phase per EOP-4, Step J, page 10.
- j. WHEN cooldown rate less than 100° F/h, THEN establish S/G(s) as heat sink.

OR

2. Control steam flow and maintain Tcold less than 540°F:

a. Operate Turbine Bypass Valves from Control Room.

OR

b. Operate Atmospheric Dump Valves from Control Room.

OR

c. Operate Atmospheric Dump Valves from 1C43:

- Verify 1C43 Atmospheric Dump Controllers at 0% output.
- (2) Align Hand Transfer Valves to 1C43 position:

<u>11 S/G</u> 1-HV-3938A 1-HV-3938B 1-HV-3939B

(3) Open Atmospheric Dump Valve(s) using 1C43 controller(s).

OR

-NOTE-

Atmospheric Dump Valves are reverse acting, i.e., clockwise to open, counterclockwise to shut.

d. Manually open Atmospheric Dump Valves by using chain operator.

OR

e. Manually position Turbine Bypass Valves.

EOP-8 Rev. 1/Unit 1 Page 23 of 49

-CAUTION-

Operating history indicates 5,G Safety Valves may fail to reseat completely after lifting.

- f. Manually open S/G Safety Valve:
 - Lower S/G pressure as low as possible using other heat removal methods prior to attempting manual operation of S/G Safety Valve.
 - (2) Operate manual lifting lever to open S/G Safety Valve.

OR

-CAUTION-

The following step may blow out the Condenser Rupture Disks and may cause equipment damage.

- g. Align steam drains to Condenser:
 - Open upstream drains by placing handswitch 1-HS-6622 in OPEN.
 - (2) Open downstream drains by placing handswitch 1-HS-6600 in OPEN.
 - (3) <u>IF</u> MSIVs shut, <u>THEN</u> open MSIV Bypass Valves.

OR

-CAUTION-

The following step will blow out the Condenser Rupture Disks and may cause equipment damage.

- h. <u>IF</u> additional heat removal required <u>AND</u> condenser vacuum <u>NOT</u> available, <u>THEN</u> open Turbine Bypass Valve(s):
 - Open all doors to the outside on the 45 ft Turbine Building.
 - (2) Notify personnel to evacuate 45 ft Turbine Building.
 - (3) Manually operate Turbine Bypass Valve(s) as directed by Control Room personnel.
EOP-8 Rev. 1/Unit 1 Page 24 of 49

3. Control Main Feedwater flow to S/Gs:

a. Ensure main feed rate is maintaining a constant level or controlled increase in S/G level.

-CAUTION-

Severe waterhammer may occur if Main Feed Ring is allowed to drain then subsequently refilled.

- b. Establish a shutdown feed system lineup:
 - (1) One operating S/G Feed Pump.
 - (2) One operating Condensate Booster Pump.
 - (3) One operating Condensate Pump.
 - (4) Both Heater Drain Pumps secured.
- c. <u>WHEN</u> manual control of feed flow rate desired <u>OR</u> S/G levels between (-)24 and (+)30 inches, <u>THEN</u> perform the following:
 - Depress Feed Regulating Bypass Valve Reset Buttons.
 - (2) Adjust Feed Regulating Bypass Valve(s) to raise S/C levels to approximately O inches.
- d. WHEN S/G levels are O inches, THEN shift Feed Regulating Bypass Controllers to AUTO.

OR

- <u>IF</u> Main Feedwater <u>NOT</u> available, THEN feed S/Gs with AFW:
 - a. Establish condensate sources:
 - (1) Confirm 12 CST operable:
 - (a) Ensure 12 CST level greater than 5 ft.
 - (b) Open 12 CST Unit 1 AFW Pump Suction Valve, 1-AFW-161.

EOP-8 Rev. 1/Unit 1 Page 25 of 49

-CAUTIC.Y-

Before transferring AFW Pump suction to an alternate supply the possibility of suction line or CST rupture should be considered.

- (2) <u>IF</u> 12 CST <u>NOT</u> operable, <u>THEN</u> line up 11 CST as alternate suction supply:
 - (a) Locally open 11 CST AFW Pump Suction Valves:

1-AFW-131 1-AFW-167

- (b) Locally shut 12 CST Unit 1 AFW Fump Suction Valve, 1-AFW-161.
- (c) Confirm normal CST level response.

(OR)

-NOTE-

The following step will cause CST levels to equalize.

- (3) <u>IF</u> 11 CST <u>NOT</u> available, <u>THEN</u> line up 21 CST as alternate suction supply:
 - (a) Locally open 11 CST AFW Pump Suction Valves:

2-AFW-131 2-AFW-167

ally open 12 CST AFW Pump Suction Valves:

W-161 2-AFW-161

(c) Confirm normal CST level response.

(OR)

- (4) Align Fire System to 13 AFW Pump suction:
 - (a) Shut 13 AFW Pump Suction Valve, 1-AFW-182.
 - (b) Connect fire hoses between pump suction and a fire main.
 - (c) Open Fire Hose Connection Isolation Valve, 1-AFW-180.

EOP-8 Rev. 1/Unit 1 Page 26 of 49

- (5) Align Fire System to 23 AFW Pump suction for cross connected operation:
 - (a) Shut 23 AFW Pump Suction Valve, 2-AFW-182.
 - (b) Connect fire hoses between pump suction and a fire main.
 - (c) Open Fire Hose Connection Isolation Valve, 2-AFW-180.

(CR)

- (f) IF Condensate Fump available, <u>IJEN</u> transfer hotwell inventory to 11 CST:
 - (a) Shift Hotwell Level Controller, 1-LIC-4405-CV, to MANUAL.
 - (b) Adjust Controller to open Hotwell To CST Dump CV, 1-CD-4405-CV.
 - (c) Shut one Condensate Fump Discharge Valve:

11	Pump	1-CD-106	
12	Pump	1-CD-)13	
13	Pump	1-CD-120	

- (d) Start appropriate Condensate Pump.
- (e) Slowly open pump discharge value to maintain flow rate loss than 2000 GPM.
- (f) Stop pum nen cavitation occurs.
- (g) Shut Hotwell To CST Dump CV, 1-CD-4405-CV.

(OR)

- (7) Emergency fill 11 UST from Fire Syst
 - (a) Connect fire hose between fire house hose manifold and 11 CST Emergency Hose Connection Valva, 1-CD-312.
 - (b) Open 11 CST Emergency Hose Connection Valve, 1-CD-312.

(c) Ensure 11 CST level increasing.

EOP-8 Rev. 1/Unit 1 Page 27 of 49

- (8) Emergency fill 21 CST from Fire System:
 - (a) Connect fire hose between fire house hose manifold and 21 CST Emergency Hose Connection Valve, 2-CD-312.
 - (b) Open 21 CST Emergency Hose Connection Valve, 2-CD-312.
 - (c) Ensure 21 CST level increasing.
- b. Establish AFW flowpath:
 - (1) Open all motor and steam driven train AFW Block Valves:

<u>11 S/G</u>	. <u>12 S/G</u>
L-AFW-4520-CV	1-AFW-4530-CV
L-AFW-4521-CV	1-AFW-4531-CV
L-AFW-4522-CV	1-AFW-4532-CV
-AFW-4523-CV	1-AFW-45-3-CV

(2) <u>IF</u> AFW block Valve(s) will <u>NOT</u> open from Control Room, <u>THEN</u> locally open valve(s) using Hand Transfer Station(s) on North wall of SRW Room.

12 S/G

(3) Open AFW Flow Control Valves:

11 S/G

and the second se	All of the original to be a set of the second to	
1-AFW-4511-CV	1-AFW-4512-CV	
1-AFW-4525-CV	-AFW-4535-CV	

- (4) IF AFW Flow Control Valve(s) will NOT open, THEN locally throttle open bypass valve(s):
 - (a) 4511-CV 11 S/C Bypass Valve, 1-AFW-163, located in 27 ft East Penetration Room.
 - (b) 4525-CV 11 S/G Bypass Valve, 1-AFW-195, located in SRW Room.
 - (c) 4512-CV 12 S/G Bypass Valve, 1-AFW-165, located in 27 ft East Penetration Room.
 - (d) 4535-CV 12 S/G Bypass Vεlve, 1-AFW-196, located in SRW Room.

EOP-8 Rev. 1/Unit 1 Page 28 of 49

c. Start at least one AFW Pump:

-CAUTION-

D/G supplying power to 13 AFW Pump flow limit is 300 GPM; otherwise, flow limit is 575 GPM.

(1) Start 13 AFW Pump:

- (a) Place 13 AFW Pump Handswitch in START.
- (b) Ensure normal pump running current of 60 to 70 AMPS.
- (c) Ensure 13 AFW Pump flow of 150 GPM per S/G.

(OR)

(2) Start 11 or 12 AFW Pump:

(a) Open 11 and 12 AFW Pump Main Steam Supply Valves:

> 1-MS-109 1-MS-107

(b) Open 11 or 12 S/G AFW Steam Supply Valves:

1-MS-4070-CV 1-MS-4071-CV

(c) Open 11 and 12 AFW Pump Turbine Throttle/Stop Valves:

1-MS-3986 1-MS-3988

- (d) Verify 11 or 12 AFW Pump discharge pressure approximately 100 PSI greater than S/G pressure.
- (e) Verify 11 or 12 AFW Fump flow of 150 GPM per S/G.
- (f) Ensure normal or emergency AFW Room Ventilation operable.

EOP-8 Rev. 1/Unit 1 Page 29 of 49

- (3) IF unable to feed S/Gs with Unit 1 AFW Pumps, <u>THEN</u> establish Unit 2 to Unit 1 cross connect operation:
 - (a) Shut Unit 2 motor train AFW Block Valves:
 - 2-AFW-4522-CV 2-AFW-4523-CV 2-AFW-4532-CV 2-AFW-4533-CV
 - (b) Open Unit 2 to Unit 1 AFW Cross Connect Valve, 2-AFW-4500-CV.

-CAUTION-

D/G Supplying power to 23 AFW Pump flow limit is 300 GPM; otherwise, flow limit is 575 GPM.

- (c) Start 23 AFW Pump by placing handswitch in START.
- (d) Ensure normal pump running current of 60 to 70 AMPS.
- (e) Maintain 150 GPM flow to each S/G using Unit 1 AFW Flow Control Valves:

1-AFW-4525-CV 1-AFW-4535-CV

EOP-8 Rev. 1/Unit 1 Page 30 of 49

-CAUTION-

D/G supplying power to 13 AFW Pump flow limit is 300 GPM; otherwise, flow limit is 575 GPM.

(4) Locally start 13 AFW Pump:

(a) Press cLOSE button at 152-1116.

-CAUTION-

Removing control power fuses causes a loss of overcurrent, undervoltage and ground protection.

(b) <u>IF</u> breaker fails to close, <u>THEN</u> remove breaker control power fuses <u>AND</u> press CLOSE button at 152-1116.

(OR)

- (5) Locally start 11 or 12 AFW Pump:
 - (a) Turn turbine governor control knob counterclockwise to the minimum position.
 - (b) Isolate the Instrument Air to the Turbine Governor Controller(s):

1-I/P-3987 1-I/P-3989

- (c) Open filter drains on controllers to allow local control.
- (d) Open AFW Steam Supply Bypass Valves:

1-MS-102 1-MS-105

(e) Open 11 and 12 AFW Pump Turbine Throttle/Stop Valves:

1-MS-3986 1-MS-3988

(f) Adjust turbine governor control knob to maintain AFW Pump discharge pressure 100 PSI greater than S/G pressure.

Ø

OR

ð

EOF-8 Rev. 1/Unit 1 Page 31 of 49

- 5. <u>IF</u> AFW flow to S/G <u>NOT</u> established <u>AND</u> power available to Condensate and Condensate Booster Pump, <u>THEN</u> depressurize S/G to allow feeding with Condensate Booster Pump:
 - a. Verify S/G heat removal available per step A.2, page 22.
 - b. Establish maximum cooldown rate not exceeding 100°F/h.
 - c. <u>WHEN</u> "SGIS A(B) BLOCK PERMITTED" alarm(s) received, <u>THEN</u> block SGIS A(B).
 - d. <u>IF</u> SGIS actuates, <u>THEN</u> block SGIS <u>AND</u> reset SGIS signal.
 - (1) Place Condensate Booster Pumps in PULL-TO-LOCK.
 - (2) Match handswitches prr SGIS Verification Checklist, Attachment (7).
 - (3) Block SGIS.
 - (4) Reset SGIS signal.
 - e. Open S/G Feedwater Isolation Valves.
 - f. Shut Main Feed Regulating Valves.
 - g. Depress Feed Regulating Bypass Valve Reset Buttons.
 - h. Manually adjust Feed Regulating Bypass Valve Controllers to 30% output.
 - Open Condensate Precoat Filter and Condensate Demin Bypass Valves.
 - j. Verify one Condensate Pump running.
 - k. Verify one Condensate Booster Pump running.
 - 1. Place Heat Drain Pump Handswitches in PULL-IO-LOCK.

EOP-0 Rev. 1/Unit 1 Page 32 of 49

-NOTE-

Feedwater flow to S/Gs should start when S/G pressure decreases to approximately 500 PSIA.

- m. Monitor feedwater flow to S/G:
 - Main Feed Regulating Valve Differential Pressure Controller indicates greater than 0.
 - (2) S/G level constant or increasing.
- 6. Establish RCS Flow:
 - a. Ensure at least one RCP operating in a loop with an operable S/G.

OR

b. Confirm Natural Circulation in at least one operable S/G loop:

-NOTE-

Wide range Thot may be obtained from Subcooled Margin Monitor per Attachment (10).

- (1) Thot minus Tcold between 10 and 50°F.
- (2) Tcold constant or decreasing.
- (3) Thot constant or decreasing.
- (4) CET temperatures consistent with Thot.
- (5) Steaming rate affects primary temperature.
- c. Monitor for Core and RCS voiding:

-CAUTION-

Fotential for void formation increases rapidly when pressure decreases below 1500 PSIA.

- (1) Letdown flow greater than charging flow.
- (2) Rapid unexplained increase in pressurizer level during an RCS pressure reduction.

EOP-8 Rev. 1/Unit 1 Page 33 of 49

- (3) Loss of subcooled margin as determined using CET temperatures.
- (4) "REACTOR VESSEL WATER LEVEL LOW" alarm.
- d. <u>IF</u> voiding inhibits heat removal, <u>THEN</u> reduce or eliminate voided area:
 - (1) Shut the Letdown Isolation Valve, 1-CVC-515-CV.
 - (2) Pressurize the RCS to maintain subcooling as near 140°F as practical.
 - (3) <u>IF</u> pressurizing the RCS does <u>NOT</u> eliminate the voids, <u>THEN</u> operate Reactor Vessel Vent Valves per OI-1G.

-CAUTION-

If voids exist in the S/G tubes, a rapid RCS pressure reduction will occur when the voids collapse.

(4) <u>IF</u> voiding occurs in the S/G tubes (saturation pressure of S/G greater than saturation pressure of RCS),

THEN cool the S/G by raising any of the following:

- (a) Steaming rate.
- (b) Feed rate.

(c) S/G Blowdown rate.

AND maintaining less than 100°F/h cooldown rate.

OR

1

B. SAFETY INJECTION CORE COOLING.

 Ensure HPSI or LPSI flow maintaining CET temperatures less than 560°F and constant or decreasing.

OR

EOP-8 Rev. 1/Unit 1 Page 34 of 49

C. ONCE THROUGH CORE COOLING.

1. Commence Once Through Core Cooling:

-CAUTION-

After S/G becomes ineffective for heat removal, Once Through Core Cooling must be initiated prior to CET temperatures reaching 560°F to ensure adequate heat removal.

- a. WHEN either of the following conditions exist:
 - Steaming S/G becomes ineffective and CET temperatures begin to increase.
 - (2) HPSI or LPSI flow insufficient and CET temperatures begin to increase.

THEN commence Once Through Core Cooling.

b. Shift Letdown Control Valve Controller, 1-HIC-110, to MANUAL and shut Letdown Control Valves:

1-CVC-110P-CV 1-CVC-110Q-CV

.

- c. Start all available Charging Pumps.
- d. Open Main and Aux HPSI Header Valves:

1-SI-616-MOV	1-SI-617-MOV
1-SI-626-MOV	1-SI-627-MOV
1-SI-636-MOV	1-SI-637-MOV
1-SI-646-MOV	1-SI-647-MOV

- e. Start 11 and 13 HPSI Pumps.
- De-energize the Pressurizer Heaters by placing all handswitches in OFF.
- g. Start all available Containment Air Coolers in HIGH with maximum SRW flow.

EOP-8 Rev. 1/Unit 1 Page 35 of 49

- h. Open both PORVs:
 - (1) <u>WHEN</u> "PRSR PRESS BLOCK A(B) FERMITTED" alarm(s) received, <u>THEN</u> block SIAS A(B).
 - (2) Verify both PORV Block Valves open.
 - (3) Pull two High Pressurizer Pressure Trip Units.
 - (4) Verify PORVs open.
- <u>IF</u> containment pressure increases to 2.0 PSIG <u>AND</u> still increasing, <u>THEN</u> start one Containment Spray Pump and open associated Cntmt Spray Header CV.

<u>11</u> or <u>12</u>

1-SI-4150-CV 1-SI-4151-CV

j. <u>IF</u> containment pressure increases to 2.8 PSIG, <u>THEN</u> verify ESFAS actuation <u>AND</u> commence Verification Checklists:

(1) SIAS per Attachment (2).

(2) CIS per Attachment (4).

- k. <u>IF</u> containment pressure increases to 4.25 PSIC, <u>THEN</u> verify CSAS actuation <u>AND</u> commence Verification Checklist, Attachment (3).
- 1. Confirm initiation of Once Through Core Cooling.
 - WHEN RCS pressure is less than 1270 PSIA, <u>THEN</u> ensure HPSI flow <u>AND</u> CET temperatures constant or decreasing.
- m. Using CET temperatures, maintain subcooling bet. 30 and 140°F per Attachment (1) by throttling HPSI
 - (1) Lower subcooling by lowering HPSI flow.
 - (2) Raise subcooling by raising HPSI flow.
- n. Continue cooldown using Once Through Core Cooling "intil feedwater restored or shutdown cooling entry conditions are established.

6

EOP-8 Rev. 1/Unit 1 Page 36 of 49

CONTAINMENT ISOLATION

I. PRECAUTIONS

A. Local radioactivity levels should be determined before attempting local manual valve isolation.

II. CONTAINMENT ISOLATION ACCEPTANCE CRITERIA

- A. IF either of the following conditions exist:
 - Containment pressure less than 0.7 PSIG and the following RMS alarms clear:
 - a. S/G Blowdown.
 - b. Condenser Off-Gas.
 - c. Main Vent Gaseous (1-RI-5415).
 - d. Containment Radiation Monitors.
 - e. Noble Gas Monitor.
 - OR

.

12

Each containment penetration required to be shut has an isolation valve shut.

THEN Containment Isolation Safety Function is satisfied.

B. WHEN Containment Isolation Safety Function is satisfied, THEN proceed to the next Safety Function in jeopardy.

EOP-8 Rev. 1/Unit 1 Page 37 of 49

III. RECOVERY ACTIONS

2

IN THE A HOLDERIALD A HOLE ADDALLED HOLE OUD	1.	VERIFY	AUTOMATIC	PROTECTIVE	ACTIONS	OCCUP
----------------------------------------------	----	--------	-----------	------------	---------	-------

- 1. Verify SIAS, CIS, CSAS:
 - <u>IF</u> containment pressure increases to 2.3 PSIG, <u>THEN</u> verify ESFAS actuation <u>AND</u> commence Verification Checklists:
 - (1) SIAS per Attachment (2).
 - (2) CIS per Attachment (4).
 - b. <u>IF</u> containment pressure increases to 4.25 PSIG, <u>THEN</u> verify CSAS actuation <u>AND</u> commence Verification Checklist, Attachment (3).
- B. IF A SIAS, CIS, CSAS VALVE FAILS TO SHUT, THEN SHUT LOCALLY OR SHUT NEXT VALVE OUT FROM PENETRATION.
- C. CHECK LOCKED VALVE DEVIATION LOG TO DETERMINE IF ANY MANUAL CONTAINMENT ISOLATION VALVES NEED TO BE SHUT.
- D. <u>IF S/G HAS A RUPTURED TUBE AND S/G MOT REQUIRED FOR HEAT REMOVAL,</u> THEN ENSURE S/G ISOLATED.
- E. <u>IF</u> CONTAINMENT RMS ALARM RECEIVED, <u>THEN</u> START ALL AVAILABLE IODINE FILTER FANS.

EOP-8 Rev. 1/Unit 1 Page 38 of 49

CONTAINMENT ENVIRONMENT

I. PRECAUTIONS

None

II. CONTAINMENT ENVIRONMENT ACCEPTANCE CRITERIA

- A. IF either of the following conditions exist:
 - Containment temperature and pressure are constant or decreasing and:
 - a. Convainment temperature is less than 222°F.
 - b. Containment pressure is less than 2.8 PSIG.
 - c. H₂ concentration less than 2% (only necessary if greater than four hours since initiation of event.)
 - OR
 - Containment temperature and pressure are constant or decreasing and:
 - a. Containment Spray flow is greater than 1350 GPM.
 - b. H₂ concentration less than 2% (only necessary if greater than four hours since initiation of event.)

0

THEN Containment Environment Safety Function is satisfied.

B. <u>WHEN</u> Containment Environment Safety Function is satisfied, THEN proceed to the next safety function in jeopardy.

EOP-8 Rev. 1/Unit 1 Page 39 of 49

III. RECOVERY ACTIONS

CIJON CR 88-1135

Α.	VERIFY AUTOMATIC PROTECTIVE ACTIONS OCCUR.	
	1.	VERIFY SIAS, CIS, CSAS:
		a. <u>IF</u> containment pressure increases to 2.8 PSIG, <u>THEN</u> verify ESFAS actuation <u>AND</u> commence Verification Checklists:
		(1) SIAS per Attachment (2).
		(2) CIS per Attachment (4).
		b. <u>IF</u> containment pressure increases to 4.25 PSIG, <u>THEN</u> verify CSAS actuation <u>.ND</u> commence Verification Checklist, Attachment (3).
в.	M	AINTAIN CONTAINMENT COOLING.
	1.	Maintain at least one of the following minimum containment cooling combinations in operation while containment pressure is above 4.25 FSIC:
		a. Two Containment Spray trains.
		OR
		b. One Containment Spray train and any two Containment Air Coolers with maximum SRW flow.
		 One Containment Spray train and any two Containment Air Coolers with maximum SRW flow. OR
		 b. One Containment Spray train and any two Containment Air Coolers with maximum SRW flow. OR c. Three Containment Air Coolers with maximum SRW flow.
	2.	 b. One Containment Spray train and any two Containment Air Coolers with maximum SRW flow. OR c. Three Containment Air Coolers with maximum SRW flow. Verify SRW Pump Room Ventilation in service, per OI-15.
	2.	 b. One Containment Spray train and any two Containment Air Coolers with maximum SRW flow. OR c. Three Containment Air Coolers with maximum SRW flow. Verify SRW Pump Room Ventilation in service, per OI-15.

EOP-8 Rev. 1/Unit 1 Page 10 of 49

-

6

-

C. HYDROGEN CONTROL:

- Direct Chemistry to place Hydrogen Monitors in service.
- Establish containment ventilation to ensure no local hydrogen accumulation:
 - a. Start available Containment Air Coolers.
 - b. Start available Cavity Cooling Fans.
 - c. Start Pressurizer Ventilation Fan.
- 3. IF hydrogen concentration increases to 1%, THEN start Hydrogen Recombiners per OI-41A.
- OR
- W: approval of SEC, establish Hydrogen Purge System Operation per OI-41B.

EOP-8 Rev. 1/Unit 1 Page 41 of 49

IV. SAFETY FUNCTION STATUS CHECK

A. The STA (or person designated by STA) will perform the safety function status checks at 10 minute intervals until plant conditions stabilize.

1

- B. Immediately notify Shift Supervisor or Control Room Supervisor if any safety function criteria is not being satisfied.
- C. Review data and verify that safety function acceptance criteria are satisfied.
- D. When all safety function acceptance criteria are being satisfied, diagnosis of event(s) may begin.
- E. The safety function status checks of EOP-8 should continue until an appropriate optimum recovery procedure is selected.

EOP-8 Rev. 1/Unit 1 Page 42 of 49

REACTIVITY CONTROL ACCEPTANCE CRITERIA

REACTIVITY SAFETY FUNCTION ACCEPTANCE CRITERIA CONTROL PARAMETERS CRITERIA STATUS CHECK a. WRNI power decreasing b. SUR (DPM) negative c. CEA status all inserted or Boration status: concentation increasing BAST/RWT level decroasing

Reactivity Control Safety Function is satisfied if:

CRITERIA

SATISFIED

...

a. All CEAs inserted and WRNI power decreasing.

OR

.

.

b. RCS boration in progress and WRNI power decreasing.

OR

c. WRNI power less than 10^{-4} % and constant or decreasing.

EOP-8 Rev. 1/Unit 1 Page 43 of 49

RCS PRESSURE AND INVENTORY ACCEPTANCE CRITERIA

RCS PRESSURE AND INVENTORY PARAMETERS

SAFETY FUNCTION ACCEPTANCE CRITERIA CRITERIA STATUS CHECK

 	and the second		
a.	Pressurizer pressure (PSIA)	within limits per Attachment (1)	
b.	Pressurizer level (inches)*	35 to 250	
c.	Charging flow (GPM)	greater than 40	
d.	HPSI flow (GPM)	per Attachment (12) .	
е.	LFSI flow (GPM)	per Attachment (13)	
f.	RCS Subcooling ([°] F) 30 to 140	********************************
g.	RVLMS	core covered	******

* Limit may be exceeded for solid plant operation.

RCS Pressure and Inventory Safety Function is satisfied if:

CRITFRIA

SATISFIED

- a. RCS pressure and temperature are within the limits per Attachment (1) and:
 - Pressurizer level is between 35 and 250 inches.
 - (2) RCS subcooling is greater than 30°F using CET temperatures.
 - (3) RVLMS indicates that the Core is covered.

UR

di-

-

- b. RCS pressure and temperature are within the limits per Attachment (1) and:
 - (1) All available Charging Pumps running.
 - (2) HPSI and LPSI Pumps are injecting water into RCS per Attachment (12) and (13).
 - (3) RVLMS indicates that the Core is covered.

EOP-8 Rev. 1/Unit 1 Page 44 of 49

CORE AND RCS HEAT REMOVAL ACCEPTANCE CRITERIA

CORE AND RCS		RE AND RCS	SAFETY FUNCTION ACCEPTANCE CRITERIA		
	PA	RAMETERS	CRITERIA	STATUS CHECK	
	а.	S/G pressure (PSIA)	less than 960		
	ь.	S/G level (inches)	(-)250 to (+)50		
	c.	CST level (It)	greater than 5		
	d.	Feedwater flow (GPM)	greater than 150	*	
	e.	CET ([°] F)	less than 560		
	f.	RCS Subcooling ($^{\circ}F$)	30 to 140		
	g.	RVLMS	core covered		
	h.	Tcold ([°] F)	less than 540		
	i.	Thot minus Tcold (°F)			
		Natural Circulation	10 to 50		
		Forced Circulation	less than 10		
	j.	HPSI flow (GPM)	per Attachment (12)		
	k.	LPSI flow (GPM)	per Attachment (13)	***************************************	

EOP-8 Rev. 1/Unit 1 Page 45 of 49

1.2

die 3

Core and RCS Heat Removal Safety Function is satisfied if:

CRITERIA

SATISFIED

- a. One S/G with level between (-)250 and (+)50 inches and trending toward zero and:
 - RCS flow by Forced Flow or Natural Circulation.
 - (2) RCS subcooling greater than 30°F using CETs.
 - (3) CET temperatures constant or decreasing.
 - (4) RVLMS indicates that the Core is covered.

OR

1.10

- b. One S/G with feedwater flow greater than 150 GPM and level being restored and:
 - RCS flow by Forced Flow or Natural Circulation.
 - (2) RCS subcooling greater than 30°F using CETs.
 - (3) CET temperatures constant or decreasing.
 - (4) RVLMS indicates that the Core is covered.

OR

c. HPSI or LPSI Pumps injecting water into RCS and CET temperatures constant or decreasing.

OR

 Once Through Core Cooling in progress and CET temperatures constant or decreasing.

EOP-8 Rev. 1/Unit 1 Page 46 of 49

VITAL AUXILIARIES ACCEPTANCE CRITERIA

· P,

VITAL AUXILIARIES		SAFETY	FUNCTION ACCEPTANCE CRITERIA
		CRITERIA	STATUS CHECK
а.	4KV vital buses 11 or 14	energized	
b.	Instrument Air pressure (PSIG)	greater than 88	
с.	Component Cooling (# pumps running)	1 or 2	
d.	Saltwater (# pumps running)	1 or 2	
е.	Service Water (# pumps running)	1 or 2	
f.	125V DC buses 11, 12, 21, 22	energized	
g.	120V AC vital buses 11, 12, 13, 14	energized	

eiz

Refer to appropriate AOP for any Vital Auxiliaries in jeopardy.

EOP-8 Rev. 1/Unit 1 Page 47 of 49

CONTAINMENT ISOLATION ACCEPTANCE CRITERIA

SAFETY FUNCTION ACCEPTANCE CRITERIA CONTAINMENT ISOLATION STATUS CHECK CRITERIA PARAMETERS less than a. Containment pressure (PSIG) 0.7 b. S/G B/D RMS alarm clear c. Condenser Off-Gas RMS alarm clear d. Main Vent Gaseous RMS (1-R1-5415) alarm clear e. Containment Radiation Monitors alarms clear f. Noble Gas Monitor alarm clear g. Containment all required penetration valves to be shut are shut

Containment Isolation Safety Function is satisfied if:

CRITERIA

SATISFIED

- a. Containment pressure less than 0.7 PSIG and the following RMS alarms clear:
 - (1) S/G Blowdown.
 - (2) Condenser Off-Gas.
 - (3) Main Vent Gaseous (1-R1-5415).
 - (4) Containment Radiation Monitors.
 - (5) Noble Gas Monitor.

OR

b. Each containment penetration required to be shut has an isolation valve shut.

EOP-8 Rev. 1/Unit 1 Page 48 cf 49

CONTAINMENT ENVIRONMENT ACCEPTANCE CRITERIA

CONTAINMENT

SAFETY FUNCTION ACCEPTANCE CRITERIA

STATUS CHECK

ENVIRONMENT

CRITERIA

- a. Containment less than temperature (°F) 222
- b. Containment less than pressure (PSIG) 2.8
- c. Containment spray greater than flow (GPM) 1350
- d. Hydrogen less than concentration 2%

Containment Environment Safety Function is satisfied if:

CRITERIA

SATISFIED

- a. Containment temperature and pressure are constant or decreasing and :
 - Containment temperature is less than (1) 222°F.
 - (2) Contrinment pressure is less than 2.8 PSIG.
 - (3) H, concentration less than 2% (only necessary if greater than four hours since initiation of event.)

OR

- b. Containment temperature and pressure are constant or decreasing and :
 - (1) Containment Spray flow is greater than 1350 GPM.
 - (2) H, concentration less than 2% (only necessary if greater than four hours since initiation of event.)

EOP-8 Rev. 1/Unit 1 Page 49 of 49

NUMBER	COMPLETE AT TIME
1	
2	
3	
4	

÷,

EOP-8 Rev. 1/Unit 2 Page 1 of 49

CALVERT CLIFFS NUCLEAR POWER PLANT

.

2

1000

l

a1

-

EOP-8 FUNCTIONAL RECOVERY PROCEDURE

REVISION 1

.

	SIGNATURE	DATE
PREPARED BY;	L. Kuptit	1 12-18-87
VERIFIED BY;	James Aroms	11/18/57
POSRC;	MEETING # 38-7	12-10-88
APPROVED BY;	Manager-Nuclear Operations or Ge Operations if POSRC review is no	neral Supervisor-

EOP-8 Rev. 1/Unit 2 Page 2 of 49

LIST OF EFFECTIVE PAGES

PAGE NUMBER	REVISION	PAGE NUMBER	REVISION
1	1	25	1
2	1	26	1
3	1	27	1
4	1	28	1
5	1	29	1
6	ī	30	1
7	ĩ	31	1
Å	ī	32	1
g	ĩ	33	1
10	ī	34	1
11	1	35	1
12	ī	36	1
13	ĩ	37	1
14	ī	38	1
15	ĩ	39	1
16	ĩ	40	1
17	ĩ	41	1
18	1	42	1
10	-	43	1
20	1	44	1
21	1	45	1
22	î	46	1
23	î	47	1
24	1	48	1
64		49	1

EOP-8 Rev. 1/Unit 2 Page 3 of 49

I. ENTRY CONDITIONS

The operator should enter the Functional Recovery Procedure under the following circumstances:

A. EOP-O has been completed but an event diagnosis cannot be made.

OR

B. An event diagnosis has been made and one of the EOP-1 through 7 procedures has been implemented but one or more safety functions are not meeting their acceptance criteria and the reason for the violation has not been established.

OR

C. An event diagnosis has been made and one of the EOP-1 through 7 procedures has been implemented but a subset of parameters for a single safety function are not meeting their acceptance criteria and the Shift Supervisor desires to reference EOP-8 to obtain additional guidance for a specific problem.

For the conditions of A or B, EOP-8 should be implemented in its entirety. The safety functions with the out of spec acceptance criteria should be addressed first.

When EOP-8 is implemented, the safety function status check of EOP-8 should be implemented until an appropriate optimum recovery procedure is selected.

EOP-8 need not be implemented if the parameters of a safety function are outside of their acceptance criteria and:

1. Reason for the violation has been established,

AND

 Action has been identified that will return the parameter(s) to within their acceptance criteria,

AND

 The Shift Supervisor determines the recovery of the out of spec parameter(s) to within acceptance criteria to be imminent.

EOP-8 Rev. 1/Unit 2 Page 4 of 49

REACTIVITY CONTROL

I. PRECAUTIONS

- A. Do not adopt manual operation of automatically controlled systems unless a malfunction is apparent or automatic system operation will not support the maintenance of a safety function.
- B. Systems shifted to manual operation must be monitored frequently to ensure correct operation.
- C. At least two independent indications should be used, when available, to evaluate and corroborate a specific plant condition since an incident could induce inconsistencies between instruments.
- D. The operator should not leave reactivity control until this function is fulfilled. If necessary, other urgent safety functions may be pursued in parallel but attempts to establish reactivity control must be continued until the acceptance criteria are met.
- E. If possible, maintain RCS temperature greater than 515°F until reactivity control criteria are satisfied.
- F. The concentration of boron in RCS makeup water should be consistent with maintaining the required shutdown margin.
- G. When borating the RCS it is possible for a large difference in boron concentration to develop between the RCS and pressurizer fluids if main or auxiliary spray is not operated at intervals. If spray is unavailable, the RCS boron concentration should be increased by 50 ppm to maintain the required shutcown margin should a pressurizer outsurge occur.

EOF-8 Rev. 1/Unit 2 Page 5 of 49

II. REACTIVITY CONTROL ACCEPTANCE CRITERIA

A. IF any of the following conditions exist:

1. All CEAs inserted and WRNI power decreasing.

OR

2. RCS boration in progress and WRNI power decreasing.

OR

3. WRNI power less than 10^{-4} % and constant or decreasing. THEN Reactivity Control Safety Function is satisfied.

B. WHEN Reactivity Control Safety Function is satisfied, THEN proceed to the next safety function in jeopardy.

III. RECOVERY ACTIONS

A. INITIATE REACTOR SHUTDOWN BY CEA INSERTION:

1. Depress both sets of Manual Reactor Trip Buttons.

OR

- 2. De-energize CEDM Motor Generator Sets:
 - a. Open feeder breaker to 22A 480V Bus.
 - b. Open feeder breaker to 23A 480V Bus.
 - c. Open tie breakers to 22A and 23A 480V Buses.

OR

 Depress local Emergency Trip Buttons on the Trip Circuit Breakers.

OR

EOP-8 Rev. 1/Unit 2 Page 6 of 49

B. INITIATE REACTOR SHUTDOWN BY BORATION:

1. Establish charging flowpath to RCS:

- a. Normal CVCS lineup:
 - (1) Open Loop Charging Valves:

2-CVC-518-CV 2-CVC-519-CV

(2) <u>IF</u> Loop Charging Valves shut, <u>THEN</u> charging may continue through Loop Charging Valves Bypass Valve, 2-CVC-188.

OR

b. Charging through Aux HPSI Header:

- Open SI Discharge To Charging Header Core Flush Valve, 2-CVC-269-MOV.
- (2) Shut Charying Header Containment Isolation Valve, 2-CVC-183, located in 27 ft West Penetration Room.
- (3) Shut HFSI Aux Header Isolation Valve, 2-SI-656-MOV.
- (4) Shut Letdown Isolation Valves:

2-CVC-515-CV 2-CVC-516-CV

(5) Open any one of the four Aux HPSI Header Valves:

2-SI-617-MOV 2-SI-627-MOV 2-SI-637-MOV 2-SI-647-MOV

2. Establish boric acid flowpath to Charging Pumps:

a. BAST Lineup:

- (1) Ensure BAST levels greater than zero.
- (2) Shut VCT Makeup Valve, 2-CVC-512-CV.
- (3) Open Boric Acid Direct Makeup Valve, 2-CVC-514-MOV.

EOP-8 Rev. 1/Unit 2 Page 7 of 49

(4) Open BAST Gravity Feed Valves:

2-CVC-508-MOV 2-CVC-509-MOV

- (5) Shut VCT Outlet Valve, 2-CVC-501-MOV.
- (6) Start Boric Acid Pumps.
- (7) Start all available Charging Pumps.
- (8) Ensure Charging Pump discharge pressure greater than RCS pressure.

OR

b. RWT Lineup:

- (1) Ensure RWT level greater than 2 ft.
- (2) Open RWT To Charging Pump Suction Valve, 2-CVC-504-MOV.

.....

- (3) Shut VCT Outlet Valve, 2-CVC-SO1-MOV.
- (4) Start all available Charging Pumps.
- (5) Ensure Charging Pump discharge pressure greater than RCS pressure.

EOP-8 Rev. 1/Unit 2 Page 8 of 49

RCS PRESSURE AND INVENTORY CONTROL

I. PRECAUTIONS

- A. Do not adopt manual operation of automatically controlled systems unless a malfunction is apparent or automatic system operation will not support the maintenance of a safety function.
- B. Systems shifted to manual operation must be monitored frequently to ensure correct operation.
- C. At least two independent indications should be used, when available, to evaluate and corroborate a specific plant condition since an incident could induce inconsistencies between instruments.
- D. Solid water operation of the Pressurizer should be avoided unless 30°F subcooling cannot be maintained. If the RCS is solid, closely monitor RCS makeup or letdown and avoid system heatup or cooldown rates which could induce rapid pressure excursions.
- E. Indications of high RCS inventory (high pressurizer level) may be caused by the displacement of water from voided areas of the RCS. Operation of letdown under these conditions may lower RCS pressure and, subsequently, increase RCS voiding.

EOP-8 Rev. 1/Unit 2 Page 9 of 49

II. RCS PRESSURE AND INVENTORY ACCEPTANCE CRITERIA

- A. IF either of the following conditions exist:
 - RCS pressure and temperature are within the limits per Attachment (1) and:
 - a. Pressurizer level is between 35 and 250 inches.
 - b. RCS subcooling is greater than 30°F, using CET temperatures.
 - c. RVLMS indicates that the Core is covered.

OR

- RCS pressure and temperature are within the limits per Attachment (1) and:
 - a. All available Charging Pumps running.
 - b. HPSI and LPSI Pumps are injecting water into RCS per Attachments (12) and (13).
 - c. RVLMS indicates that the Core is covered.

THEN RCS Pressure and Inventory Safety Function is satisfied.

B. WHEN RCS Pressure and Inventory Safety Function is satisfied, THEN proceed to the next safety function in je-pardy.

III. RECOVERY ACTIONS

A. ENSURE AUTOMATIC CONTROL OF PRESSURIZER LEVEL AND PRESSURE:

- Manually operate control systems which are not providing correct automatic control of pressurizer level or pressure:
 - <u>IF</u> Pressurizer Level Control System <u>NOT</u> restoring level to 160 inches,
 <u>THEN</u> manually operate charging and letdown to stabilize level in indicating range.
 - <u>IF</u> Pressurizer Pressure Control System <u>NOT</u> restoring pressure to setpoint value, <u>THEN</u> manually operate heaters and sprays to maintain RCS subcooling between 30 and 140°F.

EOP-8 Rev. 1/Unit 2 Page 10 of 49

- 3. Ensure automatic protective actions occur:
 - a. Verify PCRVs open at 2-00 PSIA and shut by 2300 PSIA.
 - b. <u>IF</u> RCS pressure decreases to 1725 PSIA, <u>THEN</u> verify SIAS actuation <u>AND</u> commence SIAS Verification Checklist, Attachment (2).
 - C. <u>IF</u> RWT level decreases to between 0.5 and 1.0 ft <u>OR</u> "ACTUATION SYS RAS TRIPPED" alarm received, <u>THEN</u> verify RAS actuation <u>AND</u> commence RAS Verification Checklist, Attachment (6).
- B. MONITOR FOR RCP TRIP CRITERIA.
 - 1. Trip RCPs as indicated below:
 - a. <u>IF</u> RCS pressure decreases to 1725 PSIA, THEN trip 21A and 22B RCPs <u>OR</u> trip 21B and 22A RCPs.
 - b. <u>IF</u> RCS pressure decreases to less than 1300 PSIA, <u>THEN</u> trip all RCPs.
 - C. IF CIS has actuated, THEN trip all RCPs.

C. MAINTAIN ADEQUATE WATER SUPPLY TO PUMPS CONTROLLING RCS INVENTORY:

- CAUTION -

Long term injection of concentrated boric acid could result in degraded core heat removal due to plating out the boron.

- 1. Charging Pumps aligned to BASTs using Boric Acid Pumps:
 - a. Shut VCT Makeup Valve, 2-CVC-512-CV.
 - b. Open Boric Acid Direct Makeup Valve, 2-CVC-514-MOV.
 - c. Start a Boric Acid Pump.

OR
EOP-8 Rev. 1/Unit 2 Page 11 of 49

- 2. Charging Pumps aligned to BASTs using gravity feed:
 - a. Shut VCT Makeup Valve, 2-CVC-512-CV.
 - b. Open BAST Gravity Feed Valves:

2-CVC-508-MOV 2-CVC-509-MOV

c. Shut VCT Outlet Valve, 2-CVC-501-MOV.

OR

- 3. Charging Pumps aligned to VCT:
 - a. Ensure VCT level greater than 50 inches.
 - b. Open VCT Outlet Valve, 2-CVC-501-MOV.

OR

- 4. Charging Pumps aligned to RWT:
 - Open RWT To Charging Pump Suction Valve, 2-CVC-504-MOV.
 - b. Shut VCT Outlet Valve, 2-CVC-501-MOV.
 - c. Shut Boric Acid Direct Makeup Valve, 2-CVC-514-MOV.
 - d. Secure Boric Acid Pumps.

OR

5. HPSI and LPSI Pumps aligned to RWT:

a. Open RWT Outlet Valves:

2-SI-4142-MOV 2-SI-4143-MOV

b. Ensure RWI level greater than 4 ft.

OR

EUP-8 Rev. 1/Unit 2 Page 12 of 49

6. HPSI and LPSI Pumps aligned to containment sump:

- a. Monitor containment water level to ensure adequate suction water supply.
- b. Place SI Pump Mini Flow Lockout Switches in ON.
- c. Commence RAS Verification Checklist, Attachment (6).
- d. Shut RWT Outlet valves:

2-SI-4142-MOV 2-SI-4143-MOV

- D. MAINTAIN AT LEAST ONE RCS MAKEUP FATH:
 - 1. Normal charging path:
 - a. Open Lcop Charging Valves:

2-CVC-518-CV 2-CVC-519-CV

b. <u>IF</u> Loop Charging Valves shut, <u>THEN</u> charging may continue through Loop Charging Valves Bypass Valve, 2-CVC-188.

OR

2. Charging through Aux HPSI Header:

- Open SI Discharge To Charging Header Core Flush Valve, 2-CVC-269-MOV.
- b. Shut Charging Header Containment Isolation Valve, 2-CVC-183, located in 27 ft West Penetration Room.
- c. Shut HPSI Aux Header Isolation Valve, 2-51-656-MOV.

d. Shut Letdown Isolation Valves:

2-CVC-515-CV 2-CVC-516-CV

EOP-8 Rev. 1/Unit 2 Face 13 of 49

e. Open any one of the four Aux HPSI Header Valves:

2-SI-617-MOV 2-SI-627-MOV 2-SI-637-MOV 2-SI-647-MOV

OR

3. HFSI Pump makeup to RCS in SI'S or RAS mode:

- a. Check RCS pressure less than 1270 PSIA.
- b. <u>IF</u> RCS pressure greater than 1270 PSIA, <u>THEN</u> depressurize per guidelines in step F.2.e., pag = 18.

c. Open Main and Aux HPSI Header Valves:

2-SI-616-MOV	2-SI-617-MOV
2-SI-626-MOV	2-SI-627-MOV
2-SI-636-MOV	2-SI-637-MOV
2-SI-646-MOV	2-SI-647-MOV

OR

4. _PSI Pump makeup.

a. Check RCS pressure less than 180 PSIA.

b. Open LPSI Header Valves:

2-SI-615-MOV 2-SI-625-MOV 2-SI-635-MOV 2-SI-645-MOV

E. ESTABLISH AND MAINTAIN RCS MAKEUP FLOW:

1. Charging Pump makeup:

a. Start all available Charging Pumps.

- b. Ensure Charging Pump discharge pressure greater than RCS pressure.
- c. Ensure pump running current between 75 and 95 AMPS.

EOP-8 Rev. 1/Unit 2 Page 14 of 49

- 2. HPSI Pump makeup in SIAS mode:
 - a. Start 21 and 23 HPSI Pumps.
 - b. IF 21 or 23 HPSI Pump fails, <u>THEN</u> start 22 HPSI Pump <u>AND</u> align to appropriate header.
 - c. Verily HPSI flow per Attachment (12).
- OR
- 3. HPOI Pump makeup in RAS mode:
 - a. Start 21 or 23 HPSI Pumps.
 - <u>IF</u> HPSI flow greater than 1000 GPM with two HPSI Pumps operating, <u>THEN</u> equally throttle HPSI flow to 1000 GPM.
 - c. <u>IF</u> HPSI flow greater than 600 GPM with one HPSI Pump operating, THEN equally throttle HPSI flow to 600 GPM.

- CAUTION -

To prevent pump damage, minimum flow per operating HPSI Pump is 30 GPM.

- d. IF HPSI Fump cavitation occurs in recirculation mode, THEN throttle HPSI flow per Attachment (12).
- IF Attachment (12) does <u>NOT</u> allow throttling HPSI flow,
 <u>THEN</u> align Containment Spray Pump(s) to HPSI Pump suction:
 - IF 21 HPS1 Pump cavitating, <u>THEN</u> open 21 SDC HX To HPS1 Suction Valve 2-SI-663-MOV AND start 21 Containment Spray Pump.
 - (2) IF 23 HPSI Pump cavitating, <u>THEN</u> open 22 SDC HX To HPSI Suction Valve, 2-SI-662-MOV AND start 22 Containment Spray Pump.

EOP-8 Rev. 1/Unit 2 Page 15 of 49

4. LPSI Pump makeup:

- a. Place 21 or 22 LPSI Pump RAS Override Switch in OVERRIDE.
- b. Start selected LPSI Pump.
- c. Verify LPSI flow per Attachment (13).

F. MAINTAIN SUBCOOLED MARGIN BETWEEN 30 AND 140°F:

-CAUTION-

The potential exists for pressurized thermal shock from an excessive cooldown rate followed by a repressurization.

1. Raise subcooling by any of the following:

-NOTE-

Pressurizer Backup Heater Banks 21 and 23 trip on U/V and SIAS.

a. Energize Pressurizer Heater(s).

OR

b. Operate Turbine Bypass or Atmospheric Dump Valves to maximize RCS cooldown, while maintaining cooldown rate less than 100°F/h.

OR

c. <u>IF</u> unable to obtain desired cooldown rate with Turbine Bypass and Atmospheric Dump Valves, <u>THEN</u> use steam driven AFW Pump(s) to increase cooldown rate.

OR

d. Raise HPSI flow to RCS.

OR

EOP-8 Rev. 1/Unit 2 Page 16 of 49

- e. Charging system pressurization:
 - Charge as necessary to maintain at least 30°F subcooling.
 - (2) <u>IF</u> high pressurizer level secures backup Charging Pumps <u>AND</u> more than one Charging Pump required, <u>THEN</u> locally initiate SIAS A6 and B6 <u>AND</u> secure Boric Acid Pump as needed.
 - (3) Secure Charging Pumps not required to maintain subcooling.

OR

- f. Solid plant pressurization:
 - Station a dedicated pressure control watch at the 2C05 and 2C06 panels.
 - (2) Verify letdown flowpath operable.
 - (3) Secure all but one Charging Pump by placing in PULL-TO-LOCK.
 - (4) Charge as necessary with remaining pump to maintain a minimum 30°F subcooling.
 - (5) Closely monitor makeup or draining and any heatup or cooldown to avoid rapid pressure excursions.

2. Lower subcooling by any of the following:

a. De-energize Pressurizer Heater(s).

OR

b. Lower RCS cooldown rate.

OR

EOP-8 Rev. 1/Unit 2 Page 17 of 49

- c. IF the following conditions can be maintained:
 - (1) At least 30°F subcooling.
 - (2) Pressurizer level greater than 101 inches.
 - (3) At least one S/G available for heat removal.
 - (4) RVLMS indicates that the Core is covered.

THEN throttle HPSI or charging flow as necessary to maintain subcooling between 30 and 140°F.

OR

d. Initiate Auxiliary Spray:

- Place Instrument Air CIS Override Switch, 2-HS-2080A, in OVERFIDE.
- (2) Open Cntmt Instrument Air Isolation MOV, 2-1A-2080-MOV.
- (3) Record temperature differential between Pressurizer and Regenerative Heat Exchanger Outlet.
- (4) Open Auxiliary Spray Valve, 2-CVC-517-CV.
- (5) Shut Loop Charging Valves:

2-CVC-518-CV 2-CVC-519-CV

-NOTE-

2-HS-2085 located on West wall of 27 ft Switchgear Room; Key #80 in Control Room Key Locker.

- (6) Open Cntmt Instrument Air Supply CV, 2-IA-2085-CV, by momentarily placing 2-HS-2085 in OPEN.
- (7) Shift Pressurizer Spray Valve Controller, 2-HIC-100, to MAMUAL and shut Pressurizer Spray Valves:

2-RC-100E-CV 2-RC-100F-CV

EOP-8 Rev. 1/Unit 2 Page 18 of 49

- (2) Maintain pressurizer cooldown rate less than 200°F/h.
- OR
- e. PORV depressurization:
 - Shift Letdown Control Valve Controller, 2-HIC-110, to MANUAL and shut Letdown Control Valves:

2-CVC-110P-CV 2-CVC-110Q-CV

- (2) De-energize the Pressurizer Heaters by placing all handswitches in OFF.
- (3) Start all available. Containment Air Coolers in HIGH with maximum SRW flow.
- (4) Open Main and Aux HPSI Header Valves:

2-SI-616-MOV	2-SI-617-MOV
2-SI-626-MOV	2-SI-627-MOV
2-SI-636-MOV	2-SI-637-MOV
2-SI-646-MOV	2-SI-647-MOV

- (5) Verify both PORV Block Valves open.
- (6) Start all available Charging Pumps.
- (7) Start 21 and 23 HPSI Pumps.
- (8) Pull two High Pressurizer Pressure Trip Units.
- (9) Verify PORVs open.
- (10) WHEN subcooling less than 140°F, THEN insert High Pressurizer Pressure Trip Units that were previously pulled <u>AND</u> ensure "PORV ENERGIZED" alarm clear.

G. VERIFY RCS TEMPERATURE AND PRESSURE WITHIN THE LIMITS PER ATTACHMENT (1).

EOP-8 Rev. 1/Unit 2 Page 19 of 49

CORE AND RCS HEAT REMOVAL

I. PRECAUTIONS

- A. Do not adopt manual operation of automatically controlled systems unless a malfunction is apparent or automatic system operation will not support the maintenance of a safety function.
- B. Systems shifted to manual operation must be monitored frequently to ensure correct operation.
- C. At least two independent indications should be used, when available, to evaluate and corroborate a specific plant condition since an incident could induce inconsistencies between instruments.
- D. If an initial RCS cooldown rate exceeds Technical Specification limits, the potential exists for pressurized thermal shock of the Reactor Vessel unless post accident pressure and temperature limits are restored and maintained.
- E. If both S/Gs boil dry, only attempt to refill one S/G to reinitiate core cooling.
- F. In Natural Circulation, increased loop transport time causes a 5 to 10 minute delay in temperature responses to a plant change. Pressurizer level and pressure responses, if available, typically provide better indication of RCS response during this period.
- If cooling down with a S/G isolated, an inverted delta T (Toold higher than Thot) may be observed in the idle loop. This is due to a small amount of reverse heat transfer in the isolated S/G. The inverted delta T is not expected to have any significant affect on natural circulation flow in the operating S/G loop.

EOP-8 Rev. 1/Unit 2 Page 20 of 49

II. CORE AND RCS HEAT REMOVAL ACCEPTANCE CRITERIA

- A. IF any of the following conditions exist:
 - One S/G with level between (-)250 and (+)50 inches and trending toward zero and:
 - a. RCS flow by Forced Flow or Natural Circulation.
 - b. RCS subcooling greater than 30°F using CETs.
 - c. CET temperatures constant or decreasing.
 - d. RVLMS indicates that the Core is covered.
 - OR
 - One S/G with feedwater flow greater than 150 GPM and level being restored and:
 - a. RCS flow by Forced Flow or Natural Circulation.
 - b. RCS subcooling greater than 30°F using CETs.
 - c. CET temperatures constant or decreasing.
 - d. RVLMS indicates that the Core is covered.
 - OR
 - HPSI or LPSI Pumps injecting water into RCS and CET temperatures constant or decreasing.
 - OR
 - Once Through Core Cooling in progress and CET temperatures constant or decreasing.

THEN Core and RCS Heat Removal Safety Function is satisfied.

B. <u>WHEN</u> Core and RCS Heat Removal Safety Function is satisfied, THEN proceed to the next safety function in jecpardy.

EOP-8 Rev. 1/Unit 2 Page 21 of 49

III. RECOVERY ACTIONS

Α.	MAINTAIN S/G OFERABILITY:			
	1.	IF	an uncontrolled co N isolate both S/G	oldown occurs, s:
		а.	Shut both MSIVs.	
		ь.	Shut S/G Feedwate	r Isolation Valves:
			2-FW-4516-MOV 2-FW-4517-MOV	
		с.	Shut MSIV Bypass	Valves:
			2-MS-40-5-MOV 2-MS-4052-MOV	
		d.	Shut AFW Steam Su in CLOSE:	upply Valves by placing handswitches
			2-MS-4070-CV 2-MS-4071-CV	
		е.	Shut AFW Block Vi CLOSE:	alves by placing handswitches in
			21_S/G	22 S/G
			2-AFW-4520-CV 2-AFW-4521-CV 2-AFW-4522-CV 2-AFW-4523-CV	2-AFW-4530-CV 2-AFW-4531-CV 2-AFW-4532-CV 2-AFW-4533-CV
		f.	Shut upstream dr in CLOSE.	ains by placing handswitch 2-HS-662
		g.	Shut S/G Blowdow	n Valves:
			2-BD-4010-CV 2-BD-4011-CV 2-BD-4012-CV 2-BD-4013-CV	
		h.	Shut Atmospheric	Dump Valves.

EOP-8 Rev. 1/Unit 2 Page 22 of 49

- IF one S/G has a steam line rupture, THEN maintain unaffected S/G operability during blowdown phase per EOP-4, Step J, page 10.
- j. WHEN cooldown rate less than 100°F/h, THEN establish S/G(s) as heat sink.
- OR
- 2. Control steam flow and maintain Tcold less than 540°F:
 - a. Operate Turbine Bypass Valves from Control Room.
 - OR
 - b. Operate Atmospheric Dump Valves from Control Room.
 - OR

c. Operate Atmospheric Dump Valves from 2C43:

- Verify 2C43 Atmospheric Dump Controllers at 0% output.
- (2) Align Hand Transfer Valves to 2C43 position:

<u>21 S/G</u> <u>22 S/G</u>

S-UA-23224	5-UA-2220W
2-HV-3939B	2-HV-3938B

- (3) Open Atmospheric Dump Valve(s) using 2C43 controller(s).
- OR

-NOTE-

Atmospheric Dump Valves are reverse acting, i.e., clockwise to open, counterclockwise to shut.

- d. Manually open Atmospheric Dump Valves by using chain operator.
- OR
- e. Manually position Turbine Bypass Valves.
- OR

EOP-8 Rev. 1/Unit 2 Page 23 cf 49

-CAUTION-

Operating history indicates S/G Safety Valves may fail to reseat completely after lifting.

- f. Manually open S/G Safety Valve:
 - Lower S/G pressure as low as possible using other heat removal methods prior to attempting manual operation of S/G Safety Valve.
 - (2) Operate manual lifting lever to open S/G Safety Valve.

OR

-CAUTION-

The following step may blow out the Condenser Rupture Disks and may cause equipment damage.

- c. Align steam drains to Condenser:
 - Open upstream drains by placing handswitch 2-HS-6622 in OPEN.
 - (2) Open downstream drains by placing handswitch 2-HS-6600 in OPEN.
 - (3) <u>IF</u> MSIVs shut, THEN open MSIV Bypass Valves.

OR

-CAUTION-

The following step will blow out the Condenser Rupture Disks and may cause equipment damage.

- h. <u>IF</u> additional heat removal required <u>AND</u> condenser vacuum <u>NOT</u> available, <u>THEN</u> open Turbine Bypass Valve(s):
 - Open all doors to the outside on the 45 ft Turbine Building.
 - (2) Notify personnel to evacuate 45 ft Turbine Building.
 - (3) Manually operate Turbine Bypasr Valve(s) as directed by Control Room personnel.

EOP-8 Rev. 1/Unit 2 Page 24 of 49

- 3. Control Main Feedwater flow to S/Gs:
 - a. Ensure main feed rate is maintaining a constant level or controlled increase in S/G level.

-CAUTION-

Severe waterhammer may occur if Main Feed Ring is allowed to drain then subsequently refilled.

- b. Establish a shutdown feed system lineup:
 - (1) One operating S/G Feed Pump.
 - (2) One operating Condensate Booster Pump.
 - (3) One operating Condensate Pump.
 - (4) Both Heater Drain Pumps secured.
- c. <u>WHEN</u> manual control of feed flow rate desired <u>OR</u> S/G levels between (-)24 and (+)30 inches, <u>THEN</u> perform the following:
 - Depress Feed Regulating Bypass Valve Reset Buttons.
 - (2) Adjust Feed Regulating Bypass Valve(s) to maise S/G levels to approximately O inches.
- d. WHEN S/G levels are 0 inches, THEN shift Feed Regulating Bypass Controllers to AUTO.

OR

- <u>IF</u> Main Feedwater <u>NOT</u> available, THEN feed S/Gs with AFW:
 - a. Establish condensate sources:
 - (1) Confirm 12 CST operable:
 - (a) Ensure 12 CST level greater than 5 ft.
 - (b) Open 12 CST Unit 2 AFW Pump Suction Valve, 2-AFW-161.

EOP-8 Rev. 1/Unit 2 Page 25 of 49

-CAUTION-

Before transferring AFW Pump suction to an alternate supply the possibility of suction line or CST rupture should be considered.

- (2) <u>IF</u> 12 CST <u>NOT</u> operable, <u>THEN</u> line up 21 CST as alternate suction supply:
 - (a) Locally open 21 CST AFW Pump Suction Valves:

2-AFW-131 2-AFW-167

- (b) Locally shut 12 CST Unit 2 AFW Pump Suction Valve, 2-AFW-161.
- (c) Confirm normal. CST level response.

(OR)

-NOTE-

The following step will cause CST levels to equalize.

- (3) <u>IF</u> 21 CST <u>NOT</u> available, <u>THEN</u> line up 11 CST as alternate suction supply:
 - (a) Locally open 11 CST AFW Pump Suction Valves:

1-AFW-131 1-AFW-167

(b) Locally open 12 CST AFW Pump Suction Valves:

1-AFW-161 2-AFW-161

(c) Confirm normal CST level response.

(OR)

- (4) Align Fire System to 23 AFW Pump suction:
 - (a) Shut 23 AFW Pump Suction Valve, 2-AFW-182.
 - (b) Connect fire hoses between pump suction and a fire main.
 - (c) Open Fire Hose Connection Isolation Valve, 2-AFW-180.

EOF-8 Rev. 1/Unit 2 Page 26 of 49

- (5) Align F stem to 13 AFW Pump suction for cross connect. ______eration:
 - (a) Shut 13 AFW Pump Suction Valve, 1-AFW-182.
 - (b) Connect fire hoses between pump suction and a fire main.
 - (c) Open Fire Hose Connection Isolation Valve, 1-AFW-180.

(OR)

- (6) IF Condensate Pump available, THEN transfer hotwell inventory to 21 CST:
 - (a) Shift Hotwell Level Controller, 2-LIC-4405-CV, to MANUAL.
 - (b) Adjust Controller to open Hotwell To CST Dump CV, 2-CD-44J5-CV.
 - (c) Shut one Condensate Pump Discharge Valve:

21	Pump	3-CD-106
22	Pump	2-CD-113
23	Pump	2-CD-120

- (d) Start appropriate Condensate Pump.
- (e) Slowly open pump discharge valve to maintain flow rate less than 2000 GPM.
- (f) Stop pump when cavitation occurs.
- (g) Shut Hotwell To CST Dump CV, 2-CD-4405-CV.

(OR)

- (7) Emergency fill 21 CST from Fire System:
 - (a) Connect fire hose between fire house hose manifold and 21 CST Emergency Hose Connection Valve, 2-CD-312.
 - (b) Open 21 CST Emergency Hose Connection Valve, 2-CD-312.
 - (c) Ensure 21 CST level increasing.

EOF-8 Rev. 1/Unit 2 Page 27 of 49

- (8) Emergency fill 11 CST from Fire System:
 - (a) Connect fire hose between fire house hose manifold and 11 CST Emergency Hose Connection Valve, 1-CD-312.
 - (b) Open 11 CST Emergency Hose Connection Valve, 1-CD-312.

22 S/G

22 S/G

- (c) Ensure 11 CST level increasing.
- b. Establish AFW flowpath:

21 S/G

21 S/G

 Open all motor and steam driven train AFW Block Valves:

and a second second second	
2-AFW-4520-CV 2-AFW-4521-CV 2-AFW-4522-CV	2-AFW-4530-CV 2-AFW-4531-CV 2-AFW-4532-CV
2-AFW-4523-CV	2-AFW-4533-CV

(2) IF AFW Block Valve(s) will NOT open from Control Room, THEN locally open valve(s) using Hand Transfer Station(s) on South wall of SRW Room.

(3) Open AFW Flow Control Valves:

2-AFW-4511-CV 2-AFW-4512-CV 2-AFW-4525-CV 2-AFW-4535-CV

- (4) IF AFW Flow Control Valve(s) will NOT open, THEN locally throttle open bypass valve(s):
 - (a) 4511-CV 21 S/G Bypass Valve, 2-AFW-163, located in 27 ft East Penetration Room.
 - (b) 4525-CV 21 S/G Bypass Valve, 2-AFW-195, located in SRW Room.
 - (c) 4512-CV 22 S/G Bypass Valve, 2-AFW-165, located in 27 ft East Penetration Room.
 - (d) 4535-CV 22 S/G Bypass Valve, 2-AFW-196, located in SRW Room.

EOP-8 Rev. 1/Unit 2 Page 28 of 49

c. Start at least one AFW Fump:

-CAUTION-

D/G supplying power to 23 AFW Pump flow limit is 300 GPM; otherwise, flow limit is 575 GPM.

- (1) Start 23 AFW Pump:
 - (a) Place 23 AFW Fump Handswitch in START.
 - (b) Ensure normal pump running current of 60 to 70 AMPS.
 - (c) Ensure 23 AFW Pump flow of 150 GPM per S/G.

(OR)

(a) Open 21 and 22 AFW Pump Main Steam Supply Valves:

> 2-MS-109 2-MS-107

(b) Open 21 or 22 S/G AFW Steam Supply Valves:

2-MS-4070-CV 2-MS-4071-CV

(c) Open 21 and 22 AFW Fump Turbine Throttle/Stop Valves:

> 2-MS-3986 2-MS-3988

- (d) Verify 21 or 22 AFW Pump discharge pressure approximately 100 PSI greater than S/G pressure.
- (e) Verify 21 or 22 AFW Fump flow of 150 GPM per S/G.
- (f) Ensure normal or emergency AFW Room Ventilation operable.

EOP-8 Rev. 1/Unit 2 Page 29 of 49

- (3) <u>IF</u> unable to feed S/Gs with Unit 2 AFW Pumps, <u>THEN</u> establish Unit 1 to Unit 2 cross connect operation:
 - (a) Shut Unit 1 motor train AFW Block Valves:
 - 1-AFW-4522-CV 1-AFW-4523-CV 1-AFW-4532-CV 1-AFW-4533-CV
 - (b) Open Unit 1 to Unit 2 AFW Cross Connect Valve, 1-AFW-4550-CV.

-CAUTION-

D/G Supplying power to 13 AFW Pump flow limit is 300 GPM; otherwise, flow limit is 575 GPM.

- (c) Start 13 AFW Pump by placing handswitch in START.
- (d) Ensure normal pump running current of 60 to 70 AMPS.
- (e) Maintain 150 GPM flow to each S/G using Unit 2 AFW Flow Control Valves:
 - 2-AFW-4525-CV 2-AFW-4535-CV

EOP-8 Rev. 1/Unit 2 Page 30 of 49

-CAUTION-

D/G supplying power to 23 AFW Pump flow limit is 300 GPM; otherwise, flow limit is 575 GPM.

(4) Locally start 23 AFW Pump:

(a) Press CLOSE button at 152-2415.

-CAUTION-

Removing control power fuses causes a loss of overcurrent, undervoltage and ground protection.

> (b) <u>IF</u> breaker fails to close, <u>THEN</u> remove preaker control power fuses AND press CLOSE button at 152-2415.

(OR)

(5) Locally start 21 or 22 AFW Pump:

- (a) Turn turbine governor control knob counterclockwise to the minimum position.
- (b) Isolate the Instrument Air to the Turbine Governor Controller(s):

2-I/P-3987 2-I/P-3989

- (c) Open air filter drains on controllers to allow local control.
- (d) Open AFW Steam Supply Bypass Valves:

2-MS-102 2-MS-105

(e) Open 21 and 22 AFW Fump Turbine Throttle/Stop Valves:

2-MS-3986 2-MS-3988

(f) Adjust turbine governor control knob to maintain AFW Pump discharge pressure 100 PSI greater than S/G pressure.

EOP-8 Rev. 1/Unit 2 Page 31 of 49

5. <u>IF</u> AFW flow to S/G <u>NOT</u> established <u>AND</u> power available to Condensate and Condensate Booster Pump, <u>THEN</u> depressurize S/G to allow feeding with Condensate Booster Pump:

- a. Verify S/G heat removal available per step A.2, page 22.
- b. Establish maximum cooldown rate not exceeding 100°F/h.

c. <u>WHEN</u> "SGIS A(B) BLOCK PERMITTED" alarm(s) received, <u>THEN</u> block SGIS A(B).

d. <u>IF</u> SGIS actuates, THEN block SGIS <u>AND</u> reset SGIS signal.

- (1) Place Condensate Booster Pumps in PULL-TO-LOCK.
- (2) Match handswitches per SGIS Verification Checklist, Attachment (7).
- (3) Block SGIS.
- (4) Reset SGIS signal.
- e. Open S/G Feedwater Isolation Valves.
- f. Shut Main Feed Regulating Valves.
- g. Depress Feed Regulating Bypass Valve Reset Buttons.
- h. Manually adjust Feed Regulating Bypass Valve Controllers to 30% output.
- i. Open Condensate Precoat Filter and Condensate Demin Bypass Valves.
- j. Verify one Condensate Pump running.
- k. Verify one Condensate Booster Pump running.
- 1. Place Heater Drain Pump Handswitches in PULL-TO-LOCK.

EOP-8 Rev. 1/Unit 2 Page 32 of 49

-NOTE-

Feedwater flow to S/Gs should start when S/G pressure decreases to approximately 500 PSIA.

- m. Monitor feedwater flow to S/G:
 - (1) Main Feed Regulating Valve Differential Pressure Controller indicates greater than 0.
 - (2) S/G level constant or increasing.
- 6. Establish RCS Flow:
 - a. Ensure at least one RCP operating in a loop with an operable S/G.

1

OR

b. Confirm Natural Circulation in at least one operable S/G loop:

-NOTE-

Wide range Thot may be obtained from Subcooled Margin Monitor per Attachment (10).

- (1) Thot minus Tcold between 10 and 50°F.
- (2) Tcold constant or decreasing.
- (3) Thot constant or decreasing.
- (4) CET temperatures consistent with Thot.
- (5) Steaming rate affects primary temperature.
- c. Monitor for Core and RCS voiding:

-CAUTION-

Potential for void formation increases rapidly when pressure decreases below 1500 PSIA.

- (1) Letdown flow greater than charging flow.
- (2) Rapid unexplained increase in pressurizer level during an RCS pressure reduction.

EOP-8 Rev. 1/Unit 2 Page 33 of 49

- (3) Loss of subcooled margin as determined using CET temperatures.
- (4) "REACTOR VESSEL WATER LEVEL LOW" alarm.
- d. <u>IF</u> voiding inhibits heat removal, THEN reduce or eliminate voided area:
 - (1) Shut the Letdown Isolation Valve, 2-CVC-515-CV.
 - (2) Pressurize the RCS to maintain subcooling as near 140°F as practical.
 - (3) <u>IF</u> pressurizing the RCS does <u>NOT</u> eliminate the voids, <u>THEN</u> operate Reactor Vessel Vent Valves per OI-1G.

-CAUTION-

If voids exist in the S/G tubes, a rapid RCS pressure reduction will occur when the voids collapse.

- (4) <u>IF</u> voiding occurs in the S/G tubes (saturation pressure of S/G greater than saturation pressure of RCS),
 THEN cool the S/G by raising any of the following:
 - (a) Steaming rate.
 - (b) Feed rate.
 - (c) S/G Blowdown rate.

AND maintaining less than 100°F/h cooldown rate.

OR

B. SAFETY INJECTION CORE COOLING.

1. Ensure HPSI or LPSI flow maintaining CET temperatures less than 560°F and constant or decreasing

OR

EOP-8 Rev. 1/Unit 2 Page 34 of 49

C. ONCE THROUGH CORE COOLING.

1. Commence Once Through Core Cooling.

-CAUTION-

After S/G becomes ineffective for heat removal, Once Through Core Cooling must be initiated prior to CET temperatures reaching 560°F to ensure adequate heat removal.

- a. WHEN either of the following conditions exist:
 - Steaming S/G becomes ineffective and CET temperatures begin to increase.
 - (2) HPSI or LPSI flow insufficient and CET temperatures begin to increase.

THEN commence Once Through Core Cooling.

b. Shift Letdown Control Valve Controller, 2-HIC-110, to MANUAL and shut Letdown Control Valves:

2-CVC-110P-CV 2-CVC-110Q-CV

- c. Start all available Charging Pumps.
- d. Open Main and Aux HPSI Header Valves:

2-SI-616-MOV	2-SI-617-MOV
2-SI-626-MOV	2-SI-627-MOV
2-SI-636-MOV	2-SI-637-MOV
2-SI-646-MOV	2-SI-647-MOV

- e. Start 21 and 23 HPSI Pumps.
- f. De-energize the Pressurizer Heaters by placing all handswitches in OFF.
- g. Start all available Containment Air Coolers in HIGH with maximum SRW flow.

EOP-8 Rev. 1/Unit 2 Page 35 of 49

- h. Open both PORVs:
 - (1) WHEN "PRSR PRESS BLOCK A(B) PERMITTED" alarm(s) received, THEN block SIAS A(B).
 - (2) Verify both PORV Block Valves open.
 - (3) Pull two High Pressurizer Pressure Trip Units.
 - (4) Verify PORVs open.
- i. <u>If</u> containment pressure increases to 2.0 PSIG <u>AND</u> still increasing, <u>THEN</u> start one Containment Spray Pump and open associated Cntmt Spray Header CV.

<u>21</u> or <u>22</u>

2-SI-4150-CV 2-SI-4151-CV

- j. <u>IF</u> containment pressure increases to 2.8 PSIG, <u>THEN</u> verify ESFAS actuation <u>AND</u> commence Verification Checklists:
 - (1) SIAS per Attachment (2).
 - (2) CIS per Attachment (4).
- k. <u>IF</u> containment pressure increases to 4.25 PSIG, <u>THEN</u> verify CSAS actuation <u>AND</u> commence Verification Checklist, Attachment (3).
- 1. Confirm initiation of Once Through Core Cooling.
 - WHEN RCS pressure is less than 1270 PSIA, <u>THEN</u> ensure HPSI flow <u>AND</u> CET temperatures constant or decreasing.
- m. Using CET temperatures, maintain subcooling between 30 and 140°F per Attachment (1) by throttling HPSI flow:
 - (1) Lower subcooling by lowering HPSI flow.
 - (2) Raise subcooling by raising HPSI flow.
- n. Continue cooldown using Once Through Core Cooling until feedwater restored or shutdown cooling entry conditions are established.

EOP-8 Rev. 1/Unit 2 Page 36 of 49

CONTAINMENT ISOLATION

I. PRECAUTIONS

A. Local radioactivity levels should be determined before attempting local manual valve isolation.

II. CONTAINMENT ISOLATION ACCEPTANCE CRITERIA

- A. IF either of the following conditions exist:
 - 1. Containment pressure less than 0.7 PSIG and the following RMS alarms clear:
 - a. S/G Blowdown.
 - b. Condenser Off-Gas.
 - c. Main Vent Gaseous (2-RI-5415).
 - d. Containment Radiation Monitors.
 - e. Noble Gas Monitor.
 - OR
 - Each containment penetration required to be shut has an isolation valve shut.

THEN Containment Isolation Safety Function is satisfied.

B. WHEN Containment Isolation Safety Function is satisfied, THEN proceed to the next Safety Function in jeopardy.

EOP-8 Rev. 1/Unit 2 Page 37 of 49

III. RECOVERY ACTIONS

Α.	VERIFY AUTOMATIC PROTECTIVE ACTIONS OCCUR.		
	1. Verify SIA3, CIS, CSAS:		
	a. <u>IF</u> containment pressure increases to 2.8 PSIG, <u>THEN</u> verify ESFAS actuation <u>AND</u> commence Verification Checklists:		
	(1) SIAS per Attachment (2).		
	(2) CIS per Attachment (4).		
	b. <u>IF</u> containment pressure increases to 4.25 PSIG, <u>THEN</u> verify CSAS actuation <u>AND</u> commence Verification Checklist, Attachment (3).		
в.	IF A SIAS, CIS, CSAS VALVE FAILS TO SHUT, THEN SHUT LOCALLY OR SHUT NEXT VALVE OUT FROM PENETRATION.		
c.	CHECK LOCKED VALVE DEVIATION LOG TO DETERMINE IF ANY MANUAL CONTAINMENT ISOLATION VALVES NEED TO BE SHUT.		
D.	IF S/G HAS A RUPTURED TUBE AND S/G NOT REQUIRED FOR HEAT REMOVAL, THEN ENSURE S/G ISOLATED.		
E. <u>IF</u> CONTAINMENT RMS ALARM RECEIVED, THEN START ALL AVAILABLE IODINE FILTER FANS.			

EOP-8 Rev. 1/Unit 2 Page 38 of 49

CONTAINMENT ENVIRONMENT

I. PRECAUTIONS

None

II. CONTAINMENT ENVIRONMENT ACCEPTANCE CRITERIA

- A. IF either of the following conditions exist:
 - Containment temperature and pressure are constant or decreasing and:
 - a. Containment temperature is less than 222°F.
 - b. Containment pressure is less than 2.8 PSIG.
 - c. H₂ concentration less than 2% (only necessary if greater than four hours since initiation of event.)
 - OR
 - 2. Containment temperature and pressure are constant or decreasing and:
 - a. Containment Spray flow is greater than 1350 GPM.
 - b. H₂ concentration less than 2% (only necessary if greater than four hours since initiation of event.)

THEN Containment Environment Safety Function is satisfied.

B. WHEN Containment Environment Safety Function is satisfied, THEN proceed to the next safety function in jeopardy.

EOP-8 Rev. 1/Unit 2 Page 39 of 49

III. RECOVERY ACTIONS

CCOM CR 88-1119

	<u>1.</u>	VERIFY SIAS, CIS, CSAS:	
		a. <u>IF</u> containment pressure increases to 2.8 PSIG, <u>THEN</u> verify ESFAS actuation <u>AND</u> commence Verification Checklists:	
		(1) SIAS per Attachment (2).	
		(2) CIS per Attachment (4).	
		b. <u>IF</u> containment pressure increases to 4.25 PSIG, <u>THEN</u> verify CSAS actuation <u>AND</u> commence Verification Checklist, Attachment (3).	
B. MAINTAIN CONTAINMENT COOLING.		INTAIN CONTAINMENT COOLING.	
	<u>1.</u>	 Maintain at least one of the following minimum containm cooling combinations in operation while containment pressure is above 4.25 PSIG: 	
		a. Two Containment Spray trains.	
		OR	
		b. One Containment Spray train and any two Containment Air Coolers with maximum SRW flow.	
		OR	
		OR c. Three Containment Air Coolers with maximum SRW flow	

EOP-8 Rev. 1/Unit 2 Page 40 of 49

C. HYDROGEN CONTROL:

- 1. Direct Chemistry to place Hydrogen Monitors in service.
- 2. Establish containment ventilation to ensure no local hydrogen accumulation:
 - a. Start available Containment Air Coolers.
 - b. Start available Cavity Cooling Fans.
- 3. IF hydrogen concentration increases to 1%, THEN start Hydrogen Recombiners per OI-41A.
- OR
- 4. With approval of SEC, establish Hydrogen Purge System Operation per OI-41B.

EOP-8 Rev. 1/Unit 2 Page 41 of 49

IV. SAFETY FUNCTION STATUS CHECK

- A. The STA (or person designated by STA) will perform the safety function status checks at 10 minute intervals until plant conditions stabilize.
- B. Immediately notify Shift Supervisor or Control Room Supervisor if any safety function criteria is not being satisfied.
- C. Review data and verify that safety function acceptance criteria are satisfied.
- D. When all safety function acceptance criteria are being satisfied, diagnosis of event(s) may begin.
- E. The safety function status checks of EOP-8 should continue until an appropriate optimum recovery procedure is selected.

EOP-8 Rev. 1/Unit 2 Page 42 of 49

REACTIVITY CONTROL ACCEPTANCE CRITERIA

SAFETY FUNCTION ACCEPTANCE CRITERIA REACTIVITY CONTROL STATUS CHECK CRITERIA PARAMETERS decreasing a. WRNI power negative b. SUR (DPM) all inserted c. CEA status or Boration status: concentation increasing BAST/RWT level decreasing

Reactivity Control Safety Function is satisfied if:

CRITERIA

SATISFIED

a. All CEAs inserted and WRNI power decreasing.

OR

b. RCS boration in progress and WRNI power decreasing.

OR

c. WRNI power less than 10^{-4} % and constant or decreasing.

EOP-8 Rev. 1/Unit 2 Page 43 of 49

.

RCS PRESSURE AND INVENTORY ACCEPTANCE CRITERIA

	RCS PRESSURE	SAFETY FUNCTION ACCEPTANCE CRITERIA		
AND INVENTORY PARAMETERS		CRITERIA	STATUS CHECK	
	a. Pressurizer pressure (PSIA)	within limits per Attachment (1)		
	<pre>b. Pressurizer level (inches)*</pre>	35 to 250		
	c. Charging flow (GPM)	greater than 40		
	d. HPSI flow (GPM)	per Attachment (12)	4	
	e. LPSI flow (GPM)	per Attachment (13)		
	f. RCS Subcooling (^O F) 30 to 140		
	g. RVLMS	core covered		
)	* Limit may be exceed	led for solid plant o	peration.	
	RCS Pressure and In	ventory Safety Funct	ion is satisfied if:	
	CRITEF	AIA	SATISFIED	
	a. RCS pressure and t limits per Attachm	emperature are withi ment (1) and:	n the	
	 Pressurizer 1 250 inches. 	evel is between 35 a.	nd	
	(2) RCS subcoolin using CET ten	ng is greater than 30 mperatures.	°F	
	(3) RVLMS indicat	tes that the Core is	covered.	
	OR			
	b. RCS pressure and the limits per Att	temperature are withi tachment (1) and:	n	
	(1) All available	e Charging Yumps runn	ing.	
)	(2) HPSI and LPS into RCS per	I Pumps are injecting Attachment (12) and	(13).	
	(3) RVLMS indica	tes that the Core is	covered.	

EOP-8 Rev. 1/Unit 2 Page 44 of 49

CORE AND RCS HEAT REMOVAL ACCEPTANCE CRITERIA

HE	AT REMOVAL	CRITERIA	STATUS CHECK	
1.01				
а.	S/G pressure (PSIA)	less than 960		
b.	S/G level (inches)	(-)250 to (+)50		
с.	CST level (ft)	greater than 5		
d.	Feedwater flow (GPM)	greater than 150	L	
е.	CET ([°] F)	less than 560		
£.	RCS Subcooling (°F)	30 to 140		
g.	RVLMS	core covered		
h.	Tcold (°F)	less than 540		
i.	Thot minus Tcold (°F)			
	Natural Circulation	10 to 50		
	Forced Circulation	less than 10		
j.	HPSI flow (GPM)	per Attachment (12)		
k.	LPSI flow (GPM)	per Attachment (13)		

EOP-8 Rev. 1/Unit 2 Page 45 of 49

Core and RCS Heat Removal Safety Function is satisfied if:

CRITERIA

SATISFIED

- a. One S/G with level between (-)250 and (+)50 inches and trending toward zero and:
 - RCS flow by Forced Flow or Natur 1 Circulation.
 - (2) RCS subcooling greater than 30°F using CETs.
 - (3) CET temperatures constant or decreasing.
 - (4) RVLMS indicates that the Core is covered.

OR

- b. One S/G with feedwater flow greater than 150 GPM and level being restored and:
 - RCS flow by Forced Flow or Natural Circulation.
 - (2) RCS subcooling greater than 30°F using CETs.
 - (3) CET temperatures constant or decreasing.
 - (4) RVLMS indicates that the Core is covered.

OR

c. HPSI or LPSI Pumps injecting water into RCS and CET temperatures constant or decreasing.

OR

 Once Through Core Cooling in progress and CET temperatures constant or decreasing.

EOP-8 Rev. 1/Unit 2 Page 46 of 49

VITAL AUXILIARIES ACCEPTANCE CRITERIA

SAFETY FUNCTION ACCEPTANCE CRITERIA VITAL AUXILIARIES STATUS CHECK CRITERIA a. 4KV vital buses energized 21 or 24 greater b. Instrument Air pressure (PSIC) than 88 c. Component Cooling (# pumps running) 1 or 2 d. Saltwater (# pumps running) 1 or 2 e. Service Water 1 or 2 (# pumps running) f. 125V DC buses 11, 12, 21, 22 energized g. 120V AC vital buses 21, 22, 23, 24 energized

Refer to appropriate AOP for any Vital Auxiliaries in jeopardy.
EOP-8 Rev. 1/Unit 2 Page 47 of 49

CONTAINMENT ISOLATION ACCEPTANCE CRITERIA

SAFETY FUNCTION ACCEPTANCE CRITERIA CONTAINMENT ISOLATION STATUS CHECK CRITERIA PARAMETERS less than a. Containment 0.7 pressure (PSIG) alarm clear b. S/G B/D RMS c. Condenser alarm clear Off-Gas RMS . d. Main Vent Gaseous RMS (2-R1-5415) alarm clear e. Containment alarms clear Radiation Monitors f. Noble Gas Monitor alarm clear g. Containment all required to be shut penetration valves are shut

Containment Isolation Safety Function is satisfied if:

CRITERIA

SATISFIED

an one was not been and

a. Containment pressure less than 0.7 PSIG and the following RMS alarms clear:

- (1) S/G Blowdown.
- (2) Condense: Off-Gas.
- (3) Main Vent Gaseous (2-R1-5415).
- (4) Containment Radiation Monitors.
- (5) Noble Gas Monitor.

OR

b. Each containment penetration required to be shut has an isolation valve shut.

EOP-8 Rev. 1/Unit 2 Page 48 of 49

CONTAINMENT ENVIRONMENT ACCEPTANCE CRITERIA

SAFETY FUNCTION ACCEPTANCE CRITERIA CONTAINMENT LAV. CONMENT STATUS CHECK CRITERIA less than a. Containmert tem, prature (CE) 222 less than b. Containment 2.8 pressure (PSIG) greater than c. Containment spray 1350 flow (GPM) less than d. Hydrogen concentration 2% Containment Environment Safety Function is satisfied if: SATISFIED CRITERIA a. Containment temperature and pressure are constant or decreasing and : Containment temperature is less than 222°F. (2) Containment pressure is less than 2.8 PSIG. (3) Ho concentration less than 2% (only necessary if greater than four hours since initiation of event.) OR b. Containment temperature and pressure are constant or decreasing and : (1) Containment Spray flow is greater than 1350 GPM. (2) Ho concentration less than 2% (only necessary if greater than four hours since initiation of event.)

EOP-8 Rev. 1/Unit 2 Page 49 of 49

STATUS CHECK NUMBER	COMPLETE AT TIME
1	
2	
3	· · · · · · · · · · · · · · · · · · ·
4	4

ATTACHMENTS Rev. 1/Unit 1

CALVERT CLIFFS NUCLEAR POWER PLANT

ATTACHMENTS

REVISION 1

SIGNATURE

PREPARED BY;

VERIFIED BY;

room

POSPC;

APPROVED BY;

MEETING # 88-7

Bugh

mont

12-10-88

1 12.10-87

1 12/10/87

12-10-88

DATE

Manager-Nuclear Operations or General Supervisor-Operations if POSRC review is not required

ATTACHMENTS Rev. 1/Unit 1

LIST OF EFFECTIVE PAGES

ATTACHMENT	PAGE	REVISION
1	1	1
2	1	1
2	2	1
2	3	1
2	4	1
2	5	. 1
3	1	1
4	1	1
5	1	1
6	1	1
7	1	1
8	1	1
8	2	1
9	1	1
10	1	1
11	1	1
12	1	1
13	1	1



.

ATTACHMENT (2)

SIAS VERIFICATION CHECKLIST

1008, 1009, 1010

a	. 11 and 13 HPSI Pumps	Running
b	. 11 and 12 LPSI Pumps	Running
c.	HPSI Aux Header Isolation Valve, 1-SI-656-MOV	Open
d.	4 Main HP3I Header Valves:	
	1-SI-616-MOV 1-SI-626-MOV	
	1-SI-636-MOV 1-SI-646-MOV	Open
е.	4 Aux HPSI Header Valves:	
	1-SI-617-MOV	
	1-SI-637-MOV	
F	4 IDST Maaday Values.	Open
* .	4 DEST Reader Valves:	
	1-SI-615-MOV	
	1-SI-635-MOV	
	1-SI-645-MOV	Open
g.	4 SI Tank Check Valve Leakage Drain Valves:	1.1.1
	1-SI-618-CV	
	1-SI-628-CV	
	1-SI-648-CV	Shu++
h	4 SI Tank Outles Values	Shut-
	4 SI Tank Outlet Valves:	
	1-SI-614-MOV	
	1-51-624-MOV 1-51-634-MOV	
	1-SI-644-MOV	Open
i .	SI Tank Recirc to RCDT Isolation Valve, 1-SI-661-CV	Shut*
*	HANDSWITCH MUST BE PLACED IN POST-ACCIDENT POSITION BEFORE OF SIAS CAN BE ACCOMPLISHED FROM THE CONTROL ROOM.	RESET

.

ATTACHMENT (2)

SIAS VERIFICATION CHECKLIST

j.	2 Cntmt Spray Header CVs:	
	1-SI-4150-CV 1-SI-4151-CV	Open
k.	2 Cntmt Purge Supply Valves:	
	1-CPA-1410-CV 1-CPA-1411-CV	Shut*
1.	2 Cntmt Purge Exhaust Valves:	
	1-CPA-1412-CV 1-CPA-1413-CV	Shut*
m.	RCDT Pump Containment Isolation Valve, 1-RCW-4260-CV	Shut*
n.	2 Waste Gas Cntmt Isolation Valves:	
	1-WGS-2180-CV 1-WGS-2181-CV	Shut*
ο.	2 Containment RMS Isolation Valves:	
	1-CRM-5291-CV 1-CRM-5292-CV	Shut*
p.	2 Containment Normal Sump Drain Isolation Valves:	
	1-EAD-5462-MOV 1-EAD-5463-MOV	Shut*
q.	RCS Sample Isolati 'alve, 1-PS-5464-CV	Shut*
r.	Containment Heating Water Isolation Valve, 1-PH-6579-MOV.	Shut*
8.	2 Hydrogen Purge Cntmt Isolation Valves:	
	1-HP-6900-MOV 1-HP-6901-MOV	Shut*

HANDSWITCH MUST BE PLACED IN FOST-ACCIDENT POSITION BEFORE RESET OF SIAS CAN BE ACCUMPLISHED FROM THE CONTROL ROOM.

*

ATTACHMENT (2)

SIAS VERIFICATION CHECKLIST

-	100	07	
1	a.	2 Letdown Isolation Valves:	
		1-CVC-515-CV 1-CVC-516-CV	Shut*
}	b.	11, 12, and 13 Charging Pumps	Running
(σ.	VCT Outlet Valve, 1-CVC-501-MOV	Shut
0	<u>d</u> .	VCT Makeup Valve, 1-CVC-512-CV	Shut
	в.	Boric Acid Direct Makeup Valve, 1-CVC-514-MOV	Open
1	ε.	11 and 12 Boric Acid Pumps	Running
4	g.	2 BAST Gravity Feed Valves:	
		1-CVC-508-MOV 1-CVC-509-MOV	Open
1 2	n.	2 Boric Acid Recirculation Valves:	
		1-CVC-510-CV 1-CVC-511-CV	Shut
1	ι.	2 RCP Bleedoff Isolation Valves:	
		1-CVC-505-CV 1-CVC-506-CV	Shut*
3	lco	26	
	١.	11 and 13 Pressurizer Backup Heaters	Off
3	c	13	
	۱.	11 and 12 Component Cooling Pumps	Running
k	>.	11 and 12 Saltwater Pumps	Running
		HANDSWITCH MUST BE PLACED IN POST-ACCIDENT POSITION BEFORE	RESET OF

SIAS CAN BE ACCOMPLISHED FROM THE CONTROL ROOM.

.

ATTACHMENT (2)

SIAS VERIFICATION CHECKLIST

c.	11 and 12 Service Water Pumps	Running
d.	2 SDC HX Component Cooling Outlet Valves:	
	1-CC-3828-CV 1-CC-3830-CV	Open
е.	4 SRW Turbine Building Header Isolation Valves:	
	1-SRW-1600-CV 1-SRW-1637-CV 1-SRW-1638-CV 1-SRW-1639-CV	Shut
£.	2 Circulating Water Pump Room Air Cooler Isolation Valves:	
	1-SW-5250-MOV 1-SW-5251-MOV	Shut
g.	11 and 12 Saltwater Air Compressors	Running
<u>2C2</u>	4A	
a.	11 Component Cooling HX Saltwater Inlet and Outlet Valves:	
	1-SW-5160-CV 1-SW-5206-CV DO NOT MATCH HANDSWITCH	Shut
b.	12 Component Cooling HX Saltwater Inlet Valve, 1-SW-5162-CV DO NOT MATCH HANDSWITCH	Shut
с.	12 Component Cooling HX Saltwater Outlet Valves:	
	1-SW-5208-CV 1-SW-5163-CV DO NOT MATCH HANDSWITCH	Shut
d.	11 SRW HX Saltwater Outlet Valve, 1-SW-5210-CVFr	ull Open
е.	12 SRW HX Saltwater Outlet Valve, 1-SW-5212-CV	ull Open

ATTACHMENT (2)

SIAS VERIFICATION CHECKLIST .

1018, 1019, 1020

а.	11	Diesel	Generator	******	Running
ь.	12	Diesel	Generator		Running
с.	21	Diesel	Generator		Running

1034

a.	11	Containment	Purge	Exhaust Fan	Off
b.	11	Containemnt	Purge	Supply Fan	Off

1C90 (45 ft S/G B/D Sample Panel)

a.	Pressurizer	Vapor Sample N	Valve, 1-PS-5465-CV	Shut
b.	Pressurizer	Liquid Sample	Valve, 1-PS-5466-CV	Shut
с.	RCS Hot Leg	Sample Valve,	1-PS-5467-CV	Shut

1C101 (45 ft Solid Waste)

The second	a. (Quench	Tank	0.	Sample	Valve,	1-PS-6531-SV		Shut
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------	--------	------	----	--------	--------	--------------	--	------

ATTACHMENT (3)

CSAS VERIFICATION CHECKLIST

100	03	
a.	11 and 12 Main Steam Isolation Valves:	
	1-MS-4043-CV 1-MS-4048-CV	hut*
b.	11 and 12 S/G Feedwater Isolation Valves:	
	1-FW-4516-MOV 1-FW-4517-MOV	hut*
с.	11 and 12 S/G Feed Pumps Trip	ped
d.	11 and 12 Heater Drain Pumps	Off
е.	11, 12, and 13 Condensate Booster Pumps	Off
100	08, 1009, 1010	
а.	11 and 12 Containment Spray Pumps Runn	ing
b.	4 Containment Air Cooler 8 Inch Outlet Valves:	
	1-SRW-1582-CV 1-SRW-1585-CV 1-SRW-1590-CV 1-SRW-1593-CV	pen
с.	11, 12, 13, and 14 Containment Air Coolers Running in	low
101	13	
a.	11 SFP Cooler Service Water Isolation Valves:	
	1-SRW-1596-CV 1-SRW-1597-CV	hut
	HANDSWITCH MUST BE PLACED IN POST-ACCIDENT POSITION BEFORE RESE CSAS CAN BE ACCOMPLISHED FROM THE CONTROL ROOM.	T OF

ATTACHMENT (4)

CIS VERIFICATION CHECKLIST

1009, 1010

а.	11, 12, and 13 Iodine Filter Fans	Running
b.	11 and 12 Penetration Room Vent Fans	Running
с.	11 and 12 Penetration Room Vent Filters Isolation Dampers	Open
d.	Component Cooling Containment Isolation Valves:	
	1-CC-3832-CV 1-CC-3833-CV	Shut*
е.	Containment Instrument Air Isolation MOV, 1-IA-2080-MOV .	Shut*
f.	Instrument Air CIS Override, 1-HS-2080Å	Normal*
101	3	
a.	Component Cooling Supply To Liquid Waste Evaporator Isolation Valves:	
	1-CC-3840-CV 1-CC-3842-CV	Shut

HANDSWITCH MUST BE PLACED IN POST-ACCIDENT POSITION BEFORE RESET OF CIS CAN BE ACCOMPLISHED FROM THE CONTROL ROOM.

	At Re Pa	tachments v. 1/Unit 1 ige 1 of 1
	ATTACHMENT (5)	
	CRS VERIFICATION CHECKLIST	
101	<u>o</u>	
a.	2 Cntmt Purge Supply Valves:	
	1-CPA-1410-CV 1-CPA-1411-CV	. Shut*
b.	2 Cntmt Purge Exhaust Valves:	
	1-CPA-1412-CV 1-CPA-1413-CV	. Shut*
с.	2 Hydrogen Purge Cntmt Isolation Valves:	
	1-HP-6900-MOV 1-HP-6901-MOV	. Shut*
103	14	
a.	11 Containment Purge Exhaust Fan	Off
ь.	11 Containment Purge Supply Fan	Off

HANDSWITCH MUST BE PLACED IN POST-ACCIDENT POSITION BEFORE RESET OF CRS CAN BE ACCOMPLISHED FROM THE CONTROL ROOM.

Attac	h	nent	18	
Rev.	1,	/Uni	lt	1
Page	1	of	1	

ATTACHMENT (6)

RAS VERIFICATION CHECKLIST

1008, 1009, 1010

а.	11 and 12 LPSI Pumps	Off
b.	SI Fump Mini Flow Isolation Valves:	
	1-SI-659-MOV 1-SI-660-MOV	Shut
с.	Containment Sump Discharge Valves:	
	1-SI-4144-MOV 1-SI-4145-MOV	Open
202	4A	
a .	11 Component Cooling HX Saltwater Inlet Valve, 1-SW-5160-CV	Open
b.	11 Component Cooling HX Saltwater Outlet Valve, 1-SW-5206-CV	Auto
c.	12 Component Cooling HX Saltwater Inlet Valve, 1-SW-5162-CV	Open
d.	12 Component Cooling HX Sal*water Outlet Valves:	
	1-SW-5208-CV 1-SW-5163-CV	Auto
е.	11 SRW FX Saltwater Outlet Valve, 1-SW-5210-CV	Auto
f.	12 SRW HX Saltwater Outlet Valve, 1-SW-5217 CV	Auto

ATTACHMENT (7)

SGIS VERIFICATION CHECKLIST

100	3	
а.	11 and 12 Main Steam Isolation Valves:	
	1-MS-4043-CV 1-MS-4048-CV Shut*	10.00
b.	11 and 12 S/G Feedwater Isolation Valves:	
	1-FW-4516-MOV 1-FW-4517-MOV Shut*	
с.	11 and 12 S/G Feed Pumps Tripped	
d.	11 and 12 Heater Drain Pumps Off	
е.	11, 12, and 13 Condensate Booster Pumps Off	

HANDSWITCH MUST BE PLACED IN POST-ACCIDENT POSITION BEFORE RESET OF SGIS CAN BE ACCOMPLISHED FROM THE CONTROL ROOM.

ATTACHMENT (8)

WIDE RANGE STEAM GENERATOR LEVEL TABLE FOR VARIABLE STEAM GENERATOR

PRESSURES & VARIABLE CONTAINMENT TEMPERATURES

	INDICATED LEVEL FOR AMBIENT CNTMC TEMP 120°F			INDICATED LEVEL FOR AMBIENT CNTMT TEMP 200°F			INDICATED LEVEL FOR AMBIENT CNTMT TEMP 300°F		
ACTUAL	8/	G PRESS	URE	S/0	PRESS	URE	S/	G PRESS (PSIA)	URE
LEVEL	900	500	100	900	500	100	900	500	100
-400	-400	-401	-401	-386	-387	-398	-353	-361	-369
-390	-390	-395	-400	-371	-376	-386	-344	-350	-357
-380	-380	-383	-388	-361	-366	-373	-334	-340	-345
-370	-370	-372	-376	-351	+355	-361	-324	-329	-333
-360	-360	-361	-364	- 341	-344	-349	-314	-318	-320
-350	-350	-350	-351	-331	-333	-337	-304	-307	-308
-340	-340	-340	-339	-321	-323	-324	-294	-296	-296
-330	-330	-329	-327	-311	-312	-312	-284	-285	-283
-320	-320	-318	-315	-300	-301	-300	-274	-275	-271
-310	-310	-308	-302	-290	-290	-287	-265	-263	+259
+300	-300	-297	-291	-280	-280	-275	-255	-253	-247
-290	-290	-286	-278	-273	-269	-262	-245	-242	-234
-280	-280	-275	-266	-264	-259	-250	-235	-231	-222
-270	-270	-265	•253	-258	-247	-238	-225	-220	-210
-260	-260	-254	-242	-244	-237	-226	-215	-210	-197
-250	-250	-243	-230	-234	-226	-214	-201	-199	+185
-240	-240	-233	-216	-224	-215	-201	-195	-188	-173
-230	-230	-222	-204	-214	-204	-189	-185	-177	-161
-220	+220	-211	-192	-204	-194	-176	-176	-166	-148
-210	-210	-200	-180	-194	-183	-164	-166	-156	-136
-200	-200	-190	- 168	-184	-172	-151	-156	-145	-124
-190	-190	-179	-155	-174	-160	-139	-146	-134	-111
-180	-180	-168	-143	-164	-160	-127	-136	-123	-99
-170	-170	+157	-132	+154	-139	•115	-126	-112	+87

ATTACHMENT (8)

WIDE RANGE STEAM GENERATOR LEVEL TABLE FOR VARIABLE STEAM GENERATOR

PRESSURES & VARIABLE CONTAINMENT TEMPERATURES (cont'd)

	INDICATED LEVEL FOR AMBIENT CNTMT TEMP 120°F			INDICATED LEVEL FOR AMBIENT CNTMT TEMP 200°F			INDICATED LEVEL FOR AMBIENT CNTMT TEMP 300°F		
ACTUAL	S/I	G PRESSU	JRE	S/G	PRESSU (PSIA)	URE	s/0	PRESSU	JRE
LEVEL	900	500	100	900	500	100	900	500	100
-160	-160	-146	-119	-144	-129 .	-103	-116	-101	-75
-150	-150	-135	-107	-134	-118	-91	-106	-91	-62
-140	-140	-124	-95	-125	-107	-79	-97	-80	-50
-130	-130	-114	-83	-115	-92	-66	-87	-69	-38
-120	-120	-103	-70	-105	-86	-54	-77	-58	-25
-110	-110	-92	-58	-95	-75	-42	-67	-47	-13
-100	-100	-81	-46	-86	-64	-30	-57	-37	-1
-90	-90	-70	-33	-76	-53	-18	-47	-26	+12
+80	-80	-59	-21	-66	-43	-6	-37	-15	+24
-70	-70	-49	-9	-76	-32	+7	-27	-4	+36
-60	-60	-38	+3	-46	-21	+19	-18	+7	+48
-50	-50	- 37	+15	- 36	-11	+31	-8	+18	+61
-40	-40	- 6	+28	-26	0	+44	+2	+28	+63.5
- 30	-30	-5	+41	-16	+11	+56	+12	+39	+63.5
-20	-20	+6	+53	-7	+22	+0.5	+22	+50	+63.5
-10	-10	+16	+63.5	+3	+32	+63.1	+32	+61	+63.5
0	0	+27	+63.5	+13	+43	+63.5	+42	+63.5	+63.5
10	+10	+38	+63.5	+23	+54	+63.5	+52	+63.5	+63.5
20	+20	+49	+63.5	+33	+63.5	+63.5	+62	+63.5	+63.5
30	+30	+60	+63.5	+43	+63.5	+63.5	+63.5	+63.5	+63.5
40	+40	+63.5	+63.5	+53	+63.5	+63.5	+63.5	+63.5	+63.5
50	+50	+63.5	+63.5	+63.5	+63.5	+63.5	+63.5	+63.5	+(3.5
60	+60	+63.5	+63.5	+63.5	+63.5	+63.5	+63.5	+63.5	+63.5

ATTACHMENT (9)

PRESSURIZER LEVEL TABLE FOR VARIABLE PRESSURIZER

PRESSURES & VARIABLE CONTAINMENT TEMPERATURES

	INDICATED LEVEL FOR AMBIENT CNTMT TEMP 120°F			INDICATED LEVEL FOR AMBIENT CNTMT TEMP 200°F			INDICATED LEVEL FOR AMBIENT CNTMT TEMP 250°F		
ACTUAL LEVEL	PRESSU	RIZER PI (PSIA) 1000	RESSURE 2250	PRESSU	RIZER PH (PSIA) 1000	RE 3SURE 2250	PRESSU	RIZER PI (PSIA) 1000	RESSURE 2250
50	25	29	50	39	44	68	53	57	82
75	65	61	75	84	80	94	99	95	109
100	107	96	100	128	116	119	140	128	134
125	149	131	125	167	152	143	183	167	159
150	191	167	150	211	188	168	228	201	183
175	236	205	175	248	222	192	270	237	208
200	278	240	200	294	259	216	310	274	233
250	362	308	250	370	332	267	320	344	274
300	370	370	300	370	370	318	370	370	334
350	370	370	350	370	370	368	370	370	370
370	370	370	370	370	370	370	370	370	376

ATTACHMENT (10)

PROCEDURE TO READ Thot ON SUBCOOLED MARGIN MONITOR

1.

A) <u>If in Press Mode</u>: Depress control switch 3 times within 3 seconds.

This will illuminate temperature and start testing sequence.

When the unit is in the test mode, the decimal indicator furthest to the right flashes every 1/2 second.

- b) If in Temperature Mode: Depress control switch 4 times within 3 seconds.
 This will start testing sequence.
 When the Unit is in the test mode, the decimal indicator furthest to the right flashes every 1/2 second.
- 2. Test #0 has started (number sequencing fast speed). To advance the Test #, depress the control switch. This will illuminate <u>PRESS</u> and the display will count from 1 to 16 (in slow speed). When number "5" is displayed, depress the control switch. This will illuminate <u>TEMP</u> and indicate Thot on the display. Thot will be displayed for a maximum of 20 minutes at which point it automatically returns to normal operation (Press Margin Display). To return to normal operation prior to this 20 minute delay, depress the control switch. This will illuminate <u>PRESS</u>, count to 16, and automatically return to pressure margin display. To read temp margin, depress the control switch once to illuminate TEMP.



CCOM CR

88-1137



ATTACHMENT (11

ATTACHMENTS REV. 1 /UNIT PAGE 1 DF 1 HIGH PRESSURE SAFETY INJECTION FLOW RCS PRESSURE VS. FLOW



ATTACHMENT (12)

ATTACHMENTS REV.1 /UNIT1 PAGE 1 OF 1 LOW PRESSURE SAFETY INJECTION FLOW

RCS PRESSURE VS. FLOW



ATTACHMENT (13)

ATTACHEDITS

ATTACHMENTS Rev. 1/Unit 2

DATE

1 12-10-87

1 12/10/37

1 2-10-88

1 2-10-88

CALVERT CLIFFS NUCLEAR POWER PLANT

ATTACHMENTS

REVISION 1

CL CL

MEETING # 88-7

SIGNATURE

1

PREPARED BY;

VERIFIED BY;

POSRC;

APPROVED BY;

Manager-Nuclear Operations or General Supervisor-Operations if POSRC review is not required

ATTACHMENTS Rev. 1/Unit 2

LIST OF EFFECTIVE PAGES

ATTACHMENT	PAGE	REVISION
1	1	1
2	1	1
2	2	1
2	3	1
2	4	1
2	5	. 1
3	1	1
4	1	1
5	1	1
6	1	1
7	1	1
8	1	1
8	2	1
9	1	1
10	1	1
:1	1	1
12	1	1
13	1	1



the second s

ATTACHMENT (2)

SIAS VERIFICATION CHECKLIST

2008, 2009, 2010

а.	21 and 23 HPSI Pumps	Running
b.	21 and 22 LPSI Pumps	Running
ċ.	HPSI Aux Header Isolation Valve, 2-SI-656-MOV	Open
d.	4 Main HPSI Header Valves:	
	2-SI-616-MOV 2-SI-626-MOV 2-SI-636-MOV 2-SI-646-MOV	Open
е.	4 Aux HPSI Header Valves:	
	2-SI-617-MOV 2-SI-627-MOV 2-LI-637-MOV 2-SI-647-MOV	Open
£.	4 LFSI Header Valves:	
	2-SI-615-MOV 2-SI-625-MOV 2-SI-635-MOV 2-SI-645-MOV	Open
g.	4 SI Tank Check Valve Leakage Drain Valves:	
	2-SI-618-CV 2-SI-628-CV 2-SI-638-CV 2-SI-648-CV	Shut*
h.	4 SI Tank Outlet Valves:	
	2-SI-614-MOV 2-SI-624-MOV 2-SI-634-MOV 2-SI-644-MOV	Open
i.	SI Tank Recirc to RCDT Isolation Valve, 2-SI-661-CV	Shut*
•	HANDSWITCH MUST BE PLACED IN POST-ACCIDENT POSITION BEFORE OF SIAS CAN BE ACCOMPLISHED FROM THE CONTROL ROOM.	RESET

ATTACHMENT (2)

SIAS VERIFICATION CHECKLIST

j.	2 Cntmt Spray Header CVs:	
	2-SI-4150-CV 2-SI-4151-CV	Open
k.	2 Cntmt Furge Supply Valves:	
	2-CPA-1410-CV 2-CPA-1411-CV	Shut*
1.	2 Cntmt Furge Exhaust Valves:	
	2-CPA-1412-CV 2-CPA-1413-CV	Shut*
m.	RCDT Pump Containment Isolation Valve, 2-RCW-4260-CV	Shut*
n.	2 Waste Gas Cntmt Isolation Valves:	
	2-WGS-2180-CV 2-WGS-2181-CV	Shut*
ο.	2 Containment RMS Isolation Valves:	
	2-CRM-5291-CV 2-CRM-5292-CV	Shut*
p.	2 Containment Normal Sump Drain Isolation Valves:	
	2-EAD-5462-MOV 2-EAD-5463-MOV	Shut*
q.	RCS Sample Isolation Valve, 2-PS-5464-CV	Shut*
r .	Containment Heating Water Isolation Valve, 2-PH-6579-MOV.	Shut*
в.	2 Hydrogen Furge Cntmt Isolation Valves:	
	2-HP-6900-MOV 2-179-6901-MOV	Shut*

HANDSWITCH MUST BE PLACED IN POST-ACCIDENT POSITION BEFORE RESET OF SIAS CAN BE ACCOMPLISHED FROM THE CONTROL ROOM.

ATTACHMENT (2)

SIAS VERIFICATION CHECKLIST

200	27.	
а.	2 Letdown Isolation Valves:	
	2-CVC-515-CV 2-CVC-516-CV	Shut*
b.	21, 22, and 23 Charging Pumps	Running
с.	VCT Outlet Valve, 2-CVC-501-MOV	Shut
d.	VCT Makeup Valve, 2-CVC-512-CV	Shut
е.	Boric Acid Direct Makeup Valve, 2-CVC-514-MOV	Open
£.	21 and 22 Boric Acid Pumps	Running
g.	2 BAST Gravity Feed Valves:	
	2-CVC-508-MOV 2-CVC-509-MOV	Open
h.	2 Boric Acid Recirculation Valves:	
	2-CVC-510-CV 2-CVC-511-CV	Shut
i.	2 RCP Bleedoff Isolation Valves:	
	2-CVC-505-CV 2-CVC-506-CV	Shut*
20	06	
а.	21 and 23 Pressurizer Backup Heaters	Off
20	13	
а.	21 and 22 Component Cooling Pumps	Running
b.	21 and 22 Saltwater Pumps	Running

HANDSWITCH MUST BE PLACED IN POST-ACCIDENT POSITION BEFORE RESET OF SIAS CAN BE ACCOMPLISHED FROM. THE CONTROL ROOM.

ATTACHMENT (2)

SIAS VERIFICATION CHECKLIST

c.	21 and 22 Service Water Pumps	Running
d.	2 SDC HX Component Cooling Outlet Valves:	
	2-CC-3828-CV 2-CC-3830-CV	Open
е.	4 SRW Turbine Building Header Isolation Valves:	
	2-SRW-1600-CV 2-SRW-1637-CV 2-SRW-1638-CV 2-SRW-1639-CV	Shut
£.	2 Circulating Water Fump Room Air Cooler Isolation Valves:	
	2-SW-5250-MOV 2-SW-5251-MOV	Shut
g.	21 and 22 Saltwater Air Compressors	Running
202	2.4A	
а.	21 Component Cooling hV Saltwater Inlet and Outlet Valves:	
	2-SW-5160-CV 2-SW-5206-CV DO NOT MATCH HANDSWITCH	Shut
b.	22 Component Cooling HX Saltwater Inlet Valve, 2-SW-5162-CV DO NOT MATCH HANDSWITCH	Shut
с.	22 Component Cooling HX Saltwater Outlet Valves:	
	2-SW-5208-CV 2-SW-5163-CV DO NOT MATCH HANDSWITCH	Shut
d.	21 SRW HX Saltwater Outlet Valve, 2-SW-5210-CV	full Open
е.	22 SRW HX Saltwater Outlet Valve, 2-SW-5212-CV	full Open

ATTACHMENT (2)

SIAS VERIFICATION CHECKLIST

1018, 1019, 1020

а.	11	Diesel	Generator	***************************************	Running
b.	12	Diesel	Generator		Running
с.	21	Diesel	Generator		Running

1034

a.	21	Containment	Purge	Exhaust Fan	Off
ь.	21	Containemnt	Purge	Supply Fan	Off

2C90 (45 ft S/G B/D Sample Panel)

а.	Pressurizer	Vapor Sample Valv	ve, 2-PS-5465-CV	Shut
b.	Pressurizer	Liquid Sample Val	lve, 2-PS-5466-CV	Shut
с.	RCS Hot Leg	Sample Valve, 2-1	PS-5467-CV	Shut

1C102 (45 ft Solid Waste)

a. Ouench Tank O. Sample Valve, 2-FS-0001-SV	. Shu	I.C.
----------------------------------------------	-------	------

ATTACHMENT (3)

CSAS VERIFICATION CHECKLIST ,

 a. 21 and 22 Main Steam Isolation Valves: 2-MS-4043-CV 2-MS-4048-CV Shut* b. 21 and 22 S/G Feedwater Isolation Valves: 2-FW-4516-MOV 2-FW-4517-MOV Shut* c. 21 and 22 S/G Feed Pumps Off c. 21 and 22 S/G Feed Pumps Off e. 21, 22, and 23 Condensate Booster Pumps Off 2C08, 2C09, 2C10 a. 21 and 22 Containment Spray Pumps Running A Containment Air Cooler 8 Inch Outlet Valves: 2-SRW-1582-CV 2-SRW-1585-CV 2-SRW-1593-CV 0pen c. 71, 22, 23, and 24 Containment Air Coolers Running in low
2-MS-4048-CV
 b. 21 and 22 S/G Feedwater Isolation Valves: 2-FW-4516-MOV 2-FW-4517-MOV Shut* c. 21 and 22 S/G Feed Pumps Tripped d. 21 and 22 Heater Drain Pumps Off e. 21, 22, and 23 Condensate Booster Pumps Off 2C08, 2C09, 2C10 a. 21 and 22 Containment Spray Pumps Running b. A Containment Air Cooler 8 Inch Outlet Valves: 2-SRW-1582-CV 2-SRW-1582-CV 2-SRW-1593-CV Containment Air Cooler 8 Inch Outlet Valves: 0pen c. 71, 22, 23, and 24 Containment Air Coolers Running in low
2-FW-4516-MOV 2-FW-4517-MOV
<pre>c. 21 and 22 S/G Feed Pumps Tripped d. 21 and 22 Heater Drain Pumps Off e. 21, 22, and 23 Condensate Booster Pumps Off 2CO8, 2CO9, 2C10 a. 21 and 22 Containment Spray Pumps Running b. A Containment Air Cooler 8 Inch Outlet Valves: 2-SRW-1582-CV 2-SRW-1585-CV 2-SRW-1593-CV Open c. 71, 22, 23, and 24 Containment Air Coolers Running in low 1C13</pre>
d. 21 and 22 Heater Drain Pumps
<pre>e. 21, 22, and 23 Condensate Booster Pumps Off 2CO8, 2CO9, 2C10 a. 21 and 22 Containment Spray Pumps Running b. 4 Containment Air Cooler 8 Inch Outlet Valves: 2-SRW-1582-CV 2-SRW-1593-CV Open c. 71, 22, 23, and 24 Containment Air Coolers Running in low 1C13</pre>
2CO8, 2CO9, 2C10 a. 21 and 22 Containment Spray Pumps Running b. A Containment Air Cooler 8 Inch Outlet Valves: 2-SRW-1582-CV 2-SRW-1585-CV 2-SRW-1590-CV 2-SRW-1593-CV Open c. 71, 22, 23, and 24 Containment Air Coolers Running in low 1C13
<pre>2C08, 2C09, 2C10 a. 21 and 22 Containment Spray Pumps Running b. 4 Containment Air Cooler 8 Inch Outlet Valves: 2-SRW-1582-CV 2-SRW-1585-CV 2-SRW-1590-CV 2-SRW-1593-CV Open c. 71, 22, 23, and 24 Containment Air Coolers Running in low 1C13</pre>
 a. 21 and 22 Containment Spray Pumps Running b. A Containment Air Cooler 8 Inch Outlet Valves: 2-SRW-1582-CV 2-SRW-1585-CV 2-SRW-1590-CV 2-SRW-1593-CV Open c. 71, 22, 23, and 24 Containment Air Coolers Running in low 1C13
b. A Containment Air Cooler 8 Inch Outlet Valves: 2-SRW-1582-CV 2-SRW-1585-CV 2-SRW-1590-CV 2-SRW-1593-CV Open c. 71, 22, 23, and 24 Containment Air Coolers Running in low 1C13
2-5RW-1582-CV 2-5RW-1585-CV 2-SRW-1590-CV 2-SRW-1593-CV Open c. 71, 22, 23, and 24 Containment Air Coolers Running in low 1C13
c. 71, 22, 23, and 24 Containment Air Coolers Running in low
c. 71, 22, 23, and 24 Containment Air Coolers Running in low
1013
a. 12 SFP Cooler Service Water Isolation Valves:
2-SRW-1598-CV 2-SRW-1599-CV Shut

HANDSWITCH MUST BE PLACED IN POST-ACCIDENT POSITION BEFORE RESET OF CSAS CAN BE ACCOMPLISHED FROM THE CONTROL ROOM.

 \dot{x}_{e}

ATTACHMENT (4)

CIS VERIFICATION CHECKLIST

2009, 2010

а.	21, 22, and 23 Iodine Filter Fans	Running
b.	21 and 22 Penetration Room Vent Fans	Running
с.	21 and 22 Penetration Room Vent Filters Isolation Dampers	Open
d.	Component Cooling Containment Isolation Valves:	
	2-CC-3832-CV 2-CC-3833-CV	Shut*
е.	Containment Instrument Air Isolation MOV, 2-IA-2080-MOV .	Shut*
f.	Instrument Air CIS Override, 2-HS-2080Å	Normal*
201	3	
8.	Component Cooling Supply To Liquid Waste Evaporator Isclation Valves:	
	2-CC-3840-CV 2-CC-3842-CV	Shut

HANDSWITCH MUST BE PLACED IN POST-ACCIDENT POSITION BEFORE RESET OF CIS CAN BE ACCOMPLISHED FROM THE CONTROL ROOM.

ATTACHMENT (5)

CRS VERIFICATION CHECKLIST

201	Q	
а.	2 Cntmt Purge Supply Valves:	
	2-CPA-1410-CV 2-CPA-1411-CV	Shut*
b.	2 Cntmt Purge Exhaust Valves:	
	2-CPA-1412-CV 2-CPA-1413-CV	Shut*
с.	2 Hydrogen Purge Cntmt Isolation Valves.	
	2-HF-6900-MOV 2-HF-6901-MOV	Shut*
103	14	
а.	21 Containment Furge Exhaust Fan	Off
b.	21 Containment Furge Supply Fan	Off

HANDSWITCH MUST BE PLACED IN POST-ACCIDENT FOSITION BEFORE RESET OF CRS CAN BE ACCOMPLISHED FROM THE CONTROL ROOM.

		Attac Rev. Page	1/Unit 2 1 of 1
	ATTACHMENT (6)		
	RAS VERIFICATION CHECKLIST		
08,	2009, 2010		
	21 and 22 LFSI Pumps		Off
	SI Pump Mini Flow Isolation Valves:		
-	2-SI-659-MOV 2-SI-660-MOV		Shut
. (Containment Sump Discharge Valves:		
	2-SI-4144-MOV 2-SI-4145-MOV	• • •	Open
c24/	δ		
	21 Component Cooling HX Saltwater Inlet Valve, 2-SW-5160-CV	* * *	Open
•	21 Component Cooling HX Saltwater Outlet Valve, 2-SW-5206-CV	* * *	Auto
•	22 Component Cooling HX Saltwater Inlet Valve, 2-SW-5162-CV		Open
	22 Component Croling HX Saltwater Outlet Valves:		
	2-SW-5208-CV 2-SW-5163-CV	x.x.y	Auto
	21 SRW HX Saltwater Outlet Valve, 2-SW-5210-CV		Auto
i n	22 SRW HX Saltwater Outlet Valve, 2-SW-5212-CV	x + x	Auto

ATTACHMENT (7)

SGIS VERIFICATION CHECKLIST

200		
a	21 and 22 Main Steam Isolation Valves:	
	2-MS-4043-CV 2-MS-4048-CV Shut*	•
b.	21 and 22 S/G Feedwater Isolation Valves:	
	2-FW-4516-MOV 2-FW-4517-MOV	•
с.	21 and 22 S/G Feed Pumps Tripped	
d.	21 and 22 Heater Drain Pumps Off	
е.	21, 22, and 23 Condensate Booster Pumps Off	

HANDSWITCH MUST BE PLACED IN POST-ACCIDENT POSITION BEFORE RESET OF SGIS CAN BE ACCOMPLISHED FROM THE CONTROL ROOM.
Attachments Rev. 1/Unit 2 Page 1 of 2

ATTACHMENT (8)

WIDE RANGE STEAM GENERATOR LEVEL TABLE FOR VARIABLE STEAM GENERATOR

PRESSURES & VARIABLE CONTAINMENT TEMPERATURES

ACTUAL LEVEL	INDICATED LEVEL FOR AMBIENT CNTMT TEMP 120°F			INDICATED LEVEL FOR AMBIENT CNTMT TEMP 200°F S/G PRESSURE (PSIA)			INDICATED LEVEL FOR AMBIENT CNTMT TEMP 300°F S/G PRESSURE (PSIA)		
	-400	+400	-401	-401	-386	-387	-398	- 353	-361
- 390	+ 390	-395	-400	-371	-376	-386	-344	-350	-357
-380	-380	-383	-388	-361	-366	-373	-334	-340	-345
-370	- 370	-372	-376	-351	-355	-361	-324	-329	-333
-360	- 360	-361	-364	-341	-344	-349	-314	-318	-320
-350	-350	+350	-351	-331	-333	-337	-304	- 307	-308
- 340	-340	-340	-339	-321	-323	- 324	-294	-296	-296
-330	-330	-329	- 327	-311	-312	-312	-284	-285	-283
-320	+320	-318	-315	-300	-301	-300	-274	-275	-271
+310	-310	-308	-302	-290	-290	-287	-265	-263	-259
- 300	+300	-297	-291	-280	-280	-275	-255	-253	-247
+290	-290	-286	-278	-273	-269	-262	-245	-242	+234
-280	-280	-275	-266	-264	-258	+250	-235	-231	-222
-270	+270	-265	-253	-258	-247	-238	-225	-220	-210
-260	-26'0	-254	-242	-244	-237	-226	+215	+210	•197
+ 250	-250	-243	+230	+234	-226	-214	-201	-199	=185
-240	-240	-233	-216	-224	-215	-201	+195	-188	-173
-230	+230	-222	-204	-214	+204	-189	-185	-177	-161
-220	+220	+211	-192	-204	-194	-176	-176	-166	-148
-210	-210	-200	-180	-194	-183	=164	-166	*156	-136
-200	-200	-190	-168	-184	-172	-151	+156	-145	-124
-190	-190	-179	-155	=1 +	-160	+139	-146	-134	+111
-180	-180	-168	-143	-164	1160	-127	-136	-123	-99
-170	-170	-157	+132	-154	-139	-115	-126	-112	-87

Attachments Rev. 1/Unit 2 Fage 2 of 2

ATTACHMENT (8)

WIDE RANGE STEAM GENERATOR LEVEL TABLE FOR VARIABLE STEAM GENERATOR

PRESSURES & VARIABLE CONTAINMENT TEMPERATURES (cont'd)

ACTUAL LEVEL	INDICATED LEVEL FOR AMBIENT CNTMT TEMP 120°F			INDICATED LEVEL FOR AMBIENT CNTMT FEMP 200°F			INDICATED LEVEL FOR AMBIENT CNTMT TEMP 300°F S/G PRESSURE (PSIA)		
	-160	-160	-146	-119	-144	-129	-103	-115	-101
-150	-150	-135	-107	-134	-118	-91	-100	-91	-62
-140	-140	-124	-95	-125	-107	-79	-97	-80	-50
-130	-130	+114	-83	-115	-92	+66	*87	-69	-38
+120	-120	-103	-70	-105	-86	- 54	-77	-58	-25
-110	-110	-92	-58	-95	-75	+42	-67	-47	-13
-100	-100	-81	-46	-86	-64	-30	-57	-37	-1
-90	-90	-70	-33	-76	-53	-18	-47	- 26	+12
-80	+80	-59	-21	+66	-43	-6	+37	-15	+24
-70	-70	-49	-9	-76	- 32	+7	*27	-4	+36
-60	+60	-38	+3	-46	-21	+19	-18	+7	+48
-50	-50	-27	+15	-36	-11	+31	- 8	+18	+61
+40	+40	-16	+28	+26	0	+44	+2	+28	+63.5
-30	- 30	- 5	+41	-16	+11	+56	+12	+39	+63.5
-20	-20	+6	+53	- 7	+22	+63.5	+22	+50	+63.5
-10	-10	+16	+63.5	+3	+32	+63.5	+32	+61	+63.5
0	0	+27	+63.5	+13	+43	+63.5	+42	+63.5	+63.5
10	+10	+38	+63.5	+23	+54	+63.5	+52	+63.5	+63.5
20	+20	+49	+63.5	+33	+63.5	+63.5	+62	+63.5	+63.
30	+30	+60	+63.5	+43	+69.5	+63.5	+63.5	+63.5	+63.
40	+40	+63.5	+63.5	+53	+63.5	+63.5	+63.5	+63.5	+63.
50	+50	+63.5	+63.5	+63.5	+63.5	+63.5	+63.5	+63.5	+63.
60	+60	+63.5	+63.5	+63.5	+63.5	+63.5	+63.5	+63.5	+63.

Attachments Rev. 1/Unit 2 Page 1 of 1

ATTACHMENT (9)

PRESSURIZER LEVEL TABLE FOR VARIABLE PRESSURIZER

PRESSURES & VARIABLE CONTAINMENT TEMPERATURES

and the second se				and a second sec	and the second se	successive water in the second second second second	Constrainty of the second data and the second data and the second data and the second data and the second data			
ACTUAL LEVEL	INDICATED LEVEL FOR AMBIENT CNTMT TEMP 120°F PRESSURIZER PRESSURE (PSIA) 300 10° 2250			INDICATED LEVEL FOR AMBIENT CNTMT TEMP 200°F PRESSURIZER PRESSURE (PSIA) 300 1000 2250			INDICATED LEVEL FOR AMBIE'TT CNTMT TEMP 250°F PRESSURIZER PRESSURE (PSIA) 300 1000 2250			
										50
75	65	61	75	84	80	94	99	95	109	
100	107	96	100	128	116	119	140	128	134	
125	149	131	125	167	152	143	183	167	159	
150	191	167	150	211	188	168	228	201	183	
175	236	205	175	248	222	192	270	237	208	
200	2.78	240	200	294	259	216	310	274	233	
250	362	308	250	370	332	267	370	344	274	
300	370	370	300	370	370	318	370	370	334	
350	370	370	350	370	370	368	370	370	370	
370	370	370	370	370	370	370	370	370	370	
		and the second statements of the second statem	and the second se	and the second second second second	And and an opposite the second s	contraction descent particular	the state of the s	and the second s	statement of the local division of the local	

Attachments Rev. 1/Unit 2 Page 1 of 1

ATTACHMENT (10)

PROCEDURE TO READ Thot ON SUBCOOLED MARGIN MONITOR

a) <u>If in Press Mode</u>: Depress control switch 3 times within 3 seconds.

This will illuminate temperature and start testing sequence.

When the unit is in the test mode, the decimal indicator furthest to the right flashes every 1/2 second.

- b) If in Temperature Mode: Depress control switch 4 times within 3 seconds. This will start testing sequence. When the Unit is in the test mode, the decimal indicator furthest to the right flashes every 1/2 second.
- 2. Test #0 has started (number sequencing fast speed). To advance the Test #, depress the control switch. This will illuminate <u>PRESS</u> and the display will count from 1 to 16 (in slow speed). When number "5" is displayed, depress the control switch. This will illuminate <u>TEMP</u> and indicate Thot on the display. Thot will be displayed for a maximum of 20 minutes at which point it automatically returns to normal operation (Press Margin Display). To return to normal operation prior to this 20 minute delay, depress the control switch. This will illuminate <u>PRESS</u>, count to 16, and automatically return to pressure mar in display. To read temp margin, depress the control switch once to illuminate <u>TEMP</u>.



MAKEUP WATER REQUIRED FOR RCS COOLDOWN

ATTACHMENT (11)

ATTACHMENTS REV.1 /UNIT PAGE 1 OF 1

N

HIGH PRESSURE SAFETY INJECTION FLOW

ACS PRESSURE VS. FLOW



ATTACHMENT (12)

ATTACHMENTS REV.1 /UNIT2 PABE 1 OF 1

RCS PRESSURE (PSIA) 7,000

LPSI FLOW (GPM)

ATTACHMENT (13)

PARE 1 OF 1 REV.1 /UNIT 2 ATTACHMENTS

LOW PRESSURE SAFETY INJECTION FLOW

RCS PRESSURE VS. FLOW