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CALVERT CLIFFS NUCLEAR POWER PLANT TECHNICAL PROCEDURE
UNIT ONE
EOP-8
FUNCTIONAL RECOVERY PROCEDURE
REVISION 33
Safety Related
Approval Authority: Tim Riti 8/31/09
signature/date
Effective Date:
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I. PURPOSE

This procedure provides the operator actions to be completed after events which are unable to be diagnosed, or for events where an Optimal Recovery Procedure is **NOT** sufficient. The actions in this procedure provide a systematic and structured response to plant casualties, based on the safety functions, and are necessary to ensure the plant is placed in a stable, safe condition. The goal of this procedure is to prevent core damage by satisfying safety functions at risk while minimizing any radiological releases to the environment.

II. ENTRY CONDITIONS

The following conditions exist:

- A. Post-Trip Immediate Actions are completed.
- B. ANY of the following conditions exist:
 - Something more than an uncomplicated reactor trip has occurred for which a single event diagnosis is NOT possible utilizing the diagnostic flowchart of EOP-0, <u>POST-TRIP IMMEDIATE ACTIONS</u>.
 - Something more than an uncomplicated reactor trip has occurred for which an Optimal Recovery Procedure is NOT available.
 - An Optimal Recovery Procedure has been implemented but ONE or MORE Safety Function Acceptance Criteria are NOT satisfied, and actions directed within the Optimal Recovery Procedure are NOT returning the parameter(s) to within their Acceptance Criteria.

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III. PRECAUTIONS

The following specific precautions apply prior to or throughout this procedure.

A. WARNINGS

None

B. CAUTIONS

- SUR and WRNI Power should be continuously monitored during any RCS temperature changes until adequate shutdown margin can be established. RCS temperature should NOT be lowered if SUR approaches zero and/or WRNI Power level stabilizes above 10-4%.
- Feedwater should NOT be added to a dry S/G if the other S/G still contains water. If both S/Gs become dry, only ONE S/G should be refilled to initiate Natural Circulation. A dry S/G is indicated by wide range S/G level indication off-scale low or by S/G pressure less than saturation pressure for existing TAVE.
- 3. ESFAS actuated safety features should only be overridden to support a threatened safety function or when directed by the procedure.
- 4. Solid water operation of the RCS should only be attempted in order to maintain a subcooled margin of 25° F. Pressurizer level limits may be exceeded to restore RCS subcooling. If solid water 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.
- If the initial cooldown rate exceeds Technical Specification Limits, there may be a
 potential for pressurized thermal shock of the reactor vessel.
 Pressure/Temperature Limits of ATTACHMENT (1), <u>RCS PRESSURE
 TEMPERATURE LIMITS</u> should be maintained.
- 6. Maintaining subcooling of 25° F takes precedence over PTS considerations. If there is a conflict between maintaining adequate core cooling and complying with pressure/temperature limits, then maintenance of adequate core cooling should be given the higher priority.
- 7. The use of equipment in the containment building should be minimized when containment hydrogen concentration is greater than 4.0% to reduce the possibility of hydrogen ignition.
- Common failure of a standby pump or component is possible if started following a pump or component failure. The cause of the failure should be determined prior to starting or restarting a standby pump or component.

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III.B (continued)

- There is a possibility of RCS voiding throughout this procedure. Steps to eliminate voiding should be taken anytime voiding causes heat removal or inventory control to be threatened. Void elimination should be started soon enough to ensure heat removal and inventory control are NOT lost.
- 10. After the required shutdown boron concentration is attained in the RCS, makeup water added to the RCS during the cooldown should be at least equal to the shutdown boron concentration to prevent **ANY** dilution of RCS boron concentration.
- 11. There is a possibility for excessive 1B DG loading if the DG has been loaded and the LOCI Sequencer actuates. To prevent this from occurring, the operator should NOT energize any non-essential loads unless specifically allowed within this procedure. The maximum steady state 1B DG load limit is 3300 KW, the 1A DG load limit is 5400 KW. The SMECO load limit is 240 AMPS Continuous.
- 12. The number of auxiliary spray cycles should be minimized when the temperature differential is greater than 400° F to minimize spray nozzle thermal stress accumulation factor.
- 13. If VCT pressure is reduced by greater than 5 PSIG, the idle Charging Pumps may become gas bound if **NOT** started or vented.

(continue)

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III. (continued)

C. <u>NOTES</u>

- 1. Hot and cold leg RTD and CET temperature indications may be influenced by charging pump or SIS injection water temperatures. Multiple RTD and CET indications should be used when injection is occurring.
- During a depressurization event, pressurizer level may NOT provide an accurate indication of RCS inventory due to the formation of voids. Pressurizer level when combined with RCS subcooling based on CET temperatures will indicate the core is covered.
- 3. High energy line breaks may cause erratic instrumentation response depending on the magnitude and location of the break.
- 4. Harsh Containment Environment conditions will affect instrument indications. When necessary, modified parameter values designated by braces {} are used to compensate the indicated value for Harsh Containment Environment conditions. Harsh Containment Environment conditions exist when containment pressure is greater than 4.25 PSIG.
- 5. If cooling down by natural circulation with an isolated steam generator, an inverted delta T (T COLD higher than T HOT) may be observed in the idle loop. This is due to a small amount of reverse heat transfer in the isolated steam generator. The inverted delta T is **NOT** expected to have any significant effect on natural circulation flow in the operating steam generator loop.
- An incident may cause inconsistencies between instruments. At least TWO independent indications should be used, when available, to evaluate and verify a specific plant condition.
- Do NOT adopt manual operation of automatically controlled systems unless a malfunction is apparent or the automatic system operation will NOT support the maintenance of a safety function.
- 8. Systems shifted to manual operation must be monitored frequently to ensure correct operation.
- 9. Personnel should be prepared for the possibility of inadequate lighting in access areas and equipment rooms.

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N	. FUNCTIONAL RECOVERY ENT	RY	
	RECOVERY ACTIONS	ALTERNATE ACTIONS	
A .	DETERMINE APPROPRIATE EMERGENCY REPSONSE ACTIONS PER THE ERPIP.		
bu	<u>WARNING</u> opping the Transfer Cask may spill fuel ndles in the Auxiliary Building causing ph radiation levels.		
1.	IF a Transfer Cask loaded with irradiated fuel assemblies has been dropped in the Auxiliary Building, THEN perform actions concurrently PER AOP-6D, <u>FUEL HANDLING INCIDENT</u> .		
2.	Determine the appropriate emergency response actions PER the ERPIP.		
B.	OBTAIN FUNCTIONAL RECOVERY ENTRY PLACEKEEPER AND RECORD TIME.		

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RECOVERY ACTIONS	ALTERNATE ACTIONS
C. PERFORM THE RCP TRIP STRATEGY.	
<u>NOTE</u> Subsequent operations to depressurize the plant under operator control are NOT considered a result of the event.	
 IF RCS pressure drops to 1725 PSIA as a result of the event, THEN trip RCPs so EITHER of the following pairs remain running: 	
 11A and 12B RCPs 11B and 12A RCPs 	
 IF CIS has actuated, OR Component Cooling flow can NOT be verified to the RCPs, THEN trip ALL RCPs. 	
3. IF RCS pressure drops below the minimum pump operating limits PER ATTACHMENT (1), <u>RCS PRESSURE TEMPERATURE LIMITS</u> , THEN trip ALL RCPs.	
D. MONITOR S/G ACTIVITY AND CONTAINMENT HYDROGEN LEVELS.	
 Direct Chemistry to perform qualitative samples on BOTH S/Gs for activity PER CP-436. 	
2. Direct Chemistry to place the Hydrogen Monitors in service.	

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IV. FUNCTIONAL RECOVERY ENTRY			
RECOVERY ACTIONS	ALTERNATE ACTIONS		
E. DETERMINE STATUS OF SAFETY FUNCTIONS (STA).			
1. Identify success paths for ALL Safety Functions PER Section VI., <u>RESOURCE</u> <u>ASSESSMENT TABLE</u> .			
2. Confirm the selected success paths with the CRS.			
3. Commence the Safety Function Status Checks for ALL selected success paths.	3.1 IF Safety Function Acceptance Criteria are NOT met, THEN determine the appropriate emergency response actions PER the ERPIP.		
F. PERFORM RECOVERY ACTIONS.			
 Identify success paths AND determine if Acceptance Criteria are met for ALL Safety Functions PER Section VI., <u>RESOURCE ASSESSMENT</u> <u>TABLE</u>. 	1.1 IF a success path can NOT be identified PER Section VI., <u>RESOURCE</u> <u>ASSESSMENT TABLE</u> , THEN select the highest numbered success path for that Safety Function (e.g.; HR-4).		
 IF entry is from an Optimal Recovery Procedure, THEN Exit the Optimal Recovery Procedure. 			
(continue)			

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EOP-8 Rev 29/Unit 1 Page 11 of 54 IV. FUNCTIONAL RECOVERY ENTRY **RECOVERY ACTIONS ALTERNATE ACTIONS** F. (continued) NOTE Safety Functions are presented in order of importance. Selected success paths should be commenced in accordance with the Safety Function hierarchy. 3. Commence the Recovery Actions PER APPENDIX (1), REACTIVITY CONTROL to APPENDIX (6), RADIATION LEVELS EXTERNAL TO CONTAINMENT with the following priority: a.' Safety Functions that are NOT meeting their EOP-8 Acceptance Criteria. b. Safety Functions that were NOT met in EOP-0. AND Safety Functions that were NOT met in an Optimal Recovery Procedure. c. ALL remaining Safety Functions. 4. IF, at any time, a Safety Function is NOT being satisfied, **THEN** commence the Recovery Actions for the success path of the unsatisfied Safety Function, in accordance with the Safety Function hierarchy. 5. IF, at any time, ANY success path is unable to meet the acceptance criteria, THEN IMPLEMENT an appropriate success path as determined PER Section VI., RESOURCE ASSESSMENT TABLE. (continue)

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IV. FUNCTIONAL RECOVERY ENTRY

RECOVERY ACTIONS

ALTERNATE ACTIONS

F. (continued)

NOTE

Safety Function success paths are listed in order of preference, success path #1 (e.g.; HR-1) being the most preferred.

- IF, at any time, a lower numbered success path is able to be implemented for ANY safety function, THEN, as time permits, perform the following actions:
 - a. Verify the lower numbered success path is available using the Resource Assessment Table.
 - b. Commence performance of the lower numbered success path.
 - c. Exit the original success path as appropriate.
- 7. WHEN the following conditions are met:
 - The Recovery Actions for the selected success paths are being performed
 - The Acceptance Criteria for each selected Safety Function success path is satisfied

THEN PROCEED to Section V., LONG TERM ACTIONS.

END of Section IV

V.	LONG TERM ACTIONS	EOP-8 Rev 29/Unit 1 Page 13 of 54
	RECOVERY ACTIONS	ALTERNATE ACTIONS
A .	DETERMINE PLANT STATUS.	
1.	 Determine the current status of the plant by identifying the following: Present RCS conditions, including inventory, temperature, pressure and radiation levels 	
	 Selected success paths for fulfilling each safety function Adequacy of core cooling Plant area radiation levels Rates of radioactivity release to the environment 	
B.	ATTEMPT TO DETERMINE SPECIFIC EVENT.	
1.	 IF a single event, such as a LOCA, SGTR or LOAF, can be identified, THEN entry into the appropriate Optimal Recovery Procedure may be made provided the following conditions are met: The Safety Function Status Checks Acceptance Criteria, for ALL safety functions, for EOP-8, <u>FUNCTIONAL RECOVERY PROCEDURE</u> are satisfied The Safety Function Status Checks Intermediate Acceptance Criteria for the Optimal Recovery Procedure are satisfied 	

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V.	LONG TERM ACTIONS	
	RECOVERY ACTIONS	ALTERNATE ACTIONS
C.	IF 500KV OFFSITE POWER WAS LOST, THEN ATTEMPT TO RESTORE POWER TO PLANT LOADS.	
1.	Call the SO-TSO to determine when power is expected.	
2.	WHEN 500KV offsite power is available, THEN attempt to restore 500KV offsite power PER ATTACHMENT(16), <u>500KV</u> OFFSITE POWER RESTORATION.	
3.	Verify power is available to the switchyard auxiliaries:	
	• IF SWYD SERV XFMR SX-10 is NOT energized, AND 11 4KV Vital Bus is energized, THEN close SWYD 4KV SERV XFMR FDR, 152-1113.	
	 IF SWYD SERV XFMR SX-20 is NOT energized, AND 21 4KV Vital Bus is energized, THEN close SWYD SERV XFMR 4KV FDR, 152-2113. 	
	 Verify SP-10 and SP-20 are energized PER OI-28, <u>OPERATION OF 500KV</u> <u>SWITCHYARD</u>. 	
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V. LON	G TERM ACTIONS		
R	ECOVERY ACTIONS		ALTERNATE ACTIONS
C. (continue	ed)		
	<u>CAUTION</u> hould NOT be made to a bus if a fault is suspected.		
de-enen	-104R or MCC-114R is gized, erform the following actions:		
and MCC-1	<u>CAUTION</u> t be stripped from MCC-114R 04R to ensure 114R REACTOR er, 52-1119 will NOT be I.		
AND	ICC-114R is energized MCC-104R is NOT energized, IN tie MCC-104R to MCC-114R as ws:		
(1)	Verify SALTWATER SYSTEM AIR COMPRESSOR 11 is available, AND open the SALTWATER SYSTEM AIR COMPRESSOR 12 breaker, 52-10404.	(1).1	IF SALTWATER SYSTEM AIR COMPRESSOR 11 is NOT available, THEN verify SALTWATER SYSTEM AIR COMPRESSOR 11 breaker, 52-11404 is open.
	Verify BORIC ACID PUMP 11 is available, AND open the BORIC ACID PUMP 12 breaker, 52-10406.	(2).1	IF BORIC ACID PUMP 11 is NOT available, THEN verify BORIC ACID PUMP 11 breaker, 52-11406 is open.
(3)	Open MCC-104R Main Feeder Breaker, 52-10401.		
(4)	Rotate the left key on the MCC-104R Main Feeder Breaker, and remove BOTH interlock keys.		
(5)	Insert the appropriate interlock key into MCC-104R Tie breaker, 52-10420.		
(6)	Turn the key in the clockwise direction.		
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V. LONG TERM ACTIONS

RECOVERY ACTIONS

ALTERNATE ACTIONS

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C.4.a (continued)

- (7) Close MCC-104R Tie Breaker, 52-10420.
- (8) Open the following MCC breakers:
 - BORIC ACID BATCH TANK HEATER 11, 52-11410
 - BORIC ACID BATCH TANK MIXER, 52-11425
- (9) Insert the appropriate interlock key into MCC-114R Tie Breaker, 52-11420.
- (10) Turn the key in the clockwise direction.
- (11) Close MCC-114R Tie Breaker, 52-11420.

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V. LONG TERM ACTIONS

RECOVERY ACTIONS

ALTERNATE ACTIONS

C.4 (continued)

- b. IF MCC-114R is NOT energized AND MCC-104R is energized, THEN tie MCC-114R to MCC-104R as follows:
 - (1) Open MCC-114R Main Feeder Breaker, 52-11401.
 - (2) Rotate the left key on the MCC-114R Main Feeder Breaker, and remove **BOTH** interlock keys.
 - (3) Insert the appropriate interlock key into MCC-114R Tie Breaker, 52-11420.
 - (4) Turn the key in the clockwise direction.
 - (5) Close MCC-114R Tie Breaker, 52-11420.
 - (6) Insert the appropriate interlock key into MCC-104R Tie Breaker, 52-10420.
 - (7) Turn the key in the clockwise direction.
 - (8) Close MCC-104R Tie Breaker, 52-10420.
- 5. Verify the Emergency DC PPs are operating:
 - Turbine EMERG OIL PP
 - EMERG H2 SEAL OIL PP
 - SGFP EMERG OIL PPs

(continue)

V. LONG TERM ACTIONS

RECOVERY ACTIONS

ALTERNATE ACTIONS

C. (continued)

NOTE

Operation of the equipment in this procedure will **NOT** cause 1B DG loading to exceed 3600 KW if the LOCI Sequencer actuates.

CAUTION

SMECO Power Supply System load shall be limited as follows:

- 240 AMPS Continuous
- 216 AMPS for 16 hours followed by 264 AMPS for up to 8 hours, then reducing to 216 AMPS
- 216 AMPS for 20 hours followed by 295 AMPS for up to 4 hours, then reducing to 216 AMPS
- 6. Energize the following support equipment as necessary to facilitate shutdown, while maintaining load within the power source's ratings:
 - a. Start a MAIN EXH FAN.
 - b. Start the CNTMT AIR CLR(s) in LOW as necessary to restore and maintain containment temperature below 120° F.
 - c. Start the SRW Room Ventilation PER OI-15, <u>SERVICE WATER SYSTEM</u>.
 - d. IF the "SFP TEMP HI" alarm is received,
 THEN start the SFP CLG PP(s) PER the appropriate OI-24 series procedure.

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V. LONG TERM ACTIONS

RECOVERY ACTIONS

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ALTERNATE ACTIONS

- C. (continued)
- Restore power to MCC-101AT and MCC-101BT loads, while remaining within the power source's ratings, as follows:
 - a. Strip ALL loads from MCC-101AT and MCC-101BT by opening individual MCC breakers.
 - b. IF 11A 480V BUS is energized, THEN restore power to MCC-101AT from 11 4KV Vital Bus by closing normal feeder breaker 52-1109.
 - c. IF 14B 480V BUS is energized, THEN restore power to MCC-101BT from 14 4KV Vital Bus by closing normal feeder breaker 52-1419.
 - d. IF 11 4KV Vital Bus is energized AND 14 4KV Vital Bus is NOT energized, THEN tie MCC-101BT to MCC-101AT as follows:
 - (1) Open MCC-101BT Main Feeder Breaker, 52-10141.
 - (2) Rotate the bottom key on the MCC-101BT Main Feeder Breaker, and remove **BOTH** interlock keys.
 - (3) Insert the appropriate interlock key into MCC-101BT Tie Breaker, 52-10160.
 - (4) Turn the key in the clockwise direction.
 - (5) Close MCC-101BT Tie Breaker, 52-10160.
 - (6) Insert the appropriate interlock key into MCC-101AT Tie Breaker, 52-10120.

(continue)

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V. LONG TERM ACTIONS

RECOVERY ACTIONS

ALTERNATE ACTIONS

C.7.d (continued)

- (7) Turn the key in the clockwise direction.
- (8) Close MCC-101AT Tie Breaker, 52-10120.
- e. IF 11 4KV Vital Bus is NOT energized AND 14 4KV Vital Bus is energized, THEN tie MCC-101AT to MCC-101BT as follows:
 - (1) Open MCC-101AT Main Feeder Breaker, 52-10101.
 - (2) Rotate the bottom key on the MCC-101AT Main Feeder Breaker, and remove **BOTH** interlock keys.
 - (3) Insert the appropriate interlock key into MCC-101AT Tie Breaker, 52-10120.
 - (4) Turn the key in the clockwise direction.
 - (5) Close MCC-101AT Tie Breaker, 52-10120.
 - (6) Insert the appropriate interlock key into MCC-101BT Tie Breaker, 52-10160.
 - (7) Turn the key in the clockwise direction.
 - (8) Close MCC-101BT Tie Breaker, 52-10160.

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V. LONG TERM ACTIONS

RECOVERY ACTIONS

ALTERNATE ACTIONS

C.7 (continued)

- f. Energize MCC-101AT and MCC-101BT loads by shutting the following breakers:
 - Technical Support Center HVAC Chiller & Pump Breaker, 52-10111
 - Distribution XFMR 11 Breaker, 52-10116
 - XFMR 1X51 & 1X53 (telephone) Breaker, 52-10118
 - Technical Support Center UPS Computer Breaker, 52-10122
 - AFW PP Room A/C Unit Breaker, 52-10150
- g. Start the Technical Support Center HVAC Chiller Pump by pushing the START button, 1-HS-112, located at the NW corner stairway on the 45 ft level of the Turbine Building.

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V. LONG TERM ACTIONS

RECOVERY ACTIONS

ALTERNATE ACTIONS

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C. (continued)

CAUTION

3600 KW is the maximum load limit for 1B DG and is the setting of the DG fuel rack stop. 1B DG loading should be maintained below 3300 KW to prevent the DG RPMs from falling due to automatic load variations.

- IF SIAS actuates AND 1B DG load exceeds 3600 KW, THEN perform rapid DG load reduction as follows:
 - a. Open 14B BUS 480V FDR breaker, 52-1413.
 - b. Stop the MAIN EXH FAN.
 - c. IF the normal supply bus for MCC-101BT is energized, THEN restore power to MCC-101BT from 14 4KV Vital Bus by closing normal feeder breaker 52-1419.
 - d. Close 14B BUS 480V FDR breaker, 52-1413.
- 9. IF SIAS actuates AND 1B DG load exceeds 3300 KW, THEN reduce DG load below 3300 KW as follows:
 - a. Stop the MAIN EXH FAN.

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b. Locally open MCC-101BT Main Feeder Breaker, 52-10141.

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V. LONG TERM ACTIONS RECOVERY ACTIONS **ALTERNATE ACTIONS** C. (continued) 10. Lower the Main Generator Hydrogen Pressure to 2 PSIG by performing the following actions: a. Align the GENERATOR CO2 CHARGE AND GAS VENT ISOLATION VALVE, 1-G-01, to the VENT position. b. Throttle open the GENERATOR GAS VENT LINE ISOLATION VALVE. 1-G-03. c. WHEN Main Generator hydrogen pressure is vented to 2 PSIG. THEN perform the following actions: (1) Shut 1-G-03. (2) Secure the EMERG H₂ SEAL OIL PP. 11. Minimize the 250V DC Battery discharge by closing the 15 Battery Charger remote supply breaker, 52-1107, OR 25 Battery Charger remote supply breaker, 52-2107, to energize the Battery Charger on 13 250V DC Bus.

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V. LONG TERM ACTIONS **ALTERNATE ACTIONS RECOVERY ACTIONS** D. DETERMINE IF RCS COOLDOWN SHOULD CONTINUE. 1. Determine if RCS cooldown to cold shutdown is required based on the following considerations: a. IF a high radioactivity release rate to the environment exists, THEN ensure cooldown is in progress PER the selected Heat Removal success path. AND dump steam to the condenser if possible. b. IF the available inventory approaches the minimum required for cooldown PER ATTACHMENT (9), MAKEUP WATER REQUIRED FOR RCS COOLDOWN AND is lowering due to insufficent makeup THEN ensure cooldown is in progress PER the selected Heat Removal success path. c. IF a loss of ANY vital auxiliaries may be anticipated, including a loss of electric power, compressed air, or cooling water supplies, THEN ensure cooldown is in progress PER the selected Heat Removal success path. d. IF a cooldown is necessary to make repairs. THEN ensure cooldown is in progress PER the selected Heat Removal success path.

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V .	LONG TERM ACTIONS		
	RECOVERY ACTIONS	ALTERNATE ACTIONS	
E.	ENSURE EQUIPMENT AVAILABILITY AND PLANT CONDITIONS TO SUPPORT RCS COOLDOWN.		
1.	 Determine equipment availability and plant conditons to support RCS cooldown based on the following considerations: Status of failed equipment or conditions which may prevent or inhibit a cooldown, such as a loss of ALL pressurizer sprays or inability to dump steam 		
	Availability of condensate inventory		
2.	IF repairs to equipment are required, THEN establish plant conditions to support making the necessary repairs.		
3.	IF insufficient inventory is available PER ATTACHMENT (9), <u>MAKEUP WATER</u> <u>REQUIRED FOR RCS COOLDOWN</u> , THEN attempt to raise the inventory or obtain additional sources of feedwater.		

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V. LONG TERM ACTIONS	
RECOVERY ACTIONS	ALTERNATE ACTIONS
F. PERFORM PLANT COOLDOWN	
NOTE If a cooldown is to be performed, then guidance from the Plant Technical Support Center may be required. Standard Cooldown methods may require modification due to the nature of the event.	
 IF a plant cooldown is to be performed, THEN conduct a RCS cooldown to less than 300° F using any method described in the Heat Removal success paths OR as prescribed by the Technical Support Center. 	1.1 IF a cooldown is NOT required, THEN continue to maintain the safety functions until guidance is provided by the Plant Technical Support Center or an approved procedure can be implemented.
 IF RCS activity will NOT result in unacceptable radiological consequences outside containment. AND CET temperatures are less than 300° F, THEN evaluate initiating Shutdown Cooling PER HR-3, <u>SHUTDOWN</u> <u>COOLING SYSTEM</u>. 	

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V. LONG TERM ACTIONS

RECOVERY ACTIONS

ALTERNATE ACTIONS

G. IMPLEMENT THE APPROPRIATE PROCEDURE

1. WHEN the following conditions are met:

- The Safety Function Status Checks Acceptance Criteria, for ALL safety functions, for EOP-8, <u>FUNCTIONAL</u> <u>RECOVERY PROCEDURE</u> are met
- An appropriate, approved procedure is available for implementation

THEN perform the following:

- a. IF ANY safety signals have initiated, AND are no longer needed, THEN reset the appropriate signals.
- b. Commence ATTACHMENT(13), <u>ADMINISTRATIVE POST-TRIP</u> <u>ACTIONS</u>.
- c. IMPLEMENT the appropriate procedure as directed by the Shift Manager or the Plant Technical Support Center.

END of Section V

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VI. RESOURCE ASSESSMENT TABLE

REACTIVITY	SAFETY FUNCTION SUCCESS	PATH DETERMINATION
CONTROL SUCCESS PATH	RESOURCE CONDITIONS	ACCEPTANCE CRITERIA
RC-1: CEA Insertion	 a. CEAs are able to be inserted, and SUR is negative OR b. A loss of ALL Vital 4KV Buses may have occurred 	
RC-2: Boration Using CVCS	 a. Charging pump is available for boron addition b. Boric acid source is available: BAST RWT c. Charging path is available via normal flow path or SIS flow path 	 Boration rate greater than or equal to 40 GPM, WRNI power is lowering, and SUR is negative OR WRNI power below 10⁻⁴% and SUR is negative or zero
RC-3: Boration Using SIS	 a. HPSI pump is available for boron addition b. RWT is available as boric acid source c. A flow path is available 	 Boration rate greater than or equal to 40 GPM, WRNI power is lowering, and SUR is negative OR WRNI power below 10⁻⁴% and SUR is negative or zero

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VITAL	SAFETY FUNCTION SUCCES	S PATH DETERMINATION
AUXILIARIES SUCCESS PATH	RESOURCE CONDITIONS	ACCEPTANCE CRITERIA
VA-1: 500KV Offsite Power	a. At least ONE 500KV Bus is available	1. At least ONE 4KV vital bus is energized
		2. 11, 12, 21 and 22 125V DC Buses, ALL greater than 105 volts
		3. At least THREE 120V AC Vital Buses are energized:
		• 11 • 12 • 13 • 14
		4. EITHER 1Y09 or 1Y10 is energized
/A-2: Diesel Generators	a. 1A, 1B OR 0C Diesel Generator is available	1. At least ONE 4KV vital bus is energized
	is avaliable	2. 11, 12, 21 and 22 125V DC Buses, ALL greater than 105 volts
		3. At least THREE 120V AC Vital Buses are energized:
		• 11 • 12 • 13 • 14
		4. EITHER 1Y09 or 1Y10 is energized
	(continue)	

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VI. RESOURCE ASSESSMENT TABLE

SAFETY FUNCTION SUCCESS PATH DETERMINATION

VITAL	SAFETY FUNCTION SUCCE	SS PATH DETERMINATION
AUXILIARIES (continued) SUCCESS PATH	RESOURCE CONDITIONS	ACCEPTANCE CRITERIA
VA-3: SMECO	a. SMECO Power Supply System is available	1. At least ONE 4KV vital bus is energized
		2. 11, 12, 21 and 22 125V DC Buses, ALL greater than 105 volts
		3. At least THREE 120V AC Vital Buses are energized:
		• 11 • 12 • 13 • 14
		4. EITHER 1Y09 or 1Y10 is energized

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VI. RESOURCE ASSESSMENT TABLE

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RESOURCE CONDITIONS a. Charging pump is available b. Charging path is available	ACCEPTANCE CRITERIA 1. Pressurizer pressure less than the upper limits of
a. Charging pump is available b. Charging path is available	CRITERIA 1. Pressurizer pressure less
is available b. Charging path is available	
b. Charging path is available	Att. (1)
via normal flow path or SIS flow path	2. Pressurizer level greater than 30 inches
c. A charging source is available:	3. RCS subcooling is between 25°F and 140°F based on CET temperatures
• VCT • BAST • RWT	4. Reactor Vessel level above the top of the hot leg
d. A method of pressurizer pressure control is available:	
 Pressurizer heaters Main Spray Aux Spray Controlled Steaming 	
e. SIAS has NOT actuated OR has been reset	
a. PORV or Pressurizer Vent required to reduce pressure	1. Pressurizer pressure less than 2400 PSIA
b. PORV or Pressurizer Vent available to	2. Pressurizer pressure less than the upper limits of Att. (1)
c. Charging and letdown and/or SIS is available	3. RCS subcooling is betweer 25°F and 140°F based on CET temperatures
d. Once-Through-Cooling	4. Pressurizer level greater than 30 inches {90}
	5. Reactor Vessel level above the top of the hot leg
	 SIS flow path c. A charging source is available: VCT BAST RWT d. A method of pressurizer pressure control is available: Pressurizer heaters Main Spray Aux Spray Controlled Steaming e. SIAS has NOT actuated OR has been reset a. PORV or Pressurizer Vent required to reduce pressure b. PORV or Pressurizer Vent available to control pressure c. Charging and letdown and/or SIS is available to control pressurizer level

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VI. RESOURCE ASSESSMENT TABLE

RCS PRESSURE	SAFETY FUNCTION SUCCES	S PATH DETERMINATION
CONTROL (continued) SUCCESS PATH	RESOURCE CONDITIONS	ACCEPTANCE CRITERIA
PIC-3: Loss Of Vital AC	 a. A loss of ALL 4KV Vital Buses has occurred b. SIAS has NOT actuated OR has been reset a. SIAS has actuated OR SIS is able to be used to supply RCS makeup 	 Pressurizer pressure less than the upper limits of Att. (1) RCS subcooling greater than 25°F based on CET temperatures (1) OR CET temperatures less than 50°F superheated (1) Reactor Vessel level indicates the core is covered IF RAS has NOT occurred, AND pressurizer pressure is greater than 1270 PSIA, THEN at least ONE Charging Pump operating HPSI and LPSI Pumps are injecting water into the RCS PER Atts. (10) and (11) (2) (3 Reactor Vessel level indicates the core is covered
(2) Limits in Attachmare met.	Attachment (12) to read CETs. ents (10) and (11) are not required IOT required post-RAS.	to be met if SIS throttle criteria

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VI. RESOURCE A	SSESSMENT TABLE	Rev 29/Unit 1 Page 33 of 54
CORE AND RCS	SAFETY FUNCTION SUCCESS	PATH DETERMINATION
HEAT REMOVAL SUCCESS PATH	RESOURCE CONDITIONS	ACCEPTANCE CRITERIA
HR-1: S/G Heat Sink With NO SIS Operation	 a. At least ONE S/G level greater than (-)350 inches b. Feedwater is available: Main Feedwater AFW Booster Pump Injection c. SIAS has NOT actuated OR has been reset d. SIS operation NOT required 	 At least ONE S/G has level between (-)24 inches and (+)30 inches OR S/G level is being restored by feedwater flow IF RCPs are operating, THEN THOT minus Toolo is less than 10°F IF RCPs are NOT operating THEN THOT minus Toolo is less than 50°F RCS subcooling greater than 25°F based on CET temperatures (1) Reactor Vessel level above the top of the hot leg
(1) If needed, refer to a	Attachment (12) to read CETs.	
	(continue)	

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ORE AND RCS	SAFETY FUNCTION SUCCES	S PATH DETERMINATION
IEAT REMOVAL continued) SUCCESS PATH	RESOURCE CONDITIONS	ACCEPTANCE CRITERIA
Limits in Attachme are met.	a. At least ONE S/G level greater than (-)350 inches b. Feedwater is available: • Main Feedwater • AFW • Booster Pump Injection c. SIAS has actuated or SIS operation required SIS operation required Attachment (12) to read CETs. ents (10) and (11) are not required OT required post-RAS.	 At least ONE S/G has level between 0 inches and (+)38 inches OR S/G level is being restored by feedwater flow CET temperatures less than 50°F superheated (1) IF RAS has NOT occurred, AND pressurizer pressure is greater than 1270 PSIA, THEN at least ONE Charging Pump operating HPSI and LPSI Pumps are injecting water into the RCS PER Atts. (10) and (11) (2) (3) to be met if SIS throttle criteria

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VI. RESOURCE ASSESSMENT TABLE

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CORE AND RCS	SAFETY FUNCTION SUCCESS	PATH DETERMINATION
HEAT REMOVAL (continued) SUCCESS PATH	RESOURCE CONDITIONS	ACCEPTANCE CRITERIA
HR-3: Shutdown Cooling System	 a. CET temperatures less than 300°F b. Radiation levels are low enough to allow valve repositioning 	 CET temperatures less than 300°F and less than 50°F superheated (1) HPSI Pumps are injecting water into the RCS PER Att. (10) (2) Pressurizer pressure less than 270 PSIA {245} Reactor Vessel level indicates the core is covered
HR-4: Once-Through- Cooling	 a. HPSI pumps are available b. BOTH PORVs are available c. Flow path is available d. RWT is available as a makeup source 	 CET temperatures less than 50°F superheated (1) IF RAS has NOT occurred, AND HPSI throttle criteria are NOT met, THEN ALL available Charging Pumps operating HPSI and LPSI Pumps are injecting water into the RCS PER Atts. (10) and (11) (2) (3 Pressurizer pressure less than 1270 PSIA OR is lowering
	Attachment (12) to read CETs. hts (10) and (11) are not required t OT required post-RAS.	to be met if SIS throttle criteria

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VI. RESOURCE ASSESSMENT TABLE

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CONTAINMENT	SAFETY FUNCTION SUCCE	SS PATH DETERMINATION
ENVIRONMENT SUCCESS PATH	RESOURCE CONDITIONS	ACCEPTANCE CRITERIA
CE-1: NO CIS	a. Containment pressure less than 2.8 PSIG	1. Containment pressure less than 2.8 PSIG
	b. CIS has NOT actuated OR has been reset	2. Containment temperature less than 220°F (1)
	c. Containment radiation alarms are clear with NO unexplained rise (2)	3. Containment radiation alarms are clear with NO unexplained rise (2)
	1Y10 is de-energized.	
NOT applicable if	FOOS due to loss of power.	
z) NOT applicable f	FOOS due to loss of power.	
z) NOT applicab le f	FOOS due to loss of power.	
z) NOT applicab le f	FOOS due to loss of power.	
2) NOT applicable f	FOOS due to loss of power.	
2) NOT applicab le f	FOOS due to loss of power.	
z) NOT applicab le f	FOOS due to loss of power.	
z) NUT applicab le f	FOOS due to loss of power.	
z) NUT applicab le f	FOOS due to loss of power.	
(2) NOT applicable f	FOOS due to loss of power.	

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VI. RESOURCE ASSESSMENT TABLE

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CONTAINMENT ENVIRONMENT (continued) SUCCESS PATH	SAFETY FUNCTION SUCCESS PATH DETERMINATION		
	RESOURCE CONDITIONS	ACCEPTANCE CRITERIA	
CE-2: Containment Isolation	a. Containment pressure less than 4.25 PSIG	1. Containment pressure less than 4.25 PSIG	
	b. CSAS has NOT actuated OR has been reset	2. ALL available Containment Air Coolers are operating with maximum SRW flow	
		3. ALL containment penetrations required to be shut have an isolation valve shut	
		4. Hydrogen concentration less than 0.5% (1)	
		OR	
		ALL available hydrogen recombiners are energized with Hydrogen concentration less than 4.0% (1)	
		OR	
		Hydrogen purge operation per Tech Support recommendation (1)	
(1) Hydrogen concen been able to place	tration acceptance criteria may be e hydrogen monitors in service.	omitted until Chemistry has	
	(continue)		

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VI. RESOURCE ASSESSMENT TABLE

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CONTAINMENT ENVIRONMENT (continued) SUCCESS PATH	SAFETY FUNCTION SUCCESS PATH DETERMINATION		
	RESOURCE CONDITIONS	ACCEPTANCE CRITERIA	
CE-3:	Containment Spray	a. Containment pressure greater than 4.25 PSIG	1. Containment pressure less than 50 PSIG
			2. ALL available Containment Air Coolers are operating with maximum SRW flow
			3. Containment spray flow is greater than 1350 GPM per pump, if operating
			4. ALL containment penetrations required to be shut have an isolation valve shut
			5. Hydrogen concentration less than 0.5% (1)
			OR
			ALL available hydrogen recombiners are energized with Hydrogen concentration less than 4.0% (1)
			OR
			Hydrogen purge operation per Tech Support recommendation (1)
(1) Hy be	rdrogen concent en able to place	ration acceptance criteria may b hydrogen monitors in service.	be omitted until Chemistry has

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RADIATION	SAFETY FUNCTION SUCCESS PATH DETERMINATION	
LEVELS EXTERNAL TO CONTAINMENT SUCCESS PATH	RESOURCE CONDITIONS	ACCEPTANCE CRITERIA
	s a. Normal Radiation levels exist outside of containment b. Containment pressure less than 2.8 PSIG c. A loss of ALL Vital 4KV Buses may have occurred	 Noble Gas Monitor (1-RIC-5415) alarm clear with NO unexplained rise Condenser Off-Gas RMS (1-RI-1752) alarm clear with NO unexplained rise (1) S/G B/D RMS (1-RI-4014) alarm clear with NO unexplained rise (1) Main Vent Gaseous RMS (1-RI-5415) alarm clear with NO unexplained rise (1)
	(continue)	

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RADIATION	SAFETY FUNCTION SUCCESS PATH DETERMINATION	
RADIATION LEVELS EXTERNAL TO CONTAINMENT (continued) SUCCESS PATH	RESOURCE CONDITIONS	ACCEPTANCE CRITERIA
RLEC-2:Containment Isolated	a. Radiation detected outside containment OR Containment pressure greater than 2.8 PSIG	 ALL of the following alarms are clear with NO unexplained rise: Noble Gas Monitor (1-RIC-5415) Condenser Off-Gas R (1-RI-1752) S/G B/D RMS (1-RI-4014) Main Vent Gaseous R (1-RI-5415) OR ALL containment penetrations required to shut have an isolation v shut IF a tube rupture is identified in a S/G, ALL release paths fro the affected S/G to the environment are isolar Affected S/G pressure less than 920 PSIA

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		Page 41 of t
VII. SAFETY FUNC	TION STATUS CHECK	
A. The STA (or perso status checks.	n designated by the CRS) will perfor	m the safety function
B. Perform safety fun stabilize.	ction status checks at 15 minute inte	ervals until plant conditions
C. Notify the Control F upon discovery.	Room Supervisor if any safety functi	on is not being met, promptly
REACTIVITY	SAFETY FUNCTION ACCEPTANCE CRITERIA	
CONTROL SUCCESS PATH	ACCEPTANCE CRITERIA	STATUS CHECK
RC-1: CEA Insertion	a. NO more than ONE CEA NOT fully inserted, WRNI power is lowering, and SUR is negative	
	OR	
	b. WRNI power below 10-4% and SUR is negative or zero	
RC-2: Boration Using CVCS	a. Boration rate greater than or equal to 40 GPM, WRNI power is lowering, and SUR is negative	<u></u>
	OR	
	 WRNI power below 10-4% and SUR is negative or zero 	
RC-3: Boration Using SIS	a. Boration rate greater than or equal to 40 GPM, WRNI power is lowering, and SUR is negative	
	OR	
	 WRNI power below 10⁻⁴% and SUR is negative or 	

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VII. SAFETY FUNCTION STATUS CHECK

SAFETY FUNCTION ACCEPTANCE CRITERIA VITAL AUXILIARIES ACCEPTANCE **STATUS** SUCCESS PATH CRITERIA CHECK VA-1: 500KV Offsite a. At least ONE 4KV vital Power bus is energized b. 11, 12, 21 and 22 125V DC Buses, ALL greater than 105 volts c. At least THREE 120V AC Vital Buses are energized: • 11 • 12 • 13 • 14 d. EITHER 1Y09 or 1Y10 is energized VA-2: Diesel a. At least ONE 4KV vital Generators bus is energized b. 11, 12, 21 and 22 125V DC Buses, ALL greater than 105 volts c. At least THREE 120V AC Vital Buses are energized: • 11 • 12 • 13 • 14 d. EITHER 1Y09 or 1Y10 is energized (continue)

VII. SAFETT FUN	ICTION STATUS CHECK	
VITAL	SAFETY FUNCTION ACCEPTANCE CRITERIA	
AUXILIARIES (continued) SUCCESS PATH	ACCEPTANCE CRITERIA	STATUS CHECK
VA-3: SMECO	a. At least ONE 4KV vital bus is energized	
	b. 11, 12, 21 and 22 125V DC Buses, ALL greater than 105 volts	
	c. At least THREE 120V AC Vital Buses are energized:	
	• 11 • 12 • 13 • 14	
	d. EITHER 1Y09 or 1Y10 is energized	

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VII. SAFETY FUN	CTION STATUS CHECK	EOP-8 Rev 29/Unit 1 Page 44 of 54	
RCS PRESSURE	SAFETY FUNCTION ACCEPTANCE CRITERIA		
AND INVENTORY CONTROL			
SUCCESS PATH	ACCEPTANCE CRITERIA	STATUS CHECK	
PIC-1: CVCS	a. Pressurizer pressure less than the upper limits of Att. (1)		
	b. Pressurizer level greater than 30 inches		
	c. RCS subcooling is between 25°F and 140°F based on CET temperatures	<u></u>	
	d. Reactor Vessel level above the top of the hot leg		
PIC-2: PORVs or Pressurizer Vent	a. Pressurizer pressure less than 2400 PSIA		
VEIII	b. Pressurizer pressure less than the upper limits of Att. (1)		
,	c. RCS subcooling is between 25°F and 140°F based on CET temperatures		
	d. Pressurizer level greater than 30 inches (90)		
	e. Reactor Vessel level above the top of the hot leg		
	(continue)		

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RCS PRESSURE	SAFETY FUNCTION ACCEPTANCE CRITERIA	
AND INVENTORY CONTROL (continued) SUCCESS PATH	ACCEPTANCE CRITERIA	STATUS CHECK
PIC-3: Loss Of Vital AC	a. Pressurizer pressure less than the upper limits of Att. (1)	
	 b. RCS subcooling greater than 25°F based on CET temperatures (1) 	
	OR	
	CET temperatures less than 50°F superheated (1)	
	c. Reactor Vessel level indicates the core is covered	
PIC-4: SIS	a. IF RAS has NOT occurred, AND pressurizer pressure is greater than 1270 PSIA, THEN at least ONE Charging Pump operating	<u></u>
	 b. HPSI and LPSI Pumps are injecting water into the RCS PER Atts. (10) and (11) (2) (3) 	
	c. Reactor Vessel level indicates the core is covered	

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RE AND RCS	SAFETY FUNCTION ACCEPTANC	E CRITERIA
AT REMOVAL CCESS PATH	ACCEPTANCE CRITERIA	STATUS CHECK
1: SG Heat Sink With NO SIS Operation	a. At least ONE S/G has level between (-)24 inches and (+)30 inches	
	OR	
	S/G level is being restored by feedwater flow	<u></u>
	 b. IF RCPs are operating, THEN Τ_{HOT} minus T_{COLD} is less than 10°F 	
	c. IF RCPs are NOT operating, THEN Τιώτ minus Τοωο is less than 50°F	
	d. RCS subcooling greater than 25°F based on CET temperatures (1)	
	e. Reactor Vessel level above the top of the hot leg	
needed, refer to	Attachment (12) to read CETs.	
	(continue)	

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VII. SAFETY FUNC	CTION STATUS CHECK		
CORE AND RCS	SAFETY FUNCTION ACCEPTANCE CRITERIA		
HEAT REMOVAL (continued) SUCCESS PATH	ACCEPTANCE CRITERIA	STATUS CHECK	
HR-2: SG Heat Sink With SIS Operation	a. At least ONE S/G has level between 0 inches and (+)38 inches		
	OR		
	S/G level is being restored by feedwater flow		
	b. CET temperatures less than 50°F superheated (1)	<u></u>	
	c. IF RAS has NOT occurred, AND pressurizer pressure is greater than 1270 PSIA, THEN at least ONE Charging Pump operating		
	d. HPSI and LPSI Pumps are injecting water into the RCS PER Atts. (10) and (11) (2) (3)		
(2) Limits in Attachme are met.	Attachment (12) to read CETs. nts (10) and (11) are not required to b IOT required post-RAS.	e met if SIS throttle criteria	
	(continue)		

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CORE AND RCS	SAFETY FUNCTION ACCEPTANCE CRITERIA	
HEAT REMOVAL continued) SUCCESS PATH	ACCEPTANCE CRITERIA	STATUS CHECK
IR-3: Shutdown Cooling System	a. CET temperatures less than 300°F and less than 50°F superheated (1)	
	 b. HPSI Pumps are injecting water into the RCS PER Att. (10) (2) 	
	c. Pressurizer pressure less than 270 PSIA {245}	
	d. Reactor Vessel level indicates the core is covered	
HR-4: Once-Through- Cooling	a. CET temperatures less than 50°F superheated (1)	<u> </u>
	b. IF RAS has NOT occurred, AND HPSI throttle criteria are NOT met, THEN ALL available Charging Pumps operating	
	c. HPSI and LPSI Pumps are injecting water into the RCS PER Atts. (10) and (11) (2) (3)	
	d. Pressurizer pressure less than 1270 PSIA OR is lowering	<u></u>

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VII. SAFETY FUN	ICTION STATUS CHECK	
CONTAINMENT	SAFETY FUNCTION ACCEPTANCE CRITERIA	
ENVIRONMENT SUCCESS PATH	ACCEPTANCE CRITERIA	STATUS CHECK
CE-1: NO CIS	a. Containment pressure less than 2.8 PSIG	
	 b. Containment temperature less than 220°F (1) 	
	c. Containment radiation alarms are clear with NO unexplained rise (2)	
	(continue)	

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EOP-8 Rev 29/Unit 1 Page 50 of 54 **VII. SAFETY FUNCTION STATUS CHECK** SAFETY FUNCTION ACCEPTANCE CRITERIA CONTAINMENT ENVIRONMENT ACCEPTANCE **STATUS** (continued) SUCCESS PATH CRITERIA CHECK **CE-2:** Containment a. Containment pressure Isolation less than 4.25 PSIG b. ALL available Containment Air Coolers are operating with maximum SRW flow c. ALL containment penetrations required to be shut have an isolation valve shut d. Hydrogen concentration less than 0.5% (1) OR ALL available hydrogen recombiners are energized with Hydrogen concentration less than 4.0% (1) OR Hydrogen purge operation per Tech Support recommendation (1) (1) Hydrogen concentration acceptance criteria may be omitted until Chemistry has been able to place hydrogen monitors in service. (continue)

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CONTAINING	SAFETY FUNCTION ACCEPTANCE CRITERIA				
CONTAINMENT ENVIRONMENT (continued) SUCCESS PATH	ACCEPTANCE CRITERIA	STATUS CHECK			
CE-3: Containment Spray	a. Containment pressure less than 50 PSIG				
	 ALL available Containment Air Coolers are operating with maximum SRW flow 	<u> </u>			
	c. Containment spray flow is greater than 1350 GPM per pump, if operating				
	d. ALL containment penetrations required to be shut have an isolation valve shut				
	e. Hydrogen concentration less than 0.5% (1)				
	OR				
	ALL available hydrogen recombiners are energized with Hydrogen concentration less than 4.0% (1)				
	OR				
	Hydrogen purge operation per Tech Support recommendation (1)				
(1) Hydrogen concent been able to place	tration acceptance criteria may be omit hydrogen monitors in service.	ted until Chemistry has			

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VII. SAFETY FUNC	TION STATUS CHECK			
RADIATION	SAFETY FUNCTION ACCEPTANCE CRITERIA			
LEVELS EXTERNAL TO CONTAINMENT				
SUCCESS PATH	ACCEPTANCE CRITERIA	STATUS CHECK		
RLEC-1:Normal Levels	a. Noble Gas Monitor (1-RIC-5415) alarm clear with NO unexplained rise	<u></u>		
	b. Condenser Off-Gas RMS (1-RI-1752) alarm clear with NO unexplained rise (1)			
	c. S/G B/D RMS (1-RI-4014) alarm clear with NO unexplained rise (1)			
	d. Main Vent Gaseous RMS (1-RI-5415) alarm clear with NO unexplained rise (1)			
(1) NOT applicable if O	OS due to loss of power.			

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VII SAFFTY FUNC	TION STATUS CHECK	EOP-8 Rev 29/Unit 1 Page 53 of 54		
RADIATION	SAFETY FUNCTION ACCEPTANCE CRITERIA			
LEVELS EXTERNAL TO CONTAINMENT (continued) SUCCESS PATH	ACCEPTANCE CRITERIA	STATUS CHECK		
RLEC-2:Containment Isolated	a. ALL of the following alarms are clear with NO unexplained rise:	*, *, *, *, *** * **********		
	 Noble Gas Monitor (1-RIC-5415) Condenser Off-Gas RMS (1-RI-1752) S/G B/D RMS (1-RI-4014) Main Vent Gaseous RMS (1-RI-5415) 			
	OR			
	 ALL containment penetrations required to be shut have an isolation valve shut 			
	IF a tube rupture is identified in a S/G:			
	 ALL release paths from the affected S/G to the environment are isolated 			
	 Affected S/G pressure less than 920 PSIA 			
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VII. SAFETY FUNCTION STATUS CHECK

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	PLACE FUNCTIONAL RE		,	
INITIAL ENTRY • PERFORM THE RCP TRIP STRATEGY • MONITOR SIG ACTIVITY AND CONTAINMENT HYDROGEN LEVELS • IDENTEY ALL SUCCESS PATHS • DETERMINE IF ACCEPTANCE CRITERIA ARE MET		RECOVER • RECOVERY ACTIO • Safety Functions I EOP-8 Acceptance • Safety Functions I AND Safety Funct an Optimal Recow • ALL remaining Sa • IMPLEMENT LONG	ON PRIORI NOT meetin Criteria NOT met in ions NOT n ery Procedu fety Functio	FY g their EOP-0, net in ure ons
START			DONE	PAGE
	A. DETERMINE APPROPRIATE E RESPONSE ACTIONS PER TH		c	8
	B. OBTAIN FUNCTIONAL RECOVERY ENTRY PLACEKEEPER AND RECORD TIME. C. PERFORM THE RCP TRIP STRATEGY. C.			8
			c	9
	D. MONITOR S/G ACTIVITY AND HYDROGEN LEVELS.		<u> </u>	.9
	E. DETERMINE STATUS OF SAF (STA).	ETY FUNCTIONS	с	10
	F. PERFORM RECOVERY ACTIO	NS.	С	10
	Identify success paths AND determine if the Accept for ALL Safety Functions Exit the Optimal Recovery A following priority Safety Functions NOT n EOP-B Acceptance Crit Safety Functions NOT n AND Safety Functions NOT n AND Safety Functions Recovery Procedure ALL remaining Safety F WHEN the Recovery Action AND be Acceptance Critic	Procedure ctions with the aria net in EOP-0, NOT met in an Optimal functions s are being performed		10 10 11
	AND the Acceptance Criteri Function is satisfied, THEN PROCEED to Section ACTIONS	· · · · · ·	. ** 1**	

NOTE: Continuously applicable steps are designated with a "C" in the DONE column.

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LONG TERM ACTIONS

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START	FUNCTION	DONE	PAGE
	A. DETERMINE PLANT STATUS.	C	13
	B. ATTEMPT TO DETERMINE SPECIFIC EVENT.	C	13
	 IF a specific event can be identified, THEN entry into the Optimal Recovery Procedure may be made. 		13
	C. IF 500KV OFFSITE POWER WAS LOST, THEN ATTEMPT TO RESTORE POWER TO PLANT LOADS.	c	14
	Tie MCC-104 and 114 Restore power to MCC-101AT and 101BT		15 19
	D. DETERMINE IF RCS COOLDOWN SHOULD CONTINUE.	с	24
	E. ENSURE EQUIPMENT AVAILABILITY AND PLANT CONDITIONS TO SUPPORT RCS COOLDOWN.	с	25
	F. PERFORM PLANT COOLDOWN.		26
	 IF RCS activity will NOT result in unacceptable radiological consequences outside containment, AND CET temperatures are less than 300°F, THEN evaluate initiating Shutdown Cooling PER HR-3 SHUTDOWN COOLING SYSTEM. 		26
	G. IMPLEMENT THE APPROPRIATE PROCEDURE	+	27

NOTE: Continuously applicable steps are designated with a "C" in the DONE column.

RESOURCE ASSESSMENT

RC-1	VA-1	PIC-1	HR-1	CE-1	RLEC-1
RC-2	VA-2	PIC-2	HR-2	CE-2	RLEC-2
RC-3	VA-3	PIC-3	HR-3	CE-3	
		PIC-4	HR-4		

		EOP Rev 29/Unit Page 1 of 1
PENDIX (1) REACTIVITY CONTR	OL	
-1: CEA INSERTION		
RECOVERY ACTIONS	ALTERNATE ACTIONS	
MAINTAIN RCS TEMPERATURE.		
IF EITHER of the following conditions exist:		
WRNI Power greater than 10-4%		
SUR is positive		
THEN maintain RCS temperature constant.		
	C-1: CEA INSERTION <u>RECOVERY ACTIONS</u> MAINTAIN RCS TEMPERATURE. IF EITHER of the following conditions exist: • WRNI Power greater than 10 ⁻⁴ % • SUR is positive THEN maintain RCS temperature	RECOVERY ACTIONS ALTERNATE ACTIONS MAINTAIN RCS TEMPERATURE. If EITHER of the following conditions exist: • WRNI Power greater than 10 ⁻⁴ % · · · · · · · · · · · · · · · · · · ·

	EOP-8 Rev 29/Unit 1
	Page 2 of 14
APPENDIX (1) REACTIVITY CONTR	
RC-1: CEA INSERTION	
RECOVERY ACTIONS	ALTERNATE ACTIONS
B. ESTABLISH REACTIVITY CONTROL BY CEA INSERTION.	
 Ensure the Reactor has tripped by performing ANY of the following: 	
 Depress the four local Emergency Trip Buttons on the Trip Circuit Breakers in the Unit 1 Cable Spreading Room 	
 Depress ONE set of Manual Reactor Trip Buttons 	
 De-energize the CEDM Motor Generator Sets as follows: 	
Open 12A 480V BUS FDR	
Open 12A-12B 480V BUS TIE	
Open 13A 480V BUS FDR	
Open 13A-13B 480V BUS TIE	
<u>NOTE</u> When re-energizing 12A and 13A 480V Buses, the breaker lineup should be returned to that existing prior to the trip.	
Energize 12A and 13A 480V Buses as follows:	
a. Energize 12A 480V Bus by closing its normal feeder breaker OR its tie breaker.	
 Energize 13A 480V Bus by closing its normal feeder breaker OR its tie breaker. 	
(continue)	

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	Page 3 of 14
APPENDIX (1) REACTIVITY CONTR	OL
RC-1: CEA INSERTION	
RECOVERY ACTIONS	ALTERNATE ACTIONS
B. (continued)	
2. Check NO more than ONE CEA NOT fully inserted.	2.1 IF ALL CEA indications are lost, THEN perform the following actions:
	a. Ensure WRNI Power lowering and SUR is negative OR WRNI Power below 10 ⁻⁴ % and SUR is negative or zero.
	 WHEN at least ONE Vital 4KV Bus has been restored, THEN establish reactivity control as follows:
	(1) Sample the RCS to determine boron concentration.
	(2) Determine if RCS boration is required PER the NEOPs.
	(3) IF RCS boration is required, THEN borate the RCS to achieve the required shutdown margin PER the selected Core and RCS Heat Removal success path.
	2.2 IF more than ONE CEA fails to fully insert,
	THEN PROCEED to RC-2, <u>BORATION</u> USING CVCS, OR RC-3, <u>BORATION</u> USING SIS.

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APPENDIX (1) REACTIVITY CONTR	OL
RC-1: CEA INSERTION	
RECOVERY ACTIONS	ALTERNATE ACTIONS
C. ACCEPTANCE CRITERIA FOR SUCCESS PATH RC-1.	
 Check Reactivity Control has been established by EITHER of the following indications: NO more than ONE CEA NOT fully inserted, WRNI power is lowering and SUR is negative. OR 	1.1 IF Reactivity Control has NOT been established, THEN PROCEED to the next appropriate Reactivity Control Success Path.
 WRNI power below 10⁻⁴% and SUR is negative or zero 	
 WHEN Reactivity Control has been established, THEN PROCEED to the next Safety Function to be performed. 	

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APPENDIX (1) REACTIVITY CONTROL				
RC-2: BORATION USING CVCS				
RECOVERY ACTIONS	ALTERNATE ACTIONS			
A. MAINTAIN RCS TEMPERATURE.	· · · · · · · · · · · · · · · · · · ·			
1. IF EITHER of the following conditions exist:				
WRNI Power greater than 10-4%				
SUR is positive				
THEN maintain RCS temperature constant.				
B. ESTABLISH REACTIVITY CONTROL BY BORATION USING CVCS.				
1. Commence boration by performing the following:				
 a. Verify the normal charging flowpath is available for RCS makeup with at least ONE LOOP CHG valve open: 1-CVC-518-CV 1-CVC-519-CV 	 a.1 IF the normal charging path is NOT available, THEN establish charging flowpath to the RCS via the AUX HPSI HDR as follows: (1) Shut HPSI AUX HDR ISOL valve, 1-SI-656-MOV. (2) Open ONE of the AUX HPSI HDR valves: 1-SI-617-MOV 1-SI-627-MOV 1-SI-637-MOV 1-SI-647-MOV (3) Open SI TO CHG HDR valve, 1-CVC-269-MOV. (4) Shut REGEN HX CHG INLET valve, 1-CVC-183, located in the 27 ft 			
(continue)	West Penetration Room. (continue)			

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APPENDIX (1) REACTIVITY CONTROL RC-2: BORATION USING CVCS

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.1.a (continued)	B.1.a.1 (continued)
	(5) Shut L/D CNTMT ISOL valves:
	 1-CVC-515-CV 1-CVC-516-CV
	a.2 IF a charging flowpath can NOT be established via the AUX HPSI HDR, THEN perform the following:
	(1) Verify REGEN HX CHG INLET valve, 1-CVC-183, is open.
	(2) Charge through the Loop Charging valves Bypass Valve, 1-CVC-188.
 b. Commence RCS boration from the BAST using the CVCS as follows: 	b.1 IF BAST is NOT available, THEN align charging pumps to take a suction from the RWT as follows:
(1) Ensure BAST levels remain greater than 10 inches.	(1) Ensure RWT level is greater than 2 feet.
(2) Shut VCT M/U valve, 1-CVC-512-CV.	(2) Open RWT CHG PP SUCT valve, 1-CVC-504-MOV.
(3) Open BA DIRECT M/U valve, 1-CVC-514-MOV.	(3) Shut VCT OUT valve, 1-CVC-501-MOV.
(4) Open BAST GRAVITY FD valves:	(4) Start ALL available CHG PPs.
 1-CVC-508-MOV 1-CVC-509-MOV 	(5) Ensure CHG HDR PRESS is greater than RCS pressure.
(5) Verify the M/U MODE SEL SW, 1-HS-210, is in MANUAL.	
(6) Start ALL available BA PPs.	
(7) Shut VCT OUT valve, 1-CVC-501-MOV.	
(8) Start ALL available CHG PPs.	
(9) Ensure CHG HDR PRESS is greater than RCS pressure.	
(continue)	

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APPENDIX (1) REACTIVITY CONTROL RC-2: BORATION USING CVCS RECOVERY ACTIONS ALTERNATE ACTIONS B.1 (continued) c. IF more than ONE CEA failed to fully insert. THEN borate the RCS to at least 2300 ppm. d. WHEN boration is complete AND WRNI power is less than 10-4% and SUR is negative or zero, THEN secure boration as follows: (1) IF boration was from the BASTs, THEN perform the following actions: (a) Open VCT OUT valve, 1-CVC-501-MOV. (b) Stop the BA PP(s). (c) Shut BA DIRECT MU valve, 1-CVC-514-MOV. (d) Shut BAST GRAVITY FD valves: 1-CVC-508-MOV 1-CVC-509-MOV (2) IF boration was from a RWT. THEN perform the following actions: (a) Open VCT OUT valve, 1-CVC-501-MOV. (b) Shut RWT CHG PP SUCT valve, 1-CVC-504-MOV. (3) Return makeup to the VCT PER OI-2B, BORATION, DILUTION AND MAKEUP. 2. Ensure boric acid concentration in makeup water is adequate to maintain required shutdown margin.

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RC-2: BORATION USING CVCS	
RECOVERY ACTIONS	ALTERNATE ACTIONS
C. ACCEPTANCE CRITERIA FOR SUCCESS PATH RC-2.	
 Check Reactivity Control has been established by EITHER of the following indications: Boration rate greater than or equal to 40 GPM, WRNI power is lowering and SUR is negative WRNI power below 10⁻⁴% and SUR is negative or zero WHEN Reactivity Control has been established, THEN PROCEED to the next Safety Function to be performed. 	1.1 IF Reactivity Control has NOT been established, THEN PROCEED to the next appropriate Reactivity Control Success Path.

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APPENDIX (1) REACTIVITY CONTROL	OL
RC-3: BORATION USING SIS	
RECOVERY ACTIONS	ALTERNATE ACTIONS
A. MAINTAIN RCS TEMPERATURE.	
1. IF EITHER of the following conditions exist:	
WRNI Power greater than 10-4%	
SUR is positive	
THEN maintain RCS temperature constant.	
B. ESTABLISH REACTIVITY CONTROL BY BORATION USING SIS.	
 IF pressurizer pressure is less than or equal to 1725 PSIA as a result of the event OR containment pressure is greater than or equal to 2.8 PSIG, THEN verify SIAS actuation. 	
2. IF SIAS has NOT actuated, THEN establish HPSI flow by performing the following actions:	
a. Open MAIN and AUX HPSI HDR valves:	
MAIN • 1-SI-616-MOV • 1-SI-626-MOV • 1-SI-636-MOV • 1-SI-646-MOV	
AUX • 1-SI-617-MOV • 1-SI-627-MOV • 1-SI-637-MOV • 1-SI-647-MOV	
(continue)	

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APPENDIX (1) REACTIVITY CONTROL RC-3: BORATION USING SIS RECOVERY ACTIONS ALTERNATE ACTIONS B.2 (continued) b. Start 11 and 13 HPSI PPs. c. WHEN the "PZR PRESS BLOCK A PERMITTED* alarm is received, THEN block SIAS A. d. WHEN the "PZR PRESS BLOCK B PERMITTED^{*} alarm is received, THEN block SIAS B. e. WHEN pressure is below 1270 PSIA, THEN verify appropriate HPSI flow PER ATTACHMENT(10), HIGH PRESSURE SAFETY INJECTION FLOW. 3. IF SIAS has actuated, THEN perform the following actions: a. Verify the following pumps are running: 11 HPSI PP 13 HPSI PP (continue)

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APPENDIX (1) REACTIVITY CONTR	OL
RC-3: BORATION USING SIS	
RECOVERY ACTIONS	ALTERNATE ACTIONS
B.3 (continued)	
 b. Verify safety injection flow: HPSI flow PER 	b.1 Perform the following actions as necessary:
ATTACHMENT(10), <u>HIGH</u> <u>PRESSURE SAFETY INJECTION</u> <u>FLOW</u> , when pressure is below 1270 PSIA	<u>CAUTION</u> Operation of two HPSI Pumps on 14 4KV Bus may cause 1B DG loading to exceed 3600 KW.
	• IF 11 HPSI PP failed, THEN perform the following actions:
	 (1) IF 1B DG is powering 14 4KV Bus, THEN verify DG load is less than 2960 KW.
	(2) Start 12 HPSI PP.
	IF 13 HPSI PP failed, THEN align 12 HPSI PP as follows:
	(1) Start 12 HPSI PP.
	(2) Open HPSI HDR XCONN valve, 1-SI-653-MOV.
	(3) Shut HPSI HDR XCONN valve, 1-SI-655-MOV.
	 Ensure electrical power is available to valves and pumps.
	 Verify safety injection system lineup PER ATTACHMENT (2), <u>SIAS</u> <u>VERIFICATION CHECKLIST</u>.
(continue)	

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RCS pressure is preventing ate SIS flow, attempt to depressurize the RCS ain adequate SIS flow by rrently performing actions PER the ng:
RCS pressure is preventing ate SIS flow, attempt to depressurize the RCS ain adequate SIS flow by rrently performing actions PER the
RCS pressure is preventing ate SIS flow, attempt to depressurize the RCS ain adequate SIS flow by rrently performing actions PER the
ate SIS flow, attempt to depressurize the RCS ain adequate SIS flow by rrently performing actions PER the
ate SIS flow, attempt to depressurize the RCS ain adequate SIS flow by rrently performing actions PER the
S Pressure And Inventory Control ccess paths as necessary e selected Core And RCS Heat moval success path

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APPENDIX (1) REACTIVITY CONTROL RC-3: BORATION USING SIS RECOVERY ACTIONS ALTERNATE ACTIONS B.5 (continued) Reactor Vessel level above the top of the hot leg THEN HPSI flow may be reduced by throttling the HPSI HDR valves, or stopping the HPSI PPs one at a time, as desired, to maintain the following: RCS subcooling between 25 and . 140° F based on CET temperatures Pressurizer level between 101 inches {141} and 180 inches {190} 6. IF the HPSI throttle criteria can NOT be maintained after the pumps are throttled OR secured, THEN restart the appropriate pumps AND restore full flow.

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PPENDIX (1) REACTIVITY CONTR C-3: BORATION USING SIS	OL
RECOVERY ACTIONS	ALTERNATE ACTIONS
ACCEPTANCE CRITERIA FOR SUCCESS PATH RC-3.	
Check Reactivity Control has been established by EITHER of the following indications: • Boration rate greater than or equal to do GPM, WRNI power is lowering and sur is negative. OR • WRNI power below 10-4% and SUR is negative or zero	 IF Reactivity Control has NOT been established, THEN perform the following actions: Concurrently perform the Recovery Actions for the next safety function in jeopardy while continuing efforts to establish reactivity control. Energize or restore other vital auxiliaries or components necessary to support the reactivity control success paths. Attempt manual operation of inoperative valves. IF high RCS pressure is preventing adequate SIS flow, THEN attempt to depressurize the RCS to obtain adequate SIS flow by concurrently performing actions PER the following:
WHEN Reactivity Control has been established, THEN PROCEED to the next Safety Function to be performed.	

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REACTIVITY CONTROL PLACEKEEPER RC-1: ÇEA INSERTION

RESOURCE CONDITIONS • CEAs are able to be inserted and SUR is negative	•	ACCEPTANCE CRITERIA NO more than ONE CEA NOT fully inserted, and WRNI power is lowering
OR • A loss of ALL Vital 4KV Buses may have occurred		

START	FUNCTION	DONE	PAGE
	A. MAINTAIN RCS TEMPERATURE.		1
	IF EITHER of the following conditions exist: WRNI Power greater than 10 ^{-4%} SUR is positive THEN maintain RCS temperature constant.		1
	B. ESTABLISH REACTIVITY CONTROL BY CEA INSERTION.		2
	Check NO more than ONE CEA NOT fully inserted		3
	C. ACCEPTANCE CRITERIA FOR SUCCESS PATH RC-1		4
	IF Reactivity Control has NOT been established, THEN PROCEED to the next appropriate Reactivity Control Success Path.		4

NOTE: Continuously applicable steps are designated with a "C" in the DONE column.

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REACTIVITY CONTROL PLACEKEEPER RC-2: BORATION USING CVCS

RESOURCE CONDITIONS	ACCEPTANCE CRITERIA
Charging pump is available for boron	 Boration rate greater than or equal to
addition	40 GPM, WRNI power is lowering, and
 Boric acid source is available: 	SUR is negative
BAST	OR
• RWT	 WRNI power below 10⁴% and SUR is
 Charging path is available via normal 	negative or zero
flow path or SIS flow path	

START	FUNCTION	DONE	PAGE
	A. MAINTAIN RCS TEMPERATURE.		5
	 IF EITHER of the following conditions exist: WRNI Power greater than 10^{-4%} SUR is positive THEN maintain RCS temperature constant. 		5
	B. ESTABLISH REACTIVITY CONTROL BY BORATION USING CVCS.		5
	Commence boration]	5
	C. ACCEPTANCE CRITERIA FOR SUCCESS PATH RC-2		8
	IF Reactivity Control has NOT been established, THEN PROCEED to the next appropriate Reactivity Control Success Path.		8

NOTE: Continuously applicable steps are designated with a "C" in the DONE column

	Y CONTROL PLACEKEEPER BORATION USING SIS		EOP- ev 29 / Unit Page 3 of	
HPSI pump is available for bord addition	RWT is available as boric acid source SUR is negative		than or equal to er is lowering, and	
START FUNCTION		DONE	PAGE	
A. MAINTAIN RCS TEI	MPERATURE.	1	9	
IF EITHER of the WRNI Powe SUR is posit THEN maintain	e following conditions exist: r greater than 10 ^{4%} ive RCS temperature constant.		9	
B. ESTABLISH REACT USING SIS.	IVITY CONTROL BY BORATION	c	9	
	e is less than 1725 PSIA, pressure is greater than S actuation.		9	
	tion and block SIAS.		9	
THEN attempt to RCS Pressu paths as new	I Core And RCS Heat Removal		12	
C. ACCEPTANCE CRI	TERIA FOR SUCCESS PATH RC-3		14	
THEN perform ti Concurrently for the next Restore oth Attempt marvalves IF high RCS flow, THEN attem Determine ti	htrol has NOT been established, ne following actions: y perform the Recovery actions safety function in jeopardy er vital auxiliaries or components nual operation of inoperative pressure prevents SIS injection pt to lower plant pressure to appropriate emergency tions PER the ERPIP		14	

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NOTE: Continuously applicable steps are designated with a "C" in the DONE column

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RECOVERY ACTIONS	ALTERNATE ACTIONS
IF 500KV OFFSITE POWER HAS BEEN LOST, THEN ALIGN THE ELECTRICAL SYSTEM FOR POWER RESTORATION.	
 IF 11 13KV Service Bus is NOT energized, THEN ensure the following 13KV breakers are open: 11 SERV BUS 13KV FDR, 252-1104 11 SERV BUS TIE, 252-1105 U-4000-12 13KV FDR, 252-1103 U-4000-11 13KV FDR, 252-1102 U-4000-13 13KV FDR, 252-1101 Locally at the U-1 13KV SWGR House, SITE POWER FDR BREAKER (to 0X03), 252-1106 	
 IF 21 13KV Service Bus is NOT energized, THEN ensure the following 13KV breakers are open: 21 SERV BUS 13KV FDR, 252-2104 21 SERV BUS TIE, 252-2105 U-4000-21 13KV FDR, 252-2102 U-4000-22 13KV FDR, 252-2103 U-4000-23 13KV FDR, 252-2101 Locally at the U-2 13KV SWGR House, SITE POWER FDR BREAKER (to 0X04), 252-2106 	
(continue)	

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APPENDIX (2) VITAL AUXILIARIES VA-1: 500KV OFFSITE POWER **RECOVERY ACTIONS ALTERNATE ACTIONS** A. (continued) 3. IF 11 4KV Vital Bus is NOT energized, THEN perform the following actions: Ensure the following 4KV breakers are open: 11 4KV BUS NORMAL FDR. • 152-1115 11 4KV BUS ALT FDR, 152-1101 SWYD 4KV SERV XFMR FDR. 152-1113 CAUTION Handswitches should NOT be placed in PULL TO LOCK while performing breaker position verification. Verify the following 4KV Vital Bus load • breakers are open: No. 11 Low Press Safety Inj. Pump, 152-1104 No. 11 Salt Water Pump, 152-1105 No. 11 Containment Spray Pump, 152-1107 No. 11 High Press Safety Inj. Pump, 152-1108 • No. 13 High Press Safety Inj. Pump, 152-1110 No. 13 Service Water Pump, 152-1111 No. 13 Salt Water Pump, ٠ 152-1112 (continue)



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	RECOVERY ACTIONS	ALTERNATE ACTIONS	
A.3 (continued)			
•	AFW PP No. 13, 152-1116		
SE	ce the 11 4KV BUS LOCI/SD QUENCER MANUAL INITIATE /switch in ON		
	KV Vital Bus is NOT energized, perform the following actions:		
 Ensope 	sure the following 4KV breakers are en:		
٠	14 4KV BUS NORMAL FDR, 152-1414		
•	14 4KV BUS ALT FDR, 152-1401		
PULL TO	<u>CAUTION</u> ches should NOT be placed in LOCK while performing breaker erification.		
	rify the following 4KV Vital Bus load akers are open:		
•	No. 12 Low Press Safety Inj. Pump, 152-1404		
•	No. 12 Salt Water Pump, 152-1405		
•	No. 12 Containment Spray Pump, 152-1407		
•	No. 12 High Press Safety Inj. Pump, 152-1408		
•	No. 13 High Press Safety Inj. Pump, 152-1410		
	No. 13 Service Water Pump,		
•	152-1411		

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APPENDIX (2) VITAL AUXILIARIES VA-1: 500KV OFFSITE POWER **RECOVERY ACTIONS ALTERNATE ACTIONS** A.4 (continued) No. 13 Salt Water Pump, 152-1412 Place the 14 4KV BUS LOCI/SD SEQUENCER MANUAL INITIATE keyswitch in ON CAUTION The following step provides actions to prevent water hammer damage from CAC voiding. CAUTION SRW Pumps start when power is restored to the associated 4KV Bus. 5. IF CSAS has actuated. AND EITHER SRW Header is NOT in operation, THEN perform the following actions: a.1 IF Containment Pressure exceeded a. IF 11 SRW Header is idle. THEN restart 11 SRW Header as 25 PSIG. follows: THEN perform the following actions: (1) Check that Containment Pressure (1) Place the SRW PP(s) aligned to 11 SRW Header in PULL TO LOCK. has remained less than 25 PSIG with 11 SRW Header idle. (2) Consult with the Plant Technical (2) Attempt to start the desired SRW Support Center for guidance on PP on 11 SRW Header. system restoration. (continue)

-	EOP- Rev 31/Unit Page 5 of 6			
APPENDIX (2) VITAL AUXILIARIES				
VA-1: 500KV OFFSITE POWER				
RECOVERY ACTIONS	ALTERNATE ACTIONS			
A.5 (continued)				
 b. IF 12 SRW Header is idle, THEN restart 12 SRW Header as follows: 	b.1 IF Containment Pressure exceeded 10 PSIG, THEN perform the following actions:			
(1) Check that Containment Pressure has remained less than 10 PSIG with 12 SRW Header idle.	CAUTION 1B DG SRW flow is less than SRW PP			
(2) Attempt to start the desired SRW PP on 12 SRW Header.	minimum flow requirements. This step permits restoration of SRW to supply 1B DG.			
	<u>WARNING</u> High radiation levels may exist in the Auxiliary Building. RAS may significantly raise existing radiation levels.			
	(1) Restart 12 SRW Header:			
	 (a) Shut 13 CNTMT CLG U MAN SUPP FR 12 SRW SUBSYS, 1-SRW-149, located 27 ft East Pen Room south of Containment Purge Supply. 			
	(b) Shut 14 CNTMT CLG SUPP FR 12 SRW SUBSYS, 1-SRW-156, located 5 ft West Pen Room along west wall.			
	(c) Attempt to start the desired SRW PP on 12 SRW Header.			
	(d) Consult with the Plant Technical Support Center for guidance on system restoration.			
(continue)	(continue)			

RECOVERY ACTIONS	ALTERNATE ACTIONS
A.5.b (continued)	A.5.b.1 (continued)
	 (2) IF 12 SRW Header can NOT be restarted, THEN perform the following actions (a) Place the SRW PP(s) aligned to 12 SRW Header in PULL TO LOCK. (b) Place 1B DG OUT BKR, 152-1403, in PULL TO LOCK. (c) Locally trip the 1B DG fuel racks by pushing the EMERGENCY STOP PUSH TO STOP ENGINE trip device (d) Consult with the Plant Technical Support Center for guidance on system restoration.
B. MAINTAIN VITAL AUXILIARIES BY SUPPLYING POWER FROM 500KV OFFSITE POWER.	
 IF power is NOT expected to be restored to at least ONE 4KV Vital Bus within 30 minutes, THEN perform the following actions: Open the Control Room panel bench board lower front covers. Remove the front and back covers of the Control Room DG Control Consoles. (continue) 	

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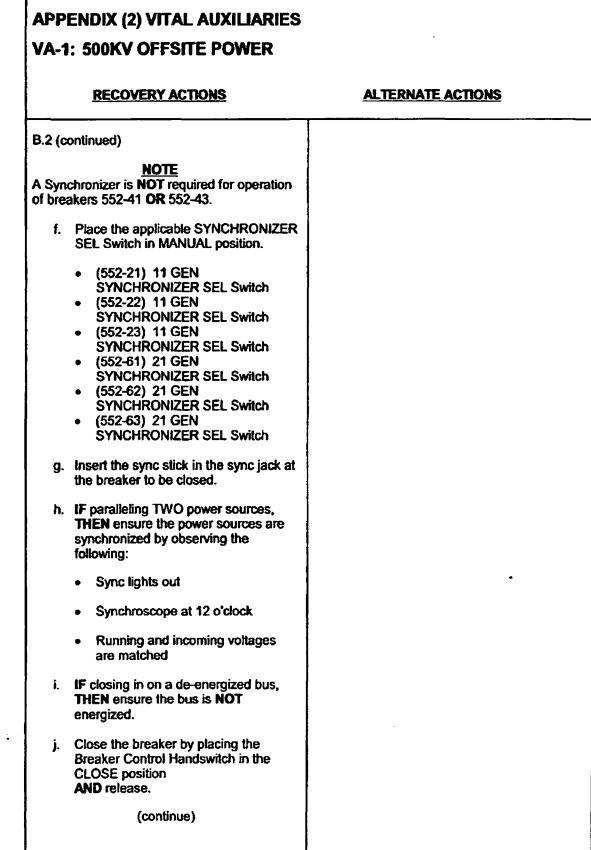
APPENDIX (2) VITAL AUXILIARIES VA-1: 500KV OFFSITE POWER **RECOVERY ACTIONS ALTERNATE ACTIONS** B.1 (continued) NOTE The Plant Computer and its associated inverter, 1Y05A, must be shed from the DC buses within 30 minutes into the blackout if control room air conditioning is lost, OR if 12 AND 24 battery chargers are lost. c. Determine whether Unit 1 Plant Computer is functional by observing the following: Time indication updating on the CRT CRT responding to function keys depressed or items selected from menu d. IF Unit 1 Plant Computer is functioning, THEN shutdown the Unit 1 Plant Computer at the Digital Decwriter III, located in the 45 ft computer room, as follows: (1) Depress the Shift key and type "@@A". (2) Observe the message and the "ENTER YOUR OWNERNAME:" prompt. (3) Type "GUEST1" and depress the Return key. (4) Observe the "ENTER KEY" response. (5) Depress the Return key. (6) Observe the message (8 lines) and the "TSM>" prompt. (7) Type "KILLER" and depress the Return key. (continue)

	RECOVERY ACTIONS	ALTERNATE ACTIONS	
B.1.d (con	linued)		
(8)	Observe the messages (several pages) and the "TSM>" prompt.		
(9)	Type "X" and depress the Return key.		
(10)	Observe two lines of statistics followed by a third line "RING IN FOR SERVICE".		
(11)	Depress the Shift key and type "@@P".		
(12)	Observe the "//" prompt.		
(13)	Type "HALT" and depress the Return key.		
"NNNNNN be any nur	<u>NOTE</u> NN" in the following response may nber.		
(14)	Observe "PSW NNNNNNNN ISNT NNNNNNNN HALT", followed by "//".		
	en the following power sources,		
e. Op bca Rod	ated in the Unit 1 Cable Spreading		
koci Rođ	ated in the Unit 1 Cable Spreading om: Instrument Bus Switch 1Y10-5 (Computer Inverter 1Y05) Unit 1 DAS/Computer Inverter Output Breaker at 1Y05		
loc: Roi • •	ated in the Unit 1 Cable Spreading om: Instrument Bus Switch 1Y10-5 (Computer Inverter 1Y05) Unit 1 DAS/Computer Inverter		

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APPENDIX (2) VITAL AUXILIARIES	
VA-1: 500KV OFFSITE POWER	
RECOVERY ACTIONS	ALTERNATE ACTIONS
B. (continued)	
<u>CAUTION</u> Attempts should NOT be made to re-energize a bus if a fault is suspected.	
 IF the 500KV Red and Black Buses are NOT energized, THEN energize the 500KV Red Bus OR the 500KV Black Bus by performing the following actions: 	2.1 IF 500KV offsite power is NOT available, THEN PROCEED to VA-2, EMERGENCY DIESEL GENERATOR, OR VA-3, <u>SMECO</u> .
a. Verify that switching orders have been received by the Control Room Supervisor OR Shift Manager, from the SO-TSO, to operate the required equipment.	
 Evaluate alarms associated with the 500KV switchyard. 	
 c. Verify the associated Unit Generator High Side Line Disconnect is open before closing Turbine Generator Output breakers. 	
 d. Verify the Unit-2 Generator Coast Down Lockout is reset. 	
e. Place the SYNCHROSCOPE SEL Switch in NORMAL (1) OR EMERGENCY (2) position.	
(continue)	

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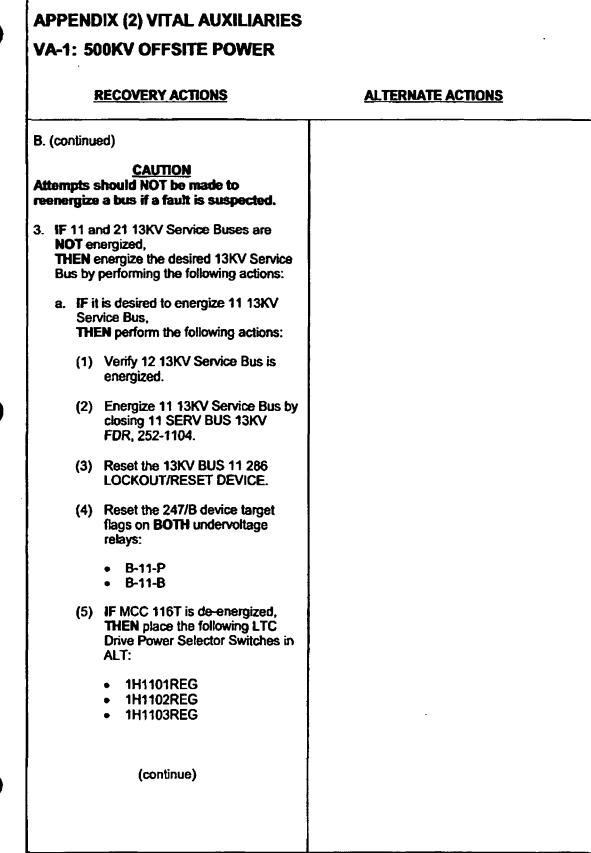


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APPENDIX (2) VITAL AUXILIARIES VA-1: 500KV OFFSITE POWER **RECOVERY ACTIONS ALTERNATE ACTIONS** B.2 (continued) k. Check the breaker has closed by observing applicable breaker indicating lights and meters, if applicable. I. Repeat steps B.1.a through B.1.k as desired to close additional breakers. m. Remove the sync stick AND return to Home Base. n. Verify BOTH SYNCHRONIZER SEL Switches in the OFF position. o. Place the SYNCHROSCOPE SEL Switch in the OFF position. p. WHEN operation has been completed in accordance with the switching orders. THEN inform the SO-TSO. q. Reset the 13KV BUS 12 OR 22 286 LOCKOUT/RESET DEVICE as applicable. r. Reset the applicable bus 247/B device target flags on BOTH undervoltage relays: 13KV BUS 12 • B-12-P B-12-B 13KV BUS 22 8-22-P B-22-B (continue)

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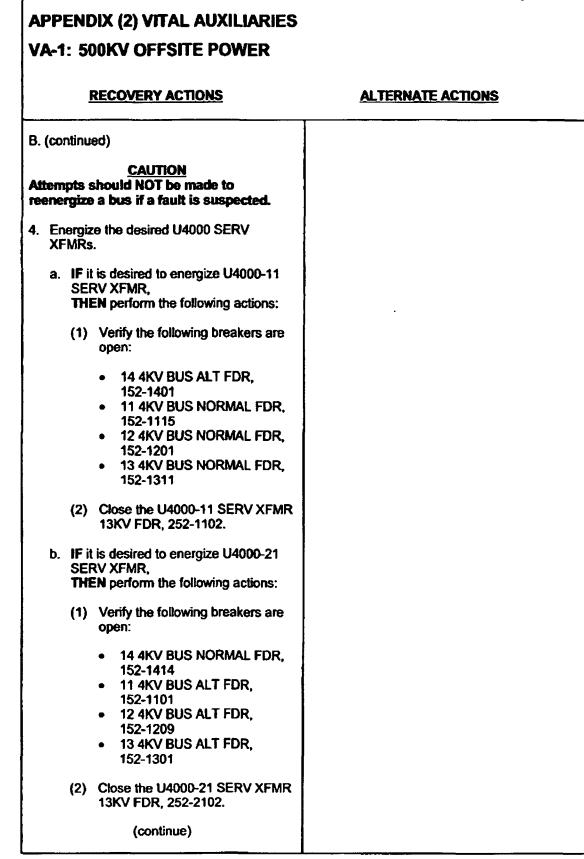
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APPENDIX (2) VITAL AUXILIARIES VA-1: 500KV OFFSITE POWER **RECOVERY ACTIONS ALTERNATE ACTIONS** B.3 (continued) b. IF it is desired to energize 21 13KV Service Bus, THEN perform the following actions: (1) Verify 22 13KV Service Bus is energized. (2) Energize 21 13KV Service Bus by closing 21 SERV BUS 13KV FDR, 252-2104. (3) Reset the 13KV BUS 21 286 LOCKOUT/RESET DEVICE. (4) Reset the 247/B device target flags on BOTH undervoltage relays: B-21-P B-21-B • (5) IF MCC 216T is de-energized, THEN place the following LTC **Drive Power Selector Switches in** ALT: 2H2101REG 2H2102REG 2H2103REG • (continue)

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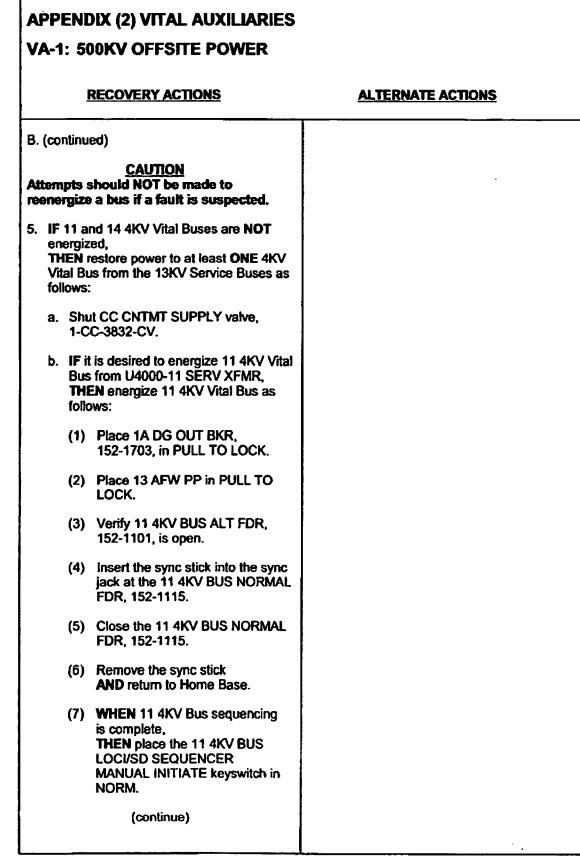
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APPENDIX (2) VITAL AUXILIARIES VA-1: 500KV OFFSITE POWER **RECOVERY ACTIONS ALTERNATE ACTIONS** B.5 (continued) c. IF it is desired to energize 14 4KV Vital Bus from U4000-11 SERV XFMR, THEN energize 14 4KV Vital Bus as follows: (1) Place 1B DG OUT BKR, 152-1403, in PULL TO LOCK. (2) Verify the 14 4KV BUS NORMAL FDR, 152-1414, is open. (3) Insert the sync stick into the sync iack at the 14 4KV BUS ALT FDR, 152-1401. (4) Close the 14 4KV BUS ALT FDR, 152-1401. (5) Remove the sync stick AND return to Home Base. (6) WHEN 14 4KV Bus sequencing is complete, THEN place the 14 4KV BUS LOCI/SD SEQUENCER MANUAL INITIATE keyswitch in NORM. (continue)

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APP	ENE	DIX (2) VITAL AUXILIARIES		Page 17 01 6
VA-1		DOKV OFFSITE POWER	ALTERNATE ACTIONS	
B.5 (ca	ontin	ued)		
d.	Bus THI	t is desired to energize 11 4KV Vital from U4000-21 SERV XFMR, EN energize 11 4KV Vital Bus as ows:		
	(1)	Place 1A DG OUT BKR, 152-1703, in PULL TO LOCK.		
	(2)	Place 13 AFW PP in PULL TO LOCK.		
	(3)	Verify 11 4KV BUS NORMAL FDR, 152-1115, is open.		
	(4)	Insert the sync stick into the sync jack at the 11 4KV BUS ALT FDR, 152-1101.		
	(5)	Close the 11 4KV BUS ALT FDR, 152-1101.		
	(6)	Remove the sync stick AND return to Home Base.		
	(7)	WHEN 11 4KV Bus sequencing is complete, THEN place the 11 4KV BUS LOCI/SD SEQUENCER MANUAL INITIATE keyswitch in NORM.		
		(continue)		
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APPENDIX (2) VITAL AUXILIARIES VA-1: 500KV OFFSITE POWER **RECOVERY ACTIONS ALTERNATE ACTIONS** B.5 (continued) e. IF it is desired to energize 14 4KV Vital Bus from U4000-21 SERV XFMR, THEN energize 14 4KV Vital Bus as follows: (1) Place 1B DG OUT BKR, 152-1403, in PULL TO LOCK. (2) Verify 14 4KV BUS ALT FDR, 152-1401, is open. (3) Insert the sync stick into the sync jack at the 14 4KV BUS NORMAL FDR. 152-1414. (4) Close the 14 4KV BUS NORMAL FDR, 152-1414. (5) Remove the sync stick AND return to Home Base. (6) WHEN 14 4KV Bus sequencing is complete, THEN place the 14 4KV BUS LOCI/SD SEQUENCER MANUAL INITIATE keyswitch in NORM. 6. IF ANY 125V DC Bus is less than 105 volts: 11 12 21 22 THEN concurrently perform AOP-7J, LOSS OF 120V VITAL AC OR 125V VITAL DC POWER. (continue)

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APPENDIX (2) VITAL AUXILIARIES VA-1: 500KV OFFSITE POWER **RECOVERY ACTIONS ALTERNATE ACTIONS** B. (continued) 7. IF less than THREE 120V AC Vital Buses are energized: 11 • 12 ٠ • 13 • 14 THEN concurrently perform AOP-7J, LOSS OF 120V VITAL AC OR 125V VITAL DC POWER. 8. IF at least ONE set of 480V Vital AC Buses is **NOT** energized: • 11A and 11B • 14A and 14B THEN restore power to at least ONE set of buses concurrently PER OI-27D, STATION POWER 480V SYSTEM. (continue)

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APPENDIX (2) VITAL AUXILIARIES VA-1: 500KV OFFSITE POWER **RECOVERY ACTIONS ALTERNATE ACTIONS** B. (continued) 9. IF 1Y09 and 1Y10 are NOT energized, THEN restore power to at least ONE bus as follows: a. Energize 1Y09 through its Main Feeder Breaker by performing the following actions: (1) Verify MCC-114R is energized. (2) Close the Instrument Bus Transformer 11 Feeder Breaker. 52-11429. (3) Close the Main Feeder Breaker, 79, on 1Y09. b. Energize 1Y10 through its Main Feeder Breaker by performing the following actions: (1) Verify MCC-104R is energized. (2) Close the Instrument Bus Transformer 12 Feeder Breaker, 52-10429. (3) Close the Main Feeder Breaker, 1. on 1Y10. 10. Verify at least ONE 125V DC Battery Charger is energized for each battery PER OI-26A, 125 VOLT VITAL DC.

APPENDIX (2) VITAL AUXILIARIES VA-1: 500KV OFFSITE POWER	
RECOVERY ACTIONS	ALTERNATE ACTIONS
C. VERIFY THE SHUTDOWN SEQUENCER LOADS ARE OPERATING AND RESTORE AUXILIARIES.	2
 Check the following Shutdown Sequencer Loads are operating: At least ONE SRW PP AND at least ONE SALTWATER PP on the same header 11 or 12 Control Room Ventilation Switchgear Room Ventilation 72' Computer Room Ventilation 	 1.1 Concurrently restore the appropriate equipment as follows: Service Water Pumps PER AOP-7B, LOSS OF SERVICE WATER Saltwater Pumps PER AOP-7A, LOSS OF SALTWATER COOLING Control Room Ventilation PER OI-22F, CONTROL ROOM AND CABLE SPREADING ROOMS VENTILATION Switchgear Room Ventilation PER OI-22H, SWITCHGEAR VENTILATION AND AIR CONDITIONING 72' Computer Room Ventilation PER OI-22B, AUXILIARY BUILDING & WASTE PROCESSING AREA VENTILATION
<u>NOTE</u> 1B DG will require a SRW and a SW Pump running on its associated supply header. 2. IF 1B DG is running, THEN verify SRW/SW cooling is supplied to 1B DG.	2.1 IF SRW/SW cooling can NOT be restored to 1B DG, THEN locally trip the 1B DG fuel racks by pushing the EMERGENCY STOP PUSH TO STOP ENGINE trip device.
 IF SIAS has NOT actuated, THEN check at least ONE IA COMPR is running. 	3.1 IF NO IA COMPRs are running AND SIAS has NOT actuated, THEN restart an IA COMPR PER OI-19, INSTRUMENT AIR.

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APPENDIX (2) VITAL AUXILIARIES VA-1: 500KV OFFSITE POWER **RECOVERY ACTIONS ALTERNATE ACTIONS** C. (continued) 4. IF Component Cooling Flow has been lost. THEN restore flow. a. Verify CC CNTMT SUPPLY valve, 1-CC-3832-CV, is shut. b. Start a CC PP. c. Verify the CC HX in service is being supplied from an operating Saltwater Header. NOTE RCP CBO and LOWER SEAL temperatures may be obtained from computer trend block 9. d. Record the highest attained RCP CBO and LOWER SEAL temperatures for each RCP: 11A RCP: ____ °F/ °F ٠ •F/ 11B RCP: ____ ۰F 12A RCP: _____ • F / ۰F 12B RCP: _____ • F / ۴ • CAUTION Uncontrolled restoration of cooling to hot RCP seals may cause a water hammer and could result in thermal shock of the RCP seal coolers. e. IF ALL RCP LOWER SEAL temperatures are less than 280° F. AND the RCP Controlled Bleed-off temperatures have been recorded, THEN open CC CNTMT SUPPLY valve, 1-CC-3832-CV. (continue)

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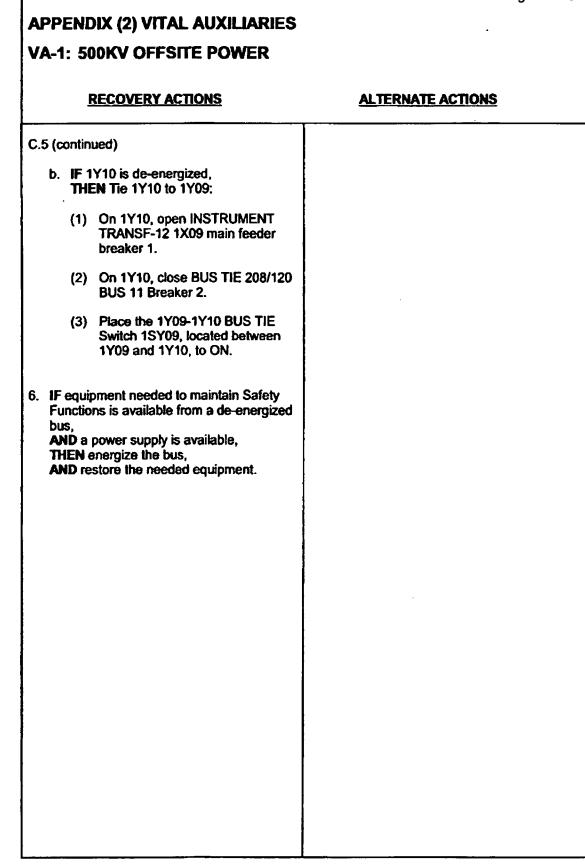
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APPENDIX (2) VITAL AUXILIARIES VA-1: 500KV OFFSITE POWER **RECOVERY ACTIONS ALTERNATE ACTIONS** C.4 (continued) f. IF ANY RCP LOWER SEAL temperature is greater than 280° F, AND the RCP Controlled Bleed-off temperatures have been recorded, THEN perform the following actions: (1) Shut CONTAINMENT SUPPLY HEADER ISOLATION valve, 1-CC-284, located in the 5 ft East Penetration Room. (2) Open CC CNTMT SUPPLY valve. 1-CC-3832-CV. (3) Slowly open 1-CC-284 to restore component cooling flow. CAUTION Attempts should NOT be made to re-energize a bus if a fault is suspected. 5. IF 1Y09 OR 1Y10 is NOT energized, THEN restore the affected Instrument Bus as follows: a. IF 1Y09 is de-energized, **THEN** Tie 1Y09 to 1Y10: (1) On 1Y09, open INSTRUMENT TRANSF-11 1X08 main feeder breaker 79. (2) On 1Y10, close BUS TIE 208/120 BUS 11 Breaker 2. (3) Place the 1Y09-1Y10 BUS TIE Switch 1SY09, located between 1Y09 and 1Y10, to ON. (continue)

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APPENDIX (2) VITAL AUXILIARIES	5
VA-1: 500KV OFFSITE POWER	
RECOVERY ACTIONS	ALTERNATE ACTIONS
D. ACCEPTANCE CRITERIA FOR SUCCESS PATH VA-1.	
 Check Vital Auxiliaries has been satisfied by the following indications: At least ONE 4KV Vital Bus is 	1.1 IF Vital Auxiliaries has NOT been satisfied, THEN PROCEED to the next appropriate Vital Auxiliaries Success
 energized 11, 12, 21 and 22 125V DC BUS VOLTS ALL greater than 105 volts 	Path.
At least THREE 120V AC Vital Buses are energized:	
 11 12 13 14 	
• EITHER 1Y09 or 1Y10 is energized	
 WHEN Vital Auxiliaries has been established, THEN PROCEED to the next Safety Function to be performed. 	

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APPENDIX (2) VITAL AUXILIARIES VA-2: EMERGENCY DIESEL GENERATOR			
A. ALIGN THE ELECTRICAL SYSTEM FOR POWER RESTORATION.			
 IF 11 4KV Vital Bus is NOT energized, THEN perform the following actions: 			
 Ensure the following 4KV breakers are open: 			
 11 4KV BUS NORMAL FDR, 152-1115 			
• 11 4KV BUS ALT FDR, 152-1101			
 SWYD 4KV SERV XFMR FDR, 152-1113 			
(continue)			

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VA-2: EMERGENCY DIESEL GENERATOR			
RECOVERY ACTIONS	ALTERNATE ACTIONS		
A.1 (continued)			
<u>CAUTION</u> Handswitches should NOT be placed in PULL TO LOCK while performing breaker position verification.			
 Verify the following 4KV Vital Bus load breakers are open: 			
 No. 11 Low Press Safety Inj. Pump, 152-1104 			
 No. 11 Salt Water Pump, 152-1105 			
 No. 11 Containment Spray Pump, 152-1107 			
 No. 11 High Press Safety Inj. Pump, 152-1108 			
 No. 13 High Press Safety Inj. Pump, 152-1110 			
 No. 13 Service Water Pump, 152-1111 			
 No. 13 Salt Water Pump, 152-1112 			
• AFW PP No. 13, 152-1116			
(continue)			

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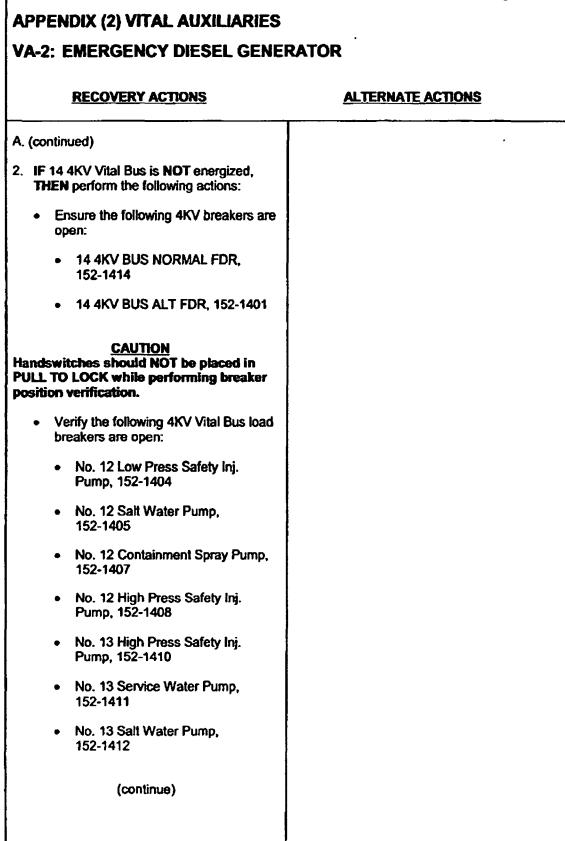
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APPENDIX (2) VITAL AUXILIARIES			
VA-2: EMERGENCY DIESEL GENERATOR			
RECOVERY ACTIONS	ALTERNATE ACTIONS		
A. (continued)			
<u>CAUTION</u> The following step provides actions to prevent water hammer damage from CAC voiding.			
<u>CAUTION</u> SRW Pumps start when power is restored to the associated 4KV Bus.			
 IF CSAS has actuated, AND EITHER SRW Header is NOT in operation, THEN perform the following actions: 			
a. IF 11 SRW Header is idle, THEN restart 11 SRW Header as follows:	a.1 IF Containment Pressure exceeded 25 PSIG, THEN perform the following actions:		
(1) Check that Containment Pressure has remained less than 25 PSIG with 11 SRW Header idle.	 Place the SRW PP(s) aligned to 11 SRW Header in PULL TO LOCK. (2) Consult with the Plant Technical 		
(2) Attempt to start the desired SRW PP on 11 SRW Header.	Support Center for guidance on system restoration.		
(continue)			

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	APPENDIX (2) VITAL AUXILIARIES VA-2: EMERGENCY DIESEL GENERATOR				
	RECOVERY ACTIONS	ALTERNATE ACTIONS			
A.3 (a	ontinued)	· · · · · · · · · · · · · · · · · · ·			
	IF 12 SRW Header is idle, THEN restart 12 SRW Header as follows:	b.1 IF Containment Pressure exceeded 10 PSIG, THEN perform the following actions:			
	(1) Check that Containment Pressure has remained less than 10 PSIG with 12 SRW Header idle.	<u>CAUTION</u> 1B DG SRW flow is less than SRW PP minimum flow requirements. This step			
	(2) Attempt to start the desired SRW PP on 12 SRW Header.	permits restoration of SRW to supply 1B DG.			
		<u>WARNING</u> High radiation levels may exist in the Auxiliary Building. RAS may significantly raise existing radiation levels.			
		(1) Restart 12 SRW Header:			
		(a) Shut 13 CNTMT CLG U MAN SUPP FR 12 SRW SUBSYS, 1-SRW-149, located 27 ft East Pen Room south of Containment Purge Supply.			
		(b) Shut 14 CNTMT CLG SUPP FR 12 SRW SUBSYS, 1-SRW-156, located 5 ft West Pen Room along west wall.			
		(c) Attempt to start the desired SRW PP on 12 SRW Header.			
		(d) Consult with the Plant Technical Support Center for guidance on system restoration.			
	(continue)	(continue)			

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APPENDIX (2) VITAL AUXILIARIES					
VA-2: EMERGENCY DIESEL GENERATOR					
RECOVERY ACTIONS	ALTERNATE ACTIONS				
A.3.b (continued)	A.3.b.1 (continued)				
	 (2) IF 12 SRW Header can NOT be restarted, THEN perform the following actions: 				
	(a) Place the SRW PP(s) aligned to 12 SRW Header in PULL TO LOCK.				
	(b) Place 1B DG OUT BKR, 152-1403, in PULL TO LOCK.				
	(c) Locally trip the 1B DG fuel racks by pushing the EMERGENCY STOP PUSH TO STOP ENGINE trip device.				
	(d) Consult with the Plant Technical Support Center for guidance on system restoration.				
B. MAINTAIN VITAL AUXILIARIES USING THE DIESEL GENERATORS.					
 IF power is NOT expected to be restored to at least ONE 4KV Vital Bus within 30 minutes, THEN perform the following actions: 					
a. Open the Control Room panel bench board lower front covers.					
 Remove the front and back covers of the Control Room DG Control Consoles. 					
(continue)					

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APPENDIX (2) VITAL AUXILIARIES VA-2: EMERGENCY DIESEL GENERATOR **RECOVERY ACTIONS ALTERNATE ACTIONS** B.1 (continued) NOTE The Plant Computer and its associated inverter, 1Y05A, must be shed from the DC buses within 30 minutes into the blackout if control room air conditioning is lost, OR if 12 AND 24 battery chargers are lost. c. Determine whether Unit 1 Plant Computer is functional by observing the following: Time indication updating on the CRT CRT responding to function keys depressed or items selected from menu d. IF Unit 1 Plant Computer is functioning. THEN shutdown the Unit 1 Plant Computer at the Digital Decwriter III. located in the 45 ft computer room, as follows: (1) Depress the Shift key and type "@@A". (2) Observe the message and the **"ENTER YOUR OWNERNAME:"** prompt. (3) Type "GUEST1" and depress the Return key. (4) Observe the "ENTER KEY" response. (5) Depress the Return key. (6) Observe the message (8 lines) and the "TSM>" prompt. (7) Type "KILLER" and depress the Return key. (continue)

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APPENDIX (2) VITAL AUXILIARIES VA-2: EMERGENCY DIESEL GENERATOR **RECOVERY ACTIONS ALTERNATE ACTIONS** B.1.d (continued) (8) Observe the messages (several pages) and the "TSM>" prompt. (9) Type "X" and depress the Return key. (10) Observe two lines of statistics followed by a third line "RING IN FOR SERVICE". (11) Depress the Shift key and type "@@P". (12) Observe the "//" prompt. (13) Type "HALT" and depress the Return key. NOTE "NNNNNNN" in the following response may be any number. (14) Observe "PSW NNNNNNN ISNT NNNNNNN HALT. followed by "//". e. Open the following power sources, located in the Unit 1 Cable Spreading Room: Instrument Bus Switch 1Y10-5 . (Computer Inverter 1Y05) Unit 1 DAS/Computer Inverter **Output Breaker at 1Y05** Unit 1 DAS/Computer Inverter Battery Input Breaker at 1Y05 DC INPUT breaker at 1INV1T11 (Unit 1 Turbine Controls Inverter) (continue)

ADDENDIV (ALL ATTAL ATTAL				
APPENDIX (2) VITAL AUXILIARIES				
VA-2: EMERGENCY DIESEL GENE	KATOR			
RECOVERY ACTIONS	ALTERNATE ACTIONS			
B. (continued)				
 2. IF 11 and 14 4KV Vital Buses are NOT energized, THEN perform the following actions: a. Shut CC CNTMT SUPPLY valve, 1-CC-3832-CV. b. Verify 1A DG has started AND its OUT BKR, 152-1703, closed. c. Verify 1B DG has started AND its OUT BKR, 152-1403, closed. 	 2.1 IF a Diesel Generator can NOT be aligned to energize at least ONE 4KV Vital Bus, THEN PROCEED to VA-3, <u>SMECO</u>. 			
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APPENDIX (2) VITAL AUXILIARIES VA-2: EMERGENCY DIESEL GENERATOR RECOVERY ACTIONS ALTERNATE ACTIONS B.2.d (continued) (5) Dispatch an operator to operate disconnect 189-1106 as follows: (a) Obtain the 189-1106 keys from the CR key locker. (b) Close 0C DG 11 4KV BUS DISC, 189-1106. (6) WHEN the OC DG is up to rated speed and voltage, THEN verify the OC DG OUT BKR, 152-0703 is closed. (7) WHEN disconnect 189-1106 is closed AND breaker 152-0703 is closed, THEN perform the following: (a) Close 07 4KV BUS TIE, 152-0701. (b) Insert the sync stick AND close the 0C DG 11 4KV BUS FDR, 152-1106 (continue)

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APPENDIX (2) VITAL AUXILIARIES VA-2: EMERGENCY DIESEL GENERATOR **ALTERNATE ACTIONS RECOVERY ACTIONS** B.2 (continued) NOTE Align the OC DG to the unit with redundant safety related equipment out of service. e. IF the 0C DG is NOT supplying a vital 4KV bus AND it is desired to place the 0C DG on 14 4KV bus, THEN perform the following: (1) IF the 0C DG is NOT running, THEN direct an operator to perform an emergency start from the local panel PER OI-21C, 0C DIESEL GENERATOR. (2) Verify 07 4KV BUS FDR, 152-0704 is open. (3) Verify the 0C DG 14 4KV BUS FDR, 152-1406 in PULL TO LOCK. (4) Verify 1B DG OUT BKR, 152-1403 in PULL TO LOCK. (5) Dispatch an operator to operate disconnect 189-1406 as follows: (a) Obtain the 189-1406 keys from the CR key locker. (b) Close 0C DG 14 4KV BUS DISC, 189-1406. (6) WHEN the OC DG is up to rated speed and voltage, THEN verify the OC DG OUT BKR, 152-0703 is closed. (continue)

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APPENDIX (2) VITAL AUXILIARIES	
VA-2: EMERGENCY DIESEL GENER/	ATOR
RECOVERY ACTIONS	ALTERNATE ACTIONS
B.2.e (continued)	
 (7) WHEN disconnect 189-1406 is closed AND breaker 152-0703 is closed, THEN perform the following: (a) Close 07 4KV BUS TIE, 	
 152-0701. (b) Insert the sync stick AND close the 0C DG 14 4KV BUS FDR, 152-1406. 	
3. Dispatch an operator to monitor DG operation.	
 4. IF ANY 125V DC Bus is less than 105 volts: 11 	
• 12 • 21 • 22	
THEN concurrently perform AOP-7J, LOSS OF 120V VITAL AC OR 125V VITAL DC POWER.	
5. IF less than THREE 120V AC Vital Buses are energized:	
 11 12 13 14 	
THEN concurrently perform AOP-7J, LOSS OF 120V VITAL AC OR 125V VITAL DC POWER.	
(continue)	

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AF	PPENDIX (2) VITAL AUXILIARIES	
V/	4-2: EMERGENCY DIESEL GENER	ATOR
	RECOVERY ACTIONS	ALTERNATE ACTIONS
B . ((continued)	
6.	IF at least ONE set of 480V Vital AC Buses is NOT energized:	
	 11A and 11B 14A and 14B 	
	THEN restore power to at least ONE set of buses concurrently PER OI-27D, STATION POWER 480V SYSTEM.	
7.	IF 1Y09 and 1Y10 are NOT energized, THEN restore power to at least ONE bus as follows:	
	a. Energize 1Y09 through its Main Feeder Breaker by performing the following actions:	
	(1) Verify MCC-114R is energized.	
	(2) Close the Instrument Bus Transformer 11 Feeder Breaker, 52-11429.	
	(3) Close the Main Feeder Breaker, 79, on 1Y09.	
	b. Energize 1Y10 through its Main Feeder Breaker by performing the following actions:	
	(1) Verify MCC-104R is energized.	
	(2) Close the Instrument Bus Transformer 12 Feeder Breaker, 52-10429.	
	(3) Close the Main Feeder Breaker,1, on 1Y10.	
8.	Verify at least ONE 125V DC Battery Charger is energized for each battery PER OI-26A, 125 VOLT VITAL DC.	

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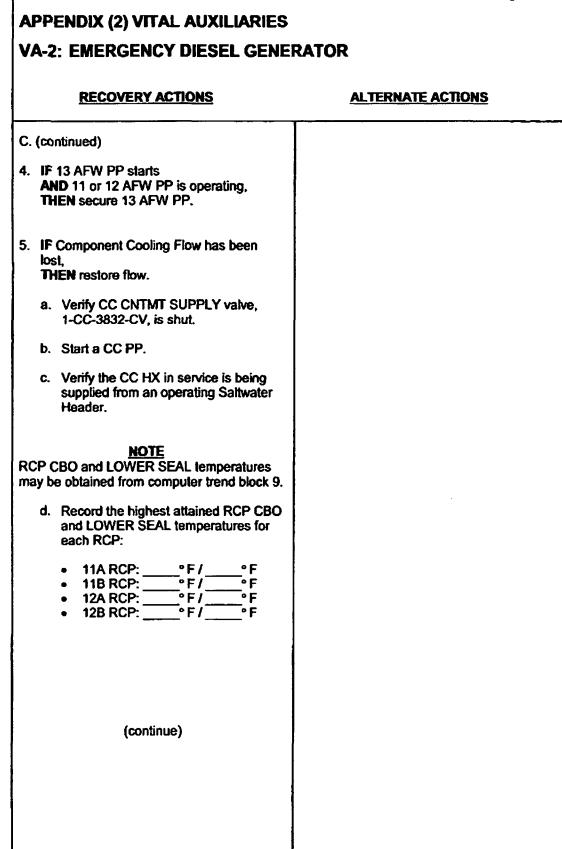
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APPENDIX (2) VITAL AUXILIARIES	
VA-2: EMERGENCY DIESEL GENE	RATOR
RECOVERY ACTIONS	ALTERNATE ACTIONS
C. VERIFY THE SHUTDOWN SEQUENCER LOADS ARE OPERATING AND RESTORE AUXILIARIES.	
 Check the following Shutdown Sequencer Loads are operating: At least ONE SRW PP AND at least ONE SALTWATER PP on the same header 11 or 12 Control Room Ventilation Switchgear Room Ventilation 72' Computer Room Ventilation 	 1.1 Concurrently restore the appropriate equipment as follows: Service Water Pumps PER AOP-7B, LOSS OF SERVICE WATER Saltwater Pumps PER AOP-7A, LOSS OF SALTWATER COOLING Control Room Ventilation PER OI-22F, CONTROL ROOM AND CABLE SPREADING ROOMS VENTILATION Switchgear Room Ventilation PER OI-22H, SWITCHGEAR VENTILATION AND AIR CONDITIONING 72' Computer Room Ventilation PER
NOTE 1B DG will require a SRW and a SW Pump running on its associated supply header. 2. IF 1B DG is running, THEN verify SRW/SW cooling is supplied to 1B DG. 3. IF SIAS has NOT actuated, THEN check at least ONE IA COMPR is running.	 OI-22B, <u>AUXILIARY BUILDING &</u> <u>WASTE PROCESSING AREA</u> <u>VENTILATION</u> 2.1 IF SRW/SW cooling can NOT be restored to 1B DG, THEN locally trip the 1B DG fuel racks by pushing the EMERGENCY STOP PUSH TO STOP ENGINE trip device. 3.1 IF NO IA COMPRs are running AND SIAS has NOT actuated, THEN restart an IA COMPR PER OI-19,
	INSTRUMENT AIR.

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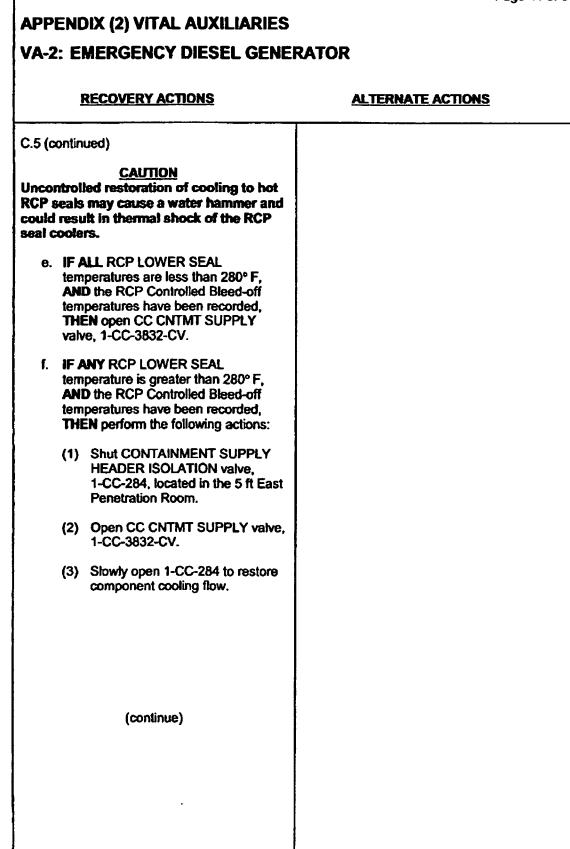
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	RECOVERY ACTIONS	ALTERNATE ACTIONS
C. (continu	ied)	
	<u>CAUTION</u> should NOT be made to the a bus if a fault is suspected.	
	9 OR 1Y10 is NOT energized, restore the affected Instrument Bus ws:	
	1Y09 is de-energized, EN Tie 1Y09 to 1Y10:	
(1)	On 1Y09, open INSTRUMENT TRANSF-11 1X08 main feeder breaker 79.	
(2)	On 1Y10, close BUS TIE 208/120 BUS 11 Breaker 2.	
(3)	Place the 1Y09-1Y10 BUS TIE Switch 1SY09, located between 1Y09 and 1Y10, to ON.	
	IY10 is d e energized , EN Tie 1Y10 to 1Y09:	
(1)	On 1Y10, open INSTRUMENT TRANSF-12 1X09 main feeder breaker 1.	
(2)	On 1Y10, close BUS TIE 208/120 BUS 11 Breaker 2.	
(3)	Place the 1Y09-1Y10 BUS TIE Switch 1SY09, located between 1Y09 and 1Y10, to ON.	
Function bus,	pment needed to maintain Safety ons is available from a de-energized	
THEN	power supply is available, energize the bus, estore the needed equipment.	

VA-2: EMERGENCY DIESEL GENE	
RECOVERY ACTIONS	ALTERNATE ACTIONS
D. ACCEPTANCE CRITERIA FOR SUCCESS PATH VA-2.	
 Check Vital Auxiliaries has been satisfied by the following indications: At least ONE 4KV Vital Bus is energized 11, 12, 21 and 22 125V DC BUS VOLTS ALL greater than 105 volts At least THREE 120V AC Vital Buses are energized: 11 12 13 14 EITHER 1Y09 or 1Y10 is energized WHEN Vital Auxiliaries has been established, THEN PROCEED to the next Safety Function to be performed. 	1.1 IF Vital Auxiliaries has NOT been satisfied, THEN PROCEED to the next appropriate Vital Auxiliaries Success Path.

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APPENDIX (2) VITAL AUXILIARIES	
VA-3: SMECO RECOVERY ACTIONS	ALTERNATE ACTIONS
A. IF 500KV OFFSITE POWER HAS BEEN LOST, THEN ALIGN THE ELECTRICAL SYSTEM FOR POWER RESTORATION.	
 IF 11 13KV Service Bus is NOT energized, THEN ensure the following 13KV breakers are open: 11 SERV BUS 13KV FDR, 252-1104 11 SERV BUS TIE, 252-1105 U-4000-12 13KV FDR, 252-1103 U-4000-11 13KV FDR, 252-1102 U-4000-13 13KV FDR, 252-1101 Locally at the U-1 13KV SWGR House, SITE POWER FDR BREAKER (to 0X03), 252-1106 IF 21 13KV Service Bus is NOT 	
energized, THEN ensure the following 13KV breakers are open: 21 SERV BUS 13KV FDR, 252-2104 21 SERV BUS TIE, 252-2105 U-4000-21 13KV FDR, 252-2102 U-4000-22 13KV FDR, 252-2103 U-4000-23 13KV FDR, 252-2101 Locally at the U-2 13KV SWGR House, SITE POWER FDR BREAKER (to 0X04), 252-2106	
(continue)	

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RECOVERY ACTIONS	ALTERNATE ACTIONS
A. (continued)	
 IF 11 4KV Vital Bus is NOT energized, THEN perform the following actions: 	
Ensure the following 4KV breakers are open:	
 11 4KV BUS NORMAL FDR, 152-1115 	
• 11 4KV BUS ALT FDR, 152-1101	
 SWYD 4KV SERV XFMR FDR, 152-1113 	
<u>CAUTION</u> Handswitches should NOT be placed in PULL TO LOCK while performing breaker position verification.	
 Verify the following 4KV Vital Bus load breakers are open: 	
breakers are open:No. 11 Low Press Safety Inj.	
 breakers are open: No. 11 Low Press Safety Inj. Pump, 152-1104 No. 11 Satt Water Pump, 	
 breakers are open: No. 11 Low Press Safety Inj. Pump, 152-1104 No. 11 Salt Water Pump, 152-1105 No. 11 Containment Spray Pump, 	
 breakers are open: No. 11 Low Press Safety Inj. Pump, 152-1104 No. 11 Satt Water Pump, 152-1105 No. 11 Containment Spray Pump, 152-1107 No. 11 High Press Safety Inj. 	
 breakers are open: No. 11 Low Press Safety Inj. Pump, 152-1104 No. 11 Salt Water Pump, 152-1105 No. 11 Containment Spray Pump, 152-1107 No. 11 High Press Safety Inj. Pump, 152-1108 No. 13 High Press Safety Inj. 	
 breakers are open: No. 11 Low Press Safety Inj. Pump, 152-1104 No. 11 Salt Water Pump, 152-1105 No. 11 Containment Spray Pump, 152-1107 No. 11 High Press Safety Inj. Pump, 152-1108 No. 13 High Press Safety Inj. Pump, 152-1110 No. 13 Service Water Pump, 	

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RECOVERY ACTIONS	ALTERNATE ACTIONS
A.3 (continued)	
• AFW PP No. 13, 152-1116	
Place the 11 4KV BUS LOCI/SD SEQUENCER MANUAL INITIATE keyswitch in ON	
 IF 14 4KV Vital Bus is NOT energized, THEN perform the following actions: 	
 Ensure the following 4KV breakers are open: 	
 14 4KV BUS NORMAL FDR, 152-1414 	
• 14 4KV BUS ALT FDR, 152-1401	
<u>CAUTION</u> Handswitches should NOT be placed in PULL TO LOCK while performing breaker position verification.	
 Verify the following 4KV Vital Bus load breakers are open: 	
 No. 12 Low Press Safety Inj. Pump, 152-1404 	
 No. 12 Salt Water Pump, 152-1405 	
 No. 12 Containment Spray Pump, 152-1407 	
 No. 12 High Press Safety Inj. Pump, 152-1408 	
 No. 13 High Press Safety Inj. Pump, 152-1410 	
 No. 13 Service Water Pump, 152-1411 	
(continue)	

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APPENDIX (2) VITAL AUXILIARIES VA-3: SMECO	
RECOVERY ACTIONS	ALTERNATE ACTIONS
RECOVERY ACTIONS A.4 (continued) 9. No. 13 Salt Water Pump, 152-1412 9. Place the 14 4KV BUS LOCUSD SEQUENCER MANUAL INITIATE keyswitch in ON The following step provides actions to prevent water hammer damage from CAC voiding. MAND ETHER SRW Header is restored to the associated 4KV Bus. 5. IF CSAS has actuated, AND ETHER SRW Header is NOT in operation, THEN perform the following actions: 1. IF 11 SRW Header is idle, THEN restart 11 SRW Header as follows: 1. Check that Containment Pressure has remained less than 25 PSIG with 11 SRW Header idle. 2. Attempt to start the desired SRW PP on 11 SRW Header.	ALTERNATE ACTIONS a.1 IF Containment Pressure exceeded 25 PSIG, THEN perform the following actions: (1) Place the SRW PP(s) aligned to 11 SRW Header in PULL TO LOCK. (2) Consult with the Plant Technical Support Center for guidance on system restoration.

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VA-3: SMECO				
ALTERNATE ACTIONS				
b.1 IF Containment Pressure exceeded 10 PSIG, THEN perform the following actions:				
<u>CAUTION</u> 1B DG SRW flow is less than SRW PP minimum flow requirements. This step permits restoration of SRW to supply 1B DG.				
<u>WARNING</u> High radiation levels may exist in the Auxiliary Building. RAS may significantly raise existing radiation levels.				
(1) Restart 12 SRW Header:				
 (a) Shut 13 CNTMT CLG U MAN SUPP FR 12 SRW SUBSYS, 1-SRW-149, located 27 ft East Pen Room south of Containment Purge Supply. 				
(b) Shut 14 CNTMT CLG SUPP FR 12 SRW SUBSYS, 1-SRW-156, located 5 ft West Pen Room along west wall.				
(c) Attempt to start the desired SRW PP on 12 SRW Header.				
(d) Consult with the Plant Technical Support Center for guidance on system restoration.				
(continue)				

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APPENDIX (2) VITAL AUXILIARIES VA-3: SMECO			
RECOVERY ACTIONS	ALTERNATE ACTIONS		
A.5.b (continued)	 A.5.b.1 (continued) (2) IF 12 SRW Header can NOT be restarted, THEN perform the following actions: (a) Place the SRW PP(s) aligned to 12 SRW Header in PULL TO LOCK. (b) Place 1B DG OUT BKR, 152-1403, in PULL TO LOCK. (c) Locally trip the 1B DG fuel racks by pushing the EMERGENCY STOP PUSH TO STOP ENGINE trip device. (d) Consult with the Plant Technical Support Center for guidance on system restoration. 		
B. MAINTAIN VITAL AUXILIARIES BY SUPPLYING POWER FROM THE SMECO POWER SUPPLY SYSTEM.			
 IF power is NOT expected to be restored to at least ONE 4KV Vital Bus within 30 minutes, THEN perform the following actions: a. Open the Control Room panel bench board lower front covers. b. Remove the front and back covers of the Control Room DG Control Consoles. 			

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			rage 50 0i 0i
APPENDIX (2) V	TTAL AUXILIARIES		
VA-3: SMECO			
RECOVER	RY ACTIONS	ALTERNATE ACTIONS	
B.1 (continued)			
The Plant Computer inverter, 1Y05A, mus	t be shed from the DC tes into the blackout if litioning is lost, OR if		
	ether Unit 1 Plant unctional by observing		
CRT • CRT resp	ation updating on the onding to function keys d or items selected from	· .	
Computer at t	t Computer is wn the Unit 1 Plant he Digital Decwriter III, 45 ft computer room, as		
(1) Depress "@@A".	the Shift key and type		
	the message and the YOUR OWNERNAME:"		
(3) Type "Gl Return k	UEST1" and depress the ey.		
(4) Observe response	the "ENTER KEY"		
(5) Depress	the Return key.		
	the message (8 lines) TSM>" prompt.		
(7) Type "Kl Return k	LLER" and depress the ey.		
(cc	ontinue)		

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APPENDIX (2) VITAL AUXILIARIES VA-3: SMECO **RECOVERY ACTIONS ALTERNATE ACTIONS** B.1.d (continued) (8) Observe the messages (several pages) and the "TSM>" prompt. (9) Type "X" and depress the Return key. (10) Observe two lines of statistics followed by a third line "RING IN FOR SERVICE". (11) Depress the Shift key and type "@@P". (12) Observe the *//* prompt. (13) Type "HALT" and depress the Return key. NOTE "NNNNNNN" in the following response may be any number. (14) Observe "PSW NNNNNNN ISNT NNNNNNN HALT. followed by "//". e. Open the following power sources, located in the Unit 1 Cable Spreading Room: Instrument Bus Switch 1Y10-5 • (Computer Inverter 1Y05) Unit 1 DAS/Computer Inverter **Output Breaker at 1Y05** Unit 1 DAS/Computer Inverter Battery Input Breaker at 1Y05 (continue)

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ALTERNATE ACTIONS
ALTERNATE ACTIONS
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APPENDIX (2) VITAL AUXILIARIES VA-3: SMECO **RECOVERY ACTIONS ALTERNATE ACTIONS** B.2.b (continued) (3) Rotate Kirk key 20497 fully clockwise. (4) Remove the key from 13.8KV SMECO DISCONNECT, 0SH301. (5) Insert Kirk key 20497 into 13.2KV SMECO DISCONNECT, 0SH302. (6) Rotate the key counterclockwise. (7) Close 13.2KV SMECO DISCONNECT, 0SH302. (8) Place OPS lock on 13.8KV SMECO DISCONNECT, 0SH301. c. IF 23 13KV Service Bus is NOT energized from the SMECO Power Supply System. THEN perform the following: (1) Rack in the OFFSITE PWR SOURCE FROM SMECO 252-2301, supply feeder to 23 13KV Service Bus. (2) Ensure the close and trip circuit fuses are in the ON position. (3) Verify the following breakers are open: 21 SERV BUS TIE, 252-2105 • 11 SERV BUS TIE, 252-1105 (4) Energize 23 13KV Service Bus by locally closing Breaker 252-2301. (continue)

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	RECOVERY ACTIONS	ALTERNATE ACTIONS	
2 (cont	linued)		
d. IF P S T	F it is desired to align the SMECO ower Supply System to 11 13KV ervice Bus, HEN energize 11 13KV Service Bus s follows:		
(1	 Verify 11 13KV Service Bus is de-energized. 		
(2	 Verify the following breakers are open: 		
	 11 SERV BUS 13KV FDR, 252-1104 11 SERV BUS TIE, 252-1105 U-4000-12 13KV FDR, 252-1103 U-4000-11 13KV FDR, 252-1102 U-4000-13 13KV FDR, 252-1101 21 SERV BUS TIE, 252-2105 Locally at the U-1 13KV SWGR House, SITE POWER FDR BREAKER (to 0X03), 252-1106 		
(3	Energize 11 13KV Service Bus by closing 11 SERV BUS TIE, 252-1105.		
(4	I) Reset the 13KV BUS 11 286 LOCKOUT/RESET DEVICE.		
(5	Reset the 247/B device target flags on BOTH undervoltage relays:		
	• B-11-P • B-11-B		
	(continue)		

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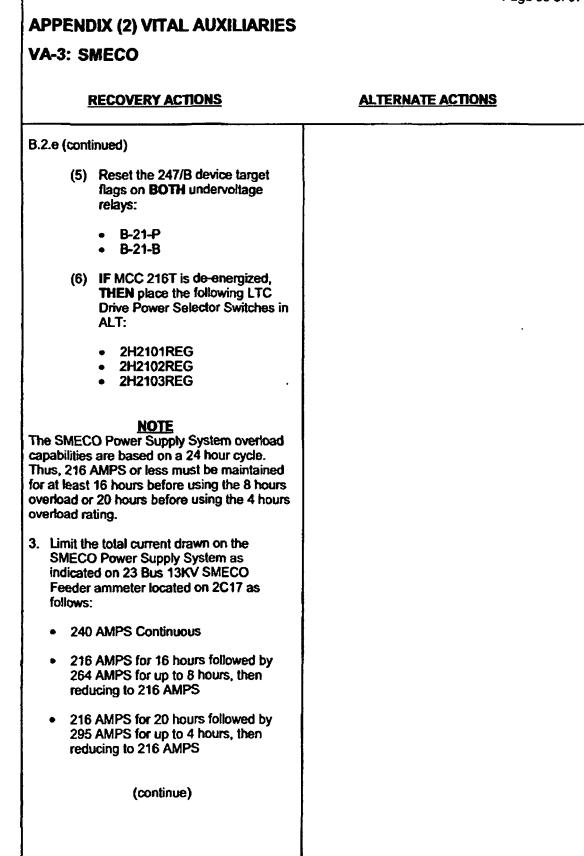
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ALTERNATE ACTIONS
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VA-3: SMECO	
RECOVERY ACTIONS	ALTERNATE ACTIONS
B. (continued)	zd)
<u>NOTE</u> Only two of the four engineering safety features buses may be re-energized from the SMECO Power Supply System.	
 Restore power to the Engineered Safety Features Buses from the 13KV Service Buses as follows: 	
a. IF NO CC PPs are operating, THEN shut CC CNTMT SUPPLY valve, 1-CC-3832-CV.	
 b. IF 11 13KV Service Bus is available to supply 11 4KV Vital Bus, THEN energize 11 4KV Vital Bus from 11 13KV Service Bus as follows: 	
(1) Verify the following breakers are open:	
 11 4KV BUS NORMAL FDR, 152-1115 12 4KV BUS NORMAL FDR, 152-1201 13 4KV BUS NORMAL FDR, 152-1311 	
 (2) IF 14 4KV Bus is NOT being supplied from 11 13KV Service Bus, THEN verify 14 4KV BUS ALT FDR, 152-1401, is open. 	
(3) Close the U-4000-11 13KV FDR, 252-1102.	
(4) Place 1A DG OUT BKR, 152-1703, in PULL TO LOCK.	
(5) Place 13 AFW PP in PULL TO LOCK.	
(continue)	

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	RECOVERY ACTIONS	ALTERNATE ACTIONS	
B.4.b (co)	ntinued)		
(6) Verify 11 4KV BUS ALT FDR, 152-1101, is open.		
(7) Insert the sync stick into the sync jack at the 11 4KV BUS NORMAL FDR, 152-1115.		
(8) Close the 11 4KV BUS NORMAL FDR, 152-1115.		
(9) Return the sync stick to its normal position.		
su Ti	11 13KV Service Bus is available to pply 14 4KV Vital Bus, IEN energize 14 4KV Vital Bus from 13KV Service Bus as follows:		
(1)) Verify the following breakers are open:		
	 14 4KV BUS ALT FDR, 152-1401 12 4KV BUS NORMAL FDR, 152-1201 13 4KV BUS NORMAL FDR, 152-1311 		
(2)	 IF 11 4KV Vital Bus is NOT being supplied from 11 13KV Service Bus, THEN verify 11 4KV BUS NORMAL FDR, 152-1115, is open. 		
(3)	Close the U-4000-11 13KV FDR, 252-1102.		
(4)	Place 1B DG OUT BKR, 152-1403, in PULL TO LOCK.		
(5)	Verify the 14 4KV BUS NORMAL FDR, 152-1414, is open.		
	(continue)		

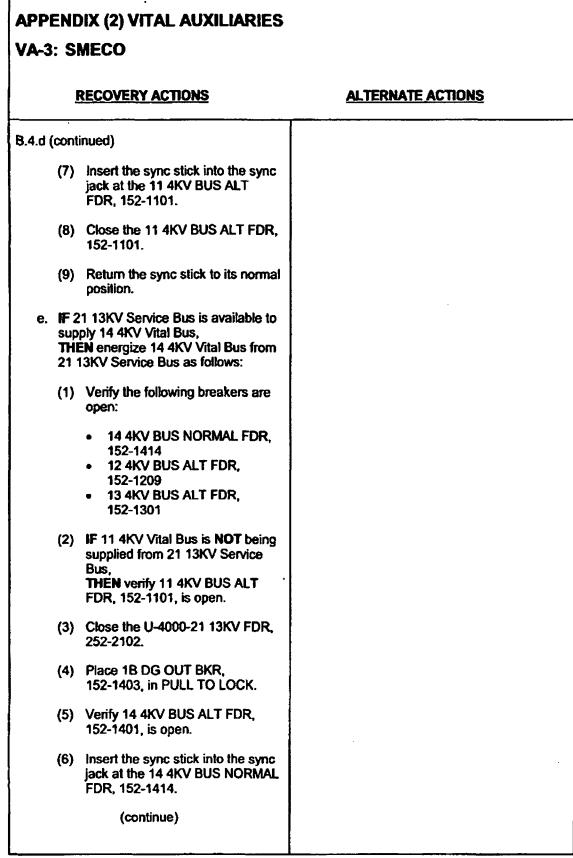
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APPENDIX (2) VITAL AUXILIARIES VA-3: SMECO	Fage 59 01 0
RECOVERY ACTIONS	ALTERNATE ACTIONS
B.4.c (continued)	
(6) Insert the sync stick into the sync jack at the 14 4KV BUS ALT FDR, 152-1401.	
(7) Close the 14 4KV BUS ALT FDR, 152-1401.	
(8) Return the sync stick to its normal position.	
 d. IF 21 13KV Service Bus is available to supply 11 4KV Vital Bus, THEN energize 11 4KV Vital Bus from 21 13KV Service Bus as follows: 	
(1) Verify the following breakers are open:	
 11 4KV BUS ALT FDR, 152-1101 12 4KV BUS ALT FDR, 152-1209 13 4KV BUS ALT FDR, 152-1301 	
 (2) IF 14 4KV Bus is NOT being supplied from 21 13KV Service Bus, THEN verify 14 4KV BUS NORMAL FDR, 152-1414, is open. 	
(3) Close the U-4000-21 13KV FDR, 252-2102.	
(4) Place 1A DG OUT BKR, 152-1703, in PULL TO LOCK.	
(5) Place 13 AFW PP in PULL TO LOCK.	
(6) Verify 11 4KV BUS NORMAL FDR, 152-1115, is open.	
(continue)	

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APPENDIX (2) VITAL AUXILIARIES VA-3: SMECO **RECOVERY ACTIONS ALTERNATE ACTIONS** B.4.e (continued) (7) Close the 14 4KV BUS NORMAL FDR, 152-1414. (8) Return the sync stick to its normal position. 5. IF ANY 125V DC Bus is less than 105 volts: • 11 12 21 • 22 THEN concurrently perform AOP-7J, LOSS OF 120V VITAL AC OR 125V VITAL DC POWER. 6. IF less than THREE 120V AC Vital Buses are energized: 11 12 13 14 THEN concurrently perform AOP-7J, LOSS OF 120V VITAL AC OR 125V VITAL DC POWER. 7. IF at least ONE set of 480V Vital AC Buses is NOT energized: 11A and 11B 14A and 14B THEN restore power to at least ONE set of buses concurrently PER OI-27D, STATION POWER 480V SYSTEM. (continue)

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		RECOVERY ACTIONS	ALTERNATE ACTIONS
3 . ((continu	ed)	
8.		9 and 1Y10 are NOT energized, restore power to at least ONE bus ws:	
	Fee	ergize 1Y09 through its Main eder Breaker by performing the owing actions:	
	(1)	Verify MCC-114R is energized.	
	(2)	Close the Instrument Bus Transformer 11 Feeder Breaker, 52-11429.	
	(3)	Close the Main Feeder Breaker, 79, on 1Y09.	
	Fee	ergize 1Y10 through its Main eder Breaker by performing the owing actions:	
	(1)	Verify MCC-104R is energized.	
	(2)	Close the Instrument Bus Transformer 12 Feeder Breaker, 52-10429.	
	(3)	Close the Main Feeder Breaker, 1, on 1Y10.	
9.	Charge	at least ONE 125V DC Battery er is energized for each battery I-26A, <u>125 VOLT VITAL DC</u> .	

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APPENDIX (2) VITAL AUXILIARIES	
VA-3: SMECO	
RECOVERY ACTIONS	ALTERNATE ACTIONS
C. VERIFY THE SHUTDOWN SEQUENCER LOADS ARE OPERATING AND RESTORE AUXILIARIES.	
 Check the following Shutdown Sequencer Loads are operating: At least ONE SRW PP 	1.1 Concurrently restore the appropriate equipment as follows:
And at least ONE SALTWATER PP on the same header	Service Water Pumps PER AOP-7B, LOSS OF SERVICE WATER
11 or 12 Control Room Ventilation	Saltwater Pumps PER AOP-7A, LOSS OF SALTWATER COOLING
Switchgear Room Ventilation	Control Room Ventilation PER OI-22F, <u>CONTROL ROOM AND</u>
72' Computer Room Ventilation	CABLE SPREADING ROOMS
	Switchgear Room Ventilation PER OI-22H, <u>SWITCHGEAR</u> <u>VENTILATION AND AIR</u> <u>CONDITIONING</u>
	72' Computer Room Ventilation PER OI-22B, <u>AUXILIARY BUILDING &</u> <u>WASTE PROCESSING AREA</u> <u>VENTILATION</u>
<u>NOTE</u> 1B DG will require a SRW and a SW Pump running on its associated supply header.	
 IF 1B DG is running, THEN verify SRW/SW cooling is supplied to 1B DG. 	2.1 IF SRW/SW cooling can NOT be restored to 1B DG, THEN locally trip the 1B DG fuel racks by pushing the EMERGENCY STOP PUSH TO STOP ENGINE trip device.
 IF SIAS has NOT actuated, THEN check at least ONE IA COMPR is running. 	3.1 IF NO IA COMPRs are running AND SIAS has NOT actuated, THEN restart an IA COMPR PER OI-19, INSTRUMENT AIR.
(continue)	

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1 **APPENDIX (2) VITAL AUXILIARIES** VA-3: SMECO **ALTERNATE ACTIONS RECOVERY ACTIONS** C. (continued) 4. IF 13 AFW PP starts AND 11 or 12 AFW PP is operating, THEN secure 13 AFW PP. 5. IF Component Cooling Flow has been lost, THEN restore flow. a. Verify CC CNTMT SUPPLY valve, 1-CC-3832-CV, is shut. b. Start a CC PP. c. Verify the CC HX in service is being supplied from an operating Saltwater Header. NOTE RCP CBO and LOWER SEAL temperatures may be obtained from computer trend block 9. d. Record the highest attained RCP CBO and LOWER SEAL temperatures for each RCP: °F/ ۰F **11A RCP**: •F/] •F 11B RCP: [~]•F/ ۰F 12A RCP: **~F/** ۰F 12B RCP: _ (continue)

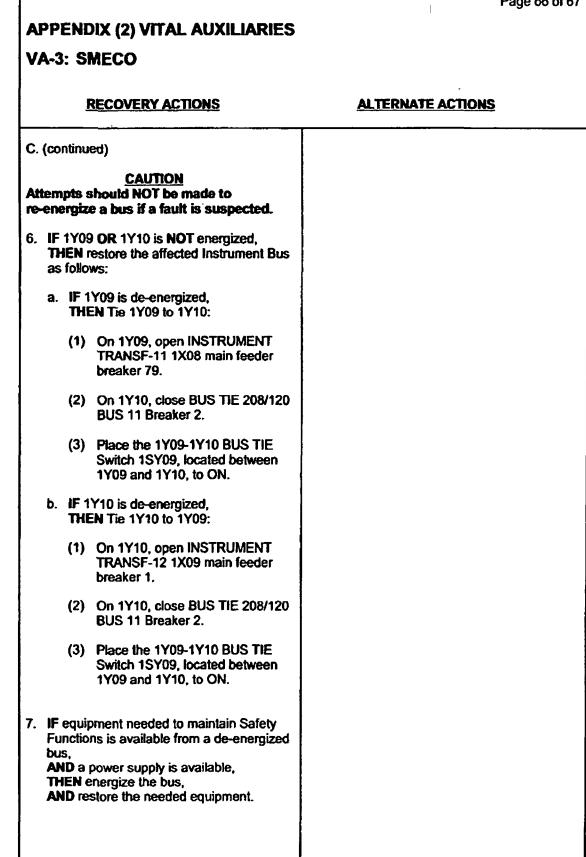
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APPENDIX (2) VITAL AUXILIARIES VA-3: SMECO	
RECOVERY ACTIONS	ALTERNATE ACTIONS
C.5 (continued)	
<u>CAUTION</u> Uncontrolled restoration of cooling to hot RCP seals may cause a water hammer and could result in thermal shock of the RCP seal coolers.	
e. IF ALL RCP LOWER SEAL temperatures are less than 280° F, AND the RCP Controlled Bleed-off temperatures have been recorded, THEN open CC CNTMT SUPPLY valve, 1-CC-3832-CV.	
f. IF ANY RCP LOWER SEAL temperature is greater than 280° F, AND the RCP Controlled Bleed-off temperatures have been recorded, THEN perform the following actions:	
(1) Shut CONTAINMENT SUPPLY HEADER ISOLATION valve, 1-CC-284, located in the 5 ft East Penetration Room.	
(2) Open CC CNTMT SUPPLY valve, 1-CC-3832-CV.	
(3) Slowly open 1-CC-284 to restore component cooling flow.	
(continue)	

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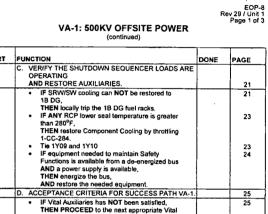
RECOVERY ACTIONS	ALTERNATE ACTIONS
D. ACCEPTANCE CRITERIA FOR SUCCESS PATH VA-3.	
 Check Vital Auxiliaries has been satisfied by the following indications: At least ONE 4KV Vital Bus is energized 11, 12, 21 and 22 125V DC BUS VOLTS ALL greater than 105 volts At least THREE 120V AC Vital Buses are energized: 11 12 13 14 EITHER 1Y09 or 1Y10 is energized WHEN Vital Auxiliaries has been established, THEN PROCEED to the next Safety Function to be performed. 	 1.1 IF Vital Auxiliaries has NOT been satisfied, THEN perform the following actions: a. Concurrently perform the recovery actions for the next safety function to be satisfied. b. Determine the appropriate emergency response actions PER the ERPIP. c. Evaluate further actions based on the following considerations: The urgency of other jeopardized safety function to a success path by use of alternate components to implement a success path

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	RESOURCE CONDITIONS ACCEPTANCE CRITER • At least ONE 500KV Bus is available • At least ONE 4KV vital bus is ene					VA-1: 500KV OF (contin		
		 11, 12, 21 and 22 12, greater than 105 voli At least THREE 120 energized: 11 12 13 14 EITHER 1Y09 or 1Y 	s VAC Vita	l Buses are		START	FUNCTION C. VERIFY THE SHUTDOWN SEC OPERATING AND RESTORE AUXILIARIES. • IF SRW/SW cooling can NO 18 DG, THEN locally trip the 1B DG • IF ANY RCP lower seal term than 280°F.	
START	FUNCTION	<u></u>	DONE	PAGE			THEN rastore Component 1-CC-284. • Tie 1Y09 and 1Y10 • IF equipment needed to m Functions is available from AND a power supply is av THEN energize the bus, AND restore the needed é	
	A. IF 500KV-OFFSITE POWER THEN ALIGN THE ELECTRI POWER RESTORATION.			1				
	Ensure breakers are ope Place 4KV BUS LOC/SE INITIATE keyswitch for 1	SEQUENCER MANUAL		1				
	Place 4KV BUS LOCUSD SEQUENCER MANUAL INITIATE keyswitch for 14 4KV Bus in ON IF a SRW Header is NOT in operation THEN attempt to restart: - 11 SRW Header – CNTMT pressure			4			D. ACCEPTANCE CRITERIA FOR • IF Vital Auxiliaries has NOT THEN PROCEED to the ney Auxiliaries Success Path. Continuously applicable steps are of	
	less than 25 PSIG. 12 SRW Header – C less than 10 PSIG.	NTMT pressure		1		NOTE:	Continuousiy applicable steps are i	
	B. MAINTAIN VITAL AUXILIAR POWER FROM 500KV OFF			6				
	NOTE: The Plant Computer and its ass shed from the DC buses within 30 control room air conditioning is bosi chargers are lost. • IF power is NOT expecte least ONE 4KV Vital Bus THEN perform the follow • Open Control Room	minutes into the blackout if , OR if 12 AND 24 battery d to be restored to at within 30 minutes, ing actions: panel covers		6				
	Shutdown the Unit 1 IF 500KV offsite power is THEN PROCEED to VA- Verify at least ONE 125V energized for each batter	2 OR VA-3. DC Battery Charger is		9 20				
NOTE:	Continuously applicable steps a		n the DO	NE column.				



NOTE: Continuously applicable steps are designated with a "C" in the DONE column.

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	ESOURCE CONDITIONS 3 OR 0C Diesel Generator is ble	ACCEPTANC • At least ONE 4KV vit. • 11, 12, 21 and 22 12 greater than 105 volts • At least THREE 120V energized: • 11 • 12 • 13 • 14 • EITHER 1Y09 or 1Y1	al bus is ei 5V DC Bus 3 / AC Vital	nergized ses, ALL Buses a
START	FUNCTION	· · · ·	DONE	PAGE
	A. ALIGN THE ELECTRICAL ST RESTORATION.	STEM FOR POWER		26
	Ensure breakers are open IF a SRW Header is NOT THEN attempt to restart: 11 SRW Header - C1 less than 25 PSIG. 12 SRW Header - C1 less than 10 PSIG. less than 10 PSIG.	in operation NTMT pressure NTMT pressure		26
	B. MAINTAIN VITAL AUXILIARI GENERATORS.	ES USING THE DIESEL		31
	NOTE: The Plant Computer and its esset shed from the OC buses within 30 m control room air conditioning is leat, chargers are lost. • IF power is NOT expecter least ONE 4KV Vital Bus THEN perform the followin • Open Control Room p • Shutdown the Unit 11	ninutes into the blackout if OR if 12 AND 24 battery d (o be restored to at within 30 minutes, ng actions: pahel covers Piant Computer		31
	 IF a Dieset Generator car least ONE 4KV Vital Bus, THEN PROCEED to VA-3 			34

NOTE: Continuously applicable steps are designated with a "C" in the DONE column.

(continue) ÷

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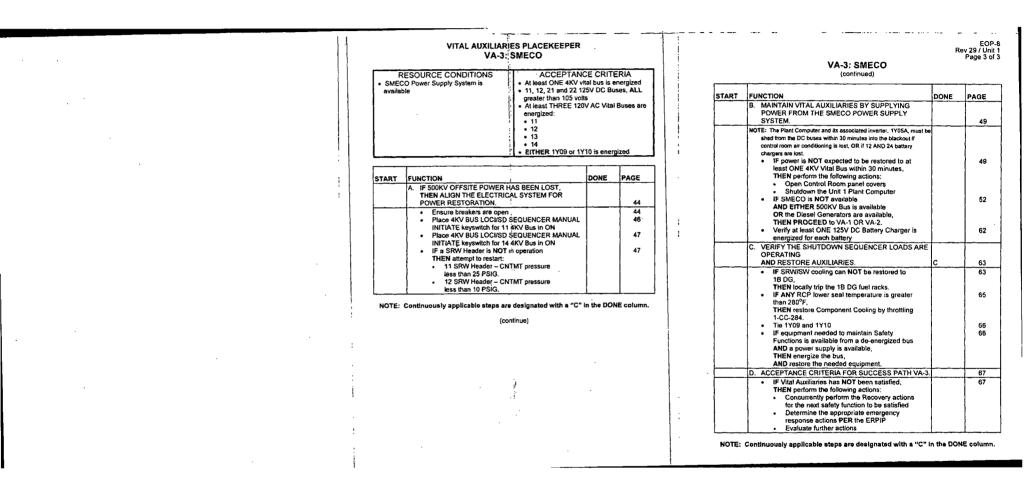
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VA-2: EMERGENCY DIESEL GENERATOR (continued)

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START	FUNCTION	DONE	PAGE
	C. VERIFY THE SHUTDOWN SEQUENCER LOADS ARE OPERATING AND RESTORE AUXILIARIES.	с	39
	IF SRW/SW cooling can NOT be restored to 18 DG, THEN locally trip the 18 DG fuel racks.		39
	IF ANY RCP lower seal temperature is greater than 280°F, THEN restore Component Cooling by throttling 1-CC-284.		41
	Tre 11/09 and 1Y10 IF equipment needed to maintain Safety Functions is available from a de-energized bus AND a power supply is available, THEN energize the bus, AND restore the needed equipment.		42 42
	D. ACCEPTANCE CRITERIA FOR SUCCESS PATH VA-2.		43
	 IF Vital Auxiliaries has NOT been satisfied, THEN PROCEED to the next appropriate Vital Auxiliaries Success Path. 		43

NOTE: Continuously applicable steps are designated with a "C" in the DONE column.



PIC-1:CVCS	
RECOVERY ACTIONS	ALTERNATE ACTIONS
A. ESTABLISH RCS INVENTORY CONTROL USING CVCS.	
 Verify the normal charging path is available for RCS makeup with at least ONE LOOP CHG valve open: 1-CVC-518-CV 1-CVC-519-CV Verify at least ONE CHG PP is operating. (continue) 	 1.1 IF the normal charging path is NOT available, THEN establish charging flow path to 1 RCS via the AUX HPSI HDR as follow a. Shut HPSI AUX HDR ISOL valve, 1-SI-656-MOV. b. Open ONE of the AUX HPSI HDR valves: 1-SI-617-MOV 1-SI-627-MOV 1-SI-637-MOV 1-SI-647-MOV Copen SI TO CHG HDR valve, 1-CVC-269-MOV. d. Shut the REGEN HX CHG INLET valve, 1-CVC-183, located in the 2 West Penetration Room. e. Shut L/D CNTMT ISOL valves: 1-CVC-515-CV 1-CVC-516-CV 1.2 IF a charging flowpath can NOT be established via the AUX HPSI HDR, THEN perform the following: a. Verify REGEN HX CHG INLET valve, 1-CVC-183, is open. b. Charge through the Loop Charging valves Bypass Valve, 1-CVC-188.

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-1: CVCS

RECOVERY ACTIONS

ALTERNATE ACTIONS

A. (continued)	
Verify RCS makeup flow by the following indications:	
 CHG HDR PRESS is greater than RCS pressure Running current for the operating CHG PP(s) is between 75 and 95 AMPS 	
 4. Check pressurizer level has stabilized by observing the following: Level is greater than 30 inches Level is trending to 160 inches Reactor Vessel level above the top of the hot leg 	 4.1 IF pressurizer level has NOT been stabilized, THEN operate charging and letdown to restore and maintain pressurizer level between 130 and 180 inches. 4.2 IF charging is unable to maintain minimum pressurizer level, THEN PROCEED to PIC-4, SIS. 4.3 IF letdown is NOT operating AND the AUX HPSI HDR is NOT being used for charging, THEN restore Letdown flow by performing the following:
(continue)	(continue)

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-1: CVCS

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RECOVERY ACTIONS	ALTERNATE ACTIONS
A.4 (continued)	A.4.3 (continued)
	<u>WARNING</u> High radiation levels in the auxiliary building may result if letdown is initiated with high activity levels in the RCS.
	a. Verify ALL of the following conditions:
	 The leak was NOT in the letdown line
	HPSI throttle criteria are met
	 Charging flow path exists through LOOP CHG valves or AUX SPRAY valve
	 At least ONE CHG PP is operating
	At least ONE CC PP is operating
	 b. Verify selected PRZR LVL CONTR, 1-LIC-110X or 1-LIC-110Y, in Auto Remote.
	c. Place L/D PRESS CONTR, 1-PIC-201, in MANUAL with a 20% output.
	d. Place IX BYPASS valve, 1-CVC-520-CV, in BYPASS.
	e. Shift LETDOWN THROTTLE VLV CONTROLLER, 1-HIC-110, to MANUAL and adjust to 20%.
(continue)	(continue)

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-1: CVCS

RECOVERY ACTIONS	ALTERNATE ACTIONS	
A.4 (continued)	A.4.3 (continued)	
÷	 f. IF the plant computer is NOT operating, THEN record the following information: 	
	RCS T COLD	
	• CHG OUT TEMP (1-TI-229)	
	 Average CNTMT ambient temperature (1-TI-5309 and 1-TI-5311) 	
	 27' Penetration Room temperature (1-TI-5276 and 1-TI-5280) 	
	g. Open L/D CNTMT ISOL valves:	
	 1-CVC-515-CV 1-CVC-516-CV 	
	<u>CAUTION</u> The setpoint of 1-PIC-201 must be above the saturation pressure for the letdown outlet temperature of the Regenerative Heat Exchanger.	
	h. Place Letdown Pressure Controller, 1-PIC-201 in service as follows:	
	(1) Adjust the setpoint on 1-PIC-201 to a value less than RCS pressure but greater than the expected saturation pressure for letdown temperature.	
	(2) Shift Letdown Pressure Controller, 1-PIC-201 to AUTO.	
	i. Adjust LETDOWN THROTTLE VLV CONTROLLER, 1-HIC-110, to slowly restore letdown flow.	
(continue)	(continue)	

APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-1: CVCS

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RECOVERY ACTIONS	ALTERNATE ACTIONS
A.4 (continued)	 A.4.3 (continued) j. Shift LETDOWN THROTTLE VLV CONTROLLER, 1-HIC-110, to AUTOMATIC. k. Operate L/D HX TEMP CONTR, 1-TIC-223, to maintain Letdown Heat Exchanger letdown outlet temperature less than 120° F. I. IF a bubble exists in the pressurizer, THEN check that pressurizer level is trending to 160 inches. m. IF pressurizer level is NOT trending to 160 inches, THEN shift the selected PZR LVL CONTR, 1-LIC-110X or 1-LIC-110Y, to Auto Local AND adjust the setpoint to 160 inches.
(continue)	(continue)

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-1:CVCS

RECOVERY ACTIONS	ALTERNATE ACTIONS
A.4 (continued)	A.4.3 (continued)
	n. IF pressurizer pressure is less than 1000 PSIA, THEN place BOTH Backpressure Regulating valves and Letdown Control Valves in service. (1) Open BOTH Letdown Control
	• 1-CVC-103 • 1-CVC-105
	(2) Check open BOTH Letdown Control Valve Outlet valves:
	 1-CVC-104 1-CVC-106
	(3) Open BOTH Backpressure Regulating Inlet valves:
	 1-CVC-108 1-CVC-110
	(4) Check open BOTH Backpressure Regulating Outlet valves:
	 1-CVC-109 1-CVC-111
	(5) Place L/D CONTR VLVS handswitch, 1-HS-110-1, in BOTH.
	(6) Place BACKPRESS REG VLVS handswitch, 1-HS-201, in BOTH.
(continue)	(continue)

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-1: CVCS <u>RECOVERY ACTIONS</u><u>ALTERNATE ACTIONS</u> A.4 (continued) A.4 (continued)

(continued)	A.4 (continued)
	<u>NOTE</u> Core and RCS voiding may be indicated by the following:
	Letdown flow greater than charging flow
	Rapid unexplained rise in pressurizer level during an RCS pressure reduction
	 Loss of subcooled margin as determined using CET temperatures
	"RXV WTR LVL LO" alarm
	 4.4 IF high pressurizer level condition appears to be caused by excessive RCS voiding, THEN reduce or eliminate voided area PER the selected heat removal success path.
(continue)	

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-1:CVCS

RECOVERY ACTIONS

ALTERNATE ACTIONS

A. (continued)

- IF the RCS is water solid, AND it is desired to draw a bubble in the RCS, THEN perform the following actions:
 - a. Energize the Pressurizer HTR(s).
 - b. **IF EITHER** of the following conditions exist:
 - BOTH S/G pressures can be maintained less than RCS pressure
 - At least ONE RCP is running

THEN draw a bubble in the RCS as follows:

(1) **IF** the HPSJ throttle criteria are met, **THEN** reduce RCS pressure by

reducing HPSI/Charging flow or raising letdown flow.

- (2) Cooldown the RCS, while NOT exceeding 100° F in any one hour, using TBVs or ADVs.
- c. IF a bubble forms in the Pressurizer, THEN operate HPSI/Charging and Letdown as necessary to restore and maintain Pressurizer level between 101 and 180 inches.
- d. IF a bubble forms in the Reactor Vessel Head,
 THEN operate HPSI/Charging and Letdown as necessary to maintain RCS level above the top of the hot leg.

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-1:CVCS

 A. (continued) 6. IF boration is NOT in progress AND the VCT is unable to be used to supply charging. THEN line up charging suction to the RWT as follows: a. Open RWT CHG PP SUCT valve, 1-CVC-504-MOV. b. Shut VCT OUT valve, 1-CVC-501-MOV. c. Observe VCT level is rising. d. Ensure CHG PP(s) current is steady. 7. IF boration is NOT in progress AND the VCT is being used as a charging source, THEN maintain VCT level between 60 and 100 inches using automatic or manual makeup. 7.1 IF makeup is NOT available to the VCT AND VCT level approaches 60 inches, THEN shift Charging Pump(s) suction to the RWT as follows: a. Open RWT CHG PP SUCT valve, 1-CVC-504-MOV. b. Shut VCT OUT valve, 1-CVC-501-MOV. c. Observe VCT level is rising. d. Ensure CHG PP(s) current is steady. e. WHEN VCT level is rising. d. Ensure CHG PP(s) current is steady. e. WHEN VCT level is rising. d. Ensure CHG PP(s) current is steady. e. WHEN VCT level is rising. d. Ensure CHG PP(s) current is steady. f. MHEN VCT level is rising. d. Ensure CHG PP(s) current is steady. makeup. MHEN VCT level is rising. d. Ensure CHG PP(s) current is steady. makeup to the return Charging Pump suction to VCT: (1) Open VCT OUT valve, 1-CVC-501-MOV. (2) Shut RWT CHG PP SUCT valve, 1-CVC-504-MOV. 	RECOVERY ACTIONS	ALTERNATE ACTIONS
	 6. IF boration is NOT in progress AND the VCT is unable to be used to supply charging, THEN line up charging suction to the RWT as follows: a. Open RWT CHG PP SUCT valve, 1-CVC-504-MOV. b. Shut VCT OUT valve, 1-CVC-501-MOV. c. Observe VCT level is rising. d. Ensure CHG PP(s) current is steady. 7. IF boration is NOT in progress AND the VCT is being used as a charging source, THEN maintain VCT level between 60 and 100 inches using automatic or manual 	 AND VCT level approaches 60 inches, THEN shift Charging Pump(s) suction to the RWT as follows: a. Open RWT CHG PP SUCT valve, 1-CVC-504-MOV. b. Shut VCT OUT valve, 1-CVC-501-MOV. c. Observe VCT level is rising. d. Ensure CHG PP(s) current is steady. e. WHEN VCT level rises to 100 inches, THEN return Charging Pump suction to VCT: (1) Open VCT OUT valve, 1-CVC-501-MOV. (2) Shut RWT CHG PP SUCT

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APPENDIX (3) RCS PRESSURE ANI	D INVENTORY CONTROL
PIC-1:CVCS	
RECOVERY ACTIONS	ALTERNATE ACTIONS
B. ESTABLISH RCS PRESSURE CONTROL.	
 IF Pressurizer HTRs OR SPRAYS are available, THEN control pressurizer pressure as follows: IF a cooldown is NOT in progress, THEN operate HTRs and SPRAYs as necessary to maintain pressurizer pressure between 1850 and 2300 PSIA AND is trending to 2250 PSIA. 	 a.1 IF pressurizer pressure is less than 2300 PSIA, AND PORV leakage is indicated by the following indications: Quench Tank Parameters PORV discharge piping temperatures, computer points T107 and T108 Acoustic Monitor indication THEN perform the following: (1) Shut the appropriate PORV BLOCK valves: 1-RC-403-MOV 1-RC-405-MOV (2) Place the appropriate PORV OVERRIDE handswitches in the OVERRIDE TO CLOSE position: 1-HS-1402 1-HS-1404 a.2 IF pressurizer pressure drops to 1725 PSIA as a result of the event, THEN PROCEED to PIC-4, <u>SIS</u>.
(continue)	(continue)

APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-1: CVCS

RECOVER	RY ACTIONS		AL	TERNATE ACTIONS
B.1.a (continued)		A T S	a Pr ND S HEN afety	inued) ressurizer Safety Valve is leaking, SIAS has NOT actuated, attempt to reseat the Pressurizer Valve by reducing pressurizer ure to 1800 PSIA.
b. IF a cooldown THEN perform	n is in progress, n the following:			
between	RCS subcooling 25 and 140° F based on operatures.	(1).1	THE	ubcooling approaches 25° F, EN raise subcooling by ANY of the wing methods:
			(a)	Operate Pressurizer HTR(s).
			(b)	Raise the RCS cooldown rate, while NOT exceeding 100° F in any one hour.
		(1).2	THE	ubcooling approaches 140° F, EN lower subcooling by ANY of the wing methods:
			(a)	De-energize Pressurizer HTR(s).
			(b)	Operate Main or AUX SPRAY.
			(c)	Lower the RCS cooldown rate.
progress	trolled cooldown is in ; ock SIAS as follows:			
A PE recei	N "PZR PRESS BLOCK RMITTED" alarm ved, N block SIAS A.			
B PE recei	N "PZR PRESS BLOCK RMITTED" alarm ved, N block SIAS B.			
(Cd	ontinue)			

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-1: CVCS

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.1 (continued)

c. IF pressure reduction is desired AND Main Pressurizer Spray is ineffective in controlling pressurizer pressure, THEN initiate AUX SPRAY as follows:

CAUTION

If the difference between the PRZR WTR TEMP and CHG OUT TEMP is greater than 400° F, then TRM 15.4.2 must be complied with.

- (1) Record the following information:
 - PRZR WTR TEMP (1-TI-101)
 - CHG OUT TEMP (1-TI-229)
- (2) Open AUX SPRAY valve, 1-CVC-517-CV.
- (3) Operate LOOP CHG valves as necessary to adjust AUX SPRAY flow:
 - 1-CVC-518-CV
 - 1-CVC-519-CV
- (4) Shift PRESSURIZER SPRAY VLV CONTROLLER, 1-HIC-100, to MANUAL.
- (5) Shut PRZR SPRAY VLVs by adjusting the output of 1-HIC-100 to 0%:
 - 1-RC-100E-CV
 - 1-RC-100F-CV
- (6) Maintain pressurizer cooldown rate less than 200° F/hour.

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL

PIC-1:CVCS

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.1 (continued)

NOTE

Pressurizer Backup Heater Banks 11 and 13 trip on U/V and SIAS.

- d. IF Pressurizer BACKUP HTR banks have tripped on U/V, THEN re-energize the heaters as follows:
 - (1) Charge closing spring using manual lever at 480V breakers 52-1127 and 52-1427.
 - (2) Push the PUSH-TO-CLOSE button on the breaker fronts.
- e. Verify RCS pressure and temperature are within the limits **PER** ATTACHMENT (1), <u>RCS PRESSURE</u> <u>TEMPERATURE LIMITS</u>.

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-1:CVCS

RECOVERY ACTIONS

ALTERNATE ACTIONS

B. (continued)

- 2. IF Pressurizer HTRs and SPRAYS are NOT available. THEN control pressurizer pressure using controlled steaming as follows:
 - a. IF RCS boration is NOT in progress, THEN commence RCS boration as follows:
 - (1) Shut VCT M/U valve, 1-CVC-512-CV.
 - (2) Open BA DIRECT M/U valve, 1-CVC-514-MOV.
 - (3) Open BAST GRAVITY FD valves:
 - 1-CVC-508-MOV
 - 1-CVC-509-MOV
 - (4) Verify the M/U MODE SEL SW, 1-HS-210, is in MANUAL.
 - (5) Start ALL available BA PPs.
 - (6) Shut VCT OUT valve, 1-CVC-501-MOV.
 - (7) Start ALL available CHG PPs.
 - b. Record the time RCS boration was commenced:
 - c. Record BAST levels:

 - 11 BAST: _____
 12 BAST: _____

(continue)

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-1:CVCS

RECOVERY ACTIONS ALTERNATE ACTIONS B.2 (continued) d. Continue boration until ONE of the following conditions is met: (1) 116 percent of the shutdown margin requirement has been achieved PER the NEOPs. (2) BAST level has been lowered a total of 108 inches (3) Boration has been in progress as follows: For 53 minutes if THREE CHG PPs are operating • For 80 minutes if TWO CHG PPs are operating For 160 minutes if ONE CHG PP is operating e. WHEN boration is complete, THEN secure boration as follows: (1) Open VCT OUT valve, 1-CVC-501-MOV. (2) Stop BA PP(s). (3) Shut BA DIRECT M/U valve, 1-CVC-514-MOV. (4) Shut BAST GRAVITY FD valves: 1-CVC-508-MOV • 1-CVC-509-MOV f. Allow pressurizer level to lower during the cooldown as necessary to aid in RCS depressurization, while maintaining pressurizer level greater than 30 inches. (continue)

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-1:CVCS

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.2 (continued)

- g. IF SGIS has NOT actuated, THEN perform the following actions:
 - WHEN "SGIS A BLOCK PERMITTED" alarm is received, THEN block SGIS A.
 - WHEN "SGIS B BLOCK PERMITTED" alarm is received, THEN block SGIS B.
- h. IF SIAS has NOT actuated, THEN block SIAS as follows:
 - WHEN "PZR PRESS BLOCK A PERMITTED" alarm received, THEN block SIAS A.
 - WHEN "PZR PRESS BLOCK B PERMITTED" alarm received, THEN block SIAS B.
- i. Commence RCS cooldown to less than 300° F using the TURB BYP valves **OR** the ADV(s) from the unaffected S/G(s), while **NOT** exceeding 100° F in any one hour.

NOTE

If a Pressurizer Safety Valve is leaking, reducing pressurizer pressure may reseat the Pressurizer Safety Valve.

j. Control the cooldown rate in order to maintain RCS pressure and temperature **PER** ATTACHMENT (1), <u>RCS PRESSURE TEMPERATURE</u> <u>LIMITS</u>.

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL

PIC-1:CVCS

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.2 (continued)

<u>NOTE</u>

If rapid pressure excursions due to RCS inventory or temperature changes have occurred, consider the RCS water solid.

 k. IF a bubble exists in the Pressurizer
 OR the Reactor Vessel Head,
 THEN restore and maintain subcooling between 25 and 140° F based on CET temperatures as follows:

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 methods:

NOTE

Pressurizer Backup Heater Banks 11 and 13 trip on U/V and SIAS.

- (a) Energize the Pressurizer HTR(s).
- (b) IF HPSI flow has been reduced, THEN raise HPSI flow by opening HPSI HDR valves which have been throttled or starting HPSI PPs which have been stopped.
- (c) Raise RCS cooldown rate, while NOT exceeding 100° F in any one hour, by using the ADV from the unaffected S/G.

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-1: CVCS

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.2.k(1) (continued)

(d) IF high pressurizer level secures the backup CHG PPs AND more than ONE CHG

PP is required to maintain subcooling, **THEN** perform the following

actions:

- 1) Locally initiate SIAS A6 and B6.
- IF boration is NOT in progress, THEN place the BA PP handswitches in PULL TO LOCK.
- (2) IF subcooling can NOT be maintained above 25° F, THEN attempt to take the pressurizer solid to establish RCS pressure control as follows:
 - (a) Station a dedicated pressure control watch at 1C05 and 1C06 panels.
 - (b) Verify letdown is operating.
 - (c) WHEN pressurizer level is above 305 inches, THEN secure ALL but ONE CHG PP by placing their handswitches in PULL TO LOCK.

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-1: CVCS

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RECOVERY ACTIONS

ALTERNATE ACTIONS

B.2.k(2) (continued)

- (d) Charge as necessary with ONE CHG PP to maintain the following:
 - RCS subcooling at least 25° F based on CET temperatures
 - RCS pressure within the limits **PER** ATTACHMENT (1), <u>RCS</u> <u>PRESSURE</u> <u>TEMPERATURE LIMITS</u>
- (3) Lower subcooling by **ANY** of the following methods:
 - (a) De-energize the Pressurizer HTR(s).
 - (b) IF ALL RCPs are operating, THEN use MAIN PRESSURIZER SPRAY.
 - (c) Lower the RCS cooldown rate.
 - (d) IF the overpressurization is due to HPSI/Charging flow AND the HPSI throttle criteria are met, THEN throttle or secure flow to restore subcooling.
 - (e) Raise the letdown flow rate.

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-1:CVCS

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.2.k(3) (continued)

- (f) Initiate AUX SPRAY as follows:
 - 1) Place the 1-IA-2080-MOV CIS OVERRIDE switch, 1-HS-2080A, in OVERRIDE.
 - 2) Open the IA CNTMT ISOL valve, 1-IA-2080-MOV.

CAUTION

If the difference between the PRZR WTR TEMP and CHG OUT TEMP is greater than 400° F, then TRM 15.4.2 must be complied with.

- 3) Record the following information:
 - PRZR WTR TEMP (1-TI-101)
 - CHG OUT TEMP (1-TI-229)
- 4) Open the AUX SPRAY valve, 1-CVC-517-CV.
- 5) Operate the LOOP CHG valves as necessary to adjust AUX SPRAY flow:
 - 1-CVC-518-CV
 - 1-CVC-519-CV
- 6) Shift the PRESSURIZER SPRAY VLV CONTROLLER, 1-HIC-100, to MANUAL.

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL

PIC-1:CVCS

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.2.k(3)(f) (continued)

- 7) Shut the PRESSURIZER SPRAY VLVS by adjusting the output of 1-HIC-100 to 0%:
 - 1-RC-100E-CV
 - 1-RC-100F-CV
- Maintain the pressurizer cooldown rate less than 200° F/hour.
- I. IF the RCS is water solid, THEN restore and maintain subcooling between 25 and 140° F based on CET temperatures as follows:
 - (1) Lower subcooling by **ANY** of the following methods:
 - (a) Lower RCS temperature.
 - (b) IF the overpressurization is due to HPSI/Charging flow AND the HPSI throttle criteria are met, THEN throttle or secure flow to restore subcooling.
 - (c) De-energize the Pressurizer HTR(s).

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL

PIC-1:CVCS

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.2.I (continued)

CAUTION

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

- (2) Raise subcooling by **ANY** of the following methods:
 - (a) Raise RCS temperature.
 - (b) IF HPSI flow has been reduced, THEN raise HPSI flow by opening HPSI HDR valves which have been throttled or starting HPSI PPs which have been stopped.

NOTE

Pressurizer Backup Heater Banks 11 and 13 trip on U/V and SIAS.

(c) Energize the Pressurizer HTR(s).

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-1: CVCS

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.2 (continued)

NOTE

Core and RCS voiding may be indicated by the following:

- Letdown flow greater than charging flow
- Rapid unexplained rise in pressurizer level during an RCS pressure reduction
- Loss of subcooled margin as determined using CET temperatures
- "RXV WTR LVL LO" alarm
 - m. IF voiding causes difficulty in depressurization,
 THEN reduce or eliminate the voided area by performing the following actions:
 - (1) Shut the L/D CNTMT ISOL valves:
 - 1-CVC-515-CV
 - 1-CVC-516-CV
 - (2) Stop depressurizing the RCS.

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APPENDIX (3) RCS PRESSURE ANI	_
PIC-1:CVCS	
RECOVERY ACTIONS	ALTERNATE ACTIONS
B.2.m (continued)	
<u>CAUTION</u> The potential exists for pressurized thermal shock from an excessive cooldown rate followed by a repressurization.	
(3) Cycle RCS subcooling between 25 and 140° F as follows:	(3).1 IF cycling RCS subcooling is ineffective, THEN operate RX VESS VENT valves
 (a) Raise RCS subcooling to as near 140° F as practical by ANY of the following methods: 	PER the <u>VENTING THE REACTOR</u> <u>COOLANT SYSTEM AFTER AN</u> <u>ACCIDENT</u> section of OI-1G.
<u>NOTE</u> Pressurizer Backup Heater Banks 11 and 13 trip on U/V and SIAS.	
Energize the Pressurizer HTR(s)	
Secure Pressurizer SPRAY	
 Raise RCS cooldown rate while maintaining cooldown less than 100° F in any one hour 	
 IF HPSI flow has been reduced, THEN raise HPSI flow by opening HPSI HDR valves which have been throttled, OR starting HPSI PPs which have been stopped. 	
(continue)	

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL

PIC-1:CVCS

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.2.m(3) (continued) (b) Lower RCS subcooling to as near 25° F as practical by ANY of the following methods: De-energize the • Pressurizer HTR(s) **Operate Pressurizer** • SPRAY Secure RCS cooldown ٠ IF HPSI throttle criteria . are met. THEN throttle the HPSI HDR valves, **OR** stop the HPSI PPs one at a time (c) Repeat steps B.2.m.(3).(a) through B.2.m.(3).(b) as necessary. (continue)

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL

PIC-1:CVCS

RECOVERY ACTIONS

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ALTERNATE ACTIONS

B.2.m (continued)

NOTE

Voids may form in the S/G Tubes if saturation pressure of a S/G is greater than saturation pressure of RCS.

CAUTION

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

- (4) IF voiding is suspected in the S/G tubes,
 THEN cool the S/G so RCS cooldown rate remains less than 100° F in any one hour by raising ANY of the following:
 - Steaming rate
 - Feed rate
 - S/G Blowdown rate
- (5) Monitor Pressurizer level and Reactor Vessel level for inventory trends.

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APPENDIX (3) RCS PRESSURE ANI	D INVENTORY CONTROL
PIC-1:CVCS	
RECOVERY ACTIONS	ALTERNATE ACTIONS
C. ACCEPTANCE CRITERIA FOR SUCCESS PATH PIC-1.	
 Check RCS Pressure And Inventory Control is satisfied by the following indications: Pressurizer pressure less than the upper limits PER ATTACHMENT (1), <u>RCS PRESSURE TEMPERATURE LIMITS</u> Pressurizer level is greater than 30 inches RCS subcooling is between 25 and 140° F based on CET temperatures Reactor Vessel level above the top of the hot leg IF RCS Pressure And Inventory Control has been established, THEN PROCEED to the next Safety Function to be satisfied. 	1.1 IF RCS Pressure And Inventory Control has NOT been satisfied, THEN PROCEED to the next appropriate RCS Pressure and Inventory Control Success Path.

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EOP-8 Rev 33/Unit 1 Page 28 of 88 **APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-2: PORVs or PRESSURIZER VENT** RECOVERY ACTIONS **ALTERNATE ACTIONS** Α. ESTABLISH RCS INVENTORY CONTROL. 1. IF pressurizer pressure is less than or equal to 1725 PSIA **OR** containment pressure is greater than or equal to 2.8 PSIG, THEN verify SIAS actuation. 2. IF pressurizer pressure is greater than 1725 PSIA AND containment pressure is less than 2.8 PSIG. THEN perform the following actions to block SIAS: a. Open MAIN and AUX HPSI HDR valves: MAIN 1-SI-616-MOV 1-SI-626-MOV 1-SI-636-MOV 1-SI-646-MOV AUX 1-SI-617-MOV 1-SI-627-MOV 1-SI-637-MOV 1-SI-647-MOV b. Start 11 and 13 HPSI PPs. c. Start ALL available CHG PPs. d. WHEN the "PZR PRESS BLOCK A PERMITTED" alarm is received. THEN block SIAS A. e. WHEN the "PZR PRESS BLOCK B PERMITTED" alarm is received, THEN block SIAS B. (continue)

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APPENDIX (3) RCS PRESSURE ANI	.
PIC-2: PORVs or PRESSURIZER VE	
RECOVERY ACTIONS	ALTERNATE ACTIONS
A.2 (continued)	
 f. WHEN pressure is below 1270 PSIA, THEN verify appropriate HPSI flow PER ATTACHMENT(10), <u>HIGH</u> <u>PRESSURE SAFETY INJECTION</u> <u>FLOW</u>. 3. IF SIAS has actuated, THEN perform the following actions: 	
a. Verify the following pumps are running:	
11 HPSI PP13 HPSI PP	
11 LPSI PP12 LPSI PP	
ALL available CHG PPs	
b. Verify safety injection flow:	b.1 Perform the following actions as necessary:
 HPSI flow PER ATTACHMENT(10), <u>HIGH</u> <u>PRESSURE SAFETY INJECTION</u> <u>FLOW</u>, when pressure is below 	IF 11 HPSI PP failed, THEN start 12 HPSI PP.
 LPSi flow PER 	IF 13 HPSI PP failed, THEN align 12 HPSI PP as follows:
ATTACHMENT(11), LOW PRESSURE SAFETY INJECTION	(1) Start 12 HPSI PP.
FLOW, when pressure is below 185 PSIA	(2) Open HPSI HDR XCONN valve, 1-SI-653-MOV.
	(3) Shut HPSI HDR XCONN valve, 1-SI-655-MOV.
	 Ensure electrical power is available to valves and pumps.
	 Verify safety injection system lineup PER ATTACHMENT (2), <u>SIAS</u> <u>VERIFICATION CHECKLIST</u>.
(continue)	

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-2: PORVs or PRESSURIZER VENT

RECOVERY ACTIONS

ALTERNATE ACTIONS

A. (continued)

- 4. IF HPSI PPs are operating AND ALL of the following conditions can be maintained:
 - At least 25° F subcooling based on CET temperatures
 - Pressurizer level greater than 101 inches {141}
 - At least ONE S/G available for heat removal
 - S/G level greater than (-)170 inches
 - capable of being supplied with feedwater
 - capable of being steamed
 - Reactor Vessel level above the top of the hot leg
 - Reactivity Control Safety Funtion Acceptance Criteria are met

THEN HPSI flow may be reduced by throttling the HPSI HDR valves, or stopping the HPSI PPs one at a time, as desired, to maintain the following:

- RCS subcooling between 25 and 140° F based on CET temperatures
- Pressurizer level between
 101 inches {141} and 180 inches {190}
- 5. IF pressurizer pressure is greater than 200 PSIA and constant OR rising, THEN the operating LPSI PPs may be stopped.

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-2: PORVs or PRESSURIZER VENT **RECOVERY ACTIONS ALTERNATE ACTIONS** A. (continued) 6. IF HPSI or LPSI throttle criteria can NOT be maintained after the pumps are throttled or secured, **THEN** restart the appropriate pumps AND restore full flow. 7. Restore and maintain Pressurizer Level 7.1 IF pressurizer level can NOT be restored between 101 inches {141} and 180 inches above 101 inches {141}, {190} by operating SIS, charging, and if THEN continue to maximize safety available, letdown. injection flow. 8. IF SIAS has NOT actuated. 8.1 IF makeup is NOT available to the VCT THEN maintain VCT level between 60 and AND VCT level approaches 60 inches, THEN shift Charging Pump(s) suction to 100 inches using automatic or manual the RWT as follows: makeup. a. Open RWT CHG PP SUCT valve, 1-CVC-504-MOV. b. Shut VCT OUT valve, 1-CVC-501-MOV. c. Observe VCT level is rising. d. Ensure CHG PP(s) current is steady. e. WHEN VCT level rises to 100 inches, THEN return Charging Pump suction to VCT: (1) Open VCT OUT valve, 1-CVC-501-MOV. (2) Shut RWT CHG PP SUCT valve, 1-CVC-504-MOV.

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-2: PORVs or PRESSURIZER VENT				
RECOVERY ACTIONS	ALTERNATE ACTIONS			
B. ESTABLISH RCS PRESSURE CONTROL USING PORVs OR PRESSURIZER VENT.				
 IF pressurizer pressure rises to 2400 PSIA, THEN perform the following: Verify BOTH PORV OVERRIDE handswitches in the AUTO position: 	 1.1 IF PORVs do NOT open automatically, THEN perform the following: a. Place the PORV OVERRIDE handswitches in MANUAL OPEN: 1-HS-1402 1-HS-1404 b. Verify BOTH PORVs are open. c. Reduce pressure such that: Pressurizer pressure is less than 2300 PSIA RCS pressure is within the limits PER ATTACHMENT (1), RCS PRESSURE TEMPERATURE LIMITS RCS subcooling is less than 140° F based on CET temperatures d. Place the PORV OVERRIDE handswitches in AUTO: 1-HS-1402 1-HS-1404 			
(continue)				

EOP-8 Rev 33/Unit 1 Page 33 of 88 APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL **ALTERNATE ACTIONS**

PIC-2: PORVs or PRESSURIZER VENT

RECOVERY ACTIONS

B. (continued)

- 2. Restore and maintain RCS subcooling within the following limits:
 - Pressurizer pressure less than 2300 PSIA
 - RCS pressure within the limits PER ATTACHMENT (1), RCS PRESSURE **TEMPERATURE LIMITS**
 - RCS subcooling between 25 and 140° F based on CET temperatures
 - a. IF Pressurizer level is less than 305 inches. **THEN** lower pressure and subcooling with the PORVs as follows:
 - (1) Verify the PORV BLOCK valves are OPEN:
 - 1-RC-403-MOV
 - 1-RC-405-MOV
 - (2) Place ONE PORV OVERRIDE handswitch in MANUAL OPEN:
 - 1-HS-1402
 - 1-HS-1404
 - (3) IF a second PORV is needed to lower pressure OR subcooling, THEN place the other PORV **OVERRIDE** handswitch in MANUAL OPEN.
 - (4) Start ALL available CNTMT AIR CLRs in HIGH with maximum SRW flow.

- a.1 IF PORVs are NOT available. THEN depressurize the RCS with the PRZR VENT valves as follows:
 - (1) Open the QUENCH TK VENT TO CNTMT 1-RC-402-SV.
 - (2) Open the PRZR VENT valves to lower pressure and subcooling:
 - 1-RC-105-SV
 - 1-RC-106-SV
 - (3) IF Pressurizer level approaches 305 inches **OR** Pressurizer Vents are NOT required to be open. THEN perform the following:
 - (a) Shut the PRZR VENT valves:
 - 1-RC-105-SV
 - 1-RC-106-SV
 - (b) Shut the QUENCH TK VENT TO CNTMT, 1-RC-402-SV.

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-2: PORVs or PRESSURIZER VENT

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.2 (continued)

- b. IF PORVs must remain open for heat removal PER HR-4, <u>ONCE-THROUGH-COOLING</u>, THEN IMPLEMENT RCS Pressure and Inventory Control Success Path PIC-4, <u>SIS</u>.
- c. IF Pressurizer level approaches 305 inches, OR PORVs are NOT required to be open, THEN close the PORVs by performing the following:
 - (1) Place the PORV OVERRIDE handswitches in AUTO:
 - 1-HS-1402
 - 1-HS-1404
 - (2) IF the PORV(s) will NOT shut OR the Acoustic Monitor indicates flow through a PORV, THEN shut the affected PORV BLOCK valve.

REC	OVERY ACTIONS		AL	TERNATE ACTIONS
B.2 (continued))			
shock from an	<u>CAUTION</u> exists for pressurized thermal n excessive cooldown rate repressurization.			
	ubcooling by ANY of the g methods:			
• • •	sure the PORVs and PRZR ENT valves are shut.			
Pressurizer Ba trip on U/V and	NOTE ckup Heater Banks 11 and 13 I SIAS.			
(2) En	ergize the Pressurizer HTR(s).	(2).1	2).1 IF Pressurizer BACKUP HTR bar have tripped on U/V, THEN re-energize the heaters as follows:	
			(a)	Charge closing spring using manual lever at 480V break 52-1127 and 52-1427.
			(b)	Push the PUSH-TO-CLOSE on the breaker fronts.
TH HF be	HPSI flow has been reduced, IEN raise HPSI flow by opening PSI HDR valves which have en throttled or starting HPSI Ps which have been stopped.			
NC ho	ise RCS cooldown rate, while DT exceeding 100° F in any one ur, by using the ADV from the affected S/G.			
(5) Re	educe letdown flow.			

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL					
PIC-2: PORVs or PRESSURIZER VENT					
RECOVERY ACTIONS	ALTERNATE ACTIONS				
C. PREPARE FOR RAS ACTUATION					
 WHEN RWT level drops to 4 feet, THEN perform the following actions: a. IF CSAS has NOT actuated, THEN place BOTH CS PPs in PULL TO LOCK. 					
 b. Place the SI PP RECIRC LOCKOUT switches in ON. 					
c. Check HPSI flow is greater than 90 GPM per pump, OR check the HPSI PPs have been secured.	 c.1 IF HPSI flow is less than 90 GPM per pump AND the HPSI throttle criteria have been met, THEN perform the following actions: (1) IF the CHG PPs are operating, THEN turn off ONE CHG PP at a time until HPSI flow is at least 90 GPM per pump. (2) IF HPSI flow is still less than 90 GPM per pump with ALL CHG PPs secured, THEN turn off ONE HPSI PP at a time until HPSI flow is greater than 90 GPM per pump. 				

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL						
PIC-2: PORVs or PRESSURIZER VENT						
RECOVERY ACTIONS	ALTERNATE ACTIONS					
D. VERIFY CONTAINMENT SUMP LEVEL AND RAS ACTUATION.						
1. Observe Containment Sump level rises as RWT level lowers.	 1.1 IF Containment Sump level does NOT rise as RWT level lowers, THEN perform the follows actions: a. Maintain RWT level greater than 2 feet by replenishment from ANY available source. <u>NOTE</u> Leakage location may be indicated by sump alarms or room level alarms. b. Determine the cause for the leakage and attempt to isolate it. 					
(continue)						

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-2: PORVs or PRESSURIZER VENT

RECOVERY ACTIONS

ALTERNATE ACTIONS

D. (continued)

- 2. WHEN RWT level drops to 0.75 feet OR the "ACTUATION SYS RAS TRIP" alarm is received, THEN perform the following actions:
 - a. Verify RAS actuation.
 - b. Check a minimum containment sump level of at least 28 inches is indicated on the CNTMT WR WATER LVL indication, 1-LI-4146 or 1-LI-4147.
 - c. Verify RAS lineup **PER** ATTACHMENT (6), <u>RAS</u> <u>VERIFICATION CHECKLIST</u>.
 - d. IF RAS lineup is verified, THEN shut the RWT OUT valves:
 - 1-SI-4142-MOV
 - 1-SI-4143-MOV

EOP-8 Rev 33/Unit 1 Page 39 of 88 APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-2: PORVs or PRESSURIZER VENT **RECOVERY ACTIONS ALTERNATE ACTIONS** D.2 (continued) e. Verify Component Cooling in service e.1 IF NO CC PPs are operating, as follows: THEN restore Component Cooling PER AOP-7C, LOSS OF COMPONENT (1) Throttle open BOTH CC HX COOLING WATER. SALTWATER OUT valves: e.2 IF Component Cooling can NOT be 1-HIC-5206 restored, 1-HIC-5208 THEN align a CS PP for Safety Injection as follows: (2) Verify BOTH CC HX CC OUT valves are open: (1) Notify the Operational Support Center to check radiation levels are 1-CC-3824-CV low enough for valve repositioning. 1-CC-3826-CV (3) Verify TWO CC PPs in operation. WARNING Do NOT continue with this step until the **Operational Support Center has** determined radiation levels are low enough for valve repositioning. (2) Stop ONE CS PP. (3) Shut SDC Hx Out To CS Valve for the SDC Hx associated with the CS Pump. (11 SDC Hx) 1-SI-319 (12 SDC Hx) 1-SI-329 (4) Open SDC Hx Inlet X-Conn Valve for the SDC Hx associated with the CS Pump. (11 SDC Hx) 1-SI-452 (12 SDC Hx) 1-SI-453 (5) Open SDC HX LPSI INL valve. 1-SI-658-MOV. (6) Start the CS PP. (7) Stop ALL running HPSI PPs. (continue)

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APPENDIX (3) RCS PRESSURE AND	D INVENTORY CONTROL
PIC-2: PORVs or PRESSURIZER VE	NT
RECOVERY ACTIONS	ALTERNATE ACTIONS
D.2 (continued)	
<u>CAUTION</u> Minimum HPSI Pump flow is 90 GPM to prevent pump damage.	
 f. IF TWO HPSI PPs are running, THEN throttle HPSI flow to achieve 250 GPM through each of the four headers. 	 f.1 IF HPSI flow of 250 GPM to each header can NOT be achieved, THEN throttle HPSI flow equally among the four headers.
	f.2 IF HPSI flow indication has been lost, THEN perform the following:
	NOTE It is desired to secure 11 HPSI PP due to HPSI flow indication and MOV POSITION indicators associated with 11 HPSI PP are powered from 1Y09.
	(1) Secure ONE HPSI PP.
	(2) Throttle HPSI MOVs equally among the four headers to maintain the following:
	NO HPSI PP cavitation
	 CETs less than 50° F superheated
	Core covered
 g. IF ONE HPSt PP is running, THEN throttle HPSI flow to achieve 150 GPM through each of the four headers. 	 g.1 IF HPSI flow of 150 GPM to each header can NOT be achieved, THEN throttle HPSI flow equally among the four headers.
(continue)	(continue)

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APPENDIX (3) RCS PRESSURE ANI	D INVENTORY CONTROL
PIC-2: PORVs or PRESSURIZER VE	NT
RECOVERY ACTIONS	ALTERNATE ACTIONS
D.2.g (continued)	D.2.g (continued)
	g.2 IF HPSI flow indication has been lost, THEN throttle HPSI MOVs equally among the four headers to maintain the following:
	NO HPSI PP cavitation
	CETs less than 50° F superheated
	Core covered
 IF a loss of ECCS pump suction is indicated during recirculation by ANY of the following: 	
Lower or unstable HPSI or CS flow	
 Lower or unstable HPSI or CS PP discharge pressure 	
 Lower or unstable HPSI or CS PP motor current 	
HPSI or CS PP noise	
THEN take actions to prevent HPSI and CS PP damage, AND maintain adequate core cooling by performing the following:	
(1) Throttle HPSI flow equally among the four headers to the minimum allowed PER ATTACHMENT(10), <u>HIGH PRESSURE SAFETY</u> INJECTION FLOW.	(1).1 IF HPSI flow indication has been lost, THEN throttle HPSI MOVs equally among the four headers to maintain the following:
	NO HPSI PP cavitation
	CETs less than 50° F superheated
	Core covered
(continue)	

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-2: PORVs or PRESSURIZER VENT RECOVERY ACTIONS ALTERNATE ACTIONS D.2.h (continued) (2) IF HPSI or CS PP performance is NOT acceptable, THEN perform the following: (a) Stop BOTH CS PPs. (b) Check acceptable HPSI PP IF HPSI PP performance is NOT (b).1 performance. acceptable, THEN stop the HPSI PP(s). (c) Notify the Plant Technical Support Center. i. Commence ECCS Pump Room cooling as follows: (1) Open the ECCS AIR CLR INL/OUT VLVs: 1-SW-5170-CV • 1-SW-5171-CV • 1-SW-5173-CV (2) Start 11 EAST and 12 WEST ECCS PP RM CLG FANs. Place the ECCS PP RM EXH FILT in j. service. (continue)

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APPENDIX (3) RCS PRESSURE AND) INVENTORY CONTROL
PIC-2: PORVs or PRESSURIZER VE	NT
RECOVERY ACTIONS	ALTERNATE ACTIONS
D.2 (continued)	
k. Maintain SRW and Component Cooling temperatures by performing the following:	
 Adjust the CC HX SALTWATER OUT valves to maintain Component Cooling temperature less than 120° F: 	
 1-HIC-5206 1-HIC-5208 	
(2) IF EITHER SRW HX SW BYPASS valve is in AUTO, THEN adjust the setpoint as necessary to maintain SRW temperature less than 105° F:	
 1-PIC-5154 1-PIC-5157 	
<u>NOTE</u> The current maximum SW header pressure limits are recorded on the Shift Turnover Sheet.	
(3) Verify SW HDR PRESS less than the maximum SW header pressure limit.	
I. IF CHG PPs are aligned with suction from the RWT, THEN place the CHG PPs in PULL TO LOCK.	
(continue)	

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APPENDIX (3) RCS PRESSURE AN	-
PIC-2: PORVs or PRESSURIZER VE	INT
RECOVERY ACTIONS	ALTERNATE ACTIONS
D.2 (continued) <u>CAUTION</u> Minimum HPSI Pump flow is 90 GPM to prevent pump damage.	
m. Ensure HPSI PP flow is at least 90 GPM during recirculation.	 m.1 IF HPSI flow is less than 90 GPM per pump during recirculation AND HPSI throttle criteria have been met, THEN perform the following actions: (1) IF CHG PPs are operating, THEN turn off ONE CHG PP at a time until HPSI flow is at least 90 GPM per pump. (2) IF HPSI flow is still less than 90 GPM per pump with ALL CHG PPs secured, THEN turn off ONE HPSI PP at a time until HPSI flow is greater than 90 GPM per pump.
E. IF RAS ACTUATED, THEN REFILL THE RWT.	
1. Contact the Operational Support Center to check radiation levels are low enough to allow valve repositioning.	
2. WHEN SIAS has been reset, THEN initiate actions to makeup to the RWT PER OI-2B, <u>CVCS BORATION</u> , <u>DILUTION AND MAKEUP OPERATIONS</u> .	
3. Notify the Plant Technical Support Center to review ERPIP-611, <u>SEVERE</u> <u>ACCIDENT MANAGEMENT</u> <u>RESTORATIVE ACTIONS</u> for alternate methods to refill the RWT AND actions to inject directly to the RCS bypassing the RWT.	

	RECOVERY ACTIONS	ALTERNATE ACTIONS
F.	ACCEPTANCE CRITERIA FOR SUCCESS PATH PIC-2.	
	 Check RCS Pressure And Inventory Control is satisfied by the following indications: Pressurizer pressure is less than 2400 PSIA Pressurizer pressure less than the upper limits PER ATTACHMENT (1), <u>RCS PRESSURE TEMPERATURE LIMITS</u> RCS subcooling is between 25 and 140° F based on CET temperatures Pressurizer level is greater than 30 inches {90} Reactor Vessel level above the top of the hot leg 	1.1 IF RCS Pressure And Inventory Contro has NOT been satisfied, THEN PROCEED to the next appropriate RCS Pressure and Invento Control Success Path.
	IF RCS Pressure And Inventory Control has been established, THEN PROCEED to the next Safety Function to be satisfied.	

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-3: LOSS OF VITAL AC

RECOVERY ACTIONS

ALTERNATE ACTIONS

A. ESTABLISH RCS PRESSURE AND INVENTORY CONTROL DURING LOSS OF VITAL AC

- 1. Minimize RCS inventory loss by performing the following:
 - a. Shut L/D CNTMT ISOL valves:
 - 1-CVC-515-CV
 - 1-CVC-516-CV
 - b. Maintain an RCP Bleedoff flowpath:
 - (1) Verify RCP BLEED-OFF RELIEF ISOL, 1-CVC-507-CV, is open.
 - (2) Shut RCP BLEED-OFF ISOL valves:
 - 1-CVC-505-CV
 - 1-CVC-506-CV
 - (3) Open 11 RCDT DRN TO CNTMT FLOOR valve, 1-RCW-4258-SV.
 - c. Shut RCS SAMPLE ISOL valve, 1-PS-5464-CV.
 - d. Verify RX VESS VENT and PRZR VENT valves are shut:
 - 1-RC-103-SV
 - 1-RC-104-SV
 - 1-RC-105-SV
 - 1-RC-106-SV

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APPENDIX (3) RCS PRESSURE ANI	D INVENTORY CONTROL
PIC-3: LOSS OF VITAL AC	
RECOVERY ACTIONS	ALTERNATE ACTIONS
A. (continued)	
NOTE If needed, refer to ATTACHMENT(12), <u>PROCEDURE TO LOCALLY READ CORE</u> <u>EXIT THERMOCOUPLES</u> to read CETs.	
2. IF RCS subcooling drops to 25° F, THEN cooldown the RCS PER the selected Heat Removal success path to maintain the following conditions:	 2.1 IF 25° F subcooling can NOT be maintained, THEN continue RCS heat removal using two-phase natural circulation PER the selected Heat Removal success path
Subcooling between 25 and 50° F	AND ensure the following:
 RCS cooldown rate less than 100° F in any one hour 	 At least ONE S/G has level between (-)24 inches {0}and (+)30 inches {(+)38}
 S/G level between (-)24 and (+)30 inches 	OR S/G level is being restored by feedwater flow
 SUR negative, or SUR zero with WRNI Power less than 10⁻⁴% 	 CET temperatures are less than 50° F superheated
 T_{COLD} greater than NEOP-13, figure titled, <u>MINIMUM ALLOWED</u> <u>RCS TEMPERATURE TO ENSURE</u> <u>1%Δρ SHUTDOWN vs. BURNUP</u> 	
3. IF a controlled cooldown is in progress, THEN block SIAS as follows:	
WHEN "PZR PRESS BLOCK A PERMITTED" alarm received, THEN block SIAS A.	
WHEN "PZR PRESS BLOCK B PERMITTED" alarm received, THEN block SIAS B.	
(continue)	

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-3: LOSS OF VITAL AC

RECOVERY ACTIONS

ALTERNATE ACTIONS

A. (continued)

- WHEN at least ONE 4KV Vital Bus has been re-energized, THEN restore RCP Bleedoff flowpath to the VCT by performing the following actions:
 - a. Open RCP BLEED-OFF ISOL valves:
 - 1-CVC-505-CV
 - 1-CVC-506-CV
 - b. Shut 11 RCDT DRN TO CNTMT FLOOR valve, 1-RCW-4258-SV.
- WHEN at least ONE 4KV Vital Bus has been re-energized, THEN IMPLEMENT ONE of the following success paths as appropriate:
 - PIC-1, <u>CVCS</u>
 - PIC-2, <u>PORVs or PRESSURIZER</u>
 <u>VENT</u>
 - PIC-4, <u>SIS</u>

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-3: LOSS OF VITAL AC		
RECOVERY ACTIONS	ALTERNATE ACTIONS	
B. ACCEPTANCE CRITERIA FOR SUCCESS PATH PIC-3.		
 Check RCS Pressure And Inventory Control is satisfied by the following indications: Pressurizer pressure less than the upper limits PER ATTACHMENT (1), <u>RCS PRESSURE TEMPERATURE LIMITS</u> RCS subcooling greater than 25 based on CET temperatures OR CET temperatures less than 50° F superheated Reactor Vessel level indicates the core is covered IF RCS Pressure And Inventory Control has been established, THEN PROCEED to the next Safety Function to be satisfied. 	1.1 IF RCS Pressure And Inventory Control has NOT been satisfied, THEN PROCEED to the next appropriate RCS Pressure and Inventory Control Success Path.	

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL

PIC-4: SIS

RECOVERY ACTIONS	ALTERNATE ACTIONS
A. ESTABLISH RCS PRESSURE AND INVENTORY CONTROL USING SIS.	
 IF pressurizer pressure is less than or equal to 1725 PSIA OR containment pressure is greater than or equal to 2.8 PSIG, THEN verify SIAS actuation. 	
 2. IF pressurizer pressure is greater than 1725 PSIA AND containment pressure is less than 2.8 PSIG, THEN perform the following actions to block SIAS: a. Open MAIN and AUX HPSI HDR valves: MAIN 1-SI-616-MOV 1-SI-626-MOV 1-SI-636-MOV 1-SI-646-MOV AUX 1-SI-617-MOV 1-SI-627-MOV 1-SI-637-MOV 1-SI-647-MOV 	
 b. Start 11 and 13 HPSI PPs. c. Start ALL available CHG PPs. 	
d. WHEN the "PZR PRESS BLOCK A PERMITTED" alarm is received, THEN block SIAS A.	
e. WHEN the "PZR PRESS BLOCK B PERMITTED" alarm is received, THEN block SIAS B. (continue)	

DECOVERY ACTIONS	
RECOVERY ACTIONS	ALTERNATE ACTIONS
(continued)	
f. WHEN pressure is below 1270 PSIA, THEN verify appropriate HPSI flow PER ATTACHMENT(10), <u>HIGH</u> <u>PRESSURE SAFETY INJECTION</u> <u>FLOW</u> .	
IF SIAS has actuated, THEN perform the following actions:	
a. Verify the following pumps are running:	
11 HPSI PP13 HPSI PP	
11 LPSI PP12 LPSI PP	
ALL available CHG PPs	
(continue)	
(continue)	

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL

PIC-4: SIS

RECOVERY ACTIONS

ALTERNATE ACTIONS

A.3 (continued)

- b. Verify safety injection flow:
 - HPSI flow **PER** ATTACHMENT(10), <u>HIGH</u>
 <u>PRESSURE SAFETY INJECTION</u>
 <u>FLOW</u>, when pressure is below
 1270 PSIA
 - LPSI flow **PER** ATTACHMENT(11), <u>LOW</u>
 <u>PRESSURE SAFETY INJECTION</u>
 <u>FLOW</u>, when pressure is below
 185 PSIA
- b.1 Perform the following actions as necessary:

CAUTION

Operation of two HPSI Pumps on 14 4KV Bus may cause 1B DG loading to exceed 3600 KW.

- IF 11 HPSI PP failed, THEN perform the following actions:
 - IF 1B DG is powering 14 4KV Bus, THEN verify DG load is less than 2960 KW.
 - (2) Start 12 HPSI PP.
- IF 13 HPSI PP failed, THEN align 12 HPSI PP as follows:
 - (1) Start 12 HPSI PP.
 - (2) Open HPSI HDR XCONN valve, 1-SI-653-MOV.
 - (3) Shut HPSI HDR XCONN valve, 1-SI-655-MOV.
- Ensure electrical power is available to valves and pumps.
- Verify safety injection system lineup PER ATTACHMENT (2), <u>SIAS</u> <u>VERIFICATION CHECKLIST</u>.

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL

PIC-4:SIS

RECOVERY ACTIONS

ALTERNATE ACTIONS

A. (continued)

 IF high RCS pressure is preventing adequate SIS flow to support heat removal,

THEN attempt to depressurize the RCS to obtain adequate SIS flow by concurrently performing actions **PER** the following:

- RCS Pressure And Inventory Control success paths as necessary
- The selected Core And RCS Heat Removal success path

NOTE

If rapid pressure excursions due to RCS inventory or temperature changes have occurred, consider the RCS water solid.

5. IF a bubble exists in the Pressurizer OR the Reactor Vessel Head, THEN maintain subcooling as low as possible AND within the following limits:

AND within the following limits:

- Between 25 and 140° F based on CET temperatures
- RCS pressure greater than the NPSH limits PER ATTACHMENT (1), <u>RCS</u> <u>PRESSURE TEMPERATURE LIMITS</u>

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL

PIC-4: SIS

RECOVERY ACTIONS

ALTERNATE ACTIONS

A.5 (continued)

- a. Lower subcooling by **ANY** of the following methods:
 - (1) De-energize the Pressurizer HTR(s).
 - (2) **IF ALL** RCPs are operating, **THEN** use MAIN PRESSURIZER SPRAY.
 - (3) Lower the RCS cooldown rate.
 - (4) IF the overpressurization is due to HPSI/Charging flow
 AND the HPSI throttle criteria are met,
 THEN throttle or secure flow to restore subcooling.

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL

PIC-4: SIS

RECOVERY ACTIONS

ALTERNATE ACTIONS

A.5.a (continued)

- (5) Initiate AUX SPRAY as follows:
 - (a) Place the 1-IA-2080-MOV CIS OVERRIDE switch, 1-HS-2080A, in OVERRIDE.
 - (b) Open the IA CNTMT ISOL valve, 1-IA-2080-MOV.

CAUTION

If the difference between the PRZR WTR TEMP and CHG OUT TEMP is greater than 400° F, then TRM 15.4.2 must be complied with.

- (c) Record the following information:
 - PRZR WTR TEMP
 (1-TI-101)
 - CHG OUT TEMP (1-TI-229)
- (d) Open the AUX SPRAY valve, 1-CVC-517-CV.
- (e) Operate the LOOP CHG valves as necessary to adjust AUX SPRAY flow:
 - 1-CVC-518-CV
 - 1-CVC-519-CV
- (f) Shift the PRESSURIZER SPRAY VLV CONTROLLER, 1-HIC-100, to MANUAL.
- (g) Shut the PRZR SPRAY VLVs by adjusting the output of 1-HIC-100 to 0%:
 - 1-RC-100E-CV
 - 1-RC-100F-CV

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-4: SIS

RECOVERY ACTIONS

ALTERNATE ACTIONS

A.5.a(5) (continued)

(h) Maintain the pressurizer cooldown rate less than 200° F/hour.

CAUTION

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

b. Raise subcooling by **ANY** of the following methods:

NOTE

Pressurizer Backup Heater Banks 11 and 13 trip on U/V and SIAS.

- (1) Energize the Pressurizer HTR(s).
- (2) IF HPSI flow has been reduced, THEN raise HPSI flow by opening HPSI HDR valves which have been throttled or starting HPSI PPs which have been stopped.
- (3) Raise RCS cooldown rate, while NOT exceeding 100° F in any one hour, by using the ADV from the unaffected S/G.

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL

PIC-4:SIS

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RECOVERY ACTIONS

ALTERNATE ACTIONS

A. (continued)

- IF the RCS is water solid, THEN maintain subcooling within the following limits:
 - Between 25 and 140° F based on CET temperatures
 - RCS pressure greater than the NPSH limits **PER** ATTACHMENT (1), <u>RCS</u> <u>PRESSURE TEMPERATURE LIMITS</u>
 - a. Lower subcooling by **ANY** of the following methods:
 - (1) Lower RCS temperature.
 - (2) IF the overpressurization is due to HPSI/Charging flow
 AND the HPSI throttle criteria are met,
 THEN throttle or secure flow to restore subcooling.
 - (3) De-energize the Pressurizer HTR(s).

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL

PIC-4:SIS

RECOVERY ACTIONS

ALTERNATE ACTIONS

A.6 (continued)

CAUTION

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

- b. Raise subcooling by **ANY** of the following methods:
 - (1) Raise RCS temperature.
 - (2) IF HPSI flow has been reduced, THEN raise HPSI flow by opening HPSI HDR valves which have been throttled or starting HPSI PPs which have been stopped.

NOTE

Pressurizer Backup Heater Banks 11 and 13 trip on U/V and SIAS.

(3) Energize the Pressurizer HTR(s).

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL

PIC-4: SIS

RECOVERY ACTIONS	ALTERNATE ACTIONS
A. (continued)	
 7. IF the RCS is water solid, AND it is desired to draw a bubble in the RCS, THEN perform the following actions: 	
<u>NOTE</u> Pressurizer Backup Heater Banks 11 and 13 trip on U/V and SIAS.	
a. Energize the Pressurizer HTR(s).	
b. IF EITHER of the following conditions exist:	
BOTH S/G pressures can be maintained less than RCS pressure	
At least ONE RCP is running	
THEN draw a bubble in the RCS as follows:	
 (1) IF the HPSI throttle criteria are met, THEN reduce RCS pressure by reducing HPSI/Charging flow or raising letdown flow. 	
(2) Cooldown the RCS, while NOT exceeding 100° F in any one hour, using TBVs or ADVs.	
c. IF a bubble forms in the Pressurizer, THEN operate HPSI/Charging and Letdown as necessary to restore and maintain Pressurizer level between 101 inches {141} and 180 inches {190}.	
(continue)	

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-4: SIS

RECOVERY ACTIONS

ALTERNATE ACTIONS

A.7 (continued)

- d. IF a bubble forms in the Reactor Vessel Head,
 THEN operate HPSI/Charging and Letdown as necessary to maintain RCS level above the top of the hot leg.
- IF a bubble exists in the Pressurizer AND HPSI flow has been secured, THEN restore and maintain Pressurizer Level between 101 inches {141} and 180 inches {190} by operating charging, and if available, letdown.

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL

PIC-4:SIS

RECOVERY ACTIONS

ALTERNATE ACTIONS

A. (continued)

- 9. WHEN ALL of the following conditions can be maintained:
 - At least 25° F subcooling based on CET temperatures
 - Pressurizer level greater than 101 inches {141}
 - At least ONE S/G available for heat removal
 - S/G level greater than (-)170 inches
 - capable of being supplied with feedwater
 - capable of being steamed
 - Reactor Vessel level above the top of the hot leg
 - Reactivity Control Safety Funtion Acceptance Criteria are met

THEN HPSI flow may be reduced by throttling the HPSI HDR valves, or stopping the HPSI PPs one at a time, as desired, to maintain the following:

- RCS subcooling between 25 and 140° F based on CET temperatures
- Pressurizer level between 101 inches {141} and 180 inches {190}
- 10. IF pressurizer pressure is greater than 200 PSIA and constant OR rising, THEN the operating LPSI PPs may be stopped.

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL

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PIC-4:SIS

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RECOVERY ACTIONS	ALTERNATE ACTIONS
 A. (continued) 11. IF HPSI or LPSI throttle criteria can NOT be maintained after the pumps are throttled or secured, THEN restart the appropriate pumps AND restore full flow. 	
B. IF ONCE-THROUGH-COOLING IS NOT IN PROGRESS, THEN IDENTIFY LOCATION OF LEAK.	
 Attempt leak isolation: Verify L/D CNTMT ISOL valves are shut: 1-CVC-515-CV 1-CVC-516-CV Check there is NO PORV leakage by the following indications: Quench Tank Parameters PORV discharge piping temperatures, computer points T107 and T108 Acoustic Monitor indication Shut RCS SAMPLE ISOL valve, 1-PS-5464-CV. (continue) 	 b.1 IF PORV leakage is indicated AND PZR pressure is less than 2300 PSIA, THEN perform the following: (1) Shut the appropriate PORV BLOCK valves: 1-RC-403-MOV 1-RC-405-MOV (2) Place the appropriate PORV OVERRIDE handswitches in the OVERRIDE TO CLOSE position: 1-HS-1402 1-HS-1404

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL

PIC-4: SIS

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.1 (continued) d. Shut RX VESS VENT valves:

- 1-RC-103-SV
- 1-RC-104-SV
- e. Shut PRZR VENT valves:
 - 1-RC-105-SV
 - 1-RC-106-SV
- f. IF leakage into Component Cooling is indicated by:
 - Rise on UNIT 1 CC radiation monitor, 1-RI-3819
 - "CC HEAD TK LVL" high alarm

AND shutting the L/D CNTMT ISOL valves did NOT isolate the leak, THEN perform the following:

- (1) Trip ALL RCPs.
- (2) Shut the CC CNTMT SUPPLY and RETURN valves:
 - 1-CC-3832-CV
 - 1-CC-3833-CV
- g. IF the leak has been isolated AND SIAS has NOT actuated, THEN perform the following actions:
 - (1) Stop the HPSI PPs **PER** step A.9.
 - (2) Shut MAIN and AUX HPSI HDR valves.
 - (3) Verify the Safety Function Status Check Acceptance Criteria for PIC-1, <u>CVCS</u>, are satisfied.
 - (4) **IMPLEMENT** PIC-1, <u>CVCS</u>.

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-4: SIS

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RECOVERY ACTIONS	ALTERNATE ACTIONS
B. (continued)	
 IF a LOCA inside containment can NOT be determined by: 	
 Rise in containment temperature, pressure, humidity or sump level 	
 UNIT 1 WIDE RANGE NOBLE GAS MON and UNIT 1 MAIN VENT GASEOUS alarms clear 	
THEN perform the following actions:	
a. Place BOTH PENETRATION RM VENT FANs in service.	
<u>NOTE</u> Leakage location may be indicated by sump alarms, room level alarms, or area RMS alarms.	
b. Attempt to locate and isolate the leak.	
 Maintain RWT level greater than 2 feet by replenishment from ANY available source. 	
 Observe Containment Sump level rises as RWT level lowers. 	3.1 IF Containment Sump level does NOT rise as RWT level lowers, THEN perform the follows actions:
	a. Maintain RWT level greater than 2 feet by replenishment from ANY available source.
	NOTE Leakage location may be indicated by sump alarms or room level alarms.
	b. Determine the cause for the leakage and attempt to isolate it.

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APPENDIX (3) RCS PRESSURE AN	
PIC-4:SIS	
RECOVERY ACTIONS	ALTERNATE ACTIONS
C. PREPARE FOR RAS ACTUATION	
1. WHEN RWT level drops to 4 feet, THEN perform the following actions:	
a. IF CSAS has NOT actuated, THEN place BOTH CS PPs in PULL TO LOCK.	
b. Place the SI PP RECIRC LOCKOUT switches in ON.	
c. Check HPSI flow is greater than 90 GPM per pump, OR check the HPSI PPs have been secured.	 c.1 IF HPSI flow is less than 90 GPM per pump AND the HPSI throttle criteria have been met, THEN perform the following actions: (1) IF the CHG PPs are operating, THEN turn off ONE CHG PP at a time until HPSI flow is at least 90 GPM per pump. (2) IF HPSI flow is still less than 90 GPM per pump with ALL CHG PPs secured, THEN turn off ONE HPSI PP at a time until HPSI flow is greater than 90 GPM per pump.
D. VERIFY RAS ACTUATION.]
 WHEN RWT level drops to 0.75 feet OR the "ACTUATION SYS RAS TRIP" alarm is received, THEN perform the following actions: verify RAS actuation. (continue) 	

EOP-8 Rev 33/Unit 1 Page 66 of 88 APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-4:SIS **RECOVERY ACTIONS ALTERNATE ACTIONS** D.1 (continued) b. Check a minimum containment sump level of at least 28 inches is indicated on the CNTMT WR WATER LVL indication, 1-LI-4146 or 1-LI-4147. 03300 c. Verify the CNTMT SUMP DISCH valves open: 1-SI-4144-MOV 1-SI-4145-MOV d. Shut the RWT OUT valves: 1-SI-4142-MOV 1-SI-4143-MOV e. Verify RAS lineup PER e.1 IF a LPSI PP does NOT stop, THEN place the LPSI PP handswitch in ATTACHMENT (6), RAS VERIFICATION CHECKLIST. PULL TO LOCK. 11 LPSI PP, 1-HS-302X 12 LPSI PP, 1-HS-302Y CAUTION 03300 LPSI flow must be reduced to less than 600 GPM within 4 hours post-RAS to ensure adequate HPSI NPSH. e.2 IF a LPSI PP continues to run with the LPSI PP handswitch in PULL TO LOCK, THEN perform the following actions: (1) Attempt to locally open the LPSI PP breaker: NO. 11 LOW PRESS SAFETY • INJ PUMP, 152-1104 NO. 12 LOW PRESS SAFETY INJ PUMP, 152-1404 (continue) (continue)

EOP-8 Rev 33/Unit 1 Page 67 of 88 **APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL** PIC-4: SIS **RECOVERY ACTIONS ALTERNATE ACTIONS** D.1.e (continued) D.1.e.2 (continued) (2) IF the LPSI PP breaker can NOT be 03300 opened locally, THEN throttle LPSI flow to 600 GPM: (a) Shut THREE LPSI HDR valves: 1-SI-615-MOV . 1-SI-625-MOV 1-SI-635-MOV 1-SI-645-MOV (b) Throttle the remaining LPSI HDR valve to 600 GPM. f. Verify Component Cooling in service f.1 IF NO CC PPs are operating, as follows: THEN restore Component Cooling PER AOP-7C, LOSS OF COMPONENT (1) Throttle open BOTH CC HX **COOLING WATER.** SALTWATER OUT valves: f.2 IF Component Cooling can NOT be 1-HIC-5206 restored. 1-HIC-5208 THEN align a CS PP for Safety Injection as follows: (2) Verify BOTH CC HX CC OUT valves are open: (1) Notify the Operational Support Center to check radiation levels are 1-CC-3824-CV low enough for valve repositioning. • 1-CC-3826-CV (3) Verify TWO CC PPs in operation. WARNING Do NOT continue with this step until the **Operational Support Center has** determined radiation levels are low enough for valve repositioning. (2) Stop ONE CS PP. (continue) (continue)

APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-4: SIS

RECOVERY ACTIONS	ALTERNATE ACTIONS
D.1.f (continued)	D.1.f.2 (continued)
	(3) Shut SDC Hx Out To CS Valve for the SDC Hx associated with the CS Pump.
	 (11 SDC Hx) 1-SI-319 (12 SDC Hx) 1-SI-329
	(4) Open SDC Hx Inlet X-Conn Valve for the SDC Hx associated with the CS Pump.
	 (11 SDC Hx) 1-SI-452 (12 SDC Hx) 1-SI-453
	(5) Open SDC HX LPSI INL valve, 1-SI-658-MOV.
	(6) Start the CS PP.
	(7) Stop ALL running HPSI PPs.
<u>CAUTION</u> Minimum HPSI Pump flow is 90 GPM to prevent pump damage.	
g. IF TWO HPSI PPs are running, THEN throttle HPSI flow to achieve 250 GPM through each of the four headers.	 g.1 IF HPSI flow of 250 GPM to each header can NOT be achieved, THEN throttle HPSI flow equally among the four headers.
(continue)	(continue)

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-4: SIS

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RECOVERY ACTIONS	ALTERNATE ACTIONS
D.1.g (continued)	D.1.g (continued) g.2 IF HPSI flow indication has been lost, THEN perform the following:
	<u>NOTE</u> It is desired to secure 11 HPSI PP due to HPSI flow indication and MOV POSITION indicators associated with 11 HPSI PP are powered from 1Y09.
	 (1) Secure ONE HPSI PP. (2) Throttle HPSI MOVs equally among the four headers to maintain the following:
	 NO HPSI PP cavitation CETs less than 50° F superheated
	Core covered
 h. IF ONE HPSI PP is running, THEN throttle HPSI flow to achieve 150 GPM through each of the four headers. 	h.1 IF HPSI flow of 150 GPM to each header can NOT be achieved, THEN throttle HPSI flow equally among the four headers.
	h.2 IF HPSI flow indication has been lost, THEN throttle HPSI MOVs equally among the four headers to maintain the following:
	NO HPSI PP cavitation
	CETs less than 50° F superheated
	Core covered
(continue)	

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-4: SIS

RECOVERY ACTIONS	ALTERNATE ACTIONS	
D.1 (continued)		
<u>NOTE</u> HPSI MOVs should be throttled at least 30% open throughout a large-break LOCA to prevent MOV erosion and/or plugging.		03300
i. Check HPSI MOVs with flow are at least 30% open.	i.1 Adjust HPSI MOV(s) as necessary while maintaining header flow at the required flow.	
	i.2 Monitor HPSI flow for indications of MOV erosion (higher flow), and/or plugging (lower or erratic flow).	
 JF a loss of ECCS pump suction is indicated during recirculation by ANY of the following: 		
Lower or unstable HPSI or CS flow		
 Lower or unstable HPSI or CS PP discharge pressure 		
Lower or unstable HPSI or CS PP motor current		
HPSI or CS PP noise		
THEN take actions to prevent HPSI and CS PP damage, AND maintain adequate core cooling by performing the following:		
(1) Throttle HPSI flow equally among the four headers to the minimum allowed PER ATTACHMENT(10), <u>HIGH PRESSURE SAFETY</u>	(1).1 IF HPSI flow indication has been lost, THEN throttle HPSI MOVs equally among the four headers to maintain the following:	
INJECTION FLOW.	NO HPSI PP cavitation	
	 CETs less than 50° F superheated 	
	Core covered	
(continue)		

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL

PIC-4: SIS

<u></u>	RECOVERY ACTIONS		ALTERNATE ACTIONS
D.1.j (conti	nued)		
(2)	IF HPSI or CS PP performance is NOT acceptable, THEN perform the following:		
	(a) Stop BOTH CS PPs.		
	(b) Check acceptable HPSI PP performance.	(b).1	IF HPSI PP performance is NOT acceptable, THEN stop the HPSI PP(s).
	(c) Notify the Plant Technical Support Center.	- 	
	nmence ECCS Pump Room ling as follows:		
(1)	Open the ECCS AIR CLR INL/OUT VLVs:		
	 1-SW-5170-CV 1-SW-5171-CV 1-SW-5173-CV 		
(2)	Start 11 EAST and 12 WEST ECCS PP RM CLG FANs.	1	
	ce the ECCS PP RM EXH FILT in vice.		
	(continue)		

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-4: SIS

RECOVERY ACTIONS

ALTERNATE ACTIONS

D.1 (continued)

- m. Maintain SRW and Component Cooling temperatures by performing the following:
 - (1) Adjust the CC HX SALTWATER OUT valves to maintain Component Cooling temperature less than 120° F:
 - 1-HIC-5206
 - 1-HIC-5208
 - (2) IF EITHER SRW HX SW BYPASS valve is in AUTO, THEN adjust the setpoint as necessary to maintain SRW temperature less than 105° F:
 - 1-PIC-5154
 - 1-PIC-5157

NOTE

The current maximum SW header pressure limits are recorded on the Shift Turnover Sheet.

- (3) Verify SW HDR PRESS less than the maximum SW header pressure limit.
- n. IF CHG PPs are aligned with suction from the RWT, THEN place the CHG PPs in PULL TO LOCK.

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APPENDIX (3) RCS PRESSURE ANI	D INVENTORY CONTROL
PIC-4: SIS	,
RECOVERY ACTIONS	ALTERNATE ACTIONS
D.1 (continued)	
<u>CAUTION</u> Minimum HPSI Pump flow is 90 GPM to prevent pump damage.	
o. Ensure HPSI PP flow is at least 90 GPM during recirculation.	 o.1 IF HPSI flow is less than 90 GPM per pump during recirculation AND HPSI throttle criteria have been met, THEN perform the following actions: (1) IF CHG PPs are operating, THEN turn off ONE CHG PP at a time until HPSI flow is at least 90 GPM per pump. (2) IF HPSI flow is still less than 90 GPM per pump with ALL CHG PPs secured, THEN turn off ONE HPSI PP at a time until HPSI flow is greater than 90 GPM per pump.
E. PROTECT ECCS PUMPS FROM OVERHEATING	
 IF ANY ECCS Pumps are operating, THEN protect the ECCS Pumps from overheating by commencing ECCS Pump Room cooling as follows: a. Open the ECCS AIR CLR INL/OUT VLVs: 1-SW-5170-CV 1-SW-5171-CV 1-SW-5173-CV b. Start 11 EAST and 12 WEST ECCS PP RM CLG FANs. 	

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-4: SIS		
RECOVERY ACTIONS	ALTERNATE ACTIONS	
F. IF RAS ACTUATED, THEN REFILL THE RWT.		
 Contact the Operational Support Center to check radiation levels are low enough to allow valve repositioning. 		
2. WHEN SIAS has been reset, THEN initiate actions to makeup to the RWT PER OI-2B, <u>CVCS BORATION,</u> <u>DILUTION AND MAKEUP OPERATIONS</u> .		
3. Notify the Plant Technical Support Center to review ERPIP-611, <u>SEVERE</u> <u>ACCIDENT MANAGEMENT</u> <u>RESTORATIVE ACTIONS</u> for alternate methods to refill the RWT AND actions to inject directly to the RCS bypassing the RWT.	- -	
G. COMMENCE CORE FLUSH.		
 IF the elapsed time from SIAS actuation is between 8 and 11 hours, AND ANY of the following conditions exist: RCS subcooling is less than 25° F based on CET temperatures Pressurizer level is less than 30 inches {90} Reactor vessel level below the top of the hot leg THEN commence core flush by lining up for Pressurizer Injection as follows: 	 1.1 IF Pressurizer Injection is NOT adequate AND the following conditions are met: RCS pressure is less than 270 PSIA {245} RCS pressure minus containment pressure is less than 75 PSID HPSI PP(s) are available THEN line up for Hot Leg Injection as follows: a. Place the selected LPSI PP RAS OVERRIDE switch in OVERRIDE. 	
a. Check TWO HPSI PPs are available. (continue)	(continue)	

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL

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PIC-4:SIS

	RECOVERY ACTIONS	ALTERNATE ACTIONS
G.1 (c	ontinued)	G.1.1 (continued)
c. d.	 Open the SI TO CHG HDR valve, 1-CVC-269-MOV. IF CIS has actuated, AND IA CNTMT ISOL valve, 1-IA-2080-MOV is shut, THEN perform the following actions: (1) Place the 1-IA-2080-MOV CIS OVERRIDE switch, 1-HS-2080A, in OVERRIDE. (2) Open IA CNTMT ISOL valve, 1-IA-2080-MOV. Shut LOOP CHG valves: 1-CVC-518-CV 1-CVC-519-CV Shut the PRESSURIZER SPRAY VLVS by adjusting the output of 1-HIC-100 to 0%: 1-RC-100E-CV 1 PC 100E CV 	 b. Verify the CNTMT SUMP DISCH valves are open: 1-SI-4144-MOV 1-SI-4145-MOV C. Open SDC RECIRC ISOL valve, 1-SI-399-MOV. d. Shut LPSI HDR valves: 1-SI-615-MOV 1-SI-625-MOV 1-SI-635-MOV 1-SI-645-MOV 1-SI-645-MOV 1-SI-645-MOV 1-SI-651-MOV breaker, 52-11466 1-SI-652-MOV breaker, 52-10424 f. Open SDC HDR RETURN ISOL valves: 1-SI-651-MOV 1-SI-651-MOV 1-SI-651-MOV
f.	 1-RC-100F-CV Verify HPSI AUX HDR ISOL valve, 1-SI-656-MOV, is open. 	 1-SI-652-MOV g. Start the selected LPSI PP.
g .	Open AUX SPRAY valve, 1-CVC-517-CV.	h. Maintain a flowrate of at least 150 GPM.
	(continue)	(continue)

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL

PIC-4: SIS

RECOVERY ACTIONS	ALTERNATE ACTIONS	
G.1 (continued)	G.1.1 (continued)	
h. IF 13 HPSI PP is available, THEN perform the following actions:	1.2 IF only ONE HPSI PP is available, AND Hot Leg Injection is NOT available, THEN commence pressurizer injection as follows:	
(1) Verify 13 HPSI PP is running.(2) Verify HPSI HDR XCONN valve,	a. Open SI TO CHG HDR valve, 1-CVC-269-MOV.	
1-SI-653-MOV, is shut.	b. IF CIS has actuated,	
(3) Shut AUX HPSI HDR valves:1-SI-617-MOV	AND IA CNTMT ISOL valve, 1-IA-2080-MOV is shut, THEN perform the following actions:	
1-SI-627-MOV1-SI-637-MOV	(1) Place 1-IA-2080-MOV CIS	
• 1-SI-647-MOV (4) Verify 11 or 12 HPSI PP is	OVERRIDE switch, 1-HS-2080A, in OVERRIDE.	
running.	(2) Open IA CNTMT ISOL valve, 1-IA-2080-MOV.	
(5) IF approximately 150 GPM is NOT indicated THEN initiate Hot Leg Injection.	c. Shut LOOP CHG valves:	
i. IF 13 HPSI PP is NOT available, THEN perform the following actions:	 1-CVC-518-MOV 1-CVC-519-MOV 	
(1) Verify 12 HPSI PP is running.	 d. Shut the PRZR SPRAY VLVs by adjusting the output of 1-HIC-100 to 0%: 	
(2) Verify HPSI HDR XCONN valve, 1-SI-653-MOV, is open.	 1-RC-100E-CV 1-RC-100F-CV 	
(3) Verify HPSI HDR XCONN valve, 1-SI-655-MOV, is shut.	e. Verify HPSI AUX HDR ISOL valve,	
(4) Shut AUX HPSI HDR valves:	1-SI-656-MOV, is open. f. Open AUX SPRAY valve,	
 1-SI-617-MOV 1-SI-627-MOV 4-SI-627-MOV 	1-CVC-517-CV.	
 1-SI-637-MOV 1-SI-647-MOV 	g. Verify ONE HPSI PP is running.h. IF 13 HPSI PP is running,	
(5) Verify 11 HPSI PP is running.	THEN open the HPSI HDR XCONN valve, 1-SI-653-MOV.	
(continue)	(continue)	

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-4: SIS

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RECOVERY ACTIONS	ALTERNATE ACTIONS
G.1.i (continued)	G.1.i.1 (continued)
(6) IF approximately 150 GPM is NOT indicated THEN initiate Hot Leg Injection.	 IF 13 HPSI PP is running, THEN Shut AUX HPSI HDR valves: 1-SI-617-MOV 1-SI-627-MOV 1-SI-637-MOV 1-SI-637-MOV 1-SI-647-MOV Throttle the HPSI flow to maintain cold leg injection flow NO more than 100 GPM above the minimum required for heat removal PER ATTACHMENT(10), HIGH PRESSURE SAFETY INJECTION FLOW. IF a CS PP is being used for injection, THEN line up for Hot Leg Injection as follows: Verify the following conditions exist: RCS pressure is less than 270 PSIA {245} RCS pressure minus containment pressure is less than 75 PSID Open SDC RECIRC ISOL valve, 1-SI-399-MOV. Verify 12A LPSI HDR valve, 1-SI-635-MOV, is open. Shut the following LPSI HDR valves: 1-SI-615-MOV 1-SI-645-MOV 1-SI-645-MOV
(continue)	(continue)

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-4: SIS

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RECOVERY ACTIONS	ALTERNATE ACTIONS
G.1 (continued)	G.1.3 (continued)
	 e. Throttle 12A LPSI HDR valve, 1-SI-635-MOV, to maintain a flowrate of 600 GPM, as indicated on 12A LPSI HDR FLOW indicator, 1-FI-332.
	f. Close the power supply breakers to the SDC HDR RETURN ISOL valves:
,	 1-SI-651-MOV breaker, 52-11466 1-SI-652-MOV breaker, 52-10424
	g. Open SDC HDR RETURN ISOL valves:
	1-SI-651-MOV1-SI-652-MOV
	h. Maintain Cold Leg Injection flowrate of 600 GPM, as indicated on 12A LPSI HDR FLOW indicator, 1-FI-332.
	 Ensure CET temperatures remain constant or lowering.
(continue)	

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL

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PIC-4: SIS

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RECOVERY ACTIONS	ALTERNATE ACTIONS
G. (continued)	
2. WHEN Pressurizer Injection OR Hot Leg Injection is in progress, AND HPSI PPs are being used for Cold Leg Injection, THEN perform the following actions:	
 Balance the flow between Pressurizer or Hot Leg Injection and Cold Leg Injection by throttling the MAIN HPSI HDR valves: 	
 1-SI-616-MOV 1-SI-626-MOV 1-SI-636-MOV 1-SI-646-MOV 	
 b. Maintain the minimum flow required to remove decay heat PER <u>ATTACHMENT(10), HIGH</u> <u>PRESSURE SAFETY INJECTION</u> <u>FLOW</u>. 	
 Ensure CET temperatures remain constant or lowering. 	
H. ACCEPTANCE CRITERIA FOR SUCCESS PATH PIC-4.	
 Check RCS Pressure And Inventory Control is satisfied by the following indications: 	1.1 IF RCS Pressure and Inventory Control has NOT been satisfied, THEN perform the following actions:
 IF RAS has NOT occurred, AND pressurizer pressure is greater than 1270 PSIA, THEN at least ONE CHG PP 	 Concurrently perform the recovery actions for the next safety function to be satisfied.
operating	b. Determine the appropriate emergency response actions PER the ERPIP.
(continue)	(continue)

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL

PIC-4: SIS

RECOVERY ACTIONS

ALTERNATE ACTIONS

H.1 (continued)

NOTE LPSI Pumps are NOT required post-RAS.

<u>NOTE</u> Limits in ATTACHMENT(10), <u>HIGH</u> <u>PRESSURE SAFETY INJECTION FLOW</u> and ATTACHMENT(11), <u>LOW PRESSURE</u> <u>SAFETY INJECTION FLOW</u> are **NOT** required to be met if SIS throttle criteria are met.

- HPSI and LPSI PPs are injecting water into the RCS **PER** ATTACHMENT(10), <u>HIGH PRESSURE SAFETY</u> <u>INJECTION FLOW</u> and ATTACHMENT(11), <u>LOW</u> <u>PRESSURE SAFETY INJECTION</u> <u>FLOW</u>
- Reactor Vessel level indicates the core
 is covered

H.1.1 (continued)

CAUTION

Cool ECCS water may cause thermal shock to the fuel pins and result in fuel damage. Injection flow should be restored gradually.

CAUTION

Initiating flow to an overheated core will cause rapid steam production and an RCS pressure spike, which may cause creep rupture failure of the RCS, including steam generator tubes. Injection flow should be restored gradually to minimize the RCS pressure spike.

c. IF ALL Safety Injection flow has been lost,

THEN consider consulting the Technical Support Center prior to reinitiating Safety Injection flow.

CAUTION

To prevent loss of Core heat removal while RCS inventory control is lost, it is important to maintain RCS heat removal via the Steam Generators to support single or two-phase natural circulation.

- d. Maximize RCS heat removal via the Steam Generators **PER** the selected Core And RCS Heat Removal success path.
- e. IF high RCS pressure is preventing adequate SIS flow, THEN attempt to depressurize the RCS to obtain adequate SIS flow by operating the PORVs or Pressurizer Vents PER PIC-2, <u>PORVs or</u> <u>PRESSURIZER VENT</u>.

(continue)

(continue)

EOP-8 Rev 33/Unit 1 Page 81 of 88 APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-4: SIS

RECOVERY ACTIONS	ALTERNATE ACTIONS
H.1 (continued)	H.1.1 (continued)
	 f. Verify ALL available CNTMT AIR CLRs are operating.
	g. IF RAS actuated, THEN perform the following:
	(1) Contact the Operational Support Center to check radiation levels are low enough to allow valve repositioning.
`	(2) Contact the Plant Technical Support Center for alternate methods to refill the RWT AND actions to inject directly to the RCS bypassing the RWT PER ERPIP-611, <u>SEVERE</u> <u>ACCIDENT MANAGEMENT</u> <u>RESTORATIVE ACTIONS</u> .
	(3) WHEN SIAS has been reset, THEN initiate actions to makeup to the RWT PER OI-2B, <u>CVCS</u> <u>BORATION, DILUTION</u> <u>AND MAKEUP OPERATIONS</u> .
(continue)	(continue)

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-4: SIS

RECOVERY ACTIONS	ALTERNATE ACTIONS
H.1 (continued)	H.1.1 (continued)
r. ((continued)	 h. IF ALL Safety Injection flow has been lost, AND ALL the following conditions have been established: ALL ECCS pumps aligned to the Containment Sump are stopped Plant Technical Support Center concurrance obtained Alignment of the selected pump has been verified The selected pump has been vented as required THEN attempt to re-establish Safety Injection flow to the RCS from the Containment Sump: (1) Throttle injection valve(s). (2) Verify the MINI FLOW RETURN TO RWT ISOL MOVs are shut: 1-SI-659-MOV 1-SI-650-MOV
(continue)	(3) Start the selected pump. (continue)

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-4: SIS

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ALTERNATE ACTIONS
H.1.1.h (continued)
(4) IF a loss of pump suction is indicated by ANY of the following:
Lower or unstable flow
Lower or unstable discharge pressure
 Lower or unstable motor current
Pump noise
THEN stop the pump.
(5) Control flow to maintain Reactor Vessel level greater than or equal to the bottom of the hot leg.
· · · ·
(continue)

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-4: SIS

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RECOVERY ACTIONS	ALTERNATE ACTIONS
H.1 (continued)	H.1.1 (continued)
	i. IF there is inventory in the SITs, THEN discharge SIT inventory as needed to replenish RCS inventory:
	(1) Ensure RCS pressure is less than SIT pressure by performing the following:
	Operate the TBVs or ADVs PER the selected Core And RCS Heat Removal success path.
	Operate the PORVs or Pressurizer Vents PER PIC-2, <u>PORVs or</u> <u>PRESSURIZER VENT</u> .
	(2) Ensure selected SIT outlet isolation valve is open.
	 (3) Verify Reactor Vessel level rises as SIT level lowers.
	 (4) WHEN Reactor Vessel level is greater than or equal to the bottom of the hot leg, THEN shut the SIT outlet isolation valve.
	(5) Repeat steps (1) through (4) above as needed to control RCS inventory at the bottom of the hot leg.
	(6) WHEN the SIT is empty, THEN isolate the SIT.
(continue)	(continue)

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-4: SIS

RECOVERY ACTIONS	ALTERNATE ACTIONS
H.1 (continued)	H.1.1 (continued)
	<u>CAUTION</u> Injecting additional inventory into the Containment may submerge equipment and/or instrumentation desired to mitigate or monitor the event. Submerged equipment/instrumentation may be rendered inoperable.
	 JF RAS actuated, AND ALL the following conditions have been established:
	 Recirculation capability via the Containment Sump has been lost
	 Usable inventory is available in the RWT
	 RWT boron concentration verified to be acceptable for current plant conditions
	 RCS pressure is less than selected pump shutoff head
	THEN inject to the RCS as necessary to control Reactor Vessel level greater than or equal to the bottom of the hot leg:
	(1) Ensure pump suction from the Containment Sump is isolated.
	(2) Align suction for selected pump to RWT:
	 HPSI PP LPSI PP Charging PP CS PP
(continue)	(continue)

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-4: SIS

I.

RECOVERY ACTIONS	ALTERNATE ACTIONS
H.1 (continued)	H.1.1.j (continued)
	(3) Align discharge to RCS:
	 Hot or Cold Leg injection Normal or Alternate charging path
	(4) Operate the selected pump as needed.
	(5) Monitor pump performance.
	(6) Control flow to maintain Reactor Vessel level greater than or equal to the bottom of the hot leg.
(continue)	(continue)

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-4: SIS

RECOVERY ACTIONS	ALTERNATE ACTIONS
H.1 (continued)	H.1.1 (continued)
	<u>CAUTION</u> Injecting additional inventory into the Containment may submerge equipment and/or instrumentation desired to mitigate or monitor the event. Submerged equipment/instrumentation may be rendered inoperable.
	k. IF RAS actuated, AND ALL the following conditions have been established:
	 Recirculation capability via the Containment Sump has been lost
	An alternate method to inject directly to the RCS bypassing the RWT has been selected (refer to ERPIP-611, <u>SEVERE</u> <u>ACCIDENT MANAGEMENT</u> <u>RESTORATIVE ACTIONS</u>)
	 Boron concentration of makeup water source verified to be acceptable for current plant conditions
	 RCS pressure is less than selected pump shutoff head
	THEN inject to the RCS as necessary to control Reactor Vessel level greater than or equal to the bottom of the hot leg:
	(1) Ensure pump suction from the Containment Sump is isolated.
	(2) Align suction for selected pump.
	(3) Align discharge to RCS.
	(4) Operate the selected pump as needed.
(continue)	(continue)

APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-4: SIS

RECOVERY ACTIONS	ALTERNATE ACTIONS
H.1 (continued)	H.1.1.k (continued)
	(5) Monitor pump performance.
	(6) Control flow to maintain Reactor Vessel level greater than or equal to the bottom of the hot leg.
	I. Evaluate further actions based on the following considerations:
	 (1) The rate of change of pressure and potential for damage to the RCS.
	(2) The urgency of other jeopardized safety functions.
	(3) The feasibility of restoring function to a success path by performing ANY of the following:
	 Restoring the vital auxiliaries necessary to operate components or systems in the success paths
	Manual operation of valves
	Use of alternate components to implement a success path
	 Depressurization or cooling of the RCS to raise or establish SIS flow
 IF RCS Pressure And Inventory Control has been established, THEN PROCEED to the next Safety Function to be satisfied. 	

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	Page 1 of 4
RCS PRESSURE AND INV	ENTORY CONTROL PLACEKEEPER
P	C-1. CVCS

EOP-8

RESOURCE CONDITIONS • Charging pump is available • Charging path is available via normal flow path or SIS flow path • A charging source is available: • VCT • BAST • RWT • A method of pressurizer pressure cor is available: • Pressurizer heaters • Main Spray • Aux Spray • Controlled Steaming • SIAS has NOT actuated OR has been reset	ACCEPTANCE CRITERIA • Pressurizer pressure less than the upper limits of Att. (1) • Pressurizer level greater than 30 inches • RCS subcooling is between 25°F and 140°F based on CET temperatures • Reactor Vessel level above the top of the hot leg

START	FUNCTION	DONE	PAGE
	A. ESTABLISH RCS INVENTORY CONTROL USING CVCS.		1
	IF charging is unable to maintain pressurizer level greater than 30 inches, THEN PROCEED to PIC-4		2
	 Restore letdown flow IF the RCS is water solid, THEN draw a bubble 		2 8
	B. ESTABLISH RCS PRESSURE CONTROL.	С	10
	Pressurizer HTRs OR SPRAYs Controlled stearning Block SGIS/SIAS		10 14
	C. ACCEPTANCE CRITERIA FOR SUCCESS PATH PIC-1.		27
<u> </u>	IF RCS Pressure And Inventory Control has NOT been satisfied, THEN PROCEED to the next appropriate RCS Pressure And Inventory Control Success Path.		27

NOTE: Continuously applicable steps are designated with a "C" in the DONE column.

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RCS PRESSURE AND INVENTORY CONTROL PLACEKEEPER PIC-2: PORVS or PRESSURIZER VENT

RESOURCE CONDITIONS	ACCEPTANCE CRITERIA
 PORV or Pressurizer Vent required 	 Pressurizer pressure less than 2400 PSIA
to reduce pressure	 Pressurizer pressure less than the upper
 PORV or Pressurizer Vent available 	limits of Att. (1)
to control pressure	 RCS subcooling is between 25°F and
 Charging and letdown and/or SIS is 	140°F based on CET temperatures
available to control pressurizer level	 Pressurizer level greater than
Once-Through-Cooling is NOT in	30 inches {90}
progress	 Reactor Vessel level above the top of
· · ·	the hot leg

:

START	FUNCTION	DONE	PAGE
	A. ESTABLISH RCS INVENTORY CONTROL.	C	28
	IF RCS pressure is less than 1725 PSIA, OR containment pressure is greater than 2.8 PSIG THEN verify SIAS actuation.		28
	 Align HPSI injection and block SIAS. 		28
	IF ALL of the following conditions can be maintained: At least 25 °F subcooling based on CET temperatures Pressurizer level greater than 101 inches (141)		30
	At least ONE S/G available for heat removal Reactor Vessel level is above the top of the hot leg Reactivity Control Safety Function Acceptance Criteria are met		
	 THEN HPSI flow may be reduced. Maintain Pressurizer Level between 101 inches (141) and 180 inches (190) 		31

NOTE: Continuously applicable steps are designated with a "C" in the DONE column.

(continue)

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START FUNCTION DONE PAGE B. ESTABLISH RCS PRESSURE CONTROL USING PORVS OR PRESSURIZER VENT. 32 IF pressurizer pressure rises to 2400 PSIA, THEN verify BOTH PORVs open Restore and maintain RCS subcooling using 32 33 PORVs or PRZR VENT valves IF pressurizer level approaches 305 inches 34 OR PORVs are NOT required to be open, THEN close the PORVs C. PREPARE FOR RAS ACTUATION. 36 RWT level drops to 4 feet 36 D. VERIFY CONTAINMENT SUMP LEVEL AND RAS ACTUATION. 37 E. IF RAS ACTUATED, THEN REFILL THE RWT. 44 Notify the Plant Technical Support Center to review ERPIP-611. 44 ACCEPTANCE CRITERIA FOR SUCCESS PATH 45 PIC-2. IF RCS Pressure And Inventory Control has NOT 45 been satisfied, THEN PROCEED to the next appropriate RCS Pressure And Inventory Control Success Path.

(continued)

NOTE: Continuously applicable steps are designated with a "C" in the DONE column.

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PIC-2: PORVs or PRESSURIZER VENT

I	RCS PRESSURE AND INVE PIC-3: LO	NTORY CONTROL PL		EOP-8 lev 33 / Unit 1 Page 3 of 4 PER
A loss occur SIAS	ESOURCE CONDITIONS of ALL 4KV Vital Buses has red has NOT actuated s been reset	ACCEPTAN • Pressurizer pressur limits of Att. (1) • RCS subcooling is based on CET tem OR CET temperatures superheated • Reactor Vessel lev the hot leg	e less than greater tha peratures less than 5	the upper n 25°F 0°F
START	FUNCTION		DONE	PAGE
	A. ESTABLISH RCS PRESSU CONTROL DURING LOSS		C	46
	Power less than 1 TCOLD greater than	os to 25°F, CS to maintain: - .50°F less than nour JO inches UR zero with WRNI 0 ⁴ NEOP-13 curve		46 47
	IF a controlled cooldow THEN block SIAS WHEN at least ONE 44 re-energized, THEN IMPLEMENT PL	W Vital Bus has been		47 48
	B. ACCEPTANCE CRITERIA PIC-3.	the second s		49
	IF RCS Pressure And I been satisfied, THEN PROCEED to th	nventory Control has NOT e next appropriate RCS / Control Success Path.		49

NOTE: Continuously applicable steps are designated with a "C" in the DONE column.

	PIC-4			
RESOURCE CONDITIONS • SIAS has actuated OR SIS is able to be used to supply RCS makeup		ACCEPTANCE CRITERIA • IF RAS has NOT occurred, AND pressuitzer pressure is greater than 1270 PSIA THEN at least ONE Charging Pump operating HPSI and LPSI Pumps are injecting wat into the RCS PER Atts. (10) and (11) • Reactor Vessel level indicates the core is covered		reater than Pump acting water nd (11)
START	FUNCTION		DONE	PAGE
	A. ESTABLISH RCS PRESSURE / CONTROL USING SIS.	ND INVENTORY	с	50
	IF RCS pressure is less that OR containment pressure is 2.8 PSIG THEN verify SIAS actuation OR	greater than		50
	Align HPSI injection and blo	ck SIAS	ŀ	50
	IF high RCS pressure is pre THEN attempt to depressuri RCS Pressure And Inve paths as necessary The selected Core And I success path	te the RCS: ntory Control success		53
	WHEN ALL of the following maintained: At least 25 °F subcooling temperatures Pressurizer level greate	based on CET		61
	101 inches (141) At least ONE S/G availa removal Reactor Vessel level is a the hot leg	i for heat		
	Reactivity Control Safet Acceptance Criteria are THEN HPSI flow may be fee IF pressurizer pressure Isig and EITHER constant or risi THEN the operating LPSI/PI stopped	met uced. eater than 200 PSIA ng,		61

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	PIC-4: SIS (continued)		Page 4 of
START	FUNCTION	DONE	PAGE
	B. IF ONCE-THROUGH-COOLING IS NOT IN PROGRESS.		
	THEN IDENTIFY LOCATION OF LEAK.		62
	C. PREPARE FOR RAS ACTUATION.	С	65
	RWT level drops to 4 feet		65
	D. VERIFY RAS ACTUATION,	С	65
	E. PROTECT ECCS PUMPS FROM OVERHEATING.		73
	F. IF RAS ACTUATED, THEN REFILL THE RWT.	с	74
	Notify the Plant Technical Support Center to review ERPIP-611.	1	74
	G. COMMENCE CORE FLUSH.	C	74
	 8 to 11 hours after SIAS was actuated 		74
	H. ACCEPTANCE CRITERIA FOR SUCCESS PATH PIC-4.		79
	 IF RCS Pressure And Inventory Control has NOT been satisfied, THEN perform the following actions: 		
	 Concurrently perform the Recovery actions for the next safety function to be satisfied 		79
	Determine the appropriate emergency response actions PER the ERPIP		79
	IF ALL Safety Injection has been lost, THEN consider consulting the Technical Support Center prior to reinitiating Safety Injection Flow		80
	Maximize RCS heat removal via the SGs	1	80
	Contact the Plant Technical Support Center for alternate methods PER ERPIP-511		81
	 Attempt to re-establish SI flow to the RCS from the Containment Sump 		82
	 Discharge SIT inventory 		84
	 Inject additional inventory to the RCS from the RWT 		85
	 Inject additional inventory to the RCS via an alternate method 		87
	 Evaluate further actions 		88

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NOTE: Continuously applicable steps are designated with a "C" in the DONE column.

	• .	EOP-6 Rev 31/Unit 1 Page 1 of 207
PENDIX (4) CORE AND RCS HEA	T REMOVAL	-
HR-1: S/G HEAT SINK WITH NO SIS OPERATION		
RECOVERY ACTIONS	ALTERNATE ACTIONS	
ESTABLISH CORE AND RCS HEAT REMOVAL.		
IF 500KV offsite power has been lost, THEN protect the condenser from overpressure and minimize S/G inventory loss.		
a. Shut BOTH M SIVs.		
b. Shut the S/G B/D valves:		
 1-BD-4010-CV 1-BD-4011-CV 1-BD-4012-CV 1-BD-4013-CV 		
IF, at ANY time, Main and Auxiliary Feedwater are lost to BOTH S/Gs and can NOT be readily restored, THEN perform the following actions:		
a. Trip ALL RCPs.		
b. Shut the S/G B/D valves:		
 1-BD-4010-CV 1-BD-4011-CV 1-BD-4012-CV 1-BD-4013-CV 		
IF, at ANY time, BOTH S/G levels are less than (-)350 inches OR T colo rises uncontrollably 5° F or greater, THEN IMPLEMENT HR-4, <u>ONCE-THROUGH-COOLING</u> .		
. (continue)		
	R-1: S/G HEAT SINK WITH NO SIS RECOVERY ACTIONS ESTABLISH CORE AND RCS HEAT REMOVAL. IF 500KV offsite power has been lost, THEN protect the condenser from overpressure and minimize S/G inventory loss. a. Shut BOTH MSIVS. b. Shut the S/G B/D valves: a. 1-BD-4010-CV b. 1-BD-4011-CV c. 1-BD-4012-CV c. 1-BD-4013-CV IF, at ANY time, Main and Auxiliary Feedwater are lost to BOTH S/Gs and can NOT be readily restored, THEN perform the following actions: a. Trip ALL RCPs. b. Shut the S/G B/D valves: a. Trip ALL RCPs. c. 1-BD-4010-CV c. 1-BD-4011-CV c. 1-BD-4011-CV c. 1-BD-4011-CV c. 1-BD-4011-CV c. 1-BD-4011-CV c. 1-BD-4011-CV c. 1-BD-4011-CV c. 1-BD-4013-CV IF, at ANY time, BOTH S/G levels are less than (-)350 inches OR T coup rises uncontrollably 5° F or greater, THEN IMPLEMENT HR-4, ONCE-THROUGH-COOLING.	RECOVERY ACTIONS ALTERNATE ACTIONS ESTABLISH CORE AND RCS HEAT REMOVAL. If SOOKV offsite power has been lost, THEN protect the condenser from overpressure and minimize S/G inventory loss. a. Shut BOTH MSIVs. b. b. Shut the S/G B/D valves: - 1-BD-4010-CV -1-BD-4011-CV 1-BD-4012-CV -1-BD-4012-CV 1-BD-4013-CV 1-BD-4013-CV IF, at ANY time, Main and Auxiliary Feedwater are lost to BOTH S/Cs and can NOT be readily restored, THEN perform the following actions: a. Trip ALL RCPs. b. Shut the S/G B/D valves: 1-BD-4012-CV 1-BD-4013-CV IF, at ANY time, BOTH S/G levels are less than (-)350 inches OR T coub rises uncontrollably 5° F or greater, THEN IMPLEMENT HR-4, ONCE-THROUGH-COOLING.

APPENDIX (4) CORE AND RCS HE HR-1: S/G HEAT SINK WITH NO SI RECOVERY ACTIONS	
	S OPERATION
RECOVERY ACTIONS	
<u>ALCOVENT ACTIONS</u>	ALTERNATE ACTIONS
A. (continued)	
 IF at least ONE 4KV Vital Bus is energized, THEN commence RCS boration as follows: 	
 a. Verify the normal charging flowpath is available for RCS makeup with at least ONE LOOP CHG valve open: 1-CVC-518-CV 1-CVC-519-CV 	 a.1 IF the normal charging path is NOT available, THEN establish charging flowpath to the RCS via the AUX HPSI HDR as follows: (1) Shut HPSI AUX HDR ISOL valve, 1-SI-656-MOV. (2) Open ONE of the AUX HPSI HDR valves: 1-SI-617-MOV 1-SI-627-MOV 1-SI-637-MOV 1-SI-637-MOV 1-SI-647-MOV (3) Open SI TO CHG HDR valve, 1-CVC-269-MOV. (4) Shut REGEN HX CHG INLET valve, 1-CVC-183, located in the 27 ft West Penetration Room. (5) Shut L/D CNTMT ISOL valves:
	 1-CVC-515-CV 1-CVC-516-CV a.2 IF a charging flowpath can NOT be established via the AUX HPSI HDR, THEN perform the following: (1) Verify REGEN HX CHG INLET valve, 1-CVC-183, is open. (2) Charge through the Loop Charging valves Bypass Valve, 1-CVC-188.
(continue)	

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	RECOVERY ACTIONS	ALTERNATE ACTIONS
.4 (contir	nued)	
 b. Co BA (1) (2) (3) (4) (5) (6) (7) (8) (9) c. Reacord cord d. Reacord 	<pre>ided) immence RCS boration from the ST using the CVCS as follows: Ensure BAST levels remain greater than 10 inches. Shut VCT M/U valve, 1-CVC-512-CV. Open BA DIRECT M/U valve, 1-CVC-514-MOV. Open BAST GRAVITY FD valves: 1-CVC-508-MOV 1-CVC-509-MOV Verify the M/U MODE SEL SW, 1-HS-210, is in MANUAL. Start ALL available BA PPs. Shut VCT OUT valve, 1-CVC-501-MOV. Start ALL available CHG PPs. Ensure CHG HDR PRESS is greater than RCS pressure. cord the time RCS boration was nmenced:</pre>	 b.1 IF BAST is NOT available, THEN align charging pumps to take a suction from the RWT as follows: (1) Ensure RWT level is greater than 2 feet. (2) Open RWT CHG PP SUCT valve, 1-CVC-504-MOV. (3) Shut VCT OUT valve, 1-CVC-501-MOV. (4) Start ALL available CHG PPs. (5) Ensure CHG HDR PRESS is greater than RCS pressure.

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APPENDIX (4) CORE AND RCS HEAT REMOVAL				
HR-1: \$	HR-1: S/G HEAT SINK WITH NO SIS OPERATION			
	RECOVERY ACTIONS	ALTERNATE ACTIONS		
A.4 (conti	nued)			
	ontinue boration until ONE of the lowing conditions is met:			
(1)) 116 percent of the shutdown margin requirement has been achieved PER the NEOPs.			
(2)) BAST level has been lowered a total of 108 inches.			G 3102
(3)) Boration has been in progress as follows:			
	• For 53 minutes if THREE CHG PPs are operating			
	 For 80 minutes if TWO CHG PPs are operating 			
	For 160 minutes if ONE CHG PP is operating			
	(continue)			
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APPENDIX (4) CORE AND RCS HEA HR-1: S/G HEAT SINK WITH NO SIS	
RECOVERY ACTIONS	ALTERNATE ACTIONS
A. (continued) <u>CAUTION</u> RCS temperature must be closely monitored to avoid a cooldown rate greater than the Technical Specification Limits.	
 IF condenser vacuum is greater than 20 InHg, THEN cooldown the RCS to establish Shutdown Cooling entry conditions using the TURB BYP valves as follows: Ensure the ADVs are shut. Operate the TURB BYP valves from the control room. IF the TURB BYP valves can NOT be operated from the Control Room, THEN station an operator to manually position the TURB BYP valves PER OI-8C, <u>MAIN STEAM AND MSR VENTS AND DRAINS</u>. Maintain RCS cooldown less than 100° F in any one hour. IF ALL 4KV Vital Buses are de-energized AND boration has NOT been commenced, THEN maintain the following conditions: SUR negative, or SUR zero with WRNI Power less than 10⁻⁴% T colD greater than NEOP-13, figure titled, <u>MINIMUM ALLOWED RCS TEMPERATURE TO ENSURE 1%Ap SHUTDOWN vs. BURNUP</u> 	 5.1 Cooldown the RCS to establish Shutdown Cooling entry conditions using the ADVs as follows: a. Prior to determining if a tube rupture exists and isolating the affected S/G, record the ADV open and close times, for dose calculations. b. Shift the ADV controller to MANUAL. c. Operate the ADVs from the control room. d. IF the ADVs will NOT operate from the Control Room, THEN perform ONE of the following: (1) Operate the ADVs from 1C43 as follows: (a) Verify the ADV controllers on 1C43 are set at 0% output: (11 ADV) 1-HC-4056A (12 ADV) 1-HC-4056B (b) Align the ADV Hand Transfer Valves to 1C43 (POSITION 2): 11 S/G 1-HV-3938B 12 S/G 1-HV-3939A 1-HV-3939B
(continue)	(continue)

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	EOP-8 Rev 31/Unit 1 Page 6 of 207
APPENDIX (4) CORE AND RCS	HEAT REMOVAL
HR-1: S/G HEAT SINK WITH N	D SIS OPERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
A.5 (continued)	A.5.1.d(1) (continued)
	(c) Operate the ADVs from 1C43.
	<u>NOTE</u> The ADVs are reverse acting, i.e., clockwise to open and counterclockwise to shut.
	(2) Locally operate the ADVs from the 45ft level of the Aux Building.
	e. Maintain RCS cooldown less than 100° F in any one hour.
	 f. IF ALL 4KV Vital Buses are de-energized AND boration has NOT been commenced, THEN maintain the following conditions:
	 SUR negative, or SUR zero with WRNI Power less than 10⁻⁴% T cold greater than NEOP-13, figure titled, <u>MINIMUM ALLOWED</u> <u>RCS TEMPERATURE TO</u> <u>ENSURE 1%Δp SHUTDOWN vs.</u> <u>BURNUP</u>
	<u>CAUTION</u> The following step may blow out the Condenser Rupture Disks and may cause equipment damage.
	5.2 IF the ADVs are NOT available, AND condenser vacuum has been lost, THEN cooldown the RCS to establish Shutdown Cooling entry conditions by opening the TURB BYP valves:
	a. Open ALL doors to the outside on the 45 ft level of the Turbine Building.
(continue)	(continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION	
RECOVERY ACTIONS	ALTERNATE ACTIONS
A.5 (continued)	A.5.2 (continued)
	 b. Notify personnel to evacuate the 45 fill level of the Turbine Building.
	c. IF BOTH MSIVs are shut, THEN perform the following:
	 (1) Close the power supply breaken to the MSIV Bypass valves: 1-MOV-4045 breaker, 52-11428 1-MOV-4052 breaker.
	(2) Open the MSIV BYP valves:
	 1-MS-4045-MOV 1-MS-4052-MOV
	d. Shut the SGFPT EXH valves.
	e. Station an operator to manually operate the TURB BYP valve(s) PER OI-8C, <u>MAIN STEAM AND MSR</u> <u>VENTS AND DRAINS</u> , as directed by the Control Room.
	f. Maintain RCS cooldown less than 100° F in any one hour.
	 g. IF ALL 4KV Vital Buses are de-energized AND boration has NOT been commenced, THEN maintain the following conditions:
	 SUR negative, or SUR zero with WRNI Power less than 10-4% T COLD greater than NEOP-13, figure titled, <u>MINIMUM ALLOWED</u> <u>RCS TEMPERATURE TO</u> <u>ENSURE 1%Ap SHUTDOWN vs.</u> <u>BURNUP</u>
(continue)	(continue)

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	EOP- Rev 31/Unit Page 8 of 20 C REAT DEMOVAL
APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION	
RECOVERY ACTIONS	ALTERNATE ACTIONS
A.5 (continued)	A.5 (continued)
	<u>CAUTION</u> The following step may blow out the Condenser Rupture Disks and may cause equipment damage.
	5.3 IF RCS cooldown has NOT been established, THEN cooldown the RCS to establish Shutdown Cooling entry conditions by aligning the steam drains to the condenser as follows:
	a. Open the MS UPSTREAM DRN ISOL VLVS by placing handswitch 1-HS-6622 in OPEN.
,	 b. Open the MS LINE DRN VLVS by placing handswitch 1-HS-6600 in OPEN.
	c. IF BOTH MSIVs are shut, THEN perform the following:
	 Close the power supply breakers to the MSIV Bypass valves:
	 1-MOV-4045 breaker, 52-11428 1-MOV-4052 breaker, 52-10428
	(2) Open the MSIV BYP valves:
	 1-MS-4045-MOV 1-MS-4052-MOV
	d. Maintain RCS cooldown less than 100° F in any one hour.
(continue)	(continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION		
RECOVERY ACTIONS	ALTERNATE ACTIONS	
A.5 (continued)	 A.5.3 (continued) e. IF ALL 4KV Vital Buses are de-energized AND boration has NOT been commenced, THEN maintain the following conditions: SUR negative, or SUR zero with WRNI Power less than 10-4% T coup greater than NEOP-13, figure titled, <u>MINIMUM ALLOWED RCS TEMPERATURE TO ENSURE 1%Δρ SHUTDOWN vs. BURNUP</u> 	
 IF a controlled cooldown is in progress, THEN block SGIS and SIAS: WHEN the "SGIS A BLOCK PERMITTED" alarm is received, THEN block SGIS B. WHEN the "SGIS B BLOCK PERMITTED" alarm is received, THEN block SGIS B. WHEN the "PZR PRESS BLOCK A PERMITTED" alarm is received, THEN block SIAS A. WHEN the "PZR PRESS BLOCK B PERMITTED" alarm is received, THEN block SIAS A. WHEN the "PZR PRESS BLOCK B PERMITTED" alarm is received, THEN block SIAS A. 	·	

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ALTERNATE ACTIONS
7.1 IF subcooled Natural Circulation can NOT be verified, THEN PROCEED to HR-2, <u>S/G HEAT</u> SINK WITH SIS OPERATION.

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PPENDIX (4) CORE AND RCS H	
IR-1. 3/0 HEAT SINK WITH NO (DIS OF ERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
DETERMINE IF A SGTR EXISTS.	
IF a SGTR has occurred, as indicated by ANY of the following:	
S/G samples	
RMS trends:	
 UNIT 1 CNDSR OFF-GAS (1-RI-1752) UNIT 1 S/G B/D (1-RI-4014) UNIT 1 MAIN VENT GASEOUS (1-RI-5415) MAIN STEAM EFFL RAD MONITOR (1-RIC-5421 OR 1-RIC-5422) 	
S/G level change when NOT feeding	
Post-Trip S/G level trends	
Mismatch in feed flow prior to the trip	
 Steam flow vs. Feed flow mismatch prior to the trip 	
THEN identify the most affected S/G.	
IF indications of a SGTR are NOT observed, THEN PROCEED to Block Step C.	
(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

B. (continued)

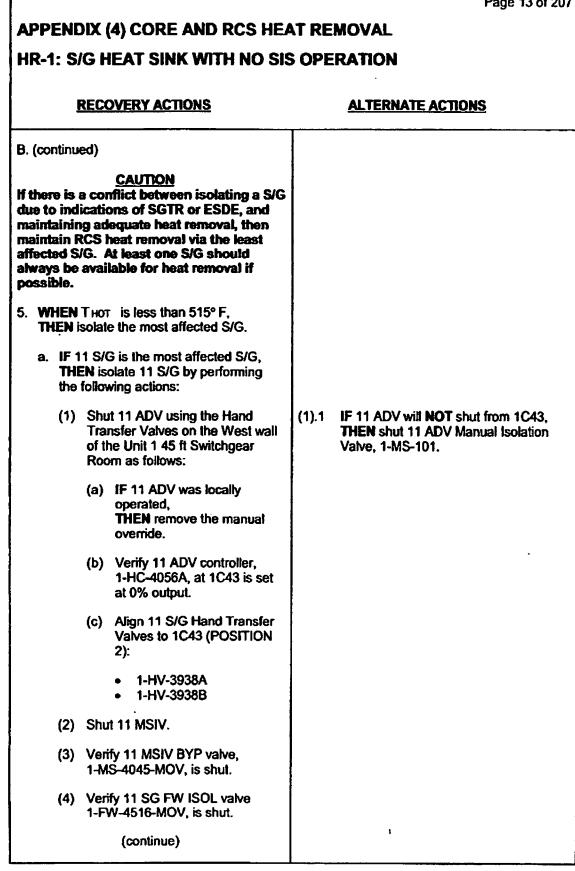
NOTE

Maintaining RCS subcooling takes precedence over equalizing RCS pressure and affected S/G pressure.

- 3. Depressurize the RCS **PER** the selected Pressure and Inventory Control success path to maintain the following:
 - Subcooling between 25 and 140° F based on CET temperatures
 - RCS pressure greater than the NPSH limits PER ATTACHMENT (1), <u>RCS</u> <u>PRESSURE TEMPERATURE LIMITS</u>
 - RCS pressure less than 900 PSIA
 - RCS pressure approximately equal to affected S/G pressure
- Dispatch an operator to standby in the Unit 1 45 ft Switchgear Room to shut the affected S/G ADV.

(continue)

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RECOVERY ACTIONS	ALTERNATE ACTIONS
ontinued)	
5) Shut 11 SG AFW STM SUPP & BYPASS valves, 1-MS-4070-CV and 1-MS-4070A-CV.	
6) Shut 11 S/G AFW BLOCK valves by placing the handswitches in SHUT:	
 1-AFW-4520-CV 1-AFW-4521-CV 1-AFW-4522-CV 1-AFW-4523-CV 	
7) Shut 11 S/G B/D valves:	
 1-BD-4010-CV 1-BD-4011-CV 	
B) Shut the MS UPSTREAM DRN ISOL VLVS by placing handswitch 1-HS-6622 in CLOSE.	
 Observe locally, the S/G Safety Valves are NOT leaking. 	
(continue)	

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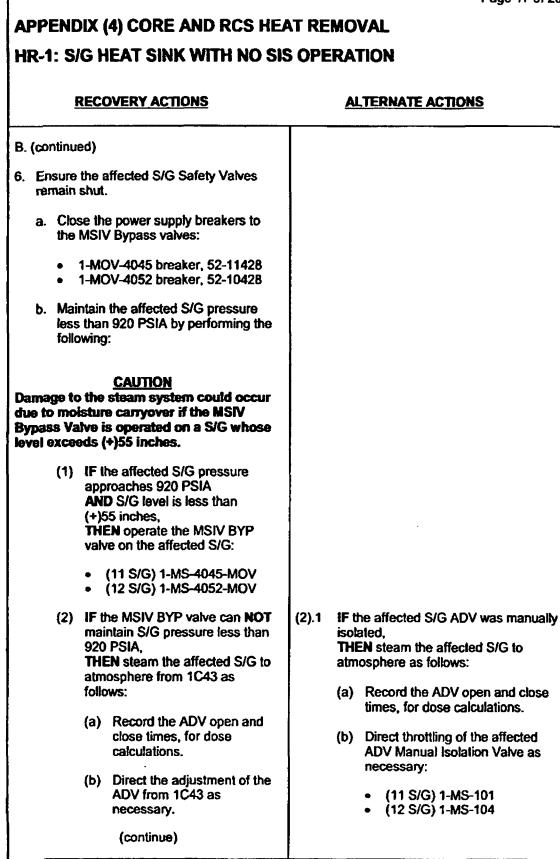
RECOVERY ACTIONS	ALTERNATE ACTIONS
B.5 (continued)	
 b. IF 12 S/G is the most affected S/G, THEN isolate 12 S/G by performing the following actions: 	
(1) Shut 12 ADV using the Hand Transfer Valves on the West wall of the Unit 1 45 ft Switchgear Room as follows:	(1).1 IF 12 ADV will NOT shut from 1C43, THEN shut 12 ADV Manual Isolation Valve, 1-MS-104.
(a) IF 12 ADV was locally operated, THEN remove the manual override.	
(b) Verify 12 ADV controller, 1-HC-4056B, at 1C43 is set at 0% output.	
(c) Align 12 S/G Hand Transfer Valves to 1C43 (POSITION 2):	
 1-HV-3939A 1-HV-3939B 	
(2) Shut 12 MSIV.	
(3) Verfiy 12 MSIV BYP valve, 1-MS-4052-MOV, is shut.	
(4) Verify 12 SG FW ISOL valve 1-FW-4517-MOV, is shut.	
(5) Shut 12 SG AFW STM SUPP & BYPASS valves, 1-MS-4071-CV and 1-MS-4071A-CV.	

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APPEN	DIX (4) CORE AND RCS HEA	AT REMOVAL		
	G HEAT SINK WITH NO SIS			
!	RECOVERY ACTIONS	ALTERNATE ACTIONS		
B.5.b (con	.tinued)			
(6)	Shut 12 S/G AFW BLOCK valves by placing the handswitches in SHUT:			
	 1-AFW-4530-CV 1-AFW-4531-CV 1-AFW-4532-CV 1-AFW-4533-CV 			
(7)	1-AFW-4533-CV Shut 12 S/G B/D valves:			
	 1-BD-4012-CV 1-BD-4013-CV 			
(8)	Shut the MS UPSTREAM DRN ISOL VLVS by placing handswitch 1-HS-6622 in CLOSE.			
(9)	Observe locally, the S/G Safety Valves are NOT leaking.			
	(continue)			

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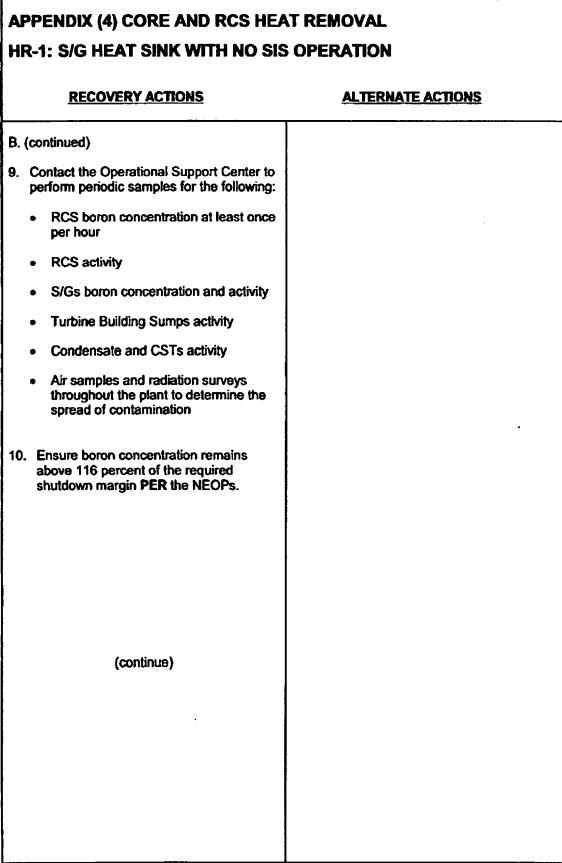
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nk-1: 5/6 nc.	AT SINK WITH NO	SIS UPERATION
RECOV	ERY ACTIONS	ALTERNATE ACTIONS
B. (continued)		
 checking the formation of the second secon	e activity higher in the G S: CNDSR OFF-GAS 752) S/G B/D 014) MAIN VENT GASEOUS 115)	THEN perform the following actions: <u>CAUTION</u> A severe waterhammer may result if Main Feedwater flow is restored after it has be stopped for greater than 80 minutes. a. Restore feeding and steaming capability to the least affected S/G. b. WHEN RCS heat removal has been re-established to the least affected S/G,
consistentS/G pressuRCS loop 1	cold trends	THEN isolate the most affected S/G PER step B.5.
BLOCK valves handswitches i	13-CV 12-CV	h n
	(continue)	

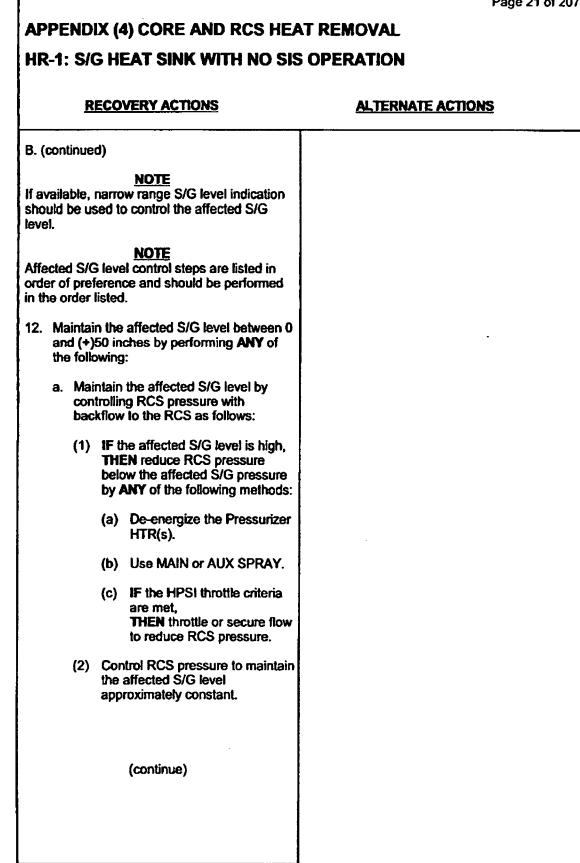
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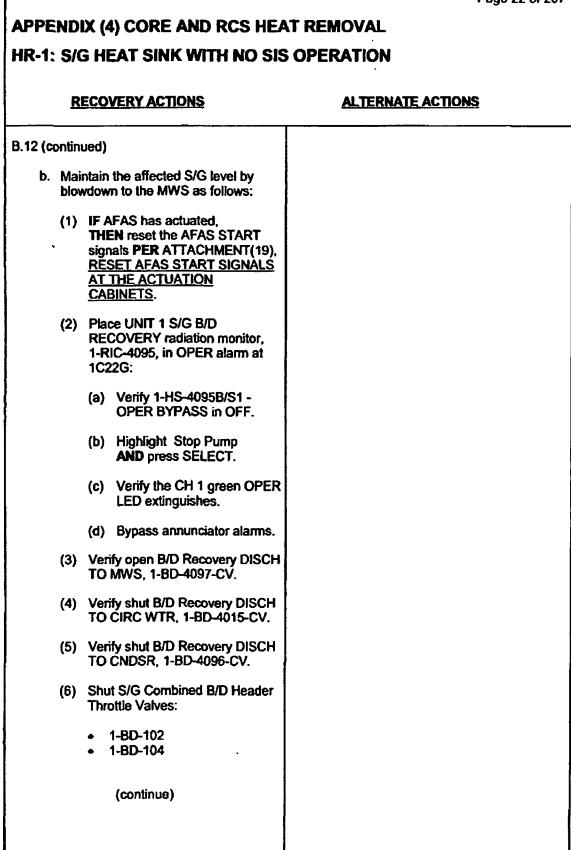
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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION **RECOVERY ACTIONS ALTERNATE ACTIONS** B. (continued) 11. IF ALL RCPs are secured, THEN disable RCPs in the affected loop to prevent inadvertant start. a. IF 11 S/G is the affected S/G, THEN disable 11A and 11B RCPs by removing the Reactor Coolant Pump Breaker CLOSE CIR fuses. 11A RCP 252-11P01 11A RCP 252-11P02 11B RCP 252-13P01 ٠ 11B RCP 252-13P02 • b. IF 12 S/G is the affected S/G, THEN disable 12A and 12B RCPs by removing the Reactor Coolant Pump Breaker CLOSE CIR fuses. 12A RCP 252-12P01 . 12A RCP 252-12P02 • 12B RCP 252-14P01 • 12B RCP 252-14P02 (continue)

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APPEND	IX (4) CORE AND RCS HEA	TREMOVAL	
HR-1: S/	G HEAT SINK WITH NO SIS	OPERATION	
R	ECOVERY ACTIONS	ALTERNATE ACTIONS	
B.12.b (con	inued)		
(7)	Open the affected S/G BOT B/D valve by placing its handswitch in RAD TRIP OVERRIDE:		
	 (11 S/G) 1-BD-4011-CV (12 S/G) 1-BD-4013-CV 		
(8)	Throttle open the S/G Combined B/D Header Throttle Valve on the affected S/G to obtain a blowdown flow of approximately 100 GPM while maintaining 11 B/D Heat Exchanger outlet temperature less than 200° F:		
	 (11 S/G) 1-BD-102 (12 S/G) 1-BD-104 		
(9)	Pump the MWRT PER the <u>TRANSFERRING THE MWRT</u> <u>TO THE RCWMT</u> section of OI-17D.		
(10)	Monitor MWRT level at 1C33 and maintain MWRT level approximately constant by throttling the S/G blowdown rate while pumping to the RCWMT.		
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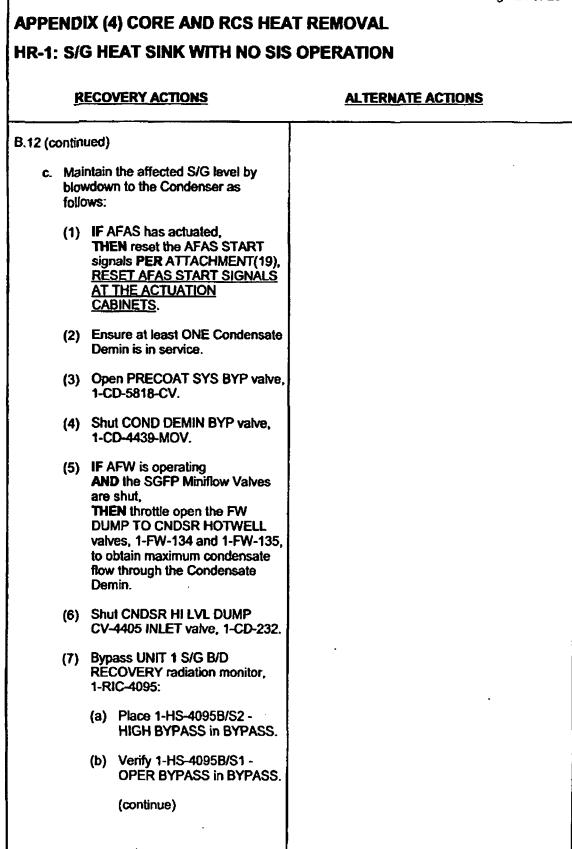
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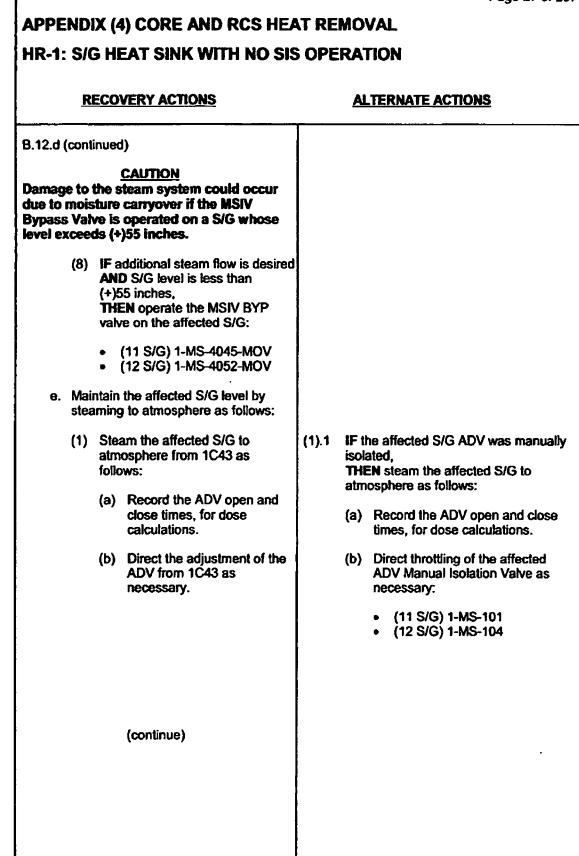
APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION **RECOVERY ACTIONS ALTERNATE ACTIONS** B.12.c (continued) (8) Verify shut B/D Recovery DISCH TO MWS, 1-BD-4097-CV. (9) Verify shut B/D Recovery DISCH TO CIRC WTR, 1-BD-4015-CV. (10) Verify open B/D Recovery DISCH TO CNDSR, 1-BD-4096-CV. (11) Shut S/G Combined B/D Header **Throttle Valves:** 1-BD-102 ٠ 1-BD-104 (12) Open the affected S/G BOT B/D valve by placing its handswitch in RAD TRIP OVERRIDE: (11 S/G) 1-BD-4011-CV ٠ • (12 S/G) 1-BD-4013-CV (13) Throttle open the S/G Combined B/D Header Throttle Valve on the affected S/G to obtain a blowdown flow of approximately 100 GPM while maintaining 11 B/D Heat Exchanger outlet temperature less than 200° F: (11 S/G) 1-BD-102 (12 S/G) 1-BD-104 (continue)

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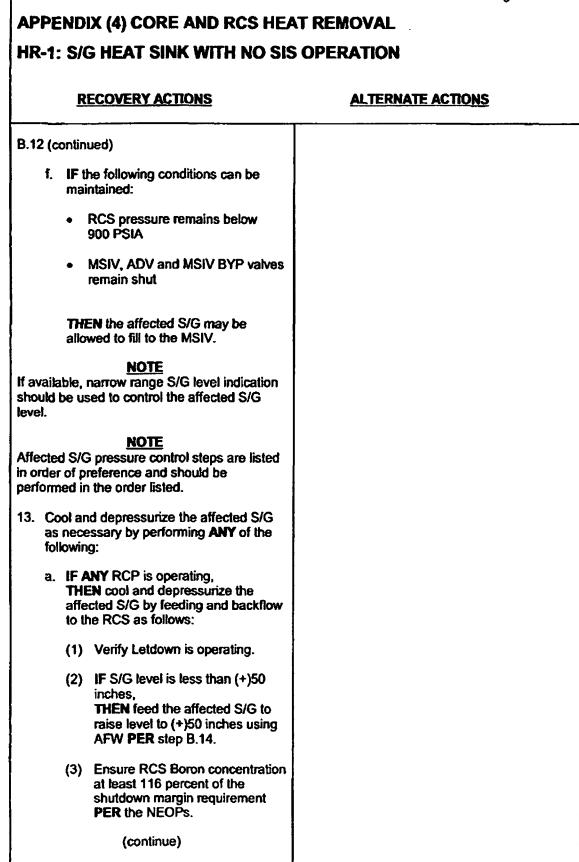
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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION **RECOVERY ACTIONS ALTERNATE ACTIONS** B.12 (continued) d. Maintain the affected S/G level by steaming to the condenser as follows: (1) Ensure the condenser vacuum is greater than 20 InHg. (2) Ensure at least ONE Condensate Demin is in service. (3) Open PRECOAT SYS BYP valve, 1-CD-5818-CV. (4) Shut COND DEMIN BYP valve. 1-CD-4439-MOV. (5) IF AFW is operating AND the SGFP Miniflow Valves are shut. THEN throttle open the FW DUMP TO CNDSR HOTWELL valves, 1-FW-134 and 1-FW-135, to obtain maximum condensate flow through the Condensate Demin. (6) Shut CNDSR HI LVL DUMP CV-4405 INLET valve, 1-CD-232. (7) Operate the MS UPSTREAM DRN ISOL VLVS using 1-HS-6622 as necessary. (continue)

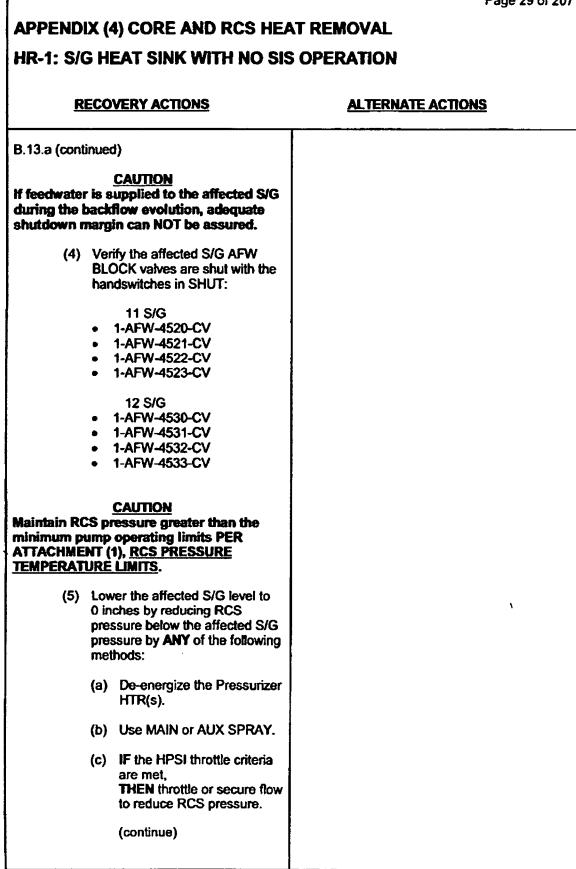
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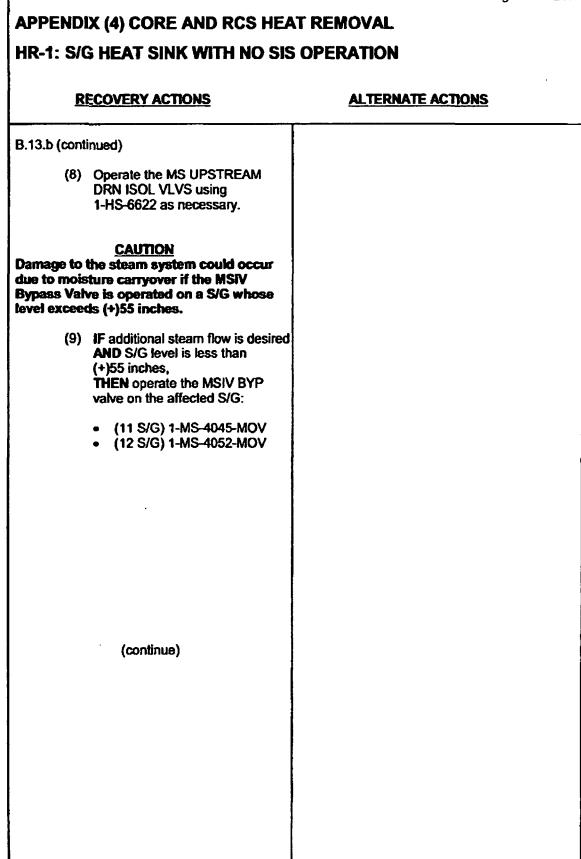


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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION **RECOVERY ACTIONS ALTERNATE ACTIONS** B.13.a (continued) (6) WHEN the affected S/G level is 0 inches, THEN control RCS pressure to maintain the affected S/G level approximately constant. (7) Repeat steps (1) through (6) as necessary. b. Cool and depressurize the affected S/G by steaming to the condenser as follows: (1) Control RCS pressure to establish and maintain the affected S/G level between 0 and (+)50 inches. (2) Ensure the condenser vacuum is greater than 20 InHg. (3) Ensure at least ONE Condensate Demin is in service. (4) Open PRECOAT SYS BYP valve, 1-CD-5818-CV. (5) Shut COND DEMIN BYP valve, 1-CD-4439-MOV. (6) IF AFW is operating AND the SGFP Miniflow Valves are shut. THEN throttle open the FW DUMP TO CNDSR HOTWELL valves, 1-FW-134 and 1-FW-135, to obtain maximum condensate flow through the Condensate Demin. (7) Shut CNDSR HI LVL DUMP CV-4405 INLET valve, 1-CD-232. (continue)

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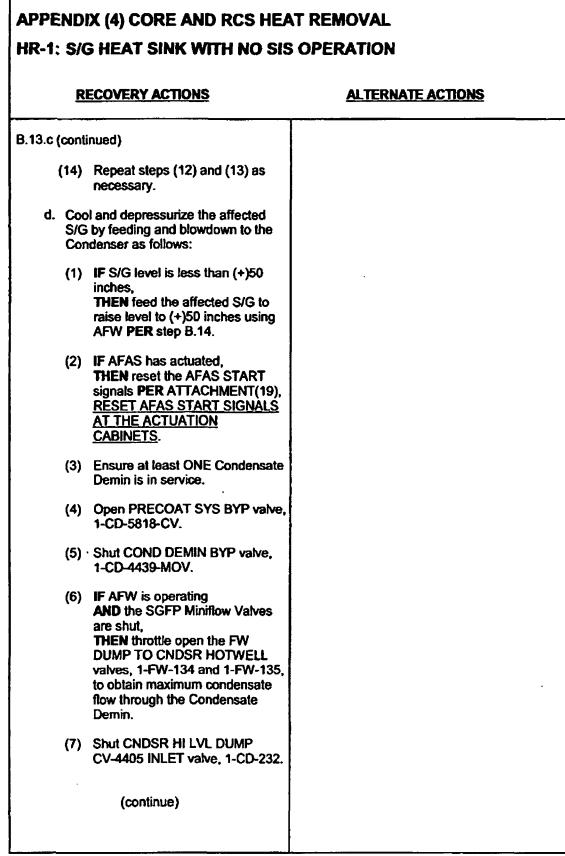
APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION **RECOVERY ACTIONS ALTERNATE ACTIONS** B.13 (continued) c. Cool and depressurize the affected S/G by feeding and blowdown to the MWS as follows: (1) IF S/G level is less than (+)50 inches. THEN feed the affected S/G to raise level to (+)50 inches using AFW PER step B.14. (2) IF AFAS has actuated, **THEN** reset the AFAS START signals PER ATTACHMENT(19), RESET AFAS START SIGNALS AT THE ACTUATION CABINETS. (3) Place UNIT 1 S/G B/D **RECOVERY** radiation monitor. 1-RIC-4095, in OPER alarm at 1C22G: (a) Verify 1-HS-4095B/S1 -**OPER BYPASS in OFF.** (b) Highlight Stop Pump AND press SELECT. (c) Verify the CH 1 green OPER LED extinguishes. (d) Bypass annunciator alarms. (4) Verify open B/D Recovery DISCH TO MWS, 1-BD-4097-CV. (5) Verify shut B/D Recovery DISCH TO CIRC WTR, 1-BD-4015-CV. (6) Verify shut B/D Recovery DISCH TO CNDSR, 1-BD-4096-CV. (continue)

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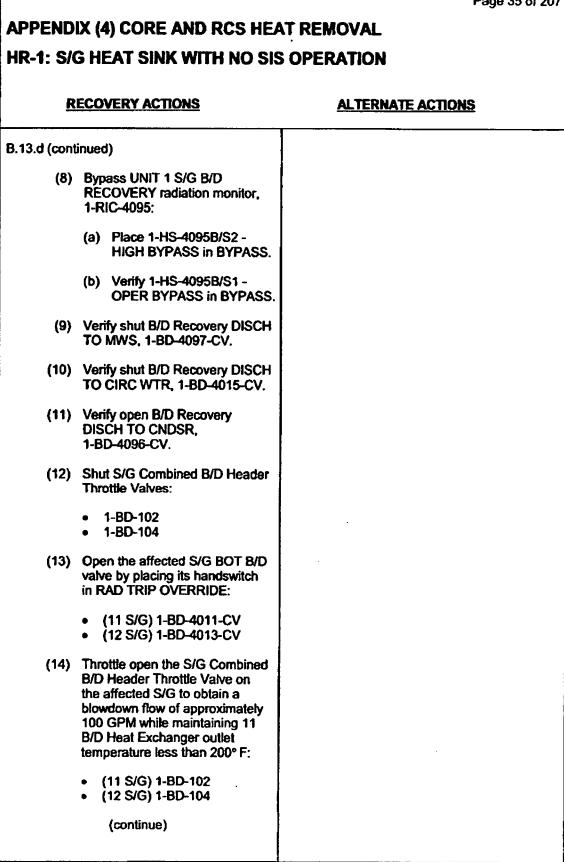
APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION **RECOVERY ACTIONS ALTERNATE ACTIONS** B.13.c (continued) (7) Shut S/G Combined B/D Header **Throttle Valves:** 1-BD-102 1-BD-104 • (8) Open the affected S/G BOT B/D valve by placing its handswitch in **RAD TRIP OVERRIDE:** • (11 S/G) 1-BD-4011-CV (12 S/G) 1-BD-4013-CV • (9) Throttle open the S/G Combined B/D Header Throttle Valve on the affected S/G to obtain a blowdown flow of approximately 100 GPM while maintaining 11 B/D Heat Exchanger outlet temperature less than 200° F: (11 S/G) 1-BD-102 (12 S/G) 1-BD-104 (10) Pump the MWRT PER the TRANSFERRING THE MWRT TO THE RCWMT section of OI-17D. (11) Monitor MWRT level at 1C33 and maintain MWRT level approximately constant by throttling the S/G blowdown rate while pumping to the RCWMT. (12) Lower the affected S/G level to 0 inches by S/G blowdown to the MWS. (13) Feed the affected S/G to raise level to (+)50 inches using AFW PER step B.14. (continue)

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<u>R</u>	ECO	VERY ACTIONS		<u>A</u>	TERNATE ACTIONS
3.13.d (cont					
(15)	0 in	rer the affected S/G level to ches by S/G blowdown to Condenser.			
(16)	leve	d the affected S/G to raise It to (+)50 inches using AFW It step B.14.			
(17)	-	eat steps (15) and (16) as essary.			
S/G	ol and i by s sws:	I depressurize the affected teaming to atmosphere as			
(1)	and	trol RCS pressure to establish maintain the affected S/G I between 0 and (+)50 inches.			
(2)		am the affected S/G to osphere from 1C43 as ws:	(2).1	isok THI	he affected S/G ADV was manually ated, EN steam the affected S/G to osphere as follows:
	(a)	Record the ADV open and close times, for dose calculations.			Record the ADV open and close times, for dose calculations.
	(b)	Direct the adjustment of the ADV from 1C43 as necessary.		(b)	Direct throttling open of the affected ADV Manual Isolation Valve to lower the affected S/G pressure:
					 (11 S/G) 1-MS-101 (12 S/G) 1-MS-104
		(continue)			

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·	EOP- Rev 31/Unit Page 37 of 20
APPENDIX (4) CORE AND RCS HEA	AT REMOVAL
HR-1: S/G HEAT SINK WITH NO SIS	OPERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
B. (continued)	
<u>CAUTION</u> If feedwater is supplied to the affected S/G during the backflow evolution, adequate shutdown margin can NOT be assured.	
 14. IF feedwater flow to the affected S/G is required, AND 13 AFW PP is available, THEN establish Auxtiliary Feedwater flow as follows: a. Open the affected S/G motor driven train S/G AFW BLOCK valves: 11 S/G 1-AFW-4522-CV 1-AFW-4523-CV 1-AFW-4532-CV 1-AFW-4532-CV b. IF 13 AFW PP is NOT being used to feed the unaffected S/G, THEN perform the following: Shut the motor driven train S/G AFW BLOCK valves for the unaffected S/G by placing the handswitches in SHUT: 11 S/G 1-AFW-4523-CV 1-AFW-4522-CV c) Shut the motor driven train S/G AFW BLOCK valves for the unaffected S/G by placing the handswitches in SHUT: 11 S/G 1-AFW-4523-CV 2 S/G 1-AFW-4523-CV (1) Shut the motor driven train S/G AFW BLOCK valves for the unaffected S/G by placing the handswitches in SHUT: 12 S/G 1-AFW-4523-CV 2 S/G 1-AFW-4533-CV 	 14.1 IF 13 AFW PP is NOT available, THEN establish Auxiliary Feedwater flow using 11 or 12 AFW PP as follows: a. Open the affected S/G steam driven train S/G AFW BLOCK valves: 11 S/G 1-AFW-4520-CV 1-AFW-4521-CV 12 S/G 1-AFW-4530-CV 1-AFW-4531-CV b. IF 11 or 12 AFW PP is NOT being used to feed the unaffected S/G, THEN shut the steam driven train S/G AFW BLOCK valves for the unaffected S/G by placing the handswitches in SHUT: 11 S/G 1-AFW-4521-CV 12 S/G 1-AFW-4521-CV 12 S/G 1-AFW-4521-CV 12 S/G 1-AFW-4531-CV
(continue)	(continue)

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	EOP-3 Rev 31/Unit 1 Page 38 of 207
APPENDIX (4) CORE AND RCS HE/	AT REMOVAL
HR-1: S/G HEAT SINK WITH NO SIS	S OPERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
B.14 (continued)	B.14.1 (continued)
	CAUTION An unmonitored radiation release could occur if the SG AFW STM SUPP & BYPASS valves from the affected S/G are open. c. Verify the SG AFW STM SUPP & BYPASS valves from the unaffected S/G are open: • (11 SG)1-MS-4070-CV, 1-MS-4070A-CV • (12 SG)1-MS-4071-CV, 1-MS-4071A-CV • (12 SG)1-MS-4071-CV, 1-MS-4071A-CV • (12 SG)1-MS-4071A-CV • (12 After pressure at least 100 PSI greater than the affected S/G pressure: • (11 AFW PP SPEED CONTR) 1-HC-3987A • (12 AFW PP SPEED CONTR) 1-HC-3989A • Restore the affected S/G level, maintain RCS cooldown less than 100° F in any one hour, by adjusting the S/G FLOW CONTR valve: • (11 S/G) 1-AFW-4511-CV • (12 S/G) 1-AFW-4512-CV • Verify AFW Room normal or emergency ventilation is operating to maintain room temperature less than 130° F.

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	EOP- Rev 31/Unit Page 39 of 20						
APPENDIX (4) CORE AND RCS HEAT	-						
HR-1: S/G HEAT SINK WITH NO SIS OPERATION							
RECOVERY ACTIONS	ALTERNATE ACTIONS						
C. DETERMINE IF AN ESDE EXISTS.							
1. IF an ESDE has occurred, by considering ALL of the following:							
 High steam flow from S/G 							
Lowering S/G pressure							
Lowering S/G level							
Lowering RCS T COLD							
Lowering PZR pressure							
Lowering PZR level							
THEN identify the most affected S/G.							
2. IF indications of an ESDE are NOT							
observed, THEN PROCEED to Block Step D.							
(continue)							

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							Rev 3 Page 4	EOP 1/Unit 0 of 20
AP	PI	END) XI	(4) CORE ANI	D RCS H	EAT RE	MOVAL	
HR	-1	: S/	G H	IEAT SINK W	ITH NO S	sis ope	RATION	
		F	RECC	OVERY ACTIONS	ŀ		ALTERNATE ACTIONS	_
C. ((cor	ntinue	ed)					
due mai mai affe	to nta nta cta ayu	indi ainin ain R ad S/ s be	catio g ad CS I G. <i>J</i>	<u>CAUTION</u> Iflict between iso ons of SGTR or E equate heat rem reat removal via It least one S/G s lable for heat rem	ESDE, and oval, then the least should	νG		
3 . I	lso	late 1	he n	nost affected S/G.				
1	a.	THE	in is	G is the most affer plate 11 S/G by po ving actions:				
		(1)	Tran of th	t 11 ADV using th nsfer Valves on th ne Unit 1 45 ft Swi om as follows:	ne West wa	1).1	IF 11 ADV will NOT shut from 10 THEN shut 11 ADV Manual Isola Valve, 1-MS-101.	•
			(a)	IF 11 ADV was b operated, THEN remove th override.	-			
			(b)	Verify 11 ADV o 1-HC-4056A, at at 0% output.		r		
			(c)	Align 11 S/G Ha Valves to 1C43 (2):				
				1-HV-3938A1-HV-3938B				
		(2)	Veri	ify 11 MSIV is shu	ıt.			
		(3)		fy 11 SG FW ISO N-4516-MOV, is s				
		(4)		fy 11 MSIV BYP v S-4045-MOV, is s				
				(continue)				

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APPEN	DIX (4) CORE AND RCS HEA	T REMOVAL
HR-1: S	G HEAT SINK WITH NO SIS	OPERATION
	RECOVERY ACTIONS	ALTERNATE ACTIONS
C.3.a (con	linued)	
(5)	Shut 11 S/G B/D valves:	
	 1-BD-4010-CV 1-BD-4011-CV 	
(6)	Shut 11 SG AFW STM SUPP & BYPASS valves, 1-MS-4070-CV and 1-MS-4070A-CV.	
(7)	Shut 11 S/G AFW BLOCK valves by placing the handswitches in SHUT:	
	 1-AFW-4520-CV 1-AFW-4521-CV 1-AFW-4522-CV 1-AFW-4523-CV 	
(8)	Shut the MS UPSTREAM DRN ISOL VLVS by placing handswitch 1-HS-6622 in CLOSE.	
(9)	Observe locally, the S/G Safety Valves are NOT leaking.	
	(continue)	

					EOF Rev 31/Uni Page 42 of 2
APPI	ENC)IX ((4) CORE AND RCS H	EAT RE	MOVAL
HR-1	: S/	G H	EAT SINK WITH NO	sis ope	ERATION
	Ē	<u>Recc</u>	OVERY ACTIONS		ALTERNATE ACTIONS
C.3 (a	ontin	ued)			
b.	THE	EN is	G is the most affected S/G, plate 12 S/G by performing ving actions:		
	(1)	Trai of th	it 12 ADV using the Hand Insfer Valves on the West wa The Unit 1 45 ft Switchgear Inn as follows:		IF 12 ADV will NOT shut from 1C43, THEN shut 12 ADV Manual Isolation Valve, 1-MS-104.
		(a)	IF 12 ADV was locally operated, THEN remove the manual override.		
		(b)	Verify 12 ADV controller, 1-HC-4056B, at 1C43 is se at 0% output.	1	
		(c)	Align 12 S/G Hand Transfe Valves to 1C43 (POSITION 2):		
			 1-HV-3939A 1-HV-3939B 		
	(2)	Veri	ify 12 MSIV is shut.		
	(3)		ify 12 SG FW ISOL valve W-4517-MOV, is shut.		
	(4)	Veri 1-M	ify 12 MSIV BYP valve, S-4052-MOV, is shut.		
	(5)	Shu	t 12 S/G B/D valves:		
			1-BD-4012-CV 1-BD-4013-CV		
	(6)	BYF	t 12 SG AFW STM SUPP & PASS valves, 1-MS-4071-CV 1-MS-4071A-CV.		
			(continue)		

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	RECOVERY ACTIONS	ALTERNATE ACTIONS
C.3.b (con	tinued)	
(7)	Shut 12 S/G AFW BLOCK valves by placing the handswitches in SHUT:	
	 1-AFW-4530-CV 1-AFW-4531-CV 1-AFW-4532-CV 1-AFW-4533-CV 	
(8)	Shut the MS UPSTREAM DRN ISOL VLVS by placing handswitch 1-HS-6622 in CLOSE.	
(9)	Observe locally, the S/G Safety Valves are NOT leaking.	
	he most affected S/G was isolated cking the following:	4.1 IF the wrong S/G was isolated, THEN perform the following actions:
• RC	S pressure lower for the affected S S loop T cold lower in the acted loop	<u>CAUTION</u> A severe waterhammer may result if Main Feedwater flow is restored after it has been stopped for greater than 80 minutes.
	G level lowering for the affected S/G I stabilized for the unaffected S/G	a. Restore feeding and steaming capability to the least affected S/G.
		 WHEN RCS heat removal has been re-established to the least affected S/G, THEN isolate the most affected S/G PER step C.3.
	(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

C. (continued)

<u>NOTE</u>

The temperature of the unaffected S/G may be obtained by using the saturation temperature for existing S/G pressure.

 IF the difference between unaffected S/G temperature and CET temperature exceeds 25° F during the blowdown, THEN cool the unaffected S/G to within 25° F of CET temperature using the unaffected S/G ADV.

NOTE

The remainder of this procedure may be performed while waiting for the S/G to blowdown.

CAUTION

A heatup of the RCS following an excessive cooldown rate can result in a rise in RCS pressure and the potential for pressurized thermal shock.

 WHEN the RCS cooldown due to blowdown of the affected S/G has stopped,

THEN operate the unaffected S/G ADV to stabilize RCS temperatures as follows:

- a. Establish the unaffected S/G temperature within 25° F of the lowest CET temperature during blowdown.
- b. WHEN unaffected S/G temperature is within 25° F of the lowest CET temperature during blowdown, THEN maintain the following:
 - Unaffected S/G pressure
 approximately constant
 - T COLD approximately constant

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION					
RECOVERY ACTIONS	ALTERNATE ACTIONS				
D. DETERMINE IF A LOAF EXISTS.					
 Determine if a LOAF has occurred, by considering ANY of the following: 					
 Lowering S/G level, S/G low level alarm, Reactor Trip on Low S/G level 					
AFAS actuation on low S/G level					
SGFPT TRIP" alarms					
 IF indications of a LOAF are NOT observed, THEN PROCEED to Block Step E. 					
3. IF Main and Auxiliary Feedwater are lost to BOTH S/Gs and can NOT be readily restored, THEN verify the following actions have been performed:					
a. Trip ALL RCPs.					
b. Shut the S/G B/D valves:					
 1-BD-4010-CV 1-BD-4011-CV 1-BD-4012-CV 1-BD-4013-CV 					
 IF, at ANY time, BOTH S/G levels are less than (-)350 inches OR T COLD rises uncontrollably 5° F or greater, THEN IMPLEMENT HR-4, ONCE-THROUGH-COOLING. 					
(continue)					
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	EOP- Rev 31/Unit Page 46 of 20
APPENDIX (4) CORE AND RCS HE	AT REMOVAL
HR-1: S/G HEAT SINK WITH NO SI	S OPERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
D. (continued)	
5. Maintain AFW PP suction supply AND CST inventory PER ATTACHMENT (8), <u>MAINTAIN AFW PUMP SUCTION</u> <u>SUPPLY AND CST INVENTORY</u> .	
 IF AFW is available, THEN attempt to establish AFW flow to the S/G(s) which is unaffected by EITHER a SGTR OR an ESDE. 	
 Establish AFW flowpath to the S/G(s) by placing the handswitches for the unaffected S/G AFW BLOCK valves in OPEN: 	a.1 IF S/G AFW BLOCK valve(s) will NOT open from the control room, THEN locally open valve(s) using the Hand Transfer Station(s) on North wall of SRW Room.
11 S/G 1-AFW-4520-CV 1-AFW-4521-CV 1-AFW-4522-CV 1-AFW-4523-CV	
12 S/G 1-AFW-4530-CV 1-AFW-4531-CV 1-AFW-4532-CV	
• 1-AFW-4533-CV	
(continue)	

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	EOP-8 Rev 31/Unit 1 Page 47 of 207				
APPENDIX (4) CORE AND RCS HEA	AT REMOVAL				
HR-1: S/G HEAT SINK WITH NO SIS OPERATION					
RECOVERY ACTIONS	ALTERNATE ACTIONS				
D.6 (continued) D.6 (continued) NOTE The following substeps are alternative methods to establish auxiliary feedwater flow. Each available method can be altempted until auxiliary feed flow is successfully established. b. Establish AFW flow with 13 AFW PP as follows: (1) Shut the S/G FLOW CONTR valves: (1) Shut the S/G FLOW CONTR valves: (1) Start 13 AFW PP by placing its handswitch in START. (3) Adjust the S/G FLOW CONTR valves to approximately 150 GPM per S/G: (11 S/G) 1-AFW-4535-CV (12 S/G) 1-AFW-4535-CV (12 S/G) 1-AFW-4535-CV	ALTERNATE ACTIONS b.1 Start 13 AFW PP locally as follows: (1) Shut the S/G FLOW CONTR valves: (1) Shut the S/G FLOW CONTR valves: (2) Verify 13 AFW PP houses: (2) Verify 13 AFW PP handswitch is in AUTO. (2) Verify 13 AFW PP handswitch is in AUTO. (3) Close the AFW PP No. 13 breaker, 152-1116, by pressing the CLOSE button.				
(continue)	(continue)				

IX (4) CORE AND RCS HEA S HEAT SINK WITH NO SIS ECOVERY ACTIONS	S OPER/	ATIC	
ECOVERY ACTIONS			DN
	4	AI TE	
			ERNATE ACTIONS
	D.6.b.1(3) (∞	ontinued)
 WHEN S/G level response is observed OR continuous feed has been maintained for at least 5 minutes, THEN feed rate may be slowly raised while maintaining the following: Gradual rise in S/G level S/G level trending to between (-)24 and (+)30 inches RCS cooldown rate less than 100° F in any one hour 	bus prot overcum protectic (4)	ectic ent, on fo IF th THE SM/ activ (a) (b) (c) (d) Adju valv per	CAUTION ontrol power fuses eliminates on from breaker faults, and undervoltage and ground with breaker. The breaker fails to close, EN, with the approval of the (CRS, perform the following ons: Remove the breaker control power fuses. IF necessary, THEN manually charge the breaker closing spring. Press the CLOSE button at AFW PP No. 13 breaker, 152-1116. Ensure normal pump running current less than 70 AMPS. Ust the S/G FLOW CONTR res to approximately 150 GPM S/G:
(continue)			(continue)
	 DR continuous feed has been maintained for at least 5 minutes, THEN feed rate may be slowly raised while maintaining the following: Gradual rise in S/G level S/G level trending to between (-)24 and (+)30 inches RCS cooldown rate less than 100° F in any one hour 	 OR continuous feed has been maintained for at least 5 minutes, THEN feed rate may be slowly raised while maintaining the following: Gradual rise in S/G level S/G level trending to between (-)24 and (+)30 inches RCS cooldown rate less than 100° F in any one hour (4) 	OR continuous feed has been maintained for at least 5 minutes, THEN feed rate may be slowly raised while maintaining the following: Removing column for bus protection for overcurrent, protection for overcurre

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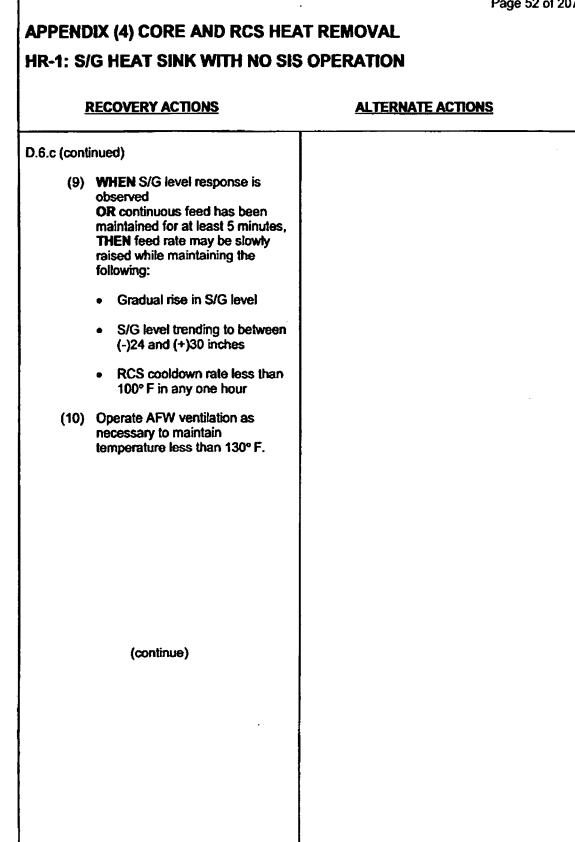
RECOVERY ACTIONS	ALTERNATE ACTIONS
D.6.b (continued)	D.6.b.1 (continued) (6) WHEN S/G level response is
	observed OR continuous feed has been maintained for at least 5 minutes, THEN feed rate may be slowly raised while maintaining the following:
	 Gradual rise in S/G level S/G level trending to between (-)24 and (+)30 inches RCS cooldown rate less than
 c. Establish AFW flow with 11 or 12 AFW PP as follows: (1) Shut the S/G FLOW CONTR valves: (11 S/G) 1-AFW-4511-CV (12 S/G) 1-AFW-4512-CV (2) Verify open 11 and 12 AFW PP Main Steam Supply Valves: 1-MS-109 1-MS-107 (3) Verify open 11 OR 12 THROTTLE/STOP valve: 1-MS-3986 1-MS-3988 	 100° F in any one hour c.1 Start 11 or 12 AFW PP locally as follows: (1) Shut the S/G FLOW CONTR valves: (11 S/G) 1-AFW-4511-CV (12 S/G) 1-AFW-4512-CV (2) Turn the turbine governor control knob counterclockwise to the minimum position.
(continue)	(continue)

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APPENDIX (4) CORE AND RCS HEA	AT REMOVAL				
HR-1: S/G HEAT SINK WITH NO SIS OPERATION					
RECOVERY ACTIONS	ALTERNATE ACTIONS D.6.c.1 (continued)				
D.6.c (continued)					
<u>CAUTION</u> An unmonitored radiation release could occur if the AFW Steam Supply Bypass Valve from a S/G affected by a SGTR is opened.	(3) Isolate the Instrument Air to the Turbine Governor Controller(s) by shutting the following valves:				
 (4) Open the SG AFW STM SUPP & BYPASS valves from a S/G NOT affected by a SGTR: (11 S/G)1-MS-4070-CV, 1-MS-4070A-CV (12 S/G)1-MS-4071-CV, 	<u>11 AFW PP</u> 1-AFW-3987A I/P ISOL, 1-IA-24 1-AFW-3987B I/P ISOL, 1-IA-23 <u>12 AFW PP</u> 1-AFW-3989A I/P ISOL, 1-IA-22				
1-MS-4071A-CV <u>WARNING</u> The use of N ₂ to operate AFW may result in the depletion of oxygen levels in some rooms due to system venting.	 1-AFW-3989B I/P ISOL, 1-IA-21 (4) Open the air filter drains on controllers to allow local control. (5) Verify open 11 and 12 AFW PP Main Steam Supply Valves: 				
 (5) IF a loss of ALL Vital 4KV busses has occurred, THEN align Liquid N₂ System to supply S/G FLOW CONTR valves by opening the following valves located in SRW Room: N₂ Supply To AFW Amplifier Air System, 0-N2-105 	 1-MS-109 1-MS-107 (6) Verify open 11 OR 12 THROTTLE/STOP valve: 1-MS-3986 1-MS-3988 				
 AFW amplifier Air System N2 Backup Supply, I-IA-182 (6) IF a loss of ALL Vital 4KV busses has occurred, THEN assign an operator to control AFW discharge pressure locally as follows: (a) Establish communications between the operator and the control room. 	CAUTION An unmonitored radiation release could occur if the AFW Steam Supply Bypass Valve from a S/G affected by a SGTR is opened. (7) Open the AFW Steam Supply Bypass Valves from a S/G NOT affected by a SGTR: • 1-MS-102 • 1-MS-105				
(continue)	(continue)				

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EOP-8 Rev 31/Unit 1 Page 51 of 207 APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION **RECOVERY ACTIONS ALTERNATE ACTIONS** D.6.c(6) (continued) D.6.c(6).1 (continued) (b) Isolate the Instrument Air to (8) Adjust and maintain the turbine the Turbine Governor driven discharge header pressure at Controller(s) by shutting the least 100 PSI greater than S/G following valves: pressure using the local turbine governor control knob. 11 AFW PP 1-AFW-3987A I/P ISOL. (9) Adjust the S/G FLOW CONTR 1-IA-24 valves to approximately 150 GPM 1-AFW-3987B I/P ISOL. per S/G: 1-IA-23 (11 S/G) 1-AFW-4511-CV **12 AFW PP** (12 S/G) 1-AFW-4512-CV . 1-AFW-3989A I/P ISOL, 1-IA-22 (10) WHEN S/G level response is 1-AFW-3989B I/P ISOL. observed 1-IA-21 OR continuous feed has been maintained for at least 5 minutes. (c) Adjust 11 or 12 AFW PP THEN feed rate may be slowly governor control knob to raised while maintaining the maintain discharge pressure following: at least 100 PSI greater than S/G pressure. Gradual rise in S/G level (7) Adjust and maintain the turbine S/G level trending to between driven discharge header pressure (-)24 and (+)30 inches at least 100 PSI greater than S/G pressure: RCS cooldown rate less than 100° F in any one hour (11 AFW PP SPEED CONTR) 1-HC-3987A (11) Operate AFW ventilation as (12 AFW PP SPEED CONTR) necessary to maintain temperature 1-HC-3989A less than 130° F. (8) Adjust the S/G FLOW CONTR valves to approximately 150 GPM per S/G: (11 S/G) 1-AFW-4511-CV (12 S/G) 1-AFW-4512-CV (continue)

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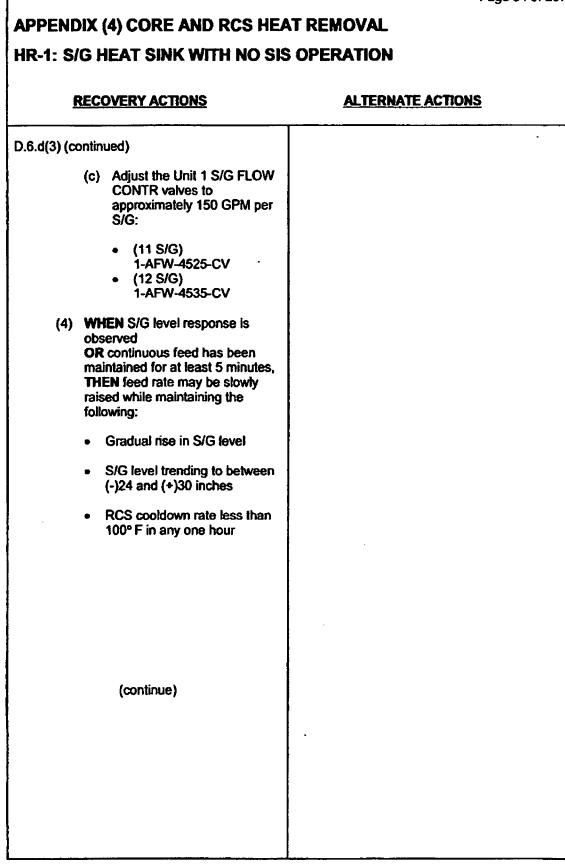


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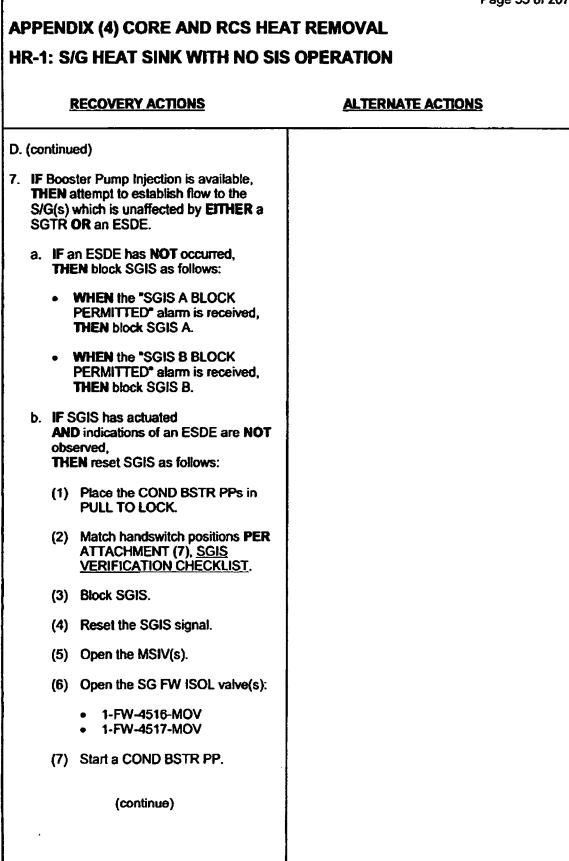
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APPENDIX (4) CORE AND RCS HEAT REMOVAL				
HR-1: S/G HEAT SINK WITH NO SIS OPERATION				
RECOVERY ACTIONS	ALTERNATE ACTIONS			
D.6 (continued)				
d. Establish AFW flow with 23 AFW PP as follows:				
(1) Shut the Unit 2 Motor Train S/G AFW BLOCK valves by placing the handswitches in SHUT:				
21 S/G • 2-AFW-4522-CV • 2-AFW-4523-CV				
22 S/G • 2-AFW-4532-CV • 2-AFW-4533-CV				
(2) Open the U-2 TO U-1 XCONN valve, 2-AFW-4550-CV.				
(3) Establish AFW flow with 23 AFW PP as follows:				
(a) Shut the Unit 1 S/G FLOW CONTR vatves:				
 (11 S/G) 1-AFW-4525-CV (12 S/G) 1-AFW-4535-CV 				
<u>CAUTION</u> The 23 AFW PP flow limit is 575 GPM.				
(b) Start 23 AFW PP by placing its handswitch in START.				
(continue)				

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION	
nk-1: 5/g neat sink with NU S	IS OPERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
D.7 (continued)	
<u>CAUTION</u> RCS temperature must be closely monitored to avoid a cooldown greater than Technical Specification Limits.	
c. Commence a rapid RCS cooldown to T coub less than 465° F using the TURB BYP valves OR ADVs, while maintaining the following:	c.1 IF subcooling exceeds 140° F, THEN depressurize the RCS PER the selected Pressure and Inventory Contro success path.
 Cooldown less than 100° F in any one hour 	
 Subcooling between 25 and 140° F based on CET temperatures 	
 Pressurizer level between 50 and 180 inches 	
d. Shut the MAIN SG FW REG valves.	
e. Shift the SG FW REG BYPASS controllers to Manual.	
f. Verify the operating SGFPT SPD BIAS ADJ is less than or equal to 5.0.	
g. Depress the S/G FRV BYP RESET buttons.	
 Manually adjust the SG FW REG BYPASS valve controllers to 0%. 	
i. Open the SG FW ISOL valves:	
 (11 S/G) 1-FW-4516-MOV (12 S/G) 1-FW-4517-MOV 	
j. Open the PRECOAT SYS BYP valve, 1-CD-5818-CV.	
 k. Open the COND DEMIN BYP valve, 1-CD-4439-MOV. 	

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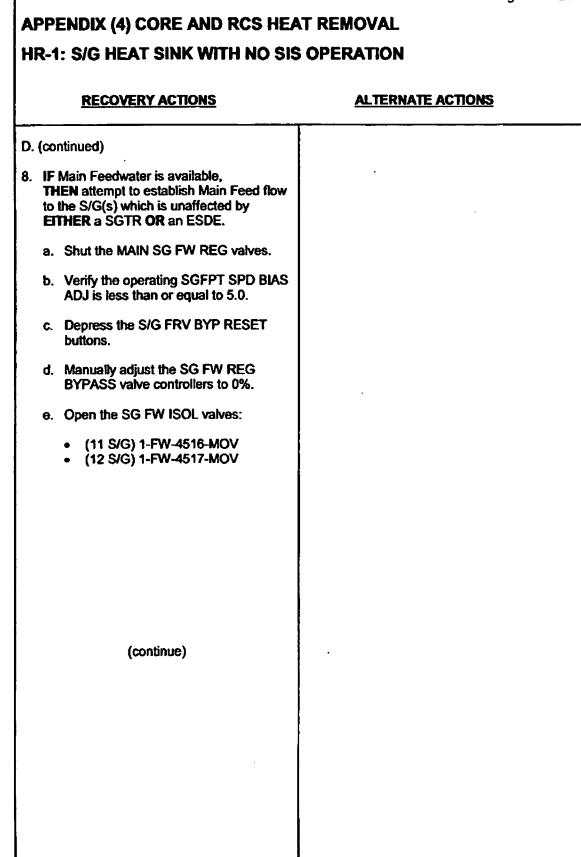
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RECO	OVERY ACTIONS	ALTERNATE ACTIONS
D.7 (continued)		
I. Verify at running.	least ONE COND PP is	
m. Verify Ol running.	NE COND BSTR PP is	
	OTH HTR DRN PP itches in PULL TO LOCK.	
RCS cooldown I pressures dropp	NOTE to S/Gs should start when has resulted in the S/G bing to less than the oster Pump shut-off head of 00 PSIA.	
	CAUTION	
	trolled restoration of Main cause a severe	
Feedwater may waterhammer. 0. Throttle BYPASS 100 to 10 ATTACH	strolled restoration of Main	
Feedwater may waterhammer. o. Throttle BYPASS 100 to 10 ATTACH <u>FEEDW/</u> FLOW. p. WHEN c maintain THEN fe	trolled restoration of Main cause a severe open the SG FW REG valve to establish a flow of 60 GPM PER IMENT(18), MAIN	
Feedwater may waterhammer. o. Throttle of BYPASS 100 to 10 ATTACH FEEDW/ FLOW. p. WHEN c maintain THEN fe while ma	Atrolled restoration of Main y cause a severe open the SG FW REG b valve to establish a flow of 60 GPM PER IMENT(18), <u>MAIN</u> ATER GOOSENECK PURGE ontinuous feed has been ed for at least 10 minutes, ed rate may be slowly raised	
Feedwater may waterhammer. o. Throttle (BYPASS 100 to 10 ATTACH FEEDW/ FLOW. p. WHEN c maintain THEN fe while ma • Grad • S/G I	trolled restoration of Main reause a severe open the SG FW REG valve to establish a flow of 60 GPM PER IMENT(18), <u>MAIN</u> ATER GOOSENECK PURGE ontinuous feed has been ed for at least 10 minutes, ed rate may be slowly raised intaining the following:	
Feedwater may waterhammer. o. Throttle (BYPASS 100 to 10 ATTACH <u>FEEDW/</u> <u>FLOW</u> . p. WHEN c maintain THEN fe while ma • Grad • S/G I and (• RCS	atrolled restoration of Main reause a severe open the SG FW REG valve to establish a flow of 60 GPM PER IMENT(18), <u>MAIN</u> ATER GOOSENECK PURGE ontinuous feed has been ed for at least 10 minutes, ed rate may be slowly raised intaining the following: ual rise in S/G level level trending to between (-)24	

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Rev 31/Unit 1 Page 59 of 207 **APPENDIX (4) CORE AND RCS HEAT REMOVAL** HR-1: S/G HEAT SINK WITH NO SIS OPERATION **RECOVERY ACTIONS ALTERNATE ACTIONS** D.8 (continued) f. IF at least ONE SGFP is NOT operating, THEN, with the approval of the SM/CRS, attempt to start a SGFP. (1) Verify shut the SGFPT HP and LP STOP VLVs. (2) Check the DEMAND MIN IF the DEMAND MIN indicator is NOT (2).1 indicator is illuminated at the illuminated. OCS. THEN depress the down arrow until the **DEMAND MIN indicator illuminates.** (3) Reset the SGFP Vacuum Trip AND Turbine Trip. (4) Depress the DIRECT GOVNR VLV pushbutton at the OCS. (5) Raise the speed of the SGFP, until the discharge pressure is sufficient to feed the SGs, by depressing the "up" SPEED arrow at the OCS. CAUTION Rapid or uncontrolled restoration of Main Feedwater may cause a severe waterhammer. g. Throttle open the SG FW REG BYPASS valve to establish a flow of 100 to 160 GPM PER ATTACHMENT(18), MAIN FEEDWATER GOOSENECK PURGE FLOW. (continue)

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APPENDIX (4) CORE AND RCS HE	Page 60 of 2 AT REMOVAL	
HR-1: S/G HEAT SINK WITH NO SIS OPERATION		
RECOVERY ACTIONS	ALTERNATE ACTIONS	
D.8 (continued)		
 WHEN continuous feed has been maintained for at least 10 minutes, THEN feed rate may be slowly raised while maintaining the following: 		
Gradual rise in S/G level		
 S/G level trending to between (-)24 and (+)30 inches 		
 RCS cooldown rate less than 100° F in any one hour 		
E. VERIFY CORE AND RCS HEAT REMOVAL HAS BEEN ESTABLISHED.		
1. Ensure the TBVs OR ADVs are controlling T cold less than 535° F.		
 Ensure adequate RCS heat removal with at least ONE S/G by observing BOTH of the following conditions exist: At least ONE S/C level is greater than 	2.1 IF, at ANY time, BOTH S/G levels are less than (-)350 inches OR T COLD rises uncontrollably 5° F or greater,	
 At least ONE S/G level is greater than (-)350 inches 	THEN IMPLEMENT HR-4, ONCE-THROUGH-COOLING.	
• T COLD is stable or lowering		
3. Maintain AFW PP suction supply AND CST inventory PER ATTACHMENT (8), <u>MAINTAIN AFW PUMP SUCTION</u> <u>SUPPLY AND CST INVENTORY</u> .		
(continue)		

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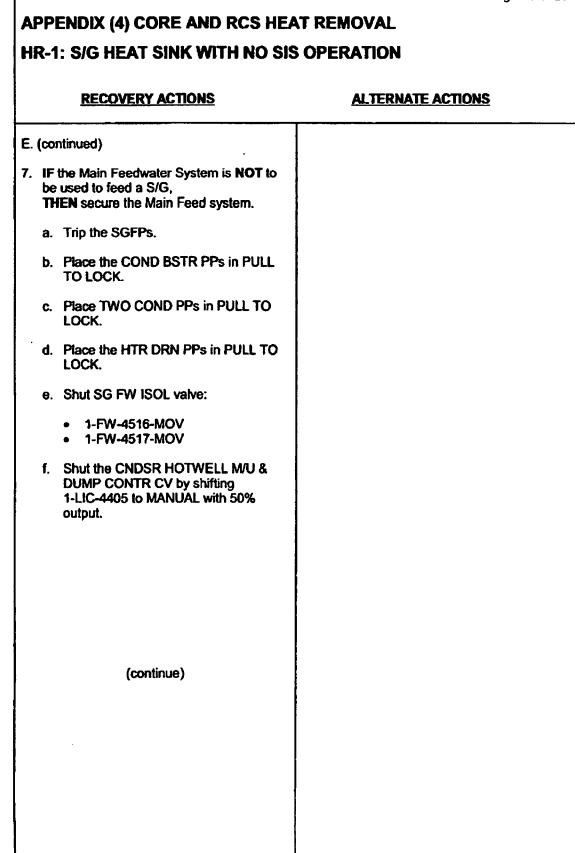
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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION **RECOVERY ACTIONS ALTERNATE ACTIONS** E. (continued) 4. IF AFW is feeding the least affected S/G(s), THEN perform the following: a. Ensure feed flow is restoring S/G level to between (-)24 and (+)30 inches and RCS cooldown does NOT exceed 100° F in any one hour. 5. IF Booster Pump Injection is feeding the least affected S/G(s), THEN perform the following: a. Ensure feed flow is restoring S/G level to between (-)24 and (+)30 inches and RCS cooldown does NOT exceed 100° F in any one hour. b. Adjust the SG FW REG BYPASS valves to establish S/G levels at approximately 0 inches. c. WHEN S/G levels are at approximately 0 inches, THEN shift SG FW REG BYPASS controllers to Auto. (continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION **RECOVERY ACTIONS ALTERNATE ACTIONS** E. (continued) 6. IF Main Feedwater is feeding the least affected S/G(s), THEN perform the following: a. Establish a shutdown feed system lineup as follows: ONE operating SGFP ONE operating COND BSTR PP **TWO operating COND PPs BOTH HTR DRN PPs secured** b. Ensure feed flow is restoring S/G level to between (-)24 and (+)30 inches and RCS cooldown does NOT exceed 100° F in any one hour. c. WHEN manual control of feed flow is desired OR S/G level is between (-)24 and (+)30 inches, THEN perform the following actions: (1) Shift the SG FW REG BYPASS controllers to Manual. (2) Verify the operating SGFPT SPD BIAS ADJ is less than or equal to 5.0. (3) Depress the S/G FRV BYP **RESET buttons.** (4) Adjust the SG FW REG BYPASS valves to establish S/G levels at approximately 0 inches. d. WHEN S/G levels are at approximately 0 inches, **THEN shift SG FW REG BYPASS** controllers to Auto. (continue)

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APPENDIX (4) CORE AND RCS HEAT	REMOVAL	
HR-1: S/G HEAT SINK WITH NO SIS OPERATION		
RECOVERY ACTIONS	ALTERNATE ACTIONS	
E.7 (continued)		
g. IF NO COND PPs are operating, THEN protect against blowdown related waterhammer:		
(1) Verify the S/G B/D valves are shut:		
 1-BD-4010-CV 1-BD-4011-CV 1-BD-4012-CV 1-BD-4013-CV 		
<u>NOTE</u> 1-CD-410 is located east of 11A Drain Cooler. 1-CD-411 is located west of 13 CBP.		
(2) Shut the 11 B/D HX HDR ISOL valves:		
1-CD-4101-CD-411		

APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION	
RECOVERY ACTIONS	ALTERNATE ACTIONS
SECURE RCS BORATION.	
. WHEN RCS boration has been completed,	
THEN shift the charging pump suction to a lower boric acid concentration source as follows:	
a. IF boration was from the BASTs, THEN secure boration as follows:	
(1) Open VCT OUT valve, 1-CVC-501-MOV.	
(2) Stop BA PP(s).	
(3) Shut BA DIRECT M/U valve, 1-CVC-514-MOV.	
(4) Shut BAST GRAVITY FD valves:	
 1-CVC-508-MOV 1-CVC-509-MOV 	
 b. IF boration was from a RWT, THEN secure boration as follows: 	
(1) Open VCT OUT valve, 1-CVC-501-MOV.	
(2) Shut RWT CHG PP SUCT valve, 1-CVC-504-MOV.	
c. Return makeup to the VCT PER OI-2B, <u>BORATION, DILUTION</u> <u>AND MAKEUP</u> .	
 Ensure boric acid concentration in makeup water is adequate to maintain required shutdown margin. 	

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APPENDIX (4) CORE AND RCS HEAT	REMOVAL
HR-1: S/G HEAT SINK WITH NO SIS OPERATION	
RECOVERY ACTIONS	ALTERNATE ACTIONS
G. EVALUATE RESTORING FORCED CIRCULATION.	
 IF the RCPs are NOT operating, THEN evaluate the need and desirability of restarting RCPs based on the following: 	
 Verify electrical power is available to the RCPs 	
 RCP BUS MCC-115 (ALL RCPs) MCC-105 (11A/11B RCP) 	
 Adequacy of RCS and Core Heat Removal using natural circulation 	
Existing RCS pressure and temperatures	
RCP Controlled Bleed-off temperatures	
 The capability to supply Main OR Auxiliary Feedwater to at least ONE S/G 	
 The possibility of dilute pockets of water in the RCS due to flow stagnation in the affected loop 	
2. IF at least ONE RCP is operating in each loop	
OR RCP operation is NOT desired, THEN PROCEED to step H.	
3. IF T COLD is less than 369° F, THEN PROCEED to step H.	
(continue)	

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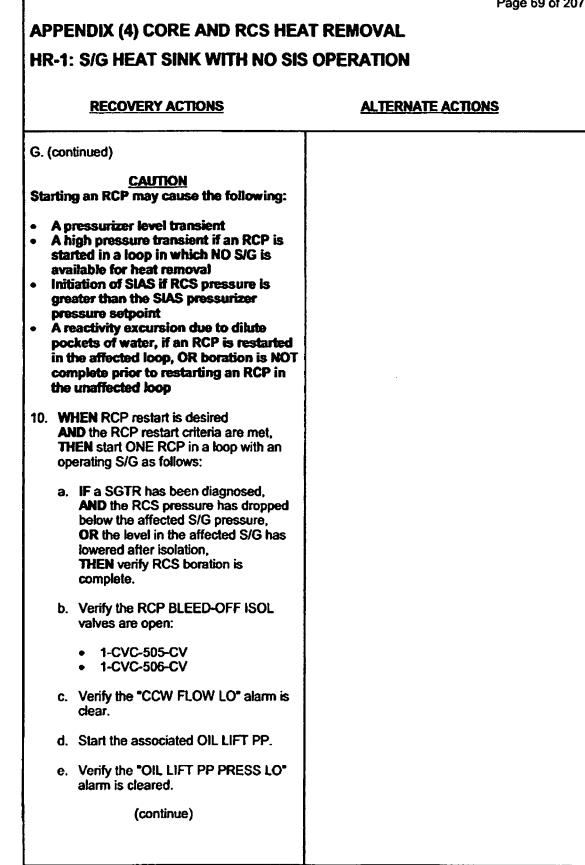
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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION **RECOVERY ACTIONS ALTERNATE ACTIONS** G. (continued) 4. IF RCPs have been exposed to excessive moisture. THEN consider meggering the RCP motors. 5. IF Component Cooling has been isolated to Containment, THEN restore cooling flow PER CE-2, CONTAINMENT ISOLATION, OR CE-3, CONTAINMENT SPRAY. CAUTION If a RCP Controlled Bleed-off temperature exceeds 250° F, the affected seal must be rebuilt before the RCP can be operated. **Do NOT restart ANY RCP whose Controlled Bleed-off temperature has exceeded** 250° F. 6. Check Controlled Bleed-off temperatures for the RCPs to be restarted have NOT exceeded 250° F. 7. Verify RCP Controlled Bleed-off temperatures are less than 200° F or are lowering. 8. Restore Pressurizer level to between 155 and 180 inches. (continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION **RECOVERY ACTIONS ALTERNATE ACTIONS** G. (continued) 9. Verify the RCP restart criteria are met by ALL of the following: Electrical power is available to the ٠ **RCPs** 12/22 SERV BUS VOLTS is less than 14.8 KV 4KV Vital Bus voltage is greater than 4100 volts RCP Controlled Bleed-off temperatures are less than 200° F RCS subcooling is greater than 25° F • based on CET temperatures At least ONE S/G available for heat removal S/G level greater than (-)170 inches capable of being supplied with feedwater capable of being steamed Pressurizer level is greater than 155 inches and NOT lowering T COLD is less than 525° F RCS temperature and pressure are greater than the minimum operating limits PER ATTACHMENT (1), RCS PRESSURE TEMPERATURE LIMITS. for the pumps to be started (continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION	
RECOVERY ACTIONS	ALTERNATE ACTIONS
G.10 (continued)	
 f. Operate the OIL LIFT PP for at least 60 seconds. 	
g. Insert the RCP sync stick.	
h. Verify the synchroscope on panel 1C19 is NOT rotating.	
i. Start the RCP.	
 j. Verify the RCP(s) are NOT cavitating by observing running current is steady. 	
 Operate Charging and Letdown, or HPSI to restore and maintain pressurizer level between 101 and 180 inches. 	
12. Monitor RCP seal parameters following pump restart.	. · · ·
13. Allow backflow to equalize temperatures in the opposite loop.	
(continue)	

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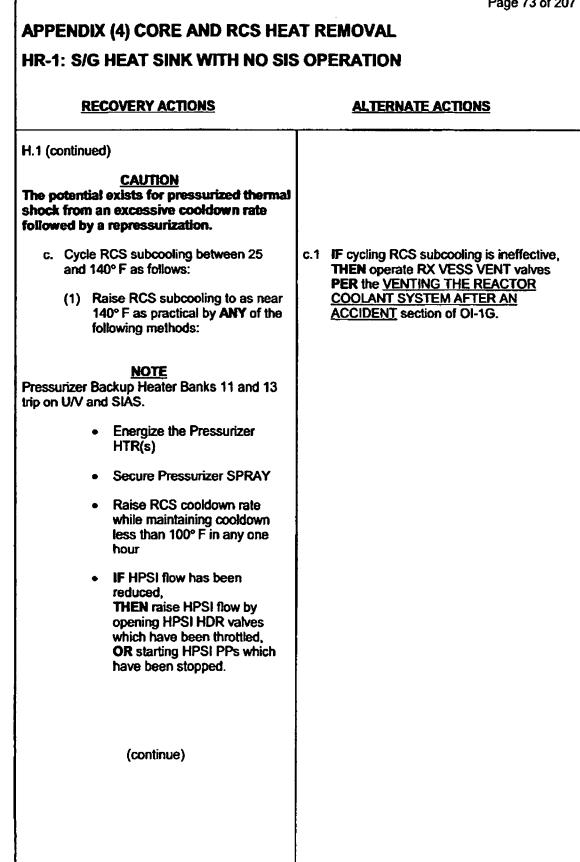
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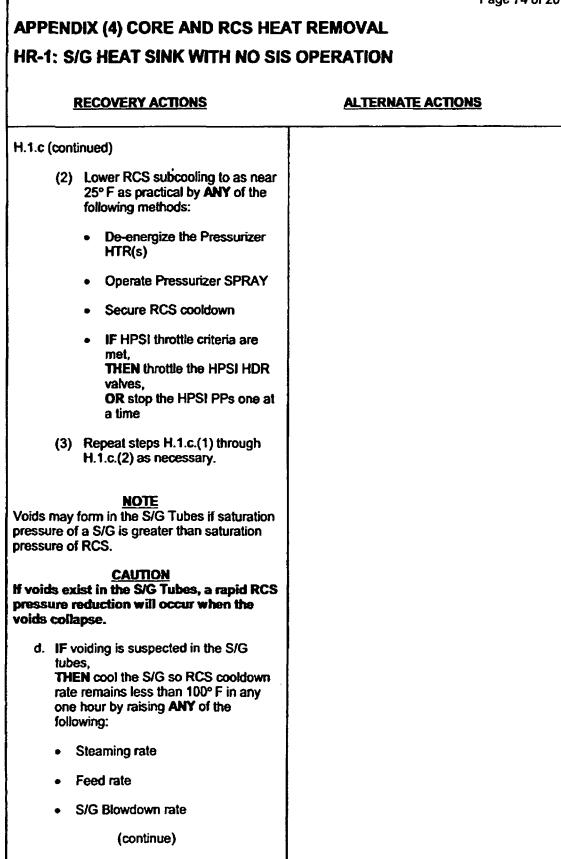
RECOVERY ACTIONS	ALTERNATE ACTIONS
6. (continued)	
4. Start a second RCP in the opposite loop:	
 a. IF the Reactor Coolant Pump Breaker CLOSE CIR fuses have been removed, THEN replace the CLOSE CIR fuses on the selected Reactor Coolant Pump Breaker. 11A RCP 252-11P01 11A RCP 252-13P01 11B RCP 252-13P02 12A RCP 252-12P01 12B RCP 252-14P01 12B RCP 252-14P02 b. Ensure RCP NPSH requirements are maintained PER ATTACHMENT (1), <u>RCS PRESSURE TEMPERATURE LIMITS</u> . c. Start RCP PER step G.10 above. d. Monitor RCP seal parameters following pump restart.	

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APPENDIX (4) CORE AND RCS HEAT	5
HR-1: S/G HEAT SINK WITH NO SIS OPERATION	
RECOVERY ACTIONS	ALTERNATE ACTIONS
H. CONTROL CORE AND RCS VOIDING.	
NOTE Core and RCS voiding may be indicated by the following:	
Letdown flow greater than charging flow	
 Rapid unexplained rise in pressurizer level during an RCS pressure reduction 	
 Loss of subcooled margin as determined using CET temperatures 	
"RXV WTR LVL LO" atarm	
 IF voiding causes difficulty in depressurization, THEN reduce or eliminate the voided area by performing the following actions: 	
a. Shut the L/D CNTMT ISOL valves:	
 1-CVC-515-CV 1-CVC-516-CV 	
b. Stop depressurizing the RCS.	
(continue)	

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APPENDIX (4) CORE AND RCS HE		
HR-1: S/G HEAT SINK WITH NO SIS OPERATION		
RECOVERY ACTIONS	ALTERNATE ACTIONS	
H.1 (continued)		
e. Monitor Pressurizer level and Reactor Vessel level for inventory trends.		
I. PERFORM LOW TEMPERATURE ACTIONS.	<u></u>	
 IF Main Feedwater is in operation AND high Feedwater pressure is causing level control problems, THEN secure pumps as required: SGFP COND BSTR PP 		
<u>NOTE</u> If a T cold mismatch exists between loops, actions should be performed based on the lowest operating loop indication.		
 WHEN T COLD is less than 385° F, THEN establish LTOP control by performing the following: a. Place ALL HPSI PPs in PULL TO LOCK. 	 2.1 IF HPSI LTOP control can NOT be established, THEN operate MAIN SPRAY, AUX SPRAY or PRZR VENT valves to maintain the following: RCS subcooling above 25° F based 	
	 on CET temperatures RCS pressure PER ATTACHMENT (1), <u>RCS PRESSURE</u> <u>TEMPERATURE LIMITS</u> 	
(continue)		

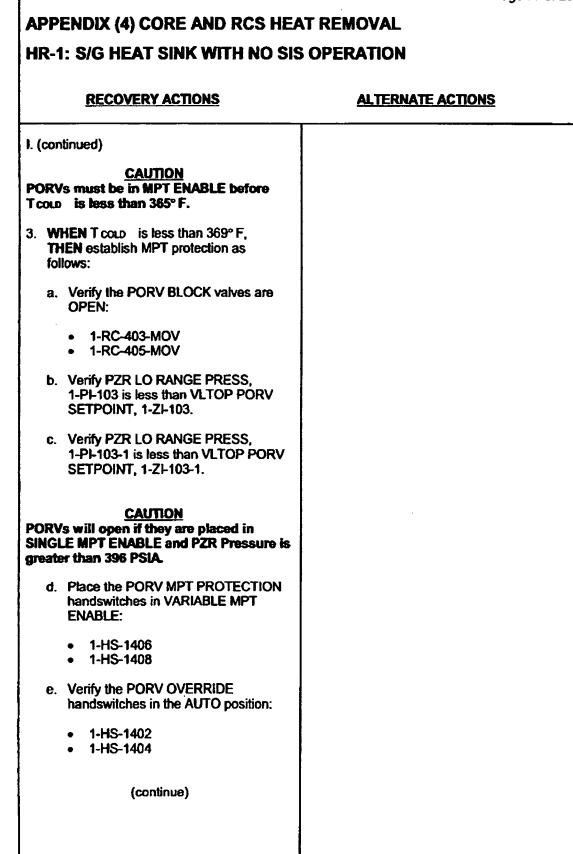
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APPENDIX (4) CORE AND RCS HEAT	5	
HR-1: S/G HEAT SINK WITH NO SIS OPERATION		
RECOVERY ACTIONS	ALTERNATE ACTIONS	
I.2 (continued)		
 b. Shut ALL HPSI HDR valves and place their handswitches in PULL-TO-OVERRIDE: MAIN 1-SI-616-MOV 1-SI-626-MOV 		
 1-SI-626-MOV 1-SI-636-MOV 1-SI-646-MOV 		
AUX • 1-SI-617-MOV • 1-SI-627-MOV • 1-SI-637-MOV • 1-SI-647-MOV		
<u>CAUTION</u> Only ONE HPSI Pump shall be operable prior to cooldown to less than 365° F T COLD.		
c. Rack out the breakers for the TWO HPSI PPs NOT required.		
(continue)		

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION **RECOVERY ACTIONS ALTERNATE ACTIONS** I. (continued) 4. WHEN RCS temperature is less than 350° F, THEN verify that NO more than TWO RCPs are in operation. 5. WHEN RCS temperature is less than 300° F AND RCS pressure is less than 300 PSIA, THEN perform the following actions: NOTE Cavity Cooling and CEDM Cooling aid in cooling Reactor Vessel Head if a void exists. a. Verify ONE CAV CLG and ONE CEDM CLG fan running if available. b. Close SIT OUT breakers: • (1-SI-614-MOV) 52-11442 (1-SI-624-MOV) 52-11443 (1-SI-634-MOV) 52-10442 • (1-SI-644-MOV) 52-10443 c. Shut SIT OUT valves: 1-SI-614-MOV 1-SI-624-MOV 1-SI-634-MOV 1-SI-644-MOV (continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL			
HR-1: S/G HEAT SINK WITH NO SIS OPERATION			
RECOVERY ACTIONS	ALTERNATE ACTIONS		
I.5 (continued)			
 d. IF Auxiliary Feedwater is NOT being used to feed the S/Gs, THEN perform the following actions: 			
(1) Shut the S/G AFW BLOCK valves by placing the handswitches in SHUT:			
11 S/G • 1-AFW-4520-CV • 1-AFW-4521-CV • 1-AFW-4522-CV • 1-AFW-4523-CV			
12 S/G 1-AFW-4530-CV 1-AFW-4531-CV 1-AFW-4532-CV 1-AFW-4533-CV	·		
(2) Place 13 AFW PP in PULL TO LOCK.			
(3) Verify shut SG AFW STM SUPP & BYPASS valves:			
 (11 SG)1-MS-4070-CV, 1-MS-4070A-CV (12 SG)1-MS-4071-CV, 1-MS-4071A-CV 			

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APPENDIX (4) CORE AND RCS HEAT REMOVAL		
HR-1: S/G HEAT SINK WITH NO SIS OPERATION		
RECOVERY ACTIONS	ALTERNATE ACTIONS	
J. ACCEPTANCE CRITERIA FOR SUCCESS PATH HR-1.		
 Check Core and RCS Heat Removal is satisfied by the following indications: At least ONE S/G has level between (-)24 and (+)30 inches OR S/G level is being restored by feedwater flow IF RCPs are operating, THEN THOT minus T COLD is less than 10° F IF RCPs are NOT operating, THEN THOT minus T COLD is less than 50° F RCS subcooling greater than 25° F based on CET temperatures Reactor Vessel level above the top of the hot leg IF Core and RCS Heat Removal has been established, THEN PROCEED to the next Safety Function to be satisfied. 	1.1 IF Core and RCS Heat Removal has NOT been satisfied, THEN PROCEED to the next appropriate Core and RCS Heat Removal Success Path.	

	RECOVERY ACTIONS	ALTERNATE ACTIONS
A.	ESTABLISH CORE AND RCS HEAT REMOVAL WITH SIS OPERATION.	
1.	IF 500KV offsite power has been lost, THEN protect the condenser from overpressure and minimize S/G inventory loss.	
	a. Shut BOTH M SIVs.	
	b. Shut the S/G B/D valves:	
	 1-BD-4010-CV 1-BD-4011-CV 1-BD-4012-CV 1-BD-4013-CV 	
2.	IF, at ANY time, Main and Auxiliary Feedwater are lost to BOTH S/Gs and can NOT be readily restored, THEN perform the following actions:	
	a. Trip ALL RCPs.	
	b. Shut the S/G B/D valves:	
	 1-BD-4010-CV 1-BD-4011-CV 1-BD-4012-CV 1-BD-4013-CV 	
3.	IF, at ANY time, BOTH S/G levels are less than (-)350 inches OR T COLD rises uncontrollably 5° F or greater, THEN IMPLEMENT HR-4,	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION **RECOVERY ACTIONS ALTERNATE ACTIONS** A. (continued) 4. IF pressurizer pressure is less than or equal to 1725 PSIA OR containment pressure is greater than or equal to 2.8 PSIG, THEN verify SIAS actuation. 5. IF pressurizer pressure is greater than 1725 PSIA AND containment pressure is less than 2.8 PSIG. THEN perform the following actions to block SIAS: a. Open MAIN and AUX HPSI HDR valves: MAIN 1-SI-616-MOV 1-SI-626-MOV 1-SI-636-MOV 1-SI-646-MOV AUX 1-SI-617-MOV 1-SI-627-MOV 1-\$I-637-MOV 1-SI-647-MOV b. Start 11 and 13 HPSI PPs. c. Start ALL available CHG PPs. d. WHEN the "PZR PRESS BLOCK A PERMITTED" alarm is received, THEN block SIAS A. e. WHEN the "PZR PRESS BLOCK B PERMITTED" alarm is received, THEN block SIAS B. (continue)

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APPENDIX (4) CORE AND RCS HEAT	-
HR-2: S/G HEAT SINK WITH SIS OPE	
RECOVERY ACTIONS	ALTERNATE ACTIONS
A.5 (continued)	
f. WHEN pressure is below 1270 PSIA, THEN verify appropriate HPSI flow PER ATTACHMENT(10), <u>HIGH</u> <u>PRESSURE SAFETY INJECTION</u> <u>FLOW</u> .	
 IF SIAS has actuated, THEN perform the following actions: 	
a. Verify the following pumps are running:	
11 HPSI PP13 HPSI PP	
11 LPSI PP 12 LPSI PP	
ALL available CHG PPs	
(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL	
HR-2: S/G HEAT SINK WITH SIS OF	PERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
A.6 (continued)	
 b. Verify safety injection flow: HPSI flow PER ATTACHMENT(10), <u>HIGH</u> <u>PRESSURE SAFETY INJECTION</u> <u>FLOW</u>, when pressure is below 1270 PSIA LPSI flow PER ATTACHMENT(11), <u>LOW</u> <u>PRESSURE SAFETY INJECTION</u> <u>FLOW</u>, when pressure is below 185 PSIA 	 b.1 Perform the following actions as necessary: <u>CAUTION</u> Operation of two HPSI Pumps on 14 4KV Bus may cause 1B DG loading to exceed 3600 KW. IF 11 HPSI PP failed, THEN perform the following actions: IF 11 HPSI PP failed, THEN perform the following actions: IF 18 DG is powering 14 4KV Bus, THEN verify DG load is less than 2960 KW. Start 12 HPSI PP. IF 13 HPSI PP failed, THEN align 12 HPSI PP as follows: Start 12 HPSI PP. Start 12 HPSI PP. (2) Open HPSI HDR XCONN valve, 1-SI-653-MOV. Shut HPSI HDR XCONN valve, 1-SI-655-MOV.
	 Ensure electrical power is available to valves and pumps. Verify safety injection system lineup
(continue)	PER ATTACHMENT (2), <u>SIAS</u> VERIFICATION CHECKLIST

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APPENDIX (4) CORE AND RCS HEAT REMOVAL		
HR-2: S/G HEAT SINK WITH SIS O	PERATION	
RECOVERY ACTIONS	ALTERNATE ACTIONS	
A. (continued)		
 IF high RCS pressure is preventing adequate SIS flow to support heat removal, THEN attempt to depressurize the RCS to obtain adequate SIS flow by concurrently performing actions PER the following: RCS Pressure And Inventory Control success paths as necessary The selected Core And RCS Heat Removal success path IF at least ONE 4KV Vital Bus is energized, THEN commence RCS boration as follows: Verify the normal charging flowpath is available for RCS makeup with at least ONE LOOP CHG valve open: 1-CVC-518-CV 1-CVC-519-CV 	 a.1 IF the normal charging path is NOT available, THEN establish charging flowpath to the RCS via the AUX HPSI HDR as follows: (1) Shut HPSI AUX HDR ISOL valve, 1-SI-656-MOV. (2) Open ONE of the AUX HPSI HDR valves: 1-SI-617-MOV 1-SI-627-MOV 1-SI-637-MOV 1-SI-637-MOV 1-SI-647-MOV (3) Open SI TO CHG HDR valve, 1-CVC-269-MOV. (4) Shut REGEN HX CHG INLET valve, 1-CVC-183, located in the 27 ft West Penetration Room. 	
(continue)	(continue)	

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APPENDIX (4) CORE AND RCS HEA	AT REMOVAL	
IR-2: S/G HEAT SINK WITH SIS OPERATION		
RECOVERY ACTIONS	ALTERNATE ACTIONS	
A.8.a (continued)	A.8.a.1 (continued)	
	(5) Shut L/D CNTMT ISOL valves:	
	 1-CVC-515-CV 1-CVC-516-CV 	
	a.2 IF a charging flowpath can NOT be established via the AUX HPSI HDR, THEN perform the following:	
	(1) Verify REGEN HX CHG INLET valve, 1-CVC-183, is open.	
	(2) Charge through the Loop Charging valves Bypass Valve, 1-CVC-188.	
 b. Verify RCS boration from the BAST using the CVCS is in progress as follows: 	b.1 IF BAST is NOT available, THEN align charging pumps to take a suction from the RWT as follows:	
(1) BAST levels remain greater than 10 inches.	(1) Ensure RWT level is greater than 2 feet.	
(2) VCT M/U valve, 1-CVC-512-CV, is shut.	(2) Open RWT CHG PP SUCT valve, 1-CVC-504-MOV.	
(3) BA DIRECT M/U valve, 1-CVC-514-MOV, is open.	(3) Shut VCT OUT valve, 1-CVC-501-MOV.	
(4) BAST GRAVITY FD valves, are open:	(4) Start ALL available CHG PPs.	
 1-CVC-508-MOV 1-CVC-509-MOV 	(5) Ensure CHG HDR PRESS is greater than RCS pressure.	
(5) Verify the M/U MODE SEL SW, 1-HS-210, is in MANUAL.		
(6) ALL available BA PPs are running.		
(7) VCT OUT valve, 1-CVC-501-MOV, is shut.		
(continue)		

APPENDIX (4) C	ORE AND RCS HE		_
APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION			
RECOVER	Y ACTIONS	ALTERNATE A	CTIONS
A.8.b (continued)			· · · · · · · · · · · · · · · · · · ·
(8) ALL avail running.	able CHG PPs are		
	HG HDR PRESS is an RCS pressure.		
c. Record the tim commenced:	e RCS boration was		
d. Record BAST	levels:		
• 11 BAST:			
-			
<u>CAU</u> To prevent boric aci continue boration fo	TION d precipitation, do NOT r greater than the		
CAU To prevent boric acid continue boration fo following: • 134 inches from f • 60 minutes if THI operating • 90 minutes if TW	d precipitation, do NOT r greater than the the BAST REE CHG PPs are		
CAU To prevent boric acid continue boration fo following: • 134 inches from f • 60 minutes if THI operating • 90 minutes if TW operating	d precipitation, do NOT r greater than the the BAST REE CHG PPs are		
<u>CAU</u> To prevent boric acid continue boration fo following: • 134 inches from f • 60 minutes from f • 60 minutes if THI operating • 90 minutes if TW operating • 180 minutes if Ol	d precipitation, do NOT r greater than the the BAST REE CHG PPs are O CHG PPs are NE CHG PP is operating tion until ONE of the		
CAU To prevent boric acid continue boration fo following: 134 inches from f 60 minutes if THI operating 90 minutes if TW operating 180 minutes if Ol e. Continue boral following condi (1) 116 perce margin re	d precipitation, do NOT r greater than the the BAST REE CHG PPs are O CHG PPs are NE CHG PP is operating tion until ONE of the		
CAU To prevent boric acid continue boration fo following: 134 inches from t 60 minutes if THI operating 90 minutes if TW operating 180 minutes if Ol e. Continue borat following condi (1) 116 perce margin re achieved	d precipitation, do NOT r greater than the the BAST REE CHG PPs are O CHG PPs are NE CHG PP is operating tion until ONE of the itions is met: ent of the shutdown quirement has been PER the NEOPs. eI has been lowered a		· · ·
CAU To prevent boric acid continue boration fo following: 134 inches from f 60 minutes if THI operating 90 minutes if TW operating 180 minutes if OI e. Continue boral following condi (1) 116 perce margin re achieved (2) BAST leve total of 10	d precipitation, do NOT r greater than the the BAST REE CHG PPs are O CHG PPs are NE CHG PP is operating tion until ONE of the tions is met: ent of the shutdown quirement has been PER the NEOPs. eI has been lowered a		

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RECOVERY ACTIONS ALTERI		ALTERNATE ACTIONS
follows • Fo CH • Fo PF • Fo PF Q RCS temperature monitored to avo	r 53 minutes if THREE IG PPs are operating r 80 minutes if TWO CHG Ps are operating r 160 minutes if ONE CHG is operating AUTION must be closely id a cooldown rate greate	5
 IF condenser v 20 InHg, THEN cooldow Shutdown Coo the TURB BYP a. Ensure the 	al Specification Limits. Facuum is greater than on the RCS to establish ling entry conditions using valves as follows: ADVs are shut. TURB BYP valves from room.	 9.1 Cooldown the RCS to establish Shutdown Cooling entry conditions using the ADVs as follows: a. Prior to determining if a tube rupture exists and isolating the affected S/G, record the ADV open and close times, for dose calculations. b. Shift the ADV controller to MANUAL.
	(continue)	(continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

A.9 (continued)

- c. IF the TURB BYP valves can NOT be operated from the Control Room, THEN station an operator to manually position the TURB BYP valves PER OI-8C, MAIN STEAM AND MSR VENTS AND DRAINS.
- d. Maintain RCS cooldown less than 100° F in any one hour.
- e. IF ALL 4KV Vital Buses are de-energized AND boration has NOT been commenced, THEN maintain the following conditions:
 - SUR negative, or SUR zero with WRNI Power less than 10⁻⁴%
 - T COLD greater than NEOP-13, figure titled, <u>MINIMUM ALLOWED</u> <u>RCS TEMPERATURE TO</u> <u>ENSURE 1%Ap SHUTDOWN vs.</u> <u>BURNUP</u>

A.9.1 (continued)

- c. Operate the ADVs from the control room.
- d. IF the ADVs will NOT operate from the Control Room, THEN perform ONE of the following:
 - (1) Operate the ADVs from 1C43 as follows:
 - (a) Verify the ADV controllers on 1C43 are set at 0% output:
 - (11 ADV) 1-HC-4056A
 - (12 ADV) 1-HC-4056B
 - (b) Align the ADV Hand Transfer Valves to 1C43 (POSITION 2):
 - 11 S/G
 - 1-HV-3938A
 - 1-HV-3938B
 - 12 S/G
 - 1-HV-3939A
 - 1-HV-3939B
 - (c) Operate the ADVs from 1C43.

NOTE

The ADVs are reverse acting, i.e., clockwise to open and counterclockwise to shut.

- (2) Locally operate the ADVs from the 45ft level of the Aux Building.
- e. Maintain RCS cooldown less than 100° F in any one hour.

(continue)

(continue)

RECOVERY ACTIONS	ALTERNATE ACTIONS
A.9 (continued)	A.9.1 (continued)
	 f. IF ALL 4KV Vital Buses are de-energized AND boration has NOT been commenced, THEN maintain the following conditions:
	 SUR negative, or SUR zero with WRNI Power less than 10⁻⁴% T coLD greater than NEOP-13, figure titled, <u>MINIMUM ALLOWED</u> <u>RCS TEMPERATURE TO</u> <u>ENSURE 1%Ap SHUTDOWN vs.</u> <u>BURNUP</u>
	<u>CAUTION</u> The following step may blow out the Condenser Rupture Disks and may cause equipment damage.
	9.2 IF the ADVs are NOT available, AND condenser vacuum has been lost, THEN cooldown the RCS to establish Shutdown Cooling entry conditions by opening the TURB BYP valves:
	a. Open ALL doors to the outside on the 45 ft level of the Turbine Building.
	 b. Notify personnel to evacuate the 45 ft level of the Turbine Building.
(continue)	(continue)

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APPENDIX (4) CORE AND RCS HR-2: S/G HEAT SINK WITH SI	
RECOVERY ACTIONS	ALTERNATE ACTIONS
A.9 (continued)	A.9.2 (continued)
	 c. IF BOTH MSIVs are shut, THEN perform the following: (1) Close the power supply breakers
	to the MSIV Bypass valves: • 1-MOV-4045 breaker, 52-11428 • 1-MOV-4052 breaker, 52-10428 (2) Open the MSIV BYP valves:
	 1-MS-4045-MOV 1-MS-4052-MOV d. Shut the SGFPT EXH values.
	e. Station an operator to manually operate the TURB BYP valve(s) PER OI-8C, <u>MAIN STEAM AND MSR</u> <u>VENTS AND DRAINS</u> , as directed by the Control Room.
	f. Maintain RCS cooldown less than 100° F in any one hour.
	 g. IF ALL 4KV Vital Buses are de-energized AND boration has NOT been commenced, THEN maintain the following conditions:
	 SUR negative, or SUR zero with WRNI Power less than 10⁻⁴% T coLo greater than NEOP-13, figure titled, <u>MINIMUM ALLOWED</u> <u>RCS TEMPERATURE TO</u> <u>ENSURE 1%∆p SHUTDOWN vs.</u> <u>BURNUP</u>
(continue)	(continue)

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APPENDIX (4) CORE AND RCS	Ū
HR-2: S/G HEAT SINK WITH SI	IS OPERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
A.9 (continued)	A.9 (continued)
	<u>CAUTION</u> The following step may blow out the Condenser Rupture Disks and may cause equipment damage.
	 9.3 IF RCS cooldown has NOT been established, THEN cooldown the RCS to establish Shutdown Cooling entry conditions by aligning the steam drains to the condenser as follows:
	a. Open the MS UPSTREAM DRN ISOL VLVS by placing handswitch 1-HS-6622 in OPEN.
	b. Open the MS LINE DRN VLVS by placing handswitch 1-HS-6600 in OPEN.
	c. IF BOTH MSIVs are shut, THEN perform the following:
	 Close the power supply breakers to the MSIV Bypass valves:
	 1-MOV-4045 breaker, 52-11428 1-MOV-4052 breaker, 52-10428
	(2) Open the MSIV BYP valves:
	 1-MS-4045-MOV 1-MS-4052-MOV
	d. Maintain RCS cooldown less than 100° F in any one hour.
(continue)	(continue)

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APPENDIX (4) CORE AND RCS HEA	
HR-2: S/G HEAT SINK WITH SIS OP	
1112. 313 HEAT SHAR WITH 313 UP	
RECOVERY ACTIONS	ALTERNATE ACTIONS
A.9 (continued)	A.9.3 (continued)
	 e. IF ALL 4KV Vital Buses are de-energized AND boration has NOT been commenced, THEN maintain the following conditions: SUR negative, or SUR zero with WRNI Power less than 10-4% T COLD greater than NEOP-13, figure titled, <u>MINIMUM ALLOWED RCS TEMPERATURE TO ENSURE 1%Δρ SHUTDOWN vs. BURNUP</u>
NOTE Verification of RCS temperature response to a plant change during natural circulation takes approximately 5 to 15 minutes following the action due to increased loop cycle times. 10. IF ALL RCPs are secured, THEN verify Natural Circulation in at least ONE toop by the following: • RCS subcooling is at least 25° F based on CET temperatures • THOT minus T COLD less than 50° F • T COLD constant or lowering • THOT constant or lowering • CET temperatures trend consistent with T HOT • Steaming rate affects RCS temperatures	 10.1 IF subcooled natural circulation can NOT be verified, THEN verify adequate RCS cooling flow by the following: ALL available CHG PPs are operating SIS flow is appropriate PER ATTACHMENT(10), <u>HIGH</u> <u>PRESSURE SAFETY INJECTION</u> FLOW, and ATTACHMENT(11), <u>LOW PRESSURE SAFETY</u> <u>INJECTION FLOW</u> At least ONE S/G available for heat removal S/G tevel greater than (-)170 inches capable of being supplied with feedwater capable of being steamed CET temperatures are less than 50° F superheated

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION RECOVERY ACTIONS ALTERNATE ACTIONS A. (continued) 11. IF a controlled cooldown is in progress, THEN block SGIS and SIAS: • WHEN the "SGIS A BLOCK PERMITTED" alarm is received, THEN block SGIS A. WHEN the "SGIS B BLOCK . PERMITTED" alarm is received, THEN block SGIS B. WHEN the "PZR PRESS BLOCK A PERMITTED^{*} alarm is received, THEN block SIAS A. WHEN the "PZR PRESS BLOCK B . PERMITTED" alarm is received, THEN block SIAS B.

	RECOVERY ACTIONS	ALTERNATE ACTIONS
B.	DETERMINE IF A SGTR EXISTS.	
	IF a SGTR has occurred, as indicated by ANY of the following:	
	S/G samples	
1	RMS trends:	
	 UNIT 1 CNDSR OFF-GAS (1-RI-1752) UNIT 1 S/G B/D (1-RI-4014) UNIT 1 MAIN VENT GASEOUS (1-RI-5415) MAIN STEAM EFFL RAD MONITOR (1-RIC-5421 OR 1-RIC-5422) 	
	S/G level change when NOT feeding	
	 Post-Trip S/G level trends 	
	Mismatch in feed flow prior to the trip	
	 Steam flow vs. Feed flow mismatch prior to the trip 	
	THEN identify the most affected S/G.	
	IF indications of a SGTR are NOT observed, THEN PROCEED to Block Step C.	
	(continue)	

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APPENDIX (4) CORE AND RCS HEA HR-2: S/G HEAT SINK WITH SIS OF	
RECOVERY ACTIONS	ALTERNATE ACTIONS
B. (continued)	
<u>NOTE</u> Maintaining RCS subcooling takes precedence over equalizing RCS pressure and affected S/G pressure.	
3. Depressurize the RCS PER the selected Pressure and Inventory Control success path to maintain the following:	· ·
 Subcooling between 25 and 140° F based on CET temperatures 	
RCS pressure greater than the NPSH limits PER ATTACHMENT (1), <u>RCS</u> <u>PRESSURE TEMPERATURE LIMITS</u>	
RCS pressure less than 850 PSIA	
 RCS pressure approximately equal to affected S/G pressure 	
 Dispatch an operator to standby in the Unit 1 45 ft Switchgear Room to shut the affected S/G ADV. 	
(continue)	



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APPENDD	((4) CORE AND RCS HEA	T RE	MOVAL
HR-2: S/G	HEAT SINK WITH SIS OP	ERA	TION
RE	COVERY ACTIONS		ALTERNATE ACTIONS
B. (continued))		· · · · · · · · · · · · · · · · · · ·
due to indica maintaining maintain RC affected S/G.	<u>CAUTION</u> conflict between isolating a S/G tions of SGTR or ESDE, and adequate heat removal, then S heat removal via the least At least one S/G should railable for heat removal if		
	or is less than 515° F, ate the most affected S/G.		
THEN	S/G is the most affected S/G, isolate 11 S/G by performing lowing actions:		
T O	hut 11 ADV using the Hand ransfer Valves on the West wall f the Unit 1 45 ft Switchgear loom as follows:	(1).1	IF 11 ADV will NOT shut from 1C43, THEN shut 11 ADV Manual Isolation Valve, 1-MS-101.
(2	 IF 11 ADV was locally operated, THEN remove the manual override. 		
(t	 verify 11 ADV controller, 1-HC-4056A, at 1C43 is set at 0% output. 		
(0	:) Align 11 S/G Hand Transfer Valves to 1C43 (POSITION 2):		
	1-HV-3938A1-HV-3938B		
(2) S	hut 11 MSIV.		
	erify 11 MSIV BYP valve, MS-4045-MOV, is shut.		
	erify 11 SG FW ISOL valve FW-4516-MOV, is shut.		
	(continue)		

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APPEND)IX (4) CORE AND RCS HEA	TREMOVAL
HR-2: S/	G HEAT SINK WITH SIS OP	ERATION
<u>I</u>	RECOVERY ACTIONS	ALTERNATE ACTIONS
B.5.a (cont	inued)	
(5)	Shut 11 SG AFW STM SUPP & BYPASS valves, 1-MS-4070-CV and 1-MS-4070A-CV.	
(6)	Shut 11 S/G AFW BLOCK valves by placing the handswitches in SHUT:	
	 1-AFW-4520-CV 1-AFW-4521-CV 1-AFW-4522-CV 1-AFW-4523-CV 	
(7)	Shut 11 S/G B/D valves:	
	 1-BD-4010-CV 1-BD-4011-CV 	
(8)	Shut the MS UPSTREAM DRN ISOL VLVS by placing handswitch 1-HS-6622 in CLOSE.	
(9)	Observe locally, the S/G Safety Valves are NOT leaking.	
	(continue)	

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APPENDIX (4) CORE AND RCS HEA	AT REMOVAL
HR-2: S/G HEAT SINK WITH SIS OF	PERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
B.5 (continued)	
 b. IF 12 S/G is the most affected S/G, THEN isolate 12 S/G by performing the following actions: 	
(1) Shut 12 ADV using the Hand Transfer Valves on the West wall of the Unit 1 45 ft Switchgear Room as follows:	(1).1 IF 12 ADV will NOT shut from 1C43, THEN shut 12 ADV Manual Isolation Valve, 1-MS-104.
(a) IF 12 ADV was locally operated, THEN remove the manual override.	
(b) Verify 12 ADV controller, 1-HC-4056B, at 1C43 is set at 0% output.	
(c) Align 12 S/G Hand Transfer Valves to 1C43 (POSITION 2):	
 1-HV-3939A 1-HV-3939B 	
(2) Shut 12 MSIV.	
(3) Verfiy 12 MSIV BYP valve, 1-MS-4052-MOV, is shut.	
(4) Verify 12 SG FW ISOL valve 1-FW-4517-MOV, is shut.	
(5) Shut 12 SG AFW STM SUPP & BYPASS valves, 1-MS-4071-CV and 1-MS-4071A-CV.	
(continue)	

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APPENDIX (4) CORE AND RCS HEA	T REMOVAL
HR-2: S/G HEAT SINK WITH SIS OP	ERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
B.5.b (continued)	-
 (6) Shut 12 S/G AFW BLOCK valves by placing the handswitches in SHUT: 1-AFW-4530-CV 1-AFW-4531-CV 1-AFW-4532-CV 1-AFW-4533-CV (7) Shut 12 S/G B/D valves: 1-BD-4012-CV 1-BD-4013-CV (8) Shut the MS UPSTREAM DRN ISOL VLVS by placing handswitch 1-HS-6622 in 	
CLOSE. (9) Observe locally, the S/G Safety Valves are NOT leaking.	
(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

B. (continued)

- 6. Ensure the affected S/G Safety Valves remain shut.
 - a. Close the power supply breakers to the MSIV Bypass valves:
 - 1-MOV-4045 breaker, 52-11428
 - 1-MOV-4052 breaker, 52-10428
 - b. Maintain the affected S/G pressure less than 920 PSIA by performing the following:

CAUTION

Damage to the steam system could occur due to moisture carryover if the MSIV Bypass Valve is operated on a S/G whose level exceeds (+)55 inches {(+)50}.

- (1) IF the affected S/G pressure approaches 920 PSIA
 AND S/G level is less than (+)55 inches {(+)50},
 THEN operate the MSIV BYP valve on the affected S/G;
 - (11 S/G) 1-MS-4045-MOV
 - (12 S/G) 1-MS-4052-MOV
- (2) IF the MSIV BYP valve can NOT maintain S/G pressure less than 920 PSIA, THEN steam the affected S/G to atmosphere from 1C43 as follows:
 - (a) Record the ADV open and close times, for dose calculations.
 - (b) Direct the adjustment of the ADV from 1C43 as necessary.

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- (2).1 IF the affected S/G ADV was manually isolated,
 THEN steam the affected S/G to atmosphere as follows:
 - (a) Record the ADV open and close times, for dose calculations.
 - (b) Direct throttling of the affected ADV Manual Isolation Valve as necessary:
 - (11 S/G) 1-MS-101
 - (12 S/G) 1-MS-104

(continue)

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AT REMOVAL
PERATION
ALTERNATE ACTIONS
7.1 IF the wrong S/G was isolated, THEN perform the following actions:
<u>CAUTION</u> A severe waterhammer may result if Main Feedwater flow is restored after it has been
a. Restore feeding and steaming capability to the least affected S/G.
b. WHEN RCS heat removal has been re-established to the least affected S/G,
THEN isolate the most affected S/G PER step B.5.

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

B. (continued)

- 9. Contact the Operational Support Center to perform periodic samples for the following:
 - RCS boron concentration at least once per hour
 - RCS activity
 - S/Gs boron concentration and activity
 - Turbine Building Sumps activity
 - Condensate and CSTs activity
 - Air samples and radiation surveys throughout the plant to determine the spread of contamination
- 10. Ensure boron concentration remains above 116 percent of the required shutdown margin **PER** the NEOPs.

(continue)

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P **APPENDIX (4) CORE AND RCS HEAT REMOVAL** HR-2: S/G HEAT SINK WITH SIS OPERATION **RECOVERY ACTIONS ALTERNATE ACTIONS** B. (continued) 11. IF ALL RCPs are secured. THEN disable RCPs in the affected loop to prevent inadvertant start. a. IF 11 S/G is the affected S/G. THEN disable 11A and 11B RCPs by removing the Reactor Coolant Pump Breaker CLOSE CIR fuses. 11A RCP 252-11P01 . • 11A RCP 252-11P02 • 11B RCP 252-13P01 • 11B RCP 252-13P02 b. IF 12 S/G is the affected S/G, THEN disable 12A and 12B RCPs by removing the Reactor Coolant Pump Breaker CLOSE CIR fuses. 12A RCP 252-12P01 . 12A RCP 252-12P02 12B RCP 252-14P01 12B RCP 252-14P02 (continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

B. (continued)

NOTE

If available, narrow range S/G level indication should be used to control the affected S/G level.

NOTE

Affected S/G level control steps are listed in order of preference and should be performed in the order listed.

- Maintain the affected S/G level between 0 and (+)50 inches by performing ANY of the following:
 - a. Maintain the affected S/G level by controlling RCS pressure with backflow to the RCS as follows:
 - IF the affected S/G level is high, THEN reduce RCS pressure below the affected S/G pressure by ANY of the following methods:
 - (a) De-energize the Pressurizer HTR(s).
 - (b) Use MAIN or AUX SPRAY.
 - (c) IF the HPSI throttle criteria are met, THEN throttle or secure flow to reduce RCS pressure.
 - (2) Control RCS pressure to maintain the affected S/G level approximately constant.

(continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.12 (α	ontin	ued)	
b. Maintain the affected S/G level by blowdown to the MWS as follows:			
	(1)	THI sigr <u>RES</u> <u>AT</u>	FAS has actuated, EN reset the AFAS START hals PER ATTACHMENT(19) <u>SET AFAS START SIGNALS</u> THE ACTUATION BINETS.
	(2)	RE(1-R	ce UNIT 1 S/G B/D COVERY radiation monitor, IC-4095, in OPER alarm at 22G:
		(a)	Verify 1-HS-4095B/S1 - OPER BYPASS in OFF.
		(b)	Highlight Stop Pump AND press SELECT.
		(c)	Verify the CH 1 green OPE LED extinguishes.
		(d)	Bypass annunciator alarms
	(3)		ify open B/D Recovery DISC MWS, 1-BD-4097-CV.
	(4)		ify shut B/D Recovery DISCH CIRC WTR, 1-BD-4015-CV.
	(5)		fy shut B/D Recovery DISCF CNDSR, 1-BD-4096-CV.
	(6)		t S/G Combined B/D Header ottle Valves:
			1-BD-102 1-BD-104
			(continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.12.b (continued)

- (7) Open the affected S/G BOT B/D valve by placing its handswitch in RAD TRIP OVERRIDE:
 - (11 S/G) 1-BD-4011-CV
 - (12 S/G) 1-BD-4013-CV
- (8) Throttle open the S/G Combined B/D Header Throttle Valve on the affected S/G to obtain a blowdown flow of approximately 100 GPM while maintaining 11 B/D Heat Exchanger outlet temperature less than 200° F:
 - (11 S/G) 1-BD-102
 - (12 S/G) 1-BD-104
- (9) Pump the MWRT PER the <u>TRANSFERRING THE MWRT</u> <u>TO THE RCWMT</u> section of OI-17D.
- (10) Monitor MWRT level at 1C33 and maintain MWRT level approximately constant by throttling the S/G blowdown rate while pumping to the RCWMT.

(continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.12 (continued)

- c. Maintain the affected S/G level by blowdown to the Condenser as follows:
 - (1) IF AFAS has actuated, THEN reset the AFAS START signals PER ATTACHMENT(19), <u>RESET AFAS START SIGNALS</u> <u>AT THE ACTUATION</u> <u>CABINETS</u>.
 - (2) Ensure at least ONE Condensate Demin is in service.
 - (3) Open PRECOAT SYS BYP valve, 1-CD-5818-CV.
 - (4) Shut COND DEMIN BYP valve, 1-CD-4439-MOV.
 - (5) IF AFW is operating AND the SGFP Miniflow Valves are shut, THEN throttle open the FW DUMP TO CNDSR HOTWELL valves, 1-FW-134 and 1-FW-135, to obtain maximum condensate flow through the Condensate Demin.
 - (6) Shut CNDSR HI LVL DUMP CV-4405 INLET valve, 1-CD-232.
 - (7) Bypass UNIT 1 S/G B/D RECOVERY radiation monitor, 1-RIC-4095:
 - (a) Place 1-HS-4095B/S2 -HIGH BYPASS in BYPASS.
 - (b) Verify 1-HS-4095B/S1 -OPER BYPASS in BYPASS.

(continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION **RECOVERY ACTIONS ALTERNATE ACTIONS** B.12.c (continued) (8) Verify shut B/D Recovery DISCH TO MWS, 1-BD-4097-CV. (9) Verify shut B/D Recovery DISCH TO CIRC WTR, 1-BD-4015-CV. (10) Verify open B/D Recovery DISCH TO CNDSR, 1-BD-4096-CV. (11) Shut S/G Combined B/D Header Throttle Valves: 1-BD-102 1-BD-104 • (12) Open the affected S/G BOT B/D valve by placing its handswitch in RAD TRIP OVERRIDE: • (11 S/G) 1-BD-4011-CV • (12 S/G) 1-BD-4013-CV (13) Throttle open the S/G Combined B/D Header Throttle Valve on the affected S/G to obtain a blowdown flow of approximately 100 GPM while maintaining 11 B/D Heat Exchanger outlet temperature less than 200° F: • (11 S/G) 1-BD-102 (12 S/G) 1-BD-104 (continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

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RECOVERY ACTIONS

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ALTERNATE ACTIONS

B.12 (c	ontin	ued)	
d.		ntain the affected S/G level by aming to the condenser as follows:	
	(1)	Ensure the condenser vacuum is greater than 20 InHg.	
	(2)	Ensure at least ONE Condensate Demin is in service.	
	(3)	Open PRECOAT SYS BYP valve, 1-CD-5818-CV.	
	(4)	Shut COND DEMIN BYP valve, 1-CD-4439-MOV.	
	(5)	IF AFW is operating AND the SGFP Miniflow Valves are shut, THEN throttle open the FW DUMP TO CNDSR HOTWELL valves, 1-FW-134 and 1-FW-135, to obtain maximum condensate flow through the Condensate Demin.	
	(6)	Shut CNDSR HI LVL DUMP CV-4405 INLET valve, 1-CD-232.	
	(7)	Operate the MS UPSTREAM DRN ISOL VLVS using 1-HS-6622 as necessary.	
		(continue)	

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APPENDIX (4) CORE AND RCS HEA	T REMOVAL
HR-2: S/G HEAT SINK WITH SIS OP	ERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
B.12.d (continued)	
<u>CAUTION</u> Damage to the steam system could occur due to moisture carryover if the MSIV Bypass Valve is operated on a S/G whose level exceeds (+)55 inches {(+)50}.	
 (8) IF additional steam flow is desired AND S/G level is less than (+)55 inches {(+)50}, THEN operate the MSIV BYP valve on the affected S/G: 	
 (11 S/G) 1-MS-4045-MOV (12 S/G) 1-MS-4052-MOV 	
e. Maintain the affected S/G level by steaming to atmosphere as follows:	
(1) Steam the affected S/G to atmosphere from 1C43 as follows:	 (1).1 IF the affected S/G ADV was manually isolated, THEN steam the affected S/G to atmosphere as follows:
(a) Record the ADV open and close times, for dose calculations.	(a) Record the ADV open and close times, for dose calculations.
(b) Direct the adjustment of the ADV from 1C43 as necessary.	(b) Direct throttling of the affected ADV Manual Isolation Valve as necessary:
	 (11 S/G) 1-MS-101 (12 S/G) 1-MS-104
(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.12 (continued)

- f. IF the following conditions can be maintained:
 - RCS pressure remains below
 850 PSIA
 - MSIV, ADV and MSIV BYP valves remain shut

THEN the affected S/G may be allowed to fill to the MSIV.

NOTE

If available, narrow range S/G level indication should be used to control the affected S/G level.

NOTE

Affected S/G pressure control steps are listed in order of preference and should be performed in the order listed.

- 13. Cool and depressurize the affected S/G as necessary by performing ANY of the following:
 - a. IF ANY RCP is operating, THEN cool and depressurize the affected S/G by feeding and backflow to the RCS as follows:
 - (1) Verify Letdown is operating.
 - (2) IF S/G level is less than (+)50 inches, THEN feed the affected S/G to

raise level to (+)50 inches using AFW **PER** step B.14.

(3) Ensure RCS Boron concentration at least 116 percent of the shutdown margin requirement **PER** the NEOPs.

(continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.13.a (continued)

<u>CAUTION</u> If feedwater is supplied to the affected S/G during the backflow evolution, adequate shutdown margin can NOT be assured.

(4) Verify the affected S/G AFW BLOCK valves are shut with the handswitches in SHUT:

11 S/G

- 1-AFW-4520-CV
- 1-AFW-4521-CV
- 1-AFW-4522-CV
- 1-AFW-4523-CV

12 S/G

- 1-AFW-4530-CV
- 1-AFW-4531-CV
- 1-AFW-4532-CV
- 1-AFW-4533-CV

CAUTION

Maintain RCS pressure greater than the minimum pump operating limits PER ATTACHMENT (1), <u>RCS PRESSURE</u> TEMPERATURE LIMITS.

- (5) Lower the affected S/G level to 0 inches by reducing RCS pressure below the affected S/G pressure by **ANY** of the following methods:
 - (a) De-energize the Pressurizer HTR(s).
 - (b) Use MAIN or AUX SPRAY.
 - (c) IF the HPSI throttle criteria are met, THEN throttle or secure flow to reduce RCS pressure.

(continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.13.a (continued) (6) WHEN the affected S/G level is 0 inches. THEN control RCS pressure to maintain the affected S/G level approximately constant. (7) Repeat steps (1) through (6) as necessary. b. Cool and depressurize the affected S/G by steaming to the condenser as follows: (1) Control RCS pressure to establish and maintain the affected S/G level between 0 and (+)50 inches. (2) Ensure the condenser vacuum is greater than 20 InHg. (3) Ensure at least ONE Condensate Demin is in service. (4) Open PRECOAT SYS BYP valve, 1-CD-5818-CV. (5) Shut COND DEMIN BYP valve, 1-CD-4439-MOV. (6) IF AFW is operating AND the SGFP Miniflow Valves are shut. THEN throttie open the FW DUMP TO CNDSR HOTWELL valves, 1-FW-134 and 1-FW-135, to obtain maximum condensate flow through the Condensate Demin. (7) Shut CNDSR HILVL DUMP CV-4405 INLET valve, 1-CD-232. (continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

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B.13.b (continued)

(8) Operate the MS UPSTREAM DRN ISOL VLVS using 1-HS-6622 as necessary.

CAUTION

Damage to the steam system could occur due to moisture carryover if the MSIV Bypass Valve is operated on a S/G whose level exceeds (+)55 inches {(+)50}.

- (9) IF additional steam flow is desired AND S/G level is less than (+)55 inches {(+)50}, THEN operate the MSIV BYP valve on the affected S/G:
 - (11 S/G) 1-MS-4045-MOV
 - (12 S/G) 1-MS-4052-MOV

(continue)

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APPENDIX (4) CORE AND RCS HEA	TREMOVAL
HR-2: S/G HEAT SINK WITH SIS OP	ERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
B.13 (continued)	
 Cool and depressurize the affected S/G by feeding and blowdown to the MWS as follows: 	
 (1) IF S/G level is less than (+)50 inches, THEN feed the affected S/G to raise level to (+)50 inches using AFW PER step B.14. 	
(2) IF AFAS has actuated, THEN reset the AFAS START signals PER ATTACHMENT(19), <u>RESET AFAS START SIGNALS</u> <u>AT THE ACTUATION</u> <u>CABINETS</u> .	
(3) Place UNIT 1 S/G B/D RECOVERY radiation monitor, 1-RIC-4095, in OPER alarm at 1C22G:	
(a) Verify 1-HS-4095B/S1 - OPER BYPASS in OFF.	
(b) Highlight Stop Pump AND press SELECT.	
(c) Verify the CH 1 green OPER LED extinguishes.	
(d) Bypass annunciator alarms.	
(4) Verify open B/D Recovery DISCH TO MWS, 1-BD-4097-CV.	
(5) Verify shut B/D Recovery DISCH TO CIRC WTR, 1-BD-4015-CV.	
(6) Verify shut B/D Recovery DISCH TO CNDSR, 1-BD-4096-CV.	
(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.13.c (continued)

- (7) Shut S/G Combined B/D Header Throttle Valves:
 - 1-BD-102
 - 1-BD-104
- (8) Open the affected S/G BOT B/D valve by placing its handswitch in RAD TRIP OVERRIDE:
 - (11 S/G) 1-BD-4011-CV
 - (12 S/G) 1-BD-4013-CV
- (9) Throttle open the S/G Combined B/D Header Throttle Valve on the affected S/G to obtain a blowdown flow of approximately 100 GPM while maintaining 11 B/D Heat Exchanger outlet temperature less than 200° F:
 - (11 S/G) 1-BD-102
 - (12 S/G) 1-BD-104
- (10) Pump the MWRT **PER** the <u>TRANSFERRING THE MWRT</u> <u>TO THE RCWMT</u> section of OI-17D.
- (11) Monitor MWRT level at 1C33 and maintain MWRT level approximately constant by throttling the S/G blowdown rate while pumping to the RCWMT.
- (12) Lower the affected S/G level to 0 inches by S/G blowdown to the MWS.
- (13) Feed the affected S/G to raise level to (+)50 inches using AFW PER step B.14.

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(continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.13.c (continued) (14) Repeat steps (12) and (13) as necessary. d. Cool and depressurize the affected S/G by feeding and blowdown to the Condenser as follows: (1) IF S/G level is less than (+)50 inches. THEN feed the affected S/G to raise level to (+)50 inches using AFW PER step B.14. (2) IF AFAS has actuated, THEN reset the AFAS START signals PER ATTACHMENT(19), **RESET AFAS START SIGNALS** AT THE ACTUATION CABINETS. (3) Ensure at least ONE Condensate Demin is in service. (4) Open PRECOAT SYS BYP valve, 1-CD-5818-CV. (5) Shut COND DEMIN BYP valve, 1-CD-4439-MOV. (6) IF AFW is operating AND the SGFP Miniflow Valves are shut. THEN throttle open the FW DUMP TO CNDSR HOTWELL valves, 1-FW-134 and 1-FW-135, to obtain maximum condensate flow through the Condensate Demin. (7) Shut CNDSR HI LVL DUMP CV-4405 INLET valve, 1-CD-232. (continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.13.d (continued)

- (8) Bypass UNIT 1 S/G B/D RECOVERY radiation monitor, 1-RIC-4095:
 - (a) Place 1-HS-4095B/S2 -HIGH BYPASS in BYPASS.
 - (b) Verify 1-HS-4095B/S1 -OPER BYPASS in BYPASS.
- (9) Verify shut B/D Recovery DISCH TO MWS, 1-BD-4097-CV.
- (10) Verify shut B/D Recovery DISCH TO CIRC WTR, 1-BD-4015-CV.
- (11) Verify open B/D Recovery DISCH TO CNDSR, 1-BD-4096-CV.
- (12) Shut S/G Combined B/D Header Throttle Valves:
 - 1-BD-102
 - 1-BD-104
- (13) Open the affected S/G BOT B/D valve by placing its handswitch in RAD TRIP OVERRIDE:
 - (11 S/G) 1-BD-4011-CV
 - (12 S/G) 1-8D-4013-CV
- (14) Throttle open the S/G Combined B/D Header Throttle Valve on the affected S/G to obtain a blowdown flow of approximately 100 GPM while maintaining 11 B/D Heat Exchanger outlet temperature less than 200° F:
 - (11 S/G) 1-BD-102
 - (12 S/G) 1-BD-104

(continue)

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APPEND	X (4) CORE AND RCS HEA	TREMOVAL
HR-2: S/(B HEAT SINK WITH SIS OP	ERATION
<u>R</u>	ECOVERY ACTIONS	ALTERNATE ACTIONS
B.13.d (conti	nued)	
(15)	Lower the affected S/G level to 0 inches by S/G blowdown to the Condenser.	
(16)	Feed the affected S/G to raise level to (+)50 inches using AFW PER step B.14.	
(17)	Repeat steps (15) and (16) as necessary.	
	I and depressurize the affected by steaming to atmosphere as ws:	
(1)	Control RCS pressure to establish and maintain the affected S/G level between 0 and (+)50 inches.	
(2)	Steam the affected S/G to atmosphere from 1C43 as follows:	 (2).1 IF the affected S/G ADV was manually isolated, THEN steam the affected S/G to atmosphere as follows:
	(a) Record the ADV open and close times, for dose calculations.	(a) Record the ADV open and close times, for dose calculations.
	(b) Direct the adjustment of the ADV from 1C43 as necessary.	(b) Direct throttling open of the affected ADV Manual Isolation Valve to lower the affected S/G pressure:
		 (11 S/G) 1-MS-101 (12 S/G) 1-MS-104
	(continue)	

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APPENDIX (4) CORE AND RCS HE	AT REMOVAL
HR-2: S/G HEAT SINK WITH SIS OF	PERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
B. (continued)	
<u>CAUTION</u> If feedwater is supplied to the affected S/G during the backflow evolution, adequate shutdown margin can NOT be assured.	
 14. IF feedwater flow to the affected S/G is required, AND 13 AFW PP is available, THEN establish Auxiliary Feedwater flow as follows: a. Open the affected S/G motor driven train S/G AFW BLOCK valves: 11 S/G 1-AFW-4522-CV 1-AFW-4523-CV 12 S/G 1-AFW-4532-CV 1-AFW-4533-CV b. IF 13 AFW PP is NOT being used to feed the unaffected S/G, THEN perform the following: (1) Shut the motor driven train S/G AFW BLOCK valves for the unaffected S/G by placing the handswitches in SHUT: 11 S/G 1-AFW-4522-CV 1-AFW-4522-CV 1-AFW-4522-CV 1-AFW-4522-CV 1-AFW-4522-CV 1-AFW-4522-CV 1-AFW-4523-CV 1-AFW-4523-CV 1-AFW-4523-CV 1-AFW-4523-CV 1-AFW-4523-CV 1-AFW-4533-CV 	 14.1 IF 13 AFW PP is NOT available, THEN establish Auxiliary Feedwater flow using 11 or 12 AFW PP as follows: a. Open the affected S/G steam driven train S/G AFW BLOCK valves: 11 S/G 1.AFW-4520-CV 1.AFW-4521-CV 12 S/G 1.AFW-4530-CV 1.AFW-4531-CV b. IF 11 or 12 AFW PP is NOT being used to feed the unaffected S/G, THEN shut the steam driven train S/G AFW BLOCK valves for the unaffected S/G by placing the handswitches in SHUT: 11 S/G 1.AFW-4520-CV 1.AFW-4520-CV 2 S/G 1.AFW-4521-CV 12 S/G 1.AFW-4520-CV 3.AFW BLOCK valves for the unaffected S/G by placing the handswitches in SHUT: 12 S/G 1.AFW-4531-CV 12 S/G 1.AFW-4531-CV (continue)

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APPENDIX (4) CORE AND RCS HEA	I KEMUVAL
HR-2: S/G HEAT SINK WITH SIS OP	PERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
B.14.b (continued)	B.14.b.1 (continued)
(2) Start 13 AFW PP.	CAUTION
	An unmonitored radiation release could occur if the SG AFW STM SUPP & BYPASS
CAUTION	valves from the affected S/G are open.
The 13 AFW PP flow limit is 575 GPM.	c. Verify the SG AFW STM SUPP &
c. Restore the affected S/G level,	BYPASS valves from the unaffected
maintain RCS cooldown less than	S/G are open:
100° F in any one hour, by adjusting the S/G FLOW CONTR valve:	• (11 SG)1-MS-4070-CV,
	1-MS-4070A-CV
 (11 S/G) 1-AFW-4525-CV (12 S/G) 1-AFW-4535-CV 	• (12 SG)1-MS-4071-CV, 1-MS-4071A-CV
• (12 S/G) 1-AFW-4535-CV	 1-MS-4071A-CV d. Adjust and maintain 11 or 12 AFW PP discharge pressure at least 100 PSI greater than the affected S/G pressure: (11 AFW PP SPEED CONTR) 1-HC-3987A (12 AFW PP SPEED CONTR) 1-HC-3989A e. Restore the affected S/G level, maintain RCS cooldown less than 100° F in any one hour, by adjusting the S/G FLOW CONTR valve: (11 S/G) 1-AFW-4511-CV (12 S/G) 1-AFW-4512-CV Verify AFW Room normal or emergency ventilation is operating to maintain room temperature less than 130° F.

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION **RECOVERY ACTIONS ALTERNATE ACTIONS** C. DETERMINE IF AN ESDE EXISTS. 1. IF an ESDE has occurred, by considering ALL of the following: • High steam flow from S/G • Lowering S/G pressure Lowering S/G level Lowering RCS T coub Lowering PZR pressure Lowering PZR level THEN identify the most affected S/G. 2. IF indications of an ESDE are NOT observed, THEN PROCEED to Block Step D. (continue)

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APPENDIX (4) CORE AND RCS HEA	AT REMOVAL
HR-2: S/G HEAT SINK WITH SIS OF	PERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
C. (continued)	
<u>CAUTION</u> If there is a conflict between isolating a S/G due to indications of SGTR or ESDE, and maintaining adequate heat removal, then maintain RCS heat removal via the least affected S/G. At least one S/G should always be available for heat removal if possible.	
3. Isolate the most affected S/G.	
a. IF 11 S/G is the most affected S/G, THEN isolate 11 S/G by performing the following actions:	
 (1) Shut 11 ADV using the Hand Transfer Valves on the West wall of the Unit 1 45 ft Switchgear Room as follows: 	(1).1 IF 11 ADV will NOT shut from 1C43, THEN shut 11 ADV Manual Isolation Valve, 1-MS-101.
(a) IF 11 ADV was locally operated, THEN remove the manual override.	
(b) Verify 11 ADV controller, 1-HC-4056A, at 1C43 is set at 0% output.	
(c) Align 11 S/G Hand Transfer Valves to 1C43 (POSITION 2):	
 1-HV-3938A 1-HV-3938B 	
(2) Verify 11 MSIV is shut.	
(3) Verify 11 SG FW ISOL valve 1-FW-4516-MOV, is shut.	
(4) Verify 11 MSIV BYP valve, 1-MS-4045-MOV, is shut.	
(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

C.3.a (continued)

(5) Shut 11 S/G B/D valves:

- 1-BD-4010-CV
- 1-BD-4011-CV
- (6) Shut 11 SG AFW STM SUPP & BYPASS valves, 1-MS-4070-CV and 1-MS-4070A-CV.
- (7) Shut 11 S/G AFW BLOCK valves by placing the handswitches in SHUT:
 - 1-AFW-4520-CV
 - 1-AFW-4521-CV
 - 1-AFW-4522-CV
 - 1-AFW-4523-CV
- (8) Shut the MS UPSTREAM DRN ISOL VLVS by placing handswitch 1-HS-6622 in CLOSE.
- (9) Observe locally, the S/G Safety Valves are **NOT** leaking.

(continue)

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AT REMOVAL
PERATION
ALTERNATE ACTIONS
(1).1 IF 12 ADV will NOT shut from 1C43, THEN shut 12 ADV Manual Isolation Valve, 1-MS-104.

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APPENDIX (4) CORE AND RCS HEA	AT REMOVAL
HR-2: S/G HEAT SINK WITH SIS OF	PERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
C.3.b (continued)	
(7) Shut 12 S/G AFW BLOCK valves by placing the handswitches in SHUT:	
 1-AFW-4530-CV 1-AFW-4531-CV 1-AFW-4532-CV 1-AFW-4533-CV 	
(8) Shut the MS UPSTREAM DRN ISOL VLVS by placing handswitch 1-HS-6622 in CLOSE.	
(9) Observe locally, the S/G Safety Valves are NOT leaking.	
 Verify the most affected S/G was isolated by checking the following: 	4.1 IF the wrong S/G was isolated, THEN perform the following actions:
 S/G pressure lower for the affected S/G 	CAUTION
RCS loop T coup lower in the affected loop	A severe waterhammer may result if Main Feedwater flow is restored after it has been stopped for greater than 80 minutes.
 S/G level lowering for the affected S/G and stabilized for the unaffected S/G 	a. Restore feeding and steaming capability to the least affected S/G.
	 WHEN RCS heat removal has been re-established to the least affected S/G,
	THEN isolate the most affected S/G PER step C.3.
(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

C. (continued)

NOTE

The temperature of the unaffected S/G may be obtained by using the saturation temperature for existing S/G pressure.

 IF the difference between unaffected S/G temperature and CET temperature exceeds 25° F during the blowdown, THEN cool the unaffected S/G to within 25° F of CET temperature using the unaffected S/G ADV.

NOTE

The remainder of this procedure may be performed while waiting for the S/G to blowdown.

CAUTION

A heatup of the RCS following an excessive cooldown rate can result in a rise in RCS pressure and the potential for pressurized thermal shock.

- WHEN the RCS cooldown due to blowdown of the affected S/G has stopped,
 THEN operate the unaffected S/G ADV to stabilize RCS temperatures as follows:
 - a. Establish the unaffected S/G temperature within 25° F of the lowest CET temperature during blowdown.
 - WHEN unaffected S/G temperature is within 25° F of the lowest CET temperature during blowdown, THEN maintain the following:
 - unaffected S/G pressure
 approximately constant

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TCOLD approximately constant

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·	APPENDIX (4) CORE AND RCS HEAT REMOVAL		
	R-2: S/G HEAT SINK WITH SIS OF	EKATION	
	RECOVERY ACTIONS	ALTERNATE ACTIONS	
D.	DETERMINE IF A LOAF EXISTS.		
1.	Determine if a LOAF has occurred, by considering ANY of the following:		
	Lowering S/G level, S/G low level alarm, Reactor Trip on Low S/G level		
	AFAS actuation on low S/G level		
	SGFPT TRIP* alarms		
2.	IF indications of a LOAF are NOT observed, THEN PROCEED to Block Step E.		
3.	IF Main and Auxiliary Feedwater are lost to BOTH S/Gs and can NOT be readily restored, THEN verify the following actions have been performed:		
	a. Trip ALL RCPs.		
	b. Shut the S/G B/D valves:		
	 1-BD-4010-CV 1-BD-4011-CV 1-BD-4012-CV 1-BD-4013-CV 		
4.	IF, at ANY time, BOTH S/G levels are less than (-)350 inches OR T COLD rises uncontrollably 5° F or greater, THEN IMPLEMENT HR-4, ONCE-THROUGH-COOLING.		
	(continue)		

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APPENDIX (4) CORE AND RCS HEA	AT REMOVAL
HR-2: S/G HEAT SINK WITH SIS OF	ERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
D. (continued)	
5. Maintain AFW PP suction supply AND CST inventory PER ATTACHMENT (8), <u>MAINTAIN AFW PUMP SUCTION</u> <u>SUPPLY AND CST INVENTORY</u> .	
 IF AFW is available, THEN attempt to establish AFW flow to the S/G(s) which is unaffected by EITHER a SGTR OR an ESDE. 	
a. Establish AFW flowpath to the S/G(s) by placing the handswitches for the unaffected S/G AFW BLOCK valves in OPEN:	a.1 IF S/G AFW BLOCK valve(s) will NOT open from the control room, THEN locally open valve(s) using the Hand Transfer Station(s) on North wall of SRW Room.
11 S/G 1-AFW-4520-CV 1-AFW-4521-CV 1-AFW-4522-CV 1-AFW-4523-CV	
12 S/G 1-AFW-4530-CV 1-AFW-4531-CV 1-AFW-4532-CV 1-AFW-4533-CV	
(continue)	

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APPENDIX (4) CORE AND RCS HEA	AT REMOVAL
HR-2: S/G HEAT SINK WITH SIS OP	PERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
D.6 (continued)	
<u>NOTE</u> The following substeps are alternative methods to establish auxiliary feedwater flow. Each available method can be attempted until auxiliary feed flow is successfully established.	
 Establish AFW flow with 13 AFW PP as follows: 	b.1 Start 13 AFW PP locally as follows:
 (1) Shut the S/G FLOW CONTR valves: (11 S/G) 1-AFW-4525-CV 	 (1) Shut the S/G FLOW CONTR valves: (11 S/G) 1-AFW-4525-CV (12 S/G) 1-AFW-4535-CV
 (11 S/G) 1-AFW-4525-CV (12 S/G) 1-AFW-4535-CV 	(2) Verify 13 AFW PP handswitch is in AUTO.
<u>CAUTION</u> The 13 AFW PP flow limit is 575 GPM.	<u>CAUTION</u> The 13 AFW PP flow limit is 575 GPM.
(2) Start 13 AFW PP by placing its handswitch in START.	(3) Close the AFW PP No. 13 breaker, 152, 1116, by propaging the CLOSE
(3) Adjust the S/G FLOW CONTR valves to approximately 150 GPM per S/G:	152-1116, by pressing the CLOSE button.
 (11 S/G) 1-AFW-4525-CV (12 S/G) 1-AFW-4535-CV 	
(continue)	(continue)

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APPEND	DIX (4) CORE AND RCS HEA	T REMOVAL
HR-2: S/	G HEAT SINK WITH SIS OP	ERATION
<u> </u>	RECOVERY ACTIONS	ALTERNATE ACTIONS
D.6.b (cont	inued)	D.6.b.1(3) (continued)
(4)	 WHEN S/G level response is observed OR continuous feed has been maintained for at least 5 minutes, THEN feed rate may be slowly raised while maintaining the following: Gradual rise in S/G level S/G level trending to between 0 and (+)38 inches RCS cooldown rate less than 100° F in any one hour 	CAUTION Removing control power fuses eliminates bus protection from breaker faults, and overcurrent, undervoltage and ground protection for the breaker fails to close, THEN, with the approval of the SM/CRS, perform the following actions: (a) Remove the breaker control power fuses. (b) IF necessary, THEN manually charge the breaker closing spring. (c) Press the CLOSE button at AFW PP No. 13 breaker, 152-1116. (d) Ensure normal pump running current less than 70 AMPS.
		per S/G: • (11 S/G) 1-AFW-4525-CV • (12 S/G) 1-AFW-4535-CV
	(continue)	(continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION	
RECOVERY ACTIONS	
<u>RECOVERTACTIONS</u>	ALTERNATE ACTIONS
 c. Establish AFW flow with 11 or 12 AFW PP as follows: (1) Shut the S/G FLOW CONTR valves: 	 (6) WHEN S/G level response is observed OR continuous feed has been maintained for at least 5 minutes, THEN feed rate may be slowly raised while maintaining the following: Gradual rise in S/G level S/G level trending to between 0 and (+)38 inches RCS cooldown rate less than 100° F in any one hour c.1 Start 11 or 12 AFW PP locally as follows: (1) Shut the S/G FLOW CONTR valves: (11 S/G) 1-AFW-4511-CV (12 S/G) 1-AFW-4512-CV
 (11 S/G) 1-AFW-4511-CV (12 S/G) 1-AFW-4512-CV (2) Verify open 11 and 12 AFW PP Main Steam Supply Valves: 1-MS-109 1-MS-107 (3) Verify open 11 OR 12 THROTTLE/STOP valve: 1-MS-3986 1-MS-3988 	(2) Turn the turbine governor control knob counterclockwise to the minimum position.
(continue)	(continue)

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EOP-8 Rev 31/Unit 1 Page 134 of 207 APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION **RECOVERY ACTIONS ALTERNATE ACTIONS** D.6.c.1 (continued) D.6.c (continued) CAUTION An unmonitored radiation release could (3) Isolate the Instrument Air to the occur if the AFW Steam Supply Bypass Turbine Governor Controller(s) by Valve from a S/G affected by a SGTR is shutting the following valves: opened. 11 AFW PP (4) Open the 12 SG AFW STM SUPP & BYPASS valves from a • 1-AFW-3987A I/P ISOL, 1-IA-24 • 1-AFW-3987B I/P ISOL, 1-IA-23 S/G NOT affected by a SGTR: (11 S/G)1-MS-4070-CV, **12 AFW PP** 1-MS-4070A-CV • 1-AFW-3989A I/P ISOL, 1-IA-22 (12 S/G)1-MS-4071-CV. 1-AFW-3989B I/P ISOL, 1-IA-21 1-MS-4071A-CV (4) Open the air filter drains on controllers to allow local control. WARNING The use of N₂ to operate AFW may result (5) Verify open 11 and 12 AFW PP in the depletion of oxygen levels in some rooms due to system venting. Main Steam Supply Valves: (5) IF a loss of ALL Vital 4KV busses 1-MS-109 has occurred. 1-MS-107 THEN align Liquid N2 System to supply S/G FLOW CONTR (6) Verify open 11 OR 12 THROTTLE/STOP valve: valves by opening the following valves located in SRW Room: 1-MS-3986 N₂ Supply To AFW 1-MS-3988 Amplifier Air System, 0-N2-105 AFW amplifier Air System CAUTION An unmonitored radiation release could N₂ Backup Supply, I-IA-182 occur if the AFW Steam Supply Bypass (6) IF a loss of ALL Vital 4KV busses Valve from a S/G affected by a SGTR is has occurred. opened. THEN assign an operator to control AFW discharge pressure (7) Open the AFW Steam Supply locally as follows: Bypass Valves: (a) Establish communications 1-MS-102 between the operator and 1-MS-105 the control room. (continue) (continue)

EOP-8 Rev 31/Unit 1 Page 135 of 207 **APPENDIX (4) CORE AND RCS HEAT REMOVAL** HR-2: S/G HEAT SINK WITH SIS OPERATION **RECOVERY ACTIONS ALTERNATE ACTIONS** D.6.c(6).1 (continued) D.6.c(6) (continued) (8) Adjust and maintain the turbine (b) Isolate the Instrument Air to driven discharge header pressure at the Turbine Governor least 100 PSI greater than S/G Controller(s) by shutting the pressure using the local turbine following valves: governor control knob. 11 AFW PP (9) Adjust the S/G FLOW CONTR 1-AFW-3987A I/P ISOL, valves to approximately 150 GPM per S/G: 1-IA-24 1-AFW-3987B I/P ISOL, 1-IA-23 (11 S/G) 1-AFW-4511-CV (12 S/G) 1-AFW-4512-CV **12 AFW PP** 1-AFW-3989A I/P ISOL, (10) WHEN S/G level response is 1-IA-22 observed 1-AFW-3989B I/P ISOL. OR continuous feed has been 1-IA-21 maintained for at least 5 minutes, THEN feed rate may be slowly (c) Adjust 11 or 12 AFW PP raised while maintaining the governor control knob to following: maintain discharge pressure at least 100 PSI greater than Gradual rise in S/G level S/G pressure. S/G level trending to between 0 (7) Adjust and maintain the turbine and (+)38 inches driven discharge header pressure at least 100 PSI greater than S/G RCS cooldown rate less than 100° F in any one hour pressure: (11 AFW PP SPEED CONTR) (11) Operate AFW ventilation as 1-HC-3987A necessary to maintain temperature (12 AFW PP SPEED CONTR) less than 130° F. 1-HC-3989A (8) Adjust the S/G FLOW CONTR valves to approximately 150 GPM per S/G: (11 S/G) 1-AFW-4511-CV (12 S/G) 1-AFW-4512-CV (continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

D.6.c (continued)

- (9) WHEN S/G level response is observed OR continuous feed has been maintained for at least 5 minutes, THEN feed rate may be slowly raised while maintaining the following:
 - Gradual rise in S/G level
 - S/G level trending to between 0 and (+)38 inches
 - RCS cooldown rate less than 100° F in any one hour
- (10) Operate AFW ventilation as necessary to maintain temperature less than 130° F.

(continue)

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APPENDIX (4) CORE AND RCS HEA	T REMOVAL
HR-2: S/G HEAT SINK WITH SIS OP	
RECOVERY ACTIONS	ALTERNATE ACTIONS
D.6 (continued)	
d. Establish AFW flow with 23 AFW PP as follows:	
 Shut the Unit 2 Motor Train S/G AFW BLOCK valves by placing the handswitches in SHUT: 	
21 S/G • 2-AFW-4522-CV • 2-AFW-4523-CV	
22 S/G • 2-AFW-4532-CV • 2-AFW-4533-CV	
(2) Open the U-2 TO U-1 XCONN valve, 2-AFW-4550-CV.	
(3) Establish AFW flow with 23 AFW PP as follows:	
(a) Shut the Unit 1 S/G FLOW CONTR valves:	
 (11 S/G) 1-AFW-4525-CV (12 S/G) 1-AFW-4535-CV 	
<u>CAUTION</u> The 23 AFW PP flow limit is 575 GPM.	
(b) Start 23 AFW PP by placing its handswitch in START.	
(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

D.6.d(3) (continued) (c) Adjust the Unit 1 S/G FLOW CONTR valves to approximately 150 GPM per S/G: (11 S/G)1-AFW-4525-CV (12 S/G)1-AFW-4535-CV (4) WHEN S/G level response is observed OR continuous feed has been maintained for at least 5 minutes, THEN feed rate may be slowly raised while maintaining the following: Gradual rise in S/G level S/G level trending to between 0 and (+)38 inches RCS cooldown rate less than 100° F in any one hour (continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

D. (continued) 7. IF Booster Pump Injection is available, THEN attempt to establish flow to the S/G(s) which is unaffected by EITHER a SGTR OR an ESDE. a. IF an ESDE has NOT occurred, THEN block SGIS as follows: WHEN the "SGIS A BLOCK PERMITTED^{*} alarm is received, THEN block SGIS A. WHEN the "SGIS B BLOCK PERMITTED" alarm is received. THEN block SGIS B. b. IF SGIS has actuated AND indications of an ESDE are NOT observed. THEN reset SGIS as follows: (1) Place the COND BSTR PPs in PULL TO LOCK. (2) Match handswitch positions PER ATTACHMENT (7), SGIS VERIFICATION CHECKLIST. (3) Block SGIS. (4) Reset the SGIS signal. (5) Open the MSIV(s). (6) Open the SG FW ISOL valve(s): 1-FW-4516-MOV 1-FW-4517-MOV (7) Start a COND BSTR PP. (continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

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ALTERNATE ACTIONS

D.7 (continued) CAUTION **RCS temperature must be closely** monitored to avoid a cooldown greater than Technical Specification Limits. c. Commence a rapid RCS cooldown to c.1 IF subcooling exceeds 140° F. T coud less than 465° F using the THEN depressurize the RCS PER the TURB BYP valves OR ADVs, while selected Pressure and Inventory Control maintaining the following: success path. Cooldown less than 100° F in any one hour Subcooling less than 140° F based on CET temperatures d. Shut the MAIN SG FW REG valves. e. Shift the SG FW REG BYPASS controllers to Manual. f. Verify the operating SGFPT SPD BIAS ADJ is less than or equal to 5.0. g. Depress the S/G FRV BYP RESET buttons. h. Manually adjust the SG FW REG BYPASS valve controllers to 0%. i. Open the SG FW ISOL valves: (11 S/G) 1-FW-4516-MOV (12 S/G) 1-FW-4517-MOV j. Open the PRECOAT SYS BYP valve, 1-CD-5818-CV. k. Open the COND DEMIN BYP valve, 1-CD-4439-MOV. I. Verify at least ONE COND PP is running. (continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

D.7 (continued)

- m. Verify ONE COND BSTR PP is running.
- n. Place BOTH HTR DRN PP Handswitches in PULL TO LOCK.

NOTE

Feedwater flow to S/Gs should start when RCS cooldown has resulted in the S/G pressures dropping to less than the Condensate Booster Pump shut-off head of approximately 500 PSIA.

CAUTION

Rapid or uncontrolled restoration of Main Feedwater may cause a severe waterhammer.

- o. Throttle open the SG FW REG BYPASS valve to establish a flow of 100 to 160 GPM PER ATTACHMENT(18), <u>MAIN</u> FEEDWATER GOOSENECK PURGE FLOW.
- WHEN continuous feed has been maintained for at least 10 minutes, THEN feed rate may be slowly raised while maintaining the following:
 - Gradual rise in S/G level
 - S/G level trending to between 0 and (+)38 inches
 - RCS cooldown rate less than
 100° F in any one hour

(continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

D. (continued) 8. IF Main Feedwater is available, THEN attempt to establish Main Feed flow to the S/G(s) which is unaffected by EITHER a SGTR OR an ESDE. a. Shut the MAIN SG FW REG valves. b. Verify the operating SGFPT SPD BIAS ADJ is less than or equal to 5.0. c. Depress the S/G FRV BYP RESET buttons. d. Manually adjust the SG FW REG BYPASS valve controllers to 0%. e. Open the SG FW ISOL valves: (11 S/G) 1-FW-4516-MOV (12 S/G) 1-FW-4517-MOV (continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

D.8 (continued) f. IF at least ONE SGFP is NOT operating, THEN, with the approval of the SM/CRS, attempt to start a SGFP. (1) Verify shut the SGFPT HP and LP STOP VLVs. (2) Check the DEMAND MIN (2).1 IF the DEMAND MIN indicator is NOT indicator is illuminated at the illuminated, OCS. THEN depress the down arrow until the DEMAND MIN indicator illuminates. (3) Reset the SGFP Vacuum Trip AND Turbine Trip. (4) Depress the DIRECT GOVNR VLV pushbutton at the OCS. (5) Raise the speed of the SGFP. until the discharge pressure is sufficient to feed the SGs, by depressing the "up" SPEED arrow at the OCS. CAUTION Rapid or uncontrolled restoration of Main Feedwater may cause a severe waterhammer. g. Throttle open the SG FW REG BYPASS valve to establish a flow of 100 to 160 GPM PER ATTACHMENT(18), MAIN FEEDWATER GOOSENECK PURGE FLOW. (continue)

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APPENDIX (4) CORE AND RCS HEA	T REMOVAL
HR-2: S/G HEAT SINK WITH SIS OP	ERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
D.8 (continued)	
 WHEN continuous feed has been maintained for at least 10 minutes, THEN feed rate may be slowly raised while maintaining the following: 	
Gradual rise in S/G level	
 S/G level trending to between 0 and (+)38 inches 	
RCS cooldown rate less than 100° F in any one hour	
E. VERIFY CORE AND RCS HEAT REMOVAL HAS BEEN ESTABLISHED.	
1. Ensure the TBVs OR ADVs are controlling T coud less than 535° F.	,
2. Ensure adequate RCS heat removal with at least ONE S/G by observing BOTH of the following conditions exist:	2.1 IF, at ANY time, BOTH S/G levels are less than (-)350 inches OR T coLD rises uncontrollably 5° F or
 At least ONE S/G level is greater than (-)350 inches 	greater, THEN IMPLEMENT HR-4, ONCE-THROUGH-COOLING.
T cold is stable or lowening	
3. Maintain AFW PP suction supply AND CST inventory PER ATTACHMENT (8), <u>MAINTAIN AFW PUMP SUCTION</u> <u>SUPPLY AND CST INVENTORY</u> .	
(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

E. (continued)

- 4. IF AFW is feeding the least affected S/G(s), THEN perform the following:
 - Ensure feed flow is restoring S/G level to between 0 and (+)38 inches and RCS cooldown does NOT exceed 100° F in any one hour.
- IF Booster Pump Injection is feeding the least affected S/G(s),
 THEN perform the following:
 - a. Ensure feed flow is restoring S/G level to between 0 and (+)38 inches and RCS cooldown does **NOT** exceed 100° F in any one hour.
 - Adjust the SG FW REG BYPASS valves to establish S/G levels at approximately 0 inches.
 - c. WHEN S/G levels are at approximately 0 inches, THEN shift SG FW REG BYPASS controllers to Auto.

(continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

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RECOVERY ACTIONS	ALTERNATE ACTIONS
E. (continued)	
 IF Main Feedwater is feeding the least affected S/G(s), THEN perform the following: 	
a. Establish a shutdown feed system lineup as follows:	
ONE operating SGFP	
ONE operating COND BSTR PP	
TWO operating COND PPs	
BOTH HTR DRN PPs secured	
 Ensure feed flow is restoring S/G level to between 0 and (+)38 inches and RCS cooldown does NOT exceed 100° F in any one hour. 	
 WHEN manual control of feed flow is desired OR S/G level is between 0 and (+)38 inches, THEN perform the following actions: 	
(1) Shift the SG FW REG BYPASS controllers to Manual.	
(2) Verify the operating SGFPT SPD BIAS ADJ is less than or equal to 5.0.	
(3) Depress the S/G FRV BYP RESET buttons.	
(4) Adjust the SG FW REG BYPASS valves to establish S/G levels at approximately 0 inches.	
d. WHEN S/G levels are at approximately 0 inches, THEN shift SG FW REG BYPASS controllers to Auto.	
(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

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ALTERNATE ACTIONS

E.	(continued)	
7.	IF the Main Feedwater System is NOT to be used to feed a S/G, THEN secure the Main Feed system.	
	a. Trip the SGFPs.	
	b. Place the COND BSTR PPs in PULL TO LOCK.	
	c. Place TWO COND PPs in PULL TO LOCK.	
	d. Place the HTR DRN PPs in PULL TO LOCK.	
	e. Shut SG FW ISOL valve:	
	 1-FW-4516-MOV 1-FW-4517-MOV 	
	f. Shut the CNDSR HOTWELL M/U & DUMP CONTR CV by shifting 1-LIC-4405 to MANUAL with 50% output.	
	(continue)	

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APPENDIX (4) CORE AND RCS HEAT	REMOVAL
HR-2: S/G HEAT SINK WITH SIS OPEI	RATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
E.7 (continued)	
g. IF NO COND PPs are operating, THEN protect against blowdown related waterhammer:	
(1) Verify the S/G B/D valves are shut:	
 1-BD-4010-CV 1-BD-4011-CV 1-BD-4012-CV 1-BD-4013-CV 	
NOTE 1-CD-410 is located east of 11A Drain Cooler. 1-CD-411 is located west of 13 CBP.	
(2) Shut the 11 B/D HX HDR ISOL valves:	
 1-CD-410 1-CD-411 	
F. SECURE RCS BORATION.	
1. WHEN RCS boration has been	
completed, THEN shift the charging pump suction to the RWT as follows:	
a. Open RWT CHG PP SUCT valve, 1-CVC-504-MOV.	
b. Shut VCT OUT valve, 1-CVC-501-MOV.	
c. Place the BA PPs in PULL TO LOCK.	
d. Ensure the BAST levels are steady.	

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APPENDIX (4) CORE AND RCS HEA	AT REMOVAL
HR-2: S/G HEAT SINK WITH SIS OF	PERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
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G. EVALUATE RESTORING FORCED CIRCULATION.	
1. IF the RCPs are NOT operating, THEN evaluate the need and desirability of restarting RCPs based on the following:	
 Verify electrical power is available to the RCPs 	
 RCP BUS MCC-115 (ALL RCPs) MCC-105 (11A/11B RCP) 	
 Adequacy of RCS and Core Heat Removal using natural circulation 	
 Existing RCS pressure and temperatures 	
RCP Controlled Bleed-off temperatures	•
 The capability to supply Main OR Auxiliary Feedwater to at least ONE S/G 	
 The possibility of dilute pockets of water in the RCS due to flow stagnation in the affected loop 	
 IF at least ONE RCP is operating in each loop OR RCP operation is NOT desired, THEN PROCEED to step H. 	
3. IF T COLD is less than 369° F, THEN PROCEED to step H.	
(continue)	

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APPENDIX (4) CORE AND RCS HEA	T REMOVAL
HR-2: S/G HEAT SINK WITH SIS OP	ERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
G. (continued)	
 IF RCPs have been exposed to excessive moisture, THEN consider meggering the RCP motors. 	
 IF Component Cooling has been isolated to Containment, THEN restore cooling flow PER CE-2, <u>CONTAINMENT ISOLATION</u>, OR CE-3, <u>CONTAINMENT SPRAY</u>. 	-
<u>CAUTION</u> If a RCP Controlled Bleed-off temperature exceeds 250° F, the affected seal must be rebuilt before the RCP can be operated. Do NOT restart ANY RCP whose Controlled Bleed-off temperature has exceeded 250° F.	
 Check Controlled Bleed-off temperatures for the RCPs to be restarted have NOT exceeded 250° F. 	
 Verify RCP Controlled Bleed-off temperatures are less than 200° F or are lowering. 	
8. Restore Pressurizer level to between 155 and 180 inches.	
(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

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ALTERNATE ACTIONS

G. (continued) 9. Verify the RCP restart criteria are met by ALL of the following: Electrical power is available to the **RCPs** 12/22 SERV BUS VOLTS is less than 14.8 KV 4KV Vital Bus voltage is greater than 4100 volts RCP Controlled Bleed-off temperatures are less than 200° F RCS subcooling is greater than 25° F based on CET temperatures At least ONE S/G available for heat removal S/G level greater than (-)170 inches capable of being supplied with feedwater capable of being steamed Pressurizer level is greater than 155 inches and NOT lowering TcoLp is less than 525° F RCS temperature and pressure are greater than the minimum operating limits PER ATTACHMENT (1), RCS PRESSURE TEMPERATURE LIMITS, for the pumps to be started (continue)

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APPENDIX (4) CORE AND RCS HEA	-
HR-2: S/G HEAT SINK WITH SIS OP	ERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
G. (continued)	
<u>CAUTION</u> Starting an RCP may cause the following:	
 A pressurizer level transient A high pressure transient if an RCP is started in a loop in which NO S/G is available for heat removal Initiation of SIAS if RCS pressure is greater than the SIAS pressurizer pressure setpoint A reactivity excursion due to dilute pockets of water, if an RCP is restarted in the affected loop, OR boration is NOT complete prior to restarting an RCP in the unaffected loop 	
 WHEN RCP restart is desired AND the RCP restart criteria are met, THEN start ONE RCP in a loop with an operating S/G as follows: 	
 a. IF a SGTR has been diagnosed, AND the RCS pressure has dropped below the affected S/G pressure, OR the level in the affected S/G has lowered after isolation, THEN verify RCS boration is complete. 	
b. Verify the RCP BLEED-OFF ISOL valves are open:	
 1-CVC-505-CV 1-CVC-506-CV 	
 c. Verify the "CCW FLOW LO" alarm is clear. 	
d. Start the associated OIL LIFT PP.	
e. Verify the "OIL LIFT PP PRESS LO" alarm is cleared.	
(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

G.10 (continued)

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- f. Operate the OIL LIFT PP for at least 60 seconds.
- g. Insert the RCP sync stick.
- h. Verify the synchroscope on panel 1C19 is NOT rotating.
- i. Start the RCP.
- j. Verify the RCP(s) are NOT cavitating by observing running current is steady.
- 11. Operate Charging and Letdown, or HPSI to restore and maintain pressurizer level between 101 and 180 inches.
- 12. Monitor RCP seal parameters following pump restart.
- 13. Allow backflow to equalize temperatures in the opposite loop.

(continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

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ALTERNATE ACTIONS

G. (continued) 14. Start a second RCP in the opposite loop: a. IF the Reactor Coolant Pump Breaker CLOSE CIR fuses have been removed. THEN replace the CLOSE CIR fuses on the selected Reactor Coolant Pump Breaker. 11A RCP 252-11P01 • 11A RCP 252-11P02 • 11B RCP 252-13P01 11B RCP 252-13P02
12A RCP 252-12P01
12A RCP 252-12P01
12A RCP 252-12P02 • 12B RCP 252-14P01 • 12B RCP 252-14P02 b. Ensure RCP NPSH requirements are maintained PER ATTACHMENT (1), RCS PRESSURE TEMPERATURE LIMITS. c. Start RCP PER step G.10 above. d. Monitor RCP seal parameters following pump restart.

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APPENDIX (4) CORE AND RCS HEA	-
HR-2: S/G HEAT SINK WITH SIS OPERATION	
RECOVERY ACTIONS	ALTERNATE ACTIONS
H. CONTROL CORE AND RCS VOIDING.	
<u>NOTE</u> Core and RCS voiding may be indicated by the following:	
Letdown flow greater than charging flow	
Rapid unexplained rise in pressurizer level during an RCS pressure reduction	
Loss of subcooled margin as determined using CET temperatures	
"RXV WTR LVL LO" alarm	
 IF voiding causes difficulty in depressurization, THEN reduce or eliminate the voided area by performing the following actions: 	
a. Shut the L/D CNTMT ISOL valves:	
 1-CVC-515-CV 1-CVC-516-CV 	
b. Stop depressurizing the RCS.	
(continue)	
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APPENDIX (4) CORE AND RCS HEA	AT REMOVAL
HR-2: S/G HEAT SINK WITH SIS OP	ERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
H.1 (continued)	
<u>CAUTION</u> The potential exists for pressurized thermal shock from an excessive cooldown rate followed by a repressurization.	
 Cycle RCS subcooling between 25 and 140° F as follows: 	c.1 IF cycling RCS subcooling is ineffective, THEN operate RX VESS VENT valves
 Raise RCS subcooling to as near 140° F as practical by ANY of the following methods: 	PER the <u>VENTING THE REACTOR</u> <u>COOLANT SYSTEM AFTER AN</u> <u>ACCIDENT</u> section of OI-1G.
<u>NOTE</u> Pressurizer Backup Heater Banks 11 and 13 trip on U/V and SIAS.	
 Energize the Pressurizer HTR(s) 	
Secure Pressurizer SPRAY	
 Raise RCS cooldown rate while maintaining cooldown less than 100° F in any one hour 	
 IF HPSI flow has been reduced, THEN raise HPSI flow by opening HPSI HDR valves which have been throttled, OR starting HPSI PPs which have been stopped. 	
(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

H.1.c (continued)

- (2) Lower RCS subcooling to as near 25° F as practical by ANY of the following methods:
 - De-energize the Pressurizer HTR(s)
 - Operate Pressurizer SPRAY
 - Secure RCS cooldown
 - IF HPSI throttle criteria are met, THEN throttle the HPSI HDR valves, OR stop the HPSI PPs one at a time
- (3) Repeat steps H.1.c.(1) through H.1.c.(2) as necessary.

NOTE

Voids may form in the S/G Tubes if saturation pressure of a S/G is greater than saturation pressure of RCS.

CAUTION

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

 d. IF voiding is suspected in the S/G tubes,
 THEN cool the S/G so RCS cooldown

rate remains less than 100° F in any one hour by raising **ANY** of the following:

- Steaming rate
- Feed rate
- S/G Blowdown rate

(continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL	
HR-2: S/G HEAT SINK WITH SIS OF	PERATION
RECOVERY ACTIONS ALTERNATE ACTIONS	
H.1 (continued)	
e. Monitor pressurizer level and RVLMS for inventory trends.	
I. ENSURE INVENTORY CONTROL SUPPORTS HEAT REMOVAL.	
1. Observe Containment Sump level rises as RWT level lowers.	1.1 IF Containment Sump level does NOT rise as RWT level lowers, THEN perform the follows actions:
	a. Maintain RWT level greater than 2 feet by replenishment from ANY available source.
,	<u>NOTE</u> Leakage location may be indicated by sump alarms or room level alarms.
	 Determine the cause for the leakage and attempt to isolate it.
2. Ensure steps associated with RAS are performed PER the selected RCS Pressure and Inventory Control success path.	
 Ensure Core Flush is initiated PER PIC-4, <u>SIS</u> as required. 	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION **RECOVERY ACTIONS ALTERNATE ACTIONS** J. PERFORM LOW TEMPERATURE ACTIONS. 1. IF Main Feedwater is in operation AND high Feedwater pressure is causing level control problems, THEN secure pumps as required: • SGFP COND BSTR PP CAUTION PORVs must be in MPT ENABLE before TCOLD is less than 365° F. 2. WHEN T COLD is less than 369° F, THEN establish MPT protection as follows: a. Verify the PORV BLOCK valves are OPEN: 1-RC-403-MOV 1-RC-405-MOV b. Verify PZR LO RANGE PRESS, 1-PI-103 is less than VLTOP PORV SETPOINT, 1-ZI-103. c. Verify PZR LO RANGE PRESS, 1-PI-103-1 is less than VLTOP PORV SETPOINT, 1-ZI-103-1. (continue)

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ERATION
ALTERNATE ACTIONS
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APPENDIX (4) CORE AND RCS HEAT	FREMOVAL
HR-2: S/G HEAT SINK WITH SIS OPE	ERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
J. (continued)	
 4. WHEN RCS temperature is less than 300° F AND RCS pressure is less than 300 PSIA, THEN perform the following actions: <u>NOTE</u> Cavity Cooling and CEDM Cooling aid in cooling Reactor Vessel Head if a void exists. a. Verify ONE CAV CLG and ONE CEDM CLG fan running if available. b. Close SIT OUT breakers: (1-SI-614-MOV) 52-11442 (1-SI-624-MOV) 52-11443 (1-SI-634-MOV) 52-10443 c. Shut SIT OUT valves: 1-SI-614-MOV 1-SI-634-MOV 2-SI-634-MOV 3-SI-634-MOV 1-SI-634-MOV 1-SI-634-MOV 1-SI-644-MOV 	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

J.4 (c	ontinued)	
d.	IF Auxiliary Feedwater is NOT being used to feed the S/Gs, THEN perform the following actions:	
	 Shut the S/G AFW BLOCK valves by placing the handswitches in SHUT: 	
	11 S/G 1-AFW-4520-CV 1-AFW-4521-CV 1-AFW-4522-CV 1-AFW-4523-CV	
	12 S/G • 1-AFW-4530-CV • 1-AFW-4531-CV • 1-AFW-4532-CV • 1-AFW-4533-CV	
	(2) Place 13 AFW PP in PULL TO LOCK.	
	 (3) Verify shut SG AFW STM SUPP & BYPASS valves: (11 SG)1-MS-4070-CV, 1-MS-4070A-CV (12 SG)1-MS-4071-CV, 1-MS-4071A-CV 	

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APPENDIX (4) CORE AND RCS HEA	AT REMOVAL
HR-2: S/G HEAT SINK WITH SIS OF	PERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
K. ACCEPTANCE CRITERIA FOR SUCCESS PATH HR-2.	
 Check Core and RCS Heat Removal is satisfied by the following indications: 	1.1 IF Core and RCS Heat Removal has NOT been satisfied, THEN PROCEED to the next
 At least ONE S/G has level between 0 and (+)38 inches OR S/G level is being restored by feedwater flow 	appropriate Core and RCS Heat Removal Success Path.
 CET temperatures are less than 50° F superheated 	
 IF RAS has NOT occurred, AND pressurizer pressure is greater than 1270 PSIA, THEN at least ONE CHG PP operating 	
<u>NOTE</u> LPSI Pumps are NOT required post-RAS.	
NOTE Limits in ATTACHMENT(10), <u>HIGH</u> <u>PRESSURE SAFETY INJECTION FLOW</u> and ATTACHMENT(11), <u>LOW PRESSURE</u> <u>SAFETY INJECTION FLOW</u> are NOT required to be met if SIS throttle criteria are met.	
HPSI and LPSI Pumps are injecting water into the RCS PER ATTACHMENT(10), <u>HIGH</u> <u>PRESSURE SAFETY INJECTION</u> <u>FLOW</u> and ATTACHMENT(11), <u>LOW</u> <u>PRESSURE SAFETY INJECTION</u> <u>FLOW</u>	
 IF Core and RCS Heat Removal has been established, THEN PROCEED to the next Safety Function to be satisfied. 	

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APPENDIX (4) CORE AND RCS HE	AT REMOVAL
HR-3: SHUTDOWN COOLING SYST	ſEM
RECOVERY ACTIONS	ALTERNATE ACTIONS
A. PERFORM LOW TEMPERATURE ACTIONS.	
 IF Main Feedwater is in operation AND high Feedwater pressure is causing level control problems, THEN secure pumps as required: SGFP COND BSTR PP MOTE If a T COLD mismatch exists between loops, actions should be performed based on the lowest operating loop indication. IF HPSI system is NOT in operation, AND T COLD is less than 385° F, THEN establish LTOP control by performing the following: Place ALL HPSI PPs in PULL TO LOCK. Shut ALL HPSI HDR valves and place their handswitches in PULL-TO-OVERRIDE: MAIN 1-SI-616-MOV 1-SI-636-MOV 1-SI-648-MOV 1-SI-647-MOV 1-SI-647-MOV 1-SI-647-MOV (continue) 	 IF HPSI LTOP control can NOT be established, THEN operate MAIN SPRAY, AUX SPRAY or PRZR VENT valves to maintain the following: RCS subcooling above 25° F based on CET temperatures RCS pressure PER ATTACHMENT (1), RCS PRESSURE TEMPERATURE LIMITS

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APPENDIX (4) CORE AND RCS HEA	
HR-3: SHUTDOWN COOLING SYST	EM
RECOVERY ACTIONS	ALTERNATE ACTIONS
A.2 (continued)	
<u>CAUTION</u> Only ONE HPSI Pump shall be operable prior to cooldown to less than 365° F T COLD.	
c. Rack out the breakers for the TWO HPSI PPs NOT required.	
<u>CAUTION</u> PORVs must be in MPT ENABLE before T COLD is less than 365° F.	
3. WHEN T coud is less than 369° F, THEN establish MPT protection as follows:	
a. Verify the PORV BLOCK valves are OPEN:	
 1-RC-403-MOV 1-RC-405-MOV 	
 b. Verify PZR LO RANGE PRESS, 1-PI-103 is less than VLTOP PORV SETPOINT, 1-ZI-103. 	
c. Verify PZR LO RANGE PRESS, 1-PI-103-1 is less than VLTOP PORV SETPOINT, 1-ZI-103-1.	
<u>CAUTION</u> PORVs will open if they are placed in SINGLE MPT ENABLE and PZR Pressure is greater than 396 PSIA.	
d. Place the PORV MPT PROTECTION handswitches in VARIABLE MPT ENABLE:	
1-HS-14061-HS-1408	
(continue)	

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EOP-8 Rev 31/Unit 1 Page 166 of 207 **APPENDIX (4) CORE AND RCS HEAT REMOVAL** HR-3: SHUTDOWN COOLING SYSTEM **ALTERNATE ACTIONS RECOVERY ACTIONS** A.3 (continued) e. Verify the PORV OVERRIDE handswitches in the AUTO position: • 1-HS-1402 1-HS-1404 4. WHEN RCS temperature is less than 350° F, THEN verify that NO more than TWO RCPs are in operation. 5. WHEN RCS temperature is less than 300° F AND RCS pressure is less than 300 PSIA, THEN perform the following actions: NOTE Cavity Cooling and CEDM Cooling aid in cooling Reactor Vessel Head if a void exists. a. Verify ONE CAV CLG and ONE CEDM CLG fan running if available. b. Close SIT OUT breakers: • (1-SI-614-MOV) 52-11442 • (1-SI-624-MOV) 52-11443 • (1-SI-634-MOV) 52-10442 • (1-SI-644-MOV) 52-10443 c. Shut SIT OUT valves: 1-SI-614-MOV 1-SI-624-MOV 1-SI-634-MOV 1-SI-644-MOV (continue)

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APPENDIX (4) CORE AND RCS HEAT	REMOVAL
HR-3: SHUTDOWN COOLING SYSTEM	Λ
RECOVERY ACTIONS	ALTERNATE ACTIONS
A.5 (continued)	
 IF Auxiliary Feedwater is NOT being used to feed the S/Gs, THEN perform the following actions: 	
(1) Shut the S/G AFW BLOCK valves by placing the handswitches in SHUT:	
11 S/G 1-AFW-4520-CV 1-AFW-4521-CV 1-AFW-4522-CV 1-AFW-4523-CV	
12 S/G 1-AFW-4530-CV 1-AFW-4531-CV 1-AFW-4532-CV 1-AFW-4533-CV	
(2) Place 13 AFW PP in PULL TO LOCK.	
(3) Verify shut SG AFW STM SUPP & BYPASS valves:	
 (11 SG)1-MS-4070-CV, 1-MS-4070A-CV (12 SG)1-MS-4071-CV, 1-MS-4071A-CV 	

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APPENDIX (4) CORE AND RCS HEA	AT REMOVAL
HR-3: SHUTDOWN COOLING SYST	
	- 177
RECOVERY ACTIONS	ALTERNATE ACTIONS
	_
B. CONTROL CORE AND RCS VOIDING.	
<u>NOTE</u> Core and RCS voiding may be indicated by the following:	
Letdown flow greater than charging flow	
Rapid unexplained rise in pressurizer level during an RCS pressure reduction	
 Loss of subcooled margin as determined using CET temperatures 	
"RXV WTR LVL LO" alarm	
 IF voiding causes difficulty in depressurization, THEN reduce or eliminate the voided area by performing the following actions: 	
a. Shut the L/D CNTMT ISOL valves:	
1-CVC-515-CV1-CVC-516-CV	
b. Stop depressurizing the RCS.	
(continue)	
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APPENDIX (4) CORE AND RCS HEA	AT REMOVAL
HR-3: SHUTDOWN COOLING SYST	EM
RECOVERY ACTIONS	ALTERNATE ACTIONS
B.1 (continued)	
<u>CAUTION</u> The potential exists for pressurized thermal shock from an excessive cooldown rate followed by a repressurization.	
 C. Cycle RCS subcooling between 25 and 140° F as follows: (1) Raise RCS subcooling to as near 140° F as practical by ANY of the following methods: NOTE Pressurizer Backup Heater Banks 11 and 13 trip on U/V and SIAS. Energize the Pressurizer HTR(s) Secure Pressurizer SPRAY Raise RCS cooldown rate while maintaining cooldown less than 100° F in any one hour IF HPSI flow has been reduced, THEN raise HPSI flow by opening HPSI HDR valves which have been throttled, OR starting HPSI PPs which have been stopped. 	c.1 IF cycling RCS subcooling is ineffective, THEN operate RX VESS VENT valves PER the <u>VENTING THE REACTOR</u> <u>COOLANT SYSTEM AFTER AN</u> <u>ACCIDENT</u> section of OI-1G.

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APPENDIX (4) CORE AND RCS HEAT	REMOVAL
-	OWN COOLING SYSTEM	
RECON	VERY ACTIONS	ALTERNATE ACTIONS
B.1.c (continued)		
25° F	r RCS subcooling to as near as practical by ANY of the ing methods:	
	e-energize the Pressurizer TR(s)	
• 0	perate Pressurizer SPRAY	
• S	ecure RCS cooldown	
m TI VZ O	HPSI throttle criteria are et, HEN throttle the HPSI HDR lives, R stop the HPSI PPs one at time	
	at steps B.1.c.(1) through (2) as necessary.	
	NOTE the S/G Tubes if saturation is greater than saturation	
lf voids exist in t	<u>CAUTION</u> he S/G Tubes, a rapid RCS on will occur when the	
tubes, THEN cool rate remain	is suspected in the S/G the S/G so RCS cooldown ns less than 100° F in any y raising ANY of the	
 Steami 	ng rate	
• Feed ra	ate	
• S/G Bl	owdown rate	
	(continue)	

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APPENDIX (4) CORE AND RCS HEA	
HR-3: SHUTDOWN COOLING SYST	EM
RECOVERY ACTIONS	ALTERNATE ACTIONS
B.1 (continued)	
e. Monitor pressurizer level and RVLMS for inventory trends.	
C. ESTABLISH CORE AND RCS HEAT REMOVAL BY SHUTDOWN COOLING.	
1. Verify RCS pressure and temperature is within the limits PER ATTACHMENT (1), <u>RCS PRESSURE TEMPERATURE</u> LIMITS	
2. WHEN the following conditions exist:	
 CET temperatures are less than 300° F 	
 Pressurizer pressure is less than 270 PSIA 	
 Pressurizer level is greater than 101 inches 	
 RCS subcooling is greater than 25° F based on CET temperatures 	
THEN perform the following actions:	
a. Contact the Operational Support Center to check radiation levels are low enough to allow valve repositioning.	
 b. Initiate Shutdown Cooling PER OI-3B, SHUTDOWN COOLING. 	
(continue)	
SHUTDOWN COOLING.	

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APPENDIX (4) CORE AND RCS HEA	T REMOVAL
HR-3: SHUTDOWN COOLING SYST	
RECOVERY ACTIONS	ALTERNATE ACTIONS
C.2 (continued)	
c. Operate HPSI, and Charging and Letdown to maintain the following:	
 Pressurizer level between 101 and 180 inches 	
RCS pressure within the specified limits PER ATTACHMENT (1), <u>RCS PRESSURE</u> <u>TEMPERATURE LIMITS</u>	
3. IF the following conditions exist:	
 CET temperatures are less than 300° F 	
 Conditions for establishing shutdown cooling can NOT be met 	
 Recirculation via the Containment Sump is in progress 	
CNTMT WR WATER LVL indicator 1-LI-4146, or 1-LI-4147 indicates at least 28 inches	
 Component Cooling system is available as a heat sink 	
BOTH CS PPs are secured	
THEN commence alternate shutdown cooling as follows:	
 a. Contact the Operational Support Center to check radiation levels are low enough to allow valve repositioning. 	
 b. Verify RCS pressure minus containment pressure is less than 160 PSID. 	
(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-3: SHUTDOWN COOLING SYSTEM

RECOVERY ACTIONS

ALTERNATE ACTIONS

C.3 (continued)

- c. IF the plant computer is NOT operating, THEN record the following information:
 - RCS T coub
 - PZR PRESS
 - SDC HX OUTLET TEMP (1-TI-303X and 1-TI-303Y)
 - Average CNTMT ambient temperature (1-TI-5309 and 1-TI-5311)
 - 27' Penetration Room temperature (1-TI-5276 and 1-TI-5280)
 - Steady State SDC flow rate (1-FtC-306) (following initiation)
- d. Shut 11 CS PP DISCH valve, 1-SI-314.
- e. Shut 12 CS PP DISCH valve, 1-SI-324.
- f. Shut 11 SDC HX OUT TO CS valve, 1-SI-319.
- g. Shut 12 SDC HX OUT TO CS valve, 1-SI-329.
- h. Open 11 SDC HX INLET XCONN valve, 1-SI-452.
- i. Open 11 SDC HX OUTLET TO LPSI HDR valve, 1-SI-456.
- j. Open 12 SDC HX INLET XCONN valve, 1-SI-453.
- k. Open 12 SDC HX OUTLET TO LPSI HDR valve, 1-SI-457.

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APPENDIX (4) CORE AND RCS HEA	TREMOVAL
HR-3: SHUTDOWN COOLING SYST	EM
RECOVERY ACTIONS	ALTERNATE ACTIONS
C.3 (continued)	
I. Verify Component Cooling in service as follows:	
(1) Throttle open BOTH CC HX SALTWATER OUT valves:	
 1-HIC-5206 1-HIC-5208 	
(2) Verify BOTH CC HX CC OUT valves are open:	
 1-CC-3824-CV 1-CC-3826-CV 	
(3) Verify TWO CC PPs in operation.	
m. Open 11 SDC HX CC OUT valve, 1-CC-3828-CV.	
n. Open 12 SDC HX CC OUT valve, 1-CC-3830-CV.	
 Open SDC HX LPSI INL valve, 1-SI-658-MOV. 	
p. Place the keyswitch for SDC FLOW CONTR, 1-SI-306-CV in AUTO.	
 q. Shift 1-FIC-306 to MANUAL with a 95% output signal. 	
 IF Hot Leg Injection is being used for core flush, THEN verify 12A LPSI HDR valve, 1-SI-635-MOV, is shut. 	
 IF Pressurizer Injection is being used for core flush, THEN open 12A LPSI HDR valve, 1-SI-635-MOV. 	
(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-3: SHUTDOWN COOLING SYSTEM	
RECOVERY ACTIONS	ALTERNATE ACTIONS
C.3 (continued)	
t. Open LPSI HDR valves:	
 1-SI-615-MOV 1-SI-625-MOV 1-SI-645-MOV 	
u. Verfiy the CNTMT SUMP DISCH valves are open:	
 1-SI-4144-MOV 1-SI-4145-MOV 	
v. Shut MINI FLOW RETURN TO RWT ISOL valves:	
 1-SI-659-MOV 1-SI-660-MOV 	
<u>CAUTION</u> The possibility of cavitation rises when taking suction from the Containment sump.	
w. IF the LPSI PPs are NOT operating, THEN clear RAS from ONE operable LPSI PP and start as follows:	
(1) Place the selected LPSI PP RAS OVERRIDE switch in OVERRIDE.	
(2) Start the selected LPSI PP.	
<u>CAUTION</u> The cooldown limit changes from 100° F in any one hour period to 40° F in any one hour period when RCS temperatures are below 256° F.	
x. Adjust the signal on 1-FIC-306 to raise flow to 3000 GPM, while maintaining cooldown rate within limits.	
(continue)	

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APPENDIX (4) CORE AND RCS HEA	T REMOVAL
HR-3: SHUTDOWN COOLING SYST	EM
RECOVERY ACTIONS	ALTERNATE ACTIONS
C.3 (continued)	
y. Place the keyswitch for the SDC TEMP CONTR, 1-SI-657-CV, in AUTO.	
<u>CAUTION</u> The heatup rate limit for the Shutdown Cooling Heat Exchangers is 14° F/m.	
z. Adjust 1-SI-657-CV to obtain less than 14° F/m heatup rate at SDC HX OUTLET TEMP, 1-TI-303X and 1-TI-303Y.	
aa. IF a second LPSI PP is desired, THEN perform the following actions:	
(1) Place the second LPSI PP RAS OVERRIDE switch in OVERRIDE.	
(2) Start the second LPSI PP and adjust 1-FIC-306 to 6000 GPM.	
ab. Adjust S/D COOLING TEMP CONTR valve, 1-SI-657-CV, to obtain the desired cooldown rate.	
(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-3: SHUTDOWN COOLING SYSTEM

RECOVERY ACTIONS

ALTERNATE ACTIONS

C. (continued)
IF recirculation via the Containment Sump has been lost AND the following conditions exist:
CET temperatures are less than 300° F AND less than 50° F superheated

- Pressurizer pressure is less than 270 PSIA
- Reactor Vessel level above the middle
 of the hot leg

THEN perform the following actions:

- a. Contact the Operational Support Center to check radiation levels are low enough to allow valve repositioning.
- b. Initiate Shutdown Cooling PER OI-3B, SHUTDOWN COOLING.

(continue)

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APPENDIX (4) CORE AND RCS HEA	-
HR-3: SHUTDOWN COOLING SYST	EM
RECOVERY ACTIONS	ALTERNATE ACTIONS
D. ACCEPTANCE CRITERIA FOR SUCCESS PATH HR-3.	
 Verify Core And RCS Heat Removal is satisfied by the following indications: CET temperatures are less than 300° F, and less than 50° F superheated 	1.1 IF Core and RCS Heat Removal has NOT been satisfied, THEN PROCEED to the next appropriate Core and RCS Heat Removal Success Path.
NOTE The limits of ATTACHMENT(10), <u>HIGH</u> <u>PRESSURE SAFETY INJECTION FLOW</u> are NOT required to be met if the HPSI throttle criteria are met. • HPSI PPs are injecting water into RCS <u>PER ATTACHMENT(10), HIGH</u> <u>PRESSURE SAFETY INJECTION</u> <u>FLOW</u> • Pressurizer pressure is less than 270 PSIA {245}	
Reactor Vessel level indicates the core is covered	
 IF Core and RCS Heat Removal has been established, THEN PROCEED to the next Safety Function to be satisfied. 	

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APPENDIX (4) CORE AND RCS HEA	T REMOVAL
HR-4: ONCE-THROUGH-COOLING	
RECOVERY ACTIONS	ALTERNATE ACTIONS
A. ESTABLISH CORE AND RCS HEAT REMOVAL BY ONCE-THROUGH-COOLING.	
1. Ensure ALL RCPs are tripped.	
2. Minimize S/G inventory losses by ensuring the S/G B/D valves are shut:	
 1-BD-4010-CV 1-BD-4011-CV 1-BD-4012-CV 1-BD-4013-CV 	
3. IF EITHER S/G level is greater than (-)350 inches, THEN attempt to maintain RCS temperature constant using the TURB BYP valves OR the ADV(s).	,
 IF SGIS has NOT actuated, THEN perform the following: 	
WHEN "SGIS A BLOCK PERMITTED" alarm is received, THEN block SGIS A.	
WHEN "SGIS B BLOCK PERMITTED" alarm is received, THEN block SGIS B.	
(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL

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HR-4: ONCE-THROUGH-COOLING

RECOVERY ACTIONS

ALTERNATE ACTIONS

A. (continued)

NOTE

Prior to meeting initiation criteria, with the exception of opening the PORVs, the substeps of A.5 may be performed, and in any order.

NOTE

Perform steps A.5 and A.6 concurrently.

CAUTION

If S/Gs have become ineffective in removing heat, Once-Through-Cooling must be initiated prior to CET temperatures reaching 560° F to ensure adequate RCS and Core Heat Removal.

- 5. IF, at ANY time, ANY of the following conditions exists:
 - BOTH S/G levels are less than (-)350 inches
 - TCOLD rises uncontrollably 5° F or greater
 - Once-Through-Cooling has been determined to be required for heat removal

THEN initiate Once-Through-Cooling as follows:

- a. Place ALL Pressurizer HTR handswitches in OFF.
- b. Shut the L/D CNTMT ISOL valves:
 - 1-CVC-515-CV
 - 1-CVC-516-CV
- c. Start ALL available CHG PPs.

(continue)

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APPENDIX (4)	CORE AND RCS HEA	AT R	EM	OVAL	
HR-4: ONCE-T	HROUGH-COOLING				
RECOVE	RY ACTIONS			ALTERNATE ACTION	<u>s</u>
A.5 (continued)					
d. Open BOTH	PORVs as follows:				
A PERM received	the "PZR PRESS BLOCK /ITTED" alarm is J, liock SIAS A.		-		
B PERM received	the "PZR PRESS BLOCK AITTED" alarm is J, Jock SIAS B.				
	OTH PORV BLOCK are OPEN:				
	C-403-MOV C-405-MOV				
	e PORV OVERRIDE itches in MANUAL OPEN:				
• 1-H • 1-H					
(5) Verify B	OTH PORVs are open.				
e. Start ALL TH	iree HPSI PPs.	e.1	ANI	3 HPSI PP will NOT sta D 14 4KV Bus is de-ene EN perform the following	rgized,
			(1)	Align the 13 HPSI PP 11 4KV Bus PER OI-2	
			(2)	Start 13 HPSI PP.	
(c	ontinue)				

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PPENDIX (4) CORE AND RCS HE	AT REMOVAL
R-4: ONCE-THROUGH-COOLING	i
RECOVERY ACTIONS	ALTERNATE ACTIONS
5 (continued)	
f. Open the MAIN and AUX HPSI HDR valves: MAIN 1-SI-616-MOV 1-SI-626-MOV 1-SI-636-MOV 1-SI-636-MOV 1-SI-646-MOV AUX 1-SI-647-MOV 1-SI-637-MOV 1-SI-647-MOV 9. Open ALL CNTMT CLR EMER OUT valves.	f.1 IF the MAIN OR AUX HPSI HDR valves will NOT open, THEN open the HPSI HDR XCONN valve, 1-SI-653-MOV.
h. Start ALL available CNTMT AIR CLRs in HIGH.	
 WHEN RCS pressure is less than 1270 PSIA, THEN verify initiation of Once-Through-Cooling by observing the following: HPSI flow PER 	 i.1 IF HPSI flow is NOT PER ATTACHMENT(10), <u>HIGH PRESSURE</u> <u>SAFETY INJECTION FLOW</u>, THEN perform the following actions as necessary: (1) Ensure electrical power is available
ATTACHMENT(10), <u>HIGH</u> <u>PRESSURE SAFETY INJECTION</u> <u>FLOW</u> • CET temperatures constant or lowering	to valves and pumps. (2) Verify safety injection system lineup PER ATTACHMENT (2), <u>SIAS</u> <u>VERIFICATION CHECKLIST</u> .
(continue)	

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APPENDIX (4) CORE AND RCS HEA	Page 184 of 207	
HR-4: ONCE-THROUGH-COOLING		
RECOVERY ACTIONS	ALTERNATE ACTIONS	
A.5 (continued)		
 j. IF SIAS has NOT actuated, THEN prevent high pressurizer level from securing the backup CHG PPs by performing the following actions: (1) Locally initiate SIAS A6 and B6. (2) IF boration is NOT in progress, THEN place the BA PP handswitches in PULL TO LOCK. 		
k. Verify minimum equipment to ensure successful Once-Through-Cooling is available PER ATTACHMENT(17), <u>ONCE-THROUGH-COOLING</u> <u>MATRIX</u> .	 k.1 IF minimum equipment to ensure successful Once-Through-Cooling is NOT available, THEN verify BOTH S/Gs are isolated PER step A.6, AND PROCEED to Step G.1.1. 	
6. Prevent S/G dryout.		
 a. WHEN EACH S/G level lowers to (-)380 inches, THEN isolate the S/G by performing the following actions: 		
Shut the MSIV(s):		
 (11 S/G) 11 MSIV (12 S/G) 12 MSIV 		
 Shut the SG AFW STM SUPP & BYPASS valves: 		
 (11 S/G)1-MS-4070-CV, 1-MS-4070A-CV (12 S/G)1-MS-4071-CV, 1-MS-4071A-CV 		
(continue)		

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APPENDIX (4) CORE AND RCS HEA	AT REMOVAL
HR-4: ONCE-THROUGH-COOLING	
RECOVERY ACTIONS	ALTERNATE ACTIONS
A.6.a (continued)	
Verify the S/G B/D valves are shut:	
 1-BD-4010-CV 1-BD-4011-CV 1-BD-4012-CV 1-BD-4013-CV 	
 Verify the MSIV BYP valves are shut: 	
 1-MS-4045-MOV 1-MS-4052-MOV 	
 Shut the MS UPSTREAM DRN ISOL VLVS by placing handswitch 1-HS-6622 in CLOSE 	
 WHEN at least ONE S/G level is less than (-)380 inches, AND BOTH S/G levels are less than (-)350 inches, THEN ensure the ADVs are shut 	
B. ESTABLISH FEEDWATER SOURCE.	
 Determine the desirability of restoring feed capability to a S/G by considering: Plant Status Integrity of the S/Gs Condensate inventory 	
 Time remaining until Shutdown Cooling entry conditions are established Adequacy of the cooldown while on Once-Through-Cooling 	
(continue)	

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T REMOVAL
ALTERNATE ACTIONS

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Rev 31/Unit 1 Page 187 of 207 **APPENDIX (4) CORE AND RCS HEAT REMOVAL** HR-4: ONCE-THROUGH-COOLING **RECOVERY ACTIONS ALTERNATE ACTIONS** B.2 (continued) c. Shut the ADVs using the Hand c.1 IF the ADV will NOT shut from 1C43, Transfer Valves on the West wall of THEN shut the affected ADV Manual the Unit 1 45 ft Switchgear Room as Isolation Valve: follows: • (11 S/G) 1-MS-101 (1) Verify the ADV controller on 1C43 (12 S/G) 1-MS-104 is set at 0% output: • (11 ADV) 1-HC-4056A • (12 ADV) 1-HC-4056B (2) Align the Hand Transfer Valves to 1C43 (POSITION 2): 11 S/G 1-HV-3938A 1-HV-3938B 12 S/G 1-HV-3939A 1-HV-3939B d. PROCEED to Block Step D. 3. Maintain AFW PP suction supply AND CST inventory PER ATTACHMENT (8), MAINTAIN AFW PUMP SUCTION SUPPLY AND CST INVENTORY. (continue)

EOP-8

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APPENDIX (4) CORE AND RCS HEA	T REMOVAL
HR-4: ONCE-THROUGH-COOLING	
RECOVERY ACTIONS	ALTERNATE ACTIONS
B. (continued)	
NOTE The following steps are alternative methods to establish a feedwater source. Each available method can be attempted until a feedwater source is successfully established.	
4. Attempt to establish AFW.	
a. Establish AFW flowpath to the S/G(s) by placing the handswitches for the unaffected S/G AFW BLOCK valves in OPEN: 11 S/G 1-AFW-4520-CV 1-AFW-4521-CV 1-AFW-4522-CV 1-AFW-4523-CV 12 S/G 1-AFW-4530-CV 1-AFW-4531-CV 1-AFW-4533-CV 1-AFW-4533-CV	a.1 IF S/G AFW BLOCK valve(s) will NOT open from the control room, THEN locally open valve(s) using the Hand Transfer Station(s) on North wall of SRW Room.
(continue)	

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APPENDIX (4) CORE AND RCS HEA	AT REMOVAL
HR-4: ONCE-THROUGH-COOLING	
RECOVERY ACTIONS	ALTERNATE ACTIONS
B.4 (continued)	
<u>NOTE</u> The following substeps are alternative methods to establish auxiliary feedwater. Each available method can be attempted until auxiliary feed is successfully established.	
 b. Establish AFW with 13 AFW PP as follows: 	b.1 Start 13 AFW PP locally as follows:
 (1) Shut the S/G FLOW CONTR valves: (11 S/G) 1-AFW-4525-CV (12 S/G) 1-AFW-4535-CV CAUTION The 13 AFW PP flow limit is 575 GPM. (2) Start 13 AFW PP by placing its handswitch in START.	 (1) Shut the S/G FLOW CONTR valves: (11 S/G) 1-AFW-4525-CV (12 S/G) 1-AFW-4535-CV (2) Verify 13 AFW PP handswitch is in AUTO. <u>CAUTION</u> The 13 AFW PP flow limit is 575 GPM. (3) Close the AFW PP No. 13 breaker, 152-1116, by pressing the CLOSE button.
(continue)	(continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-4: ONCE-THROUGH-COOLING		
RECOVERY ACTIONS	ALTERNATE ACTIONS	
B.4.b (continued)	B.4.b.1 (continued)	
	<u>CAUTION</u> Removing control power fuses eliminates bus protection from breaker faults, and overcurrent, undervoltage and ground protection for the breaker.	
	(4) IF the breaker fails to close, THEN, with the approval of the SM/CRS, perform the following actions:	
	(a) Remove the breaker control power fuses.	
	(b) IF necessary, THEN manually charge the breaker closing spring.	
	(c) Press the CLOSE button at AFW PP No. 13 breaker, 152-1116.	
	(d) Ensure normal pump running current less than 70 AMPS.	
(continue)		

		EOP-8 Rev 31/Unit 1 Page 191 of 207			
APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-4: ONCE-THROUGH-COOLING					
1	RECOVERY ACTIONS	ALTERNATE ACTIONS			
B.4 (contin	ued)				
as f (1) (2) (3) An unmon occur if th Valve from opened.	ablish AFW with 11 or 12 AFW PP follows: Shut the S/G FLOW CONTR valves: • (11 S/G) 1-AFW-4511-CV • (12 S/G) 1-AFW-4512-CV Verify open 11 and 12 AFW PP Main Steam Supply Valves: • 1-MS-109 • 1-MS-107 Verify open 11 OR 12 THROTTLE/STOP valve: • 1-MS-3986 • 1-MS-3988 <u>CAUTION</u> intored radiation release could a AFW Steam Supply Bypass a S/G affected by a SGTR is Open the 12 SG AFW STM SUPP & BYPASS valves from a S/G NOT affected by a SGTR:	 c.1 Start 11 or 12 AFW PP locally as follows: Shut the S/G FLOW CONTR valves: (11 S/G) 1-AFW-4511-CV (12 S/G) 1-AFW-4512-CV (2) Turn the turbine governor control knob counterclockwise to the minimum position. (3) Isolate the Instrument Air to the Turbine Governor Controller(s) by shutting the following valves: <u>11 AFW PP</u> 1-AFW-3987A I/P ISOL, 1-IA-24 1-AFW-3987B I/P ISOL, 1-IA-23 <u>12 AFW PP</u> 1-AFW-3989A I/P ISOL, 1-IA-22 1-AFW-3989B I/P ISOL, 1-IA-21 (4) Open the air filter drains on controllers to allow local control. (5) Verify open 11 and 12 AFW PP Main Steam Supply Valves: 1-MS-109 1-MS-107 			
	 (11 S/G)1-MS-4070-CV, 1-MS-4070A-CV (12 S/G)1-MS-4071-CV, 1-MS-4071A-CV (continue) 	(continue)			

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APPENDIX (4) CORE AND RCS HEA	T REMOVAL					
HR-4: ONCE-THROUGH-COOLING	HR-4: ONCE-THROUGH-COOLING					
RECOVERY ACTIONS	ALTERNATE ACTIONS					
B.4.c (continued)	B.4.c.1 (continued)					
(5) Adjust and maintain the turbine driven discharge header pressure at least 100 PSI greater than S/G pressure:	 (6) Verify open 11 OR 12 THROTTLE/STOP valve: 1-MS-3986 1-MS-3988 					
 (11 AFW PP SPEED CONTR) 1-HC-3987A (12 AFW PP SPEED CONTR) 1-HC-3989A 	<u>CAUTION</u> An unmonitored radiation release could occur if the AFW Steam Supply Bypass Valve from a S/G affected by a SGTR is					
(6) Operate AFW ventilation as necessary to maintain temperature less than 130° F.	opened. (7) Open the AFW Steam Supply Bypass Valves:					
	1-MS-1021-MS-105					
	(8) Adjust and maintain the turbine driven discharge header pressure at least 100 PSI greater than S/G pressure using the local turbine governor control knob.					
	(9) Operate AFW ventilation as necessary to maintain temperature less than 130° F.					
	r					
(continue)						

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APPENDIX (4) CORE AND RCS HEAT	_
HR-4: ONCE-THROUGH-COOLING	
RECOVERY ACTIONS	ALTERNATE ACTIONS
B.4 (continued)	
d. Establish AFW with 23 AFW PP as follows:	
(1) Shut the Unit 2 Motor Train S/G AFW BLOCK valves by placing the handswitches in SHUT:	
21 S/G • 2-AFW-4522-CV • 2-AFW-4523-CV	
22 S/G • 2-AFW-4532-CV • 2-AFW-4533-CV	
(2) Open the U-2 TO U-1 XCONN valve, 2-AFW-4550-CV.	
(3) Establish AFW with 23 AFW PP as follows:	
(a) Shut the Unit 1 S/G FLOW CONTR valves:	
 (11 S/G) 1-AFW-4525-CV (12 S/G) 1-AFW-4535-CV 	
<u>CAUTION</u> The 23 AFW PP flow limit is 575 GPM.	
(b) Start 23 AFW PP by placing its handswitch in START.	
(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL				
HR-4: ONCE-THROUGH-COOLING				
RECOVERY ACTIONS	ALTERNATE ACTIONS			
B. (continued)				
 IF T COLD is less than 465° F, THEN attempt to establish Booster Pump Injection. 				
a. IF SGIS has actuated AND indications of an ESDE are NOT observed, THEN reset SGIS as follows:				
(1) Place the COND BSTR PPs in PULL TO LOCK.				
(2) Match handswitch positions PER ATTACHMENT (7), <u>SGIS</u> <u>VERIFICATION CHECKLIST</u> .				
(3) Block SGIS.				
(4) Reset the SGIS signal.				
(5) Open the MSIV(s).				
b. Shut the MAIN SG FW REG valves.	-			
c. Shift the SG FW REG BYPASS controllers to Manual.				
d. Depress the S/G FRV BYP RESET buttons.				
e. Manually adjust the SG FW REG BYPASS valve controllers to 0%.				
f. Verify BOTH SG FW ISOL valves are shut:				
 (11 S/G) 1-FW-4516-MOV (12 S/G) 1-FW-4517-MOV 				
g. Open the PRECOAT SYS BYP valve, 1-CD-5818-CV.				
h. Open the COND DEMIN BYP valve, 1-CD-4439-MOV.				
(continue)				

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AF	APPENDIX (4) CORE AND RCS HEAT REMOVAL					
HF	-4: ONCE-THROUGH-COOLING					
	RECOVERY ACTIONS	ALTERNATE ACTIONS				
B.5	(continued)					
	 Verify at least ONE COND PP is running. 					
	j. Verify ONE COND BSTR PP is running.					
	k. Place BOTH HTR DRN PP Handswitches in PULL TO LOCK.					
	IF a feedwater source can NOT be established, THEN PROCEED to Block Step D.	- -				
C.	ESTABLISH S/G HEAT SINK.					
	IF feedwater capability is restored AND Once-Through-Cooling is in progress, THEN evaluate feeding a S/G by considering the following:					
	 Plant Status Auxiliary systems availability Condensate inventory Time remaining until Shutdown Cooling entry conditions are established Adequacy of the cooldown while on Once-Through-Cooling 					
	IF NEITHER S/G is to be fed, THEN PROCEED to Block Step D.					
	(continue)					

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-4: ONCE-THROUGH-COOLING **ALTERNATE ACTIONS RECOVERY ACTIONS** C. (continued) NOTE The decision to feed a S/G should be made by the Plant Technical Support Center or the Shift Manager. CAUTION If ANY S/G has indicated level, then only the S/G with the highest level should be fed. If BOTH S/Gs are dry, then only ONE S/G should be fed to initiate RCS heat removal 3. IF the Plant Technical Support Center or Shift Manager recommends feeding a S/G, THEN isolate the S/G which is NOT to be fed as follows: a. Shut the SG FW ISOL valve for the S/G to be isolated: • (11 S/G) 1-FW-4516-MOV (12 S/G) 1-FW-4517-MOV b. Shut the S/G AFW BLOCK valves for the S/G to be isolated by placing the handswitches in SHUT: 11 S/G 1-AFW-4520-CV • 1-AFW-4521-CV 1-AFW-4522-CV 1-AFW-4523-CV 12 S/G 1-AFW-4530-CV 1-AFW-4531-CV 1-AFW-4532-CV 1-AFW-4533-CV (continue)

EOP-8 Rev 31/Unit 1 Page 197 of 207 **APPENDIX (4) CORE AND RCS HEAT REMOVAL** HR-4: ONCE-THROUGH-COOLING **ALTERNATE ACTIONS RECOVERY ACTIONS** C.3 (continued) c.1 IF the ADV will NOT shut from 1C43. c. Shut the ADV for the S/G to be isolated using the Hand Transfer THEN shut the affected ADV Manual Valves on the West wall of the Unit 1 Isolation Valve: 45 ft Switchgear Room as follows: • (11 S/G) 1-MS-101 (1) Verify the ADV controller on 1C43 (12 S/G) 1-MS-104 is set at 0% output: (11 ADV) 1-HC-4056A • (12 ADV) 1-HC-4056B (2) Align the Hand Transfer Valves to 1C43 (POSITION 2): 11 S/G 1-HV-3938A 1-HV-3938B 12 S/G 1-HV-3939A 1-HV-3939B (continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL					
HR-4: ONCE-THROUGH-COOLING					
RECOVERY ACTIONS	ALTERNATE ACTIONS				
C. (continued)					
<u>CAUTION</u> If voids exist in the S/G tubes, a rapid RCS pressure reduction will occur when the voids collapse.					
4. Establish feed to the selected S/G.					
a. Verify the ADV is shut.					
b. IF AFW has been restored, THEN perform the following actions:					
 (1) IF AFW has been restored using 13 OR 23 AFW PP, THEN adjust S/G FLOW CONTR valve to approximately 150 GPM to the appropriate S/G: 	 (1).1 IF the S/G FLOW CONTR valve(s) will NOT open, THEN locally throttle open the appropriate bypass valve(s), located in the SRW Room: 				
 (11 S/G) 1-AFW-4525-CV (12 S/G) 1-AFW-4535-CV 	 (11 S/G) 1-AFW-195 (12 S/G) 1-AFW-196 				
 (2) IF AFW has been restored using 11 or 12 AFW PP, THEN adjust S/G FLOW CONTR valve to approximately 150 GPM to the appropriate S/G: 	 (2).1 IF the S/G FLOW CONTR valve(s) will NOT open, THEN locally throttle open the appropriate bypass valve(s), located in the 27 ft East Penetration Room: 				
 (11 S/G) 1-AFW-4511-CV (12 S/G) 1-AFW-4512-CV 	 (11 S/G) 1-AFW-163 (12 S/G) 1-AFW-165 				
(continue)					

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APPENDIX (4) CORE AND RCS HEA	TREMOVAL
HR-4: ONCE-THROUGH-COOLING	
RECOVERY ACTIONS	ALTERNATE ACTIONS
C.4.b (continued)	
 (3) WHEN S/G level response is observed OR continuous feed has been maintained for at least 5 minutes, THEN feed rate may be slowly raised while maintaining the following: Gradual rise in S/G level S/G level trending towards 0 inches RCS cooldown rate less than 100° F in any one hour 	
<u>CAUTION</u> Rapid or uncontrolled restoration of Main Feedwater may cause a severe waterhammer.	
 c. IF Booster Pump Injection has been restored, THEN perform the following for the S/G to be fed: 	
(1) Open the appropriate SG FW ISOL valve:	
 (11 S/G) 1-FW-4516-MOV (12 S/G) 1-FW-4517-MOV 	
(2) Throttle open the SG FW REG BYPASS valve to establish a flow of 100 to 160 GPM PER ATTACHMENT(18), <u>MAIN</u> <u>FEEDWATER GOOSENECK</u> <u>PURGE FLOW</u> .	
(continue)	

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APPENDIX (4) CORE AND RCS HEA	T REMOVAL
HR-4: ONCE-THROUGH-COOLING	
RECOVERY ACTIONS	ALTERNATE ACTIONS
C.4.c (continued)	
 (3) WHEN continuous feed has been maintained for at least 10 minutes, THEN feed rate may be slowly raised while maintaining the following: Gradual rise in S/G level S/G level trending towards 0 inches RCS cooldown rate less than 100° F in any one hour CAUTION The RCS may be solid. Any action involving RCS cooldown or heatup should be closely monitored to prevent rapid	
pressure excursions.	
 Establish a secondary heat sink as follows: 	
a. Adjust the ADV to establish RCS temperature control.	
 b. Restore and maintain the level of the S/G being fed to between (-)170 and (+)30 inches. 	
(continue)	

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APPENDIX (4) CORE AND RCS HEA	AT REMOVAL
HR-4: ONCE-THROUGH-COOLING	
RECOVERY ACTIONS	ALTERNATE ACTIONS
C. (continued)	
 WHEN a secondary heat sink has been established, THEN reduce Once-Through-Cooling flow as follows: 	
a. IF THREE HPSI PPs are operating, AND HPSI throttle criteria are met THEN stop ONE HPSI PP.	
b. Stop ALL but ONE CHG PP.	
<u>CAUTION</u> HPSI flow must be closely monitored to prevent a rapid pressure excursion when the PORV Block Valve is shut.	
c. Shut the BLOCK valve for ONE PORV.	
 Adjust the HPSI flow to maintain RCS subcooling between 25 and 140° F using CET temperatures. 	
e. Adjust the ADV to establish RCS temperature control.	
7. IF a S/G heat sink can NOT be established, THEN continue RCS cooldown using Once-Through-Cooling until shutdown cooling entry conditions are reached.	

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A	PPENDIX (4) CORE AND RCS HE	-
Н	R-4: ONCE-THROUGH-COOLING	
	RECOVERY ACTIONS	ALTERNATE ACTIONS
D.	EVALUATE THE NEED FOR HPSI OR LPSI THROTTLING/TERMINATION.	
1.	IF HPSI PPs are operating AND ALL of the following conditions can be maintained:	
	 At least 25° F subcooling based on CET temperatures 	
	 Pressurizer level greater than 101 inches {141} 	
	 At least ONE S/G available for heat removal 	
	 S/G level greater than (-)170 inches capable of being supplied with feedwater 	
	 capable of being steamed Reactor Vessel level above the top of the hot leg 	
	Reactivity Control Safety Funtion Acceptance Criteria are met	
	THEN HPSI flow may be reduced by throttling the HPSI HDR valves, or stopping the HPSI PPs one at a time, as desired, to maintain RCS subcooling between 25 and 140° F based on CET temperatures.	
2.	IF pressurizer pressure is greater than 200 PSIA and constant OR rising, THEN the operating LPSI PPs may be stopped.	
	(continue)	

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A	PPENDIX (4) CORE AND RCS HE	AT REMOVAL
H	R-4: ONCE-THROUGH-COOLING	
	RECOVERY ACTIONS	ALTERNATE ACTIONS
D.	(continued)	
3.	IF HPSI or LPSI throttle criteria can NOT be maintained after the pumps are throttled or secured, THEN restart the appropriate pumps AND restore full flow.	
E.	IF A SECONDARY HEAT SINK HAS BEEN ESTABLISHED, THEN SECURE ONCE-THROUGH-COOLING.	
1.	WHEN S/G level is greater than (-)170 inches, THEN secure Once-Through-Cooling as follows:	
	a. Ensure Once-Through-Cooling flow has been reduced PER step C.6.	
	 Verify the HPSI throttle criteria are met. 	
	c. Secure the HPSI PPs.	
	d. Shut the HPSI HDR valves.	
	e. Place the PORV OVERRIDE handswitches in AUTO:	
	1-HS-14021-HS-1404	
	f. Adjust charging and letdown to maintain RCS subcooling between 25 and 140° F using CET temperatures.	
2.	circulation, and maintain CET temperatures constant or lowering.	
	(continue)	

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<u>CTIONS</u>
np level does NOT wers, ollows actions: evel greater than shment from ANY
indicated by sump ms.
ause for the leakage solate it.

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APPENDIX (4) CORE AND RCS HE	AT REMOVAL
HR-4: ONCE-THROUGH-COOLING	
RECOVERY ACTIONS	ALTERNATE ACTIONS
G. ACCEPTANCE CRITERIA FOR SUCCESS PATH HR-4,	
 Check Core and RCS Heat Removal is satisfied by the following indications: CET temperatures less than 50° F superheated IF RAS has NOT occurred, AND HPSI throttle criteria are NOT met, THEN ALL available Charging Pumps operating 	 1.1 IF Core and RCS Heat Removal has NOT been satisfied, THEN perform the following actions: a. Concurrently perform the recovery actions for the next safety function to be satisfied. b. Determine the appropriate emergency response actions PER the ERPIP.
NOTE LPSI Pumps are NOT required post-RAS. <u>NOTE</u> Limits in ATTACHMENT(10), <u>HIGH</u> <u>PRESSURE SAFETY INJECTION FLOW</u> and ATTACHMENT(11), <u>LOW PRESSURE</u> <u>SAFETY INJECTION FLOW</u> are NOT required to be met if SIS throttle criteria are met. • HPSI and LPSI Pumps are injecting water into the RCS PER ATTACHMENT(10), <u>HIGH</u> <u>PRESSURE SAFETY INJECTION</u> <u>FLOW</u> and ATTACHMENT(11), <u>LOW</u> <u>PRESSURE SAFETY INJECTION</u> <u>FLOW</u> • Pressurizer Pressure less than 1270 PSIA OR is lowering	 c. IF SIS flow is adequate, THEN perform ANY of the following as necessary to transfer additional heat through the S/Gs: Restore vital auxiliaries necessary to feed at least ONE S/G. IF remote valve operation fails, THEN operate failed valves locally. Feed the S/Gs from ANY of the following water supplies: Condensate DI Water Well Water System Fire System Bay Water (4) Steam the S/G through ANY of the following paths: TURB BYP valves ADVs SGFPs or AFW PPs MSIV Bypass valves
(continue)	(continue)

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APPENDIX (4) CORE AND RCS HEA	
HR-4: ONCE-THROUGH-COOLING	
RECOVERY ACTIONS	ALTERNATE ACTIONS
<u>RECOVERT ACTIONS</u>	
G.1 (continued)	G.1.1.c(4) (continued)
	Upstream drains
	d. IF SIS flow is NOT adequate, THEN IMPLEMENT a Core and RCS Heat Removal success path by performing ANY of the following as necessary:
	 Restore vital auxiliaries necessary to regain needed components or subsystems.
	(2) IF remote valve operation fails, THEN operate failed valves locally.
	(3) Fill the RCS from an alternate source.
	(4) Depressurize or cool the RCS to raise or establish SIS flow.
	(5) Steam and feed S/Gs from alternate sources.
	e. IF BOTH of the following conditions exist:
	AC power is NOT available
	 RCS subcooling can NOT be maintained
	THEN perform BOTH of the following to maintain two-phase natural circulation:
	(1) S/G steaming and feeding are property controlled.
	(2) Maintain CET temperatures less than 50° F superheated
(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL				
HR-4: ONCE-THROUGH-COOLING				
ALTERNATE ACTIONS				

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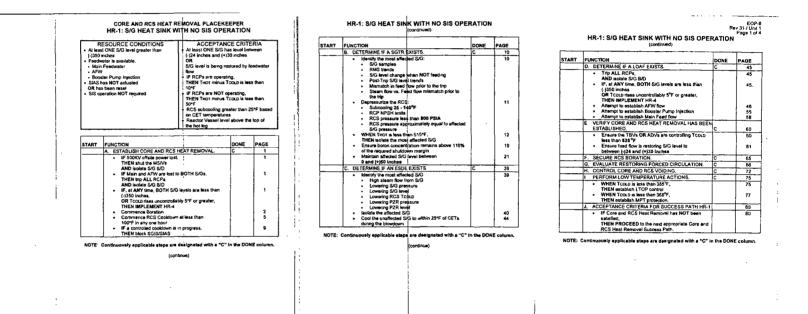
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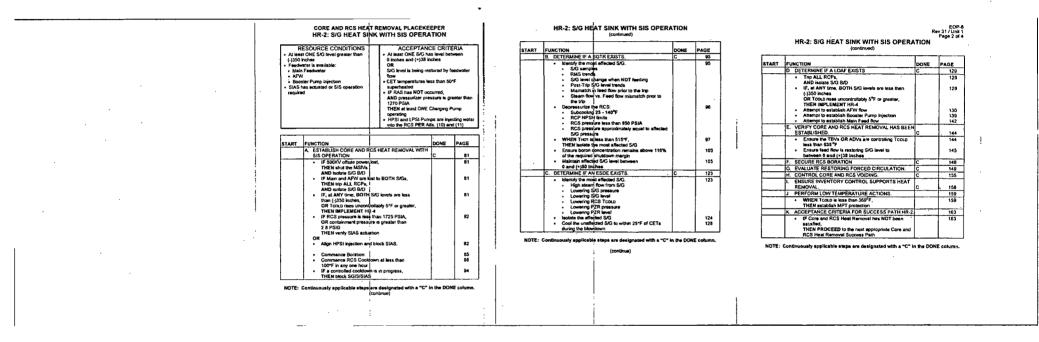
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CORE AND RCS HEAT REMOVAL PLACEKEEPER HR-3: SHUTDOWN COOLING SYSTEM

CET Radia	RESOURCE CONDITIONS Femperatures less than 300°F tion levels are low enough to allow repositioning	ACCEPTANCE CRITERIA • CET Temperatures less than 300°F an less than 50°F superheated • HPSI Pumps are injecting water into th RCS PER Att. (10) • Pressurizer pressure less than 270{24 • Reactor Vessel level indicates the core is covered
START	FUNCTION	DONE PAGE

START	FUNCTION	DONE	PAGE
	A. PERFORM LOW TEMPERATURE ACTIONS.	С	164
	WHEN TCOLD is less than 385°F,		164
	THEN establish LTOP control		
	WHEN TCOLD is less than 369°F,	1	165
	THEN establish MPT protection.	1	
	B. CONTROL CORE AND RCS VOIDING.	C	168
	C. ESTABLISH CORE AND RCS HEAT REMOVAL BY		
	SHUTDOWN COOLING.	С	171
	D. ACCEPTANCE CRITERIA FOR SUCCESS PATH HR-3.		179
	IF Core and RCS Heat Removal has NOT been satisfied,		179
	THEN PROCEED to the next appropriate Core and		
	RCS Heat Removal Success Path.		<u> </u>

NOTE: Continuously applicable steps are designated with a "C" in the DONE column.

HPSI BOTH Flow p	pumps are available PORVs are available at his available s available as a makeup source HTHEN + HPSI into the + Pressu	has NOT occurred, PSI throttle criteria are NOT met ALL available Charging Pumps
START	FUNCTION	DONE PAGE
	A. ESTABLISH CORE AND RCS HEAT REM ONCE-THROUGH-COOLING.	OVAL BY C 180
	Ensure ALL RCPs are tripped	180
	Isolate S/G B/D	180
	Attempt to maintain RCS temperature	
	 IF SGIS has NOT actuated. 	180
	THEN block SGIS	
	NOTE: Prior to meeting initiation criteria, with the e	xception of
	opening the PORVs, the substeps of A 5 may be pe	informed, and in
	any order.	
	Perform S/G dryout step concurrently with initiation	of ·
	Once-Through-Cooling.	
	 IF, at ANY time, ANY of the following of exist: 	
	 BOTH S/G levels are less than (-)3 	150 inches
	 TCOLD rises uncontrollably 5°F or g 	
	 Once-Through-Cooling has been d to be required for heat removal 	etermined
	THEN initiate Once-Through-Cooling	
	Verify BOTH PORVs are open	1
	Biock SIAS	
	• WHEN EACH S/G level is less than (-)	380 inches. 184
	THEN prevent S/G dryout	
	B. ESTABLISH FEEDWATER SOURCE.	C 185
	 IF feedwater will NOT be restored, 	186
	THEN isolate BOTH S/Gs	1 1
	 Attempt to establish AFW Attempt to establish Booster Pump Inje 	188
		ction 194

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	HR-4: ONCE-THROUGH-COOLING (continued)		Page 4 d
START	FUNCTION	DONE	PAGE
	C. ESTABLISH S/G HEAT SINK.	c	195
_	Isolate the S/G which is NOT to be fed Establish Feed flow Verity ADV is shut		196 198
	Establish a secondary heat sink Adjust ADV Restore and maintain S/G level between		,200
	(-)170 and (+)30 inches Reduce Once-Through-Cooling flow		201
	D. EVALUATE THE NEED FOR HPSI OR LPSI THROTTLING/TERMINATION	с	202
	IF HPSI PPs are operating AND ALL of the following conditions can be maintained: At least 25 °F subcooling based on CET temperatures Pressurizer level greater than 101 inches (141) At least ONE S/G available for heat removal Reactor Vessel level above the top of the hot leg Reactivity Control Safety Function Acceptance Criteria are met THEN HPSI flow may be reduced. IF pressurizer pressure ls greater than 200 PSIA and EITHER constant or rising, THEN the operating LPSI PPs may be stopped E. IF A SECONDARY HEAT SINK HAS BEEN		202
	ESTABLISHED, THEN SECURE ONCE-THROUGH-COOLING,	[203
	F. ENSURE INVENTORY CONTROL SUPPORTS HEAT REMOVAL	с	204
	G. ACCEPTANCE CRITERIA FOR SUCCESS PATH HR-4.		205
	IF Core and RCS Heat Removal has NOT been satisfied, THEN perform the following actions: Concurrently perform the Recovery actions for the next satisfy function to be satisfied Determine the appropriate emergency response actions PER the ERPIP		205

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NOTE: Continuously applicable steps are designated with a "C" in the DONE column.

		EOP-8 Rev 29/Unit 1 Page 1 of 26
A	PPENDIX (5) CONTAINMENT ENV	
C	E-1: NO CIS	
	RECOVERY ACTIONS	ALTERNATE ACTIONS
A.	ESTABLISH CONTAINMENT ENVIRONMENT WITH CONTAINMENT FANS.	
1.	Verify ALL available CNTMT AIR CLRs are operating.	
2.	IF containment pressure exceeds 0.7 PSIG, OR containment temperature exceeds 120° F, THEN open the CNTMT CLR EMER OUT valves for the operating CNTMT AIR CLRs. • 1-SRW-1582-CV • 1-SRW-1585-CV • 1-SRW-1590-CV • 1-SRW-1593-CV	
3.	Check containment radiation monitor alarms are clear with NO unexplained rise.	3.1 Verify ALL available IODINE FILT FANs are running, AND PROCEED to CE-2, CONTAINMENT ISOLATION.
4.	Verify SRW Pump Room Ventilation is in service PER the <u>SRW Pump Room</u> <u>Ventilation</u> section of OI-15.	
	(continue)	

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APPENDIX (5) CONTAINMENT ENVIRONMENT CE-1: NO CIS

RECOVERY ACTIONS

ALTERNATE ACTIONS

A. (continued)

5. IF SIAS has actuated, THEN perform the following actions:

NOTE

Performance of procedure steps and present plant conditions may create acceptable exceptions to the checklist.

CAUTION

To prevent uncontrolled system restoration, handswitches should be matched to the checklist positions unless specified otherwise.

- a. Verify ESFAS equipment is aligned correctly AND handswitches are matched PER ATTACHMENT (2), <u>SIAS</u> <u>VERIFICATION CHECKLIST</u>.
- b. Block the pressurizer pressure signals.

NOTE

1B Diesel Generator non-essential trips are enabled when SIAS is reset.

- c. Reset the SIAS signals.
- d. Restore the equipment listed in ATTACHMENT (2), <u>SIAS</u> <u>VERIFICATION CHECKLIST</u> to the desired condition.
- e. Evaluate the Charging Pump suction supply.

(continue)

		EOP-8 Rev 29/Unit 1 Page 3 of 26
APPENDIX (5) CONTAINMENT ENV	RONMENT	
CE-1: NO CIS		
RECOVERY ACTIONS	ALTERNATE ACTIONS	
A. (continued)		
6. IF SIAS has actuated AND has been reset, THEN restore auxiliaries.		
a. Restore Service Water to the Turbine Building as follows:		
(1) Verify 21 PA COMPR is operating.		
(2) Verify the Plant Air To Plant Air Header Valve, 1-PA-2059-CV, is shut.	1	
(3) Verify the PA TO IA HDR XCONN valve, 1-PA-2061-CV, is open.		
(4) Open SRW HDR TURB BLDG ISOL valves:		
 1-SRW-1600-CV 1-SRW-1637-CV 1-SRW-1638-CV 1-SRW-1639-CV 		
 Restore an IA COMPR to service as follows: 		
 IF a high temperature alarm exists on the IA COMPRs, THEN open the service water isolation valves by placing their override handswitches in OPEN until the temperature alarm clears: 		
 (11 IA COMPR) 1-HS-2063 (12 IA COMPR) 1-HS-2065 		
(2) Start at least ONE IA COMPR.		
(continue)		

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APPENDIX (5) CONTAINMENT ENVI	RONMENT	
CE-1: NO CIS		
RECOVERY ACTIONS	ALTERNATE ACTIONS	
A.6 (continued)		
c. Restore Instrument Air to the Containment as follows:		
(1) Open IA CNTMT ISOL valve, 1-IA-2080-MOV.		
NOTE 1-HS-2085 is located on the West wall of the 27 ft Switchgear Room and is operated by Key #85 from the Control Room Key Locker.		
(2) Open Containment Instrument Air Supply Valve, 1-IA-2085-CV, by momentarily placing 1-HS-2085 in OPEN.		
 IF Component Cooling has been secured to containment, THEN restore flow. 		·
NOTE RCP CBO and LOWER SEAL temperatures may be obtained from computer trend block 9.		
a. Record the highest attained RCP CBO and LOWER SEAL temperatures for each RCP:		
 11A RCP:°F /°F 11B RCP:°F /°F 12A RCP:°F /°F 12B RCP:°F /°F 		
 b. Verify CIS has NOT actuated or is reset. 		
(continue)		

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	EOP-8 Rev 29/Unit 1 Page 5 of 26	
APPENDIX (5) CONTAINMENT ENVIRONMENT		
CE-1: NO CIS		
RECOVERY ACTIONS	ALTERNATE ACTIONS	
A.7 (continued)		
<u>CAUTION</u> Uncontrolled restoration of cooling to hot RCP seals may cause a water hammer and could result in thermal shock of the RCP seal coolers.		
c. IF ALL RCP LOWER SEAL temperatures are less than 280° F, THEN restore Component Cooling flow to Containment by opening the CC CNTMT SUPPLY and RETURN valves:		
 1-CC-3832-CV 1-CC-3833-CV 		
d. IF ANY RCP LOWER SEAL temperature is greater than 280° F, THEN restore Component Cooling Flow to Containment as follows:		
 (1) Shut CONTAINMENT SUPPLY HEADER ISOLATION valve, 1-CC-284, located in the 5 ft East Penetration Room. 		
(2) Open CC CNTMT SUPPLY and RETURN valves:		
 1-CC-3832-CV 1-CC-3833-CV 		
(3) Slowly open 1-CC-284 to restore component cooling flow.		

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	EOP-8 Rev 29/Unit 1 Page 6 of 26
APPENDIX (5) CONTAINMENT ENV	IRONMENT
CE-1: NO CIS	
RECOVERY ACTIONS	ALTERNATE ACTIONS
B. ACCEPTANCE CRITERIA FOR SUCCESS PATH CE-1.	
 Check Containment Environment is satisfied by the following indications: 	1.1 IF Containment Environment has NOT been satisfied, THEN PROCEED to the next
Containment pressure less than 2.8 PSIG	appropriate Containment Environment Success Path.
 Containment temperature less than 220° F 	
Containment radiation alarms are clear with NO unexplained rise	
2. IF Containment Environment has been established, THEN PROCEED to the next Safety Function to be satisfied.	
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			EOP-8 Rev 29/Unit 1 Page 7 of 26
A	PPENDIX (5) CONTAINMENT ENV	IRONMENT	
C	E-2: CONTAINMENT ISOLATION		
	RECOVERY ACTIONS	ALTERNATE ACTIONS	
A.	ESTABLISH CONTAINMENT ENVIRONMENT BY CONTAINMENT ISOLATION.		
1.	IF containment pressure exceeds 2.8 PSIG, THEN verify ESFAS actuation of the following:		
	SIASCIS		
2.	IF CIS has actuated, THEN trip ALL RCPs.		
3.	Verify ALL available CNTMT AIR CLRs are operating.		
4.	Open the CNTMT CLR EMER OUT valves for the operating CNTMT AIR CLRs:		
	 1-SRW-1582-CV 1-SRW-1585-CV 1-SRW-1590-CV 1-SRW-1593-CV 		
5.	Verify SRW Pump Room Ventilation is in service PER the <u>SRW Pump Room</u> <u>Ventilation</u> section of OI-15.		
	(continue)		

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APPENDIX (5) CONTAINMENT ENVIRONMENT

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CE-2: CONTAINMENT ISOLATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

A. (continued)

<u>NOTE</u>

Performance of procedure steps and present plant conditions may create acceptable exceptions to the checklists.

CAUTION

To prevent uncontrolled system restoration, handswitches should be matched to the checklist positions unless specified otherwise.

 Verify ESFAS equipment is aligned correctly
 AND handswitches are matched PER the following checklists as appropriate:

- ATTACHMENT (2), <u>SIAS</u> <u>VERIFICATION CHECKLIST</u>
- ATTACHMENT (4), <u>CIS</u> <u>VERIFICATION CHECKLIST</u>
- 7. Verify ALL available IODINE FILT FANs are running.
- 8. Ensure Chemistry has been directed to place the Hydrogen Monitors in service.

(continue)

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APPENDIX (5) CONTAINMENT ENVIRONMENT CE-2: CONTAINMENT ISOLATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

A. (continued)

- Establish containment ventilation to prevent local hydrogen accumulation as follows:
 - a. Verify ALL available CNTMT AIR CLRs are operating.
 - Verify ONE CAV CLG and ONE CEDM CLG fan running if available.

NOTE

Pressurizer Ventilation Fan handswitches are located in the 45 ft East Pen Room and 27 ft Switchgear Room.

- c. Verify ALL available Pressurizer Ventilation Fans are operating.
- IF hydrogen concentration rises to 0.5%, OR hydrogen concentration can NOT be determined, THEN start the Hydrogen Recombiners PER OI-41A, <u>HYDROGEN</u> <u>RECOMBINERS</u>.
- 11. IF hydrogen concentration rises to 4.0%, THEN consult with the Plant Technical Support Center for guidance to secure the Hydrogen Recombiners.
- IF the Plant Technical Support Center recommends the use of the Hydrogen Purge System, THEN operate the Hydrogen Purge System PER OI-418, <u>HYDROGEN</u> <u>PURGE SYSTEM OPERATION</u>, until the Plant Technical Support Center recommends its termination.

APPENDIX (5) CONTAINMENT ENVI CE-2: CONTAINMENT ISOLATION	
RECOVERY ACTIONS	ALTERNATE ACTIONS
B. RESTORE THE CONTAINMENT ENVIRONMENT.	
 WHEN containment pressure drops to less than 2.8 PSIG, THEN perform the following actions: a. Block the pressurizer pressure signals. 	
<u>NOTE</u> 1B Diesel Generator non-essential trips are enabled when SIAS is reset.	
b. Reset the SIAS signals.	
c. Reset the CIS signals.	
<u>CAUTION</u> At least ONE Containment Spray Pump shall remain in operation until Containment temperature can be maintained less than 120° F by the Containment Air Coolers.	
d. Secure ONE CS PP.	
e. Restore the equipment listed in ATTACHMENT (2), <u>SIAS</u> <u>VERIFICATION CHECKLIST</u> AND ATTACHMENT (4), <u>CIS</u> <u>VERIFICATION CHECKLIST</u> to the desired condition.	
f. Evaluate the Charging Pump suction supply.	
g. WHEN the Plant Technical Support Center recommends securing Containment Spray, THEN secure the remaining CS PP.	
(continue)	

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APPENDIX (5) CONTAINMENT ENVIR	ONMENT
CE-2: CONTAINMENT ISOLATION	
RECOVERY ACTIONS	ALTERNATE ACTIONS
B. (continued)	
2. Restore Service Water to the Turbine Building as follows:	
a. Verify 21 PA COMPR is operating.	
b. Verify the Plant Air To Plant Air Header Valve, 1-PA-2059-CV, is shut.	
c. Verify the PA TO IA HDR XCONN valve, 1-PA-2061-CV, is open.	
d. Open SRW HDR TURB BLDG ISOL valves:	
 1-SRW-1600-CV 1-SRW-1637-CV 1-SRW-1638-CV 1-SRW-1639-CV 	
 Restore an IA COMPR to service as follows: 	
 a. IF a high temperature alarm exists on the IA COMPRs, THEN open the service water isolation valves by placing their override handswitches in OPEN until the temperature alarm clears: 	
 (11 IA COMPR) 1-HS-2063 (12 IA COMPR) 1-HS-2065 	
b. Start at least ONE IA COMPR.	
(continue)	

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APPENDIX (5) CONTAINMENT ENVIR	ONMENT
CE-2: CONTAINMENT ISOLATION	
RECOVERY ACTIONS	ALTERNATE ACTIONS
B. (continued)	
4. Restore Instrument Air to the Containment as follows:	
a. Open IA CNTMT ISOL valve, 1-IA-2080-MOV.	
<u>NOTE</u> 1-HS-2085 is located on the West wall of the 27 ft Switchgear Room and is operated by Key #85 from the Control Room Key Locker.	
b. Open Containment Instrument Air Supply Valve, 1-IA-2085-CV, by momentarily placing 1-HS-2085 in OPEN.	
5. Restore Component Cooling flow to the containment.	
NOTE RCP CBO and LOWER SEAL temperatures may be obtained from computer trend block 9.	
a. Record the highest attained RCP CBO and LOWER SEAL temperatures for each RCP:	
 11A RCP:°F/°F 11B RCP:°F/°F 12A RCP:°F/°F 12B RCP:°F/°F 	
b. Verify CIS is reset.	
(continue)	

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APPENDIX (5) CONTAINMENT ENVI	5
CE-2: CONTAINMENT ISOLATION	
RECOVERY ACTIONS	ALTERNATE ACTIONS
B.5 (continued)	
<u>CAUTION</u> Uncontrolled restoration of cooling to hot RCP seals may cause a water hammer and could result in thermal shock of the RCP seal coolers.	
c. IF ALL RCP LOWER SEAL temperatures are less than 280° F, THEN restore Component Cooling flow to Containment by opening the CC CNTMT SUPPLY and RETURN valves:	
 1-CC-3832-CV 1-CC-3833-CV 	
d. IF ANY RCP LOWER SEAL temperature is greater than 280° F. THEN restore Component Cooling Flow to Containment as follows:	
(1) Shut CONTAINMENT SUPPLY HEADER ISOLATION valve, 1-CC-284, located in the 5 ft East Penetration Room.	
(2) Open CC CNTMT SUPPLY and RETURN valves:	
1-CC-3832-CV1-CC-3833-CV	
(3) Slowly open 1-CC-284 to restore component cooling flow.	

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CE-2: CONTAINMENT ISOLATION	
RECOVERY ACTIONS	ALTERNATE ACTIONS
C. ACCEPTANCE CRITERIA FOR SUCCESS PATH CE-2.	
 Check Containment Environment is satisfied by the following indications: Containment pressure less than 4.25 PSIG ALL available CNTMT AIR CLRs are operating with maximum SRW flow ALL containment penetrations required to be shut have an Isolation valve shut Hydrogen concentration less than 0.5% OR ALL available hydrogen recombiners are energized with Hydrogen concentration less than 4.0% OR Hydrogen purge operation per Tech Support recommendation 	1.1 IF Containment Environment has NOT been satisfied, THEN PROCEED to the next appropriate Containment Environment Success Path.
 IF Containment Environment has been established, THEN PROCEED to the next Safety Function to be satisfied. 	

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APPENDIX (5) CONTAINMENT ENV	IRONMENT
CE-3: CONTAINMENT SPRAY	
RECOVERY ACTIONS	ALTERNATE ACTIONS
A. ESTABLISH CONTAINMENT ENVIRONMENT BY CONTAINMENT SPRAY.	
 IF containment pressure exceeds 2.8 PSIG, THEN verify ESFAS actuation of the following: 	
SIASCIS	
2. IF CIS has actuated, THEN trip ALL RCPs.	
3. Verify ALL available CNTMT AIR CLRs are operating.	
4. Open the CNTMT CLR EMER OUT valves for the operating CNTMT AIR CLRs:	
 1-SRW-1582-CV 1-SRW-1585-CV 1-SRW-1590-CV 1-SRW-1593-CV 	
5. Verify SRW Pump Room Ventilation is in service PER the <u>SRW Pump Room</u> <u>Ventilation</u> section of OI-15.	
 6. IF containment pressure rises to 4.25 PSIG, THEN verify CSAS has actuated and spray flow is approximately 1350 GPM per pump by flow indicators: 	
 (11 CS HDR FLOW) 1-FI-4148 (12 CS HDR FLOW) 1-FI-4149 	
(continue)	

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APPENDIX (5) CONTAINMENT ENV	IRONMENT	
CE-3: CONTAINMENT SPRAY		
RECOVERY ACTIONS	ALTERNATE ACTIONS	
A. (continued)		
<u>CAUTION</u> The following step provides actions to prevent water hammer damage from CAC voiding.		
<u>CAUTION</u> SRW Pumps start when power is restored to the associated 4KV Bus.		
7. IF CSAS has actuated, AND EITHER SRW Header is NOT in operation, THEN perform the following actions:		
a. IF 11 SRW Header is idle, THEN restart 11 SRW Header as follows:	a.1 IF Containment Pressure exceeded 25 PSIG, THEN perform the following actions:	
(1) Check that Containment Pressure has remained less than 25 PSIG with 11 SRW Header idle.	 Place the SRW PP(s) aligned to 11 SRW Header in PULL TO LOCK. Oncome the it to the Place Technical 	
(2) Attempt to start the desired SRW PP on 11 SRW Header.	(2) Consult with the Plant Technical Support Center for guidance on system restoration.	
(continue)		

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	APPENDIX (5) CONTAINMENT ENVIRONMENT CE-3: CONTAINMENT SPRAY			
	<u> </u>	RECOVERY ACTIONS	ALT	ERNATE ACTIONS
A.7 (co	ontin	ued)		
b.	THI folic		10 PSIC	ainment Pressure exceeded S, verform the following actions:
	•••	Check that Containment Pressure has remained less than 10 PSIG with 12 SRW Header idle.	<u>CAUTION</u> 1B DG SRW flow is less than SRW PP minimum flow requirements. This step	
	(2)	Attempt to start the desired SRW PP on 12 SRW Header.	DG.	toration of SRW to supply 1B
			Auxiliary Bu	<u>WARNING</u> on levels may exist in the hilding. RAS may significantly ng radiation levels.
			(1) Re	start 12 SRW Header:
			(a)	Shut 13 CNTMT CLG U MAN SUPP FR 12 SRW SUBSYS, 1-SRW-149, tocated 27 ft East Pen Room south of Containment Purge Supply.
			(b)	Shut 14 CNTMT CLG SUPP FR 12 SRW SUBSYS, 1-SRW-156, located 5 ft West Pen Room along west wall.
			(c)	Attempt to start the desired SRW PP on 12 SRW Header.
			(b)	Consult with the Plant Technical Support Center for guidance on system restoration.
		(continue)		(continue)

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APPENDIX (5) CONTAINMENT ENVIRONMENT		
CE-3: CONTAINMENT SPRAY		
RECOVERY ACTIONS	ALTERNATE ACTIONS	
A.7.b (continued)	A.7.b.1 (continued)	
	 (2) IF 12 SRW Header can NOT be restarted, THEN perform the following actions (a) Place the SRW PP(s) aligned to 12 SRW Header in PULL TO LOCK. (b) Place 1B DG OUT BKR, 152-1403, in PULL TO LOCK. (c) Locally trip the 1B DG fuel racks by pushing the EMERGENCY STOP PUSH TO STOP ENGINE trip device 	
	(d) Consult with the Plant Technical Support Center for guidance on system restoration.	
<u>NOTE</u> Performance of procedure steps and present plant conditions may create acceptable exceptions to the checklists.		
<u>CAUTION</u> To prevent uncontrolled system restoration, handswitches should be matched to the checklist positions unless specified otherwise.		
 Verify ESFAS equipment is aligned correctly AND handswitches are matched PER the following checklists as appropriate: 		
 ATTACHMENT (2), <u>SIAS</u> <u>VERIFICATION CHECKLIST</u> ATTACHMENT (3), <u>CSAS</u> <u>VERIFICATION CHECKLIST</u> ATTACHMENT (4), <u>CIS</u> <u>VERIFICATION CHECKLIST</u> 		
(continue)		

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APPENDIX (5) CONTAINMENT ENVI	RONMENT
CE-3: CONTAINMENT SPRAY	
RECOVERY ACTIONS	ALTERNATE ACTIONS
A. (continued)	
9. Verify ALL available IODINE FILT FANs are running.	
10. Ensure Chemistry has been directed to place the Hydrogen Monitors in service.	
 Establish containment ventilation to prevent local hydrogen accumulation as follows: 	
a. Verify ALL available CNTMT AIR CLRs are operating.	
 b. Verify ONE CAV CLG and ONE CEDM CLG fan running if available. 	
<u>NOTE</u> Pressurizer Ventilation Fan handswitches are located in the 45 ft East Pen Room and 27 ft Swilchgear Room.	
c. Verify ALL available Pressurizer Ventilation Fans are operating.	· · ·
12. IF hydrogen concentration rises to 0.5%, OR hydrogen concentration can NOT be determined, THEN start the Hydrogen Recombiners PER OI-41A, <u>HYDROGEN</u> <u>RECOMBINERS</u> .	
 IF hydrogen concentration rises to 4.0%, THEN consult with the Plant Technical Support Center for guidance to secure the Hydrogen Recombiners. 	
(continue)	

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APPENDIX (5) CONTAINMENT ENV		
CE-3: CONTAINMENT SPRAY		
RECOVERY ACTIONS	ALTERNATE ACTIONS	
A. (continued)		
 14. IF the Plant Technical Support Center recommends the use of the Hydrogen Purge System, THEN operate the Hydrogen Purge System PER 01-418, <u>HYDROGEN</u> <u>PURGE SYSTEM OPERATION</u>, until the Plant Technical Support Center recommends its termination. 		
B. RESTORE THE CONTAINMENT ENVIRONMENT.		
 WHEN containment pressure drops to less than 4.0 PSIG, THEN perform the following actions: Verify the CS HDR handswitches, 1-HS-4150 and 1-HS-4151 in OPEN. Reset the CSAS signals. Verify ALL available CNTMT AIR CLRs are operating to reduce containment temperature. Restore the equipment listed in ATTACHMENT (3), <u>CSAS</u> <u>VERIFICATION CHECKLIST</u> to the desired condition. 		
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APPENDIX (5) CONTAINMENT ENVIRONMENT

CE-3: CONTAINMENT SPRAY

RECOVERY ACTIONS

ALTERNATE ACTIONS

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B. (continued)

- 2. WHEN containment pressure drops to less than 2.8 PSIG, THEN perform the following actions:
 - a. Block the pressurizer pressure signals.

<u>NOTE</u>

1B Diesel Generator non-essential trips are enabled when SIAS is reset.

- b. Reset the SIAS signals.
- c. Reset the CIS signals.

CAUTION

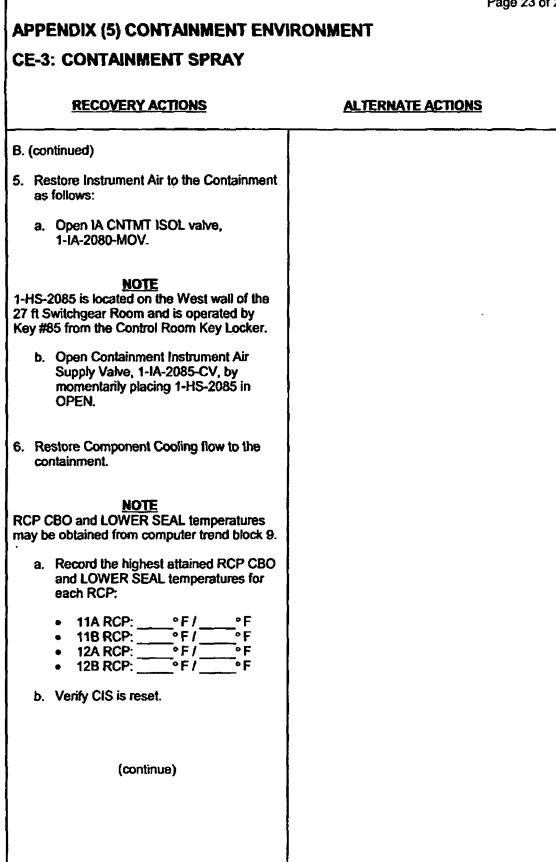
At least ONE Containment Spray Pump shall remain in operation until Containment temperature can be maintained less than 120° F by the Containment Air Coolers.

- d. Secure ONE CS PP.
- e. Restore the equipment listed in ATTACHMENT (2), <u>SIAS</u> <u>VERIFICATION CHECKLIST</u> **AND** ATTACHMENT (4), <u>CIS</u> <u>VERIFICATION CHECKLIST</u> to the desired condition.
- f. Evaluate the Charging Pump suction supply.
- WHEN the Plant Technical Support Center recommends securing Containment Spray, THEN secure the remaining CS PP.

(continue)

	EOP- Rev 29/Unit Page 22 of 2
APPENDIX (5) CONTAINMENT EN	IVIRONMENT
CE-3: CONTAINMENT SPRAY	
RECOVERY ACTIONS	ALTERNATE ACTIONS
B. (continued)	
 Restore Service Water to the Turbine Building as follows: 	
a. Verify 21 PA COMPR is operating.	
 b. Verify the Plant Air To Plant Air Header Valve, 1-PA-2059-CV, is shut 	
c. Verify the PA TO IA HDR XCONN valve, 1-PA-2061-CV, is open.	
d. Open SRW HDR TURB BLDG ISOL valves:	
 1-SRW-1600-CV 1-SRW-1637-CV 1-SRW-1638-CV 1-SRW-1639-CV 	
 Restore an IA COMPR to service as follows: 	
 a. IF a high temperature alarm exists on the IA COMPRs, THEN open the service water isolation valves by placing their override handswitches in OPEN until the temperature alarm clears: 	
 (11 IA COMPR) 1-HS-2063 (12 IA COMPR) 1-HS-2065 	
b. Start at least ONE IA COMPR.	
(continue)	

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APPENDIX (5) CONTAINMENT ENVIRONMENT CE-3: CONTAINMENT SPRAY RECOVERY ACTIONS ALTERNATE ACTIONS B.6 (continued) CAUTION Uncontrolled restoration of cooling to hot RCP seals may cause a water hammer and could result in thermal shock of the RCP seat coolers. c. IF ALL RCP LOWER SEAL temperatures are less than 280° F, **THEN** restore Component Cooling flow to Containment by opening the CC CNTMT SUPPLY and RETURN valves: • 1-CC-3832-CV 1-CC-3833-CV d. IF ANY RCP LOWER SEAL temperature is greater than 280° F, THEN restore Component Cooling Flow to Containment as follows: (1) Shut CONTAINMENT SUPPLY HEADER ISOLATION valve, 1-CC-284, located in the 5 ft East Penetration Room. (2) Open CC CNTMT SUPPLY and **RETURN** valves: • 1-CC-3832-CV • 1-CC-3833-CV (3) Slowly open 1-CC-284 to restore component cooling flow.

	EOP-8 Rev 29/Unit 1 Page 25 of 26				
APPENDIX (5) CONTAINMENT ENVIRONMENT					
CE-3: CONTAINMENT SPRAY					
RECOVERY ACTIONS	ALTERNATE ACTIONS				
C. ACCEPTANCE CRITERIA FOR SUCCESS PATH CE-3.					
 Check Containment Environment is satisfied by the following indications: Containment pressure less than 50 PSIG ALL available CNTMT AIR CLRs are operating with maximum SRW flow Containment spray flow is greater than 1350 GPM per pump, if operating ALL containment penetrations required to be shut have an isolation valve shut Hydrogen concentration less than 0.5% OR ALL available hydrogen recombiners are energized with Hydrogen concentration less than 4.0% OR Hydrogen purge operation per Tech Support recommendation 	 1.1 IF Containment Environment has NOT been satisfied, THEN perform the following actions: a. Concurrently perform the recovery actions for the next safety function to be satisfied. b. Determine the appropriate emergency response actions PER the ERPIP. c. IF Containment Cooling has been lost, THEN consider consulting the Technical Support Center about deinerting the Containment prior to reinitiating Containment Cooling. d. Evaluate further actions based on the following considerations: The urgency of other jeopardized safety functions. Rate of change of containment temperature and pressure, and potential for damage to the containment. Rate of change of containment hydrogen concentration, and potential for hydrogen burn. 				
(continue)	(continue)				

E-3: CONTAINMENT SPRAY	ALTERNATE ACTIONS
.1 (continued) IF Containment Environment has been established, THEN PROCEED to the next Safety Function to be satisfied.	 C.1.1.d (continued) (4) The feasibility of restoring a success path by performing ANY of the following: Restoring the vital auxiliaries necessary to operate components or systems in the success paths Manual operation of valves Use of alternate components to implement a success path

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			R	ESOURCE CONDITIONS		CE CRIT	
			 CIS hat OR hat Contation 	inment pressure less than 2.8 PSIG as NOT actuated s been reset inment radiation alarms are clear O unexplained rise	 Containment pressu Containment tempe 220°F Containment radiati with NO unexplained 	on alarms	than
			START	FUNCTION	<u> </u>	DONE	PAGE
				A. ESTABLISH CONTAINMENT	ENVIRONMENT WITH	•	
·				CONTAINMENT FANS. Verify ALL available CNT	MT AIR CLRs are	<u>с</u>	1
				operating IF SIAS has actuated, THEN perform the followin SIAS VERIFICATION Reset SIAS	ng actions: CHECKLIST		2
				B. ACCEPTANCE CRITERIA FO		1.	6
				IF Containment Environm satisfied, THEN PROCEED to the r Containment Environment	ext appropriate		6
			NOTE:	Continuously applicable steps ar	e designated with a "C"	in the DOI	NE colum
				:			
·							
	-						
	- -						

CE-2: CONTA	EOP-8 Rev 29 / Unit 1 Page 2 of 3 VIRONMENT PLACEKEEPER
RESOURCE CONDITIONS • Containment pressure less than 4.25 PSIG • CSAS has NOT actuated OR has been reset	ACCEPTANCE CRITERIA • Containment pressure less than 4.25 PSIG • ALL available CNTMT AIR CLRs are operating with maximum SRW flow • ALL containment penetrations required to be shut have an isolation valve shut • Hydrogen concentration less than 0.5% OR ALL available hydrogen recombiners are energized with hydrogen concentration less than 4.0% OR Hydrogen purge operation per Tech Suppport recommendation

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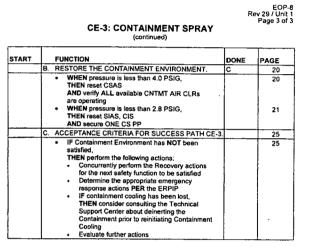
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START	FUNCTION	DONE	PAGE
	A. ESTABLISH CONTAINMENT ENVIRONMENT BY CONTAINMENT ISOLATION.	с	7
	IF pressure rises to 2,8 PSIG, THEN verify SIAS and CIS.		7
	IF CIS has actuated, THEN trip ALL RCPs		7
•	 Verify ALL available CNTMT AIR CLRs are operating 		7
	SIAS VERIFICATION CHECKLIST	ſ	8
	CIS VERIFICATION CHECKLIST		8
	 Prevent local hydrogen accumulation 	Į	9
	B. RESTORE THE CONTAINMENT ENVIRONMENT.	C	10
	WHEN pressure is less than 2.8 PSIG, THEN reset SIAS, CIS AND secure ONE CS PP		10
	C. ACCEPTANCE CRITERIA FOR SUCCESS PATH CE-2.		14
	IF Containment Environment has NOT been satisfied, THEN PROCEED to the next appropriate Containment Environment Success Path.		14

NOTE: Continuously applicable steps are designated with a "C" in the DONE column.

CONTAINMENT ENVIRONMENT PLACEKEEPER CE-3: CONTAINMENT SPRAY RESOURCE CONDITIONS ACCEPTANCE CRITERIA Containment pressure less than 50 PSIG Containment pressure greater than 4.25 PSIG ALL available CNTMT AIR CLRs are operating with maximum SRW flow Containment spray flow is greater than1350 GPM per pump, if operating ALL containment penetrations required to be shut have an isolation valve shut Hydrogen concentration less than 0.5% ALL available hydrogen recombiners are energized with hydrogen concentration less than 4.0% OR Hydrogen purge operation per Tech Suppport recommendation START FUNCTION DONE PAGE A. ESTABLISH CONTAINMENT ENVIRONMENT BY CONTAINMENT SPRAY. 15 IF pressure rises to 2.8 PSIG, THEN verify SIAS and CIS, 4 . 15 IF CIS has actuated, 15 . THEN trip ALL RCPs Verify ALL available CNTMT AIR CLRs are • 15 operating 15 IF pressure rises to 4.25 PSIG, . THEN verify CSAS IF a SRW Header is NOT in operation 16 THEN attempt to restart: 4 • 11 SRW Header - CNTMT pressure less than 25 PSIG. 12 SRW Header – CNTMT pressure less than 10 PSIG. SIAS VERIFICATION CHECKLIST CSAS VERIFICATION CHECKLIST CIS VERIFICATION CHECKLIST 18 18 . 18 . 19 Prevent local hydrogen accumulation NOTE: Continuously applicable steps are designated with a "C" in the DONE column. (continue)

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NOTE: Continuously applicable steps are designated with a "C" in the DONE column.

		EOP-8 Rev 29/Unit 1 Page 1 of 14
A	PPENDIX (6) RADIATION LEVELS	EXTERNAL TO CONTAINMENT
R	LEC-1:NORMAL LEVELS	
	RECOVERY ACTIONS	ALTERNATE ACTIONS
A.	VERIFY NORMAL RADIATION LEVELS EXTERNAL TO CONTAINMENT.	
1.	Check the following RMS alarms are clear with NO unexplained rise: • "U-1 WIDE RANGE NOBLE GAS MON" (1-RIC-5415) • "UNIT 1 CNDSR OFF-GAS" (1-RI-1752) • "UNIT 1 S/G B/D" (1-RI-4014) • "UNIT 1 MAIN VENT GASEOUS"	 IF a valid "UNIT 1 CNDSR OFF-GAS" or "UNIT 1 S/G B/D" alarm is received, THEN secure S/G Blowdown. IMPLEMENT RLEC-2, <u>CONTAINMENT</u> <u>ISOLATED</u>.
2.	 (1-RI-5415) IF a loss of ALL Vital 4KV buses has occurred, THEN verify the following containment isolation valves are shut: CNTMT NORMAL SUMP DRN, 1-EAD-5462-MOV CNTMT NORMAL SUMP DRN, 1-EAD-5463-MOV CNTMT NORMAL SUMP DRN, 1-EAD-5463-MOV H2 PURGE INBD ISOL, 1-HP-6900-MOV H2 PURGE OUTBD ISOL, 1-HP-6901-MOV 	 2.1 IF Containment Normal Sump Drain valves can NOT be verified shut from the control room, THEN locally check shut the valves. 2.2 IF H2 Purge Valves can NOT be verified shut from the control room, THEN locally check shut 1-HP-6901-MOV.
3.	IF containment pressure exceeds 2.8 PSIG, THEN IMPLEMENT RLEC-2, CONTAINMENT ISOLATED.	
4.	IF 500KV Offsite Power was lost, AND power has been restored, THEN restore the associated Radiation Monitors to service.	

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	EOP-8 Rev 29/Unit 1 Page 2 of 14			
APPENDIX (6) RADIATION LEVELS EXTERNAL TO CONTAINMENT				
RLEC-1:NORMAL LEVELS				
RECOVERY ACTIONS	ALTERNATE ACTIONS			
B. ACCEPTANCE CRITERIA FOR SUCCESS PATH RLEC-1.				
 Check Radiation Levels External to Containment is satisfied by the following indications: "U-1 WIDE RANGE NOBLE GAS MON" (1-RIC-5415) alarm clear with NO unexplained rise "UNIT 1 CNDSR OFF-GAS" (1-RI-1752) alarm clear with NO unexplained rise "UNIT 1 S/G B/D" (1-RI-4014) alarm clear with NO unexplained rise "UNIT 1 MAIN VENT GASEOUS" (1-RI-5415) alarm clear with NO unexplained rise IF Radiation Levels External to Containment has been established, THEN PROCEED to the next Safety Function to be satisfied. 	1.1 IF Radiation Levels External to Containment has NOT been satisfied, THEN PROCEED to the next appropriate Radiation Levels External to Containment Success Path.			

	EOP-8 Rev 29/Unit 1 Page 3 of 14					
APPENDIX (6) RADIATION LEVELS EXTERNAL TO CONTAINMENT						
RLEC-2:CONTAINMENT ISOLATED						
RECOVERY ACTIONS	ALTERNATE ACTIONS					
A. ESTABLISH RADIATION LEVELS EXTERNAL TO CONTAINMENT BY CONTAINMENT ISOLATION.						
 Check the following RMS alarms are clear with NO unexplained rise: 	1.1 IF a valid "UNIT 1 CNDSR OFF-GAS" or "UNIT 1 S/G B/D" alarm is received,					
 "U-1 WIDE RANGE NOBLE GAS MON" (1-RIC-5415) 	THEN secure S/G Blowdown.					
 "UNIT 1 CNDSR OFF-GAS" (1-RI-1752) 						
• "UNIT 1 S/G B/D" (1-RI-4014)						
 "UNIT 1 MAIN VENT GASEOUS" (1-RI-5415) 						
(continue)						

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EOP-8 Rev 29/Unit 1 Page 4 of 14

APPENDIX (6) RADIATION LEVELS EXTERNAL TO CONTAINMENT RLEC-2:CONTAINMENT ISOLATED

RECOVERY ACTIONS

ALTERNATE ACTIONS

A. (continued)

- 2. IF leakage into Component Cooling is indicated by:
 - Rise on UNIT 1 CC radiation monitor, 1-RI-3819
 - "CC HEAD TK LVL" high alarm

THEN perform the following:

- a. Verify L/D CNTMT ISOL valves are shut:
 - 1-CVC-515-CV
 - 1-CVC-516-CV
- b. IF shutting the L/D CNTMT ISOL valves did NOT isolate the leak, THEN perform the following:
 - (1) Trip ALL RCPs.
 - (2) Shut the CC CNTMT SUPPLY and RETURN valves:
 - 1-CC-3832-CV
 - 1-CC-3833-CV
- IF containment pressure exceeds 2.8 PSIG, THEN verify ESFAS actuation of the following:
 - SIAS
 - CIS

4. IF containment pressure rises to 4.25 PSIG, THEN verify CSAS has actuated.

(continue)

EOP-8 Rev 29/Unit 1 Page 5 of 14

APPENDIX (6) RADIATION LEVELS EXTERNAL TO CONTAINMENT RLEC-2:CONTAINMENT ISOLATED

RECOVERY ACTIONS

ALTERNATE ACTIONS

A. (continued) 5. IF a loss of ALL Vital 4KV buses has 5.1 IF Containment Normal Sump Drain occurred, valves can NOT be verified shut from the THEN verify the following containment control room, isolation valves are shut: THEN locally check shut the valves. CNTMT NORMAL SUMP DRN. 5.2 IF H₂ Purge Valves can NOT be 1-EAD-5462-MOV verified shut from the control room, CNTMT NORMAL SUMP DRN, THEN locally check shut 1-EAD-5463-MOV 1-HP-6901-MOV. H₂ PURGE INBD ISOL. 1-HP-6900-MOV H₂ PURGE OUTBD ISOL, 1-HP-6901-MOV 6. IF a SGTR has occurred as indicated by ANY of the following: S/G samples ٠ RMS trends: . UNIT 1 CNDSR OFF-GAS (1-RI-1752) UNIT 1 S/G B/D (1-RI-4014) UNIT 1 MAIN VENT GASEOUS (1-RI-5415) MAIN STEAM EFFL RAD • MONITOR (1-RIC-5421 OR 1-RIC-5422) S/G level change when NOT feeding Post-Trip S/G level trends • Mismatch in feed flow prior to the trip Steam flow vs. Feed flow mismatch prior to the trip THEN identify the most affected S/G. (continue)

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APPENDIX (6) RADIATION LEVELS EXTERNAL TO CONTAINMENT RLEC-2:CONTAINMENT ISOLATED				
RECOVERY ACTIONS	ALTERNATE ACTIONS			
 A. (continued) 7. IF a tube rupture is identified in a S/G. THEN commence working the appropriate Heat Removal success path until the affected OR most affected S/G is isolated. <u>CAUTION</u> The following step provides actions to prevent water hammer damage from CAC voiding. <u>CAUTION</u> SRW Pumps start when power is restored to the associated 4KV Bus. 8. IF CSAS has actuated, AND EITHER SRW Header is NOT in operation, THEN perform the following actions: a. IF 11 SRW Header is idle, THEN restart 11 SRW Header as follows: (1) Check that Containment Pressure has remained less than 25 PSIG with 11 SRW Header. (2) Attempt to start the desired SRW PP on 11 SRW Header. 	 a.1 IF Containment Pressure exceeded 25 PSIG, THEN perform the following actions: (1) Place the SRW PP(s) aligned to 11 SRW Header in PULL TO LOCK. (2) Consult with the Plant Technical Support Center for guidance on system restoration. 			

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					EOP-8 Rev 29/Unit 1 Page 7 of 14
APPENDIX (6) RADIATION LEVELS RLEC-2:CONTAINMENT ISOLATEI			EXTER	NAI	L TO CONTAINMENT
RLE	.2-ما	CONTAINMENT ISOLATED			
	Ē	RECOVERY ACTIONS		ALTI	ERNATE ACTIONS
A.8 (a	ontini	ued)			
b.		2 SRW Header is idle, EN restart 12 SRW Header as ws:	10	PSIG	inment Pressure exceeded , erform the following actions:
	(1)	Check that Containment Pressure has remained less than 10 PSIG with 12 SRW Header idle.			<u>CAUTION</u> flow is less than SRW PP
	(2)	Attempt to start the desired SRW PP on 12 SRW Header.			w requirements. This step pration of SRW to supply 1B
			Auxiliar	y Bui	<u>WARNING</u> on levels may exist in the ilding. RAS may significantly g radiation levels.
			(1)	Res	start 12 SRW Header:
				(a)	Shut 13 CNTMT CLG U MAN SUPP FR 12 SRW SUBSYS, 1-SRW-149, located 27 ft East Pen Room south of Containment Purge Supply.
				(b)	Shut 14 CNTMT CLG SUPP FR 12 SRW SUBSYS, 1-SRW-156, located 5 ft West Pen Room along west wall.
				(c)	Attempt to start the desired SRW PP on 12 SRW Header.
				(d)	Consult with the Plant Technical Support Center for guidance on system restoration.
		(continue)			(continue)

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APPENDIX (6) RADIATION LEVELS EXTERNAL TO CONTAINMENT RLEC-2:CONTAINMENT ISOLATED RECOVERY ACTIONS ALTERNATE ACTIONS A.8.b (continued) A.B.b.1 (continued) (2) IF 12 SRW Header can NOT be restarted. THEN perform the following actions: (a) Place the SRW PP(s) aligned to 12 SRW Header in PULL TO LOCK. (b) Place 18 DG OUT BKR, 152-1403, in PULL TO LOCK. (c) Locally trip the 1B DG fuel racks by pushing the EMERGENCY STOP PUSH TO STOP ENGINE trip device. (d) Consult with the Plant **Technical Support Center for** guidance on system restoration. NOTE Performance of procedure steps and present plant conditions may create acceptable exceptions to the checklists. CAUTION To prevent uncontrolled system restoration, handswitches should be matched to the checklist positions unless specified otherwise. 9. Verify ESFAS equipment is aligned correctly AND handswitches are matched PER the following checklists as appropriate: ATTACHMENT (2), <u>SIAS</u> **VERIFICATION CHECKLIST** ATTACHMENT (3), CSAS VERIFICATION CHECKLIST ATTACHMENT (4), CIS **VERIFICATION CHECKLIST** (continue)

			EOP-8 Rev 29/Unit 1 Page 9 of 14
	PPENDIX (6) RADIATION LEVELS		-
RI	EC-2:CONTAINMENT ISOLATED		
	RECOVERY ACTIONS	ALTERNATE ACTIONS	
A. ((continued)		
10.	IF ANY automatic Containment Isolation valve fails to shut, OR ANY manual Containment Isolation valve is open, THEN shut the affected valve(s) OR the next valve out from the appropriate penetration,		
11.	IF a tube rupture is identified in a S/G, THEN control secondary system contamination.		
	a. Minimize the spread of contamination by performing the following:		
	(1) Ensure the Unit 1 Turbine Building Sump Pumps are in STOP.		
	(2) Isolate Condensate Dump to 11 CST by verifying the following valves are shut:		
	 CONDENSER HOTWELL HIGH LEVEL DUMP CV-4405 INLET VALVE, 1-CD-232 CONDENSER HOTWELL HIGH LEVEL DUMP CV-4405 BYPASS VALVE, 1-CD-234 		
	(3) Verify CONDENSER MAKEUP CV-4406 BYPASS VALVE, 1-CD-238, is shut.		
	(continue)		

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APPENDIX (6) RADIATION LEVELS EXTERNAL TO CONTAINMENT RLEC-2:CONTAINMENT ISOLATED RECOVERY ACTIONS ALTERNATE ACTIONS A.11.a (continued) (4) Reduce moisture carryover into the CAR Discharge Header by fully opening the CONDENSER VACUUM PUMP SERVICE WATER OUTLET VALVES: (11 CAR) 1-SRW-211 . • (12 CAR) 1-SRW-215 (13 CAR) 1-SRW-219 • (14 CAR) 1-SRW-223 . (5) Ensure Condensate to Circ Water Dump is isolated by verifying the following valves shut: CONDENSER DUMP TO CIRCULATING WATER **ISOLATION VALVE,** 1-CD-239 CONDENSATE DUMP TO **CIRCULATING WATER** BYPASS VALVE, 1-CD-455 (6) Ensure condenser expansion joints are NOT overflowing by verifying the CONDENSER **EXPANSION JOINT FILL** VALVEs are shut: (11 Condenser) 1-CD-306 (12 Condenser) 1-CD-307 • (13 Condenser) 1-CD-308 (7) Verify shut SRW HEAD TANK MAKEUP ISOLATION VALVE. 1-CD-144. (8) Verify shut COMPONENT COOLING SYSTEM MAKEUP ISOLATION VALVE, 1-CD-145. (continue)

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APPENDIX (6) RADIATION LEVELS EXTERNAL TO CONTAINMENT RLEC-2:CONTAINMENT ISOLATED

RECOVERY ACTIONS

ALTERNATE ACTIONS

A.11.a (continued)

- (9) Notify Plant Chemistry to secure the Hotwell sample pumps and isolate the Condensate Demin and Turbine Plant sample sinks.
- b. Control the volume of contaminated condensate inventory by performing the following:

CAUTION

Operating CAR PPs with condenser hotwell level greater than 12 feet may draw excessive water into the CAR PPs.

CAUTION

Operating a SGFP with condenser hotwell level greater than 12 feet may actuate the high exhaust casing level trip.

- (1) IF condenser hotwell level exceeds 12 feet, THEN perform the following:
 - (a) Ensure Auxiliary Feedwater flow is established to the unaffected S/G.
 - (b) IF a SGFP is in operation, THEN secure the SGFP.
 - (c) Secure the CAR PPs.
- (2) IF condenser hotwell level exceeds 14 feet, THEN shut the COND SHELL STOPs:
 - 1-CAR-101
 - 1-CAR-102
 - 1-CAR-103
 - 1-CAR-104
 - 1-CAR-105
 - 1-CAR-106

(continue)

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EOP-8 Rev 29/Unit 1 Page 12 of 14

APPENDIX (6) RADIATION LEVELS EXTERNAL TO CONTAINMENT RLEC-2:CONTAINMENT ISOLATED

RECOVERY ACTIONS

ALTERNATE ACTIONS

A.11.b (continued)

NOTE

Using the TURB BYP valves with Condensate/Main Feedwater will enable greater cooldown capability without raising contaminated condensate inventory.

CAUTION

An unmonitored radiation release could occur if the ADVs are in use and Condensate/Main Feedwater is used to feed the unaffected S/G.

- (3) IF Audiliary Feedwater is being used to feed the unaffected S/G, THEN attempt to restore the TURB BYP valves, AND Condensate/Main Feedwater to operation PER the appropriate procedure.
- (4) IF Auxiliary Feedwater is being used to feed the unaffected S/G, THEN shut the Hotwell Makeup CV by shifting 1-LIC-4405 to MANUAL with 100% output.
- (5) Ensure the Auxiliary Boiler Condensate returns are aligned to Unit 2 by verifying the following:
 - (a) 0-AHB-211, DEAERATOR OVERFLOW TO 21 CONDENSER ISOLATION VALVE, is open.
 - (b) 0-AHB-210, DEARATOR OVERFLOW TO 11 CONDENSER ISOLATION VALVE, is shut.

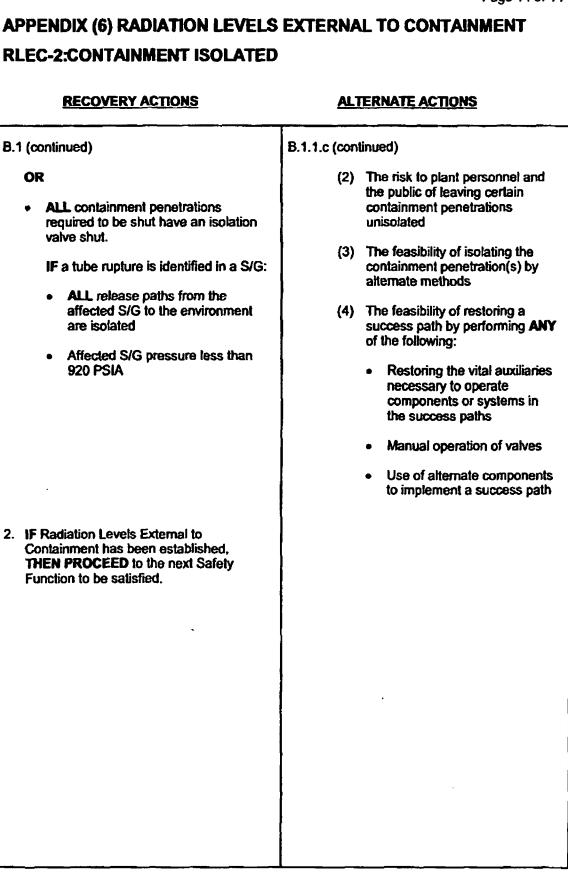
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ADDENDLY (6) DADIATION LEVELS	Page 13 of 14			
APPENDIX (6) RADIATION LEVELS EXTERNAL TO CONTAINMENT RLEC-2:CONTAINMENT ISOLATED				
RECOVERY ACTIONS	ALTERNATE ACTIONS			
 A.11.b (continued) (6) Ensure the RC Waste Evaporators are aligned to Unit 2 or the Auxiliary Boilers PER OI-17E, <u>REACTOR COOLANT</u> WASTE EVAPORATOR <u>OPERATION</u>. (7) Ensure Plant Heating is aligned to Unit 2 Reheat Steam or the Auxiliary Boilers PER OI-40, <u>PLANT HEATING SYSTEM</u>. 12. IF 500KV Offsite Power was lost, AND power has been restored, THEN restore the associated Radiation Monitors to service. 				
B. ACCEPTANCE CRITERIA FOR SUCCESS PATH RLEC-2.				
 Check Radiation Levels External to Containment is satisfied by EITHER of the following indications: ALL of the following alarms are clear with NO unexplained rise: "U-1 WIDE RANGE NOBLE GAS MON" (1-RIC-5415) "UNIT 1 CNDSR OFF-GAS" (1-RI-1752) "UNIT 1 S/G B/D" (1-RI-4014) "UNIT 1 MAIN VENT GASEOUS" (1-RI-5415) 	 1.1 IF Radiation Levels External to Containment has NOT been satisfied, THEN perform the following actions: a. Concurrently perform the recovery actions for the next safety function to be satisfied. b. Determine the appropriate emergency response actions PER the ERPIP. c. Evaluate further actions based on the following considerations: The urgency of other jeopardized safety functions. 			

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		containment cle	ACCEPTANCE CRITE oble Gas Monitor (1-RIC-5416 ar with NO unexplained rise	RIA 5) alarm
	•	Containment pressure less than 2.8 PSIG A loss of ALL Vital 4KV Buses may have occurred S/Witak 4KV Buses may have	ondenser Off-Gas RMS (1-RI- arm clear with NO unexplaine /G B/D RMS (1-RI-4014) alarr th NO unexplained rise lain Vent Gaseous RMS (1-RI arm clear with NO unexplaine	d rise n clear -5415)
	et		DONE	PAGE
		A. VERIFY NORMAL RADIATION LEVE	LS EXTERNAL TO	
		CONTAINMENT. IF radiation detected outside contained outs	c C	
		THEN IMPLEMENT RLEC-2 IF a loss of ALL Vital 4KV buses I THEN verify Containment Normal Purge Isolation valves are shut	has occurred.	1
		 IF containment pressure exceeds THEN IMPLEMENT RLEC-2 		1
		B. ACCEPTANCE CRITERIA FOR SUCO	CESS PATH	2
		IF Radiation Levels External to Concern NOT been satisfied, THEN PROCEED to the next appr Radiation Levels External to Conternation Conter	ropriate	2
	N	OTE: Continuously applicable steps are design	nated with a "C" in the DON	E column
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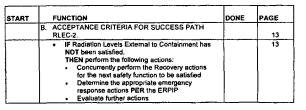
ACCEPTANCE CRITERIA **RESOURCE CONDITIONS** Radiation detected outside containment ALL of the following alarms are clear Containment pressure greater than with NO unexplained rise: Noble Gas Monitor (1-RIC-5415) 2.8 PSIG Condenser Off-Gas RMS (1-RI-1752) S/G B/D RMS (1-RI-4014) Main Vent Gaseous RMS (1-RI-5415) OR ALL containment penetrations required to be shut have an isolation valve shut IF a tube rupture is identified in a S/G. • ALL release paths from the affected S/G to the environment are isolated . Affected S/G pressure less than 920 PSIA DONE PAGE START FUNCTION A. VERIFY RADIATION LEVELS EXTERNAL TO CONTAINMENT BY CONTAINMENT ISOLATION. з IF pressure rises to 2.8 PStG. 4 THEN verify SIAS and CIS, IF pressure rises to 4.25 PSIG, 4 THEN verify CSAS 5 THEN verify Containment Normal Sump and H₂ Purge Isolation valves are shut 6 IF a tube rupture is identified. THEN perform the following Commence working the appropriate Heat . Removal success path until the affected OR most affected S/G is isolated IF a SRW Header is NOT in operation 6 THEN attempt to restart: 11 SRW Header – CNTMT pressure less than 25 PSIG. 12 SRW Header – CNTMT pressure less than 10 PSIG. . SIAS VERIFICATION CHECKLIST 8 SIAS VERIFICATION CHECKLIST CSAS VERIFICATION CHECKLIST CIS VERIFICATION CHECKLIST IF a tube rupture is identified, THEN control secondary system contamination 8 . 8 . 9 NOTE: Continuously applicable steps are designated with a "C" in the DONE column. (continue)

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RADIATION LEVELS EXTERNAL: TO CONTAINMENT PLACEKEEPER RLEC-2: CONTAINMENT ISOLATED

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RLEC-2: CONTAINMENT ISOLATED (continued)



NOTE: Continuously applicable steps are designated with a "C" in the DONE column.

CALVERT	CLIFFS NUCLEAR POWER PLANT TECHNICAL PROCEDURE	
	UNIT TWO	
FUNCTI	ONAL RECOVERY PROCEDURE REVISION 30	
	Safahr Balatad	•
	Safety Related	
Approval Authority:	Tim Riti 8/31/09 signature/date	
	Signature, date	
	Effective Date:9/3/09	

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	4.0	

<u>REVISION</u>

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PLACEKEEPER PAGE NUMBERS

1

REVISION

27

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PROCEDURE ALTERATIONS

REVISION/CHANGE

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APPENDI	X (6) RADIATION LEVELS EXTERNAL TO CONTAINMENT	
	RADIATION LEVELS EXTERNAL TO CONTAINMENT PLACEKEEPER	

1

I. PURPOSE

This procedure provides the operator actions to be completed after events which are unable to be diagnosed, or for events where an Optimal Recovery Procedure is **NOT** sufficient. The actions in this procedure provide a systematic and structured response to plant casualties, based on the safety functions, and are necessary to ensure the plant is placed in a stable, safe condition. The goal of this procedure is to prevent core damage by satisfying safety functions at risk while minimizing any radiological releases to the environment.

II. ENTRY CONDITIONS

The following conditions exist:

- A. Post-Trip Immediate Actions are completed.
- B. ANY of the following conditions exist:
 - Something more than an uncomplicated reactor trip has occurred for which a single event diagnosis is NOT possible utilizing the diagnostic flowchart of EOP-0, <u>POST-TRIP IMMEDIATE ACTIONS</u>.
 - Something more than an uncomplicated reactor trip has occurred for which an Optimal Recovery Procedure is **NOT** available.
 - An Optimal Recovery Procedure has been implemented but ONE or MORE Safety Function Acceptance Criteria are **NOT** satisfied, and actions directed within the Optimal Recovery Procedure are **NOT** returning the parameter(s) to within their Acceptance Criteria.

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III. PRECAUTIONS

The following specific precautions apply prior to or throughout this procedure.

A. WARNINGS

None

B. CAUTIONS

- SUR and WRNI Power should be continuously monitored during any RCS temperature changes until adequate shutdown margin can be established. RCS temperature should NOT be lowered if SUR approaches zero and/or WRNI Power level stabilizes above 10⁻⁴%.
- Feedwater should NOT be added to a dry S/G if the other S/G still contains water. If both S/Gs become dry, only ONE S/G should be refilled to initiate Natural Circulation. A dry S/G is indicated by wide range S/G level indication off-scale low or by S/G pressure less than saturation pressure for existing TAVE.
- 3. ESFAS actuated safety features should only be overridden to support a threatened safety function or when directed by the procedure.
- 4. Solid water operation of the RCS should only be attempted in order to maintain a subcooled margin of 25° F. Pressurizer level limits may be exceeded to restore RCS subcooling. If solid water 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.
- If the initial cooldown rate exceeds Technical Specification Limits, there may be a
 potential for pressurized thermal shock of the reactor vessel.
 Pressure/Temperature Limits of ATTACHMENT (1), <u>RCS PRESSURE
 TEMPERATURE LIMITS</u> should be maintained.
- 6. Maintaining subcooling of 25° F takes precedence over PTS considerations. If there is a conflict between maintaining adequate core cooling and complying with pressure/temperature limits, then maintenance of adequate core cooling should be given the higher priority.
- 7. The use of equipment in the containment building should be minimized when containment hydrogen concentration is greater than 4.0% to reduce the possibility of hydrogen ignition.
- 8. Common failure of a standby pump or component is possible if started following a pump or component failure. The cause of the failure should be determined prior to starting or restarting a standby pump or component.

(continue)

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III.B (continued)

 There is a possibility of RCS voiding throughout this procedure. Steps to eliminate voiding should be taken anytime voiding causes heat removal or inventory control to be threatened. Void elimination should be started soon enough to ensure heat removal and inventory control are NOT lost.

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- 10. After the required shutdown boron concentration is attained in the RCS, makeup water added to the RCS during the cooldown should be at least equal to the shutdown boron concentration to prevent **ANY** dilution of RCS boron concentration.
- 11. There is a possibility for excessive DG loading if a SIAS is received and the LOCI Sequencer actuates. To prevent this from occurring, the operator should NOT energize any non-essential loads unless specifically allowed within this procedure. The maximum steady state 2A or 2B DG load limit is 3300 KW. The SMECO load limit is 240 AMPS Continuous.
- 12. The number of auxiliary spray cycles should be minimized when the temperature differential is greater than 400° F to minimize spray nozzle thermal stress accumulation factor.
- 13. If VCT pressure is reduced by greater than 5 PSIG, the idle Charging Pumps may become gas bound if **NOT** started or vented.

(continue)

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III. (continued)

C. <u>NOTES</u>

- Hot and cold leg RTD and CET temperature indications may be influenced by charging pump or SIS injection water temperatures. Multiple RTD and CET indications should be used when injection is occurring.
- During a depressurization event, pressurizer level may NOT provide an accurate indication of RCS inventory due to the formation of voids. Pressurizer level when combined with RCS subcooling based on CET temperatures will indicate the core is covered.
- 3. High energy line breaks may cause erratic instrumentation response depending on the magnitude and location of the break.
- 4. Harsh Containment Environment conditions will affect instrument indications. When necessary, modified parameter values designated by braces {} are used to compensate the indicated value for Harsh Containment Environment conditions. Harsh Containment Environment conditions exist when containment pressure is greater than 4.25 PSIG.
- 5. If cooling down by natural circulation with an isolated steam generator, an inverted delta T (T COLD higher than T HOT) may be observed in the idle loop. This is due to a small amount of reverse heat transfer in the isolated steam generator. The inverted delta T is **NOT** expected to have any significant effect on natural circulation flow in the operating steam generator loop.
- 6. An incident may cause inconsistencies between instruments. At least TWO independent indications should be used, when available, to evaluate and verify a specific plant condition.
- Do NOT adopt manual operation of automatically controlled systems unless a malfunction is apparent or the automatic system operation will NOT support the maintenance of a safety function.
- 8. Systems shifted to manual operation must be monitored frequently to ensure correct operation.
- 9. Personnel should be prepared for the possibility of inadequate lighting in access areas and equipment rooms.

			EOP-8 Rev 27/Unit 2 Page 8 of 54
IV .	FUNCTIONAL RECOVERY ENT	IRY	
	RECOVERY ACTIONS	ALTERNATE ACTIONS	
A .	DETERMINE APPROPRIATE EMERGENCY REPSONSE ACTIONS PER THE ERPIP.		
j bu	<u>WARNING</u> opping the Transfer Cask may spill fuel adles in the Auxiliary Building causing h radiation levels.		
1.	IF a Transfer Cask loaded with irradiated fuel assemblies has been dropped in the Auxiliary Building, THEN perform actions concurrently PER AOP-6D, <u>FUEL HANDLING INCIDENT</u> .		
2.	Determine the appropriate emergency response actions PER the ERPIP.		
В.	OBTAIN FUNCTIONAL RECOVERY ENTRY PLACEKEEPER AND RECORD TIME.		
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			EOP-8 Rev 27/Unit 2 Page 9 of 54
1	. FUNCTIONAL RECOVERY ENT	RY	
	RECOVERY ACTIONS	ALTERNATE ACTIONS	
C.	PERFORM THE RCP TRIP STRATEGY.		
pla con 1.	NOTE bsequent operations to depressurize the int under operator control are NOT insidered a result of the event. IF RCS pressure drops to 1725 PSIA as a result of the event, THEN trip RCPs so EITHER of the following pairs remain running: 21A and 22B RCPs 21B and 22A RCPs		
2.	IF CIS has actuated, OR Component Cooling flow can NOT be verified to the RCPs, THEN trip ALL RCPs.		
3.	IF RCS pressure drops below the minimum pump operating limits PER ATTACHMENT (1), <u>RCS PRESSURE</u> <u>TEMPERATURE LIMITS</u> , THEN trip ALL RCPs.		
D.	MONITOR S/G ACTIVITY AND CONTAINMENT HYDROGEN LEVELS.		
1.	Direct Chemistry to perform qualitative samples on BOTH S/Gs for activity PER CP-436.		
2.	Direct Chemistry to place the Hydrogen Monitors in service.		
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		EOP-8 Rev 27/Unit 2 Page 10 of 54
L RECOVERY ENT	RY	
ACTIONS		ALTERNATE ACTIONS
tion VI., <u>RESOURCE</u>		
d success paths with		
	3.1	IF Safety Function Acceptance Criteria are NOT met, THEN determine the appropriate emergency response actions PER the ERPIP.
VERY ACTIONS.	I	
cceptance Criteria are Functions PER	1.1	IF a success path can NOT be identified PER Section VI., <u>RESOURCE</u> <u>ASSESSMENT TABLE</u> , THEN select the highest numbered success path for that Safety Function (e.g.; HR-4).
tinue)		
	L RECOVERY ENT ACTIONS TUS OF SAFETY A). TUS OF SAFETY A). ths for ALL Safety tion VI., RESOURCE BLE. ed success paths with fety Function Status lected success paths. VERY ACTIONS. ths acceptance Criteria are Functions PER JRCE ASSESSMENT Optimal Recovery mal Recovery	ATUS OF SAFETY A). ths for ALL Safety ction VI., RESOURCE BLE. ed success paths with fety Function Status lected success paths. OVERY ACTIONS. ths acceptance Criteria are Functions PER JRCE ASSESSMENT Optimal Recovery mal Recovery

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IV. FUNCTIONAL RECOVERY ENTRY

RECOVERY ACTIONS

ALTERNATE ACTIONS

F. (continued)

NOTE

Safety Functions are presented in order of importance. Selected success paths should be commenced in accordance with the Safety Function hierarchy.

- 3. Commence the Recovery Actions **PER** APPENDIX (1), <u>REACTIVITY CONTROL</u> to APPENDIX (6), <u>RADIATION LEVELS</u> <u>EXTERNAL TO CONTAINMENT</u> with the following priority:
 - a. Safety Functions that are **NOT** meeting their EOP-8 Acceptance Criteria.
 - b. Safety Functions that were NOT met in EOP-0,
 AND Safety Functions that were NOT met in an Optimal Recovery Procedure.
 - c. ALL remaining Safety Functions.
- IF, at any time, a Safety Function is NOT being satisfied, THEN commence the Recovery Actions for the success path of the unsatisfied Safety Function, in accordance with the Safety Function hierarchy.
- IF, at any time, ANY success path is unable to meet the acceptance criteria, THEN IMPLEMENT an appropriate success path as determined PER Section VI., <u>RESOURCE ASSESSMENT</u> TABLE.

(continue)

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V. FUNCTIONAL RECOVERY ENTRY	Ū
RECOVERY ACTIONS	ALTERNATE ACTIONS
F. (continued)	
<u>NOTE</u> Safety Function success paths are listed in order of preference, success path #1 (e.g.; HR-1) being most preferred.	
 IF, at any time, a lower numbered success path is able to be implemented for ANY safety function, THEN, as time permits, perform the following actions: 	
a. Verify the lower numbered success path is available using the Resource Assessment Table.	
b. Commence performance of the lower numbered success path.	
c. Exit the original success path as appropriate.	
7. WHEN the following conditions are met:	
 The Recovery Actions for the selected success paths are being performed 	
 The Acceptance Criteria for each selected Safety Function success path is satisfied 	
THEN PROCEED to Section V., <u>LONG</u> TERM ACTIONS.	
END of Section IV	

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		EOP-8 Rev 27/Unit 2 Page 13 of 54
v.	LONG TERM ACTIONS	
	RECOVERY ACTIONS	ALTERNATE ACTIONS
A .	DETERMINE PLANT STATUS.	
1.	Determine the current status of the plant by identifying the following:	
	 Present RCS conditions, including inventory, temperature, pressure and radiation levels 	
	 Selected success paths for fulfilling each safety function 	
	Adequacy of core cooling	
	Plant area radiation levels	
	 Rates of radioactivity release to the environment 	
В.	ATTEMPT TO DETERMINE SPECIFIC EVENT.	
1.	 IF a single event, such as a LOCA, SGTR or LOAF, can be identified, THEN entry into the appropriate Optimal Recovery Procedure may be made provided the following conditions are met: The Safety Function Status Checks, for ALL safety functions, for EOP-8, <u>FUNCTIONAL RECOVERY</u> <u>PROCEDURE</u> are satisfied The Safety Function Status Checks Intermediate Acceptance Criteria for the Optimal Recovery Procedure are satisfied 	· · ·

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V. LONG TERM ACTIONS **ALTERNATE ACTIONS RECOVERY ACTIONS** C. IF 500KV OFFSITE POWER WAS LOST, THEN ATTEMPT TO RESTORE POWER TO PLANT LOADS. 1. Call the SO-TSO to determine when power is expected. 2. WHEN 500KV offsite power is available, **THEN** attempt to restore 500KV offsite power PER ATTACHMENT(16), 500KV OFFSITE POWER RESTORATION. 3. Verify power is available to the switchyard auxiliaries: IF SWYD SERV XFMR SX-20 is NOT energized, AND 21 4KV Vital Bus is energized, THEN CLOSE SWYD SERV XFMR 4KV FDR, 152-2113. IF SWYD SERV XFMR SX-10 is NOT energized, AND 11 4KV Vital Bus is energized, THEN close SWYD 4KV SERV XFMR FDR, 152-1113. Verify SP-10 and SP-20 are energized PER OI-28, OPERATION OF 500KV SWITCHYARD. (continue)

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V. LONG TERM ACTIONS

RECOVERY ACTIONS

ALTERNATE ACTIONS

C. (continued)

<u>CAUTION</u> Attempts should NOT be made to re-energize a bus if a fault is suspected.

- IF MCC-204R or MCC-214R is de-energized, THEN perform the following actions:
 - a. IF MCC-214R is energized AND MCC-204R is NOT energized, THEN tie MCC-204R to MCC-214R as follows:
 - (1) Open MCC-204R Main Feeder Breaker, 52-20401.
 - (2) Rotate the bottom key on the MCC-204R Main Feeder Breaker, and remove **BOTH** interlock keys.
 - (3) Insert the appropriate interlock key into MCC-204R Tie breaker, 52-20420.
 - (4) Turn the key in the clockwise direction.
 - (5) Close MCC-204R Tie Breaker, 52-20420.
 - (6) Insert the appropriate interlock key into MCC-214R Tie Breaker, 52-21420.
 - (7) Turn the key in the clockwise direction.
 - (8) Close MCC-214R Tie Breaker, 52-21420.

(continue)

V. LONG TERM ACTIONS RECOVERY ACTIONS ALTERNATE ACTIONS C.4 (continued) CAUTION Loads must be stripped from MCC-214R and MCC-204R to ensure 204R REACTOR MCC breaker, 52-2409 will NOT be overloaded. ND MCC-204R is energized AND MCC-204R is energized, THEN tie MCC-214R to MCC-204R as follows: (1) Open the following MCC breakers: • BORIC ACID BATCH TANK HEATER 21, 52-21410
C.4 (continued) CAUTION Loads must be stripped from MCC-214R and MCC-204R to ensure 204R REACTOR MCC breaker, 52-2409 will NOT be overloaded. b. IF MCC-214R is NOT energized AND MCC-204R is energized, THEN tie MCC-214R to MCC-204R as follows: (1) Open the following MCC breakers: BORIC ACID BATCH TANK
CAUTION Loads must be stripped from MCC-214R and MCC-204R to ensure 204R REACTOR MCC breaker, 52-2409 will NOT be overloaded. b. IF MCC-214R is NOT energized AND MCC-204R is energized, THEN tie MCC-214R to MCC-204R as follows: (1) Open the following MCC breakers: • BORIC ACID BATCH TANK
Loads must be stripped from MCC-214R and MCC-204R to ensure 204R REACTOR MCC breaker, 52-2409 will NOT be overloaded. b. IF MCC-214R is NOT energized AND MCC-204R is energized, THEN tie MCC-214R to MCC-204R as follows: (1) Open the following MCC breakers: • BORIC ACID BATCH TANK
AND MCC-204R is energized, THEN tie MCC-214R to MCC-204R as follows: (1) Open the following MCC breakers: • BORIC ACID BATCH TANK
breakers: BORIC ACID BATCH TANK
BORIC ACID BATCH TANK MIXER 21, 52-21425
 (2) Verify SALTWATER SYSTEM AIR COMPRESSOR 22 is available, AND open the SALTWATER SYSTEM AIR COMPRESSOR 21 breaker, 52-21405. (2).1 IF SALTWATER SYSTEM AIR COMPRESSOR 22 is NOT available, THEN verify SALTWATER SYSTEM AIR COMPRESSOR 22 breaker, 52-20405 is open.
 (3) Verify BORIC ACID PUMP 22 is available, AND open the BORIC ACID PUMP 22 is NOT available, PUMP 21 breaker, 52-21406. (3).1 IF BORIC ACID PUMP 22 is NOT available, THEN verify BORIC ACID PUMP 22 breaker, 52-20406 is open.
(4) Open MCC-214R Main Feeder Breaker, 52-21401.
(5) Rotate the left key on the MCC-214R Main Feeder Breaker, and remove BOTH interlock keys.
(6) Insert the appropriate interlock key into MCC-214R Tie Breaker, 52-21420.
(7) Turn the key in the clockwise direction.
(continue)

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V. LONG	STERM ACTIONS		
R	ECOVERY ACTIONS	ALTERNATE ACTIONS	
C.4.b (contir	nued)		
(8)	Close MCC-214R Tie Breaker, 52-21420.		
	Insert the appropriate interlock key into MCC-204R Tie Breaker, 52-20420.		
(10)	Tum the key in the clockwise direction.		
(11)	Close MCC-204R Tie Breaker, 52-20420.		
5. Verify the operating	e Emergency DC PPs are g:		
	INE EMERGENCY BRG OIL PP		
	P EMERGENCY OIL PPs		
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	(continue)		

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V. LONG TERM ACTIONS

C. (continued)

RECOVERY ACTIONS

NOTE

ALTERNATE ACTIONS

Operation of the equipment in this procedure will NOT cause 2A or 2B DG loading to exceed 3600 KW if the LOCI Sequencer actuates. CAUTION SMECO Power Supply System load shall be limited as follows: • 240 AMPS Continuous 216 AMPS for 16 hours followed by 264 AMPS for up to 8 hours, then reducing to 216 AMPS 216 AMPS for 20 hours followed by 295 AMPS for up to 4 hours, then reducing to 216 AMPS 6. Energize the following support equipment as necessary to facilitate shutdown, while maintaining load within the power source's ratings: a. Start a MAIN EXH FAN. b. Start the CAC(s) in LOW as necessary to restore and maintain containment temperature below 120° F. c. Start the SRW Room Ventilation PER **OI-15, SERVICE WATER SYSTEM.** d. IF the "SFP TEMP HI" alarm is received. THEN start the SFP CLG PP(s) PER the appropriate OI-24 series procedure. (continue)

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V. LONG TERM ACTIONS

RECOVERY ACTIONS

ALTERNATE ACTIONS

C. (continued)

- Restore power to MCC-201AT and MCC-201BT loads, while remaining within the power source's ratings, as follows:
 - a. Strip ALL loads from MCC-201AT and MCC-201BT by opening individual MCC breakers.
 - b. IF 21A 480V BUS is energized, THEN restore power to MCC-201AT from 21 4KV Vital Bus by closing normal feeder breaker 52-2109.
 - c. IF 24B 480V BUS is energized, THEN restore power to MCC-201BT from 24 4KV Vital Bus by closing normal feeder breaker 52-2419.
 - d. IF 21 4KV Vital Bus is energized AND 24 4KV Vital Bus is NOT energized, THEN tie MCC-201BT to MCC-201AT as follows:
 - (1) Open MCC-201BT Main Feeder Breaker, 52-20141.
 - (2) Rotate the bottom key on the MCC-201BT Main Feeder Breaker, and remove **BOTH** interlock keys.
 - (3) Insert the appropriate interlock key into MCC-201BT Tie Breaker, 52-20160.
 - (4) Turn the key in the clockwise direction.
 - (5) Close MCC-201BT Tie Breaker, 52-20160.
 - (6) Insert the appropriate interlock key into MCC-201AT Tie Breaker, 52-20120.

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			EOP-8 Rev 27/Unit 2 Page 20 of 54
V. LON	IG TERM ACTIONS		
	RECOVERY ACTIONS	ALTERNATE ACTIONS	
C.7.d (cor	tinued)		
(7)	Turn the key in the clockwise direction.		
(8)	Close MCC-201AT Tie Breaker, 52-20120.		
AN 11	21 4KV Vital Bus is NOT energized ID 24 4KV Vital Bus is energized, IEN tie MCC-201AT to MCC-201BT follows:		
(1)	Open MCC-201AT Main Feeder Breaker, 52-20101.		
(2)	Rotate the bottom key on the MCC-201AT Main Feeder Breaker, and remove BOTH interlock keys.		
(3)	Insert the appropriate interlock key into MCC-201AT Tie Breaker, 52-20120.		
(4)	Turn the key in the clockwise direction.		
(5)	Close MCC-201AT Tie Breaker, 52-20120.		
(6)	Insert the appropriate interlock key into MCC-201BT Tie Breaker, 52-20160.		
(7)	Turn the key in the clockwise direction.		
(8)	Close MCC-201BT Tie Breaker, 52-20160.		
	(continue)		

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V. LONG TERM ACTIONS

RECOVERY ACTIONS

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ALTERNATE ACTIONS

C.7 (continued)

- f. Energize MCC-201AT and MCC-201BT loads by shutting the following breakers:
 - Distribution Panel 21 Breaker, 52-20116
 - AFW PP Room Air Conditioner Breaker, 52-20150

CAUTION

3600 KW is the maximum load limit for 2A and 2B DG and is the setting of the DG fuel rack stop. 2A and 2B DG loading should be maintained below 3300 KW to prevent the DG RPMs from falling due to automatic load variations.

- 8. IF SIAS actuates AND 2A OR 2B DG loading exceeds 3600 KW, THEN perform rapid DG load reduction as follows:
 - a. IF 2A DG loading exceeds 3600 KW, THEN perform the following:
 - (1) Open the 21A 480V BUS FDR breaker, 52-2112.
 - (2) Stop 21 MAIN EXH FAN.
 - (3) Locally open MCC-201AT Main Feeder Breaker, 52-20101.
 - (4) Close the 21A 480V BUS FDR breaker, 52-2112.

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V. LONG TERM ACTIONS

RECOVERY ACTIONS

ALTERNATE ACTIONS

C.8 (continued)

3300 KW:

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- b. IF 2B DG loading exceeds 3600 KW, THEN perform the following:
 - (1) Open the 24B 480V BUS FDR breaker, 52-2413.
 - (2) Stop 22 MAIN EXH FAN.
 - (3) Stop 12 SFP CLG PP.
 - (4) Locally open MCC-201BT Main Feeder Breaker, 52-20141.
 - (5) Close the 24B 480V BUS FDR breaker, 52-2413.
- IF SIAS actuates
 AND 2A OR 2B DG loading exceeds 3300 KW,
 THEN secure the following DG loads as necessary to lower DG load below
 - a. IF 2A DG loading exceeds 3300 KW, THEN perform the following:
 - (1) Stop 21 MAIN EXH FAN.
 - (2) Locally open MCC-201AT Main Feeder Breaker, 52-20101.
 - b. IF 2B DG loading exceeds 3300 KW, THEN perform the following:
 - (1) Stop 22 MAIN EXH FAN.
 - (2) Stop 12 SFP CLG PP.
 - (3) Locally open MCC-201BT Main Feeder Breaker, 52-20141.

(continue)

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V. LONG TERM ACTIONS

RECOVERY ACTIONS

ALTERNATE ACTIONS

C. (continued)

- 10. Lower the Main Generator Hydrogen Pressure to 2 PSIG by performing the following actions:
 - a. Throttle open the GENERATOR BOTTOM VENT TO ATMOSPHERE ISOLATION VALVE, 2-G-06.
 - b. WHEN Main Generator hydrogen pressure is vented to 2 PSIG, THEN perform the following actions:
 - (1) Shut 2-G-06.
 - (2) Secure the EMERGENCY AIR SIDE SEAL OIL PP.
- 11. Minimize the 250V DC Battery discharge by closing the 15 Battery Charger remote supply breaker, 52-1107, OR 25 Battery Charger remote supply breaker, 52-2107, to energize the Battery Charger on 13 250V DC Bus.

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V. LONG TERM ACTIONS RECOVERY ACTIONS ALTERNATE ACTIONS D. DETERMINE IF RCS COOLDOWN SHOULD CONTINUE. 1. Determine if RCS cooldown to cold shutdown is required based on the following considerations: a. IF a high radioactivity release rate to the environment exists. THEN ensure cooldown is in progress PER the selected Heat Removal success path, AND dump steam to the condenser if possible. b. IF the available inventory approaches the minimum required for cooldown PER ATTACHMENT (9), MAKEUP WATER REQUIRED FOR RCS COOLDOWN AND is lowering due to insufficent makeup THEN ensure cooldown is in progress PER the selected Heat Removal success path. c. IF a loss of ANY vital auxiliaries may be anticipated, including a loss of electric power, compressed air, or cooling water supplies, THEN ensure cooldown is in progress PER the selected Heat Removal success path. d. IF a cooldown is necessary to make repairs. THEN ensure cooldown is in progress PER the selected Heat Removal success path.

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V. LONG TERM ACTIONS

RECOVERY ACTIONS

ALTERNATE ACTIONS

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E. ENSURE EQUIPMENT AVAILABILITY AND PLANT CONDITIONS TO SUPPORT RCS COOLDOWN. 1. Determine equipment availability and plant conditons to support RCS cooldown based on the following considerations: • Status of failed equipment or conditions which may prevent or inhibit a cooldown, such as a loss of ALL pressurizer sprays or inability to dump steam Availability of condensate inventory 2. IF repairs to equipment are required, THEN establish plant conditions to support making the necessary repairs. 3. IF insufficient inventory is available PER ATTACHMENT (9), MAKEUP WATER **REQUIRED FOR RCS COOLDOWN,** THEN attempt to raise the inventory or obtain additional sources of feedwater.

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V. 1	LONG TERM ACTIONS	raye 20 01 04
	RECOVERY ACTIONS	ALTERNATE ACTIONS
F. I	PERFORM PLANT COOLDOWN	
guida Cente methe	<u>NOTE</u> ooldown is to be performed, then ance from the Plant Technical Support er may be required. Standard Cooldown ods may require modification due to the e of the event.	
TI th in pi	F a plant cooldown is to be performed, HEN conduct a RCS cooldown to less han 300° F using any method described the Heat Removal success paths OR as rescribed by the Technical Support center.	1.1 IF a cooldown is NOT required, THEN continue to maintain the safety functions until guidance is provided by the Plant Technical Support Center or an approved procedure can be implemented.
UI 04 30 TI C	FRCS activity will NOT result in nacceptable radiological consequences uside containment, ND CET temperatures are less than 0° F, HEN evatuate initiating Shutdown cooling PER HR-3, <u>SHUTDOWN</u> COLING SYSTEM.	

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V. LONG TERM ACTIONS	
RECOVERY ACTIONS	ALTERNATE ACTIONS
G. IMPLEMENT THE APPROPRIATE PROCEDURE	
1. WHEN the following conditions are met:	
The Safety Function Status Checks Acceptance Criteria, for ALL safety functions, for EOP-8, <u>FUNCTIONAL</u> <u>RECOVERY PROCEDURE</u> are met	
An appropriate, approved procedure is available for implementation	
THEN perform the following:	
 a. IF ANY safety signals have initiated, AND are no longer needed, THEN reset the appropriate signals. 	
b. Commence ATTACHMENT(13), <u>ADMINISTRATIVE POST-TRIP</u> <u>ACTIONS</u> .	
c. IMPLEMENT the appropriate procedure as directed by the Shift Manager or the Plant Technical Support Center.	
END of Section V	
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VI. RESOURCE ASSESSMENT TABLE

SAFETY FUNCTION SUCCESS PATH DETERMINATION

REACTIVITY

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ACCEPTANCE

SUCCESS PATH	RESOURCE CONDITIONS	ACCEPTANCE CRITERIA
RC-1: CEA Insertion	a. CEAs are able to be inserted, and SUR is negative	1. NO more than ONE CEA NOT fully inserted, WRNI power is lowering,
	OR b. A loss of ALL Vital 4KV Buses may have occurred	OR 2. WRNI power below 10 ⁻⁴ % and SUR is negative or zero
RC-2: Boration Using CVCS	a. Charging pump is available for boron addition	1. Boration rate greater than or equal to 40 GPM, WRNI power is lowering, and SUR is negative
	b. Boric acid source is available:	OR
	• BAST • RWT	2. WRNI power below 10-4% and SUR is negative or zero
	c. Charging path is available via normal flow path or SIS flow path	
RC-3: Boration Using SIS	 a. HPSI pump is available for boron addition b. RWT is available as boric acid source c. A flow path is available 	 Boration rate greater than or equal to 40 GPM, WRNI power is lowering, and SUR is negative OR WRNI power below 10-4%
		2. WRNI power below 10-4% and SUR is negative or zero

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VI. RESOURCE ASSESSMENT TABLE

SAFETY FUNCTION SUCCESS PATH DETERMINATION

VITAL AUXILIARIES

AUXILIARIES SUCCESS PATH	RESOURCE	ACCEPTANCE CRITERIA
VA-1: 500KV Offsite Power	a. At least ONE 500KV Bus is available	1. At least ONE 4KV vital bus is energized
		2. 11, 12, 21 and 22 125V DC Buses, ALL greater than 105 volts
		3. At least THREE 120V AC Vital Buses are energized:
		• 21 • 22 • 23 • 24
		4. EITHER 2Y09 or 2Y10 is energized
VA-2: Diesel Generators	a. 2A, 2B OR 0C Diesel Generator is available	1. At least ONE 4KV vital bus is energized
		2. 11, 12, 21 and 22 125V DC Buses, ALL greater than 105 volts
		3. At least THREE 120V AC Vital Buses are energized:
		• 21 • 22 • 23 • 24
		4. EITHER 2Y09 or 2Y10 is energized
	(continue)	

VI. RESOURCE ASSESSMENT TABLE

SAFETY FUNCTION SUCCESS PATH DETERMINATION

VITAL	SAFETY FUNCTION SUCCESS PATH DETERMINATION			
AUXILIARIES (continued) SUCCESS PATH	RESOURCE	ACCEPTANCE CRITERIA		
VA-3: SMECO	a. SMECO Power Supply System is available	1. At least ONE 4KV vital bus is energized		
		2. 11, 12, 21 and 22 125V DC Buses, ALL greater than 105 volts		
		3. At least THREE 120V AC Vital Buses are energized:		
		• 21 • 22 • 23 • 24		
		4. EITHER 2Y09 or 2Y10 is energized		

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VI. RESOURCE /	ASSESSMENT TABLE	EOP-8 Rev 27/Unit 2 Page 31 of 54	
RCS PRESSURE AND INVENTORY	SAFETY FUNCTION SUCCESS PATH DETERMINATION		
CONTROL SUCCESS PATH	RESOURCE	ACCEPTANCE CRITERIA	
PIC-1: CVCS	a. Charging pump is available	1. Pressurizer pressure less than the upper limits of Att. (1)	
	 b. Charging path is available via normal flow path or SIS flow path 	2. Pressurizer level greater than 30 inches	
	c. A charging source is available:	3. RCS subcooling is between 25°F and 140°F based on CET temperatures	
	• VCT • BAST • RWT	4. Reactor Vessel level above the top of the hot leg	
	d. A method of pressurizer pressure control is available:		
	 Pressurizer heaters Main Spray Aux Spray Controlled Steaming 		
	e. SIAS has NOT actuated OR has been reset		
PIC-2: PORVs or Pressurizer Vent	a. PORV or Pressurizer Vent required to reduce pressure	1. Pressurizer pressure less than 2400 PSIA	
	b. PORV or Pressurizer Vent available to control pressure	2. Pressurizer pressure less than the upper limits of Att. (1)	
	c. Charging and letdown and/or SIS is available to control pressurizer level	3. RCS subcooling is between 25°F and 140°F based on CET temperatures	
	d. Once-Through-Cooling is NOT in progress	4. Pressurizer level greater than 30 inches (90)	
	(continue)	5. Reactor Vessel level above the top of the hot leg	

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EOP-8 Rev 27/Unit 2 Page 32 of 54 VI. RESOURCE ASSESSMENT TABLE SAFETY FUNCTION SUCCESS PATH DETERMINATION RCS PRESSURE AND INVENTORY CONTROL RESOURCE ACCEPTANCE (continued) CONDITIONS CRITERIA SUCCESS PATH a. A loss of ALL 4KV Vital 1. Pressurizer pressure less PIC-3: Loss Of Buses has occurred than the upper limits of Vital AC Att. (1) b. SIAS has NOT actuated 2. RCS subcooling greater OR has been reset than 25°F based on CET temperatures (1) **OR** CET temperatures less than 50°F superheated (1) 3. Reactor Vessel level indicates the core is covered a. SIAS has actuated 1. IF RAS has NOT occurred, PIC-4: SIS OR SIS is able to be used AND pressurizer pressure is greater than 1270 PSIA. to supply RCS makeup THEN at least ONE Charging Pump operating 2. HPSI and LPSI Pumps are injecting water into the RCS PER Atts. (10) and (11) (2) (3) 3. Reactor Vessel level indicates the core is covered (1) If needed, refer to Attachment (12) to read CETs. (z) Limits in Attachments (10) and (11) are not required to be met if SIS throttle criteria are met. (3) LPSI Pumps are NOT required post-RAS.

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VI. RESOURCE ASSESSMENT TABLE

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SAFETY FUNCTION SUCCESS PATH DETERMINATION

CORE AND RCS HEAT REMOVAL RESOURCE ACCEPTANCE SUCCESS PATH CONDITIONS CRITERIA HR-1: S/G Heat Sink a. At least ONE S/G level 1. At least ONE S/G has With NO SIS greater than (-)350 inches level between (-)24 inches Operation and (+)30 inches b. Feedwater is available: OR Main Feedwater AFW S/G level is being restored Booster Pump Injection by feedwater flow c. SIAS has NOT actuated 2. IF RCPs are operating, OR has been reset THEN THOT MINUS TOOLO IS less than 10°F d. SIS operation NOT required 3. IF RCPs are NOT operating, THEN THOT MINUS TCOLD IS less than 50°F 4. RCS subcooling greater than 25°F based on CET temperatures (1) 5. Reactor Vessel level above the top of the hot leg (1) If needed, refer to Attachment (12) to read CETs. (continue)

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VI. RESOURCE ASSESSMENT TABLE

CORE AND RCS	SAFETY FUNCTION SUCCESS PATH DETERMINATION		
HEAT REMOVAL (continued) SUCCESS PATH	RESOURCE CONDITIONS	ACCEPTANCE CRITERIA	
(2) Limits in Attachme are met.	 a. At least ONE S/G level greater than (-)350 inches b. Feedwater is available: Main Feedwater AFW Booster Pump Injection c. SIAS has actuated or SIS Operation required Attachment (12) to read CETs. ents (10) and (11) are not required IOT required post-RAS. (continue)	 At least ONE S/G has level between 0 inches and (+)38 inches OR S/G level is being restored by feedwater flow CET temperatures less than 50°F superheated (1) IF RAS has NOT occurred, AND pressurizer pressure is greater than 1270 PSIA, THEN at least ONE Charging Pump operating HPSI and LPSI Pumps are injecting water into the RCS PER Atts. (10) and (11) (2) (3) to be met if SIS throttle criteria 	

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CORE AND RCS HEAT REMOVAL (continued) SUCCESS PATH		SAFETY FUNCTION SUCCESS PATH DETERMINATION	
	d)	RESOURCE CONDITIONS	ACCEPTANCE CRITERIA
	outdown ooling stem	a. CET temperatures less than 300°F	1. CET temperatures I than 300°F and less than 50°F superhea
·		b. Radiation levels are low enough to allow valve repositioning	2. HPSI Pumps are inj water into the RCS PER Att. (10) (2)
			3. Pressurizer pressur than 270 PSIA {245
			4. Reactor Vessel leve indicates the core is
	nce-Through- poling	a. HPSI pumps are available	1. CET temperatures & than 50°F superhea
	omg	b. BOTH PORVs are available	2. IF RAS has NOT oc
		c. Flow path is available	AND HPS1 throttle c
		d. RWT is available as a makeup source	are NOT met, THEN ALL available Charging Pumps op
			3. HPSI and LPSI Pur injecting water into t PER Atts. (10) and (
			4. Pressurizer pressure less than 1270 PSIA OR is lowering

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CONTAINMENT	SAFETY FUNCTION SUCCE	SS PATH DETERMINATION
ENVIRONMENT SUCCESS PATH	RESOURCE CONDITIONS	ACCEPTANCE CRITERIA
CE-1: NO CIS	a. Containment pressure less than 2.8 PSIG	1. Containment pressure less than 2.8 PSIG
	b. CIS has NOT actuated OR has been reset	2. Containment temperature less than 220°F (1)
	c. Containment radiation alarms are clear with NO unexplained rise (2)	3. Containment radiation alarms are clear with NO unexplained rise (2)

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		EOP-8 Rev 27/Unit 2 Page 37 of 54	
VI. RESOURCE A	ASSESSMENT TABLE		
	SAFETY FUNCTION SUCCESS PATH DETERMINATION		
CONTAINMENT ENVIRONMENT (continued) SUCCESS PATH			
	RESOURCE CONDITIONS	ACCEPTANCE CRITERIA	
CE-2: Containment Isolation	a. Containment pressure less than 4.25 PSIG	1. Containment pressure less than 4.25 PSIG	
	b. CSAS has NOT actuated OR has been reset	2. ALL available Containment Air Coolers are operating with maximum SRW flow	
		3. ALL containment penetrations required to be shut have an isolation valve shut	
		4. Hydrogen concentration less than 0.5% (1)	
		OR	
		ALL available hydrogen recombiners are energized with Hydrogen concentration less than 4.0% (1)	
		OR	
		Hydrogen purge operation per Tech Support recommendation (1)	
1) Hydrogen concent been able to place	tration acceptance criteria may be a hydrogen monitors in service.	omitted until Chemistry has	
	(continue)		

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VI. RESOURCE ASSESSMENT TABLE		
CONTAINMENT	SAFETY FUNCTION SUCCESS PATH DETERMINATION	
ENVIRONMENT (continued) SUCCESS PATH	RESOURCE CONDITIONS	ACCEPTANCE CRITERIA
CE-3: Containment Spray	a. Containment pressure greater than 4.25 PSIG	1. Containment pressure less than 50 PSIG
		2. ALL available Containment Air Coolers are operating with maximum SRW flow
		3. Containment spray flow is greater than 1350 GPM per pump, if operating
		4. ALL containment penetrations required to be shut have an isolation valve shut
		5. Hydrogen concentration less than 0.5% (1)
		OR
		ALL available hydrogen recombiners are energized with Hydrogen concentration less than 4.0% (1)
		OR
		Hydrogen purge operation per Tech Support recommendation (1)
(1) Hydrogen concent been able to place	tration acceptance criteria may b hydrogen monitors in service.	e omitted until Chemistry has

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VI. RESOURCE A	EOP- Rev 27/Unit Page 39 of 5 RESOURCE ASSESSMENT TABLE		
RADIATION	SAFETY FUNCTION SUCCESS PATH DETERMINATION		
LEVELS EXTERNAL TO CONTAINMENT SUCCESS PATH	RESOURCE	ACCEPTANCE CRITERIA	
	s a. Normal Radiation levels exist outside of containment b. Containment pressure less than 2.8 PSIG c. A loss of ALL Vital 4KV Buses may have occurred	 Noble Gas Monitor (2-RIC-5415) alarm clear with NO unexplained rise Condenser Off-Gas RMS (2-RI-1752) alarm clear with NO unexplained rise (1) S/G B/D RMS (2-RI-4014) alarm clear with NO unexplained rise (1) Main Vent Gaseous RMS (2-RI-5415) alarm clear with NO unexplained rise (1) 	
	(continue)		

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VI. RESOURCE ASSESSMENT TABLE SAFETY FUNCTION SUCCESS PATH DETERMINATION RADIATION LEVELS EXTERNAL TO CONTAINMENT (continued) RESOURCE ACCEPTANCE **SUCCESS PATH** CONDITIONS CRITERIA RLEC-2:Containment a. Radiation detected 1. ALL of the following Isolated outside containment alarms are clear with NO unexplained rise: OR . Noble Gas Monitor (2-RIC-5415) • Condenser Off-Gas RMS Containment pressure greater than 2.8 PSIG (2-RI-1752) • S/G B/D RMS (2-RI-4014) Main Vent Gaseous RMS (2-RI-5415) OR 2. ALL containment penetrations required to be shut have an isolation valve shut IF a tube rupture is identified in a S/G, • ALL release paths from the affected S/G to the environment are isolated Affected S/G pressure less than 920 PSIA

		EOP-8 Rev 27/Unit 2 Page 41 of 54
VII. SAFETY FUNC	TION STATUS CHECK	
A. The STA (or persor status checks.	n designated by the CRS) will perfor	m the safety function
B. Perform safety fund stabilize.	tion status checks at 15 minute inte	rvals until plant conditions
C. Notify the Control F upon discovery.	Room Supervisor if any safety function	on is not being met, promptly
REACTIVITY	SAFETY FUNCTION ACCEPTAN	CE CRITERIA
CONTROL SUCCESS PATH	ACCEPTANCE CRITERIA	STATUS CHECK
RC-1: CEA Insertion	a. NO more than ONE CEA NOT fully inserted, WRNI power is lowering, and SUR is negative	<u></u>
	OR	
	 WRNI power below 10⁻⁴% and SUR is negative or zero 	<u></u>
RC-2: Boration Using CVCS	a. Boration rate greater than or equal to 40 GPM, WRNI power is lowering, and SUR is negative	
	OR	
	 WRNI power below 10⁻⁴% and SUR is negative or zero 	
RC-3: Boration Using SIS	a. Boration rate greater than or equal to 40 GPM, WRNI power is lowering, and SUR is negative	
	OR	
	 WRNI power below 10⁻⁴% and SUR is negative or zero 	

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VITAL	SAFETY FUNCTION ACCEPTANCE CRITERIA	
AUXILIARIES	ACCEPTANCE	STATUS
SUCCESS PATH	CRITERIA	CHECK
VA-1: 500KV Offsite Power	a. At least ONE 4KV vital bus is energized	
	b. 11, 12, 21 and 22	
	125V DC Buses, ALL greater than 105 volts	
	c. At least THREE 120V AC Vital Buses are energized:	
	• 21	
	• 22 • 23]]
	• 24	
	d. EITHER 2Y09 or 2Y10 is energized	
VA-2: Diesel Generators	a. At least ONE 4KV vital bus is energized	
	b. 11, 12, 21 and 22 125V DC Buses, ALL greater than 105 volts	<u></u>
	c. At least THREE 120V AC Vital Buses are energized:	
	• 21	
	• 22 • 23	
	• 24	
	d. EITHER 2Y09 or 2Y10 is energized	
	(continue)	

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VII. SAFETY FUN	Page 43 of 54 INCTION STATUS CHECK	
	SAFETY FUNCTION ACCEPTANCE CRITERIA	
VITAL AUXILIARIES (continued) SUCCESS PATH	ACCEPTANCE CRITERIA	STATUS CHECK
VA-3: SMECO	a. At least ONE 4KV vital bus is energized	
	 b. 11, 12, 21 and 22 125V DC Buses, ALL greater than 105 volts 	
	c. At least THREE 120V AC Vital Buses are energized:	
	• 21 • 22 • 23 • 24	<u></u>
	d. EITHER 2Y09 or 2Y10 is energized	
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VII. SAFETY FUN	CTION STATUS CHECK	EOP-8 Rev 27/Unit 2 Page 44 of 54
RCS PRESSURE	SAFETY FUNCTION ACCEPTANC	E CRITERIA
AND INVENTORY CONTROL		
SUCCESS PATH	ACCEPTANCE CRITERIA	STATUS CHECK
PIC-1: CVCS	a. Pressurizer pressure less than the upper limits of Att. (1)	
	b. Pressurizer level greater than 30 inches	
	c. RCS subcooling is between 25°F and 140°F based on CET temperatures	
	d. Reactor Vessel level above the top of the hot leg	
PIC-2: PORVs or Pressurizer Vent	a. Pressurizer pressure less than 2400 PSIA	
	b. Pressurizer pressure less than the upper limits of Att. (1)	
	 c. RCS subcooling is between 25°F and 140°F based on CET temperatures 	<u> </u>
	d. Pressurizer level greater than 30 inches {90}	<u> </u>
	e. Ractor Vessel level above the top of the hot leg	
	(continue)	
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VII. SAFETY FUNCTION STATUS CHECK

RCS PRESSURE	SAFETY FUNCTION ACCEPTANCE CRITERIA		
CONTROL (continued) SUCCESS PATH	ACCEPTANCE CRITERIA	STATUS CHECK	
PIC-3: Loss Of Vital AC	a. Pressurizer pressure less than the upper limits of Att. (1)		
	 b. RCS subcooling greater than 25°F based on CET temperatures (1) 	<u></u>	
	OR		
	CET temperatures less than 50°F superheated (1)	<u> </u>	
	c. Reactor Vessel level indicates the core is covered		
PIC-4: SIS	a. IF RAS has NOT occurred, AND pressurizer pressure is greater than 1270 PSIA, THEN at least ONE Charging Pump operating		
	b. HPSI and LPSI Pumps are injecting water into the RCS PER Atts. (10) and (11) (2) (3)		
	c. Reactor Vessel level indicates the core is covered		
(2) Limits in Attachm are met.	o Attachment (12) to read CETs. ents (10) and (11) are not required to 1 NOT required post-RAS.	be met if SIS throttle criteria	

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CORE AND RCS	SAFETY FUNCTION ACCEPTANCE CRITERIA	
EAT REMOVAL	ACCEPTANCE CRITERIA	STATUS CHECK
R-1: SG Heat Sink With NO SIS Operation	level between (-)24 inches and (+)30 inches	
	OR S/G level is being restored by feedwater flow	
	 b. IF RCPs are operating, THEN Тиот minus Тошь is less than 10°F 	
	c. IF RCPs are NOT operating, THEN Тют minus Тоор is less than 50°F	
	d. RCS subcooling greater than 25°F based on CET temperatures (1)	
	e. Reactor Vessel level above the top of the hot leg	
1) If needed, refer to	Attachment (12) to read CETs.	
	(continue)	

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VII. SAFETY FUNC	UNCTION STATUS CHECK		
CORE AND RCS	SAFETY FUNCTION ACCEPTANCE CRITERIA		
HEAT REMOVAL (continued) SUCCESS PATH	ACCEPTANCE CRITERIA	STATUS CHECK	
HR-2: SG Heat Sink With SIS Operation	a. At least ONE S/G has level between 0 inches and (+)38 inches		
	OR		
	S/G level is being restored by feedwater flow		
	b. CET temperatures less than 50°F superheated (1)	<u></u>	
	c. IF RAS has NOT occurred, AND pressurizer pressure is greater than 1270 PSIA, THEN at least ONE Charging Pump operating		
	d. HPSI and LPSI Pumps are injecting water into the RCS PER Atts. (10) and (11) (2) (3)		
(2) Limits in Attachme are met.	Attachment (12) to read CETs. nts (10) and (11) are not required to b IOT required post-RAS.	e met if SIS throttle criteria	
	(continue)		

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	SAFETY FUNCTION ACCEPTANCE CRITERIA	
CORE AND RCS HEAT REMOVAL (continued) SUCCESS PATH	ACCEPTANCE CRITERIA	STATUS CHECK
HR-3: Shutdown Cooling System	a. CET temperatures less than 300°F and less than 50°F superheated (1)	
	b. HPSI Pumps are injecting water into the RCS PER AtL (10) (2)	<u></u>
	c. Pressurizer pressure less than 270 PSIA {245}	
	d. Reactor Vessel level indicates the core is covered	
HR-4: Once-Through- Cooling	a. CET temperatures less than 50°F superheated (1)	<u> </u>
	b. IF RAS has NOT occurred, AND HPSI throttle criteria are NOT met, THEN ALL available Charging Pumps operating	
	c. HPSI and LPSI Pumps are injecting water into the RCS PER Atts. (10) and (11) (2) (3)	
	d. Pressurizer pressure less than 1270 PSIA OR is lowering	

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VII. SAFETY FUNCTION STATUS CHECK

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CONTAINMENT ENVIRONMENT SUCCESS PATH	SAFETY FUNCTION ACCEPTANCE CRITERIA		
	ACCEPTANCE CRITERIA	STATUS CHECK	
CE-1: NO CIS	a. Containment pressure less than 2.8 PSIG		
	 b. Containment temperature less than 220°F (1) 		
	c. Containment radiation alarms are clear with NO unexplained rise (2)		
	FOOS due to loss of power.		
	(continue)		

VII. SAFETY FUN	CTION STATUS CHECK	EOP-8 Rev 27/Unit 2 Page 50 of 54	
CONTAINMENT	SAFETY FUNCTION ACCEPTANCE CRITERIA		
ENVIRONMENT (continued) SUCCESS PATH	ACCEPTANCE CRITERIA	STATUS CHECK	
CE-2: Containment Isolation	a. Containment pressure less than 4.25 PSIG		
	 ALL available Containment Air Coolers are operating with maximum SRW flow 		
	c. ALL containment penetrations required to be shut have an isolation valve shut		
	d. Hydrogen concentration less than 0.5% (1)		
	OR		
	ALL available hydrogen recombiners are energized with Hydrogen concentration less than 4.0% (1)		
	OR		
	Hydrogen purge operation per Tech Support recommendation (1)		
(1) Hydrogen concent been able to place	ration acceptance criteria may be omi hydrogen monitors in service.	itted until Chemistry has	
	(continue)		
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ENVIRONMENT (continued) SUCCESS PATH ACCEPTANCE CRITERIA STATUS CHECK CE-3: Containment Spray a. Containment pressure less than 50 PSIG	CONTAINMENT	SAFETY FUNCTION ACCEPTANCE CRITERIA			
Spray less than 50 PSIG b. ALL available Containment Air Coolers are operating with maximum SRW flow c. Containment spray flow is greater than 1350 GPM per pump, if operating d. ALL containment penetrations required to be shut have an isolation valve shut e. Hydrogen concentration less than 0.5% (1) OR ALL available hydrogen recombiners are energized with Hydrogen purge operation per Tech	ENVIRONMENT (continued)	ACCEPTANCE CRITERIA			
Air Coolers are operating with maximum SRW flow C. Containment spray flow is greater than 1350 GPM per pump, if operating		a. Containment pressure less than 50 PSIG			
greater than 1350 GPM per pump, if operating		Air Coolers are operating			
required to be shut have an isolation valve shut e. Hydrogen concentration less than 0.5% (1) OR ALL available hydrogen recombiners are energized with Hydrogen concentration less than 4.0% (1) OR Hydrogen purge operation per Tech	÷	greater than 1350 GPM			
less than 0.5% (1)		required to be shut have			
ALL available hydrogen recombiners are energized with Hydrogen concentration less than 4.0% (1) OR Hydrogen purge operation per Tech					
recombiners are energized with Hydrogen concentration less than 4.0% (1) OR Hydrogen purge operation per Tech		OR			
Hydrogen purge operation per Tech		recombiners are energized with Hydrogen concentration	<u></u>		
operation per Tech		OR			
		Hydrogen purge operation per Tech Support recommendation (1)	<u></u>		

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RADIATION	SAFETY FUNCTION ACCEPTANC	E CRITERIA
LEVELS EXTERNAL TO CONTAINMENT	ACCEPTANCE	STATUS
SUCCESS PATH	CRITERIA	CHECK
RLEC-1:Normal Levels	a. Noble Gas Monitor (2-RIC-5415) alarm clear with NO unexplained rise	
	b. Condenser Off-Gas RMS (2-RI-1752) alarm clear with NO unexplained rise (1)	<u> </u>
	c. S/G B/D RMS (2-RI-4014) alarm clear with NO unexplained rise (1)	
	d. Main Vent Gaseous RMS (2-RI-5415) alarm clear with NO unexplained rise (1)	
(1) NOT applicable if O	OS due to loss of power.	
(1) NOT applicable if O	OS due to loss of power.	

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VIL SAFETY FUNC	TION STATUS CHECK	Rev 27/Unit 2 Page 53 of 54		
RADIATION LEVELS EXTERNAL	SAFETY FUNCTION ACCEPTANCE CRITERIA			
TO CONTAINMENT (continued) SUCCESS PATH	ACCEPTANCE CRITERIA	STATUS CHECK		
RLEC-2:Containment Isolated	a. ALL of the following alarms are clear with NO unexplained rise:			
·	 Noble Gas Monitor (2-RIC-5415) Condenser Off-Gas RMS (2-RI-1752) S/G B/D RMS (2-RI-4014) Main Vent Gaseous RMS (2-RI-5415) 	<u> </u>		
	OR			
	 ALL containment penetrations required to be shut have an isolation valve shut 			
	IF a tube rupture is identified in a S/G:			
	 ALL release paths from the affected S/G to the environment are isolated 	<u> </u>		
	Affected S/G pressure less than 920 PSIA			
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VII. SAFETY FUNCTION STATUS CHECK

 STATUS CHECK NUMBER	COMPLETED AT TIME
1_	
_2	
3	
4	
6	
7	
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PLACEKEEPER FUNCTIONAL RECOVERY ENTRY

INITIAL ENTRY	RECOVERY ACTIONS
PERFORM THE RCP TRIP STRATEGY	 RECOVERY ACTION PRIORITY
 MONITOR S/G ACTIVITY AND 	 Safety Functions NOT meeting their
CONTAINMENT HYDROGEN LEVELS	EOP-8 Acceptance Criteria
 IDENTIFY ALL SUCCESS PATHS 	 Safety Functions NOT met in EOP-0.
DETERMINE IF ACCEPTANCE CRITERIA	AND Safety Functions NOT met in
ARE MET	an Optimal Recovery Procedure
	 ALL remaining Safety Functions
	IMPLEMENT LONG TERM ACTIONS

START	FUNCTION	DONE	PAGE
	A. DETERMINE APPROPRIATE EMERGENCY RESPONSE ACTIONS PER THE ERPIP.	с	8
	B. OBTAIN FUNCTIONAL RECOVERY ENTRY PLACEKEEPER AND RECORD TIME.		8
	C. PERFORM THE RCP TRIP STRATEGY.	С	9
	D. MONITOR S/G ACTIVITY AND CONTAINMENT HYDROGEN LEVELS.		9
	E. DETERMINE STATUS OF SAFETY FUNCTIONS (STA).	с	10
	F. PERFORM RECOVERY ACTIONS.	С	10
	identify success paths AND determine if the Acceptance Criteria are met for ALL Safety Functions Exit the Optimal Recovery Procedure Commence the Recovery Actions with the following priority Safety Functions NOT meeting their EOP-8 Acceptance Criteria		10 10 11
	Safety Functions NOT met in EOP-0, AND Safety Functions NOT met in EOP-0, AND Safety Functions NOT met in an Optimal Recovery Procedure ALL remaining Safety Functions are being performed AND the Acceptance Criteria for each Safety Function is satisfied, THEN PROCEED to Section V., LONG TERM ACTIONS		12

NOTE: Continuously applicable steps are designated with a "C" in the DONE column.

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LONG TERM ACTIONS

START	FUNCTION	DONE	PAGE
	A. DETERMINE PLANT STATUS.	C	13
	B. ATTEMPT TO DETERMINE SPECIFIC EVENT.	C	13
	IF a specific event can be identified, THEN entry into the Optimal Recovery Procedure may be made.		13
	C. IF 500KV OFFSITE POWER WAS LOST, THEN ATTEMPT TO RESTORE POWER TO PLANT LOADS.	c	14
	Tie MCC-204 and 214 Restore power to MCC-201AT and 201BT		15 19
	D. DETERMINE IF RCS COOLDOWN SHOULD CONTINUE.	c	24
	E. ENSURE EQUIPMENT AVAILABILITY AND PLANT CONDITIONS TO SUPPORT RCS COOLDOWN.	с	25
	F. PERFORM PLANT COOLDOWN.		26
	 IF RCS activity will NOT result in unacceptable radiological consequences outside containment, AND CET temperatures are less than 300°F, THEN evaluate initiating Shutdown Cooling PER HR-3 SHUTDOWN COOLING SYSTEM. 		26
	G. IMPLEMENT THE APPROPRIATE PROCEDURE.	+	27

NOTE: Continuously applicable steps are designated with a "C" in the DONE column.

RESOURCE ASSESSMENT

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Salety FL		met in EOP-0	or Optimal R	ecovery Proc	equire
RC-1	VA-1	PIC-1	HR-1	CE-1	RLEC-1
RC-2	VA-2	PIC-2	HR-2	CE-2	RLEC-2
RC-3	VA-3	PIC-3	HR-3	CE-3	
		PIC-4	HR-4		

			Rev 27/Ur Page 1 o
	PPENDIX (1) REACTIVITY CONTR	OL	
R	C-1: CEA INSERTION		
	RECOVERY ACTIONS	ALTERNATE ACTIONS	
A .	MAINTAIN RCS TEMPERATURE.		
1.	IF EITHER of the following conditions exist:		
	WRNI Power greater than 10-4%		
	SUR is positive		
	THEN maintain RCS temperature constant.		
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APPENDIX (1) REACTIVITY CONTRO	÷
RC-1: CEA INSERTION	
RC-1. CEA INSERTION	
RECOVERY ACTIONS	ALTERNATE ACTIONS
B. ESTABLISH REACTIVITY CONTROL BY CEA INSERTION.	
1. Ensure the Reactor has tripped by performing ANY of the following:	
Depress the four local Emergency Trip Buttons on the Trip Circuit Breakers in the Unit 2 Cable Spreading Room	
Depress ONE set of Manual Reactor Trip Buttons	
De-energize the CEDM Motor Generator Sets as follows:	
Open 22A 480V BUS FDR	
Open 22A/22B 480V BUS TIE	
Open 23A 480V BUS FDR	
Open 23A/23B 480V BUS TIE	
NOTE When re-energizing 22A and 23A 480V Buses, the breaker lineup should be returned to that existing prior to the trip.	
 Energize 22A and 23A 480V Buses as follows: 	
a. Energize 22A 480V Bus by closing its normal feeder breaker OR its tie breaker.	
b. Energize 23A 480V Bus by closing its normal feeder breaker OR its tie breaker.	
(continue)	

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APPENDIX (1) REACTIVITY CONTROL RC-1: CEA INSERTION				
RECOVERY ACTIONS	ALTERNATE ACTIONS			
B. (continued)				
 Check NO more than ONE CEA NOT fully inserted. 	2.1 IF ALL CEA indications are lost, THEN perform the following actions:			
	a. Ensure WRNI Power lowering and SUR is negative OR WRNI Power below 10 ⁻⁴ % and SUR is negative or zero.			
	 WHEN at least ONE Vital 4KV Bus has been restored, THEN establish reactivity control as follows: 			
	(1) Sample the RCS to determine boron concentration.			
	(2) Determine if RCS boration is required PER the NEOPs.			
	(3) IF RCS boration is required, THEN borate the RCS to achieve the required shutdown margin PER the selected Core and RCS Heat Removal success path.			
	 2.2 IF more than ONE CEA fails to fully insert, THEN PROCEED to RC-2, <u>BORATION</u> <u>USING CVCS</u>, OR RC-3, <u>BORATION</u> <u>USING SIS</u>. 			

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		EOP-8 Rev 27/Unit 2 Page 4 of 14
A	PPENDIX (1) REACTIVITY CONTR	OL
R	C-1: CEA INSERTION	
	RECOVERY ACTIONS	ALTERNATE ACTIONS
C.	ACCEPTANCE CRITERIA FOR SUCCESS PATH RC-1.	
1.	Check Reactivity Control has been established by EITHER of the following indications: • NO more than ONE CEA NOT fully	1.1 IF Reactivity Control has NOT been established, THEN PROCEED to the next appropriate Reactivity Control Success Path.
	inserted, WRNI power is lowering and SUR is negative.	
	 WRNI power below 10⁻⁴% and SUR is negative or zero 	
2.	WHEN Reactivity Control has been established, THEN PROCEED to the next Safety Function to be performed.	
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APPENDIX (1) REACTIVITY CONTR	OL
RC-2: BORATION USING CVCS	
RECOVERY ACTIONS	ALTERNATE ACTIONS
A. MAINTAIN RCS TEMPERATURE.	
1. IF EITHER of the following conditions exist:	
 WRNI Power greater than 10⁻⁴% SUR is positive 	
THEN maintain RCS temperature constant.	
B. ESTABLISH REACTIVITY CONTROL BY BORATION USING CVCS.	
 Commence boration by performing the following: 	
a. Verify the normal charging flowpath is available for RCS makeup with at least ONE LOOP CHG valve open:	a.1 IF the normal charging path is NOT available, THEN establish charging flowpath to the RCS via the AUX HPSI HDR as follows:
 2-CVC-518-CV 2-CVC-519-CV 	(1) Shut HPSI AUX HDR ISOL valve, 2-SI-656-MOV.
	(2) Open ONE of the HPSI AUX HDR valves:
	 2-SI-617-MOV 2-SI-627-MOV 2-SI-637-MOV 2-SI-647-MOV
	(3) Open SI TO CHG HDR valve, 2-CVC-269-MOV.
	(4) Shut REGEN HX CHG INLET valve, 2-CVC-183, located in the 27 ft West Penetration Room.
(continue)	(continue)

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APPENDIX (1) REACTIVITY CONTROL RC-2: BORATION USING CVCS

RECOVERY ACTIONS

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ALTERNATE ACTIONS

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3.1.a (continued)	B.1.a.1 (continued)
	(5) Shut L/D CNTMT ISOL valves:
	 2-CVC-515-CV 2-CVC-516-CV
	a.2 IF a charging flowpath can NOT be established via the HPSI AUX HDR, THEN perform the following:
	(1) Verify REGEN HX CHG INLET valve, 2-CVC-183, is open.
	(2) Charge through the Loop Charging valves Bypass Valve, 2-CVC-188.
b. Commence RCS boration from the BAST using the CVCS as follows:	b.1 IF BAST is NOT available, THEN align charging pumps to take a suction from the RWT as follows:
(1) Ensure BAST levels remain greater than 10 inches.	(1) Ensure RWT level is greater than 2 feet.
(2) Shut VCT M/U valve, 2-CVC-512-CV.	(2) Open RWT CHG PP SUCT valve, 2-CVC-504-MOV.
(3) Open BA DIRECT M/U valve, 2-CVC-514-MOV.	(3) Shut VCT OUT valve, 2-CVC-501-MOV.
 (4) Open BAST GRAVITY FD valves: 2-CVC-508-MOV 	(4) Start ALL available CHG PPs.
• 2-CVC-509-MOV	(5) Ensure CHG HDR PRESS is greater than RCS pressure.
(5) Verify the M/U MODE SEL SW, 2-HS-210, is in MANUAL.	
(6) Start ALL available BA PPs.	
(7) Shut VCT OUT valve, 2-CVC-501-MOV.	
(8) Start ALL available CHG PPs.	
(9) Ensure CHG HDR PRESS is greater than RCS pressure.	
(continue)	

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APPENDIX (1) REACTIVITY CONTROL RC-2: BORATION USING CVCS

RECOVERY ACTIONS

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ALTERNATE ACTIONS

B.1 (continued) c. IF more than ONE CEA failed to fully insert. THEN borate the RCS to at least 2300 ppm. d. WHEN boration is complete AND WRNI power is less than 10-4% and SUR is negative or zero, THEN secure boration as follows: (1) IF boration was from the BASTs, THEN perform the following actions: (a) Open VCT OUT valve, 2-CVC-501-MOV. (b) Stop the BA PP(s). (c) Shut BA DIRECT M/U valve, 2-CVC-514-MOV. (d) Shut BAST GRAVITY FD valves: 2-CVC-508-MOV 2-CVC-509-MOV ٠ (2) IF boration was from a RWT, THEN perform the following actions: (a) Open VCT OUT valve, 2-CVC-501-MOV. (b) Shut RWT CHG PP SUCT valve, 2-CVC-504-MOV. (3) Return makeup to the VCT PER OI-2B, BORATION, DILUTION AND MAKEUP. 2. Ensure boric acid concentration in makeup water is adequate to maintain required shutdown margin.

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A	PPENDIX (1) REACTIVITY CONTR	OL
R	C-2: BORATION USING CVCS	
	RECOVERY ACTIONS	ALTERNATE ACTIONS
		·····
C.	ACCEPTANCE CRITERIA FOR SUCCESS PATH RC-2.	
1.	Check Reactivity Control has been established by EITHER of the following indications:	1.1 IF Reactivity Control has NOT been established, THEN PROCEED to the next appropriate Reactivity Control Success
	 Boration rate greater than or equal to 40 GPM, WRNI power is lowering and SUR is negative 	Path.
Į	OR	
	 WRNI power below 10⁻⁴% and SUR is negative or zero 	
2.	WHEN Reactivity Control has been established, THEN PROCEED to the next Safety Function to be performed.	

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			EOP-8 Rev 27/Unit 2 Page 9 of 14
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	PPENDIX (1) REACTIVITY CONTR	UL	
R (C-3: BORATION USING SIS		
	RECOVERY ACTIONS	ALTERNATE ACTIONS	
A.	MAINTAIN RCS TEMPERATURE.		
1.	IF EITHER of the following conditions exist:		
	WRNI Power greater than 10-4%		
	SUR is positive		
	THEN maintain RCS temperature constant.		
В.	ESTABLISH REACTIVITY CONTROL BY BORATION USING SIS.	·····	
1.	IF pressurizer pressure is less than or equal to 1725 PSIA as a result of the event OR containment pressure is greater than or equal to 2.8 PSIG, THEN verify SIAS actuation.		
2.	IF SIAS has NOT actuated, THEN establish HPSI flow by performing the following actions:		
	a. Open HPSI MAIN and AUX HDR valves:		
	MAIN • 2-SI-616-MOV • 2-SI-626-MOV • 2-SI-636-MOV • 2-SI-646-MOV		
N	AUX • 2-SI-617-MOV • 2-SI-627-MOV • 2-SI-637-MOV • 2-SI-647-MOV		
	(continue)		

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APPENDIX (1) REACTIVITY CONTROL RC-3: BORATION USING SIS

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.2 (continued) b. Start 21 and 23 HPSI PPs. c. WHEN the "PZR PRESS BLOCK A PERMITTED" alarm is received, THEN block SIAS A. d. WHEN the "PZR PRESS BLOCK B PERMITTED" alarm is received. THEN block SIAS B. e. WHEN pressure is below 1270 PSIA, THEN verify appropriate HPSI flow PER ATTACHMENT(10), HIGH PRESSURE SAFETY INJECTION FLOW. 3. IF SIAS has actuated, THEN perform the following actions: a. Verify the following pumps are running: . • 21 HPSI PP • 23 HPSI PP (continue)

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APPENDIX (1) REACTIVITY CONTR	OL
RC-3: BORATION USING SIS	
RECOVERY ACTIONS	ALTERNATE ACTIONS
B.3 (continued)	
 b. Verify safety injection flow: HPSI flow PER ATTACHMENT(10), <u>HIGH</u> <u>PRESSURE SAFETY INJECTION</u> <u>FLOW</u>, when pressure is below 1270 PSIA 	b.1 Perform the following actions as necessary: <u>CAUTION</u> Operation of two HPSI Pumps on 24 4KV Bus may cause 2B DG loading to exceed
	 3600 KW. IF 21 HPSI PP failed, THEN perform the following actions: IF 2B DG is powering 24 4KV Bus, THEN verify DG load is less than 2960 KW. Start 22 HPSI PP. IF 23 HPSI PP failed, THEN align 22 HPSI PP as follows: Start 22 HPSI PP. Start 22 HPSI PP. (2) Open HPSI HDR XCONN valve, 2-SI-653-MOV. Shut HPSI HDR XCONN valve, 2-SI-655-MOV. Ensure electrical power is available to valves and pumps. Verify safety injection system lineup PER ATTACHMENT (2), <u>SIAS</u> VERIFICATION CHECKLIST.
(continue)	

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APPENDIX (1) REACTIVITY CONTROL RC-3: BORATION USING SIS RECOVERY ACTIONS ALTERNATE ACTIONS B. (continued) 4. Check SIS flow rate is greater than 4.1 IF high RCS pressure is preventing 40 GPM. adequate SIS flow, **THEN** attempt to depressurize the RCS to obtain adequate SIS flow by concurrently performing actions PER the following: **RCS Pressure And Inventory Control** . success paths as necessary The selected Core And RCS Heat Removal success path 5. WHEN ALL of the following conditions can be maintained: • WRNI power is less than 10-4% and SUR is negative or zero At least 25° F subcooling based on **CET** temperatures Pressurizer level greater than 101 inches {141} At least ONE S/G available for heat removal S/G level greater than • (-)170 inches capable of being supplied with feedwater capable of being steamed (continue)

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APPENDIX (1) REACTIVITY CONTROL RC-3: BORATION USING SIS ALTERNATE ACTIONS RECOVERY ACTIONS B.5 (continued) Reactor Vessel level above the top of the hot leg THEN HPSI flow may be reduced by throttling the HPSI HDR valves, or stopping the HPSI PPs one at a time, as desired, to maintain the following: RCS subcooling between 25 and 140° F based on CET temperatures Pressurizer level between 101 inches {141} and 180 inches {190} 6. IF the HPSI throttle criteria can NOT be maintained after the pumps are throttled OR secured, THEN restart the appropriate pumps AND restore full flow.

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APPENDIX (1) REACTIVITY CONTR RC-3: BORATION USING SIS	OL
RECOVERY ACTIONS	ALTERNATE ACTIONS
C. ACCEPTANCE CRITERIA FOR SUCCESS PATH RC-3.	
 Check Reactivity Control has been established by EITHER of the following indications: Boration rate greater than or equal to 40 GPM, WRNI power is lowering and SUR is negative. OR WRNI power below 10⁻⁴% and SUR is negative or zero 	 1.1 IF Reactivity Control has NOT been established. THEN perform the following actions: a. Concurrently perform the Recovery Actions for the next safety function in jeopardy while continuing efforts to establish reactivity control. b. Energize or restore other vital auxiliaries or components necessary to support the reactivity control success paths. c. Attempt manual operation of inoperative valves. d. IF high RCS pressure is preventing adequate SIS flow, THEN attempt to depressurize the RCS to obtain adequate SIS flow by concurrently performing actions PER the following: RCS Pressure And Inventory Control success paths as necessary The selected Core And RCS Heat Removal success path e. Determine the appropriate emergency response actions PER the ERPIP.
 WHEN Reactivity Control has been established, THEN PROCEED to the next Safety Function to be performed. 	

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REACTIVITY CONTROL PLACEKEEPER RC-1: CEA INSERTION

RESOURCE CONDITIONS	ACCEPTANCE CRITERIA
 CEAs are able to be inserted 	NO more than ONE CEA NOT fully
and SUR is negative	inserted, and WRNI power is lowering
OR	OR
 A loss of ALL Vital 4KV Buses 	 WRNI power below 10⁻⁴% and SUR is
may have occurred	negative or zero

START	FUNCTION	DONE	PAGE
	A. MAINTAIN RCS TEMPERATURE.		1
	 IF EITHER of the following conditions exist: WRNI Power greater than 10^{4%} SUR is positive THEN meintain RCS temperature constant. 		1
	B. ESTABLISH REACTIVITY CONTROL BY CEA INSERTION.		2
	 Check NO more than ONE CEA NOT fully inserted 		3
	C. ACCEPTANCE CRITERIA FOR SUCCESS PATH RC-1.		4
	 IF Reactivity Control has NOT been established, THEN PROCEED to the next appropriate Reactivity Control Success Path. 		4

NOTE: Continuously applicable steps are designated with a "C" in the DONE column.

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REACTIVITY CONTROL PLACEKEEPER RC-2: BORATION USING CVCS

RESOURCE CONDITIONS	ACCEPTANCE CRITERIA
Charging pump is available for boron	Boration rate greater than or equal to
addition	40 GPM, WRNI power is lowering, and
 Boric acid source is available: 	SUR is negative
BAST	OR
RWT	 WRNI power below 10⁻⁴% and SUR is
 Charging path is available via normal 	negative or zero
flow path or SIS flow path	1

START	FUNCTION	DONE	PAGE
	A. MAINTAIN RCS TEMPERATURE.		5
	 IF EITHER of the following conditions exist: WRNI Power greater than 10^{-4%} SUR is positive THEN maintain RCS temperature constant. 		5
	B. ESTABLISH REACTIVITY CONTROL BY BORATION USING CVCS.		5
	Commence boration		5
	C. ACCEPTANCE CRITERIA FOR SUCCESS PATH RC-2.		8
	IF Reactivity Control has NOT been established, THEN PROCEED to the next appropriate Reactivity Control Success Path.		8

NOTE: Continuously applicable steps are designated with a "C" in the DONE column

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REACTIVITY CONTROL PLACEKEEPER RC-3: BORATION USING SIS

- RESOURCE CONDITIONS • HPSI pump is available for boron addition
- ACCEPTANCE CRITERIA
- Boration rate greater than or equal to 40 GPM, WRNI power is lowering, and SUR is negative
- RWT is available as boric acid source
 A flow path is available

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OR ● WRNI power below 10⁻⁴% and SUR is negative or zero

START	FUNCTION	DONE	PAGE
	A. MAINTAIN RCS TEMPERATURE.		. 9
	 IF EITHER of the following conditions exist: WRNI Power greater than 10^{-4%} SUR is positive THEN maintain RCS temperature constant. 		9
	B. ESTABLISH REACTIVITY CONTROL BY BORATION USING SIS.	с	9
	 IF RCS pressure is less than 1725 PSIA, OR containment pressure is greater than 2.8 PSIG THEN verify SIAS actuation. 		9
	 OR Align HPSI injection and block SIAS. 		9
	 IF high RCS pressure is preventing SIS flow, THEN attempt to depressurize the RCS: RCS Pressure And Inventory Control success paths as necessary The selected Core And RCS Heat Removal success path 	-	12
	C. ACCEPTANCE CRITERIA FOR SUCCESS PATH RC-3		14
	 IF Reactivity Control has NOT been established, THEN perform the following actions: Concurrently perform the Recovery actions for the next safety function in jeopardy Restore other vital auxiliaries or components Attempt manual operation of inoperative valves IF high RCS pressure prevents SIS injection flow, THEN attempt to lower plant pressure Determine the appropriate emergency response actions PER the ERPIP 		14

NOTE: Continuously applicable steps are designated with a "C" in the DONE column

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APPENDIX (2) VITAL AUXILIARIES VA-1: 500KV OFFSITE POWER **RECOVERY ACTIONS ALTERNATE ACTIONS** Α. **IF 500KV OFFSITE POWER HAS BEEN** LOST, THEN ALIGN THE ELECTRICAL SYSTEM FOR POWER RESTORATION. 1. IF 21 13KV Service Bus is NOT energized, THEN ensure the following 13KV breakers are open: 21 SERV BUS 13KV FDR, 252-2104 • • 21 SERV BUS TIE, 252-2105 • U-4000-21 13KV FDR, 252-2102 • U-4000-22 13KV FDR, 252-2103 U-4000-23 13KV FDR, 252-2101 Locally at the U-2 13KV SWGR House, SITE POWER FDR BREAKER (to 0X04), 252-2106 2. IF 11 13KV Service Bus is NOT energized, THEN ensure the following 13KV breakers are open: 11 SERV BUS 13KV FDR, 252-1104 . 11 SERV BUS TIE, 252-1105 • U-4000-12 13KV FDR, 252-1103 U-4000-11 13KV FDR, 252-1102 U-4000-13 13KV FDR, 252-1101 ٠ Locally at the U-1 13KV SWGR • House, SITE POWER FDR BREAKER (to 0X03), 252-1106 (continue)

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APPENDIX (2) VITAL AUXILIARIES VA-1: 500KV OFFSITE POWER

RECOVERY ACTIONS

ALTERNATE ACTIONS

A. (continued) 3. IF 21 4KV Vital Bus is NOT energized, THEN perform the following actions: Ensure the following 4KV breakers are open: 21 4KV BUS NORMAL FDR, 152-2101 • 21 4KV BUS ALT FDR, 152-2115 SWYD SERV XFMR 4KV FDR, 152-2113 CAUTION Handswitches should NOT be placed in PULL TO LOCK while performing breaker position verification. Verify the following 4KV Vital Bus load breakers are open: No. 21 Low Press Safety Inj. Pump, 152-2104 No. 21 Salt Water Pump, 152-2105 No. 21 Containment Spray Pump, 152-2107 • No. 21 High Press Safety Inj. Pump, 152-2108 No. 23 High Press Safety Inj. Pump, 152-2110 No. 23 Service Water Pump, 152-2111 No. 23 Salt Water Pump, 152-2112 (continue)

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APPENDIX (2) VITAL AUXILIARIES VA-1: 500KV OFFSITE POWER **RECOVERY ACTIONS ALTERNATE ACTIONS** A.3 (continued) . Place the 21 4KV BUS LOCI/SD SEQUENCER MANUAL INITIATE keyswitch in ON 4. IF 24 4KV Vital Bus is NOT energized, THEN perform the following actions: Ensure the following 4KV breakers are open: 24 4KV BUS NORMAL FDR. 152-2401 • 24 4KV BUS ALT FDR, 152-2414 CAUTION Handswitches should NOT be placed in PULL TO LOCK while performing breaker position verification. Verify the following 4KV Vital Bus load • breakers are open: No. 22 Low Press Safety Inj. Pump, 152-2404 No. 22 Salt Water Pump, 152-2405 No. 22 Containment Spray Pump, 152-2407 No. 22 High Press Safety Inj. Pump, 152-2408 • No. 23 High Press Safety Inj. Pump, 152-2410 No. 23 Service Water Pump, • 152-2411 (continue)

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APPENDIX (2) VITAL AUXILIARIES VA-1: 500KV OFFSITE POWER

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RECOVERY ACTIONS

ALTERNATE ACTIONS

A.4 (continued)	
 No. 23 Salt Water Pump, 152-2412 	
• AFW PP No. 23, 152-2415	
 Place the 24 4KV BUS LOCI/SD SEQUENCER MANUAL INITIATE keyswitch in ON 	
(continue)	

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APPENDIX (2) VITAL AUXILIARIES VA-1: 500KV OFFSITE POWER

RECOVERY ACTIONS

ALTERNATE ACTIONS

A. (continued)

CAUTION

The following step provides actions to prevent water hammer damage from CAC voiding.

CAUTION

SRW Pumps start when power is restored to the associated 4KV Bus.

- IF CSAS has actuated, AND EITHER SRW Header is NOT in operation, THEN perform the following actions:
 - a. IF 21 SRW Header is idle, THEN restart 21 SRW Header as follows:
 - (1) Check that Containment Pressure has remained less than 25 PSIG with 21 SRW Header idle.
 - (2) Attempt to start the desired SRW PP on 21 SRW Header.
- a.1 IF Containment Pressure exceeded 25 PSIG, THEN perform the following actions:

CAUTION

2A DG SRW flow is less than SRW PP minimum flow requirements. This step permits restoration of SRW to supply 2A DG.

WARNING

High radiation levels may exist in the Auxiliary Building. RAS may significantly raise existing radiation levels.

- (1) Restart 21 SRW Header:
 - (a) Shut 21 CAC MAN SUPP 21 SRW SUBSYS, 2-SRW-135, located 27 ft East Pen Room.
 - (b) Shut 22 CAC MAN SUPP 21 SRW SUBSYS, 2-SRW-142, located 5 ft West Pen Room.
 - (c) Attempt to start the desired SRW PP on 21 SRW Header.

(continue)

(continue)

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APPENDIX (2) VITAL AUXILIARIES VA-1: 500KV OFFSITE POWER **RECOVERY ACTIONS ALTERNATE ACTIONS** A.5.a.1(1) (continued) A.5.a (continued) (d) Consult with the Plant Technical Support Center for guidance on system restoration. (2) IF 21 SRW Header can NOT be restarted, THEN perform the following actions: (a) Place the SRW PP(s) aligned to 21 SRW Header in PULL TO LOCK. (b) Place 2A DG OUT BKR, 152-2103, in PULL TO LOCK. (c) Locally trip the 2A DG fuel racks by pushing the EMERGENCY STOP PUSH TO STOP ENGINE trip device. (d) Consult with the Plant Technical Support Center for guidance on system restoration. (continue)

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APPENDIX (2) VITAL AUXILIARI	Page 7 of 72
VA-1: 500KV OFFSITE POWER RECOVERY ACTIONS	ALTERNATE ACTIONS
A.5 (continued)	
 b. IF 22 SRW Header is idle, THEN restart 22 SRW Header as follows: 	b.1 IF Containment Pressure exceeded 10 PSIG, THEN perform the following actions:
(1) Check that Containment Press has remained less than 10 PS with 22 SRW Header idle.	IG <u>CAUTION</u> 2B DG SRW flow is less than SRW PP
(2) Attempt to start the desired SR PP on 22 SRW Header.	minimum flow requirements. This stepWpermits restoration of SRW to supply 2BDG.
	<u>WARNING</u> High radiation levels may exist in the Auxiliary Buikding. RAS may significantly raise existing radiation levels.
	(1) Restart 22 SRW Header:
	(a) Shut 23 CAC MAN SUPP 22 SRW SUBSYS, 2-SRW-149, located 27 ft East Pen Room.
	(b) Shut 24 CAC MAN SUPP 22 SRW SUBSYS, 2-SRW-156, located 5 ft West Pen Room.
	(c) Attempt to start the desired SRW PP on 22 SRW Header.
•	(d) Consult with the Plant Technical Support Center for guidance on system restoration.
(continue)	(continue)

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APPENDIX (2) VITAL AUXILIARIE	S
VA-1: 500KV OFFSITE POWER	
RECOVERY ACTIONS	ALTERNATE ACTIONS
A.5.b (continued)	A.5.b.1 (continued)
	(2) IF 22 SRW Header can NOT be restarted, THEN perform the following actions
	(a) Place the SRW PP(s) aligned to 22 SRW Header in PULL TO LOCK.
	(b) Place 2B DG OUT BKR, 152-2403, in PULL TO LOCK.
	(c) Locally trip the 2B DG fuel racks by pushing the EMERGENCY STOP PUSH TO STOP ENGINE trip device.
	(d) Consult with the Plant Technical Support Center for guidance on system restoration.
B. MAINTAIN VITAL AUXILIARIES BY SUPPLYING POWER FROM 500KV OFFSITE POWER.	
 IF power is NOT expected to be restored to at least ONE 4KV Vital Bus within 30 minutes, THEN perform the following actions: 	
a. Open the Control Room panel bench board lower front covers.	
 Remove the front and back covers of the Control Room DG Control Consoles. 	
(continue)	

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APPENDIX (2) VITAL AUXILIARIES VA-1: 500KV OFFSITE POWER

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.1 (continued)

NOTE

The Plant Computer and its associated inverter, 2Y05A, must be shed from the DC buses within 30 minutes into the blackout if control room air conditioning is lost, **OR** if 22 AND 14 battery chargers are lost.

- c. Determine whether Unit 2 Plant Computer is functional by observing the following:
 - Time indication updating on the CRT
 - CRT responding to function keys depressed or items selected from menu
- IF Unit 2 Plant Computer is functioning, THEN shutdown the Unit 2 Plant Computer at the Digital Decwriter III, located in the 45 ft computer room, as follows:
 - (1) Depress the Shift key and type "@@A".
 - (2) Observe the message and the "ENTER YOUR OWNERNAME:" prompt.
 - (3) Type "GUEST1" and depress the Return key.
 - (4) Observe the "ENTER KEY" response.
 - (5) Depress the Return key.
 - (6) Observe the message (8 lines) and the "TSM>" prompt.
 - (7) Type "KILLER" and depress the Return key.

(continue)

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APPENDIX (2) VITAL AUXILIARIES VA-1: 500KV OFFSITE POWER

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.1.d (continued)

- (8) Observe the messages (several pages) and the "TSM>" prompt.
- (9) Type "X" and depress the Return key.
- (10) Observe two lines of statistics followed by a third line "RING IN FOR SERVICE".
- (11) Depress the Shift key and type "@@P".
- (12) Observe the "//" prompt.
- (13) Type "HALT" and depress the Return key.

NOTE

"NNNNNNN" in the following response may be any number.

- (14) Observe "PSW NNNNNNN ISNT NNNNNNN HALT", followed by "//".
- e. Open the following power sources, located in the Unit 2 Cable Spreading Room:
 - Instrument Bus Switch 2Y10-80
 (Computer Inverter 2Y05)
 - Unit 2 DAS/Computer Inverter Output Breaker at 2Y05
 - Unit 2 DAS/Computer Inverter Battery Input Breaker at 2Y05

(continue)

RECOVERY ACTIONS	ALTERNATE ACTIONS
B. (continued)	
<u>CAUTION</u> Attempts should NOT be made to reenergize a bus if a fault is suspected.	
 IF the 500KV Red and Black Buses are NOT energized, THEN energize the 500KV Red Bus OR the 500KV Black Bus by performing the following actions: 	2.1 IF 500KV offsite power is NOT available, THEN PROCEED to VA-2, EMERGENCY DIESEL GENERATOR, OR VA-3, <u>SMECO</u> .
a. Verify that switching orders have been received by the Control Room Supervisor OR Shift Manager, from the SO-TSO, to operate the required equipment.	
 Evaluate alarms associated with the 500KV switchyard. 	
 Verify the associated Unit Generator High Side Line Disconnect is open before closing Turbine Generator Output breakers. 	
d. Verify the Unit-2 Generator Coast Down Lockout is reset.	
e. Place the SYNCHROSCOPE SEL Switch in NORMAL (1) OR EMERGENCY (2) position.	
(continue)	

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APPENDIX (2) VITAL AUXILIARIES VA-1: 500KV OFFSITE POWER

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.2 (continued)

<u>NOTE</u>

A Synchronizer is **NOT** required for operation of breakers 552-41 **OR** 552-43.

- f. Place the applicable SYNCHRONIZER SEL Switch in MANUAL position.
 - (552-21) 11 GEN SYNCHRONIZER SEL Switch
 (552-22) 11 CEN
 - (552-22) 11 GEN
 SYNCHRONIZER SEL Switch
 - (552-23) 11 GEN
 SYNCHRONIZER SEL Switch
 (552-61) 21 GEN
 - (552-61) 21 GEN
 SYNCHRONIZER SEL Switch
 (552-62) 21 GEN
 (552-62) 21 GEN
 - SYNCHRONIZER SEL Switch (552-63) 21 GEN SYNCHRONIZER SEL Switch
- g. Insert the sync stick in the sync jack at the breaker to be closed.
- IF paralleling TWO power sources, THEN ensure the power sources are synchronized by observing the following:
 - Sync lights out
 - Synchroscope at 12 o'clock
 - Running and incoming voltages
 are matched
- i. IF closing in on a de-energized bus, THEN ensure the bus is NOT energized.
- j. Close the breaker by placing the Breaker Control Handswitch in the CLOSE position AND release.

(continue)

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APPENDIX (2) VITAL AUXILIARIES VA-1: 500KV OFFSITE POWER

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.2 (continued)

- k. Check the breaker has closed by observing applicable breaker indicating lights and meters, if applicable.
- I. Repeat steps B.1.a through B.1.k as desired to close additional breakers.
- m. Remove the sync stick AND return to Home Base.
- n. Verify **BOTH** SYNCHRONIZER SEL Switches in the OFF position.
- o. Place the SYNCHROSCOPE SEL Switch in the OFF position.
- WHEN operation has been completed in accordance with the switching orders,
 THEN inform the SO-TSO.
- q. Reset the 13KV BUS 22 OR 12 286 LOCKOUT/RESET DEVICE as applicable.
- r. Reset the applicable bus 247/B device target flags on **BOTH** undervoltage relays:

13KV BUS 22

- B-22-P
- B-22-B

13KV BUS 12

- B-12-P
- B-12-B

(continue)

	DIX (2) VITAL AUXILIARIES 00KV OFFSITE POWER		EOP-8 Rev 27/Unit 2 Page 14 of 72
	RECOVERY ACTIONS	ALTERNATE ACTIONS	
B. (continu	ued)	· · · · · · · · · · · · · · · · · · ·	
	<u>CAUTION</u> should NOT be made to e a bus if a fault is suspected.		
NOT e THEN	and 11 13KV Service Buses are nergized, energize the desired 13KV Service performing the following actions:		
Se	it is desired to energize 21 13KV rvice Bus, EN perform the following actions:		
(1)	Verify 22 13KV Service Bus is energized.		
(2)	Energize 21 13KV Service Bus by closing 21 SERV BUS 13KV FDR, 252-2104.		
(3)	Reset the 13KV BUS 21 286 LOCKOUT/RESET DEVICE.		
(4)	Reset the 247/B device target flags on BOTH undervoltage relays:		
	• B-21-P • B-21-B		
(5)	IF MCC 216T is de-energized, THEN place the following LTC Drive Power Selector Switches in ALT:		
	 2H2101REG 2H2102REG 2H2103REG 		
	(continue)		

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APPENDIX (2) VITAL AUXILIARIES VA-1: 500KV OFFSITE POWER

RECOVERY ACTIONS

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ALTERNATE ACTIONS

B.3 (continued) b. IF it is desired to energize 11 13KV Service Bus, THEN perform the following actions: (1) Verify 12 13KV Service Bus is energized. (2) Energize 11 13KV Service Bus by closing 11 SERV BUS 13KV FDR, 252-1104. (3) Reset the 13KV BUS 11 286 LOCKOUT/RESET DEVICE. (4) Reset the 247/B device target flags on BOTH undervoltage relays: B-11-P . • B-11-B (5) IF MCC 116T is de-energized, THEN place the following LTC Drive Power Selector Switches in ALT: 1H1101REG • 1H1102REG . 1H1103REG (continue)

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APPENDIX (2) VITAL AUXILIARIES VA-1: 500KV OFFSITE POWER 1 **ALTERNATE ACTIONS RECOVERY ACTIONS** B. (continued) CAUTION Attempts should NOT be made to reenergize a bus if a fault is suspected. 4. Energize the desired U4000 SERV XFMRs. a. IF it is desired to energize U4000-22 SERV XFMR, THEN perform the following actions: (1) Verify the following breakers are open: 24 4KV BUS NORMAL FDR, 152-2401 21 4KV BUS ALT FDR. 152-2115 22 4KV BUS NORMAL FDR, 152-2201 23 4KV BUS NORMAL FDR. . 152-2311 (2) Close the U4000-22 SERV XFMR 13KV FDR, 252-2103. b. IF it is desired to energize U4000-12 SERV XFMR, THEN perform the following actions: (1) Verify the following breakers are open: 24 4KV BUS ALT FDR. . 152-2414 21 4KV BUS NORMAL FDR, 152-2101 22 4KV BUS ALT FDR, 152-2209 23 4KV BUS ALT FDR, 152-2301 (2) Close the U4000-12 SERV XFMR 13KV FDR, 252-1103. (continue)

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APPENDIX (2) VITAL AUXILIARIES VA-1: 500KV OFFSITE POWER **RECOVERY ACTIONS** ALTERNATE ACTIONS B. (continued) CAUTION Attempts should NOT be made to reenergize a bus if a fault is suspected. 5. IF 21 and 24 4KV Vital Buses are NOT energized. THEN restore power to at least ONE 4KV Vital Bus from the 13KV Service Buses as follows: a. Shut CC CNTMT SUPP valve, 2-CC-3832-CV. b. IF it is desired to energize 21 4KV Vital Bus from U4000-22 SERV XFMR, THEN energize 21 4KV Vital Bus as follows: (1) Place 2A DG OUT BKR, 152-2103, in PULL TO LOCK. (2) Verify 21 4KV BUS NORMAL FDR, 152-2101, is open. (3) Insert the sync stick into the sync jack at the 21 4KV BUS ALT FDR, 152-2115. (4) Close the 21 4KV BUS ALT FDR. 152-2115. (5) Remove the sync stick AND return to Home Base. (6) WHEN 21 4KV Bus sequencing is complete, THEN place the 21 4KV BUS LOCI/SD SEQUENCER MANUAL INITIATE keyswitch in NORM. (continue)

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APPENDIX (2) VITAL AUXILIARIES VA-1: 500KV OFFSITE POWER **RECOVERY ACTIONS ALTERNATE ACTIONS** B.5 (continued) c. IF it is desired to energize 24 4KV Vital Bus from U4000-22 SERV XFMR, THEN energize 24 4KV Vital Bus as follows: (1) Place 2B DG OUT BKR, 152-2403, in PULL TO LOCK. (2) Place 23 AFW PP in PULL TO LOCK. (3) Verify the 24 4KV BUS ALT FDR, 152-2414, is open. (4) Insert the sync stick into the sync jack at the 24 4KV BUS NORMAL FDR, 152-2401. (5) Close the 24 4KV BUS NORMAL FDR, 152-2401. (6) Remove the sync stick AND return to Home Base. (7) WHEN 24 4KV Bus sequencing is complete, THEN place the 24 4KV BUS LOCI/SD SEQUENCER MANUAL INITIATE keyswitch in NORM. (continue)

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APPENDIX (2) VITAL AUXILIARIES VA-1: 500KV OFFSITE POWER **RECOVERY ACTIONS ALTERNATE ACTIONS** B.5 (continued) d. JF it is desired to energize 21 4KV Vital Bus from U4000-12 SERV XFMR, THEN energize 21 4KV Vital Bus as follows: (1) Place 2A DG OUT BKR, 152-2103, in PULL TO LOCK. (2) Verify 21 4KV BUS ALT FDR, 152-2115, is open. (3) Insert the sync stick into the sync jack at the 21 4KV BUS NORMAL FDR, 152-2101. (4) Close the 21 4KV BUS NORMAL FDR, 152-2101. (5) Remove the sync stick AND return to Home Base. (6) WHEN 21 4KV Bus sequencing is complete, THEN place the 21 4KV BUS LOCISD SEQUENCER MANUAL INITIATE keyswitch in NORM. (continue)

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APPENDIX (2) VITAL AUXILIARIES VA-1: 500KV OFFSITE POWER

RECOVERY ACTIONS

ALTERNATE ACTIONS

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3.5 (a	ontini	ued)	
e.	Bus THI	is desired to energize 24 4KV Vital from U4000-12 SERV XFMR, EN energize 24 4KV Vital Bus as ws:	
	(1)	Piace 28 DG OUT 8KR, 152-2403, in PULL TO LOCK.	
	(2)	Place 23 AFW PP in PULL TO LOCK.	·
	(3)	Verify 24 4KV BUS NORMAL FDR, 152-2401, is open.	
	(4)	Insert the sync stick into the sync jack at the 24 4KV BUS ALT FDR, 152-2414.	
	(5)	Close the 24 4KV BUS ALT FDR, 152-2414.	
	(6)	Remove the sync stick AND return to Home Base.	
	(7)	WHEN 24 4KV Bus sequencing is complete, THEN place the 24 4KV BUS LOCI/SD SEQUENCER MANUAL INITIATE keyswitch in NORM.	
	ANY 5 vol	125V DC Bus is less than ts:	
• • •	11 12 21 22		
LC	SS C	concurrently perform AOP-7J, DF 120V VITAL AC OR 125V DC POWER.	
		(continue)	

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APPENDIX (2) VITAL AUXILIARIES VA-1: 500KV OFFSITE POWER

RECOVERY ACTIONS

ALTERNATE ACTIONS

B. (continued) 7. IF less than THREE 120V AC Vital Buses are energized: 21 • • 22 • 23 • 24 THEN concurrently perform AOP-7J, LOSS OF 120V VITAL AC OR 125V VITAL DC POWER. 8. IF at least ONE set of 480V Vital AC Buses is NOT energized: 21A and 21B 24A and 24B THEN restore power to at least ONE set of buses concurrently PER OI-27D, STATION POWER 480V SYSTEM. (continue)

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APPENDIX (2) VITAL AUXILIARIES VA-1: 500KV OFFSITE POWER

RECOVERY ACTIONS

ALTERNATE ACTIONS

B. (continued) 9. IF 2Y09 and 2Y10 are NOT energized, THEN restore power to at least ONE bus as follows: a. Energize 2Y09 through its Main Feeder Breaker by performing the following actions: (1) Verify MCC-214R is energized. (2) Close the Instrument Bus Transformer 21 Feeder Breaker, 52-21429. (3) Close the Main Feeder Breaker, 1, on 2Y09. b. Energize 2Y10 through its Main Feeder Breaker by performing the following actions: (1) Verify MCC-204R is energized. (2) Close the Transformer 2X09 Inst. AC Bus 22 (2Y10) Feeder Breaker, 52-20429. (3) Close the Main Feeder Breaker, 77, on 2Y10. 10. Verify at least ONE 125V DC Battery Charger is energized for each battery PER OF-26A, 125 VOLT VITAL DC.

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APPENDIX (2) VITAL AUXILIARIES	
VA-1: 500KV OFFSITE POWER	
RECOVERY ACTIONS	ALTERNATE ACTIONS
C. VERIFY THE SHUTDOWN SEQUENCER LOADS ARE OPERATING AND RESTORE AUXILIARIES.	
1. Check the following Shutdown Sequencer Loads are operating:	1.1 Concurrently restore the appropriate equipment as follows:
At least ONE SRW PP AND at least ONE SW PP on the same header	 Service Water Pumps PER AOP-7B, LOSS OF SERVICE WATER
11 or 12 Control Room Ventilation	Saltwater Pumps PER AOP-7A, LOSS OF SALTWATER COOLING
Switchgear Room Ventilation	 Control Room Ventilation PER 0I-22F, CONTROL ROOM AND
72' Computer Room Ventilation	CABLE SPREADING ROOMS VENTILATION
	Switchgear Room Ventilation PER OI-22H, <u>SWITCHGEAR VENTILATION AND AIR CONDITIONING </u>
	72' Computer Room Ventilation PER OI-22B, <u>AUXILIARY BUILDING &</u> WASTE PROCESSING AREA VENTILATION
<u>NOTE</u> 2A or 2B DG will require a SRW and a SW Pump running on its associated supply header.	
2. IF 2A or 2B DG is running, THEN verify SRW/SW cooling is supplied to the running DG.	2.1 IF SRW/SW cooling can NOT be restored to a running DG, THEN locally trip the DG fuel racks by pushing the EMERGENCY STOP PUSH TO STOP ENGINE trip device.
(continue)	

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EOP-8 Rev 27/Unit 2 Page 24 of 72 **APPENDIX (2) VITAL AUXILIARIES** VA-1: 500KV OFFSITE POWER **RECOVERY ACTIONS ALTERNATE ACTIONS** C. (continued) 3. IF SIAS has NOT actuated. 3.1 IF NO IA COMPRs are running THEN check at least ONE IA COMPR is AND SIAS has NOT actuated, running. THEN restart an IA COMPR PER OI-19. **INSTRUMENT AIR.** 4. IF Component Cooling Flow has been lost. THEN restore flow. a. Verify CC CNTMT SUPP valve, 2-CC-3832-CV, is shut. b. Start a CC PP. c. Verify the CC HX in service is being supplied from an operating Saltwater Header. NOTE RCP CBO and LOWER SEAL temperatures may be obtained from computer trend block 9. d. Record the highest attained RCP CBO and LOWER SEAL temperatures for each RCP: • 21A RCP: °F/__ °F •F/____ • 21B RCP: _ ۰F ۰Ē • 22A RCP: _ •F/___ ___•F/__ ۰F (continue)

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APPENDIX (2) VITAL AUXILIARIES VA-1: 500KV OFFSITE POWER

RECOVERY ACTIONS

ALTERNATE ACTIONS

C.4 (continued)

<u>CAUTION</u> Uncontrolled restoration of cooling to hot RCP seals may cause a water hammer and could result in thermal shock of the RCP seal coolers.

- e. IF ALL RCP LOWER SEAL temperatures are less than 280° F, AND the RCP Controlled Bleed-off temperatures have been recorded, THEN open CC CNTMT SUPP valve, 2-CC-3832-CV.
- f. IF ANY RCP LOWER SEAL temperature is greater than 280° F, AND the RCP Controlled Bleed-off temperatures have been recorded, THEN perform the following actions:
 - (1) Shut CONTAINMENT SUPPLY HEADER ISOLATION valve, 2-CC-284, located in the 5 ft East Penetration Room.
 - (2) Open CC CNTMT SUPP valve, 2-CC-3832-CV.
 - (3) Slowly open 2-CC-284 to restore component cooling flow.

(continue)

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APPENDIX (2) VITAL AUXILIARIES VA-1: 500KV OFFSITE POWER

RECOVERY ACTIONS

ALTERNATE ACTIONS

C. (continued)

<u>CAUTION</u> Attempts should NOT be made to re-energize a bus if a fault is suspected.

- 5. IF 2Y09 OR 2Y10 is NOT energized, THEN restore the affected Instrument Bus as follows:
 - a. IF 2Y09 is de-energized, THEN Tie 2Y09 to 2Y10:
 - (1) On 2Y09, open INSTR. TRANSF. 21 2X08 main feeder breaker 1.
 - (2) On 2Y10, close BUS TIE 208/120V INSTR. BUS 21 Breaker 78.
 - (3) Place the 2Y09-2Y10 BUS TIE Switch 2SY09, located between 2Y09 and 2Y10, to ON.

b. IF 2Y10 is de-energized, THEN Tie 2Y10 to 2Y09:

- (1) On 2Y10, open INSTR. TRANSF. 22 2X09 main feeder breaker 77.
- (2) On 2Y10, close BUS TIE 208/120V INSTR. BUS 21 Breaker 78.
- (3) Place the 2Y09-2Y10 BUS TIE Switch 2SY09, located between 2Y09 and 2Y10, to ON.
- IF equipment needed to maintain Safety Functions is available from a de-energized bus,
 AND a power supply is available,

THEN energize the bus, AND restore the needed equipment.

ALTERNATE ACTIONS
1.1 IF Vital Auxiliaries has NOT been satisfied, THEN PROCEED to the next appropriate Vital Auxiliaries Success Path.

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Page 28 c	
APPENDIX (2) VITAL AUXILIARIES	
VA-2: EMERGENCY DIESEL GENERATOR	
RECOVERY ACTIONS ALTERNATE ACTIONS	
A. ALIGN THE ELECTRICAL SYSTEM FOR POWER RESTORATION.	
1. IF 21 4KV Vital Bus is NOT energized, THEN perform the following actions:	
 Ensure the following 4KV breakers are open: 	
 21 4KV BUS NORMAL FDR, 152-2101 	
• 21 4KV BUS ALT FDR, 152-2115	
SWYD SERV XFMR 4KV FDR, 152-2113	
(continue)	

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APPENDIX (2) VITAL AUXILIARIES VA-2: EMERGENCY DIESEL GENERATOR

RECOVERY ACTIONS

ALTERNATE ACTIONS

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A.1 (continued)

<u>CAUTION</u> Handswitches should NOT be placed in PULL TO LOCK while performing breaker position verification.

- Verify the following 4KV Vital Bus load breakers are open:
 - No. 21 Low Press Safety Inj. Pump, 152-2104
 - No. 21 Satt Water Pump, 152-2105
 - No. 21 Containment Spray Pump, 152-2107
 - No. 21 High Press Safety Inj. Pump, 152-2108
 - No. 23 High Press Safety Inj. Pump, 152-2110
 - No. 23 Service Water Pump, 152-2111
 - No. 23 Salt Water Pump, 152-2112

(continue)

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APPENDIX (2) VITAL AUXILIARIES VA-2: EMERGENCY DIESEL GENERATOR RECOVERY ACTIONS ALTERNATE ACTIONS A. (continued) 2. IF 24 4KV Vital Bus is NOT energized, THEN perform the following actions: Ensure the following 4KV breakers are open: 24 4KV BUS NORMAL FDR, 152-2401 • 24 4KV BUS ALT FDR, 152-2414 CAUTION Handswitches should NOT be placed in PULL TO LOCK while performing breaker position verification. Verify the following 4KV Vital Bus load • breakers are open: No. 22 Low Press Safety Inj. Pump, 152-2404 No. 22 Salt Water Pump, 152-2405 No. 22 Containment Spray Pump, 152-2407 No. 22 High Press Safety Inj. Pump, 152-2408 • No. 23 High Press Safety Inj. Pump, 152-2410 No. 23 Service Water Pump, 152-2411 No. 23 Salt Water Pump, 152-2412

• AFW PP No. 23, 152-2415

(continue)

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APPENDIX (2) VITAL AUXILIARIES			
VA-2: EMERGENCY DIESEL GENERATOR			
RECOVERY ACTIONS	ALTERNATE ACTIONS		
A. (continued)			
<u>CAUTION</u> The following step provides actions to prevent water hammer damage from CAC voiding.			
<u>CAUTION</u> SRW Pumps start when power is restored to the associated 4KV Bus.			
3. IF CSAS has actuated, AND EITHER SRW Header is NOT in operation, THEN perform the following actions:			
a. IF 21 SRW Header is idle, THEN restart 21 SRW Header as follows:	a.1 IF Containment Pressure exceeded 25 PSIG, THEN perform the following actions:		
 Check that Containment Pressure has remained less than 25 PSIG with 21 SRW Header idle. Attempt to start the desired SRW PP on 21 SRW Header. 	<u>CAUTION</u> 2A DG SRW flow is less than SRW PP minimum flow requirements. This step permits restoration of SRW to supply 2A DG.		
	<u>WARNING</u> High radiation levels may exist in the Auxiliary Building. RAS may significantly raise existing radiation levels.		
	(1) Restart 21 SRW Header:		
	(a) Shut 21 CAC MAN SUPP 21 SRW SUBSYS, 2-SRW-135, located 27 ft East Pen Room.		
	(b) Shut 22 CAC MAN SUPP 21 SRW SUBSYS, 2-SRW-142, located 5 ft West Pen Room.		
	(c) Attempt to start the desired SRW PP on 21 SRW Header.		
(continue)	(continue)		

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APPENDIX (2) VITAL AUXILIARIES		
VA-2: EMERGENCY DIESEL GENE	PATOP	
WAZ. EMERGENOT DIEGEE GENE		
RECOVERY ACTIONS	ALTERNATE ACTIONS	
A.3.a (continued)	A.3.a.1(1) (continued)	
	(d) Consult with the Plant Technical Support Center for guidance on system restoration.	
	(2) IF 21 SRW Header can NOT be restarted, THEN perform the following actions:	
	(a) Place the SRW PP(s) aligned to 21 SRW Header in PULL TO LOCK.	
	(b) Place 2A DG OUT BKR, 152-2103, in PULL TO LOCK.	
	(c) Locally trip the 2A DG fuel racks by pushing the EMERGENCY STOP PUSH TO STOP ENGINE trip device.	
	(d) Consult with the Plant Technical Support Center for guidance on system restoration.	
(continue)		

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APPENDIX (2) VITAL AUXILIARIES				
VA-2: EME	RGENCY DIESEL GENE			
RECOVERY ACTIONS			ERNATE ACTIONS	
A.3 (continued)	A.3 (continued)			
	 b. IF 22 SRW Header is idle, THEN restart 22 SRW Header as follows: 		b.1 IF Containment Pressure exceeded 10 PSIG, THEN perform the following actions:	
ha: wit (2) Att	eck that Containment Pressure s remained less than 10 PSIG h 22 SRW Header idle. empt to start the desired SRW on 22 SRW Header.	<u>CAUTION</u> 2B DG SRW flow is less than SRW PP minimum flow requirements. This step permits restoration of SRW to supply 2B DG.		
		Auxiliary Bu	<u>WARNING</u> on levels may exist in the ilding. RAS may significantly og radiation levels.	
		(1) Re	start 22 SRW Header:	
		(a)	Shut 23 CAC MAN SUPP 22 SRW SUBSYS, 2-SRW-149, located 27 ft East Pen Room.	
		(b)	Shut 24 CAC MAN SUPP 22 SRW SUBSYS, 2-SRW-156, located 5 ft West Pen Room.	
		. (c)	Attempt to start the desired SRW PP on 22 SRW Header.	
		(d)	Consult with the Plant Technical Support Center for guidance on system restoration.	
	(continue)		(continue)	

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APPENDIX (2) VITAL AUXILIARIES VA-2: EMERGENCY DIESEL GENERATOR **RECOVERY ACTIONS ALTERNATE ACTIONS** A.3.b.1 (continued) A.3.b (continued) (2) IF 22 SRW Header can NOT be restarted. THEN perform the following actions: (a) Place the SRW PP(s) aligned to 22 SRW Header in PULL TO LOCK. (b) Place 2B DG OUT BKR, 152-2403, in PULL TO LOCK. (c) Locally trip the 2B DG fuel racks by pushing the EMERGENCY STOP PUSH TO STOP ENGINE trip device. (d) Consult with the Plant **Technical Support Center for** guidance on system restoration. B. MAINTAIN VITAL AUXILIARIES USING THE DIESEL GENERATORS. 1. IF power is NOT expected to be restored to at least ONE 4KV Vital Bus within 30 minutes, THEN perform the following actions: a. Open the Control Room panel bench board lower front covers. b. Remove the front and back covers of the Control Room DG Control Consoles. (continue)

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APPENDIX (2) VITAL AUXILIARIES VA-2: EMERGENCY DIESEL GENERATOR				
RECOVERY ACTIONS	ALTERNATE ACTIONS			
B.1 (continued)				
NOTE The Plant Computer and its associated inverter, 2Y05A, must be shed from the DC buses within 30 minutes into the blackout if control room air conditioning is lost, OR if 22 AND 14 battery chargers are lost.				
c. Determine whether Unit 2 Plant Computer is functional by observing the following:				
 Time indication updating on the CRT CRT responding to function keys depressed or items selected from menu 				
d. IF Unit 2 Plant Computer is functioning, THEN shutdown the Unit 2 Plant Computer at the Digital Decwriter III, located in the 45 ft computer room, as follows:				
 Depress the Shift key and type "@@A". 				
(2) Observe the message and the "ENTER YOUR OWNERNAME:" prompt.				
(3) Type "GUEST1" and depress the Return key.				
(4) Observe the "ENTER KEY" response.				
(5) Depress the Return key.				
(6) Observe the message (8 lines) and the "TSM>" prompt.				
(7) Type "KILLER" and depress the Return key.				
(continue)				

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EOP-8 Rev 27/Unit 2 Page 36 of 72 **APPENDIX (2) VITAL AUXILIARIES** VA-2: EMERGENCY DIESEL GENERATOR **RECOVERY ACTIONS ALTERNATE ACTIONS** B.1.d (continued) (8) Observe the messages (several pages) and the "TSM>" prompt. (9) Type "X" and depress the Return key. (10) Observe two lines of statistics followed by a third line "RING IN FOR SERVICE". (11) Depress the Shift key and type "@@P". (12) Observe the "//" prompt. (13) Type "HALT" and depress the Return key. NOTE "NNNNNNN" in the following response may be any number. (14) Observe "PSW NNNNNNN ISNT NNNNNNN HALT. followed by "//". e. Open the following power sources, located in the Unit 2 Cable Spreading Room: Instrument Bus Switch 2Y10-80 (Computer Inverter 2Y05) Unit 2 DAS/Computer Inverter **Output Breaker at 2Y05** Unit 2 DAS/Computer Inverter Battery Input Breaker at 2Y05 (continue)

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APPENDIX (2) VITAL AUXILIARIES					
VA-2: EMERGENCY DIESEL GENERATOR					
RECOVERY ACTIONS	ALTERNATE ACTIONS				
					
B. (continued)					
 IF 21 and 24 4KV Vital Buses are NOT energized, THEN perform the following actions: 	2.1 IF a Diesel Generator can NOT be aligned to energize at least ONE 4KV Vital Bus,				
a. Shut CC CNTMT SUPP valve, 2-CC-3832-CV.	THEN PROCEED to VA-3, <u>SMECO</u> .				
b. Verify 2A DG has started AND its OUT BKR, 152-2103, closed.					
 c. Verify 28 DG has started AND its OUT BKR, 152-2403, closed. 					
NOTE Align the 0C DG to the unit with redundant safety related equipment out of service.					
d. IF the 0C DG is NOT supplying a vital 4KV bus					
AND it is desired to place the 0C DG on 21 4KV bus, THEN perform the following:					
(1) IF the 0C DG is NOT running, THEN direct an operator to perform an emergency start from the local panel PER OI-21C, <u>0C</u> <u>DIESEL GENERATOR</u> .					
(2) Verify 07 4KV BUS FDR, 152-0704 is open.					
(3) Verify the 0C DG 21 4KV BUS FDR, 152-2106 in PULL TO LOCK.					
(4) Verify 2A DG OUT BKR, 152-2103 in PULL TO LOCK.					
(continue)					

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APPENDIX (2) VITAL AUXILIARIES VA-2: EMERGENCY DIESEL GENERATOR RECOVERY ACTIONS ALTERNATE ACTIONS B.2.d (continued) (5) Dispatch an operator to operate disconnect 189-2106 as follows: (a) Obtain the 189-2106 keys from the CR key locker. (b) Close 0C DG 21 4KV BUS DISC, 189-2106. (6) WHEN the OC DG is up to rated speed and voltage, THEN verify the OC DG OUT BKR, 152-0703 is closed. (7) WHEN disconnect 189-2106 is closed AND breaker 152-0703 is closed, THEN perform the following: (a) Close 07 4KV BUS TIE, 152-0701. (b) Insert the sync stick AND close the 0C DG 21 4KV BUS FDR, 152-2106 (continue)

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APPENDIX (2) VITAL AUXILIARIES VA-2: EMERGENCY DIESEL GENERATOR <u>RECOVERY ACTIONS</u> <u>ALTE</u> B.2 (continued) <u>NOTE</u> Align the 0C DG to the unit with redundant safety related equipment out of service.

- e. IF the 0C DG is NOT supplying a vital 4KV bus AND it is desired to place the 0C DG on 24 4KV bus, THEN perform the following:
 - (1) IF the 0C DG is NOT running, THEN direct an operator to perform an emergency start from the local panel PER OI-21C, <u>0C</u> <u>DIESEL GENERATOR</u>.
 - (2) Verify 07 4KV BUS FDR, 152-0704 is open.
 - (3) Verify the 0C DG 24 4KV BUS FDR, 152-2406 in PULL TO LOCK.
 - (4) Verify 2B DG OUT BKR, 152-2403 in PULL TO LOCK.
 - (5) Dispatch an operator to operate disconnect 189-2406 as follows:
 - (a) Obtain the 189-2406 keys from the CR key locker.
 - (b) Close 0C DIESEL GENERATOR TO BUS 24, 189-2406.
 - WHEN the 0C DG is up to rated speed and voltage, THEN verify the 0C DG OUT BKR, 152-0703 is closed.

(continue)

ALTERNATE ACTIONS

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APPENDIX (2) VITAL AUXILIARIES VA-2: EMERGENCY DIESEL GENERATOR RECOVERY ACTIONS ALTERNATE ACTIONS B.2.e (continued) (7) WHEN disconnect 189-2406 is closed AND breaker 152-0703 is closed, THEN perform the following: (a) Close 07 4KV BUS TIE, 152-0701. (b) Insert the sync slick AND close the 0C DG 24 4KV BUS FDR, 152-2406. 3. Dispatch an operator to monitor DG operation. 4. IF ANY 125V DC Bus is less than 105 volts: 11 • 12 21 22 THEN concurrently perform AOP-7J, LOSS OF 120V VITAL AC OR 125V VITAL DC POWER. 5. IF less than THREE 120V AC Vital Buses are energized: 21 22 • 23 • 24 THEN concurrently perform AOP-7J, LOSS OF 120V VITAL AC OR 125V VITAL DC POWER. (continue)

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APPENDIX (2) VITAL AUXILIARIES VA-2: EMERGENCY DIESEL GENERATOR <u>RECOVERY ACTIONS</u> ALTERNATE ACTIONS B. (continued) 6. IF at least ONE set of 480V Vital AC Buses is NOT energized: • 21A and 21B • 24A and 24B THEN restore power to at least ONE set of buses concurrently PER OI-27D, STATION POWER 480V SYSTEM.

- 7. IF 2Y09 and 2Y10 are NOT energized, THEN restore power to at least ONE bus as follows:
 - a. Energize 2Y09 through its Main Feeder Breaker by performing the following actions:
 - (1) Verify MCC-214R is energized.
 - (2) Close the Instrument Bus Transformer 21 Feeder Breaker, 52-21429.
 - (3) Close the Main Feeder Breaker, 1, on 2Y09.
 - b. Energize 2Y10 through its Main Feeder Breaker by performing the following actions:
 - (1) Verify MCC-204R is energized.
 - (2) Close the Transformer 2X09 Inst. AC Bus 22 (2Y10) Feeder Breaker, 52-20429.
 - (3) Close the Main Feeder Breaker, 77, on 2Y10.
- 8. Verify at least ONE 125V DC Battery Charger is energized for each battery PER 0I-26A, <u>125 VOLT VITAL DC</u>.

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APPENDIX (2) VITAL AUXILIARIES	
VA-2: EMERGENCY DIESEL GENE	RATOR
RECOVERY ACTIONS	ALTERNATE ACTIONS
C. VERIFY THE SHUTDOWN SEQUENCER LOADS ARE OPERATING AND RESTORE AUXILIARIES.	
 Check the following Shutdown Sequencer Loads are operating: 	1.1 Concurrently restore the appropriate equipment as follows:
 At least ONE SRW PP AND at least ONE SW PP on the same header 	 Service Water Pumps PER AOP-7B, LOSS OF SERVICE WATER
11 or 12 Control Room Ventilation	 Saltwater Pumps PER AOP-7A, LOSS OF SALTWATER COOLING
 Switchgear Room Ventilation 72' Computer Room Ventilation 	Control Room Ventilation PER OI-22F, <u>CONTROL ROOM AND</u> <u>CABLE SPREADING ROOMS</u> <u>VENTILATION</u>
	Switchgear Room Ventilation PER OI-22H, <u>SWITCHGEAR VENTILATION AND AIR CONDITIONING </u>
	72' Computer Room Ventilation PER OI-22B, <u>AUXILIARY BUILDING &</u> <u>WASTE PROCESSING AREA</u> <u>VENTILATION</u>
<u>NOTE</u> 2A or 2B DG will require a SRW and a SW Pump running on its associated supply header.	
 IF 2A or 2B DG is running, THEN verify SRW/SW cooling is supplied to the running DG. 	2.1 IF SRW/SW cooling can NOT be restored to a running DG, THEN locally trip the DG fuel racks by pushing the EMERGENCY STOP PUSH TO STOP ENGINE trip device.
(continue)	

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ATOR
ALTERNATE ACTIONS
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3.1 IF NO IA COMPRs are running AND SIAS has NOT actuated, THEN restart an IA COMPR PER OI-19, <u>INSTRUMENT AIR</u> .

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APPENDIX (2) VITAL AUXILIARIES VA-2: EMERGENCY DIESEL GENERATOR **ALTERNATE ACTIONS RECOVERY ACTIONS** C.5 (continued) CAUTION Uncontrolled restoration of cooling to hot RCP seals may cause a water hammer and could result in thermal shock of the RCP seal coolers. e. IF ALL RCP LOWER SEAL temperatures are less than 280° F, AND the RCP Controlled Bleed-off temperatures have been recorded, THEN open CC CNTMT SUPP valve, 2-CC-3832-CV. f. IF ANY RCP LOWER SEAL temperature is greater than 280° F, AND the RCP Controlled Bleed-off temperatures have been recorded, THEN perform the following actions: (1) Shut CONTAINMENT SUPPLY HEADER ISOLATION valve, 2-CC-284, located in the 5 ft East Penetration Room. (2) Open CC CNTMT SUPP valve, 2-CC-3832-CV. (3) Slowly open 2-CC-284 to restore component cooling flow.

(continue)

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APPENDIX (2) VITAL AUXILIARIES VA-2: EMERGENCY DIESEL GENERATOR **ALTERNATE ACTIONS RECOVERY ACTIONS** C. (continued) CAUTION Attempts should NOT be made to re-energize a bus if a fault is suspected. 6. IF 2Y09 OR 2Y10 is NOT energized, THEN restore the affected Instrument Bus as follows: a. IF 2Y09 is de-energized, THEN Tie 2Y09 to 2Y10: (1) On 2Y09, open INSTR. TRANSF. 21 2X08 main feeder breaker 1. (2) On 2Y10, close BUS TIE 208/120V INSTR. BUS 21 Breaker 78. (3) Place the 2Y09-2Y10 BUS TIE Switch 2SY09, located between 2Y09 and 2Y10, to ON. b. IF 2Y10 is de-energized, THEN Tie 2Y10 to 2Y09: (1) On 2Y10, open INSTR. TRANSF. 22 2X09 main feeder breaker 77. (2) On 2Y10, close BUS TIE 208/120V INSTR. BUS 21 Breaker 78. (3) Place the 2Y09-2Y10 BUS TIE Switch 2SY09, located between 2Y09 and 2Y10, to ON. 7. IF equipment needed to maintain Safety Functions is available from a de-energized bus. AND a power supply is available, THEN energize the bus, AND restore the needed equipment.

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APPENDIX (2) VITAL AUXILIARIES VA-2: EMERGENCY DIESEL GENERATOR	
VA-2: EMERGENCY DIESEL GENERATUR	
RECOVERY ACTIONS ALTERNATE ACTIONS	
	<u> </u>
D. ACCEPTANCE CRITERIA FOR SUCCESS PATH VA-2.	
1. Check Vital Auxiliaries has been satisfied by the following indications: THEN PROCEED to the next	
At least ONE 4KV Vital Bus is energized At least ONE 4KV Vital Bus is energized Path. At least ONE 4KV Vital Bus is	•
 11, 12, 21 and 22 125V DC BUS VOLTS ALL greater than 105 volts 	
At least THREE 120V AC Vital Buses are energized:	
• 21 • 22 • 23 • 24	
EITHER 2Y09 or 2Y10 is energized	
 WHEN Vital Auxiliaries has been established, THEN PROCEED to the next Safety Function to be performed. 	

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APPENDIX (2) VITAL AUXILIARIES	
VA-3: SMECO	
VA-3: SMECO	
RECOVERY ACTIONS	ALTERNATE ACTIONS
A. IF 500KV OFFSITE POWER HAS BEEN LOST, THEN ALIGN THE ELECTRICAL SYSTEM FOR POWER RESTORATION.	
 IF 21 13KV Service Bus is NOT energized, THEN ensure the following 13KV breakers are open: 	
 21 SERV BUS 13KV FDR, 252-2104 21 SERV BUS TIE, 252-2105 U-4000-21 13KV FDR, 252-2102 U-4000-22 13KV FDR, 252-2103 U-4000-23 13KV FDR, 252-2101 Locally at the U-2 13KV SWGR House, SITE POWER FDR BREAKER (to 0X04), 252-2106 	
 IF 11 13KV Service Bus is NOT energized, THEN ensure the following 13KV breakers are open: 	
 11 SERV BUS 13KV FDR, 252-1104 11 SERV BUS TIE, 252-1105 U-4000-12 13KV FDR, 252-1103 U-4000-11 13KV FDR, 252-1102 U-4000-13 13KV FDR, 252-1101 Locally at the U-1 13KV SWGR House, SITE POWER FDR BREAKER (to 0X03), 252-1106 	
(continue)	

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APPENDIX (2) VITAL AUXILIARIES	
VA-3: SMECO	
RECOVERY ACTIONS	ALTERNATE ACTIONS
A. (continued)	
3. IF 21 4KV Vital Bus is NOT energized, THEN perform the following actions:	
 Ensure the following 4KV breakers are open: 	
 21 4KV BUS NORMAL FDR, 152-2101 	
• 21 4KV BUS ALT FDR, 152-2115	
• SWYD SERV XFMR 4KV FDR, 152-2113	
<u>CAUTION</u> Handswitches should NOT be placed in PULL TO LOCK while performing breaker position verification.	,
 Verify the following 4KV Vital Bus load breakers are open: 	
 No. 21 Low Press Safety Inj. Pump, 152-2104 	
 No. 21 Salt Water Pump, 152-2105 	· ,
 No. 21 Containment Spray Pump, 152-2107 	
 No. 21 High Press Safety Inj. Pump, 152-2108 	
 No. 23 High Press Safety Inj. Pump, 152-2110 	
 No. 23 Service Water Pump, 152-2111 	
 No. 23 Salt Water Pump, 152-2112 	
(continue)	

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APPENDIX (2) VITAL AUXILIARIES	Page 49 01 12	
VA-3: SMECO		
RECOVERY ACTIONS	ALTERNATE ACTIONS	
A.3 (continued)		
Place the 21 4KV BUS LOCI/SD SEQUENCER MANUAL INITIATE keyswitch in ON		
4. IF 24 4KV Vital Bus is NOT energized, THEN perform the following actions:		
 Ensure the following 4KV breakers are open: 		
 24 4KV BUS NORMAL FDR, 152-2401 		
• 24 4KV BUS ALT FDR, 152-2414		
<u>CAUTION</u> Handswitches should NOT be placed in PULL TO LOCK while performing breaker position verification.	·	
 Verify the following 4KV Vital Bus load breakers are open: 		
 No. 22 Low Press Safety Inj. Pump, 152-2404 		
 No. 22 Salt Water Pump, 152-2405 		
 No. 22 Containment Spray Pump, 152-2407 		
 No. 22 High Press Safety Inj. Pump, 152-2408 		
 No. 23 High Press Safety Inj. Pump, 152-2410 		
 No. 23 Service Water Pump, 152-2411 		
(continue)		

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APPENDIX (2) VITAL AUXILIARIES	
VA-3: SMECO	
TA-3. SHILGO	
RECOVERY ACTIONS	ALTERNATE ACTIONS
RECOVERT ACTIONS	ALTERNATE ACTIONS
A.4 (continued)	
 No. 23 Salt Water Pump, 152-2412 	
• AFW PP No. 23, 152-2415	
Place the 24 4KV BUS LOCI/SD SEQUENCER MANUAL INITIATE keyswitch in ON	
(continue)	
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ALTERNATE ACTIONS
a.1 IF Containment Pressure exceeded 25 PSIG, THEN perform the following actions:
<u>CAUTION</u> 2A DG SRW flow is less than SRW PP minimum flow requirements. This step permits restoration of SRW to supply 2A
DG.
<u>WARNING</u> High radiation levels may exist in the Auxiliary Building. RAS may significantly raise existing radiation levels.
(1) Restart 21 SRW Header:
(a) Shut 21 CAC MAN SUPP 21 SRW SUBSYS, 2-SRW-135, located 27 ft East Pen Room.
(b) Shut 22 CAC MAN SUPP 21 SRW SUBSYS, 2-SRW-142, located 5 ft West Pen Room.
(c) Attempt to start the desired SRW PP on 21 SRW Header.
·(continue)

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APPENDIX (2) VITAL AUXILIARIES			
VA-3: SMECO			
RECOVERY ACTIONS	A	LTE	RNATE ACTIONS
A.5.a (continued)	A.5.a.1(1)	(ထ၊	ntinued)
		(d)	Consult with the Plant Technical Support Center for guidance on system restoration.
	l i r	resta	I SRW Header can NOT be arted, N perform the following actions:
	((a)	Place the SRW PP(s) aligned to 21 SRW Header in PULL TO LOCK.
	((b)	Place 2A DG OUT BKR, 152-2103, in PULL TO LOCK.
	((c)	Locally trip the 2A DG fuel racks by pushing the EMERGENCY STOP PUSH TO STOP ENGINE trip device.
	((d)	Consult with the Plant Technical Support Center for guidance on system restoration.
(continue)			

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APPENDIX (2) VITAL AUXILIARIES VA-3: SMECO **RECOVERY ACTIONS** ALTERNATE ACTIONS A.5 (continued) b. IF 22 SRW Header is idle, b.1 IF Containment Pressure exceeded THEN restart 22 SRW Header as 10 PSIG. THEN perform the following actions: follows: (1) Check that Containment Pressure has remained less than 10 PSIG CAUTION with 22 SRW Header idle. 2B DG SRW flow is less than SRW PP minimum flow requirements. This step (2) Attempt to start the desired SRW permits restoration of SRW to supply 2B PP on 22 SRW Header. DG. WARNING High radiation levels may exist in the Auxiliary Building. RAS may significantly raise existing radiation levels. (1) Restart 22 SRW Header: (a) Shut 23 CAC MAN SUPP 22 SRW SUBSYS, 2-SRW-149, located 27 ft East Pen Room. (b) Shut 24 CAC MAN SUPP 22 SRW SUBSYS, 2-SRW-156. located 5 ft West Pen Room. (c) Attempt to start the desired SRW PP on 22 SRW Header. (d) Consult with the Plant Technical Support Center for guidance on system restoration. (continue) (continue)

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APPENDIX (2) VITAL AUXILIARIES	
VA-3: SMECO	
RECOVERY ACTIONS	ALTERNATE ACTIONS
A.5.b (continued)	A.5.b.1 (continued)
	(2) IF 22 SRW Header can NOT be restarted, THEN perform the following actions:
	(a) Place the SRW PP(s) aligned to 22 SRW Header in PULL TO LOCK.
	(b) Place 2B DG OUT BKR, 152-2403, in PULL TO LOCK.
	(c) Locally trip the 2B DG fuel racks by pushing the EMERGENCY STOP PUSH TO STOP ENGINE trip device.
	(d) Consult with the Plant Technical Support Center for guidance on system restoration.
B. MAINTAIN VITAL AUXILIARIES BY SUPPLYING POWER FROM THE SMECO POWER SUPPLY SYSTEM.	
 JF power is NOT expected to be restored to at least ONE 4KV Vital Bus within 30 minutes, THEN perform the following actions: 	
a. Open the Control Room panel bench board lower front covers.	
 Remove the front and back covers of the Control Room DG Control Consoles. 	
(continue)	

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APPENDIX (2) VITAL AUXILIARIES VA-3: SMECO **RECOVERY ACTIONS ALTERNATE ACTIONS** B.1 (continued) NOTE The Plant Computer and its associated inverter, 2Y05A, must be shed from the DC buses within 30 minutes into the blackout if control room air conditioning is lost, OR if 22 AND 14 battery chargers are lost. c. Determine whether Unit 2 Plant Computer is functional by observing the following: Time indication updating on the . CRT CRT responding to function keys depressed or items selected from menu d. IF Unit 2 Plant Computer is functioning, THEN shutdown the Unit 2 Plant Computer at the Digital Decwriter III, located in the 45 ft computer room, as follows: (1) Depress the Shift key and type @@A*. (2) Observe the message and the "ENTER YOUR OWNERNAME:" prompt. (3) Type "GUEST1" and depress the Return key. (4) Observe the "ENTER KEY" response. (5) Depress the Return key. (6) Observe the message (8 lines) and the "TSM>" prompt. (7) Type "KILLER" and depress the Return key. (continue)

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APPENDIX (2) VITAL AUXILIARIES VA-3: SMECO **RECOVERY ACTIONS ALTERNATE ACTIONS** B.1.d (continued) (8) Observe the messages (several pages) and the "TSM>" prompt. (9) Type "X" and depress the Return key. (10) Observe two lines of statistics followed by a third line "RING IN FOR SERVICE. (11) Depress the Shift key and type @@P". (12) Observe the "//" prompt. (13) Type "HALT" and depress the Return key. NOTE "NNNNNNN" in the following response may be any number. (14) Observe "PSW NNNNNNN ISNT NNNNNNN HALT", followed by "//". e. Open the following power sources, located in the Unit 2 Cable Spreading Room: Instrument Bus Switch 2Y10-80 (Computer Inverter 2Y05) Unit 2 DAS/Computer Inverter **Output Breaker at 2Y05** Unit 2 DAS/Computer Inverter Battery Input Breaker at 2Y05 (continue)

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APPENDIX (2) VITAL AUXILIARIES	
VA-3: SMECO	
RECOVERY ACTIONS	ALTERNATE ACTIONS
B. (continued)	•
 Align the SMECO Power Supply System to the 13KV Service Buses by performing the following actions: Contact the SMECO Distribution Center (301-274-9285) to ensure the following:	2.1 IF the SMECO Power Supply System is NOT available AND EITHER 500KV Bus is available OR the Diesel Generators are able to supply power to at least ONE 4KV Vital Bus, THEN PROCEED to VA-1, <u>500KV OFFSITE POWER OR VA-2, EMERGENCY DIESEL GENERATOR</u> .

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APPENDIX (2) VITAL AUXILIARIES VA-3: SMECO **ALTERNATE ACTIONS RECOVERY ACTIONS** B.2.b (continued) (3) Rotate Kirk key 20497 fully clockwise. (4) Remove the key from 13.8KV SMECO DISCONNECT, 0SH301. (5) Insert Kirk key 20497 into 13.2KV SMECO DISCONNECT, 0SH302. (6) Rotate the key counterclockwise. (7) Close 13.2KV SMECO DISCONNECT, 0SH302. (8) Place OPS lock on 13.8KV SMECO DISCONNECT, 0SH301. c. IF 23 13KV Service Bus is NOT energized from the SMECO Power Supply System, THEN perform the following: (1) Rack in the OFFSITE PWR SOURCE FROM SMECO 252-2301, supply feeder to 23 13KV Service Bus. (2) Ensure the close and trip circuit fuses are in the ON position. (3) Verify the following breakers are open: 21 SERV BUS TIE, 252-2105 • 11 SERV BUS TIE, 252-1105 (4) Energize 23 13KV Service Bus by locally closing Breaker 252-2301. (continue)

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APPENDIX (2) VITAL AUXILIARIES VA-3: SMECO **RECOVERY ACTIONS ALTERNATE ACTIONS** B.2 (continued) d. IF it is desired to align the SMECO Power Supply System to 21 13KV Service Bus, THEN energize 21 13KV Service Bus as follows: (1) Verify 21 13KV Service Bus is de-energized. (2) Verify the following breakers are open: • 21 SERV BUS 13KV FDR, 252-2104 21 SERV BUS TIE, 252-2105 U-4000-21 13KV FDR, 252-2102 U-4000-22 13KV FDR, 252-2103 U-4000-23 13KV FDR, 252-2101 • 11 SERV BUS TIE, 252-1105 Locally at the U-2 13KV SWGR House, SITE POWER FDR BREAKER (to 0X04), 252-2106 (3) Energize 21 13KV Service Bus by closing 21 SERV BUS TIE, 252-2105. (4) Reset the 13KV BUS 21 286 LOCKOUT/RESET DEVICE. (5) Reset the 247/B device target flags on BOTH undervoltage relays: B-21-P B-21-B (continue)

APPENDIX (2) VITAL AUXILIARIES VA-3: SMECO **RECOVERY ACTIONS ALTERNATE ACTIONS** B.2.d (continued) (6) IF MCC 216T is de-energized, THEN place the following LTC Drive Power Selector Switches in ALT: 2H2101REG • 2H2102REG 2H2103REG e. IF it is desired to align the SMECO Power Supply System to 11 13KV Service Bus, THEN energize 11 13KV Service Bus as follows: (1) Verify 11 13KV Service Bus is de-energized. (2) Verify the following breakers are open: 11 SERV BUS 13KV FDR, 252-1104 11 SERV BUS TIE, 252-1105 U-4000-12 13KV FDR, 252-1103 U-4000-11 13KV FDR, 252-1102 • U-4000-13 13KV FDR, 252-1101 • 21 SERV BUS TIE, 252-2105 Locally at the U-1 13KV SWGR House, SITE POWER FDR BREAKER (to 0X03), 252-1106 (3) Energize 11 13KV Service Bus by closing 11 SERV BUS TIE, 252-1105. (4) Reset the 13KV BUS 11 286 LOCKOUT/RESET DEVICE. (continue)

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APPENDIX (2) VITAL AUXILIARIES VA-3: SMECO **RECOVERY ACTIONS ALTERNATE ACTIONS** B.2.e (continued) (5) Reset the 247/B device target flags on BOTH undervoltage relays: • B-11-P • B-11-B (6) IF MCC 116T is de-energized, THEN place the following LTC Drive Power Selector Switches in ALT: 1H1101REG . 1H1102REG 1H1103REG NOTE The SMECO Power Supply System overload capabilities are based on a 24 hour cycle. Thus, 216 AMPS or less must be maintained for at least 16 hours before using the 8 hours overload or 20 hours before using the 4 hours overload rating. 3. Limit the total current drawn on the SMECO Power Supply System as indicated on 23 Bus 13KV SMECO Feeder ammeter located on 2C17 as follows: 240 AMPS Continuous 216 AMPS for 16 hours followed by ٠ 264 AMPS for up to 8 hours, then reducing to 216 AMPS 216 AMPS for 20 hours followed by 295 AMPS for up to 4 hours, then reducing to 216 AMPS (continue)

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APPENDIX (2) VITAL AUXILIARIES VA-3: SMECO **RECOVERY ACTIONS ALTERNATE ACTIONS** B. (continued) NOTE Only two of the four engineering safety features buses may be re-energized from the SMECO Power Supply System. 4. Restore power to the Engineered Safety Features Buses from the 13KV Service Buses as follows: a. IF NO CC PPs are operating, THEN shut CC CNTMT SUPP valve. 2-CC-3832-CV. b. IF 21 13KV Service Bus is available to supply 21 4KV Vital Bus, THEN energize 21 4KV Vital Bus from 21 13KV Service Bus as follows: (1) Verify the following breakers are open: 21 4KV BUS ALT FDR. 152-2115 22 4KV BUS NORMAL FDR, 152-2201 23 4KV BUS NORMAL FDR. 152-2311 (2) IF 24 4KV Bus is NOT being supplied from 21 13KV Service Bus. THEN verify 24 4KV BUS NORMAL FDR, 152-2401, is open. (3) Close the U-4000-22 13KV FDR, 252-2103. (4) Place 2A DG OUT BKR. 152-2103, in PULL TO LOCK. (5) Verify 21 4KV BUS ALT FDR, 152-2101, is open. (continue)

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APPENDIX (2) VITAL AUXILIARIES VA-3: SMECO **RECOVERY ACTIONS ALTERNATE ACTIONS** B.4.b (continued) (6) Insert the sync stick into the sync jack at the 21 4KV BUS ALT FDR, 152-2115. (7) Close the 21 4KV BUS ALT FDR. 152-2115. (8) Return the sync stick to its normal position. c. IF 21 13KV Service Bus is available to supply 24 4KV Vital Bus. THEN energize 24 4KV Vital Bus from 21 13KV Service Bus as follows: (1) Verify the following breakers are open: • 24 4KV BUS NORMAL FDR, 152-2401 22 4KV BUS NORMAL FDR. 152-2201

- 23 4KV BUS NORMAL FDR, 152-2311
- IF 21 4KV Vital Bus is NOT being supplied from 21 13KV Service Bus, THEN verify 21 4KV BUS ALT FDR, 152-2115, is open.
- (3) Close the U-4000-22 13KV FDR, 252-2203.
- (4) Place 2B DG OUT BKR, 152-2403, in PULL TO LOCK.
- (5) Place 23 AFW PP in PULL TO LOCK.
- (6) Verify the 24 4KV BUS ALT FDR, 152-2414, is open.

(continue)

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APPENDIX (2) VITAL AUXILIARIES VA-3: SMECO **RECOVERY ACTIONS ALTERNATE ACTIONS** B.4.c (continued) (7) Insert the sync stick into the sync jack at the 24 4KV BUS NORMAL FDR, 152-2401. (8) Close the 24 4KV BUS NORMAL FDR, 152-2401. (9) Return the sync stick to its normal position. d. IF 11 13KV Service Bus is available to supply 21 4KV Vital Bus. THEN energize 21 4KV Vital Bus from 11 13KV Service Bus as follows: (1) Verify the following breakers are open: • 21 4KV BUS NORMAL FDR, 152-2101 22 4KV BUS ALT FDR, 152-2209 23 4KV BUS ALT FDR, 152-2301 (2) IF 24 4KV Bus is NOT being supplied from 11 13KV Service Bus. THEN verify 24 4KV BUS ALT FDR, 152-2414, is open. (3) Close the U-4000-12 13KV FDR. 252-1103. (4) Place 2A DG OUT BKR, 152-2103, in PULL TO LOCK. (5) Verify 21 4KV BUS ALT FDR, 152-2115, is open. (6) Insert the sync stick into the sync jack at the 21 4KV BUS NORMAL FDR, 152-2101. (continue)

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APPENDIX (2) VITAL AUXILIARIES VA-3: SMECO

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.4.d (continued)

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- (7) Close the 21 4KV BUS NORMAL FDR, 152-2101.
- (8) Return the sync stick to its normal position.
- e. IF 11 13KV Service Bus is available to supply 24 4KV Vital Bus, THEN energize 24 4KV Vital Bus from 11 13KV Service Bus as follows:
 - (1) Verify the following breakers are open:
 - 24 4KV BUS ALT FDR, 152-2414
 - 22 4KV BUS ALT FDR, 152-2209
 - 23 4KV BUS ALT FDR, 152-2301
 - (2) IF 21 4KV Vital Bus is NOT being supplied from 11 13KV Service Bus, THEN verify 21 4KV BUS NORMAL FDR, 152-2101, is open.
 - (3) Close the U-4000-12 13KV FDR, 252-1103.
 - (4) Place 2B DG OUT BKR, 152-2403, in PULL TO LOCK.
 - (5) Place 23 AFW PP in PULL TO LOCK.
 - (6) Verify 24 4KV BUS NORMAL FDR, 152-2401, is open.
 - (7) Insert the sync stick into the sync jack at the 24 4KV BUS ALT FDR, 152-2414.

(continue)

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1	PPENDIX (2) VITAL AUXILIARIES		
V	A-3: SMECO		
	RECOVERY ACTIONS	ALTERNATE ACTIONS	
В.	4.e (continued)		
	(8) Close the 24 4KV BUS ALT FDR. 152-2414.		
	(9) Return the sync stick to its normal position.		
5.	IF ANY 125V DC Bus is less than 105 volts:		
	 11 12 21 22 		
	THEN concurrently perform AOP-7J, LOSS OF 120V VITAL AC OR 125V VITAL DC POWER.		
6.	IF less than THREE 120V AC Vital Buses are energized:		
	 21 22 23 24 		
	THEN concurrently perform AOP-7J, LOSS OF 120V VITAL AC OR 125V VITAL DC POWER.		
7.	IF at least ONE set of 480V Vital AC Buses is NOT energized:		
	 21A and 21B 24A and 24B 		
	THEN restore power to at least ONE set of buses concurrently PER OI-27D, STATION POWER 480V SYSTEM.		
	(continue)		

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APPENDIX (2) VITAL AUXILIARIES VA-3: SMECO **RECOVERY ACTIONS ALTERNATE ACTIONS** B. (continued) 8. IF 2Y09 and 2Y10 are NOT energized, THEN restore power to at least ONE bus as follows: a. Energize 2Y09 through its Main Feeder Breaker by performing the following actions: (1) Verify MCC-214R is energized. (2) Close the Instrument Bus Transformer 21 Feeder Breaker, 52-21429. (3) Close the Main Feeder Breaker. 1, on 2Y09. b. Energize 2Y10 through its Main Feeder Breaker by performing the following actions: (1) Verify MCC-204R is energized. (2) Close the Transformer 2X09 Inst. AC Bus 22 (2Y10) Feeder Breaker, 52-20429. (3) Close the Main Feeder Breaker, 77, on 2Y10. 9. Verify at least ONE 125V DC Battery Charger is energized for each battery PER OI-26A, 125 VOLT VITAL DC.

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APPENDIX (2) VITAL AUXILIARIES	
VA-3: SMECO	
RECOVERY ACTIONS	ALTERNATE ACTIONS
C. VERIFY THE SHUTDOWN SEQUENCER LOADS ARE OPERATING AND RESTORE AUXILIARIES.	
 Check the following Shutdown Sequencer Loads are operating: 	1.1 Concurrently restore the appropriate equipment as follows:
At least ONE SRW PP AND at least ONE SW PP on the same header	Service Water Pumps PER AOP-7B, LOSS OF SERVICE WATER
11 or 12 Control Room Ventilation	 Saltwater Pumps PER AOP-7A, LOSS OF SALTWATER COOLING
Switchgear Room Ventilation	 Control Room Ventilation PER OI-22F, CONTROL ROOM AND
72' Computer Room Ventilation	CABLE SPREADING ROOMS VENTILATION
	Switchgear Room Ventilation PER OI-22H, <u>SWITCHGEAR VENTILATION AND AIR CONDITIONING </u>
	72' Computer Room Ventilation PER OI-22B, <u>AUXILIARY BUILDING &</u> <u>WASTE PROCESSING AREA</u> <u>VENTILATION</u>
<u>NOTE</u> 2A or 2B DG will require a SRW and a SW Pump running on its associated supply header.	
 IF 2A or 2B DG is running, THEN verify SRW/SW cooling is supplied to the running DG. 	2.1 IF SRW/SW cooling can NOT be restored to a running DG, THEN locally trip the DG fuel racks by pushing the EMERGENCY STOP PUSH TO STOP ENGINE trip device.
(continue)	

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APPENDIX (2) VITAL AUXILIARIES	Page 69 of 72
VA-3: SMECO	
RECOVERY ACTIONS	ALTERNATE ACTIONS
C. (continued)	
3. IF SIAS has NOT actuated, THEN check at least ONE IA COMPR is running.	3.1 IF NO IA COMPRs are running AND SIAS has NOT actuated, THEN restart an IA COMPR PER OI-19, INSTRUMENT AIR.
4. IF 23 AFW PP starts AND 21 or 22 AFW PP is operating, THEN secure 23 AFW PP.	
 5. IF Component Cooling Flow has been lost, THEN restore flow. 	
a. Verify CC CNTMT SUPP valve, 2-CC-3832-CV, is shut.	
b. Start a CC PP.	
c. Verify the CC HX in service is being supplied from an operating Saltwater Header.	
<u>NOTE</u> RCP CBO and LOWER SEAL temperatures may be obtained from computer trend block 9.	
d. Record the highest attained RCP CBO and LOWER SEAL temperatures for each RCP:	
 21A RCP:°F/°F 21B RCP:°F/°F 22A RCP:°F/°F 22B RCP:°F/°F 	
(continue)	

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APPENDIX (2) VITAL AUXILIARIES VA-3: SMECO **RECOVERY ACTIONS ALTERNATE ACTIONS** C.5 (continued) CAUTION Uncontrolled restoration of cooling to hot RCP seals may cause a water hammer and could result in thermal shock of the RCP seal coolers. e. IF ALL RCP LOWER SEAL temperatures are less than 280° F, AND the RCP Controlled Bleed-off temperatures have been recorded. THEN open CC CNTMT SUPP valve, 2-CC-3832-CV. f. IF ANY RCP LOWER SEAL temperature is greater than 280° F, AND the RCP Controlled Bleed-off temperatures have been recorded, THEN perform the following actions: (1) Shut CONTAINMENT SUPPLY HEADER ISOLATION valve. 2-CC-284, located in the 5 ft East Penetration Room. (2) Open CC CNTMT SUPP valve, 2-CC-3832-CV. (3) Slowly open 2-CC-284 to restore component cooling flow. (continue)

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APPENDIX (2) VITAL AUXILIARIES VA-3: SMECO

RECOVERY ACTIONS

ALTERNATE ACTIONS

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C. (continued)

<u>CAUTION</u> Attempts should NOT be made to re-energize a bus if a fault is suspected.

- 6. IF 2Y09 OR 2Y10 is NOT energized, THEN restore the affected Instrument Bus as follows:
 - a. IF 2Y09 is de-energized, THEN Tie 2Y09 to 2Y10:
 - (1) On 2Y09, open INSTR. TRANSF. 21 2X08 main feeder breaker 1.
 - (2) On 2Y10, close BUS TIE 208/120V INSTR. BUS 21 Breaker 78.
 - (3) Place the 2Y09-2Y10 BUS TIE Switch 2SY09, located between 2Y09 and 2Y10, to ON.

b. IF 2Y10 is de-energized, THEN Tie 2Y10 to 2Y09:

- (1) On 2Y10, open INSTR. TRANSF. 22 2X09 main feeder breaker 77.
- (2) On 2Y10, close BUS TIE 208/120V INSTR. BUS 21 Breaker 78.
- (3) Place the 2Y09-2Y10 BUS TIE Switch 2SY09, located between 2Y09 and 2Y10, to ON.
- IF equipment needed to maintain Safety Functions is available from a de-energized bus, AND a power supply is available,

THEN energize the bus, AND restore the needed equipment.

VA-3: SMECO	
RECOVERY ACTIONS	ALTERNATE ACTIONS
D. ACCEPTANCE CRITERIA FOR SUCCESS PATH VA-3.	
 Check Vital Auxiliaries has been satisfied by the following indications: At least ONE 4KV Vital Bus is energized 11, 12, 21 and 22 125V DC BUS VOLTS ALL greater than 105 volts At least THREE 120V AC Vital Buses are energized: 21 22 23 24 EITHER 2Y09 or 2Y10 is energized WHEN Vital Auxiliaries has been established, THEN PROCEED to the next Safety Function to be performed. 	 1.1 IF Vital Auxiliaries has NOT been satisfied, THEN perform the following actions: a. Concurrently perform the recovery actions for the next safety function to be satisfied. b. Determine the appropriate emergency response actions PER the ERPIP. c. Evaluate further actions based on the following considerations: The urgency of other jeopardized safety functions The feasibility of restoring function to a success path by use of alternate components to implement a success path

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VITAL AUXILIARIES PLACEKEEPER VA-1: 500KV OFFSITE POWER

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RESOURCE CONDITIONS • At least ONE 500KV Bus is available		At least ONE 4KV vit 11, 12, 21 and 22 12 preater than 105 volt	V AC Vital Buses are	
START	FUNCTION		DONE	PAGE
	A. IF 500KV OFFSITE POWER HAS B THEN ALIGN THE ELECTRICAL SY POWER RESTORATION.			1
	Ensure breakers are open Place 4KV BUS LOCI/SD SEQL INITIATE keyswitch for 21 4KV			1 3
	Place 4KV BUS LOCI/SD SEQU INITIATE keyswitch for 24 4KV IF a SRW Header is NOT in ope	ENCER MANUAL Bus in ON		. 4
	IF a Srkv Header is NOT in ope THEN attempt to restart: 21 SRW Header ~ CNTMT ; less than 25 PSIG. 22 SRW Header ~ CNTMT ; less than 10 PSIG.	pressure		5
_	B. MAINTAIN VITAL AUXILIARIES BY POWER FROM 500KV OFFSITE PO			8
	NOTE: The Plant Computer and its associated in shed from the DC buses within 30 minutes control room air conditioning is lost, OR if 2: chargers are lost. • IF power is NOT expected to be	nto the blackout if 2 AND 14 battery		8
	least ONE 4KV Vital Bus within THEN perform the following acti • Open Control Room panel c • Shutdown the Unit 2 Plant C	30 minutes, ons: overs		
	 IF 500KV offsite power is NOT a THEN PROCEED to VA-2 OR V 	vailable. A-3.		11
	 Verify at least ONE 125V DC Ba energized for each battery 	ttery Charger is		22

NOTE: Continuously applicable steps are designated with a "C" in the DONE column.

(continue)

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VA-1: 500KV OFFSITE POWER (continued)

START	FUNCTION	DONE	PAGE
	C. VERIFY THE SHUTDOWN SEQUENCER LOADS ARE OPERATING AND RESTORE AUXILIARIES.		
	 IF SRW/SW cooling can NOT be restored to 		23
	 2A or 28 DG, THEN locally trip the 2A or 28 DG fuel racks. IF ANY RCP lower seal temperature is greater than 280°F, THEN restore Component Cooling by throttling 2-CC-284. Tie 21/09 and 2Y10 		25
	The 2 ros and 2 r to The capitor of the constraint of the		26 26
	D. ACCEPTANCE CRITERIA FOR SUCCESS PATH VA-1.		27
	 IF Vital Auxiliaries has NOT been satisfied, THEN PROCEED to the next appropriate Vital Auxiliaries Success Path. 		27

NOTE: Continuously applicable steps are designated with a "C" in the DONE column.

VA-2: EMERGENCY DIESEL GENERATOR RESOURCE CONDITIONS ACCEPTANCE CRITERIA 2A, 2B OR 0C Diesel Generator is At least ONE 4KV vital bus is energized available 11, 12, 21 and 22 125V DC Buses, ALL. greater than 105 volts • At least THREE 120V AC Vital Buses are energized: • 21 • 22 • 23 • 24 EITHER 2Y09 or 2Y10 is energized START FUNCTION PAGE DONE A. ALIGN THE ELECTRICAL SYSTEM FOR POWER RESTORATION. 28 Ensure breakers are open 28 31 ٠ IF a SRW Header is NOT in operation THEN attempt to restart: 21 SRW Header – CNTMT pressure less than 25 PSIG. 22 SRW Header – CNTMT pressure less than 10 PSIG. B. MAINTAIN VITAL AUXILIARIES USING THE DIESEL GENERATORS. 34 NOTE: The Plant Computer and its associated inverter, 2Y05A, must be shed from the DC buses within 30 minutes into the blackout if control room air conditioning is lost, OR If 22 AND 14 battery chargers are lost. IF power is NOT expected to be restored to at least ONE 4KV Vital Bus within 30 minutes, 34 THEN perform the following actions: Open Control Room panel covers Shutdown the Unit 2 Plant Computer IF a Diesel Generator can NOT be aligned to at ٠ 37 least ONE 4KV Vital Bus. THEN PROCEED to VA-3. . Verify at least ONE 125V DC Battery Charger is 41 energized for each battery

VITAL AUXILIARIES PLACEKEEPER

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NOTE: Continuously applicable steps are designated with a "C" in the DONE column.

(continue)

VA-2: EMERGENCY DIESEL GENERATOR

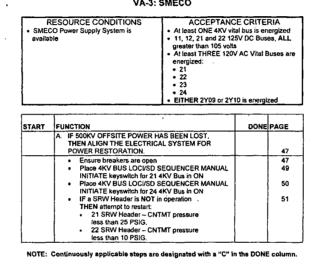
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(continued)

START	FUNCTION	DONE	PAGE
	C. VERIFY THE SHUTDOWN SEQUENCER LOADS ARE		
	OPERATING AND RESTORE AUXILIARIES.	c	42
	 IF SRW/SW cooling can NOT be restored to 2A or 2B DG, 	1 ⁰	42
	 THEN locally trip the 2A or 2B DG fuel racks. IF ANY RCP lower seal temperature is greater than 280°F. 		42
	THEN restore Component Cooling by throttling 2-CC-284.		
	 Tie 2Y09 and 2Y10 		45
	 IF equipment needed to maintain Safety Functions is available from a de-energized bus AND a power supply is available, THEN energize the bus, 		45
	AND restore the needed equipment.	ļ	
	D. ACCEPTANCE CRITERIA FOR SUCCESS PATH VA-2.		46
	 IF Vital Auxiliaries has NOT been satisfied, THEN PROCEED to the next appropriate Vital Auxiliaries Success Path. 		46

NOTE: Continuously applicable steps are designated with a "C" in the DONE column.



(continue)

VITAL AUXILIARIES PLACEKEEPER VA-3: SMECO

MAINTAIN VITAL AUXILIARIES BY SUPPLYING POWER FROM THE SMECO POWER SUPPLY SYSTEM 54 NOTE: The Plant Computer and its associated inverter, 2Y05A, must b shed from the DC buses within 30 minutes into the blackout if control room air conditioning is lost, OR if 22 AND 14 battery chargers are lost. IF power is NOT expected to be restored to at 54 least ONE 4KV Vital Bus within 30 minutes. THEN perform the following actions: Open Control Room panel covers Shutdown the Unit 2 Plant Computer IF SMECO is NOT available 57 . AND EITHER 500KV Bus is available OR the Diesel Generators are available, THEN PROCEED to VA-1 OR VA-2. Verify at least ONE 125V DC Battery Charger is 67 energized for each battery C. VERIFY THE SHUTDOWN SEQUENCER LOADS ARE OPERATING AND RESTORE AUXILIARIES. 68 . IF SRW/SW cooling can NOT be restored to 68 2A or 2B DG, THEN locally trip the 2A or 2B DG fuel racks. IF ANY RCP lower seal temperature is greater 70 . than 280°F. THEN restore Component Cooling by throttling 2-CC-284. Tie 2Y09 and 2Y10 . 71 . IF equipment needed to maintain Safety 71 Functions is available from a de-energized bus AND a power supply is available. THEN energize the bus, AND restore the needed equipment. D. ACCEPTANCE CRITERIA FOR SUCCESS PATH VA-3. 72 IF Vital Auxiliaries has NOT been satisfied, 72 THEN perform the following actions: Concurrently perform the Recovery actions for the next safety function to be satisfied Determine the appropriate emergency response actions PER the ERPIP Evaluate further actions

VA-3: SMECO

(continued)

START FUNCTION

1

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PAGE

DONE

NOTE: Continuously applicable steps are designated with a "C" in the DONE column.

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-1:CVCS

ALTERNATE ACTIONS
 1.1 IF the normal charging path is NOT available, THEN establish charging flow path to the RCS via the HPSI AUX HDR as follows: a. Shut HPSI AUX HDR ISOL valve, 2-SI-656-MOV. b. Open ONE of the HPSI AUX HDR valves: 2-SI-617-MOV 2-SI-627-MOV 2-SI-627-MOV 2-SI-637-MOV 2-SI-647-MOV 2-SI-647-MOV C. Open SI TO CHG HDR valve, 2-CVC-269-MOV. d. Shut the REGEN HX CHG INLET valve, 2-CVC-183, located in the 27 ft West Penetration Room. e. Shut L/D CNTMT ISOL valves: 2-CVC-515-CV 2-CVC-516-CV IF a charging flowpath can NOT be established via the HPSI AUX HDR, THEN perform the following: Verify REGEN HX CHG INLET valve, 2-CVC-183, is open. Charge through the Loop Charging valves Bypass Valve, 2-CVC-188.

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-1: CVCS

RECOVERY ACTIONS ALTERNATE ACTIONS A. (continued) 3. Verify RCS makeup flow by the following indications: CHG HDR PRESS is greater than • **RCS** pressure Running current for the operating CHG • PP(s) is between 75 and 95 AMPS 4. Check pressurizer level has stabilized by 4.1 IF pressurizer level has **NOT** been observing the following: stabilized. THEN operate charging and letdown to restore and maintain pressurizer level Level is greater than 30 inches Level is trending to 160 inches between 130 and 180 inches. Reactor Vessel level above the top of the hot leg 4.2 IF charging is unable to maintain minimum pressurizer level, THEN PROCEED to PIC-4, SIS. 4.3 IF letdown is NOT operating AND the HPSI AUX HDR is NOT being used for charging, THEN restore Letdown flow by performing the following: (continue) (continue)

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-1: CVCS

RECOVERY ACTIONS	ALTERNATE ACTIONS
A.4 (continued)	A.4.3 (continued) WARNING High radiation levels in the auxiliary building may result if letdown is initiated with high activity levels in the RCS. a. Verify ALL of the following conditions: • The leak was NOT in the letdown line • HPSI throttle criteria are met • Charging flow path exists through LOOP CHG valves or AUX SPRAY valve • At least ONE CHG PP is operating • At least ONE CC PP is operating b. Verify the selected PZR LVL CONTR, 2-LIC-110X or 2-LIC-110Y, in Auto Remote. c. Place Letdown Pressure Controller, 2-PIC-201, in MANUAL with a 20% output. d. Place IX BYP valve, 2-CVC-520-CV, in BYPASS. e. Shift LETDOWN VALVE CONTROLLER, 2-HIC-110, to
(continue)	MANUAL and adjust to 20%. (continue)

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-1: CVCS

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RECOVERY ACTIONS	ALTERNATE ACTIONS
A.4 (continued)	A.4.3 (continued)
	 f. IF the plant computer is NOT operating, THEN record the following information:
	RCS T COLD
	• CHG OUT TEMP (2-TI-229)
	 Average CNTMT ambient temperature (2-TI-5309 and 2-TI-5311)
	 27' Penetration Room temperature (2-TI-5276 and 2-TI-5280)
	g. Open L/D CNTMT ISOL valves:
	 2-CVC-515-CV 2-CVC-516-CV
	<u>CAUTION</u> The setpoint of 2-PIC-201 must be above the saturation pressure for the letdown outlet temperature of the Regenerative Heat Exchanger.
	h. Place Letdown Pressure Controller, 2-PIC-201 in service as follows:
	(1) Adjust the setpoint on 2-PIC-201 to a value less than RCS pressure but greater than the expected saturation pressure for letdown temperature.
	(2) Shift Letdown Pressure Controller, 2-PIC-201 to AUTO.
	i. Adjust LETDOWN VALVE CONTROLLER, 2-HIC-110, to slowly restore letdown flow.
(continue)	(continue)

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-1: CVCS

RECOVERY ACTIONS	ALTERNATE ACTIONS
A.4 (continued)	A.4.3 (continued)
	j. Shift LETDOWN VALVE CONTROLLER, 2-HIC-110, to AUTOMATIC.
	 k. Operate L/D HX TEMP CONTR, 2-TIC-223, to maintain Letdown Heat Exchanger letdown outlet temperature less than 120° F.
	I. IF a bubble exists in the pressurizer, THEN check that pressurizer level is trending to 160 inches.
	 m. IF pressurizer level is NOT trending to 160 inches, THEN shift the selected PZR LVL CONTR, 2-LIC-110X or 2-LIC-110Y, to Auto Local AND adjust the setpoint to 160 inches.
• (continue)	(continue)

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RECOVERY ACTIONS	ALTERNATE ACTIONS
A.4 (continued)	A.4.3 (continued)
	n. IF pressurizer pressure is less than 1000 PSIA, THEN place BOTH Backpressure Regulating valves and Letdown Control Valves in service.
	(1) Open BOTH Letdown Control Valve Inlet valves:
	 2-CVC-103 2-CVC-105
	(2) Check open BOTH Letdown Control Valve Outlet valves:
x	 2-CVC-104 2-CVC-106
	(3) Open BOTH Backpressure Regulating Inlet valves:
	2-CVC-1082-CVC-110
	(4) Check open BOTH Backpressure Regulating Outlet valves:
	2-CVC-1092-CVC-111
	(5) Place L/D CONTR VLVS handswitch, 2-HS-110-1, in BOTH.
	(6) Place BACKPRESSURE REG VLVS handswitch, 2-HS-201, in BOTH.
(continue)	(continue)

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-1:CVCS

RECOVERY ACTIONS	ALTERNATE ACTIONS
A.4 (continued)	A.4 (continued)
	<u>NOTE</u> Core and RCS voiding may be indicated by the following:
	Letdown flow greater than charging flow
	 Rapid unexplained rise in pressurizer level during an RCS pressure reduction
	 Loss of subcooled margin as determined using CET temperatures
	"RXV WTR LVL LO" alarm
	 4.4 IF high pressurizer level condition appears to be caused by excessive RCS voiding, THEN reduce or eliminate voided area PER the selected heat removal success path.
(continue)	

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-1: CVCS

RECOVERY ACTIONS

ALTERNATE ACTIONS

A. (continued)

- IF the RCS is water solid,
 AND it is desired to draw a bubble in the RCS,
 THEN perform the following actions:
 - a. Energize the Pressurizer HTR(s).
 - b. **IF EITHER** of the following conditions exist:
 - BOTH S/G pressures can be maintained less than RCS pressure
 - At least ONE RCP is running

THEN draw a bubble in the RCS as follows:

- IF the HPSI throttle criteria are met, THEN reduce RCS pressure by reducing HPSI/Charging flow or raising letdown flow.
- (2) Cooldown the RCS, while NOT exceeding 100° F in any one hour, using TBVs or ADVs.
- c. IF a bubble forms in the Pressurizer, THEN operate HPSI/Charging and Letdown as necessary to restore and maintain Pressurizer level between 101 and 180 inches.
- d. IF a bubble forms in the Reactor Vessel Head,
 THEN operate HPSI/Charging and Letdown as necessary to maintain RCS level above the top of the hot leg.

(continue)

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-1: CVCS

RECOVERY ACTIONS A. (continued)

- 6. IF boration is NOT in progress AND the VCT is unable to be used to supply charging, THEN line up charging suction to the RWT as follows:
 a. Open RWT CHG PP SUCT valve, 2-CVC-504-MOV.
 - b. Shut VCT OUT valve, 2-CVC-501-MOV.

makeup.

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- c. Observe VCT level is rising.
- d. Ensure CHG PP(s) current is steady.
- IF boration is NOT in progress AND the VCT is being used as a charging source, THEN maintain VCT level between 60 and 100 inches using automatic or manual
- 7.1 IF makeup is NOT available to the VCT AND VCT level approaches 60 inches, THEN shift Charging Pump(s) suction to the RWT as follows:

ALTERNATE ACTIONS

- a. Open RWT CHG PP SUCT valve, 2-CVC-504-MOV.
- b. Shut VCT OUT valve, 2-CVC-501-MOV.
- c. Observe VCT level is rising.
- d. Ensure CHG PP(s) current is steady.
- e. WHEN VCT level rises to 100 inches, THEN return Charging Pump suction to VCT:
 - (1) Open VCT OUT valve, 2-CVC-501-MOV.
 - (2) Shut RWT CHG PP SUCT valve, 2-CVC-504-MOV.

EOP-8 Rev 30/Unit 2 Page 10 of 88 **APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL** PIC-1:CVCS **RECOVERY ACTIONS ALTERNATE ACTIONS** B. **ESTABLISH RCS PRESSURE** CONTROL. 1. IF Pressurizer HTRs OR SPRAYS are available, THEN control pressurizer pressure as follows: a. IF a cooldown is NOT in progress, a.1 IF pressurizer pressure is less than **THEN** operate HTRs and SPRAYs as 2300 PSIA, necessary to maintain pressurizer AND PORV leakage is indicated by the pressure between 1850 and 2300 following indications: **PSIA** AND is trending to 2250 PSIA. **Quench Tank Parameters** PORV discharge piping temperatures, computer points T107 and T108 Acoustic Monitor indication **THEN** perform the following: (1) Shut the appropriate PORV BLOCK valves: 2-RC-403-MOV 2-RC-405-MOV (2) Place the appropriate PORV OVERRIDE handswitches in the OVERRIDE TO CLOSE position: 2-HS-1402 2-HS-1404 a.2 IF pressurizer pressure drops to 1725 PSIA as a result of the event, THEN PROCEED to PIC-4, SIS. (continue) (continue)

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-1: CVCS

RECOVERY ACTIONS	ALTERNATE ACTIONS
 B.1.a (continued) b. IF a cooldown is in progress, 	 B.1.a (continued) a.3 IF a Pressurizer Safety Valve is leaking, AND SIAS has NOT actuated, THEN attempt to reseat the Pressurizer Safety Valve by reducing pressurizer pressure to 1800 PSIA.
THEN perform the following:	
(1) Maintain RCS subcooling between 25 and 140° F based on CET temperatures.	 (1).1 IF subcooling approaches 25° F, THEN raise subcooling by ANY of the following methods:
	(a) Operate Pressurizer HTR(s).
	(b) Raise the RCS cooldown rate, while NOT exceeding 100° F in any one hour.
	(1).2 IF subcooling approaches 140° F, THEN lower subcooling by ANY of the following methods:
	(a) De-energize Pressurizer HTR(s).
	(b) Operate Main or AUX SPRAY.
	(c) Lower the RCS cooldown rate.
(2) IF a controlled cooldown is in progress, THEN block SIAS as follows:	
WHEN "PZR PRESS BLOCK A PERMITTED" alarm received, THEN block SIAS A.	
WHEN "PZR PRESS BLOCK B PERMITTED" alarm received, THEN block SIAS B.	
(continue)	

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-1: CVCS

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.1 (continued)

c. IF pressure reduction is desired AND Main Pressurizer Spray is ineffective in controlling pressurizer pressure, THEN initiate AUX SPRAY as follows:

CAUTION

If the difference between the PZR WTR TEMP and CHG OUT TEMP is greater than 400° F, then TRM 15.4.2 must be complied with.

- (1) Record the following information:
 - PZR WTR TEMP (2-TI-101)
 - CHG OUT TEMP (2-TI-229)
- (2) Open AUX SPRAY valve, 2-CVC-517-CV.
- (3) Operate LOOP CHG valves as necessary to adjust AUX SPRAY flow:
 - 2-CVC-518-CV
 - 2-CVC-519-CV
- (4) Shift PZR SPRAY VLV CONTR, 2-HIC-100, to MANUAL.
- (5) Shut PZR SPRAY VLVs by adjusting the output of 2-HIC-100 to 0%:
 - 2-RC-100E-CV
 - 2-RC-100F-CV
- (6) Maintain pressurizer cooldown rate less than 200° F/hour.

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-1: CVCS

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.1 (continued)

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

- d. IF Pressurizer B/U HTR banks have tripped on U/V, THEN re-energize the heaters as follows:
 - (1) Charge closing spring using manual lever at 480V breakers 52-2127 and 52-2427.
 - (2) Push the PUSH-TO-CLOSE button on the breaker fronts.
- e. Verify RCS pressure and temperature are within the limits **PER** ATTACHMENT (1), <u>RCS PRESSURE</u> <u>TEMPERATURE LIMITS</u>.

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL

PIC-1:CVCS

RECOVERY ACTIONS

ALTERNATE ACTIONS

B. (continued)

- 2. IF Pressurizer HTRs and SPRAYS are NOT available. THEN control pressurizer pressure using controlled steaming as follows: a. IF RCS boration is NOT in progress, THEN commence RCS boration as follows: (1) Shut VCT M/U valve, 2-CVC-512-CV. (2) Open BA DIRECT M/U valve, 2-CVC-514-MOV.
 - (3) Open BAST GRAVITY FD valves:
 - 2-CVC-508-MOV
 - 2-CVC-509-MOV
 - (4) Verify the M/U MODE SEL SW, 2-HS-210, is in MANUAL.
 - (5) Start ALL available BA PPs.
 - (6) Shut VCT OUT valve, 2-CVC-501-MOV.
 - (7) Start ALL available CHG PPs.
 - b. Record the time RCS boration was commenced:
 - c. Record BAST levels:

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-1: CVCS

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.2 (continued)

- d. Continue boration until **ONE** of the following conditions is met:
 - (1) 116 percent of the shutdown margin requirement has been achieved **PER** the NEOPs.
 - (2) BAST level has been lowered a total of 108 inches
 - (3) Boration has been in progress as follows:
 - For 53 minutes if THREE CHG PPs are operating
 - For 80 minutes if TWO CHG PPs are operating
 - For 160 minutes if ONE CHG PP is operating
- e. WHEN boration is complete, THEN secure boration as follows:
 - (1) Open VCT OUT valve, 2-CVC-501-MOV.
 - (2) Stop BA PP(s).
 - (3) Shut BA DIRECT M/U valve, 2-CVC-514-MOV.
 - (4) Shut BAST GRAVITY FD valves:
 - 2-CVC-508-MOV
 - 2-CVC-509-MOV
- f. Allow pressurizer level to lower during the cooldown as necessary to aid in RCS depressurization, while maintaining pressurizer level greater than 30 inches.

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL

PIC-1:CVCS

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.2 (continued)

- g. IF SGIS has NOT actuated, THEN perform the following actions:
 - WHEN "SGIS A BLOCK PERMITTED" alarm is received, THEN block SGIS A.
 - WHEN "SGIS B BLOCK PERMITTED" alarm is received, THEN block SGIS B.
- h. IF SIAS has NOT actuated, THEN block SIAS as follows:
 - WHEN "PZR PRESS BLOCK A PERMITTED" alarm received, THEN block SIAS A.
 - WHEN "PZR PRESS BLOCK B PERMITTED" alarm received, THEN block SIAS B.
- i. Commence RCS cooldown to less than 300° F using the TURB BYP valves **OR** the ADV(s) from the unaffected S/G(s), while **NOT** exceeding 100° F in any one hour.

NOTE

If a Pressurizer Safety Valve is leaking, reducing pressurizer pressure may reseat the Pressurizer Safety Valve.

j. Control the cooldown rate in order to maintain RCS pressure and temperature **PER** ATTACHMENT (1), <u>RCS PRESSURE TEMPERATURE</u> <u>LIMITS</u>.

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-1: CVCS

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.2 (continued)

NOTE

If rapid pressure excursions due to RCS inventory or temperature changes have occurred, consider the RCS water solid.

 k. IF a bubble exists in the Pressurizer
 OR the Reactor Vessel Head,
 THEN restore and maintain subcooling between 25 and 140° F based on CET temperatures as follows:

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 methods:

NOTE

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

- (a) Energize the Pressurizer HTR(s).
- (b) IF HPSI flow has been reduced, THEN raise HPSI flow by opening HPSI HDR valves which have been throttled or starting HPSI PPs which have been stopped.
- (c) Raise RCS cooldown rate, while NOT exceeding 100° F in any one hour, by using the ADV from the unaffected S/G.

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ALTERNATE ACTIONS

APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-1: CVCS

RECOVERY ACTIONS B.2.k(1) (continued)

- (d) IF high pressurizer level secures the backup CHG PPs
 AND more than ONE CHG PP is required to maintain subcooling,
 THEN perform the following actions:
 - 1) Locally initiate SIAS A6 and B6.
 - IF boration is NOT in progress, THEN place the BA PP handswitches in PULL TO LOCK.
- (2) IF subcooling can NOT be maintained above 25° F, THEN attempt to take the pressurizer solid to establish RCS
 pressure control as follows:
 - (a) Station a dedicated pressure control watch at 2C05 and 2C06 panels.
 - (b) Verify letdown is operating.
 - (c) WHEN pressurizer level is above 305 inches, THEN secure ALL but ONE CHG PP by placing their handswitches in PULL TO LOCK.

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-1: CVCS

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.2.k(2) (continued)

- (d) Charge as necessary with ONE CHG PP to maintain the following:
 - RCS subcooling at least 25° F based on CET temperatures
 - RCS pressure within the limits **PER** ATTACHMENT (1), <u>RCS</u> <u>PRESSURE</u> <u>TEMPERATURE LIMITS</u>
- (3) Lower subcooling by **ANY** of the following methods:
 - (a) De-energize the Pressurizer HTR(s).
 - (b) IF ALL RCPs are operating, THEN use Main PRESSURIZER SPRAY.
 - (c) Lower the RCS cooldown rate.
 - (d) IF the overpressurization is due to HPSI/Charging flow AND the HPSI throttle criteria are met, THEN throttle or secure flow to restore subcooling.
 - (e) Raise the letdown flow rate.

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL

PIC-1: CVCS

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.2.k(3) (continued)

- (f) Initiate AUX SPRAY as follows:
 - 1) Place the CIS OVERRIDE switch, 2-HS-2080A, in OVERRIDE.
 - 2) Open the IA CNTMT ISOL valve, 2-IA-2080-MOV.

CAUTION

If the difference between the PZR WTR TEMP and CHG OUT TEMP is greater than 400° F, then TRM 15.4.2 must be complied with.

- 3) Record the following information:
 - PZR WTR TEMP (2-TI-101)
 - CHG OUT TEMP (2-TI-229)
- 4) Open the AUX SPRAY valve, 2-CVC-517-CV.
- 5) Operate the LOOP CHG valves as necessary to adjust AUX SPRAY flow:
 - 2-CVC-518-CV
 - 2-CVC-519-CV
- 6) Shift the PZR SPRAY VLV CONTR, 2-HIC-100, to MANUAL.

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL

PIC-1:CVCS

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.2.k(3)(f) (continued)

- Shut the PZR SPRAY VLVS by adjusting the output of 2-HIC-100 to 0%:
 - 2-RC-100E-CV
 - 2-RC-100F-CV
- 8) Maintain the pressurizer cooldown rate less than 200° F/hour.
- IF the RCS is water solid, THEN restore and maintain subcooling between 25 and 140° F based on CET temperatures as follows:
 - (1) Lower subcooling by **ANY** of the following methods:
 - (a) Lower RCS temperature.
 - (b) IF the overpressurization is due to HPSI/Charging flow AND the HPSI throttle criteria are met, THEN throttle or secure flow to restore subcooling.
 - (c) De-energize the Pressurizer HTR(s).

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-1: CVCS

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.2.I (continued)

CAUTION

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

- (2) Raise subcooling by **ANY** of the following methods:
 - (a) Raise RCS temperature.
 - (b) IF HPSI flow has been reduced, THEN raise HPSI flow by opening HPSI HDR valves which have been throttled or starting HPSI PPs which have been stopped.

NOTE

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

(c) Energize the Pressurizer HTR(s).

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-1: CVCS

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.2 (continued)

<u>NOTE</u> Core and RCS voiding may be indicated by the following:

- Letdown flow greater than charging flow
- Rapid unexplained rise in pressurizer level during an RCS pressure reduction
- Loss of subcooled margin as determined using CET temperatures
- "RXV WTR LVL LO" alarm
 - m. IF voiding causes difficulty in depressurization,
 THEN reduce or eliminate the voided area by performing the following actions:
 - (1) Shut the L/D CNTMT ISOL valves:
 - 2-CVC-515-CV
 - 2-CVC-516-CV
 - (2) Stop depressurizing the RCS.

PIC-1:CVCS	
RECOVERY ACTIONS	ALTERNATE ACTIONS
B.2.m (continued)	
<u>CAUTION</u> The potential exists for pressurized thermal shock from an excessive cooldown rate followed by a repressurization.	
 (3) Cycle RCS subcooling between 25 and 140° F as follows: (a) Raise RCS subcooling to as near 140° F as practical by 	(3).1 IF cycling RCS subcooling is ineffective, THEN operate RX VESS VENT valves PER the <u>VENTING THE REACTOR</u> <u>COOLANT SYSTEM AFTER AN</u> <u>ACCIDENT</u> section of OI-1G.
ANY of the following methods:	ACCIDENT SECTOR OF OF TO.
NOTE Pressurizer Backup Heater Banks 21 and 23 trip on U/V and SIAS.	
 Energize the Pressurizer HTR(s) 	
Secure Pressurizer SPRAY	
 Raise RCS cooldown rate while maintaining cooldown less than 100° F in any one hour 	
 IF HPSI flow has been reduced, THEN raise HPSI flow by opening HPSI HDR valves which have been throttled, OR starting HPSI PPs which have been stopped. 	
(continue)	

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-1: CVCS

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.2.m(3) (continued)

- (b) Lower RCS subcooling to as near 25° F as practical by ANY of the following methods:
 - De-energize the Pressurizer HTR(s)
 - Operate Pressurizer SPRAY
 - Secure RCS cooldown
 - IF HPSI throttle criteria are met, THEN throttle the HPSI HDR valves, OR stop the HPSI PPs one at a time
- (c) Repeat steps B.2.m.(3).(a) through B.2.m.(3).(b) as necessary.

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-1: CVCS

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.2.m (continued)

NOTE

Voids may form in the S/G Tubes if saturation pressure of a S/G is greater than saturation pressure of RCS.

CAUTION

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

- (4) IF voiding is suspected in the S/G tubes,
 THEN cool the S/G so RCS cooldown rate remains less than 100° F in any one hour by raising ANY of the following:
 - Steaming rate
 - Feed rate
 - S/G Blowdown rate
- (5) Monitor Pressurizer level and Reactor Vessel level for inventory trends.

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-1: CVCS

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	RECOVERY ACTIONS	ALTERNATE ACTIONS
C.	ACCEPTANCE CRITERIA FOR SUCCESS PATH PIC-1.	
1.	 Check RCS Pressure And Inventory Control is satisfied by the following indications: Pressurizer pressure less than the upper limits PER ATTACHMENT (1), <u>RCS PRESSURE TEMPERATURE LIMITS</u> Pressurizer level is greater than 30 inches RCS subcooling is between 25 and 140° F based on CET temperatures Reactor Vessel level above the top of the hot leg 	1.1 IF RCS Pressure And Inventory Control has NOT been satisfied, THEN PROCEED to the next appropriate RCS Pressure and Inventory Control Success Path.
2.	IF RCS Pressure And Inventory Control has been established, THEN PROCEED to the next Safety Function to be satisfied.	

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	PPENDIX (3) RCS PRESSURE ANI	D INVENTORY CONTROL	
PI	C-2: PORVs or PRESSURIZER VE	NT	
RECOVERY ACTIONS ALTERNATE ACTIONS			
A .	ESTABLISH RCS INVENTORY CONTROL		
1.	IF pressurizer pressure is less than or equal to 1725 PSIA OR containment pressure is greater than or equal to 2.8 PSIG, THEN verify SIAS actuation.		
2.	IF pressurizer pressure is greater than 1725 PSIA AND containment pressure is less than 2.8 PSIG, THEN perform the following actions to block SIAS:		
	a. Open HPSI MAIN and AUX HDR valves:		
	MAIN • 2-SI-616-MOV • 2-SI-626-MOV • 2-SI-636-MOV • 2-SI-646-MOV AUX		
	 2-SI-617-MOV 2-SI-627-MOV 2-SI-637-MOV 2-SI-647-MOV 		
	b. Start 21 and 23 HPSI PPs.		
	c. Start ALL available CHG PPs.		
	d. WHEN the "PZR PRESS BLOCK A PERMITTED" alarm is received, THEN block SIAS A.		
	e. WHEN the "PZR PRESS BLOCK B PERMITTED" alarm is received, THEN block SIAS B.		
	(continue)		

Rev 30/Unit 2 Page 29 of 88 APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL **PIC-2: PORVs or PRESSURIZER VENT RECOVERY ACTIONS ALTERNATE ACTIONS** A.2 (continued) f. WHEN pressure is below 1270 PSIA, THEN verify appropriate HPSI flow PER ATTACHMENT(10), HIGH PRESSURE SAFETY INJECTION FLOW. 3. IF SIAS has actuated, THEN perform the following actions: a. Verify the following pumps are running: 21 HPSI PP 23 HPSI PP 21 LPSI PP 22 LPSI PP ALL available CHG PPs b. Verify safety injection flow: b.1 Perform the following actions as necessary: HPSI flow PER ATTACHMENT(10), HIGH IF 21 HPSI PP failed, PRESSURE SAFETY INJECTION THEN start 22 HPSI PP. FLOW, when pressure is below 1270 PSIA IF 23 HPSI PP failed, THEN align 22 HPSI PP as follows: LPSI flow PER . ATTACHMENT(11), LOW (1) Start 22 HPSI PP. PRESSURE SAFETY INJECTION FLOW, when pressure is below (2) Open HPSI HDR XCONN valve, **185 PSIA** 2-SI-653-MOV. (3) Shut HPSI HDR XCONN valve, 2-SI-655-MOV. Ensure electrical power is available to valves and pumps. Verify safety injection system lineup PER ATTACHMENT (2), SIAS VERIFICATION CHECKLIST. (continue)

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-2: PORVs or PRESSURIZER VENT

RECOVERY ACTIONS

ALTERNATE ACTIONS

A. (continued)

- IF HPSI PPs are operating AND ALL of the following conditions can be maintained:
 - At least 25° F subcooling based on CET temperatures
 - Pressurizer level greater than 101 inches {141}
 - At least ONE S/G available for heat removal
 - S/G level greater than
 (-)170 inches
 - capable of being supplied with feedwater
 - capable of being steamed
 - Reactor Vessel level above the top of the hot leg
 - Reactivity Control Safety Function Acceptance Criteria are met

THEN HPSI flow may be reduced by throttling the HPSI HDR valves, or stopping the HPSI PPs one at a time, as desired, to maintain the following:

- RCS subcooling between 25 and 140° F based on CET temperatures
- Pressurizer level between 101 inches {141} and 180 inches {190}
- 5. IF pressurizer pressure is greater than 200 PSIA and constant OR rising, THEN the operating LPSI PPs may be stopped.

EOP-8 Rev 30/Unit 2 Page 31 of 88 **APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL** PIC-2: PORVs or PRESSURIZER VENT **RECOVERY ACTIONS ALTERNATE ACTIONS** A. (continued) 6. IF HPSI or LPSI throttle criteria can NOT be maintained after the pumps are throttled or secured, THEN restart the appropriate pumps AND restore full flow. 7. Restore and maintain Pressurizer Level 7.1 IF pressurizer level can NOT be restored above 101 inches {141}, between 101 inches {141} and 180 inches THEN continue to maximize safety {190} by operating SIS, charging, and if available, letdown, injection flow. 8. IF SIAS has NOT actuated, 8.1 IF makeup is NOT available to the VCT THEN maintain VCT level between 60 and AND VCT level approaches 60 inches, THEN shift Charging Pump(s) suction to 100 inches using automatic or manual the RWT as follows: makeup. a. Open RWT CHG PP SUCT valve, 2-CVC-504-MOV. b. Shut VCT OUT valve, 2-CVC-501-MOV. c. Observe VCT level is rising. d. Ensure CHG PP(s) current is steady. e. WHEN VCT level rises to 100 inches, THEN return Charging Pump suction to VCT: (1) Open VCT OUT valve, 2-CVC-501-MOV. (2) Shut RWT CHG PP SUCT valve, 2-CVC-504-MOV.

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APPENDIX (3) RCS PRESSURE AN	D INVENTORY CONTROL
PIC-2: PORVs or PRESSURIZER VE	INT
RECOVERY ACTIONS	ALTERNATE ACTIONS
B. ESTABLISH RCS PRESSURE CONTROL USING PORVs OR PRESSURIZER VENT.	
 IF pressurizer pressure rises to 2400 PSIA, THEN perform the following: Verify BOTH PORV OVERRIDE handswitches in the AUTO position: 	 1.1 IF PORVs do NOT open automatically, THEN perform the following: a. Place the PORV OVERRIDE handswitches in MANAUL OPEN: 2-HS-1402 2-HS-1404 b. Verify BOTH PORVs are open. c. Reduce pressure such that: Pressurizer pressure is less than 2300 PSIA RCS pressure is within the limits PER ATTACHMENT (1), RCS PRESSURE TEMPERATURE LIMITS RCS subcooling is less than 140° F based on CET temperatures d. Place the PORV OVERRIDE handswitches in AUTO: 2-HS-1404
(continue)	

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-2: PORVs or PRESSURIZER VENT

RECOVERY ACTIONS

ALTERNATE ACTIONS

B. (continued)

- 2. Restore and maintain RCS subcooling within the following limits:
 - Pressurizer pressure less than 2300 PSIA
 - RCS pressure within the limits PER ATTACHMENT (1), <u>RCS PRESSURE</u> <u>TEMPERATURE LIMITS</u>
 - RCS subcooling between 25 and 140° F based on CET temperatures
 - a. IF Pressurizer level is less than 305 inches, THEN lower pressure and subcooling with the PORVs as follows:
 - (1) Verify the PORV BLOCK valves are OPEN:
 - 2-RC-403-MOV
 - 2-RC-405-MOV
 - (2) Place ONE PORV OVERRIDE handswitch in MANUAL OPEN:
 - 2-HS-1402
 - 2-HS-1404
 - (3) IF a second PORV is needed to lower pressure OR subcooling, THEN place the other PORV OVERRIDE handswitch in MANUAL OPEN.
 - (4) Start ALL available CACs in HIGH with maximum SRW flow.

- a.1 IF PORVs are **NOT** available, **THEN** depressurize the RCS with the PZR VENT valves as follows:
 - (1) Open the QUENCH TK VENT TO CNTMT, 2-RC-402-SV.
 - (2) Open the PZR VENT valves to lower pressure and subcooling:
 - 2-RC-105-SV
 - 2-RC-106-SV
 - (3) IF Pressurizer level approaches 305 inches OR Pressurizer Vents are NOT required to be open, THEN perform the following:
 - (a) Shut the PZR VENT valves:
 - 2-RC-105-SV
 - 2-RC-106-SV
 - (b) Shut the QUENCH TK VENT TO CNTMT, 2-RC-402-SV.

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-2: PORVs or PRESSURIZER VENT

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.2 (continued)

- b. IF PORVs must remain open for heat removal PER HR-4, <u>ONCE-THROUGH-COOLING,</u> THEN IMPLEMENT RCS Pressure and Inventory Control Success Path PIC-4, <u>SIS.</u>
- c. IF Pressurizer level approaches 305 inches, OR PORVs are NOT required to be open, THEN close the PORVs by performing the following:
 - (1) Place the PORV OVERRIDE handswitches in AUTO:
 - 2-HS-1402
 - 2-HS-1404
 - (2) IF the PORV(s) will NOT shut OR the Acoustic Monitor indicates flow through a PORV, THEN shut the affected PORV BLOCK valve.

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-2: PORVs or PRESSURIZER VENT RECOVERY ACTIONS ALTERNATE ACTIONS B.2 (continued) CAUTION The potential exists for pressurized thermal shock from an excessive cooldown rate followed by a repressurization. d. Raise subcooling by ANY of the following methods: (1) Ensure the PORVs and PZR VENT valves are shut. NOTE Pressurizer Backup Heater Banks 21 and 23 trip on U/V and SIAS. IF Pressurizer B/U HTR banks have (2) Energize the Pressurizer HTR(s). (2).1 tripped on U/V. THEN re-energize the heaters as follows: (a) Charge closing spring using manual lever at 480V breakers 52-2127 and 52-2427. (b) Push the PUSH-TO-CLOSE button on the breaker fronts. (3) IF HPSI flow has been reduced, THEN raise HPSI flow by opening HPS1 HDR valves which have been throttled or starting HPSI PPs which have been stopped. (4) Raise RCS cooldown rate, while NOT exceeding 100° F in any one hour, by using the ADV from the unaffected S/G. (5) Reduce letdown flow.

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL		
ENT		
ALTERNATE ACTIONS		
 c.1 IF HPSI flow is less than 90 GPM per pump AND the HPSI throttle criteria have been met, THEN perform the following actions: (1) IF the CHG PPs are operating, THEN turn off ONE CHG PP at a time until HPSI flow is at least 90 GPM per pump. (2) IF HPSI flow is still less than 90 GPM per pump with ALL CHG PPs secured, THEN turn off ONE HPSI PP at a time until HPSI flow is greater than 90 GPM per pump. 		

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APPENDIX (3) RCS PRESSURE AN	D INVENTORY CONTROL
PIC-2: PORVs or PRESSURIZER VE	NT
RECOVERY ACTIONS	ALTERNATE ACTIONS
D. VERIFY CONTAINMENT SUMP LEVEL AND RAS ACTUATION.	
1. Observe Containment Sump level rises as RWT level lowers.	1.1 IF Containment Sump level does NOT rise as RWT level lowers, THEN perform the follows actions:
	 a. Maintain RWT level greater than 2 feet by replenishment from ANY available source.
	NOTE Leakage location may be indicated by sump alarms or room level alarms.
·	 b. Determine the cause for the leakage and attempt to isolate it.
(continue)	
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Page 38 of 88 **APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-2: PORVs or PRESSURIZER VENT RECOVERY ACTIONS ALTERNATE ACTIONS** D. (continued) 2. WHEN RWT level drops to 0.75 feet OR the "ACTUATION SYS RAS TRIP" alarm is received. THEN perform the following actions: a. Verify RAS actuation. b. Check a minimum containment sump level of at least 28 inches is indicated on the CNTMT WIDE RANGE WTR LVL indication, 2-LI-4146 or 2-LI-4147. c. Verify RAS lineup PER ATTACHMENT (6), RAS VERIFICATION CHECKLIST. d. IF RAS lineup is verified, THEN shut the RWT OUT valves: 2-SI-4142-MOV 2-SI-4143-MOV (continue)

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-2: PORVs or PRESSURIZER VENT

RECOVERY ACTIONS ALTERNATE ACTIONS D.2 (continued) e. Verify Component Cooling in service e.1 IF NO CC PPs are operating, as follows: THEN restore Component Cooling PER AOP-7C, LOSS OF COMPONENT COOLING WATER. (1) Throttle open BOTH CC HX SW OUT valves: e.2 IF Component Cooling can NOT be 2-HIC-5206 restored. THEN align a CS PP for Safety Injection 2-HIC-5208 as follows: (2) Verify BOTH CC HX CC OUT (1) Notify the Operational Support valves are open: Center to check radiation levels are low enough for valve repositioning. 2-CC-3824-CV 2-CC-3826-CV (3) Verify TWO CC PPs in operation. WARNING Do NOT continue with this step until the **Operational Support Center has** determined radiation levels are low enough for valve repositioning. (2) Stop ONE CS PP. (3) Shut SDC Hx Out To CS Valve for the SDC Hx associated with the CS Pump. (21 SDC Hx) 2-SI-319 (22 SDC Hx) 2-SI-329 (4) Open SDC Hx Inlet Cross Connect Valve for the SDC Hx associated with the CS Pump. (21 SDC Hx) 2-SI-452 (22 SDC Hx) 2-SI-453 (5) Open SDC HX LPSI INL valve, 2-SI-658-MOV. (6) Start the CS PP. (7) Stop ALL running HPSI PPs. (continue)

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APPENDIX (3) RCS PRESSURE AI	ND INVENTORY CONTROL
PIC-2: PORVs or PRESSURIZER V	ENT
RECOVERY ACTIONS	ALTERNATE ACTIONS
D.2 (continued)	
<u>CAUTION</u> Minimum HPSI Pump flow is 90 GPM to prevent pump damage.	
f. IF TWO HPSI PPs are running, THEN throttle HPSI flow to achieve 250 GPM through each of the four headers.	 f.1 IF HPSI flow of 250 GPM to each header can NOT be achieved, THEN throttle HPSI flow equally among the four headers. f.2 IF HPSI flow indication has been lost, THEN perform the following:
g. IF ONE HPSI PP is running, THEN throttle HPSI flow to achieve	NOTE It is desired to secure 21 HPSI PP due to HPSI flow indication and MOV POSITION indicators associated with 21 HPSI PP are powered from 2Y09. (1) Secure ONE HPSI PP. (2) Throttle HPSI MOVs equally among the four headers to maintain the following: • NO HPSI PP cavitation • CETs less than 50° F superheated • Core covered (9.1 IF HPSI flow of 150 GPM to each header can NOT be achieved,
150 GPM through each of the four headers.	THEN throttle HPSI flow equally among the four headers.
(continue)	(continue)

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-2: PORVs or PRESSURIZER VENT

RECOVERY ACTIONS ALTERNATE ACTIONS D.2.g (continued) D.2.g (continued) g.2 IF HPSI flow indication has been lost, THEN throttle HPSI MOVs equally among the four headers to maintain the following: **NO HPSI PP cavitation** CETs less than 50° F superheated Core covered h. IF a loss of ECCS pump suction is indicated during recirculation by ANY of the following: Lower or unstable HPSI or CS flow Lower or unstable HPSI or CS PP discharge pressure Lower or unstable HPSI or CS PP motor current **HPSI or CS PP noise** THEN take actions to prevent HPSI and CS PP damage. AND maintain adequate core cooling by performing the following: (1) Throttle HPSI flow equally among (1).1 IF HPSI flow indication has been lost. the four headers to the minimum THEN throttle HPSI MOVs equally allowed PER ATTACHMENT(10), among the four headers to maintain the HIGH PRESSURE SAFETY following: **INJECTION FLOW. NO HPSI PP cavitation** CETs less than 50° F superheated Core covered (continue)

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ļ	RECOVERY ACTIONS		ALTERNATE ACTIONS
2.h (conf	inued)		
(2)	IF HPSI or CS PP performance is NOT acceptable, THEN perform the following:		
	(a) Stop BOTH CS PPs.		
	(b) Check acceptable HPSI PP performance.	(b).1	IF HPSI PP performance is NOT acceptable, THEN stop the HPSI PP(s).
	(c) Notify the Plant Technical Support Center.		
i. Cor coo	nmence ECCS Pump Room ling as follows:		
(1)	Open the ECCS AIR CLR INL/OUT VLVs:		
	 2-SW-5170-CV 2-SW-5171-CV 2-SW-5173-CV 		
(2)	Start 21 EAST and 22 WEST ECCS PP RM CLG FANs.		
-	ce the ECCS PP RM EXH FILT in vice.		
	(continue)		

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-2: PORVs or PRESSURIZER VENT RECOVERY ACTIONS ALTERNATE ACTIONS D.2 (continued) k. Maintain SRW and Component Cooling temperatures by performing the following: (1) Adjust the CC HX SW OUT valves to maintain Component Cooling temperature less than 120° F. 2-HIC-5206 2-HIC-5208 • (2) IF EITHER SRW HX SW BYPASS valve is in AUTO. THEN adjust the setpoint as necessary to maintain SRW temperature less than 105° F: 2-PIC-5154 2-PIC-5157 NOTE The current maximum SW header pressure limits are recorded on the Shift Turnover Sheet. (3) Verify SW HDR PRESS less than the maximum SW header pressure limit. I. IF CHG PPs are aligned with suction from the RWT, THEN place the CHG PPs in PULL TO LOCK. (continue)

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APPENDIX (3) RCS PRESSURE AND	DINVENTORY CONTROL
PIC-2: PORVs or PRESSURIZER VE	NT
RECOVERY ACTIONS	ALTERNATE ACTIONS
D.2 (continued)	
<u>CAUTION</u> Minimum HPSI Pump flow is 90 GPM to prevent pump damage.	
m. Ensure HPSI PP flow is at least 90 GPM during recirculation.	 m.1 IF HPSI flow is less than 90 GPM per pump during recirculation AND HPSI throttle criteria have been met, THEN perform the following actions: (1) IF CHG PPs are operating, THEN turn off ONE CHG PP at a time until HPSI flow is at least 90 GPM per pump. (2) IF HPSI flow is still less than 90 GPM per pump with ALL CHG PPs secured, THEN turn off ONE HPSI PP at a time until HPSI flow is greater than 90 GPM per pump.
E. IF RAS ACTUATED, THEN REFILL THE RWT.	
 Contact the Operational Support Center to check radiation levels are low enough to allow valve repositioning. 	
2. WHEN SIAS has been reset, THEN initiate actions to makeup to the RWT PER OI-2B, <u>CVCS BORATION,</u> <u>DILUTION AND MAKEUP OPERATIONS</u> .	
 Notify the Plant Technical Support Center to review ERPIP-611, <u>SEVERE</u> <u>ACCIDENT MANAGEMENT</u> <u>RESTORATIVE ACTIONS</u> for alternate methods to refill the RWT AND actions to inject directly to the RCS bypassing the RWT. 	

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APPENDIX (3) RCS PRESSURE AND	D INVENTORY CONTROL
PIC-2: PORVs or PRESSURIZER VE	NT
RECOVERY ACTIONS	ALTERNATE ACTIONS
F. ACCEPTANCE CRITERIA FOR SUCCESS PATH PIC-2.	
 Check RCS Pressure And Inventory Control is satisfied by the following indications: Pressurizer pressure is less than 2400 PSIA Pressurizer pressure less than the upper limits PER ATTACHMENT (1), <u>RCS PRESSURE TEMPERATURE LIMITS</u> RCS subcooling is between 25 and 140° F based on CET temperatures Pressurizer level is greater than 30 inches {90} Reactor Vessel level above the top of the hot leg 	1.1 IF RCS Pressure And Inventory Control has NOT been satisfied, THEN PROCEED to the next appropriate RCS Pressure and Inventory Control Success Path.
2. IF RCS Pressure And Inventory Control has been established, THEN PROCEED to the next Safety Function to be satisfied.	

APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-3:LOSS OF VITAL AC RECOVERY ACTIONS ALTERNATE ACTIONS A. ESTABLISH RCS PRESSURE AND INVENTORY CONTROL DURING LOSS OF VITAL AC 1. Minimize RCS inventory loss by performing the following: a. Shut L/D CNTMT ISOL valves: • 2-CVC-515-CV • 2-CVC-516-CV b. Maintain an RCP Bleedoff flowpath: (1) Verify RCP CBO RELIEF ISOL, 2-CVC-507-CV, is open. (2) Shut RCP CBO RELIEF ISOL, 2-CVC-505-CV • 2-CVC-505-CV • 2-CVC-506-CV (3) Open 21 RCDT DRN TO CNTMT FLOOR valve, 2-RCW-4258-SV. c. Shut RCS SAMPLE ISOL valve, 2-PS-5464-CV. d. Verify RXV VENT and PZR VENT valves are shut:
RECOVERY ACTIONS ALTERNATE ACTIONS A. ESTABLISH RCS PRESSURE AND INVENTORY CONTROL DURING LOSS OF VITAL AC Inventory control provide the following: 1. Minimize RCS inventory loss by performing the following: a. Shut L/D CNTMT ISOL valves: a. Shut L/D CNTMT ISOL valves: b. 2-CVC-515-CV b. Maintain an RCP Bleedoff flowpath: (1) Verify RCP CBO RELIEF ISOL, 2-CVC-507-CV, is open. (2) Shut RCP CBO INBD and OUTBD ISOL valves: b. 2-CVC-505-CV c. 2-CVC-505-CV c. 2-CVC-506-CV (3) Open 21 RCDT DRN TO CNTMT FLOOR valve, 2-RCW-4258-SV. c. Shut RCS SAMPLE ISOL valve, 2-PS-5464-CV. c. Shut RCS SAMPLE ISOL valve, 2-PS-5464-CV. c. Verify RXV VENT and PZR VENT valves are shut:
 A. ESTABLISH RCS PRESSURE AND INVENTORY CONTROL DURING LOSS OF VITAL AC 1. Minimize RCS inventory loss by performing the following: a. Shut L/D CNTMT ISOL valves: 2-CVC-515-CV 2-CVC-516-CV b. Maintain an RCP Bleedoff flowpath: (1) Verify RCP CBO RELIEF ISOL, 2-CVC-507-CV, is open. (2) Shut RCP CBO INBD and OUTBD ISOL valves: 2-CVC-505-CV 2-CVC-505-CV 2-CVC-506-CV (3) Open 21 RCDT DRN TO CNTMT FLOOR valve, 2-RCW-4258-SV. c. Shut RCS SAMPLE ISOL valve, 2-PS-5464-CV. d. Verify RXV VENT and PZR VENT valves are shut:
 A. ESTABLISH RCS PRESSURE AND INVENTORY CONTROL DURING LOSS OF VITAL AC 1. Minimize RCS inventory loss by performing the following: a. Shut L/D CNTMT ISOL valves: 2-CVC-515-CV 2-CVC-516-CV b. Maintain an RCP Bleedoff flowpath: (1) Verify RCP CBO RELIEF ISOL, 2-CVC-507-CV, is open. (2) Shut RCP CBO INBD and OUTBD ISOL valves: 2-CVC-505-CV 2-CVC-505-CV 2-CVC-506-CV (3) Open 21 RCDT DRN TO CNTMT FLOOR valve, 2-RCW-4258-SV. c. Shut RCS SAMPLE ISOL valve, 2-PS-5464-CV. d. Verify RXV VENT and PZR VENT valves are shut:
INVENTORY CONTROL DURING LOSS OF VITAL AC 1. Minimize RCS inventory loss by performing the following: a. Shut L/D CNTMT ISOL valves: • 2-CVC-515-CV • 2-CVC-516-CV b. Maintain an RCP Bleedoff flowpath: (1) Verify RCP CBO RELIEF ISOL, 2-CVC-507-CV, is open. (2) Shut RCP CBO INBD and OUTBD ISOL valves: • 2-CVC-505-CV • 2-CVC-506-CV (3) Open 21 RCDT DRN TO CNTMT FLOOR valve, 2-RCW-4258-SV. c. Shut RCS SAMPLE ISOL valve, 2-PS-5464-CV. d. Verify RXV VENT and PZR VENT valves are shut:
INVENTORY CONTROL DURING LOSS OF VITAL AC 1. Minimize RCS inventory loss by performing the following: a. Shut L/D CNTMT ISOL valves: • 2-CVC-515-CV • 2-CVC-516-CV b. Maintain an RCP Bleedoff flowpath: (1) Verify RCP CBO RELIEF ISOL, 2-CVC-507-CV, is open. (2) Shut RCP CBO INBD and OUTBD ISOL valves: • 2-CVC-505-CV • 2-CVC-506-CV (3) Open 21 RCDT DRN TO CNTMT FLOOR valve, 2-RCW-4258-SV. c. Shut RCS SAMPLE ISOL valve, 2-PS-5464-CV. d. Verify RXV VENT and PZR VENT valves are shut:
 performing the following: a. Shut L/D CNTMT ISOL valves: 2-CVC-515-CV 2-CVC-516-CV b. Maintain an RCP Bleedoff flowpath: (1) Verify RCP CBO RELIEF ISOL, 2-CVC-507-CV, is open. (2) Shut RCP CBO INBD and OUTBD ISOL valves: 2-CVC-505-CV 2-CVC-506-CV (3) Open 21 RCDT DRN TO CNTMT FLOOR valve, 2-RCW-4258-SV. c. Shut RCS SAMPLE ISOL valve, 2-PS-5464-CV. d. Verify RXV VENT and PZR VENT valves are shut:
 2-CVC-515-CV 2-CVC-516-CV Maintain an RCP Bleedoff flowpath: Verify RCP CBO RELIEF ISOL, 2-CVC-507-CV, is open. (2) Shut RCP CBO INBD and OUTBD ISOL valves: 2-CVC-505-CV 2-CVC-506-CV (3) Open 21 RCDT DRN TO CNTMT FLOOR valve, 2-RCW-4258-SV. C. Shut RCS SAMPLE ISOL valve, 2-PS-5464-CV. Verify RXV VENT and PZR VENT valves are shut:
 2-CVC-516-CV Maintain an RCP Bleedoff flowpath: Verify RCP CBO RELIEF ISOL, 2-CVC-507-CV, is open. (2) Shut RCP CBO INBD and OUTBD ISOL valves: 2-CVC-505-CV 2-CVC-506-CV (3) Open 21 RCDT DRN TO CNTMT FLOOR valve, 2-RCW-4258-SV. c. Shut RCS SAMPLE ISOL valve, 2-PS-5464-CV. d. Verify RXV VENT and PZR VENT valves are shut:
 (1) Verify RCP CBO RELIEF ISOL, 2-CVC-507-CV, is open. (2) Shut RCP CBO INBD and OUTBD ISOL valves: 2-CVC-505-CV 2-CVC-506-CV (3) Open 21 RCDT DRN TO CNTMT FLOOR valve, 2-RCW-4258-SV. c. Shut RCS SAMPLE ISOL valve, 2-PS-5464-CV. d. Verify RXV VENT and PZR VENT valves are shut:
2-CVC-507-CV, is open. (2) Shut RCP CBO INBD and OUTBD ISOL valves: • 2-CVC-505-CV • 2-CVC-506-CV (3) Open 21 RCDT DRN TO CNTMT FLOOR valve, 2-RCW-4258-SV. c. Shut RCS SAMPLE ISOL valve, 2-PS-5464-CV. d. Verify RXV VENT and PZR VENT valves are shut:
OUTBD ISOL valves: • 2-CVC-505-CV • 2-CVC-506-CV (3) Open 21 RCDT DRN TO CNTMT FLOOR valve, 2-RCW-4258-SV. c. Shut RCS SAMPLE ISOL valve, 2-PS-5464-CV. d. Verify RXV VENT and PZR VENT valves are shut:
 2-CVC-506-CV (3) Open 21 RCDT DRN TO CNTMT FLOOR valve, 2-RCW-4258-SV. c. Shut RCS SAMPLE ISOL valve, 2-PS-5464-CV. d. Verify RXV VENT and PZR VENT valves are shut:
FLOOR valve, 2-RCW-4258-SV. c. Shut RCS SAMPLE ISOL valve, 2-PS-5464-CV. d. Verify RXV VENT and PZR VENT valves are shut:
2-PS-5464-CV. d. Verify RXV VENT and PZR VENT valves are shut:
valves are shut:
 2-RC-103-SV 2-RC-104-SV 2-RC-105-SV 2-RC-106-SV
(continue)

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APPENDIX (3) RCS PRESSURE AN	D INVENTORY CONTROL	
PIC-3: LOSS OF VITAL AC		
RECOVERY ACTIONS	ALTERNATE ACTIONS	
A. (continued)		
<u>NOTE</u> If needed, refer to ATTACHMENT(12), <u>PROCEDURE TO LOCALLY READ CORE</u> EXIT THERMOCOUPLES to read CETs.		
 IF RCS subcooling drops to 25° F, THEN cooldown the RCS PER the selected Heat Removal success path to maintain the following conditions: 	 2.1 IF 25° F subcooling can NOT be maintained, THEN continue RCS heat removal using two-phase natural circulation PER the selected Heat Removal success path 	
Subcooling between 25 and 50° F	AND ensure the following:	
 RCS cooldown rate less than 100° F in any one hour 	 At least ONE S/G has level between (-)24 inches {0}and (+)30 inches {(+)38} 	
 S/G level between (-)24 and (+)30 inches 	OR S/G level is being restored by feedwater flow	
 SUR negative, or SUR zero with WRNI Power less than 10-4% 	CET temperatures are less than 50° F superheated	
 T COLD greater than NEOP-23, figure titled, <u>MINIMUM ALLOWED</u> <u>RCS TEMPERATURE TO ENSURE</u> <u>1%4ρ SHUTDOWN vs. BURNUP</u> 		
3. IF a controlled cooldown is in progress, THEN block SIAS as follows:		
WHEN "PZR PRESS BLOCK A PERMITTED" alarm received, THEN block SIAS A.		
WHEN "PZR PRESS BLOCK B PERMITTED" alarm received, THEN block SIAS B.		
(continue)		

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APPENDIX (3) RCS PRESSURE AND	INVENTORY CONTROL
PIC-3: LOSS OF VITAL AC	
RECOVERY ACTIONS	ALTERNATE ACTIONS
A. (continued)	
 4. WHEN at least ONE 4KV Vital Bus has been re-energized, THEN restore RCP Bleedoff flowpath to the VCT by performing the following actions: a. Open RCP CBO INBD and OUTBD ISOL valves: 2-CVC-505-CV 2-CVC-506-CV 	
b. Shut 21 RCDT DRN TO CNTMT FLOOR valve, 2-RCW-4258-SV.	
 WHEN at least ONE 4KV Vital Bus has been re-energized, THEN IMPLEMENT ONE of the following success paths as appropriate: 	
 PIC-1, <u>CVCS</u> PIC-2, <u>PORVs or PRESSURIZER</u> <u>VENT</u> PIC-4, <u>SIS</u> 	C .

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APPENDIX (3) RCS PRESSUR	E AND INVENTORY CONTROL
PIC-3: LOSS OF VITAL AC	
RECOVERY ACTIONS	ALTERNATE ACTIONS
B. ACCEPTANCE CRITERIA FOR SUCCESS PATH PIC-3.	
 Check RCS Pressure And Inventory Control is satisfied by the following indications: Pressurizer pressure less than the upper PER ATTACHMENT (1), R PRESSURE TEMPERATURE LIN RCS subcooling greater than 25 based on CET temperatures OR CET temperatures less than 5 superheated Reactor Vessel level indicates the is covered IF RCS Pressure And Inventory Cont has been established, THEN PROCEED to the next Safety Function to be satisfied. 	<u>CS</u> <u>MITS</u> 50° F e core

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-4: SIS

	RECOVERY ACTIONS	ALTERNATE ACTIONS
A.	ESTABLISH RCS PRESSURE AND INVENTORY CONTROL USING SIS.	
1.	IF pressurizer pressure is less than or equal to 1725 PSIA OR containment pressure is greater than or equal to 2.8 PSIG, THEN verify SIAS actuation.	
2.	IF pressurizer pressure is greater than 1725 PSIA AND containment pressure is less than 2.8 PSIG, THEN perform the following actions to block SIAS:	
	a. Open HPSI MAIN and AUX HDR valves:	
	MAIN • 2-SI-616-MOV • 2-SI-626-MOV • 2-SI-636-MOV • 2-SI-646-MOV	
	AUX • 2-SI-617-MOV • 2-SI-627-MOV • 2-SI-637-MOV • 2-SI-647-MOV	
	b. Start 21 and 23 HPSI PPs.	
	c. Start ALL available CHG PPs.	
	d. WHEN the "PZR PRESS BLOCK A PERMITTED" alarm is received, THEN block SIAS A.	
	e. WHEN the "PZR PRESS BLOCK B PERMITTED" alarm is received, THEN block SIAS B.	
	(continue)	

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APPENDIX (3) RCS PRESSURE AND	DINVENTORY CONTROL
PIC-4: SIS	
RECOVERY ACTIONS	ALTERNATE ACTIONS
A.2 (continued)	
f. WHEN pressure is below 1270 PSIA, THEN verify appropriate HPSI flow PER ATTACHMENT(10), <u>HIGH</u> <u>PRESSURE SAFETY INJECTION</u> <u>FLOW</u> .	
3. IF SIAS has actuated, THEN perform the following actions:	
 a. Verify the following pumps are running: 	1
21 HPSI PP23 HPSI PP	
21 LPSI PP 22 LPSI PP	
ALL available CHG PPs	
	, ,
(continue)	

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Page 52 of 88 **APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL** PIC-4: SIS **RECOVERY ACTIONS ALTERNATE ACTIONS** A.3 (continued) b. Verify safety injection flow: b.1 Perform the following actions as necessary: HPSI flow PER ATTACHMENT(10), HIGH PRESSURE SAFETY INJECTION CAUTION FLOW, when pressure is below Operation of two HPSI Pumps on 24 4KV 1270 PSIA Bus may cause 2B DG loading to exceed 3600 KŴ. LPSI flow PER • IF 21 HPSI PP failed, ATTACHMENT(11), LOW PRESSURE SAFETY INJECTION **THEN** perform the following actions: FLOW, when pressure is below **185 PSIA** (1) IF 2B DG is powering 24 4KV Bus, THEN verify DG load is less than 2960 KW. (2) Start 22 HPSI PP. IF 23 HPSI PP failed, THEN align 22 HPSI PP as follows: (1) Start 22 HPSI PP. (2) Open HPSI HDR XCONN valve. 2-SI-653-MOV. (3) Shut HPSI HDR XCONN valve, 2-SI-655-MOV. Ensure electrical power is available to valves and pumps. Verify safety injection system lineup PER ATTACHMENT (2), SIAS **VERIFICATION CHECKLIST.** (continue)

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL

PIC-4:SIS

RECOVERY ACTIONS

ALTERNATE ACTIONS

A. (continued)

- IF high RCS pressure is preventing adequate SIS flow to support heat removal, THEN attempt to depressurize the RCS to obtain adequate SIS flow by concurrently performing actions PER the following:
 - RCS Pressure And Inventory Control success paths as necessary
 - The selected Core And RCS Heat Removal success path

NOTE

If rapid pressure excursions due to RCS inventory or temperature changes have occurred, consider the RCS water solid.

- 5. IF a bubble exists in the Pressurizer OR the Reactor Vessel Head, THEN maintain subcooling as low as possible AND within the following limits:
 - Between 25 and 140° F based on CET temperatures
 - RCS pressure greater than the NPSH limits **PER** ATTACHMENT (1), <u>RCS</u> <u>PRESSURE TEMPERATURE LIMITS</u>

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL

PIC-4: SIS

RECOVERY ACTIONS

ALTERNATE ACTIONS

A.5 (continued)

- a. Lower subcooling by **ANY** of the following methods:
 - (1) De-energize the Pressurizer HTR(s).
 - (2) IF ALL RCPs are operating, THEN use Main Pressurizer Spray.
 - (3) Lower the RCS cooldown rate.
 - (4) IF the overpressurization is due to HPSI/Charging flow
 AND the HPSI throttle criteria are met,
 THEN throttle or secure flow to

restore subcooling.

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL

PIC-4: SIS

RECOVERY ACTIONS

ALTERNATE ACTIONS

A.5.a (continued)

- (5) Initiate AUX SPRAY as follows:
 - (a) Place the CIS OVERRIDE switch, 2-HS-2080A, in OVERRIDE.
 - (b) Open the IA CNTMT ISOL valve, 2-IA-2080-MOV.

CAUTION

If the difference between the PZR WTR TEMP and CHG OUT TEMP is greater than 400° F, then TRM 15.4.2 must be complied with.

- (c) Record the following information:
 - PZR WTR TEMP (2-TI-101)
 - CHG OUT TEMP (2-TI-229)
- (d) Open the AUX SPRAY valve, 2-CVC-517-CV.

(e) Operate the LOOP CHG valves as necessary to adjust AUX SPRAY flow:

- 2-CVC-518-CV
- 2-CVC-519-CV
- (f) Shift the PZR SPRAY VLV CONTR, 2-HIC-100, to MANUAL.
- (g) Shut the PZR SPRAY VLVs by adjusting the output of 2-HIC-100 to 0%:
 - 2-RC-100E-CV
 - 2-RC-100F-CV

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL

PIC-4: SIS

RECOVERY ACTIONS

ALTERNATE ACTIONS

A.5.a(5) (continued)

(h) Maintain the pressurizer cooldown rate less than 200° F/hour.

CAUTION

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

b. Raise subcooling by **ANY** of the following methods:

<u>NOTE</u>

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

- (1) Energize the Pressurizer HTR(s).
- (2) IF HPSI flow has been reduced, THEN raise HPSI flow by opening HPSI HDR valves which have been throttled or starting HPSI PPs which have been stopped.
- (3) Raise RCS cooldown rate, while **NOT** exceeding 100° F in any one hour, by using the ADV from the unaffected S/G.

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-4: SIS

RECOVERY ACTIONS

ALTERNATE ACTIONS

A. (continued)

- 6. IF the RCS is water solid, THEN maintain subcooling within the following limits:
 - Between 25 and 140° F based on CET temperatures
 - RCS pressure greater than the NPSH limits PER ATTACHMENT (1), <u>RCS</u> <u>PRESSURE TEMPERATURE LIMITS</u>
 - a. Lower subcooling by **ANY** of the following methods:
 - (1) Lower RCS temperature.
 - (2) IF the overpressurization is due to HPSI/Charging flow
 AND the HPSI throttle criteria are met,
 THEN throttle or secure flow to restore subcooling.
 - (3) De-energize the Pressurizer HTR(s).

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL

PIC-4:SIS

RECOVERY ACTIONS

ALTERNATE ACTIONS

A.6 (continued)

CAUTION

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

- b. Raise subcooling by **ANY** of the following methods:
 - (1) Raise RCS temperature.
 - (2) IF HPSI flow has been reduced, THEN raise HPSI flow by opening HPSI HDR valves which have been throttled or starting HPSI PPs which have been stopped.

<u>NOTE</u>

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

(3) Energize the Pressurizer HTR(s).

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-4: SIS

RECOVERY ACTIONS

ALTERNATE ACTIONS

A. (continued)

 IF the RCS is water solid, AND it is desired to draw a bubble in the RCS, THEN perform the following actions:

NOTE

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

- a. Energize the Pressurizer HTR(s).
- b. **IF EITHER** of the following conditions exist:
 - BOTH S/G pressures can be maintained less than RCS pressure
 - At least ONE RCP is running

THEN draw a bubble in the RCS as follows:

(1) IF the HPSI throttle criteria are met, THEN reduce RCS pressure by

reducing HPSI/Charging flow or raising letdown flow.

- (2) Cooldown the RCS, while NOT exceeding 100° F in any one hour, using TBVs or ADVs.
- c. IF a bubble forms in the Pressurizer, THEN operate HPSI/Charging and Letdown as necessary to restore and maintain Pressurizer level between 101 inches {141} and 180 inches {190}.

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-4: SIS

RECOVERY ACTIONS

ALTERNATE ACTIONS

A.7 (continued)

	 IF a bubble forms in the Reactor Vessel Head, THEN operate HPSI/Charging and Letdown as necessary to maintain RCS level above the top of the hot leg. 	
8.	IF a bubble exists in the Pressurizer AND HPSI flow has been secured, THEN restore and maintain Pressurizer Level between 101 inches {141} and 180 inches {190} by operating charging, and if available, letdown.	
	(continue)	
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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-4: SIS

RECOVERY ACTIONS	ALTERNATE ACTIONS
A. (continued)	
9. WHEN ALL of the following conditions can be maintained:	
 At least 25° F subcooling based on CET temperatures 	
 Pressurizer level greater than 101 inches {141} 	
 At least ONE S/G available for heat removal 	
S/G level greater than	
(-)170 inchescapable of being supplied with	
feedwatercapable of being steamed	
 Reactor Vessel level above the top of the hot leg 	,
 Reactivity Control Safety Function Acceptance Criteria are met 	
THEN HPSI flow may be reduced by throttling the HPSI HDR valves, or stopping the HPSI PPs one at a time, as desired, to maintain the following:	
 RCS subcooling between 25 and 140° F based on CET temperatures 	
 Pressurizer level between 101 inches {141} and 180 inches {190} 	
10. IF pressurizer pressure is greater than 200 PSIA and constant OR rising, THEN the operating LPSI PPs may be stopped.	
(continue)	

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-4: SIS

RECOVERY ACTIONS	ALTERNATE ACTIONS
 A. (continued) 11. IF HPSI or LPSI throttle criteria can NOT be maintained after the pumps are throttled or secured, THEN restart the appropriate pumps AND restore full flow. 	
B. IF ONCE-THROUGH-COOLING IS NOT IN PROGRESS, THEN IDENTIFY LOCATION OF LEAK.	
 Attempt leak isolation: Verify L/D CNTMT ISOL valves are shut: 2-CVC-515-CV 2-CVC-516-CV Check there is NO PORV leakage by the following indications: Quench Tank Parameters PORV discharge piping temperatures, computer points T107 and T108 Acoustic Monitor indication Shut RCS SAMPLE ISOL valve, 2-PS-5464-CV. (continue) 	 b.1 IF PORV leakage is indicated AND PZR pressure is less than 2300 PSIA, THEN perform the following: (1) Shut the appropriate PORV BLOCK valves: 2-RC-403-MOV 2-RC-405-MOV (2) Place the appropriate PORV OVERRIDE handswitches in the OVERRIDE TO CLOSE position: 2-HS-1402 2-HS-1404

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL

PIC-4:SIS

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.1 (continued) d. Shut RXV VENT valves: 2-RC-103-SV • 2-RC-104-SV • e. Shut PZR VENT valves: 2-RC-105-SV • 2-RC-106-SV • f. IF leakage into Component Cooling is indicated by: **Rise on UNIT 2 CC radiation** monitor, 2-RI-3819 "CC HEAD TK LVL" high alarm AND shutting the L/D CNTMT ISOL valves did NOT isolate the leak, THEN perform the following: (1) Trip ALL RCPs. (2) Shut the CC CNTMT SUPP and **RTN valves:** 2-CC-3832-CV 2-CC-3833-CV . g. IF the leak has been isolated AND SIAS has NOT actuated, THEN perform the following actions: (1) Stop the HPSI PPs **PER** step A.9. (2) Shut HPSI MAIN and AUX HDR valves. (3) Verify the Safety Function Status Check Acceptance Criteria for PIC-1, <u>CVCS</u>, are satisfied. (4) IMPLEMENT PIC-1, CVCS. (continue)

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-4: SIS

ALTERNATE ACTIONS
 IF Containment Sump level does NOT rise as RWT level lowers, THEN perform the follows actions: Maintain RWT level greater than 2 feet by replenishment from ANY available source. <u>NOTE</u> Leakage location may be indicated by sump alarms or room level alarms. Determine the cause for the leakage and attempt to isolate it.
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A	PPENDIX (3) RCS PRESSURE AN	D INVENTORY CONTROL
PI	C-4:SIS	
	RECOVERY ACTIONS	ALTERNATE ACTIONS
C.	PREPARE FOR RAS ACTUATION	
1.	WHEN RWT level drops to 4 feet, THEN perform the following actions:	
	a. IF CSAS has NOT actuated, THEN place BOTH CS PPs in PULL TO LOCK.	
	 Place the SI PP RECIRC LOCKOUT switches in ON. 	
	c. Check HPSI flow is greater than 90 GPM per pump, OR check the HPSI PPs have been secured.	 c.1 IF HPSI flow is less than 90 GPM per pump AND the HPSI throttle criteria have been met, THEN perform the following actions: (1) IF the CHG PPs are operating, THEN turn off ONE CHG PP at a time until HPSI flow is at least 90 GPM per pump. (2) IF HPSI flow is still less than 90 GPM per pump with ALL CHG PPs secured, THEN turn off ONE HPSI PP at a
		time until HPSI flow is greater than 90 GPM per pump.
D.	VERIFY RAS ACTUATION.	
1.	WHEN RWT level drops to 0.75 feet OR the "ACTUATION SYS RAS TRIP" alarm is received, THEN perform the following actions: a. Verify RAS actuation.	
	(continue)	

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APPENDIX (3) RCS PRESSURE AN	5	
PIC-4:SIS		
RECOVERY ACTIONS	ALTERNATE ACTIONS	
D.1 (continued)		
 b. Check a minimum containment sump level of at least 28 inches is indicated on the CNTMT WIDE RANGE WTR LVL indication, 2-LI-4146 or 2-LI-4147. 		
c. Verify the CNTMT SUMP DISCH valves open:		03000
 2-SI-4144-MOV 2-SI-4145-MOV 		
d. Shut the RWT OUT valves:		
 2-SI-4142-MOV 2-SI-4143-MOV		
e. Verify RAS lineup PER ATTACHMENT (6), <u>RAS</u> <u>VERIFICATION_CHECKLIST</u> .	e.1 IF a LPSI PP does NOT stop, THEN place the LPSI PP handswitch in PULL TO LOCK.	
	 21 LPSI PP, 2-HS-302X 22 LPSI PP, 2-HS-302Y 	
	<u>CAUTION</u> LPSI flow must be reduced to less than 600 GPM within 4 hours post-RAS to ensure adequate HPSI NPSH.	03000
	e.2 IF a LPSI PP continues to run with the LPSI PP handswitch in PULL TO LOCK, THEN perform the following actions:	
	(1) Attempt to locally open the LPSI PP breaker:	
	 NO. 21 LOW PRESS SAFETY INJ. PUMP, 152-2104 NO. 22 LOW PRESS SAFETY INJ. PUMP, 152-2404 	
(continue)	(continue)	

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-4: SIS		
RECOVERY ACTIONS	ALTERNATE ACTIONS	
 D.1.e (continued) f. Verify Component Cooling in service as follows: Throttle open BOTH CC HX SW OUT valves: 2-HIC-5206 2-HIC-5208 (2) Verify BOTH CC HX CC OUT valves are open: 2-CC-3824-CV 2-CC-3826-CV (3) Verify TWO CC PPs in operation. 	 D.1.e.2 (continued) (2) IF the LPSI PP breaker can NOT be opened locally, THEN throttle LPSI flow to 600 GPM: (a) Shut THREE LPSI HDR valves: 2-SI-615-MOV 2-SI-625-MOV 2-SI-635-MOV 2-SI-645-MOV (b) Throttle the remaining LPSI HDR valve to 600 GPM. 1 IF NO CC PPs are operating, THEN restore Component Cooling PER AOP-7C, LOSS OF COMPONENT COOLING WATER. 1.2 IF Component Cooling can NOT be restored, THEN align a CS PP for Safety Injection as follows: (1) Notify the Operational Support Center to check radiation levels are low enough for valve repositioning. WARNING Do NOT continue with this step until the Operational Support Center has determined radiation levels are low enough for valve repositioning. (2) Stop ONE CS PP. 	03000
(continue)	(continue)	

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL

PIC-4: SIS

RECOVERY ACTIONS	ALTERNATE ACTIONS
D.1.f (continued)	D.1.f.2 (continued)
	(3) Shut SDC Hx Out To CS Valve for the SDC Hx associated with the CS Pump.
	 (21 SDC Hx) 2-SI-319 (22 SDC Hx) 2-SI-329
	(4) Open SDC Hx Inlet Cross Connect Valve for the SDC Hx associated with the CS Pump.
	 (21 SDC Hx) 2-SI-452 (22 SDC Hx) 2-SI-453
	(5) Open SDC HX LPSI INL valve, 2-SI-658-MOV.
	(6) Start the CS PP.
	(7) Stop ALL running HPSI PPs.
<u>CAUTION</u> Minimum HPSI Pump flow is 90 GPM to prevent pump damage.	
 g. IF TWO HPSI PPs are running, THEN throttle HPSI flow to achieve 250 GPM through each of the four headers. 	g.1 IF HPSI flow of 250 GPM to each header can NOT be achieved, THEN throttle HPSI flow equally among the four headers.
(continue)	(continue)

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-4: SIS

RECOVERY ACTIONS	ALTERNATE ACTIONS
D.1.g (continued)	D.1.g (continued) g.2 IF HPSI flow indication has been lost, THEN perform the following:
	NOTE It is desired to secure 21 HPSI PP due to HPSI flow indication and MOV POSITION indicators associated with 21 HPSI PP are powered from 2Y09.
	 (1) Secure ONE HPSI PP. (2) Throttle HPSI MOVs equally among the four headers to maintain the following:
	NO HPSI PP cavitation
	CETs less than 50° F superheated
	Core covered
 IF ONE HPSI PP is running, THEN throttle HPSI flow to achieve 150 GPM through each of the four headers. 	h.1 IF HPSI flow of 150 GPM to each header can NOT be achieved, THEN throttle HPSI flow equally among the four headers.
	h.2 IF HPSI flow indication has been lost, THEN throttle HPSI MOVs equally among the four headers to maintain the following:
	. NO HPSI PP cavitation
	CETs less than 50° F superheated
	Core covered
(continue)	

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APPENDIX (3) RCS PRESSURE AN PIC-4: SIS	D INVENTORY CONTROL	
RECOVERY ACTIONS	ALTERNATE ACTIONS	
D.1 (continued)		
<u>NOTE</u> HPSI MOVs should be throttled at least 30% open throughout a large-break LOCA to prevent MOV erosion and/or plugging.		03000
i. Check HPSI MOVs with flow are at least 30% open.	i.1 Adjust HPSI MOV(s) as necessary while maintaining header flow at the required flow.	
	i.2 Monitor HPSI flow for indications of MOV erosion (higher flow), and/or plugging (lower or erratic flow).	
 JF a loss of ECCS pump suction is indicated during recirculation by ANY of the following: 		
Lower or unstable HPSI or CS flow		
 Lower or unstable HPSI or CS PP discharge pressure 		
Lower or unstable HPSI or CS PP motor current		
HPSI or CS PP noise		
THEN take actions to prevent HPSI and CS PP damage, AND maintain adequate core cooling by performing the following:		
(1) Throttle HPSI flow equally among the four headers to the minimum allowed PER ATTACHMENT(10), <u>HIGH PRESSURE SAFETY</u>	(1).1 IF HPSI flow indication has been lost, THEN throttle HPSI MOVs equally among the four headers to maintain the following:	
INJECTION FLOW.	NO HPSJ PP cavitation	
	 CETs less than 50° F superheated 	
	Core covered	
(continue)		

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-4: SIS

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ALTERNATE ACTIONS RECOVERY ACTIONS D.1.j (continued) (2) IF HPSI or CS PP performance is NOT acceptable, THEN perform the following: (a) Stop BOTH CS PPs. (b) Check acceptable HPSI PP (b).1 IF HPSI PP performance is NOT performance. acceptable, THEN stop the HPSI PP(s). (c) Notify the Plant Technical Support Center. k. Commence ECCS Pump Room cooling as follows: (1) Open the ECCS AIR CLR INL/OUT VLVs: 2-SW-5170-CV • 2-SW-5171-CV 2-SW-5173-CV (2) Start 21 EAST and 22 WEST ECCS PP RM CLG FANs. I. Place the ECCS PP RM EXH FILT in service. (continue)

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL

PIC-4: SIS

RECOVERY ACTIONS	ALTERNATE ACTIONS
D.1 (continued)	
m. Maintain SRW and Component Cooling temperatures by performing the following:	
 Adjust the CC HX SW OUT valves to maintain Component Cooling temperature less than 120° F: 	
2-HIC-52062-HIC-5208	
(2) IF EITHER SRW HX SW BYPASS valve is in AUTO, THEN adjust the setpoint as necessary to maintain SRW temperature less than 105° F:	
 2-PIC-5154 2-PIC-5157 	
NOTE The current maximum SW header pressure limits are recorded on the Shift Turnover Sheet.	
(3) Verify SW HDR PRESS less than the maximum SW header pressure limit.	
 IF CHG PPs are aligned with suction from the RWT, THEN place the CHG PPs in PULL TO LOCK. 	
(continue)	

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APPENDIX (3) RCS PRESSURE ANI	D INVENTORY CONTROL
PIC-4: SIS	
RECOVERY ACTIONS	ALTERNATE ACTIONS
D.1 (continued)	
<u>CAUTION</u> Minimum HPSI Pump flow is 90 GPM to prevent pump damage.	
o. Ensure HPSI PP flow is at least 90 GPM during recirculation.	 o.1 IF HPSI flow is less than 90 GPM per pump during recirculation AND HPSI throttle criteria have been met, THEN perform the following actions: (1) IF CHG PPs are operating, THEN turn off ONE CHG PP at a time until HPSI flow is at least 90 GPM per pump. (2) IF HPSI flow is still less than 90 GPM per pump with ALL CHG PPs secured, THEN turn off ONE HPSI PP at a time until HPSI flow is greater than 90 GPM per pump.
E. PROTECT ECCS PUMPS FROM OVERHEATING	
 IF ANY ECCS Pumps are operating, THEN protect the ECCS Pumps from overheating by commencing ECCS Pump Room cooling as follows: a. Open the ECCS AIR CLR INL/OUT VLVs: 2-SW-5170-CV 2-SW-5171-CV 2-SW-5173-CV b. Start 21 EAST and 22 WEST ECCS PP RM CLG FANs. 	

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL			
PI	C-4:SIS		
	RECOVERY ACTIONS	ALTERNATE ACTIONS	
F.	IF RAS ACTUATED, THEN REFILL THE RWT.		
1.	Contact the Operational Support Center to check radiation levels are low enough to allow valve repositioning.		
2.	WHEN SIAS has been reset, THEN initiate actions to makeup to the RWT PER OI-2B, <u>CVCS BORATION</u> , DILUTION AND MAKEUP OPERATIONS.		
3.	Notify the Plant Technical Support Center to review ERPIP-611, <u>SEVERE</u> <u>ACCIDENT MANAGEMENT</u> <u>RESTORATIVE ACTIONS</u> for alternate methods to refill the RWT AND actions to inject directly to the RCS bypassing the RWT.	·	
G.	COMMENCE CORE FLUSH.		
1.	 IF the elapsed time from SIAS actuation is between 8 and 11 hours, AND ANY of the following conditions exist: RCS subcooling is less than 25° F based on CET temperatures Pressurizer level is less than 30 inches {90} Reactor Vessel level below the top of the hot leg 	 1.1 IF Pressurizer Injection is NOT adequate AND the following conditions are met: RCS pressure is less than 270 PSIA {245} RCS pressure minus containment pressure is less than 75 PSID HPSI PP(s) are available THEN line up for Hot Leg Injection as follower: 	
	THEN commence core flush by lining up for Pressurizer Injection as follows: a. Check TWO HPSI PPs are available.	follows: a. Place the selected LPSI PP RAS OVERRIDE switch in OVERRIDE.	
	(continue)	(continue)	

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL

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PIC-4: SIS

RECOVERY ACTIONS	ALTERNATE ACTIONS
 G.1 (continued) b. Open the SI TO CHG HDR valve, 2-CVC-269-MOV. c. IF CIS has actuated, AND IA CNTMT ISOL valve, 2-IA-2080-MOV is shut, THEN perform the following actions: Place the CIS OVERRIDE switch, 2-HS-2080A, in OVERRIDE. Open IA CNTMT ISOL valve, 2-IA-2080-MOV. G. Shut LOOP CHG valves: 2-CVC-518-CV 2-CVC-519-CV Shut the PZR SPRAY VLVs by adjusting the output of 2-HIC-100 to 0%: 2-RC-100E-CV 2-RC-100F-CV Verify HPSI AUX HDR ISOL valve, 2-SI-656-MOV, is open. Open AUX SPRAY valve, 2-CVC-517-CV. (continue) 	G.1.1 (continued) b. Verify the CNTMT SUMP DISCH valves are open: 2-SI-4144-MOV 2-SI-4145-MOV c. Open SDC RECIRC ISOL valve, 2-SI-399-MOV. d. Shut LPSI HDR valves: 2-SI-615-MOV 2-SI-625-MOV 2-SI-635-MOV 2-SI-6545-MOV e. Close the power supply breakers to the SDC HDR RETURN ISOL valves: 2-SI-651-MOV breaker, 52-21466 2-SI-652-MOV breaker, 52-20424 f. Open SDC HDR RETURN ISOL valves: 2-SI-651-MOV 9. 2-SI-651-MOV 9. 2-SI-651-MOV 9. 2-SI-651-MOV 9. Start the selected LPSI PP. h. Maintain a flowrate of at least 150 GPM. (continue)

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-4: SIS

G.1

IC-4:SIS			
	Ē	RECOVERY ACTIONS	ALTERNATE ACTIONS
.1 (continued)		ued)	G.1.1 (continued)
h.	THE (1) (2) (3) (4) (5) IF 2 THE (1) (2)	 2-SI-617-MOV 2-SI-627-MOV 2-SI-637-MOV 2-SI-647-MOV 2-SI-647-MOV Verify 21 or 22 HPSI PP is running. IF approximately 150 GPM is NOT indicated THEN initiate Hot Leg Injection. 3 HPSI PP is NOT available, In perform the following actions: Verify 22 HPSI PP is running. Verify HPSI HDR XCONN valve, 2-SI-653-MOV, is open. Verify HPSI HDR XCONN valve, 2-SI-655-MOV, is shut. 	 1.2 IF only ONE HPSI PP is available, AND Hot Leg Injection is NOT available, THEN commence pressurizer injection as follows: a. Open SI TO CHG HDR valve, 2-CVC-269-MOV. b. IF CIS has actuated, AND IA CNTMT ISOL valve, 2-IA-2080-MOV is shut, THEN perform the following actions: (1) Place the CIS OVERRIDE switch, 2-HS-2080A, in OVERRIDE. (2) Open IA CNTMT ISOL valve, 2-IA-2080-MOV. c. Shut LOOP CHG valves: 2-CVC-518-MOV 2-CVC-519-MOV d. Shut the PZR SPRAY VLVs by adjusting the output of 2-HIC-100 to 0%: 2-RC-100E-CV 2-RC-100F-CV Verify HPSI AUX HDR ISOL valve, 2-SI-656-MOV, is open. f. Open AUX SPRAY valve, 2-CVC-517-CV. g. Verify ONE HPSI PP is running.
		(continue)	(continue)

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-4: SIS

	RECOVERY ACTIONS	ALTERNATE ACTIONS
G.1.i (conti	inued)	G.1.i.1 (continued)
	Verify 21 HPSI PP is running. IF approximately 150 GPM is NOT indicated THEN initiate Hot Leg Injection.	 h. IF 23 HPSI PP is running, THEN open the HPSI HDR XCONN valve, 2-SI-653-MOV. i. IF 23 HPSI PP is running, THEN Shut HPSI AUX HDR valves: 2-SI-617-MOV 2-SI-627-MOV 2-SI-637-MOV 2-SI-647-MOV 3. Throttle the HPSI flow to maintain cold leg injection flow NO more than 100 GPM above the minimum required for heat removal PER ATTACHMENT(10), <u>HIGH PRESSURE SAFETY INJECTION FLOW.</u>
	(continue)	(continue)

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-4: SIS

RECOVERY ACTIONS	ALTERNATE ACTIONS
G.1 (continued)	G.1 (continued)
	1.3 IF a CS PP is being used for injection, THEN line up for Hot Leg Injection as follows:
	a. Verify the following conditions exist:
	 RCS pressure is less than 270 PSIA {245}
	 RCS pressure minus containment pressure is less than 75 PSID
	 b. Open SDC RECIRC ISOL valve, 2-SI-399-MOV.
	c. Verify 22B LPSI HDR valve, 2-SI-635-MOV, is open.
	d. Shut the following LPSI HDR valves:
•	 2-SI-615-MOV 2-SI-625-MOV 2-SI-645-MOV
·	e. Throttle 22B LPSI HDR valve, 2-SI-635-MOV, to maintain a flowrate of 600 GPM, as indicated on 22B LPSI HDR FLOW indicator, 2-FI-332.
	 f. Close the power supply breakers to the SDC HDR RETURN ISOL valves:
	 2-SI-651-MOV breaker, 52-21466 2-SI-652-MOV breaker, 52-20424
	g. Open SDC HDR RETURN ISOL valves:
	 2-SI-651-MOV 2-SI-652-MOV
	 Maintain Cold Leg Injection flowrate of 600 GPM, as indicated on 22B LPSI HDR FLOW indicator, 2-FI-332.
(continue)	(continue)

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-4: SIS

RECOVERY ACTIONS	ALTERNATE ACTIONS
G.1 (continued)	G.1.3 (continued) i. Ensure CET temperatures remain constant or lowering.
 WHEN Pressurizer Injection OR Hot Leg Injection is in progress, AND HPSI PPs are being used for Cold Leg Injection, THEN perform the following actions: Balance the flow between Pressurizer or Hot Leg Injection and Cold Leg Injection by throttling the HPSI MAIN HDR valves: 2-SI-616-MOV 2-SI-626-MOV 2-SI-636-MOV 2-SI-646-MOV 2-SI-646-MOV 2-SI-646-MOV Maintain the minimum flow required to remove decay heat PER ATTACHMENT(10), HIGH PRESSURE SAFETY INJECTION FLOW Ensure CET temperatures remain constant or lowering. 	
H. ACCEPTANCE CRITERIA FOR SUCCESS PATH PIC-4:	
 Check RCS Pressure And Inventory Control is satisfied by the following indications: 	1.1 IF RCS Pressure and Inventory Control has NOT been satisfied, THEN perform the following actions:
(continue)	(continue)

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-4: SIS

RECOVERY ACTIONS

H.1 (continued)

 IF RAS has NOT occurred, AND pressurizer pressure is greater than 1270 PSIA, THEN at least ONE CHG PP operating

NOTE

LPSI Pumps are **NOT** required post-RAS.

NOTE

Limits in ATTACHMENT(10), <u>HIGH</u> <u>PRESSURE SAFETY INJECTION FLOW</u> and ATTACHMENT(11), <u>LOW PRESSURE</u> <u>SAFETY INJECTION FLOW</u> are **NOT** required to be met if SIS throttle criteria are met.

- HPSI and LPSI PPs are injecting water into the RCS **PER** ATTACHMENT(10), <u>HIGH PRESSURE SAFETY</u> <u>INJECTION FLOW</u> and ATTACHMENT(11), <u>LOW</u> <u>PRESSURE SAFETY INJECTION</u> <u>FLOW</u>
- Reactor Vessel level indicates the core is covered

(continue)

ALTERNATE ACTIONS

H.1.1 (continued)

- a. Concurrently perform the recovery actions for the next safety function to be satisfied.
- b. Determine the appropriate emergency response actions **PER** the ERPIP.

CAUTION

Cool ECCS water may cause thermal shock to the fuel pins and result in fuel damage. Injection flow should be restored gradually.

CAUTION

Initiating flow to an overheated core will cause rapid steam production and an RCS pressure spike, which may cause creep rupture failure of the RCS, including steam generator tubes. Injection flow should be restored gradually to minimize the RCS pressure spike.

c. IF ALL Safety Injection flow has been lost, THEN consider consulting the

Technical Support Center prior to reinitiating Safety Injection flow.

CAUTION

To prevent loss of Core heat removal while RCS inventory control is lost, it is important to maintain RCS heat removal via the Steam Generators to support single or two-phase natural circulation.

> d. Maximize RCS heat removal via the Steam Generators **PER** the selected Core And RCS Heat Removal success path.

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL

PIC-4: SIS

RECOVERY ACTIONS	ALTERNATE ACTIONS
RECOVERY ACTIONS	 H.1.1 (continued) e. IF high RCS pressure is preventing adequate SIS flow, THEN attempt to depressurize the RCS to obtain adequate SIS flow by operating the PORVs or Pressurizer Vents PER PIC-2, <u>PORVs or PRESSURIZER VENT</u>. f. Verify ALL available CACs are operating. g. IF RAS actuated, THEN perform the following: (1) Contact the Operational Support Center to check radiation levels are low enough to allow valve repositioning. (2) Contact the Plant Technical Support Center for alternate methods to refill the RWT AND actions to inject directly to the RCS bypassing the RWT PER ERPIP-611, <u>SEVERE ACCIDENT MANAGEMENT</u>
(continue)	RESTORATIVE ACTIONS. (3) WHEN SIAS has been reset, THEN initiate actions to makeup to the RWT PER OI-2B, <u>CVCS</u> <u>BORATION, DILUTION</u> <u>AND MAKEUP OPERATIONS</u> . (continue)

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-4: SIS

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RECOVERY ACTIONS	ALTERNATE ACTIONS
H.1 (continued)	 H.1.1 (continued) h. IF ALL Safety Injection flow has been lost, AND ALL the following conditions have been established: ALL ECCS pumps aligned to the Containment Sump are stopped Plant Technical Support Center concurrance obtained
	 Alignment of the selected pump has been verified The selected pump has been vented as required THEN attempt to re-establish Safety Injection flow to the RCS from the Containment Sump: Throttle injection valve(s). Verify the SI PP RECIRC isolation MOVs are shut: 2-SI-659-MOV 2-SI-660-MOV Start the selected pump.
(continue)	(continue)

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-4: SIS

RECOVERY ACTIONS	ALTERNATE ACTIONS
H.1 (continued)	H.1.1.h (continued)
	(4) IF a loss of pump suction is indicated by ANY of the following:
	Lower or unstable flow
	 Lower or unstable discharge pressure
	Lower or unstable motor current
	Pump noise
	THEN stop the pump.
	(5) Control flow to maintain Reactor Vessel level greater than or equal to the bottom of the hot leg.
(continue)	(continue)

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-4: SIS

RECOVERY ACTIONS	ALTERNATE ACTIONS	
H.1 (continued)	H.1.1 (continued)	
	i. IF there is inventory in the SITs, THEN discharge SIT inventory as needed to replenish RCS inventory:	
	(1) Ensure RCS pressure is less than SIT pressure by performing the following:	
	Operate the TBVs or ADVs PER the selected Core And RCS Heat Removal success path.	
- -	Operate the PORVs or Pressurizer Vents PER PIC-2, <u>PORVs or</u> <u>PRESSURIZER VENT</u> .	
	(2) Ensure selected SIT outlet isolation valve is open.	
	(3) Verify Reactor Vessel level rises as SIT level lowers.	
	 (4) WHEN Reactor Vessel level is greater than or equal to the bottom of the hot leg, THEN shut the SIT outlet isolation valve. 	
	(5) Repeat steps (1) through (4) above as needed to control RCS inventory at the bottom of the hot leg.	
	(6) WHEN the SIT is empty, THEN isolate the SIT.	
(continue)	(continue)	

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-4: SIS

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RECOVERY ACTIONS	ALTERNATE ACTIONS	
H.1 (continued)	H.1.1 (continued)	
	<u>CAUTION</u> Injecting additional inventory into the Containment may submerge equipment and/or instrumentation desired to mitigat or monitor the event. Submerged equipment/instrumentation may be rendered inoperable.	
	 JF RAS actuated, AND ALL the following conditions have been established: 	
	 Recirculation capability via the Containment Sump has been lost 	
	 Usable inventory is available in the RWT 	
	 RWT boron concentration verified to be acceptable for current plant conditions 	
	 RCS pressure is less than selected pump shutoff head 	
	THEN inject to the RCS as necessary to control Reactor Vessel level greater than or equal to the bottom of the hot leg:	
	 Ensure pump suction from the Containment Sump is isolated. 	
	(2) Align suction for selected pump to RWT:	
	 HPSI PP LPSI PP Charging PP CS PP 	
(continue)	(continue)	

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EOP-8

RECOVERY ACTIONS	ALTERNATE ACTIONS
H.1 (continued)	H.1.1.j (continued)
	(3) Align discharge to RCS:
	 Hot or Cold Leg injection Normal or Alternate charging path
	(4) Operate the selected pump as needed.
	(5) Monitor pump performance.
	(6) Control flow to maintain Reactor Vessel level greater than or equal to the bottom of the hot leg.
(continue)	(continue)

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APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL PIC-4: SIS

RECOVERY ACTIONS	ALTERNATE ACTIONS	
H.1 (continued)	H.1.1 (continued)	
	<u>CAUTION</u> Injecting additional inventory into the Containment may submerge equipment and/or instrumentation desired to mitigate or monitor the event. Submerged equipment/instrumentation may be rendered inoperable.	
	 k. IF RAS actuated, AND ALL the following conditions have been established: 	
	 Recirculation capability via the Containment Sump has been lost 	
	An alternate method to inject directly to the RCS bypassing the RWT has been selected (refer to ERPIP-611, <u>SEVERE</u> <u>ACCIDENT MANAGEMENT</u> <u>RESTORATIVE ACTIONS</u>)	
	 Boron concentration of makeup water source verified to be acceptable for current plant conditions 	
	 RCS pressure is less than selected pump shutoff head 	
	THEN inject to the RCS as necessary to control Reactor Vessel level greater than or equal to the bottom of the hot leg:	
	 Ensure pump suction from the Containment Sump is isolated. 	
	(2) Align suction for selected pump.	
	(3) Align discharge to RCS.	
	(4) Operate the selected pump as needed.	
(continue)	(continue)	

EOP-8 Rev 30/Unit 2 Page 88 of 88 **APPENDIX (3) RCS PRESSURE AND INVENTORY CONTROL** PIC-4:SIS **RECOVERY ACTIONS ALTERNATE ACTIONS** H.1.1.k (continued) H.1 (continued) (5) Monitor pump performance. (6) Control flow to maintain Reactor Vessel level greater than or equal to the bottom of the hot leg. I. Evaluate further actions based on the following considerations: (1) The rate of change of pressure and potential for damage to the RCS. (2) The urgency of other jeopardized safety functions. (3) The feasibility of restoring function to a success path by performing ANY of the following: Restoring the vital auxiliaries ٠ necessary to operate components or systems in the success paths Manual operation of valves Use of alternate components to implement a success path Depressurization or cooling of the RCS to raise or establish SIS flow 2. IF RCS Pressure And Inventory Control has been established, THEN PROCEED to the next Safety Function to be satisfied.

EOP-8 Rev 30 / Unit 2 Page 1 of 4 RCS PRESSURE AND INVENTORY CONTROL PLACEKEEPER PIC-1: CVCS

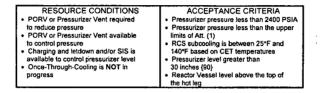
RESOURCE CONDITIONS • Charging pump is available • Charging path is available via normal flow path or SIS flow path • A charging source is available: • VCT • BAST • RWT • A method of pressurizer pressure control is available: • Pressurizer heaters • Main Spray • Aux Spray • Controlled Steaming • SIAS has NOT actuated OR has been reset	ACCEPTANCE CRITERIA • Pressurizer pressure less than the upper limits of Att. (1) • Pressurizer level greater than 30 inches • RCS subcooling is between 25°F and 140°F based on CET temperatures • Reactor Vessel level above the top of the hot leg
---	--

		1		
START	FUNCTION		PAGE	
	A. ESTABLISH RCS INVENTORY CONTROL USING CVCS.		1	
	IF charging is unable to maintain pressurizer level greater than 30 inches, THEN PROCEED to PIC-4		2	
	 Restore letdown flow IF the RCS is water solid, THEN draw a bubble 		2 8	
	B. ESTABLISH RCS PRESSURE CONTROL.	C	10	
	Pressurizer HTRs OR SPRAYs Controlled stearning Block SGIS/SIAS		10 14	
	C. ACCEPTANCE CRITERIA FOR SUCCESS PATH PIC-1.		27	
	IF RCS Pressure And Inventory Control has NOT been satisfied, THEN PROCEED to the next appropriate RCS Pressure And Inventory Control Success Path.		27	

NOTE: Continuously applicable steps are designated with a "C" in the DONE column.

RCS PRESSURE AND INVENTORY CONTROL PLACEKEEPER PIC-2: PORVs or PRESSURIZER VENT

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START	FUNCTION	DONE	PAGE
	A. ESTABLISH RCS INVENTORY CONTROL.	c	28
	IF RCS pressure is less than 1725 PSIA, OR containment pressure is greater than 2.8 PSIG THEN verify SIAS actuation. OR		28
	 Align HPSI injection and block SIAS. 		28
	 IF ALL of the following conditions can be maintained: At least 25 °F subcooling based on CET temperatures Pressurizer level greater than 101 inches (141) At least ONE S/G available for heat removal Reactor Vessel level above the top of 		30
	the hot leg Reactivity Control Safety Function Acceptance Criteria are met THEN HPSI flow may be reduced.		
	Maintain Pressurizer Level between 101 inches (141) and 180 inches (190)	·	31

NOTE: Continuously applicable steps are designated with a "C" in the DONE column.

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- 1

(continue)

EOP-8 Rev 30 / Unit 2 Page 2 of 4 PIC-2: PORVs or PRESSURIZER VENT (continued)

START	FUNCTION	DONE	PAGE
	B. ESTABLISH RCS PRESSURE CONTROL USING PORVs OR PRESSURIZER VENT.	c	32
	 IF pressurizer pressure rises to 2400 PSIA, THEN verify BOTH PORVs open 		32
	 Restore and maintain RCS subcooling using PORVs or PZR VENT valves 		33
	IF pressurizer level approaches 305 inches OR PORVs are NOT required to be open, THEN close the PORVs		34
	C. PREPARE FOR RAS ACTUATION	С	36
	RWT level drops to 4 feet	1	36
	D. VERIFY CONTAINMENT SUMP LEVEL AND RAS ACTUATION.	c	37
	E. IF RAS ACTUATED, THEN REFILL THE RWT.	c	44
_	 Notify the Plant Technical Support Center to review ERPIP-611. 		44
	F. ACCEPTANCE CRITERIA FOR SUCCESS PATH PIC-2.		45
	 IF RCS Pressure And Inventory Control has NOT been satisfied, THEN PROCEED to the next appropriate RCS Pressure And Inventory Control Success Path. 		45

NOTE: Continuously applicable steps are designated with a "C" in the DONE column.

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EOP-8 Rev 30 / Unit 2 Page 3 of 4 RCS PRESSURE AND INVENTORY CONTROL PLACEKEEPER PIC-3: LOSS OF VITAL AC

RESOURCE CONDITIONS	ACCEPTANCE CRITERIA
A loss of ALL 4KV Vital Buses has occurred SIAS has NOT actuated	 Pressurizer pressure less than the upper limits of Att. (1) RCS subcooling is greater than 25°F
OR has been reset	based on CET temperatures OR CET temperatures less than 50°F
	superheated • Reactor Vessel level above the top of the hot leg

START	FUNCTION	DONE	PAGE
	A. ESTABLISH RCS PRESSURE AND INVENTORY CONTROL DURING LOSS OF VITAL AC.	с	46
	 Minimize RCS inventory loss IF RCS subcooling drops to 25°F, THEN cooldown the RCS to maintain: RCS subcooling 25 - 50°F RCS cooldown rate less than 100°F in any one hour S/G level (-)24 - (+)30 inches SUR negative, or SUR zero with WRNI Power less than 10⁴ TCOLD greater than NEOP-23 curve 		46 47
	IF a controlled cooldown is in progress, THEN block SIAS		47
	WHEN at least ONE 4KV Vital Bus has been re-energized, THEN IMPLEMENT PIC-1, PIC-2 OR PIC-4		48
	B. ACCEPTANCE CRITERIA FOR SUCCESS PATH PIC-3.		49
	IF RCS Pressure And Inventory Control has NOT been satisfied, THEN PROCEED to the next appropriate RCS Pressure And Inventory Control Success Path.		49

NOTE: Continuously applicable steps are designated with a "C" in the DONE column.

	 SIAS has actual 	tted • IF RAS has Ni AND pressure 1270 PSIA THEN at least operating • HPSI and LPS	er pressure is g ONE Charging I I Pumps are inji ER Atts. (10) ar	reater than Pump ecting water nd (11)
:	START FUNCT		DONE	PAGE
		TABLISH RCS PRESSURE AND INVENTORY NTROL USING SIS.	с	50
		IF RCS pressure is less than 1725 PSIA, OR containment pressure is greater than 2.8 PSIG THEN verify SIAS actuation		50
	•	Align HPSI injection and block SIAS		50
	•	IF high RCS pressure is preventing SIS flow, THEN attempt to depressurize the RCS: RCS Pressure And Inventory Control succ paths as necessary The selected Core And RCS Heat Remov success path		53
	•	WHEN ALL of the following conditions can be maintained: At least 25°F subcooling based on CET temperatures Pressuizer level greater than 101 inches (141) Fressuizer level greater than terroval Reactor Vessel level above the top of the hot leg Reactivity Control Safety Function Acceptance Critaria are met THEN HFSI flow may be reduced.		61
		IF pressurizer pressure is greater than 200 PS and EITHER constant or rising, THEN the operating LPSI PPs may be stopped	A	61

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ssure is greater than	START	FUNCTION
Charging Pump		B. IF ONCE THE

START	FUNCTION	DONE	PAGE
	B. IF ONCE-THROUGH-COOLING IS NOT IN	1	
	PROGRESS,		1
	THEN IDENTIFY LOCATION OF LEAK.	1	62
_	C. PREPARE FOR RAS ACTUATION.	C	65
	RWT level drops to 4 feet	1	65
	D. VERIFY RAS ACTUATION.	C	65
	E. PROTECT ECCS PUMPS FROM OVERHEATING.	<u> </u>	73
	F. IF RAS ACTUATED.	<u> </u>	
	THEN REFILL THE RWT.	C	74
-	 Notify the Plant Technical Support Center to review 	<u> </u>	74
	ERPIP-611.		
	G. COMMENCE CORE FLUSH.	C	74
	 8 to 11 hours after SIAS was actuated 		74
	H. ACCEPTANCE CRITERIA FOR SUCCESS PATH		
	PIC-4.		79
	IF RCS Pressure And Inventory Control has NOT	1	
	been satisfied.		
	THEN perform the following actions:		
	 Concurrently perform the Recovery actions 	i i	80
	for the next safety function to be satisfied		
	 Determine the appropriate emergency 		60
	response actions PER the ERPIP		
	 IF ALL Safety Injection has been lost, 	1	80
	THEN consider consulting the Technical	1	
	Support Center prior to reinitiating Safety		
	Injection Flow		
	 Maximize RCS heat removal via the SGs 		78
	 Contact the Plant Technical Support Center 	1.	61
	for alternate methods PER ERPIP-611	1	1
	 Attempt to re-establish SI flow to the RCS 	i i	62
	from the Containment Sump		
	Discharge SIT inventory	1.	84
	 Inject additional inventory to the RCS from the RWT 		85
•			67
	 Inject additional inventory to the RCS via an alternate method 	1	0'
	Evaluate further actions	1	88

PIC-4: SIS (continued) EOP-8 Rev 30 / Unit 2 Page 4 of 4

NOTE: Continuously applicable steps are designated with a "C" in the DONE column.

		EOP-8 Rev 28/Unit 2 Page 1 of 206
A	PPENDIX (4) CORE AND RCS HEA	AT REMOVAL
н	R-1: S/G HEAT SINK WITH NO SIS	OPERATION
	RECOVERY ACTIONS	ALTERNATE ACTIONS
A	ESTABLISH CORE AND RCS HEAT REMOVAL.	· · · · · · · · · · · · · · · · · · ·
1.	IF 500KV offsite power has been lost, THEN protect the condenser from overpressure and minimize S/G inventory loss.	
	a. Shut BOTH MSIVs.	
	b. Shut the SG BD valves:	
	 2-BD-4010-CV 2-BD-4011-CV 2-BD-4012-CV 2-BD-4013-CV 	
2.	IF , at ANY time, Main and Auxiliary Feedwater are lost to BOTH S/Gs and can NOT be readily restored, THEN perform the following actions:	
	a. Trip ALL RCPs.	
	b. Shut the SG BD valves:	
	 2-BD-4010-CV 2-BD-4011-CV 2-BD-4012-CV 2-BD-4013-CV 	
3.	IF , at ANY time, BOTH S/G levels are less than (-)350 inches OR T coub rises uncontrollably 5° F or greater, THEN IMPLEMENT HR-4, <u>ONCE-THROUGH-COOLING</u> .	· · ·
	(continue)	

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	EOP-8 Rev 28/Unit 2 Page 2 of 206
APPENDIX (4) CORE AND RCS HEA	TREMOVAL
HR-1: S/G HEAT SINK WITH NO SIS	OPERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
A. (continued)	
 IF at least ONE 4KV Vital Bus is energized, THEN commence RCS boration as follows: 	
a. Verify the normal charging flowpath is available for RCS makeup with at least ONE LOOP CHG valve open:	a.1 IF the normal charging path is NOT available, THEN establish charging flowpath to the RCS via the HPSI AUX HDR as follows:
 2-CVC-518-CV 2-CVC-519-CV 	(1) Shut HPSI AUX HDR ISOL valve, 2-SI-656-MOV.
	(2) Open ONE of the HPSI AUX HDR valves:
	 2-SI-617-MOV 2-SI-627-MOV 2-SI-637-MOV 2-SI-647-MOV
	(3) Open SI TO CHG HDR valve, 2-CVC-269-MOV.
	 (4) Shut REGEN HX CHG INLET valve, 2-CVC-183, located in the 27 ft West Penetration Room.
	(5) Shut L/D CNTMT ISOL valves:
	 2-CVC-515-CV 2-CVC-516-CV
	a.2 IF a charging flowpath can NOT be established via the HPSI AUX HDR, THEN perform the following:
	(1) Verify REGEN HX CHG INLET valve, 2-CVC-183, is open.
	(2) Charge through the Loop Charging valves Bypass Valve, 2-CVC-188.
(continue)	

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		EOP-8 Rev 28/Unit 2 Page 3 of 206
	ENDIX (4) CORE AND RCS HE	AT REMOVAL
HR-1	: S/G HEAT SINK WITH NO SIS	S OPERATION
	RECOVERY ACTIONS	ALTERNATE ACTIONS
A.4 (c	ontinued)	
b.	Commence RCS boration from the BAST using the CVCS as follows: (1) Ensure BAST levels remain greater than 10 inches	 b.1 IF BAST is NOT available, THEN align charging pumps to take a suction from the RWT as follows: (1) Ensure RWT level is greater than
	 greater than 10 inches. (2) Shut VCT M/U valve, 2-CVC-512-CV. (3) Open BA DIRECT M/U valve, 2-CVC-514-MOV. (4) Open BAST GRAVITY FD valves: 2-CVC-508-MOV 2-CVC-509-MOV (5) Verify the M/U MODE SEL SW, 2-HS-210, is in MANUAL. (6) Start ALL available BA PPs. (7) Shut VCT OUT valve, 2-CVC-501-MOV. (8) Start ALL available CHG PPs. (9) Ensure CHG HDR PRESS is greater than RCS pressure. Record the time RCS boration was commenced:	 Ensure RWT level is greater than 2 feet. Open RWT CHG PP SUCT valve, 2-CVC-504-MOV. Shut VCT OUT valve, 2-CVC-501-MOV. Start ALL available CHG PPs. Ensure CHG HDR PRESS is greater than RCS pressure.
	(continue)	

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APP	ENI	DIX (4) CORE AND RCS HEA	-	
HR-	I: S	G HEAT SINK WITH NO SIS	SOPERATION	
	l	RECOVERY ACTIONS	ALTERNATE ACTIONS	
A.4 (c	ontin	ued)		1
e.		ntinue boration until ONE of the owing conditions is met:		
	(1)	116 percent of the shutdown margin requirement has been achieved PER the NEOPs.		
	(2)	BAST level has been lowered a total of 108 inches.		02802
	(3)	Boration has been in progress as follows:		
		 For 53 minutes if THREE CHG PPs are operating 		
		 For 80 minutes if TWO CHG PPs are operating 		
		 For 160 minutes if ONE CHG PP is operating 		
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		(continue)		
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APPENDIX (4) CORE AND RCS HEA	T REMOVAL
IR-1: S/G HEAT SINK WITH NO SIS	OPERATION .
RECOVERY ACTIONS	ALTERNATE ACTIONS
. (continued)	· ·
<u>CAUTION</u> ICS temperature must be closely nonitored to avoid a cooldown rate greater han the Technical Specification Limits.	
 IF condenser vacuum is greater than 20 InHg, THEN cooldown the RCS to establish Shutdown Cooling entry conditions using the TURB BYP valves as follows: a. Ensure the ADVs are shut. b. Operate the TURB BYP valves from the control room. c. IF the TURB BYP valves can NOT be operated from the Control Room, THEN station an operator to manually position the TURB BYP valves PER OI-8C, MAIN STEAM AND MSR VENTS AND DRAINS. d. Maintain RCS cooldown less than 100° F in any one hour. e. IF ALL 4KV Vital Buses are de-energized AND boration has NOT been commenced, THEN maintain the following conditions: SUR negative, or SUR zero with WRNI Power less than 10⁻⁴% T colo greater than NEOP-23, figure tiled, <u>MINIMUM ALLOWED RCS TEMPERATURE TO ENSURE 1%Ap SHUTDOWN vs. BURNUP</u> 	 5.1 Cooldown the RCS to establish Shutdown Cooling entry conditions using the ADVs as follows: a. Prior to determining if a tube rupture exists and isolating the affected S/G, record the ADV open and close times, for dose calculations. b. Shift the ADV controller to MANUAL. c. Operate the ADVs from the control room. d. IF the ADVs will NOT operate from the Control Room, THEN perform ONE of the following: (1) Operate the ADVs from 2C43 as follows: (a) Verify the ADV controllers on 2C43 are set at 0% output: (21 ADV) 2-HC-4056B (b) Align the ADV Hand Transfer Valves to 2C43 (POSITION 2): 21 S/G 2-HV-3939A 2-HV-3938A 2-HV-3938B
(continue)	 2-HV-3938B (continue)

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APPENDIX (4) CORE AND RCS H	EAT REMOVAL
HR-1: S/G HEAT SINK WITH NO	SIS OPERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
A.5 (continued)	A.5.1.d(1) (continued)
	(c) Operate the ADVs from 2C43.
	<u>NOTE</u> The ADVs are reverse acting, i.e., clockwise to open and counterclockwise to shut.
	(2) Locally operate the ADVs from the 45ft level of the Aux Building.
	e. Maintain RCS cooldown less than 100° F in any one hour.
	 f. IF ALL 4KV Vital Buses are de-energized AND boration has NOT been commenced, THEN maintain the following conditions:
	 SUR negative, or SUR zero with WRNI Power less than 10⁻⁴% T COLD greater than NEOP-23, figure titled, <u>MINIMUM ALLOWED</u> <u>RCS TEMPERATURE TO</u> <u>ENSURE 1%Δρ SHUTDOWN vs.</u> <u>BURNUP</u>
	<u>CAUTION</u> The following step may blow out the Condenser Rupture Disks and may cause equipment damage.
	5.2 IF the ADVs are NOT available, AND condenser vacuum has been lost, THEN cooldown the RCS to establish Shutdown Cooling entry conditions by opening the TURB BYP valves:
	 Open ALL doors to the outside on the 45 ft level of the Turbine Building.
(continue)	(continue)

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PPENDIX (4) CORE AND RCS	HEAT REMOVAL
IR-1: S/G HEAT SINK WITH N	O SIS OPERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
.5 (continued)	A.5.2 (continued)
	b. Notify personnel to evacuate the 45 ft level of the Turbine Building.
	c. IF BOTH MSIVs are shut, THEN perform the following
	(1) Close the power supply breakers to the MSIV Bypass valves:
	 2-MOV-4045 breaker, 52-21428 2-MOV-4052 breaker, 52-20428
	(2) Open the MSIV BYP valves:
	 2-MS-4045-MOV 2-MS-4052-MOV
	d. Shut the SGFPT EXH valves.
	e. Station an operator to manually operate the TURB BYP valve(s) PER OI-8C, <u>MAIN STEAM AND MSR</u> <u>VENTS AND DRAINS</u> , as directed by the Control Room.
	f. Maintain RCS cooldown less than 100° F in any one hour.
	 g. IF ALL 4KV Vital Buses are de-energized AND boration has NOT been commenced, THEN maintain the following conditions:
	 SUR negative, or SUR zero with WRNI Power less than 10⁻⁴% T colo greater than NEOP-23, figure titled, <u>MINIMUM ALLOWED</u> <u>RCS TEMPERATURE TO</u> <u>ENSURE 1%Ap SHUTDOWN vs.</u> <u>BURNUP</u>
(continue)	(continue)

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APPENDIX (4) CORE AND RCS	HEAT REMOVAL
HR-1: S/G HEAT SINK WITH NO) SIS OPERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
A.5 (continued)	A.5 (continued)
	<u>CAUTION</u> The following step may blow out the Condenser Rupture Disks and may cause equipment damage.
	 5.3 IF RCS cooldown has NOT been established, THEN cooldown the RCS to establish Shutdown Cooling entry conditions by aligning the steam drains to the condenser as follows:
	a. Open the MAIN STM UPSTREAM DRN ISOL VLVS by placing handswitch 2-HS-6622 in OPEN.
	 b. Open the MAIN STM LINE DRN VLVS by placing handswitch 2-HS-6600 in OPEN.
	c. IF BOTH MSIVs are shut, THEN perform the following
م	(1) Close the power supply breakers to the MSIV Bypass valves:
	 2-MOV-4045 breaker, 52-21428 2-MOV-4052 breaker, 52-20428
	(2) Open the MSIV BYP valves:
	 2-MS-4045-MOV 2-MS-4052-MOV
	d. Maintain RCS cooldown less than 100° F in any one hour.
(continue)	(continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL		
HR-1: S/G HEAT SINK WITH NO S		
RECOVERY ACTIONS	ALTERNATE ACTIONS	
A.5 (continued)	A.5.3 (continued)	
	 e. IF ALL 4KV Vital Buses are de-energized AND boration has NOT been commenced, THEN maintain the following conditions: SUR negative, or SUR zero with WRNI Power less than 10-4% 	
	 T COLD greater than NEOP-23, figure titled, <u>MINIMUM ALLOWED</u> <u>RCS TEMPERATURE TO</u> <u>ENSURE 1%AP SHUTDOWN vs.</u> <u>BURNUP</u> 	
6. IF a controlled cooldown is in progress, THEN block SGIS and SIAS:		
WHEN the "SGIS A BLOCK PERMITTED" alarm is received, THEN block SGIS A.		
WHEN the "SGIS B BLOCK PERMITTED" alarm is received, THEN block SGIS B.		
WHEN the "PZR PRESS BLOCK A PERMITTED" alarm is received, THEN block SIAS A.		
WHEN the "PZR PRESS BLOCK B PERMITTED" alarm is received, THEN block SIAS B.		
(continue)		

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APPENDIX (4) CORE AND RCS HEA	AT REMOVAL
HR-1: S/G HEAT SINK WITH NO SIS	OPERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
A. (continued)	
<u>NOTE</u> Verification of RCS temperature response to a plant change during natural circulation takes approximately 5 to 15 minutes following the action due to increased loop cycle times.	
7. IF ALL RCPs are secured, THEN verify Natural Circulation in at least ONE loop by the following:	 7.1 IF subcooled Natural Circulation can NOT be verified, THEN PROCEED to HR-2, <u>S/G HEAT</u> SINK WITH SIS OPERATION.
 RCS subcooling is at least 25° F based on CET temperatures 	
 Тнот minus T coub less than 50° F 	
• T COLD constant or lowering	
• THOT constant or lowering	
 CET temperatures trend consistent with T нот 	
Steaming rate affects RCS temperatures	
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APPENDIX (4) CORE AND RCS HEAT REMOVAL			
5/G HEAT SINK WITH NO SIS	OPERATION		
RECOVERY ACTIONS	ALTERNATE ACTIONS		
ERMINE IF A SGTR EXISTS.			
GTR has occurred, as indicated by of the following:			
'G samples			
MS trends:			
UNIT 2 CNDSR OFF-GAS (2-RI-1752) UNIT 2 S/G B/D (2-RI-4014) UNIT 2 MAIN VENT GASEOUS (2-RI-5415) MAIN STM EFFL RAD MON (2-RIC-5421 OR 2-RIC-5422)			
G level change when NOT feeding			
ost-Trip S/G level trends			
ismatch in feed flow prior to the trip			
eam flow vs. Feed flow mismatch ior to the trip			
I identify the most affected S/G.			
ications of a SGTR are NOT ved, I PROCEED to Block Step C.			
(continue)	· ·		
	S/G HEAT SINK WITH NO SIS RECOVERY ACTIONS ERMINE IF A SGTR EXISTS. GTR has occurred, as indicated by of the following: G samples MS trends: UNIT 2 CNDSR OFF-GAS (2-RI-1752) UNIT 2 S/G B/D (2-RI-4014) UNIT 2 MAIN VENT GASEOUS (2-RI-5415) MAIN STM EFFL RAD MON (2-RIC-5421 OR 2-RIC-5422) G level change when NOT feeding ost-Trip S/G level trends ismatch in feed flow prior to the trip eam flow vs. Feed flow mismatch ior to the trip I identify the most affected S/G. ications of a SGTR are NOT ved, I PROCEED to Block Step C.		

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

B. (continued)

NOTE

Maintaining RCS subcooling takes precedence over equalizing RCS pressure and affected S/G pressure.

- 3. Depressurize the RCS **PER** the selected Pressure and Inventory Control success path to maintain the following:
 - Subcooling between 25 and 140° F based on CET temperatures
 - RCS pressure greater than the NPSH limits PER ATTACHMENT (1), <u>RCS</u> <u>PRESSURE TEMPERATURE LIMITS</u>
 - RCS pressure less than 900 PSIA
 - RCS pressure approximately equal to affected S/G pressure
- 4. Dispatch an operator to standby in the Unit 2 45 ft Switchgear Room to shut the affected S/G ADV.

(continue)

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APPENDIX (4) CORE AND RCS HE	AT REMOVAL
HR-1: S/G HEAT SINK WITH NO SI	S OPERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
B. (continued)	
<u>CAUTION</u> If there is a conflict between isolating a S/G due to indications of SGTR or ESDE, and maintaining adequate heat removal, then maintain RCS heat removal via the least affected S/G. At least one S/G should always be available for heat removal if possible.	
5. WHEN Тиот is less than 515° F, THEN isolate the most affected S/G.	
a. IF 21 S/G is the most affected S/G, THEN isolate 21 S/G by performing the following actions:	
(1) Shut 21 ADV using the Hand Transfer Valves on the West wall of the Unit 2 45 ft Switchgear Room as follows:	(1).1 IF 21 ADV will NOT shut from 2C43, THEN shut 21 ADV Manual Isolation Valve, 2-MS-101.
(a) IF 21 ADV was locally operated, THEN remove the manual override.	
(b) Verify 21 ADV controller, 2-HC-4056A, at 2C43 is set at 0% output.	
(c) Align 21 S/G Hand Transfer Valves to 2C43 (POSITION 2):	
2-HV-3939A2-HV-3939B	
(2) Shut 21 MSIV.	
(3) Verify 21 MSIV BYP valve, 2-MS-4045-MOV, is shut.	
(4) Verify 21 SG FW ISOL valve 2-FW-4516-MOV, is shut.	
(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.5.a (continued)

- (5) Shut 21 SG AFW MAIN STM SUPP & BYP valves, 2-MS-4070-CV and 2-MS-4070A-CV.
- (6) Shut 21 SG AFW BLOCK valves by placing the handswitches in SHUT:
 - 2-AFW-4520-CV ·
 - 2-AFW-4521-CV
 - 2-AFW-4522-CV
 - 2-AFW-4523-CV
- (7) Shut 21 SG BD valves:
 - 2-BD-4010-CV
 - 2-BD-4011-CV
- (8) Shut the MAIN STM UPSTREAM DRN ISOL VLVS by placing handswitch 2-HS-6622 in CLOSE.
- (9) Observe locally, the S/G Safety Valves are NOT leaking.

(continue)

					EOP-8 Rev 28/Unit 2 Page 15 of 206
APPI	END) XI	4) CORE AND RCS HEA	T RE	MOVAL
HR-1	: S/	GH	EAT SINK WITH NO SIS	5 OPE	RATION
	<u> </u>	RECC	OVERY ACTIONS		ALTERNATE ACTIONS
B.5 (cc	ontinu	req)			
b.	THE	N iso	S is the most affected S/G, blate 22 S/G by performing ving actions:		
	(1)	Tran of th	t 22 ADV using the Hand nsfer Valves on the West wall ne Unit 2 45 ft Switchgear om as follows:	(1).1	IF 22 ADV will NOT shut from 2C43, THEN shut 22 ADV Manual Isolation Valve, 2-MS-104.
		(a)	IF 22 ADV was locally operated, THEN remove the manual override.		
		(b)	Verify 22 ADV controller, 2-HC-4056B, at 2C43 is set at 0% output.		
		(c)	Align 22 S/G Hand Transfer Valves to 2C43 (POSITION 2):		
			 2-HV-3938A 2-HV-3938B 		
	(2)	Shu	t 22 MSIV.		
	(3)		īy 22 MSIV BYP valve, S-4052-MOV, is shut.		
	(4)		fy 22 SG FW ISOL valve N-4517-MOV, is shut.	:	
	(5)	SUF 2-M	t 22 SG AFW MAIN STM PP & BYP valves, S-4071-CV and S-4071A-CV.		,
			(continue)		

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APPENDIX (4) CORE AND RCS HEA	T REMOVAL
HR-1: S/G HEAT SINK WITH NO SIS	OPERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
B.5.b (continued)	
 (6) Shut 22 SG AFW BLOCK valves by placing the handswitches in SHUT: 2-AFW-4530-CV 2-AFW 4504 OV 	1
 2-AFW-4531-CV 2-AFW-4532-CV 2-AFW-4533-CV 	
(7) Shut 22 SG BD valves:	
 2-BD-4012-CV 2-BD-4013-CV 	
(8) Shut the MAIN STM UPSTREAM DRN ISOL VLVS by placing handswitch 2-HS-6622 in CLOSE.	
(9) Observe locally, the S/G Safety Valves are NOT leaking.	
(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

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B. (continued)

- 6. Ensure the affected S/G Safety Valves remain shut.
 - a. Close the power supply breakers to the MSIV Bypass valves:
 - 2-MOV-4045 breaker, 52-21428
 - 2-MOV-4052 breaker, 52-20428
 - b. Maintain the affected S/G pressure less than 920 PSIA by performing the following:

CAUTION

Damage to the steam system could occur due to moisture carryover if the MSIV Bypass Valve is operated on a S/G whose level exceeds (+)55 inches.

- IF the affected S/G pressure approaches 920 PSIA
 AND S/G level is less than (+)55 inches,
 THEN operate the MSIV BYP valve on the affected S/G;
 - (21 S/G) 2-MS-4045-MOV
 - (22 S/G) 2-MS-4052-MOV
- (2) IF the MSIV BYP valve can NOT maintain S/G pressure less than 920 PSIA,
 THEN steam the affected S/G to atmosphere from 2C43 as follows:
 - (a) Record the ADV open and close times, for dose calculations.
 - (b) Direct the adjustment of the ADV from 2C43 as necessary.

(continue)

- (2).1 IF the affected S/G ADV was manually isolated, THEN steam the affected S/G to atmosphere as follows:
 - (a) Record the ADV open and close times, for dose calculations.
 - (b) Direct throttling of the affected ADV Manual Isolation Valve as necessary:
 - (21 S/G) 2-MS-101
 - (22 S/G) 2-MS-104

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APPENDIX (4) CORE AND RCS HEA HR-1: S/G HEAT SINK WITH NO SIS	
HK-1: 5/G HEAT SINK WITH NO SK	OPERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
B. (continued)	
 Verify the most affected S/G is isolated by checking the following: 	7.1 IF the wrong S/G was isolated, THEN perform the following actions:
 S/G sample activity higher in the affected S/G RMS trends: UNIT 2 CNDSR OFF-GAS (2-RI-1752) UNIT 2 S/G B/D (2-RI-4014) UNIT 2 MAIN VENT GASEOUS (2-RI-5415) Unaffected S/G level change consistent with feed flow S/G pressures RCS loop T coub trends 8. Verify the motor driven train SG AFW BLOCK valves are open with the handswitches in OPEN on the S/G which is unaffected by EITHER a SGTR OR an ESDE: 21 S/G 2-AFW-4523-CV 2-AFW-4533-CV 	CAUTION Severe waterhammer may result if Main Feedwater flow is restored after it has been stopped for greater than 80 minutes. a. Restore feeding and steaming capability to the least affected S/G. b. WHEN RCS heat removal has been re-established to the least affected S/G, THEN isolate the most affected S/G PER step B.5.
(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION

RECOVERY ACTIONS

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ALTERNATE ACTIONS

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B.	(œ	ntinued)	
9 .		ontact the Operational Support Center to erform periodic samples for the following:	
	•	RCS boron concentration at least once per hour	
	•	RCS activity	
r.	٠	S/Gs boron concentration and activity	
	•	Turbine Building Sumps activity	
	٠	Condensate and CSTs activity	
	•	Air samples and radiation surveys throughout the plant to determine the spread of contamination	
10	2	Ensure boron concentration remains above 116 percent of the required shutdown margin PER the NEOPs.	
		(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION **RECOVERY ACTIONS ALTERNATE ACTIONS** B. (continued) 11. IF ALL RCPs are secured, THEN disable RCPs in the affected loop to prevent inadvertant start. a. IF 21 S/G is the affected S/G, THEN disable 21A and 21B RCPs by removing the Reactor Coolant Pump Breaker CLOSE CIR fuses. 21A RCP 252-21P01 • 21A RCP 252-21P02 • 21B RCP 252-23P01 • 21B RCP 252-23P02 b. IF 22 S/G is the affected S/G, THEN disable 22A and 22B RCPs by removing the Reactor Coolant Pump Breaker CLOSE CIR fuses. 22A RCP 252-22P01 22A RCP 252-22P02 22B RCP 252-24P01 • 22B RCP 252-24P02 (continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

B. (continued)

NOTE

If available, narrow range S/G level indication should be used to control the affected S/G level.

NOTE

Affected S/G level control steps are listed in order of preference and should be performed in the order listed.

- Maintain the affected S/G level between 0 and (+)50 inches by performing ANY of the following:
 - a. Maintain the affected S/G level by controlling RCS pressure with backflow to the RCS as follows:
 - IF the affected S/G level is high, THEN reduce RCS pressure below the affected S/G pressure by ANY of the following methods:
 - (a) De-energize the Pressurizer HTR(s).
 - (b) Use MAIN or AUX SPRAY.
 - (c) IF the HPSI throttle criteria are met, THEN throttle or secure flow to reduce RCS pressure.
 - (2) Control RCS pressure to maintain the affected S/G level approximately constant.

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(continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.12 (continued)

- b. Maintain the affected S/G level by blowdown to the MWS as follows:
 - (1) IF AFAS has actuated, THEN reset the AFAS START signals PER ATTACHMENT(19), RESET AFAS START SIGNALS AT THE ACTUATION CABINETS.
 - (2) Place UNIT 2 S/G B/D RECOVERY radiation monitor, 2-RIC-4095, in OPER alarm at 1C22G:
 - (a) Verify 2-HS-4095B/S1 -OPER BYPASS in OFF.
 - (b) Highlight Stop Pump AND press SELECT.
 - (c) Verify the CH 1 green OPER LED extinguishes.
 - (d) Bypass annunciator alarms.
 - (3) Verify open B/D Recovery DISCH TO MWS, 2-BD-4097-CV.
 - (4) Verify shut B/D Recovery DISCH TO CIRC WTR, 2-BD-4015-CV.
 - (5) Verify shut B/D Recovery DISCH TO CNDSR, 2-BD-4096-CV.
 - (6) Shut S/G Combined B/D Header Throttle Valves:
 - 2-BD-102
 - 2-BD-104

(continue)

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APPEND	IX (4) CORE AND RCS HEA	TREMOVAL
HR-1: S/0	G HEAT SINK WITH NO SIS	OPERATION
R	ECOVERY ACTIONS	ALTERNATE ACTIONS
B.12.b (cont	inued)	
(7)	Open the affected SG BOT BD valve by placing its handswitch in RAD TRIP OVERRIDE:	
	 (21 S/G) 2-BD-4011-CV (22 S/G) 2-BD-4013-CV 	
(8)	Throttle open the S/G Combined B/D Header Throttle Valve on the affected S/G to obtain a blowdown flow of approximately 100 GPM while maintaining 21 B/D Heat Exchanger outlet temperature less than 200° F:	
	 (21 \$/G) 2-BD-102 (22 \$/G) 2-BD-104 	
(9)	Pump the MWRT PER the <u>TRANSFERRING THE MWRT</u> <u>TO THE RCWMT</u> section of OI-17D.	
(10)	Monitor MWRT level at 1C33 and maintain MWRT level approximately constant by throttling the S/G blowdown rate while pumping to the RCWMT.	
	(continue)	

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EOP-8 Rev 28/Unit 2 Page 24 of 206 APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION **RECOVERY ACTIONS ALTERNATE ACTIONS** B.12 (continued) c. Maintain the affected S/G level by blowdown to the Condenser as follows: (1) JF AFAS has actuated, THEN reset the AFAS START signals PER ATTACHMENT(19), RÉSET AFAS START SIGNALS AT THE ACTUATION CABINETS. (2) Ensure at least ONE Condensate Demin is in service. (3) Open PRECOAT SYS BYP valve, 2-CD-5818-CV. (4) Shut COND DEMIN BYP valve. 2-CD-4439-MOV. (5) IF AFW is operating AND the SGFP Miniflow Valves are shut, THEN throttle open the FW DUMP TO CNDSR HTWL valves, 2-FW-134 and 2-FW-135, to obtain maximum condensate flow through the Condensate Demin. (6) Shut CONDENSER HOTWELL **HIGH LEVEL DUMP CV-4405** INLET VALVE, 2-CD-232. (7) Bypass UNIT 2 S/G B/D **RECOVERY** radiation monitor, 2-RIC-4095: (a) Place 2-HS-4095B/S2 -HIGH BYPASS in BYPASS. (b) Verify 2-HS-4095B/S1 -**OPER BYPASS in BYPASS.** (continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION **RECOVERY ACTIONS ALTERNATE ACTIONS** B.12.c (continued) (8) Verify shut B/D Recovery DISCH TO MWS, 2-BD-4097-CV. (9) Verify shut B/D Recovery DISCH TO CIRC WTR, 2-BD-4015-CV. (10) Verify open B/D Recovery **DISCH TO CNDSR,** 2-BD-4096-CV. (11) Shut S/G Combined B/D Header Throttle Valves: 2-BD-102 ٠ 2-BD-104 -(12) Open the affected SG BOT BD valve by placing its handswitch in RAD TRIP OVERRIDE: (21 S/G) 2-BD-4011-CV (22 S/G) 2-BD-4013-CV

(13) Throttle open the S/G Combined B/D Header Throttle Valve on the affected S/G to obtain a blowdown flow of approximately 100 GPM while maintaining 21 B/D Heat Exchanger outlet temperature less than 200° F:

• (21 S/G) 2-BD-102

• (22 S/G) 2-BD-104

(continue)

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IX (4) CORE AND RCS HEA	T REMOVAL
G HEAT SINK WITH NO SIS	OPERATION
ECOVERY ACTIONS	ALTERNATE ACTIONS
ued)	
intain the affected S/G level by aming to the condenser as follows:	
Ensure the condenser vacuum is greater than 20 InHg.	
Ensure at least ONE Condensate Demin is in service.	
Open PRECOAT SYS BYP valve, 2-CD-5818-CV.	
Shut COND DEMIN BYP valve, 2-CD-4439-MOV.	
IF AFW is operating AND the SGFP Miniflow Valves are shut, THEN throttle open the FW DUMP TO CNDSR HTWL valves, 2-FW-134 and 2-FW-135, to obtain maximum condensate flow through the Condensate Demin.	
Shut CONDENSER HOTWELL HIGH LEVEL DUMP CV-4405 INLET VALVE, 2-CD-232.	
Operate the MAIN STM UPSTREAM DRN ISOL VLVS using 2-HS-6622 as necessary.	
(continue)	
	 aued) intain the affected S/G level by aming to the condenser as follows: Ensure the condenser vacuum is greater than 20 InHg. Ensure at least ONE Condensate Demin is in service. Open PRECOAT SYS BYP valve, 2-CD-5818-CV. Shut COND DEMIN BYP valve, 2-CD-4439-MOV. IF AFW is operating AND the SGFP Miniflow Valves are shut, THEN throttle open the FW DUMP TO CNDSR HTWL valves, 2-FW-134 and 2-FW-135, to obtain maximum condensate flow through the Condensate Demin. Shut CONDENSER HOTWELL HIGH LEVEL DUMP CV-4405 INLET VALVE, 2-CD-232. Operate the MAIN STM UPSTREAM DRN ISOL VLVS using 2-HS-6622 as necessary.

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APPENDIX (4) CORE AND RCS HEA	-			
HR-1: S/G HEAT SINK WITH NO SIS	HR-1: S/G HEAT SINK WITH NO SIS OPERATION			
RECOVERY ACTIONS	ALTERNATE ACTIONS			
B.12.d (continued)				
<u>CAUTION</u> Damage to the steam system could occur due to moisture carryover if the MSIV Bypass Valve is operated on a S/G whose level exceeds (+)55 inches.				
 (8) IF additional steam flow is desired AND S/G level is less than (+)55 inches, THEN operate the MSIV BYP valve on the affected S/G: 	·			
 (21 S/G) 2-MS-4045-MOV (22 S/G) 2-MS-4052-MOV 				
e. Maintain the affected S/G level by steaming to atmosphere as follows:				
- · ·	 (1).1 IF the affected S/G ADV was manually isolated, THEN steam the affected S/G to atmosphere as follows: 			
(a) Record the ADV open and close times, for dose calculations.	(a) Record the ADV open and close times, for dose calculations.			
(b) Direct the adjustment of the ADV from 2C43 as necessary.	(b) Direct throttling of the affected ADV Manual Isolation Valve as necessary:			
(continue)	• (21 S/G) 2-MS-101 • (22 S/G) 2-MS-104			

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.12 (continued)

- f. IF the following conditions can be maintained:
 - RCS pressure remains below 900 PSIA
 - MSIV, ADV and MSIV BYP valves remain shut

THEN the affected S/G may be allowed to fill to the MSIV.

NOTE

If available, narrow range S/G level indication should be used to control the affected S/G level.

NOTE

Affected S/G pressure control steps are listed in order of preference and should be performed in the order listed.

- 13. Cool and depressurize the affected S/G as necessary by performing ANY of the following:
 - a. IF ANY RCP is operating, THEN cool and depressurize the affected S/G by feeding and backflow to the RCS as follows:
 - (1) Verify Letdown is operating.
 - (2) IF S/G level is less than (+)50 inches, THEN feed the affected S/G to raise level to (+)50 inches using

raise level to (+)50 inches using AFW PER step B.14.

(3) Ensure RCS Boron concentration at least 116 percent shutdown margin requirement **PER** the NEOPs.

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(continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.13.a (continued)

CAUTION

If feedwater is supplied to the affected S/G during the backflow evolution, adequate shutdown margin can NOT be assured.

> (4) Verify the affected S/G AFW BLOCK valves are shut with the handswitches in SHUT:

21 S/G

- 2-AFW-4520-CV
- 2-AFW-4521-CV
- 2-AFW-4522-CV
- 2-AFW-4523-CV

22 S/G

- 2-AFW-4530-CV
- 2-AFW-4531-CV
- 2-AFW-4532-CV
- 2-AFW-4533-CV

CAUTION

Maintain RCS pressure greater than the minimum pump operating limits PER ATTACHMENT (1), <u>RCS PRESSURE</u> TEMPERATURE LIMITS.

- (5) Lower the affected S/G level to 0 inches by reducing RCS pressure below the affected S/G pressure by ANY of the following methods:
 - (a) De-energize the Pressurizer HTR(s).
 - (b) Use MAIN or AUX SPRAY.
 - (c) IF the HPSI throttle criteria are met, THEN throttle or secure flow to reduce RCS pressure.

(continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.13.a (continued) (6) WHEN the affected S/G level is 0 inches, THEN control RCS pressure to maintain the affected S/G level approximately constant. (7) Repeat steps (1) through (6) as necessary. b. Cool and depressurize the affected S/G by steaming to the condenser as follows: Control RCS pressure to establish and maintain the affected S/G level between 0 and (+)50 inches. (2) Ensure the condenser vacuum is greater than 20 InHg. (3) Ensure at least ONE Condensate Demin is in service. (4) Open PRECOAT SYS BYP valve, 2-CD-5818-CV. (5) Shut COND DEMIN BYP valve, 2-CD-4439-MOV. (6) IF AFW is operating AND the SGFP Miniflow Valves are shut, THEN throttle open the FW DUMP TO CNDSR HTWL valves, 2-FW-134 and 2-FW-135, to obtain maximum condensate flow through the Condensate Demin. (7) Shut CONDENSER HOTWELL HIGH LEVEL DUMP CV-4405 INLET VALVE, 2-CD-232. (continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.13.b (continued)	
(8) Operate the MAIN STM UPSTREAM DRN ISOL VLVS using 2-HS-6622 as necessary.	
<u>CAUTION</u> Damage to the steam system could occur due to moisture carryover if the MSIV Bypass Valve is operated on a S/G whose level exceeds (+)55 inches.	
 (9) IF additional steam flow is desired AND S/G level is less than (+)55 inches, THEN operate the MSIV BYP valve on the affected S/G: 	
 (21 S/G) 2-MS-4045-MOV (22 S/G) 2-MS-4052-MOV 	
(continue)	
Damage to the steam system could occur due to moisture carryover if the MSIV Bypass Valve is operated on a S/G whose level exceeds (+)55 inches. (9) IF additional steam flow is desired AND S/G level is less than (+)55 inches, THEN operate the MSIV BYP valve on the affected S/G: • (21 S/G) 2-MS-4045-MOV • (22 S/G) 2-MS-4052-MOV	

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APPENDIX (4) CORE AND RCS HEA	TREMOVAL
HR-1: S/G HEAT SINK WITH NO SIS	OPERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
B.13 (continued)	
 Cool and depressurize the affected S/G by feeding and blowdown to the MWS as follows: 	
 (1) IF S/G level is less than (+)50 inches, THEN feed the affected S/G to raise level to (+)50 inches using AFW PER step B.14. 	
(2) IF AFAS has actuated, THEN reset the AFAS START signals PER ATTACHMENT(19), <u>RESET AFAS START SIGNALS</u> <u>AT THE ACTUATION</u> <u>CABINETS</u> .	
 (3) Place UNIT 2 S/G B/D RECOVERY radiation monitor, 2-RIC-4095, in OPER alarm at 1C22G: 	
(a) Verify 2-HS-4095B/S1 - OPER BYPASS in OFF.	
(b) Highlight Stop Pump AND press SELECT.	
(c) Verify the CH 1 green OPER LED extinguishes.	
(d) Bypass annunciator alarms.	
(4) Verify open B/D Recovery DISCH TO MWS, 2-BD-4097-CV.	
(5) Verify shut B/D Recovery DISCH TO CIRC WTR, 2-BD-4015-CV.	
(6) Verify shut B/D Recovery DISCH TO CNDSR, 2-BD-4096-CV.	
(continue)	

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APPEND	X (4) CORE AND RCS HEA	T REMOVAL	
HR-1: S/0	G HEAT SINK WITH NO SIS	OPERATION	
<u>R</u>	ECOVERY ACTIONS	ALTERNATE ACTIONS	
B.13.c (conti	inued)	•	
(7)	Shut S/G Combined B/D Header Throttle Valves:		
	 2-BD-102 2-BD-104 		
(8)	Open the affected SG BOT BD valve by placing its handswitch in RAD TRIP OVERRIDE:		
	 (21 S/G) 2-BD-4011-CV (22 S/G) 2-BD-4013-CV 		
(9)	Throttle open the S/G Combined B/D Header Throttle Valve on the affected S/G to obtain a blowdown flow of approximately 100 GPM while maintaining 21 B/D Heat Exchanger outlet temperature less than 200° F:		
	 (21 S/G) 2-BD-102 (22 S/G) 2-BD-104 		
(10)	Pump the MWRT PER the TRANSFERRING THE MWRT TO THE RCWMT section of OI-17D.		
(11)	Monitor MWRT level at 1C33 and maintain MWRT level approximately constant by throttling the S/G blowdown rate while pumping to the RCWMT.		
(12)	Lower the affected S/G level to 0 inches by S/G blowdown to the MWS.		
(13)	Feed the affected S/G to raise level to (+)50 inches using AFW PER step B.14.		
	(continue)	-	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.13.c (continued)

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- (14) Repeat steps (11) and (12) as necessary.
- d. Cool and depressurize the affected S/G by feeding and blowdown to the Condenser as follows:
 - IF S/G level is less than (+)50 inches,
 THEN feed the affected S/G to raise level to (+)50 inches using AFW PER step B.14.
 - (2) IF AFAS has actuated, THEN reset the AFAS START signals PER ATTACHMENT(19), RESET AFAS START SIGNALS AT THE ACTUATION CABINETS.
 - (3) Ensure at least ONE Condensate Demin is in service.
 - (4) Open PRECOAT SYS BYP valve, 2-CD-5818-CV.
 - (5) Shut COND DEMIN BYP valve, 2-CD-4439-MOV.
 - (6) IF AFW is operating AND the SGFP Miniflow Valves are shut, THEN throttle open the FW DUMP TO CNDSR HTWL valves, 2-FW-134 and 2-FW-135, to obtain maximum condensate flow through the Condensate Demin.
 - (7) Shut CONDENSER HOTWELL HIGH LEVEL DUMP CV-4405 INLET VALVE, 2-CD-232.

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION

RECOVERY ACTIONS

(8) Bypass UNIT 2 S/G B/D

B.13.d (continued)

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ALTERNATE ACTIONS

RECOVERY radiation monitor, 2-RIC-4095: (a) Place 2-HS-4095B/S2 -HIGH BYPASS in BYPASS. (b) Verify 2-HS-4095B/S1 -**OPER BYPASS in BYPASS.** (9) Verify shut B/D Recovery DISCH TO MWS, 2-BD-4097-CV. (10) Verify shut B/D Recovery DISCH TO CIRC WTR, 2-BD-4015-CV. (11) Verify open B/D Recovery **DISCH TO CNDSR.** 2-BD-4096-CV. (12) Shut S/G Combined B/D Header Throttle Valves: 2-BD-102 • 2-BD-104 (13) Open the affected SG BOT BD valve by placing its handswitch in RAD TRIP OVERRIDE: (21 S/G) 2-BD-4011-CV (22 S/G) 2-BD-4013-CV ٠ (14) Throttle open the S/G Combined B/D Header Throttle Valve on the affected S/G to obtain a blowdown flow of approximately 100 GPM while maintaining 21 **B/D Heat Exchanger outlet** temperature less than 200° F: (21 S/G) 2-BD-102 (22 S/G) 2-BD-104 (continue)

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APPENDI	X (4) CORE AND RCS HEA	AT REMOVAL
HR-1: S/0	G HEAT SINK WITH NO SIS	S OPERATION
RI	ECOVERY ACTIONS	ALTERNATE ACTIONS
B.13.d (conti	nued)	
(15)	Lower the affected S/G level to 0 inches by S/G blowdown to the Condenser.	
(16)	Feed the affected S/G to raise level to (+)50 inches using AFW PER step B.14.	
(17)	Repeat steps (14) and (15) as necessary.	
	I and depressurize the affected by steaming to atmosphere as ws:	
(1)	Control RCS pressure to establish and maintain the affected S/G level between 0 and (+)50 inches.	
(2)	Steam the affected S/G to atmosphere from 2C43 as follows:	(2).1 JF the affected S/G ADV was manually isolated, THEN steam the affected S/G to atmosphere as follows:
	(a) Record the ADV open and close times, for dose calculations.	(a) Record the ADV open and close times, for dose calculations.
	(b) Direct the adjustment of the ADV from 2C43 as necessary.	(b) Direct throttling open of the affected ADV Manual Isolation Valve to lower the affected S/G pressure:
		 (21 S/G) 2-MS-101 (22 S/G) 2-MS-104
	(continue)	

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APPENDIX (4) CORE AND RCS HEAT R HR-1: S/G HEAT SINK WITH NO SIS OP <u>RECOVERY ACTIONS</u> B. (continued) <u>CAUTION</u> If feedwater is supplied to the affected S/G during the backflow evolution, adequate shutdown margin can NOT be assured. 14. IF feedwater flow to the affected S/G is required, AND 23 AFW PP is available, THEN establish Auxiliary Feedwater flow as follows: a. Open the affected S/G motor driven train SG AFW BLOCK valves: 21 S/G 2 2-AFW-4522-CV 2 2-AFW-4523-CV 2 2-AFW-4533-CV b. IF 23 AFW PP is NOT being used to feed the unaffected S/G, THEN perform the following:	
RECOVERY ACTIONS B. (continued) CAUTION If feedwater is supplied to the affected S/G during the backflow evolution, adequate shutdown margin can NOT be assured. 14. IF feedwater flow to the affected S/G is required, AND 23 AFW PP is available, THEN establish Auxiliary Feedwater flow as follows: a. Open the affected S/G motor driven train SG AFW BLOCK valves: 21 S/G 21 S/G 2.AFW-4522-CV 22 S/G 2.AFW-4523-CV 22 S/G 2.AFW-4533-CV b. IF 23 AFW PP is NOT being used to feed the unaffected S/G,	
B. (continued) CAUTION If feedwater is supplied to the affected S/G during the backflow evolution, adequate shutdown margin can NOT be assured. 14. IF feedwater flow to the affected S/G is required, AND 23 AFW PP is available, THEN establish Auxiliary Feedwater flow as follows: a. Open the affected S/G motor driven train SG AFW BLOCK valves: 21 S/G 2-AFW-4522-CV 22 S/G 2-AFW-4532-CV 22 S/G 2-AFW-4532-CV b. IF 23 AFW PP is NOT being used to feed the unaffected S/G,	ALTERNATE ACTIONS
CAUTIONIf feedwater is supplied to the affected S/G during the backflow evolution, adequate shutdown margin can NOT be assured.14. IF feedwater flow to the affected S/G is required, AND 23 AFW PP is available, THEN establish Auxiliary Feedwater flow as follows:14.1a. Open the affected S/G motor driven train SG AFW BLOCK valves:21 S/G21 S/G2-AFW-4522-CV22 S/G2-AFW-4523-CV22 S/G2-AFW-4533-CVb. IF 23 AFW PP is NOT being used to feed the unaffected S/G,	-
If feedwater is supplied to the affected S/G during the backflow evolution, adequate shutdown margin can NOT be assured. 14. IF feedwater flow to the affected S/G is required, AND 23 AFW PP is available, THEN establish Auxiliary Feedwater flow as follows: a. Open the affected S/G motor driven train SG AFW BLOCK valves: 21 S/G 2-AFW-4522-CV 22 S/G 2-AFW-4523-CV 22 S/G 2-AFW-4533-CV b. IF 23 AFW PP is NOT being used to feed the unaffected S/G,	-
required, AND 23 AFW PP is available, THEN establish Auxiliary Feedwater flow as follows: a. Open the affected S/G motor driven train SG AFW BLOCK valves: 21 S/G 2-AFW-4522-CV 2-AFW-4523-CV 22 S/G 2-AFW-4532-CV 22 S/G 2-AFW-4533-CV b. IF 23 AFW PP is NOT being used to feed the unaffected S/G,	
 (1) Shut the motor driven train SG AFW BLOCK valves for the unaffected S/G by placing the handswitches in SHUT: 21 S/G 2-AFW-4522-CV 2-AFW-4523-CV 22 S/G 2-AFW-4532-CV 2-AFW-4533-CV (2) Start 23 AFW PP. 	 IF 23 AFW PP is NOT available, THEN establish Auxiliary Feedwater flow using 21 or 22 AFW PP as follows: a. Open the affected S/G steam driven train SG AFW BLOCK valves: 21 S/G 2-AFW-4520-CV 2-AFW-4521-CV 22 S/G 2-AFW-4530-CV 2-AFW-4531-CV b. IF 21 or 22 AFW PP is NOT being used to feed the unaffected S/G, THEN shut the steam driven train SG AFW BLOCK valves for the unaffected S/G by placing the handswitches in SHUT: 21 S/G 2-AFW-4521-CV 22 S/G 2-AFW-4521-CV 22 S/G 2-AFW-4531-CV 22 S/G 2-AFW-4531-CV

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APPENDIX (4) CORE AND RCS HE	AT REMOVAL
HR-1: S/G HEAT SINK WITH NO SI	S OPERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
B.14 (continued)	B.14.1 (continued)
	CAUTION An unmonitored radiation release could occur if the SG AFW MAIN STM SUPP & BYP valves from the affected S/G are open. C. Verify the SG AFW MAIN STM SUPP & BYP valves from the unaffected S/G are open: (21 SG)2-MS-4070-CV, 2-MS-4070A-CV (22 SG)2-MS-4071-CV, 2-MS-4071A-CV (23 Adjust and maintain 21 or 22 AFW PP discharge pressure at least 100 PSI greater than the affected S/G pressure: (21 AFW PP SPD CONTR) 2-HC-3987A (22 AFW PP SPD CONTR) 2-HC-3989A (22 AFW PP SPD CONTR) 2-HC-3989A (21 S/G) 2-AFW-4511-CV (21 S/G) 2-AFW-4511-CV (22 S/G) 2-AFW-4512-CV (1 Verify AFW Room normal or emergency ventilation is operating the sole of the set of
	to maintain room temperature less than 130° F.

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A	PPENDIX (4) CORE AND RCS HEA	AT REMOVAL
H	R-1: S/G HEAT SINK WITH NO SIS	5 OPERATION
	RECOVERY ACTIONS	ALTERNATE ACTIONS
C.	DETERMINE IF AN ESDE EXISTS.	
1.	IF an ESDE has occurred, by considering ALL of the following:	
	High steam flow from S/G	
	Lowering S/G pressure	
	Lowering S/G level	
	Lowering RCS T colo	
	Lowering PZR pressure	
	Lowering PZR level	
	THEN identify the most affected S/G.	
2	IF indications of an ESDE are NOT	
~ ··	observed, THEN PROCEED to Block Step D.	
	(continue)	
	(001111120)	

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APPENDIX (4) CORE AND RCS HEA	TREMOVAL
HR-1: S/G HEAT SINK WITH NO SIS	OPERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
C. (continued)	
<u>CAUTION</u> If there is a conflict between Isolating a S/G due to indications of SGTR or ESDE, and maintaining adequate heat removal, then maintain RCS heat removal via the least affected S/G. At least one S/G should always be available for heat removal if possible.	
3. Isolate the most affected S/G.	
a. IF 21 S/G is the most affected S/G, THEN isolate 21 S/G by performing the following actions:	
(1) Shut 21 ADV using the Hand Transfer Valves on the West wall of the Unit 2 45 ft Switchgear Room as follows:	(1).1 IF 21 ADV will NOT shut from 2C43, THEN shut 21 ADV Manual Isolation Valve, 2-MS-101.
(a) IF 21 ADV was locally operated, THEN remove the manual override.	
(b) Verify 21 ADV controller, 2-HC-4056A, at 2C43 is set at 0% output.	
(c) Align 21 S/G Hand Transfer Valves to 2C43 (POSITION 2):	
 2-HV-3939A 2-HV-3939B 	
(2) Verify 21 MSIV is shut.	
(3) Verify 21 SG FW ISOL valve 2-FW-4518-MOV, is shut.	
(4) Verify 21 MSIV BYP valve, 2-MS-4045-MOV, is shut.	
(continue)	

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APPENDIX (4) CORE AND RCS HEAT	REMOVAL
HR-1: S/G HEAT SINK WITH NO SIS (OPERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
C.3.a (continued)	
(5) Shut 21 SG BD valves:	
 2-BD-4010-CV 2-BD-4011-CV 	
 (6) Shut 21 SG AFW MAIN STM SUPP & BYP valves, 2-MS-4070-CV and 2-MS-4070A-CV. 	
(7) Shut 21 SG AFW BLOCK valves by placing the handswitches in SHUT:	
 2-AFW-4520-CV 2-AFW-4521-CV 2-AFW-4522-CV 2-AFW-4523-CV 	
(8) Shut the MAIN STM UPSTREAM DRN ISOL VLVS by placing handswitch 2-HS-6622 in CLOSE.	
(9) Observe locally, the S/G Safety Valves are NOT leaking.	
(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION RECOVERY ACTIONS ALTERNATE ACTIONS C.3 (continued) b. IF 22 S/G is the most affected S/G, THEN isolate 22 S/G by performing the following actions: (1) Shut 22 ADV using the Hand Transfer Valves on the West wall of the Unit 2 45 ft Switchgear Room as follows: (1).1 IF 22 ADV will NOT shut from 2C43, THEN shut 22 ADV Manual Isolation Valve, 2-MS-104. (a) IF 22 ADV was locally operated, THEN remove the manual override. (b) Verify 22 ADV controller, 2-HC-4056B, at 2C43 is set at 0% output. (c) Align 22 S/G Hand Transfer Valves to 2C43 (POSITION
RECOVERY ACTIONSALTERNATE ACTIONSC.3 (continued)b. IF 22 S/G is the most affected S/G, THEN isolate 22 S/G by performing the following actions:(1).1 IF 22 ADV will NOT shut from 2C43, THEN shut 22 ADV Manual Isolation Valve, 2-MS-104.(1) Shut 22 ADV using the Hand Transfer Valves on the West wall of the Unit 2 45 ft Switchgear Room as follows:(1).1 IF 22 ADV will NOT shut from 2C43, THEN shut 22 ADV Manual Isolation Valve, 2-MS-104.(a) IF 22 ADV was locally operated, THEN remove the manual override.(b) Verify 22 ADV controller, 2-HC-4056B, at 2C43 is set at 0% output.(c) Align 22 S/G Hand Transfer(c) Align 22 S/G Hand Transfer
 C.3 (continued) b. IF 22 S/G is the most affected S/G, THEN isolate 22 S/G by performing the following actions: Shut 22 ADV using the Hand Transfer Valves on the West wall of the Unit 2 45 ft Switchgear Room as follows: IF 22 ADV was locally operated, THEN remove the manual override. (b) Verify 22 ADV controller, 2-HC-4056B, at 2C43 is set at 0% output. (c) Align 22 S/G Hand Transfer
 b. IF 22 S/G is the most affected S/G, THEN isolate 22 S/G by performing the following actions: (1) Shut 22 ADV using the Hand Transfer Valves on the West wall of the Unit 2 45 ft Switchgear Room as follows: (a) IF 22 ADV was locally operated, THEN remove the manual override. (b) Verify 22 ADV controller, 2-HC-4056B, at 2C43 is set at 0% output. (c) Align 22 S/G Hand Transfer
 THEN isolate 22 S/G by performing the following actions: (1) Shut 22 ADV using the Hand Transfer Valves on the West wall of the Unit 2 45 ft Switchgear Room as follows: (a) IF 22 ADV was locally operated, THEN remove the manual override. (b) Verify 22 ADV controller, 2-HC-4056B, at 2C43 is set at 0% output. (c) Align 22 S/G Hand Transfer
 Transfer Valves on the West wall of the Unit 2 45 ft Switchgear Room as follows: (a) IF 22 ADV was locally operated, THEN remove the manual override. (b) Verify 22 ADV controller, 2-HC-4056B, at 2C43 is set at 0% output. (c) Align 22 S/G Hand Transfer
 operated, THEN remove the manual override. (b) Verify 22 ADV controller, 2-HC-4056B, at 2C43 is set at 0% output. (c) Align 22 S/G Hand Transfer
2-HC-4056B, at 2C43 is set at 0% output. (c) Align 22 S/G Hand Transfer
2):
 2-HV-3938A 2-HV-3938B
(2) Verify 22 MSIV is shut.
(3) Verify 22 SG FW ISOL valve 2-FW-4517-MOV, is shut.
(4) Verify 22 MSIV BYP valve, 2-MS-4052-MOV, is shut.
(5) Shut 22 SG BD valves:
 2-BD-4012-CV 2-BD-4013-CV
(6) Shut 22 SG AFW MAIN STM SUPP & BYP valves, 2-MS-4071-CV and 2-MS-4071A-CV.
(continue)

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APPENDIX (4) CORE AND RCS HEA HR-1: S/G HEAT SINK WITH NO SIS	
RECOVERY ACTIONS	ALTERNATE ACTIONS
C.3.b (continued)	
(7) Shut 22 SG AFW BLOCK valves by placing the handswitches in SHUT:	
 2-AFW-4530-CV 2-AFW-4531-CV 2-AFW-4532-CV 2-AFW-4533-CV 	
(8) Shut the MAIN STM UPSTREAM DRN ISOL VLVS by placing handswitch 2-HS-6622 in CLOSE.	
(9) Observe locally, the S/G Safety Valves are NOT leaking.	
 Verify the most affected S/G was isolated by checking the following: 	4.1 IF the wrong S/G was isolated, THEN perform the following actions:
 S/G pressure lower for the affected S/G RCS loop T cold lower in the affected loop 	<u>CAUTION</u> Severe waterhammer may result if Main Feedwater flow is restored after it has been stopped for greater than 80 minutes.
 S/G level lowering for the affected S/G and stabilized for the unaffected S/G 	a. Restore feeding and steaming capability to the least affected S/G.
	 b. WHEN RCS heat removal has been re-established to the least affected S/G, THEN isolate the most affected S/G PER step C.3.
(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

C. (continued)

NOTE

The temperature of the unaffected S/G may be obtained by using the saturation temperature for existing S/G pressure.

 IF the difference between unaffected S/G temperature and CET temperature exceeds 25° F during the blowdown, THEN cool the unaffected S/G to within 25° F of CET temperature using the unaffected S/G ADV.

NOTE

The remainder of this procedure may be performed while waiting for the S/G to blowdown.

CAUTION

A heatup of the RCS following an excessive cooldown rate can result in a rise in RCS pressure and the potential for pressurized thermal shock.

 WHEN the RCS cooldown due to blowdown of the affected S/G has stopped,

THEN operate the unaffected S/G ADV to stabilize RCS temperatures as follows:

- a. Establish the unaffected S/G temperature within 25° F of the lowest CET temperature during blowdown.
- WHEN unaffected S/G temperature is within 25° F of the lowest CET temperature during blowdown, THEN maintain the following:
 - Unaffected S/G pressure
 approximately constant
 - TCOLD approximately constant

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	PPENDIX (4) CORE AND RCS HEA	
	R-1: S/G HEAT SINK WITH NO SIS	
	RECOVERY ACTIONS	ALTERNATE ACTIONS
D.	DETERMINE IF A LOAF EXISTS.	
1.	Determine if a LOAF has occurred, by considering ANY of the following:	
	Lowering S/G level, S/G low level alarm, Reactor Trip on Low S/G level	
	AFAS actuation on low S/G level	
	"SGFPT TRIP" alarms	
2.	IF indications of a LOAF are NOT observed, THEN PROCEED to Block Step E.	
3.	IF Main and Auxiliary Feedwater are lost to BOTH S/Gs and can NOT be readily restored, THEN verify the following actions have been performed:	
	a. Trip ALL RCPs.	
	b. Shut the SG BD valves:	
3	 2-BD-4010-CV 2-BD-4011-CV 2-BD-4012-CV 2-BD-4013-CV 	
4.	IF, at ANY time, BOTH S/G levels are less than (-)350 inches OR T COLD rises uncontrollably 5° F or greater, THEN IMPLEMENT HR-4,	
	ONCE-THROUGH-COOLING.	
	(continue)	

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APPENDIX (4) CORE AND RCS HE	AT REMOVAL
HR-1: S/G HEAT SINK WITH NO SIS	SOPERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
D. (continued)	
 Maintain AFW PP suction supply AND CST inventory PER ATTACHMENT (8), <u>MAINTAIN AFW PUMP SUCTION</u> <u>SUPPLY AND CST INVENTORY</u>. 	
 IF AFW is available, THEN attempt to establish AFW flow to the S/G(s) which is unaffected by EITHER a SGTR OR an ESDE. 	
a. Establish AFW flowpath to the S/G(s) by placing the handswitches for the unaffected SG AFW BLOCK valves in OPEN:	a.1 IF S/G AFW BLOCK valve(s) will NOT open from the control room, THEN locally open valve(s) using the Hand Transfer Station(s) on North wall of SRW Room.
21 S/G • 2-AFW-4520-CV • 2-AFW-4521-CV • 2-AFW-4522-CV • 2-AFW-4523-CV	
22 S/G • 2-AFW-4530-CV • 2-AFW-4531-CV • 2-AFW-4532-CV • 2-AFW-4533-CV	
(continue)	
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APPENDIX (4) CORE AND RCS HEA	T REMOVAL			
HR-1: S/G HEAT SINK WITH NO SIS	HR-1: S/G HEAT SINK WITH NO SIS OPERATION			
RECOVERY ACTIONS	ALTERNATE ACTIONS			
D.6 (continued)	•			
<u>NOTE</u> The following substeps are alternative methods to establish auxiliary feedwater flow. Each available method can be attempted until auxiliary feed flow is successfully established.				
 b. Establish AFW flow with 23 AFW PP as follows: (1) Shut the SG FLOW CONTR valves: (21 S/G) 2-AFW-4525-CV (22 S/G) 2-AFW-4535-CV 	 b.1 Start 23 AFW PP locally as follows: (1) Shut the SG FLOW CONTR valves: (21 S/G) 2-AFW-4525-CV (22 S/G) 2-AFW-4535-CV (2) Verify 23 AFW PP handswitch is in AUTO. 			
CAUTION The 23 AFW PP flow limit is 575 GPM. (2) Start 23 AFW PP by placing its handswitch in START. (3) Adjust the SG FLOW CONTR valves to approximately 150 GPM per S/G: • (21 S/G) 2-AFW-4525-CV • (22 S/G) 2-AFW-4535-CV	CAUTION The 23 AFW PP flow limit is 575 GPM. (3) Close the AFW PP No. 23 breaker, 152-2415, by pressing the CLOSE button.			
(continue)	(continue)			

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APPENDIX (4) CORE AND RCS HEA	T REMOVAL
HR-1: S/G HEAT SINK WITH NO SIS	OPERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
D.6.b (continued)	D.6.b.1(3) (continued)
 (4) WHEN S/G level response is observed OR continuous feed has been maintained for at least 5 minutes, THEN feed rate may be slowly raised while maintaining the following: Gradual rise in S/G level S/G level trending to between (-)24 and (+)30 inches RCS cooldown rate less than 100° F in any one hour 	CAUTION Removing control power fuses eliminates bus protection from breaker faults, and ground protection for the breaker faults, and ground protection for the breaker. (4) IF the breaker fails to close, THEN, with the approval of the SM/CRS, perform the following actions: (a) Remove the breaker control power fuses. (b) IF necessary, THEN manually charge the breaker closing spring. (c) Press the CLOSE button at AFW PP No. 23 breaker, 152-2415. (d) Ensure normal pump running current less than 70 AMPS. (f) Adjust the SG FLOW CONTR valves to approximately 150 GPMs per S/G: (f) (21 S/G) 2-AFW-4525-CV (f) (21 S/G) 2-AFW-4535-CV
(continue)	(continue)

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APPENDIX (4) CORE AND RCS HEA HR-1: S/G HEAT SINK WITH NO SIS	
RECOVERY ACTIONS	ALTERNATE ACTIONS
D.6.b (continued)	D.6.b.1 (continued)
	 (6) WHEN S/G level response is observed OR continuous feed has been maintained for at least 5 minutes, THEN feed rate may be slowly raised while maintaining the following:
	Gradual rise in S/G level
	 S/G level trending to between (-)24 and (+)30 inches
	RCS cooldown rate less than 100° F in any one hour
c. Establish AFW flow with 21 or 22 AFW PP as follows:	c.1 Start 21 or 22 AFW PP locally as follows:
 (1) Shut the SG FLOW CONTR valves: (21 S/G) 2-AFW-4511-CV 	 (1) Shut the SG FLOW CONTR valves: (21 S/G) 2-AFW-4511-CV (22 S/G) 2-AFW-4512-CV
 (21 3/G) 2-AFW-4511-CV (22 S/G) 2-AFW-4512-CV (2) Verify open 21 and 22 AFW PP 	(2) Turn the turbine governor control knob counterclockwise to the minimum position.
Main Steam Supply Valves: • 2-MS-109 • 2-MS-107	 (3) Isolate the Instrument Air to the Turbine Governor Controller(s) by shutting the following valves;
 (3) Verify open 21 OR 22 AFW PP TURB THROTTLE/STOP valve: 2-MS-3986 2-MS-3988 	<u>21 AFW PP</u> • 2-AFW-3987 I/P A ISOL, 2-1A-512 • 2-AFW-3987 I/P B ISOL,
	2-IA-511 <u>22 AFW PP</u>
	 2-AFW-3989 I/P A ISOL, 2-IA-509 2-AFW-3989 I/P B ISOL, 2-IA-510
(continue)	(continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

D.6.c (continued)

CAUTION

An unmonitored radiation release could occur if the AFW Steam Supply Bypass Valve from a S/G affected by a SGTR is opened.

- (4) Open the SG AFW MAIN STM SUPP & BYP valves from a S/G NOT affected by a SGTR:
 - (21 S/G)2-MS-4070-CV, 2-MS-4070A-CV
 - (22 S/G)2-MS-4071-CV, 2-MS-4071A-CV

WARNING

The use of N₂ to operate AFW may result in the depletion of oxygen levels in some rooms due to system venting.

- (5) IF a loss of ALL Vital 4KV busses has occurred, THEN align Liquid N2 System to supply SG FLOW CONTR valves by opening the following valves located in SRW Room:
 - N2 SUPPLY TO U-2 AFW AMP AIR SYS B/U ISOLATION VALVE, 0-N2-107
 - AFW AMPLIFIER AIR SYSTEM N2 BACKUP SUPPLY VALVE, 2-IA-390

D.6.c.1 (continued)

- (4) Open the air filter drains on controllers to allow local control.
- (5) Verify open 21 and 22 AFW PP Main Steam Supply Valves:
 - 2-MS-109
 - 2-MS-107
- (6) Verify open 21 OR 22 AFW PP TURB THROTTLE/STOP valve:
 - 2-MS-3986
 - 2-MS-3988

CAUTION

An unmonitored radiation release could occur if the AFW Steam Supply Bypass Valve from a S/G affected by a SGTR is opened.

- (7) Open the AFW Steam Supply Bypass Valves from a S/G NOT affected by a SGTR:
 - 2-MS-102
 - 2-MS-105
- (8) Adjust and maintain the turbine driven discharge header pressure at least 100 PSI greater than S/G pressure using the local turbine governor control knob.

(continue)

(continue)

		EOP-8 Rev 28/Unit 2
)IX (4) CORE AND RCS HEA	Page 51 of 206
	IG HEAT SINK WITH NO SIS	
<u> </u>	RECOVERY ACTIONS	ALTERNATE ACTIONS
D.6.c (conl	inued)	D.6.c.1 (continued)
	 IF a loss of ALL Vital 4KV busses has occurred, THEN assign an operator to control AFW discharge pressure locally as follows: (a) Establish communications between the operator and the control room. (b) Isolate the Instrument Air to the Turbine Governor Controller(s) by shutting the following valves: 21 AFW PP 2-AFW-3987 I/P A ISOL, 2-IA-512 2-AFW-3987 I/P B ISOL, 2-IA-511 22 AFW PP 2-AFW-3989 I/P B ISOL, 2-IA-509 2-AFW-3989 I/P B ISOL, 2-IA-510 (c) Adjust 21 or 22 AFW PP governor control knob to maintain discharge pressure at least 100 PSI greater than S/G pressure. Adjust and maintain the turbine driven discharge header pressure at least 100 PSI greater than S/G pressure. (21 AFW PP SPEED CONTR) 2-HC-3989A (continue) 	 (9) Adjust the SG FLOW CONTR valves to approximately 150 GPM per S/G: (21 S/G) 2-AFW-4511-CV (22 S/G) 2-AFW-4512-CV (10) WHEN S/G level response is observed OR continuous feed has been maintained for at least 5 minutes, THEN feed rate may be slowly raised while maintaining the following: Gradual rise in S/G level S/G level trending to between (-)24 and (+)30 inches RCS cooldown rate less than 100° F in any one hour (11) Operate AFW ventilation as necessary to maintain temperature less than 130° F.

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APPEN	DIX (4) CORE AND RCS HEA	T REMOVAL
HR-1: S	G HEAT SINK WITH NO SIS	OPERATION
1	RECOVERY ACTIONS	ALTERNATE ACTIONS
D.6.c (cont	inued)	
(8)	Adjust the SG FLOW CONTR valves to approximately 150 GPM per S/G:	
	 (21 S/G) 2-AFW-4511-CV (22 S/G) 2-AFW-4512-CV 	
(9)	WHEN S/G level response is observed OR continuous feed has been maintained for at least 5 minutes, THEN feed rate may be slowly raised while maintaining the following:	
	Gradual rise in S/G level	
	 S/G level trending to between (-)24 and (+)30 inches 	
	RCS cooldown rate less than 100° F in any one hour	
(10)	Operate AFW ventilation as necessary to maintain temperature less than 130° F.	
	(continue)	

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EOP-8 Rev 28/Unit 2 Page 53 of 206 **APPENDIX (4) CORE AND RCS HEAT REMOVAL** HR-1: S/G HEAT SINK WITH NO SIS OPERATION **RECOVERY ACTIONS ALTERNATE ACTIONS** D.6 (continued) d. Establish AFW flow with 13 AFW PP as follows: (1) Shut the Unit 1 Motor Train S/G AFW BLOCK valves by placing the handswitches in SHUT: 11 S/G 1-AFW-4522-CV 1-AFW-4523-CV 12 S/G • 1-AFW-4532-CV • 1-AFW-4533-CV (2) Open the U-1 TO U-2 XCONN valve, 1-AFW-4550-CV. (3) Establish AFW flow with 13 AFW PP as follows: (a) Shut the Unit 2 SG FLOW . CONTR valves: • (21 S/G) 2-AFW-4525-CV (22 S/G) • 2-AFW-4535-CV CAUTION The 13 AFW PP flow limit is 575 GPM. (b) Start 13 AFW PP by placing its handswitch in START. (continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION

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RECOVERY ACTIONS

ALTERNATE ACTIONS

D.6.d(3) (continued)

- (c) Adjust the Unit 2 SG FLOW CONTR valves to approximately 150 GPM per S/G:
 - (21 S/G) 2-AFW-4525-CV
 - (22 S/G)
 2-AFW-4535-CV
- (4) WHEN S/G level response is observed OR continuous feed has been maintained for at least 5 minutes, THEN feed rate may be slowly raised while maintaining the following:
 - Gradual rise in S/G level
 - S/G level trending to between (-)24 and (+)30 inches
 - RCS cooldown rate less than 100° F in any one hour

(continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION

RECOVERY ACTIONS

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ALTERNATE ACTIONS

D. (continued) 7. IF Booster Pump Injection is available, THEN attempt to establish flow to the S/G(s) which is unaffected by EITHER a SGTR OR an ESDE. a. IF an ESDE has NOT occurred. THEN block SGIS as follows: WHEN the "SGIS A BLOCK PERMITTED" alarm is received, THEN block SGIS A. WHEN the *SGIS B BLOCK PERMITTED* alarm is received, THEN block SGIS B. b. IF SGIS has actuated AND indications of an ESDE are NOT observed. THEN reset SGIS as follows: (1) Place the CBPs in PULL TO LOCK. (2) Match handswitch positions PER ATTACHMENT (7), SGIS VERIFICATION CHECKLIST. (3) Block SGIS. (4) Reset the SGIS signal. (5) Open the MSIV(s). (6) Open the SG FW ISOL valve(s): 2-FW-4516-MOV 2-FW-4517-MOV (7) Start a CBP. (continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

D.7 (continued) CAUTION **RCS temperature must be closely** monitored to avoid a cooldown greater than Technical Specification Limits. c. Commence a rapid RCS cooldown to c.1 IF subcooling exceeds 140° F. T COLD less than 465° F using the THEN depressurize the RCS PER the TURB BYP valves OR ADVs, while selected Pressure and Inventory Control maintaining the following: success path. Cooldown less than 100° F in any one hour Subcooling between 25 and 140° F based on CET temperatures Pressurizer level between 50 and 180 inches d. Shut the MAIN SG FW REG valves. e. Shift the SG FW REG BYPASS controllers to Manual. f. Verify the operating SGFPT SPD BIAS ADJ is less than or equal to 5.0. a. Depress the SG FRV BYP RESET buttons. h. Manually adjust the SG FW REG BYPASS valve controllers to 0%. i. Open the SG FW ISOL valves: (21 S/G) 2-FW-4516-MOV (22 S/G) 2-FW-4517-MOV j. Open the PRECOAT SYS BYP valve, 2-CD-5818-CV. k. Open the COND DEMIN BYP valve, 2-CD-4439-MOV. (continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

D.7 (continued)	
 Verify at least ONE COND PP is running. 	
m. Verify ONE CBP is running.	
n. Place BOTH HDT PP Handswitches in PULL TO LOCK.	
<u>NOTE</u> Feedwater flow to S/Gs should start when RCS cooldown has resulted in the S/G pressures dropping to less than the Condensate Booster Pump shut-off head of approximately 500 PSIA.	
<u>CAUTION</u> Rapid or uncontrolled restoration of Main Feedwater may cause a severe waterhammer.	
 Throttle open the SG FW REG BYPASS valve to establish a flow of 100 to 160 GPM PER ATTACHMENT(18), <u>MAIN</u> FEEDWATER GOOSENECK PURGE FLOW. 	
 P. WHEN continuous feed has been maintained for at least 10 minutes, THEN feed rate may be slowly raised while maintaining the following: 	
Gradual rise in S/G level	
 S/G level trending to between (-)24 and (+)30 inches 	
 RCS cooldown rate less than 100° F in any one hour 	
(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION

RECOVERY ACTIONS

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ALTERNATE ACTIONS

D. (continued) 8. IF Main Feedwater is available, THEN attempt to establish Main Feed flow to the S/G(s) which is unaffected by EITHER a SGTR OR an ESDE. a. Shut the MAIN SG FW REG valves. b. Verify the operating SGFPT SPD BIAS ADJ is less than or equal to 5.0. c. Depress the SG FRV BYP RESET buttons. d. Manually adjust the SG FW REG BYPASS valve controllers to 0%. e. Open the SG FW ISOL valves: • (21 S/G) 2-FW-4516-MOV (22 S/G) 2-FW-4517-MOV (continue)

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APPENDIX (4) CORE AND RCS HE	
HR-1: S/G HEAT SINK WITH NO SI	SUPERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
D.8 (continued)	
f. IF at least ONE SGFP is NOT operating, THEN, with the approval of the SM/CRS, attempt to start a SGFP.	
(1) Verify shut the HP and LP Stop Valves.	
(2) Check the DEMAND MIN indicator is illuminated at the OCS.	(2).1 IF the DEMAND MIN indicator is NOT illuminated, THEN depress the down arrow until the DEMAND MIN indicator illuminates.
(3) Reset the SGFP Vacuum Trip AND Turbine Trip.	
(4) Open the HP and LP Stop Valves.	
(5) Depress the DIRECT GOVNR VLV pushbutton at the OCS.	
(6) Raise the speed of the SGFP, until the discharge pressure is sufficient to feed the SGs, by depressing the "up" SPEED arrow at the OCS.	
<u>CAUTION</u> Rapid or uncontrolled restoration of Main Feedwater may cause a severe waterhammer.	
g. Throttle open the SG FW REG BYPASS valve to establish a flow of 100 to 160 GPM PER ATTACHMENT(18), <u>MAIN</u> FEEDWATER GOOSENECK PURGE FLOW.	
(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION

RECOVERY ACTIONS

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ALTERNATE ACTIONS

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D.	8 (continued)	
	 WHEN continuous feed has been maintained for at least 10 minutes, THEN feed rate may be slowly raised while maintaining the following: 	
	Gradual rise in S/G level	
	 S/G level trending to between (-)24 and (+)30 inches 	
ľ	 RCS cooldown rate less than 100° F in any one hour 	
F		
E.	VERIFY CORE AND RCS HEAT REMOVAL HAS BEEN ESTABLISHED.	
1.	Ensure the TBVs OR ADVs are controlling T cold less than 535° F.	
2.	Ensure adequate RCS heat removal with at least ONE S/G by observing BOTH of the following conditions exist:	2.1 IF, at ANY time, BOTH S/G levels are less than (-)350 inches OR T coup rises uncontrollably 5° F or greater
	 At least ONE S/G level is greater than (-)350 inches 	greater, THEN IMPLEMENT HR-4, ONCE-THROUGH-COOLING.
	• T coud is stable or lowering	
3.	Maintain AFW PP suction supply AND CST inventory PER ATTACHMENT (8), <u>MAINTAIN AFW PUMP SUCTION</u> SUPPLY AND CST INVENTORY.	
	(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

E. (continued) 4. IF AFW is feeding the least affected S/G(s), THEN perform the following: a. Ensure feed flow is restoring S/G level to between (-)24 and (+)30 inches and RCS cooldown does NOT exceed 100° F in any one hour. 5. IF Booster Pump Injection is feeding the least affected S/G(s), THEN perform the following: a. Ensure feed flow is restoring S/G level to between (-)24 and (+)30 inches and RCS cooldown does NOT exceed 100° F in any one hour. b. Adjust the SG FW REG BYPASS valves to establish S/G levels at approximately 0 inches. c. WHEN S/G levels are at approximately 0 inches, THEN shift SG FW REG BYPASS controllers to Auto. (continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION

RECOVERY ACTIONS ALTERNATE ACTIONS E. (continued) 6. IF Main Feedwater is feeding the least affected S/G(s), THEN perform the following: a. Establish a shutdown feed system lineup as follows: ONE operating SGFP ONE operating CBP TWO operating COND PPs **BOTH HDT PPs secured** b. Ensure feed flow is restoring S/G level to between (-)24 and (+)30 inches and RCS cooldown does NOT exceed 100° F in any one hour. c. WHEN manual control of feed flow is desired OR S/G level is between (-)24 and (+)30 inches, THEN perform the following actions: (1) Shift the SG FW REG BYPASS controllers to Manual. (2) Verify the operating SGFPT SPD BIAS ADJ is less than or equal to 5.0. (3) Depress the S/G FRV BYP **RESET** buttons. (4) Adjust the SG FW REG BYPASS valves to establish S/G levels at approximately 0 inches. d. WHEN S/G levels are at approximately 0 inches, THEN shift SG FW REG BYPASS controllers to Auto. (continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL			
HR-1: S/G HEAT SINK WITH NO SIS OPERATION			
RECOVERY ACTIONS	ALTERNATE ACTIONS		
E. (continued)			
 IF the Main Feedwater System is NOT to be used to feed a S/G, THEN secure the Main Feed system. 			
a. Trip the SGFPs.			
b. Place the CBPs in PULL TO LOCK.			
c. Place TWO COND PPs in PULL TO LOCK.			
d. Place the HDT PPs in PULL TO LOCK.			
e. Shut SG FW ISOL valve:			
 2-FW-4516-MOV 2-FW-4517-MOV 			
f. Shut the CNDSR HOTWELL M/U & DUMP CONTR CV by shifting 2-LIC-4405 to MANUAL with 50% output.			
g. IF NO COND PPs are operating, THEN protect against blowdown related waterhammer.			
(1) Verify the SG BD valves are shut:			
 2-BD-4010-CV 2-BD-4011-CV 2-BD-4012-CV 2-BD-4012-CV 2-BD-4013-CV 			
<u>NOTE</u> 2-CD-333 is located 27 foot southeast of 23 Condenser. 2-CD-334 is located 12 foot west of 21 CBP.			
(2) Shut the 21 B/D RECV HX valves:			
 2-CD-333 2-CD-334 			

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION				
	F	RECOVERY ACTIONS	ALTERNAT	E ACTIONS
-	SECU	RE RCS BORATION.		**************************************
	complet THEN s	shift the charging pump suction to a oric acid concentration source as		
	THE	oration was from the BASTs, EN secure boration as follows:	. •	
	(1)	Open VCT OUT valve, 2-CVC-501-MOV.		
	• •	Stop BA PP(s).		
	(3)	Shut BA DIRECT M/U valve, 2-CVC-514-MOV.		
	(4)	Shut BAST GRAVITY FD valves:		
		2-CVC-508-MOV 2-CVC-509-MOV		
		oration was from a RWT, EN secure boration as follows:		
	(1)	Open VCT OUT valve, 2-CVC-501-MOV.		
	(2)	Shut RWT CHG PP SUCT valve, 2-CVC-504-MOV.	•	
	01-2	um makeup to the VCT PER 2B, <u>BORATION, DILUTION</u> 2 <u>MAKEUP</u> .		
	mak	ure boric acid concentration in teup water is adequate to maintain uired shutdown margin.		

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APPENDIX (4) CORE AND RCS HEAT REMOVAL				
HR-1: S/G	HEAT SINK WITH NO S	IS OPERATION		
<u>RE</u>	COVERY ACTIONS	ALTERNATE ACTIONS		
G. EVALUA CIRCUL	ATE RESTORING FORCED ATION.			
THEN eva	Ps are NOT operating, aluate the need and desirability ing RCPs based on the following:			
 Verify the R(electrical power is available to CPs			
• M0	CP BUS CC-215 (ALL RCPs) CC-205 (21A/21B RCP)			
	uacy of RCS and Core Heat oval using natural circulation			
	ng RCS pressure and eratures			
	Controlled Bleed-off eratures			
• The ca Auxilia S/G	apability to supply Main OR ary Feedwater to at least ONE			
water	ossibility of dilute pockets of in the RCS due to flow ation in the affected loop			
loop	t ONE RCP is operating in each			
	operation is NOT desired, NOCEED to step H.			
	is less than 306° F, IOCEED to step H.			
	(continue)			

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

G. (continued)

- IF RCPs have been exposed to excessive moisture, THEN consider meggering the RCP motors.
- IF Component Cooling has been isolated to Containment, THEN restore cooling flow PER CE-2, <u>CONTAINMENT ISOLATION</u>, OR CE-3, <u>CONTAINMENT SPRAY</u>.

CAUTION

If a RCP Controlled Bleed-off temperature exceeds 250° F, the affected seal must be rebuilt before the RCP can be operated. Do NOT restart ANY RCP whose Controlled Bleed-off temperature has exceeded 250° F.

- Check Controlled Bleed-off temperatures for the RCPs to be restarted have NOT exceeded 250° F.
- Verify RCP Controlled Bleed-off temperatures are less than 200° F or are lowering.
- 8. Restore Pressurizer level to between 155 and 180 inches.

(continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION

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RECOVERY ACTIONS

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ALTERNATE ACTIONS

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G.	(CO	ntinued)		
9.		rify the RCP restart criteria are met by L of the following:		
	٠	Electrical power is available to the RCPs		
	•	22/12 SERV BUS VOLTS is less than 14.8 KV		
	•	4KV Vital Bus voltage is greater than 4100 volts		
	•	RCP Controlled Bleed-off temperatures are less than 200° F		
	٠	RCS subcooling is greater than 25° F based on CET temperatures	Ì	
	•	At least ONE S/G available for heat removal		
		 S/G level greater than (-)170 inches capable of being supplied with feedwater capable of being steamed 		
	٠	Pressurizer level is greater than 155 inches and NOT lowering		
	•	T COLD is less than 525° F]	
	•	RCS temperature and pressure are greater than the minimum operating limits PER ATTACHMENT (1), <u>RCS</u> <u>PRESSURE TEMPERATURE LIMITS</u> , for the pumps to be started		
		(continue)		

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

G. (continued)

CAUTION Starting an RCP may cause the following:

- A pressurizer level transient
- A high pressure transient if an RCP is started in a loop in which NO S/G is available for heat removal
- Initiation of SIAS if RCS pressure is greater than the SIAS pressurizer pressure setpoint
- A reactivity excursion due to dilute pockets of water, if an RCP is restarted in the affected loop, OR boration is NOT complete prior to restarting an RCP in the unaffected loop
- 10. WHEN RCP restart is desired AND the RCP restart criteria are met, THEN start ONE RCP in a loop with an operating S/G as follows:
 - a. IF a SGTR has been diagnosed, AND the RCS pressure has dropped below the affected S/G pressure, OR the level in the affected S/G has lowered after isolation, THEN verify RCS boration is complete.
 - b. Verify the RCP CBO INBD and OUTBD ISOL valves are open:
 - 2-CVC-505-CV
 - 2-CVC-506-CV
 - c. Verify the "CCW FLOW LO" alarm is clear.
 - d. Start the associated OIL LIFT PP.
 - e. Verify the *OIL LIFT PP PRESS LO* alarm is cleared.

(continue)

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APPENDIX (4) CORE AND RCS HEA	T REMOVAL	
HR-1: \$/G HEAT SINK WITH NO SIS OPERATION		
RECOVERY ACTIONS	ALTERNATE ACTIONS	
G.10 (continued)		
f. Operate the OIL LIFT PP for at least 60 seconds.		
g. Insert the RCP sync stick.		
 h. Verify the synchroscope on panel 1C19 is NOT rotating. 		
i. Start the RCP.		
 J. Verify the RCP(s) are NOT cavitating by observing running current is steady. 		
11. Operate Charging and Letdown, or HPSI to restore and maintain pressurizer level between 101 and 180 inches.		
12. Monitor RCP seal parameters following pump restart.		
 Allow backflow to equalize temperatures in the opposite loop. 		
(continue)		

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

G. (continued)

- 14. Start a second RCP in the opposite loop:
 - a. IF the Reactor Coolant Pump Breaker CLOSE CIR fuses have been removed. THEN replace the CLOSE CIR fuses on the selected Reactor Coolant Pump Breaker.

 - 21A RCP 252-21P01 ٠ 21A RCP 252-21P02
 - 21B RCP 252-23P01
 - 21B RCP 252-23P02 •
 - 22A RCP 252-22P01 .
 - 22A RCP 252-22P02 22B RCP 252-24P01
 - •
 - 22B RCP 252-24P02
 - b. Ensure RCP NPSH requirements are maintained PER ATTACHMENT (1), RCS PRESSURE TEMPERATURE LIMITS.
 - c. Start RCP PER step G.10 above.
 - d. Monitor RCP seal parameters following pump restart.

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APPENDIX (4) CORE AND RCS HEAT REMOVAL			
HR-1: S/G HEAT SINK WITH NO SIS	OPERATION		
RECOVERY ACTIONS	ALTERNATE ACTIONS		
H. CONTROL CORE AND RCS VOIDING.			
NOTE			
Core and RCS voiding may be indicated by			
the following:			
Letdown flow greater than charging flow			
 Rapid unexplained rise in pressurizer level during an RCS pressure reduction 			
 Loss of subcooled margin as determined using CET temperatures 			
"RXV WTR LVL LO" alarm			
 IF voiding causes difficulty in depressurization, 			
THEN reduce or eliminate the voided area by performing the following actions:			
a. Shut the L/D CNTMT ISOL valves:			
 2-CVC-515-CV 2-CVC-516-CV 			
b. Stop depressurizing the RCS.			
(continue)			
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EOP-8 Rev 28/Unit 2 Page 72 of 206 **APPENDIX (4) CORE AND RCS HEAT REMOVAL** HR-1: S/G HEAT SINK WITH NO SIS OPERATION **RECOVERY ACTIONS ALTERNATE ACTIONS** H.1 (continued) CAUTION The potential exists for pressurized thermal shock from an excessive cooldown rate followed by a repressurization. c. Cycle RCS subcooling between 25 c.1 IF cycling RCS subcooling is ineffective, THEN operate RXV VENT valves PER and 140° F as follows: the VENTING THE REACTOR (1) Raise RCS subcooling to as near **COOLANT SYSTEM AFTER AN** 140° F as practical by ANY of the ACCIDENT section of OI-1G. following methods: NOTE Pressurizer Backup Heater Banks 21 and 23 trip on U/V and SIAS. Energize the Pressurizer HTR(s) Secure Pressurizer SPRAY Raise RCS cooldown rate while maintaining cooldown less than 100° F in any one hour IF HPSI flow has been reduced. THEN raise HPSI flow by opening HPSI HDR valves which have been throttled, **OR** starting HPSI PPs which have been stopped. (continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION **RECOVERY ACTIONS** ALTERNATE ACTIONS H.1.c (continued) (2) Lower RCS subcooling to as near 25° F as practical by ANY of the following methods: De-energize the Pressurizer • HTR(s) Operate Pressurizer SPRAY Secure RCS cooldown IF HPSI throttle criteria are met. THEN throttle the HPSI HDR valves, **OR** stop the HPSI PPs one at a time (3) Repeat steps H.1.c.(1) through H.1.c.(2) as necessary. NOTE Voids may form in the S/G Tubes if saturation pressure of a S/G is greater than saturation pressure of RCS. CAUTION If voids exist in the S/G Tubes, a rapid RCS pressure reduction will occur when the voids collapse. d. IF voiding is suspected in the S/G tubes. THEN cool the S/G so RCS cooldown rate remains less than 100° F in any one hour by raising ANY of the following: Steaming rate Feed rate S/G Blowdown rate (continue)

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APPENDIX (4) CORE AND RCS HEAT	_	
HR-1: S/G HEAT SINK WITH NO SIS OPERATION		
RECOVERY ACTIONS	ALTERNATE ACTIONS	
H.1 (continued)		
e. Monitor Pressurizer level and Reactor Vessel level for inventory trends.		
I. PERFORM LOW TEMPERATURE ACTIONS.		
1. IF Main Feedwater is in operation AND high Feedwater pressure is causing level control problems, THEN secure pumps as required:		
SGFPCBP		
 WHEN RCS temperature is less than 350° F, THEN verify that NO more than TWO RCPs are in operation. 		
(continue)		

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APPENDIX (4) CORE AND RCS HEAT REMOVAL				
HR-1: S/G HEAT SINK WITH NO SIS	S OPERATION			
RECOVERY ACTIONS	ALTERNATE ACTIONS			
I. (continued)				
I. (continued) <u>NOTE</u> If a T COLD misimatch exists between loops, actions should be performed based on the lowest operating loop indication. 3. WHEN T COLD is less than 325° F, THEN establish LTOP control by performing the following: a. Place ALL HPSI PPs in PULL TO LOCK. b. Shut ALL HPSI HDR valves and place their handswitches in PULL-TO-OVERRIDE: MAIN 2-SI-616-MOV 2-SI-636-MOV 2-SI-636-MOV 2-SI-636-MOV 2-SI-636-MOV 2-SI-637-MOV 2-SI-647-MOV 2-SI-647-MOV 2-SI-647-MOV 3-S	 3.1 IF HPSI LTOP control can NOT be established, THEN operate MAIN SPRAY, AUX SPRAY or PZR VENT valves to maintain the following: RCS subcooling above 25° F based on CET temperatures RCS pressure PER ATTACHMENT (1), RCS PRESSURE TEMPERATURE LIMITS 			
(continue)				

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

I. (continued)

<u>CAUTION</u> PORVs must be in MPT ENABLE before T coud is less than 301° F.

- 4. WHEN T COLD is less than 306° F, THEN establish MPT protection as follows:
 - a. Verify the PORV BLOCK valves are OPEN:
 - 2-RC-403-MOV
 - 2-RC-405-MOV
 - b. Verify PZR LO RANGE PRESS, 2-PI-103 is less than VLTOP PORV SETPOINT, 2-ZI-103.
 - c. Verify PZR LO RANGE PRESS, 2-PI-103-1 is less than VLTOP PORV SETPOINT, 2-ZI-103-1.

CAUTION

PORVs will open if they are placed in SINGLE MPT ENABLE and PZR Pressure is greater than 406 PSIA.

- d. Place the MPT PROT handswitches in VARIABLE MPT ENABLE:
 - 2-HS-1406
 - 2-HS-1408
- e. Verify the PORV OVERRIDE handswitches in the AUTO position:
 - 2-HS-1402
 - 2-HS-1404

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(continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-1: S/G HEAT SINK WITH NO SIS OPERATION

RECOVERY ACTIONS

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ALTERNATE ACTIONS

I. (continued) 5. WHEN RCS temperature is less than 300° F AND RCS pressure is less than 300 PSIA, THEN perform the following actions: NOTE Cavity Cooling and CEDM Cooling aid in cooling Reactor Vessel Head if a void exists. a. Verify ONE CAV CLG and ONE CEDM CLG fan running if available. b. Close SIT OUT breakers: (2-SI-614-MOV) 52-21442 • (2-SI-624-MOV) 52-21443 (2-SI-634-MOV) 52-20442 • • (2-SI-644-MOV) 52-20443 c. Shut SIT OUT valves: 2-SI-614-MOV 2-SI-624-MOV 2-SI-634-MOV 2-SI-644-MOV (continue)

APPENDIX (4) CORE AND RCS HEAT	REMOVAL
HR-1: S/G HEAT SINK WITH NO SIS O	PERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
1.5 (continued)	
 d. IF Auxiliary Feedwater is NOT being used to feed the S/Gs, THEN perform the following actions: 	
(1) Shut the SG AFW BLOCK values by placing the handswitches in SHUT:	
21 S/G 2-AFW-4520-CV 2-AFW-4521-CV 2-AFW-4522-CV 2-AFW-4523-CV	
22 S/G • 2-AFW-4530-CV • 2-AFW-4531-CV • 2-AFW-4532-CV • 2-AFW-4533-CV	
(2) Place 23 AFW PP in PULL TO LOCK.	
(3) Verify shut SG AFW MAIN STM SUPP & BYP valves:	
 (21 SG)2-MS-4070-CV, 2-MS-4070A-CV (22 SG)2-MS-4071-CV, 2-MS-4071A-CV 	

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A	APPENDIX (4) CORE AND RCS HEAT REMOVAL				
	R-1: S/G HEAT SINK WITH NO SIS				
	RECOVERY ACTIONS	ALTERNATE ACTIONS			
J.	ACCEPTANCE CRITERIA FOR SUCCESS PATH HR-1.				
1.	Check Core and RCS Heat Removal is satisfied by the following indications:	1.1 IF Core and RCS Heat Removal has NOT been satisfied, THEN PROCEED to the next			
	 At least ONE S/G has level between (-)24 and (+)30 inches OR S/G level is being restored by feedwater flow 	appropriate Core and RCS Heat Removal Success Path.			
	 IF RCPs are operating, THEN T нот minus T coub is less than 10° F 				
	IF RCPs are NOT operating, THEN THOT minus T COLD is less than 50° F				
	 RCS subcooling greater than 25° F based on CET temperatures 				
	 Reactor Vessel level above the top of the hot leg 				
2.	IF Core and RCS Heat Removal has been established, THEN PROCEED to the next Safety Function to be satisfied.				
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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION **RECOVERY ACTIONS** ALTERNATE ACTIONS A. ESTABLISH CORE AND RCS HEAT **REMOVAL WITH SIS OPERATION.** 1. IF 500KV offsite power has been lost, THEN protect the condenser from overpressure and minimize S/G inventory loss. a. Shut BOTH MSIVs. b. Shut the SG BD valves: 2-BD-4010-CV 2-BD-4011-CV • 2-BD-4012-CV • 2-BD-4013-CV 2. IF, at ANY time, Main and Auxiliary Feedwater are lost to BOTH S/Gs and can NOT be readily restored, THEN perform the following actions: a. Trip ALL RCPs. b. Shut the SG BD valves: 2-BD-4010-CV 2-BD-4011-CV 2-BD-4012-CV • 2-BD-4013-CV 3. IF, at ANY time, BOTH S/G levels are less than (-)350 inches OR T COLD rises uncontrollably 5° F or greater, THEN IMPLEMENT HR-4, ONCE-THROUGH-COOLING. (continue)

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APPENDIX (4) CORE AND RCS HEA	
HR-2: S/G HEAT SINK WITH SIS OP	
RECOVERY ACTIONS	ALTERNATE ACTIONS
A. (continued)	
 IF pressurizer pressure is less than or equal to 1725 PSIA OR containment pressure is greater than or equal to 2.8 PSIG, THEN verify SIAS actuation. IF pressurizer pressure is greater than 1725 PSIA AND containment pressure is less than 2.8 PSIG, THEN perform the following actions to block SIAS: Open HPSI MAIN and AUX HDR valves: MAIN 	
e. WHEN the "PZR PRESS BLOCK B PERMITTED" alarm is received, THEN block SIAS B.	
(continue)	

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APPENDIX (4) CORE AND RCS HEAT	T REMOVAL
HR-2: S/G HEAT SINK WITH SIS OPE	ERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
A.5 (continued)	
f. WHEN pressure is below 1270 PSIA, THEN verify appropriate HPSI flow PER ATTACHMENT(10), <u>HIGH</u> <u>PRESSURE SAFETY INJECTION</u> <u>FLOW</u> .	
6. IF SIAS has actuated, THEN perform the following actions:	
a. Verify the following pumps are running:	
21 HPSI PP23 HPSI PP	
21 LPSI PP 22 LPSI PP	
ALL available CHG PPs	
(continue)	

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APPENDIX (4) CORE AND RCS HEA	TREMOVAL
HR-2: S/G HEAT SINK WITH SIS OP	
	LIVITION
RECOVERY ACTIONS	ALTERNATE ACTIONS
A.6 (continued)	
b. Verify safety injection flow:	b.1 Perform the following actions as necessary:
HPSI flow PER ATTACHMENT(10), <u>HIGH</u> <u>PRESSURE SAFETY INJECTION</u> <u>FLOW</u> , when pressure is below 1270 PSIA	<u>CAUTION</u> Operation of two HPSI Pumps on 24 4KV Bus may cause 2B DG loading to exceed 3600 KW.
LPSI flow PER ATTACHMENT(11), LOW <u>PRESSURE SAFETY INJECTION</u> <u>FLOW</u> , when pressure is below 185 PSIA	 IF 21 HPSI PP failed, THEN perform the following actions: (1) IF 2B DG is powering 24 4KV Bus, THEN verify DG load is less than 2960 KW. (2) Start 22 HPSI PP. IF 23 HPSI PP failed,
	 THEN align 22 HPSI PP as follows: (1) Start 22 HPSI PP. (2) Open HPSI HDR XCONN valve, 2-SI-653-MOV. (3) Shut HPSI HDR XCONN valve,
	 (3) Shart HPST HDR ACONN valve, 2-SI-655-MOV. Ensure electrical power is available to valves and pumps. Verify safety injection system lineup PER ATTACHMENT (2), <u>SIAS</u> <u>VERIFICATION CHECKLIST</u>.
(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

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A. (continued) 7. IF high RCS pressure is preventing adequate SIS flow to support heat removal. THEN attempt to depressurize the RCS to obtain adequate SIS flow by concurrently performing actions PER the following: **RCS Pressure And Inventory Control** success paths as necessary The selected Core And RCS Heat • Removal success path 8. IF at least ONE 4KV Vital Bus is energized, THEN commence RCS boration as follows: a. Verify the normal charging flowpath is a.1 IF the normal charging path is NOT available for RCS makeup with at least available, ONE LOOP CHG valve open: THEN establish charging flowpath to the RCS via the HPSI AUX HDR as follows: 2-CVC-518-CV 2-CVC-519-CV (1) Shut HPSI AUX HDR ISOL valve, 2-SI-656-MOV. (2) Open ONE of the HPSI AUX HDR valves: 2-SI-617-MOV 2-SI-627-MOV 2-SI-637-MOV 2-SI-647-MOV (3) Open SI TO CHG HDR valve, 2-CVC-269-MOV. (4) Shut REGEN HX CHG INLET valve, 2-CVC-183, located in the 27 ft West Penetration Room. (continue) (continue)

EOP-8 Rev 28/Unit 2 Page 85 of 206 APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION **RECOVERY ACTIONS ALTERNATE ACTIONS** A.8.a (continued) A.8.a.1 (continued) (5) Shut L/D CNTMT ISOL valves: 2-CVC-515-CV 2-CVC-516-CV a.2 IF a charging flowpath can NOT be established via the HPSI AUX HDR. THEN perform the following: (1) Verify REGEN HX CHG INLET valve, 2-CVC-183, is open. (2) Charge through the Loop Charging valves Bypass Valve, 2-CVC-188. b. Verify RCS boration from the BAST b.1 IF BAST is NOT available, using the CVCS is in progress as THEN align charging pumps to take a suction from the RWT as follows: follows: (1) BAST levels remain greater than (1) Ensure RWT level is greater than 10 inches. 2 feet. (2) VCT M/U valve, 2-CVC-512-CV, (2) Open RWT CHG PP SUCT valve, 2-CVC-504-MOV. is shut. (3) BA DIRECT M/U valve, (3) Shut VCT OUT valve. 2-CVC-501-MOV. 2-CVC-514-MOV, is open. (4) BAST GRAVITY FD valves, are (4) Start ALL available CHG PPs. open: (5) Ensure CHG HDR PRESS is 2-CVC-508-MOV greater than RCS pressure. . 2-CVC-509-MOV (5) Verify the M/U MODE SEL SW, 2-HS-210, is in MANUAL. (6) ALL available BA PPs, are running. (7) VCT OUT valve, 2-CVC-501-MOV, is shut. (continue)

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APPENDIX (4) CORE AND RCS HEA	TREMOVAL
HR-2: S/G HEAT SINK WITH SIS OP	
RECOVERY ACTIONS	ALTERNATE ACTIONS
A.8.b (continued)	···· •••••••••••••••••••••••••••••••••
(8) ALL available CHG PPs are running.	
(9) Ensure CHG HDR PRESS is greater than RCS pressure.	
c. Record the time RCS boration was commenced:	
d. Record BAST levels:	
21 BAST: 22 BAST:	
<u>CAUTION</u> To prevent boric acid precipitation, do NOT continue boration for greater than the following:	
 134 inches from the BAST 60 minutes if THREE CHG PPs are operating 90 minutes if TWO CHG PPs are operating 180 minutes if ONE CHG PP is operating 	
e. Continue boration until ONE of the following conditions is met:	
(1) 116 percent of the shutdown margin requirement has been achieved PER the NEOPs.	
(2) BAST level has been lowered a total of 108 inches.	
(continue)	
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APPENDIX (4) CORE AND RCS HEA		
HR-2: S/G HEAT SINK WITH SIS OF	-ERATION	
RECOVERY ACTIONS	ALTERNATE ACTIONS	
A.8.e (continued)		
(3) Boration has been in progress as follows:		02802
 For 53 minutes if THREE CHG PPs are operating 		
 For 80 minutes if TWO CHG PPs are operating 		
 For 160 minutes if ONE CHG PP is operating 		
<u>CAUTION</u> RCS temperature must be closely monitored to avoid a cooldown rate greater than the Technical Specification Limits.		
 IF condenser vacuum is greater than 20 InHg, THEN cooldown the RCS to establish Shutdown Cooling entry conditions using the TURB BYP valves as follows: 	 9.1 Cooldown the RCS to establish Shutdown Cooling entry conditions using the ADVs as follows: a. Prior to determining if a tube rupture exists and isolating the affected S/G, 	
a. Ensure the ADVs are shut.	record the ADV open and close times, for dose calculations.	
 Degrate the TURB BYP values from the control room. 	b. Shift the ADV controller to MANUAL.	
(continue)	(continue)	
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APPENDIX (4) CORE AND RCS HE/	AT REMOVAL
HR-2: S/G HEAT SINK WITH SIS OF	PERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
A.9 (continued)	A.9.1 (continued)
 c. IF the TURB BYP valves can NOT be operated from the Control Room, THEN station an operator to manually position the TURB BYP valves PER OI-8C, MAIN STEAM AND MSR VENTS AND DRAINS. d. Maintain RCS cooldown less than 100° F in any one hour. e. IF ALL 4KV Vital Buses are de-energized AND boration has NOT been commenced, THEN maintain the following conditions: SUR negative, or SUR zero with WRNI Power less than 10⁻⁴%. T coub greater than NEOP-23, figure titled, <u>MINIMUM ALLOWED RCS TEMPERATURE TO ENSURE 1%Ap SHUTDOWN vs. BURNUP</u> 	 c. Operate the ADVs from the control room. d. IF the ADVs will NOT operate from the Control Room, THEN perform ONE of the following: Operate the ADVs from 2C43 as follows: (a) Verify the ADV controllers on 2C43 are set at 0% output: (21 ADV) 2-HC-4056A (22 ADV) 2-HC-4056B (b) Align the ADV Hand Transfer Valves to 2C43 (POSITION 2): 21 S/G 2-HV-3939A 2-HV-3939B 22 S/G 2-HV-3938B (c) Operate the ADVs from 2C43.
	NOTE The ADVs are reverse acting, i.e., clockwise to open and counterclockwise to shut. (2) Locally operate the ADVs from the 45ft level of the Aux Building. e. Maintain RCS cooldown less than
(continue)	100° F in any one hour. (continue)

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APPENDIX (4) CORE AND RCS H	EAT REMOVAL
HR-2: S/G HEAT SINK WITH SIS C	PERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
A.9 (continued)	A.9.1 (continued)
	 f. IF ALL 4KV Vital Buses are de-energized AND boration has NOT been commenced, THEN maintain the following conditions: SUR negative, or SUR zero with WRNI Power less than 10⁻⁴% T coub greater than NEOP-23, figure titled, <u>MINIMUM ALLOWED RCS TEMPERATURE TO ENSURE 1%Ap SHUTDOWN vs. BURNUP</u>
	CAUTION The following step may blow out the Condenser Rupture Disks and may cause equipment damage. 9.2 IF the ADVs are NOT available, AND condenser vacuum has been lost, THEN cooldown the RCS to establish Shutdown Cooling entry conditions by opening the TURB BYP valves: a. Open ALL doors to the outside on the 45 ft level of the Turbine Building. b. Notify personnel to evacuate the 45 ft level of the Turbine Building.
(continue)	(continue)

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Page APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION <u>RECOVERY ACTIONS</u> A.9 (continued) A.9 (continued) A.9.2 (continued) C. IF BOTH MSIVs are shut, THEN perform the following (1) Close the power supply to the MSIV Bypass valv - 2-MOV-4045 breake 52-21428 - 2-MOV-4052 breake	EOP-8 v 2B/Unit 2
HR-2: S/G HEAT SINK WITH SIS OPERATION RECOVERY ACTIONS ALTERNATE ACTIONS A.9 (continued) A.9.2 (continued) c. IF BOTH MSIVs are shut, THEN perform the following (1) Close the power supply to the MSIV Bypass value . 2-MOV-4045 breake 52-21428	90 of 206
RECOVERY ACTIONS ALTERNATE ACTIONS A.9 (continued) A.9.2 (continued) c. IF BOTH MSIVs are shut, THEN perform the following (1) Close the power supply to the MSIV Bypass value • 2-MOV-4045 breake 52-21428	
A.9 (continued) A.9 (continued) C. IF BOTH MSIVs are shut, THEN perform the following (1) Close the power supply to the MSIV Bypass valv • 2-MOV-4045 breake 52-21428	
c. IF BOTH MSIVs are shut, THEN perform the following (1) Close the power supply to the MSIV Bypass valv • 2-MOV-4045 breake 52-21428	
 THEN perform the following (1) Close the power supply to the MSIV Bypass valv 2-MOV-4045 breake 52-21428 	
to the MSIV Bypass valv • 2-MOV-4045 breake 52-21428	
52-21428	
52-20428	-
(2) Open the MSIV BYP val	ves:
 2-MS-4045-MOV 2-MS-4052-MOV 	
d. Shut the SGFPT EXH valves.	•
 B. Station an operator to manual operate the TURB BYP valve OI-8C, MAIN STEAM AND M VENTS AND DRAINS, as dimensional the Control Room. 	e(s) PER ISR
f. Maintain RCS cooldown less 100° F in any one hour.	than
g. IF ALL 4KV Vital Buses are de-energized AND boration has NOT been commenced, THEN maintain the following conditions:	
 SUR negative, or SUR ze WRNI Power less than 10 T COLD greater than NEC figure titled, <u>MINIMUM AL</u> <u>RCS TEMPERATURE TO ENSURE 1%Ap SHUTDO</u> <u>BURNUP</u>)-4%)P-23, LOWED
(continue) (continue)	

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APPENDIX (4) CORE AND RCS	Page 91 of 206
HR-2: S/G HEAT SINK WITH SI	
RECOVERY ACTIONS	ALTERNATE ACTIONS
A.9 (continued)	A.9 (continued)
	<u>CAUTION</u> The following step may blow out the Condenser Rupture Disks and may cause equipment damage.
	 9.3 IF RCS cooldown has NOT been established, THEN cooldown the RCS to establish Shutdown Cooling entry conditions by aligning the steam drains to the condenser as follows:
	a. Open the MAIN STM UPSTREAM DRN ISOL VLVS by placing handswitch 2-HS-6622 in OPEN.
	 b. Open the MAIN STM LINE DRN VLVS by placing handswitch 2-HS-6600 in OPEN.
·	c. IF BOTH MSIVs are shut, THEN perform the following
	(1) Close the power supply breakers to the MSIV Bypass valves:
	 2-MOV-4045 breaker, 52-21428 2-MOV-4052 breaker, 52-20428
	(2) Open the MSIV BYP valves:
	 2-MS-4045-MOV 2-MS-4052-MOV
	d. Maintain RCS cooldown less than 100° F in any one hour.
(continue)	(continue)
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APPENDIX (4) CORE AND RCS HEA	•
HR-2: S/G HEAT SINK WITH SIS OF	ERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
A.9 (continued)	A.9.3 (continued)
	e. IF ALL 4KV Vital Buses are de-energized AND boration has NOT been commenced, THEN maintain the following conditions:
	 SUR negative, or SUR zero with WRNI Power less than 10⁻⁴% T coLD greater than NEOP-23, figure titled, <u>MINIMUM ALLOWED</u> <u>RCS TEMPERATURE TO</u> <u>ENSURE 1%∆p SHUTDOWN vs.</u> <u>BURNUP</u>
<u>NOTE</u> Verification of RCS temperature response to a plant change during natural circulation takes approximately 5 to 15 minutes following the action due to increased loop cycle times.	
10. IF ALL RCPs are secured, THEN verify Natural Circulation in at least ONE loop by the following:	10.1 IF subcooled natural circulation can NOT be verified, THEN verify adequate RCS cooling flow by the following:
 RCS subcooling is at least 25° F based on CET temperatures 	ALL available CHG PPs are operating
 Тнот minus T coub less than 50° F 	SIS flow is appropriate PER ATTACHMENT(10), <u>HIGH</u> PRESSURE SAFETY INJECTION
T coup constant or lowering	FLOW, and ATTACHMENT(11), LOW PRESSURE SAFETY
• THOT constant or lowering	INJECTION FLOW At least ONE S/G available for heat
 CET temperatures trend consistent with T нот 	removal • S/G level greater than (-)170 inches
 Steaming rate affects RCS temperatures 	 capable of being supplied with feedwater capable of being steamed CET temperatures are less than 50° F superheated
(continue)	
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APPENDIX (4) CORE AND RCS HEA	TREMOVAL
HR-2: S/G HEAT SINK WITH SIS OP	
RECOVERY ACTIONS	ALTERNATE ACTIONS
A. (continued)	
11. IF a controlled cooldown is in progress, THEN block SGIS and SIAS:	
a. WHEN the "SGIS A BLOCK PERMITTED" alarm is received, THEN block SGIS A.	
b. WHEN the "SGIS B BLOCK PERMITTED" alarm is received, THEN block SGIS B.	
c. WHEN the "PZR PRESS BLOCK A PERMITTED" alarm is received, THEN block SIAS A.	
d. WHEN the "PZR PRESS BLOCK B PERMITTED" alarm is received, THEN block SIAS B.	

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APPENDIX (4) CORE AND RCS HEAT	REMOVAL
HR-2: S/G HEAT SINK WITH SIS OPEI	
R-2: 3/3 REAT SINK WITH 313 OPEN	RATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
B. DETERMINE IF A SGTR EXISTS.]
1. IF a SGTR has occurred, as indicated by ANY of the following:	
S/G samples	
RMS trends:	
UNIT 2 CNDSR OFF-GAS (2 DI 4750)	
(2-RI-1752) • UNIT 2 S/G B/D	
(2-RI-4014) UNIT 2 MAIN VENT GASEOUS	
(2-RI-5415)	
MAIN STM EFFL RAD MON (2-RIC-5421 OR 2-RIC-5422)	
S/G level change when NOT feeding	
Post-Trip S/G level trends	
Mismatch in feed flow prior to the trip	
 Steam flow vs. Feed flow mismatch prior to the trip 	
THEN identify the most affected S/G.	
2. IF indications of a SGTR are NOT	
observed, THEN PROCEED to Block Step C.	
(continue)	
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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION RECOVERY ACTIONS ALTERNA

ALTERNATE ACTIONS

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B. (continued)

NOTE Maintaining RCS subcooling takes precedence over equalizing RCS pressure and affected S/G pressure.

- 3. Depressurize the RCS **PER** the selected Pressure and Inventory Control success path to maintain the following:
 - Subcooling between 25 and 140° F based on CET temperatures
 - RCS pressure greater than the NPSH limits PER ATTACHMENT (1), <u>RCS</u> <u>PRESSURE TEMPERATURE LIMITS</u>
 - RCS pressure less than 850 PSIA
 - RCS pressure approximately equal to affected S/G pressure
- 4. Dispatch an operator to standby in the Unit 2 45 ft Switchgear Room to shut the affected S/G ADV.

(continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

B. (continued) CAUTION If there is a conflict between isolating a S/G due to indications of SGTR or ESDE, and maintaining adequate heat removal, then maintain RCS heat removal via the least affected S/G. At least one S/G should always be available for heat removal if possible. 5. WHEN THOT is less than 515° F. THEN isolate the most affected S/G. a. IF 21 S/G is the most affected S/G. THEN isolate 21 S/G by performing the following actions: (1) Shut 21 ADV using the Hand IF 21 ADV will NOT shut from 2C43. (1).1 Transfer Valves on the West wall THEN shut 21 ADV Manual Isolation of the Unit 2 45 ft Switchgear Valve, 2-MS-101. Room as follows: (a) IF 21 ADV was locally operated, THEN remove the manual override. (b) Verify 21 ADV controller, 2-HC-4056A, at 2C43 is set at 0% output. (c) Align 21 S/G Hand Transfer Valves to 2C43 (POSITION 2): 2-HV-3939A 2-HV-3939B (2) Shut 21 MSIV.

- (3) Verify 21 MSIV BYP valve, 2-MS-4045-MOV, is shut.
- (4) Verify 21 SG FW ISOL valve 2-FW-4516-MOV, is shut.

(continue)

RECOVERY ACTIONS		ALTERNATE ACTIONS
5.a (conti	nued)	
(5)	Shut 21 SG AFW MAIN STM SUPP & BYP valves, 2-MS-4070-CV and 2-MS-4070A-CV.	
(6)	Shut 21 SG AFW BLOCK valves by placing the handswitches in SHUT:	
	 2-AFW-4520-CV 2-AFW-4521-CV 2-AFW-4522-CV 2-AFW-4523-CV 	
(7)	Shut 21 SG BD valves:	
	 2-BD-4010-CV 2-BD-4011-CV 	
(8)	Shut the MAIN STM UPSTREAM DRN ISOL VLVS by placing handswitch 2-HS-6622 in CLOSE.	
(9)	Observe locally, the S/G Safety Valves are NOT l eaking.	
	(continue)	

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EOP-8 Rev 28/Unit 2 Page 98 of 206 **APPENDIX (4) CORE AND RCS HEAT REMOVAL** HR-2: S/G HEAT SINK WITH SIS OPERATION **RECOVERY ACTIONS ALTERNATE ACTIONS** B.5 (continued) b. IF 22 S/G is the most affected S/G, THEN isolate 22 S/G by performing the following actions: (1) Shut 22 ADV using the Hand (1).1 IF 22 ADV will NOT shut from 2C43, Transfer Valves on the West wall THEN shut 22 ADV Manual Isolation of the Unit 2 45 ft Switchgear Valve, 2-MS-104. Room as follows: (a) IF 22 ADV was locally operated, THEN remove the manual override. (b) Verify 22 ADV controller, 2-HC-4056B, at 2C43 is set at 0% output. (c) Align 22 S/G Hand Transfer Valves to 2C43 (POSITION 2): 2-HV-3938A ٠ 2-HV-3938B (2) Shut 22 MSiV. (3) Verfiy 22 MSIV BYP valve, 2-MS-4052-MOV, is shut. (4) Verify 22 SG FW ISOL valve 2-FW-4517-MOV, is shut. (5) Shut 22 SG AFW MAIN STM SUPP & BYP valves. 2-MS-4071-CV and 2-MS-4071A-CV. (continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION				
B.5.b (cont	linued)			
(6)	Shut 22 SG AFW BLOCK valves by placing the handswitches in SHUT:			
	 2-AFW-4530-CV 2-AFW-4531-CV 2-AFW-4532-CV 2-AFW-4533-CV 			
(7)	Shut 22 SG BD valves:			
	 2-BD-4012-CV 2-BD-4013-CV 			
(8)	Shut the MAIN STM UPSTREAM DRN ISOL VLVS by placing handswitch 2-HS-6622 in CLOSE.			
(9)	Observe locally, the S/G Safety Valves are NOT leaking.			
	(continue)			
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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

B. (continued)

- 6. Ensure the affected S/G Safety Valves remain shut.
 - a. Close the power supply breakers to the MSIV Bypass valves:
 - 2-MOV-4045 breaker, 52-21428
 - 2-MOV-4052 breaker, 52-20428
 - b. Maintain the affected S/G pressure less than 920 PSIA by performing the following:

CAUTION

Damage to the steam system could occur due to moisture carryover if the MSIV Bypass Valve is operated on a S/G whose level exceeds (+)55 inches {(+)50}.

- IF the affected S/G pressure approaches 920 PSIA
 AND S/G level is less than (+)55 inches {(+)50},
 THEN operate the MSIV BYP valve on the affected S/G;
 - (21 S/G) 2-MS-4045-MOV
 - (22 S/G) 2-MS-4052-MOV
- (2) IF the MSIV BYP valve can NOT maintain S/G pressure less than 920 PSIA, THEN steam the affected S/G to atmosphere from 2C43 as follows:
 - (a) Record the ADV open and close times, for dose calculations.
 - (b) Direct the adjustment of the ADV from 2C43 as necessary.

- (2).1 IF the affected S/G ADV was manually isolated,
 THEN steam the affected S/G to atmosphere as follows:
 - (a) Record the ADV open and close times, for dose calculations.
 - (b) Direct throttling of the affected ADV Manual Isolation Valve as necessary:
 - (21 S/G) 2-MS-101
 - (22 S/G) 2-MS-104

(continue)

EOP-8 Rev 28/Unit 2 Page 101 of 206 **APPENDIX (4) CORE AND RCS HEAT REMOVAL** HR-2: S/G HEAT SINK WITH SIS OPERATION **RECOVERY ACTIONS ALTERNATE ACTIONS** B. (continued) 7. Verify the most affected S/G is isolated by 7.1 IF the wrong S/G was isolated, checking the following: THEN perform the following actions: S/G sample activity higher in the affected S/G CAUTION Severe waterhammer may result if Main RMS trends: Feedwater flow is restored after it has been stopped for greater than 80 minutes. UNIT 2 CNDSR OFF-GAS (2-RF1752) a. Restore feeding and steaming UNIT 2 S/G B/D capability to the least affected S/G. (2-RI-4014)UNIT 2 MAIN VENT GASEOUS b. WHEN RCS heat removal has been (2-RI-5415) re-established to the least affected S/G. THEN isolate the most affected S/G . Unaffected S/G level change consistent with feed flow PER step B.5. S/G pressures RCS loop T coup trends 8. Verify the motor driven train SG AFW BLOCK valves are open with the handswitches in OPEN on the S/G which is unaffected by EITHER a SGTR OR an ESDE: 21 S/G 2-AFW-4522-CV 2-AFW-4523-CV 22 S/G 2-AFW-4532-CV 2-AFW-4533-CV (continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

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ALTERNATE ACTIONS

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B. (continued)	
 Contact the Operational Support Center to perform periodic samples for the following: 	
RCS boron concentration at least once per hour	
RCS activity	
S/Gs boron concentration and activity	
Turbine Building Sumps activity	
Condensate and CSTs activity	
 Air samples and radiation surveys throughout the plant to determine the spread of contamination 	
10. Ensure boron concentration remains above 116 percent of the required shutdown margin PER the NEOPs.	
(continue)	
spread of contamination 10. Ensure boron concentration remains above 116 percent of the required shutdown margin PER the NEOPs.	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

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B. (continued) 11. IF ALL RCPs are secured, THEN disable RCPs in the affected loop to prevent inadvertant start. a. IF 21 S/G is the affected S/G. THEN disable 21A and 21B RCPs by removing the Reactor Coolant Pump Breaker CLOSE CIR fuses. 21A RCP 252-21P01 21A RCP 252-21P02 • 21B RCP 252-23P01 • 21B RCP 252-23P02 b. IF 22 S/G is the affected S/G. THEN disable 22A and 22B RCPs by removing the Reactor Coolant Pump Breaker CLOSE CIR fuses. • 22A RCP 252-22P01 • 22A RCP 252-22P02 22B RCP 252-24P01
22B RCP 252-24P02 (continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

B. (continued)

<u>NOTE</u>

If available, narrow range S/G level indication should be used to control the affected S/G level.

NOTE

Affected S/G level control steps are listed in order of preference and should be performed in the order listed.

- Maintain the affected S/G level between 0 and (+)50 inches by performing ANY of the following:
 - a. Maintain the affected S/G level by controlling RCS pressure with backflow to the RCS as follows:
 - IF the affected S/G level is high, THEN reduce RCS pressure below the affected S/G pressure by ANY of the following methods:
 - (a) De-energize the Pressurizer HTR(s).
 - (b) Use MAIN or AUX SPRAY.
 - (c) IF the HPSI throttle criteria are met, THEN throttle or secure flow to reduce RCS pressure,
 - (2) Control RCS pressure to maintain the affected S/G level approximately constant.

(continue)

1							EOP- Rev 28/Unit 2 Page 105 of 200	2
APPE	ND	IX (4	4) CORE AN	D RCS HEA	AT REM	IOVAL		
		•	EAT SINK W					
	R	<u>ECO</u>	VERY ACTIONS			ALTERNA	<u>is</u>	
B.12 (a	ontin	ued)						
b.) the affected S/(m to the MWS a					
	(1)	THI sigi <u>RE</u> AT	AFAS has actuat EN reset the AFA nals PER ATTAC <u>SET AFAS STAI</u> THE ACTUATIC BINETS.	AS START CHMENT(19), RT SIGNALS				;
	(2)	RE 2-R	ce UNIT 2 S/G E COVERY radiatif NC-4095, in OPE 22G:	on monitor,				2
		(a)	Verify 2-HS-40 OPER BYPAS	95B/S1 - S in OFF.				
		(b)	Highlight Stop AND press SE					
		(c)	Verify the CH 1 LED extinguish					
		(d)	Bypass annund	iator alarms.				
	(3)	Ver TO	ify open B/D Rec MWS, 2-BD-409	xovery DISCH 17-CV.				
	(4)		ify shut B/D Rec CIRC WTR, 2-B					
	(5)		ify shut B/D Rec CNDSR, 2-BD-4					
	(6)		ut S/G Combined ottle Valves:	B/D Header				
			2-BD-102 2-BD-104					
			(continue)					

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APPENDIX (4) CORE AND RCS HEA	T REMOVAL	
HR-2: S/G HEAT SINK WITH SIS OPI	ERATION	
RECOVERY ACTIONS	ALTERNATE ACTIONS	
B.12.b (continued)		
(7) Open the affected SG BOT BD valve by placing its handswitch in RAD TRIP OVERRIDE:		
 (21 S/G) 2-BD-4011-CV (22 S/G) 2-BD-4013-CV 		
 (8) Throttle open the S/G Combined B/D Header Throttle Valve on the affected S/G to obtain a blowdown flow of approximately 100 GPM while maintaining 21 B/D Heat Exchanger outlet temperature less than 200° F: 	•	
 (21 S/G) 2-BD-102 (22 S/G) 2-BD-104 		
(9) Pump the MWRT PER the <u>TRANSFERRING THE MWRT</u> <u>TO THE RCWMT</u> section of OI-17D.		
(10) Monitor MWRT level at 1C33 and maintain MWRT level approximately constant by throttling the S/G blowdown rate while pumping to the RCWMT.		
(continue)		

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		EOP-8 Rev 28/Unit 2 Page 107 of 206
PPEND	X (4) CORE AND RCS HEA	TREMOVAL
R-2: S/0	G HEAT SINK WITH SIS OP	ERATION
<u>R</u>	ECOVERY ACTIONS	ALTERNATE ACTIONS
12 (contin	ued)	
blov	ntain the affected S/G level by vdown to the Condenser as ows:	
(1)	IF AFAS has actuated, THEN reset the AFAS START signals PER ATTACHMENT(19), <u>RESET AFAS START SIGNALS</u> <u>AT THE ACTUATION</u> <u>CABINETS</u> .	
(2)	Ensure at least ONE Condensate Demin is in service.	
(3)	Open PRECOAT SYS BYP valve, 2-CD-5818-CV.	
(4)	Shut COND DEMIN BYP valve, 2-CD-4439-MOV.	
(5)	IF AFW is operating AND the SGFP Miniflow Valves are shut, THEN throttle open the FW DUMP TO CNDSR HTWL valves, 2-FW-134 and 2-FW-135, to obtain maximum condensate flow through the Condensate Demin.	
(6)	Shut CONDENSER HOTWELL HIGH LEVEL DUMP CV-4405 INLET VALVE, 2-CD-232.	
(7)	Bypass UNIT 2 S/G B/D RECOVERY radiation monitor, 2-RIC-4095:	
	(a) Place 2-HS-4095B/S2 - HIGH BYPASS in BYPASS.	
	(b) Verify 2-HS-4095B/S1 - OPER BYPASS in BYPASS.	
	(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.12.c (continued)

- (8) Verify shut B/D Recovery DISCH TO MWS, 2-BD-4097-CV.
- (9) Verify shut B/D Recovery DISCH TO CIRC WTR, 2-BD-4015-CV.
- (10) Verify open B/D Recovery DISCH TO CNDSR, 2-BD-4096-CV.
- (11) Shut S/G Combined B/D Header Throttle Valves:
 - 2-BD-102
 - 2-BD-104
- (12) Open the affected SG BOT BD valve by placing its handswitch in RAD TRIP OVERRIDE:
 - (21 S/G) 2-BD-4011-CV
 - (22 S/G) 2-BD-4013-CV
- (13) Throttle open the S/G Combined B/D Header Throttle Valve on the affected S/G to obtain a blowdown flow of approximately 100 GPM while maintaining 21 B/D Heat Exchanger outlet temperature less than 200° F:
 - (21 S/G) 2-BD-102
 - (22 S/G) 2-BD-104

(continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

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ALTERNATE ACTIONS

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B.12 (c	ontini	ued)	
d.	 Maintain the affected S/G level by steaming to the condenser as follows: 		
	(1)	Ensure the condenser vacuum is greater than 20 InHg.	
	(2)	Ensure at least ONE Condensate Demin is in service.	
	(3)	Open PRECOAT SYS BYP valve, 2-CD-5818-CV.	
	(4)	Shut COND DEMIN BYP vaive, 2-CD-4439-MOV.	
	(5)	IF AFW is operating AND the SGFP Miniflow Valves are shut, THEN throttle open the FW DUMP TO CNDSR HTWL valves, 2-FW-134 and 2-FW-135, to obtain maximum condensate flow through the Condensate Demin.	
	(6)	Shut CONDENSER HOTWELL HIGH LEVEL DUMP CV-4405 INLET VALVE, 2-CD-232.	
	(7)	Operate the MAIN STM UPSTREAM DRN ISOL VLVS using 2-HS-6622 as necessary.	
		(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION **RECOVERY ACTIONS ALTERNATE ACTIONS** B.12.d (continued) CAUTION Damage to the steam system could occur due to moisture carryover if the MSIV Bypass Valve is operated on a S/G whose level exceeds (+)55 inches {(+)50}. (8) IF additional steam flow is desired AND S/G level is less than (+)55 inches {(+)50}, THEN operate the MSIV BYP valve on the affected S/G: (21 S/G) 2-MS-4045-MOV • (22 S/G) 2-MS-4052-MOV e. Maintain the affected S/G level by steaming to atmosphere as follows: (1) Steam the affected S/G to (1).1 IF the affected S/G ADV was manually atmosphere from 2C43 as isolated. follows: THEN steam the affected S/G to atmosphere as follows: (a) Record the ADV open and close times, for dose (a) Record the ADV open and close calculations. times, for dose calculations. (b) Direct the adjustment of the (b) Direct throttling of the affected ADV from 2C43 as ADV Manual Isolation Valve as necessary. necessary: (21 S/G) 2-MS-101 (22 S/G) 2-MS-104

(continue)

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APPENDIX (4) CORE AND RCS HE	AT REMOVAL
HR-2: S/G HEAT SINK WITH SIS O	
RECOVERY ACTIONS	ALTERNATE ACTIONS
B.12 (continued)	
 IF the following conditions can be maintained: 	
RCS pressure remains below 850 PSIA	
 MSIV, ADV and MSIV BYP valves remain shut 	
THEN the affected S/G may be allowed to fill to the MSIV.	
<u>NOTE</u> If available, narrow range S/G level indication should be used to control the affected S/G level.	
<u>NOTE</u> Affected S/G pressure control steps are listed in order of preference and should be performed in the order listed.	
13. Cool and depressurize the affected S/G as necessary by performing ANY of the following:	
a. IF ANY RCP is operating, THEN cool and depressurize the affected S/G by feeding and backflow to the RCS as follows:	
(1) Verify Letdown is operating.	
 (2) IF S/G level is less than (+)50 inches, THEN feed the affected S/G to raise level to (+)50 inches using AFW PER step B.14. 	
(3) Ensure RCS Boron concentration at least 116 percent of the shutdown margin requirement PER the NEOPs.	
. (continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL. HR-2: S/G HEAT SINK WITH SIS OPERATION RECOVERY ACTIONS ALTERNATE ACTIONS B.13.a (continued) <u>CAUTION</u> If feedwater is supplied to the affected S/G during the backflow evolution, adequate shutdown margin can NOT be assured. (4) Verify the affected S/G AFW BLOCK valves are shut with the handswitches in SHUT:

21 S/G

- 2-AFW-4520-CV
- 2-AFW-4521-CV
- 2-AFW-4522-CV
- 2-AFW-4523-CV

22 S/G

- 2-AFW-4530-CV
- 2-AFW-4531-CV
- 2-AFW-4532-CV
- 2-AFW-4533-CV

CAUTION

Maintain RCS pressure greater than the minimum pump operating limits PER ATTACHMENT (1), <u>RCS PRESSURE</u> TEMPERATURE LIMITS.

- (5) Lower the affected S/G level to 0 inches by reducing RCS pressure below the affected S/G pressure by ANY of the following methods:
 - (a) De-energize the Pressurizer HTR(s).
 - (b) Use MAIN or AUX SPRAY.
 - (c) IF the HPSI throttle criteria are met, THEN throttle or secure flow to reduce RCS pressure.

(continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION **RECOVERY ACTIONS ALTERNATE ACTIONS** B.13.a (continued) (6) WHEN the affected S/G level is 0 inches. THEN control RCS pressure to maintain the affected S/G level approximately constant. (7) Repeat steps (1) through (6) as necessary. b. Cool and depressurize the affected S/G by steaming to the condenser as follows: (1) Control RCS pressure to establish and maintain the affected S/G level between 0 and (+)50 inches. (2) Ensure the condenser vacuum is greater than 20 InHg. (3) Ensure at least ONE Condensate Demin is in service. (4) Open PRECOAT SYS BYP valve. 2-CD-5818-CV. (5) Shut COND DEMIN BYP valve, 2-CD-4439-MOV. (6) IF AFW is operating AND the SGFP Miniflow Valves are shut. THEN throttle open the FW DUMP TO CNDSR HTWL valves. 2-FW-134 and 2-FW-135, to obtain maximum condensate flow through the Condensate Demin. (7) Shut CONDENSER HOTWELL HIGH LEVEL DUMP CV-4405 INLET VALVE, 2-CD-232. (continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.13.b (continued)

(8) Operate the MAIN STM UPSTREAM DRN ISOL VLVS using 2-HS-6622 as necessary.

CAUTION

Damage to the steam system could occur due to moisture carryover if the MSIV Bypass Valve is operated on a S/G whose level exceeds (+)55 inches {(+)50}.

> (9) IF additional steam flow is desired AND S/G level is less than (+)55 inches {(+)50}, THEN operate the MSIV BYP valve on the affected S/G;

• (21 S/G) 2-MS-4045-MOV

• (22 S/G) 2-MS-4052-MOV

(continue)

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PPENDIX (4) CORE A	ND RCS HEAT	REMOVAL	
IR-2: S/G HEAT SINK	WITH SIS OPE	RATION	
RECOVERY ACTIO	NS	ALTERNATE ACTIONS	
B.13 (continued)			
c. Cool and depressurize S/G by feeding and blo MWS as follows:			
(1) IF S/G level is les inches, THEN feed the af raise level to (+)5 AFW PER step B	fected S/G to 0 inches using		
(2) IF AFAS has actu THEN reset the A signals PER ATTA <u>RESET AFAS ST</u> <u>AT THE ACTUAT</u> <u>CABINETS</u> .	FAS START ACHMENT(19), ART SIGNALS		
(3) Place UNIT 2 S/G RECOVERY radia 2-RIC-4095, in Of 1C22G:	ation monitor,		
(a) Verify 2-HS-4 OPER BYPA	4095B/S1 - SS in OFF.		
(b) Highlight Sto AND press S	pp Pump ELECT.		
(c) Verify the CH LED extingui			
(d) Bypass annu	nciator alarms.		
(4) Verify open B/D R TO MWS, 2-BD-4			
(5) Verify shut B/D Re TO CIRC WTR, 2			
(6) Verify shut B/D Re TO CNDSR, 2-BD			
(continue)			

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.13.c (continued)

- (7) Shut S/G Combined B/D Header Throttle Valves:
 - 2-BD-102
 - 2-BD-104
- (8) Open the affected SG BOT BD valve by placing its handswitch in RAD TRIP OVERRIDE:
 - (21 S/G) 2-BD-4011-CV
 - (22 S/G) 2-BD-4013-CV

(9) Throttle open the S/G Combined B/D Header Throttle Valve on the affected S/G to obtain a blowdown flow of approximately 100 GPM while maintaining 21 B/D Heat Exchanger outlet temperature less than 200° F:

- (21 S/G) 2-BD-102
- (22 S/G) 2-BD-104
- (10) Pump the MWRT **PER** the <u>TRANSFERRING THE MWRT</u> <u>TO THE RCWMT</u> section of OI-17D.
- (11) Monitor MWRT level at 1C33 and maintain MWRT level approximately constant by throttling the S/G blowdown rate while pumping to the RCWMT.
- (12) Lower the affected S/G level to 0 inches by S/G blowdown to the MWS.
- (13) Feed the affected S/G to raise level to (+)50 inches using AFW PER step B.14.

(continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

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B.13.c (continued)

- (14) Repeat steps (11) and (12) as necessary.
- d. Cool and depressurize the affected S/G by feeding and blowdown to the Condenser as follows:
 - (1) IF S/G level is less than (+)50 inches, THEN feed the affected S/G to

raise level to (+)50 inches using AFW **PER** step 8.14.

- (2) IF AFAS has actuated, THEN reset the AFAS START signals PER ATTACHMENT(19), <u>RESET AFAS START SIGNALS</u> <u>AT THE ACTUATION</u> <u>CABINETS</u>.
- (3) Ensure at least ONE Condensate Demin is in service.
- (4) Open PRECOAT SYS BYP valve, 2-CD-5818-CV.
- (5) Shut COND DEMIN BYP valve, 2-CD-4439-MOV.
- (6) IF AFW is operating AND the SGFP Miniflow Valves are shut, THEN throttle open the FW DUMP TO CNDSR HTWL valves, 2-FW-134 and 2-FW-135, to obtain maximum condensate flow through the Condensate Demin.
- (7) Shut CONDENSER HOTWELL HIGH LEVEL DUMP CV-4405 INLET VALVE, 2-CD-232.

(continue)

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APPEND	IX (4) CORE AND RCS HEA	AT REMOVAL
HR-2: S/	G HEAT SINK WITH SIS OP	ERATION
R	ECOVERY ACTIONS	ALTERNATE ACTIONS
B.13.d (cont	linued)	
(8)	Bypass UNIT 2 S/G B/D RECOVERY radiation monitor, 2-RIC-4095:	
	(a) Place 2-HS-4095B/S2 - HIGH BYPASS in BYPASS.	
	(b) Verify 2-HS-4095B/S1 - OPER BYPASS in BYPASS.	
(9)	Verify shut B/D Recovery DISCH TO MWS, 2-BD-4097-CV.	
(10)	Verify shut B/D Recovery DISCH TO CIRC WTR, 2-BD-4015-CV.	
(11)	Verify open B/D Recovery DISCH TO CNDSR, 2-BD-4096-CV.	
(12)	Shut S/G Combined B/D Header Throttle Valves:	
	 2-BD-102 2-BD-104 	
(13)	Open the affected SG BOT BD valve by placing its handswitch in RAD TRIP OVERRIDE:	
	 (21 S/G) 2-BD-4011-CV (22 S/G) 2-BD-4013-CV 	
(14)	Throttle open the S/G Combined B/D Header Throttle Valve on the affected S/G to obtain a blowdown flow of approximately 100 GPM while maintaining 21 B/D Heat Exchanger outlet temperature less than 200° F:	
	 (21 S/G) 2-BD-102 (22 S/G) 2-BD-104 	
	(continue)	

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EOP-8 Rev 28/Unit 2 Page 119 of 206 **APPENDIX (4) CORE AND RCS HEAT REMOVAL** HR-2: S/G HEAT SINK WITH SIS OPERATION **RECOVERY ACTIONS ALTERNATE ACTIONS** B.13.d (continued) (15) Lower the affected S/G level to 0 inches by S/G blowdown to the Condenser. (16) Feed the affected S/G to raise level to (+)50 inches using AFW PER step B.14. (17) Repeat steps (14) and (15) as necessary. e. Cool and depressurize the affected S/G by steaming to atmosphere as follows: (1) Control RCS pressure to establish and maintain the affected S/G level between 0 and (+)50 inches. (2) Steam the affected S/G to (2).1 IF the affected S/G ADV was manually atmosphere from 2C43 as isolated. THEN steam the affected S/G to follows: atmosphere as follows: (a) Record the ADV open and close times, for dose (a) Record the ADV open and close calculations. times, for dose calculations. (b) Direct the adjustment of the (b) Direct throttling open of the ADV from 2C43 as affected ADV Manual Isolation Valve to lower the affected S/G necessary. pressure: (21 S/G) 2-MS-101 (22 S/G) 2-MS-104 (continue)

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APPENDIX (4) CORE AND RCS HE	-
HR-2: S/G HEAT SINK WITH SIS OF	
RECOVERY ACTIONS	ALTERNATE ACTIONS
B. (continued)	
<u>CAUTION</u> If feedwater is supplied to the affected S/G during the backflow evolution, adequate shutdown margin can NOT be assured.	
 14. IF feedwater flow to the affected S/G is required, AND 23 AFW PP is available, THEN establish Auxiliary Feedwater flow as follows: a. Open the affected S/G motor driven train SG AFW BLOCK valves: 21 S/G 2-AFW-4522-CV 2-AFW-4523-CV 22 S/G 2-AFW-4532-CV 2-AFW-4533-CV 2-AFW-4533-CV b. IF 23 AFW PP is NOT being used to feed the unaffected S/G, THEN perform the following: (1) Shut the motor driven train SG AFW BLOCK valves for the unaffected S/G by placing the handswitches in SHUT: 21 S/G 2-AFW-4522-CV 2-AFW-4522-CV 2-AFW-4533-CV (1) Shut the motor driven train SG AFW BLOCK valves for the unaffected S/G by placing the handswitches in SHUT: 21 S/G 2-AFW-4522-CV 2-AFW-4523-CV 2-AFW-4523-CV 2-AFW-4532-CV 2-AFW-4532-CV 2-AFW-4532-CV 2-AFW-4532-CV 2-AFW-4533-CV (2) Start 23 AFW PP. 	 14.1 IF 23 AFW PP is NOT available, THEN establish Auxiliary Feedwater flow using 21 or 22 AFW PP as follows: a. Open the affected S/G steam driven train SG AFW BLOCK valves: 21 S/G 2-AFW-4520-CV 2-AFW-4521-CV 22 S/G 2-AFW-4530-CV 2-AFW-4531-CV b. IF 21 or 22 AFW PP is NOT being used to feed the unaffected S/G, THEN shut the steam driven train SG AFW BLOCK valves for the unaffected S/G by placing the handswitches in SHUT: 21 S/G 2-AFW-4520-CV 2-AFW-4520-CV 2-AFW-4520-CV 2-AFW-4520-CV 2-AFW-4520-CV 2-AFW-4521-CV 22 S/G 2-AFW-4531-CV
(continue)	(continue)

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APPENDIX (4) CORE AND RCS HEA	
HR-2: S/G HEAT SINK WITH SIS OF	
RECOVERY ACTIONS	ALTERNATE ACTIONS
B.14 (continued)	B.14.1 (continued)
B.14 (continued) CAUTION The 23 AFW PP flow limit is 575 GPM. 2. Restore the affected S/G level, maintain RCS cooldown less than 100° F in any one hour, by adjusting the SG FLOW CONTR valve: 2. (21 S/G) 2-AFW-4525-CV 3. (22 S/G) 2-AFW-4535-CV 3. (22 S/G) 2-AFW-4535-CV 3. (21 S/G) 2-AFW-4535-CV 4. (21 S/G) 2-AFW-455-CV 4. (21 S/G) 2-AFW	 B.14.1 (continued) CAUTION An unmonitored radiation release could occur if the SG AFW MAIN STM SUPP & BYP valves from the affected S/G are open. C. Verify the SG AFW MAIN STM SUPP & BYP valves from the unaffected S/G are open: (21 SG)2-MS-4070-CV, 2-MS-4070A-CV (22 SG)2-MS-4071-CV, 2-MS-4071A-CV (22 SG)2-MS-4071A-CV (Adjust and maintain 21 or 22 AFW PP discharge pressure at least 100 PSI greater than the affected S/G pressure: (21 AFW PP SPD CONTR) 2-HC-3987A (22 AFW PP SPD CONTR) 2-HC-3989A Restore the affected S/G level, maintain RCS cooldown less than 100° F in any one hour, by adjusting the SG FLOW CONTR valve: (21 S/G) 2-AFW-4511-CV (22 S/G) 2-AFW-4512-CV Verify AFW Room normal or emergency ventilation is operating to maintain room temperature less than 130° F.

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	PPENDIX (4) CORE AND RCS HEA	Page 122 of 206
	R-2: S/G HEAT SINK WITH SIS OP	
	x-2. 3/3 NEAT SIAK WITH 3/3 OF	
Í	RECOVERY ACTIONS	ALTERNATE ACTIONS
C.	DETERMINE IF AN ESDE EXISTS.	
1.	IF an ESDE has occurred, by considering ALL of the following:	
	High steam flow from S/G	
	Lowering S/G pressure	
	Lowering S/G level	
	Lowering RCS T coup	
	Lowering PZR pressure	
	Lowering PZR level	
	THEN identify the most affected S/G.	
2.	IF indications of an ESDE are NOT	
	observed, THEN PROCEED to Block Step D.	
	(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL	
HR-2: S/G HEAT SINK WITH SIS OPERATION	
RECOVERY ACTIONS ALTERNA	TE ACTIONS
C. (continued)	
<u>CAUTION</u> If there is a conflict between isolating a S/G due to indications of SGTR or ESDE, and maintaining adequate heat removal, then maintain RCS heat removal via the least affected S/G. At least one S/G should always be available for heat removal if possible.	
3. Isolate the most affected S/G.	
a. IF 21 S/G is the most affected S/G, THEN isolate 21 S/G by performing the following actions:	
	ill NOT shut from 2C43, 11 ADV Manual Isolation -101.
(a) IF 21 ADV was locally operated, THEN remove the manual override.	
(b) Verify 21 ADV controller, 2-HC-4056A, at 2C43 is set at 0% output.	
(c) Align 21 S/G Hand Transfer Valves to 2C43 (POSITION 2):	
 2-HV-3939A 2-HV-3939B 	
(2) Verify 21 MSIV iş shut.	
(3) Verify 21 SG FW ISOL valve 2-FW-4516-MOV, is shut.	
(4) Verify 21 MSIV BYP valve, 2-MS-4045-MOV, is shut.	
(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

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C.3.a (continued)

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- (5) Shut 21 SG BD valves:
 - 2-BD-4010-CV
 - 2-BD-4011-CV
- (6) Shut 21 SG AFW MAIN STM SUPP & BYP valves, 2-MS-4070-CV and 2-MS-4070A-CV.
- (7) Shut 21 SG AFW BLOCK valves by placing the handswitches in SHUT:
 - 2-AFW-4520-CV
 - 2-AFW-4521-CV
 - 2-AFW-4522-CV
 - 2-AFW-4523-CV
- (8) Shut the MAIN STM UPSTREAM DRN ISOL VLVS by placing handswitch 2-HS-6622 in CLOSE.
- (9) Observe locally, the S/G Safety Valves are **NOT** leaking.

(continue)

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APPENDIX (4) CORE AND RCS HE	
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IR-2: S/G HEAT SINK WITH SIS O	PERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
.3 (continued)	
 IF 22 S/G is the most affected S/G, THEN isolate 22 S/G by performing the following actions: 	
(1) Shut 22 ADV using the Hand Transfer Valves on the West wall of the Unit 2 45 ft Switchgear Room as follows:	(1).1 IF 22 ADV will NOT shut from 2C43, THEN shut 22 ADV Manual Isolation Valve, 2-MS-104.
(a) IF 22 ADV was locally operated, THEN remove the manual override.	
(b) Verify 22 ADV controller, 2-HC-4056B, at 2C43 is set at 0% output.	
(c) Align 22 S/G Hand Transfer Valves to 2C43 (POSITION 2):	
2-HV-3938A2-HV-3938B	
(2) Verify 22 MSIV is shut.	
(3) Verify 22 SG FW ISOL valve 2-FW-4517-MOV, is shut.	
(4) Verify 22 MSIV BYP valve, 2-MS-4052-MOV, is shut.	
(5) Shut 22 SG BD valves:	
 2-BD-4012-CV 2-BD-4013-CV 	
(6) Shut 22 SG AFW MAIN STM SUPP & BYP valves, 2-MS-4071-CV and 2-MS-4071A-CV.	
(continue)	

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APPENDIX (4) CORE AND RCS HE	·
HR-2: S/G HEAT SINK WITH SIS OF	
RECOVERY ACTIONS	ALTERNATE ACTIONS
C.3.b (continued)	
(7) Shut 22 SG AFW BLOCK valvesby placing the handswitches in SHUT:	
 2-AFW-4530-CV 2-AFW-4531-CV 2-AFW-4532-CV 2-AFW-4533-CV 	
(8) Shut the MAIN STM UPSTREAM DRN ISOL VLVS by placing handswitch 2-HS-6622 in CLOSE.	
(9) Observe locally, the S/G Safety Valves are NOT leaking.	
 Verify the most affected S/G was isolated by checking the following: 	4.1 IF the wrong S/G was isolated, THEN perform the following actions:
 S/G pressure lower for the affected S/G 	CAUTION
RCS loop T coup lower in the affected loop	Severe waterhammer may result if Main Feedwater flow is restored after it has been stopped for greater than 80 minutes.
S/G level lowering for the affected S/G and stabilized for the unaffected S/G	a. Restore feeding and steaming capability to the least affected S/G.
	 WHEN RCS heat removal has been re-established to the least affected S/G.
	THEN isolate the most affected S/G PER step C.3.
(continue)	
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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

C. (continued)

NOTE

The temperature of the unaffected S/G may be obtained by using the saturation temperature for existing S/G pressure.

 IF the difference between unaffected S/G temperature and CET temperature exceeds 25° F during the blowdown, THEN cool the unaffected S/G to within 25° F of CET temperature using the unaffected S/G ADV.

NOTE

The remainder of this procedure may be performed while waiting for the S/G to blowdown.

CAUTION

A heatup of the RCS following an excessive cooldown rate can result in a rise in RCS pressure and the potential for pressurized thermal shock.

- WHEN the RCS cooldown due to blowdown of the affected S/G has stopped, THEN operate the unaffected S/G ADV to stabilize RCS temperatures as follows:
 - a. Establish the unaffected S/G temperature within 25° F of the lowest CET temperature during blowdown.
 - WHEN unaffected S/G temperature is within 25° F of the lowest CET temperature during blowdown, THEN maintain the following:
 - Unaffected S/G pressure
 approximately constant
 - Tcolb approximately constant

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APPENDIX (4) CORE AND RCS HEAT REMOVAL		
HR-2: S/G HEAT SINK WITH SIS OI	PERATION	
RECOVERY ACTIONS	ALTERNATE ACTIONS	
D. (continued)		
5. Maintain AFW PP suction supply AND CST inventory PER ATTACHMENT (8), <u>MAINTAIN AFW PUMP SUCTION</u> <u>SUPPLY AND CST INVENTORY</u> .		
 IF AFW is available, THEN attempt to establish AFW flow to the S/G(s) which is unaffected by EITHER a SGTR OR an ESDE. 		
a. Establish AFW flowpath to the S/G(s) by placing the handswitches for the unaffected SG AFW BLOCK valves in OPEN:	a.1 IF S/G AFW BLOCK valve(s) will NOT open from the control room, THEN locally open valve(s) using the Hand Transfer Station(s) on North wall of SRW Room.	
21 S/G 2-AFW-4520-CV 2-AFW-4521-CV 2-AFW-4522-CV 2-AFW-4523-CV		
22 S/G • 2-AFW-4530-CV • 2-AFW-4531-CV • 2-AFW-4532-CV • 2-AFW-4533-CV		
(continue)		

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APPENDIX (4) CORE AND RCS HEA	-
HR-2: S/G HEAT SINK WITH SIS OF	
RECOVERY ACTIONS	ALTERNATE ACTIONS
D.6 (continued)	
NOTE The following substeps are alternative methods to establish auxiliary feedwater flow. Each available method can be attempted until auxiliary feed flow is successfully established.	
 b. Establish AFW flow with 23 AFW PP as follows: (1) Shut the SG FLOW CONTR valves: (21 S/G) 2-AFW-4525-CV (22 S/G) 2-AFW-4535-CV CAUTION The 23 AFW PP flow limit is 575 GPM. (2) Start 23 AFW PP by placing its handswitch in START. (3) Adjust the SG FLOW CONTR valves to approximately 150 GPM per S/G: (21 S/G) 2-AFW-4525-CV (22 S/G) 2-AFW-4535-CV 	 b.1 Start 23 AFW PP locally as follows: (1) Shut the SG FLOW CONTR valves: (21 S/G) 2-AFW-4525-CV (22 S/G) 2-AFW-4535-CV (2) Verify 23 AFW PP handswitch is in AUTO. CAUTION The 23 AFW PP flow limit is 575 GPM. (3) Close the AFW PP No. 23 breaker, 152-2415, by pressing the CLOSE button.
(continue)	(continue)

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		Rev 28/Unit 2 Page 131 of 206
	X (4) CORE AND RCS HEA	
HR-2: S/	IG HEAT SINK WITH SIS OF	'ERATION
Į	RECOVERY ACTIONS	ALTERNATE ACTIONS
D.6.b (cont	inued)	D.6.b.1(3) (continued)
(4)	 WHEN S/G level response is observed OR continuous feed has been maintained for at least 5 minutes, THEN feed rate may be slowly raised while maintaining the following: Gradual rise in S/G level S/G level trending to between 0 and (+)38 inches RCS cooldown rate less than 100° F in any one hour 	CAUTION Removing control power fuses eliminates by protection from breaker faults, and protection for the breaker faults, and protection for the breaker. (4) IF the breaker fails to close, THEN, with the approval of the SM/CRS, perform the following actions: (a) Remove the breaker control power fuses. (b) IF necessary, THEN manually charge the breaker closing spring. (c) Press the CLOSE button at AFW PP No. 23 breaker, 152-2415. (d) Ensure normal pump running current less than 70 AMPS. (f) Adjust the SG FLOW CONTR valves to approximately 150 GPM per S/G: (f) 21 S/G) 2-AFW-4525-CV (f) 22 S/G) 2-AFW-4535-CV
	(continue)	(continue)

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APPENDIX (4) CORE AND RCS HE	
HR-2: S/G HEAT SINK WITH SIS O	PERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
D.6.b (continued)	D.6.b.1 (continued)
	 (6) WHEN S/G level response is observed OR continuous feed has been maintained for at least 5 minutes, THEN feed rate may be slowly raised while maintaining the following: Gradual rise in S/G level S/G level trending to between 0 and (+)38 inches RCS cooldown rate less than 1000 F in provide hours.
c. Establish AFW flow with 21 or 22 AFW PP as follows:	100° F in any one hour c.1 Start 21 or 22 AFW PP locally as follows:
 (1) Shut the SG FLOW CONTR valves: (21 S/G) 2-AFW-4511-CV (22 S/G) 2-AFW-4512-CV (2) Verify open 21 and 22 AFW PP Main Steam Supply Valves: 2-MS-109 2-MS-107 (3) Verify open 21 OR 22 AFW PP TURB THROTTLE/STOP valve: 2-MS-3986 2-MS-3988 	 (1) Shut the SG FLOW CONTR valves: (21 S/G) 2-AFW-4511-CV (22 S/G) 2-AFW-4512-CV (2) Turn the turbine governor control knob counterclockwise to the minimum position. (3) Isolate the Instrument Air to the Turbine Governor Controller(s) by shutting the following valves: <u>21 AFW PP</u> 2-AFW-3987 I/P A ISOL, 2-IA-512 2-AFW-3989 I/P B ISOL, 2-IA-511 <u>22 AFW PP</u> 2-AFW-3989 I/P A ISOL, 2-IA-509 2-AFW-3989 I/P B ISOL, 2-IA-510
(continue)	(continue)

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APPENDIX (4) CORE AND RCS HEA	T REMOVAL
HR-2: S/G HEAT SINK WITH SIS OP	ERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
D.6.c (continued)	D.6.c.1 (continued)
<u>CAUTION</u> An unmonitored radiation release could occur if the AFW Steam Supply Bypass Valve from a S/G affected by a SGTR is opened. (4) Open the SG AFW MAIN STM SUPP & BYP valves from a S/G NOT affected by a SGTR: • (21 S/G)2-MS-4070-CV, 2-MS-4070A-CV	 (4) Open the air filter drains on controllers to allow local control. (5) Verify open 21 and 22 AFW PP Main Steam Supply Valves: 2-MS-109 2-MS-107 (6) Verify open 21 OR 22 AFW PP TURB THROTTLE/STOP valve:
 (22 S/G)2-MS-4071-CV, 2-MS-4071A-CV WARNING 	 2-MS-3986 2-MS-3988 <u>CAUTION</u>
 The use of N2 to operate AFW may result in the depletion of oxygen levels in some rooms due to system venting. (5) IF a loss of ALL Vital 4KV busses has occurred, THEN align Liquid N2 System to supply SG FLOW CONTR valves by opening the following valves located in SRW Room: N2 SUPPLY TO U-2 AFW AMP AIR SYS B/U ISOLATION VALVE, 0-N2-107 AFW AMPLIFIER AIR SYSTEM N2 BACKUP SUPPLY VALVE, 2-IA-390 	 An unmonitored radiation release could occur if the AFW Steam Supply Bypass Valve from a S/G affected by a SGTR is opened. (7) Open the AFW Steam Supply Bypass Valves from a S/G NOT affected by a SGTR: 2-MS-102 2-MS-105 (8) Adjust and maintain the turbine driven discharge header pressure at least 100 PSI greater than S/G pressure using the local turbine governor control knob.
(continue)	(continue)

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ΔΡΡΕΝΙ	DIX (4) CORE AND RCS HEA	•
	G HEAT SINK WITH SIS OF	
	RECOVERY ACTIONS	ALTERNATE ACTIONS
D.6.c (con	tinued)	D.6.c.1 (continued)
	 IF a loss of ALL Vital 4KV busses has occurred, THEN assign an operator to control AFW discharge pressure locally as follows: (a) Establish communications between the operator and the control room. (b) Isolate the Instrument Air to the Turbine Governor Controller(s) by shutting the following valves: 21 AFW PP 2-AFW-3987 I/P A ISOL, 2-IA-512 2-AFW-3987 I/P B ISOL, 2-IA-511 22 AFW PP 2-AFW-3989 I/P B ISOL, 2-IA-509 2-AFW-3989 I/P B ISOL, 2-IA-510 (c) Adjust 21 or 22 AFW PP governor control knob to maintain discharge pressure at least 100 PSI greater than S/G pressure. Adjust and maintain the turbine driven discharge header pressure at least 100 PSI greater than S/G pressure. (21 AFW PP SPEED CONTR) 2-HC-3987A (22 AFW PP SPEED CONTR) 2-HC-3989A (continue) 	 (9) Adjust the SG FLOW CONTR valves to approximately 150 GPM per S/G: (21 S/G) 2-AFW-4511-CV (22 S/G) 2-AFW-4512-CV (10) WHEN S/G level response is observed OR continuous feed has been maintained for at least 5 minutes, THEN feed rate may be slowly raised while maintaining the following: Gradual rise in S/G level S/G level trending to between 0 and (+)38 inches RCS cooldown rate less than 100° F in any one hour (11) Operate AFW ventilation as necessary to maintain temperature less than 130° F.

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	DIX (4) CORE AND RCS HEA	Page 135 of 206
	G HEAT SINK WITH SIS OP	
111(-2. 0)		
<u> </u>	RECOVERY ACTIONS	ALTERNATE ACTIONS
D.6.c (cont	inued)	
(8)	Adjust the SG FLOW CONTR valves to approximately 150 GPM per S/G:	
	 (21 S/G) 2-AFW-4511-CV (22 S/G) 2-AFW-4512-CV 	
(9)	WHEN S/G level response is observed OR continuous feed has been maintained for at least 5 minutes, THEN feed rate may be slowly raised while maintaining the following:	
	Gradual rise in S/G level	
	 S/G level trending to between 0 and (+)38 inches 	
	 RCS cooldown rate less than 100° F in any one hour 	
(10)	Operate AFW ventilation as necessary to maintain temperature less than 130° F.	
	(continue)	
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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

D.6 (continued) d. Establish AFW flow with 13 AFW PP as follows: (1) Shut the Unit 1 Motor Train S/G AFW BLOCK valves by placing the handswitches in SHUT: 11 S/G 1-AFW-4522-CV 1-AFW-4523-CV 12 S/G 1-AFW-4532-CV 1-AFW-4533-CV (2) Open the U-1 TO U-2 XCONN valve, 1-AFW-4550-CV. (3) Establish AFW flow with 13 AFW PP as follows: (a) Shut the Unit 2 SG FLOW CONTR valves: (21 S/G) 2-AFW-4525-CV (22 S/G) 2-AFW-4535-CV CAUTION The 13 AFW PP flow limit is 575 GPM. (b) Start 13 AFW PP by placing its handswitch in START. (continue)

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P
E ACTIONS

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- (c) Adjust the Unit 2 SG FLOW CONTR valves to approximately 150 GPM per S/G:
 - (21 S/G) 2-AFW-4525-CV
 (22 S/G) 2-AFW-4535-CV
- (4) WHEN S/G level response is observed
 OR continuous feed has been maintained for at least 5 minutes, THEN feed rate may be slowly raised while maintaining the following:
 - Gradual rise in S/G level
 - S/G level trending to between 0 and (+)38 inches
 - RCS cooldown rate less than 100° F in any one hour

(continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

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ALTERNATE ACTIONS

D. (continued) 7. IF Booster Pump Injection is available, THEN attempt to establish flow to the S/G(s) which is unaffected by EITHER a SGTR OR an ESDE. a. IF an ESDE has NOT occurred, THEN block SGIS as follows: WHEN the "SGIS A BLOCK PERMITTED" alarm is received. THEN block SGIS A. WHEN the "SGIS B BLOCK PERMITTED" alarm is received, THEN block SGIS B. b. IF SGIS has actuated AND indications of an ESDE are NOT observed. THEN reset SGIS as follows: (1) Place the CBPs in PULL TO LOCK. (2) Match handswitch positions PER ATTACHMENT (7), SGIS VERIFICATION CHECKLIST. (3) Block SGIS. (4) Reset the SGIS signal. (5) Open the MSIV(s). (6) Open the SG FW ISOL valve(s): 2-FW-4516-MOV 2-FW-4517-MOV (7) Start a CBP. (continue)

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APPENDIX (4) CORE AND RCS HE	AT REMOVAL
HR-2: S/G HEAT SINK WITH SIS OF	PERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
D.7 (continued)	
<u>CAUTION</u> RCS temperature must be closely monitored to avoid a cooldown greater than Technical Specification Limits.	
c. Commence a rapid RCS cooldown to T coLD less than 465° F using the TURB BYP valves OR ADVs, while maintaining the following:	c.1 IF subcooling exceeds 140° F, THEN depressurize the RCS PER the selected Pressure and Inventory Control success path.
 Cooldown less than 100° F in any one hour 	
 Subcooling less than 140° F based on CET temperatures 	
d. Shut the MAIN SG FW REG valves.	
e. Shift the SG FW REG BYPASS controllers to Manual.	
f. Verify the operating SGFPT SPD BIAS ADJ is less than or equal to 5.0.	
g. Depress the SG FRV BYP RESET buttons.	
h. Manually adjust the SG FW REG BYPASS valve controllers to 0%.	
i. Open the SG FW ISOL valves:	
 (21 S/G) 2-FW-4516-MOV (22 S/G) 2-FW-4517-MOV 	
j. Open the PRECOAT SYS BYP valve, 2-CD-5818-CV.	
k. Open the COND DEMIN BYP valve, 2-CD-4439-MOV.	
I. Verify at least ONE COND PP is running.	
(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

D.7 (continued)

- m. Verify ONE CBP is running.
- n. Place BOTH HDT PP Handswitches in PULL TO LOCK.

NOTE

Feedwater flow to S/Gs should start when RCS cooldown has resulted in the S/G pressures dropping to less than the Condensate Booster Pump shut-off head of approximately 500 PSIA.

CAUTION

Rapid or uncontrolled restoration of Main Feedwater may cause a severe waterhammer.

- o. Throttle open the SG FW REG BYPASS valve to establish a flow of 100 to 160 GPM PER ATTACHMENT(18), <u>MAIN FEEDWATER GOOSENECK PURGE FLOW</u>.
- WHEN continuous feed has been maintained for at least 10 minutes, THEN feed rate may be slowly raised while maintaining the following:
 - Gradual rise in S/G level
 - S/G level trending to between 0 and (+)38 inches
 - RCS cooldown rate less than
 100° F in any one hour

(continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

D. (continued)

CAUTION

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

- 8. IF Main Feedwater is available, THEN attempt to establish Main Feed flow to the S/G(s) which is unaffected by EITHER a SGTR OR an ESDE.
 - a. Shut the MAIN SG FW REG valves.
 - b. Verify the operating SGFPT SPD BIAS ADJ is less than or equal to 5.0.
 - c. Depress the SG FRV BYP RESET buttons.
 - d. Manually adjust the SG FW REG BYPASS valve controllers to 0%.
 - e. Open the SG FW ISOL valves:
 - (21 S/G) 2-FW-4516-MOV
 - (22 S/G) 2-FW-4517-MOV

(continue)

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APPEN	DIX (4) CORE AND RCS HEA	AT RE	C C
	G HEAT SINK WITH SIS OF		
	RECOVERY ACTIONS		ALTERNATE ACTIONS
		r	
D.8 (contin	eued)		
ope TH	at least ONE SGFP is NOT erating, EN, with the approval of the /CRS, attempt to start a SGFP.		
(1)	Verify shut the HP and LP Stop Valves.		
(2)	Check the DEMAND MIN indicator is illuminated at the OCS.	(2).1	IF the DEMAND MIN indicator is NOT illuminated, THEN depress the down arrow until the DEMAND MIN indicator illuminates.
(3)	Reset the SGFP Vacuum Trip AND Turbine Trip.		
(4)	Open the HP and LP Stop Valves.		
(5)	Depress the DIRECT GOVNR VLV pushbutton at the OCS.		
(6)	Raise the speed of the SGFP, until the discharge pressure is sufficient to feed the SGs, by depressing the "up" SPEED arrow at the OCS.		
	<u>CAUTION</u> Incontrolled restoration of Main r may cause a severe mer.		· .
BYI 100 AT <u>FE</u>	ottle open the SG FW REG PASS valve to establish a flow of to 160 GPM PER FACHMENT(18), <u>MAIN</u> EDWATER GOOSENECK PURGE DW.		
	(continue)		

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APPENDIX (4) CORE AND RCS HEA	T REMOVAL
HR-2: S/G HEAT SINK WITH SIS OP	ERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
D.8 (continued)	
 WHEN continuous feed has been maintained for at least 10 minutes, THEN feed rate may be slowly raised while maintaining the following: 	
Gradual rise in S/G level	
 S/G level trending to between 0 and (+)38 inches 	
 RCS cooldown rate less than 100° F in any one hour 	
E. VERIFY CORE AND RCS HEAT REMOVAL HAS BEEN ESTABLISHED.	
1. Ensure the TBVs OR ADVs are controlling T COLD less than 535° F.	
 Ensure adequate RCS heat removal with at least ONE S/G by observing BOTH of the following conditions exist: 	2.1 IF, at ANY time, BOTH S/G levels are less than (-)350 inches OR T couder rises uncontrollably 5° F or
 At least ONE S/G level is greater than (-)350 inches 	greater, THEN IMPLEMENT HR-4, <u>ONCE-THROUGH-COOLING</u> .
T COLD is stable or lowering	
 Maintain AFW PP suction supply AND CST inventory PER ATTACHMENT (8), <u>MAINTAIN AFW PUMP SUCTION</u> <u>SUPPLY AND CST INVENTORY</u>. 	
(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

E. (continued)

- IF AFW is feeding the least affected S/G(s), THEN perform the following:
 - a. Ensure feed flow is restoring S/G level to between 0 and (+)38 inches and RCS cooldown does NOT exceed 100° F in any one hour.
- IF Booster Pump Injection is feeding the least affected S/G(s), THEN perform the following:
 - a. Ensure feed flow is restoring S/G level to between 0 and (+)38 inches and RCS cooldown does **NOT** exceed 100° F in any one hour.
 - b. Adjust the SG FW REG BYPASS valves to establish S/G levels at approximately 0 inches.
 - WHEN S/G levels are at approximately 0 inches, THEN shift SG FW REG BYPASS controllers to Auto.

(continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

E. (continued)

- IF Main Feedwater is feeding the least affected S/G(s), THEN perform the following:
 - a. Establish a shutdown feed system lineup as follows:
 - ONE operating SGFP
 - ONE operating CBP
 - TWO operating COND PPs
 - BOTH HDT PPs secured
 - Ensure feed flow is restoring S/G level to between 0 and (+)38 inches and RCS cooldown does NOT exceed 100° F in any one hour.
 - WHEN manual control of feed flow is desired
 OR S/G level is between 0 and
 (+)38 inches;
 THEN perform the following actions:
 - (1) Shift the SG FW REG BYPASS controllers to Manual.
 - (2) Verify the operating SGFPT SPD BIAS ADJ is less than or equal to 5.0.
 - (3) Depress the S/G FRV BYP RESET buttons.
 - (4) Adjust the SG FW REG BYPASS valves to establish S/G levels at approximately 0 inches.
 - WHEN S/G levels are at approximately 0 inches, THEN shift SG FW REG BYPASS controllers to Auto.

(continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

E. (continued)

- IF the Main Feedwater System is NOT to be used to feed a S/G, THEN secure the Main Feed system.
 - a. Trip the SGFPs.
 - b. Place the CBPs in PULL TO LOCK.
 - c. Place TWO COND PPs in PULL TO LOCK.
 - d. Place the HDT PPs in PULL TO LOCK.
 - e. Shut SG FW ISOL valve:
 - 2-FW-4516-MOV
 - 2-FW-4517-MOV
 - f. Shut the CNDSR HOTWELL M/U & DUMP CONTR CV by shifting 2-LIC-4405 to MANUAL with 50% output.
 - g. IF NO COND PPs are operating, THEN protect against blowdown related waterhammer:
 - (1) Verify the SG BD valves are shut:
 - 2-BD-4010-CV
 - 2-BD-4011-CV
 - 2-BD-4012-CV
 - 2-BD-4013-CV

NOTE

2-CD-333 is located 27 foot southeast of 23 Condenser. 2-CD-334 is located 12 foot west of 21 CBP.

(2) Shut the 21 B/D RECV HX valves:

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- 2-CD-333
- 2-CD-334

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AJ	APPENDIX (4) CORE AND RCS HEAT REMOVAL		
HI	HR-2: S/G HEAT SINK WITH SIS OPERATION		
	RECOVERY ACTIONS	ALTERNATE ACTIONS	
	· · · · · · · · · · · · · · · · · · ·		
F.	SECURE RCS BORATION.		
1.	WHEN RCS boration has been		
	completed, THEN shift the charging pump suction to the RWT as follows:		
	a. Open RWT CHG PP SUCT valve, 2-CVC-504-MOV.		
	b. Shut VCT OUT valve, 2-CVC-501-MOV.		
	c. Place the BA PPs in PULL TO LOCK.		
	d. Ensure the BAST levels are steady.		
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	PPENDIX (4) CORE AND RCS HEA	
H	R-2: S/G HEAT SINK WITH SIS OP	ERATION
	RECOVERY ACTIONS	ALTERNATE ACTIONS
G.	EVALUATE RESTORING FORCED CIRCULATION.	
1.	IF the RCPs are NOT operating, THEN evaluate the need and desirability of restarting RCPs based on the following:	
	 Verify electrical power is available to the RCPs 	
	 RCP BUS MCC-215 (ALL RCPs) MCC-205 (21A/21B RCP) 	
	 Adequacy of RCS and Core Heat Removal using natural circulation 	
	 Existing RCS pressure and temperatures 	·
	RCP Controlled Bleed-off temperatures	
	 The capability to supply Main OR Auxiliary Feedwater to at least ONE S/G 	
	The possibility of dilute pockets of water in the RCS due to flow stagnation in the affected loop	
2.	IF at least ONE RCP is operating in each loop OR RCP operation is NOT desired, THEN PROCEED to step H.	
3.	IF T COLD is less than 306° F, THEN PROCEED to step H.	
	(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

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G. (continued)

- IF RCPs have been exposed to excessive moisture, THEN consider meggering the RCP motors.
- IF Component Cooling has been isolated to Containment, THEN restore cooling flow PER CE-2, <u>CONTAINMENT ISOLATION</u>, OR CE-3, <u>CONTAINMENT SPRAY</u>.

CAUTION

If a RCP Controlled Bleed-off temperature exceeds 250° F, the affected seal must be rebuilt before the RCP can be operated. Do NOT restart ANY RCP whose Controlled Bleed-off temperature has exceeded 250° F.

- 6. Check Controlled Bleed-off temperatures for the RCPs to be restarted have **NOT** exceeded 250° F.
- 7. Verify RCP Controlled Bleed-off temperatures are less than 200° F or are lowering.
- 8. Restore Pressurizer level to between 155 and 180 inches.

(continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

G. (continued)

- 9. Verify the RCP restart criteria are met by ALL of the following:
 - Electrical power is available to the RCPs
 - 22/12 SERV BUS VOLTS is less than 14.8 KV
 - 4KV Vital Bus voltage is greater than 4100 volts
 - RCP Controlled Bleed-off temperatures are less than 200° F
 - RCS subcooling is greater than 25° F based on CET temperatures
 - At least ONE S/G available for heat removal
 - S/G level greater than (-)170 inches
 - capable of being supplied with feedwater
 - capable of being steamed
 - Pressurizer level is greater than
 155 inches and NOT lowering
 - T COLD is less than 525° F
 - RCS temperature and pressure are greater than the minimum operating limits PER ATTACHMENT (1), <u>RCS</u> <u>PRESSURE TEMPERATURE LIMITS</u>, for the pumps to be started

(continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

G. (continued)

CAUTION Starting an RCP may cause the following:

- A pressurizer level transient
- A high pressure transient if an RCP is started in a loop in which NO S/G is available for heat removal
- Initiation of SIAS if RCS pressure is greater than the SIAS pressurizer pressure setpoint
- A reactivity excursion due to dilute pockets of water, if an RCP is restarted in the affected loop, OR boration is NOT complete prior to restarting an RCP in the unaffected loop
- 10. WHEN RCP restart is desired AND the RCP restart criteria are met, THEN start ONE RCP in a loop with an operating S/G as follows:
 - a. IF a SGTR has been diagnosed, AND the RCS pressure has dropped below the affected S/G pressure, OR the level in the affected S/G has lowered after isolation, THEN verify RCS boration is complete.
 - b. Verify the RCP CBO INBD and OUTBD ISOL valves are open:
 - 2-CVC-505-CV
 - 2-CVC-506-CV
 - c. Verify the "CCW FLOW LO" alarm is clear.
 - d. Start the associated OIL LIFT PP.
 - e. Verify the "OIL LIFT PP PRESS LO" alarm is cleared.

(continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

G.10 (continued)

- f. Operate the OIL LIFT PP for at least 60 seconds.
- g. Insert the RCP sync stick.
- h. Verify the synchroscope on panel 1C19 is **NOT** rotating.
- i. Start the RCP.
- j. Verify the RCP(s) are NOT cavitating by observing running current is steady.
- 11. Operate Charging and Letdown, or HPSI to restore and maintain pressurizer level between 101 and 180 inches.
- 12. Monitor RCP seal parameters following pump restart.
- 13. Allow backflow to equalize temperatures in the opposite loop.

(continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

G. (continued)

- 14. Start a second RCP in the opposite loop:
 - a. IF the Reactor Coolant Pump Breaker CLOSE CIR fuses have been removed, THEN replace the CLOSE CIR fuses on the selected Reactor Coolant Pump Breaker.
 - 21A RCP 252-21P01
 - 21A RCP 252-21P02
 - 21B RCP 252-23P01
 - 21B RCP 252-23P02
 - 22A RCP 252-22P01
 - 22A RCP 252-22P02
 - 22B RCP 252-24P01
 22B RCP 252-24P02
 - b. Ensure RCP NPSH requirements are maintained PER ATTACHMENT (1), RCS PRESSURE TEMPERATURE LIMITS.
 - c. Start RCP PER step G.10 above.
 - d. Monitor RCP seal parameters following pump restart.

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APPENDIX (4) CORE AND RCS HEA	
HR-2: S/G HEAT SINK WITH SIS OP	ERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
H. CONTROL CORE AND RCS VOIDING.	
<u>NOTE</u> Core and RCS voiding may be indicated by the following:	
Letdown flow greater than charging flow	
 Rapid unexplained rise in pressurizer level during an RCS pressure reduction 	
Loss of subcooled margin as determined using CET temperatures	
"RXV WTR LVL LO" alarm	
 IF voiding causes difficulty in depressurization, THEN reduce or eliminate the voided area by performing the following actions: 	
a. Shut the L/D CNTMT ISOL valves:	
 2-CVC-515-CV 2-CVC-516-CV 	
b. Stop depressurizing the RCS.	
(continue)	

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APPENDIX (4) CORE AND RCS HEA	-
HR-2: S/G HEAT SINK WITH SIS OP	
RECOVERY ACTIONS	ALTERNATE ACTIONS
H.1 (continued)	
<u>CAUTION</u> The potential exists for pressurized thermal shock from an excessive cooldown rate followed by a repressurization.	
 c. Cycle RCS subcooling between 25 and 140° F as follows: (1) Raise RCS subcooling to as near 140° F as practical by ANY of the following mathedep. 	c.1 IF cycling RCS subcooling is ineffective, THEN operate RXV VENT valves PER the <u>VENTING THE REACTOR</u> <u>COOLANT SYSTEM AFTER AN</u> <u>ACCIDENT</u> section of OI-1G.
following methods: <u>NOTE</u> Pressurizer Backup Heater Banks 21 and 23 tip on U/V and SIAS. . Energize the Pressurizer HTR(s) . Secure Pressurizer SPRAY . Raise RCS cooldown rate while maintaining cooldown less than 100° F in any one hour . IF HPSI flow has been reduced, THEN raise HPSI flow by opening HPSI HDR valves which have been throttled, OR starting HPSI PPs which have been stopped. (continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

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RECOVERY ACTIONS

ALTERNATE ACTIONS

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H.1.c (continued)

- (2) Lower RCS subcooling to as near 25° F as practical by ANY of the following methods:
 - De-energize the Pressurizer HTR(s)
 - Operate Pressurizer SPRAY
 - Secure RCS cooldown
 - IF HPSI throttle criteria are met, THEN throttle the HPSI HDR valves, OR stop the HPSI PPs one at a time
- (3) Repeat steps H.1.c.(1) through H.1.c.(2) as necessary.

<u>NOTE</u>

Voids may form in the S/G Tubes if saturation pressure of a S/G is greater than saturation pressure of RCS.

CAUTION

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

d. IF voiding is suspected in the S/G tubes,

THEN cool the S/G so RCS cooldown rate remains less than 100° F in any one hour by raising ANY of the following:

- Steaming rate
- Feed rate

• S/G Blowdown rate

(continue)

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APPENDIX (4) CORE AND RCS HEA	AT REMOVAL
HR-2: S/G HEAT SINK WITH SIS OF	PERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
H.1 (continued)	
e. Monitor Pressurizer level and Reactor Vessel level for inventory trends.	
I. ENSURE INVENTORY CONTROL SUPPORTS HEAT REMOVAL.	
1. Observe Containment Sump level rises as RWT level lowers.	1.1 IF Containment Sump level does NOT rise as RWT level lowers, THEN perform the follows actions:
	a. Maintain RWT level greater than 2 feet by replenishment from ANY available source.
	NOTE Leakage location may be indicated by sump alarms or room level alarms.
	 Determine the cause for the leakage and attempt to isolate it.
2. Ensure steps associated with RAS are performed PER the selected RCS Pressure and Inventory Control success path.	
 Ensure Core Flush is initiated PER PIC-4, <u>SIS</u> as required. 	

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APPENDIX (4) CORE AND RCS HEA	· · · · ·
HR-2: S/G HEAT SINK WITH SIS OP	
RECOVERY ACTIONS	ALTERNATE ACTIONS
J. PERFORM LOW TEMPERATURE ACTIONS.	
 IF Main Feedwater is in operation AND high Feedwater pressure is causing level control problems, THEN secure pumps as required: 	
• SGFP • CBP	
 WHEN RCS temperature is less than 350° F, THEN verify that NO more than TWO RCPs are in operation. 	
(continue)	

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APPENDIX (4) CORE AND RCS HEA	-
HR-2: S/G HEAT SINK WITH SIS OP	ERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
J. (continued)	
<u>CAUTION</u> PORVs must be in MPT ENABLE before T coud is less than 301° F.	
3. WHEN T COLD is less than 306° F, THEN establish MPT protection as follows:	
a. Verify the PORV BLOCK valves are OPEN:	
 2-RC-403-MOV 2-RC-405-MOV 	
 b. Verify PZR LO RANGE PRESS, 2-PI-103 is less than VLTOP PORV SETPOINT, 2-ZI-103. 	
c. Verify PZR LO RANGE PRESS, 2-PI-103-1 is less than VLTOP PORV SETPOINT, 2-ZI-103-1.	
<u>CAUTION</u> PORVs will open if they are placed in SINGLE MPT ENABLE and PZR Pressure is greater than 406 PSIA.	
d. Place the MPT PROT handswitches in VARIABLE MPT ENABLE:	
2-HS-14062-HS-1408	
e. Verify the PORV OVERRIDE handswitches in the AUTO position:	
 2-HS-1402 2-HS-1404 	
(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-2: S/G HEAT SINK WITH SIS OPERATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

J. (continued)

 WHEN RCS temperature is less than 300° F
 AND RCS pressure is less than 300 PSIA, THEN perform the following actions:

NOTE

Cavity Cooling and CEDM Cooling aid in cooling Reactor Vessel Head if a void exists.

- a. Verify ONE CAV CLG and ONE CEDM CLG fan running if available.
- b. Close SIT OUT breakers:
 - (2-SI-614-MOV) 52-21442
 - (2-SI-624-MOV) 52-21443
 - (2-SI-634-MOV) 52-20442
 - (2-SI-644-MOV) 52-20443

c. Shut SIT OUT valves:

- 2-SI-614-MOV
- 2-SI-624-MOV
- 2-SI-634-MOV
- 2-SI-644-MOV

(continue)

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APPENDIX (4) CORE AND RCS HEA	_
HR-2: S/G HEAT SINK WITH SIS OP	
RECOVERY ACTIONS	ALTERNATE ACTIONS
J.4 (continued)	
 d. IF Auxiliary Feedwater is NOT being used to feed the S/Gs, THEN perform the following actions: (1) Shut the SG AFW BLOCK valves 	
by placing the handswitches in SHUT:	
21 S/G 2-AFW-4520-CV 2-AFW-4521-CV 2-AFW-4522-CV 2-AFW-4523-CV	
22 S/G • 2-AFW-4530-CV • 2-AFW-4531-CV • 2-AFW-4532-CV • 2-AFW-4533-CV	
(2) Place 23 AFW PP in PULL TO LOCK.	
(3) Verify shut SG AFW MAIN STM SUPP & BYP valves:	
 (21 SG)2-MS-4070-CV, 2-MS-4070A-CV (22 SG)2-MS-4071-CV, 2-MS-4071A-CV 	

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APPENDIX (4) CORE AND RCS HEA	-
HR-2: S/G HEAT SINK WITH SIS OP	ERATION
RECOVERY ACTIONS	ALTERNATE ACTIONS
K. ACCEPTANCE CRITERIA FOR SUCCESS PATH HR-2.	
 Check Core and RCS Heat Removal is satisfied by the following indications: At least ONE S/G has level between 0 	1.1 IF Core and RCS Heat Removal has NOT been satisfied, THEN PROCEED to the next appropriate Core and RCS Heat
and (+)38 inches OR S/G level is being restored by feedwater flow	Removal Success Path.
 CET temperatures are less than 50° F superheated 	
 IF RAS has NOT occurred, AND pressurizer pressure is greater than 1270 PSIA, THEN at least ONE CHG PP operating 	
<u>NOTE</u> LPSI Pumps are NOT required post-RAS.	
NOTE Limits in ATTACHMENT(10), <u>HIGH</u> <u>PRESSURE SAFETY INJECTION FLOW</u> and ATTACHMENT(11), <u>LOW PRESSURE</u> <u>SAFETY INJECTION FLOW</u> are NOT required to be met if SIS throttle criteria are met.	
HPSI and LPSI Pumps are injecting water into the RCS PER ATTACHMENT(10), <u>HIGH</u> <u>PRESSURE SAFETY INJECTION</u> <u>FLOW</u> and ATTACHMENT(11), <u>LOW</u> <u>PRESSURE SAFETY INJECTION</u> <u>FLOW</u>	
 IF Core and RCS Heat Removal has been established, THEN PROCEED to the next Safety Function to be satisfied. 	

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APPENDIX (4) CORE AND RCS HEAT	REMOVAL
HR-3: SHUTDOWN COOLING SYSTE	
RECOVERY ACTIONS	ALTERNATE ACTIONS
<u>RECOVERE ACTIONS</u>	ALTERNATE ACTIONS
A. PERFORM LOW TEMPERATURE ACTIONS.	
1. IF Main Feedwater is in operation AND high Feedwater pressure is causing	
level control problems, THEN secure pumps as required:	
SGFP CBP	
2. WHEN RCS temperature is less than	
350° F, THEN verify that NO more than TWO RCPs are in operation.	
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(continue)	

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APPENDIX (4) CORE AND RCS HEA	AT REMOVAL
HR-3: SHUTDOWN COOLING SYST	'EM
RECOVERY ACTIONS	ALTERNATE ACTIONS
A. (continued)	
NOTE If a T cold mismatch exists between loops, actions should be performed based on the lowest operating loop indication.	
 3. IF the HPSI system is NOT in operation, AND T coup is less than 325° F, THEN establish LTOP control by performing the following: a. Place ALL HPSI PPs in PULL TO LOCK. b. Shut ALL HPSI HDR valves and place their handswitches in PULL-TO-OVERRIDE: MAIN 2-SI-616-MOV 2-SI-626-MOV 2-SI-636-MOV 2-SI-646-MOV 2-SI-647-MOV 2-SI-647-MOV 2-SI-647-MOV CAUTION Only ONE HPSI Pump shall be operable prior to cooldown to less than 301° F t coup. (continue) 	 3.1 IF HPSI LTOP control can NOT be established, THEN operate MAIN SPRAY, AUX SPRAY or PZR VENT valves to maintain the following: a RCS subcooling above 25° F based on CET temperatures RCS pressure PER ATTACHMENT (1), RCS PRESSURE TEMPERATURE LIMITS

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-3: SHUTDOWN COOLING SYSTEM RECOVERY ACTIONS ALTERNATE ACTIONS A. (continued) CAUTION PORVs must be in MPT ENABLE before T COLD is less than 301° F. 4. WHEN T coup is less than 306° F, THEN establish MPT protection as follows: a. Verify the PORV BLOCK valves are OPEN: • 2-RC-403-MOV 2-RC-405-MOV b. Verify PZR LO RANGE PRESS, 2-PI-103 is less than VLTOP PORV SETPOINT, 2-ZI-103. c. Verify PZR LO RANGE PRESS, 2-PI-103-1 is less than VLTOP PORV SETPOINT, 2-ZI-103-1. CAUTION PORVs will open if they are placed in SINGLE MPT ENABLE and PZR Pressure is greater than 406 PSIA. d. Place the MPT PROT handswitches in VARIABLE MPT ENABLE: 2-HS-1406 2-HS-1408 e. Verify the PORV OVERRIDE handswitches in the AUTO position: 2-HS-1402 • 2-HS-1404 (continue) .

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APPENDIX (4) CORE AND RCS HEA	AT REMOVAL
HR-3: SHUTDOWN COOLING SYST	
RECOVERY ACTIONS	ALTERNATE ACTIONS
A. (continued)	
5. WHEN RCS temperature is less than 300° F AND RCS pressure is less than 300 PSIA, THEN perform the following actions:	
<u>NOTE</u> Cavity Cooling and CEDM Cooling aid in cooling Reactor Vessel Head if a void exists.	
a. Verify ONE CAV CLG and ONE CEDM CLG fan running if available.	
b. Close SIT OUT breakers:	
 (2-SI-614-MOV) 52-21442 (2-SI-624-MOV) 52-21443 (2-SI-634-MOV) 52-20442 (2-SI-644-MOV) 52-20443 	
c. Shut SIT OUT valves:	
 2-SI-614-MOV 2-SI-624-MOV 2-SI-634-MOV 2-SI-644-MOV 	
(continue)	
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APPENDIX (4) CORE AND RCS HEA	TREMOVAL
HR-3: SHUTDOWN COOLING SYSTI	
RECOVERY ACTIONS	ALTERNATE ACTIONS
A.5 (continued)	
 IF Auxiliary Feedwater is NOT being used to feed the S/Gs, THEN perform the following actions: 	
(1) Shut the SG AFW BLOCK valves by placing the handswitches in SHUT:	
21 S/G • 2-AFW-4520-CV • 2-AFW-4521-CV • 2-AFW-4522-CV • 2-AFW-4523-CV	
22 S/G • 2-AFW-4530-CV • 2-AFW-4531-CV • 2-AFW-4532-CV • 2-AFW-4533-CV	
(2) Place 23 AFW PP in PULL TO LOCK.	
(3) Verify shut SG AFW MAIN STM SUPP & BYP valves:	
 (21 SG)2-MS-4070-CV, 2-MS-4070A-CV (22 SG)2-MS-4071-CV, 2-MS-4071A-CV 	

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APPENDIX (4) CORE AND RCS HEA	TREMOVAL
HR-3: SHUTDOWN COOLING SYST	
RECOVERY ACTIONS	ALTERNATE ACTIONS
B. CONTROL CORE AND RCS VOIDING.	
<u>NOTE</u> Core and RCS voiding may be indicated by the following:	
Letdown flow greater than charging flow	
Rapid unexplained rise in pressurizer level during an RCS pressure reduction	
Loss of subcooled margin as determined using CET temperatures	•
"RXV WTR LVL LO" alarm	
 IF voiding causes difficulty in depressurization, THEN reduce or eliminate the voided area by performing the following actions: 	
a. Shut the L/D CNTMT ISOL valves:	
 2-CVC-515-CV 2-CVC-516-CV 	
b. Stop depressurizing the RCS.	· · ·
(continue)	

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APPENDIX (4) CORE AND RCS HEA	AT REMOVAL
HR-3: SHUTDOWN COOLING SYST	EM
RECOVERY ACTIONS	ALTERNATE ACTIONS
B.1 (continued)	
<u>CAUTION</u> The potential exists for pressurized thermal shock from an excessive cooldown rate followed by a repressurization.	
c. Cycle RCS subcooling between 25 and 140° F as follows:	c.1 IF cycling RCS subcooling is ineffective, THEN operate RXV VENT valves PER
(1) Raise RCS subcooling to as near 140° F as practical by ANY of the following methods:	the <u>VENTING THE REACTOR</u> <u>COOLANT SYSTEM AFTER AN</u> <u>ACCIDENT</u> section of OI-1G.
<u>NOTE</u> Pressurizer Backup Heater Banks 21 and 23 trip on U/V and SIAS.	
 Energize the Pressurizer HTR(s) 	
Secure Pressurizer SPRAY	
 Raise RCS cooldown rate while maintaining cooldown less than 100° F in any one hour 	
 IF HPSI flow has been reduced, THEN raise HPSI flow by opening HPSI HDR valves which have been throttled, OR starting HPSI PPs which have been stopped. 	
(continue)	
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EOP-8 Rev 28/Unit 2 Page 170 of 206 **APPENDIX (4) CORE AND RCS HEAT REMOVAL** HR-3: SHUTDOWN COOLING SYSTEM **RECOVERY ACTIONS ALTERNATE ACTIONS** B.1.c (continued) (2) Lower RCS subcooling to as near 25° F as practical by ANY of the following methods: De-energize the Pressurizer HTR(s) Operate Pressurizer SPRAY Secure RCS cooldown IF HPSI throttle criteria are met, THEN throttle the HPSI HDR valves. OR stop the HPSI PPs one at a time (3) Repeat steps B.1.c.(1) through B.1.c.(2) as necessary. NOTE Voids may form in the S/G Tubes if saturation pressure of a S/G is greater than saturation pressure of RCS. CAUTION If voids exist in the S/G Tubes, a rapid RCS pressure reduction will occur when the voids collapse. d. IF voiding is suspected in the S/G tubes. THEN cool the S/G so RCS cooldown rate remains less than 100° F in any one hour by raising ANY of the following: Steaming rate Feed rate S/G Blowdown rate (continue)

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APPENDIX (4) CORE AND RCS HEA	AT REMOVAL
HR-3: SHUTDOWN COOLING SYST	EM
RECOVERY ACTIONS	ALTERNATE ACTIONS
B.1 (continued)	
e. Monitor Pressurizer level and Reactor Vessel level for inventory trends.	
C. ESTABLISH CORE AND RCS HEAT REMOVAL BY SHUTDOWN COOLING.	
1. Verify RCS pressure and temperature is within the limits PER ATTACHMENT (1), <u>RCS PRESSURE TEMPERATURE</u> <u>LIMITS</u> .	
2. WHEN the following conditions exist:	
 CET temperatures are less than 300° F 	
 Pressurizer pressure is less than 270 PSIA 	
 Pressurizer level is greater than 101 inches 	
 RCS subcooling is greater than 25° F based on CET temperatures 	
THEN perform the following actions:	
a. Contact the Operational Support Center to check radiation levels are low enough to allow valve repositioning.	
 b. Initiate Shutdown Cooling PER OI-3B, <u>SHUTDOWN COOLING</u>. 	
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AT REMOVAL
EM
ALTERNATE ACTIONS

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-3: SHUTDOWN COOLING SYSTEM

RECOVERY ACTIONS

ALTERNATE ACTIONS

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C.3 (continued)

- c. IF the plant computer is NOT operating, THEN record the following information:
 - RCS T COLD
 - PZR PRESS
 - SDC HX OUTLET TEMP (2-TI-303X and 2-TI-303Y)
 - Average CNTMT ambient temperature (2-TI-5309 and 2-TI-5311)
 - 27' Penetration Room temperature (2-TI-5276 and 2-TI-5280)
 - Steady State SDC flow rate (2-FIC-306) (following initiation)
- d. Shut 21 CS PP DISCH valve, 2-SI-314.
- e. Shut 22 CS PP DISCH valve, 2-SI-324.
- f. Shut 21 SDC HX OUT TO CS valve, 2-SI-319.
- g. Shut 22 SDC HX OUT TO CS valve, 2-SI-329.
- h. Open 21 SDC HX INLET XCONN valve, 2-SI-452.
- i. Open 21 SDC HX OUTLET TO LPSI HDR valve, 2-SI-456.
- j. Open 22 SDC HX INLET XCONN valve, 2-SI-453.
- k. Open 22 SDC HX OUTLET TO LPSI HDR valve, 2-SI-457.

(continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-3: SHUTDOWN COOLING SYSTEM		
RECOVERY ACTIONS	ALTERNATE ACTIONS	
C.3 (continued)		
I. Verify Component Cooling in service as follows:		
(1) Throttle open BOTH CC HX SW OUT valves:		
 2-HIC-5206 2-HIC-5208 		
(2) Verify BOTH CC HX CC OUT valves are open:		
 2-CC-3824-CV 2-CC-3826-CV 		
(3) Verify TWO CC PPs in operation.		
m. Open 21 SDC HX CC OUT valve, 2-CC-3828-CV.		
n. Open 22 SDC HX CC OUT valve, 2-CC-3830-CV.		
o: Open SDC HX LPSI INL valve, 2-SI-658-MOV.		
p. Place the keyswitch for SDC FLOW CONTR, 2-SI-306-CV in AUTO.		
 q. Shift 2-FIC-306 to MANUAL with a 95% output signal. 		
 IF Hot Leg Injection is being used for core flush, THEN verify 22B LPSI HDR valve, 2-SI-635-MOV, is shut. 		
s. IF Pressurizer Injection is being used for core flush, THEN open 22B LPSI HDR valve, 2-SI-635-MOV.		
(continue)		

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APPENDIX (4) CORE AND RCS HEAT	REMOVAL
HR-3: SHUTDOWN COOLING SYSTEM	
RECOVERY ACTIONS	ALTERNATE ACTIONS
C.3 (continued)	
t. Open LPSI HDR valves:	
 2-SI-615-MOV 2-SI-625-MOV 2-SI-645-MOV 	
 verfiy the CNTMT SUMP DISCH valves are open; 	
 2-SI-4144-MOV 2-SI-4145-MOV 	
v. Shut SI PP RECIRC valves:	
 2-SI-659-MOV 2-SI-660-MOV 	
<u>CAUTION</u> The possibility of cavitation rises when taking suction from the Containment sump.	
w. IF the LPSI PPs are NOT operating, THEN clear RAS from ONE operable LPSI PP and start as follows:	
(1) Place the selected LPSI PP RAS OVERRIDE switch in OVERRIDE.	
(2) Start the selected LPSI PP.	
x. Adjust the signal on 2-FIC-306 to raise flow to 3000 GPM, while maintaining cooldown rate less than 100° F in any one hour.	
y. Place the keyswitch for the S/D COOLING TEMP CONTR, 2-SI-657-CV, in AUTO.	
(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-3: SHUTDOWN COOLING SYSTEM **RECOVERY ACTIONS ALTERNATE ACTIONS** C.3 (continued) CAUTION The heatup rate limit for the Shutdown Cooling Heat Exchangers is 14° F/m. z. Adjust 2-SI-657-CV to obtain less than 14° F/m heatup rate at SDC HX OUT TEMP, 2-TI-303X and 2-TI-303Y. aa. IF a second LPSI PP is desired, THEN perform the following actions: (1) Place the second LPSI PP RAS **OVERRIDE** switch in OVERRIDE. (2) Start the second LPSI PP and adjust 2-FIC-306 to 6000 GPM. ab. Adjust SDC TEMP CONTR valve, 2-SI-657-CV, to obtain the desired cooldown rate. 4. WHEN the following conditions exist: CET temperatures are less than 300° F AND less than 50° F superheated Pressurizer pressure is less than **270 PSIA** Reactor Vessel level is above the middle of the hot leg THEN perform the following actions: a. Contact the Operational Support Center to check radiation levels are low enough to allow valve repositioning. b. Initiate Shutdown Cooling PER OI-3B, SHUTDOWN COOLING. (continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-3: SHUTDOWN COOLING SYSTEM <u>RECOVERY ACTIONS</u> <u>ALTERNATE ACTIONS</u> C. (continued)

- IF core flush is in progress
 AND CET temperatures are less than 200° F,
 THEN secure core flush as follows:
 - a. IF Pressurizer Injection is being used, THEN perform the following actions:
 - (1) IF HPSI PPs are NOT required for RCS pressure or level control, THEN secure HPSI PPs.

CAUTION

Minimum HPSI Pump flow is 90 GPM to prevent pump damage.

- (2) Shut SI TO CHG HDR valve, 2-CVC-269-MOV.
- (3) Open LOOP CHG valves:
 - 2-CVC-518-CV
 - 2-CVC-519-CV
- (4) Shut AUX SPRAY valve, 2-CVC-517-CV.
- b. IF Hot Leg Injection is being used, THEN perform the following actions:
 - (1) Shut SDC RECIRC ISOL valve, 2-SI-399-MOV.
 - (2) Open 22B LPSI HDR valve, 2-SI-635-MOV.

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APPENDIX (4) CORE AND RCS HEA	AT REMOVAL
HR-3: SHUTDOWN COOLING SYST	EM
RECOVERY ACTIONS	ALTERNATE ACTIONS
D. ACCEPTANCE CRITERIA FOR SUCCESS PATH HR-3.	
 Verify Core And RCS Heat Removal is satisfied by the following indications: CET temperatures are less than 300° F, and less than 50° F superheated 	 1.1 IF Core and RCS Heat Removal has NOT been satisfied, THEN PROCEED to the next appropriate Core and RCS Heat Removal Success Path.
NOTE The limits of ATTACHMENT(10), <u>HIGH</u> <u>PRESSURE SAFETY INJECTION FLOW</u> are NOT required to be met if the HPSI throttle criteria are met. • HPSI PPs are injecting water into RCS <u>PER ATTACHMENT(10), HIGH</u> <u>PRESSURE SAFETY INJECTION FLOW</u> • Pressurizer pressure is less than 270 PSIA (245) • Reactor Vessel level indicates the core is covered 2. IF Core and RCS Heat Removal has been established, THEN PROCEED to the next Safety Function to be satisfied.	

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		Ρ	EOP-8 Rev 28/Unit 2 Page 179 of 206
APPENDIX (4	I) CORE AND RCS HEA	TREMOVAL	
HR-4: ONCE	-THROUGH-COOLING		
RECO	VERY ACTIONS	ALTERNATE ACTIONS	
REMOVAL E	I CORE AND RCS HEAT BY OUGH-COOLING.		
1. Ensure ALL F	RCPs are tripped.		
	inventory losses by ensuring lives are shut:		
 2-BD-401 2-BD-401 2-BD-401 2-BD-401 	1-CV 2-CV		
(-)350 inches THEN attemp temperature of	G level is greater than t to maintain RCS constant using the TURB DR the ADV(s).		
4. IF SGIS has I THEN perform	NOT actuated, n the following:		
alarm is r	GIS A BLOCK PERMITTED" accived, ck SGIS A.		
alarm is re	GIS B BLOCK PERMITTED* eccived, ck SGIS B.		
	(continue)		

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-4: ONCE-THROUGH-COOLING

RECOVERY ACTIONS

ALTERNATE ACTIONS

A. (continued)

NOTE

Prior to meeting initiation criteria, with the exception of opening the PORVs, the substeps of A.5 may be performed, and in any order.

<u>NOTE</u>

Perform steps A.5 and A.6 concurrently.

CAUTION

If S/Gs have become ineffective in removing heat, Once-Through-Cooling must be initiated prior to CET temperatures reaching 560° F to ensure adequate RCS and Core Heat Removal.

- 5. IF, at ANY time, ANY of the following conditions exists:
 - BOTH S/G levels are less than
 (-)350 inches
 - TCOLD rises uncontrollably 5° F or greater
 - Once-Through-Cooling has been determined to be required for heat removal

THEN initiate Once-Through-Cooling as follows:

- a. Place ALL Pressurizer HTR handswitches in OFF.
- b. Shut the L/D CNTMT ISOL valves:
 - 2-CVC-515-CV
 - 2-CVC-516-CV

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c. Start ALL available CHG PPs.

(continue)

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APPENDIX (4) CORE AND RCS HEA	AT REMOVAL
HR-4: ONCE-THROUGH-COOLING	
RECOVERY ACTIONS	ALTERNATE ACTIONS
A.5 (continued)	
d. Open BOTH PORVs as follows:	
(1) WHEN the "PZR PRESS BLOCK A PERMITTED" alarm is received, THEN block SIAS A.	
(2) WHEN the "PZR PRESS BLOCK B PERMITTED" alarm is received, THEN block SIAS B.	
(3) Verify BOTH PORV BLOCK valves are OPEN:	
 2-RC-403-MOV 2-RC-405-MOV 	
(4) Place the PORV OVERRIDE handswitches in MANUAL OPEN:	
2-HS-14022-HS-1404	
(5) Verify BOTH PORVs are open.	
e. Start ALL THREE HPSI PPs.	e.1 IF 23 HPSI PP will NOT start, AND 24 4KV Bus is de-energized, THEN perform the following:
	 Align the 23 HPSI PP disconnect to 21 4KV Bus PER OI-27C.
	(2) Start 23 HPSI PP.
(continue)	

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APP	ENDIX (4) CORE AND RCS HEA	AT R	EMOVAL
	: ONCE-THROUGH-COOLING		
	RECOVERY ACTIONS		ALTERNATE ACTIONS
A.5 (c	ontinued)		
f.	Open the HPSI MAIN and AUX HDR valves: MAIN • 2-SI-616-MOV • 2-SI-626-MOV • 2-SI-636-MOV • 2-SI-636-MOV • 2-SI-646-MOV	f.1	IF the HPSI MAIN OR AUX HDR valves will NOT open, THEN open the HPSI HDR XCONN valve, 2-SI-653-MOV.
g.	AUX 2-SI-617-MOV 2-SI-627-MOV 2-SI-637-MOV 2-SI-647-MOV Open ALL CAC EMERGENCY OUT valves.		
h.	Start ALL available CACs in HIGH.		
i.	WHEN RCS pressure is less than 1270 PSIA, THEN verify initiation of Once-Through-Cooling by observing the following:	i.1	IF HPSI flow is NOT PER ATTACHMENT(10), <u>HIGH PRESSURE</u> <u>SAFETY INJECTION FLOW</u> , THEN perform the following actions as necessary:
	 HPSI flow PER ATTACHMENT(10), <u>HIGH</u> <u>PRESSURE SAFETY INJECTION</u> <u>FLOW</u> CET temperatures constant or lowering 		 Ensure electrical power is available to valves and pumps. Verify safety injection system lineup PER ATTACHMENT (2), <u>SIAS</u> <u>VERIFICATION CHECKLIST</u>.
j.	IF SIAS has NOT actuated, THEN prevent high pressurizer level from securing the backup CHG PPs by performing the following actions:		
	 Locally initiate SIAS A6 and B6. IF boration is NOT in progress, THEN place the BA PP handswitches in PULL TO LOCK. 		
	(continue)		

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APPENDIX (4) CORE AND RCS HEA	AT REMOVAL
HR-4: ONCE-THROUGH-COOLING	
RECOVERY ACTIONS	ALTERNATE ACTIONS
A.5 (continued)	
k. Verify minimum equipment to ensure successful Once-Through-Cooling is available PER ATTACHMENT(17), <u>ONCE-THROUGH-COOLING</u> <u>MATRIX</u> .	 k.1 IF minimum equipment to ensure successful Once-Through-Cooling is NOT available, THEN verify BOTH S/Gs are isolated PER step A.6, AND PROCEED to Step G.1.1.
6. Prevent S/G dryout.	
a. WHEN EACH S/G level lowers to (-)380 inches, THEN isolate the S/G by performing the following actions:	
Shut the MSIV(s):	
 (21 S/G) 21 MSIV (22 S/G) 22 MSIV 	
Shut the SG AFW MAIN STM SUPP & BYP valves:	
 (21 S/G)2-MS-4070-CV, 2-MS-4070A-CV (22 S/G)2-MS-4071-CV, 	
• (22 S/G)2-WS-4071-CV, 2-MS-4071A-CV	
Verify the SG BD valves are shut:	
 2-BD-4010-CV 2-BD-4011-CV 	
• 2-BD-4011-CV • 2-BD-4012-CV	
 2-BD-4013-CV 	
 Verify the MSIV BYP valves are shut: 	
• 2-MS-4045-MOV	
• 2-MS-4052-MOV	
Shut the MAIN STM UPSTREAM DRN ISOL VLVS by placing handswitch 2-HS-6622 in CLOSE	
(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL		
HR-4: ONCE-THROUGH-COOLING		
RECOVERY ACTIONS	ALTERNATE ACTIONS	
A.6.a (continued)		
 WHEN at least ONE S/G is less than (-)380 inches, AND BOTH S/G levels are less than (-)350 inches, THEN ensure the ADVs are shut 		
B. ESTABLISH FEEDWATER SOURCE.		
 Determine the desirability of restoring feed capability to a S/G by considering: Plant Status Integrity of the S/Gs Condensate inventory Time remaining until Shutdown Cooling entry conditions are established Adequacy of the cooldown while on Once-Through-Cooling 		

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-4: ONCE-THROUGH-COOLING **RECOVERY ACTIONS ALTERNATE ACTIONS** B. (continued) 2. IF Once-Through-Cooling is in progress AND feedwater will NOT be restored to ANY S/Gs. THEN perform the following actions to isolate BOTH S/Gs: a. Shut SG FW ISOL valves: • (21 S/G) 2-FW-4516-MOV (22 S/G) 2-FW-4517-MOV b. Shut SG AFW BLOCK valves by placing the handswitches in SHUT: 21 S/G 2-AFW-4520-CV 2-AFW-4521-CV 2-AFW-4522-CV 2-AFW-4523-CV 22 S/G 2-AFW-4530-CV 2-AFW-4531-CV • 2-AFW-4532-CV 2-AFW-4533-CV (continue)

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APPENDIX (4) CORE AND RCS HEA	AT REMOVAL
HR-4: ONCE-THROUGH-COOLING	
RECOVERY ACTIONS	ALTERNATE ACTIONS
B.2 (continued)	
c. Shut the ADVs using the Hand Transfer Valves on the West wall of the Unit 2 45 ft Switchgear Room as follows:	 c.1 IF the ADV will NOT shut from 2C43, THEN shut the affected ADV Manual Isolation Valve: (21 S/G) 2-MS-101
(1) Verify the ADV controller on 2C43 is set at 0% output:	• (22 S/G) 2-MS-104
 (21 ADV) 2-HC-4056A (22 ADV) 2-HC-4056B 	
(2) Align the Hand Transfer Valves to 2C43 (POSITION 2):	
21 S/G • 2-HV-3939A • 2-HV-3939B	
22 S/G • 2-HV-3938A • 2-HV-3938B	
d. PROCEED to Block Step D.	
3. Maintain AFW PP suction supply AND CST inventory PER ATTACHMENT (8), <u>MAINTAIN AFW PUMP SUCTION</u> SUPPLY AND CST INVENTORY.	
(continue)	

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APPENDIX (4) CORE AND RCS HEA	AT REMOVAL
HR-4: ONCE-THROUGH-COOLING	
RECOVERY ACTIONS	ALTERNATE ACTIONS
B. (continued)	
<u>NOTE</u> The following steps are alternative methods to establish a feedwater source. Each available method can be attempted until a feedwater source is successfully established.	
4. Attempt to establish AFW.	
 a. Establish AFW flowpath to the S/G(s) by placing the handswitches for the unaffected SG AFW BLOCK valves in OPEN: 21 S/G 2-AFW-4520-CV 2-AFW-4521-CV 2-AFW-4521-CV 2-AFW-4523-CV 22 S/G 2-AFW-4530-CV 2-AFW-4531-CV 2-AFW-4532-CV 2-AFW-4533-CV 2-AFW-4533-CV 	a.1 IF S/G AFW BLOCK valve(s) will NOT open from the control room, THEN locally open valve(s) using the Hand Transfer Station(s) on North wall of SRW Room.
(continue)	

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APPENDIX (4) CORE AND RCS HEA HR-4: ONCE-THROUGH-COOLING	AT REMOVAL
RECOVERY ACTIONS	ALTERNATE ACTIONS
B.4 (continued) <u>NOTE</u> The following substeps are alternative	
methods to establish auxiliary feedwater flow. Each available method can be attempted until auxiliary feed flow is successfully established.	
b. Establish AFW flow with 23 AFW PP as follows:	b.1 Start 23 AFW PP locally as follows:(1) Shut the SG FLOW CONTR valves:
 (1) Shut the SG FLOW CONTR valves: (21 S/G) 2-AFW-4525-CV 	 (21 S/G) 2-AFW-4525-CV (22 S/G) 2-AFW-4535-CV
• (22 S/G) 2-AFW-4535-CV	(2) Verify 23 AFW PP handswitch is in normal.
CAUTION The 23 AFW PP flow limit is 575 GPM. (2) Start 23 AFW PP by placing its	<u>CAUTION</u> The 23 AFW PP flow limit is 575 GPM.
handswitch in START.	(3) Close the AFW PP No. 23 breaker, 152-2415, by pressing the CLOSE button.
(continue)	(continue)

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RECOVERY ACTIONS	ALTERNATE ACTIONS	
B.4.b (continued)	B.4.b.1 (continued)	
	<u>CAUTION</u> Removing control power fuses eliminat bus protection from breaker faults, and overcurrent, undervoltage and ground protection for the breaker.	25
	(4) IF the breaker fails to close, THEN, with the approval of the SM/CRS, perform the following actions:	
	(a) Remove the breaker contro power fuses.	}
	(b) IF necessary, THEN manually charge the breaker closing spring.	
	(c) Press the CLOSE button at AFW PP No. 23 breaker, 152-2415.	
•	(d) Ensure normal pump runnir current less than 70 AMPS	g
(continue)		

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APPENDIX (4) CORE AND RCS HE	AT REMOVAL
HR-4: ONCE-THROUGH-COOLING	
RECOVERY ACTIONS	ALTERNATE ACTIONS
B.4 (continued)	
 c. Establish AFW flow with 21 or 22 AFW PP as follows: (1) Shut the SG FLOW CONTR valves: (21 S/G) 2-AFW-4511-CV (22 S/G) 2-AFW-4512-CV (2) Verify open 21 and 22 AFW PP Main Steam Supply Valves: 2-MS-109 2-MS-107 (3) Verify open 21 OR 22 AFW PP TURB THROTTLE/STOP valve: 2-MS-3986 2-MS-3988 CAUTION An unmonitored radiation release could occur if the AFW Steam Supply Bypass Valve from a S/G affected by a SGTR is opened. (4) Open the SG AFW MAIN STM SUPP & BYP valves from a S/G NOT affected by a SGTR: (21 S/G)2-MS-4070-CV, 2-MS-4070A-CV 	 c.1 Start 21 or 22 AFW PP locally as follows: Shut the SG FLOW CONTR valves: (21 S/G) 2-AFW-4511-CV (22 S/G) 2-AFW-4512-CV (2) Turn the turbine governor control knob counterclockwise to the minimum position. (3) Isolate the Instrument Air to the Turbine Governor Controller(s) by shutting the following valves: <u>21 AFW PP</u> 2-AFW-3987 I/P A ISOL, 2-IA-512 2-AFW-3987 I/P B ISOL, 2-IA-511 <u>22 AFW PP</u> 2-AFW-3989 I/P A ISOL, 2-IA-511 (4) Open the air filter drains on controllers to allow local control. (5) Verify open 21 and 22 AFW PP Main Steam Supply Valves:
 (22 S/G)2-MS-4071-CV, 2-MS-4071A-CV (continue) 	 2-MS-109 2-MS-107 (continue)

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APPEND	DIX (4) CORE AND RCS HEA	AT REMOVAL	
HR-4: 01	NCE-THROUGH-COOLING		
<u>R</u>	RECOVERY ACTIONS	ALTERNATE ACTIONS	_
B.4.c (conti	inued)	B.4.c.1 (continued)	
	Adjust and maintain the turbine driven discharge header pressure at least 100 PSI greater than S/G pressure: • (21 AFW PP SPEED CONTR) 2-HC-3987A • (22 AFW PP SPEED CONTR) 2-HC-3989A Operate AFW ventilation as necessary to maintain temperature less than 130° F.	 (6) Verify open 21 OR 22 AFW PP TURB THROTTLE/STOP valve: 2-MS-3986 2-MS-3988 CAUTION An unmonitored radiation release could occur if the AFW Steam Supply Bypass Valve from a S/G affected by a SGTR is opened. (7) Open the AFW Steam Supply Bypass Valves from a S/G NOT affected by a SGTR: 2-MS-102 2-MS-105 (8) Adjust and maintain the turbine driven discharge header pressure at least 100 PSI greater than S/G pressure using the local turbine governor control knob. (9) Operate AFW ventilation as necessary to maintain temperature less than 130° F.	
	(continue)		

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APPENDIX (4) CORE AND RCS HEAT HR-4: ONCE-THROUGH-COOLING	[REMOVAL
RECOVERY ACTIONS	ALTERNATE ACTIONS
B.4 (continued)	
d. Establish AFW flow with 13 AFW PP as follows:	
(1) Shut the Unit 1 Motor Train S/G AFW BLOCK valves by placing the handswitches in SHUT:	
11 S/G • 1-AFW-4522-CV • 1-AFW-4523-CV	
12 S/G • 1-AFW-4532-CV • 1-AFW-4533-CV	
(2) Open the U-1 TO U-2 XCONN valve, 1-AFW-4550-CV.	
(3) Establish AFW flow with 13 AFW PP as follows:	
(a) Shut the Unit 2 SG FLOW CONTR valves:	
 (21 S/G) 2-AFW-4525-CV (22 S/G) 2-AFW-4535-CV 	
<u>CAUTION</u> The 13 AFW PP flow limit is 575 GPM.	
(b) Start 13 AFW PP by placing its handswitch in START.	
(continue)	
(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-4: ONCE-THROUGH-COOLING

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RECOVERY ACTIONS

ALTERNATE ACTIONS

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B. (continued)

- 5. IF T COLD is less than 465° F, THEN attempt to establish Booster Pump Injection.
 - a. IF SGIS has actuated AND indications of an ESDE are NOT observed, THEN reset SGIS as follows:
 - (1) Place the CBPs in PULL TO LOCK.
 - (2) Match handswitch positions PER ATTACHMENT (7), <u>SGIS</u> VERIFICATION CHECKLIST.
 - (3) Block SGIS.
 - (4) Reset the SGIS signal.
 - (5) Open the MSIV(s).
 - b. Shut the MAIN SG FW REG valves.
 - c. Shift the BYPASS SG FW REG controllers to Manual.
 - d. Depress the SG FRV BYP RESET buttons.
 - e. Manually adjust the BYPASS SG FW REG valve controllers to 0%.
 - f. Verify **BOTH** SG FW ISOL valves are shut:
 - (21 S/G) 2-FW-4516-MOV
 - (22 S/G) 2-FW-4517-MOV
 - g. Open the PRECOAT SYS BYP valve, 2-CD-5818-CV.
 - h. Open the COND DEMIN BYP valve, 2-CD-4439-MOV.

(continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-4: ONCE-THROUGH-COOLING **RECOVERY ACTIONS ALTERNATE ACTIONS** B.5 (continued) i. Verify at least ONE COND PP is running. j. Verify ONE CBP is running. k. Place BOTH HDT PP Handswitches in PULL TO LOCK. 6. IF a feedwater source can NOT be established, THEN PROCEED to Block Step D. C. ESTABLISH S/G HEAT SINK. 1. IF feedwater capability is restored AND Once-Through-Cooling is in progress. THEN evaluate feeding a S/G by considering the following: Plant Status • Auxiliary systems availability Condensate inventory Time remaining until Shutdown Cooling entry conditions are established Adequacy of the cooldown while on Once-Through-Cooling 2. IF NEITHER S/G is to be fed. THEN PROCEED to Block Step D. (continue)

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APPENDIX (4) CORE AND RCS HEA	T REMOVAL
HR-4: ONCE-THROUGH-COOLING	
RECOVERY ACTIONS	ALTERNATE ACTIONS
C. (continued)	· .
<u>NOTE</u> The decision to feed a S/G should be made by the Plant Technical Support Center or the Shift Manager.	
<u>CAUTION</u> If ANY S/G has indicated level, then only the S/G with the highest level should be fed. If BOTH S/Gs are dry, then only ONE S/G should be fed to initiate RCS heat removal.	
 IF the Plant Technical Support Center or Shift Manager recommends feeding a S/G, THEN isolate the S/G which is NOT to be fed as follows: 	
 a. Shut the SG FW ISOL valve for the S/G to be isolated: 	
 (21 S/G) 2-FW-4516-MOV (22 S/G) 2-FW-4517-MOV 	
 b. Shut the SG AFW BLOCK valves for the S/G to be isolated by placing the handswitches in SHUT: 	
21 S/G 2-AFW-4520-CV 2-AFW-4521-CV 2-AFW-4522-CV 2-AFW-4523-CV	,
22 S/G • 2-AFW-4530-CV • 2-AFW-4531-CV • 2-AFW-4532-CV • 2-AFW-4533-CV	
(continue)	

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HR-4: ONCE-THROUGH-COOLING		
	RECOVERY ACTIONS	ALTERNATE ACTIONS
C.3 (c	ontinued)	
C.	Shut the ADV for the S/G to be isolated using the Hand Transfer Valves on the West wall of the Unit 2 45 ft Switchgear Room as follows: (1) Varify the ADV controller on 1C43 is set at 0% output: • (21 ADV) 2-HC-4056A • (22 ADV) 2-HC-4056B (2) Align the Hand Transfer Valves to 2C43 (POSITION 2): 21 S/G • 2-HV-3939A • 2-HV-3939B 22 S/G • 2-HV-3938A • 2-HV-3938B	 c.1 IF the ADV will NOT shut from 2C43, THEN shut the affected ADV Manual Isolation Valve: (21 S/G) 2-MS-101 (22 S/G) 2-MS-104
	(continue)	

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APPENDIX (4) CORE AND RCS HEA	AT REMOVAL
HR-4: ONCE-THROUGH-COOLING	
RECOVERY ACTIONS	ALTERNATE ACTIONS
C. (continued)	
<u>CAUTION</u> If voids exist in the S/G tubes, a rapid RCS pressure reduction will occur when the voids collapse.	
4. Establish feed to the selected S/G.	
a. Verify the ADV is shut.	
b. IF AFW has been restored, THEN perform the following actions:	
 (1) IF AFW has been restored using 23 OR 13 AFW PP, THEN adjust SG FLOW CONTR valve to approximately 150 GPM to the appropriate S/G: 	 (1).1 IF the SG FLOW CONTR valve(s) will NOT open, THEN locally throttle open the appropriate bypass valve(s), located in the SRW Room:
 (21 S/G) 2-AFW-4525-CV (22 S/G) 2-AFW-4535-CV 	 (21 S/G) 2-AFW-195 (22 S/G) 2-AFW-196
 (2) IF AFW has been restored using 21 or 22 AFW PP, THEN adjust SG FLOW CONTR valve to approximately 150 GPM to the appropriate S/G: 	 (2).1 IF the SG FLOW CONTR valve(s) will NOT open, THEN locally throttle open the appropriate bypass valve(s), located in the 27 ft East Penetration Room:
 (21 S/G) 2-AFW-4511-CV (22 S/G) 2-AFW-4512-CV 	 (21 S/G) 2-AFW-163 (22 S/G) 2-AFW-165
(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-4: ONCE-THROUGH-COOLING **RECOVERY ACTIONS** ALTERNATE ACTIONS C.4.b (continued) (3) WHEN S/G level response is observed OR continuous feed has been maintained for at least 5 minutes, THEN feed rate may be slowly raised while maintaining the following: Gradual rise in S/G level S/G level trending towards 0 inches RCS cooldown rate less than 100° F in any one hour CAUTION Rapid or uncontrolled restoration of Main Feedwater may cause a severe waterhammer. c. IF Booster Pump Injection has been restored. THEN perform the following for the S/G to be fed: (1) Open the appropriate SG FW ISOL valve: (21 S/G) 2-FW-4516-MOV ٠ (22 S/G) 2-FW-4517-MOV (2) Throttle open the SG FW REG BYPASS valve to establish a flow of 100 to 160 GPM PER ATTACHMENT(18), MAIN FEEDWATER GOOSENECK PURGE FLOW. (continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-4: ONCE-THROUGH-COOLING

RECOVERY ACTIONS

ALTERNATE ACTIONS

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C.4.c (continued)

- (3) WHEN continuous feed has been maintained for at least 10 minutes,
 THEN feed rate may be slowly raised while maintaining the following:
 - Gradual rise in S/G level
 - S/G level trending towards 0 inches
 - RCS cooldown rate less than 100° F in any one hour

CAUTION

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

- 5. Establish a secondary heat sink as follows:
 - a. Adjust the ADV to establish RCS temperature control.
 - Restore and maintain the level of the S/G being fed to between (-)170 and (+)30 inches.

(continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-4: ONCE-THROUGH-COOLING **ALTERNATE ACTIONS RECOVERY ACTIONS** C. (continued) 6. WHEN a secondary heat sink has been established. THEN reduce Once-Through-Cooling flow as follows: a. IF THREE HPSI PPs are operating, AND HPSI throttle criteria are met THEN stop ONE HPSI PP. b. Stop ALL but ONE CHG PP. CAUTION HPSI flow must be closely monitored to prevent a rapid pressure excursion when the PORV Block Valve is shut. c. Shut the BLOCK valve for ONE PORV. d. Adjust the HPSI flow to maintain RCS subcooling between 25 and 140° F using CET temperatures. e. Adjust the ADV to establish RCS temperature control. 7. IF a S/G heat sink can NOT be established. THEN continue RCS cooldown using Once-Through-Cooling until shutdown cooling entry conditions are reached.

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-	I of 206
APPENDIX (4) CORE AND RCS HEAT REMOVAL	
HR-4: ONCE-THROUGH-COOLING	
RECOVERY ACTIONS ALTERNATE ACTIONS	
D. EVALUATE THE NEED FOR HPSI OR LPSI THROTTLING/TERMINATION.	
1. IF HPSI PPs are operating AND ALL of the following conditions can be maintained:	
At least 25° F subcooling based on CET temperatures	
 Pressurizer level greater than 101 inches {141} 	
At least ONE S/G available for heat removal	
 S/G level greater than (-)170 inches capable of being supplied with feedwater 	
capable of being steamed	
Reactor Vessel level above the top of the hot leg	
Reactivity Control Safety Function Acceptance Criteria are met	
THEN HPSI flow may be reduced by throttling the HPSI HDR valves, or stopping the HPSI PPs one at a time, as desired, to maintain RCS subcooling between 25 and 140° F based on CET temperatures.	
 IF pressurizer pressure is greater than 200 PSIA and constant OR rising, THEN the operating LPSI PPs may be stopped. 	
(continue)	

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APPENDIX (4) CORE AND RCS HE	-		
HR-4: ONCE-THROUGH-COOLING			
RECOVERY ACTIONS	ALTERNATE ACTIONS		
D. (continued)			
3. IF HPSI or LPSI throttle criteria can NOT be maintained after the pumps are throttled or secured, THEN restart the appropriate pumps AND restore full flow.			
E. IF A SECONDARY HEAT SINK HAS BEEN ESTABLISHED, THEN SECURE ONCE-THROUGH-COOLING.			
1. WHEN S/G level is greater than (-)170 inches, THEN secure Once-Through-Cooling as follows:			
a. Ensure Once-Through-Cooling flow has been reduced PER step C.6.			
 b. Verify the HPSI throttle criteria are met. 			
c. Secure the HPSI PPs.			
d. Shut the HPSI HDR valves.			
e. Place the PORV OVERRIDE handswitches in AUTO:			
2-HS-14022-HS-1404			
f. Adjust charging and letdown to maintain RCS subcooling between 25 and 140° F using CET temperatures.			
2. Adjust the ADV to establish natural circulation, and maintain CET temperatures constant or lowering. (continue)			

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		EOP-8 Rev 28/Unit 2 Page 203 of 206
A	PPENDIX (4) CORE AND RCS HEA	AT REMOVAL
HI	R-4: ONCE-THROUGH-COOLING	
	RECOVERY ACTIONS	ALTERNATE ACTIONS
E.	(continued)	
3.	Verify BOTH PORV BLOCK valves are OPEN:	
	 2-RC-403-MOV 2-RC-405-MOV 	
4.	Restore and maintain the level of the S/G being fed between (-)24 inches {0} and (+)30 inches {(+)38}.	
F.	ENSURE INVENTORY CONTROL SUPPORTS HEAT REMOVAL.	
1.	Observe Containment Sump level rises as RWT level lowers.	1.1 IF Containment Sump level does NOT rise as RWT level lowers, THEN perform the follows actions:
		a. Maintain RWT level greater than 2 feet by replenishment from ANY available source.
		<u>NOTE</u> Leakage location may be indicated by sump alarms or room level alarms.
		 Determine the cause for the leakage and attempt to isolate it.
2.	Ensure steps associated with RAS are performed PER the selected RCS Pressure and Inventory Control success path.	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-4: ONCE-THROUGH-COOLING	
RECOVERY ACTIONS	ALTERNATE ACTIONS
G. ACCEPTANCE CRITERIA FOR SUCCESS PATH HR-4.	· · · · · · · · · · · · · · · · · · ·
 Check Core and RCS Heat Removal is satisfied by the following indications: CET temperatures less than 50° F superheated IF RAS has NOT occurred, AND HPSI throttle criteria are NOT met, THEN ALL available Charging Pumps operating NOTE LPSI Pumps are NOT required post-RAS. <u>NOTE</u> Limits in ATTACHMENT(10), <u>HIGH PRESSURE SAFETY INJECTION FLOW</u> and ATTACHMENT(11), LOW PRESSURE 	 1.1 IF Core and RCS Heat Removal has NOT been satisfied, THEN perform the following actions: a. Concurrently perform the recovery actions for the next safety function to be satisfied. b. Determine the appropriate emergency response actions PER the ERPIP. c. IF SIS flow is adequate, THEN perform ANY of the following as necessary to transfer additional heat through the S/Gs: (1) Restore vital auxiliaries necessary to feed at least ONE S/G.
SAFETY INJECTION FLOW are NOT required to be met if SIS throttle criteria are met. • HPSI and LPSI Pumps are injecting	(2) IF remote valve operation fails, THEN operate failed valves locally.
water into the RCS PER ATTACHMENT(10), <u>HIGH</u> <u>PRESSURE SAFETY INJECTION</u> <u>FLOW</u> and ATTACHMENT(11), <u>LOW</u> <u>PRESSURE SAFETY INJECTION</u> <u>FLOW</u> • Pressurizer Pressure less than 1270 PSIA OR is lowering	 (3) Feed the S/Gs from ANY of the following water supplies: Condensate DI Water Well Water System Fire System Bay Water (4) Steam the S/G through ANY of the following paths: TURB BYP values
(continue)	 ADVs SGFPs or AFW PPs MSIV Bypass valves (continue)

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-4: ONCE-THROUGH-COOLING

RECOVERY ACTIONS

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ALTERNATE ACTIONS

G.1 (continued)	G.1.1.c(4) (continued)
	Upstream drains
	d. IF SIS flow is NOT adequate, THEN IMPLEMENT a Core and RCS Heat Removal success path by performing ANY of the following as necessary:
	 Restore vital auxiliaries necessary to regain needed components or subsystems.
	(2) IF remote valve operation fails, THEN operate failed valves locally.
	(3) Fill the RCS from an alternate source.
	(4) Depressurize or cool the RCS to raise or establish SIS flow.
	(5) Steam and feed S/Gs from alternate sources.
-	e. IF BOTH of the following conditions exist:
	AC power is NOT available
	 RCS subcooling can NOT be maintained
	THEN perform BOTH of the following to maintain two-phase natural circulation:
	(1) S/G steaming and feeding are properly controlled.
	(2) Maintain CET temperatures less than 50° F superheated
(continue)	

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APPENDIX (4) CORE AND RCS HEAT REMOVAL HR-4: ONCE-THROUGH-COOLING

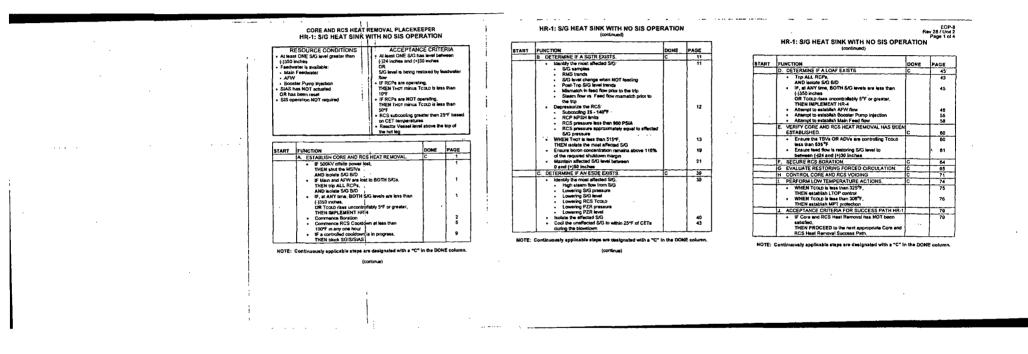
RECOVERY ACTIONS

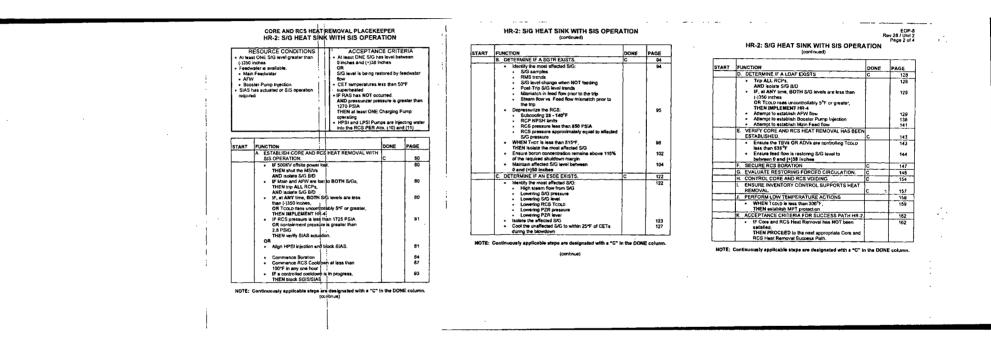
ALTERNATE ACTIONS

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G. (continued)

 IF Core and RCS Heat Removal has been established,
 THEN PROCEED to the next Safety Function to be satisfied.





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CORE AND RCS HEAT REMOVAL PLACEKEEPER HR-3: SHUTDOWN COOLING SYSTEM

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Radiation levels are low enough to allow valve repositioning	ACCEPTANCE CRITERIA CET Temperatures less than 300°F and ess than 50°F superheated HPSI Pumps are injecting water into the RCS PER Att. (10) Pressurizer pressure less than 270{245} Reactor Vessel level indicates the core s covered
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START	FUNCTION		PAGE	
	A. PERFORM LOW TEMPERATURE ACTIONS.	С	163	
	WHEN TCOLD is less than 325°F, THEN establish LTOP control		164	
	WHEN TCOLD is less than 306°F, THEN establish MPT protection.		165	
	B. CONTROL CORE AND RCS VOIDING.	C.	168	
	C. ESTABLISH CORE AND RCS HEAT REMOVAL BY SHUTDOWN COOLING.	с	171	
	D. ACCEPTANCE CRITERIA FOR SUCCESS PATH HR-3.		178	
	IF Core and RCS Heat Removal has NOT been satisfied, THEN PROCEED to the next appropriate Core and RCS Heat Removal Success Path.		178	

CORE AND RCS HEAT REMOVAL PLACEKEEPER HR-4: ONCE-THROUGH-COOLING

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RESOURCE CONDITIONS • HPSI pumps are available • BOTH PORVs are available • Flow path is available	ACCEPTANCE CRITERIA • CET temperatures less than 50°F superheated • IF RAS has NOT occurred.
 RWT is available as a makeup source 	AND HPSI throttle criteria are NOT met THEN ALL available Charging Pumps operating
	HPSI and LPSI Pumps are injecting wate into the RCS PER Atts. (10) and (11) Pressurizer pressure less than 1270 PSI/
	OR is lowering

START	FUNCTION	DONE	PAGE
	A. ESTABLISH CORE AND RCS HEAT REMOVAL BY ONCE-THROUGH-COOLING.	c	179
	Ensure ALL RCPs are tripped		179
· ·	 Isolate S/G B/D 		179
	 Attempt to maintain RCS temperature constant 	l	179
	 IF SGIS has NOT actuated, 		179
	THEN block SGIS		
	NOTE: Prior to meeting initiation onteria, with the exception of		
	opening the PORVs, the substeps of A.5 may be performed, and in		
	any order.		
	Perform S/G dryout step concurrently with initiation of		1
	Once-Through-Cooling.		1
	 IF, at ANY time, ANY of the following conditions 		180
	exist;		
	 BOTH S/G levels are less than (-)350 inches 		
	 TCOLD rises uncontrollably 5°F or greater, 	l	
	 Once-Through-Cooling has been determined 		
	to be required for heat removal THEN initiate Once-Through-Cooling		1
	Verify BOTH PORVs are open		1
	Block SIAS		
	 WHEN EACH S/G level is less than (-)380 inches, 		183
	THEN prevent S/G dryout		1.105
	B. ESTABLISH FEEDWATER SOURCE.	c	184
	IF feedwater will NOT be restored.		185
	THEN isolate BOTH S/Gs		
	 Attempt to establish AFW 		187
	 Attempt to establish Booster Pump Injection 	1	193

NOTE: Continuously applicable steps are designated with a "C" in the DONE column.

(continue)

START	FUNCTION	DONE	PAGE
	C. ESTABLISH S/G HEAT SINK.	c	194
	 Isolate the S/G which is NOT to be fed 		195
	Establish Feed flow	1	197
	 Verify ADV is shut 	ļ	
	 Establish a secondary heat sink 	1	199
	 Adjust ADV 		
	 Restore and maintain S/G level between 	1	
	(-)170 and (+)30 inches		
	Reduce Once-Through-Cooling flow		200
	D. EVALUATE THE NEED FOR HPSI OR LPSI		
	THROTTLING/TERMINATION.	C	201
	IF HPSI PPs are operating		201
	AND ALL of the following conditions can be	1	1
	maintained.		
	 At least 25 °F subcooling based on CET 		1
	temperatures	1	
	Pressurizer level greater than	(
	101 inches (141) • At least ONE S/G available for heat		ľ
	 At least ONE S/G available for heat removal 	· .	
	Reactor Vessel level above the top of		
	the hot leg		
	Reactivity Control Safety Function		
	Acceptance Criteria are met		· ·
	THEN HPSI flow may be reduced.		- ·
	 IF pressurizer pressure is greater than 200 PSIA 	Į	201
	and EITHER constant or rising,		-
	THEN the operating LPSI PPs may be stopped	1	
	E. IF A SECONDARY HEAT SINK HAS BEEN		
	ESTABLISHED,		
	THEN SECURE ONCE-THROUGH-COOLING.		202
	F. ENSURE INVENTORY CONTROL SUPPORTS HEAT		
	REMOVAL.	С	203
	G. ACCEPTANCE CRITERIA FOR SUCCESS PATH HR-4.		204
	 IF Core and RCS Heat Removal has NOT been 		204
	satisfied,		
	THEN perform the following actions:		1
	 Concurrently perform the Recovery actions 		1
	for the next safety function to be satisfied	1	1
	 Determine the appropriate emergency 	1	1
	response actions PER the ERPIP Evaluate further actions		1

HR-4: ONCE-THROUGH-COOLING (continued) EOP-8 Rev 28 / Unit 2 Page 4 of 4

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APPENDIX (5) CONTAINMENT E	NVIRONMENT
CE-1: NO CIS	
RECOVERY ACTIONS	ALTERNATE ACTIONS
A. ESTABLISH CONTAINMENT ENVIRONMENT WITH CONTAINMEN FANS.	vт
1. Verify ALL available CACs are operating	9-
 IF containment pressure exceeds 0.7 PSIG, OR containment temperature exceeds 120° F, THEN open the CAC EMERGENCY OU valves for the operating CACs. 2-SRW-1582-CV 2-SRW-1585-CV 2-SRW-1590-CV 2-SRW-1593-CV 	л
 Check containment radiation monitor alarms are clear with NO unexplained ris 	3.1 Verify ALL available IODINE FILT FANs are running, AND PROCEED to CE-2, CONTAINMENT ISOLATION.
 Verify SRW Pump Room Ventilation is in service PER the <u>SRW Pump Room</u> <u>Ventilation</u> section of OI-15. 	n
(continue)	

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APPENDIX (5) CONTAINMENT ENVIRONMENT

CE-1: NO CIS

RECOVERY ACTIONS

ALTERNATE ACTIONS

A. (continued)

5. IF SIAS has actuated, THEN perform the following actions:

NOTE

Performance of procedure steps and present plant conditions may create acceptable exceptions to the checklist.

CAUTION

To prevent uncontrolled system restoration, handswitches should be matched to the checklist positions unless specified otherwise.

- a. Verify ESFAS equipment is aligned correctly AND handswitches are matched PER ATTACHMENT (2), <u>SIAS</u> VERIFICATION CHECKLIST,
- b. Block the pressurizer pressure signals.

NOTE

Diesel Generator non-essential trips are enabled when SIAS is reset.

- c. Reset the SIAS signals.
- Restore the equipment listed in ATTACHMENT (2), <u>SIAS</u> <u>VERIFICATION CHECKLIST</u> to the desired condition.
- e. Evaluate the Charging Pump suction supply.

(continue)

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APPENDIX (5) CONTAINMENT ENVIRONMENT CE-1: NO CIS

RECOVERY ACTIONS

ALTERNATE ACTIONS

A. (continued)

- 6. IF SIAS has actuated AND has been reset, THEN restore auxiliaries.
 - a. Restore Service Water to the Turbine Building as follows:
 - (1) Verify 11 PA COMPR is operating.
 - (2) Verify the Plant Air To Plant Air Header Valve, 2-PA-2059-CV, is shut.
 - (3) Verify the PA TO IA HDR XCONN valve, 2-PA-2061-CV, is open.
 - (4) Open SRW HDR TURB BLDG ISOL valves:
 - 2-SRW-1600-CV
 - 2-SRW-1637-CV
 - 2-SRW-1638-CV
 - 2-SRW-1639-CV
 - b. Restore an IA COMPR to service as follows:
 - IF a high temperature alarm exists on the IA COMPRs, THEN open the service water isolation valves by placing their override handswitches in OPEN until the temperature alarm clears;
 - (21 IA COMPR) 2-HS-2063
 - (22 IA COMPR) 2-HS-2065
 - (2) Start at least ONE IA COMPR.

(continue)

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APPENDIX (5) CONTAINMENT ENVIRONMENT

CE-1: NO CIS

RECOVERY ACTIONS

ALTERNATE ACTIONS

A.6 (continued)

- c. Restore Instrument Air to the Containment as follows:
 - (1) Open IA CNTMT ISOL valve, 2-IA-2080-MOV.

NOTE

2-HS-2085 is located on the West wall of the 27 ft Switchgear Room and is operated by Key #80 from the Control Room Key Locker.

- (2) Open Containment Instrument Air Supply Valve, 2-IA-2085-CV, by momentarily placing 2-HS-2085 in OPEN.
- IF Component Cooling has been secured to containment, THEN restore flow.

NOTE

RCP CBO and LOWER SEAL temperatures may be obtained from computer trend block 9.

- Record the highest attained RCP CBO and LOWER SEAL temperatures for each RCP:
 - 21A RCP: _____° F / _____° F
 - 21B RCP: ____• F / ____• F
 - 22A RCP: _____ ° F / ____ ° F
 - 22B RCP: ____° F / ____° F
- b. Verify CIS has **NOT** actuated or is reset.

(continue)

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APPENDIX (5) CONTAINMENT ENVIRONMENT CE-1: NO CIS

RECOVERY ACTIONS

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ALTERNATE ACTIONS

A.7 (continued)

CAUTION

Uncontrolled restoration of cooling to hot RCP seals may cause a water hammer and could result in thermal shock of the RCP seal coolers.

- c. IF ALL RCP LOWER SEAL temperatures are less than 280° F, THEN restore Component Cooling flow to Containment by opening the CC CNTMT SUPP and RTN valves:
 - 2-CC-3832-CV
 - 2-CC-3833-CV
- d. IF ANY RCP LOWER SEAL temperature is greater than 280° F, THEN restore Component Cooling Flow to Containment as follows:
 - (1) Shut CONTAINMENT SUPPLY HEADER ISOLATION valve, 2-CC-284, located in the 5 ft East Penetration Room.
 - (2) Open CC CNTMT SUPP and RTN valves:
 - 2-CC-3832-CV
 - 2-CC-3833-CV
 - (3) Slowly open 2-CC-284 to restore component cooling flow.

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APPENDIX (5) CONTAINMENT ENV	-
CE-1: NO CIS	
RECOVERY ACTIONS	ALTERNATE ACTIONS
B. ACCEPTANCE CRITERIA FOR SUCCESS PATH CE-1.	
 Check Containment Environment is satisfied by the following indications: Containment pressure less than 2.8 PSIG Containment temperature less than 220° F Containment radiation alarms are clear with NO unexplained rise 	 1.1 IF Containment Environment has NOT been satisfied, THEN PROCEED to the next appropriate Containment Environment Success Path.
 IF Containment Environment has been established, THEN PROCEED to the next Safety Function to be satisfied. 	

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			EOP-8 Rev 27/Unit 2 Page 7 of 27
A	PPENDIX (5) CONTAINMENT ENV	IRONMENT	
C	E-2: CONTAINMENT ISOLATION		
	RECOVERY ACTIONS	ALTERNATE ACTIONS	
A.	ESTABLISH CONTAINMENT ENVIRONMENT BY CONTAINMENT ISOLATION.		
1.	 IF containment pressure exceeds 2.8 PSIG, THEN verify ESFAS actuation of the following: SIAS CIS 		
2.	IF CIS has actuated, THEN trip ALL RCPs.		
3.	Verify ALL available CACs are operating.		
4.	Open the CAC EMERGENCY OUT valves for the operating CACs: • 2-SRW-1582-CV • 2-SRW-1585-CV • 2-SRW-1590-CV • 2-SRW-1593-CV		
5.	Verify SRW Pump Room Ventilation is in service PER the <u>SRW Pump Room</u> <u>Ventilation</u> section of OI-15.		
	(continue)		

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APPENDIX (5) CONTAINMENT ENVIRONMENT

CE-2: CONTAINMENT ISOLATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

A. (continued)

NOTE

Performance of procedure steps and present plant conditions may create acceptable exceptions to the checklists.

CAUTION

To prevent uncontrolled system restoration, handswitches should be matched to the checklist positions unless specified otherwise.

- Verify ESFAS equipment is aligned correctly AND handswitches are matched PER the following checklists as appropriate:
 - ATTACHMENT (2), <u>SIAS</u> <u>VERIFICATION CHECKLIST</u>
 - ATTACHMENT (4), <u>CIS</u> <u>VERIFICATION CHECKLIST</u>
- 7. Verify ALL available IODINE FILT FANs are running.
- 8. Ensure Chemistry has been directed to place the Hydrogen Monitors in service.
- Establish containment ventilation to prevent local hydrogen accumulation as follows:
 - a. Verify ALL available CACs are operating.
 - Verify ONE CAV CLG and ONE CEDM CLG fan running if available.

(continue)

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APPENDIX	(5) CONTAINMENT ENVI	RONMENT	-
CE-2: CON	ITAINMENT ISOLATION		
REC	COVERY ACTIONS	ALTERNATE ACTIONS	
A. (continued)			
OR hydro determine THEN sta	nt the Hydrogen Recombiners		
THEN cor Support C	en concentration rises to 4.0%, nsult with the Plant Technical Center for guidance to secure the Recombiners.		
recomme Purge Sys THEN ope System P <u>PURGE S</u> Plant Tec	Int Technical Support Center nds the use of the Hydrogen stem, erate the Hydrogen Purge PER OI-41B, <u>HYDROGEN</u> <u>SYSTEM OPERATION</u> , until the hnical Support Center nds its termination.		
B. RESTOR	E THE CONTAINMENT IMENT.		
less than 2 THEN perfe	ntainment pressure drops to 8.8 PSIG, form the following actions: he pressurizer pressure signals.		
Diesel General enabled when	NOTE tor non-essential trips are SIAS is reset.		
b. Reset t	he SIAS signals.		
c. Reset t	he CIS signals.		
	(continue)		

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APPENDIX (5) CONTAINMENT ENVI	-
CE-2: CONTAINMENT ISOLATION	
RECOVERY ACTIONS	ALTERNATE ACTIONS
B.1 (continued)	
<u>CAUTION</u> At least ONE Containment Spray Pump shall remain in operation until Containment temperature can be maintained less than 120° F by the Containment Air Coolers.	
d. Secure ONE CS PP.	
e. Restore the equipment listed in ATTACHMENT (2), <u>SIAS</u> <u>VERIFICATION CHECKLIST</u> AND ATTACHMENT (4), <u>CIS</u> <u>VERIFICATION CHECKLIST</u> to the desired condition.	
 Evaluate the Charging Pump suction supply. 	
 g. WHEN the Plant Technical Support Center recommends securing Containment Spray, THEN secure the remaining CS PP. 	
 Restore Service Water to the Turbine Building as follows: 	
a. Verify 11 PA COMPR is operating.	
 b. Verify the Plant Air To Plant Air Header Valve, 2-PA-2059-CV, is shut. 	
c. Verify the PA TO IA HDR XCONN valve, 2-PA-2061-CV, is open.	
d. Open SRW HDR TURB BLDG ISOL valves:	
 2-SRW-1600-CV 2-SRW-1637-CV 2-SRW-1638-CV 2-SRW-1639-CV 	
(continue)	

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APPENDIX (5) CONTAINMENT ENV	-
CE-2: CONTAINMENT ISOLATION	
RECOVERY ACTIONS	ALTERNATE ACTIONS
B. (continued)	
3. Restore an IA COMPR to service as follows:	
 a. IF a high temperature alarm exists on the IA COMPRs, THEN open the service water isolation valves by placing their override handswitches in OPEN until the temperature alarm clears: 	
 (21 IA COMPR) 2-HS-2063 (22 IA COMPR) 2-HS-2065 	
b. Start at least ONE IA COMPR.	
4. Restore Instrument Air to the Containment as follows:	
a. Open IA CNTMT ISOL valve, 2-IA-2080-MOV.	
<u>NOTE</u> 2-HS-2085 is located on the West wall of the 27 ft Switchgear Room and is operated by Key #80 from the Control Room Key Locker.	
 Dpen Containment Instrument Air Supply Valve, 2-IA-2085-CV, by momentarily placing 2-HS-2085 in OPEN. 	
(continue)	

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APPENDIX (5) CONTAINMENT ENVIRONMENT CE-2: CONTAINMENT ISOLATION RECOVERY ACTIONS ALTERNATE ACTIONS B. (continued) 5. Restore Component Cooling flow to containment. NOTE **RCP CBO and LOWER SEAL temperatures** may be obtained from computer trend block 9. a. Record the highest attained RCP CBO and LOWER SEAL temperatures for each RCP: 21A RCP: _____°F / ____°F 21B RCP: _____°F / ____°F 22A RCP: _____°F / ____°F 22B RCP: _____°F / ____°F b. Verify CIS is reset. CAUTION Uncontrolled restoration of cooling to hot RCP seals may cause a water hammer and could result in thermal shock of the RCP seal coolers. c. IF ALL RCP LOWER SEAL temperatures are less than 280° F. **THEN** restore Component Cooling flow to Containment by opening the CC CNTMT SUPP and RTN valves: • 2-CC-3832-CV 2-CC-3833-CV (continue)

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APPENDIX (5) CONTAINMENT ENVIRONMENT CE-2: CONTAINMENT ISOLATION

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.5 (continued)

- d. IF ANY RCP LOWER SEAL temperature is greater than 280° F, THEN restore Component Cooling Flow to Containment as follows:
 - (1) Shut CONTAINMENT SUPPLY HEADER ISOLATION valve, 2-CC-284, located in the 5 ft East Penetration Room.
 - (2) Open CC CNTMT SUPP and RTN valves:
 - 2-CC-3832-CV
 - 2-CC-3833-CV
 - (3) Slowly open 2-CC-284 to restore component cooling flow.

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		EOP-8 Rev 27/Unit 2 Page 14 of 27
A	PPENDIX (5) CONTAINMENT ENV	IRONMENT
C	E-2: CONTAINMENT ISOLATION	
	RECOVERY ACTIONS	ALTERNATE ACTIONS
C.	ACCEPTANCE CRITERIA FOR SUCCESS PATH CE-2.	
1.	 Check Containment Environment is satisfied by the following indications: Containment pressure less than 4.25 PSIG ALL available CACs are operating with maximum SRW flow ALL containment penetrations required to be shut have an isolation valve shut Hydrogen concentration less than 0.5% OR ALL available hydrogen recombiners are energized with Hydrogen concentration less than 4.0% OR Hydrogen purge operation per Tech Support recommendation 	1.1 IF Containment Environment has NOT been satisfied, THEN PROCEED to the next appropriate Containment Environment Success Path.
2.	IF Containment Environment has been established, THEN PROCEED to the next Safety Function to be satisfied.	

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A	APPENDIX (5) CONTAINMENT ENVIRONMENT				
С	E-3: CONTAINMENT SPRAY				
	RECOVERY ACTIONS	ALTERNATE ACTIONS			
Α.	ESTABLISH CONTAINMENT ENVIRONMENT BY CONTAINMENT SPRAY.				
1.	IF containment pressure exceeds 2.8 PSIG, THEN verify ESFAS actuation of the following:				
	SIASCIS				
2.	IF CIS has actuated, THEN trip ALL RCPs.				
3.	Verify ALL available CACs are operating.				
4.	Open the CAC EMERGENCY OUT valves for the operating CACs:				
	 2-SRW-1582-CV 2-SRW-1585-CV 2-SRW-1590-CV 2-SRW-1593-CV 				
5.	Verify SRW Pump Room Ventilation is in service PER the <u>SRW Pump Room</u> <u>Ventilation</u> section of OI-15.				
6.	IF containment pressure rises to 4.25 PSIG, THEN verify CSAS has actuated and spray flow is approximately 1350 GPM per pump by flow indicators:	•			
	 (21 CS HDR FLOW) 2-FI-4148 (22 CS HDR FLOW) 2-FI-4149 				
	(continue)				
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	EOP-8 Rev 27/Unit 2 Page 16 of 27			
APPENDIX (5) CONTAINMENT ENVIRONMENT				
CE-3: CONTAINMENT SPRAY				
RECOVERY ACTIONS	ALTERNATE ACTIONS			
A. (continued)				
<u>CAUTION</u> The following step provides actions to prevent water hammer damage from CAC voiding.				
<u>CAUTION</u> SRW Pumps start when power is restored to the associated 4KV Bus.				
 IF CSAS has actuated, AND EITHER SRW Header is NOT in operation, THEN perform the following actions: 				
a. JF 21 SRW Header is idle, THEN restart 21 SRW Header as follows:	a.1 IF Containment Pressure exceeded 25 PSIG, THEN perform the following actions:			
 Check that Containment Pressure has remained less than 25 PSIG with 21 SRW Header idle. Attempt to start the desired SRW PP on 21 SRW Header. 	<u>CAUTION</u> 2A DG SRW flow is less than SRW PP minimum flow requirements. This step permits restoration of SRW to supply 2A DG.			
	<u>WARNING</u> High radiation levels may exist in the Auxiliary Building. RAS may significantly raise existing radiation levels.			
,	(1) Restart 21 SRW Header:			
	(a) Shut 21 CAC MAN SUPP 21 SRW SUBSYS, 2-SRW-135, located 27 ft East Pen Room.			
	(b) Shut 22 CAC MAN SUPP 21 SRW SUBSYS, 2-SRW-142, located 5 ft West Pen Room.			
	(c) Attempt to start the desired SRW PP on 21 SRW Header.			
(continue)	(continue)			

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APPENDIX (5) CONTAINMENT	ENVIRONMENT
CE-3: CONTAINMENT SPRAY	
RECOVERY ACTIONS	ALTERNATE ACTIONS
A.7.a (continued)	A.7.a.1(1) (continued)
	(d) Consult with the Plant Technical Support Center for guidance on system restoration.
	(2) IF 21 SRW Header can NOT be restarted, THEN perform the following actions:
	(a) Place the SRW PP(s) aligned to 21 SRW Header in PULL TO LOCK.
	(b) Place 2A DG OUT BKR, 152-2103, in PULL TO LOCK.
	(c) Locally trip the 2A DG fuel racks by pushing the EMERGENCY STOP PUSH TO STOP ENGINE trip device.
١	(d) Consult with the Plant Technical Support Center for guidance on system restoration.
(continue)	

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APPENDIX (5) CONTAINMENT ENVIRONMENT CE-3: CONTAINMENT SPRAY

RECOVERY ACTIONS

ALTERNATE ACTIONS

A.7 (continued)

- b. IF 22 SRW Header is idle, THEN restart 22 SRW Header as follows:
 - (1) Check that Containment Pressure has remained less than 10 PSIG with 22 SRW Header idle.
 - (2) Attempt to start the desired SRW PP on 22 SRW Header.
- b.1 IF Containment Pressure exceeded 10 PSIG, THEN perform the following actions:

CAUTION

2B DG SRW flow is less than SRW PP minimum flow requirements. This step permits restoration of SRW to supply 2B DG.

WARNING

High radiation levels may exist in the Auxiliary Building. RAS may significantly raise existing radiation levels.

- (1) Restart 22 SRW Header:
 - (a) Shut 23 CAC MAN SUPP 22 SRW SUBSYS, 2-SRW-149, located 27 ft East Pen Room.
 - (b) Shut 24 CAC MAN SUPP 22 SRW SUBSYS, 2-SRW-156, located 5 ft West Pen Room.
 - (c) Attempt to start the desired SRW PP on 22 SRW Header.
 - (d) Consult with the Plant Technical Support Center for guidance on system restoration.

(continue)

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(continue)

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	EOP-8 Rev 27/Unit 2 Page 19 of 27
APPENDIX (5) CONTAINMENT ENV	÷
CE-3: CONTAINMENT SPRAY	
RECOVERY ACTIONS	ALTERNATE ACTIONS
A.7.b (continued)	A.7.b.1 (continued)
	 (2) IF 22 SRW Header can NOT be restarted, THEN perform the following actions:
	(a) Place the SRW PP(s) aligned to 22 SRW Header in PULL TO LOCK.
	(b) Place 2B DG OUT BKR, 152-2403, in PULL TO LOCK.
	(c) Locally trip the 2B DG fuel racks by pushing the EMERGENCY STOP PUSH TO STOP ENGINE trip device.
	(d) Consult with the Plant Technical Support Center for guidance on system restoration.
<u>NOTE</u> Performance of procedure steps and present plant conditions may create acceptable exceptions to the checklists.	
<u>CAUTION</u> To prevent uncontrolled system restoration, handswitches should be matched to the checklist positions unless specified otherwise.	
 Verify ESFAS equipment is aligned correctly AND handswitches are matched PER the following checklists as appropriate: 	
 ATTACHMENT (2), <u>SIAS</u> <u>VERIFICATION CHECKLIST</u> ATTACHMENT (3), <u>CSAS</u> <u>VERIFICATION CHECKLIST</u> ATTACHMENT (4), <u>CIS</u> <u>VERIFICATION CHECKLIST</u> 	
(continue)	

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	Page 20 of 2
APPENDIX (5) CONTAINMENT ENVI	RONMENT
CE-3: CONTAINMENT SPRAY	
RECOVERY ACTIONS	ALTERNATE ACTIONS
A. (continued)	
 Verify ALL available IODINE FILT FANs are running. 	
10. Ensure Chemistry has been directed to place the Hydrogen Monitors in service.	
 Establish containment ventilation to prevent local hydrogen accumulation as follows: 	
a. Verify ALL available CACs are operating.	
 b. Verify ONE CAV CLG and ONE CEDM CLG fan running if available. 	
 IF hydrogen concentration rises to 0.5%, OR hydrogen concentration can NOT be determined, THEN start the Hydrogen Recombiners PER 0I-41A, <u>HYDROGEN</u> <u>RECOMBINERS</u>. 	
 IF hydrogen concentration rises to 4.0%, THEN consult with the Plant Technical Support Center for guidance to secure the Hydrogen Recombiners. 	
 IF the Plant Technical Support Center recommends the use of the Hydrogen Purge System, THEN operate the Hydrogen Purge System PER OI-41B, <u>HYDROGEN PURGE SYSTEM OPERATION</u>, until the Plant Technical Support Center recommends its termination. 	

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		· · ·		EOP-8 Rev 27/Unit 2 Page 21 of 27
A	PP	ENDIX (5) CONTAINMENT ENV	RONMENT	
C	E-3	: CONTAINMENT SPRAY		
		RECOVERY ACTIONS	ALTERNATE ACTIONS	
В.	-	RESTORE THE CONTAINMENT INVIRONMENT.		
1.	les TH a. b. c.	HEN containment pressure drops to is than 4.0 PSIG, IEN perform the following actions: Verify the CS HDR handswitches, 2-HS-4150 and 2-HS-4151 in OPEN. Reset the CSAS signals. Verify ALL available CACs are operating to reduce containment temperature. Restore the equipment listed in ATTACHMENT (3), <u>CSAS</u> <u>VERIFICATION CHECKLIST</u> to the desired condition.		

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APPENDIX (5) CONTAINMENT ENVIRONMENT CE-3: CONTAINMENT SPRAY

RECOVERY ACTIONS

ALTERNATE ACTIONS

B. (continued)

- 2. WHEN containment pressure drops to less than 2.8 PSIG, THEN perform the following actions:
 - a. Block the pressurizer pressure signals.

NOTE

Diesel Generator non-essential trips are enabled when SIAS is reset.

- b. Reset the SIAS signals.
- c. Reset the CIS signals.

CAUTION

At least ONE Containment Spray Pump shall remain in operation until Containment temperature can be maintained less than 120° F by the Containment Air Coolers.

- d. Secure ONE CS PP.
- e. Restore the equipment listed in ATTACHMENT (2), <u>SIAS</u> <u>VERIFICATION CHECKLIST</u> **AND** ATTACHMENT (4), <u>CIS</u> <u>VERIFICATION CHECKLIST</u> to the desired condition.
- f. Evaluate the Charging Pump suction supply.
- g. WHEN the Plant Technical Support Center recommends securing Containment Spray, THEN secure the remaining CS PP.

(continue)

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-		L			EOP-8 Rev 27/Unit 2 Page 23 of 27
A	Pi	PI	ENDIX (5) CONTAINMENT ENVI	IRONMENT	
			CONTAINMENT SPRAY	/ 	
	•				
-			RECOVERY ACTIONS	ALTERNATE ACTIONS	
B.	_ (c		ntinued)		
3.	-		estore Service Water to the Turbine allding as follows:		
	ł	э.	Verify 11 PA COMPR is operating.		
	t).	Verify the Plant Air To Plant Air Header Valve, 2-PA-2059-CV, is shut.		
	C	; .	Verify the PA TO IA HDR XCONN valve, 2-PA-2061-CV, is open.		
	¢	ł.	Open SRW HDR TURB BLDG ISOL valves:		
			• 2-SRW-1600-CV		
			 2-SRW-1637-CV 2-SRW-1638-CV 		
			• 2-SRW-1639-CV		
4.			estore an IA COMPR to service as lows:		
	ŧ	ð.	IF a high temperature alarm exists on the IA COMPRs,		
			THEN open the service water isolation		
			valves by placing their override handswitches in OPEN until the	1	
			temperature alarm clears:		
			 (21 IA COMPR) 2-HS-2063 (22 IA COMPR) 2-HS-2065 		
	t).	Start at least ONE IA COMPR.		
			(continuẹ)		
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APPENDIX (5) CONTAINMENT ENVIR	
CE-3: CONTAINMENT SPRAY	
RECOVERY ACTIONS	ALTERNATE ACTIONS
B. (continued)	
5. Restore Instrument Air to the Containment as follows:	
a. Open IA CNTMT ISOL valve, 2-IA-2080-MOV.	
<u>NOTE</u> 2-HS-2085 is located on the West wall of the 27 ft Switchgear Room and is operated by Key #80 from the Control Room Key Locker.	
 Dpen Containment Instrument Air Supply Valve, 2-IA-2085-CV, by momentarily placing 2-HS-2085 in OPEN. 	
 Restore Component Cooling flow to containment. 	
NOTE RCP CBO and LOWER SEAL temperatures may be obtained from computer trend block 9.	
a. Record the highest attained RCP CBO and LOWER SEAL temperatures for each RCP:	
 21A RCP:°F /°F 21B RCP:°F /°F 22A RCP:°F /°F 22B RCP:°F /°F 	
b. Verify CIS is reset.	
(continue)	

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APPENDIX (5) CONTAINMENT ENVIRONMENT CE-3: CONTAINMENT SPRAY

RECOVERY ACTIONS

ALTERNATE ACTIONS

B.6 (continued)

CAUTION

Uncontrolled restoration of cooling to hot RCP seals may cause a water hammer and could result in thermal shock of the RCP seal coolers.

- c. IF ALL RCP LOWER SEAL temperatures are less than 280° F, THEN restore Component Cooling flow to Containment by opening the CC CNTMT SUPP and RTN valves:
 - 2-CC-3832-CV
 - 2-CC-3833-CV
- d. IF ANY RCP LOWER SEAL temperature is greater than 280° F, THEN restore Component Cooling Flow to Containment as follows:
 - (1) Shut CONTAINMENT SUPPLY HEADER ISOLATION valve, 2-CC-284, located in the 5 ft East Penetration Room.
 - (2) Open CC CNTMT SUPP and RTN valves:
 - 2-CC-3832-CV
 - 2-CC-3833-CV
 - (3) Slowly open 2-CC-284 to restore component cooling flow.

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APPENDIX (5) CONTAINMENT ENVIRONMENT				
CE-3: CONTAINMENT SPRAY				
RECOVERY ACTIONS	ALTERNATE ACTIONS			
C. ACCEPTANCE CRITERIA FOR SUCCESS PATH CE-3.				
 Check Containment Environment is satisfied by the following indications: Containment pressure less than 50 PSIG ALL available CACs are operating with maximum SRW flow Containment spray flow is greater than 1350 GPM per pump, if operating ALL containment penetrations required to be shut have an isolation valve shut Hydrogen concentration less than 0.5% OR ALL available hydrogen recombiners are energized with Hydrogen concentration less than 4.0% OR Hydrogen purge operation per Tech Support recommendation 	 1.1 IF Containment Environment has NOT been satisfied, THEN perform the following actions: a. Concurrently perform the recovery actions for the next safety function to be satisfied. b. Determine the appropriate emergency response actions PER the ERPIP. c. IF Containment Cooling has been lost, THEN consider consulting the Technical Support Center about deinerting the Containment prior to reinitiating Containment Cooling. d. Evaluate further actions based on the following considerations: The urgency of other jeopardized safety functions. Rate of change of containment temperature and pressure, and potential for damage to the containment. Rate of change of containment hydrogen concentration, and potential for hydrogen burn. 			
(continue)	(continue)			

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EOP Rev 27/Unit Page 27 of 2 APPENDIX (5) CONTAINMENT ENVIRONMENT CE-3: CONTAINMENT SPRAY	
RECOVERY ACTIONS	ALTERNATE ACTIONS
C.1 (continued)	 C.1.1.d (continued) (4) The feasibility of restoring a success path by performing ANY of the following: Restoring the vital auxiliaries necessary to operate components or systems in the success paths Manual operation of valves Use of alternate components to implement a success path
 IF Containment Environment has been established, THEN PROCEED to the next Safety Function to be satisfied. 	

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CONTAINMENT ENVIRONMENT PLACEKEEPER CE-1: NO CIS

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RESOURCE CO	NDITIONS	ACCEPTANCE CRITERIA
Containment pressure le	ss than 2.8 PSIG	 Containment pressure less than 2.8 PSIG
 CIS has NOT actuated 		 Containment temperature less than
OR has been reset		220°F
 Containment radiation al 	arms are clear	 Containment radiation alarms are clear
with NO unexplained rise		with NO unexplained rise

START	FUNCTION	DONE	PAGE
	A. ESTABLISH CONTAINMENT ENVIRONMENT WITH CONTAINMENT FANS.	с	1
	Verify ALL available CACs are operating IF SIAS has actuated, THEN perform the following actions: SIAS VERIFICATION CHECKLIST Reset SIAS		1 2
	B. ACCEPTANCE CRITERIA FOR SUCCESS PATH CE-1.		6
	IF Containment Environment has NOT been satisfied, THEN PROCEED to the next appropriate Containment Environment Success Path.		6

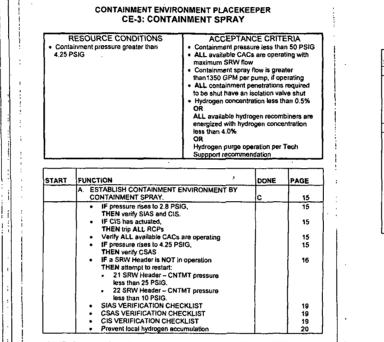
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CONTAINMENT ENVIRONMENT PLACEKEEPER CE-2: CONTAINMENT ISOLATION

RESOURCE CONDITIONS Containment pressure less than 4.25 PSIG CSAS has NOT actuated OR has been reset 	ACCEPTANCE CRITERIA • Containment pressure less than 4.25 PSIG • ALL available CACs are operating with maximum SRW flow • ALL containment penetrations required to be shut have an isolation valve shut • Hydrogen concentration less than 0.5% OR	
	ALL available hydrogen recombiners are energized with hydrogen concentration less than 4.0% OR Hydrogen purge operation per Tech Suppport recommendation	

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START	FUNCTION	DONE	PAGE
	A. ESTABLISH CONTAINMENT ENVIRONMENT BY CONTAINMENT ISOLATION.	с	7
	IF pressure rises to 2.8 PSIG, THEN verify SIAS and CIS,		7
	IF CIS has actuated, THEN trip ALL RCPs		7
	 Verify ALL available CACs are operating 		7.
	SIAS VERIFICATION CHECKLIST]	8
	CIS VERIFICATION CHECKLIST	1	8
	Prevent local hydrogen accumulation		8
	B. RESTORE THE CONTAINMENT ENVIRONMENT.	С	9
	WHEN pressure is less than 2.8 PSIG, THEN reset SIAS, CIS AND secure ONE CS PP		9
	C. ACCEPTANCE CRITERIA FOR SUCCESS PATH CE-2.		14
	IF Containment Environment has NOT been satisfied, THEN PROCEED to the next appropriate		14
	Containment Environment Success Path.		1

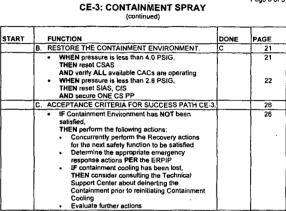


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NOTE: Continuously applicable steps are designated with a "C" in the DONE column.

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APPENDIX (6) RADIATION LEVELS EXTERNAL TO CONTAINMENT				
RECOVERY ACTIONS		ALTERNATE ACTIONS		
VERIFY NORMAL RADIATION LEVELS EXTERNAL TO CONTAINMENT.				
 with NO unexplained rise: "U-2 WIDE RANGE NOBLE GAS MON" (2-RIC-5415) "UNIT 2 CNDSR OFF-GAS" (2-RI-1752) "UNIT 2 S/G B/D" (2-RI-4014) "UNIT 2 MAIN VENT GASEOUS" 		IF a valid "UNIT 2 CNDSR OFF-GAS" or "UNIT 2 S/G B/D" alarm is received, THEN secure S/G Blowdown, IMPLEMENT RLEC-2, <u>CONTAINMENT</u> ISOLATED.		
occurred, THEN verify the following containment isolation valves are shut: • CNTMT NORMAL SUMP DRN, 2-EAD-5462-MOV • CNTMT NORMAL SUMP DRN, 2-EAD-5463-MOV • H2 PURGE INBD ISOL, 2-HP-6900-MOV • H2 PURGE OUTBD ISOL,		IF Containment Normal Sump Drain valves can NOT be verified shut from the control room, THEN locally check shut the valves. IF H2 Purge Valves can NOT be verified shut from the control room, THEN locally check shut 2-HP-6901-MOV.		
IF 500KV Offsite Power was lost, AND power has been restored, THEN restore the associated Radiation Monitors to service.				
	LEC-1:NORMAL LEVELS RECOVERY ACTIONS VERIFY NORMAL RADIATION LEVELS EXTERNAL TO CONTAINMENT. Check the following RMS alarms are clear with NO unexplained rise: • "U-2 WIDE RANGE NOBLE GAS MON" (2-RIC-5415) • "UNIT 2 CNDSR OFF-GAS" (2-RI-1752) • "UNIT 2 S/G B/D" (2-RI-4014) • "UNIT 2 MAIN VENT GASEOUS" (2-RI-5415) IF a loss of ALL Vital 4KV buses has occurred, THEN verify the following containment isolation valves are shut: • CNTMT NORMAL SUMP DRN, 2-EAD-5462-MOV • CNTMT NORMAL SUMP DRN, 2-EAD-5463-MOV • M2 PURGE INBD ISOL, 2-HP-6900-MOV • H2 PURGE INBD ISOL, 2-HP-6901-MOV IF containment pressure exceeds 2.8 PSIG, THEN IMPLEMENT RLEC-2, CONTAINMENT ISOLATED. IF 500KV Offsite Power was lost, AND power has been restored, THEN restore the associated Radiation	LEC-1:NORMAL LEVELS RECOVERY ACTIONS VERIFY NORMAL RADIATION LEVELS EXTERNAL TO CONTAINMENT. Check the following RMS alarms are clear with NO unexplained rise: 1.1 • "U-2 WIDE RANGE NOBLE GAS MON" (2-RIC-5415) 1.1 • "U-2 WIDE RANGE NOBLE GAS MON" (2-RIC-5415) 1.2 • "UNIT 2 CNDSR OFF-GAS" (2-RI-1752) 1.2 • "UNIT 2 S/G B/D" (2-RI-4014) 1.2 • "UNIT 2 S/G B/D" (2-RI-4014) 1.2 • "UNIT 2 MAIN VENT GASEOUS" (2-RI-5415) 2.1 IF a loss of ALL Vital 4KV buses has occurred, THEN verify the following containment isolation valves are shut: 2.1 • CNTMT NORMAL SUMP DRN, 2-EAD-5462-MOV 2.2 • CNTMT NORMAL SUMP DRN, 2-EAD-5463-MOV 2.2 • CNTMT NORMAL SUMP DRN, 2-EAD-5463-MOV 2.2 • LP PURGE OUTBD ISOL, 2-HP-6901-MOV 2.4 IF containment pressure exceeds 2.8 PSIG, THEN IMPLEMENT RLEC-2, CONTAINMENT ISOLATED 1 IF 500KV Offsite Power was lost, AND power has been restored, THEN restore the associated Radiation 1		

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APPENDIX (6) RADIATION LEVELS	EXTERNAL TO CONTAINMENT
RLEC-1:NORMAL LEVELS	
RECOVERY ACTIONS	ALTERNATE ACTIONS
B. ACCEPTANCE CRITERIA FOR SUCCESS PATH RLEC-1.	
 Check Radiation Levels External to Containment is satisfied by the following indications: "U-2 WIDE RANGE NOBLE GAS MON" (2-RIC-5415) alarm clear with NO unexplained rise "UNIT 2 CNDSR OFF-GAS" (2-RI-1752) alarm clear with NO unexplained rise "UNIT 2 S/G B/D" (2-RI-4014) alarm clear with NO unexplained rise "UNIT 2 MAIN VENT GASEOUS" (2-RI-5415) alarm clear with NO unexplained rise "UNIT 2 MAIN VENT GASEOUS" (2-RI-5415) alarm clear with NO unexplained rise IF Radiation Levels External to Containment has been established, THEN PROCEED to the next Safety Function to be satisfied. 	1.1 IF Radiation Levels External to Containment has NOT been satisfied, THEN PROCEED to the next appropriate Radiation Levels External to Containment Success Path.

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APPENDIX (6) RADIATION LEVELS EXTERNAL TO CONTAINMENT						
RLEC-2:CONTAINMENT ISOLATED						
RECOVERY ACTIONS	ALTERNATE ACTIONS					
A. ESTABLISH RADIATION LEVELS EXTERNAL TO CONTAINMENT BY CONTAINMENT ISOLATION.						
 Check the following RMS alarms are clear with NO unexplained rise: 	1.1 IF a valid "UNIT 2 CNDSR OFF-GAS" or "UNIT 2 S/G B/D" alarm is received, THEN secure S/G Blowdown.					
 "U-2 WIDE RANGE NOBLE GAS MON" (2-RIC-5415) 						
 "UNIT 2 CNDSR OFF-GAS" (2-RI-1752) 						
• "UNIT 2 S/G B/D" (2-RI-4014)						
 "UNIT 2 MAIN VENT GASEOUS" (2-RI-5415) 						
(continue)						

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APPENDIX (6) RADIATION LEVELS EXTERNAL TO CONTAINMENT RLEC-2:CONTAINMENT ISOLATED RECOVERY ACTIONS ALTERNATE ACTIONS A. (continued) 2. IF leakage into Component Cooling is indicated by: Rise on UNIT 2 CC radiation monitor, 2-RI-3819 "CC HEAD TK LVL" high alarm THEN perform the following: a. Verify L/D CNTMT ISOL valves are shut: • 2-CVC-515-CV • 2-CVC-516-CV b. IF shutting the L/D CNTMT ISOL valves did NOT isolate the leak, THEN perform the following: (1) Trip ALL RCPs. (2) Shut the CC CNTMT SUPP and **RTN valves:** • 2-CC-3832-CV 2-CC-3833-CV 3. IF containment pressure exceeds 2.8 PSIG, THEN verify ESFAS actuation of the following: SIAS CIS 4. IF containment pressure rises to 4.25 PSIG, THEN verify CSAS has actuated. (continue)

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APPENDIX (6) RADIATION LEVELS RLEC-2:CONTAINMENT ISOLATED	
RECOVERY ACTIONS	ALTERNATE ACTIONS
A. (continued)	
 5. IF a loss of ALL Vital 4KV buses has occurred, THEN verify the following containment isolation valves are shut: CNTMT NORMAL SUMP DRN, 2-EAD-5462-MOV CNTMT NORMAL SUMP DRN, 2-EAD-5463-MOV H2 PURGE INBD ISOL, 2-HP-6900-MOV H2 PURGE OUTBD ISOL, 2-HP-6901-MOV 	 5.1 IF Containment Normal Sump Drain valves can NOT be verified shut from the control room, THEN locally check shut the valves. 5.2 IF H₂ Purge Valves can NOT be verified shut from the control room, THEN locally check shut 2-HP-6901-MOV.
 6. IF a SGTR has occurred as indicated by ANY of the following: S/G samples RMS trends: UNIT 2 CNDSR OFF-GAS (2-RI-1752) UNIT 2 S/G B/D (2-RI-4014) UNIT 2 MAIN VENT GASEOUS (2-RI-5415) MAIN STM EFFL RAD MON (2-RIC-5421) S/G level change when NOT feeding Post-Trip S/G level trends Mismatch in feed flow prior to the trip Steam flow vs. Feed flow mismatch prior to the trip THEN identify the most affected S/G. (continue)	

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APPENDIX (6) RADIATION LEVELS EXTERNAL TO CONTAINMENT				
RLEC-2:CONTAINMENT ISOLATED				
RECOVERY ACTIONS	ALTERNATE ACTIONS			
A. (continued)				
7. IF a tube rupture is identified in a S/G, THEN commence working the appropriate Heat Removal success path until the affected OR most affected S/G is isolated.				
<u>CAUTION</u> The following step provides actions to prevent water hammer damage from CAC volding.				
<u>CAUTION</u> SRW Pumps start when power is restored to the associated 4KV Bus.				
8. IF CSAS has actuated, AND EITHER SRW Header is NOT in operation, THEN perform the following actions:				
a. IF 21 SRW Header is idle, THEN restart 21 SRW Header as follows:	a.1 IF Containment Pressure exceeded 25 PSIG, THEN perform the following actions:			
 Check that Containment Pressure has remained less than 25 PSIG with 21 SRW Header idle. 	<u>CAUTION</u> 2A DG SRW flow is less than SRW PP minimum flow requirements. This step			
(2) Attempt to start the desired SRW PP on 21 SRW Header.	permits restoration of SRW to supply 2A DG.			
	<u>WARNING</u> High radiation levels may exist in the Auxiliary Building. RAS may significantly raise existing radiation levels.			
	(1) Restart 21 SRW Header:			
	(a) Shut 21 CAC MAN SUPP 21 SRW SUBSYS, 2-SRW-135, located 27 ft East Pen Room.			
(continue)	(continue)			

EOP-8 Rev 27/Unit 2 Page 7 of 16
EXTERNAL TO CONTAINMENT
ALTERNATE ACTIONS
A.8.a.1(1) (continued)
(b) Shut 22 CAC MAN SUPP 21 SRW SUBSYS, 2-SRW-142, located 5 ft West Pen Room.
(c) Attempt to start the desired SRW PP on 21 SRW Header.
(d) Consult with the Plant Technical Support Center for guidance on system restoration.
(2) IF 21 SRW Header can NOT be restarted, THEN perform the following actions:
(a) Place the SRW PP(s) aligned to 21 SRW Header in PULL TO LOCK.
(b) Place 2A DG OUT BKR, 152-2103, in PULL TO LOCK.
(c) Locally trip the 2A DG fuel racks by pushing the EMERGENCY STOP PUSH TO STOP ENGINE trip device.
(d) Consult with the Plant Technical Support Center for guidance on system restoration.
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APPENDIX (6) RADIATION LEVELS EXTERNAL TO CONTAINMENT RLEC-2:CONTAINMENT ISOLATED

RECOVERY ACTIONS

ALTERNATE ACTIONS

A.8 (continued)

- b. IF 22 SRW Header is idle, THEN restart 22 SRW Header as follows:
 - (1) Check that Containment Pressure has remained less than 10 PSIG with 22 SRW Header idle.
 - (2) Attempt to start the desired SRW PP on 22 SRW Header.
- b.1 IF Containment Pressure exceeded 10 PSIG, THEN perform the following actions:

CAUTION

2B DG SRW flow is less than SRW PP minimum flow requirements. This step permits restoration of SRW to supply 2B DG.

WARNING

High radiation levels may exist in the Auxiliary Building. RAS may significantly raise existing radiation levels.

- (1) Restart 22 SRW Header:
 - (a) Shut 23 CAC MAN SUPP 22 SRW SUBSYS, 2-SRW-149, located 27 ft East Pen Room.
 - (b) Shut 24 CAC MAN SUPP 22 SRW SUBSYS, 2-SRW-156, located 5 ft West Pen Room.
 - (c) Attempt to start the desired SRW PP on 22 SRW Header.
 - (d) Consult with the Plant Technical Support Center for guidance on system restoration.

(continue)

(continue)

			EOP-8 Rev_27/Unit 2 Page 9 of 16	
APPENDIX (6) RADIATION LEVELS EXTERNAL TO CONTAINMENT				
RLEC-2:CONTAINMENT ISOLATED				
RECOVERY ACTIONS		<u>ALTI</u>	ERNATE ACTIONS	
A.8.b (continued)	A.8.b.1 (conti	nued)	
	(2)	rest	2 SRW Header can NOT be arted, EN perform the following actions:	
		(a)	Place the SRW PP(s) aligned to 22 SRW Header in PULL TO LOCK.	
		(b)	Place 2B DG OUT BKR, 152-2403, in PULL TO LOCK.	
		(c)	Locally trip the 2B DG fuel racks by pushing the EMERGENCY STOP PUSH TO STOP ENGINE trip device.	
		(d)	Consult with the Plant Technical Support Center for guidance on system restoration.	
NOTE Performance of procedure steps and present plant conditions may create acceptable exceptions to the checklists. <u>CAUTION</u> To prevent uncontrolled system restoration, handswitches should be matched to the checklist positions unless specified otherwise. 9. Verify ESFAS equipment is aligned				
 Verify ESFAS equipment is aligned correctly AND handswitches are matched PER the following checklists as appropriate: 				
 ATTACHMENT (2), <u>SIAS</u> <u>VERIFICATION CHECKLIST</u> ATTACHMENT (3), <u>CSAS</u> <u>VERIFICATION CHECKLIST</u> ATTACHMENT (4), <u>CIS</u> <u>VERIFICATION CHECKLIST</u> 				
(continue)				

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APPENDIX (6) RADIATION LEVELS EXTERNAL TO CONTAINMENT RLEC-2:CONTAINMENT ISOLATED

RECOVERY ACTIONS

ALTERNATE ACTIONS

A. (continued)

- IF ANY automatic Containment Isolation valve fails to shut, OR ANY manual Containment Isolation valve is open, THEN shut the affected valve(s) OR the next valve out from the appropriate penetration.
- 11. IF a tube rupture is identified in a S/G, THEN control secondary system contamination.
 - a. Minimize the spread of contamination by performing the following:
 - (1) Ensure the Unit 2 Turbine Building Sump Pumps are in STOP.
 - (2) Isolate Condensate Dump to 21 CST by verifying the following valves are shut:
 - CONDENSER HOTWELL
 HIGH LEVEL DUMP CV-4405
 INLET VALVE, 2-CD-232
 - CONDENSER HOTWELL HIGH LEVEL DUMP CV-4405 BYPASS VALVE, 2-CD-234
 - (3) Reduce moisture carryover into the CAR Discharge Header by fully opening the CONDENSER AIR REMOVAL PUMP SERVICE WATER OUTLET VALVES:
 - (21 CAR) 2-SRW-211
 - (22 CAR) 2-SRW-215
 - (23 CAR) 2-SRW-219
 - (24 CAR) 2-SRW-223

(continue)

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APPENDIX (6) RADIATION LEVELS EXTERNAL TO CONTAINMENT RLEC-2:CONTAINMENT ISOLATED ALTERNATE ACTIONS **RECOVERY ACTIONS** A_11.a (continued) (4) Ensure Condensate to Circ Water Dump is isolated by verifying the following valves shut: CONDENSER DUMP TO CIRCULATING WATER **ISOLATION VALVE,** 2-CD-239 CONDENSATE DUMP TO **CIRCULATING WATER** BYPASS VALVE, 2-CD-240 (5) Ensure condenser expansion joints are NOT overflowing by verifying the CONDENSER **EXPANSION JOINT FILL** VALVEs are shut: (21 Condenser) 2-CD-306 ٠ (22 Condenser) 2-CD-307 • (23 Condenser) 2-CD-308 (6) Verify shut SERVICE WATER HEAD TANK MAKEUP VALVE, 2-CD-144. (7) Verify shut COMPONENT COOLING HEAD TANK MAKEUP VALVE, 2-CD-145. (8) Notify Plant Chemistry to secure the Hotwell sample pumps and isolate the Condensate Demin and Turbine Plant sample sinks. (continue)

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	Page 12 of 16
APPENDIX (6) RADIATION LEVELS	EXTERNAL TO CONTAINMENT
RLEC-2:CONTAINMENT ISOLATED	
RECOVERY ACTIONS	ALTERNATE ACTIONS
A.11 (continued)	
 b. Control the volume of contaminated condensate inventory by performing the following: 	
<u>CAUTION</u> Operating CAR PPs with condenser hotwell level greater than 12 feet may draw excessive water into the CAR PPs.	
<u>CAUTION</u> Operating a SGFP with condenser hotwell level greater than 12 feet may actuate the high exhaust casing level trip.	
(1) IF condenser hotwell level exceeds 12 feet, THEN perform the following:	
(a) Ensure Auxiliary Feedwater flow is established to the unaffected S/G.	
(b) IF a SGFP is in operation, THEN secure the SGFP.	
(c) Secure the CAR PPs.	
(2) IF condenser hotwell level exceeds 14 feet, THEN shut the COND SHELL STOPs:	
 2-CAR-101 2-CAR-102 2-CAR-103 	
 2-CAR-104 2-CAR-105 2-CAR-106 	
(continue)	

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APPENDIX (6) RADIATION LEVELS EXTERNAL TO CONTAINMENT RLEC-2:CONTAINMENT ISOLATED

RECOVERY ACTIONS

ALTERNATE ACTIONS

A.11.b (continued)

<u>NOTE</u>

Using the TURB BYP valves with Condensate/Main Feedwater will enable greater cooldown capability without raising contaminated condensate inventory.

CAUTION

An unmonitored radiation release could occur if the ADVs are in use and Condensate/Main Feedwater is used to feed the unaffected S/G.

- (3) IF Auxiliary Feedwater is being used to feed the unaffected S/G, THEN attempt to restore the TURB BYP valves, AND Condensate/Main Feedwater to operation PER the appropriate procedure.
- (4) IF Auxiliary Feedwater is being used to feed the unaffected S/G, THEN isolate Condensate Makeup from 21 CST by performing the following:
 - (a) Shut the Hotwell Makeup CV by shifting 2-LIC-4405 to MANUAL with 100% output.
 - (b) Verify CONDENSER HOTWELL MAKEUP CV-4406 BYPASS VALVE, 2-CD-238, is shut.

(continue)

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EOP-8 Rev 27/Unit 2 Page 14 of 16

APPENDIX (6) RADIATION LEVELS EXTERNAL TO CONTAINMENT RLEC-2:CONTAINMENT ISOLATED

RECOVERY ACTIONS

ALTERNATE ACTIONS

A.11.b (continued)

- (5) Ensure the Auxiliary Boiler Condensate returns are aligned to Unit 1 by verifying the following:
 - (a) 0-AHB-210, DEAERATOR OVERFLOW TO 11 CONDENSER ISOLATION VALVE, is open.
 - (b) 0-AHB-211, DEARATOR OVERFLOW TO 21 CONDENSER ISOLATION VALVE, is shut.
- (6) Ensure the RC Waste Evaporators are aligned to Unit 1 or the Auxiliary Boilers PER OI-17E, <u>REACTOR COOLANT</u> <u>WASTE EVAPORATOR</u> <u>OPERATION.</u>
- (7) Ensure Plant Heating is aligned to Unit 1 Reheat Steam or the Auxiliary Boilers PER OI-40, PLANT HEATING SYSTEM.
- 12. IF 500KV Offsite Power was lost, AND power has been restored, THEN restore the associated Radiation Monitors to service.

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	PPENDIX (6) RADIATION LEVELS	
	RECOVERY ACTIONS	ALTERNATE ACTIONS
B.	ACCEPTANCE CRITERIA FOR SUCCESS PATH RLEC-2.	
1.	Check Radiation Levels External to Containment is satisfied by EITHER of the following indications: ALL of the following alarms are clear with NO unexplained rise: "U-2 WIDE RANGE NOBLE GAS MON" (2-RIC-5415) "UNIT 2 CNDSR OFF-GAS" (2-RI-1752) "UNIT 2 S/G B/D" (2-RI-4014) "UNIT 2 MAIN VENT GASEOUS" (2-RI-5415) OR ALL containment penetrations required to be shut have an isolation valve shut. IF a tube rupture is identified in a S/G: ALL release paths from the affected S/G to the environment are isolated Affected S/G pressure less than 920 PSIA	 1.1 IF Radiation Levels External to Containment has NOT been satisfied, THEN perform the following actions: a. Concurrently perform the recovery actions for the next safety function to be satisfied. b. Determine the appropriate emergency response actions PER the ERPIP. c. Evaluate further actions based on the following considerations: The urgency of other jeopardized safety functions. The risk to plant personnel and the public of leaving certain containment penetrations unisolated The feasibility of isolating the containment penetration(s) by alternate methods (4) The feasibility of restoring a success path by performing ANY of the following: Restoring the vital auxiliaries necessary to operate components or systems in the success paths Manual operation of valves
		 Use of alternate components to implement a success path

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APPENDIX (6) RADIATION LEVELS EXTERNAL TO CONTAINMENT RLEC-2:CONTAINMENT ISOLATED			
RECOVERY ACTIONS	ALTERNATE ACTIONS		
. (continued)			
 IF Radiation Levels External to Containment has been established, THEN PROCEED to the next Safety Function to be satisfied. 			
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START	FUNCTION	DONE	PAGE
	A. VERIFY NORMAL RADIATION LEVELS EXTERNAL TO CONTAINMENT.	с	1
	 IF radiation detected outside containment, THEN IMPLEMENT RLEC-2 IF a loss of ALL Vital 4KV buses has occurred, THEN verify Containment Normal Sump and H₂ 		1
	Purge Isolation valves are shut IF containment pressure exceeds 2.8 PSIG, THEN IMPLEMENT RLEC-2 		1
	B. ACCEPTANCE CRITERIA FOR SUCCESS PATH RLEC-1.		2
	 IF Radiation Levels External to Containment has NOT been satisfied, THEN PROCEED to the next appropriate Radiation Levels External to Containment Success Path. 		2

NOTE: Continuously applicable steps are designated with a "C" in the DONE column.

RESOURCE CONDITIONS ACCEPTANCE CRITERIA · ALL of the following alarms are clear Radiation detected outside containment Containment pressure greater than with NO unexplained rise: 2.8 PSIG Noble Gas Monitor (2-RIC-5415) Condenser Off-Gas RMS (2-RI-4014) S/G B/D RMS (2-RI-4014) Main Vent Gaseous RMS (2-RI-5415) OR ALL containment penetrations required to be shut have an isolation valve shut IF a tube rupture is identified in a S/G. ALL release paths from the affected S/G to the environment are isolated · Affected S/G pressure less than 920 PSIA START FUNCTION DONE PAGE A. VERIFY RADIATION LEVELS EXTERNAL TO CONTAINMENT BY CONTAINMENT ISOLATION 3 IF pressure rises to 2.8 PSIG. 4 THEN verify CIS and SIAS. IF pressure rises to 4.25 PSIG, 4 THEN verify CSAS IF a loss of ALL Vital 4KV buses has occurred, THEN verify Containment Normal Sump and H₂ Purge Isolation valves are shut 5 IF a tube rupture is identified, 6 THEN perform the following: Commence working the appropriate Heat Removal success path until the affected OR most affected S/G is isolated IF a SRW Header is NOT in operation 6 THEN attempt to restart: 21 SRW Header – CNTMT pressure

RADIATION LEVELS EXTERNAL TO CONTAINMENT PLACEKEEPER

RLEC-2: CONTAINMENT ISOLATED

less than 25 PSIG. 22 SRW Header - CNTMT pressure less than 10 PSIG.

•	SIAS VERIFICATION CHECKLIST	9
•	CSAS VERIFICATION CHECKLIST	9
•	CIS VERIFICATION CHECKLIST	9
•	IF a tube rupture is identified,	10

THEN control secondary system contamination

NOTE: Continuously applicable steps are designated with a "C" in the DONE column. (continue)

EOP-8 Rev 27 / Unit 2 Page 2 of 2 **RLEC-2: CONTAINMENT ISOLATED** (continued) START FUNCTION DONE PAGE ACCEPTANCE CRITERIA FOR SUCCESS PATH B. RLEC-2. 15 IF Radiation Levels External to Containment has 15 NOT been satisfied, THEN perform the following actions: • Concurrently perform the Recovery actions for the next safety function to be satisfied Determine the appropriate emergency response actions PER the ERPIP . Evaluate further actions

NOTE: Continuously applicable steps are designated with a "C" in the DONE column.

CALVERT CLIFFS NUCLEAR POWER PLANT TECHNICAL PROCEDURE

UNIT ONE

EOP ATTACHMENTS

REVISION 18

Safety Related

Approval Authority:

Kent Mills / 8-30-2004

signature/date

Effective Date: 9-2-2004

EOP ATTACHMENTS Rev. 18/Unit 1 Page 2 of 2 .

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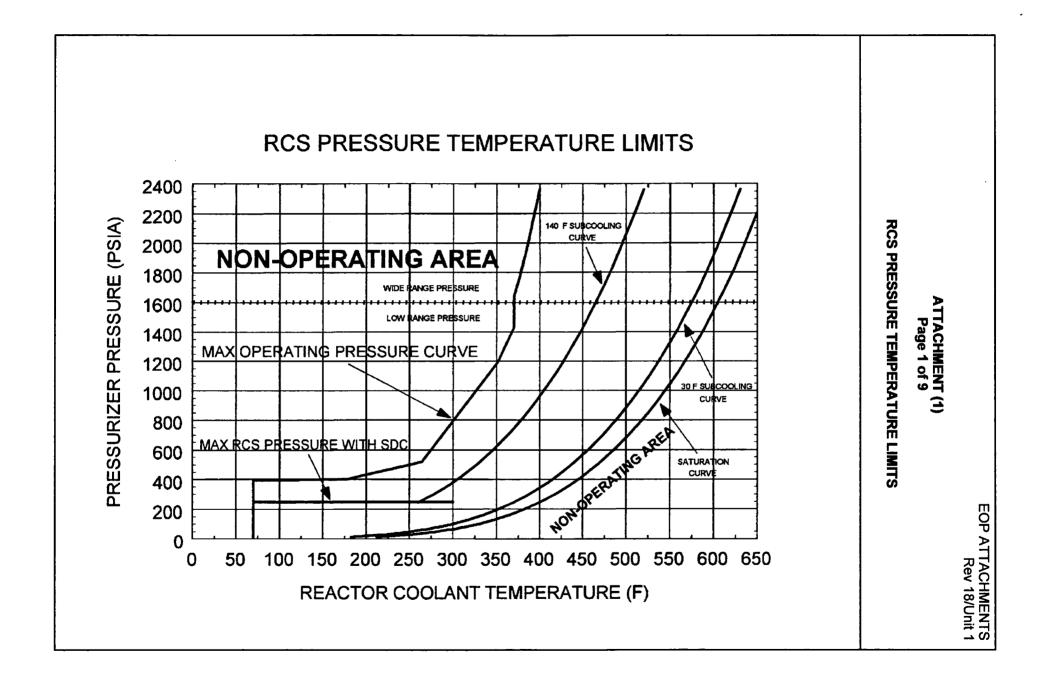
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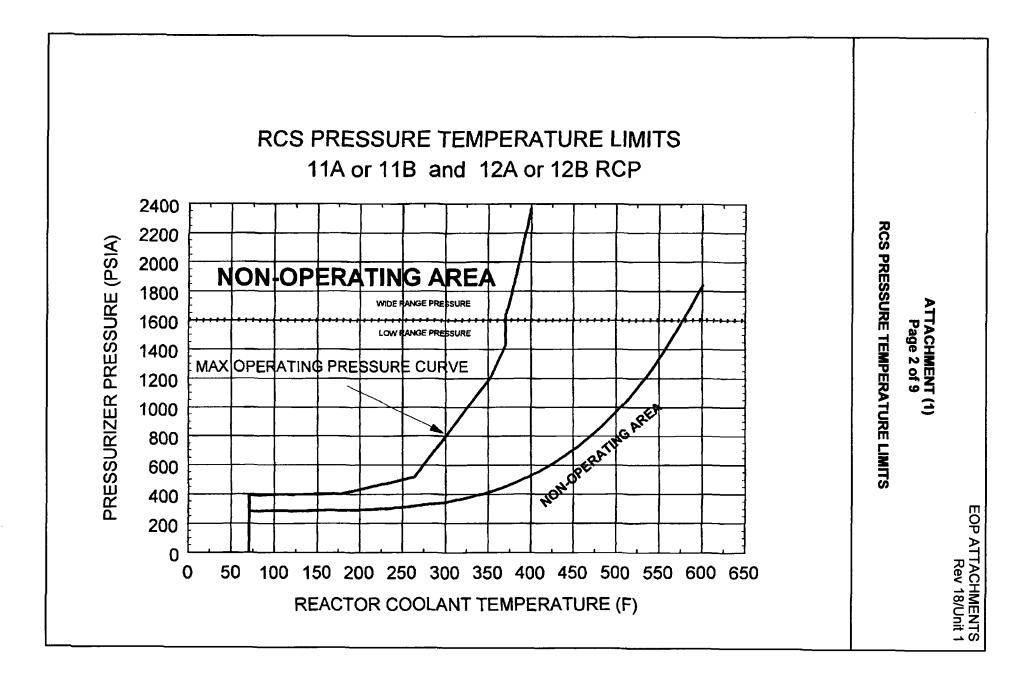
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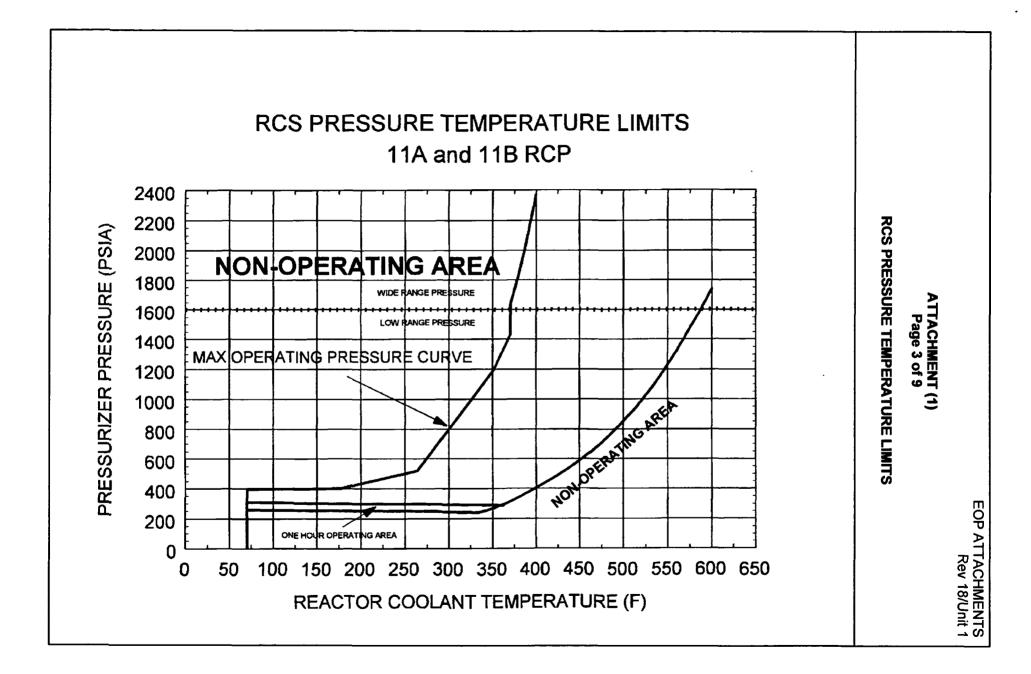
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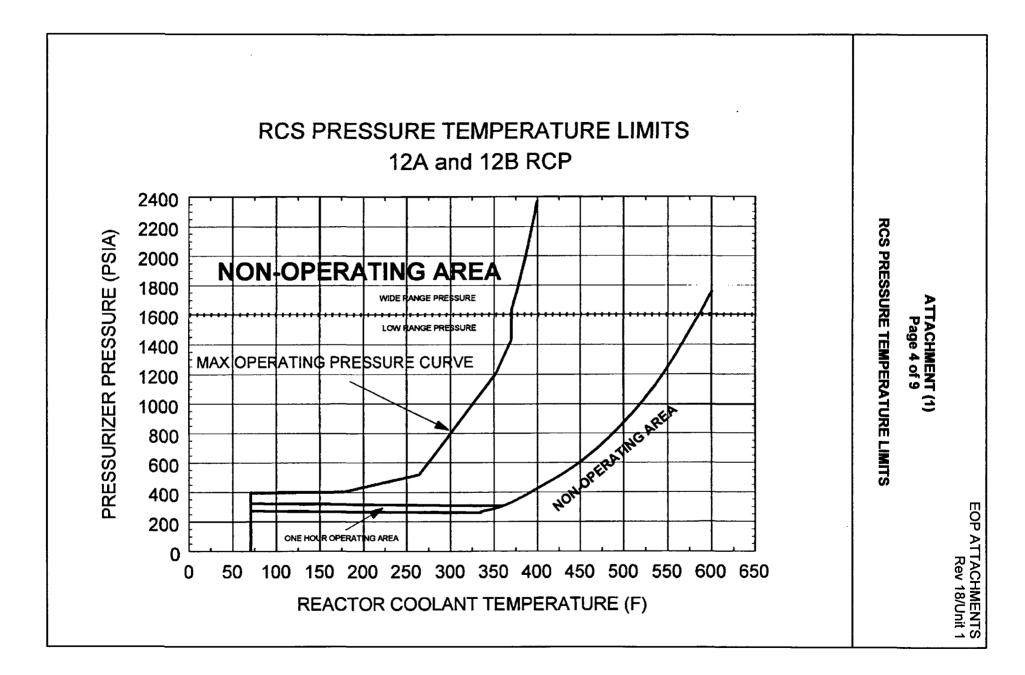
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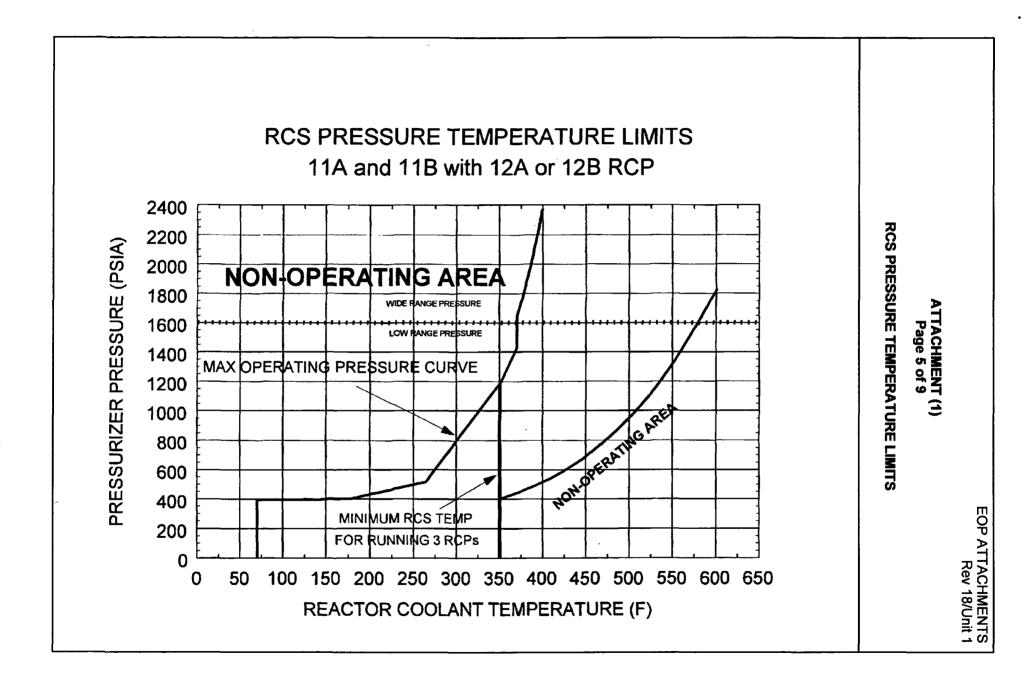
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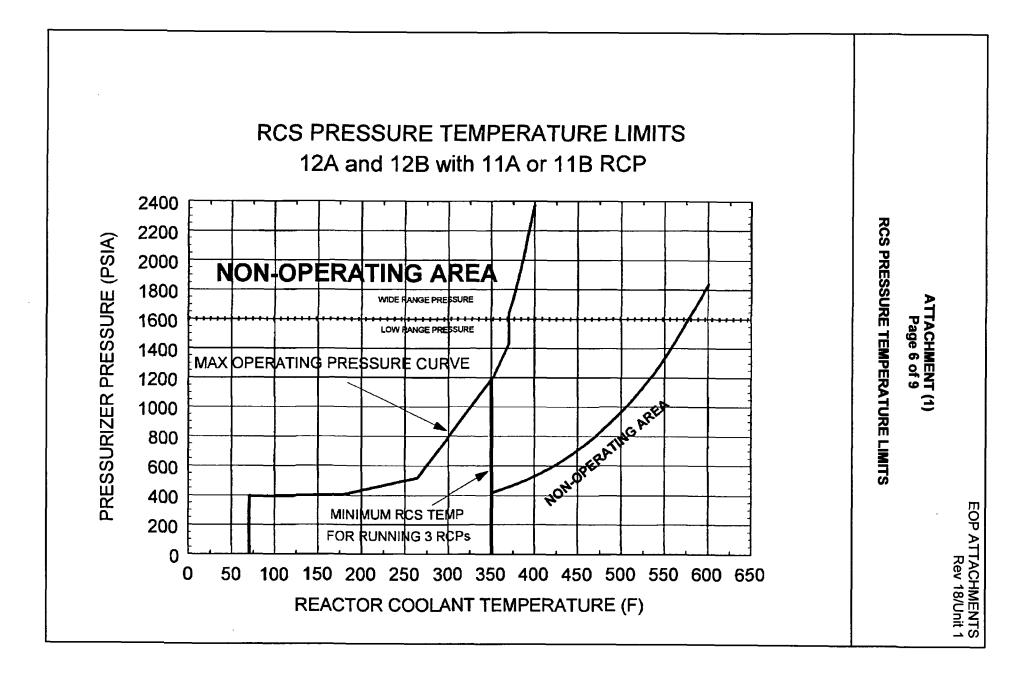


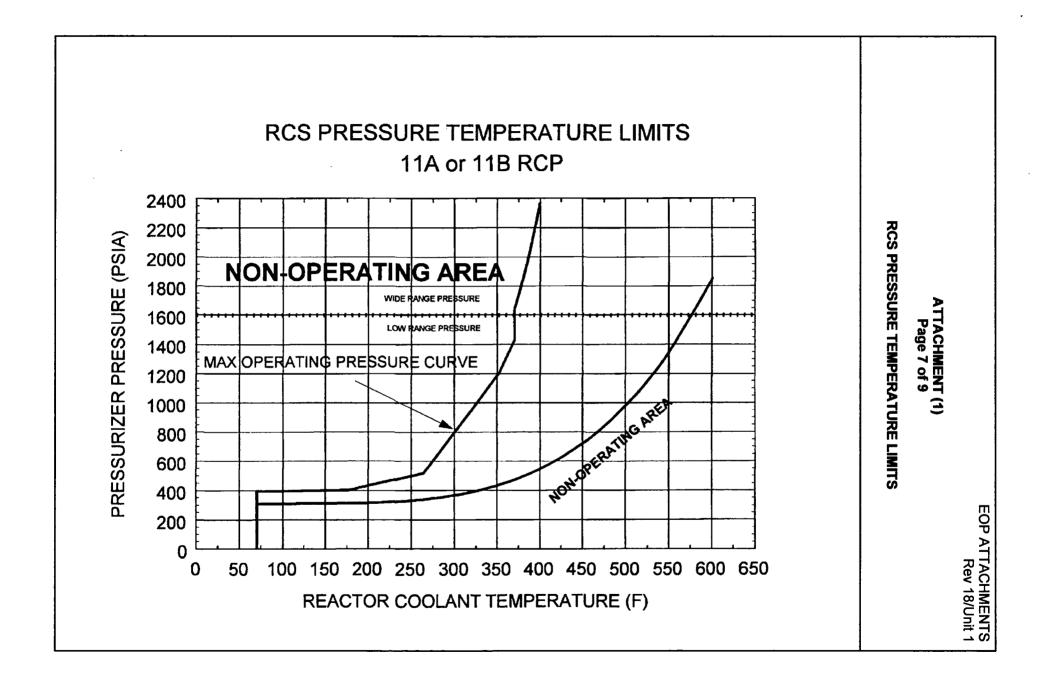


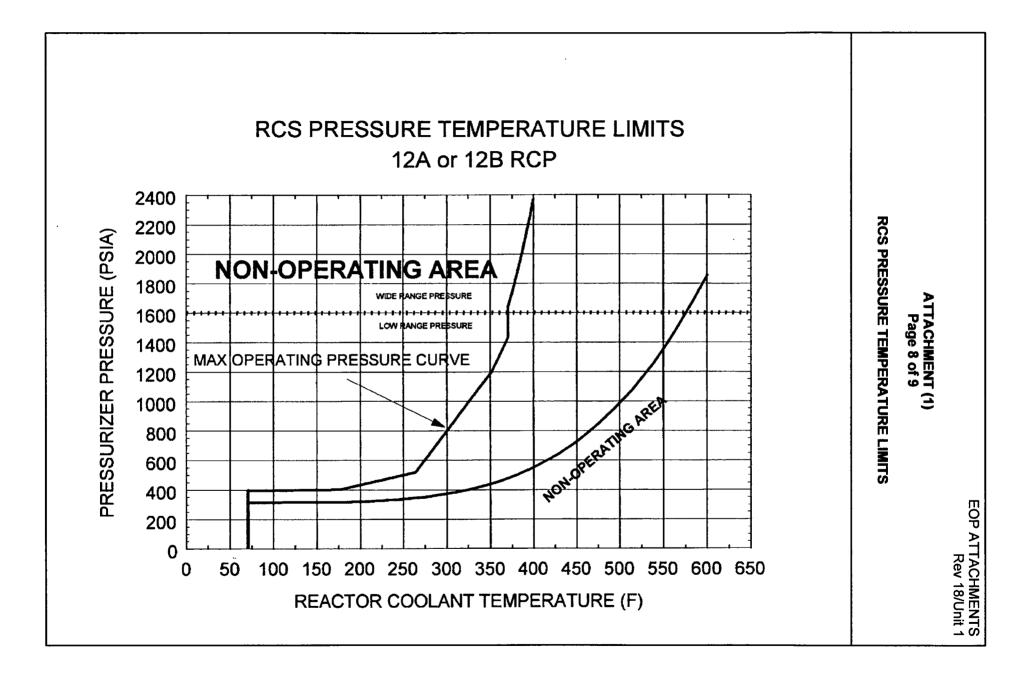


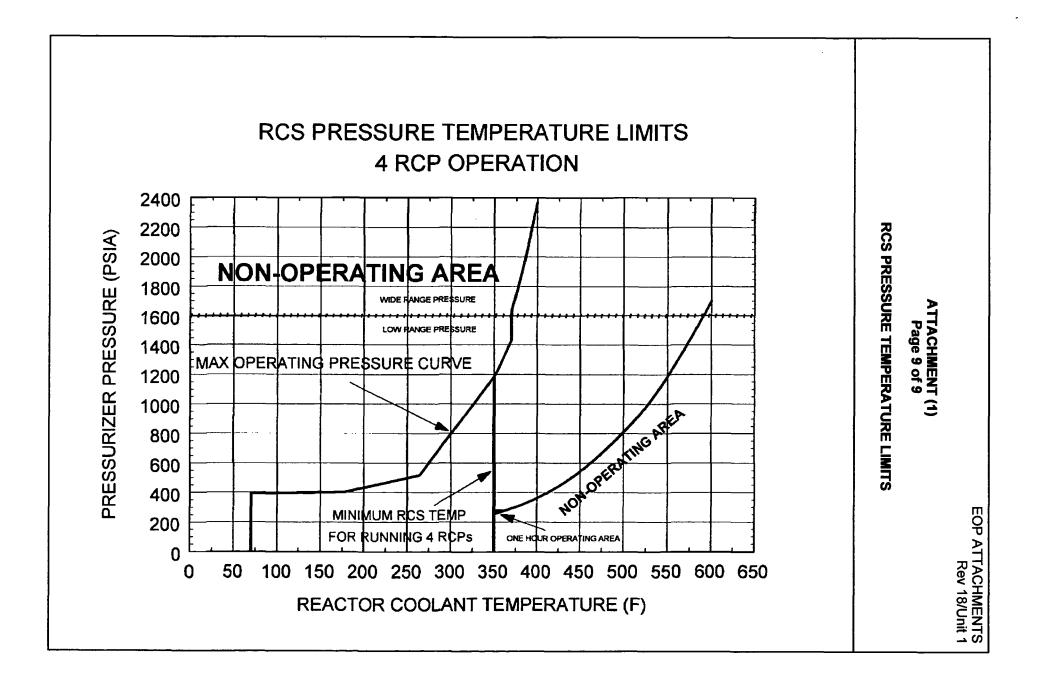












ATTACHMENT (2) Page 1 of 5

SIAS VERIFICATION CHECKLIST

1C08, 1C09, 1C10 11 and 13 HPSI PPs Running a. 11 and 12 LPSI PPs b. Running 11 and 12 CS PPs Running C. MAIN HPSI HDR valves: d. 1-SI-616-MOV..... Open Open 1-SI-626-MOV..... 1-SI-636-MOV..... Open 1-SI-646-MOV..... Open AUX HPSI HDR valves: е 1-SI-617-MOV..... Open 1-SI-627-MOV..... Open Open 1-SI-637-MOV..... 1-SI-647-MOV Open LPSI HDR valves: f 1-SI-615-MOV..... Open 1-SI-625-MOV..... Open 1-SI-635-MOV..... Open 1-SI-645-MOV..... Open SIT CKV LKG DRN valves: g. 1-SI-618-CV..... Shut* 1-SI-628-CV..... Shut* 1-SI-638-CV..... Shut* 1-SI-648-CV..... Shut* SIT OUT valves: h. 1-SI-614-MOV..... Open 1-SI-624-MOV..... Open 1-SI-634-MOV..... Open 1-SI-644-MOV..... Open Ι. SIT RECIRC TO RCDT valve, 1-SI-661-CV Shut* Handswitches required in the Post Accident Position to enable resetting SIAS. (continue)

ATTACHMENT (2) Page 2 of 5

SIAS VERIFICATION CHECKLIST

(Continued)

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1	•	
j .	11, 12, 13 and 14 CNTMT AIR CLRs	Running in Low(1)
k.	CNTMT CLR EMER OUT valves:	
	 1-SRW-1582-CV 1-SRW-1585-CV 1-SRW-1590-CV 1-SRW-1593-CV 	Open Open Open Open
I.	11, 12 and 13 IODINE FILT FANs	Running
m.	RCDT PP CNTMT ISOL valve, 1-RCW-4260-CV	Shut*
n.	WGS CNTMT ISOL valves:	
	 1-WGS-2180-CV 1-WGS-2181-CV 	
o .	CNTMT RMS ISOL valves:	
	 1-CRM-5291-CV 1-CRM-5292-CV 	Shut* Shut*
p .	CNTMT NORMAL SUMP DRN valves:	
	 1-EAD-5462-MOV 1-EAD-5463-MOV 	Shut* Shut*
q .	RCS SAMPLE ISOL valve, 1-PS-5464-CV	Shut*
r .	H ₂ PURGE ISOL valves:	
	 1-HP-6900-MOV 1-HP-6901-MOV 	Shut* Shut*
	* Handswitches required in the Post Accident Position to enable resetting SIAS.	
	(1) Do NOT place these Handswitches in their Post Accident Positi	on.

ATTACHMENT (2) Page 3 of 5

SIAS VERIFICATION CHECKLIST

1C07 a. L/D CNTMT ISOL valves: 1-CVC-515-CV Shut* 1-CVC-516-CV Shut* 11, 12 and 13 CHG PPs Running b. VCT OUT valve, 1-CVC-501-MOV С. Shut VCT M/U valve, 1-CVC-512-CV.... Shut d. BA DIRECT M/U valve, 1-CVC-514-MOV e. Open 11 and 12 BA PPs f. Running BAST GRAVITY FD valves: a. 1-CVC-508-MOV Open 1-CVC-509-MOV Open h. BAST RECIRC valves: 1-CVC-510-CV Shut • 1-CVC-511-CV Shut i. **RCP BLEED-OFF ISOL valves:** 1-CVC-505-CV Shut* 1-CVC-506-CV Shut* 1C06 11 and 13 BACKUP HTRs Off а. Handswitches required in the Post Accident Position to enable resetting SIAS.

ATTACHMENT (2) Page 4 of 5

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SIAS VERIFICATION CHECKLIST

<u>10</u>	<u>:13</u>	
a.	11 and 12 CC PPs	Running
b.	11 and 12 SALTWATER PPs	Running
C.	11 and 12 SRW PPs	Running
d.	CCHX CC OUT valves	
	 1-CC-3824-CV 1-CC-3826-CV 	Open (2) 18/00 Open (2)
e.	SDC HX CC OUT valves:	
	 1-CC-3828-CV. 1-CC-3830-CV. 	Open Open
f.	SRW HDR TURB BLDG ISOL valves:	
	 1-SRW-1600-CV 1-SRW-1637-CV 1-SRW-1638-CV 1-SRW-1639-CV 	Shut Shut Shut Shut
g.	11 and 12 SALTWATER AIR COMPRs	Running
h.	LQD WASTE EVAP UNIT 1 CC ISOL valves:	
	 1-CC-3840-CV 1-CC-3842-CV 	Shut Shut
i.	CAC SRW INL valves:	
	 1-SRW-1581-CV 1-SRW-1584-CV 1-SRW-1589-CV 1-SRW-1589-CV 1-SRW-1592-CV (Open if RAS actual (Open if RAS actual (Open if RAS actual) 1-SRW-1592-CV (Open if RAS actual) 1-SRW-1592-CV (Open if RAS actual) 	Throttled (1) ated) Throttled (1) ated) Throttled (1) ated)

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ATTACHMENT (2) Page 5 of 5

SIAS VERIFICATION CHECKLIST

<u>1C18A, 1C18B</u>			
a.	1A DG	Running	
b.	1B DG	Running	
C.	0C DG 11 4KV BUS FDR, 152-1106	Open	
d.	0C DG 14 4KV BUS FDR, 152-1406	Open	
<u>1C</u>	<u>34</u>		
a.	11 POST LOCI FILT FAN & DMPR	Running	
b.	12 POST LOCI FILT FAN & DMPR	Running	
C.	11 CONTR RM FRESH AIR, 0-HVAC-5350	Close	
d.	12 CONTR RM FRESH AIR, 0-HVAC-5351	Close	
<u>1C</u>	90 (45 ft S/G B/D Sample Panel)		
a.	Pressurizer Vapor Sample Valve, 1-PS-5465-CV	Shut	
b.	Pressurizer Liquid Sample Valve, 1-PS-5466-CV	Shut	
C.	RCS Hot Leg Sample Valve, 1-PS-5467-CV	Shut	
<u>1C</u>	<u>101</u> (45 ft Solid Waste)		
a.	Quench Tank O₂ Sample Valve, 1-PS-6531-SV	Shut	
a. b. c. <u>1C</u>	Pressurizer Vapor Sample Valve, 1-PS-5465-CV Pressurizer Liquid Sample Valve, 1-PS-5466-CV RCS Hot Leg Sample Valve, 1-PS-5467-CV	Shut Shut	

ATTACHMENT (3) Page 1 of 1

CSAS VERIFICATION CHECKLIST

1C03 a. 11 and 12 MSIVs: 1-MS-4043-CV Shut* 1-MS-4048-CV Shut* b. 11 and 12 SG FW ISOL valves: 1-FW-4516-MOV Shut* • 1-FW-4517-MOV Shut* 11 and 12 S/G B/D valves: C. 1-BD-4010-CV Shut 1-BD-4011-CV Shut 1-BD-4012-CV Shut 1-BD-4013-CV Shut 11 and 12 SGFPT TRIP RESET Tripped d. 11 and 12 HTR DRN PPs Off е. 11, 12 and 13 COND BSTR PPs f. Off 1C08, 1C09 a. CS HDR valves: 1-SI-4150-CV Open • 1-SI-4151-CV Open 1C13 a. SRW SUPP TO 12 BD HX, 1-SRW-1640-CV Shut 11 SFP HX SRW INL/OUT valves: b. 1-SRW-1597-CV Shut 1-SRW-1596-CV Shut Handswitches required in the Post Accident Position to enable resetting CSAS.

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ATTACHMENT (4) Page 1 of 2

CIS VERIFICATION CHECKLIST

<u>1C09, 1C10</u>

ļ	a. 11 and 12 PENETRATION RM VENT FANs	Running		
	b. 11 and 12 FILT ISOL DMPRs	Open		
	c. CC CNTMT SUPPLY and RETURN VLVs:			
	 1-CC-3832-CV 1-CC-3833-CV 			
	d. IA CNTMT ISOL, 1-IA-2080-MOV	Shut*		
	e. 1-IA-2080-MOV CIS OVERRIDE, 1-HS-2080A	Normal*		
	Administratively Controlled Valves			
	a. IF ANY of the following administratively controlled valves are or THEN return them to the shut position:	ben,		
	NOTE 1-PA-1040 is located inside containment. If 1-PA-1040 is open, 1-PA-1044 must be shut to establish containment isolation.			
	(1) Plant Air Containment Isolation Valves:			
	 1-PA-1040 1-PA-1044 			
	(2) Nitrogen Supply To SITs:			
	 1-SI-612-CV 1-SI-622-CV 1-SI-632-CV 1-SI-642-CV 	Shut		
	(3) DI WTR CNTMT ISOL valve, 1-DW-5460-CV	Shut		
	(4) U-1 FIRE PROT CNTMT ISOL valve, 1-FP-6200-MOV	Shut		
	* Handswitches required in the Post Accident Position to ena resetting CIS.	ble		
	(continue)			

ATTACHMENT (4) Page 2 of 2

CIS VERIFICATION CHECKLIST

(Continued)

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NOTE

The PASS Return to RCDT and Hydrogen Sample Valves may be open for accident sampling. Contact Chemistry for operation of the PASS Return to RCDT and Hydrogen Sample Valves.

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(5)	PASS Return to RCDT, 1-PS-6529-SV	Shut
(6)	Hydrogen Sample Valves:	
	 1-PS-6507A-SV 1-PS-6507B-SV 1-PS-6507C-SV 1-PS-6507D-SV 1-PS-6507E-SV 1-PS-6507F-SV 1-PS-6507G-SV 	Shut Shut Shut Shut Shut Shut
	 1-PS-6540A-SV 1-PS-6540B-SV 1-PS-6540C-SV 1-PS-6540D-SV 1-PS-6540E-SV 1-PS-6540F-SV 1-PS-6540G-SV 	Shut Shut Shut Shut Shut Shut Shut

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ATTACHMENT (5) Page 1 of 1

CRS VERIFICATION CHECKLIST

<u>1C</u>	<u>1C10</u>		
a.	CNTMT PURGE SUPP valve, 1-CPA-1410-CV	Shut*	
b.	CNTMT PURGE EXH valve, 1-CPA-1412-CV	Shut*	
с.	H ² PURGE ISOL valves:		
	 1-HP-6900-MOV 1-HP-6901-MOV 	Shut* Shut*	
<u>10</u>	34		
a.	11 CNTMT PURGE EXH FAN	Off	
b .	11 CNTMT PURGE SUPP FAN	Off	
	 Handswitches required in the Post Accident Position to enable resetting CRS. 		

ATTACHMENT (6) Page 1 of 1

RAS VERIFICATION CHECKLIST

<u>1C08, 1C09, 1C10</u>

•

a.	11 and 12 LPSI PPs	Off
b.	MINI FLOW RETURN TO RWT ISOL MOVs:	
	 1-SI-659-MOV 1-SI-660-MOV 	Shut Shut
C.	CNTMT SUMP DISCH valves:	
e.	 1-SI-4144-MOV 1-SI-4145-MOV 	Open Open
<u>1C</u>	<u>13</u>	
a.	CAC SRW INL valves:	
	 1-SRW-1581-CV 1-SRW-1584-CV 1-SRW-1589-CV 1-SRW-1592-CV 	Open Open Open Open

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ATTACHMENT (7) Page 1 of 1

SGIS VERIFICATION CHECKLIST

<u>1C03</u>

а.	11 and 12 MSIVs:	
	 1-MS-4043-CV 1-MS-4048-CV 	Shut* Shut*
b.	11 and 12 SG FW ISOL valves:	
	 1-FW-4516-MOV 1-FW-4517-MOV 	Shut* Shut*
C.	11 and 12 SGFPT TRIP RESET	Tripped
d.	11 and 12 HTR DRN PPs	Off
e.	11, 12 and 13 COND BSTR PPs	Off
	* Handswitches required in the Post Accident Position to enable resetting SGIS.	

ATTACHMENT (8) Page 1 of 5

MAINTAIN AFW PUMP SUCTION SUPPLY AND CST INVENTORY

NOTE

Technical Specifications require a minimum of 150,000 gallons of makeup water to be available to Unit 2 while it is in modes 1, 2 or 3.

1. Verify 12 CST is available to supply feedwater by the following:

- 12 CST level greater than 5 feet
- 12 CST SUPPLY TO UNIT 1 AFW PUMPS ISOLATION VALVE, 1-AFW-161, open

NOTE

Condenser Makeup valve, 1-CD-4406-CV fails open on loss of power, shut on loss of air.

2. IF 1Y09 is NOT energized, AND hotwell makeup is NOT required, THEN shut DISCH FROM COND M/U, 1-CD-236.

CAUTION

Before transferring AFW Pump suction to an alternate supply, the possibility of suction line or CST rupture should be considered.

- IF 12 CST is NOT available to supply feedwater AND 11 CST is available, THEN line up 11 CST as an alternate suction supply as follows:
 - a. Locally open 11 CST MAN ISOL valves:
 - 1-AFW-131
 - 1-AFW-167
 - b. Locally shut 12 CST SUPPLY TO UNIT 1 AFW PUMPS ISOLATION VALVE, 1-AFW-161.
 - c. Confirm normal CST LVL response.

ATTACHMENT (8) Page 2 of 5

MAINTAIN AFW PUMP SUCTION SUPPLY AND CST INVENTORY

4. IF 12 CST LVL is less than 5 feet
 AND 11 CST is NOT available to supply feedwater,
 THEN lineup an alternate supply to the auxiliary feedwater pump suction as follows:

<u>NOTE</u>

The following substeps are different methods, listed in preferred order, which may be used to line up an alternate supply to auxiliary feedwater pump suction. Each available method should be attempted until a source of water has been established.

CAUTION

Before transferring AFW Pump suction to an alternate supply, the possibility of suction line or CST rupture should be considered.

a. Lineup 21 CST as an alternate suction supply as follows:

NOTE

The following step will cause 12 and 21 CST levels to equalize.

- (1) Locally open 21 CST MAN ISOL valves:
 - 2-AFW-131
 - 2-AFW-167
- (2) Verify open 12 CST SUPPLY TO AFW PUMPS ISOLATION valves:
 - 1-AFW-161
 - 2-AFW-161
- (3) Confirm normal CST LVL response.

b. Align the Fire System to 13 AFW PP suction as follows:

- (1) Place 13 AFW PP in PULL TO LOCK.
- (2) Shut 13 AFW PP Suction Valve, 1-AFW-182.
- (3) Connect fire hoses between pump suction and a fire main.
- (4) Open the 13 AFW PP SUCTION FIRE HOSE CONNECTION ISOLATION VALVE, 1-AFW-180.
- (5) Open the fire hose discharge valve.
- (6) Restore 13 AFW PP as required.

ATTACHMENT (8) Page 3 of 5

MAINTAIN AFW PUMP SUCTION SUPPLY AND CST INVENTORY

4. (continued)

- c. Align the Fire System to 23 AFW PP suction for cross connected operation:
 - (1) Place 23 AFW PP in PULL TO LOCK.
 - (2) Shut 23 AFW PP Suction Valve, 2-AFW-182.
 - (3) Connect fire hoses between pump suction and a fire main.
 - (4) Open the FIRE HOSE CONNECTION AUX FEED SUCT LINE ISOLATION VALVE, 2-AFW-180.
 - (5) Open the fire hose discharge valve.
 - (6) Restore 23 AFW PP as required.
- 5. Makeup to the on-service CST.

NOTE

The following substeps are different methods, listed in preferred order, which may be used to establish makeup to the on-service CST. Each available method should be attempted until a source of water has been established.

- a. **IF** the Demineralized Water Transfer Pumps are available, **THEN** perform the following:
 - Throttle open the CST Fill Valve for the tank to be filled, while maintaining the Demineralized Water Transfer Pump discharge pressure greater than 30 PSIG.
 - 11 CST Fill Valve, 0-DW-184
 - 12 CST Fill Valve, 0-DW-284
 - 21 CST Fill Valve, 0-DW-186
 - (2) **IF** desired for faster CST fill rate, **THEN** start the second Demineralized Water Transfer Pump.
 - (3) **WHEN** the desired tank level is reached, **THEN** shut the appropriate CST Fill Valve.
 - 11 CST Fill Valve, 0-DW-184
 - 12 CST Fill Valve, 0-DW-284
 - 21 CST Fill Valve, 0-DW-186

ATTACHMENT (8) Page 4 of 5

MAINTAIN AFW PUMP SUCTION SUPPLY AND CST INVENTORY

5. (continued)

- b. IF a COND PP is available, THEN transfer hotwell inventory to 11 CST as follows:
 - (1) Shift the CNDSR HOTWELL M/U & DUMP CONTROLLER, 1-LIC-4405, to MANUAL.
 - (2) Adjust Controller to open Hotwell To CST Dump CV, 1-CD-4405-CV.
 - (3) **IF** a COND PP is **NOT** running, **THEN** shut ONE Condensate Pump Discharge Valve:
 - (11 Pump) 1-CD-106
 - (12 Pump) 1-CD-113
 - (13 Pump) 1-CD-120
 - (4) Verify the appropriate COND PP is running.
 - (5) Slowly throttle open the pump discharge valve to maintain pump discharge pressure between 175 and 240 PSIG.
 - (6) Stop the pump when cavitation occurs.
 - (7) Shut the Hotwell To CST Dump CV by adjusting 1-LIC-4405, to 50% output.
- c. IF the DI Water Storage Tank level is greater than 10 feet
 AND the on-service CST level is less than 5 feet,
 THEN gravity fill the on-service CST by performing the following:
 - (1) Throttle open the CST Fill Valve for the tank to be filled.
 - 11 CST Fill Valve, 0-DW-184
 - 12 CST Fill Valve, 0-DW-284
 - 21 CST Fill Valve, 0-DW-186
 - (2) **WHEN** the desired tank level is reached, **THEN** shut the appropriate CST Fill Valve.
 - 11 CST Fill Valve, 0-DW-184
 - 12 CST Fill Valve, 0-DW-284
 - 21 CST Fill Valve, 0-DW-186

ATTACHMENT (8) Page 5 of 5

MAINTAIN AFW PUMP SUCTION SUPPLY AND CST INVENTORY

- d. Emergency fill 11 CST from the Fire System as follows:
 - (1) Connect a fire hose between fire house hose manifold and 11 CST EMERGENCY CROSS CONNECT ISOLATION VALVE, 1-CD-312.
 - (2) Shut the FIRE PUMPS DISCHARGE TEST DRAIN VALVE, 0-FP-277.
 - (3) Open the FIRE PUMPS DISCHARGE HEADER TEST ISOLATION VALVE, 0-FP-246.
 - (4) Open 11 CST EMERGENCY CROSS CONNECT ISOLATION VALVE, 1-CD-312.
 - (5) Open the fire hose discharge valve.
 - (6) Ensure 11 CST LVL rises.
- e. Emergency fill 21 CST from the Fire System as follows:
 - (1) Connect a fire hose between fire house hose manifold and 21 CST EMERGENCY HOSE CONNECTION VALVE, 2-CD-312.
 - (2) Shut the FIRE PUMPS DISCHARGE TEST DRAIN VALVE, 0-FP-277.
 - (3) Open the FIRE PUMPS DISCHARGE HEADER TEST ISOLATION VALVE, 0-FP-246.
 - (4) Open 21 CST EMERGENCY HOSE CONNECTION VALVE, 2-CD-312.
 - (5) Open the fire hose discharge valve.
 - (6) Ensure 21 CST LVL rises.

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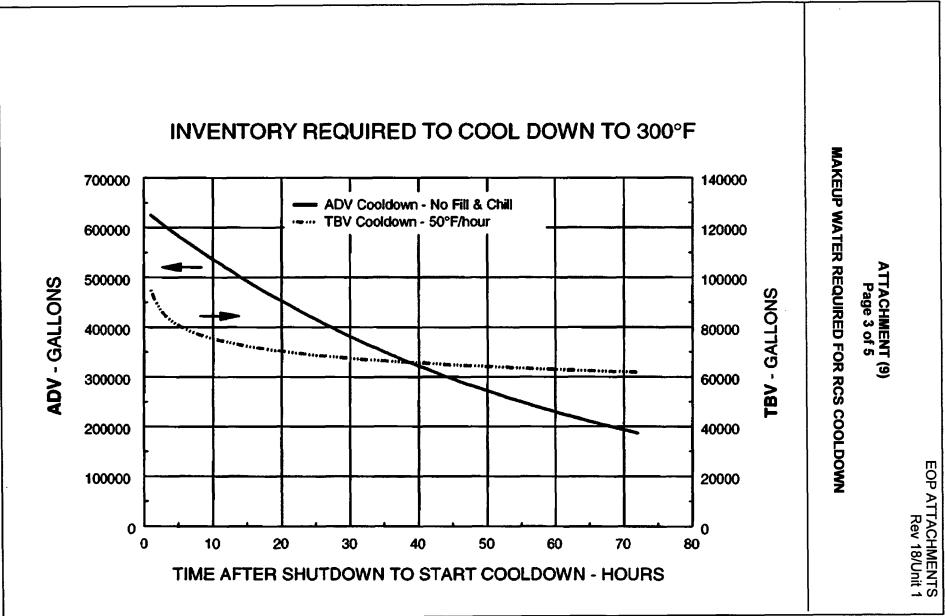
ATTACHMENT (9) Page 1 of 5

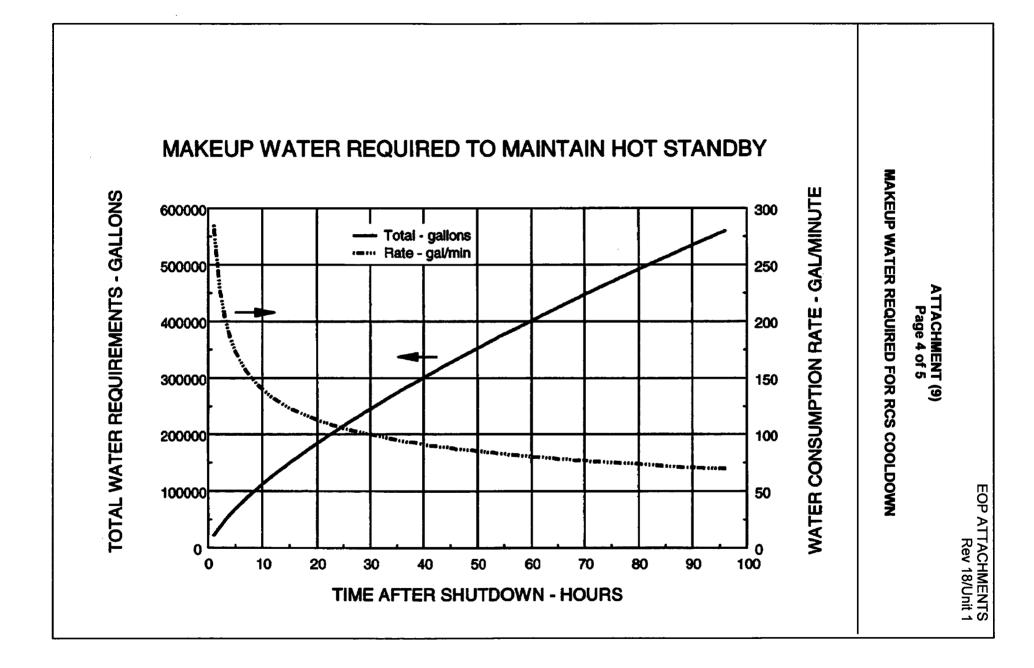
MAKEUP WATER REQUIRED FOR RCS COOLDOWN

1.	Determine the amount of makeup water required to perform an ADV cooldown and TBV cooldown, based on the time after shutdown:					
	a.	ADV cooldown and time after shutdown	1.a _	gals		
	b.	TBV cooldown and time after shutdown	1.b _	gals		
2.	De	termine the amount of makeup water available in the CSTs:				
	a.	Record the level in 11 CST.	2.a	ft		
	b.	Record the level in 12 CST.	2.b	ft		
	C.	Record the level in 21 CST.	2.c	ft		
	d.	Determine the status of Unit 2 (check one):				
		(1) Mode 1, 2 or 3 and does NOT require AFW operation.				
	(2) Mode 1, 2 or 3 and does require AFW operation.					
		(3) Mode 4, 5, 6 or defueled.				
	NOTE Calculated negative values should be entered as zero.					
	e.	 Determine the amount of makeup water available to Unit 1 using one of the following formulas, based on the status checked in step 2.d above: 				
		 IF step d.(1) is checked, THEN correct CST levels for usable volume: 				
		(a) step 2.aft - 2.75 ft =	(a)	ft		
		(b) step 2.bft - 16 ft =	(b)	ft		
		(c) step(a)ft + step(b)ft =	e.(1)	ft		

ATTACHMENT (9) Page 2 of 5				
MAKEUP WATER REQUIRED FOR RCS COOLDOWN	ı			
(2) IF step d.(2) is checked,THEN correct CST levels for usable volume:				
(a) step 2.aft - 2.75 ft =	(a)ft			
(b) $\frac{\text{step 2.b} \ft - 2.5 \ ft}{2} =$	(b)ft			
(c) step(a)ft + step(b)ft =	e.(2)ft			
 (3) IF step d.(3) is checked, THEN correct CST levels for usable volume: 				
(a) step 2.aft - 2.75 ft =	(a)ft			
(b) step 2.bft - 2.5 ft =	(b)ft			
(c) step 2.cft - 2.75 ft =	(c)ft			
(d) step(a)ft + step(b)ft + step(c)ft =	e.(3)ft			
f. Convert the amount of CST level into gallons.				
(ft available)ft x 9636.78 gal/ft =	2.fgals			
<u>NOTE</u> The nominal capacity of a Well Water pump is 300 GPM. The nominal capacity of a Demineralized Water Transfer pump is 300 GPM. The Fire System can fill the CST via fire hoses at greater than 500 GPM. <u>CAUTION</u> The status of both units should be considered when evaluating a makeup source.				
3. IF adequate inventory exists to perform cooldown, THEN determine if an adequate makeup source exists to maintain l	hot standby.			
 IF adequate inventory does NOT exist to perform cooldown, THEN evaluate the following: 				
 Maintaining hot standby conditions Time to restore an adequate makeup source Restoration of other plant systems (TBVs, main feedwater system, etc.) Performing partial cooldown while restoring plant systems 				

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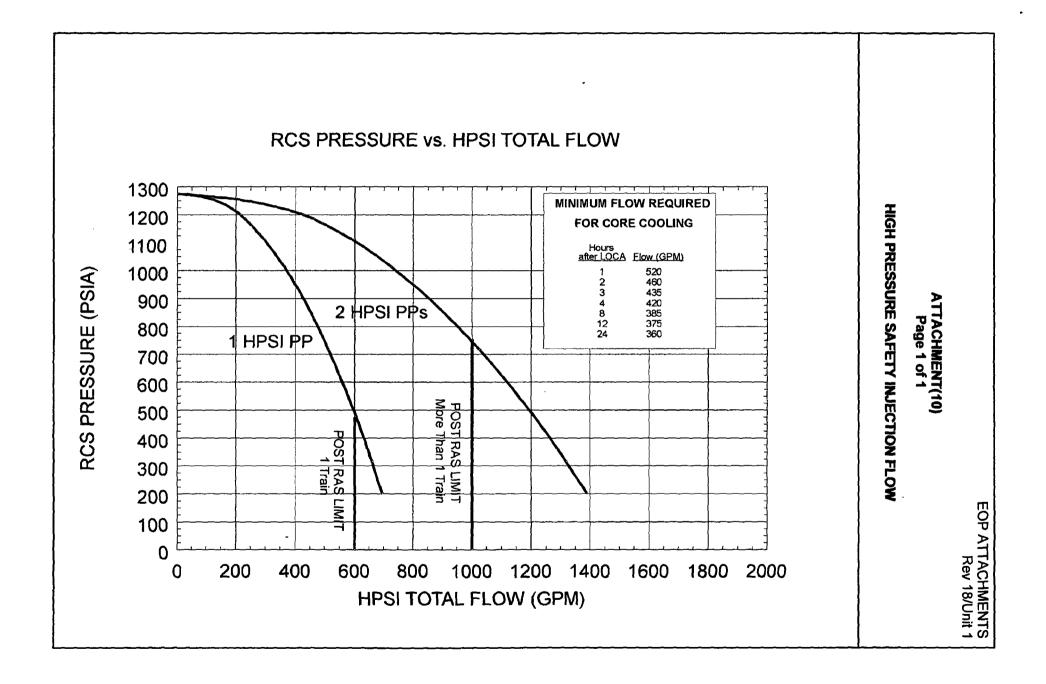
MAKEUP WATER REQUIRED FOR RCS COOLDOWN

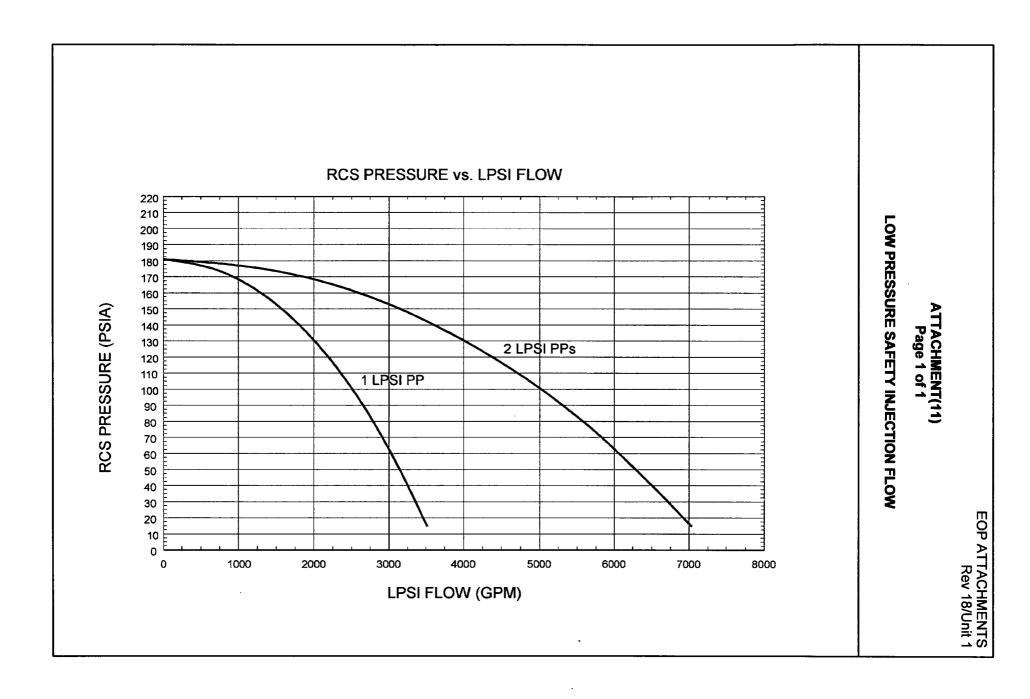
INVENTORY REQUIRED TO COOL DOWN TO 300 F

TIME AFTER SHUTDOWN - HOURS	ADV COOLDOWN - GALLONS	TBV COOLDOWN - GALLONS
1	625,067	94,828
2	614,531	88,490
4	593,988	82,575
6	574,132	79,301
8	554,939	77,056
10	536,389	75,359
12	518,458	74,000
24	422,783	69,054
36	344,764	66,316
48	281,142	64,439
72	186,953	61,883

MAKEUP WATER REQUIRED TO MAINTAIN HOT STANDBY

TIME AFTER	TOTAL	WATER
SHUTDOWN	WATER	CONSUMPTION
- HOURS	REQUIREMENT	RATE
	- GALLONS	- GAL/MINUTE
1	21,964	285
2	35,919	230
4	58,740	186
6	78,323	164
8	96,060	150
10	112,541	140
12	128,085	132
24	209,464	107
36	279,295	94
48	342,547	86
72	456,746	76
96	560,185	70





ATTACHMENT(12) Page 1 of 1

PROCEDURE TO LOCALLY READ CORE EXIT THERMOCOUPLES

- 1. Obtain an ALTEK thermocouple meter from the Operations Safety Related Storage Locker or the IM Shop, and a set of CET cables from the Operations Safety Related Storage Locker.
- 2. Obtain a small flat-head screwdriver from the Shift Manager's Office.
- 3. Obtain the U-1 PAM cabinet door key.
- 4. Align the ALTEK thermocouple meter as follows:
 - a. Select READ.
 - b. Depress RESET button until "k" appears in the lower right corner of the display.

NOTE

When using the CET cables, the RED wire is always the (-) negative post.

- 5. Connect the CET cables to the terminal posts on the ALTEK thermocouple meter.
- 6. Select an operable CET to be measured.
- 7. Open the back panel door on 1C182A or 1C182B as appropriate.
- 8. Connect the cables at terminal block A03/B03.

<u>NOTE</u>

The CET numbers are indicated on the cable labels.

- a. Locate the red and yellow thermocouple wires for the selected CET.
- b. Loosen the terminal block screws AND remove the red and yellow thermocouple wires from the terminal block.
- c. Connect the red wire to the red connector.
- d. Connect the yellow wire to the yellow connector.
- 9. Read CET temperature in ° F from the meter.

ATTACHMENT(13) Page 1 of 1

ADMINISTRATIVE POST-TRIP ACTIONS

<u>NOTE</u>

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

- 1. Prior to exiting the EOP, review OP-6, <u>PRE-STARTUP CHECKOFF</u> for Tech. Spec. compliance in the applicable mode.
- 2. Refer to the ERPIP to determine appropriate emergency response actions.
- 3. Perform notifications **PER** RM-1-101 <u>REGULATORY REPORTING</u>.
- **4**. Notify SO-TSO of trip.
 - 5. Request RCS Boron and Iodine Sample.
 - ____ 6. Perform shutdown margin calculation **PER** the NEOPs.
 - Complete any Transient Log entries PER EN-1-115, <u>RECORDING OF PLANT</u> <u>TRANSIENTS/OPERATIONAL CYCLES</u>.
 - 8. Collect the post-trip data automatically printed from the Plant Computer.
 - 9. Perform the post-trip review **PER** NO-1-111, <u>POST-TRIP REVIEW</u>.
 - _____ 10. Monitor turbine bearing temperatures.
 - 11. Continue the Main Turbine Shutdown **PER** OI-43A, <u>MAIN TURBINE AND</u> <u>GENERATOR/EXCITER OPERATION</u>.
 - _ 12. Reestablish normal plant configuration control as required:
 - Locked Valves PER NO-1-205, LOCKED VALVES
 - Component Manipulations PER NO-1-200, <u>CONTROL OF SHIFT</u> <u>ACTIVITIES</u>
 - 13. Initiate the Forced Outage Worklist.

ATTACHMENT(14) Page 1 of 1

RCS COOLDOWN DATA SHEET

RCS COOLDOWN NO.

DATE/TIME COOLDOWN COMMENCED

- The cooldown of the Reactor Vessel should be conducted at a linear rate not to exceed 100° F in any one hour period.
- At an RCS temperature of 256° F the cooldown limit changes from 100° F to 40° F in any one hour period.
- The RCS temperature should be recorded every 15 minutes.

TIME	PRESS(PSIA) (1)	TEMP(°F) (2)	C/D RATE(°F/HR)

(1) RCS Pressure:

- Greater than 1600 PSIA: PAM CH A or CH B
- Less than 1600 PSIA: PI-103 or PI-103-1

(2) RCS Temperature:

- Forced Circulation: TI-112C or 122C
- Natural Circulation:
 - RCS Temp Greater than 365° F: average of at least 2 CETs
 - RCS Temp Less than 365° F: lowest valid displayed CET
- SDC Flow: TR-351

ATTACHMENT(15) Page 1 of 1

PRESSURIZER COOLDOWN DATA SHEET

PRESSURIZER COOLDOWN NO.

DATE/TIME COOLDOWN COMMENCED

• The cooldown of the Pressurizer should be conducted at a linear rate not to exceed 200° F in any one hour period.

• The Pressurizer temperature should be recorded every 15 minutes.

TIME	PZR PRESS (PSIA)(1)	PZR TEMP(°F)(2)	PZR SPRAY TEMP(°F)(3)	PZR C/D RATE(°F/HR)	PZR SPRAY DIFF TEMP(°F) *
·					
				· · · · ·	

(1) RCS Pressure:

- Greater than 1600 PSIA: PAM CH A or CH B
- Less than 1600 PSIA: PI-103 or PI-103-1
- (2) PZR Temperature: TI-101

(3) Spray Temperature:

- PZR: TIA-103 or 104
- Aux: TI-229

* Maximum Spray Differential Temperature is 400° F (TRM 15.4.2)

ATTACHMENT(16) Page 1 of 24

500KV OFFSITE POWER RESTORATION

NOTE

Steps may be performed as necessary to energize multiple buses.

CAUTION

The following steps are intended to restore from a loss of offsite power. Restoration of power for other causes should be performed PER the appropriate procedure.

CAUTION

Attempts should NOT be made to re-energize a bus if a fault is suspected.

- 1. Energize the 500KV Red Bus **OR** the 500KV Black Bus by performing the following actions:
 - a. Verify that switching orders have been received by the Control Room Supervisor **OR** Shift Manager, from the SO-TSO, to operate the required equipment.
 - b. Evaluate alarms associated with the 500KV swithyard.
 - c. Verify the associated Unit Generator High Side Line Disconnect is open before closing Turbine Generator Output breakers.
 - d. IF the 500KV Black Bus is de-energized, THEN verify the following breakers are open:
 - UNIT 2 RCP BUS FDR, 252-1202
 - UNIT 1 RCP BUS FDR, 252-1201
 - 11 SERV BUS 13KV FDR, 252-1104
 - e. IF the 500KV Red Bus is de-energized, THEN verify the following breakers are open:
 - UNIT 1 RCP BUS FDR, 252-2202
 - UNIT 2 RCP BUS FDR, 252-2201
 - 21 SERV BUS 13KV FDR, 252-2104
 - f. Verify the Unit-2 Generator Coast Down Lockout is reset.
 - g. Place the SYNCHROSCOPE SEL Switch in NORMAL (1) **OR** EMERGENCY (2) position.

ATTACHMENT(16) Page 2 of 24

500KV OFFSITE POWER RESTORATION

1. (continued)

NOTE

A Synchronizer is NOT required for operation of breakers 552-41 OR 552-43.

h. Place the applicable SYNCHRONIZER SEL Switch in MANUAL position.

- (552-21) 11 GEN SYNCHRONIZER SEL Switch
- (552-22) 11 GEN SYNCHRONIZER SEL Switch
- (552-23) 11 GEN SYNCHRONIZER SEL Switch
- (552-61) 21 GEN SYNCHRONIZER SEL Switch
- (552-62) 21 GEN SYNCHRONIZER SEL Switch
- (552-63) 21 GEN SYNCHRONIZER SEL Switch
- i. Insert the sync stick in the sync jack at the breaker to be closed.
- j. IF paralleling TWO power sources, THEN ensure the power sources are synchronized by observing the following:
 - Sync lights out
 - Synchroscope at 12 o'clock
 - Running and incoming voltages are matched
- k. IF closing in on a de-energized bus, THEN ensure the bus is NOT energized.
- Close the breaker by placing the Breaker Control Handswitch in the CLOSE position AND release.
- m. Check the breaker has closed by observing applicable breaker indicating lights and meters, if applicable.
- n. Repeat steps 1.a through 1.m as desired to close additional breakers.
- o. Remove the sync stick **AND** return to Home Base.
- p. Verify BOTH SYNCHRONIZER SEL Switches in the OFF position.
- q. Place the SYNCHROSCOPE SEL Switch in the OFF position.
- r. **WHEN** operation has been completed in accordance with the switching orders, **THEN** inform the SO-TSO.
- s. Reset the 13KV BUS 12 OR 22 286 LOCKOUT/RESET DEVICE as applicable.

ATTACHMENT(16) Page 3 of 24

500KV OFFSITE POWER RESTORATION

1. (continued)

t. Reset the applicable bus 247/B device target flags on BOTH undervoltage relays:

13KV BUS 12

- B-12-P
- B-12-B

13KV BUS 22

- B-22-P
- B-22-B

NOTE

Steps may be performed as necessary to energize multiple buses.

CAUTION

Attempts should NOT be made to re-energize a bus if a fault is suspected.

- 2. Energize the desired 13KV Service Bus by performing the following actions:
 - a. **IF** it is desired to energize 11 13KV Service Bus, **THEN** perform the following actions:
 - (1) Verify 12 13KV Service Bus is energized.
 - (2) Verify the following breakers are open:
 - 11 SERV BUS 13KV FDR, 252-1104
 - 11 SERV BUS TIE, 252-1105
 - U-4000-12 13KV FDR, 252-1103
 - U-4000-11 13KV FDR, 252-1102
 - U-4000-13 13KV FDR, 252-1101
 - Locally at the U-1 13KV SWGR House, SITE POWER FDR BREAKER (to 0X03), 252-1106
 - (3) Energize 11 13KV Service Bus by closing 11 SERV BUS 13KV FDR, 252-1104.
 - (4) Reset the 13KV BUS 11 286 LOCKOUT/RESET DEVICE.
 - (5) Reset the 247/B device target flags on **BOTH** undervoltage relays:
 - B-11-P
 - B-11-B

ATTACHMENT(16) Page 4 of 24

500KV OFFSITE POWER RESTORATION

2.a. (continued)

- (6) **IF MCC 116T is de-energized, THEN** place the following LTC Drive Power Selector Switches in ALT:
 - 1H1101REG
 - 1H1102REG
 - 1H1103REG
- b. **IF** it is desired to energize 21 13KV Service Bus, **THEN** perform the following actions:
 - (1) Verify 22 13KV Service Bus is energized.
 - (2) Verify the following breakers are open:
 - 21 SERV BUS 13KV FDR, 252-2104
 - 21 SERV BUS TIE, 252-2105
 - U-4000-21 13KV FDR, 252-2102
 - U-4000-22 13KV FDR, 252-2103
 - U-4000-23 13KV FDR, 252-2101
 - Locally at the U-2 13KV SWGR House, SITE POWER FDR BREAKER (to 0X04), 252-2106
 - (3) Energize 21 13KV Service Bus by closing 21 SERV BUS 13KV FDR, 252-2104.
 - (4) Reset the 13KV BUS 21 286 LOCKOUT/RESET DEVICE.
 - (5) Reset the 247/B device target flags on **BOTH** undervoltage relays:
 - B-21-P
 - B-21-B
 - (6) **IF MCC 216T is de-energized**, **THEN** place the following LTC Drive Power Selector Switches in ALT:
 - 2H2101REG
 - 2H2102REG
 - 2H2103REG

ATTACHMENT(16) Page 5 of 24

500KV OFFSITE POWER RESTORATION

NOTE

Steps may be performed as necessary to energize multiple buses.

CAUTION

Attempts should NOT be made to re-energize a bus if a fault is suspected.

- 3. Energize the desired U4000 SERV XFMRs.
 - a. **IF** it is desired to energize U4000-11 SERV XFMR, **THEN** perform the following actions:
 - (1) Verify the following breakers are open:
 - 14 4KV BUS ALT FDR, 152-1401
 - 11 4KV BUS NORMAL FDR, 152-1115
 - 12 4KV BUS NORMAL FDR, 152-1201
 - 13 4KV BUS NORMAL FDR, 152-1311
 - (2) Close the U4000-11 13KV FDR, 252-1102.
 - b. **IF** it is desired to energize U4000-21 SERV XFMR, **THEN** perform the following actions:
 - (1) Verify the following breakers are open:
 - 14 4KV BUS NORMAL FDR, 152-1414
 - 11 4KV BUS ALT FDR, 152-1101
 - 12 4KV BUS ALT FDR, 152-1209
 - 13 4KV BUS ALT FDR, 152-1301
 - (2) Close the U4000-21 13KV FDR, 252-2102.
 - c. **IF** it is desired to energize U4000-13 SERV XFMR, **THEN** perform the following actions:
 - (1) Verify the following breakers are open:
 - 15 4KV BUS FDR, 152-1501
 - 26 4KV BUS FDR, 152-2604
 - (2) Close the U4000-13 13KV FDR, 252-1101.

ATTACHMENT(16) Page 6 of 24

500KV OFFSITE POWER RESTORATION

3. (continued)

- d. **IF** it is desired to energize U4000-23 SERV XFMR, **THEN** perform the following actions:
 - (1) Verify the following breakers are open:
 - 25 4KV BUS FDR, 152-2501
 - 16 4KV BUS FDR, 152-1604
 - (2) Close the U4000-23 13KV FDR, 252-2101.

CAUTION

Attempts should NOT be made to re-energize a bus if a fault is suspected.

- IF 11 OR 14 4KV Vital Bus is de-energized, THEN restore power to the Engineered Safety Features Buses from the 13KV Service Buses as follows:
 - a. IF NO CC PPs are operating, THEN shut CC CNTMT SUPPLY valve, 1-CC-3832-CV.
 - b. **IF** it is desired to energize 11 4KV Vital Bus from U4000-11 SERV XFMR, **THEN** energize 11 4KV Vital Bus as follows:
 - (1) Verify the 11 4KV BUS LOCI/SD SEQUENCER MANUAL INITIATE keyswitch is ON.
 - (2) Place 1A DG OUT BKR, 152-1703, in PULL TO LOCK.
 - (3) Place 13 AFW PP in PULL TO LOCK.
 - (4) Verify 11 4KV BUS ALT FDR, 152-1101, is open.
 - (5) Insert the sync stick into the sync jack at the 11 4KV BUS NORMAL FDR, 152-1115.
 - (6) Close the 11 4KV BUS NORMAL FDR, 152-1115.
 - (7) Remove the sync stick **AND** return to Home Base.
 - (8) WHEN 11 4KV Bus sequencing is complete, THEN place the 11 4KV BUS LOCI/SD SEQUENCER MANUAL INITIATE keyswitch in NORM.

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500KV OFFSITE POWER RESTORATION

4. (continued)

- c. **IF** it is desired to energize 14 4KV Vital Bus from U4000-11 SERV XFMR, **THEN** energize 14 4KV Vital Bus as follows:
 - (1) Verify the 14 4KV BUS LOCI/SD SEQUENCER MANUAL INITIATE keyswitch is ON.
 - (2) Place 1B DG OUT BKR, 152-1403, in PULL TO LOCK.
 - (3) Verify the 14 4KV BUS NORMAL FDR, 152-1414, is open.
 - (4) Insert the sync stick into the sync jack at the 14 4KV BUS ALT FDR, 152-1401.
 - (5) Close the 14 4KV BUS ALT FDR, 152-1401.
 - (6) Remove the sync stick **AND** return to Home Base.
 - (7) WHEN 14 4KV Bus sequencing is complete, THEN place the 14 4KV BUS LOCI/SD SEQUENCER MANUAL INITIATE keyswitch in NORM.
- d. **IF** it is desired to energize 11 4KV Vital Bus from U4000-21 SERV XFMR, **THEN** energize 11 4KV Vital Bus as follows:
 - (1) Verify the 11 4KV BUS LOCI/SD SEQUENCER MANUAL INITIATE keyswitch is ON.
 - (2) Place 1A DG OUT BKR, 152-1703, in PULL TO LOCK.
 - (3) Place 13 AFW PP in PULL TO LOCK.
 - (4) Verify 11 4KV BUS NORMAL FDR, 152-1115, is open.
 - (5) Insert the sync stick into the sync jack at the 11 4KV BUS ALT FDR, 152-1101.
 - (6) Close the 11 4KV BUS ALT FDR, 152-1101.
 - (7) Remove the sync stick **AND** return to Home Base.
 - (8) WHEN 11 4KV Bus sequencing is complete, THEN place the 11 4KV BUS LOCI/SD SEQUENCER MANUAL INITIATE keyswitch in NORM.

ATTACHMENT(16) Page 8 of 24

500KV OFFSITE POWER RESTORATION

4. (continued)

- e. **IF** it is desired to energize 14 4KV Vital Bus from U4000-21 SERV XFMR, **THEN** energize 14 4KV Vital Bus as follows:
 - (1) Verify the 14 4KV BUS LOCI/SD SEQUENCER MANUAL INITIATE keyswitch is ON.
 - (2) Place 1B DG OUT BKR, 152-1403, in PULL TO LOCK.
 - (3) Verify 14 4KV BUS ALT FDR, 152-1401, is open.
 - (4) Insert the sync stick into the sync jack at the 14 4KV BUS NORMAL FDR, 152-1414.
 - (5) Close the 14 4KV BUS NORMAL FDR, 152-1414.
 - (6) Remove the sync stick **AND** return to Home Base.
 - (7) WHEN 14 4KV Bus sequencing is complete, THEN place the 14 4KV BUS LOCI/SD SEQUENCER MANUAL INITIATE keyswitch in NORM.

CAUTION

Attempts should NOT be made to re-energize a bus if a fault is suspected.

- IF 11 OR 14 4KV Vital Bus is powered by a DG, AND SIAS has NOT actuated OR has been reset, THEN restore power to the Engineered Safety Features Buses from the 13KV Service Buses as follows:
 - a. IF it is desired to energize 11 4KV Vital Bus from U4000-11 SERV XFMR,
 AND 1A DG is powering 11 4KV Vital Bus,
 THEN transfer 11 4KV Vital Bus from 1A DG to U4000-11 SERV XFMR as follows:
 - (1) Place 1A DG in the TRANSFER MODE by performing the following:
 - (a) Depress 1A DG EMERGENCY START, 1-HS-1707, pushbutton.
 - (b) Insert the sync stick into the sync jack at the 1A DG OUT BKR, 152-1703.
 - (c) Depress 1A DG SLOW START, 1-HS-1708, pushbutton.
 - (d) Momentarily place 1A DG SPEED CONTR, 1-CS-1705, to RAISE OR LOWER.

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500KV OFFSITE POWER RESTORATION

5.a.1. (continued)

- (e) Maintain 1A DG at approximately 60 Hz using 1A DG SPEED CONTR, 1-CS-1705.
- (f) Remove the sync stick from 1A DG OUT BKR, 152-1703.
- (g) Insert the sync stick into the sync jack at the 11 4KV BUS NORMAL FDR, 152-1115.
- (h) Check the associated Synchroscope and Sync Lights are operating.

NOTE

Offsite power voltage indication will be on the INCOMING voltmeter.

(i) Adjust RUNNING VOLTS equal to INCOMING VOLTS using 1A DG AUTO VOLT CONTR, 1-CS-1704.

NOTE

The Synchroscope works in the opposite direction from normal when 1A DG is the RUNNING power source.

(j) Adjust 1A DG frequency so the synchroscope pointer is rotating <u>slowly</u> in the FAST direction using 1A DG SPEED CONTR, 1-CS-1705.

CAUTION

To avoid improper paralleling, do NOT start OR stop any large loads on the 11 4KV Bus.

- (k) WHEN the Synchroscope pointer is approximately 5 degrees prior to the 12 o'clock position, THEN close the 11 4KV BUS NORMAL FDR, 152-1115.
- (I) Check 1A DG load is approximately 2000 KW.
- (m) Remove the sync stick **AND** return to Home Base.
- (n) Shutdown 1A DG PER OI-21A, <u>1A Diesel Generator</u>, if desired.

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500KV OFFSITE POWER RESTORATION

5. (continued)

 b. IF it is desired to energize 11 4KV Vital Bus from U4000-11 SERV XFMR, AND 0C DG is powering 11 4KV Vital Bus, THEN transfer 11 4KV Vital Bus from 0C DG to U4000-11 SERV XFMR as follows:

NOTE

Load on 11 4KV bus may be reduced by using redundant 4KV bus equipment.

- (1) **IF** 0C DG load is greater than 1000 KW, **THEN** bypass breaker 152-0703 underfrequency trip as follows:
 - (a) Remove the cover from UNDERVOLTAGE PROTECTION RELAY, 0SSL 0998-81.U, in 0C DG Local Control Panel 0C188 Cabinet 5.
 - (b) Disconnect the RED knifeswitch in the bottom right of the relay by pressing the top down.
- (2) Place 0C DG in the TRANSFER MODE by performing the following:
 - (a) Depress 0C DG EMERGENCY START, 0-HS-0707, pushbutton.
 - (b) Insert the sync stick into the sync jack at the 0C DG OUT BKR, 152-0703.

CAUTION

0C DG OUT BKR, 152-0703 trips on underfrequency at 59.5 Hz in the parallel OR transfer modes, unless bypassed.

- (c) Depress 0C DG SLOW START, 0-HS-0708, pushbutton.
- (d) Momentarily place 0C DG SPEED CONTR, 0-CS-0705, to RAISE OR LOWER.
- (e) Maintain 0C DG at approximately 60 Hz using 0C DG SPEED CONTR, 0-CS-0705.
- (f) Remove the sync stick from 0C DG OUT BKR, 152-0703.

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	500KV OFFSITE POWER RESTORATION		
5.b.2. (continued)			
(g)	IF UNDERVOLTAGE PROTECTION RELAY, 0SSL 0998-81.U, is bypassed,		
	THEN enable the underfrequency trip by performing the following, in 0C DG Local Control Panel 0C188 Cabinet 5:		
	 Verify UNDERVOLTAGE PROTECTION RELAY, 0SSL 0998-81.U, is reset. 		
	 Raise the RED knifeswitch in the bottom right of the relay until the switch is fully engaged. 		
	 Request an independent person to second check the knifeswitch is closed properly. 		
	 Install the cover from UNDERVOLTAGE PROTECTION RELAY, 0SSL 0998-81.U. 		
(h)	Insert the sync stick into the sync jack at the 11 4KV BUS NORMAL FDR, 152-1115.		
(i)	Check the associated Synchroscope and Sync Lights are operating.		
Offsit	NOTE te power voltage indication will be on the INCOMING voltmeter.		
(i)	Adjust RUNNING VOLTS equal to INCOMING VOLTS using 0C DG AUTO VOLT CONTR, 0-CS-0704.		
	NOTE		
The Synchroscop RUNNING power	e works in the opposite direction from normal when 0C DG is the source.		
(k)	Adjust 0C DG frequency so the synchroscope pointer is rotating <u>slowly</u> in the FAST direction using 0C DG SPEED CONTR, 0-CS-0705.		
To avoid improp Bus.	<u>CAUTION</u> er paralleling, do NOT start OR stop any large loads on the 11 4KV		
(1)	WHEN the Synchroscope pointer is approximately 5 degrees prior to the		
	12 o'clock position, THEN close the 11 4KV BUS NORMAL FDR, 152-1115.		
	(continued)		

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500KV OFFSITE POWER RESTORATION

5.b.2. (continued)

- (m) Remove the sync stick **AND** return to Home Base.
- (n) Shutdown 0C DG PER OI-21C, 0C Diesel Generator, if desired.
- c. IF it is desired to energize 14 4KV Vital Bus from U4000-11 SERV XFMR, AND 1B DG is powering 14 4KV Vital Bus, THEN transfer 14 4KV Vital Bus from 1B DG to U4000-11 SERV XFMR as follows:
 - (1) Momentarily place 1B DG UNIT PARALLEL, 1-CS-1404, to PARA.
 - (2) Adjust 1B DG frequency to approximately 60 Hz using 1B DG SPEED, 1-CS-1403.
 - (3) Insert the sync stick into the sync jack at the 14 4KV BUS ALT FDR, 152-1401.
 - (4) Check the associated Synchroscope and Sync Lights are operating.

NOTE

Offsite power voltage indication will be on the INCOMING voltmeter.

(5) Adjust RUNNING VOLTS equal to INCOMING VOLTS using 1B DG AUTO VOLT CONTR, 1-CS-1402.

NOTE

The Synchroscope works in the opposite direction from normal when 1B DG is the RUNNING power source.

(6) Adjust 1B DG frequency so the synchroscope pointer is rotating <u>slowly</u> in the FAST direction using 1B DG SPEED CONTR, 1-CS-1403.

CAUTION

To avoid improper paralleling, do NOT start OR stop any large loads on the 14 4KV Bus.

- (7) WHEN the Synchroscope pointer is approximately 5 degrees prior to the 12 o'clock position, THEN close the 14 4KV BUS ALT FDR, 152-1401.
- (8) Remove the sync stick **AND** return to Home Base.
- (9) Shutdown 1B DG PER OI-21B, <u>1B Diesel Generator</u>, if desired.

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500KV OFFSITE POWER RESTORATION

5. (continued)

 d. IF it is desired to energize 14 4KV Vital Bus from U4000-11 SERV XFMR, AND 0C DG is powering 14 4KV Vital Bus, THEN transfer 14 4KV Vital Bus from 0C DG to U4000-11 SERV XFMR as follows:

<u>NOTE</u>

Load on 14 4KV bus may be reduced by using redundant 4KV bus equipment.

- (1) **IF** 0C DG load is greater than 1000 KW, **THEN** bypass breaker 152-0703 underfrequency trip as follows:
 - (a) Remove the cover from UNDERVOLTAGE PROTECTION RELAY, 0SSL 0998-81.U, in 0C DG Local Control Panel 0C188 Cabinet 5.
 - (b) Disconnect the RED knifeswitch in the bottom right of the relay by pressing the top down.
- (2) Place 0C DG in the TRANSFER MODE by performing the following:
 - (a) Depress 0C DG EMERGENCY START, 0-HS-0707, pushbutton.
 - (b) Insert the sync stick into the sync jack at the 0C DG OUT BKR, 152-0703.

CAUTION

0C DG OUT BKR, 152-0703 trips on underfrequency at 59.5 Hz in the parallel OR transfer modes, unless bypassed.

- (c) Depress 0C DG SLOW START, 0-HS-0708, pushbutton.
- (d) Momentarily place 0C DG SPEED CONTR, 0-CS-0705, to RAISE OR LOWER.
- (e) Maintain 0C DG at approximately 60 Hz using 0C DG SPEED CONTR, 0-CS-0705.
- (f) Remove the sync stick from 0C DG OUT BKR, 152-0703.

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500KV OFFSITE POWER RESTORATION

5.d.2. (continued)

- (g) IF UNDERVOLTAGE PROTECTION RELAY, 0SSL 0998-81.U, is bypassed, THEN enable the underfrequency trip by performing the following, in 0C DG Local Control Panel 0C188 Cabinet 5:
 - 1) Verify UNDERVOLTAGE PROTECTION RELAY, 0SSL 0998-81.U, is reset.
 - 2) Raise the RED knifeswitch in the bottom right of the relay until the switch is fully engaged.
 - 3) Request an independent person to second check the knifeswitch is closed properly.
 - 4) Install the cover from UNDERVOLTAGE PROTECTION RELAY, 0SSL 0998-81.U.
- (h) Insert the sync stick into the sync jack at the 14 4KV BUS ALT FDR, 152-1401.
- (i) Check the associated Synchroscope and Sync Lights are operating.

NOTE

Offsite power voltage indication will be on the INCOMING voltmeter.

(j) Adjust RUNNING VOLTS equal to INCOMING VOLTS using 0C DG AUTO VOLT CONTR, 0-CS-0704.

NOTE

The Synchroscope works in the opposite direction from normal when 0C DG is the RUNNING power source.

(k) Adjust 0C DG frequency so the synchroscope pointer is rotating <u>slowly</u> in the FAST direction using 0C DG SPEED CONTR, 0-CS-0705.

CAUTION

To avoid improper paralleling, do NOT start OR stop any large loads on the 14 4KV Bus.

 WHEN the Synchroscope pointer is approximately 5 degrees prior to the 12 o'clock position, THEN close the 14 4KV BUS ALT FDR, 152-1401.

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500KV OFFSITE POWER RESTORATION

5.d.2. (continued)

- (m) Remove the sync stick **AND** return to Home Base.
- (n) Shutdown 0C DG PER OI-21C, OC Diesel Generator, if desired.
- e. IF it is desired to energize 11 4KV Vital Bus from U4000-21 SERV XFMR, AND 1A DG is powering 11 4KV Vital Bus, THEN transfer 11 4KV Vital Bus from 1A DG to U4000-21 SERV XFMR as follows:
 - (1) Place 1A DG in the TRANSFER MODE by performing the following:
 - (a) Depress 1A DG EMERGENCY START, 1-HS-1707, pushbutton.
 - (b) Insert the sync stick into the sync jack at the 1A DG OUT BKR, 152-1703.
 - (c) Depress 1A DG SLOW START, 1-HS-1708, pushbutton.
 - (d) Momentarily place 1A DG SPEED CONTR, 1-CS-1705, to RAISE OR LOWER.
 - (e) Maintain 1A DG at approximately 60 Hz using 1A DG SPEED CONTR, 1-CS-1705.
 - (f) Remove the sync stick from 1A DG OUT BKR, 152-1703.
 - (g) Insert the sync stick into the sync jack at the 11 4KV BUS ALT FDR, 152-1101.
 - (h) Check the associated Synchroscope and Sync Lights are operating.

NOTE

Offsite power voltage indication will be on the INCOMING voltmeter.

(i) Adjust RUNNING VOLTS equal to INCOMING VOLTS using 1A DG AUTO VOLT CONTR, 1-CS-1704.

<u>NOTE</u>

The Synchroscope works in the opposite direction from normal when 1A DG is the RUNNING power source.

(j) Adjust 1A DG frequency so the synchroscope pointer is rotating <u>slowly</u> in the FAST direction using 1A DG SPEED CONTR, 1-CS-1705.

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500KV OFFSITE POWER RESTORATION

5.e.1. (continued)

CAUTION

To avoid improper paralleling, do NOT start OR stop any large loads on the 11 4KV Bus.

- (k) WHEN the Synchroscope pointer is approximately 5 degrees prior to the 12 o'clock position, THEN close the 11 4KV BUS ALT FDR, 152-1101.
- (I) Check 1A DG load is approximately 2000 KW.
- (m) Remove the sync stick **AND** return to Home Base.
- (n) Shutdown 1A DG PER OI-21A, <u>1A Diesel Generator</u>, if desired.
- f. IF it is desired to energize 11 4KV Vital Bus from U4000-21 SERV XFMR, AND 0C DG is powering 11 4KV Vital Bus, THEN transfer 11 4KV Vital Bus from 0C DG to U4000-21 SERV XFMR as follows:

NOTE

Load on 11 4KV bus may be reduced by using redundant 4KV bus equipment.

- (1) **IF** 0C DG load is greater than 1000 KW, **THEN** bypass breaker 152-0703 underfrequency trip as follows:
 - (a) Remove the cover from UNDERVOLTAGE PROTECTION RELAY, 0SSL 0998-81.U, in 0C DG Local Control Panel 0C188 Cabinet 5.
 - (b) Disconnect the RED knifeswitch in the bottom right of the relay by pressing the top down.

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500KV OFFSITE POWER RESTORATION

5.f. (continued)

- (2) Place 0C DG in the TRANSFER MODE by performing the following:
 - (a) Depress 0C DG EMERGENCY START, 0-HS-0707, pushbutton.
 - (b) Insert the sync stick into the sync jack at the 0C DG OUT BKR, 152-0703.

CAUTION 0C DG OUT BKR, 152-0703 trips on underfrequency at 59.5 Hz in the parallel OR transfer modes, unless bypassed. (c) Depress 0C DG SLOW START, 0-HS-0708, pushbutton. (d) Momentarily place 0C DG SPEED CONTR, 0-CS-0705, to RAISE OR LOWER. (e) Maintain 0C DG at approximately 60 Hz using 0C DG SPEED CONTR, 0-CS-0705. (f) Remove the sync stick from 0C DG OUT BKR, 152-0703. (g) IF UNDERVOLTAGE PROTECTION RELAY, 0SSL 0998-81.U, is bypassed. THEN enable the underfrequency trip by performing the following, in 0C DG Local Control Panel 0C188 Cabinet 5: 1) Verify UNDERVOLTAGE PROTECTION RELAY, 0SSL 0998-81.U, is reset. 2) Raise the RED knifeswitch in the bottom right of the relay until the switch is fully engaged. 3) Request an independent person to second check the knifeswitch is closed properly. 4) Install the cover from UNDERVOLTAGE PROTECTION RELAY, 0SSL 0998-81.U. (h) Insert the sync stick into the sync jack at the 11 4KV BUS ALT FDR. 152-1101. Check the associated Synchroscope and Sync Lights are operating. (i) (continued)

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500KV OFFSITE POWER RESTORATION

5.f.2. (continued)

<u>NOTE</u>

Offsite power voltage indication will be on the INCOMING voltmeter.

(j) Adjust RUNNING VOLTS equal to INCOMING VOLTS using 0C DG AUTO VOLT CONTR, 0-CS-0704.

NOTE

The Synchroscope works in the opposite direction from normal when 0C DG is the RUNNING power source.

(k) Adjust 0C DG frequency so the synchroscope pointer is rotating <u>slowly</u> in the FAST direction using 0C DG SPEED CONTR, 0-CS-0705.

CAUTION

To avoid improper paralleling, do NOT start OR stop any large loads on the 11 4KV Bus.

- WHEN the Synchroscope pointer is approximately 5 degrees prior to the 12 o'clock position, THEN close the 11 4KV BUS ALT FDR, 152-1101.
- (m) Remove the sync stick **AND** return to Home Base.
- (n) Shutdown 0C DG **PER** OI-21C, <u>0C Diesel Generator</u>, if desired.

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500KV OFFSITE POWER RESTORATION

5. (continued)

- g. IF it is desired to energize 14 4KV Vital Bus from U4000-21 SERV XFMR,
 AND 1B DG is powering 14 4KV Vital Bus,
 THEN transfer 14 4KV Vital Bus from 1B DG to U4000-21 SERV XFMR as follows:
 - (1) Momentarily place 1B DG UNIT PARALLEL, 1-CS-1404, to PARA.
 - (2) Adjust 1B DG frequency to approximately 60 Hz using 1B DG SPEED, 1-CS-1403.
 - (3) Insert the sync stick into the sync jack at the 14 4KV BUS NORMAL FDR, 152-1414.
 - (4) Check the associated Synchroscope and Sync Lights are operating.

NOTE

Offsite power voltage indication will be on the INCOMING voltmeter.

(5) Adjust RUNNING VOLTS equal to INCOMING VOLTS using 1B DG AUTO VOLT CONTR, 1-CS-1402.

<u>NOTE</u>

The Synchroscope works in the opposite direction from normal when 1B DG is the RUNNING power source.

(6) Adjust 1B DG frequency so the synchroscope pointer is rotating <u>slowly</u> in the FAST direction using 1B DG SPEED CONTR, 1-CS-1403.

CAUTION

To avoid improper paralleling, do NOT start OR stop any large loads on the 14 4KV Bus.

- (7) WHEN the Synchroscope pointer is approximately 5 degrees prior to the 12 o'clock position, THEN close the 14 4KV BUS NORMAL FDR, 152-1414.
- (8) Remove the sync stick **AND** return to Home Base.
- (9) Shutdown 1B DG PER OI-21B, <u>1B Diesel Generator</u>, if desired.

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500KV OFFSITE POWER RESTORATION

5. (continued)

 h. IF it is desired to energize 14 4KV Vital Bus from U4000-21 SERV XFMR, AND 0C DG is powering 14 4KV Vital Bus, THEN transfer 14 4KV Vital Bus from 0C DG to U4000-21 SERV XFMR as follows:

NOTE

Load on 14 4KV bus may be reduced by using redundant 4KV bus equipment.

- (1) **IF** 0C DG load is greater than 1000 KW, **THEN** bypass breaker 152-0703 underfrequency trip as follows:
 - (a) Remove the cover from UNDERVOLTAGE PROTECTION RELAY, 0SSL 0998-81.U, in 0C DG Local Control Panel 0C188 Cabinet 5.
 - (b) Disconnect the RED knifeswitch in the bottom right of the relay by pressing the top down.
- (2) Place 0C DG in the TRANSFER MODE by performing the following:
 - (a) Depress 0C DG EMERGENCY START, 0-HS-0707, pushbutton.
 - (b) Insert the sync stick into the sync jack at the 0C DG OUT BKR, 152-0703.

CAUTION

0C DG OUT BKR, 152-0703 trips on underfrequency at 59.5 Hz in the parallel OR transfer modes, unless bypassed.

- (c) Depress 0C DG SLOW START, 0-HS-0708, pushbutton.
- (d) Momentarily place 0C DG SPEED CONTR, 0-CS-0705, to RAISE OR LOWER.
- (e) Maintain 0C DG at approximately 60 Hz using 0C DG SPEED CONTR, 0-CS-0705.
- (f) Remove the sync stick from 0C DG OUT BKR, 152-0703.

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	500KV OFFSITE POWER RESTORATION	
5.h.2. (continued)		
(g)	IF UNDERVOLTAGE PROTECTION RELAY, 0SSL 0998-81.U, is bypassed, THEN enable the underfrequency trip by performing the following, in 0C DG Local Control Panel 0C188 Cabinet 5:	
	 Verify UNDERVOLTAGE PROTECTION RELAY, 0SSL 0998-81.U, is reset. 	
	 Raise the RED knifeswitch in the bottom right of the relay until the switch is fully engaged. 	
	 Request an independent person to second check the knifeswitch is closed properly. 	
	 Install the cover from UNDERVOLTAGE PROTECTION RELAY, 0SSL 0998-81.U. 	
(h)	Insert the sync stick into the sync jack at the 14 4KV BUS NORMAL FDR, 152-1414.	
(i)	Check the associated Synchroscope and Sync Lights are operating.	
Offsit	NOTE te power voltage indication will be on the INCOMING voltmeter.	
(j)	Adjust RUNNING VOLTS equal to INCOMING VOLTS using 0C DG AUTO VOLT CONTR, 0-CS-0704.	
The Synchroscop RUNNING power	<u>NOTE</u> we works in the opposite direction from normal when 0C DG is the source.	
(k)	Adjust 0C DG frequency so the synchroscope pointer is rotating <u>slowly</u> in the FAST direction using 0C DG SPEED CONTR, 0-CS-0705.	
To avoid improp Bus.	<u>CAUTION</u> er paralleling, do NOT start OR stop any large loads on the 14 4KV	
(1)	WHEN the Synchroscope pointer is approximately 5 degrees prior to the 12 o'clock position, THEN close the 14 4KV BUS NORMAL FDR, 152-1414.	
	(continued)	

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500KV OFFSITE POWER RESTORATION

5.h.2. (continued)

(m) Remove the sync stick **AND** return to Home Base.

(n) Shutdown 0C DG PER OI-21C, OC Diesel Generator, if desired.

NOTE

Steps may be performed as necessary to energize multiple buses.

CAUTION

Attempts should NOT be made to re-energize a bus if a fault is suspected.

- 6. Energize the desired 4KV Non Vital Buses.
 - a. **IF** it is desired to energize 12 4KV Non Vital Bus, **THEN** perform the following:
 - Verify the following breakers are open:
 - U440-12B 4KV FDR, 152-1202
 - U440-12A 4KV FDR, 152-1208
 - Verify the handswitches for the following loads are in PULL TO LOCK:
 - 11 COND PP
 - 11 COND BSTR PP
 - 12 COND BSTR PP
 - 11 HTR DRN PP
 - b. **IF** it is desired to energize 13 4KV Non Vital Bus, **THEN** perform the following:
 - Verify the following breakers are open:
 - U440-13B 4KV FDR, 152-1302
 - U440-13A 4KV FDR, 152-1310
 - Verify the handswitches for the following loads are in PULL TO LOCK:
 - 12 COND PP
 - 13 COND PP
 - 13 COND BSTR PP
 - 12 HTR DRN PP

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500KV OFFSITE POWER RESTORATION

- c. **IF** it is desired to energize 15 4KV Non Vital Bus, **THEN** perform the following:
 - Verify U440-15 4KV FDR, 152-1505, is open.
 - Verify 15-16 4KV TIE, 152-1506, is open.
 - Verify the handswitches for the following loads are in PULL TO LOCK:
 - 11 CIRC WTR PP
 - 12 CIRC WTR PP
 - 13 CIRC WTR PP
- d. **IF** it is desired to energize 16 4KV Non Vital Bus, **THEN** perform the following:
 - Verify U440-16 4KV FDR, 152-1605, is open.
 - Verify 15-16 4KV TIE, 152-1506, is open.
 - Verify the handswitches for the following loads are in PULL TO LOCK:
 - 14 CIRC WTR PP
 - 15 CIRC WTR PP
 - 16 CIRC WTR PP
- e. Verify the associated 4KV SERV XFMR FDR BKR is closed.
- f. Insert the sync stick into the sync jack at the 4KV BUS FDR or TIE breaker to be closed.
- g. Place and hold the 4KV BUS FDR or TIE breaker handswitch in CLOSE until the bus voltage indicates between 4.1 and 4.35 KV
- h. Remove the sync stick **AND** return to Home Base.
- i. Close the associated U440 4KV FDR breaker(s).
- j. Repeat steps 6.a through 6.i as desired to energize additional 4KV Non Vital Buses.

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500KV OFFSITE POWER RESTORATION

CAUTION

Attempts should NOT be made to re-energize a bus if a fault is suspected.

- 7. **IF** MCC-101AT **OR** MCC-101BT are de-energized, **THEN** energize the desired Turbine MCC.
 - a. **IF** 11A 480V BUS is energized from 500KV offsite power, **THEN** restore power to MCC-101AT by closing normal feeder breaker 52-1109.
 - b. **IF** 14B 480V BUS is energized from 500KV offsite power, **THEN** restore power to MCC-101BT by closing normal feeder breaker 52-1419.

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ONCE-THROUGH-COOLING MATRIX

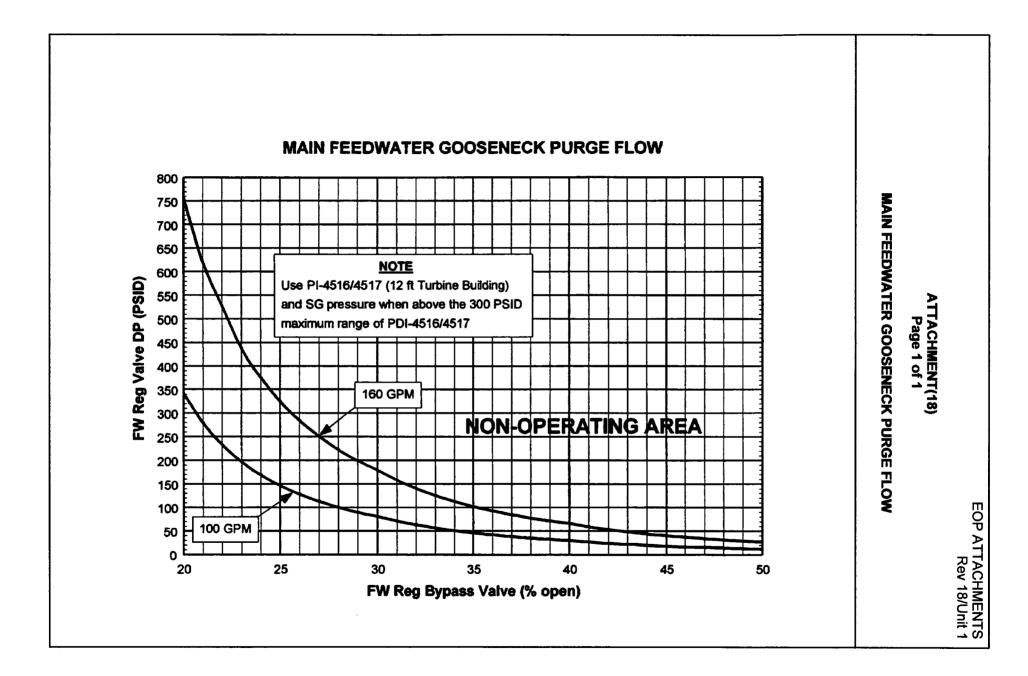
NOTE

OK: indicates adequate equipment to support successful Once-Through-Cooling.

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<u>NOTE</u> Calculated minimum time to core uncovery is displayed for cases where adequate equipment to support successful Once-Through-Cooling is **NOT** available.

equipment		2 PORV		1 PORV
	3 CHG PP	2 CHG PP	1 CHG PP	3 CHG PP 2 CHG PP 1 CHG PP
3 HPSI PP	0K	0K	0K	5 hours 3 hours 3 hours
2 HPSI PP	ОК	0K	0K	5 hours 3 hours 3 hours
1 HPSI PP	0K	3 hours	2 hours	5 hours 3 hours 2 hours



ATTACHMENT(19) Page 1 of 1

RESET AFAS START SIGNALS AT THE ACTUATION CABINETS

- 1. Verify BOTH SG levels are greater than (-)170 inches.
- 2. Verify the S/G B/D valve handswitches are in CLOSE:
 - 1-BD-4010-CV
 - 1-BD-4011-CV
 - 1-BD-4012-CV
 - 1-BD-4013-CV
- 3. Reset the AFAS Sensor Modules:
 - a. Unlock and open the Sensor Cabinet front door.
 - b. Reset the sensor module bistable(s) by momentarily pushing the RESET pushbutton on the SG LEVEL LOW module(s).
 - c. Momentarily place the BISTABLE TRIP TEST/RESET toggle switch on the AIM module in RESET.
 - d. Close and lock the Sensor Cabinet front door.
 - e. Repeat steps 3.a through 3.d for ALL channels.
- 4. Reset the AFAS Logic Modules:
 - a. Unlock and open the Logic Cabinet front door.
 - b. Reset the logic module bistable by momentarily pushing the RESET pushbutton on the AFAS START module.
 - c. Momentarily place the AFAS START TEST/RESET toggle switch on the AIM module in RESET.
 - d. Check the TRIP light is extinguished.
 - e. Close and lock the Logic Cabinet front door.
 - f. Repeat steps 4.a through 4.e for the other Logic Cabinet.
- 5. Check the following extinguished:
 - "AFAS A ACTUATED" status panel alarm light on panel 1C04.
 - "AFAS B ACTUATED" status panel alarm light on panel 1C04.

CALVERT CLIFFS NUCLEAR POWER PLANT TECHNICAL PROCEDURE

UNIT TWO

EOP ATTACHMENTS

REVISION 17

Safety Related

Approval Authority:

. .

Kent Mills / 8-30-2004

signature/date

Effective Date: 9-2-2004

EOP ATTACHMENTS Rev 17/Unit 2 Page 2 of 2

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s /

<u>.</u>

LIST OF EFFECTIVE PAGES

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REVISION

1-2

17

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12 13	1	17
14	1	17
15	1	17
16	1-23	17
17 18	1	17 17
19	1	17

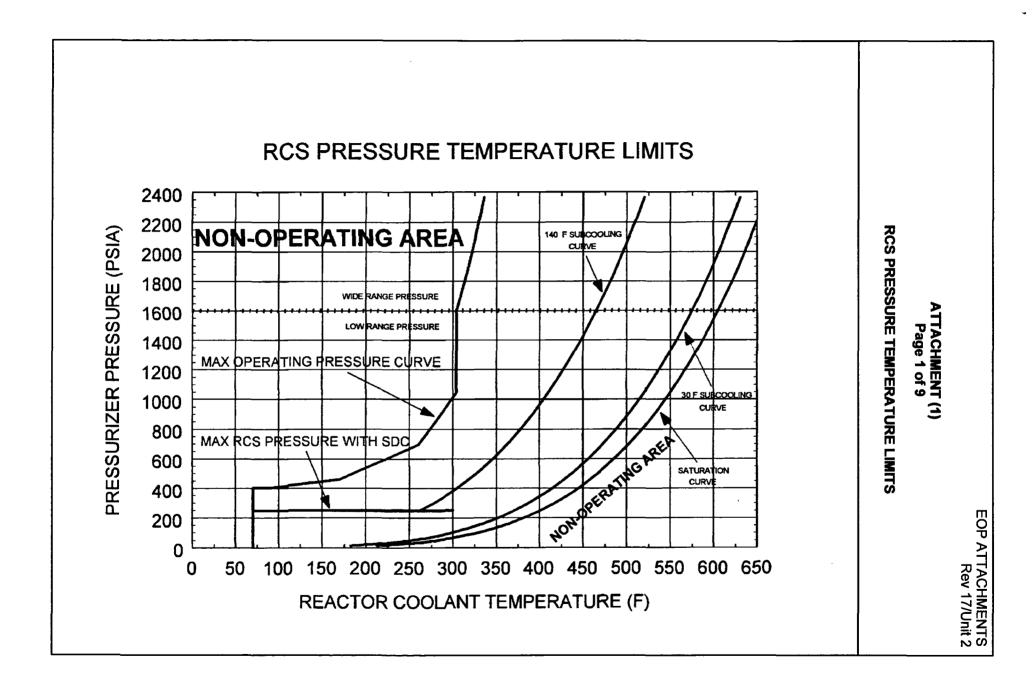
PROCEDURE ALTERATIONS

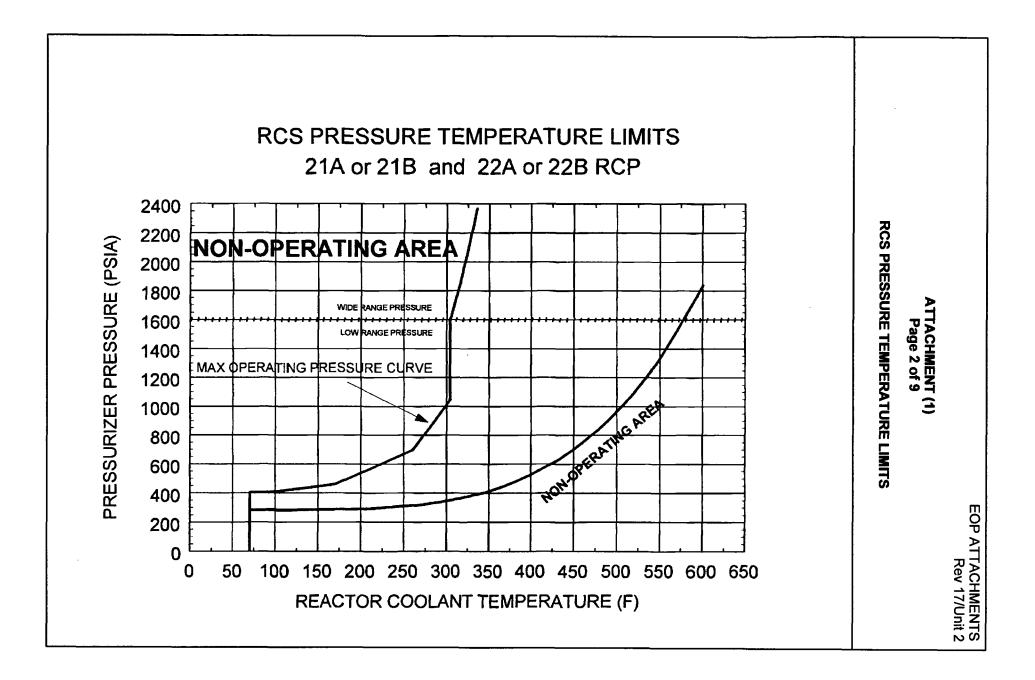
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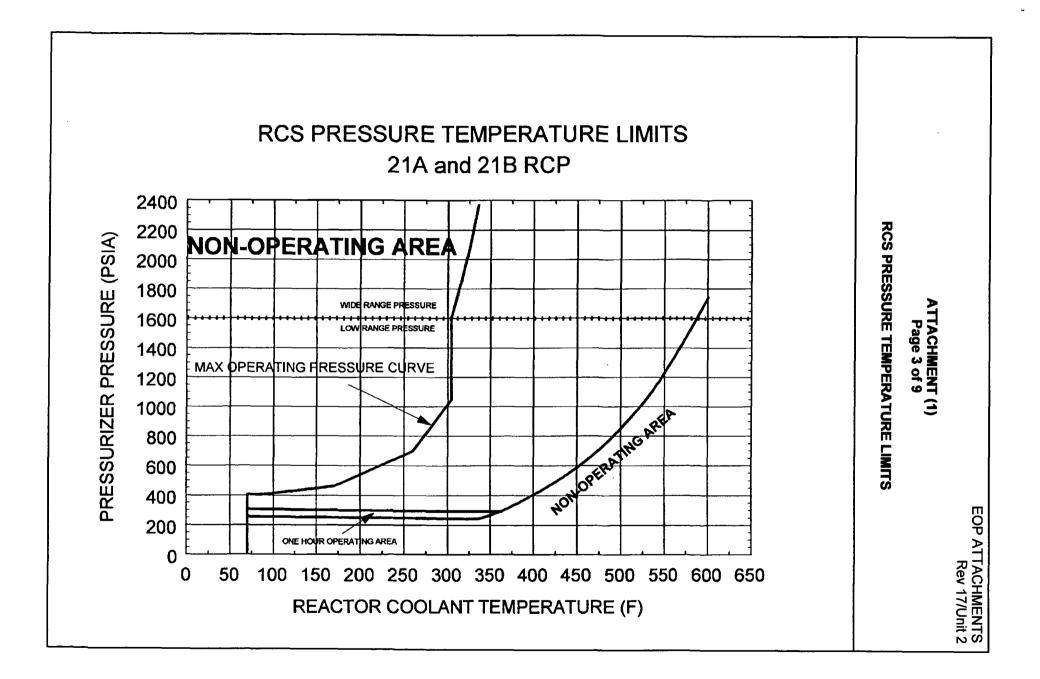
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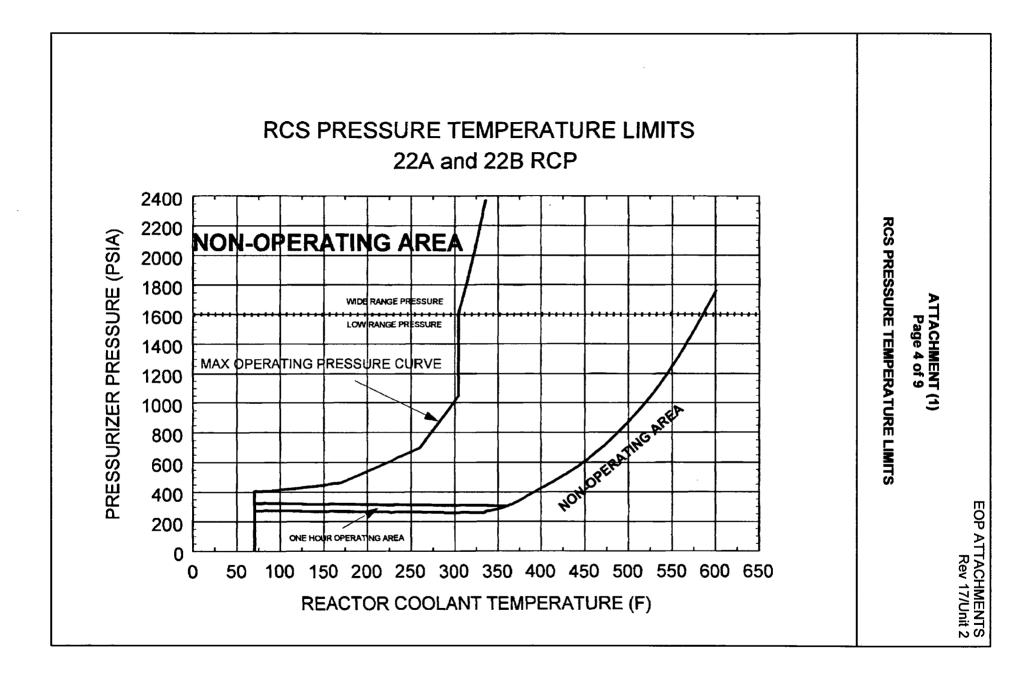
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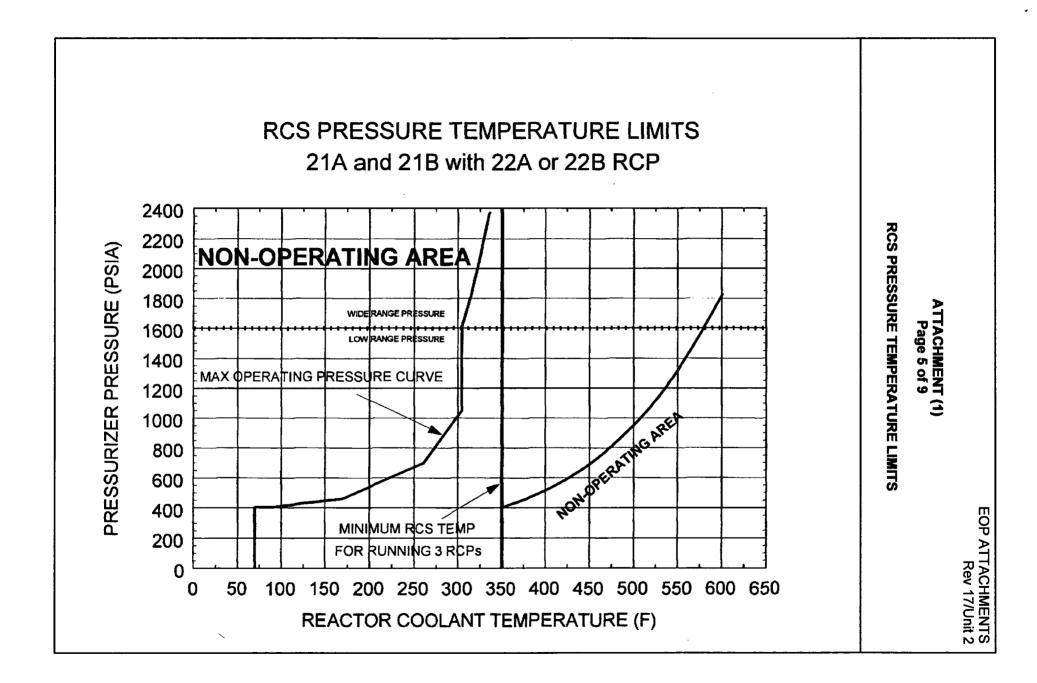
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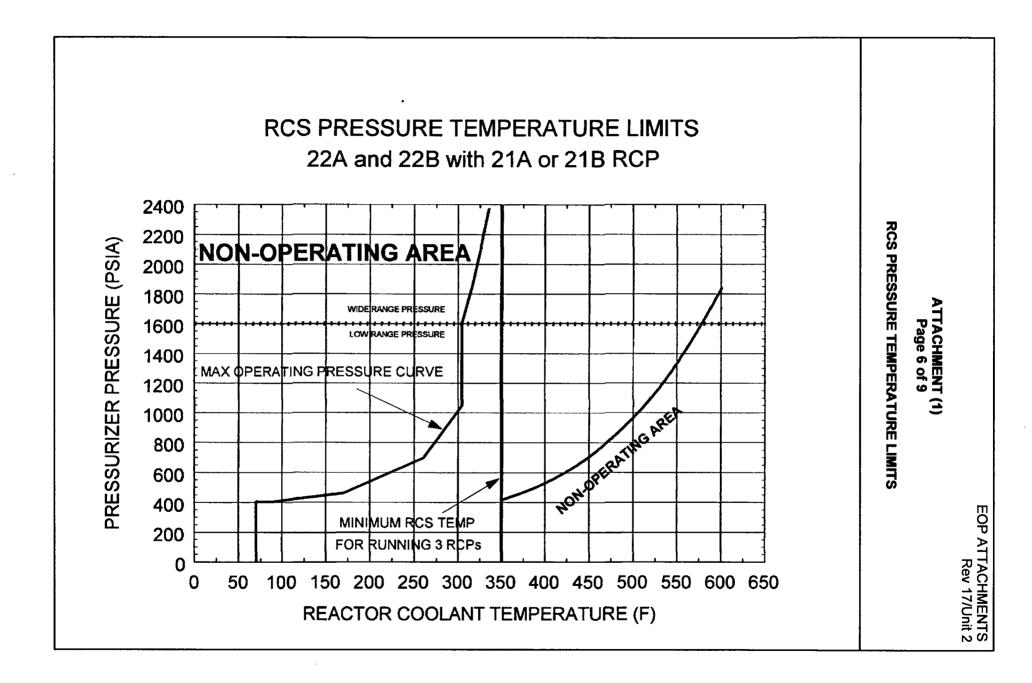


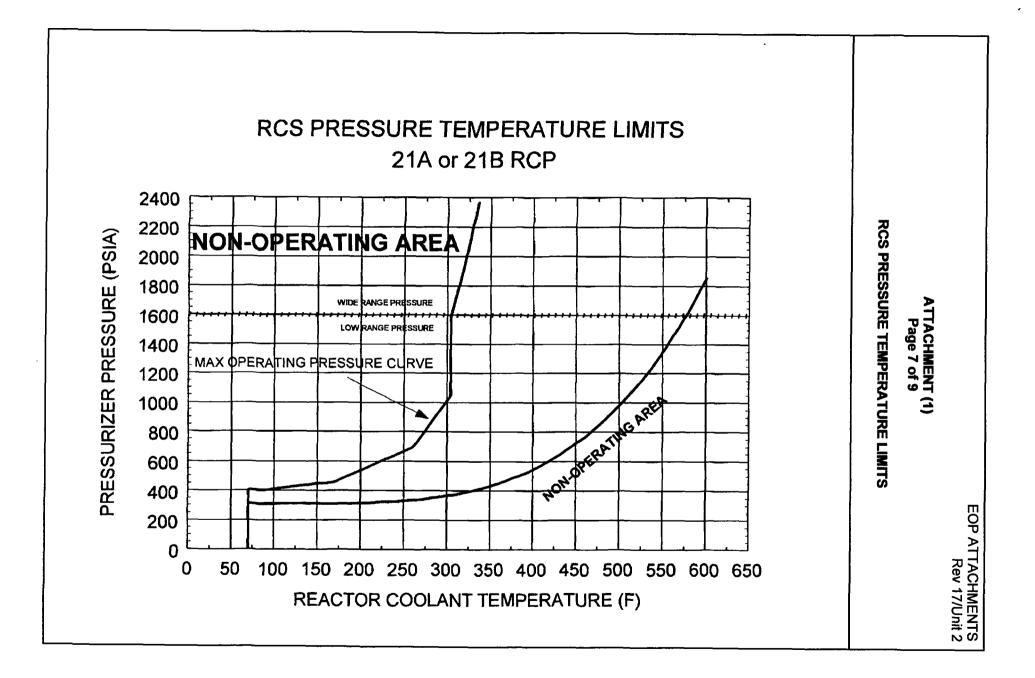


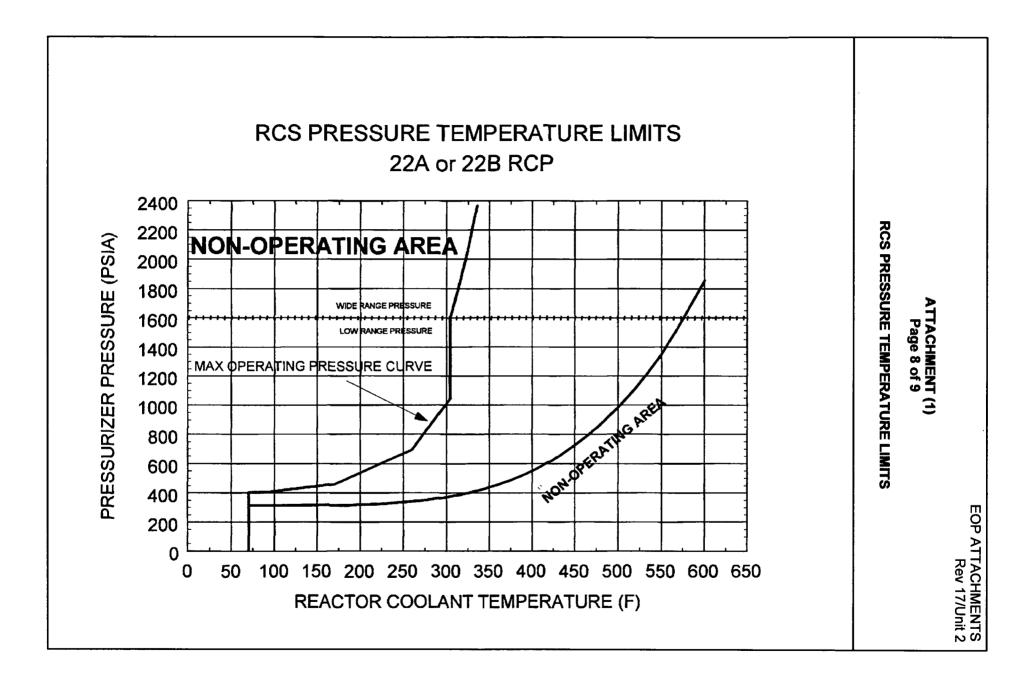


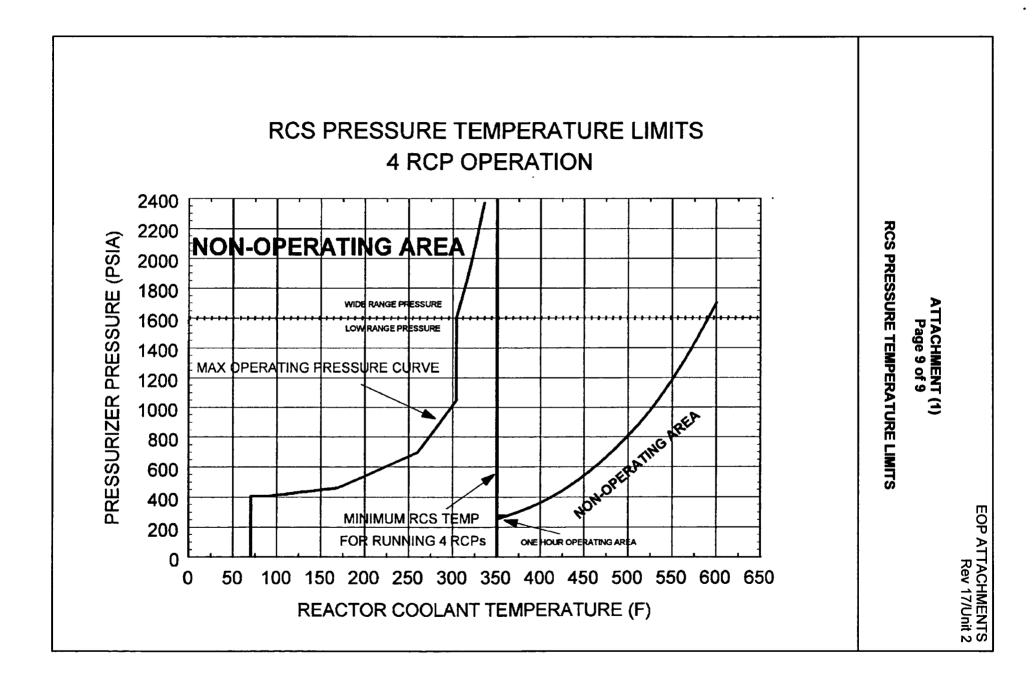












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ATTACHMENT (2) Page 1 of 5

SIAS VERIFICATION CHECKLIST

<u>2C</u>	08, 2009, 2010	
a.	21 and 23 HPSI PPs	Running
b.	21 and 22 LPSI PPs	Running
c.	21 and 22 CS PPs	Running
d.	HPSI MAIN HDR valves:	
	 2-SI-616-MOV. 2-SI-626-MOV. 2-SI-636-MOV. 2-SI-646-MOV. 	Open Open Open Open
е.	HPSI AUX HDR valves:	
	 2-SI-617-MOV 2-SI-627-MOV 2-SI-637-MOV 2-SI-647-MOV 	Open Open Open Open
f.	LPSI HDR valves:	
	 2-SI-615-MOV 2-SI-625-MOV 2-SI-635-MOV 2-SI-645-MOV 	Open Open Open Open
g.	SIT CKV LKG DRN valves:	
	 2-SI-618-CV. 2-SI-628-CV. 2-SI-638-CV. 2-SI-648-CV. 	Shut* Shut* Shut* Shut*
h.	SIT OUT valves:	
	 2-SI-614-MOV 2-SI-624-MOV 2-SI-634-MOV 2-SI-644-MOV 	Open Open Open Open
1.	SIT RECIRC TO RCDT valve, 2-SI-661-CV	Shut*
	* Handswitches required in the Post Accident Position to enable resetting SIAS.	
	(continue)	

ATTACHMENT (2) Page 2 of 5

SIAS VERIFICATION CHECKLIST

(Continued)

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j.	21, 22, 23 and 24 CACs Running in Low (
k.	CAC EMERGENCY OUT valves:
	• 2-SRW-1582-CV Open • 2-SRW-1585-CV Open • 2-SRW-1590-CV Open • 2-SRW-1593-CV Open
I.	21, 22 and 23 IODINE FILT FANs Running
m.	RCDT PP CNTMT ISOL valve, 2-RCW-4260-CV Shut*
n.	WGS CNTMT ISOL valves:
	 2-WGS-2180-CV 2-WGS-2181-CV Shut*
о.	CNTMT RMS ISOL valves:
	 2-CRM-5291-CV
p.	CNTMT NORMAL SUMP DRN valves:
	 2-EAD-5462-MOV
q .	RCS SAMPLE ISOL valve, 2-PS-5464-CV Shut*
r.	H₂ PURGE ISOL valves:
	 2-HP-6900-MOV
	 Handswitches required in the Post Accident Position to enable resetting SIAS. NOT place these Handswitches in their Post Accident Position
	(1) Do NOT place these Handswitches in their Post Accident Position.

ATTACHMENT (2) Page 3 of 5

SIAS VERIFICATION CHECKLIST

<u>2C07</u>

a. L/D CNTMT ISOL valves:

	 2-CVC-515-CV 2-CVC-516-CV 	Shut* Shut*
b.	21, 22 and 23 CHG PPs	Running
C.	VCT OUT valve, 2-CVC-501-MOV	Shut
d.	VCT M/U valve, 2-CVC-512-CV	Shut
e.	BA DIRECT M/U valve, 2-CVC-514-MOV	Open
f.	21 and 22 BA PPs	Running
g.	BAST GRAVITY FD valves:	
	 2-CVC-508-MOV 2-CVC-509-MOV 	Open Open
h.	BAST RECIRC valves:	
	 2-CVC-510-CV 2-CVC-511-CV 	Shut Shut
	NOTE	

<u>NOTE</u>

High water levels in containment may cause 2-CVC-506-CV to lose indication. The handswitch must still be placed in the post-accident position for SIAS reset from the Control Room.

i. RCP CBO ISOL valves:

•	2-CVC-505-CV	Shut*
	2-CVC-506-CV	Shut*

<u>2C06</u>

- a. 21 and 23 Pressurizer B/U HTRs Off
 - * Handswitches required in the Post Accident Position to enable resetting SIAS.

ATTACHMENT (2) Page 4 of 5

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SIAS VERIFICATION CHECKLIST

<u>2C</u>	<u>13</u>	
a.	21 and 22 CC PPs	Running
b.	21 and 22 SW PPs	Running
C.	21 and 22 SRW PPs	Running
d.	CC HX CC OUT valves:	
	 2-CC-3824-CV 2-CC-3826-CV 	Open (2) Open (2) 17/00
e.	SDC HX CC OUT valves:	I
	 2-CC-3828-CV 2-CC-3830-CV 	Open Open
f.	SRW HDR TURB BLDG ISOL valves:	
	 2-SRW-1600-CV 2-SRW-1637-CV 2-SRW-1638-CV 2-SRW-1639-CV 	Shut Shut Shut Shut
g.	21 and 22 SW AIR COMPRs	Running
h.	LQD WASTE EVP valves:	
	 2-CC-3840-CV 2-CC-3842-CV 	Shut Shut
i.	CAC SRW INL valves:	
	2-SRW-1581-CV (Open if RAS actual)	Throttled (1)
	2-SRW-1584-CV	Throttled (1)
		Throttled (1)
	2-SRW-1592-CV (Open if RAS actual	Throttled (1)
	 (1) Do NOT place these Handswitches in their Post Accident Positi (2) Valves do NOT receive a SIAS signal. 	on.
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ATTACHMENT (2) Page 5 of 5

SIAS VERIFICATION CHECKLIST

ATTACHMENT (3) Page 1 of 1

CSAS VERIFICATION CHECKLIST

2C03 a. 21 and 22 MSIVs: 2-MS-4043-CV Shut* 2-MS-4048-CV Shut* b. 21 and 22 SG FW ISOL valves: 2-FW-4516-MOV Shut* • 2-FW-4517-MOV Shut* 21 and 22 SG BD valves: C. 2-BD-4010-CV Shut 2-BD-4011-CV Shut 2-BD-4012-CV Shut 2-BD-4013-CV Shut d. 21 and 22 SGFPT TRIP RESET Tripped 21 and 22 HDT PPs Off e. 21, 22 and 23 CBPs f. Off 2C08, 2C09 a. CS HDR valves: 2-SI-4150-CV Open ۰ 2-SI-4151-CV Open 2C13 a. SRW SUPP TO 22 BD HX, 2-SRW-1640-CV Shut <u>1C13</u> 12 SFP HX SRW INL/OUT valves: а. 2-SRW-1599-CV Shut ۰ 2-SRW-1598-CV Shut ٠ * Handswitches required in the Post Accident Position to enable resetting CSAS.

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ATTACHMENT (4) Page 1 of 2

CIS VERIFICATION CHECKLIST

<u>2C09, 2C10</u>

 4		
a. 21	and 22 PENET RM VENT FANs	Running
b. 21	and 22 FILT ISOL DMPRs	Open
c. CC	CNTMT SUPP and RTN valves:	
•	2-CC-3832-CV 2-CC-3833-CV	Shut* Shut*
d. IA (CNTMT ISOL, 2-IA-2080-MOV	Shut*
e. 2-1/	A-2080-MOV CIS OVERRIDE, 2-HS-2080A	Normal*
Adminis	stratively Controlled Valves	
	ANY of the following administratively controlled valves are open, EN return them to the shut position:	
	NOTE 37 is located inside containment. If 2-PA-137 is open, 2-PA-1044 establish containment isolation.	must be
(1)	Plant Air Containment Isolation Valves:	
	 2-PA-137 2-PA-1044 	Shut Shut
(2)	SIT N₂ SUPP:	
	 2-SI-612-CV 2-SI-622-CV 2-SI-632-CV 2-SI-642-CV 	Shut Shut Shut Shut
(3)	DW CNTMT ISOL valve, 2-DW-5460-CV	Shut
(4)	U-2 FIRE PROT CNTMT ISOL valve, 2-FP-6200-MOV	Shut
*	Handswitches required in the Post Accident Position to enable resetting CIS.	
	(continue)	

ATTACHMENT (4) Page 2 of 2

CIS VERIFICATION CHECKLIST

(Continued)

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NOTE

The PASS Return to RCDT and Hydrogen Sample Valves may be open for accident sampling. Contact Chemistry for operation of the PASS Return to RCDT and Hydrogen Sample Valves.

(5)	PASS Return to RCDT, 2-PS-6529-SV	Shut
(6)	Hydrogen Sample Valves:	

 2-PS-6507A-SV 2-PS-6507B-SV 2-PS-6507C-SV 2-PS-6507D-SV 2-PS-6507E-SV 2-PS-6507F-SV 2-PS-6507G-SV 	Shut Shut Shut Shut Shut
 2-PS-6540A-SV 2-PS-6540B-SV 2-PS-6540C-SV 2-PS-6540D-SV 2-PS-6540E-SV 2-PS-6540F-SV 2-PS-6540G-SV 	Shut Shut Shut Shut Shut

ATTACHMENT (5) Page 1 of 1

CRS VERIFICATION CHECKLIST

2C10 a. CNTMT PURGE SUPP valve, 2-CPA-1410-CV Shut* b. CNTMT PURGE EXH valve, 2-CPA-1412-CV Shut* H₂ PURGE ISOL valves: C. 2-HP-6900-MOV Shut* ٠ 2-HP-6901-MOV Shut* ٠ 1C34 a. 21 CNTMT PURGE EXH FAN Off b. 21 CNTMT PURGE SUPP FAN Off * Handswitches required in the Post Accident Position to enable resetting CRS.

ATTACHMENT (6) Page 1 of 1

RAS VERIFICATION CHECKLIST

<u>2C08, 2C09, 2C10</u>

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a.	21 and 22 LPSI PPs	Off					
b.	b. SI PP RECIRC isolation MOVs:						
	 2-SI-659-MOV 2-SI-660-MOV 	Shut Shut					
c.	CNTMT SUMP DISCH valves:						
	 2-SI-4144-MOV 2-SI-4145-MOV 	Open Open					
<u>2C13</u>							
a.	a. CAC SRW INL valves:						
	 2-SRW-1581-CV 2-SRW-1584-CV 2-SRW-1589-CV 2-SRW-1592-CV 	Open Open Open Open					

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ATTACHMENT (7) Page 1 of 1

SGIS VERIFICATION CHECKLIST

<u>2C03</u>

a.	21 and 22 MSIVs:	
	 2-MS-4043-CV 2-MS-4048-CV 	Shut* Shut*
b.	21 and 22 SG FW ISOL valves:	
	 2-FW-4516-MOV 2-FW-4517-MOV 	Shut* Shut*
C.	21 and 22 SGFPT TRIP RESET	Tripped
d.	21 and 22 HDT PPs	Off
e.	21, 22 and 23 CBPs	Off
	* Handswitches required in the Post Accident Position to enable resetting SGIS.	

ATTACHMENT (8) Page 1 of 5

MAINTAIN AFW PUMP SUCTION SUPPLY AND CST INVENTORY

<u>NOTE</u>

Technical Specifications require a minimum of 150,000 gallons of makeup water to be available to Unit 1 while it is in modes 1, 2 or 3.

- 1. Verify 12 CST is available to supply feedwater by the following:
 - 12 CST level greater than 5 feet
 - 12 CST TO UNIT 2 AUX FEEDWATER PUMPS ISOLATION VALVE, 2-AFW-161, open

NOTE

Condenser Makeup valve, 2-CD-4406-CV fails open on loss of power, shut on loss of air.

2. IF 2Y10 is NOT energized, AND hotwell makeup is NOT required, THEN shut DISCH FROM COND M/U, 2-CD-236.

CAUTION

Before transferring AFW Pump suction to an alternate supply, the possibility of suction line or CST rupture should be considered.

- IF 12 CST is NOT available to supply feedwater AND 21 CST is available, THEN line up 21 CST as an alternate suction supply as follows:
 - a. Locally open 21 CST MANUAL ISOL valves:
 - 2-AFW-131
 - 2-AFW-167
 - b. Locally shut 12 CST SUPPLY TO UNIT 2 AUX FEEDWATER PUMPS ISOLATION VALVE, 2-AFW-161.
 - c. Confirm normal CST LVL response.

ATTACHMENT (8) Page 2 of 5

MAINTAIN AFW PUMP SUCTION SUPPLY AND CST INVENTORY

IF 12 CST LVL is less than 5 feet
 AND 21 CST is NOT available to supply feedwater,
 THEN lineup an alternate supply to the auxiliary feedwater pump suction as follows:

<u>NOTE</u>

The following substeps are different methods, listed in preferred order, which may be used to line up an alternate supply to auxiliary feedwater pump suction. Each available method should be attempted until a source of water has been established.

CAUTION

Before transferring AFW Pump suction to an alternate supply, the possibility of suction line or CST rupture should be considered.

a. Lineup 11 CST as an alternate suction supply as follows:

NOTE

The following step will cause 12 and 11 CST levels to equalize.

- (1) Locally open 11 CST MANUAL ISOL valves:
 - 1-AFW-131
 - 1-AFW-167
- (2) Verify open 12 CST SUPPLY TO AFW PUMPS ISOLATION valves:
 - 1-AFW-161
 - 2-AFW-161
- (3) Confirm normal CST LVL response.
- b. Align the Fire System to 23 AFW PP suction as follows:
 - (1) Place 23 AFW PP in PULL TO LOCK.
 - (2) Shut 23 AFW PP Suction Valve, 2-AFW-182.
 - (3) Connect fire hoses between pump suction and a fire main.
 - (4) Open the FIRE HOSE CONNECTION AUX FEED SUCT LINE ISOLATION VALVE, 2-AFW-180.
 - (5) Open the fire hose discharge valve.
 - (6) Restore 23 AFW PP as required.

ATTACHMENT (8) Page 3 of 5

MAINTAIN AFW PUMP SUCTION SUPPLY AND CST INVENTORY

4. (continued)

- c. Align the Fire System to 13 AFW PP suction for cross connected operation:
 - (1) Place 13 AFW PP in PULL TO LOCK.
 - (2) Shut 13 AFW PP Suction Valve, 1-AFW-182.
 - (3) Connect fire hoses between pump suction and a fire main.
 - (4) Open the 13 AFW PP SUCTION FIRE HOSE CONNECTION ISOLATION VALVE, 1-AFW-180.
 - (5) Open the fire hose discharge valve.
 - (6) Restore 13 AFW PP as required.
- 5. Makeup to the on-service CST.

<u>NOTE</u>

The following substeps are different methods, listed in preferred order, which may be used to establish makeup to the on-service CST. Each available method should be attempted until a source of water has been established.

- a. **IF** the Demineralized Water Transfer Pumps are available, **THEN** perform the following:
 - (1) Throttle open the CST Fill Valve for the tank to be filled, while maintaining the Demineralized Water Transfer Pump discharge pressure greater than 30 PSIG.
 - 11 CST Fill Valve, 0-DW-184
 - 12 CST Fill Valve, 0-DW-284
 - 21 CST Fill Valve, 0-DW-186
 - (2) **IF** desired for faster CST fill rate, **THEN** start the second Demineralized Water Transfer Pump.
 - (3) **WHEN** the desired tank level is reached, **THEN** shut the appropriate CST Fill Valve.
 - 11 CST Fill Valve, 0-DW-184
 - 12 CST Fill Valve, 0-DW-284
 - 21 CST Fill Valve, 0-DW-186

ATTACHMENT (8) Page 4 of 5

MAINTAIN AFW PUMP SUCTION SUPPLY AND CST INVENTORY

5. (continued)

- b. IF a COND PP is available, THEN transfer hotwell inventory to 21 CST as follows:
 - (1) Shift the CNDSR HOTWELL M/U & DUMP CONTR, 2-LIC-4405, to MANUAL.
 - (2) Adjust Controller to open Hotwell To CST Dump CV, 2-CD-4405-CV.
 - (3) **IF** a COND PP is **NOT** running, **THEN** shut ONE Condensate Pump Discharge Valve:
 - (21 Pump) 2-CD-106
 - (22 Pump) 2-CD-113
 - (23 Pump) 2-CD-120
 - (4) Verify the appropriate COND PP is running.
 - (5) Slowly throttle open the pump discharge valve to maintain pump discharge pressure between 175 and 240 PSIG.
 - (6) Stop the pump when cavitation occurs.
 - (7) Shut the Hotwell To CST Dump CV by adjusting 2-LIC-4405, to 50% output.
- c. IF the DI Water Storage Tank level is greater than 10 feet
 AND the on-service CST level is less than 5 feet,
 THEN gravity fill the on-service CST by performing the following:
 - (1) Throttle open the CST Fill Valve for the tank to be filled.
 - 11 CST Fill Valve, 0-DW-184
 - 12 CST Fill Valve, 0-DW-284
 - 21 CST Fill Valve, 0-DW-186
 - (2) **WHEN** the desired tank level is reached, **THEN** shut the appropriate CST Fill Valve.
 - 11 CST Fill Valve, 0-DW-184
 - 12 CST Fill Valve, 0-DW-284
 - 21 CST Fill Valve, 0-DW-186

ATTACHMENT (8) Page 5 of 5

MAINTAIN AFW PUMP SUCTION SUPPLY AND CST INVENTORY

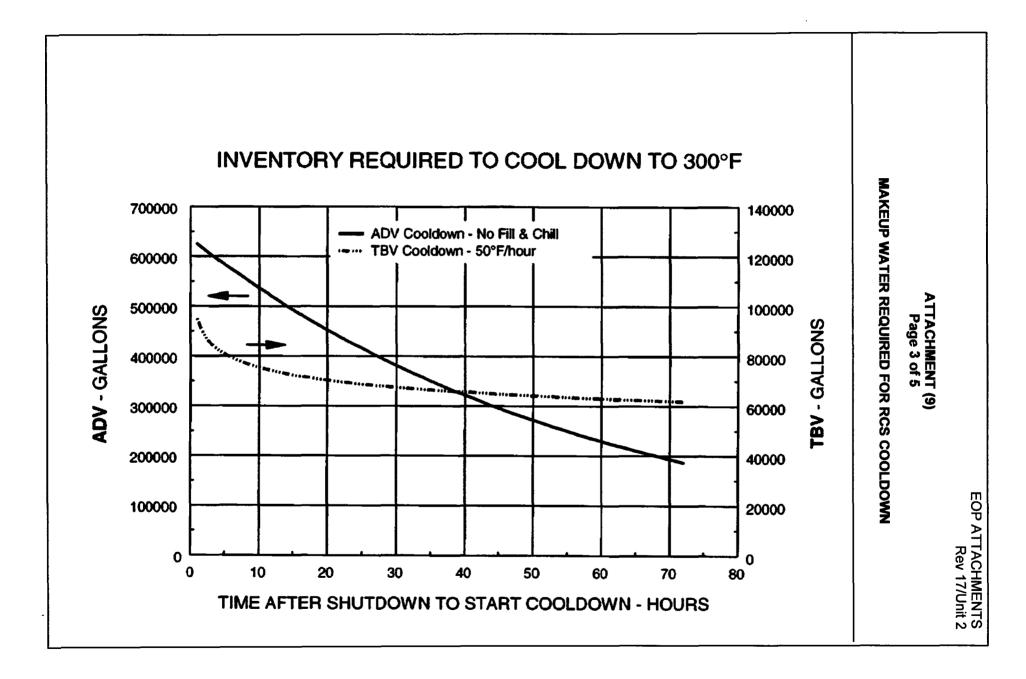
- d. Emergency fill 21 CST from the Fire System as follows:
 - (1) Connect a fire hose between fire house hose manifold and 21 CST EMERGENCY HOSE CONNECTION VALVE, 2-CD-312.
 - (2) Shut the FIRE PUMPS DISCHARGE TEST DRAIN VALVE, 0-FP-277.
 - (3) Open the FIRE PUMPS DISCHARGE HEADER TEST ISOLATION VALVE, 0-FP-246.
 - (4) Open 21 CST EMERGENCY HOSE CONNECTION VALVE, 2-CD-312.
 - (5) Open the fire hose discharge valve.
 - (6) Ensure 21 CST LVL rises.
- e. Emergency fill 11 CST from the Fire System as follows:
 - (1) Connect a fire hose between fire house hose manifold and 11 CST EMERGENCY CROSS CONNECT ISOLATION VALVE, 1-CD-312.
 - (2) Shut the FIRE PUMPS DISCHARGE TEST DRAIN VALVE, 0-FP-277.
 - (3) Open the FIRE PUMPS DISCHARGE HEADER TEST ISOLATION VALVE, 0-FP-246.
 - (4) Open 11 CST EMERGENCY CROSS CONNECT ISOLATION VALVE, 1-CD-312.
 - (5) Open the fire hose discharge valve.
 - (6) Ensure 11 CST LVL rises.

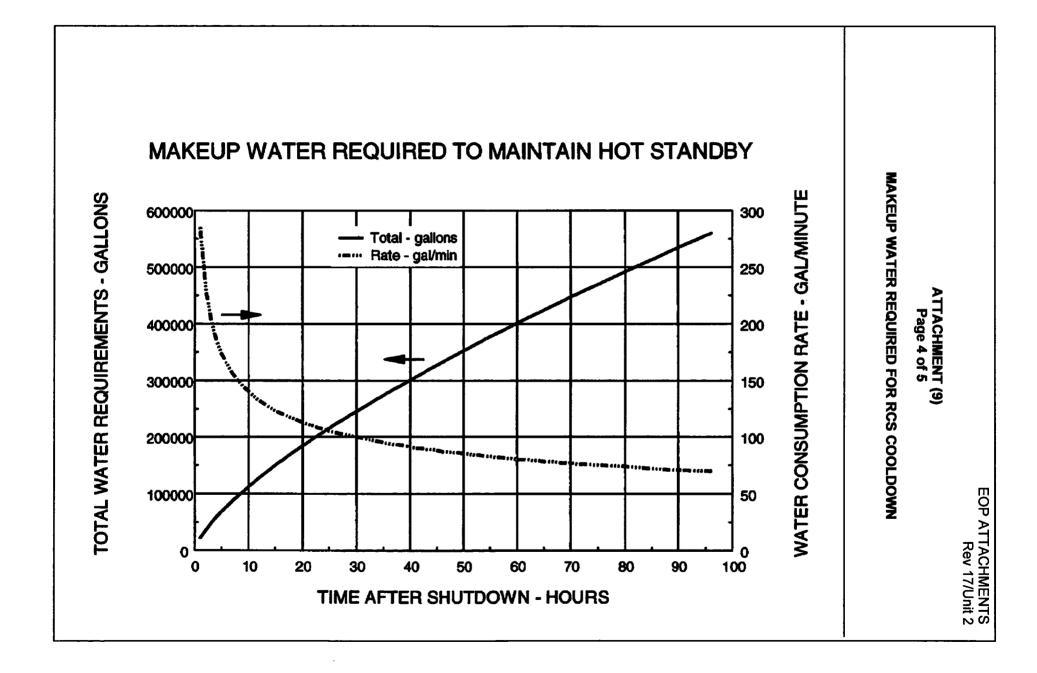
ATTACHMENT (9) Page 1 of 5

MAKEUP WATER REQUIRED FOR RCS COOLDOWN

1.	. Determine the amount of makeup water required to perform an ADV cooldown and a TBV cooldown, based on the time after shutdown:						
	a.	ADV cooldown and time after shutdown	1.a _	gals			
	b.	TBV cooldown and time after shutdown	1.b _	gals			
2.	De	Determine the amount of makeup water available in the CSTs:					
	a.	Record the level in 21 CST.	2.a	ft			
	b.	Record the level in 12 CST.	2.b	ft			
	C.	Record the level in 11 CST.	2.c	ft			
	d.	Determine the status of Unit 1 (check one):					
		(1) Mode 1, 2 or 3 and does NOT require AFW operation.					
		(2) Mode 1, 2 or 3 and does require AFW operation.					
		(3) Mode 4, 5, 6 or defueled.					
	NOTE Calculated negative values should be entered as zero.						
	e.	e. Determine the amount of makeup water available to Unit 2 using one of the following formulas, based on the status checked in step 2.d above:					
		 IF step d.(1) is checked, THEN correct CST levels for usable volume: 					
		(a) step 2.aft - 2.75 ft =	(a)	ft			
		(b) step 2.bft - 16 ft =	(b)	ft			
		(c) step(a)ft + step(b)ft =	e.(1)	ft			

			EOP A1		IMENTS 17/Unit 2
		ATTACHMENT (9) Page 2 of 5			
		MAKEUP WATER REQUIRED FOR RCS CO	OLDOWN		
	<u></u>				
	(2)	IF step d.(2) is checked, THEN correct CST levels for usable volume:			
		(a) step 2.aft - 2.75 ft =	(a) _.	ft
		(b) $\frac{\text{step 2.b } \ft - 2.5 ft}{2} =$	(b) .	ft
		(c) step(a)ft + step(b)ft =	e	(2)	ft
	(3)	IF step d.(3) is checked, THEN correct CST levels for usable volume:			
		(a) step 2.aft - 2.75 ft =	(a)	ft
		(b) step 2.bft - 2.5 ft =	(b)	ft
		(c) step 2.cft - 2.75 ft =	(c)	ft
		(d) step(a)ft + step(b)ft + step(c) _	ft = e).(3)	ft
f.	Con	vert the amount of CST level into gallons.			
	(ft a	vailable)ft x 9636.78 gal/ft =	. 2	2.f _	gals
т	he Fir	NOTE The nominal capacity of a Well Water pump is 30 inal capacity of a Demineralized Water Transfer p e System can fill the CST via fire hoses at greate CAUTION	oump is 300 r than 500 G	PM.	
		of both units should be considered when eval	luating a ma	akeup	source.
3. IF Th	adeq IEN d	uate inventory exists to perform cooldown, etermine if an adequate makeup source exists to	maintain ho	t stanc	lby.
		uate inventory does NOT exist to perform cooldov valuate the following:	vn,		
• • •	Tim Res	ntaining hot standby conditions e to restore an adequate makeup source toration of other plant systems (TBVs, main feed forming partial cooldown while restoring plant syst		ı, etc.)	1





ATTACHMENT (9) Page 5 of 5

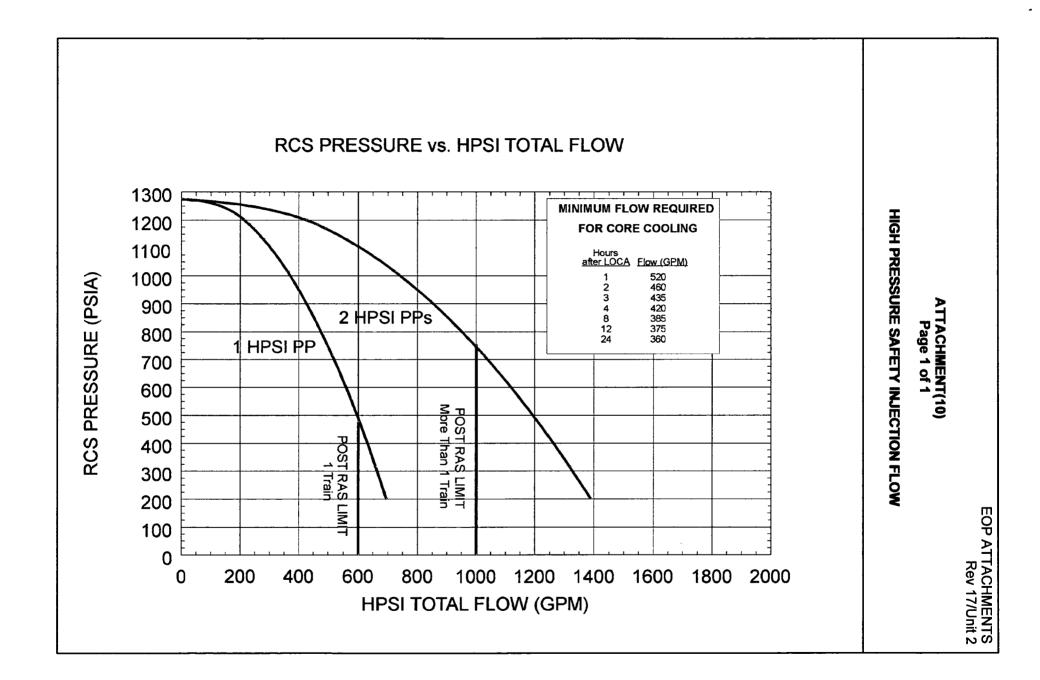
MAKEUP WATER REQUIRED FOR RCS COOLDOWN

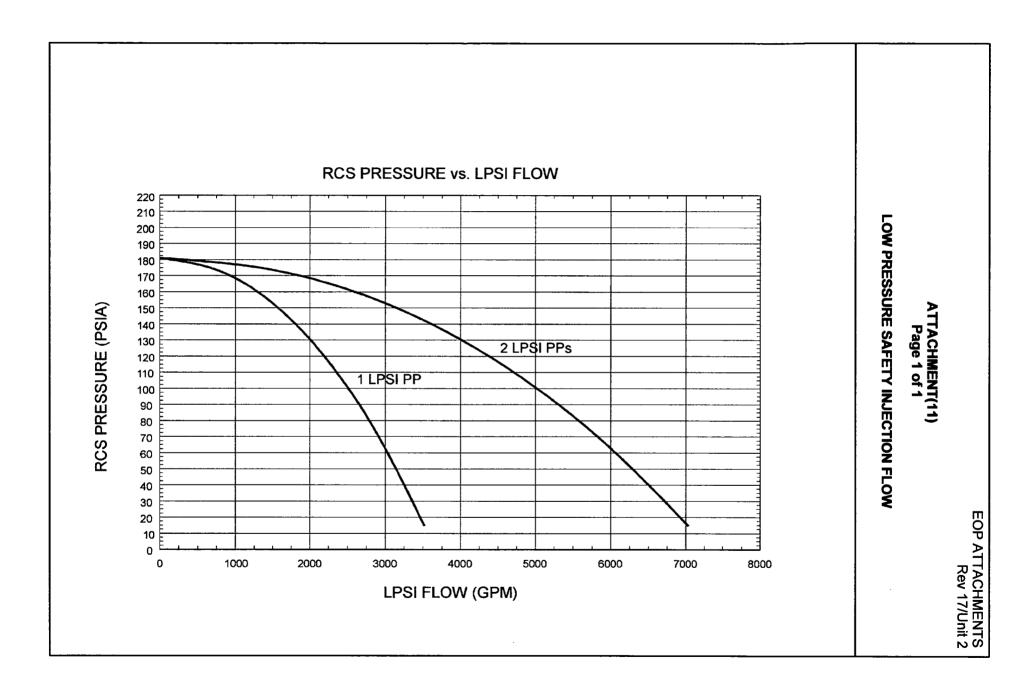
INVENTORY REQUIRED TO COOL DOWN TO 300 F

TIME AFTER	ADV	TBV
SHUTDOWN	COOLDOWN	COOLDOWN
- HOURS	- GALLONS	- GALLONS
1	625,067	94,828
2	614,531	88,490
4	593,988	82,575
6	574,132	79,301
8	554,939	77,056
10	536,389	75,359
12	518,458	74,000
24	422,783	69,054
36	344,764	66,316
48	281,142	64,439
72	186,953	61,883

MAKEUP WATER REQUIRED TO MAINTAIN HOT STANDBY

TIME AFTER SHUTDOWN	TOTAL WATER	WATER CONSUMPTION
- HOURS	REQUIREMENT	RATE
	- GALLONS	- GAL/MINUTE
1	21,964	285
2	35,919	230
4	58,740	186
6	78,323	164
8	96,060	150
10	112,541	140
12	128,085	132
24	209,464	107
36	279,295	94
48	342,547	86
72	456,746	76
96	560,185	70





ATTACHMENT(12) Page 1 of 1

PROCEDURE TO LOCALLY READ CORE EXIT THERMOCOUPLES

- 1. Obtain an ALTEK thermocouple meter from the Operations Safety Related Storage Locker or the IM Shop, and a set of CET cables from the Operations Safety Related Storage Locker.
- 2. Obtain a small flat-head screwdriver from the Shift Manager's Office.
- 3. Obtain the U-2 PAM cabinet door key.
- 4. Align the ALTEK thermocouple meter as follows:
 - a. Select READ.
 - b. Depress RESET button until "k" apppears in the lower right corner of the display.

NOTE

When using the CET cables, the RED wire is always the (-) negative post.

- 5. Connect the CET cables to the terminal posts on the ALTEK thermocouple meter.
- 6. Select an operable CET to be measured.
- 7. Open the back panel door on 2C182A or 2C182B as appropriate.
- 8. Connect the cables at terminal block A03/B03.

NOTE

The CET numbers are indicated on the cable labels.

- a. Locate the red and yellow thermocouple wires for the selected CET.
- b. Loosen the terminal block screws AND remove the red and yellow thermocouple wires from the terminal block.
- c. Connect the red wire to the red connector.
- d. Connect the yellow wire to the yellow connector.
- 9. Read CET temperature in ° F from the meter.

ATTACHMENT(13) Page 1 of 1

ADMINISTRATIVE POST-TRIP ACTIONS

<u>NOTE</u>

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

- 1. Prior to exiting the EOP, review OP-6, <u>PRE-STARTUP CHECKOFF</u> for Tech. Spec. compliance in the applicable mode.
- 2. Refer to the ERPIP to determine appropriate emergency response actions.
- 3. Perform notifications **PER** RM-1-101 <u>REGULATORY REPORTING</u>.
- _____ 4. Notify SO-TSO of trip.
 - ____ 5. Request RCS Boron and lodine Sample.
 - 6. Perform shutdown margin calculation **PER** the NEOPs.
 - Complete any Transient Log entries PER EN-1-115, <u>RECORDING OF PLANT</u> <u>TRANSIENTS/OPERATIONAL CYCLES</u>.
 - 8. Collect the post-trip data automatically printed from the Plant Computer.
 - 9. Perform the post-trip review **PER** NO-1-111, <u>POST-TRIP REVIEW</u>.
 - _____ 10. Monitor turbine bearing temperatures.
 - 11. Continue the Main Turbine Shutdown **PER** OI-43A, <u>MAIN TURBINE AND</u> <u>GENERATOR/EXCITER OPERATION</u>.
 - _ 12. Reestablish normal plant configuration control as required:
 - Locked Valves PER NO-1-205, LOCKED VALVES
 - Component Manipulations **PER** NO-1-200, <u>CONTROL OF SHIFT</u> <u>ACTIVITIES</u>
 - 13. Initiate the Forced Outage Worklist.

ATTACHMENT(14) Page 1 of 1

RCS COOLDOWN DATA SHEET

RCS COOLDOWN NO.

ч

DATE/TIME COOLDOWN COMMENCED

• The cooldown of the Reactor Vessel should be conducted at a linear rate not to exceed 100° F in any one hour period.

• The RCS temperature should be recorded every 15 minutes.

TIME	PRESS(PSIA) (1)	TEMP(°F) (2)	C/D RATE(°F/HR)

(1) RCS Pressure:

- Greater than 1600 PSIA: PAM CH A or CH B
- Less than 1600 PSIA: PI-103 or PI-103-1
- (2) RCS Temperature:
 - Forced Circulation: TI-112C or 122C
 - Natural Circulation:
 - RCS Temp Greater than 301° F: average of at least 2 CETs
 - RCS Temp Less than 301° F: lowest valid displayed CET
 - SDC Flow: TR-351

ATTACHMENT(15) Page 1 of 1

PRESSURIZER COOLDOWN DATA SHEET

PRESSURIZER COOLDOWN NO.

DATE/TIME COOLDOWN COMMENCED

• The cooldown of the Pressurizer should be conducted at a linear rate not to exceed 200° F in any one hour period.

• The Pressurizer temperature should be recorded every 15 minutes.

TIME	PZR PRESS (PSIA)(1)	PZR TEMP(°F)(2)	PZR SPRAY TEMP(°F)(3)	PZR C/D RATE(°F/HR)	PZR SPRAY DIFF TEMP(°F) *

- (1) RCS Pressure:
 - Greater than 1600 PSIA: PAM CH A or CH B
 - Less than 1600 PSIA: PI-103 or PI-103-1
- (2) PZR Temperature: TI-101
- (3) Spray Temperature:
 - PZR: TIA-103 or 104
 - Aux: TI-229

* Maximum Spray Differential Temperature is 400° F (TRM 15.4.2)

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500KV OFFSITE POWER RESTORATION

<u>NOTE</u>

Steps may be performed as necessary to energize multiple buses.

CAUTION

The following steps are intended to restore from a loss of offsite power. Restoration of power for other causes should be performed PER the appropriate procedure.

CAUTION

Attempts should NOT be made to reenergize a bus if a fault is suspected.

- 1. Energize the 500KV Red Bus **OR** the 500KV Black Bus by performing the following actions:
 - a. Verify that switching orders have been received by the Control Room Supervisor **OR** Shift Manager, from the SO-TSO, to operate the required equipment.
 - b. Evaluate alarms associated with the 500KV switchyard.
 - c. Verify the associated Unit Generator High Side Line Disconnect is open before closing Turbine Generator Output breakers.
 - d. IF the 500KV Red Bus is de-energized, THEN verify the following breakers are open:
 - UNIT 1 RCP BUS FDR, 252-2202
 - UNIT 2 RCP BUS FDR, 252-2201
 - 21 SERV BUS 13KV FDR, 252-2104
 - e. IF the 500KV Black Bus is de-energized, THEN verify the following breakers are open:
 - UNIT 2 RCP BUS FDR, 252-1202
 - UNIT 1 RCP BUS FDR, 252-1201
 - 11 SERV BUS 13KV FDR, 252-1104
 - f. Verify the Unit-2 Generator Coast Down Lockout is reset.
 - g. Place the SYNCHROSCOPE SEL Switch in NORMAL (1) **OR** EMERGENCY (2) position.

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500KV OFFSITE POWER RESTORATION

1. (continued)

NOTE

A Synchronizer is NOT required for operation of breakers 552-41 OR 552-43.

h. Place the applicable SYNCHRONIZER SEL Switch in MANUAL position.

- (552-21) 11 GEN SYNCHRONIZER SEL Switch
- (552-22) 11 GEN SYNCHRONIZER SEL Switch
- (552-23) 11 GEN SYNCHRONIZER SEL Switch
- (552-61) 21 GEN SYNCHRONIZER SEL Switch
- (552-62) 21 GEN SYNCHRONIZER SEL Switch
- (552-63) 21 GEN SYNCHRONIZER SEL Switch
- i. Insert the sync stick in the sync jack at the breaker to be closed.
- j. IF paralleling TWO power sources, THEN ensure the power sources are synchronized by observing the following:
 - Sync lights out
 - Synchroscope at 12 o'clock
 - Running and incoming voltages are matched
- k. IF closing in on a de-energized bus, THEN ensure the bus is NOT energized.
- Close the breaker by placing the Breaker Control Handswitch in the CLOSE position AND release.
- m. Check the breaker has closed by observing applicable breaker indicating lights and meters, if applicable.
- n. Repeat steps 1.a through 1.m as desired to close additional breakers.
- o. Remove the sync stick **AND** return to Home Base.
- p. Verify BOTH SYNCHRONIZER SEL Switches in the OFF position.
- q. Place the SYNCHROSCOPE SEL Switch in the OFF position.
- r. **WHEN** operation has been completed in accordance with the switching orders, **THEN** inform the SO-TSO.
- s. Reset the 13KV BUS 22 OR 12 286 LOCKOUT/RESET DEVICE as applicable.

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500KV OFFSITE POWER RESTORATION

1. (continued)

t. Reset the applicable bus 247/B device target flags on BOTH undervoltage relays:

13KV BUS 22

- B-22-P
- B-22-B

13KV BUS 12

- B-12-P
- B-12-B

<u>NOTE</u>

Steps may be performed as necessary to energize multiple buses.

CAUTION

Attempts should NOT be made to reenergize a bus if a fault is suspected.

- 2. Energize the desired 13KV Service Bus by performing the following actions:
 - a. **IF** it is desired to energize 21 13KV Service Bus, **THEN** perform the following actions:
 - (1) Verify 22 13KV Service Bus is energized.
 - (2) Verify the following breakers are open:
 - 21 SERV BUS 13KV FDR, 252-2104
 - 21 SERV BUS TIE, 252-2105
 - U-4000-21 13KV FDR, 252-2102
 - U-4000-22 13KV FDR, 252-2103
 - U-4000-23 13KV FDR, 252-2101
 - Locally at the U-2 13KV SWGR House, SITE POWER FDR BREAKER (to 0X04), 252-2106
 - (3) Energize 21 13KV Service Bus by closing 21 SERV BUS 13KV FDR, 252-2104.
 - (4) Reset the 13KV BUS 21 286 LOCKOUT/RESET DEVICE.
 - (5) Reset the 247/B device target flags on **BOTH** undervoltage relays:
 - B-21-P
 - B-21-B

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500KV OFFSITE POWER RESTORATION

2.a. (continued)

- (6) **IF** MCC 216T is de-energized, **THEN** place the following LTC Drive Power Selector Switches in ALT:
 - 2H2101REG
 - 2H2102REG
 - 2H2103REG

b. **IF** it is desired to energize 11 13KV Service Bus, **THEN** perform the following actions:

- (1) Verify 12 13KV Service Bus is energized.
- (2) Verify the following breakers are open:
 - 11 SERV BUS 13KV FDR, 252-1104
 - 11 SERV BUS TIE, 252-1105
 - U-4000-12 13KV FDR, 252-1103
 - U-4000-11 13KV FDR, 252-1102
 - U-4000-13 13KV FDR, 252-1101
 - Locally at the U-1 13KV SWGR House, SITE POWER FDR BREAKER (to 0X03), 252-1106
- (3) Energize 11 13KV Service Bus by closing 11 SERV BUS 13KV FDR, 252-1104.
- (4) Reset the 13KV BUS 11 286 LOCKOUT/RESET DEVICE.
- (5) Reset the 247/B device target flags on **BOTH** undervoltage relays:
 - B-11-P
 - B-11-B
- (6) **IF** MCC 116T is de-energized, **THEN** place the following LTC Drive Power Selector Switches in ALT:
 - 1H1101REG
 - 1H1102REG
 - 1H1103REG

ATTACHMENT(16) Page 5 of 23

500KV OFFSITE POWER RESTORATION

<u>NOTE</u>

Steps may be performed as necessary to energize multiple buses.

CAUTION

Attempts should NOT be made to reenergize a bus if a fault is suspected.

- 3. Energize the desired U4000 SERV XFMRs.
 - a. **IF** it is desired to energize U4000-22 SERV XFMR, **THEN** perform the following actions:
 - (1) Verify the following breakers are open:
 - 24 4KV BUS NORMAL FDR, 152-2401
 - 21 4KV BUS ALT FDR, 152-2115
 - 22 4KV BUS NORMAL FDR, 152-2201
 - 23 4KV BUS NORMAL FDR, 152-2311
 - (2) Close the U4000-22 13KV FDR, 252-2103.
 - b. **IF** it is desired to energize U4000-12 SERV XFMR, **THEN** perform the following actions:
 - (1) Verify the following breakers are open:
 - 24 4KV BUS ALT FDR, 152-2414
 - 21 4KV BUS NORMAL FDR, 152-2101
 - 22 4KV BUS ALT FDR, 152-2209
 - 23 4KV BUS ALT FDR, 152-2301
 - (2) Close the U4000-12 13KV FDR, 252-1103.
 - c. **IF** it is desired to energize U4000-23 SERV XFMR, **THEN** perform the following actions:
 - (1) Verify the following breakers are open:
 - 25 4KV BUS FDR, 152-2501
 - 16 4KV BUS FDR, 152-1604
 - (2) Close the U4000-23 13KV FDR, 252-2101.

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500KV OFFSITE POWER RESTORATION

3. (continued)

- d. **IF** it is desired to energize U4000-13 SERV XFMR, **THEN** perform the following actions:
 - (1) Verify the following breakers are open:
 - 15 4KV BUS FDR, 152-1501
 - 26 4KV BUS FDR, 152-2604
 - (2) Close the U4000-13 13KV FDR, 252-1101.

CAUTION

Attempts should NOT be made to reenergize a bus if a fault is suspected.

- IF 21 OR 24 4KV Vital Bus is de-energized, THEN restore power to the Engineered Safety Features Buses from the 13KV Service Buses as follows:
 - a. **IF NO** CC PPs are operating, **THEN** shut CC CNTMT SUPP valve, 2-CC-3832-CV.
 - b. **IF** it is desired to energize 21 4KV Vital Bus from U4000-22 SERV XFMR, **THEN** energize 21 4KV Vital Bus as follows:
 - (1) Verify the 21 4KV BUS LOCI/SD SEQUENCER MANUAL INITIATE keyswitch is ON.
 - (2) Place 2A DG OUT BKR, 152-2103, in PULL TO LOCK.
 - (3) Verify 21 4KV BUS NORMAL FDR, 152-2101, is open.
 - (4) Insert the sync stick into the sync jack at the 21 4KV BUS ALT FDR, 152-2115.
 - (5) Close the 21 4KV BUS ALT FDR, 152-2115.
 - (6) Remove the sync stick **AND** return to Home Base.
 - (7) WHEN 21 4KV Bus sequencing is complete, THEN place the 21 4KV BUS LOCI/SD SEQUENCER MANUAL INITIATE keyswitch in NORM.

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500KV OFFSITE POWER RESTORATION

4. (continued)

- c. **IF** it is desired to energize 24 4KV Vital Bus from U4000-22 SERV XFMR, **THEN** energize 24 4KV Vital Bus as follows:
 - (1) Verify the 24 4KV BUS LOCI/SD SEQUENCER MANUAL INITIATE keyswitch is ON.
 - (2) Place 2B DG OUT BKR, 152-2403, in PULL TO LOCK.
 - (3) Place 23 AFW PP in PULL TO LOCK.
 - (4) Verify the 24 4KV BUS ALT FDR, 152-2414, is open.
 - (5) Insert the sync stick into the sync jack at the 24 4KV BUS NORMAL FDR, 152-2401.
 - (6) Close the 24 4KV BUS NORMAL FDR, 152-2401.
 - (7) Remove the sync stick **AND** return to Home Base.
 - (8) WHEN 24 4KV Bus sequencing is complete, THEN place the 24 4KV BUS LOCI/SD SEQUENCER MANUAL INITIATE keyswitch in NORM.
- d. **IF** it is desired to energize 21 4KV Vital Bus from U4000-12 SERV XFMR, **THEN** energize 21 4KV Vital Bus as follows:
 - (1) Verify the 21 4KV BUS LOCI/SD SEQUENCER MANUAL INITIATE keyswitch is ON.
 - (2) Place 2A DG OUT BKR, 152-2103, in PULL TO LOCK.
 - (3) Verify 21 4KV BUS ALT FDR, 152-2115, is open.
 - (4) Insert the sync stick into the sync jack at the 21 4KV BUS NORMAL FDR, 152-2101.
 - (5) Close the 21 4KV BUS NORMAL FDR, 152-2101.
 - (6) Remove the sync stick **AND** return to Home Base.
 - (7) WHEN 21 4KV Bus sequencing is complete, THEN place the 21 4KV BUS LOCI/SD SEQUENCER MANUAL INITIATE keyswitch in NORM.

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500KV OFFSITE POWER RESTORATION

4. (continued)

- e. **IF** it is desired to energize 24 4KV Vital Bus from U4000-12 SERV XFMR, **THEN** energize 24 4KV Vital Bus as follows:
 - (1) Verify the 24 4KV BUS LOCI/SD SEQUENCER MANUAL INITIATE keyswitch is ON.
 - (2) Place 2B DG OUT BKR, 152-2403, in PULL TO LOCK.
 - (3) Place 23 AFW PP in PULL TO LOCK.
 - (4) Verify 24 4KV BUS NORMAL FDR, 152-2401, is open.
 - (5) Insert the sync stick into the sync jack at the 24 4KV BUS ALT FDR, 152-2414.
 - (6) Close the 24 4KV BUS ALT FDR, 152-2414.
 - (7) Remove the sync stick **AND** return to Home Base.
 - (8) WHEN 24 4KV Bus sequencing is complete, THEN place the 24 4KV BUS LOCI/SD SEQUENCER MANUAL INITIATE keyswitch in NORM.

CAUTION

Attempts should NOT be made to reenergize a bus if a fault is suspected.

- IF 21 OR 24 4KV Vital Bus is powered by a DG, AND SIAS has NOT actuated OR has been reset, THEN restore power to the Engineered Safety Features Buses from the 13KV Service Buses as follows:
 - a. IF it is desired to energize 21 4KV Vital Bus from U4000-22 SERV XFMR, AND 2A DG is powering 21 4KV Vital Bus, THEN transfer 21 4KV Vital Bus from 2A DG to U4000-22 SERV XFMR as follows:
 - (1) Momentarily place 2A DG UNIT PARALLEL, 2-CS-2104, to PARA.
 - (2) Adjust 2A DG frequency to approximately 60 Hz using 2A DG SPEED, 2-CS-2103.
 - (3) Insert the sync stick into the sync jack at the 21 4KV BUS ALT FDR, 152-2115.
 - (4) Check the associated Synchroscope and Sync Lights are operating.

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500KV OFFSITE POWER RESTORATION

5.a. (continued)

<u>NOTE</u>

Offsite power voltage indication will be on the INCOMING voltmeter.

(5) Adjust RUNNING VOLTS equal to INCOMING VOLTS using 2A DG AUTO VOLT CONTR, 2-CS-2102.

NOTE

The Synchroscope works in the opposite direction from normal when 2A DG is the RUNNING power source.

(6) Adjust 2A DG frequency so the synchroscope pointer is rotating <u>slowly</u> in the FAST direction using 2A DG SPEED CONTR, 2-CS-2103.

CAUTION

To avoid improper paralleling, do NOT start OR stop any large loads on the 24 4KV Bus.

- (7) WHEN the Synchroscope pointer is approximately 5 degrees prior to the 12 o'clock position, THEN close the 21 4KV BUS ALT FDR, 152-2115.
- (8) Remove the sync stick **AND** return to Home Base.
- (9) Shutdown 2A DG PER OI-21A, 2A Diesel Generator, if desired.

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500KV OFFSITE POWER RESTORATION

5. (continued)

 b. IF it is desired to energize 21 4KV Vital Bus from U4000-22 SERV XFMR, AND 0C DG is powering 21 4KV Vital Bus, THEN transfer 21 4KV Vital Bus from 0C DG to U4000-22 SERV XFMR as follows:

NOTE

Load on 21 4KV bus may be reduced by using redundant 4KV bus equipment.

- (1) **IF** 0C DG load is greater than 1000 KW, **THEN** bypass breaker 152-0703 underfrequency trip as follows:
 - (a) Remove the cover from UNDERVOLTAGE PROTECTION RELAY, 0SSL 0998-81.U, in 0C DG Local Control Panel 0C188 Cabinet 5.
 - (b) Disconnect the RED knifeswitch in the bottom right of the relay by pressing the top down.
- (2) Place 0C DG in the TRANSFER MODE by performing the following:
 - (a) Depress 0C DG EMERGENCY START, 0-HS-0707, pushbutton.
 - (b) Insert the sync stick into the sync jack at the 0C DG OUT BKR, 152-0703.

CAUTION

0C DG OUT BKR, 152-0703 trips on underfrequency at 59.5 Hz in the parallel OR transfer modes, unless bypassed.

- (c) Depress 0C DG SLOW START, 0-HS-0708, pushbutton.
- (d) Momentarily place 0C DG SPEED CONTR, 0-CS-0705, to RAISE OR LOWER.
- (e) Maintain 0C DG at approximately 60 Hz using 0C DG SPEED CONTR, 0-CS-0705.
- (f) Remove the sync stick from 0C DG OUT BKR, 152-0703.

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500KV OFFSITE POWER RESTORATION

5.b.2. (continued)

(g)	IF UNDERVOLTAGE PROTECTION RELAY, 0SSL 0998-81.U, is
	bypassed,
	THEN enable the underfrequency trip by performing the following, in 00
	DG Local Control Panel 0C188 Cabinet 5:

- 1) Verify UNDERVOLTAGE PROTECTION RELAY, 0SSL 0998-81.U, is reset.
- 2) Raise the RED knifeswitch in the bottom right of the relay until the switch is fully engaged.
- 3) Request an independent person to second check the knifeswitch is closed properly.
- 4) Install the cover from UNDERVOLTAGE PROTECTION RELAY, 0SSL 0998-81.U.
- (h) Insert the sync stick into the sync jack at the 21 4KV BUS ALT FDR, 152-2115.
- (i) Check the associated Synchroscope and Sync Lights are operating.

NOTE

Offsite power voltage indication will be on the INCOMING voltmeter.

(j) Adjust RUNNING VOLTS equal to INCOMING VOLTS using 0C DG AUTO VOLT CONTR, 0-CS-0704.

<u>NOTE</u>

The Synchroscope works in the opposite direction from normal when 0C DG is the RUNNING power source.

(k) Adjust 0C DG frequency so the synchroscope pointer is rotating <u>slowly</u> in the FAST direction using 0C DG SPEED CONTR, 0-CS-0705.

CAUTION

To avoid improper paralleling, do NOT start OR stop any large loads on the 21 4KV Bus.

 WHEN the Synchroscope pointer is approximately 5 degrees prior to the 12 o'clock position, THEN close the 21 4KV BUS ALT FDR, 152-2115.

Close the 21 4KV BUS ALT FDR, 152-211

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500KV OFFSITE POWER RESTORATION

5.b.2. (continued)

- (m) Remove the sync stick **AND** return to Home Base.
- (n) Shutdown 0C DG PER OI-21C, 0C Diesel Generator, if desired.
- c. IF it is desired to energize 24 4KV Vital Bus from U4000-22 SERV XFMR, AND 2B DG is powering 24 4KV Vital Bus, THEN transfer 24 4KV Vital Bus from 2B DG to U4000-22 SERV XFMR as follows:
 - (1) Momentarily place 2B DG UNIT PARALLEL, 2-CS-2404, to PARA.
 - (2) Adjust 2B DG frequency to approximately 60 Hz using 2B DG SPEED, 2-CS-2403.
 - (3) Insert the sync stick into the sync jack at the 24 4KV BUS NORMAL FDR, 152-2401.
 - (4) Check the associated Synchroscope and Sync Lights are operating.

NOTE

Offsite power voltage indication will be on the INCOMING voltmeter.

(5) Adjust RUNNING VOLTS equal to INCOMING VOLTS using 2B DG AUTO VOLT CONTR, 2-CS-2402.

NOTE

The Synchroscope works in the opposite direction from normal when 2B DG is the RUNNING power source.

(6) Adjust 2B DG frequency so the synchroscope pointer is rotating <u>slowly</u> in the FAST direction using 2B DG SPEED CONTR, 2-CS-2403.

CAUTION

To avoid improper paralleling, do NOT start OR stop any large loads on the 24 4KV Bus.

- WHEN the Synchroscope pointer is approximately 5 degrees prior to the 12 o'clock position,
 THEN close the 24 4KV BUS NORMAL FDR, 152-2401.
- (8) Remove the sync stick **AND** return to Home Base.

ATTACHMENT(16) Page 13 of 23

500KV OFFSITE POWER RESTORATION

5.c. (continued)

- (9) Shutdown 2B DG PER OI-21B, 2B Diesel Generator, if desired.
- d. IF it is desired to energize 24 4KV Vital Bus from U4000-22 SERV XFMR, AND 0C DG is powering 24 4KV Vital Bus, THEN transfer 24 4KV Vital Bus from 0C DG to U4000-22 SERV XFMR as follows:

NOTE

Load on 24 4KV bus may be reduced by using redundant 4KV bus equipment.

- (1) **IF** 0C DG load is greater than 1000 KW, **THEN** bypass breaker 152-0703 underfrequency trip as follows:
 - (a) Remove the cover from UNDERVOLTAGE PROTECTION RELAY, 0SSL 0998-81.U, in 0C DG Local Control Panel 0C188 Cabinet 5.
 - (b) Disconnect the RED knifeswitch in the bottom right of the relay by pressing the top down.
- (2) Place 0C DG in the TRANSFER MODE by performing the following:
 - (a) Depress 0C DG EMERGENCY START, 0-HS-0707, pushbutton.
 - (b) Insert the sync stick into the sync jack at the 0C DG OUT BKR, 152-0703.

CAUTION

OC DG OUT BKR, 152-0703 trips on underfrequency at 59.5 Hz in the parallel OR transfer modes, unless bypassed.

- (c) Depress 0C DG SLOW START, 0-HS-0708, pushbutton.
- (d) Momentarily place 0C DG SPEED CONTR, 0-CS-0705, to RAISE OR LOWER.
- (e) Maintain 0C DG at approximately 60 Hz using 0C DG SPEED CONTR, 0-CS-0705.
- (f) Remove the sync stick from 0C DG OUT BKR, 152-0703.

ATTACHMENT(16) Page 14 of 23

500KV OFFSITE POWER RESTORATION

5.d.2. (continued)

- (g) IF UNDERVOLTAGE PROTECTION RELAY, 0SSL 0998-81.U, is bypassed,
 THEN enable the underfrequency trip by performing the following, in 0C DG Local Control Panel 0C188 Cabinet 5:
 - 1) Verify UNDERVOLTAGE PROTECTION RELAY, 0SSL 0998-81.U, is reset.
 - 2) Raise the RED knifeswitch in the bottom right of the relay until the switch is fully engaged.
 - 3) Request an independent person to second check the knifeswitch is closed properly.
 - 4) Install the cover from UNDERVOLTAGE PROTECTION RELAY, 0SSL 0998-81.U.
- (h) Insert the sync stick into the sync jack at the 24 4KV BUS NORMAL FDR, 152-2401.
- (i) Check the associated Synchroscope and Sync Lights are operating.

NOTE

Offsite power voltage indication will be on the INCOMING voltmeter.

(j) Adjust RUNNING VOLTS equal to INCOMING VOLTS using 0C DG AUTO VOLT CONTR, 0-CS-0704.

NOTE

The Synchroscope works in the opposite direction from normal when 0C DG is the RUNNING power source.

(k) Adjust 0C DG frequency so the synchroscope pointer is rotating <u>slowly</u> in the FAST direction using 0C DG SPEED CONTR, 0-CS-0705.

CAUTION

To avoid improper paralleling, do NOT start OR stop any large loads on the 24 4KV Bus.

 WHEN the Synchroscope pointer is approximately 5 degrees prior to the 12 o'clock position, THEN close the 24 4KV BUS NORMAL FDR, 152-2401.

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500KV OFFSITE POWER RESTORATION

5.d.2. (continued)

- (m) Remove the sync stick **AND** return to Home Base.
- (n) Shutdown 0C DG PER OI-21C, 0C Diesel Generator, if desired.
- e. IF it is desired to energize 21 4KV Vital Bus from U4000-12 SERV XFMR, AND 2A DG is powering 21 4KV Vital Bus, THEN transfer 21 4KV Vital Bus from 2A DG to U4000-12 SERV XFMR as follows:
 - (1) Momentarily place 2A DG UNIT PARALLEL, 2-CS-2104, to PARA.
 - (2) Adjust 2A DG frequency to approximately 60 Hz using 2A DG SPEED, 2-CS-2103.
 - (3) Insert the sync stick into the sync jack at the 21 4KV BUS NORMAL FDR, 152-2101.
 - (4) Check the associated Synchroscope and Sync Lights are operating.

NOTE

Offsite power voltage indication will be on the INCOMING voltmeter.

(5) Adjust RUNNING VOLTS equal to INCOMING VOLTS using 2A DG AUTO VOLT CONTR, 2-CS-2102.

NOTE

The Synchroscope works in the opposite direction from normal when 2A DG is the RUNNING power source.

(6) Adjust 2A DG frequency so the synchroscope pointer is rotating <u>slowly</u> in the FAST direction using 2A DG SPEED CONTR, 2-CS-2103.

CAUTION

To avoid improper paralleling, do NOT start OR stop any large loads on the 21 4KV Bus.

- (7) WHEN the Synchroscope pointer is approximately 5 degrees prior to the 12 o'clock position, THEN close the 21 4KV BUS NORMAL FDR, 152-2101.
- (8) Remove the sync stick **AND** return to Home Base.

ATTACHMENT(16) Page 16 of 23

500KV OFFSITE POWER RESTORATION

5.e. (continued)

- (9) Shutdown 2A DG PER OI-21A, 2A Diesel Generator, if desired.
- f. IF it is desired to energize 21 4KV Vital Bus from U4000-12 SERV XFMR, AND 0C DG is powering 21 4KV Vital Bus, THEN transfer 21 4KV Vital Bus from 0C DG to U4000-12 SERV XFMR as follows:

NOTE

Load on 21 4KV bus may be reduced by using redundant 4KV bus equipment.

- (1) **IF** 0C DG load is greater than 1000 KW, **THEN** bypass breaker 152-0703 underfrequency trip as follows:
 - (a) Remove the cover from UNDERVOLTAGE PROTECTION RELAY, 0SSL 0998-81.U, in 0C DG Local Control Panel 0C188 Cabinet 5.
 - (b) Disconnect the RED knifeswitch in the bottom right of the relay by pressing the top down.
- (2) Place 0C DG in the TRANSFER MODE by performing the following:
 - (a) Depress 0C DG EMERGENCY START, 0-HS-0707, pushbutton.
 - (b) Insert the sync stick into the sync jack at the 0C DG OUT BKR, 152-0703.

CAUTION

OC DG OUT BKR, 152-0703 trips on underfrequency at 59.5 Hz in the parallel OR transfer modes, unless bypassed.

- (c) Depress 0C DG SLOW START, 0-HS-0708, pushbutton.
- (d) Momentarily place 0C DG SPEED CONTR, 0-CS-0705, to RAISE OR LOWER.
- (e) Maintain 0C DG at approximately 60 Hz using 0C DG SPEED CONTR, 0-CS-0705.
- (f) Remove the sync stick from 0C DG OUT BKR, 152-0703.

	ATTACHMENT(16) Page 17 of 23
	500KV OFFSITE POWER RESTORATION
5.f.2. (continued)	
(g)	IF UNDERVOLTAGE PROTECTION RELAY, 0SSL 0998-81.U, is bypassed,
	THEN enable the underfrequency trip by performing the following, in 0C DG Local Control Panel 0C188 Cabinet 5:
	 Verify UNDERVOLTAGE PROTECTION RELAY, 0SSL 0998-81.U, is reset.
	Raise the RED knifeswitch in the bottom right of the relay until the switch is fully engaged.
	 Request an independent person to second check the knifeswitch is closed properly.
	 Install the cover from UNDERVOLTAGE PROTECTION RELAY, 0SSL 0998-81.U.
(h)	Insert the sync stick into the sync jack at the 21 4KV BUS NORMAL FDR, 152-2101.
(i)	Check the associated Synchroscope and Sync Lights are operating.
Offsi	<u>NOTE</u> te power voltage indication will be on the INCOMING voltmeter.
(j)	Adjust RUNNING VOLTS equal to INCOMING VOLTS using 0C DG AUTO VOLT CONTR, 0-CS-0704.
The Synchroscop RUNNING power	NOTE be works in the opposite direction from normal when 0C DG is the source.
(k)	Adjust 0C DG frequency so the synchroscope pointer is rotating <u>slowly</u> in the FAST direction using 0C DG SPEED CONTR, 0-CS-0705.
To avoid improp Bus.	<u>CAUTION</u> Der paralleling, do NOT start OR stop any large loads on the 21 4KV
(I)	WHEN the Synchroscope pointer is approximately 5 degrees prior to the 12 o'clock position, THEN close the 21 4KV BUS NORMAL FDR, 152-2101.
	(continued)

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ATTACHMENT(16) Page 18 of 23

500KV OFFSITE POWER RESTORATION

5.f.2. (continued)

- (m) Remove the sync stick **AND** return to Home Base.
- (n) Shutdown 0C DG PER OI-21C, 0C Diesel Generator, if desired.
- g. IF it is desired to energize 24 4KV Vital Bus from U4000-12 SERV XFMR, AND 2B DG is powering 24 4KV Vital Bus, THEN transfer 24 4KV Vital Bus from 2B DG to U4000-12 SERV XFMR as follows:
 - (1) Momentarily place 2B DG UNIT PARALLEL, 2-CS-2404, to PARA.
 - (2) Adjust 2B DG frequency to approximately 60 Hz using 2B DG SPEED, 2-CS-2403.
 - (3) Insert the sync stick into the sync jack at the 24 4KV BUS ALT FDR, 152-2414.
 - (4) Check the associated Synchroscope and Sync Lights are operating.

NOTE

Offsite power voltage indication will be on the INCOMING voltmeter.

(5) Adjust RUNNING VOLTS equal to INCOMING VOLTS using 2B DG AUTO VOLT CONTR, 2-CS-2402.

NOTE

The Synchroscope works in the opposite direction from normal when 2B DG is the RUNNING power source.

(6) Adjust 2B DG frequency so the synchroscope pointer is rotating <u>slowly</u> in the FAST direction using 2B DG SPEED CONTR, 2-CS-2403.

CAUTION

To avoid improper paralleling, do NOT start OR stop any large loads on the 24 4KV Bus.

- (7) WHEN the Synchroscope pointer is approximately 5 degrees prior to the 12 o'clock position, THEN close the 24 4KV BUS ALT FDR, 152-2414.
- (8) Remove the sync stick **AND** return to Home Base.
- (9) Shutdown 2B DG PER OI-21B, 2B Diesel Generator, if desired.

ATTACHMENT(16) Page 19 of 23

500KV OFFSITE POWER RESTORATION

5. (continued)

 h. IF it is desired to energize 24 4KV Vital Bus from U4000-12 SERV XFMR, AND 0C DG is powering 24 4KV Vital Bus, THEN transfer 24 4KV Vital Bus from 0C DG to U4000-12 SERV XFMR as follows:

NOTE

Load on 24 4KV bus may be reduced by using redundant 4KV bus equipment.

- (1) **IF** 0C DG load is greater than 1000 KW, **THEN** bypass breaker 152-0703 underfrequency trip as follows:
 - (a) Remove the cover from UNDERVOLTAGE PROTECTION RELAY, 0SSL 0998-81.U, in 0C DG Local Control Panel 0C188 Cabinet 5.
 - (b) Disconnect the RED knifeswitch in the bottom right of the relay by pressing the top down.
- (2) Place 0C DG in the TRANSFER MODE by performing the following:
 - (a) Depress 0C DG EMERGENCY START, 0-HS-0707, pushbutton.
 - (b) Insert the sync stick into the sync jack at the 0C DG OUT BKR, 152-0703.

CAUTION

0C DG OUT BKR, 152-0703 trips on underfrequency at 59.5 Hz in the parallel OR transfer modes, unless bypassed.

- (c) Depress 0C DG SLOW START, 0-HS-0708, pushbutton.
- (d) Momentarily place 0C DG SPEED CONTR, 0-CS-0705, to RAISE OR LOWER.
- (e) Maintain 0C DG at approximately 60 Hz using 0C DG SPEED CONTR, 0-CS-0705.
- (f) Remove the sync stick from 0C DG OUT BKR, 152-0703.

ATTACHMENT(16) Page 20 of 23

500KV OFFSITE POWER RESTORATION

5.h.2. (continued)

- (g) IF UNDERVOLTAGE PROTECTION RELAY, 0SSL 0998-81.U, is bypassed, THEN enable the underfrequency trip by performing the following, in 0C DG Local Control Panel 0C188 Cabinet 5:
 - 1) Verify UNDERVOLTAGE PROTECTION RELAY, 0SSL 0998-81.U, is reset.
 - 2) Raise the RED knifeswitch in the bottom right of the relay until the switch is fully engaged.
 - 3) Request an independent person to second check the knifeswitch is closed properly.
 - 4) Install the cover from UNDERVOLTAGE PROTECTION RELAY, 0SSL 0998-81.U.
- (h) Insert the sync stick into the sync jack at the 24 4KV BUS ALT FDR, 152-2414.
- (i) Check the associated Synchroscope and Sync Lights are operating.

NOTE

Offsite power voltage indication will be on the INCOMING voltmeter.

(j) Adjust RUNNING VOLTS equal to INCOMING VOLTS using 0C DG AUTO VOLT CONTR, 0-CS-0704.

NOTE

The Synchroscope works in the opposite direction from normal when 0C DG is the RUNNING power source.

(k) Adjust 0C DG frequency so the synchroscope pointer is rotating <u>slowly</u> in the FAST direction using 0C DG SPEED CONTR, 0-CS-0705.

CAUTION

To avoid improper paralleling, do NOT start OR stop any large loads on the 24 4KV Bus.

 WHEN the Synchroscope pointer is approximately 5 degrees prior to the 12 o'clock position, THEN close the 24 4KV BUS ALT FDR, 152-2414.

ATTACHMENT(16) Page 21 of 23

500KV OFFSITE POWER RESTORATION

5.h.2. (continued)

- (m) Remove the sync stick **AND** return to Home Base.
- (n) Shutdown 0C DG PER OI-21C, OC Diesel Generator, if desired.

NOTE

Steps may be performed as necessary to energize multiple buses.

CAUTION

Attempts should NOT be made to reenergize a bus if a fault is suspected.

6. Energize the desired 4KV Non Vital Buses.

- a. **IF** it is desired to energize 22 4KV Non Vital Bus, **THEN** perform the following:
 - Verify the following breakers are open:
 - U440-22B 4KV FDR, 152-2202
 - U440-22A 4KV FDR, 152-2208
 - Verify the handswitches for the following loads are in PULL TO LOCK:
 - 21 COND PP
 - 21 CBP
 - 22 CBP
 - 21 HDT PP
- b. **IF** it is desired to energize 23 4KV Non Vital Bus, **THEN** perform the following:
 - Verify the following breakers are open:
 - U440-23B 4KV FDR, 152-2302
 - U440-23A 4KV FDR, 152-2310
 - Verify the handswitches for the following loads are in PULL TO LOCK:
 - 22 COND PP
 - 23 COND PP
 - 23 CBP
 - 22 HDT PP

ATTACHMENT(16) Page 22 of 23

500KV OFFSITE POWER RESTORATION

- c. **IF** it is desired to energize 25 4KV Non Vital Bus, **THEN** perform the following:
 - Verify U440-25 4KV FDR, 152-2505, is open.
 - Verify 25-26 4KV TIE, 152-2506, is open.
 - Verify the handswitches for the following loads are in PULL TO LOCK:
 - 21 CW PP
 - 22 CW PP
 - 23 CW PP
- d. **IF** it is desired to energize 26 4KV Non Vital Bus, **THEN** perform the following:
 - Verify U440-26 4KV FDR, 152-2605, is open.
 - Verify 25-26 4KV TIE, 152-2506, is open.
 - Verify the handswitches for the following loads are in PULL TO LOCK:
 - 24 CW PP
 - 25 CW PP
 - 26 CW PP
- e. Verify the associated 4KV SERV XFMR FDR BKR is closed.
- f. Insert the sync stick into the sync jack at the 4KV BUS FDR or TIE breaker to be closed.
- g. Place and hold the 4KV BUS FDR or TIE breaker handswitch in CLOSE until the bus voltage indicates between 4.1 and 4.35 KV
- h. Remove the sync stick **AND** return to Home Base.
- i. Close the associated U440 4KV FDR breaker(s).
- j. Repeat steps 6.a through 6.i as desired to energize additional 4KV Non Vital Buses.

ATTACHMENT(16) Page 23 of 23

500KV OFFSITE POWER RESTORATION

CAUTION

Attempts should NOT be made to reenergize a bus if a fault is suspected.

- 7. **IF** MCC-201AT **OR** MCC-201BT are de-energized, **THEN** energize the desired Turbine MCC.
 - a. IF 21A 480V BUS is energized from 500KV offsite power, THEN restore power to MCC-201AT by closing normal feeder breaker 52-2109.
 - b. **IF** 24B 480V BUS is energized from 500KV offsite power, **THEN** restore power to MCC-201BT by closing normal feeder breaker 52-2419.

ATTACHMENT(17) Page 1 of 1

ONCE-THROUGH-COOLING MATRIX

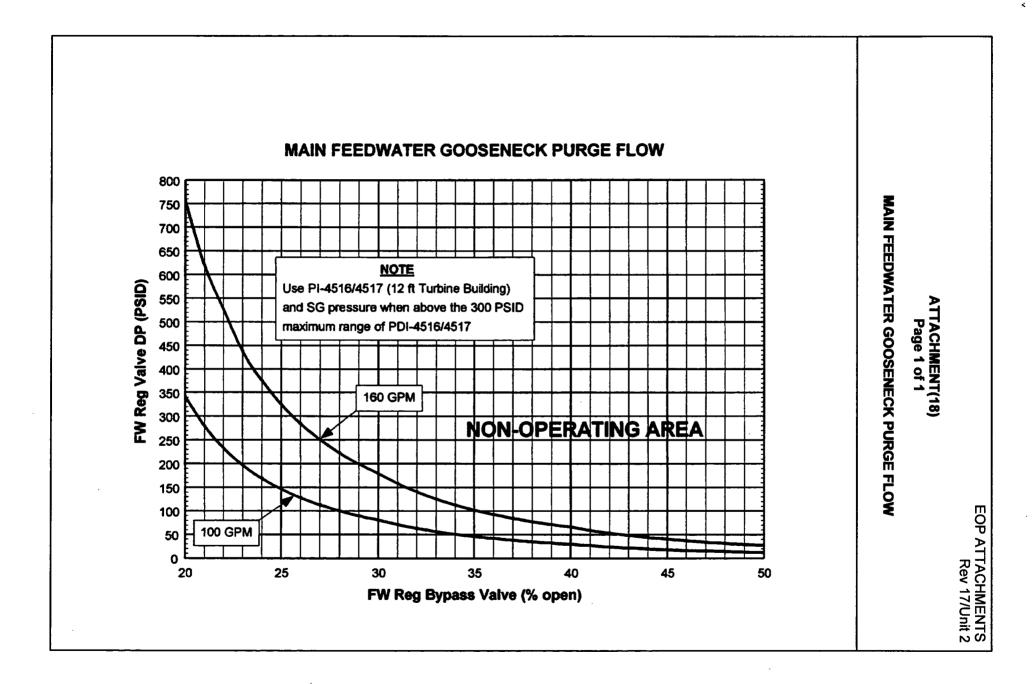
<u>NOTE</u>

OK: indicates adequate equipment to support successful Once-Through-Cooling.

NOTE

Calculated minimum time to core uncovery is displayed for cases where adequate equipment to support successful Once-Through-Cooling is **NOT** available.

equipment		2 PORV		1 PORV
	3 CHG PP	2 CHG PP	1 CHG PP	3 CHG PP 2 CHG PP 1 CHG PP
3 HPSI PP	0K	ОК	0K	5 hours 3 hours 3 hours
2 HPSI PP	0K	ОК	0K	5 hours 3 hours 3 hours
1 HPSI PP	0K	3 hours	2 hours	5 hours 3 hours 2 hours



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ATTACHMENT(19) (Page 1 of 1

RESET AFAS START SIGNALS AT THE ACTUATION CABINETS

- 1. Verify BOTH SG levels are greater than (-)170 inches.
- 2. Verify the SG BD valve handswitches are in CLOSE:
 - 2-BD-4010-CV
 - 2-BD-4011-CV
 - 2-BD-4012-CV
 - 2-BD-4013-CV
- 3. / Reset the AFAS Sensor Modules:
 - a. Unlock and open the Sensor Cabinet front door.
 - b. Reset the sensor module bistable(s) by momentarily pushing the RESET pushbutton on the SG LEVEL LOW module(s).
 - c. Momentarily place the BISTABLE TRIP TEST/RESET toggle switch on the AIM module in RESET.
 - d. Close and lock the Sensor Cabinet front door.
 - e. Repeat steps 3.a through 3.d for ALL channels.
- 4. Reset the AFAS Logic Modules:
 - a. Unlock and open the Logic Cabinet front door.
 - b. Reset the logic module bistable by momentarily pushing the RESET pushbutton on the AFAS START module.
 - c. Momentarily place the AFAS START TEST/RESET toggle switch on the AIM module in RESET.
 - d. Check the TRIP light is extinguished.
 - e. Close and lock the Logic Cabinet front door.
 - f. Repeat steps 4.a through 4.e for the other Logic Cabinet.
- 5. Check the following extinguished:
 - "AFAS A ACTUATED" status panel alarm light on panel 2C04.
 - "AFAS B ACTUATED" status panel alarm light on panel 2C04.

CALVERT CLIFFS NUCLEAR POWER PLANT TECHNICAL PROCEDURE UNIT 1 & 2

SEISMIC INSTRUMENTATION CHANNEL

STP M-260-0

REVISION 00301

This procedure is **EXEMPT** from 10CFR 50.59 / 10 CFR 72.48 Reviews.

Safety Related

CONTINUOUS USE Read each step before performing

Approval Authority : General Supervisor - I and C Maintenance



2.

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PERFORMANCE OF SURVEILLANCE TEST: A. Test Performance

А.	lest Performance					
	Permission to perform test:	SHIFT MANA	AGER	_/ 	_	
_						
в.	Test completion, results i	review and a	approval	(circle appro	priate a	inswer)
	Accept. criteria in spec?	YES NO N	/A Ac	ljustments Ma	ade?	YES NO N/A
	As found results in spec?	YES NO N	A CI	R submitted?		YES NO N/A
	As left results in spec?	YES NO N	A Ma	alfunctions inc	dicated	YES NO N/A
	REMARKS, NATURE OF M	IALFUNCTIO	ON, OR A	DJUSTMENT	AND RE	ESULTS
				· · · · · · · · · · · · · · · · · · ·		
	Test completed by:				/	DATE
	Completion acknowledged					
	and discrepancies noted:	SI		IAGER	/	DATE
	ANALYSIS OF RESULTS:_					
	SUPERVISOR:				 DA	 TE
	ANALYSIS / COMMENTS:					
						·····
	FUNCTIONAL SURVEILLA TEST COORDINATOR:	NCE			DA	TE
	EQSE (IF REQUIRED):				DA	TE
	*PORC MEETING No .:				DA	TE
	*PLANT GENERAL MANAG	GER:			DA	TE

*Required only if completed tests on SR and designated NSR structures, systems and components identified a malfunction or were out of specification.

Attach a separate sheet, if necessary, to document additional comments. Place additional cover sheet pages immediately after the initial cover sheet.

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UNIT 1 & 2 STP M-260-0 Rev. 00301 Page 4 of 32 **)** .

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LIST OF EFFECTIVE PAGES

Cumulative Changes _____1

1.0 PURPOSE

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A. To provide detailed instructions for the Channel Check of the SMA-3, Strong Motion Accelerograph earthquake monitoring system.

2.0 APPLICABILITY/SCOPE

- A. This procedure satisfies Technical Requirements Manual (TRM) TVR 15.3.4.1 and TVR 15.3.4.2.
- B. Conditional steps which are not performed shall be marked N/A.
- C. Check applicable reason for Surveillance Test:
 - [] Scheduled Surveillance
 - [] Plant Conditions requiring test (Explain in Pre-surveillance remarks)
 - [] Post Maintenance Operability Verification

Enter WO/CR number_____

PRE-SURVEILLANCE REMARKS:

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3.0 **REFERENCES AND DEFINITIONS**

- A. Development References: System 65
 - Technical Manual 12-778-12, Strong Motion Accelerograph SMA-2 & SMA-3.
 - Technical Manual 12-778-13, Operating Instructions for SMP-1 Magnetic Tape Playback System.
 - Technical Manual 12-778-14, Operating Instructions for SMA-3 Strong Motion Accelerograph System.
 - Technical Manual 12-778-15, Triaxial Force-Balance Accelerometer FBA-3.
- B. Performance References:
 - None

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- C. Equipment Locations: All tests are in the Control Room for the associated equipment below:
 - Seismic Control Panel 0YRC001, Control Room

<u>Tag No</u>	EIN
0YE001	200-065-IYE001
0YE002	200-065-IYE002
0YE003	200-065-IYE003
0YE004	200-065-IYE004
0YE005	200-065-IYE005
0YR001	200-065-IYR001
0YRC001	200-065-IYRC001

4.0 PREREQUISITES

- A. Personnel Requirements:
 - A minimum of one qualified person who SHALL meet the requirements of The Fleet Maintenance Training and Qualification Programs.
 - When a procedure requires technicians at multiple locations to perform tasks that require qualification, a qualified person SHALL be at that location to oversee any task that the technician is not qualified to perform.
- B. Specifications/Surveillances:
 - None
- C. Special Tools and Equipment Recommended:
 - Bulk Tape Eraser
 - Five Blank Cassette Tapes
 - Fluke 45, Digital Multimeter (DMM) or equivalent
 - Stopwatch
- D. Spare Parts Required:
 - None
- E. Documentation and Support:
 - Work Order may be required to replace <u>+</u> 12 vdc batteries.

F. Signature / Initial Block:

NAME (Print)	SIGNATURE	INITIALS

UNIT 1 & 2 STP M-260-0 Rev. 00301 Page 8 of 32 . .

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4.0 PREREQUISITES (Continued)

- G. Initial Conditions:
 - 1. Plant in any mode.
 - 2. Ensure an adequate supply of chart paper is available on the Magnetic Tape Playback system for recording.
 - 3. Five spare cassette tapes have been obtained and erased using the bulk eraser.
 - 4. Each spare tape has been inspected for the presence of a felt pad under the tape. If the felt pad is missing, obtain a new tape(s).
 - 5. **PAGE CHECK** to ensure all pages are contained within.

The prerequisites listed above have all been satisfied.

JOB SUPERVISOR DATE

5.0 PRECAUTIONS

- A. Ensure that equipment is returned to its normal lineup after completion of each test (including alarms and annunciators).
- B. Extreme care should be taken while working on energized equipment.
- C. Do not erase tapes which have earthquakes recorded on them.
- D. Do not put on a calibration record nor remove a cassette if the yellow EVENT ALARM is on.
- E. Stop the STP, and immediately notify the Shift Manager if unexpected conditions occur. Unexpected conditions include the following:
 - Malfunctions
 - Out of tolerance As Left items
 - Conditions outside those allowed by TRM
 - Other discrepancies appropriate for the specific STP

6.0 PERFORMANCE

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A. **BRIEF** the OWC and the CRS on work to be performed.

6.1 SEISMIC INSTRUMENTATION CHECK

A. FUNCTIONAL TEST

- 1. **OBTAIN** SEISMIC System Key from CRS (Key #73).
- 2. **VERIFY** the "AC ON" light is lit.
- 3. On control panel 0YRC001. **INSERT AND TURN** the key switch to the "OFF" position.
- 4. **VERIFY** the "AC ON" light is extinguished.

NOTE:

In order to minimize the amount of paper used, step 6.1.A.5 should be reviewed prior to performance.

- 5. **OBTAIN** a calibration record for each of the five accelerometers using the following:
 - a. **TURN** the key switch to "TEST" for 30+ seconds.
 - b. **TURN** the key switch to "CALIB" for 1-2 seconds.
 - c. **TURN** the key switch to "NAT FREQ" for 1-2 seconds.
 - d. **TURN** the key switch back to "CALIB" for 1-2 seconds.
 - e. **TURN** the key switch back to "TEST" for 1-2 seconds.
 - f. **TURN** the key switch back to "OFF" **AND WAIT** 15-20 seconds to allow the internal time delay to reset.

UNIT 1 & 2 STP M-260-0 Rev. 00301 Page 10 of 32 INITIALS . .

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6.1.A (CONTINUED)

- 6. **REMOVE** active tape cassettes from the Tape Transport on the recorder panel.
- 7. **UNPLUG** the AC supply for the Control Panel (upper cord) in back of the panel.
- 8. **TURN** key switch to the "TEST" position.
- 9. **PUSH** Battery Voltage selector up towards positive (+) **AND RECORD** AS FOUND reading in TABLE 1.

	TAB	LE 1	
DESIRED VDC	MINIMUM	AS FOUND	MAXIMUM
+12.5	+11.5		+13.5

10. **PUSH** Battery Voltage selector down towards negative (-) **AND RECORD** AS FOUND reading in TABLE 2.

	TAB	LE 2	
DESIRED VDC	MINIMUM	AS FOUND	MAXIMUM
-12.5	-13.5		-11.5

- 11. **IF** the voltage is less than +11.5 volts DC for steps 6.1.A.9, **THEN PERFORM** the following:
 - a. **REPLACE** the battery in accordance with MN-1-101.
 - b. DOCUMENT the WO#: _____
- 12. **IF** the voltage is greater than -11.5 volts DC for steps 6.1.A.10, **THEN PERFORM** the following:
 - a. **REPLACE** the battery in accordance with MN-1-101.
 - b. DOCUMENT the WO#: _____

6.1.A (CONTINUED)

NOTE:

Battery age is determined by the date stamped on a label on the top of the case.

- 13. **RECORD** the date of manufacture for the two batteries.
 - a. +12 VDC battery Date_____
 - b. -12 VDC battery Date_____
- 14. **IF** either battery is more than 5 years old, **THEN PERFORM** the following:
 - a. **REPLACE** the battery in accordance with MN-1-101.
 - b. **DOCUMENT** the battery that was replaced
 - +12 VDC Battery replaced [] YES [] NO
 - -12 VDC Battery replaced
 []YES []NO
 - c. DOCUMENT the WO#_____
- 15. **IF** either battery was replaced, **THEN PERFORM** the following for the replacement battery.
 - a. **PUSH** Battery Voltage selector up towards positive (+) **AND RECORD** AS LEFT reading in TABLE 3.

	TAB	LE 3	
DESIRED VDC	MINIMUM	AS LEFT	MAXIMUM
+12.5	+11.5		+13.5

b. **PUSH** Battery Voltage selector down towards negative (-) **AND RECORD** AS LEFT reading in TABLE 4.

	TAB	LE 4	
DESIRED VDC	MINIMUM	AS LEFT	MAXIMUM
-12.5	-13.5		-11.5

UNIT 1 & 2 STP M-260-0 Rev. 00301 Page 12 of 32 INITIALS . .

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6.1.A (CONTINUED)

NOTE:

Turn the key switch with as close to a snap action as possible.

16. Simultaneously **TURN** the key switch to the "OPERATE" position **AND RECORD** the amount of time the tape transport spools continue to rotate with a stopwatch in TABLE 5.

TABLE 5					
DESIRED TIME (SECONDS)	MINIMUM	AS FOUND	MAXIMUM		
11.0	7.0		15.0		

- 17. VERIFY the Event Indicator has turned "WHITE".
- 18. **TURN** the key switch to the "OFF" position.
- 19. **PLUG** in the AC supply cord for the Control Panel in back of the panel.

CV

- 20. On the Magnetic Tape Playback Unit SMP-1, **PERFORM** the following:
 - a. **PLACE** the Chart Drive Switch to "OFF".
 - b. **PLACE** the Power Select switch to "BATTERY RUN" position.
- 21. **UNPLUG** the AC supply for the Magnetic Tape Playback Unit (lower cord) in back of the panel.

6.1.A (CONTINUED)

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22. **MEASURE AND RECORD** the Voltage on the battery terminals for the SMP-1 in the rear of the panel in TABLE 6.

TABLE 6				
DESIRED VDC	MINIMUM	AS FOUND	MAXIMUM	
+12.5	+11.5		+13.5	
23. IF the voltage in step 6.1.A.22 is less than +11.5 volts DC, THEN PERFORM the following:				
	a. REPLACE the battery in accordance with MN-1-101.			
	b. DOCUMENT th	ne WO#		
24.	RECORD the date of	manufacture for the batt	ery in the SMP-1.	
	SMP-1 +12 VDC battery Date			
25.	IF the battery is more than 5 years old, THEN PEFORM the following:			
	a. REPLACE the battery in accordance with MN-1-101.			
	b. DOCUMENT t	ne WO#		
26.	26. PLUG in the AC supply cord for the Magnetic Tape Playback Unit in the rear of the panel.			
·				CV
27.	On the Magnetic Tap select switch to "AC F	e Playback Unit SMP-1, RUN" position.	TURN the power	
		NOTE:		

A gain factor of 1 is 1g full scale.

28. **ENSURE** the Gain Factor switch is in position "1".

UNIT 1 & 2 STP M-260-0 Rev. 00301 Page 14 of 32 INITIALS . .

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6.1.A (CONTINUED)

- 29. PLACE the Stylus Drive "ON/OFF" switch to "ON".
- 30. **PLACE AND HOLD** the Stylus Drive RUN/CAL/ZERO switch to "ZERO".

NOTE:

The position control is used to center the Stylus on the center line of the chart paper.

- 31. **PERFORM** the following:
 - a. **CENTER** the Stylus on the center line of the chart paper.
 - b. **PLACE** the Chart Drive switch to "25 mm/sec." to obtain a short trace.
 - c. **REPEAT** steps 6.1.A.31.a and 6.1.A.31.b **UNTIL** the Stylus is centered on chart paper.
 - d. **RELEASE** the Stylus Drive RUN/CAL/ZERO switch.
- 32. **IF** a proper trace is NOT present, **THEN ADJUST** Stylus Heat Control for a proper trace.
- 33. **PLACE AND HOLD** the Stylus Drive RUN/CAL/ZERO switch to "CAL".

NOTE:

Ensure the pen is not hitting the mechanical stop while adjusting GAIN/CAL pot during the performance of Step 6.1.A.34. The GAIN/CAL potentiometer may have to be lowered in order to determine whether full scale deflection is indicated.

- 34. **PERFORM** the following:
 - a. **IF** full scale deflection is indicated, **THEN RELEASE** the Stylus Drive RUN/CAL/ZERO switch **AND PROCEED** to step 6.1.A.35.
 - b. **IF** full scale deflection is not indicated, **THEN ADJUST** the GAIN/CAL potentiometer for full scale deflection.
 - c. **RELEASE** the Stylus Drive RUN/CAL/ZERO switch.

6.1.A (CONTINUED)

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35. **PLACE** the Chart Drive Switch to the "OFF" position.

NOTE:
All three data channels of each tape on the SMP-1 will be verified to contain the presence and acceptability of the following items (Attachment 2 is a typical test record): calibration offset (nominal sensitivity) natural frequency (system freq. response) damping (sensor and system damping) background noise (signal continuity) output balance and timing marks.

- 36. **SELECT** a cassette recording of an accelerometer calibration.
- On the Playback Unit, PULL down the tape transport slide AND INSERT the cassette to be played in the transport mechanism label side up.
- 38. **PLACE** the Transport "ON/OFF" switch to "ON".
- 39. **PULL** down and to the left on the slide handle to rewind the tape.
- 40. **PLACE** the Transport "ON/OFF" switch to "OFF".

NOTE:

Channel 1 plays back the signal from the longitudinal axis. Channel 2 plays back the signal from the transverse axis. Channel 3 plays back the signal from the vertical axis

41. **TURN** Channel Select switch to playback an axis.

NOTE:

Tape Playback will occur upon completion of step 6.1.A.42.

42. **PLACE** the Transport "ON/OFF" switch to "ON".

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6.1.A (CONTINUED)

NOTE:

When the playback unit begins playing back a recorded signal, the timing marker on the right hand side of the chart paper will begin making $\frac{1}{2}$ second interval marks on the paper. When the record is over, the timing marks will stop. Attachment 2 is a typical test record.

- 43. **PERFORM** the following:
 - a. **ADJUST** the tape position for the first test record.
 - b. **MONITOR** the Stylus for movement that indicates a testing record is present.
 - c. **REWIND** the tape to a point just prior to the Stylus movement observed in step 6.1.A.43.b.
 - d. **PLACE** the Chart Drive switch to the "25 mm/sec." position **UNTIL** the first test record has been printed.
 - e. **PLACE** the Chart Drive switch to the "OFF" position.
 - f. **ADJUST** the tape position for the second test record.
 - g. **MONITOR** the Stylus for movement that indicates a testing record is present.
 - h. **REWIND** the tape to a point just prior to the Stylus movement observed in step 6.1.A.43.g.
 - i. **PLACE** the Chart Drive switch to the "25 mm/sec." position **UNTIL** the second test record has been printed.
 - j. **PLACE** the Chart Drive switch to the "OFF" position.
 - k. **INITIAL** for the channel tested in TABLE 7 below.

	TABLE 7					
0YE001 0YE002 0YE003 0YE004 0YE005						
Channel 1						
Channel 2						
Channel 3						

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6.1.A.43 (CONTINUED)

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- I. **MARK** the chart paper for each cassette recording to identify the Accelerometer Number, Channel Number, and Test Record Number.
- m. **SELECT** the next channel that will be tested for the Accelerometer under test.
- n. **REPEAT** steps 6.1.A.43.a through 6.1.A.43.m for the remaining channels of the accelerometer under test.
- 44. **VERIFY** Transport ON/OFF switch is in the "OFF" position.
- 45. **REPEAT** steps 6.1.A.36 through 6.1.A.44 for the remaining Accelerometers to be tested.
- 46. **PLACE** the Stylus Drive ON/OFF switch to "OFF."
- 47. PLACE Channel Select Switch to "OFF."
- 48. **IF** the tapes are NOT completely rewound on the left reel, **THEN USE** the play back unit to rewind the tape.
- 49. **TURN** the Power Selector switch to the "BATTERY CHARGER" position.
- 50. **ENSURE** each tape is clearly marked designating corresponding tape transport.
- 51. **INSERT** tapes into each designated tape transport.

UNIT 1 & 2 STP M-260-0 Rev. 00301 Page 18 of 32 INITIALS

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6.1.A (CONTINUED)

NOTE:

The slide handle may have to be momentarily pulled down if the tape stalls during performance of step 6.1.A.52.

- 52. **TURN** key switch to "TEST" for 15 seconds **AND ENSURE** the following:
 - Indicator is black
 - Event Alarm is illuminated yellow
 - Control Room annunciator is received
 - Leaders are wound on the tape reels.
- 53. **TURN** key switch to "OFF".

NOTE:

In order to minimize the amount of paper used, step 6.1.A.54 should be reviewed prior to performance.

- 54. **OBTAIN** a calibration record for each of the five accelerometers using the following:
 - a. **TURN** the key switch to "TEST" for 30+ seconds.
 - b. **TURN** the key switch to "CALIB" for 1-2 seconds.
 - .c. **TURN** the key switch to "NAT FREQ" for 1-2 seconds.
 - d. **TURN** the key switch back to "CALIB" for 1-2 seconds.
 - e. **TURN** the key switch back to "TEST" for 1-2 seconds.
 - f. **TURN** the key switch back to "OFF" **AND WAIT** 15-20 seconds to allow the internal time delay to reset.
- 55. **TURN** the key switch to "OPERATE".
- 56. **ENSURE** that the Event Indicator is BLACK.

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6.1.A (CONTINUED)							
	57. VERIFY Control Room Annunciator is clear.						
	 58. VERIFY that the "AC ON" light is lit. 59. ENSURE an adequate supply of chart paper remains to record possible seismic events. 						
	60.	REMOVE the key from the key switch AND RETURN to OPERATIONS.					
	61.	VERIFY the following on the Chart printouts, (Reference Attachment 2):					
	a. Calibration amplitude (12.5 <u>+</u> 2.5 increments)						
	b. The presence and acceptable appearance of each of the following items:						
		(1)	Natural fre	equency (system freque	ency response)		
		(2)	Damping (sensor and system dar	nping)		
	(3) Background noise (signal continuity)			iity)			
	(4) Output balance and timing marks			;			
					-		
	62.	62. IF review of all data reveals any discrepancies, THEN NOTIFY the Shift Manager, System Manager, and RMGS.					
	63. RETAIN Tapes for review by System Manager.						
	64.	RECORD Test Equipment used during performance of this Surveillance Test Procedure.					
INS	TRUMENT	SERIAL	NUMBER	MODEL NUMBER	CAL DUE DATE		
					· · · · · · · · · · · · · · · · · · ·		

UNIT 1 & 2 STP M-260-0 Rev. 00301 Page 20 of 32

7.0 POST-PERFORMANCE ACTIVITIES

- A. **ATTACH** chart paper recordings from Step 6.1.A.45 to the corresponding Attachment 3 sheets on pages 23 through 32.
- B. **PAGE CHECK** to ensure all pages are contained within.

PERFORMED BY DATE

8.0 BASES

· None

9.0 RECORDS

- A. Records generated by this procedure SHALL be captured and controlled. Prior to transferring records to Records Management for retention, legibility and completeness of the record SHALL be verified by the transmitting organization.
- B. Records generated by this procedure are identified as Lifetime and SHALL be retained for the lifetime of Calvert Cliffs Nuclear Power Plant.
- C. This procedure has been written under the guidance of, and is controlled by CNG-PR-1.01-1011, Control Of Station-Specific Procedure Change Process.
- D. This procedure has been written under the guidance of, and is controlled by EN-4-104, Surveillance Testing.
- E. The contents of this procedure SHALL be retained in accordance with CNG-PR-3.01-1000, Records Management.

10.0 ATTACHMENTS:

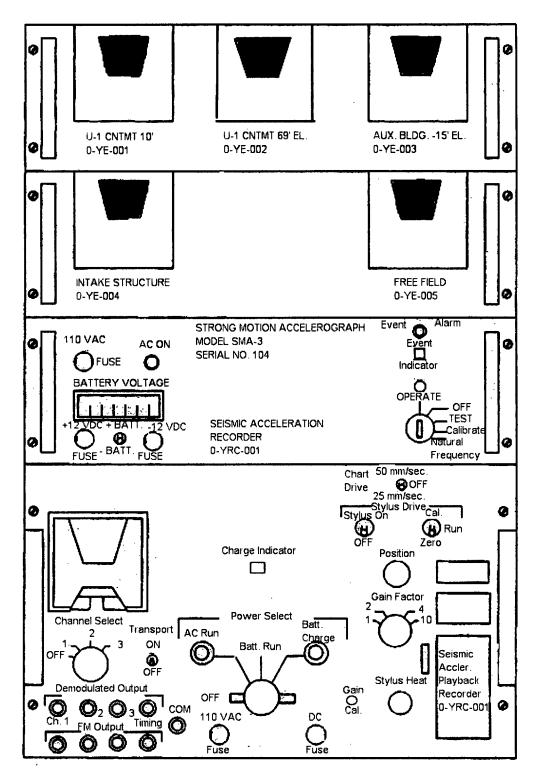
- A. ATTACHMENT 1, SEISMIC INSTRUMENT PANEL
- B. ATTACHMENT 2, TYPICAL TEST RECORD
- C. ATTACHMENT 3, CALIBRATION RECORDS

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UNIT 1 & 2 STP M-260-0 Rev. 00301 Page 21 of 32

ATTACHMENT 1 SEISMIC INSTRUMENTATION PANEL

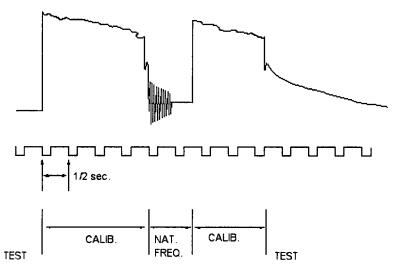


UNIT 1 & 2 STP M-260-0 Rev. 00301 Page 22 of 32 J

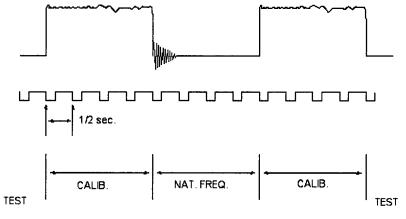
.

ATTACHMENT 2

TYPICAL TEST RECORD



TYPICAL TEST RECORD - ELECTROMAGNETIC ACCELEROMETER (EMA)



TYPICAL TEST RECORD - FORCED BALANCE ACCELEROMETER (FBA)

UNIT 1 & 2 STP M-260-0 Rev. 00301 Page 23 of 32

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ATTACHMENT 3 CALIBRATION RECORD

(Page 1 of 10)

First Calibration Record Channel 0YE001

LOCATION: 10' Level, Containment Building Floor

LONGITUDINAL AXIS

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TRANSVERSE AXIS

UNIT 1 & 2 STP M-260-0 Rev. 00301 Page 24 of 32 ,

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ATTACHMENT 3 CALIBRATION RECORD (Continued) (Page 2 of 10)

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First Calibration Record Channel 0YE002

LOCATION: 69' Level, Containment Building Floor

LONGITUDINAL AXIS

TRANSVERSE AXIS

UNIT 1 & 2 STP M-260-0 Rev. 00301 Page 25 of 32

ATTACHMENT 3 CALIBRATION RECORD (Continued) (Page 3 of 10)

First Calibration Record Channel 0YE003

LOCATION: -15' Level, Aux Building

LONGITUDINAL AXIS

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TRANSVERSE AXIS

UNIT 1 & 2 STP M-260-0 Rev. 00301 Page 26 of 32 .

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ATTACHMENT 3 CALIBRATION RECORD (Continued) (Page 4 of 10)

First Calibration Record Channel 0YE004

LOCATION: 3' Level, Intake Structure

LONGITUDINAL AXIS

TRANSVERSE AXIS

UNIT 1 & 2 STP M-260-0 Rev. 00301 Page 27 of 32

ATTACHMENT 3 CALIBRATION RECORD (Continued) (Page 5 of 10)

First Calibration Record Channel 0YE005

LOCATION: Free Field

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LONGITUDINAL AXIS

TRANSVERSE AXIS

UNIT 1 & 2 STP M-260-0 Rev. 00301 Page 28 of 32 ٠

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ATTACHMENT 3 CALIBRATION RECORD (Continued) (Page 6 of 10)

Second Calibration Record Channel 0YE001

LOCATION: 10' Level, Containment Building Floor

LONGITUDINAL AXIS

TRANSVERSE AXIS

UNIT 1 & 2 STP M-260-0 Rev. 00301 Page 29 of 32

ATTACHMENT 3 CALIBRATION RECORD (Continued) (Page 7 of 10)

Second Calibration Record Channel 0YE002

LOCATION: 69' Level, Containment Building Floor

LONGITUDINAL AXIS

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TRANSVERSE AXIS

UNIT 1 & 2 STP M-260-0 Rev. 00301 Page 30 of 32 ٠

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ATTACHMENT 3 CALIBRATION RECORD (Continued) (Page 8 of 10)

Second Calibration Record Channel 0YE003

LOCATION: -15' Level, Aux Building

LONGITUDINAL AXIS

TRANSVERSE AXIS

UNIT 1 & 2 STP M-260-0 Rev. 00301 Page 31 of 32

ATTACHMENT 3 CALIBRATION RECORD (Continued) (Page 9 of 10)

Second Calibration Record Channel 0YE004

LOCATION: 3' Level, Intake Structure

LONGITUDINAL AXIS

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TRANSVERSE AXIS

UNIT 1 & 2 STP M-260-0 Rev. 00301 Page 32 of 32 •

ATTACHMENT 3 CALIBRATION RECORD (Continued) (Page 10 of 10)

Second Calibration Record Channel 0YE005

LOCATION: Free Field

LONGITUDINAL AXIS

TRANSVERSE AXIS

VERTICAL AXIS

- END -

CALVERT CLIFFS NUCLEAR POWER PLANT TECHNICAL PROCEDURE

UNIT ONE

AOP-11 CONTROL ROOM EVACUATION AND SAFE SHUTDOWN NON-FIRE CONDITIONS

REVISION 2

Safety Related

Approval Authority:

5/14/02

signature/date

Effective Date: 05-15-02

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LIST OF EFFECTIVE PAGES

PAGE NUMBERS

REVISION

1-41

1

2

REVISION

ATTACHMENT NUMBER

2

PROCEDURE ALTERATIONS

REVISION/CHANGE

PAGE NUMBERS

None

None

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111.	PRECAUTIONS	5			
IV.	ACTIONS PRIOR TO EVACUATION OF THE CONTROL ROOM	6			
V.	ACTIONS OUTSIDE THE CONTROL ROOM	8			
VI.	RE-ESTABLISHING CONTROL FROM THE CONTROL ROOM	26			
∨0.	SAFETY FUNCTION STATUS CHECK	35			
ATTACHMENT (1) PLACEKEEPER					

I. PURPOSE

The purpose of this procedure is to provide a means of shutting down the Unit from outside the Control Room and maintaining the Unit in a Mode 3 (hot standby) condition until plant control is reestablished from the Control Room.

II. ENTRY CONDITIONS

- 1. Any non-fire condition which, in the opinion of the Shift Manager, exposes Control Room personnel to a harmful operating environment.
- 2. Any non-fire condition which, in the opinion of the Shift Manager, impedes plant control from the Control Room.

III. PRECAUTIONS

The following specific precautions apply prior to or throughout this procedure.

A. WARNINGS

1. Other plant areas may be affected by the same conditions causing the Control Room evacuation.

B. CAUTIONS

- 1. When the Pressurizer heaters are controlled from panel 1C43, the low level cutoff at 101 inches is inoperable.
- 2. Valid ESFAS and AFAS signals to equipment shall **NOT** be overridden or blocked unless specifically directed in this procedure. A valid signal is a signal that at the time of initiation, correlated to plant parameters (e.g., the monitored parameter actually reached its setpoint value).

C. NOTES

1. This procedure has parallel actions assigned to specific watchstations. When a boxed function is complete, the next assigned boxed function applicable to the Operator's watchstation position shall be implemented. When supporting evolutions are to be completed before execution of another, a conditional statement is used.

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IV. ACTIONS PRIOR TO EVACUATION OF THE CONTROL ROOM

A. (RO) TRIP THE REACTOR.

<u>NOTE</u>

This procedure has parallel actions assigned to specific watchstations. When a boxed function is complete, the next assigned boxed function applicable to the Operator's watchstation position shall be implemented. When supporting evolutions are to be completed before execution of another, a conditional statement is used.

WARNING

Other plant areas may be affected by the same conditions causing the Control Room evacuation.

- 1. Trip the Reactor by depressing **ONE** set of Manual Reactor Trip Buttons at 1C05 or 1C15.
- 2. IF RCS dilution is in progress, THEN secure RC M/U PPs.
- 3. GO TO the Main Turbine Front Standard to perform Section V, Step A.

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IV. ACTIONS PRIOR TO EVACUATION OF THE CONTROL ROOM

B. (CRO) TRIP THE MAIN TURBINE, SGFPs AND SECURE BLOWDOWN.

NOTE

This procedure has parallel actions assigned to specific watchstations. When a boxed function is complete, the next assigned boxed function applicable to the Operator's watchstation position shall be implemented. When supporting evolutions are to be completed before execution of another, a conditional statement is used.

WARNING

Other plant areas may be affected by the same conditions causing the Control Room evacuation.

1. Before leaving the Control Room, perform the following actions:

a. Trip the Main Turbine by depressing the Turbine TRIP button at 1C02.

b. Trip 11 and 12 SGFPs at 1C03.

c. Shut the S/G B/D valves:

- 1-BD-4010-CV
- 1-BD-4011-CV
- 1-BD-4012-CV
- 1-BD-4013-CV
- 2. If time permits, make the following a site wide page announcement:

"The Control Room is being evacuated. Plant operators report to their safe shutdown stations, all persons stay clear of the Control Room."

3. GO TO Unit 1 45' Switchgear Room to perform Section V, Step C.

C. (ALL PERSONNEL) EVACUATE THE CONTROL ROOM.

- 1. WHEN evacuation is ordered by the SM/CRS, THEN ALL personnel are to leave the Control Room.
- 2. Report to Safe Shutdown Stations.

END of Section IV

1C433501/5625/3511	AFW4768	1A DG5320	ADVs5626
27' SWGR5463/5464	SRW UL/LL5575/5576	1B DG5631	INTAKE5498
2C433502/5652/3522	CC RM5587	2A DG5630	13KV MC5655
72' CMPTR RM4404	0C DG5302	2B DG5642	U-1 NSSS5635
69' SWGR5675	MCC-1045635	MCC-1145675	

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V. ACTIONS OUTSIDE THE CONTROL ROOM

- A. (RO) MANUALLY TRIP THE MAIN TURBINE.
- 1. Manually trip the Unit 1 Main Turbine at the Front Standard.
- 2. GO TO Unit 1 45' Switchgear Room.
- 3. Notify 1C43 that the Main Turbine is tripped.

B. (RO) SHUTDOWN 11 AND 12 CEDM MG SETS.

- 1. On the CEDM MG Set Control Panel:
 - a. Depress the Local LOAD OFF Pushbutton.
 - b. Depress the Remote LOAD OFF Pushbutton.
 - c. Depress and hold the Local MOTOR OFF Pushbutton until the MOTOR ON light deenergizes.
 - d. Depress and hold the Remote MOTOR OFF Pushbutton until the MOTOR ON light deenergizes.

C. (CRO) UNLOCK SAFE SHUTDOWN KEY LOCKER AND EQUIPMENT LOCKER.

- 1. Open 11 ADV Handvalve enclosure.
- 2. Obtain the Safe Shutdown Key Locker door key.
- 3. Open the Safe Shutdown Key Locker.
- Obtain the CRO key ring at the Safe Shutdown Key Locker.

NOTE

The key for the Safe Shutdown Equipment Locker is on the 1C43 Panel key ring.

5. Open the Safe Shutdown Equipment Locker.

6. Obtain CRO equipment at the Safe Shutdown Equipment Locker.

1C433501/5625/3511	AFW4768	1A DG5320	ADVs5626
27' SWGR5463/5464	SRW UL/LL5575/5576	1B DG5631	INTAKE5498
2C433502/5652/3522	CC RM5587	2A DG5630	13KV MC5655
72' CMPTR RM4404	0C DG5302	2B DG5642	U-1 NSSS5635
69' SWGR5675	MCC-1045635	MCC-1145675	

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V. ACTIONS OUTSIDE THE CONTROL ROOM

D. **(SM)** DETERMINE APPROPRIATE EMERGENCY RESPONSE ACTIONS PER THE ERPIP.

NOTE

The SM may designate personnel to notify the offsite agencies.

WARNING

Other plant areas may be affected by the same conditions causing the Control Room evacuation.

1. Determine the appropriate emergency response actions **PER** the ERPIP.

2. Determine reporting requirements of RM-1-101, REGULATORY REPORTING.

E. (OSO) OBTAIN RADIOS AND REPORT TO 1C43 AND 2C43.

WARNING

Other plant areas may be affected by the same conditions causing the Control Room evacuation.

- 1. GO TO the Fire Brigade Locker and retrieve two portable radios.
- 2. GO TO 1C43 and give one radio to the SM.
- 3. Obtain designated key ring and equipment at Safe Shutdown Key and Equipment Lockers.
- 4. GO TO 2C43 and give the other radio to the CRS.
- 5. Make the following announcement:

"The Control Room has been evacuated. The Plant is being controlled from 1C43 and 2C43. All personnel are required to stay clear of the following areas: Control Room, Cable Spreading Room, Shift Managers Office, Security Central Alarm Station, Technical Support Center, Technical Support Computer Room and Control Room Computer Rooms."

6. GO TO 1C43 to provide additional assistance where needed.

1C433501/5625/3511 27' SWGR5463/5464 2C433502/5652/3522 22' CMPTP PM	SRW UL/LL5575/5576 CC RM5587	1A DG5320 1B DG5631 2A DG5630 28 DG5642	ADVs5626 INTAKE5498 13KV MC5655
72' CMPTR RM4404 69' SWGR5675	-	2B DG5642 MCC-1145675	U-1 NSSS5635

AOP-11 Rev 2/Unit 1 Page 10 of 41

V. ACTIONS OUTSIDE THE CONTROL ROOM

F. (TBO) OBTAIN EQUIPMENT, THEN TRIP 11 AND 12 SGFPs.

<u>NOTE</u>

This procedure has parallel actions assigned to specific watchstations. When a boxed function is complete, the next assigned boxed function applicable to the Operator's watchstation position shall be implemented. When supporting evolutions are to be completed before execution of another, a conditional statement is used.

WARNING

Other plant areas may be affected by the same conditions causing the Control Room evacuation.

- 1. Obtain designated key ring and equipment at Safe Shutdown Key and Equipment Lockers.
- 2. GO TO the SGFPs 12' Turbine Building.
- 3. Manually trip the SGFPs.
 - PULL-TO-TRIP 11 SGFP
 - PULL-TO-TRIP 12 SGFP
- 4. GO TO the AFW Pump Room to perform Section V, Step O.

·····			
1C433501/5625/3511	AFW4768	1A DG5320	ADVs5626
27' SWGR5463/5464		1B DG5631	INTAKE5498
2C433502/5652/3522	CC RM5587	2A DG5630	13KV MC5655
72' CMPTR RM4404	0C DG5302	2B DG5642	U-1 NSSS5635
69' SWGR5675	MCC-1045635	MCC-1145675	

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V. ACTIONS OUTSIDE THE CONTROL ROOM

G. (ABO) OBTAIN EQUIPMENT, THEN GO TO 45 FOOT AUXILIARY BUILDING.

NOTE

This procedure has parallel actions assigned to specific watchstations. When a boxed function is complete, the next assigned boxed function applicable to the Operator's watchstation position shall be implemented. When supporting evolutions are to be completed before execution of another, a conditional statement is used.

WARNING

Other plant areas may be affected by the same conditions causing the Control Room evacuation.

- 1. Obtain designated key ring and equipment at Safe Shutdown Key and Equipment Lockers.
- 2. GO TO 45' Auxiliary Building to the telephone by the Unit 1 NSSS Sample Sink.
- 3. Notify 1C43 upon arrival.

H. (CRO) VERIFY REACTOR IS SHUTDOWN.

- 1. Verify Reactor Power trending to or is less than 10⁻⁴% power and lowering.
- 2. WHEN Reactor Power is less than 10-4% power and constant or lowering, THEN Reactivity Control is satisfactory.

I. (CRO) INITIALIZE ADV CONTROLLERS ON 1C43.

NOTE

Adjustment of the ADV controllers past the controller detent pin will stop valve motion.

- 1. Place 11 ADV CONTR, 1-HC-4056A, to SHUT.
- 2. Place 12 ADV CONTR, 1-HC-4056B, to SHUT.
- 3. Notify the RO to align 11 and 12 ADVs to 1C43 PER Section V, Step J.

AFW4768	1A DG5320	ADVs5626
SRW UL/LL5575/5576	1B DG5631	INTAKE5498
CC RM5587	2A DG5630	13KV MC5655
0C DG5302	2B DG5642	U-1 NSSS5635
MCC-1045635	MCC-1145675	
	SRW UL/LL5575/5576 CC RM5587	SRW UL/LL5575/5576 1B DG5631 CC RM5587 2A DG5630 0C DG5302 2B DG5642

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V. ACTIONS OUTSIDE THE CONTROL ROOM

J. (RO) ALIGN 11 AND 12 ADVs TO 1C43.

<u>NOTE</u>

This procedure has parallel actions assigned to specific watchstations. When a boxed function is complete, the next assigned boxed function applicable to the Operator's watchstation position shall be implemented. When supporting evolutions are to be completed before execution of another, a conditional statement is used.

WARNING

Other plant areas may be affected by the same conditions causing the Control Room evacuation.

- 1. Obtain designated key ring and equipment at Safe Shutdown Key and Equipment Lockers.
- 2. WHEN notified to align 11 and 12 ADVs to 1C43, THEN GO TO the ADV Handvalve enclosure.
- 3. Place the following handvalves to POSITION 2:
 - 11 ADV Aux Shutdown Control Transfer, 1-HV-3938A
 - 11 ADV Quick Open Override Handvalve, 1-HV-3938B
 - 12 ADV Aux Shutdown Control Transfer, 1-HV-3939A
 - 12 ADV Quick Open Override Handvalve, 1-HV-3939B
- 4. Notify the CRO that the ADVs are aligned to 1C43.

1C433501/5625/3511	AFW4768	1A DG5320	ADVs5626
27' SWGR5463/5464	SRW UL/LL5575/5576	1B DG5631	INTAKE5498
2C433502/5652/3522	CC RM5587	2A DG5630	13KV MC5655
72' CMPTR RM4404	0C DG5302	2B DG5642	U-1 NSSS5635
69' SWGR5675	MCC-1045635	MCC-1145675	

V. ACTIONS OUTSIDE THE CONTROL ROOM

K. (CRO) VERIFY COLD LEG TEMPERATURES.

- 1. Verify the Turbine Bypass Valves are maintaining T COLD between 525 and 535° F.
- IF T COLD is greater than 535° F, AND NOT trending to less than 535° F, THEN adjust 11 and 12 ADV CONTRs, 1-HC-4056A and 1-HC-4056B, as needed to maintain T COLD between 525 and 535° F.
- 3. IF T COLD is less than 525° F, AND NOT trending to greater than 525° F, THEN perform the following actions:

<u>NOTE</u>

The ABO is located at the Unit 1 NSSS Sample Sink telephone.

a. Notify the ABO to shut the MSIVs PER Section V, Step L.

b. WHEN notified that the MSIVs are shut, THEN adjust 11 and 12 ADV CONTRs, 1-HC-4056A and 1-HC-4056B, as needed to maintain T colo between 525 and 535° F.

1C433501/5625/3511 27' SWGR5463/5464 2C433502/5652/3522 72' CMPTR RM4404	SRW UL/LL5575/5576 CC RM5587	1A DG5320 1B DG5631 2A DG5630 2B DG5642	ADVs5626 INTAKE5498 13KV MC5655 U-1 NSSS5635
69' SWGR		MCC-1145675	U-1 NSSS9635

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V. ACTIONS OUTSIDE THE CONTROL ROOM

L. (ABO) IF NOTIFIED, THEN SHUT BOTH MSIVs.

NOTE

Performance of this step may not be required. Direction to perform this step will be given from 1C43.

CAUTION

Performance of this step will result in a fast closure of the MSIVs.

- 1. **IF** notified to shut the MSIVs, **THEN** perform the following actions:
 - a. Shut Instrument Air Isolation to 11 MSIV Hydraulic Pump, 1-IA-1069.
 - b. Perform the following actions to shut 11 MSIV:
 - (1) Remove the Dump Solenoid Valve Cap on ONE of the following:
 - 11 MSIV Dump SV Channel A, 1-MSH-4042A-SV

OR

- 11 MSIV Dump SV Channel B, 1-MSH-4042B-SV
- (2) Place a wrench on the selected Dump Solenoid stem nut.
- (3) Rotate the wrench in the clockwise direction (approximately three turns) to bleed hydraulic fluid back to the reservoir.
- c. Shut Instrument Air Isolation to 12 MSIV Hydraulic Pump, 1-IA-1070.

(continue)

1C433501/5625/3511 27' SWGR5463/5464 2C433502/5652/3522 72' CMPTR RM4404	SRW UL/LL5575/5576 CC RM5587 0C DG5302	1A DG5320 1B DG5631 2A DG5630 2B DG5642	ADVs5626 INTAKE5498 13KV MC5655 U-1 NSSS5635
69' SWGR5675	MCC-1045635	MCC-1145675	

AOP-11 Rev 2/Unit 1 Page 15 of 41 V. ACTIONS OUTSIDE THE CONTROL ROOM L.1 (continued) d. Perform the following actions to shut 12 MSIV: Remove the Dump Solenoid Valve Cap on ONE of the following: 12 MSIV Dump SV Channel A, 1-MSH-4047A-SV OR 12 MSIV Dump SV Channel B, 1-MSH-4047B-SV (2) Place a wrench on the selected Dump Solenoid stem nut. (3) Rotate the wrench in the clockwise direction (approximately three turns) to bleed hydraulic fluid back to the reservoir. Notify 1C43 that the MSIVs are shut. GO TO 45' Auxiliary Building to the telephone by the Unit 1 NSSS Sample Sink. M. (STA) COMMENCE SAFETY FUNCTION STATUS CHECKS. NOTE Data to complete the Safety Function Status Checks may be obtained at the 72' Computer Room. WARNING Other plant areas may be affected by the same conditions causing the Control Room evacuation. Monitor plant status PER Section VII., <u>SAFETY FUNCTION STATUS CHECK.</u> ADVs......5626 1A DG...5320 27' SWGR......5463/5464 SRW UL/LL..5575/5576 1B DG...5631 INTAKE.....5498 13KV MC...5655 2A DG...5630 2B DG...5642 U-1 NSSS...5635 69' SWGR......5675 MCC-104.....5635 MCC-114...5675

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V. ACTIONS OUTSIDE THE CONTROL ROOM

N. (CRO) COMPLETE INITIALIZATION OF CONTROLLERS ON 1C43.

NOTE

Adjustment of Controllers past the controller detent pin will stop valve motion.

- 1. Place 11 AFW PP SPEED CONTR, 1-HC-3987B, to MIN SPD.
- 2. Place 12 AFW PP SPEED CONTR, 1-HC-3989B, to MIN SPD.
- 3. Place 11 S/G FLOW CONTR, 1-HC-4511B, to MIN FLOW.
- 4. Place 12 S/G FLOW CONTR, 1-HC-4512B, to MIN FLOW.
- 5. Place 11 S/G FLOW CONTR, 1-HC-4525B, to MIN FLOW.
- 6. Place 12 S/G FLOW CONTR, 1-HC-4535B, to MIN FLOW.
- 7. Notify the TBO to align AFW Pump Speed Control to 1C43 PER Section V, Step O.

O. (TBO) ALIGN AFW PUMP SPEED CONTROL TO 1C43.

- 1. WHEN notified to align the AFW Pump Speed Control to 1C43, THEN perform the following actions:
 - a. Place 11 AFW Pump Speed Control Handvalve, 1-HV-3987, to POSITION 2.
 - b. Place 12 AFW Pump Speed Control Handvalve, 1-HV-3989, to POSITION 2.
- 2. Notify 1C43 that AFW Speed Control is aligned to 1C43.
- 3. GO TO the SRW Pump Room to perform Section V, Step P.

1C433501/5625/3511	AFW4768	1A DG5320	ADVs5626
27' SWGR5463/5464	SRW UL/LL.5575/5576	1B DG5631	INTAKE5498
2C433502/5652/3522	CC RM5587	2A DG5630	13KV MC5655
72' CMPTR RM4404		2B DG5642	U-1 NSSS5635
69' SWGR5675	MCC-1045635	MCC-1145675	

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V. ACTIONS OUTSIDE THE CONTROL ROOM

P. (TBO) ALIGN THE AFW FLOW CONTROL TO 1C43.

- 1. In the SRW Pump Room Upper Level, Place in POSITION 2 ALL AFW System Valves listed below:
 - NORTH WALL (In Hand Transfer Box)
 - 1-IA-4511-HV
 - 1-IA-4512-HV
 - Stanchion L.O.9 between 1-AFW-4525-CV and 1-AFW-4535-CV (In Hand Transfer Box)
 - 1-IA-4525-HV
 - 1-IA-4535-HV
 - Southwest Corner next to U-1 to U-2 AFW X-conn CV, 1-AFW-4550-CV
 1-IA-4070-HV
 - 1-IA-4071-HV
- 2. Notify 1C43 that the AFW flow control is aligned to 1C43.
- 3. GO TO the AFW Pump Room and verify AFW Pump operation PER Section V, Step Q.

Q. (TBO) VERIFY AFW PUMP OPERATION.

1. IF the in-service AFW Pump has tripped, THEN reset the Throttle/Stop Valve, 1-MS-3986 (1-MS-3988):

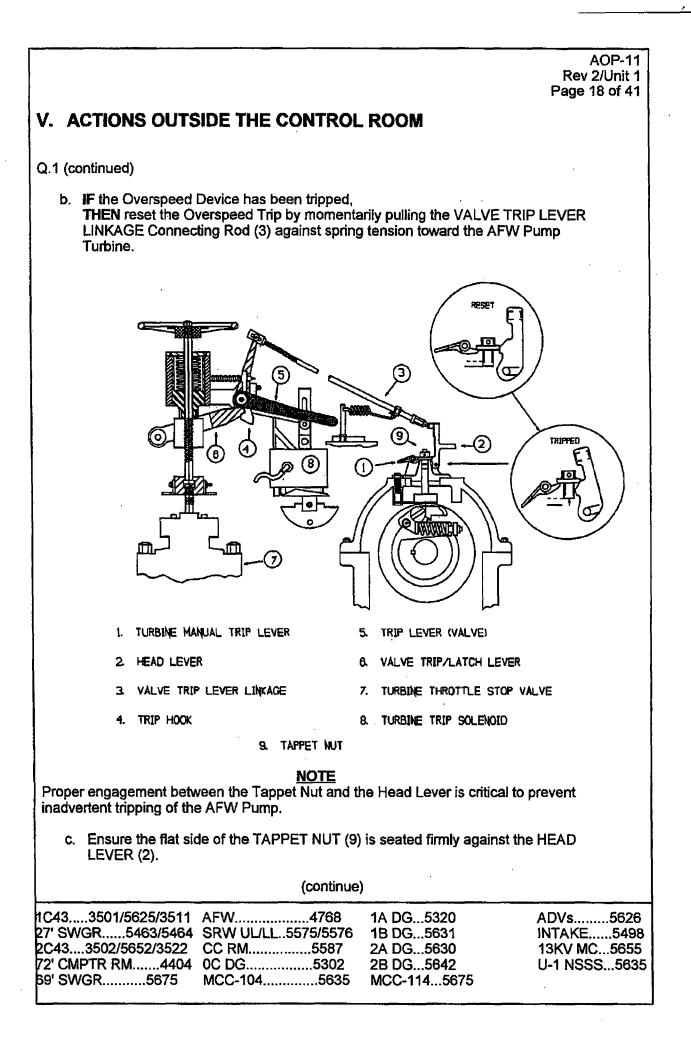
<u>NOTE</u>

Cycling the governor MANUAL ADJUSTMENT knob after Turbine Operation releases a hydraulic lock on the speed setting piston.

- a. Reset the Turbine Governor Speed Control as follows:
 - (1) Turn the governor MANUAL ADJUSTMENT knob fully counterclockwise to MINIMUM position.
 - (2) Turn the governor MANUAL ADJUSTMENT knob fully clockwise to MAXIMUM position.

(continue)

1C433501/5625/3511 27' SWGR5463/5464		1A DG5320 1B DG5631	ADVs5626 INTAKE5498
2C433502/5652/3522	CC RM,5587	2A DG5630	13KV MC5655
72' CMPTR RM4404	0C DG5302	2B DG5642	U-1 NSSS5635
69' SWGR5675	MCC-1045635	MCC-1145675	



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V. ACTIONS OUTSIDE THE CONTROL ROOM

Q.1 (continued)

- d. Reset the Throttle/Stop Valve:
 - (1) Rotate the handwheel clockwise until the Trip/Latch Lever is lifted over the Trip Hook.
 - (2) Ensure the Trip/Latch Lever and the Trip Hook are fully engaged.
- e. Slowly rotate the handwheel counterclockwise until the Throttle/Stop Valve, 1-MS-3986 (1-MS-3988), is fully open.
- 2. IF the in service AFW Pump fails to operate, **THEN** perform the following actions:
 - a. Notify 1C43 that the standby AFW pump will be placed in service.
 - b. Slowly rotate the handwheel counterclockwise until the Throttle/Stop Valve, 1-MS-3986 (1-MS-3988), is fully open.
 - c. Notify 1C43 that the standby AFW PP has been placed in service.
- 3. Periodically monitor the operating AFW Pump.
- 4. GO TO the Main Turbine to perform Section V, Step AA.

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V. ACTIONS OUTSIDE THE CONTROL ROOM

R. (CRO) INITIATE AFW FLOW TO SGs.

- WHEN notified that AFW flow control is aligned to 1C43, THEN slowly feed the S/Gs by ANY of the following methods AND restore S/G level to 0 inches.
 - Adjusting 11 AUX FD PP SPEED CONTR, 1-HC-3987B
 - Adjusting 12 AUX FD PP SPEED CONTR, 1-HC-3989B
 - Adjusting 11 S/G STM DRIVEN AFW FLOW CONTR, 1-HC-4511B
 - Adjusting 12 S/G STM DRIVEN AFW FLOW CONTR, 1-HC-4512B
- IF SG level can NOT be restored using the Steam Driven AFW Pumps, AND 13 AFW PP is NOT already running, THEN notify the RO to start 13 AFW PP PER step S.
- IF 13 AFW PP has been started, THEN slowly feed the S/Gs by performing the following actions AND restore S/G level to 0 inches.
 - Adjusting 11 S/G MOTOR DRIVEN AFW FLOW CONTR, 1-HC-4525B.
 - Adjusting 12 S/G MOTOR DRIVEN AFW FLOW CONTR, 1-HC-4535B.

S. (RO) START 13 AFW PP.

- 1. IF notified to start 13 AFW PP, THEN perform the following actions:
 - a. Depress the CLOSE pushbutton on breaker 152-1116.
 - b. Notify 1C43 that 13 AFW PP has been started.

1C433501/5625/3511 27' SWGR5463/5464 2C433502/5652/3522	SRW UL/LL5575/5576 CC RM5587	1B DG5631 2A DG5630	ADVs5626 INTAKE5498 13KV MC5655
72' CMPTR RM4404 89' SWGR5675		2B DG5642 MCC-1145675	U-1 NSSS5635

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V. ACTIONS OUTSIDE THE CONTROL ROOM

T. (CRO) MONITOR PRESSURIZER LEVEL.

- 1. Check Pressurizer level stabilizes between 80 and 180 AND is trending to 160 inches.
- 2. IF Pressurizer level has NOT stabilized, THEN perform the following actions:
 - a. Determine which Charging Pump(s) are needed to stabilize Pressurizer level.
 - b. Notify the RO to manually operate the Charging Pump(s) PER Section V, Step V.

U. (CRO) ENERGIZE PRESSURIZER BACKUP HEATER.

CAUTION

The Pressurizer heater low level cutout at 101 inches is inoperable when heaters are operated at 1C43.

1. IF Pressurizer pressure is less than 2225 PSIA AND Pressurizer level is greater than 101 inches, THEN raise Pressurizer pressure:

a. Insert the keys into the following Pressurizer Backup Heater Transfer Controllers:

- 11 BACKUP HTR TRANSFER CONTR 1-HS-100-4A
- 13 BACKUP HTR TRANSFER CONTR 1-HS-100-6A

NOTE

Any combination of Pressurizer Heaters may be used to restore Pressurizer pressure.

- b. Turn key to ON to energize the selected Pressurizer Heater(s).
- c. Cycle the Pressurizer Backup Heater Transfer Controller(s) as necessary to maintain Pressurizer pressure between 2225 and 2275 PSIA.

1C433501/5625/3511	AFW4768	1A DG5320	ADVs5626
27' SWGR5463/5464	SRW UL/LL5575/5576	1B DG5631	INTAKE5498
2C433502/5652/3522	CC RM5587	2A DG5630	13KV MC5655
72' CMPTR RM4404	0C DG5302	2B DG5642	U-1 NSSS5635
69' SWGR5675	MCC-1045635	MCC-1145675	

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V. ACTIONS OUTSIDE THE CONTROL ROOM

V. (RO) MANUALLY OPERATE THE CHARGING PUMP(S).

CAUTION

Performance of this step may NOT be required. Direction to perform this step will be given from 1C43.

- 1. IF notified to manually operate the Charging Pumps THEN perform the following actions as required:
 - a. Start the Charging Pump(s) by performing the following actions:
 - (1) If necessary, charge the breaker Closing Spring for the charging pump to be started:
 - (11 Charging Pump breaker) 52-1115
 - (13 Charging Pump breaker) 52-1104
 - (12 Charging Pump breaker) 52-1415
 - (13 Charging Pump breaker) 52-1404
 - (2) Depress the PUSH TO CLOSE pushbutton on the pump breaker.

b. Stop the Charging Pump(s) by performing the following actions:

- (1) Depress the TRIP pushbutton on the pump breaker.
- (2) Charge the closing spring, if required.
- 2. Notify 1C43 of Charging Pump status.

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1C433501/5625/3511	AFW4768	1A DG5320	ADVs5626
27' SWGR5463/5464	SRW UL/LL5575/5576	1B DG5631	INTAKE5498
2C433502/5652/3522	CC RM5587	2A DG5630	13KV MC5655
72' CMPTR RM4404	0C DG5302	2B DG5642	U-1 NSSS5635
69' SWGR5675	MCC-1045635	MCC-1145675	

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V. ACTIONS OUTSIDE THE CONTROL ROOM

W. (CRO) MAKEUP TO THE VCT.

- 1. Notify the STA to monitor VCT level, L226, on the Plant Computer.
- WHEN VCT makeup is desired, THEN notify the ABO to deenergize CVCS MOVs PER Section V, Step X.
- 3. WHEN 1-MOV-504 and 1-MOV-501 have been deenergized, THEN notify the ABO to align CHG Pump suction to the RWT PER Section V, Step Y.
- 4. WHEN VCT makeup is NO longer desired, THEN notify the ABO to align CHG Pump suction to the VCT PER Section V, Step Z.
- 5. Repeat Steps 3 and 4 as necessary.

X. (ABO) DEENERGIZE CVCS MOVs.

- 1. WHEN notified to deenergize CVCS MOVs, THEN perform the following actions:
 - a. GO TO MCC 114.

b. Open the following breakers:

- REFUELING WATER TNK. STOP 1-MOV-504 breaker 52-11423
- VOL. CONT. TANK. ISOL 1-MOV-501 breaker 52-11431
- 2. Notify 1C43 that 1-MOV-504 and 1-MOV-501 have been deenergized.
- 3. GO TO the Unit 1 VCT Room to align Charging Pump suction to the RWT PER Section V, Step Y.

1C433501/5625/3511	AFW4768	1A DG5320	ADVs5626
27' SWGR5463/5464	SRW UL/LL5575/5576	1B DG5631	INTAKE5498
2C433502/5652/3522	CC RM5587	2A DG5630	13KV MC5655
72' CMPTR RM4404	0C DG5302	2B DG5642	U-1 NSSS5635
69' SWGR5675	MCC-1045635	MCC-1145675	

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V. ACTIONS OUTSIDE THE CONTROL ROOM

Y. (ABO) ALIGN CHARGING PUMP SUCTION TO THE RWT.

- 1. WHEN notified to align Charging Pump suction to the RWT, THEN perform the following actions:
 - a. Manually open the Charging Pump Suction from the RWT, 1-CVC-504-MOV.
 - b. GO TO the Unit 1 Charging Pump Room.
 - c. Manually shut the VCT Outlet, 1-CVC-501-MOV.
 - d. Notify 1C43 that the Charging Pump(s) is taking suction from the RWT.

Z. (ABO) ALIGN CHARGING PUMP SUCTION TO THE VCT.

- 1. WHEN notified to align Charging Pump suction to the VCT, THEN perform the following actions:
 - a. GO TO the Unit 1 Charging Pump Room.
 - b. Manually open the VCT Outlet, 1-CVC-501-MOV.
 - c. GO TO the Unit 1 VCT Room.
 - d. Manually shut the Charging Pump Suction from the RWT, 1-CVC-504-MOV.

2. Notify 1C43 that the Charging Pump(s) is taking suction from the VCT.

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1C433501/5625/3511	AFW4768	1A DG5320	ADVs5626
27' SWGR5463/5464		1B DG5631	INTAKE5498
2C433502/5652/3522	CC RM5587	2A DG5630	13KV MC5655
72' CMPTR RM4404	0C DG5302	2B DG5642	U-1 NSSS5635
69' SWGR5675	MCC-1045635	MCC-1145675	

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V. ACTIONS OUTSIDE THE CONTROL ROOM

AA. (TBO) CHECK THE STATUS OF THE MAIN TURBINE.

1. WHEN Main Turbine speed is estimated to be less than 3 RPM, THEN observe proper operation of the Turning Gear.

a. Observe that the Main Turbine Turning Gear is engaged.

b. Observe that the Rotor is turning.

2. Observe that the Turbine Lift Pumps are running at the Lift Pump Panel on the 45' of the Turbine Building.

3, GO TO 1C43 for further instructions.

END of Section V

1C433501/5625/3511	AFW4768	1A DG5320	ADVs5626
27' SWGR5463/5464	SRW UL/LL5575/5576	1B DG5631	INTAKE5498
2C433502/5652/3522	CC RM5587	2A DG5630	13KV MC5655
72' CMPTR RM4404	0C DG5302	2B DG5642	U-1 NSSS5635
69' SWGR5675	MCC-1045635	MCC-1145675	
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VI. RE-ESTABLISHING CONTROL FROM THE CONTROL ROOM

A. (RO) RETURN TO THE CONTROL ROOM.

- WHEN the SM has been notified that control can be re-established to the Control Room, THEN GO TO the Control Room.
- 2. Notify 1C43 that the Control Room is occupied.

B. (RO) ADJUST AFW FLOW CONTROLS AT 1C04.

- 1. On 1C04, adjust the following AFW flow controller setpoints to 0 GPM:
 - AFW Turbine Driven Train Flow Controllers:
 - 11 S/G FLOW CONTR 1-FIC-4511A
 - 12 S/G FLOW CONTR 1-FIC-4512A
 - AFW Motor Driven Train Flow Controllers:
 - 11 S/G FLOW CONTR 1-FIC-4525A
 - 12 S/G FLOW CONTR 1-FIC-4535A

C. (RO) ADJUST AFW SPEED CONTROLLERS AT 1CO4.

- 1. On 1C04, open SG AFW STM SUPP & BYPASS valves:
 - (11 SG) 1-MS-4070-CV and 1-MS-4070A-CV
 - (12 SG) 1-MS-4071-CV and 1-MS-4071A-CV
- 2. On 1C04, place the following AFW Pump Speed Controllers to MIN SPD position (100% output):
 - (11 AFW Pump) 1-HC-3987A
 - (12 AFW Pump) 1-HC-3989A
- 3. Notify 1C43 to secure AFW flow PER Section VI, Step D.

1C433501/5625/3511	AFW4768	1A DG5320	ADVs5626
27' SWGR5463/5464	SRW UL/LL5575/5576	1B DG5631	INTAKE5498
2C433502/5652/3522	CC RM5587	2A DG5630	13KV MC5655
72' CMPTR RM4404	0C DG5302	2B DG5642	U-1 NSSS5635
69' SWGR5675	MCC-1045635	MCC-1145675	

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VI. RE-ESTABLISHING CONTROL FROM THE CONTROL ROOM

<u>CAUTION</u>

Steps D through G must be completed in an expeditious manner to avoid excessively low levels in the steam generators.

D. (CRO) SECURE AFW FLOW FROM 1C43.

- 1. Ensure both SG levels are approximately 0 inches.
- 2. Notify the TBO to perform the following actions:
 - a. GO TO the SRW Pump Room.
 - b. Notify 1C43 upon arrival.
- 3. WHEN the TBO is stationed in the SRW Pump Room, THEN perform the following actions:

NOTE

Adjustment of Controllers past the controller detent pin will stop valve motion.

- a. Place 11 AFW PP SPEED CONTR, 1-HC-3987B, to MIN SPD.
- b. Place 12 AFW PP SPEED CONTR, 1-HC-3989B, to MIN SPD.
- c. Place 11 S/G FLOW CONTR, 1-HC-4511B, to MIN FLOW.
- d. Place 12 S/G FLOW CONTR, 1-HC-4512B, to MIN FLOW.
- e. Place 11 S/G FLOW CONTR, 1-HC-4525B, to MIN FLOW.
- f. Place 12 S/G FLOW CONTR, 1-HC-4535B, to MIN FLOW.
- g. Notify the TBO to align AFW Flow and Speed Control to 1C04 PER Section VI, Step E.

1C433501/5625/3511	AFW4768	1A DG5320	ADVs5626
27' SWGR5463/5464	SRW UL/LL5575/5576	1B DG5631	INTAKE5498
2C433502/5652/3522		2A DG5630	13KV MC5655
72' CMPTR RM4404		2B DG5642	U-1 NSSS5635
69' SWGR5675	MCC-1045635	MCC-1145675	

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VI. RE-ESTABLISHING CONTROL FROM THE CONTROL ROOM

E. (TBO) ALIGN AFW FLOW AND SPEED CONTROL TO 1C04.

- 1. WHEN notified to align AFW Flow and Speed Control to 1C04, THEN perform the following actions:
 - a. In the SRW Pump Room Upper Level, Place in POSITION 1 ALL AFW System Valves listed below:
 - NORTH WALL (In Hand Transfer Box)
 - 1-IA-4511-HV
 - 1-IA-4512-HV
 - Stanchion L.O.9 between 1-AFW-4525-CV and 1-AFW-4535-CV (In Hand Transfer Box)
 - 1-IA-4525-HV
 - 1-IA-4535-HV
 - Southwest Corner next to U-1 to U-2 AFW X-conn CV, 1-AFW-4550-CV
 - 1-IA-4070-HV
 - 1-IA-4071-HV

b. GO TO the AFW Pump Room.

- c. Place 11 AFW Pump Speed Control Handvalve, 1-HV-3987, to POSITION 1.
- d. Place 12 AFW Pump Speed Control Handvalve, 1-HV-3989, to POSITION 1.
- 2. Notify the Control Room that the AFW Flow and Speed Controls are aligned to 1C04.
- 3. Notify 1C43 that the AFW Flow and Speed Controls are aligned to 1C04.
- 4. GO TO the Unit 1 45' Switchgear Room.
- 5. Notify the Control Room upon arrival.
- 6. GO TO the ADV Handvalve enclosure to align 11 and 12 ADVs to 1C03 PER Section VI, Step I.

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1C433501/5625/3511	AFW4768	1A DG5320	ADVs5626
27' SWGR5463/5464	SRW UL/LL5575/5576	1B DG5631	INTAKE5498
2C433502/5652/3522	CC RM5587	2A DG5630	13KV MC5655
72' CMPTR RM4404	0C DG5302	2B DG5642	U-1 NSSS5635
69' SWGR5675	MCC-1045635	MCC-1145675	

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VI. RE-ESTABLISHING CONTROL FROM THE CONTROL ROOM

F. (RO) START FEEDING BOTH SGs FROM 1C04.

- 1. WHEN notified by the TBO that AFW Flow and Speed Control are aligned to 1C04, THEN start feeding the SGs with an AFW pump from 1C04.
 - a. IF 11 or 12 AFW pump is operating, THEN perform the following actions:
 - Slowly raise the output of the in service AFW Pump's SPEED CONTR to maintain turbine driven discharge header pressure at least 100 PSI greater than S/G pressure.
 - (11 SG) 1-HC-3987A
 - (12 SG) 1-HC-3989A
 - (2) Adjust the following controllers as necessary to maintain SG levels between (-)24 and (+)30 inches:
 - (11 SG) 1-FIC-4511A
 - (12 SG) 1-FIC-4512A
 - b. IF 13 AFW pump is operating, THEN adjust the following controllers as necessary to maintain SG levels between (-)24 and (+)30 inches:
 - (11 SG) 1-FIC-4525A
 - (12 SG) 1-FIC-4535A

G. (RO) ALIGN ADV CONTROL TO 1C03.

1. WHEN the TBO has arrived in the 45' Switchgear Room, THEN place ATMOSPHERIC STEAM DUMP CONTR, 1-HIC-4056, in manual.

- 2. Adjust ATMOSPHERIC STEAM DUMP CONTR, 1-HIC-4056, to 0% output.
- 3. Notify 1C43 to shut the ADVs at 1C43 PER Section VI, Step H.

1C433501/5625/3511 27' SWGR5463/5464	AFW	1A DG5320 1B DG5631	ADVs5626 INTAKE5498
2C433502/5652/3522	CC RM5587	2A DG5630	13KV MC5655
72' CMPTR RM4404 69' SWGR5675		2B DG5642 MCC-1145675	U-1 NSSS5635

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VI. RE-ESTABLISHING CONTROL FROM THE CONTROL ROOM

H. (CRO) SHUT ADVs AT 1C43.

- 1. WHEN notified to shut the ADVs THEN place the following ADV CONTRS to SHUT (zero output):
 - (11 ADV) 1-HC-4056A
 - (12 ADV) 1-HC-4056B
- 2. Notify the TBO to align 11 and 12 ADVs to 1C03 PER Section VI, Step I.

I. (TBO) ALIGN 11 AND 12 ADVs TO 1C03.

- 1. WHEN notified to align 11 and 12 ADVs to 1C03, THEN place the following handvalves to POSITION 1:
 - 11 ADV Aux Shutdown Control Transfer, 1-HV-3938A
 - 11 ADV Quick Open Override Handvalve, 1-HV-3938B
 - 12 ADV Aux Shutdown Control Transfer, 1-HV-3939A
 - 12 ADV Quick Open Override Handvalve, 1-HV-3939B
- 2. Notify the Control Room that the ADVs are aligned to 1C03.
- 3. Notify 1C43 the ADVs are aligned to 1C03.

J. (RO) CONTROL COLD LEG TEMPERATURES.

- 1. WHEN notified that the ADVs are aligned to 1C03, THEN adjust the ATMOSPHERIC STEAM DUMP CONTR, 1-HIC-4056, as necessary to maintain T coup between 525 and 535° F.
- 2. IF the Turbine Bypass Valves are controlling T COLD between 525 and 535° F, THEN place the ATMOSPHERIC STEAM DUMP CONTR, 1-HIC-4056, to AUTO.

1C433501/5625/3511 27' SWGR5463/5464 2C433502/5652/3522	SRW UL/LL5575/5576 CC RM5587	1B DG5631 2A DG5630	ADVs5626 INTAKE5498 13KV MC5655
72' CMPTR RM4404	0C DG5302	2B DG5642	U-1 NSSS5635
89' SWGR5675	MCC-1045635	MCC-1145675	

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VI. RE-ESTABLISHING CONTROL FROM THE CONTROL ROOM

K. (CRO) ALIGN PRESSURIZER HEATER CONTROL TO 1C06.

- 1. Rotate the keys to REMOTE for the Pressurizer Backup Heater Transfer Controllers:
 - 11 BACKUP HTR TRANSFER CONTR 1-HS-100-4A
 - 13 BACKUP HTR TRANSFER CONTR 1-HS-100-6A
- 2. Remove the keys from the Pressurizer Backup Heater Transfer Controllers.
- 3. Notify the Control Room that PZR Backup Heater control has been transferred to 1C06.

L. (CRO) RETURN TO THE CONTROL ROOM.

- 1. Make a site-wide page announcement informing all plant personnel that control has been shifted from 1C43 to the Control Room.
- 2. GO TO the Control Room.
- 3. Notify the STA to perform the Final Check of plant status PER Section VI, Step M.

M. (STA) PERFORM THE FINAL CHECK OF PLANT STATUS.

- 1. WHEN notified by the CRO to perform the Final Check of plant status, THEN return to the Control Room.
- 2. Perform the Final Check of plant status **PER** Section VII., <u>SAFETY FUNCTION</u> <u>STATUS CHECK</u>, using Control Room Instrumentation.
- 3. WHEN the Safety Function Status Check Final Acceptance Criteria are met, THEN notify the CRS and the CRO.

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VI. RE-ESTABLISHING CONTROL FROM THE CONTROL ROOM

N. (CRO) ALIGN MSIV CONTROL TO 1C03.

NOTE

Performance of this step may NOT be required.

1. IF the MSIVs were manually shut, THEN place MSIV handswitches to CLOSE:

• (11 MSIV) 1-HS-4043

• (12 MSIV) 1-HS-4048

2. Notify the ABO to restore MSIV operation to the Control Room PER Section VI, Step O:

O. (ABO) RESTORE MSIV OPERATION TO THE CONTROL ROOM.

NOTE

Performance of this step may **NOT** be required. Direction to perform this step will be given from Control Room.

1. IF notified to restore MSIV operation to the Control Room, THEN perform the following actions:

a. Place a wrench on the Dump Solenoid stem nut of:

- (11 MSIV) 1-MSH-4042A-SV (1-MSH-4042B-SV)
- (12 MSIV) 1-MSH-4047A-SV (1-MSH-4047B-SV)
- b. Rotate the wrench in the counterclockwise direction, approximately three turns, until the wrench stops.
- c. Remove the wrench and replace the Dump Solenoid Valve Cap.
- d. Repeat steps 0.1.a through 0.1.c for the other MSIV.
- e. Open Instrument Air Isolation to 11 MSIV Hydraulic Pump, 1-IA-1069.
- f. Open Instrument Air Isolation to 12 MSIV Hydraulic Pump, 1-IA-1070.
- g. Notify the Control Room that MSIV operation has been restored to the Control Room.

1C433501/5625/3511	AFW4768	1A DG5320	ADVs5626
27' SWGR5463/5464	SRW UL/LL5575/5576	1B DG5631	INTAKE5498
2C433502/5652/3522	CC RM5587	2A DG5630	13KV MC5655
72' CMPTR RM4404	0C DG5302	2B DG5642	U-1 NSSS5635
69' SWGR5675	MCC-1045635	MCC-1145675	

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VI. RE-ESTABLISHING CONTROL FROM THE CONTROL ROOM

P. (CRO) RESTORE CVCS CONTROL TO 1C07.

- 1. Verify that the handswitches for VCT OUT, 1-CVC-501-MOV and RWT CHG PP SUCT valve, 1-CVC-504-MOV, are in the same positions that the ABO left the MOVs in.
- 2. Notify the ABO to energize CVCS MOVs PER Section VI, Step Q.
- WHEN notified that the CVCS MOVs are energized THEN place the handswitches for VCT OUT, 1-CVC-501-MOV and RWT CHG PP SUCT valve, 1-CVC-504-MOV, in AUTO.
- 4. Operate Charging and Letdown to maintain Pressurizer level approximately 160 inches.

Q. (ABO) ENERGIZE CVCS MOVs.

- 1. WHEN notified to energize CVCS MOVs, THEN GO TO MCC 114.
- 2. Shut the following breakers:
 - REFUELING WATER TNK. STOP 1-MOV-504 breaker 52-11423
 - VOL. CONT. TANK. ISOL 1-MOV-501 breaker 52-11431
- 3. Notify the Control Room that 1-MOV-504 and 1-MOV-501 have been energized.

R. (OSO) RETURN SAFE SHUTDOWN EQUIPMENT.

1. Ensure that ALL Safe Shutdown Equipment and Keys are returned to the appropriate lockers and enclosure.

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VI. RE-ESTABLISHING CONTROL FROM THE CONTROL ROOM

S. (CRO) IMPLEMENT APPROPRIATE OPERATING PROCEDURE.

1. IMPLEMENT EOP-0, POST TRIP IMMEDIATE ACTIONS.

END of Section VI

1C433501/5625/3511 27' SWGR5463/5464 2C433502/5652/3522	SRW UL/LL5575/5576 CC RM5587	1A DG5320 1B DG5631 2A DG5630	ADVs5626 INTAKE5498 13KV MC5655
72' CMPTR RM4404 89' SWGR5675		2B DG5642 MCC-1145675	U-1 NSSS5635

- A. The STA (or person designated by the CRS) 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 15 minute intervals until plant conditions stabilize.
- C. Notify the Control Room Supervisor if any safety function is not being met, promptly upon discovery.

REACTIVITY	SAFETY FUNCTION ACCEPTANCE CRITERIA				
CONTROL PARAMETERS	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK	
a. WRNI	lowering		less than 10-4%		
b. SUR	negative		negative or zero		
c. CEA status	NO more than ONE CEA NOT fully inserted	t	NO more than ONE CEA NOT fully inserted	i	
OR	-	, , , 	÷		
Boration status	greater than or equal to 40 GPM		greater than 2300 ppm		
		:			
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ነፕ ለ፣	SAFETY FUNCT	SAFETY FUNCTION ACCEPTANCE CRITERIA				
ITAL UXILIARIES ARAMETERS	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK		
. 13KV service buses 11 or 21	e NOT Available		at least ONE energized			
. 4KV vital buses 11 or 14	at least ONE energized		at least ONE energized			
. 125V DC bus 11, 12 21 and 22	ses ALL greater than 105 volts		ALL greater than 105 volts			
. 120V AC vital buses 11, 12, 13, 1	at least THREE 4 energized		at least THREE energized	<u> </u>		
e. 1Y09 or 1Y1	0 NOT Available		at least ONE energized	- <u></u>		

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RCS PRESSURE AND INVENTORY PARAMETERS		SAFETY FUNCTION ACCEPTANCE CRITERIA			
		CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK
а.	Pressurizer pressure	1850 PSIA to 2300 PSIA		2225 PSIA to 2275 PSIA	
b.	Pressurizer level	80 inches to 180 inches		130 inches to 180 inches	
C.	RCS subcooling	30°F to 140°F		30°F to 140° F	

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VII. SAFETY FUNCTION STATUS CHECK

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SAFETY FUNCTION ACCEPTANCE CRITERIA				
CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK	
525°F to 535° F		525°F to 535°F		
less than 10°F		less than 10°F	<u> </u>	
(-)170 inches to (+)30 inches		(-)24 inches to (+)30 inches		
trending to (-)24 inches to (+)30 inches		N/A	N/A	
	CRITERIA 525°F to 535° F less than 10°F (-)170 inches to (+)30 inches trending to (-)24 inches to (+)30 inches	CRITERIA INTERMEDIATE 525°F	CRITERIA INTERMEDIATE CHECK CRITERIA 525°F to 535°F	

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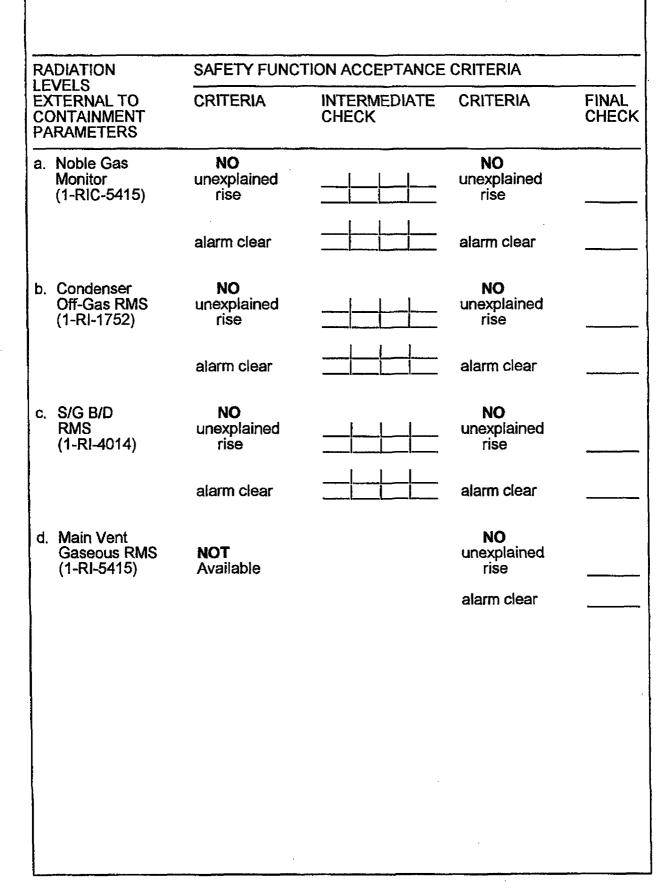
VII. SAFETY FUNCTION STATUS CHECK

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SAFETY FUNCTION ACCEPTANCE CRITERIA					
CONTAINMENT ENVIRONMENT PARAMETERS		CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK
a.	Containment Pressure	less than 0.7 PSIG	· · · · · · · · · · · · · · · · · · ·	less than 0.7 PSIG	
b.	Containment Temperature	less than 120°F		less than 120°F	
C.	Containment Radiation Monitor	NO unexplained rise		NO unexplained rise	
		alarm clear		alarm clear	
	. •				
	:				

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VII. SAFETY FUNCTION STATUS CHECK

 STATUS CHECK NUMBER	COMPLETED AT TIME	
1		
2	· · · ·	
3	·	
4		
5		
6	, 	
7		
8		

			ATTACHMENT (1) Page 1 of 5 PLACEKEEPER	AOP-11 Rev 2/Unit 1	
		START	FUNCTION	ONE PAGE	
			SECTION IV. ACTIONS PRIOR TO EVACUATION OF THE CONTROL ROOM		
			A. (RO) TRIP THE REACTOR.	6	
			B. (CRO) TRIP THE MAIN TURBINE, SGFPs AND SECURE BLOWDOWN.	7	
			C. (ALL PERSONNEL) EVACUATE THE CONTROL ROOM.	7	
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ATTACHMENT (1) Page 2 of 5

AOP-11 Rev 2/Unit 1

PLACEKEEPER (continued)

START	FUNCTION	DONE	PAGE
	SECTION V. ACTIONS OUTSIDE THE CONTRO ROOM	OL	
	A. (RO) MANUALLY TRIP THE MAIN TURBINE.		8
	B. (RO) SHUTDOWN 11 AND 12 CEDM MG SET	rs.	8
	C. (CRO) UNLOCK SAFE SHUTDOWN KEY LOCKER AND EQUIPMENT LOCKER.		8
	D. (SM) DETERMINE APPROPRIATE EMERGENCY RESPONSE ACTIONS PER TH ERPIP.	E	9
	E. (OSO) OBTAIN RADIOS AND REPORT TO 1C43 AND 2C43.		9
	F. (TBO) OBTAIN EQUIPMENT, THEN TRIP 11 AND 12 SGFPs.		10
	G. (ABO) OBTAIN EQUIPMENT, THEN GO TO 4 FOOT AUXILIARY BUILDING.	5	11
	H. (CRO) VERIFY REACTOR IS SHUTDOWN.		11
	I. (CRO) INITIALIZE ADV CONTROLLERS ON 1C43.		11
(1)	J. (RO) ALIGN 11 AND 12 ADVs TO 1C43.		12
	K. (CRO) VERIFY COLD LEG TEMPERATURES.	с	13
	L. (ABO) IF NOTIFIED, THEN SHUT BOTH MSIV	's.	14
	M. (STA) COMMENCE SAFETY FUNCTION STATUS CHECKS.		15
	N. (CRO) COMPLETE INITIALIZATION OF CONTROLLERS ON 1C43.		16

NOTE: Continuously Applicable Steps are designated with a *C" in the Done column. Letters in the START column are prerequisite steps that must be completed prior to initiation of the step.

START FI O P Q (P) R S T	TO 1C43. (TBO) ALIGN THE AFW FLOW CONTROL TO 1C43. (TBO) VERIFY AFW PUMP OPERATION.	DONE	PA (
(P) R	 (TBO) ALIGN AFW PUMP SPEED CONTROL TO 1C43. (TBO) ALIGN THE AFW FLOW CONTROL TO 1C43. (TBO) VERIFY AFW PUMP OPERATION. 	DONE	
(P) R S.	TO 1C43. (TBO) ALIGN THE AFW FLOW CONTROL TO 1C43. (TBO) VERIFY AFW PUMP OPERATION.		1
(P) R S.	1C43. (TBO) VERIFY AFW PUMP OPERATION.		
(P) R S			1
S	(CRO) INITIATE AFW FLOW TO SGs.	C	1
		С	2
Т.	(RO) START 13 AFW PP.		2
	(CRO) MONITOR PRESSURIZER LEVEL.	С	2
Ü.	(CRO) ENERGIZE PRESSURIZER BACKUP HEATER.	c	2
V.	(RO) MANUALLY OPERATE THE CHARGING PUMP(S).		2
W	. (CRO) MAKEUP TO THE VCT.		23
X.	(ABO) DEENERGIZE CVCS MOVs.		23
Y.	(ABO) ALIGN CHARGING PUMP SUCTION TO THE RWT.		24
z	(ABO) ALIGN CHARGING PUMP SUCTION TO THE VCT.		24
A/	A. (TBO) CHECK THE STATUS OF THE MAIN TURBINE.		25

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	ATTACHMENT (1) Page 4 of 5				
	PLACEKEEPER (continued)				
START	FUNCTION	DONE	PAGE		
	SECTION VI. RE-ESTABLISHING CONTROL FROM THE CONTROL ROOM				
	A. (RO) RETURN TO THE CONTROL ROOM.		26		
	B. (RO) ADJUST AFW FLOW CONTROLS AT 1C04.		26		
	C. (RO) ADJUST AFW SPEED CONTROLLERS AT 1CO4.		26		
(C)	D. (CRO) SECURE AFW FLOW FROM 1C43.		27		
(D)	E. (TBO) ALIGN AFW FLOW AND SPEED CONTROL TO 1C04.		28		
(E)	F. (RO) START FEEDING BOTH SGs FROM 1C04.	c	29		
	G. (RO) ALIGN ADV CONTROL TO 1C03.		29		
(G)	H. (CRO) SHUT ADVs AT 1C43.	·	30		
(H)	I. (TBO) ALIGN 11 AND 12 ADVs TO 1C03.		30		
(I)	J. (RO) CONTROL COLD LEG TEMPERATURES.	с	30		
· · · · .	K. (CRO) ALIGN PRESSURIZER HEATER CONTROL TO 1C06.		31		
	L. (CRO) RETURN TO THE CONTROL ROOM.		31		
	M. (STA) PERFORM THE FINAL CHECK OF PLANT STATUS.		31		
	N. (CRO) ALIGN MSIV CONTROL TO 1C03.		32		
(N)	O. (ABO) RESTORE MSIV OPERATION TO THE CONTROL ROOM.		32		
	P. (CRO) RESTORE CVCS CONTROL TO 1C07.		33		

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NOTE: Continuously Applicable Steps are designated with a "C" in the Done column. Letters in the START column are prerequisite steps that must be completed prior to initiation of the step.

	ATTACHMENT (1) Page 5 of 5 PLACEKEEPER (continued)	F	AOP-11 Rev 2/Unit 1
START	FUNCTION	DONE	PAGE
	Q. (ABO) ENERGIZE CVCS MOVs.		33
	R. (OSO) RETURN SAFE SHUTDOWN EQUIPMENT.		33
	S. (CRO) IMPLEMENT APPROPRIATE OPERATING PROCEDURE.		34

CALVERT CLIFFS NUCLEAR POWER PLANT TECHNICAL PROCEDURE

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UNIT TWO

AOP-11 CONTROL ROOM EVACUATION AND SAFE SHUTDOWN NON-FIRE CONDITIONS

REVISION 1

Safety Related

Approval Authority:

Dell strates

signature/date

Effective Date: 05-15-02

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LIST OF EFFECTIVE PAGES

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REVISION

1-43

1

ATTACHMENT NUMBER

1

1

REVISION

PROCEDURE ALTERATIONS

REVISION/CHANGE

1.0111

PAGE NUMBERS

None

None

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V.	ACTIONS OUTSIDE THE CONTROL ROOM	9
VI.	RE-ESTABLISHING CONTROL FROM THE CONTROL ROOM	28
VII.	SAFETY FUNCTION STATUS CHECK	37
ATTACH	IMENT (1) PLACEKEEPER	

I. PURPOSE

r. 1-15.

The purpose of this procedure is to provide a means of shutting down the Unit from outside the Control Room and maintaining the Unit in a Mode 3 (hot standby) condition until plant control is reestablished from the Control Room.

II. ENTRY CONDITIONS

- 1. Any non-fire condition which, in the opinion of the Shift Manager, exposes Control Room personnel to a harmful operating environment.
- 2. Any non-fire condition which, in the opinion of the Shift Manager, impedes plant control from the Control Room.

III. PRECAUTIONS

The following specific precautions apply prior to or throughout this procedure.

A. WARNINGS

1. Other plant areas may be affected by the same conditions causing the Control Room evacuation.

B. CAUTIONS

- 1. When the Pressurizer heaters are controlled from panel 2C43, the low level cutoff at 101 inches is inoperable.
- 2. Valid ESFAS and AFAS signals to equipment shall **NOT** be overridden or blocked unless specifically directed in this procedure. A valid signal is a signal that at the time of initiation, correlated to plant parameters (e.g., the monitored parameter actually reached its setpoint value).

C. NOTES

1. This procedure has parallel actions assigned to specific watchstations. When a boxed function is complete, the next assigned boxed function applicable to the Operator's watchstation position shall be implemented. When supporting evolutions are to be completed before execution of another, a conditional statement is used.

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IV. ACTIONS PRIOR TO EVACUATION OF THE CONTROL ROOM

A. (RO) TRIP THE REACTOR.

<u>NOTE</u>

This procedure has parallel actions assigned to specific watchstations. When a boxed function is complete, the next assigned boxed function applicable to the Operator's watchstation position shall be implemented. When supporting evolutions are to be completed before execution of another, a conditional statement is used.

WARNING

Other plant areas may be affected by the same conditions causing the Control Room evacuation.

- 1. Trip the Reactor by depressing **ONE** set of Manual Reactor Trip Buttons at 2C05 or 2C15.
- 2. IF RCS dilution is in progress, THEN secure RCMU PPs.
- 3. GO TO the Main Turbine Front Standard to perform Section V, Step A.

2C433502/5652/3522 27' SWGR5482/5483 1C433501/5625/3511	SRW UL/LL.,5601/5600		ADVs5648 INTAKE5511 13KV MC5655
72'CMPTR RM4404 MCC-2045645	0C DG5302	2B DG5642	U-2 NSSS5640

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IV. ACTIONS PRIOR TO EVACUATION OF THE CONTROL ROOM

B. (CRO) TRIP THE MAIN TURBINE SGFPs AND SECURE BLOWDOWN.

NOTE

This procedure has parallel actions assigned to specific watchstations. When a boxed function is complete, the next assigned boxed function applicable to the Operator's watchstation position shall be implemented. When supporting evolutions are to be completed before execution of another, a conditional statement is used.

WARNING

Other plant areas may be affected by the same conditions causing the Control Room evacuation.

1. Before leaving the Control Room, perform the following actions:

a. Trip the Main Turbine by depressing the U-2 MAIN TURB TRIP button at 2C02.

- b. Isolate the MSRs by depressing the RESET button on the MSR Control Panel at 2C02.
- c. Trip 21 and 22 SGFPs at 2C03.
- d. Shut the SG BD valves:
 - 2-BD-4010-CV
 - 2-BD-4011-CV
 - 2-BD-4012-CV
 - 2-BD-4013-CV

2. If time permits, make the following site wide page announcement:

"The Control Room is being evacuated. Plant operators report to their safe shutdown stations, all persons stay clear of the Control Room."

3. GO TO Unit 2 45' Switchgear Room to perform Section V, Step C.

	ويرون ويستجم والمتحد المتحد والمراجع والمتحد والمتحر والمتحد والمتحد والمتحد والمتحد والمحاد والمحاد والمحاد والمحاد		
2C433502/5652/3522	AFW5517	1A DG5320	ADVs5648
27' SWGR5482/5483		1B DG5631	INTAKE5511
1C433501/5625/3511		2A DG5630	13KV MC5655
72'CMPTR RM4404		2B DG5642	U-2 NSSS5640
MCC-2045645	MCC-2145687		

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IV. ACTIONS PRIOR TO EVACUATION OF THE CONTROL ROOM

C. (ALL PERSONNEL) EVACUATE THE CONTROL ROOM.

1. WHEN evacuation is ordered by the SM/CRS, THEN all personnel are to leave the Control Room.

2. Report to Safe Shutdown Stations.

END of Section IV

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V. ACTIONS OUTSIDE THE CONTROL ROOM

A. (RO) MANUALLY TRIP THE MAIN TURBINE.

- 1. Manually trip the Unit 2 Main Turbine at the Front Standard.
- 2. GO TO the Unit 2 45' Switchgear Room.
- 3. Notify 2C43 that the Main Turbine is tripped.

B. (RO) SHUTDOWN 21 AND 22 CEDM MG SETS.

- 1. On the CEDM MG Set Control Panel:
 - a. Depress the Local LOAD OFF Pushbutton,
 - b. Depress the Remote LOAD OFF Pushbutton.
 - c. Depress and hold the Local MOTOR OFF Pushbutton until the MOTOR ON light deenergizes.
 - d. Depress and hold the Remote MOTOR OFF Pushbutton until the MOTOR ON light deenergizes.

C. (CRO) UNLOCK SAFE SHUTDOWN KEY LOCKER AND EQUIPMENT LOCKER.

- 1. Open 22 ADV Handvalve enclosure.
- 2. Obtain the Safe Shutdown Key Locker door key.
- 3. Open the Safe Shutdown Key Locker.
- 4. Obtain the CRO key ring from the Safe Shutdown Key Locker.

NOTE

The key for the Safe Shutdown Equipment Locker is on the 2C43 Panel key ring.

- 5. Open the Safe Shutdown Equipment Locker.
- 6. Obtain CRO equipment at the Safe Shutdown Equipment Locker.

2C433502/5652/3522		ADVs5648
27' SWGR5482/5483 1C433501/5625/3511	1B DG5631 2A DG5630	INTAKE5511 13KV MC5655
72'CMPTR RM4404 MCC-2045645	2B DG5642	U-2 NSSS5640

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V. ACTIONS OUTSIDE THE CONTROL ROOM

D. **(SM)** DETERMINE APPROPRIATE EMERGENCY RESPONSE ACTIONS PER THE ERPIP.

NOTE

The SM may designate personnel to notify the offsite agencies.

WARNING

Other plant areas may be affected by the same conditions causing the Control Room evacuation.

1. Determine the appropriate emergency response actions PER the ERPIP.

2. Determine reporting requirements of RM-1-101, REGULATORY REPORTING.

L		and the second second second second second second second second second second second second second second second		
ķ	27' SWGR5482/5483	AFW		ADVs5648 INTAKE5511
ł	IC433501/5625/3511	CC RM5590	2A DG5630	13KV MC5655
ļ	2'CMPTR RM4404	0C DG5302	2B DG5642	U-2 NSSS5640
ł	ACC-2045645	MCC-2145687		

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V. ACTIONS OUTSIDE THE CONTROL ROOM

E. (OSO) OBTAIN RADIOS AND GO TO 1C43 AND 2C43.

CAUTION

This step is for information only and will be performed under the Unit 1 AOP-11 procedure. The steps are left in this procedure as a placekeeper. IF the controlling step in AOP-11 UNIT 1 procedure is NOT performed, THEN the OSO step should be performed with this procedure.

WARNING

Other plant areas may be affected by the same conditions causing the Control Room evacuation.

- 1. GO TO the Fire Brigade Locker and retrieve two portable radios.
- 2. GO TO 1C43 and give one radio to the SM.
- 3. Obtain designated key ring and equipment at Safe Shutdown Key and Equipment Lockers.
- 4. GO TO 2C43 and give the other radio to the CRS.
- 5. Make the following announcement:

"The Control Room has been evacuated. The Plant is being controlled from 1C43 and 2C43. All personnel are required to stay clear of the following areas: Control Room, Cable Spreading Room, Shift Managers Office, Security Central Alarm Station, Technical Support Center, Technical Support Computer Room and Control Room Computer Rooms."

6. GO TO to 1C43 to provide additional assistance where needed.

	and the second second second second second second second second second second second second second second second		
2C433502/5652/3522	AFW5517	1A DG5320	ADVs5648
27' SWGR5482/5483	SRW UL/LL5601/5600	1B DG5631	INTAKE5511
1C433501/5625/3511	CC RM5590	2A DG5630	13KV MC5655
72'CMPTR RM4404	0C DG5302	2B DG5642	U-2 NSSS5640
MCC-2045645	MCC-2145687		

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V. ACTIONS OUTSIDE THE CONTROL ROOM

F. (TBO) OBTAIN EQUIPMENT, THEN TRIP 21 AND 22 SGFPs.

NOTE

This procedure has parallel actions assigned to specific watchstations. When a boxed function is complete, the next assigned boxed function applicable to the Operator's watchstation position shall be implemented. When supporting evolutions are to be completed before execution of another, a conditional statement is used.

WARNING

Other plant areas may be affected by the same conditions causing the Control Room evacuation.

1. Obtain designated key ring and equipment at Safe Shutdown Key and Equipment Lockers.

2. GO TO the SGFPs 12' Turbine Building.

3. Manually trip 21 and 22 SGFPs using the manual trip pushbuttons:

- 21 SGFP at 2C65
- 22 SGFP at 2C66

4. GO TO the 2 AFW Pump Room to perform Section V, Step O.

2C433502/5652/3522 AFW	5511
1C433501/5625/3511 CC RM	655
72'CMPTR RM	5640
MCC-204	

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V. ACTIONS OUTSIDE THE CONTROL ROOM

G. (ABO) OBTAIN EQUIPMENT, THEN GO TO 45 FOOT AUXILIARY BUILDING.

NOTE

This procedure has parallel actions assigned to specific watchstations. When a boxed function is complete, the next assigned boxed function applicable to the Operator's watchstation position shall be implemented. When supporting evolutions are to be completed before execution of another, a conditional statement is used.

WARNING

Other plant areas may be affected by the same conditions causing the Control Room evacuation.

- 1. Obtain designated key ring and equipment at Safe Shutdown Key and Equipment Lockers.
- 2. GO TO 45' Auxiliary Building to the telephone by the Unit 2 NSSS Sample Sink.
- 3. Notify 2C43 upon arrival.

H. (CRO) VERIFY REACTOR IS SHUTDOWN.

- 1. Observe Reactor Power trending to or is less than 10-4% power and lowering.
- 2. WHEN Reactor Power is less than 10-4% power and constant or lowering, THEN Reactivity Control is satisfactory.

I. (CRO) ADJUST ADV CONTROLLERS ON 2C43.

<u>NOTE</u>

Adjustment of the ADV controllers past the controller detent pin will stop valve motion.

1. Place 21 ADV CONTR, 2-HC-4056A, to SHUT.

2. Place 22 ADV CONTR, 2-HC-4056B, to SHUT.

3. Notify the RO to align 21 and 22 ADVs to 2C43 PER Section V, Step J.

2C433502/5652/3522	AFW5517	1A DG5320	ADVs5648
27' SWGR5482/5483		1B DG5631	INTAKE5511
1C433501/5625/3511	CC RM5590	2A DG5630	13KV MC5655
72'CMPTR RM4404	0C DG5302	2B DG5642	U-2 NSSS5640
MCC-2045645	MCC-2145687		

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V. ACTIONS OUTSIDE THE CONTROL ROOM

J. (RO) ALIGN 21 AND 22 ADVs TO 2C43.

NOTE

This procedure has parallel actions assigned to specific watchstations. When a boxed function is complete, the next assigned boxed function applicable to the Operator's watchstation position shall be implemented. When supporting evolutions are to be completed before execution of another, a conditional statement is used.

WARNING

Other plant areas may be affected by the same conditions causing the Control Room evacuation.

- 1. Obtain designated key ring and equipment at Safe Shutdown Key and Equipment Lockers.
- 2. WHEN notified to align 21 and 22 ADVs to 2C43, THEN GO TO the ADV Handvalve enclosure.
- 3. Place the following handvalves to POSITION 2:
 - 21 ADV Aux Shutdown Control Transfer, 2-HV-3939A
 - 21 ADV Quick Open Override Handvalve, 2-HV-3939B
 - 22 ADV Aux Shutdown Control Transfer, 2-HV-3938A
 - 22 ADV Quick Open Override Handvalve, 2-HV-3938B

4. Notify the CRO that the ADVs are aligned to 2C43.

s	and the second sec			the second secon
	2C433502/5652/3522	AFW5517	1A DG5320	ADVs5648
Į	27' SWGR5482/5483	SRW UL/LL5601/5600	1B DG5631	INTAKE5511
1	1C433501/5625/3511	CC RM5590	2A DG5630	13KV MC5655
	72'CMPTR RM4404	0C DG5302	2B DG5642	U-2 NSSS5640
	MCC-2045645	MCC-2145687		
ł	•			

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V. ACTIONS OUTSIDE THE CONTROL ROOM

K. (CRO) VERIFY COLD LEG TEMPERATURES.

- 1. Verify the Turbine Bypass Valves are maintaining T cold between 525 and 535° F.
- IF T COLD is greater than 535° F, AND NOT trending to less than 535° F, THEN adjust 21 and 22 ADV CONTRs, 2-HC-4056A and 2-HC-4056B, as needed to maintain T COLD between 525 and 535° F.
- 3. IF T COLD is less than 525° F, AND NOT trending to greater than 525° F, THEN perform the following actions:

NOTE

The ABO is located at the Unit 2 NSSS Sample Sink telephone.

a. Notify the ABO to shut the MSIVs PER Section V, Step L.

 b. WHEN notified that the MSIVs are shut, THEN adjust 21 and 22 ADV CONTRs, 2-HC-4056A and 2-HC-4056B, as needed to maintain T coup between 525 and 535° F.

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2C433502/5652/3522	AFW5517	1A DG5320	ADVs5648
27' SWGR5482/5483		1B DG5631	INTAKE5511
1C433501/5625/3511	CC RM5590	2A DG5630	13KV MC5655
72'CMPTR RM4404	0C DG5302	2B DG5642	U-2 NSSS5640
MCC-2045645	MCC-2145687		

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V. ACTIONS OUTSIDE THE CONTROL ROOM

L. (ABO) IF NOTIFIED, THEN SHUT BOTH MSIVs.

<u>NOTE</u>

Performance of this step may not be required. Direction to perform this step will be given from 2C43.

CAUTION

Performance of this step will result in a fast closure of the MSIVs.

- 1. IF notified to shut the MSIVs, THEN perform the following actions:
 - a. Shut Instrument Air Isolation to 21 MSIV Hydraulic Pump, 2-IA-928.
 - b. IF 21 MSIV is open, THEN:
 - (1) Remove the Dump Solenoid Valve Cap on ONE of the following:
 - 21 MSIV Dump SV Channel A, 2-MSH-4042A-SV

OR

- 21 MSIV Dump SV Channel B, 2-MSH-4042B-SV
- (2) Place a wrench on the selected Dump Solenoid stem nut.
- (3) Rotate the wrench in the clockwise direction (approximately three turns) to bleed hydraulic fluid back to the reservoir.
- c. Shut Instrument Air Isolation to 22 MSIV Hydraulic Pump, 2-IA-930.

(continue)

1C433501/5625/3511 CC RM5590 2A DG5630 72'CMPTR RM4404 0C DG5302 2B DG5642 MCC-2045645 MCC-2145687	13KV MC5655 U-2 NSSS5640
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V.	V. ACTIONS OUTSIDE THE CONTROL ROOM					
L.1	(continu	Jed)				
	d. IF 2 The	2 MSIV is open, EN:				
	(1)	Remove the Dump Solenoid Valve Cap on ONE of the following:				
		22 MSIV Dump SV Channel A, 2-MSH-4047A-SV				
		OR				
		22 MSIV Dump SV Channel B, 2-MSH-4047B-SV				
	(2)	Place a wrench on the selected Dump Solenoid stem nut.				
	(3)	Rotate the wrench in the clockwise direction (approximately three turns) to bleed hydraulic fluid back to the reservoir.				
2.	Notify 2	2C43 that the MSIVs are shut.				
3.	go to	45' Auxiliary Building to the telephone by the Unit 2 NSSS Sample Sink.				
М.	(STA)	COMMENCE SAFETY FUNCTION STATUS CHECKS.				
Ro Otl	om.	<u>NOTE</u> mplete the Safety Function Status Checks may be obtained at the 72' Computer <u>WARNING</u> nt areas may be affected by the same conditions causing the Control Room n.				
1.	Monito	r plant status PER Section VII., SAFETY FUNCTION STATUS CHECK.				
27' 1C4 72'(SWGR. 13350 CMPTR	02/5652/3522 AFW				

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V. ACTIONS OUTSIDE THE CONTROL ROOM

N. (CRO) COMPLETE INITIALIZATION OF CONTROLLERS ON 2C43.

NOTE

Adjustment of Controllers past the controller detent pin will stop valve motion.

- 1. Adjust 21 AFW PP SPD CONTR, 2-HC-3987B, to MIN SPD.
- 2. Adjust 22 AFW PP SPD CONTR, 2-HC-3989B, to MIN SPD.
- 3. Adjust 21 SG STM DRIVEN AFW FLOW CONTR, 2-HC-4511B, to MIN FLOW.

4. Adjust 22 SG STM DRIVEN AFW FLOW CONTR, 2-HC-4512B, to MIN FLOW.

5. Adjust 21 SG MOTOR DRIVEN AFW FLOW CONTR, 2-HC-4525B, to MIN FLOW.

- 6. Adjust 22 SG MOTOR DRIVEN AFW FLOW CONTR, 2-HC-4535B, to MIN FLOW.
- 7. Notify the TBO to align AFW Pump Speed Control to 2C43 PER Section V, Step O.

O. (TBO) ALIGN AFW PUMP SPEED CONTROL TO 2C43.

- 1. WHEN notified to align the AFW Pump Speed Control to 2C43, THEN perform the following actions:
 - a. Place 21 AFW Pump Speed Control Handvalve, 2-HV-3987, to POSITION 2.
 - b. Place 22 AFW Pump Speed Control Handvalve, 2-HV-3989, to POSITION 2.
- 2. Notify 2C43 that AFW Speed Control is aligned to 2C43.
- 3. GO TO the SRW Pump Room to perform Section V, Step P.

2C433502/5652/3522	AFW5517	1A DG5320	ADVs5648
27' SWGR5482/5483	SRW UL/LL5601/5600	1B DG5631	INTAKE5511
1C433501/5625/3511	CC RM5590	2A DG5630	13KV MC5655
72'CMPTR RM4404	0C DG5302	2B DG5642	U-2 NSSS5640
MCC-2045645	MCC-2145687		

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V. ACTIONS OUTSIDE THE CONTROL ROOM

P. (TBO) ALIGN THE AFW FLOW CONTROL TO 2C43.

- 1. In the SRW Room Upper Level, Place in POSITION 2 ALL AFW System Valves listed below:
 - SOUTH WALL (In Hand Transfer Box)
 - 2-IA-4511-HV
 - 2-IA-4512-HV
 - Stanchion L50.1 between 2-AFW-4525-CV and 2-AFW-4535-CV (In Hand Transfer Box)
 - 2-IA-4525-HV
 - 2-IA-4535-HV
 - Northwest Corner next to U-2 to U-1 AFW X-conn CV, 2-AFW-4550-CV.
 2-IA-4070-HV
 - 2-IA-4071-HV
- 2. Notify 2C43 that the AFW flow control is aligned to 2C43.
- 3. GO TO the AFW Pump Room and verify AFW Pump operation PER Section V, Step Q.

Q. (TBO) VERIFY AFW PUMP OPERATION.

1. IF the in-service AFW Pump has tripped, THEN reset the Throttle/Stop Valve, 2-MS-3986 (2-MS-3988):

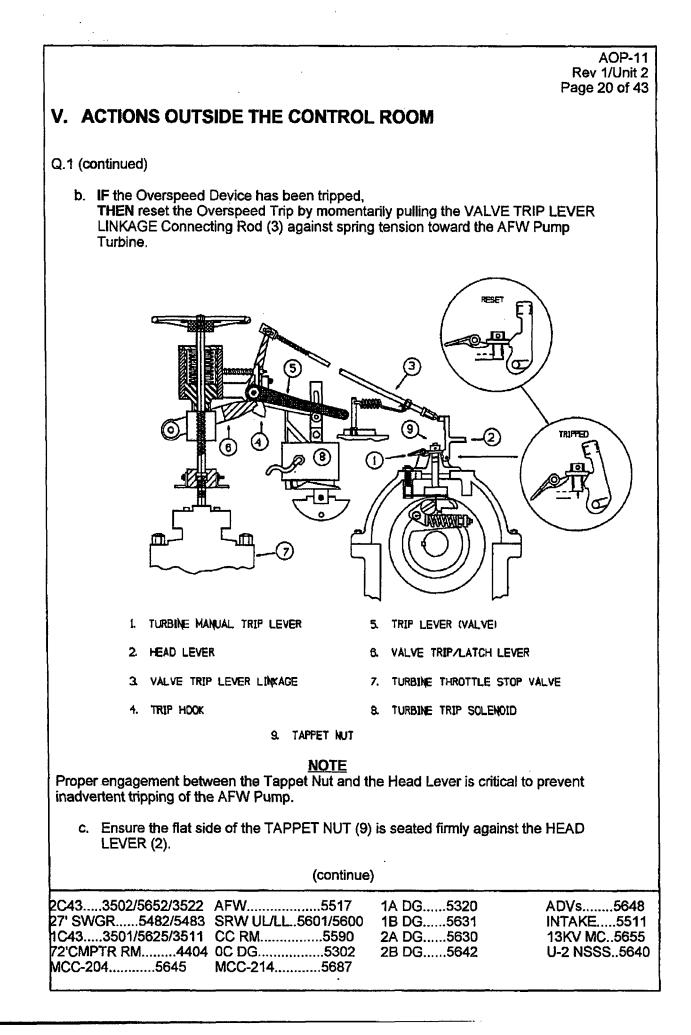
NOTE

Cycling the governor MANUAL ADJUSTMENT knob after Turbine Operation releases a hydraulic lock on the speed setting piston.

- a. Reset the Turbine Governor Speed Control as follows:
 - (1) Turn the governor MANUAL ADJUSTMENT knob fully counterclockwise to MINIMUM position.
 - (2) Turn the governor MANUAL ADJUSTMENT knob fully clockwise to MAXIMUM position.

(continue)

2C433502/5652/3522	AFW5517	1A DG5320	ADVs5648
27' SWGR5482/5483		1B DG5631	INTAKE5511
1C433501/5625/3511		2A DG5630	13KV MC5655
72'CMPTR RM4404		2B DG5642	U-2 NSSS5640
MCC-2045645	MCC-2145687		



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V. ACTIONS OUTSIDE THE CONTROL ROOM

Q.1 (continued)

- d. Reset the Throttle/Stop Valve:
 - (1) Rotate the handwheel clockwise until the Trip/Latch Lever is lifted over the Trip Hook.
 - (2) Ensure the Trip/Latch Lever and the Trip Hook are fully engaged.
- e. Slowly rotate the handwheel counterclockwise until the Throttle/Stop Valve, 2-MS-3986 (2-MS-3988), is fully open.
- 2. IF the in service AFW Pump fails to operate, THEN perform the following actions:
 - a. Notify 2C43 that the standby AFW pump will be placed in service.
 - b. Slowly rotate the handwheel counterclockwise until the Throttle/Stop Valve, 2-MS-3986 (2-MS-3988), is fully open.
 - c. Notify 2C43 that the in standby AFW PP has been placed in service.
- 3. Periodically monitor the operating AFW Pump.
- 4. GO TO the Main Turbine to perform Section V, Step AA.

2C433502/5652/3522	AFW5517	1A DG5320	ADVs5648
	SRW UL/LL5601/5600	1B DG5631	INTAKE5511
1C433501/5625/3511	CC RM5590	2A DG5630	13KV MC5655
72'CMPTR RM4404	0C DG5302	2B DG5642	U-2 NSSS5640
MCC-2045645	MCC-2145687		

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V. ACTIONS OUTSIDE THE CONTROL ROOM

R. (CRO) INITIATE AFW FLOW TO SGs.

- WHEN notified that AFW flow control is aligned to 2C43, THEN slowly feed the S/Gs by ANY of the following methods AND restore S/G level to 0 inches:
 - Adjusting 21 AUX FD PP SPEED CONTR, 2-HC-3987B
 - Adjusting 22 AUX FD PP SPEED CONTR, 2-HC-3989B
 - Adjusting 21 S/G STM DRIVEN AFW FLOW CONTR, 2-HC-4511B
 - Adjusting 22 S/G STM DRIVEN AFW FLOW CONTR, 2-HC-4512B
- IF SG level cannot be restored using the Steam Driven AFW Pumps, AND 23 AFW PP is not already running, THEN notify the RO to start 23 AFW PP PER step S.
- 3. IF 23 AFW PP has been started, THEN slowly feed the S/Gs by performing the following actions AND restore S/G level to 0 inches:
 - Adjusting 21 S/G MOTOR DRIVEN AFW FLOW CONTR, 2-HC-4525B.
 - Adjusting 22 S/G MOTOR DRIVEN AFW FLOW CONTR, 2-HC-4535B.

S. (RO) START 23 AFW PP.

- 1. IF notified to start 23 AFW PP, THEN perform the following actions:
 - a. Depress the CLOSE pushbutton on breaker 152-2415.
 - b. Notify 2C43 that 23 AFW PP has been started.

2C433502/5652/3522 27' SWGR5482/5483	SRW UL/LL5601/5600	1B DG5631	ADVs5648 INTAKE5511
1C433501/5625/3511	CC RM5590	2A DG5630	13KV MC5655
72'CMPTR RM4404		2B DG5642	U-2 NSSS5640
MCC-2045645	MCC-2145687		

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V. ACTIONS OUTSIDE THE CONTROL ROOM

T. (CRO) MONITOR PRESSURIZER LEVEL.

- 1. Check Pressurizer level stabilizes between 80 and 180 AND is trending to 160 inches.
- 2. IF Pressurizer level has NOT stabilized, THEN perform the following actions:
 - a. Determine which Charging Pump(s) are needed to stabilize Pressurizer level.
 - b. Notify the RO to manually operate the Charging Pump(s) PER Section V, Step V.

U. (CRO) ENERGIZE PRESSURIZER BACKUP HEATER.

CAUTION

The Pressurizer heater low level cutout at 101 inches is inoperable when heaters are operated at 2C43.

1. IF Pressurizer pressure is less than 2225 PSIA AND Pressurizer level is greater than 101 inches, THEN raise Pressurizer pressure:

a. Insert the keys into the following Pressurizer Backup Heater Transfer Controllers:

•	21 BACKUP	HTR TRANSFER C	ONTR 2-HS-100-4

• 23 BACKUP HTR TRANSFER CONTR 2-HS-100-6A

NOTE

Any combination of Pressurizer Heaters may be used to restore Pressurizer pressure.

b. Turn key to ON to energize the selected Pressurizer Heater(s).

c. Cycle the Pressurizer Backup Heater Transfer Controller(s) as necessary to maintain Pressurizer pressure between 2225 and 2275 PSIA.

2C433502/5652/3522 27' SWGR5482/5483 1C433501/5625/3511 72'CMPTR RM4404	SRW UL/LL5601/5600 CC RM5590	1A DG5320 1B DG5631 2A DG5630 2B DG5642	ADVs5648 INTAKE5511 13KV MC5655 U-2 NSSS5640
MCC-2045645		2B DG5042	U-2 N5555640

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V. ACTIONS OUTSIDE THE CONTROL ROOM

V. (RO) MANUALLY OPERATE THE CHARGING PUMP(S).

CAUTION

Performance of this step may not be required. Direction to perform this step will be given from 2C43.

- 1. IF notified to manually operate the Charging Pumps, THEN perform the following actions:
 - a. Start the Charging Pump(s) by performing the following actions:
 - (1) If necessary, charge the breaker closing spring for the charging pump to be started:
 - (21 Charging Pump Breaker) 52-2115
 - (23 Charging Pump Breaker) 52-2104
 - (22 Charging Pump Breaker) 52-2415
 - (23 Charging Pump Breaker) 52-2404
 - (2) Depress the PUSH TO CLOSE pushbutton on the pump breaker.

b. Stop the Charging Pump(s) by performing the following actions:

(1) Depress the TRIP pushbutton on the pump breaker.

- (2) Charge the closing spring, if required.
- 2. Notify 2C43 of Charging Pump status.

2C433502/5652/3522	AFW5517	1A DG5320	ADVs5648
27' SWGR5482/5483	SRW UL/LL5601/5600	1B DG5631	INTAKE5511
1C433501/5625/3511	CC RM5590	2A DG5630	13KV MC5655
72'CMPTR RM4404	0C DG5302	2B DG5642	U-2 NSSS5640
MCC-2045645	MCC-2145687		
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V. ACTIONS OUTSIDE THE CONTROL ROOM

W. (CRO) MAKEUP TO THE VCT.

- 1. Notify the STA to monitor VCT level, L226, on the Plant Computer.
- WHEN VCT makeup is desired, THEN notify the ABO to deenergize CVCS MOVs PER Section V, Step X.
- 3. WHEN 2-MOV-504 and 2-MOV-501 have been deenergized, THEN notify the ABO to align CHG Pump suction to the RWT PER Section V, Step Y.
- 4. WHEN VCT makeup is no longer desired, THEN notify the ABO to align CHG Pump suction to the VCT PER Section V, Step Z.
- 5. Repeat Steps 3 and 4 as necessary.

X. (ABO) DEENERGIZE CVCS MOVs.

- 1. WHEN notified to deenergize CVCS MOVs, THEN perform the following actions:
 - a. GO TO MCC 214.

b. Open the following breakers:

•	REFUELING WATER	TNK. STOP 2-MOV-504 breaker	52-21423
٠	VOL. CONT. TANK.	ISOL 2-MOV-501 breaker	52-21431

- 2. Notify 2C43 that 2-MOV-504 and 2-MOV-501 have been deenergized.
- 3. GO TO the Unit 2 VCT Room to align Charging Pump suction to the RWT PER Section V, Step Y.

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2C433502/5652/3522	AFW5517	1A DG5320	ADVs5648
	SRW UL/LL5601/5600	1B DG5631	INTAKE5511
1C433501/5625/3511	CC RM5590	2A DG5630	13KV MC5655
72'CMPTR RM4404	0C DG5302	2B DG5642	U-2 NSSS5640
MCC-2045645	MCC-2145687		

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V. ACTIONS OUTSIDE THE CONTROL ROOM

Y. (ABO) ALIGN CHARGING PUMP SUCTION TO THE RWT.

1. WHEN notified to align Charging Pump suction to the RWT, THEN perform the following actions:

a. Manually open the Charging Pump Suction from the RWT, 2-CVC-504-MOV.

b. GO TO the Unit 2 Charging Pump Room.

c. Manually shut the VCT Outlet, 2-CVC-501-MOV.

d. Notify 2C43 that the Charging Pump(s) is taking suction from the RWT.

Z. (ABO) ALIGN CHARGING PUMP SUCTION TO THE VCT.

- 1. WHEN notified to align Charging Pump suction to the VCT, THEN perform the following actions:
 - a. GO TO the Unit 2 Charging Pump Room.

b. Manually open the VCT Outlet, 2-CVC-501-MOV.

c. GO TO the Unit 2 VCT Room.

d. Manually shut the Charging Pump Suction from the RWT, 2-CVC-504-MOV.

2. Notify 2C43 that the Charging Pump(s) is taking suction from the VCT.

27' SWGR5482/5483		1A DG5320 1B DG5631	ADVs5648 INTAKE5511
1C433501/5625/3511	CC RM5590	2A DG5630	13KV MC5655
72'CMPTR RM4404		2B DG5642	U-2 NSSS. 5640
MCC-2045645	MCC-2145687		
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V. ACTIONS OUTSIDE THE CONTROL ROOM

AA. (TBO) CHECK THE STATUS OF THE MAIN TURBINE.

1. WHEN Main Turbine speed is estimated to be less than 3 RPM, THEN observe proper operation of the Turning Gear.

a. Observe that the Main Turbine Turning Gear is engaged.

b. Observe that the Rotor is turning.

2. Observe that the Turbine Lift Pump is running at the Main Lube Oil Reservior on the 12' level of the Service Building.

3. GO TO 2C43 for further instructions.

END of Section V

2C433502/5652/3522	AFW5517	1A DG5320	ADVs5648
27' SWGR5482/5483		1B DG5631	INTAKE5511
1C433501/5625/3511	CC RM5590	2A DG5630	13KV MC5655
72'CMPTR RM4404		2B DG5642	U-2 NSSS5640
MCC-2045645	MCC-2145687		

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VI. RE-ESTABLISHING CONTROL FROM THE CONTROL ROOM

A. (RO) RETURN TO THE CONTROL ROOM.

- WHEN the SM has been notified that control can be re-established to the Control Room, THEN GO TO the Control Room.
- 2. Notify 2C43 that the Control Room is occupied.

B. (RO) ADJUST AFW FLOW CONTROLS AT 2C04.

- 1. On 2C04, adjust the following AFW flow controller setpoints to 0 GPM:
 - AFW Turbine Driven Train Flow Controllers:
 - 21 S/G FLOW CONTR 2-FIC-4511A
 - 22 S/G FLOW CONTR 2-FIC-4512A
 - AFW Motor Driven Train Flow Controllers:
 - 21 S/G FLOW CONTR 2-FIC-4525A
 - 22 S/G FLOW CONTR 2-FIC-4535A

C. (RO) ADJUST AFW SPEED CONTROLLERS AT 2CO4.

- 1. On 2C04, open SG AFW STM SUPP & BYPASS valves:
 - (21 SG) 2-MS-4070-CV and 2-MS-4070A-CV
 - (22 SG) 2-MS-4071-CV and 2-MS-4071A-CV
- On 2C04, place the following AFW Pump Speed Controllers to MIN SPD position (100% output):
 - (21 AFW Pump) 2-HC-3987A
 - (22 AFW Pump) 2-HC-3989A
- 3. Notify 2C43 to secure AFW flow PER Section VI, Step D.

27' SWGR5482/5483		1B DG5631	ADVs5648 INTAKE5511
1C433501/5625/3511 72'CMPTR RM4404 MCC-2045645	0C DG5302	2A DG5630 2B DG5642	13KV MC5655 U-2 NSSS5640

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VI. RE-ESTABLISHING CONTROL FROM THE CONTROL ROOM

<u>CAUTION</u>

Steps D through G must be completed in an expeditious manner to avoid excessively low levels in the steam generators.

D. (CRO) SECURE AFW FLOW FROM 2C43.

- 1. Ensure both SG levels are approximately 0 inches.
- 2. Notify the TBO to perform the following actions:
 - a. GO TO the SRW Pump Room.
 - b. Notify 2C43 upon arrival.
- 3. WHEN the TBO is stationed in the SRW Pump Room, THEN perform the following actions:

NOTE

Adjustment of Controllers past the controller detent pin will stop valve motion.

- a. Adjust 21 AFW PP SPD CONTR, 2-HC-3987B, to MIN SPD.
- b. Adjust 22 AFW PP SPD CONTR, 2-HC-3989B, to MIN SPD.
- c. Adjust 21 SG STM DRIVEN AFW FLOW CONTR 2-AFW-4511-CV, 2-HC-4511B, to MIN FLOW.
- d. Adjust 22 SG STM DRIVEN AFW FLOW CONTR 2-AFW-4512-CV, 2-HC-4512B, to MIN FLOW.
- e. Adjust 21 SG MOTOR DRIVEN AFW FLOW CONTR 2-AFW-4525-CV, 2-HC-4525B, to MIN FLOW.
- f. Adjust 22 SG MOTOR DRIVEN AFW FLOW CONTR 2-AFW-4535-CV, 2-HC-4535B, to MIN FLOW.
- g. Notify the TBO to align AFW Flow and Speed Control to 2C04 PER Section VI, Step E.

2C433502/5652/3522	AFW5517	1A DG5320	ADVs5648
27' SWGR5482/5483	SRW UL/LL5601/5600	1B DG5631	INTAKE5511
1C433501/5625/3511	CC RM5590	2A DG5630	13KV MC5655
72'CMPTR RM4404	0C DG5302	2B DG5642	U-2 NSSS5640
MCC-2045645	MCC-2145687		

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VI. RE-ESTABLISHING CONTROL FROM THE CONTROL ROOM

E. (TBO) ALIGN AFW FLOW AND SPEED CONTROL TO 2C04.

- 1. WHEN notified to align AFW Flow and Speed Control to 2C04, THEN perform the following actions:
 - a. In the SRW Room Upper Level, Place in POSITION 1 ALL AFW System Valves listed below:
 - **SOUTH WALL** (In Hand Transfer Box)
 - 2-IA-4511-HV
 - 2-IA-4512-HV
 - Stanchion L50.1 between 2-AFW-4525-CV and 2-AFW-4535-CV (In Hand Transfer Box)
 - 2-IA-4525-HV
 - 2-IA-4535-HV
 - Northwest Corner next to U-2 to U-1 AFW X-conn CV, 2-AFW-4550-CV.
 - 2-IA-4070-HV
 - 2-IA-4071-HV

b. GO TO the AFW Pump Room.

c. Place 21 AFW Pump Speed Control Handvalve, 2-HV-3987, to POSITION 1.

- d. Place 22 AFW Pump Speed Control Handvalve, 2-HV-3989, to POSITION 1.
- 2. Notify the Control Room that the AFW Flow and Speed Controls are aligned to 2C04.
- 3. Notify 2C43 that the AFW Flow and Speed Controls are aligned to 2C04.
- 4. GO TO the Unit 2 45' Switchgear Room.
- 5. Notify the Control Room upon arrival.
- 6. GO TO the ADV Handvalve enclosure to align 21 and 22 ADVs to 2C03 PER Section VI, Step I.

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2C433502/5652/3522	AFW5517	1A DG5320	ADVs5648
27' SWGR5482/5483		1B DG5631	INTAKE5511
1C433501/5625/3511		2A DG5630	13KV MC5655
72'CMPTR RM4404	0C DG5302	2B DG5642	U-2 NSSS5640
MCC-2045645	MCC-2145687		

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VI. RE-ESTABLISHING CONTROL FROM THE CONTROL ROOM

F. (RO) START FEEDING BOTH SGs FROM 2C04.

- 1. WHEN notified by the TBO that AFW Flow and Speed Control are aligned to 2C04, THEN start feeding the SGs with an AFW pump from 2C04.
 - a. IF 21 or 22 AFW pump is operating, THEN perform the following actions:
 - (1) Slowly raise the output of the in service AFW pump's SPEED CONTR to the maintain pump discharge pressure at least 100 PSI greater than SG pressure.
 - (21 SG) 2-HC-3987A
 - (22 SG) 2-HC-3989A
 - (2) Adjust the following controllers as necessary to maintain SG levels between (-)24 and (+)30 inches:
 - (21 SG) 2-FIC-4511A
 - (22 SG) 2-FIC-4512A

 b. IF 23 AFW pump is operating, THEN adjust the following controllers as necessary to maintain SG levels between (-)24 and (+)30 inches:

- (21 SG) 2-FIC-4525A
- (22 SG) 2-FIC-4535A

G. (RO) ALIGN ADV CONTROL TO 2C03.

1. WHEN the TBO has arrived in the 45' Switchgear Room, THEN place ATMOSPHERIC STEAM DUMP CONTR, 2-HIC-4056, in manual.

2. Adjust ATMOSPHERIC STEAM DUMP CONTR, 2-HIC-4056, to 0% output.

3. Notify 2C43 to shut ADVs at 2C43 PER Section VI, Step H.

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2C433502/5652/3522		1A DG5320	ADVs5648
27' SWGR5482/5483		1B DG5631	INTAKE5511
1C433501/5625/3511	CC RM5590	2A DG5630	13KV MC5655
72'CMPTR RM4404	0C DG5302	2B DG5642	U-2 NSSS5640
MCC-2045645	MCC-2145687		

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VI. RE-ESTABLISHING CONTROL FROM THE CONTROL ROOM

H. (CRO) SHUT ADVs AT 2C43.

- 1. WHEN notified to shut the ADVs THEN place the following ADV Controllers to SHUT (zero output):
 - (21 ADV) 2-HC-4056A
 - (22 ADV) 2-HC-4056B

I.

2. Notify the TBO to align 21 and 22 ADVs to 2C03 PER Section VI, Step I.

(TBO) ALIGN 21 AND 22 ADVs TO 2C03.

- 1. WHEN notified to align 21 and 22 ADVs to 2C03, THEN place the following handvalves to POSITION 1:
 - 21 ADV Aux Shutdown Control Transfer, 2-HV-3939A
 - 21 ADV Quick Open Override Handvalve, 2-HV-3939B
 - 22 ADV Aux Shutdown Control Transfer, 2-HV-3938A
 22 ADV Quick Ones Questide User tracks 2 HW 2022P
 - 22 ADV Quick Open Override Handvalve, 2-HV-3938B
- 2. Notify the Control Room that the ADVs are aligned to 2C03.
- 3. Notify 2C43 the ADVs are aligned to 2C03.

J. (RO) CONTROL COLD LEG TEMPERATURES.

- WHEN notified that the ADVs are aligned to 2C03, THEN adjust the ATMOSPHERIC STEAM DUMP CONTR, 2-HIC-4056, as necessary to maintain T coub between 525 and 535° F.
- 2. IF the Turbine Bypass Valves are controlling T cold between 525 and 535° F, THEN place the ATMOSPHERIC STEAM DUMP CONTR, 2-HIC-4056, to AUTO.

2C433502/5652/3522 27' SWGR5482/5483 1C433501/5625/3511 72'CMPTR RM4404	SRW UL/LL5601/5600 CC RM5590	1A DG5320 1B DG5631 2A DG5630 2B DG5642	ADVs5648 INTAKE5511 13KV MC5655 U-2 NSSS5640
MCC-2045645		2B DG5642	U-2 NSSS5640

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VI. RE-ESTABLISHING CONTROL FROM THE CONTROL ROOM

K. (CRO) ALIGN PRESSURIZER HEATER CONTROL TO 2C06.

1. Rotate the keys to REMOTE for the Pressurizer Backup Heater Transfer Controllers:

- (21 Backup Heater) 2-HS-100-4A
- (23 Backup Heater) 2-HS-100-6A
- 2. Remove the keys from the Pressurizer Backup Heater Transfer Controllers.
- 3. Notify the Control Room that PZR Backup Heater control has been transferred to 2C06.

L. (CRO) RETURN TO THE CONTROL ROOM.

- 1. Make a site-wide page announcement informing all plant personnel that control has been shifted from 2C43 to the Control Room.
- 2. GO TO the Control Room.
- 3. Notify the STA to perform the Final Check of plant status PER Section VI Step M.

M. (STA) PERFORM THE FINAL CHECK OF PLANT STATUS.

- 1. WHEN notified by the CRO to perform the Final Check of plant status, THEN return to the Control Room.
- 2. Perform the Final Check of plant status **PER** Section VII., <u>SAFETY FUNCTION</u> <u>STATUS CHECK</u>, using Control Room instrumentation.
- 3. WHEN the Safety Function Status Check Final Acceptance Criteria are met, THEN notify the CRS and the CRO.

27' SWGR5482/5483 SRW UL/LL5601/5600 1C433501/5625/3511 CC RM5590	1A DG5320 1B DG5631 2A DG5630 2B DG5642	ADVs5648 INTAKE5511 13KV MC5655 U-2 NSSS5640
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VI. RE-ESTABLISHING CONTROL FROM THE CONTROL ROOM

N. (CRO) ALIGN MSIV CONTROL TO 2C03.

NOTE

Performance of this step may NOT be required.

- 1. IF the MSIVs were manually shut, THEN place MSIV handswitches to CLOSE:
 - (21 MSIV) 2-HS-4043
 - (22 MSIV) 2-HS-4048

2. Notify the ABO to restore MSIV operation to the Control Room PER Section VI, Step O.

O. (ABO) RESTORE MSIV OPERATION TO THE CONTROL ROOM.

NOTE

Performance of this step may **NOT** be required. Direction to perform this step will be given from Control Room.

- 1. IF notified to restore MSIV operation to the Control Room, THEN perform the following actions:
 - a. Place a wrench on the Dump Solenoid stem nut of:
 - (21 MSIV) 2-MSH-4042A-SV (2-MSH-4042B-SV)
 - (22 MSIV) 2-MSH-4047A-SV (2-MSH-4047B-SV)
 - b. Rotate the wrench in the counterclockwise direction, approximately three turns, until the wrench stops.
 - c. Remove the wrench and replace the Dump Solenoid Valve Cap.
 - d. Repeat steps O.1.a through O.1.c for the other MSIV.

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- e. Open Instrument Air Isolation to 21 MSIV Hydraulic Pump; 2-IA-928.
- f. Open Instrument Air Isolation to 22 MSIV Hydraulic Pump, 2-IA-930.
- g. Notify the Control Room that MSIV operation has been restored to the Control Room.

2C433502/5652/3522	AFW5517	1A DG5320	ADVs5648
27' SWGR5482/5483	SRW UL/LL5601/5600	1B DG5631	INTAKE5511
1C433501/5625/3511	CC RM5590	2A DG5630	13KV MC5655
72'CMPTR RM4404	0C DG5302	2B DG5642	U-2 NSSS5640
MCC-2045645	MCC-2145687		

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52-21431

VI. RE-ESTABLISHING CONTROL FROM THE CONTROL ROOM

P. (CRO) RESTORE CVCS CONTROL TO 2C07.

- 1. Verify that the handswitches for VCT Outlet, 2-CVC-501-MOV and RWT To Charging PP Suction valve, 2-CVC-504-MOV, are in the same positions that the ABO left the MOVs in.
- 2. Notify the ABO to energize CVCS MOVs PER Section VI, Step Q.
- WHEN notified that the CVCS MOVs are energized, THEN place the handswitches for VCT Outlet, 2-CVC-501-MOV and RWT To Charging PP Suction valve, 2-CVC-504-MOV, in AUTO.
- 4. Operate Charging and Letdown to maintain pressurizer level at approximately 160 inches.

Q. (ABO) ENERGIZE CVCS MOVs.

- 1. WHEN notified to energize CVCS MOVs, THEN GO TO MCC 214.
- 2. Shut the following breakers:
 - RWT to Charging Pump Suction Valve, 2-CVC-504-MOV breaker 52-21423
 - VCT Outlet Valve, 2-CVC-501-MOV breaker
- 3. Notify the Control Room that 2-MOV-504 and 2-MOV-501 have been energized.

R. (OSO) RETURN SAFE SHUTDOWN EQUIPMENT.

1. Ensure that ALL Safe Shutdown Equipment and Keys are returned to the appropriate lockers and enclosure.

2C433502/5652/3522			ADVs5648
27' SWGR5482/5483		1B DG5631	INTAKE5511
1C433501/5625/3511	CC RM5590	2A DG5630	13KV MC5655
72'CMPTR RM4404	0C DG5302	2B DG5642	U-2 NSSS5640
MCC-2045645	MCC-2145687		

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VI. RE-ESTABLISHING CONTROL FROM THE CONTROL ROOM

S. (CRO) IMPLEMENT APPROPRIATE OPERATING PROCEDURE.

1. IMPLEMENT EOP-0, POST TRIP IMMEDIATE ACTIONS.

END of Section VI

2C433502/5652/3522			ADVs5648
27' SWGR5482/5483		1B DG5631	INTAKE5511
1C433501/5625/3511	CC RM5590	2A DG5630	13KV MC5655
72'CMPTR RM4404		2B DG5642	U-2 NSSS5640
MCC-2045645	MCC-2145687		

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- A. The STA (or person designated by the CRS) 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 15 minute intervals until plant conditions stabilize.
- C. Notify the Control Room Supervisor if any safety function is not being met, promptly upon discovery.

	SAFETY FUNCTION ACCEPTANCE CRITERIA				
REACTIVITY CONTROL PARAMETERS	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK	
a, WRNI	lowering		less than 10 ⁻⁴ %		
b. SUR	negative		negative or zero		
c. CEA status	NO more than ONE CEA NOT fully inserted	d	NO more than ONE CEA NOT fully inserted	1	
OR					
Boration status	greater than or equal to 40 GPM		greater than 2300 ppm	<u> </u>	

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VITA	1	SAFETY FUNCTION ACCEPTANCE CRITERIA				
AUXILIARIES PARAMETERS	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK		
b	3KV service uses 1 or 21	NOT Available		at least ONE energized		
b	KV vital uses 1 or 24	ا at least ONE energized		at least ONE energized		
1	25V DC buses 1, 12 1 and 22	ALL greater than 105 volts		ALL greater than 105 volts		
V	20V AC ital buses 1, 22; 23, 24	at least THREE energized		at least THREE energized		
e. 2	Y09 or 2Y10	NOT Available		at least ONE energized		

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P		SAFETY FUNC	SAFETY FUNCTION ACCEPTANCE CRITERIA				
RCS PRESSURE AND INVENTORY PARAMETERS		CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK		
a.	Pressurizer pressure	1850 PSIA to 2300 PSIA		2225 PSIA to 2275 PSIA			
b.	Pressurizer level	80 inches to 180 inches		130 inches to 180 inches	<u></u>		
C.	RCS subcooling	30°F to 140°F		30°F to 140°F			

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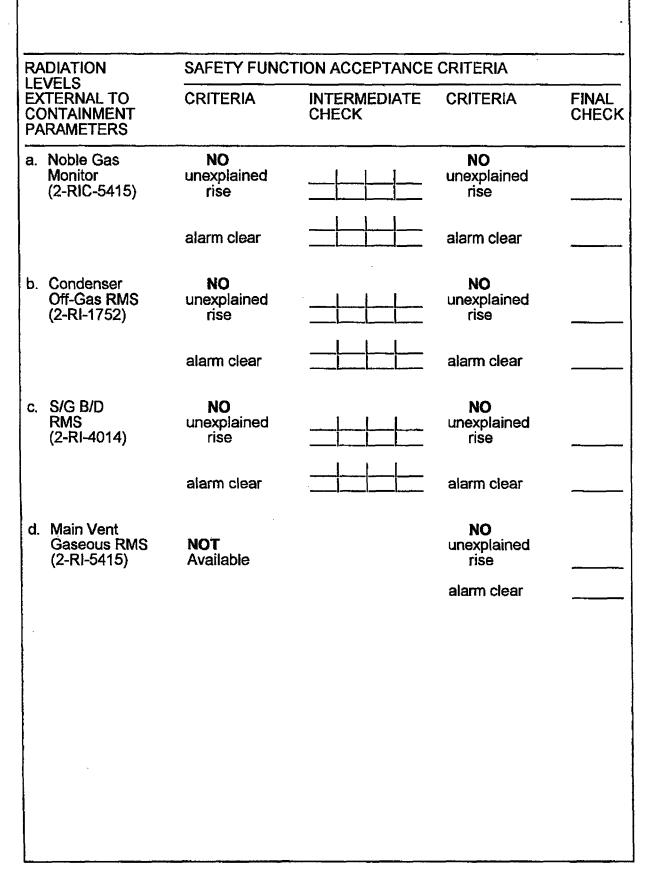
CORE AND	SAFETY FUNCT	TION ACCEPTANCE	CRITERIA	
RCS HEAT REMOVAL PARAMETERS	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK
a. RCS TCOLD	525°F to 535°F		525°F to 535° F	
b. Thot minus Tcold	less than 10°F		less than 10°F	
c. S/G level 21 or 22	(-)170 inches to (+)30 inches		(-)24 inches to (+)30 inches	
	trending to (-)24 inches to (+)30 inches		N/A	N/A

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	SAFETY FUNC	SAFETY FUNCTION ACCEPTANCE CRITERIA					
CONTAINMENT ENVIRONMENT PARAMETERS	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK			
a. Containment Pressure	less than 0.7 PSIG		less than 0.7 PSIG				
b. Containment Temperature	less than 120°F		less than 120°F				
c. Containment Radiation Monitor	NO unexplained rise		NO unexplained rise				
	alarm clear		alarm clear				
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			A				

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VII. SAFETY FUNCTION STATUS CHECK

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 STATUS CHECK NUMBER	COMPLETED AT TIME	
1		
_2		
3		
4		
5		
6	••••••••••••••••••••••••••••••••••	
7		
8		

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	ATTACHMENT (1) Page 1 of 5 PLACEKEEPER				
DO	FUNCTION	START			
1	SECTION IV. ACTIONS PRIOR TO EVACUATION OF THE CONTROL ROOM				
	A. (RO) TRIP THE REACTOR.				
	B. (CRO) TRIP THE MAIN TURBINE SGFPs AND SECURE BLOWDOWN.				
	C. (ALL PERSONNEL) EVACUATE THE CONTROL ROOM.				
				· · · · · · · · · · · · · · · · · · ·	

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	AOP-11 Rev 1/Unit 2			
START	FUNCTION	DONE	PAGE	
	SECTION V. ACTIONS OUTSIDE THE CONTROL ROOM			
	A. (RO) MANUALLY TRIP THE MAIN TURBINE.	1	9	
	B. (RO) SHUTDOWN 21 AND 22 CEDM MG SETS.	[9	
	C. (CRO) UNLOCK SAFE SHUTDOWN KEY LOCKER AND EQUIPMENT LOCKER.		9	
<u></u>	D. (SM) DETERMINE APPROPRIATE EMERGENCY RESPONSE ACTIONS PER THE ERPIP.		10	
	E. (OSO) OBTAIN RADIOS AND GO TO 1C43 AND 2C43.		11	
	F. (TBO) OBTAIN EQUIPMENT, THEN TRIP 21 AND 22 SGFPs.		12	
	G. (ABO) OBTAIN EQUIPMENT, THEN GO TO 45 FOOT AUXILIARY BUILDING.		13	
	H. (CRO) VERIFY REACTOR IS SHUTDOWN.		13	
<u></u>	I. (CRO) ADJUST ADV CONTROLLERS ON 2C43.		13	
(i)	J. (RO) ALIGN 21 AND 22 ADVs TO 2C43.		14	
	K. (CRO) VERIFY COLD LEG TEMPERATURES.	С	15	
<u></u>	L. (ABO) IF NOTIFIED, THEN SHUT BOTH MSIVS.		16	
	M. (STA) COMMENCE SAFETY FUNCTION STATUS CHECKS.		17	
	N. (CRO) COMPLETE INITIALIZATION OF CONTROLLERS ON 2C43.	-	18	
	O. (TBO) ALIGN AFW PUMP SPEED CONTROL TO 2C43.		18	
NOTE: Continuously Applicable Steps are designated with a "C" in the Done column. Letters in the START column are prerequisite steps that must be completed prior to initiation of the step.				

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ATTACHMENT (1) Page 3 of 5 PLACEKEEPER (continued)					
TART	FUN	ICTION	DONE	PAGE	
	Ρ.	(TBO) ALIGN THE AFW FLOW CONTROL TO 2C43.		19	
	Q.	(TBO) VERIFY AFW PUMP OPERATION.	С	19	
?)	R.	(CRO) INITIATE AFW FLOW TO SGs.	С	22	
	S.	(RO) START 23 AFW PP.		22	
	Т.	(CRO) MONITOR PRESSURIZER LEVEL.	С	23	
	U.	(CRO) ENERGIZE PRESSURIZER BACKUP HEATER.	с	23	
	V.	(RO) MANUALLY OPERATE THE CHARGING PUMP(S).		24	
	W .	(CRO) MAKEUP TO THE VCT.		25	
	Х.	(ABO) DEENERGIZE CVCS MOVs.		25	
	Y.	(ABO) ALIGN CHARGING PUMP SUCTION TO THE RWT.		26	
	Z.	(ABO) ALIGN CHARGING PUMP SUCTION TO THE VCT.		26	
	AA.	(TBO) CHECK THE STATUS OF THE MAIN TURBINE.		27	

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ATTACHMENT (1) Page 4 of 5				
		PLACEKEEPER (continued)		
START	FU	VCTION	DONE	PAGE
· · · · · · · ·	SEC	CTION VI. RE-ESTABLISHING CONTROL FROM THE CONTROL ROOM		
	A.	(RO) RETURN TO THE CONTROL ROOM.		28
	В.	(RO) ADJUST AFW FLOW CONTROLS AT 2C04.		28
	C.	(RO) ADJUST AFW SPEED CONTROLLERS AT 2CO4.		28
(C)	D.	(CRO) SECURE AFW FLOW FROM 2C43.		29
(D)	E.	(TBO) ALIGN AFW FLOW AND SPEED CONTROL TO 2C04.		30
(E)	F .	(RO) START FEEDING BOTH SGs FROM 2C04.	С	31
	G.	(RO) ALIGN ADV CONTROL TO 2C03.		31
(G)	Н.	(CRO) SHUT ADVs AT 2C43.		32
(H)	1.	(TBO) ALIGN 21 AND 22 ADVs TO 2C03.		32
(1)	J.	(RO) CONTROL COLD LEG TEMPERATURES.	С	32
	ĸ	(CRO) ALIGN PRESSURIZER HEATER CONTROL TO 2006.		33
	L	(CRO) RETURN TO THE CONTROL ROOM.		33
	M.	(STA) PERFORM THE FINAL CHECK OF PLANT STATUS.		33
	N.	(CRO) ALIGN MSIV CONTROL TO 2C03.		34
(N)	О.	(ABO) RESTORE MSIV OPERATION TO THE CONTROL ROOM.		34
	Ρ.	(CRO) RESTORE CVCS CONTROL TO 2C07.		35

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NOTE: Continuously Applicable Steps are designated with a "C" in the Done column. Letters in the START column are prerequisite steps that must be completed prior to initiation of the step.

	ATTACHMENT (1) Page 5 of 5 PLACEKEEPER (continued)		AOP-11 Rev 1/Unit 2
START	FUNCTION	DONE	PAGE
	Q. (ABO) ENERGIZE CVCS MOVs.		35
	R. (OSO) RETURN SAFE SHUTDOWN EQUIPMENT.		35
	S. (CRO) IMPLEMENT APPROPRIATE OPERATING PROCEDURE.		36

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CALVERT CLIFFS NUCLEAR POWER PLANT TECHNICAL PROCEDURE

UNIT ONE

AOP-2A

EXCESSIVE REACTOR COOLANT LEAKAGE

REVISION 23

Safety Related

Approval Authority: Chris Jones 12/10/2008 signature/date

Effective Date: 12/16/2008

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Х.	SAFETY FUNCTION STATUS CHECK FOR EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT	151
XI.	SAFETY FUNCTION STATUS CHECK FOR EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT	158
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	PLACEKEEPER	

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I. PURPOSE

The purpose of this AOP is to provide direction and actions to be taken for a loss of RCS inventory for all operating conditions except:

- 1) Reactor Trip related events.
- 2) During SDC.

II. ENTRY CONDITIONS

Excessive RCS leakage may be indicated by any of the following conditions:

- A. One or more Charging Pumps energize automatically during steady state conditions.
- B. Charging flow exceeds letdown flow by an abnormal amount during steady state conditions.
- C. Charging header pressure is less than RCS pressure.
- D. The rate of lowering in VCT level has risen during steady state conditions.
- E. Low Pressurizer level occurs during steady state conditions.
- F. Quench Tank pressure, level, and/or temperature is high or rising.
- G. Acoustic Monitor indicates flow through any of the relief valves, or high temperature exists on their discharge piping (Computer points T106, T107, T108):
 - 1-RV-200
 - 1-RV-201
 - 1-PORV-402
 - 1-PORV-404
- H. Reactor Coolant Pump seal pressure (upper & middle) is abnormally high or low, and high temperature exists on lower pump seal.
- I. Safety Injection Tank check valve leakage pressure is high.
- J. Rise in Containment pressure, temperature, and/or humidity.
- K. Safety Injection Tank(s) level is rising.
- L. Reactor Coolant Drain Tank has abnormal rate of level rise.
- M. Component Cooling Head Tank level is high or rising.
- N. Reactor Coolant Leakage Evaluation on STP O-27-1 is high.

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II. (continued)

- O. Radiation levels have risen or alarms occur on any of the following:
 - Waste Processing Ventilation Radiation Monitors
 - Main Vent Radiation Monitors
 - Containment Atmosphere Radiation Monitors
 - Steam Generator Blowdown Radiation Monitor
 - Condenser Off-Gas Radiation Monitor
 - Main Steam Line Effluent Radiation Monitors
 - Component Cooling Radiation Monitor
 - Main Steam/N-16 Radiation Monitors
- P. Leakage is observed from primary system piping, flanges, or valve packing.
- Q. Portable air samples indicate a rise in activity levels.
- R. Rise in Containment Sump Alarm frequency.
- S. Identified SG Tube leakage reaching operational limit of 50 GPD through any one SG.

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III. PRECAUTIONS

The following specific precautions apply to or throughout this procedure.

A. WARNINGS

1. Radiological conditions in containment may change due to lowering RCS level. Re-entry into Containment is controlled by radiation condition assessment by Rad Con. **[B0138]**

B. CAUTIONS

- 1. If during the course of implementing this AOP, Pressurizer pressure lowers to the TM/LP pretrip value, the Reactor must be tripped and EOP-0 implemented.
- Two sections of this AOP address excessive RCS leakage in Modes 3, 4 and 5 when LTOP controls are in effect. The goal of these sections of this AOP is to maintain RCS inventory while ensuring that the RCS components are not subject to an LTOP event. Whenever HPSI Pumps and/or Charging Pumps are maintaining RCS inventory, extreme caution must be exercised to prevent RCS pressure from exceeding the limits of EOP ATTACHMENT (1), <u>RCS PRESSURE</u> <u>TEMPERATURE LIMITS</u>, whenever RCS temperature is less than 369° F.
- 3. Valid ESFAS and AFAS signals to equipment shall **NOT** be overridden or blocked unless specifically directed in this procedure. A valid signal is a signal that at the time on initiation, correlated to plant parameters (e.g., the monitored parameter actually reached its setpoint value).
- 4. This AOP contains reactivity sensitive steps, actions or consequences. Caution should be used to control parameters that affect reactivity.
- 5. Solid water operation of the pressurizer should be avoided unless 25° F of subcooling can not be maintained in the RCS. Pressurizer level limits may be exceeded to restore RCS subcooling. Makeup, drainage, heatup or cooldown could cause unfavorable rapid pressure excursions if the RCS is solid.
- 6. If VCT pressure is significantly reduced, then idle Charging Pumps may become gas bound if **NOT** started or vented.
 - Indication of gas binding in a running Charging Pump include oscillating or reduced amps, flow or discharge pressure.

III. (continued)

C. <u>NOTES</u>

- 1. If the Unit is on Shutdown Cooling, then AOP-3B, <u>ABNORMAL SHUTDOWN</u> <u>COOLING CONDITIONS</u>, should be implemented for RCS inventory loss.
- 2. With the approval of the CRS or SM, two or more steps of this procedure may be performed concurrently. The steps must be evaluated in the sequence listed and determined **NOT** to be dependent upon the actions of other steps of the procedure.
- 3. Harsh Containment Environment conditions will affect instrument indications. When necessary, modified parameter values designated by braces **{}** are used to compensate the indicated value for Harsh Containment Environment conditions.

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IV. PRELIMINARY

<u>ACTIONS</u>

ALTERNATE ACTIONS

A. DETERMINE ACTIONS REQUIRED FOR THE EXISTING PLANT CONDITIONS.

- 1. Evacuate ALL unnecessary personnel from the Containment PER the <u>CONTAINMENT EVACUATION</u> Attachment of ERPIP 3.0. [B0138]
- 2. Notify Radiation Safety Supervision that excessive RCS leakage exists, and that radiation levels may be changing in the Auxiliary Building and Containment.
- 3. Direct Chemistry to perform qualitative samples on both SGs for activity **PER** CP-436.
- 4. IF the RCS is on Shutdown Cooling, THEN IMPLEMENT AOP-3B, <u>ABNORMAL SHUTDOWN COOLING</u> <u>CONDITIONS</u>.
- IF Pressurizer level is being maintained by ONE Charging Pump, THEN PROCEED to Section V., <u>RCS</u> <u>LEAKAGE WITHIN THE CAPACITY</u> OF ONE CHARGING PUMP, Page 11.
- IF the Unit is in Mode 1 or 2, AND RCS leakage exceeds the capacity of ONE Charging Pump, THEN PROCEED to Section VI., <u>RCS LEAKAGE EXCEEDS ONE CHARGING PUMP, MODES 1 & 2</u>, Page 27.

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IV. PRELIMINARY

ACTIONS

ALTERNATE ACTIONS

A. (continued)

- 7. IF the following conditions exist:
 - The Reactor is **NOT** critical
 - RCS leakage exceeds the capacity of ONE Charging Pump
 - LTOP controls are **NOT** in effect

THEN perform ONE of the following:

- IF pressurizer level is lowering using ALL available Charging Pumps, THEN PROCEED to Section VII., <u>RCS</u> LEAKAGE EXCEEDS ONE CHARGING PUMP, MODE 3 WITHOUT LTOP CONTROLS IN EFFECT, Step A, Page 44.
- IF pressurizer level is being maintained constant or rising using ALL available Charging Pumps, THEN PROCEED to Section VII., <u>RCS</u> <u>LEAKAGE EXCEEDS ONE</u> <u>CHARGING PUMP, MODE 3</u> <u>WITHOUT LTOP CONTROLS IN</u> <u>EFFECT</u>, Step C, Page 46.

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IV. PRELIMINARY

ACTIONS

ALTERNATE ACTIONS

A. (continue	ed)
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- IF LTOP controls are in effect, AND RCS leakage exceeds the capacity of ONE Charging Pump, AND a SG tube leak is identified by observing a rise in ANY of the following:
 - SG sample activities
 - Condenser Off-Gas radiation levels at 1-RI-1752
 - SG Blowdown radiation levels at 1-RIC-4095 or 1-RI-4014
 - MAIN STEAM EFFL RAD MONITOR levels at 1-RIC-5421 or 1-RIC-5422
 - Feed flow mismatch
 - SG water level (Unexplained)

THEN PROCEED to Section VIII., EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT, Page 56.

 IF LTOP controls are in effect AND RCS leakage exceeds the capacity of ONE Charging Pump, AND a SG tube leak has NOT been identified, THEN PROCEED to Section IX., EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT, Page 106.

END of Section IV

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V. RCS LEAKAGE WITHIN THE CAPACITY OF ONE CHARGING PUMP **ACTIONS ALTERNATE ACTIONS** Α. DETERMINE THE APPROPRIATE EMERGENCY RESPONSE. 1. Determine the appropriate emergency response actions PER the ERPIP. 2. Determine reporting requirements of RM-1-101, REGULATORY REPORTING. Β. ATTEMPT TO DETERMINE RCS LEAK RATE. 1. Attempt to determine RCS leak rate by considering the following: RMS indications PER RMS Correlation • Graphs • ATTACHMENT (1), ESTIMATE **GROSS LEAK RATE** Reactor Coolant Leakage Evaluation, STP 0-27-1 • VCT level trend from recorder CNTMT Sump alarm frequency Comparison of Charging flow versus • Letdown flow

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V. RCS LEAKAGE WITHIN THE CAPACITY OF ONE CHARGING PUMP

ACTIONS

ALTERNATE ACTIONS

C. ATTEMPT TO LOCATE AND ISOLATE THE LEAK.

1. Determine if a SG tube leak exists by observing a rise in **ANY** of the following:

- SG sample activities
- Condenser Off-Gas radiation levels at 1-RI-1752
- SG Blowdown radiation levels at 1-RIC-4095 or 1-RI-4014
- MAIN STEAM EFFL RAD MONITOR levels at 1-RIC-5421 or 1-RIC-5422
- MAIN STM N-16 RAD MONITOR levels at 1-RIC-5421A or 1-RIC-5422A
- Feed flow mismatch
- SG level (Unexplained)
- 2. IF a SG tube leak is identified, THEN PROCEED to Step D, Page 15.
- 3. Determine if the leak is in Containment by observing the following:
 - Rise in Containment temperature, pressure, humidity or sump level alarm frequency
 - Rise in Containment gaseous or particulate activity
 - "U-1 WR NOBLE GAS RAD MON" and "UNIT 1 MAIN VENT GASEOUS" alarms clear
- IF the leak is determined to be inside Containment, THEN coordinate with Rad Safety and consider performing a Containment entry to locate the source of the leak.

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V. RCS LEAKAGE WITHIN THE CAPACITY OF ONE CHARGING $\operatorname{\mathsf{PUMP}}$

ACTIONS

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ALTERNATE ACTIONS

ACTIONS	ALILMATE AOTONO
C. (continued)	
 Determine if the leak is in the Auxiliary Building by observing the following: 	
 Rise in radiation levels on the UNIT 1 WP VENT RMS, 1-RI-5410 	
 Unexplained rise in the Waste Processing Tank levels 	
 IF the location of the leak has NOT been determined, THEN attempt to locate the leak PER ATTACHMENT (2), <u>LEAK</u> IDENTIFICATION. 	
 WHEN the location of the leak has been determined, AND plant conditions permit, THEN isolate the leak. 	
 IF the location of the leak has NOT been determined, THEN perform the following actions: 	
a. Continue to investigate the source of the leak.	
 b. Continue to evaluate the leak rate PER Step B, Page 11. 	
9. IF the leak rate exceeds the capacity of ONE Charging Pump, THEN PROCEED to Section IV., <u>PRELIMINARY</u> , Page 8, to determine actions required for existing plant conditions.	
(continue)	

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V. RCS LEAKAGE WITHIN THE CAPACITY OF ONE CHARGING PUMP

ACTIONS

ALTERNATE ACTIONS

C. (continued)	
10. IF the LCO for Tech. Spec. 3.4.13, <u>RCS</u> <u>Operational Leakage</u> , is exceeded, THEN comply with the Actions by placing the plant in cold shutdown PER OP-3, <u>NORMAL POWER OPERATION</u> , OP-4, <u>PLANT SHUTDOWN FROM POWER</u> <u>OPERATION TO HOT STANDBY</u> , or OP-5, <u>PLANT SHUTDOWN FROM HOT</u> <u>STANDBY TO COLD SHUTDOWN</u> .	
 11. IF the leak has been isolated, or the leak rate is within the limits of Tech. Spec. 3.4.13, <u>RCS Operational Leakage</u>, THEN evaluate the need to place the plant in a cold shutdown condition. 	
 12. IF normal operations are to continue, THEN perform the following: a. Reestablish normal plant configuration control as required: 	
 Locked Valves PER NO-1-205, <u>LOCKED VALVES</u> Component Manipulations PER NO-1-200, <u>CONTROL OF SHIFT</u> <u>ACTIVITIES</u> 	
b. IMPLEMENT the applicable Operating Procedure.	

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V. RCS LEAKAGE WITHIN THE CAPACITY OF ONE CHARGING PUMP

<u>ACTIONS</u>

ALTERNATE ACTIONS

D. COMMENCE THE ACTIONS FOR A SG TUBE LEAK.

<u>NOTE</u>

Leak rate should be qualitatively evaluated by more than one RMS channel prior to commencing plant shutdown. Samples may be used to perform the qualitative evaluation if the leak rate trend is rising less than 20 GPD in any 30 minute period.

- 1. IF the leak rate exceeds 50 GPD through any one SG, THEN perform the following:
 - a. Continue to evaluate the leak rate **PER** Step B, Page 11.
 - b. IF the leak rate exceeds the capacity of ONE Charging Pump, THEN PROCEED to Section IV., <u>PRELIMINARY</u>, Page 8, to determine actions required for existing plant conditions.

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V. RCS LEAKAGE WITHIN THE CAPACITY OF ONE CHARGING PUMP

ACTIONS

ALTERNATE ACTIONS

D.1 (continued)

c. IF the reactor is critical, THEN commence power reduction:

NOTE

NO action is required for leak rate spikes if the indicated leak rate is returning to within 20 GPD of the previous value in less than 30 minutes.

- (1) **IF BOTH** of the following conditions exist:
 - The leak rate is greater than 100 GPD
 - The leak rate trend is rising greater than 20 GPD in any 30 minute period

THEN perform the following:

- (a) Within one hour, reduce power to less than 50% **PER** OP-3, <u>NORMAL POWER</u> <u>OPERATION</u>.
- (b) Continue to reduce power to be in Mode 3 within the next 2 hours **PER** OP-3, <u>NORMAL POWER</u> <u>OPERATION</u>, and OP-4, <u>PLANT SHUTDOWN FROM</u> <u>POWER OPERATION TO</u> HOT STANDBY.
- (2) Commence an expeditious power reduction **PER** OP-3, <u>NORMAL</u> <u>POWER OPERATION</u>, and OP-4, <u>PLANT SHUTDOWN</u> <u>FROM POWER OPERATION TO</u> <u>HOT STANDBY</u>.

Rev 23/Unit 1 Page 17 of 165 V. RCS LEAKAGE WITHIN THE CAPACITY OF ONE CHARGING PUMP **ACTIONS ALTERNATE ACTIONS** D. (continued) 2. Shut the S/G B/D valves: 1-BD-4010-CV • 1-BD-4011-CV • 1-BD-4012-CV 1-BD-4013-CV 3. IF an alarm occurs on the UNIT 1 S/G B/D 3.1 **IF** the Blowdown IXs are bypassed due **RECOVERY** radiation monitor, to high temperature, 1-RIC-4095, AND an alarm actuates on SG Blowdown **THEN** verify that Blowdown has diverted Monitor, 1-RI-4014, to the Waste Processing System by THEN verify that Blowdown has diverted observing: to the Waste Processing System by observing: a. DISCH TO MWS valve, 1-BD-4097-CV, is open. a. DISCH TO MWS valve, 1-BD-4097-CV, is open. b. The following Blowdown valves are shut: b. The following Blowdown valves are shut: **DISCH TO CNDSR** • 1-BD-4096-CV DISCH TO CNDSR • DISCH TO CIRC WTR 1-BD-4096-CV 1-BD-4015-CV DISCH TO CIRC WTR 1-BD-4015-CV 4. Open the PRECOAT SYS BYP valve, 1-CD-5818-CV. 5. Verify that Condensate flow through the Demineralizers is maximized. 6. Determine the affected SG by evaluating the SG activity samples. (continue)

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V. RCS LEAKAGE WITHIN THE CAPACITY OF ONE CHARGING PUMP

ACTIONS

ALTERNATE ACTIONS

- D. (continued)
 7. Direct Radiation Safety Supervision to begin taking radiation surveys in the Turbine Building and the Water Treatment Area, in order to establish radiological controlled areas.
- 8. WHEN the reactor is shutdown, THEN commence a plant cooldown and depressurization PER OP-5, <u>PLANT</u> <u>SHUTDOWN FROM HOT STANDBY TO</u> <u>COLD SHUTDOWN</u>.

<u>NOTE</u>

If both SGs are affected, then consider the most affected SG as the affected SG.

- WHEN RCS temperature is less than 515° F,
 THEN isolate the affected SG:
 - a. On the affected SG, shut the MSIV:
 - (11 SG) 1-MS-4043-CV
 - (12 SG) 1-MS-4048-CV
 - b. On the affected SG, shut the SG FW ISOL valve:
 - (11 SG) 1-FW-4516-MOV
 - (12 SG) 1-FW-4517-MOV
 - c. On the affected SG, shut the AFW Flow Control Valves:

11 SG

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

12 SG

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

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V. RCS LEAKAGE WITHIN THE CAPACITY OF ONE CHARGING PUMP

ACTIONS

ALTERNATE ACTIONS

D.9 (continued)

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d. On the affected SG, shut the motor and steam driven train AFW Block valves:

11 SG

- 1-AFW-4520-CV
- 1-AFW-4521-CV
- 1-AFW-4522-CV
- 1-AFW-4523-CV

12 SG

- 1-AFW-4530-CV
- 1-AFW-4531-CV
- 1-AFW-4532-CV
- 1-AFW-4533-CV

e. On the affected SG, shut the SG AFW STM SUPP & BYPASS valves:

- (11 SG) 1-MS-4070-CV 1-MS-4070A-CV
- (12 SG) 1-MS-4071-CV
 - 1-MS-4071A-CV

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V. RCS LEAKAGE WITHIN THE CAPACITY OF ONE CHARGING PUMP

ACTIONS	ALTERNATE ACTIONS
D.9 (continued)	
 f. On the affected SG, shut the ADV using the Hand Transfer Valves on the West wall of the Unit 1 45 foot Switchgear Room as follows: (1) Verify that the ADV controller at 1C43 for the affected SG is set at 0% output: (11 SG) 1-HC-4056A (12 SG) 1-HC-4056B (2) Align the Hand Transfer Valves for the affected SG to POSITION 2 (1C43): 11 SG 1-HV-3938A 1-HV-3938B 12 SG 1-HV-3939B 9. On the affected SG, verify shut the SG MSIV BYP valve: (11 SG) 1-MS-4045-MOV (12 SG) 1-MS-4045-MOV (11 SG) 1-MS-4045-MOV (12 SG) 1-MS-4052-MOV h. Shut the upstream drains by placing MS STEAM UPSTREAM DRN ISOL VLVS handswitch, 1-HS-6622, to CLOSE.	 f.1 IF the ADV will NOT shut from 1C43, THEN shut the affected SG ADV Manual Isolation valve: (11 SG) 1-MS-101 (12 SG) 1-MS-104
i. Observe locally, from the Auxiliary Building Roof, that the SG Safety Valves are NOT leaking. (continue)	i.1 IF the SG Safety Valves are observed leaking, THEN inform Chemistry and Radiation Safety Supervision that an unmonitored radiological release is occurring.

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V. RCS LEAKAGE WITHIN THE CAPACITY OF ONE CHARGING PUMP

by

ACTIONS

ALTERNATE ACTIONS

10.	Verify that the affected SG is isolated checking the following:
	checking the following.

D. (continued)

- Condenser Off-Gas radiation levels at 1-RI-1752 lowering
- SG samples verifies activity higher in the affected SG

11. IF the wrong SG was isolated, THEN perform the following actions to return the isolated SG to service:

- a. IF Main Feedwater flow has been stopped for greater than 80 minutes, THEN perform the following actions:
 - (1) Initiate AFW flow to the unaffected SG.
 - (2) Ensure the SG FW ISOL valves are shut.

CAUTION

A severe waterhammer may result if Main Feedwater flow is restored after it has been stopped for greater than 80 minutes.

- b. Position all valves that were shut in Step D.9 to their desired position.
- c. Isolate the proper SG PER Step D.9.

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V. RCS LEAKAGE WITHIN THE CAPACITY OF ONE CHARGING $\ensuremath{\mathsf{PUMP}}$

ACTIONS

ALTERNATE ACTIONS

D. (continued)

WARNING

Radiation levels may be higher than normal on the (-)10 and (-)15 foot levels of the Auxiliary Building.
12. Maintain the level in the isolated SG between (-)24 and (+)60 inches by

- between (-)24 and (+)60 inches by blowing down to the MWS **PER** OI-8A, <u>BLOWDOWN SYSTEM</u>.
- 13. Control secondary system contamination.
 - a. Minimize the spread of contamination by performing the following:
 - (1) Ensure the Unit 1 Turbine Building Sump Pumps are in STOP.
 - (2) Isolate Condensate Dump to 11 CST by verifying the following valves are shut:
 - CONDENSER HOTWELL
 HIGH LEVEL DUMP CV-4405
 INLET VALVE, 1-CD-232
 - CONDENSER HOTWELL HIGH LEVEL DUMP CV-4405 BYPASS VALVE, 1-CD-234
 - (3) Verify CONDENSER MAKEUP CV-4406 BYPASS VALVE, 1-CD-238, is shut.

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V. RCS LEAKAGE WITHIN THE CAPACITY OF ONE CHARGING PUMP

ACTIONS

ALTERNATE ACTIONS

- D.13.a (continued)
 - (4) Reduce moisture carryover into the CAR Discharge Header by fully opening the CONDENSER VACUUM PUMP SERVICE WATER OUTLET VALVEs:
 - (11 CAR) 1-SRW-211
 - (12 CAR) 1-SRW-215
 - (13 CAR) 1-SRW-219
 - (14 CAR) 1-SRW-223
 - (5) Ensure Condensate to Circ Water Dump is isolated by verifying the followng valves shut:
 - CONDENSER DUMP TO CIRCULATING WATER ISOLATION VALVE, 1-CD-239
 - CONDENSATE DUMP TO CIRCULATING WATER BYPASS VALVE, 1-CD-455
 - (6) Ensure condenser expansion joints are **NOT** overflowing by verifying the CONDENSER EXPANSION JOINT FILL VALVEs are shut:
 - (11 Condenser) 1-CD-306
 - (12 Condenser) 1-CD-307
 - (13 Condenser) 1-CD-308
 - (7) Verify shut SRW HEAD TANK MAKEUP ISOLATION VALVE, 1-CD-144.
 - (8) Verify shut COMPONENT COOLING SYSTEM MAKEUP ISOLATION VALVE, 1-CD-145.
 - (9) Notify Plant Chemistry to secure the Hotwell sample pumps and isolate the sample sinks.

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V. RCS LEAKAGE WITHIN THE CAPACITY OF ONE CHARGING PUMP

ACTIONS

ALTERNATE ACTIONS

D.13 (continued)

b. Control the volume of contaminated condensate inventory by performing the following actions:

CAUTION

Operating CAR PPs with condenser hotwell level greater than 12 feet may draw excessive water into the CAR PPs.

CAUTION

Operating a SGFP with condenser hotwell level greater than 12 feet may actuate the high exhaust casing level trip.

- (1) **IF** condenser hotwell level exceeds 12 feet, **THEN** perform the following:
 - (a) Ensure Auxiliary Feedwater flow is established to the unaffected S/G.
 - (b) **IF** a SGFP is in operation, **THEN** secure the SGFP.
 - (c) Secure the CAR PPs.
- (2) IF condenser hotwell level exceeds 14 feet, THEN shut the COND SHELL STOPs:
 - 1-CAR-101
 - 1-CAR-102
 - 1-CAR-103
 - 1-CAR-104
 - 1-CAR-105
 - 1-CAR-106

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V. RCS LEAKAGE WITHIN THE CAPACITY OF ONE CHARGING PUMP

ACTIONS

ALTERNATE ACTIONS

D.13.b (continued)

NOTE

Using the Turbine Bypass System with Condensate/Main Feedwater will enable greater cooldown capability without raising contaminated condensate inventory.

CAUTION

An unmonitored radiation release could occur if the Atmospheric Dump Valve is in use and Condensate/Main Feedwater is used to feed the unaffected S/G.

- (3) IF Auxiliary Feedwater is being used to feed the unaffected S/G, THEN attempt to restore the Turbine Bypass System AND Condensate/Main Feedwater to operation PER the appropriate procedure.
- (4) IF Auxiliary Feedwater is being used to feed the unaffected S/G, THEN shut the Hotwell Makeup CV by shifting 1-LIC-4405 to MANUAL with 100% output.
- (5) Ensure the Auxiliary Boiler Condensate returns are aligned to Unit 2 by verifying the following:
 - (a) 0-AHB-211, DEAERATOR OVERFLOW TO 21 CONDENSER ISOLATION VALVE, is open.
 - (b) 0-AHB-210, DEAERATOR OVERFLOW TO 11 CONDENSER ISOLATION VALVE, is shut.

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V. RCS LEAKAGE WITHIN THE CAPACITY OF ONE CHARGING PUMP

<u>ACTIONS</u>

ALTERNATE ACTIONS

D.13.b (continued)

- (6) Ensure the RC Waste Evaporators are aligned to Unit 2 or the Auxiliary Boilers PER OI-17E, <u>REACTOR COOLANT</u> <u>WASTE EVAPORATOR</u> <u>OPERATION</u>.
- (7) Ensure Plant Heating is aligned to Unit 2 Reheat Steam or the Auxiliary Boilers **PER** OI-40, <u>PLANT HEATING SYSTEM</u>.
- 14. Sample the SGs for activity periodically.
- 15. WHEN the cooldown is complete, THEN perform the following:
 - a. Reestablish normal plant configuration control as required:
 - Locked Valves PER NO-1-205, LOCKED VALVES
 - Component Manipulations PER NO-1-200, <u>CONTROL OF SHIFT</u> <u>ACTIVITIES</u>
 - b. IMPLEMENT OP-5, <u>PLANT</u> <u>SHUTDOWN FROM HOT STANDBY</u> <u>TO COLD SHUTDOWN</u>.

END of Section V

		AOP-2A Rev 23/Unit 1 Page 27 of 165	
V	VI. RCS LEAKAGE EXCEEDS ONE CHARGING PUMP, MODES 1 & 2		
	ACTIONS	ALTERNATE ACTIONS	
A.	DETERMINE THE APPROPRIATE EMERGENCY RESPONSE.		
1.	Determine the appropriate emergency response actions PER the ERPIP.		
2.	Determine reporting requirements of RM-1-101, <u>REGULATORY REPORTING</u> .		
В.	VERIFY THAT THE EVENT IS NOT CHALLENGING THE RPS.		
1.	IF , at ANY time, PZR pressure reaches the TM/LP pretrip setpoint, THEN , with the permission of the SM/CRS, perform the following actions:		
	 a. Trip the Reactor b. IMPLEMENT EOP-0, <u>POST TRIP</u> IMMEDIATE ACTIONS. 		
C.	CONTROL PRESSURIZER LEVEL.		
1.	Verify that Charging Pumps are maintaining PZR level within 15 inches of programmed level.	1.1 IF PZR level is NOT being maintained by ALL available Charging Pumps, THEN shut the L/D CNTMT ISOL valves:	
		 1-CVC-515-CV 1-CVC-516-CV 	
2.	Makeup to the VCT to maintain level as necessary.		

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VI. RCS LEAKAGE EXCEEDS ONE CHARGING PUMP, MODES 1 & 2

ACTIONS

ALTERNATE ACTIONS

D. CHECK FOR A SG TUBE LEAK.

1. Determine if a SG Tube Leak exists by observing a rise in **ANY** of the following:

- SG sample activities
- Condenser Off-Gas radiation levels at 1-RI-1752
- SG Blowdown radiation levels at 1-RIC-4095 or 1-RI-4014
- MAIN STEAM EFFL RAD MONITOR radiation levels at 1-RIC-5421 or 1-RIC-5422
- MAIN STM N-16 RAD MONITOR levels at 1-RIC-5421A or 1-RIC-5422A
- SG water level (Unexplained)
- Feed flow mismatch

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VI. RCS LEAKAGE EXCEEDS ONE CHARGING PUMP, MODES 1 & 2

<u>ACTIONS</u>

ALTERNATE ACTIONS

D. (continued)

- 2. IF a SG Tube Leak is indicated, THEN perform the following actions:
 - a. Shut the L/D CNTMT ISOL valves:
 - 1-CVC-515-CV
 - 1-CVC-516-CV
 - b. Ensure the S/G B/D valves are shut:
 - 1-BD-4010-CV
 - 1-BD-4011-CV
 - 1-BD-4012-CV
 - 1-BD-4013-CV

<u>NOTE</u>

The intent of the following step is to reduce T_{AVE} to less than 537° F prior to tripping the Reactor so that the SG Safety Valves will **NOT** lift.

- c. Borate to reduce TAVE to less than 537° F by using **ANY** of the following methods:
 - Initial boration from the BASTs followed by suction from the RWT:
 - (1) Open the BA DIRECT M/U valve, 1-CVC-514-MOV.
 - (2) Start ALL available CHG PPs.
 - (3) Start ONE BA PP and operate it for approximately one minute.
 - (4) Shut the BA DIRECT M/U valve, 1-CVC-514-MOV.
 - (5) Open the RWT CHG PP SUCT valve, 1-CVC-504-MOV.

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ACTIONS	ALTERNATE ACTIONS
D.2.c (continued)	
(6) Shut the VCT OUT valve, 1-CVC-501-MOV.	
Boration from the BASTs (BA PP):	
(1) Open the BA DIRECT M/U valve, 1-CVC-514-MOV.	
(2) Start ALL available CHG PPs.	
(3) Start ONE BA PP and operate it for approximately one minute.	
(4) Operate the BA PP approximately fifteen seconds per minute thereafter.	
 Boration from the BASTs (gravity feed): 	
(1) Start ALL available CHG PPs.	
(2) Open at least ONE BAST GRAVITY FD valve:	
 1-CVC-508-MOV 1-CVC-509-MOV 	
(3) Shut the VCT OUT valve, 1-CVC-501-MOV:	
 Approximately one minute for initial boration 	
 Approximately fifteen seconds per minute thereafter 	
(4) Open the VCT OUT valve, 1-CVC-501-MOV.	
(continue)	

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ACTIONS	ALTERNATE ACTIONS
D.2.c (continued)	
(5) Verify BOTH BAST GRAVITY FD valves are shut:	
 1-CVC-508-MOV 1-CVC-509-MOV 	
(6) Repeat steps (2) through (5) as necessary.	
(7) IF desired to shift boration to the RWT,THEN perform the following:	
(a) Open the RWT CHG PP SUCT valve, 1-CVC-504-MOV.	
(b) Shut the VCT OUT valve, 1-CVC-501-MOV.	
Boration from the RWT:	
(1) Start ALL available CHG PPs.	
(2) Open the RWT CHG PP SUCT valve, 1-CVC-504-MOV.	
(3) Shut the VCT OUT valve, 1-CVC-501-MOV.	
 Obtain the desired rate of power reduction by using ANY of the following methods: 	
Adjust the boration rate	
Using CEAs	
(continue)	

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VI. RCS LEAKAGE EXCEEDS ONE CHARGING PUMP, MODES 1 & 2

ACTIONS

ALTERNATE ACTIONS

D.2 (continued)

CAUTION

Due to loss of PZR heaters, the reactor must be tripped anytime PZR level can NOT be maintained above 101 inches.

- e. Reduce Turbine load as necessary to maintain SG pressure between approximately 800 PSIA and 825 PSIA.
- f. Shutdown MSRs during Turbine shutdown as follows:
 - (1) Establish communications between Control Room and Operator(s) at local Panel loaders for MSRs.
 - (2) At 575 MWE load, ensure shut MSR 2nd STG HIGH LOAD MOVS:
 - 1-MS-4017-MOV
 - 1-MS-4018-MOV

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VI. RCS LEAKAGE EXCEEDS ONE CHARGING PUMP, MODES 1 & 2

ACTIONS

ALTERNATE ACTIONS

D.2.f (continued)

CAUTION

Exceeding any of the below limits may cause turbine rotor packing rubs and increased turbine vibration.

- (3) Adjust **BOTH** second stage panel loader output signals such that load valves, 1-MS-4021-CV and 1-MS-4024-CV, shut to reduce the MSR Second Stage pressure, while observing the following:
 - Maintain <Monitor><MSR loading> <u>MSR 2nd Stage</u> <u>Pressure</u>, **OR** 1-PI-4020 and 1-PI-4024 at the local Panel Loader, on or to the right and below the <Monitor><MSR loading> <u>SECOND STAGE</u> <u>PRESSURE</u> curve.
 - Maintain BOTH MSR Second Stage Pressures as close to equal as possible during the ramp.
 - LP Turbine inlet temperature rate of change should **NOT** exceed 125° F/hr as indicated on <Aux><Metal Temps> <u>ISV Crossaround Pipe</u> <u>Differential</u>.
 - Differential temperature between LP turbine inlets should NOT exceed 50° F as indicated on <Monitor><Misc temps> ISV Crossaround Differential Temps.

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VI. RCS LEAKAGE EXCEEDS ONE CHARGING PUMP, MODES 1 & 2

ACTIONS

D.2 (c	ontinued)	
g.	Verify the HI LVL DUMP valves for the following Low Pressure Feedwater Heaters are open:	
	 11A HI LVL DUMP, 1-HS-1447 11B HI LVL DUMP, 1-HS-1449 11C HI LVL DUMP, 1-HS-1451 	
	 12A HI LVL DUMP, 1-HS-1453 12B HI LVL DUMP, 1-HS-1455 12C HI LVL DUMP, 1-HS-1457 	
will be React BIAS	<u>CAUTION</u> sure that the SGFP runback speed in the required range when the or Trip occurs, ensure SGFPT SPD ADJ potentiometer setpoint is ained greater than or equal to 4.8.	
h.	Monitor the Feedwater system and adjust the SGFP BIAS as necessary to maintain S/G levels.	
i.	WHEN ANY of the following conditions exist:	
	TAVE is less than 537° F	
	 PZR level can NOT be maintained above 101 inches 	
	 PZR pressure reaches the TM/LP pretrip setpoint 	
	THEN , with the permission of the SM/CRS, perform the following actions:	
	(1) Trip the Reactor.	
	(2) IMPLEMENT EOP-0, <u>POST-TRIP</u> <u>IMMEDIATE ACTIONS</u> .	
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Rev 23/Unit 1 Page 35 of 165 VI. RCS LEAKAGE EXCEEDS ONE CHARGING PUMP, MODES 1 & 2 ACTIONS **ALTERNATE ACTIONS** E. ATTEMPT TO ISOLATE THE LEAK. [B0101] 1. Verify that the L/D CNTMT ISOL valves are shut: 1-CVC-515-CV • 1-CVC-516-CV 2. Check there is **NO** PORV leakage by the 2.1 IF PORV leakage is indicated, following indications: **AND** PZR pressure is less than 2300 PSIA. **Quench Tank Parameters THEN** perform the following: . PORV discharge piping temperatures, a. Shut the appropriate PORV BLOCK . computer points T107 and T108 valves: Acoustic Monitor indication 1-RC-403-MOV . 1-RC-405-MOV . b. Place the appropriate PORV **OVERRIDE** handswitches in the **OVERRIDE TO CLOSE position:** 1-HS-1402 • 1-HS-1404 • 3. Verify that RCS SAMPLE ISOL valve, 1-PS-5464-CV, is shut. 4. Verify that the Reactor Vessel Vent valves are shut: 1-RC-103-SV . 1-RC-104-SV • 5. Verify that the PZR Vent valves are shut: 1-RC-105-SV 1-RC-106-SV (continue)

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VI. RCS LEAKAGE EXCEEDS ONE CHARGING PUMP, MODES 1 & 2

<u>ACTIONS</u>

ALTERNATE ACTIONS

E. (continued)

NOTE

A leak on the Charging header which exceeds the capacity of the charging pumps can be identified by Charging header pressure indicating less than RCS pressure. Identification of the leak may be missed if more than one charging pump is running. 6. Determine if the leak is on the Charging header by performing the following actions: a. Stop all but ONE CHG PP. b. IF Charging header pressure is less than RCS Pressure. THEN assume the leak is on the Charging header. c. IF the leak is NOT on the Charging header, THEN start any CHG PPs that were stopped.

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VI. RCS LEAKAGE EXCEEDS ONE CHARGING PUMP, MODES 1 & 2

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E. (continued)	
7. IF the leak is on the Charging header, THEN perform the following actions:	
a. Place ALL CHG PPs in PULL TO LOCK.	
b. Dispatch an operator to determine the location of the leak.	
NOTE CHG PP HDR XCONN, 1-CVC-182, is located near 12 Charging Pump. c. IF the leak is upstream of CHG PP HDR XCONN, 1-CVC-182,	
THEN shut 1-CVC-182, AND start 12 or 13 CHG PP as required.	
(continue)	

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ACTIONS	ALTERNATE ACTIONS
E.7 (continued)	
 d. IF the leak is downstream of 1-CVC-182, THEN align Charging to the Auxiliary HPSI Header: 	
(1) Verify that the following valves are shut:	
 AUX SPRAY valve, 1-CVC-517-CV 	
LOOP CHG valves:	
1-CVC-518-CV1-CVC-519-CV	
<u>NOTE</u> The Auxiliary HPSI Header is out of service and T.S. 3.5.2 applies when 1-SI-656-MOV is shut.	
(2) Shut the HPSI AUX HDR ISOL valve, 1-SI-656-MOV.	
(3) Open ONE of the following AUX HPSI HDR Valves:	
 1-SI-617-MOV 1-SI-627-MOV 1-SI-637-MOV 1-SI-647-MOV 	
(4) Open the SI TO CHG HDR valve, 1-CVC-269-MOV.	
(continue)	

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ACTIONS	ALTERNATE ACTIONS
E.7.d (continued)	
NOTE REGEN HX CHG INLET, 1-CVC-183, is located in the 27 foot West Penetration Room.	
<u>CAUTION</u> When a Charging Pump is started, Reactor power will lower due to the concentration of Boric Acid in the Auxiliary HPSI header being 2300 PPM or greater.	
 (5) IF the leak is downstream of the REGEN HX CHG INLET valve, 1-CVC-183, THEN shut 1-CVC-183, AND start any available CHG PP. 	 (5).1 IF 1-CVC-183 in NOT accessible, THEN shut CHG PP HDR XCONN, 1-CVC-182, AND start 11 CHG PP.
 (6) IF the leak is upstream of 1-CVC-183, THEN shut CHG PP HDR XCONN, 1-CVC-182, AND start 11 CHG PP. 	
(7) Declare the Auxiliary HPSI Header out of service and refer to T.S. 3.5.2 <u>ECCS-Operating</u>.	
NOTE If charging via the Auxiliary HPSI header, the Reactor power reduction will result in an initial PZR level reduction.	
e. Verify charging flow by observing a rise in PZR level.	e.1 IF PZR level does NOT rise with charging flow, THEN perform the following:
	(1) Trip the Reactor.
	(2) IMPLEMENT EOP-0, <u>POST-TRIP</u> IMMEDIATE ACTIONS.
(continue)	

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ACTIONS	ALTERNATE ACTIONS
E. (continued)	
8. IF the leak is determined to be occurring inside Containment by checking the following indications:	
 Rise in Containment temperature, pressure, humidity or sump level alarm frequency 	
Rise in Containment gaseous or particulate activity	
 "U-1 WR NOBLE GAS RAD MON" and "UNIT 1 MAIN VENT GASEOUS" alarms clear 	
THEN perform the following actions:	
a. Start ALL available CNTMT AIR CLRs in HIGH.	
b. Open the CNTMT CLR EMER OUT valves for the operating CNTMT AIR CLRs.	
 IF the leak is NOT occurring inside of Containment, THEN perform the following actions: 	
a. Place both Penetration Room Exhaust Fans in service.	
<u>NOTE</u> Leakage location may be indicated by sump alarms, room level alarms, or area RMS alarms.	
b. Attempt to locate and isolate the leak.	
(continue)	

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ACTIONS	ALTERNATE ACTIONS
E. (continued)	
	<u>CAUTION</u> Once Letdown is isolated with a Component Cooling to Letdown leak occuring, dilution of the VCT will occur until Component Cooling to the Letdown Heat Exchanger is isolated.
 Determine that NO leakage into the Component Cooling System is indicated by: NO rising trends on Component Cooling Radiation Monitor, 1-RI-3819 "CC HEAD TK LVL" high alarm clear 	 10.1 IF leakage into the Component Cooling System is indicated, AND shutting the Letdown CNTMT Isolation valves stopped the leak, THEN perform the following actions: a. Shift VCT INL, 1-CVC-500-CV, to WPS. b. Isolate Component Cooling to the Letdown HX by performing the following: (1) Place L/D HX TEMP CONTR, 1-TIC-223, in manual with 100% output signal. (2) Shut L/D HX INLET ISOL, 1-CC-166. c. WHEN the Component Cooling valves are shut, THEN restore 1-CVC-500-CV to the desired position. d. Evaluate continued operation with Letdown isolated. e. PROCEED to Step F.
(continue)	(continue)

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ACTIONS	ALTERNATE ACTIONS
E.10 (continued)	 E.10 (continued) 10.2 IF leakage into the CC System is indicated, AND shutting the Letdown CNTMT Isolation valves did NOT stop the leak, THEN, with the approval of the SM/CRS, perform the following actions: a. Trip the Reactor. b. Perform Reactivity Control immediate actions of EOP-0, <u>POST TRIP IMMEDIATE ACTIONS.</u> c. Stop ALL RCPs. d. Shut the CC CNTMT SUPPLY and RETURN valves: 1-CC-3832-CV 1-CC-3833-CV e. IMPLEMENT EOP-0, <u>POST TRIP IMMEDIATE ACTIONS</u>.
F. DETERMINE THE APPROPRIATE ACTIONS FOR RCS LEAKAGE.	
1. Check that the leak has been isolated.	 1.1 IF the leak has NOT been isolated AND the leak is greater than the capacity of ONE Charging Pump, THEN, with the approval of the SM/CRS, perform the following actions: a. Trip the Reactor. b. IMPLEMENT EOP-0, POST TRIP IMMEDIATE ACTIONS.
(continue)	(continue)

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ACTIONS	ALTERNATE ACTIONS
F.1 (continued)	F.1 (continued)
	 1.2 IF the leak rate has been reduced to within the capacity of ONE Charging Pump, THEN perform the following:
	 a. IF the leak was NOT on the Letdown line or Charging header, THEN evaluate restoring Letdown PER OI-2A, <u>CHEMICAL AND</u> VOLUME CONTROL SYSTEM.
	b. PROCEED to Section V., <u>RCS</u> <u>LEAKAGE WITHIN THE</u> <u>CAPACITY OF ONE CHARGING</u> <u>PUMP</u> , Page 11.
 IF the leak was NOT on the Letdown line or Charging header, THEN restore Letdown PER OI-2A, <u>CHEMICAL AND VOLUME CONTROL</u> <u>SYSTEM</u>. 	
3. Maintain PZR level within 15 inches of programmed level NOT to exceed 225 inches.	
 Evaluate Technical Specifications requirements for components isolated. 	
5. Reestablish normal plant configuration control as required:	
 Locked Valves PER NO-1-205, LOCKED VALVES Component Manipulations PER NO-1-200, <u>CONTROL OF SHIFT</u> ACTIVITIES 	
6. IMPLEMENT the applicable Operating Procedure.	
END of Section VI	

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VII. RCS LEAKAGE EXCEEDS ONE WITHOUT LTOP CONTROLS IN	E CHARGING PUMP, MODE 3 N EFFECT
ACTIONS	ALTERNATE ACTIONS
A. ESTABLISH PROPER SAFETY	
	1
 IF SIAS has actuated, THEN verify that safety injection is in progress by the following: The MAIN HPSI HDR valves are open: 1-SI-616-MOV 1-SI-626-MOV 1-SI-636-MOV 1-SI-636-MOV 1-SI-646-MOV The AUX HPSI HDR valves are open: 1-SI-646-MOV 1-SI-647-MOV 1-SI-627-MOV 1-SI-637-MOV 1-SI-637-MOV 1-SI-647-MOV 1-SI-647-MOV 1-SI-647-MOV 1-SI-647-MOV 1-SI-647-MOV 1-SI-647-MOV 1-SI-647-MOV 11 and 13 HPSI PPs are running The LPSI HDR valves are open: 1-SI-615-MOV 1-SI-625-MOV 1-SI-645-MOV 1-SI-645-MOV 1-SI-645-MOV Hand 12 LPSI PPs are running ALL available CHG PPs are running (continue) 	 1.1 IF SIAS has NOT actuated, THEN initiate HPSI as follows: a. Open the MAIN HPSI HDR valves: 1-SI-616-MOV 1-SI-626-MOV 1-SI-636-MOV 1-SI-646-MOV b. Open the AUX HPSI HDR valves: 1-SI-617-MOV 1-SI-627-MOV 1-SI-637-MOV 1-SI-637-MOV c. Start 11 and 13 HPSI PPs. d. WHEN the "PZR PRESS BLOCK A PERMITTED" alarm is received, THEN block SIAS A. e. WHEN the "PZR PRESS BLOCK B PERMITTED" alarm is received, THEN block SIAS B. f. WHEN PZR pressure is below 1270 PSIA, THEN verify appropriate HPSI flow PER EOP ATTACHMENT (10), HIGH PRESSURE SAFETY INJECTION FLOW. g. Verify that ALL available CHG PPs are running.
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VII. RCS LEAKAGE EXCEEDS ONE CHARGING PUMP, MODE 3 WITHOUT LTOP CONTROLS IN EFFECT

ACTIONS

A. (continued)

ALTERNATE ACTIONS

2.		WHEN the following conditions can be maintained:	
	•	At least 30° F subcooling based on CET temperatures	

- PZR level greater than 101 inches {141 inches if Containment pressure is greater than 4.25 PSIG}
- At least one SG available for heat removal
- Reactor Vessel level above the top of the hot leg

THEN HPSI flow can be reduced by throttling the HPSI header isolation valves or by stopping the HPSI Pumps one at a time to maintain the following:

- RCS subcooling between 30° F and 140° F based on CET temperatures
- PZR level between 101 and 180 inches **{141 and 190 inches** if Containment pressure is greater than 4.25 PSIG**}**
- IF PZR pressure is greater than 200 PSIA and either constant or rising, THEN the operating LPSI PPs may be stopped.
- IF HPSI or LPSI throttle/termination criteria can NOT be maintained after the pumps are throttled or secured, THEN restart the appropriate pumps and restore full flow.

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VI	VII. RCS LEAKAGE EXCEEDS ONE CHARGING PUMP, MODE 3 WITHOUT LTOP CONTROLS IN EFFECT		
	ACTIONS	ALTERNATE ACTIONS	
В.	PERFORM RCP TRIP STRATEGY.		
1.	 IF RCS pressure drops to 1725 PSIA, THEN trip RCPs so that either of the following pairs of RCPs remain running: 11A and 12B RCPs 11B and 12A RCPs 		
2.	IF CIS has actuated, OR Component Cooling flow can NOT be verified to the RCPs, THEN trip ALL RCPs.		
3.	IF RCS temperature and pressure are less than the minimum pump operating limits PER the RCP curve of EOP ATTACHMENT (1), <u>RCS PRESSURE</u> <u>TEMPERATURE LIMITS</u> , THEN trip ALL RCPs.		
C.	CHECK FOR A SG TUBE LEAK.		
	 Determine if a SG Tube Leak exists by observing a rise in ANY of the following: SG sample activities Condenser Off-Gas radiation levels at 1-RI-1752 SG Blowdown radiation levels at 1-RIC-4095 or 1-RI-4014 MAIN STEAM EFFL RAD MONITOR radiation levels at 1-RIC-5422 SG water level (Unexplained) Feed flow mismatch 		
	THEN IMPLEMENT EOP-6, <u>STEAM</u> <u>GENERATOR TUBE RUPTURE</u> .		

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VII. RCS LEAKAGE EXCEEDS ONE CHARGING PUMP, MODE 3 WITHOUT LTOP CONTROLS IN EFFECT

ACTIONS

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D. ATTEMPT TO ISOLATE THE LEAK. [B0101]	
 Shut the L/D CNTMT ISOL valves: 1-CVC-515-CV 1-CVC-516-CV 	
 2. Check there is NO PORV leakage by the following indications: Quench Tank Parameters PORV discharge piping temperatures, computer points T107 and T108 Acoustic Monitor indication 	 2.1 IF PORV leakage is indicated, AND PZR pressure is less than 2300 PSIA, THEN perform the following: a. Shut the appropriate PORV BLOCK valves: 1-RC-403-MOV 1-RC-405-MOV b. Place the appropriate PORV OVERRIDE handswitches in the OVERRIDE TO CLOSE position: 1-HS-1402 1-HS-1404
3. IF a Pressurizer Safety Valve is leaking AND SIAS has NOT actuated, THEN attempt to reseat the Pressurizer Safety Valve by reducing pressurizer pressure to 1800 PSIA.	
 Verify that RCS SAMPLE ISOL valve, 1-PS-5464-CV, is shut. 	
 5. Verify that the Reactor Vessel Vent valves are shut: 1-RC-103-SV 1-RC-104-SV (continue) 	

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VII. RCS LEAKAGE EXCEEDS ONE CHARGING PUMP, MODE 3 WITHOUT LTOP CONTROLS IN EFFECT	
ACTIONS	ALTERNATE ACTIONS
D. (continued)	
6. Verify that the PZR Vent valves are shut:	
1-RC-105-SV1-RC-106-SV	
NOTE A leak on the Charging header which exceeds the capacity of the charging pumps can be identified by Charging header pressure indicating less than RCS pressure. Identification of the leak may be missed if more than one charging pump is running.	
 Determine if the leak is on the Charging header by performing the following actions: 	
a. Stop all but ONE CHG PP.	
 b. IF Charging header pressure is less than RCS Pressure, THEN assume the leak is on the Charging header. 	
 c. IF the leak is NOT on the Charging header, THEN start any CHG PPs that were stopped. 	
(continue)	

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VII. RCS LEAKAGE EXCEEDS ONE CHARGING PUMP, MODE 3 WITHOUT LTOP CONTROLS IN EFFECT

ACTIONS

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VII. RCS LEAKAGE EXCEEDS ONE CHARGING PUMP, MODE 3 WITHOUT LTOP CONTROLS IN EFFECT

ACTIONS

ALTERNATE ACTIONS

D.8 (continued) d. IF the leak is downstream of 1-CVC-182, THEN align Charging to the Auxiliary HPSI Header: (1) Verify that the following valves are shut: AUX SPRAY valve, 1-CVC-517-CV LOOP CHG valves: • 1-CVC-518-CV • 1-CVC-519-CV NOTE The Auxiliary HPSI Header is out of service and T.S. 3.5.2 or 3.5.3 applies when 1-SI-656-MOV is shut. (2) Shut the HPSI AUX HDR ISOL valve, 1-SI-656-MOV. (3) Open **ONE** of the following AUX HPSI HDR Valves: 1-SI-617-MOV • 1-SI-627-MOV ٠ 1-SI-637-MOV • • 1-SI-647-MOV (4) Open the SI TO CHG HDR valve, 1-CVC-269-MOV. (continue)

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VII. RCS LEAKAGE EXCEEDS ONE CHARGING PUMP, MODE 3 WITHOUT LTOP CONTROLS IN EFFECT		
ACTIONS	ALTERNATE ACTIONS	
D.8.d (continued)		
NOTE REGEN HX CHG INLET, 1-CVC-183, is located in the 27 foot West Penetration Room.		
 (5) IF the leak is downstream of the REGEN HX CHG INLET valve, 1-CVC-183, THEN shut 1-CVC-183, AND start any available CHG PP. 	(5).1 IF 1-CVC-183 in NOT accessible, THEN shut CHG PP HDR XCONN, 1-CVC-182, AND start 11 CHG PP.	
 (6) IF the leak is upstream of 1-CVC-183, THEN shut CHG PP HDR XCONN, 1-CVC-182, AND start 11 CHG PP. 		
(7) Declare the Auxiliary HPSI Header out of service and refer to T.S. 3.5.2 <u>ECCS-Operating</u> or 3.5.3 <u>ECCS-Shutdown</u> as applicable.		
e. Verify charging flow by observing a rise in PZR level.		
(continue)		

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VII. RCS LEAKAGE EXCEEDS ONE CHARGING PUMP, MODE 3 WITHOUT LTOP CONTROLS IN EFFECT

ACTIONS

D. (continued)	
 IF the leak is determined to be occurring inside Containment by checking the following indications: 	
 Rise in Containment temperature, pressure, humidity or sump level alarm frequency 	
 Rise in Containment gaseous or particulate activity 	
 "U-1 WR NOBLE GAS RAD MON" and "UNIT 1 MAIN VENT GASEOUS" alarms clear 	
THEN perform the following actions:	
a. Start ALL available CNTMT AIR CLRs in HIGH.	
 Dpen the CNTMT CLR EMER OUT valves for the operating CNTMT AIR CLRs. 	
10. IF the leak is NOT occurring inside of Containment, THEN perform the following actions:	
a. Place both PENETRATION RM VENT FANs in service.	
<u>NOTE</u> Leakage location may be indicated by sump alarms, room level alarms, or area RMS alarms.	
b. Attempt to locate and isolate the leak.	
(continue)	
(continue)	

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VII. RCS LEAKAGE EXCEEDS ONE CHARGING PUMP, MODE 3 WITHOUT LTOP CONTROLS IN EFFECT

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ACTIONS

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D. (continued)	
	<u>CAUTION</u> Once Letdown is isolated with a Component Cooling to Letdown leak occuring, dilution of the VCT will occur until Component Cooling to the Letdown Heat Exchanger is isolated.
 Determine that NO leakage into the Component Cooling System is indicated by: NO rising trends on Component Cooling Radiation Monitor, 1-RI-3819 "CC HEAD TK LVL" high alarm clear 	 11.1 IF leakage into the Component Cooling System is indicated, AND shutting the Letdown CNTMT Isolation valves stopped the leak, THEN perform the following actions: a. Shift VCT INL, 1-CVC-500-CV, to WPS. b. Isolate Component Cooling to the Letdown HX by performing the following: Place L/D HX TEMP CONTR, 1-TIC-223, in manual with 100% output signal. Shut L/D HX INLET ISOL, 1-CC-166. c. WHEN the Component Cooling valves are shut, THEN restore 1-CVC-500-CV to the desired position.
(continue)	(continue)

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VII. RCS LEAKAGE EXCEEDS ONE CHARGING PUMP, MODE 3 WITHOUT LTOP CONTROLS IN EFFECT

ACTIONS

D.11 (continued)	D.11 (continued)
	 11.2 IF leakage into the CC System is indicated, AND shutting the Letdown CNTMT Isolation valves did NOT stop the leak, THEN perform the following actions:
	a. Trip ALL RCPs.
,	b. Shut the CC CNTMT SUPPLY and RETURN valves:
	 1-CC-3832-CV 1-CC-3833-CV
 NOTE The entire PZR level band should be utilized whenever the charging system is aligned to the Auxiliary HPSI Header to minimize pump start/stop cycles and thermal shock to the Safety Injection Penetrations into the RCS. 12. IF the leak is isolated, OR the leak is within the capacity of the available Charging Pumps, THEN perform the following actions: a. Maintain Pressurizer level between 130 and 180 inches. b. Reestablish normal plant configuration control as required: a. Locked Valves PER NO-1-205, LOCKED VALVES b. Component Manipulations PER NO-1-200, <u>CONTROL OF SHIFT ACTIVITIES</u> c. IMPLEMENT the appropriate Operating Procedure to continue operations or to cooldown the plant. 	

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VII. RCS LEAKAGE EXCEEDS ONE CHARGING PUMP, MODE 3 WITHOUT LTOP CONTROLS IN EFFECT

ACTIONS

ALTERNATE ACTIONS

D ((continued)	
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13. IF the leak is NOT isolated AND the leak is greater than the capacity of the available Charging Pumps, THEN IMPLEMENT EOP-5, LOSS OF COOLANT ACCIDENT.

END of Section VII

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V	II. EXCESSIVE SG TUBE LEAKA EFFECT	GE WITH LTOP CONTROLS IN
	ACTIONS	ALTERNATE ACTIONS
Α.	STABILIZE RCS TEMPERATURE.	
1.	IF an RCS heatup or cooldown is in progress, THEN stop the heatup or cooldown and maintain the RCS temperature.	
В.	BEGIN AN INTERMEDIATE SAFETY FUNCTION STATUS CHECK PER SECTION X., <u>SAFETY FUNCTION</u> <u>STATUS CHECK FOR EXCESSIVE</u> <u>SG TUBE LEAKAGE WITH LTOP</u> <u>CONTROLS IN EFFECT</u> .	
C.	DETERMINE THE APPROPRIATE EMERGENCY RESPONSE ACTIONS PER THE ERPIP.	
1.	Determine the appropriate emergency response actions PER the ERPIP.	
2.	Determine reporting requirements of RM-1-101, <u>REGULATORY REPORTING</u> .	
D.	ESTABLISH INVENTORY CONTROL.	
1.	Shut the L/D CNTMT ISOL valves: [B0101]	
	 1-CVC-515-CV 1-CVC-516-CV 	
	(continue)	

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VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS	ALTERNATE ACTIONS
D. (continued)	
2. Check that the Charging Pumps are maintaining PZR level between 101 and 170 inches.	 2.1 IF ALL available Charging Pumps can NOT maintain Pressurizer level greater than 101 inches, THEN complete the following actions: a. Verify STP-O-55A-1, <u>CONTAINMENT CLOSURE VERIFICATION</u>, is complete and current if applicable. b. Stop ALL RCPs. c. Verify that the following RWT OUT valves are open: 1-SI-4142-MOV 1-SI-4143-MOV d. Verify that the MINI FLOW RETURN TO RWT ISOL valves are open: 1-SI-659-MOV 1-SI-660-MOV
(continue)	(continue)

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VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS ALTERNATE ACTIONS D.2 (continued) D.2.1 (continued) e. IF Pressurizer pressure is greater than 180 PSIA, THEN commence HPSI flow as follows: (1) Open the HPSI Header Valve for the desired flowpath: HPSI MAIN HDR ISOL 1-SI-654-MOV HPSI AUX HDR ISOL 1-SI-656-MOV (2) Align HPSI HDR XCONN valves for selected HPSI Pump: 1-SI-655-MOV • PP HDR POSITION Main Open 11 Main Shut 12 13 Main Shut 11 Aux Shut 12 Aux Open 13 Aux Open 1-SI-653-MOV PP HDR POSITION 11 Main Open Main Open 12 13 Main Shut 11 Aux Shut 12 Aux Shut 13 Aux Open (continue) (continue)

Rev 23/Unit 1 Page 59 of 165 EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN VIII. EFFECT ACTIONS **ALTERNATE ACTIONS** D.2 (continued) D.2.1.e (continued) (3) Verify that the MAIN and AUX HPSI HDR valves are shut: Main 1-SI-616-MOV 1-SI-626-MOV • 1-SI-636-MOV 1-SI-646-MOV Auxiliary 1-SI-617-MOV 1-SI-627-MOV 1-SI-637-MOV 1-SI-647-MOV (4) Start the selected HPSI PP. (5) Throttle open ONE MAIN or AUX HPSI HDR valve to maintain ALL of the following: PZR pressure PER EOP • ATTACHMENT (1), RCS PRESSURE **TEMPERATURE LIMITS** PZR level between 101 and 170 inches At least 25° F subcooling f. IF PZR pressure is less than 180 PSIA, **THEN** commence LPSI flow as follows: (1) Open the LPSI HDR valves: 1-SI-615-MOV • 1-SI-625-MOV ۰ 1-SI-635-MOV 1-SI-645-MOV (2) Start 11 and 12 LPSI PPs. (continue) (continue)

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VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS ALTERNATE ACTIONS D.2 (continued) D.2.1 (continued) g. IF PZR pressure is less than 180 PSIA and the LPSI Pumps are NOT available. THEN commence HPSI flow as follows: (1) Perform steps D.2.1.e.(1) through D.2.1.e.(4) of this section. (2) Throttle open ALL MAIN or AUX HPSI HDR valves to maintain ALL of the following: PZR pressure PER EOP • ATTACHMENT (1), RCS PRESSURE **TEMPERATURE LIMITS** PZR level between 101 and ٠ 170 inches At least 25° F subcooling (continue) (continue)

AOP-2A Rev 23/Unit 1 Page 61 of 165 **EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN** ACTIONS **ALTERNATE ACTIONS** D.2.1 (continued) h. WHEN the following conditions exist: • At least 25° F subcooling based on CET temperatures • PZR level greater than 101 inches and controlled At least one SG available for heat • removal Reactor Vessel level above the . top of the hot leg **THEN** throttle HPSI or LPSI HDR valves or stop SI Pumps one at a time to maintain the following: RCS subcooling between 25° F • and 140° F based on CET temperatures Pressurizer level between 101 . and 170 inches 2.2 **IF** pressurizer pressure is greater than 180 PSIA and either constant or rising, THEN the operating LPSI PPs may be stopped. 2.3 IF HPSI or LPSI throttle/termination criteria can NOT be maintained after the pumps are throttled or secured, THEN restart the appropriate pumps and restore flow. (continue)

VIII.

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EFFECT

D.2 (continued)

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VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

D. (continued)		
3.	 IF RCS boron concentration is less than 116 percent of the shutdown margin requirement PER NEOP-13, <u>TECHNICAL</u> <u>DATA BOOK (UNIT 1)</u>, THEN commence RCS boration. 	
	a.	Shut the VCT M/U valve, 1-CVC-512-CV.
	b.	Open the BA DIRECT M/U valve, 1-CVC-514-MOV.
	C.	Open the BAST GRAVITY FD valves:
		 1-CVC-508-MOV 1-CVC-509-MOV
	d.	Start ALL available BA PPs.
	e.	Shut VCT OUT valve, 1-CVC-501-MOV.
	f.	Start ALL available CHG PPs.
	g .	Record the time RCS boration was commenced:
	h.	Record BAST levels:
		BAST 11 BAST 12
		(continue)

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VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS	ALTERNATE ACTIONS
D.3 (continued)	
i. Continue boration until ONE of the following conditions is met:	
 116 percent of the shutdown margin requirement has been achieved PER the NEOPs. 	
(2) BAST level has been lowered a total of 108 inches.	
(3) Boration has been in progress as follows:	
 For 53 minutes if three charging pumps are operating 	
 For 80 minutes if two charging pumps are operating 	
 For 160 minutes if one charging pump is operating 	
 Makeup to the VCT to maintain level as necessary. 	
E. PERFORM THE RCP TRIP STRATEGY.	
 IF CIS has actuated, OR Component Cooling flow can NOT be verified to the RCPs, THEN trip ALL RCPs. 	
2. IF RCS temperature and pressure are less than the minimum pump operating limits PER the RCP curve of EOP Attachment (1), <u>RCS PRESSURE TEMPERATURE</u> <u>LIMITS</u> , THEN trip ALL RCPs.	

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VIII. EXCESSIVE SG TUBE LEAKA EFFECT	GE WITH LTOP CONTROLS IN
ACTIONS	ALTERNATE ACTIONS
F. IDENTIFY THE AFFECTED SG.	
NOTE If both SGs are affected, then consider the most affected SG as the affected SG. 1. Identify the affected SG by observing any of the following: • Unexplained rise in SG level • SG samples • Feed flow mismatch	
G. ISOLATE THE AFFECTED SG.	
1. IF the only operating RCPs are in the RCS loop with the affected SG, THEN trip the RCPs. (continue)	

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VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

ALTERNATE ACTIONS

G.	(continued)	
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- 2. Isolate the affected SG as follows:
 - a. On the affected SG, verify shut the MSIV:
 - (11 SG) 1-MS-4043
 - (12 SG) 1-MS-4048
 - b. On the affected SG, verify shut the SG FW ISOL valve:
 - (11 SG) 1-FW-4516-MOV
 - (12 SG) 1-FW-4517-MOV
 - c. On the affected SG, verify shut the SG FLOW CONTR valves:

11 SG

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

12 SG

- 1-AFW-4512-CV
- 1-AFW-4535-CV
- d. On the affected SG, verify shut the motor and steam driven train SG AFW BLOCK valves:

11 SG

- 1-AFW-4520-CV
- 1-AFW-4521-CV
- 1-AFW-4522-CV
- 1-AFW-4523-CV

12 SG

- 1-AFW-4530-CV
- 1-AFW-4531-CV
- 1-AFW-4532-CV
- 1-AFW-4533-CV

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VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

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G.2 (continued)	
e. On the affected SG, verify shut the SG AFW STM SUPP & BYPASS valve:	
 (11 SG) 1-MS-4070-CV 1-MS-4070A-CV (12 SG) 1-MS-4071-CV 1-MS-4071A-CV 	
	 f.1 IF the ADV will NOT shut from 1C43, THEN shut the ADV Manual Isolation valve for the affected SG: (11 SG) 1-MS-101 (12 SG) 1-MS-104
(continue)	

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VIII. EXCESSIVE SG TUBE LEAKA EFFECT	GE WITH LTOP CONTROLS IN
<u>ACTIONS</u>	ALTERNATE ACTIONS
 G.2 (continued) h. On the affected SG, verify shut the S/G B/D valves: 11 SG 1-BD-4010-CV 1-BD-4011-CV 12 SG 1-BD-4012-CV 1-BD-4013-CV Verify shut the upstream drains by placing MS UPSTREAM DRN ISOL VLVS handswitch 1-HS-6622 in CLOSE. j. Observe locally, from the Auxiliary Building Roof, that the SG Safety Valves are NOT leaking. 3. Verify that the affected SG is isolated by checking the following parameters: Unaffected SG level change consistent with feed flow SG samples verifies activity higher in 	j.1 IF the SG Safety Valves are observed leaking, THEN inform Chemistry and Radiation Safety Supervision that an unmonitored radiological release is occurring.
the affected SG (continue)	

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VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

	<u></u>
G. (continued)	
 IF the wrong SG was isolated, THEN perform the following actions to return the isolated SG to service: 	
a. IF Main Feedwater flow has been stopped for greater than 80 minutes, THEN perform the following actions:	
(1) Initiate AFW flow to the unaffected SG.	
(2) Ensure the SG FW ISOL valves are shut.	
<u>CAUTION</u> A severe waterhammer may result if Main Feedwater flow is restored after it has been stopped for greater than 80 minutes.	
b. Position all valves that were shut in Step G.2 to their desired position.	
c. Isolate the proper SG PER Step G.2.	
H. WHEN THE AFFECTED SG IS ISOLATED, THEN COMMENCE AN RCS COOLDOWN.	
 Maintain unaffected SG level between (-)24 and (+)30 inches. 	
2. Place the CNDSR HOTWELL MAKEUP & DUMP CONTR, 1-LIC-4405, in MANUAL with a 50% output signal.	
(continue)	

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VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT		
ACTIONS	ALTERNATE ACTIONS	
H. (continued)		
<u>CAUTION</u> RCS temperature and pressure must be closely monitored to avoid a cooldown greater than the Technical Specification Limit.		
3. Commence an RCS cooldown to less than 300° F, while NOT exceeding the following limits for any one hour. [B0053]		
 Greater than 256° F 100° F/hr 106° F to 256° F 40° F/hr Less than 106° F 35° F/hr 		
	WARNING The following step could result in an unmonitored radiation release if performed improperly.	
a. IF Turbine Bypass Valves are available, THEN perform the following:	a.1 IF Turbine Bypass Valves are NOT available, THEN conduct the RCS cooldown by throttling the ADV on the unaffected SG.	
(1) Ensure the ADVs are shut.(2) Conduct the RCS cooldown using		
the Turbine Bypass System. (continue)		

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VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

ALTERNATE ACTIONS

H.3 (continued)

- b. **IF ALL** RCPs are secured, **THEN** perform the following:
 - (1) Reduce the RCS cooldown rate to approximately 35° F per hour.

NOTE

Maintaining flow in the affected loop will prevent the formation of dilute pockets of water due to backflow from the SG.

- (2) Verify flow in the affected loop by the following indications:
 - Affected loop T COLD trend consistent with the unaffected loop T COLD
 - T cold is greater than Тнот
- (3) **IF** 11 SG is the affected SG, **THEN** disable 11A and 11B RCPs by removing the Reactor Coolant Pump Breaker CLOSE CIR fuses.
 - 11A RCP 252-11P01
 - 11A RCP 252-11P02
 - 11B RCP 252-13P01
 - 11B RCP 252-13P02
- (4) **IF** 12 SG is the affected SG, **THEN** disable 12A and 12B RCPs by removing the Reactor Coolant Pump Breaker CLOSE CIR fuses.
 - 12A RCP 252-12P01
 - 12A RCP 252-12P02
 - 12B RCP 252-14P01
 - 12B RCP 252-14P02

(continue)

NOTE

The maximum cooldown rate to prevent flow stagnation in the affected loop is expected to be between 10° F and 35° F per hour, depending on decay heat removal.

- (2).1 **IF** flow can **NOT** be verified in the affected loop, **THEN** reduce the cooldown rate until flow is established.
- (2).2 IF the cooldown rate can NOT be reduced sufficiently to establish flow in the affected loop, THEN control RCS pressure PER Step I, Page 72, to minimize backflow from the SG.

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VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

<u>ACTIONS</u>

ALTERNATE ACTIONS

H. (continued)

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 WHEN T HOT is less than 300° F AND RCS pressure is less than 300 PSIA, THEN perform the following actions:

<u>NOTE</u>

Cavity Cooling and CEDM Cooling aid in cooling Reactor Vessel Head if a void exists.

- a. Verify that ALL available CAV CLG FANs and CEDM CLG FANs are running.
- b. Close the SIT OUT breakers.
 - (1-SI-614-MOV) 52-11442
 - (1-SI-624-MOV) 52-11443
 - (1-SI-634-MOV) 52-10442
 - (1-SI-644-MOV) 52-10443
- c. Shut the SIT OUT valves:
 - 1-SI-614-MOV
 - 1-SI-624-MOV
 - 1-SI-634-MOV
 - 1-SI-644-MOV

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VIII.	EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN
	EFFECT

ACTIONS	ALTERNATE ACTIONS
I. DEPRESSURIZE THE RCS TO REDUCE SUBCOOLING AND MAINTAIN PZR LVL.	
 IF Main Pressurizer Spray is available, THEN depressurize the RCS using Main Pressurizer Spray while maintaining the following: RCS pressure approximately equal to affected SG pressure At least 25° F subcooling RCS pressure as close to the NPSH limits PER EOP ATTACHMENT (1), RCS PRESSURE TEMPERATURE LIMITS, as possible 	 1.1 IF the Main PZR Spray Valves are NOT effective at reducing pressure OR Main Spray is NOT available, THEN depressurize the RCS using Aux Spray while maintaining the following: RCS pressure approximately equal to affected SG pressure At least 25° F subcooling IF the RCPs are running, THEN maintain RCS pressure as close to the NPSH limits PER EOP ATTACHMENT (1), RCS PRESSURE TEMPERATURE LIMITS, as possible IF the SIT OUT valves are open THEN maintain RCS pressure greater than SIT pressure CAUTION TRM 15.4.2 shall be complied with, if the temperature difference between the PZR and the Regenerative HX Outlet is greater than 400° F. Record the temperature difference between PZR WATER TEMP, 1-TI-101, and CHG OUT TEMP, 1-TI-229. Open the AUX SPRAY valve, 1-CVC-517-CV. Operate the LOOP CHG valves as necessary to adjust Aux Spray: 1-CVC-518-CV 1-CVC-518-CV
(continue)	(continue)

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EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN VIII. EFFECT ACTIONS **ALTERNATE ACTIONS** I.1 (continued) I.1.1 (continued) d. Shift the PRESSURIZER SPRAY VLV CONTROLLER, 1-HIC-100, to MANUAL. e. Shut the Pressurizer Spray Valves by adjusting the output of 1-HIC-100 to 0%: • 1-RC-100E-CV • 1-RC-100F-CV f. WHEN Aux Spray is NOT required, THEN secure Aux Spray. (1) Open the LOOP CHG valves: • 1-CVC-518-CV • 1-CVC-519-CV (2) Shut the AUX SPRAY valve, 1-CVC-517-CV. g. Maintain the pressurizer cooldown rate less than 200° F/hour. (continue)

a.

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VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

ALTERNATE ACTIONS

I. (continued)

<u>NOTE</u>

The RCS is **NOT** water solid if Pressurizer Level or Reactor Vessel level indicates a bubble exists, **AND** either saturated conditions exist in the RCS **OR NO** rapid pressure excursions due to RCS inventory or temperature changes have occurred.

- 2. IF the RCS is NOT water solid, THEN maintain subcooling within the following limits:
 - Between 25° F and 140° F based on CET temperatures
 - RCS pressure greater than the NPSH limits PER EOP ATTACHMENT (1), RCS PRESSURE TEMPERATURE LIMITS
 - RCS pressure approximately equal to affected SG pressure
 - IF the SIT OUT valves are open, THEN maintain RCS pressure greater than SIT pressure

CAUTION

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

- a. Raise subcooling by **ANY** of the following methods:
 - (1) Secure Pressurizer Spray.

NOTE

Pressurizer Backup Heater Banks 11 and 13 trip on U/V and SIAS.

(2) Operate the Pressurizer HTR(s).

(continue)

- 2.1 IF the RCS is water solid, THEN maintain subcooling within the following limits:
 - Between 25° F and 140° F based on CET temperatures
 - RCS pressure greater than the NPSH limits PER EOP ATTACHMENT (1), RCS PRESSURE TEMPERATURE LIMITS
 - RCS pressure approximately equal to affected SG pressure
 - IF the SIT OUT valves are open, THEN maintain RCS pressure greater than SIT pressure
 - a. Lower subcooling by **ANY** of the following methods:
 - (1) Lower RCS temperature.
 - (2) IF the overpressurization is due to the HPSI/Charging flow

AND the HPSI termination criteria are met, THEN throttle or secure flow to restore subcooling to less than 140° F.

(3) De-energize the Pressurizer HTR(s).

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VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

a.

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I.2.a (continued)		I.2.a.1 (continued)
(3)	Raise the RCS cooldown rate, while NOT exceeding the following cooldown limits in any one hour, by using the Turbine Bypass System or Atmospheric Dump Valves:	<u>CAUTION</u> The potential exists for pressurized thermal shock from an excessive cooldown followed by a repressurization. b. Raise subcooling by ANY of the following methods:
(4)	 [B0053] Greater than 256° F 100° F/hr 106° F to 256° F 40° F/hr Less than 106° F 35° F/hr IF HPSI flow has been reduced, THEN raise HPSI flow by opening HPSI header valves which have been throttled or starting the HPSI pump which has been stopped. 	 (1) Raise RCS temperature. (2) IF HPSI flow has been reduced, THEN raise HPSI flow by opening HPSI header valves which have been throttled or starting the HPSI pump which has been stopped. NOTE Pressurizer Backup Heater Banks 11 and 13 trip on U/V and SIAS.
	ver subcooling by any of the owing methods:	(3) Operate the Pressurizer HTR(s).
(1)	Deenergize the Pressurizer HTR(s).	
(2)	Use Main or Auxiliary Pressurizer Spray.	
(3)	Lower the RCS cooldown rate.	
(4)	IF the overpressurization is due to the HPSI/Charging flow AND the HPSI termination criteria are met, THEN throttle or secure flow to reduce subcooling.	
	(continue)	

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VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

ALTERNATE ACTIONS

I.2.b (continued)

(5) Use the Presurizer Vent valves:

- 1-RC-105-SV
- 1-RC-106-SV

3. IF ALL of the following conditions exist:

- Backflow from the affected SG to the RCS is anticipated
- HPSI termination criteria can be met
- A bubble exists in the Pressurizer

THEN maintain Pressurizer Level between 101 and 120 inches until the backflow is initiated.

4. IF a bubble exists in the Pressurizer AND HPSI flow has been secured, THEN restore and maintain Pressurizer Level between 101 and 170 inches by operating Charging and, if available, Letdown.

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VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

ALTERNATE ACTIONS

J. MAINTAIN PRESSURE AND LEVEL CONTROL OF THE AFFECTED SG.

<u>NOTE</u>

If available, narrow range SG level indication should be used to control the affected SG level.

NOTE

The following methods of maintaining affected SG pressure and level are arranged in order of priority. The method with the highest priority should be employed first, based on equipment availability.

CAUTION

SG pressure and RCS pressure should be monitored closely to avoid uncontrolled pressurizer level rises due to backfill from the affected SG.

- Maintain pressure in the affected SG approximately equal to RCS pressure and SG level between (-)24 and (+)30 inches by performing **ANY** of the following:
 - a. Maintain the affected SG level by controlling RCS pressure with backflow to the RCS as follows:
 - IF the affected SG level is high, THEN reduce RCS pressure below the affected SG pressure by ANY of the following methods:
 - Deenergize the Pressurizer Heater(s)
 - Use Main or Auxiliary
 Pressurizer Spray

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VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

ALTERNATE ACTIONS

J.1.a(1) (continued)

- IF the HPSI/LPSI throttle/termination criteria are met, THEN throttle or secure flow to reduce RCS pressure
- (2) Control RCS pressure to maintain the affected SG level approximately constant.
- (3) IF pressure reduction of the affected SG is required, THEN steam the affected SG to the condenser by concurrently performing step J.1.d, Page 83.
- b. On the affected SG, maintain pressure and level by blowing down to the MWS as follows:
 - (1) Place UNIT 1 S/G B/D RECOVERY radiation monitor, 1-RIC-4095, in OPER alarm at 1C22G:
 - (a) Verify 1-HS-4095B/S1 -OPER BYPASS in OFF.
 - (b) Highlight Stop Pump AND press SELECT.
 - (c) Verify the CH 1 green OPER LED extinguishes.
 - (d) Bypass annunciator alarms.

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VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

ALTERNATE ACTIONS

J.1.b (continued)

NOTE

B/D RECVRY DISCH TO MWS valve, 1-BD-4097-CV, B/D RECVRY DISCH TO CIRC WTR valve, 1-BD-4015-CV, and B/D RECVRY DISCH TO CNDSR valve, 1-BD-4096-CV, are operated from 1C107.

- (2) Open the B/D RECVRY DISCH TO MWS valve, 1-BD-4097-CV.
- (3) Shut the B/D RECVRY DISCH TO CIRC WTR valve, 1-BD-4015-CV.
- (4) Shut the B/D RECVRY DISCH TO CNDSR valve, 1-BD-4096-CV.
- (5) Shut the SG Combined BD Header Throttle Valves:
 - 1-BD-102
 - 1-BD-104
- (6) On the affected SG, open the BOT BD Valve by placing its handswitch in RAD TRIP OVERRIDE:
 - (11 SG) 1-BD-4011-CV
 - (12 SG) 1-BD-4013-CV
- (7) On the affected SG, throttle open the SG Combined BD Header Throttle Valve to obtain a blowdown flow of approximately 100 GPM while maintaining 11 BD HX outlet temperature less than 200° F:
 - (11 SG) 1-BD-102
 (12 SG) 1-BD-104

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VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

J.1.b (continued)

ALTERNATE ACTIONS

- (8) Pump the MWRT **PER** the <u>Processing The Contents Of The</u> <u>MWRT To The RCWMT Through</u> <u>the MWIX</u> section of OI-17D, <u>MISCELLANEOUS WASTE</u> <u>PROCESSING SYSTEM</u>.
 - (9) Monitor MWRT level at 1C33 and maintain MWRT level approximately constant by throttling the SG BD rate while pumping to the RCWMT.
- (10) Feed and Bleed the affected SG by alternately lowering level to (-)24 inches using SG BD to the MWS and raising level to (+)30 inches using AFW PER Step J.2.b, Page 86.

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VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

J.1 (continued)

ALTERNATE ACTIONS

- Maintain the affected SG pressure and level by blowdown to the condenser as follows:
 - (1) Ensure that at least one Condensate Demin is in service.
 - (2) Open the PRECOAT SYS BYP valve, 1-CD-5818-CV.
 - (3) Shut the COND DEMIN BYP valve, 1-CD-4439-MOV.
 - (4) IF AFW is operating, AND the Main Feedwater Minflow valves are shut, THEN establish maximum condensate flow through the Condensate Demineralizers:
 - (a) Open FEEDWATER DUMP TO CONDENSER ISOLATION valve, 1-FW-135.
 - (b) Throttle open FEEDWATER DUMP TO CONDENSER B/U ISOLATION valve, 1-FW-134 while maintaining COND HDR PRESS greater than 175 PSIG.
 - (5) Shut the Condenser High Level Dump CV Inlet valve, 1-CD-232.
 - (6) Bypass UNIT 1 S/G B/D RECOVERY radiation monitor, 1-RIC-4095:
 - (a) Place 1-HS-4095B/S2 -HIGH BYPASS in BYPASS.
 - (b) Verify 1-HS-4095B/S1 -OPER BYPASS in BYPASS.

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VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

ALTERNATE ACTIONS

J.1.c (continued)

<u>NOTE</u>

B/D RECVRY DISCH TO MWS valve, 1-BD-4097-CV, B/D RECVRY DISCH TO CIRC WTR valve, 1-BD-4015-CV, and B/D RECVRY DISCH TO CNDSR valve, 1-BD-4096-CV are operated from 1C107.

- (7) Shut the B/D RECVRY DISCH TO MWS valve, 1-BD-4097-CV.
- (8) Shut the B/D RECVRY DISCH TO CIRC WTR valve, 1-BD-4015-CV.
- (9) Open the B/D RECVRY DISCH TO CNDSR valve, 1-BD-4096-CV.
- (10) Shut the SG Combined BD Header Throttle valves:
 - 1-BD-102
 - 1-BD-104
- (11) On the affected SG, open the SG BOT blowdown valve by placing its handswitch in RAD TRIP OVERRIDE:
 - 11 BOT 1-BD-4011-CV
 - 12 BOT 1-BD-4013-CV
- (12) On the affected SG, throttle open the SG Combined BD Header Throttle valve to obtain a blowdown flow of approximately 100 GPM while maintaining 11 BD HX outlet temperature less than 200° F:
 - (11 SG) 1-BD-102
 (12 SG) 1-BD-104

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VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

J.1.c (continued)

ALTERNATE ACTIONS

- (13) Feed and Bleed the affected SG by alternately lowering level to
 (-)24 inches using SG Blowdown to the Condenser and raising level to (+)30 inches using AFW
 PER Step J.2.b, Page 86.
- d. On the affected SG, maintain pressure and level by steaming to the Condenser as follows:
 - (1) Ensure that Condenser Vacuum is greater than 20 inches HG.
 - (2) Ensure that at least one Condensate Demin is in service.
 - (3) Open the PRECOAT SYS BYP valve, 1-CD-5818-CV.
 - (4) Shut the COND DEMIN BYP valve, 1-CD-4439-MOV.
 - (5) IF AFW is operating, AND the Main Feedwater Minflow valves are shut, THEN establish maximum condensate flow through the Condensate Demineralizers:
 - (a) Open FEEDWATER DUMP TO CONDENSER ISOLATION valve, 1-FW-135.
 - (b) Throttle open FEEDWATER DUMP TO CONDENSER B/U ISOLATION valve, 1-FW-134 while maintaining COND HDR PRESS greater than 175 PSIG.
 - (6) Shut the Condenser High Level Dump CV Inlet valve, 1-CD-232.

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VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

ALTERNATE ACTIONS

J.1.d (continued)

- (7) Operate the MS UPSTREAM DRN ISOL VLVS using
 1-HS-6622 as necessary to control pressure on the affected SG.
- (8) Close the power supply breakers to the MSIV Bypass valves:
 - 1-MOV-4045 breaker, 52-11428
 - 1-MOV-4052 breaker, 52-10428

CAUTION

Damage to the steam system could occur due to moisture carryover if the MSIV Bypass Valve is operated on a SG whose level exceeds (+)63.5 inches.

- (9) IF additional steam flow is desired,
 AND SG level is less than (+)63.5 inches,
 THEN operate the MSIV BYP valve on the affected SG:
 - (11 SG) 1-MS-4045-MOV
 - (12 SG) 1-MS-4052-MOV

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VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

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e.	IF the ADV has NOT been manually isolated, THEN maintain pressure and level on the affected SG by steaming to the		TH		IF the ADV was manually isolated, THEN maintain pressure on the affected SG as follows:
	atmosphere from 1C43 as follows:		(1)	Record the total time ADV is open for dose calculations:	
	(1)	Establish communications between the Control Room and an operator at 1C43.		(2)	Direct throttling open the ADV Manual Isolation Valve on the affected SG to maintain its pressure
	(2)	Verify that the ADV controller at 1C43 for the affected SG is set at 0% output:			approximately equal to RCS pressure:
		 (11 SG) 1-HC-4056A (12 SG) 1-HC-4056B 			 (11 SG) 1-MS-101 (12 SG) 1-MS-104
	(3)	Verify that the Hand Transfer Valves for the affected SG are selected to POSITION 2 (1C43):			
		11 SG • 1-HV-3938A • 1-HV-3938B			
		12 SG • 1-HV-3939A • 1-HV-3939B			
	(4)	Record the total time ADV is open for dose calculations:			
	(5)	Direct the adjustment of the ADV from 1C43 as necessary to maintain pressure on the affected SG approximately equal to RCS pressure.			
f.	valv THE	ne MSIV, ADV and MSIV BYP es remain shut, EN the affected SG level may be wed to fill to the MSIV.			
		(continue)			

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VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

ALTERNATE ACTIONS

J. (continued) 2. IF the SG level drops below (-)24 inches, THEN restore level on the affected SG by performing ANY of the following actions: a. Reduce the cooldown and depressurization rate of the RCS to allow RCS and SG pressures to equalize so that the affected SG level is maintained above (-)24 inches by leakage from the RCS. b. IF 13 AFW Pump is available, b.1 IF 13 AFW Pump is NOT available to **THEN** establish Auxiliary Feedwater feed the affected SG. flow to the affected SG as follows: THEN establish AFW using the Unit 2 to Unit 1 AFW cross connect as follows: (1) On the affected SG, place the motor driven train SG AFW (1) Shut the Unit 2 motor driven train **BLOCK valve handswitches in** SG AFW BLOCK valves: OPEN: 21 SG 11 SG 2-AFW-4522-CV 1-AFW-4522-CV 2-AFW-4523-CV . 1-AFW-4523-CV 22 SG 12 SG 2-AFW-4532-CV 1-AFW-4532-CV 2-AFW-4533-CV 1-AFW-4533-CV (continue) (continue)

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VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

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J.2.b (continued)	J.2.b.1 (continued)
J.2.b (continued) (2) IF 13 AFW Pump is NOT being used to feed the unaffected SG, THEN perform the following: (a) Shut the motor driven train SG AFW BLOCK valves for the unaffected SG: 11 SG 1-AFW-4522-CV 12 SG 1-AFW-4523-CV 12 AFW-4533-CV (b) Start 13 AFW Pump. (b) Start 13 AFW Pump. (caution 13 AFW Pump flow limit is 575 GPM. (3) Restore and maintain the affected SG level between (-)24 and (+)30 inches, by adjusting the S/G FLOW CONTR valve: (11 SG) 1-AFW-4525-CV (12 SG) 1-AFW-4535-CV (4) Do NOT exceed the following cooldown limits in any one hour: [B0126] Greater than 256° F 100° F/hr	 (2) Open the Unit 2 to Unit 1 AFW Cross Connect valve, 2-AFW-4550-CV. (3) Start 23 AFW PP as follows to establish AFW flow to the affected SG: (a) Shut the Unit 1 S/G FLOW CONTR valves: (11 SG) 1-AFW-4525-CV (12 SG) 1-AFW-4535-CV (b) For the affected SG, place the motor driven train SG AFW BLOCK valve handswitches in OPEN: 11 SG 1-AFW-4522-CV 1-AFW-4523-CV 12 SG 1-AFW-4532-CV 1-AFW-4533-CV (c) Start 23 AFW PP. (d) On the affected SG, adjust the Unit 1 S/G FLOW CONTR
 Greater than 256° F 100° F/hr 106° F to 256° F 40° F/hr Less than 106° F 35° F/hr 	Onit 1 S/G FLOW CONTR valve to maintain SG level between (-)24 and (+)30 inches: (11 SG) 1-AFW-4525-CV
(continue)	• (11 33) 1-AFW-4535-CV • (12 SG) 1-AFW-4535-CV (continue)

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VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS	ALTERNATE ACTIONS
J.2.b (continued)	J.2.b.1(3) (continued)
	(e) Do NOT exceed the following cooldown limits in any one hour: [B0126]
	 Greater than 256° F 100° F/hr 106° F to 256° F 40° F/hr Less than 106° F 35° F/hr
	b.2 IF 23 AFW Pump is NOT available, THEN establish AFW flow to the unaffected SG using 11 or 12 AFW Pump.
	(1) For the affected SG, place the steam driven train SG AFW Block valve handswitches in OPEN:
	11 SG • 1-AFW-4520-CV • 1-AFW-4521-CV
	12 SG • 1-AFW-4530-CV • 1-AFW-4531-CV
	(2) IF 11 or 12 AFW Pump is NOT being used to feed the unaffected SG,
	THEN shut the steam driven train SG AFW Block valves for the unaffected SG:
	11 SG • 1-AFW-4520-CV • 1-AFW-4521-CV
	12 SG • 1-AFW-4530-CV • 1-AFW-4531-CV
(continue)	(continue)
	х <i>,</i>

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VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

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J.2.b (continued)	J.2.b.2 (continued)
	<u>WARNING</u> The following step could result in an unmonitored radiation release if performed improperly.
	(3) For the unaffected SG, open the SG AFW STM SUPP & BYPASS valves:
	 (11 SG) 1-MS-4070-CV 1-MS-4070A-CV (12 SG) 1-MS-4071-CV 1-MS-4071A-CV
	(4) Adjust and maintain the 11 or 12 AFW Pump discharge pressure approximately 100 PSI greater than the affected SG pressure using the AFW PP SPEED CONTRs:
	 11 AFW PP 1-HC-3987A 12 AFW PP 1-HC-3989A
	(5) On the affected SG, adjust the S/G FLOW CONTR to maintain affected SG level between (-)24 and (+)30 inches:
	 (11 SG) 1-FIC-4511A (12 SG) 1-FIC-4512A
	 (6) Do NOT exceed the following cooldown limits in any one hour: [B0126]
	 Greater than 256° F 100° F/hr 106° F to 256° F 40° F/hr Less than 106° F 35° F/hr
· ·	(7) Operate the AFW Pump Room ventilation PER OI-32A, <u>AUXILIARY</u> <u>FEEDWATER SYSTEM UNIT 1</u> .

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VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

ALTERNATE ACTIONS

K. CONTINUE TO TAKE CHEMISTRY AND RAD CON SAMPLES.

1. Notify Chemistry and Radiation Safety Supervision to perform periodic samples for the following:

- RCS boron concentration at least once per hour
- RCS activity
- SGs boron concentration and activity
- Turbine Building Sumps for activity
- Condensate and CSTs for activity
- Air samples and radiation throughout the plant to determine the spread of contamination
- 2. Ensure boron concentration remains above 116 percent of the required shutdown margin **PER** NEOP-13, <u>TECHNICAL DATA BOOK (UNIT 1)</u>.

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VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

<u>ACTIONS</u>

ALTERNATE ACTIONS

IF RCPs ARE SECURED, THEN CONFIRM NATURAL CIRCULATION IN THE UNAFFECTED SG LOOP.

L.

NOTE

Verification of an RCS temperature response to a plant change during Natural Circulation can not be accomplished until approximately 5 to 15 minutes following the action due to increase in loop cycle times.

- 1. Verify Natural Circulation in at least one loop by the following:
 - THOT minus T COLD less than 50° F
 - T COLD constant or lowering
 - THOT constant or lowering
 - CET temperatures trend consistent with T HOT
 - Steaming rate affects RCS temperatures

Rev 23/Unit 1 Page 92 of 165 VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT **ACTIONS ALTERNATE ACTIONS** М. **RESTORE LETDOWN FLOW.** WARNING High area radioactivity in the auxiliary building may result if letdown is initiated with high activity levels in the RCS. 1. Verify the following: 1.1 IF ANY condition can NOT be maintained. HPSI throttle/termination criteria are THEN PROCEED to step N. ٠ met Charging flow path exists through LOOP CHG valves or AUX SPRAY valve At least ONE CHG PP is operating 2. Verify the PRZR LVL CONTR, 1-LIC-110X or 1-LIC-110Y, in Auto Remote. 3. Place the L/D PRESS CONTR, 1-PIC-201, in MANUAL with a 20% output. 4. Place IX BYPASS valve, 1-CVC-520-CV, in BYPASS. 5. Shift LETDOWN THROTTLE VLV CONTROLLER, 1-HIC-110, to MANUAL and adjust to 0%. 6. IF the plant computer is **NOT** operating, **THEN** record the following information: RCS T COLD • CHG OUT TEMP (1-TI-229) Average CNTMT ambient temperature . (1-TI-5309 and 1-TI-5311) 27' Penetration Room temperature ٠ (1-TI-5276 and 1-TI-5280) (continue)

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VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

ALTERNATE ACTIONS

- 7. Check BOTH Backpressure Regulating valves and Letdown Control Valves in service by verifying the following:
 a. BOTH Letdown Control Valve Inlet valves open:

 1-CVC-103
 1-CVC-105
 - b. **BOTH** Letdown Control Valve Outlet valves open:
 - 1-CVC-104

M. (continued)

- 1-CVC-106
- c. **BOTH** Backpressure Regulating Inlet valves open:
 - 1-CVC-108
 - 1-CVC-110
- d. **BOTH** Backpressure Regulating Outlet valves open:
 - 1-CVC-109
 - 1-CVC-111
- e. L/D CONTR VLVS handswitch, 1-HS-110-1, in BOTH.
- f. BACKPRESS REG VLVS handswitch, 1-HS-201, in **BOTH**.
- 8. Open L/D CNTMT ISOL valves:
 - 1-CVC-515-CV
 - 1-CVC-516-CV

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VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

M. (continued)

ALTERNATE ACTIONS

CAUTION The setpoint of 1-PIC-201 must be above the saturation pressure for the letdown outlet temperature of the Regenerative Heat Exchanger. 9. Place L/D PRESS CONTR, 1-PIC-201 in service as follows: a. Adjust the setpoint on 1-PIC-201 to a value less than RCS pressure but greater than the expected saturation pressure for letdown temperature. b. Shift L/D PRESS CONTR, 1-PIC-201 to AUTO. 10. Adjust the LETDOWN THROTTLE VLV CONTROLLER, 1-HIC-110, to slowly restore letdown flow. 11. Shift the LETDOWN THROTTLE VLV CONTROLLER, 1-HIC-110, to AUTOMATIC. 12. Operate L/D HX TEMP CONTR, 1-TIC-223, to maintain Letdown Heat Exchanger letdown outlet temperature less than 120 ° F. 13. IF a bubble exists in the pressurizer, 13.1 IF pressurizer level is **NOT** trending to THEN check pressurizer level is trending 160 inches. to 160. **THEN** shift the PRZR LVL CONTR, 1-LIC-110X or 1-LIC-110Y, to Auto Local **AND** adjust the setpoint to 160 inches.

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VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

ALTERNATE ACTIONS

N. **IF** THE RCS IS WATER SOLID, **THEN** DRAW A BUBBLE IN THE RCS.

IF the RCS is water solid, AND it is desired to draw a bubble in the RCS, THEN perform the following actions:

NOTE

Pressurizer Backup Heater Banks 11 and 13 trip on U/V and SIAS.

- a. Energize the Pressurizer Heater(s).
- b. **IF EITHER** of the following conditions exist:
 - BOTH SG pressures can be maintained less than RCS pressure
 - At least one RCP is running

THEN draw a bubble in the RCS as follows:

- IF the HPSI throttle/termination criteria are met, THEN reduce RCS pressure by reducing HPSI/Charging flow or raising letdown flow.
- (2) Cooldown the RCS, while **NOT** exceeding the following cooldown limits in any one hour, by using the TBVs or ADVs: **[B0053]**
 - Greater than 256° F 100° F/hr
 - 106° F to 256° F 40° F/hr
 - Less than 106° F 35° F/hr

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VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

ALTERNATE ACTIONS

N.1 (continued)	
 c. IF a bubble forms in the Pressurizer, THEN operate HPSI/Charging and Letdown as necessary to restore and maintain Pressurizer level between 101 and 170 inches. 	
 IF a bubble forms in the Reactor Vessel Head, THEN operate HPSI/Charging and Letdown as necessary to restore and maintain level above the top of the hot leg. 	
O. MONITOR FOR CORE AND RCS VOIDING.	
<u>CAUTION</u> Void formation occurs when pressure drops below the saturation pressure for the Reactor Vessel Head temperature.	
 Monitor for Core and RCS voiding by the following: 	
 Rapid unexplained rise in pressurizer level during an RCS pressure reduction 	
 Loss of subcooled margin as determined using CET temperatures 	
• "RXV WTR LVL LO" alarm	
(continue)	

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VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

ALTERNATE ACTIONS

- O. (continued)
- IF voiding causes difficulty in depressurization
 OR threatens heat removal as indicated by EITHER of the following:
 - Reactor Vessel level approaching the top of the Hot Leg with at least 25° F subcooling
 - The pressure in **BOTH** S/Gs is greater than the saturation pressure of the RCS

THEN reduce or eliminate the voided area by performing the following actions:

- a. Verify that the L/D CNTMT ISOL valves are shut:
 - 1-CVC-515-CV
 - 1-CVC-516-CV

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VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

ALTERNATE ACTIONS

O.2 (continued)

CAUTION

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

b. Stop the depressurization and raise RCS subcooling to as near 140° F as practical by **ANY** of the following methods:

NOTE

Pressurizer Backup Heater Banks 11 and 13 trip on U/V and SIAS.

- (1) Operate pressurizer heaters.
- (2) Raise cooldown rate while **NOT** exceeding the following limits for any one hour. **[B0053]**
- Greater than 256° F 100° F/hr
- 106° F to 256° F 40° F/hr
- Less than 106° F 35° F/hr
- (3) **IF** HPSI flow has been reduced, **THEN raise** HPSI flow by opening HPSI header valves which have been throttled or starting HPSI Pumps which have been stopped.

b.1 IF raising RCS subcooling does NOT restore heat removal, THEN operate Reactor Vessel Vent Valves PER the <u>Venting The Reactor</u> <u>Coolant System After An Accident</u> section of OI-1G, <u>REACTOR COOLANT</u> <u>VESSEL HEAD AND PRESSURIZER</u> VENT SYSTEM.

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VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT	
ACTIONS	ALTERNATE ACTIONS
O.2 (continued)	

NOTE Voids may form in the SG Tubes if the saturation pressure of a SG is greater than the saturation pressure of the RCS.

CAUTION

If voids exist in the SG Tubes, a rapid RCS pressure reduction will occur when the voids collapse.

- c. IF voiding is suspected in the SG tubes,
 THEN cool the SG so that the following RCS cooldown rates are
 NOT exceeded in any one hour:
 [B0053]
 - Greater than 256° F 100° F/hr
 - 106° F to 256° F 40° F/hr
 - Less than 106° F 35° F/hr

by raising **ANY** of the following:

- Steaming rate
- Feed rate
- SG Blowdown rate

P. CONTROL SECONDARY SYSTEM CONTAMINATION.

- 1. Minimize the spread of contamination by performing the following:
 - a. Ensure the Unit 1 Turbine Building Sump Pumps are in STOP.

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VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

ALTERNATE ACTIONS

P.1 (continued)	
 Isolate Condensate Dump to 11 CST by verifying the following valves are shut: 	
 CONDENSER HOTWELL HIGH LEVEL DUMP CV-4405 INLET VALVE, 1-CD-232 CONDENSER HOTWELL HIGH LEVEL DUMP CV-4405 BYPASS VALVE, 1-CD-234 	- -
 c. Verify CONDENSER MAKEUP CV-4406 BYPASS VALVE, 1-CD-238, is shut. 	
d. Reduce moisture carryover into the CAR Discharge Header by fully opening the CONDENSER VACUUM PUMP SERVICE WATER OUTLET VALVEs:	
 (11 CAR) 1-SRW-211 (12 CAR) 1-SRW-215 (13 CAR) 1-SRW-219 (14 CAR) 1-SRW-223 	
e. Ensure Condensate to Circ Water Dump is isolated by verifying the followng valves shut:	
 CONDENSER DUMP TO CIRCULATING WATER ISOLATION VALVE, 1-CD-239 CONDENSATE DUMP TO CIRCULATING WATER BYPASS VALVE, 1-CD-455 	
 f. Ensure condenser expansion joints are NOT overflowing by verifying the CONDENSER EXPANSION JOINT FILL VALVEs are shut: 	
 (11 Condenser) 1-CD-306 (12 Condenser) 1-CD-307 (13 Condenser) 1-CD-308 	
(continue)	

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VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

ALTERNATE ACTIONS

P.1 (continued)		
g .	Verify shut SRW HEAD TANK MAKEUP ISOLATION VALVE,	

1-CD-144.

h. Verify shut COMPONENT COOLING SYSTEM MAKEUP ISOLATION VALVE, 1-CD-145.

- i. Notify Plant Chemistry to secure the Hotwell sample pumps and isolate the sample sinks.
- 2. Control the volume of contaminated condensate inventory by performing the following:

CAUTION

Operating CAR PPs with condenser hotwell level greater than 12 feet may draw excessive water into the CAR PPs.

CAUTION

Operating a SGFP with condenser hotwell level greater than 12 feet may actuate the high exhaust casing level trip.

- a. IF condenser hotwell level exceeds 12 feet. THEN perform the following:
 - **Ensure Auxiliary Feedwater flow** (1) is established to the unaffected S/G.
 - (2) IF a SGFP is in operation, THEN secure the SGFP.
 - (3) Secure the CAR PPs.

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VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

<u>ACTIONS</u>

ALTERNATE ACTIONS

P.2 (continued)

- b. IF condenser hotwell level exceeds 14 feet, THEN shut the COND SHELL STOPs:
 - 1-CAR-101
 - 1-CAR-102
 - 1-CAR-103
 - 1-CAR-104
 - 1-CAR-105
 - 1-CAR-106

NOTE

Using the Turbine Bypass System with Condensate/Main Feedwater will enable greater cooldown capability without raising contaminated condensate inventory.

CAUTION

An unmonitored radiation release could occur if the Atmospheric Dump Valve is in use and Condensate/Main Feedwater is used to feed the unaffected S/G.

- c. IF Auxiliary Feedwater is being used to feed the unaffected S/G,
 THEN attempt to restore the Turbine Bypass System
 AND Condensate/Main Feedwater to operation PER the appropriate procedure.
- IF Auxiliary Feedwater is being used to feed the unaffected S/G,
 THEN shut the Hotwell Makeup CV by shifting 1-LIC-4405 to MANUAL with 100% output.

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VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

ALTERNATE ACTIONS

P.2 (continued)

- e. Ensure the Auxiliary Boiler Condensate returns are aligned to Unit 2 by verifying the following:
 - (1) 0-AHB-211, DEAERATOR OVERFLOW TO 21 CONDENSER ISOLATION VALVE, is open.
 - (2) 0-AHB-210, DEAERATOR OVERFLOW TO 11 CONDENSER ISOLATION VALVE, is shut.
- f. Ensure the RC Waste Evaporators are aligned to Unit 2 or the Auxiliary Boilers PER OI-17E, <u>REACTOR</u> <u>COOLANT WASTE EVAPORATOR</u> <u>OPERATION</u>.
- g. Ensure Plant Heating is aligned to Unit 2 Reheat Steam or the Auxiliary Boilers **PER** OI-40, <u>PLANT HEATING</u> <u>SYSTEM</u>.

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VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

ALTERNATE ACTIONS

Q. ATTEMPT TO ESTABLISH SHUTDOWN COOLING CONDITIONS.

1. **WHEN** the following conditions have been established:

- RCS temperature is less than 300° F
- RCS pressure is less than 260 PSIA
- PZR level is greater than 101 inches
- RCS subcooling is greater than 25° F based on CET temperatures

THEN perform the following actions:

- a. Contact Radiation Safety Supervision to check that radiation levels are low enough to allow valve repositioning.
- b. Initiate SDC **PER** OI-3B, <u>SHUTDOWN</u> <u>COOLING UNIT-1</u>.
- c. Operate HPSI and Charging and Letdown to maintain the following:
 - Pressurizer level between 101 and 170 inches
 - RCS pressure within the specified limits PER EOP Attachment (1), <u>RCS PRESSURE</u> <u>TEMPERATURE LIMITS</u>, AND less than 260 PSIA

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VIII. EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT ACTIONS **ALTERNATE ACTIONS** R. IMPLEMENT THE APPROPRIATE PROCEDURE. 1. WHEN the RCS is aligned to Shutdown Coolina. THEN continue to cool the RCS to allow RCS pressure to equalize with the pressure in the affected SG. 2. WHEN the RCS pressure is equal to the 2.1 IF the Final Safety Function Status pressure in the affected SG, Check Acceptance Criteria are NOT met, THEN ensure that the Safety Function THEN continue recovery actions as Status Check Final Acceptance Criteria necessary until Final Acceptance Criteria are met. are met. 3. Reestablish normal plant configuration control as required: Locked Valves PER NO-1-205, ٠ LOCKED VALVES Component Manipulations PER • NO-1-200, CONTROL OF SHIFT ACTIVITIES 4. **IMPLEMENT** the appropriate Operating Procedure. **END of Section VIII**

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IX	. EXCESSIVE RCS LEAKAGE W	ITH LTOP CONTROLS IN EFFECT
	ACTIONS	ALTERNATE ACTIONS
Α.	STABILIZE RCS TEMPERATURE.	
1.	IF an RCS heatup or cooldown is in progress, THEN stop the heatup or cooldown and maintain the RCS temperature.	
В.	BEGIN AN INTERMEDIATE SAFETY FUNCTION STATUS CHECK PER SECTION XI., <u>SAFETY FUNCTION</u> <u>STATUS CHECK FOR EXCESSIVE</u> <u>RCS LEAKAGE WITH LTOP</u> <u>CONTROLS IN EFFECT</u> .	
C.	DETERMINE THE APPROPRIATE EMERGENCY RESPONSE ACTIONS PER THE ERPIP.	
1.	Determine the appropriate emergency response actions PER the ERPIP.	
2.	Determine reporting requirements of RM-1-101, <u>REGULATORY REPORTING</u> .	
3.	Evacuate ALL unnecessary personnel from the Containment PER the <u>CONTAINMENT EVACUATION</u> Attachment of ERPIP 3.0. [B0138]	

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IX. EXCESSIVE RCS LEAKAGE W	VITH LTOP CONTROLS IN EFFECT
ACTIONS	ALTERNATE ACTIONS
D. ESTABLISH INVENTORY CONTROL.	· · · · · · · · · · · · · · · · · · ·
 Shut the L/D CNTMT ISOL valves: [B0101] 1-CVC-515-CV 1-CVC-516-CV 	
2. Check that the Charging Pumps are maintaining PZR level between 101 and 170 inches.	 2.1 IF ALL available Charging Pumps can NOT maintain Pressurizer level greater than 101 inches, THEN complete the following actions: a. Verify STP O-55A-1, <u>CONTAINMENT CLOSURE VERIFICATION</u>, is complete and current if applicable. b. Stop ALL RCPs. c. Verify that the following RWT OUT valves are open: 1-SI-4142-MOV 1-SI-4143-MOV d. Verify that the MINI FLOW RETURN TO RWT ISOL valves are open. 1-SI-659-MOV 1-SI-660-MOV
(continue)	(continue)

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IX. EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS	ALTERNATE ACTIONS
D.2 (continued)	D.2.1 (continued)
	e. IF Pressurizer pressure is greater than 180 PSIA, THEN commence HPSI flow as follows:
	(1) Open the HPSI Header valve for the desired flowpath:
	HPSI MAIN HDR ISOL 1-SI-654
	HPSI AUX HDR ISOL 1-SI-656
	(2) Align HPSI HDR XCONN valves for selected HPSI Pump:
	• <u>1-SI-655-MOV</u>
	PPHDRPOSITION11MainOpen12MainShut13MainShut11AuxShut12AuxOpen13AuxOpen
	• <u>1-SI-653-MOV</u>
	PPHDRPOSITION11MainOpen12MainOpen13MainShut11AuxShut12AuxShut13AuxOpen
(continue)	(continue)

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EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT IX. ACTIONS **ALTERNATE ACTIONS** D.2 (continued) D.2.1.e (continued) (3) Verify that the MAIN and AUX HPSI HDR valves are shut: Main 1-SI-616-MOV • 1-SI-626-MOV 1-SI-636-MOV 1-SI-646-MOV Auxiliary 1-SI-617-MOV 1-SI-627-MOV 1-SI-637-MOV 1-SI-647-MOV (4) Start the selected HPSI PP. (5) Throttle open ONE MAIN or AUX HPSI HDR valve to maintain ALL of the following: PZR pressure PER EOP • Attachment (1), RCS PRESSURE **TEMPERATURE LIMITS** PZR level between 101 and • 170 inches At least 30° F subcooling f. IF PZR pressure is less than 180 **PSIA** THEN commence LPSI flow as follows: (1) Open the LPSI HDR valves: 1-SI-615-MOV ٠ 1-SI-625-MOV • 1-SI-635-MOV 1-SI-645-MOV (2) Start 11 and 12 LPSI PPs. (continue) (continue)

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IX. EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT

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ACTIONS	ALTERNATE ACTIONS
D.2 (continued)	 D.2.1 (continued) g. IF PZR pressure is less than 180 PSIA, AND the LPSI Pumps are NOT available, THEN commence HPSI flow as follows: [B0141] (1) Perform steps D.2.1.e.(1) through D.2.1.e.(4) of this section. (2) Throttle open ALL MAIN or AUX HPSI HDR valves to maintain ALL of the following: PZR pressure PER EOP Attachment (1), RCS PRESSURE TEMPERATURE LIMITS PZR level between 101 and 170 inches At least 30° F subcooling
(continue)	(continue)

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IX. EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT

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ACTIONS	ALTERNATE ACTIONS
D.2 (continued)	D.2.1 (continued)
	h. WHEN the following conditions exist:
	At least 30° F subcooling based on CET temperatures
	 PZR level greater than 101 inches and controlled
	 At least one SG available for heat removal
	 Reactor Vessel level above the top of the hot leg
	THEN throttle HPSI or LPSI flow to maintain the following conditions:
	 RCS subcooling between 30° and 140° F based on CET temperatures
	 Pressurizer level between 101 and 170 inches
	2.2 IF pressurizer pressure is greater than 180 PSIA and either constant or rising, THEN the operating LPSI PPs may be stopped.
	2.3 IF HPSI or LPSI throttle/termination criteria can NOT be maintained after the pumps are throttled or secured, THEN restart the appropriate pumps and restore flow.
 Makeup to the VCT to maintain level as necessary. 	

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IX	. EXCESSIVE RCS LEAKAGE W	ITH LTOP CONTROLS IN EFFECT
	ACTIONS	ALTERNATE ACTIONS
E.	PERFORM THE RCP TRIP STRATEGY.	
1.	IF CIS has actuated, OR Component Cooling flow can NOT be verified to the RCPs, THEN trip ALL RCPs.	
2.	IF RCS temperature and pressure are less than the minimum pump operating limits of the RCP curve on EOP ATTACHMENT (1), <u>RCS PRESSURE TEMPERATURE</u> <u>LIMITS</u> , THEN trip ALL RCPs.	
F.	ATTEMPT TO ISOLATE THE LEAK. [B0101]	
1.	Verify that the RCS SAMPLE ISOL valve, 1-PS-5464-CV, is shut.	
2.	Verify that the Reactor Vessel Vent valves are shut:	
	1-RC-103-SV1-RC-104-SV	
3.	Verify that the PZR Vent valves are shut:	
	1-RC-105-SV1-RC-106-SV	
	(continue)	

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IX. EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS		ALTERNATE ACTIONS
F. (continued)		
 4. Determine that the leak is occ Containment by considering t indications: Rise in Containment temp pressure, humidity or sum "U-1 WR NOBLE GAS RA and "UNIT 1 MAIN VENT alarms clear 	he following perature, plevel AD MON" GASEOUS" Lea ala	 IF the leak is NOT occurring inside of Containment, THEN perform the following actions: a. Place both PENETRATION RM VENT FANs in service. <u>NOTE</u> akage location may be indicated by sumparms, room level alarms, or area RMS arms. b. Attempt to locate and isolate the leak.
	Co occ unt Hea	<u>CAUTION</u> nce Letdown is isolated with a omponent Cooling to Letdown leak curing, dilution of the VCT will occur til Component Cooling to the Letdown eat Exchanger is isolated.
 5. Determine that NO leakage ir Component Cooling System i by: NO rising trends on Comp Cooling Radiation Monitor 	s indicated	 IF leakage into the Component Cooling System is indicated, AND shutting the Letdown CNTMT Isolation valves stopped the leak, THEN perform the following actions:
"CC HEAD TK LVL" high	alarm clear	a. Shift VCT INL, 1-CVC-500-CV, to WPS.
		 Isolate Component Cooling to the Letdown HX by performing the following:
		 Place L/D HX TEMP CONTR, 1-TIC-223, in manual with 100% output signal.
		(2) Shut L/D HX INLET ISOL, 1-CC-166.
(continue)		(continue)

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IX. EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT

ALTERNATE ACTIONS
F.5.1 (continued)
c. WHEN the Component Cooling valves are shut, THEN restore 1-CVC-500-CV to the desired position.
d. PROCEED to Step F.8, Page 117.
 5.2 IF leakage into the CC System is indicated, AND shutting the Letdown CNTMT Isolation values did NOT stop the leak, THEN perform the following actions:
a. Trip ALL RCPs.
 b. Shut the CC CNTMT SUPPLY and RETURN valves:
 1-CC-3832-CV 1-CC-3833-CV

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IX. EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

ALTERNATE ACTIONS

F. (continued)	
7. IF the leak is on the Charging header, THEN perform the following actions:	
a. Place ALL CHG PPs in PULL TO LOCK.	
b. Dispatch an operator to determine the location of the leak.	
<u>NOTE</u> CHG PP HDR XCONN, 1-CVC-182, is located near 12 Charging Pump.	
 c. IF the leak is upstream of CHG PP HDR XCONN, 1-CVC-182, THEN shut 1-CVC-182, AND start 12 or 13 CHG PP as required. 	
(continue)	

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IX. EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

ALTERNATE ACTIONS

F.7 (continued)				
d.	1-CY	ne leak is downstream of VC-182, EN align Charging to the Auxiliary EN Header:		
	(1)	Verify that the following valves are shut:		

- AUX SPRAY valve, 1-CVC-517-CV
- LOOP CHG valves:
 - 1-CVC-518-CV
 - 1-CVC-519-CV

NOTE

The Auxiliary HPSI Header is out of service, refer to T.S. 3.5.3 when 1-SI-656-MOV is shut.

- (2) Shut the HPSI AUX HDR ISOL valve, 1-SI-656-MOV.
- (3) Open **ONE** of the following AUX HPSI HDR Valves:
 - 1-SI-617-MOV
 - 1-SI-627-MOV
 - 1-SI-637-MOV
 - 1-SI-647-MOV
- (4) Open the SI TO CHG HDR valve, 1-CVC-269-MOV.

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IX. **EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT** ACTIONS **ALTERNATE ACTIONS** F.7.d (continued) NOTE REGEN HX CHG INLET, 1-CVC-183, is located in the 27 foot West Penetration Room. (5) **IF** the leak is downstream of the IF 1-CVC-183 in NOT accessible. (5).1 REGEN HX CHG INLET valve, THEN shut CHG PP HDR XCONN, 1-CVC-183, 1-CVC-182, THEN shut 1-CVC-183, AND start 11 CHG PP. AND start any available CHG PP. (6) IF the leak is upstream of 1-CVC-183. **THEN** shut CHG PP HDR XCONN, 1-CVC-182, AND start 11 CHG PP. (7) Declare the Auxiliary HPSI Header out of service and refer to T.S. 3.5.3 ECCS-Shutdown. e. Verify charging flow by observing a rise in PZR level. 8. IF the leak is isolated, THEN perform the following actions: a. Maintain PZR level between 101 and 170 inches. b. Reestablish normal plant configuration control as required: Locked Valves PER NO-1-205, LOCKED VALVES Component Manipulations PER NO-1-200, CONTROL OF SHIFT ACTIVITIES c. **IMPLEMENT** the appropriate **Operating Procedure to continue** operations or to cooldown the plant.

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IX. EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

ALTERNATE ACTIONS

G.	MONITOR CONTAINMENT ENVIRONMENT.		
1.	IF SIAS has NOT actuated, THEN perform the following actions:		
	a. Start ALL available CNTMT AIR CLRs in HIGH.		
	 b. Open the CNTMT CLR EMER OUT valves for the operating CNTMT AIR CLRs. 		
2.	IF Containment pressure rises to 2.8		
	PSIG, THEN verify the ESFAS actuation of the following:		
	SIASCIS		
3.	IF CIS has actuated, THEN trip ALL RCPs.		
4.	IF the leak is in Containment, THEN verify that SRW Pump Room Ventilation is in service PER <u>SRW Pump</u> <u>Room Ventilation</u> section of OI-15, <u>SERVICE WATER SYSTEM</u> .		
5.	Observe that Containment Sump level rises as RWT level lowers.	5.1	IF Containment Sump level does NOT rise as RWT level lowers, THEN maintain RWT level greater than 2 feet by replenishment from any available source.
	(continue)		

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IX. EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

G. (continued)

ALTERNATE ACTIONS

- 6. IF Containment pressure rises to 4.25 PSIG, THEN perform the following actions:
 a. Verify CSAS actuation.
 b. Verify that spray flow is approximately 1350 GPM by checking the following flow indicators:
 - 11 CS HDR FLOW, 1-FI-4148
 12 CS HDR FLOW, 1-FI-4149
- 7. Direct Chemistry to place Hydrogen Monitors in service.
- IF Hydrogen concentration rises to 0.5%, THEN start the Hydrogen Recombiners PER the Post LOCI Recombiner Startup section of OI-41A, <u>HYDROGEN</u> <u>RECOMBINERS.</u>
- IF the Plant Technical Support Center recommends the use of Hydrogen Purge System,
 THEN operate the Hydrogen Purge System PER OI-41B, <u>HYDROGEN</u> <u>PURGE SYSTEM OPERATION</u>, until the Plant Technical Support Center recommends its termination.

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IX. EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT ACTIONS **ALTERNATE ACTIONS** H. VERIFY SG LEVEL CONTROL. 1. Verify that at least one SG is available for 1.1 **IF** SG WR level drops to (-)170 inches, controlled heat removal from the following THEN verify AFAS actuation. indications: 1.2 **IF** Feedwater is lost SG level is between (-)170 and (+)30 OR is excessive. inches THEN perform the following actions: Main or Auxiliary Feedwater is a. Trip the SG Feed Pumps. operating to maintain level b. Shut the SG FW ISOL valves: (11 SG) 1-FW-4516-MOV • (12 SG) 1-FW-4517-MOV CAUTION 13 AFW Pump flow limit is 575 GPM. c. Start an AFW PP. d. Operate AFW System to restore SG levels to between (-)170 and (+)30 inches. e. If required, operate the AFW Pump Room ventilation PER OI-32A, AUXILIARY FEEDWATER SYSTEM. 2. Ensure that feed flow is restoring level to between (-)24 and (+)30 inches. 3. Do **NOT** exceed the following cooldown limits in any one hour: [B0126] Greater than 256° F 100° F/hr 106° F to 256° F 40° F/hr Less than 106° F 35° F/hr

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IX. **EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT** ACTIONS **ALTERNATE ACTIONS** I. IF THOT IS GREATER THAN 300° F. THEN COMMENCE RCS COOLDOWN. CAUTION **RCS temperature and pressure must be** closely monitored to avoid a cooldown greater than Technical Specification Limits. 1. IF the leak has NOT been isolated, THEN conduct a rapid RCS cooldown to less than 300° F using Turbine Bypass or Atmospheric Dump Valves, while NOT exceeding the following limits for any one hour. [B0053] Greater than 256° F 100° F/hr 106° F to 256° F 40° F/hr . Less than 106° F 35° F/hr 2. WHEN THOT is less than 300° F AND RCS pressure is less than 300 PSIA, THEN perform the following actions: NOTE Cavity Cooling and CEDM Cooling aid in cooling Reactor Vessel Head if a void exists. a. Verify that ALL available CAV CLG FANs and CEDM CLG FANs are running. b. Close the SIT OUT: • (1-SI-614-MOV) 52-11442 (1-SI-624-MOV) 52-11443 • • (1-SI-634-MOV) 52-10442 (1-SI-644-MOV) 52-10443 c. Shut the SIT OUT valves: 1-SI-614-MOV 1-SI-624-MOV 1-SI-634-MOV 1-SI-644-MOV

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IX. EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT				
ACTIONS	ALTERNATE ACTIONS			
J. MAINTAIN RCS SUBCOOLING AND PRESSURIZER LEVEL.				
NOTE The RCS is NOT water solid if Pressurizer Level or Reactor Vessel level indicates a bubble exists, AND either saturated conditions exist in the RCS OR NO rapid pressure excursions due to RCS inventory or temperature changes have occurred. 1. IF the RCS is NOT water solid, THEN restore and maintain subcooling between 30° F and 140° F based on CET temperatures as follows:	 1.1 IF the RCS is water solid, THEN restore and maintain subcooling between 30° F and 140° F based on CET temperatures as follows: 			
CAUTION The potential exists for pressurized thermal shock from an excessive cooldown followed by a repressurization. a. Raise subcooling by ANY of the following methods: (1) Secure Pressurizer Spray. (1) Secure Pressurizer Spray. NOTE Pressurizer Backup Heater Banks 11 and 13 trip on U/V and SIAS. (2) Operate the Pressurizer HTR(s). (3) Raise the RCS cooldown rate, while NOT exceeding the following cooldown limits in any one hour, by using the TBVs or ADVs: [B0053] Best the State of the St	 a. Lower subcooling by ANY of the following methods: Lower RCS temperature. IF the overpressurization is due to the HPSI/Charging flow AND the HPSI termination criteria are met, THEN throttle or secure flow to restore subcooling to less than 140° F. 3. De-energize the Pressurizer HTR(s). The potential exists for pressurized thermal shock from an excessive cooldown followed by a repressurization. b. Raise subcooling by ANY of the following methods: Raise RCS temperature. 			

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IX. EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT ACTIONS ALTERNATE ACTIONS J.1 (continued) J.1.1.b (continued) (2) IF HPSI flow has been reduced, (4) IF HPSI flow has been reduced. THEN raise HPSI flow by opening HPSI header valves THEN raise HPSI flow by opening HPSI header valves which have which have been throttled or been throttled or starting the starting the HPSI pump which HPSI pump which has been has been stopped. stopped. b. Lower subcooling by any of the NOTE following methods: Pressurizer Backup Heater Banks 11 and 13 trip on U/V and SIAS. (1) Deenergize the Pressurizer HTR(s). (3) Operate the Pressurizer HTR(s). (2) IF ALL RCPs are operating, THEN use Main Spray. (3) Lower the RCS cooldown rate. (4) **IF** the overpressurization is due to the HPSI/Charging flow **AND** the HPSI termination criteria are met. THEN throttle or secure flow to reduce subcooling. (continue)

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IX. EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

ALTERNATE ACTIONS

J.1.b (continued)

CAUTION

TRM 15.4.2 shall be complied with, if the temperature difference between the PZR and the Regenerative HX Outlet is greater than 400° F.

- (5) **IF** unable to lower subcooling, **THEN** initiate Auxiliary Spray as follows:
 - (a) IF CIS has initiated, THEN place the 1-IA-2080-MOV CIS OVERRIDE switch, 1-HS-2080A. in OVERRIDE.
 - (b) IF CIS has initiated, THEN open the Instrument Air Containment Isolation valve, 1-IA-2080-MOV.
 - (c) Record the temperature difference between PZR WATER TEMP, 1-TI-101, and CHG OUT TEMP, 1-TI-229.
 - (d) Open the AUX SPRAY valve, 1-CVC-517-CV.
 - (e) Operate the LOOP CHG valves as necessary to adjust Aux Spray:
 - 1-CVC-518-CV
 - 1-CVC-519-CV
 - (f) Shift the PRESSURIZER SPRAY VLV CONTROLLER, 1-HIC-100, to MANUAL.
 - (g) Shut the PZR Spray Valves:
 - 1-RC-100E-CV
 - 1-RC-100F-CV

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IX. EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

ALTERNATE ACTIONS

J.1.b(5) (continued)

(h) WHEN Aux Spray is NOT required, THEN secure Aux Spray.

- 1) Open the Loop Charging Valves:
 - 1-CVC-518-CV
 - 1-CVC-519-CV
- 2) Shut the AUX SPRAY valve, 1-CVC-517-CV.
- (6) Use the Presurizer Vent valves:
 - 1-RC-105-SV
 - 1-RC-106-SV
- 2. IF a bubble exists in the Pressurizer AND HPSI has been secured, THEN restore and maintain Pressurizer Level between 101 and 170 inches by operating Charging, and if available, Letdown.

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IX. EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT			
ACTIONS	ALTERNATE ACTIONS		
K. MAINTAIN RCS FLOW VERIFICATION.			
 IF any RCPs are running, THEN verify Тнот minus T cold is less than 10° F in the loop(s) with an operating SG. 	1.1 IF Тнот minus T cold is greater than 10° F in the loop(s) with an operating SG, THEN trip ALL RCPs.		
NOTE During Natural Circulation, increased loop transport time causes a 5 to 15 minute delay in temperature responses to a plant change. PZR level and pressure typically provide better indications of RCS response during this period.			
 IF RCPs have been secured, THEN verify subcooled Natural Circulation by the following: THOT minus T COLD is less than 50° F T COLD is constant or lowering T HOT is constant or lowering RCS subcooling is at least 30° F based on CET temperatures CET temperatures trend consistent with T HOT Steaming rate affects RCS temperatures 	 2.1 IF subcooled natural circulation can NOT be verified, THEN verify adequate RCS cooling flow by the following: ALL available charging pumps are operating SG steaming and feeding are properly controlled CET temperatures are less than superheated 		

AOP-2A Rev 23/Unit 1 Page 127 of 165 IX. EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT ACTIONS **ALTERNATE ACTIONS** L. MONITOR FOR CORE AND RCS VOIDING. CAUTION Void formation occurs when pressure drops below the saturation pressure for the **Reactor Vessel Head temperature.** 1. Monitor for Core and RCS voiding by the following: Rapid unexplained rise in pressurizer ٠ level during an RCS pressure reduction Loss of subcooled margin as • determined using CET temperatures "RXV WTR LVL LO" alarm • (continue)

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IX. EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

ALTERNATE ACTIONS

L. (continued)	
 IF voiding causes difficulty in depressurization OR threatens heat removal as indicated by EITHER of the following: 	
 Reactor Vessel level approaching the top of the Hot Leg with at least 30° F subcooling 	
 The pressure in BOTH S/Gs is greater than the saturation pressure of the RCS 	
THEN reduce or eliminate the voided area by performing the following actions:	
a. Verify that the L/D CNTMT ISOL valves are shut:	
 1-CVC-515-CV 1-CVC-516-CV 	
(continue)	

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IX. **EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT ACTIONS ALTERNATE ACTIONS** L.2 (continued) CAUTION The potential exists for pressurized thermal shock from an excessive cooldown rate followed by a repressurization. b. Stop the depressurization and raise b.1 IF raising RCS subcooling does NOT RCS subcooling to as near 140° F as restore heat removal, practical by ANY of the following THEN operate Reactor Vessel Vent methods: Valves PER the Venting The Reactor Coolant System After An Accident section of OI-1G, REACTOR COOLANT NOTE VESSEL HEAD AND PRESSURIZER Pressurizer Backup Heater Banks 11 and 13 VENT SYSTEM. trip on U/V and SIAS. (1) Operate pressurizer heaters. (2) Raise cooldown rate while NOT exceeding the following limits for any one hour: [B0053] Greater than 256° F 100° F/hr 106° F to 256° F 40° F/hr Less than 106° F 35° F/hr (3) IF HPSI flow has been reduced. THEN raise HPSI flow by opening HPSI header valves which have been throttled or starting HPSI Pumps which have been stopped. (continue)

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IX. EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

ALTERNATE ACTIONS

L.2 (continued)

<u>NOTE</u>

Voids may form in the SG Tubes if the saturation pressure of a SG is greater than the saturation pressure of the RCS.

<u>CAUTION</u> If voids exist in the SG Tubes, a rapid RCS pressure reduction will occur when the voids collapse.

- c. IF voiding is suspected in the SG tubes,
 THEN cool the SG so that the following RCS cooldown rates are not exceeded in any one hour: [B0053]
 - Greater than 256° F 100° F/hr
 - 106° F to 256° F 40° F/hr
 - Less than 106° F 35° F/hr

by raising **ANY** of the following:

- Steaming rate
- Feed rate
- SG Blowdown rate

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IX. EXCESSIVE RCS LEAKAGE W	ITH LTOP CONTROLS IN EFFECT
ACTIONS	ALTERNATE ACTIONS
M. IF ESFAS ACTUATIONS OCCUR, THEN COMMENCE VERIFICATION CHECKLISTS.	-
NOTE HPSI and LPSI throttle/termination will affect the system lineup in the checklists used in the following step. 1. Verify that ESFAS equipment, (with the exception of HPSI Pumps, Main and Aux HPSI HDR MOVs, and Charging pumps), is aligned correctly PER the following checklists as appropriate: • EOP ATTACHMENT (2), <u>SIAS VERIFICATION CHECKLIST</u> • EOP ATTACHMENT (3), <u>CSAS</u> <u>VERIFICATION CHECKLIST</u> • EOP ATTACHMENT (4), <u>CIS</u> <u>VERIFICATION CHECKLIST</u>	
N. IF SIAS HAS ACTUATED, THEN SHIFT THE CHARGING PP SUCTION TO THE RWT.	
 IF SIAS has actuated, THEN switch the Charging Pump Suction to the RWT as follows: Open the RWT CHG PP SUCT valve, 1-CVC-504-MOV. Verify that the VCT OUT valve, 1-CVC-501-MOV, is shut. Place the Boric Acid Pumps in PULL TO LOCK. Ensure CHG PP amps are steady. Ensure BAST levels are steady. 	

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IX. EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT		
ALTERNATE ACTIONS		
 c.1 IF HPSI flow is less than 90 GPM per pump AND the HPSI throttle criteria have been met, THEN perform the following actions: (1) IF the CHG PPs are operating, THEN turn off ONE CHG PP at a time until HPSI flow is at least 90 GPM per pump. (2) IF HPSI flow is still less than 90 GPM per pump with ALL CHG PPs secured, THEN turn off ONE HPSI PP at a time until HPSI flow is greater than 		
90 GPM per pump.		

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IX. EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT

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ACTIONS

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ALTERNATE ACTIONS

P.1 (co	ontinued)	
b.	Ensure that a minimum Containment sump level of at least 28 inches is indicated on the wide range containment water level indication, 1-LI-4146 or 1-LI-4147.	
C.	Verify the RAS lineup PER EOP ATTACHMENT (6), <u>RAS</u> <u>VERIFICATION CHECKLIST</u> .	
d.	IF the RAS lineup is verified, THEN shut the RWT OUT valves:	
	1-SI-4142-MOV1-SI-4143-MOV	
е.	Verify Component Cooling in service as follows:	
	(1) Throttle open BOTH CC HX SALTWATER OUT valves:	
	1-HIC-52061-HIC-5208	
	(2) Verify BOTH CC HX CC OUT valves are open:	
	 1-CC-3824-CV 1-CC-3826-CV 	
	(3) Verify TWO CC Pumps in operation.	
	(continue)	

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IX. EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS	ALTERNATE ACTIONS
P.1 (continued)	
f. IF a loss of ECCS pump suction is indicated during recirculation by ANY of the following:	
Lower or unstable HPSI or CS flow	
 Lower or unstable HPSI or CS PP discharge presure 	
 Lower or unstable HPSI or CS PP motor current 	
HPSI or CS PP noise	
THEN take actions to prevent HPSI and CS PP damage, AND maintain adequate core cooling by performing the following:	
(1) Throttle HPSI flow equally among the four headers to the minimum allowed PER EOP ATTACHMENT(10), <u>HIGH PRESSURE SAFETY</u> <u>INJECTION FLOW</u> .	 (1).1 IF HPSI flow indication has been lost, THEN throttle HPSI MOVs equally among the four headers to maintain the following: NO HPSI PP cavitation CETs less than 50° F superheated Core covered
(continue)	-

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IX. EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT **ACTIONS ALTERNATE ACTIONS** P.1.f (continued) (2) IF HPSI or CS PP performance is NOT acceptable, THEN perform the following: (a) Verify BOTH CS PPs stopped. (b) Check acceptable HPSI PP IF HPSI PP performance is NOT (b).1 performance. acceptable, THEN stop the HPSI PP(s). (c) Notify the Plant Technical Support Center. (d) IMPLEMENT EOP-8, FUNCTIONAL RECOVERY PROCEDURE. g. Commence ECCS Pump Room cooling as follows: (1) Open the ECCS AIR CLR INL/OUT VLVs: • 1-SW-5170-CV • 1-SW-5171-CV • 1-SW-5173-CV (2) Start 11 EAST and 12 WEST ECCS PP RM CLG FANs. h. Place the ECCS PP RM EXH FILT in service. (continue)

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IX. EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT

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ACTIONS

ALTERNATE ACTIONS

P.1 (continued)	
i. Maintain SRW and Component Cooling temperatures by performing the following:	·
 Adjust the CC HX SALTWATER OUT valves to maintain Component Cooling temperature less than 120° F: 	
1-HIC-52061-HIC-5208	
(2) IF EITHER SRW HX SW BYPASS valve is in AUTO, THEN adjust the setpoint as necessary to maintain SRW temperature less than 105° F:	
1-PIC-51541-PIC-5157	
NOTE The current maximum SW header pressure limits are recorded on the Shift Turnover Sheet.	
(3) Verify SW HDR PRESS less than the maximum SW header pressure limit.	
j. IF Charging Pumps are aligned with suction from RWT, THEN place the CHG PPs in PULL TO LOCK.	
(continue)	

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IX. EXCESSIVE RCS LEAKAGE	WITH LTOP CONTROLS IN EFFECT
ACTIONS	ALTERNATE ACTIONS
P.1 (continued)	
<u>CAUTION</u> Minimum HPSI Pump flow is 90 GPM to prevent pump damage.	
k. Ensure HPSI PP flow is at least 90 GPM during recirculation.	 k.1 IF HPSI flow is less than 90 GPM per pump during recirculation AND HPSI throttle criteria have been met, THEN perform the following actions: (1) IF CHG PPs are operating, THEN turn off ONE CHG PP at a time until HPSI flow is at least 90 GPM per pump. (2) IF HPSI flow is still less than 90 GPM GPM per pump with ALL CHG PPs secured, THEN turn off ONE HPSI PP at a time until HPSI flow is greater than 90 GPM per pump.
Q. IF SIAS HAS ACTUATED THEN RESTORE CONTAINMENT ENVIRONMENT.	
 Verify that the IODINE FILT FANs are running. (continue) 	

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IX. EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

ALTERNATE ACTIONS

Q. (continued)	
2. WHEN Containment pressure drops to less than 4.0 PSIG, THEN perform the following actions:	
a. Verify the CS HDR handswitches, 1-HS-4150 and 1-HS-4151 in OPEN.	
b. Reset the CSAS signal.	
c. Verify that ALL available CACs are operating to reduce Containment temperature.	
d. Restore equipment listed in the EOP ATTACHMENT (3), <u>CSAS</u> <u>VERIFICATION CHECKLIST</u> , to the desired condition.	
3. WHEN Containment pressure drops to less than 2.8 PSIG, THEN perform the following actions:	
a. Reset the SIAS signal.	
b. Reset the CIS signal.	
<u>CAUTION</u> At least one Containment Spray Pump shall remain in operation until Containment Temperature can be maintained less than 120° F by the Containment Air Coolers.	
c. Secure ONE CS PP.	
d. Restore equipment listed in EOP ATTACHMENTS (2) and (4), the SIAS and CIS VERIFICATION CHECKLISTS, to the desired condition.	
4. WHEN the Plant Technical Support Center recommends securing Containment Spray, THEN secure the remaining CS PP.	
	4

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IX	. EXCESSIVE RCS LEAKAGE W	ITH LTOP CONTROLS IN EFFECT
	ACTIONS	ALTERNATE ACTIONS
R.	IF RAS ACTUATED, THEN REFILL THE RWT.	
1.	Contact the Operational Support Center to check radiation levels are low enough to allow valve repositioning.	
2.	Verify SIAS has NOT actuated OR has been reset, AND initiate actions to make up to the RWT PER OI-2B, <u>CVCS BORATION,</u> <u>DILUTION AND MAKEUP OPERATIONS</u> .	
3.	Notify the Plant Technical Support Center to review ERPIP-611, <u>SEVERE</u> <u>ACCIDENT MANAGEMENT</u> <u>RESTORATIVE ACTIONS</u> for alternate methods to refill the RWT AND actions to inject directly to the RCS bypassing the RWT.	
S.	IF SIAS HAS ACTUATED AND HAS BEEN RESET, THEN RESTORE AUXILIARIES.	
1.	Restore SRW to the Turbine Building as follows:	
	a. Verify 21 PA Compressor operating.	
	b. Verify shut Plant Air to Plant Air Header valve, 1-PA-2059-CV.	
	 Verify open Plant Air To Instrument Air Cross Connect valve, 1-PA-2061-CV. 	
	(continue)	

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IX. EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS ALTERNATE ACTIONS S.1 (continued) d. Open the SRW HDR TURB BLDG **ISOL valves:** 1-SRW-1600-CV 1-SRW-1637-CV 1-SRW-1638-CV 1-SRW-1639-CV 2. Restore Instrument Air Compressors to service as follows: a. IF high temperature alarm exists on a.1 IF SRW is NOT available, the Instrument Air Compressors, THEN restore cooling to the IA **THEN** open the SRW Isolation Valves compressors using the Fire Main PER by placing their override handswitches OI-19, INSTRUMENT AIR. in OPEN until the temperature alarm clears: • (11) 1-HS-2063 1-HS-2065 (12) b. Start at least one Instrument Air Compressor PER OI-19, **INSTRUMENT AIR.** 3. Restore Instrument Air To Containment as follows: a. Open the IA CNTMT ISOL valve, 1-IA-2080-MOV. NOTE 1-HS-2085 is located on the West wall of the 27 ft Switchgear Room and is operated by a T112 key (#85 from the Control Room Key Locker). The TBO key ring also has a T112 key. b. Open the Containment Instrument Air Supply Valve, 1-IA-2085-CV, by momentarily placing 1-HS-2085 in OPEN. (continue)

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IX. EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

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ALTERNATE ACTIONS

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 S. (continued) IF the leak is isolated, OR within Charging Pump capacity, THEN perform the following: a. Reestablish normal plant configuration control as required: Locked Valves PER NO-1-205, LOCKED VALVES Component Manipulations PER NO-1-200, CONTROL OF SHIFT ACTIVITIES b. IMPLEMENT the appropriate Operating Procedure to continue operations or to cooldown the plant. 	
T. RESTORE LETDOWN FLOW.	
WARNING High area radioactivity in the auxiliary building may result if letdown is initiated with high activity levels in the RCS. 1. Verify the following: • The leak was NOT on the letdown line • HPSI throttle/termination criteria are met • Charging flow path exists through LOOP CHG valves or AUX SPRAY valve • At least ONE CHG PP is operating 2. Verify the PRZR LVL CONTR, 1-LIC-110X or 1-LIC-110Y, in Auto Remote. (continue)	1.1 IF ANY condition can NOT be maintained, THEN PROCEED to step U.

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IX. EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT

	ACTIONS	ALTERNATE ACTIONS
T. (continued	I)	
	L/D PRESS CONTR, 1, in MANUAL with a 20% output.	
4. Place IX in BYPAS	BYPASS valve, 1-CVC-520-CV, SS.	
	DOWN THROTTLE VLV DLLER, 1-HIC-110, to MANUAL st to 0%.	
6. IF the pla THEN re-	ant computer is NOT operating, cord the following information:	
 Avera (1-TI- 27' P 	T COLD OUT TEMP (1-TI-229) age CNTMT ambient temperature 5309 and 1-TI-5311) enetration Room temperature 5276 and 1-TI-5280)	
	(continue)	

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IX. EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

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ALTERNATE ACTIONS

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T. (continued)	
 Check BOTH Backpressure Regulating valves and Letdown Control Valves in service by verifying the following: 	
a. BOTH Letdown Control Valve Inlet valves open:	
1-CVC-1031-CVC-105	
b. BOTH Letdown Control Valve Outlet valves open:	
1-CVC-1041-CVC-106	
c. BOTH Backpressure Regulating Inlet valves open:	
1-CVC-1081-CVC-110	
d. BOTH Backpressure Regulating Outlet valves open:	
1-CVC-1091-CVC-111	
e. L/D CONTR VLVS handswitch, 1-HS-110-1, in BOTH.	
 f. BACKPRESS REG VLVS handswitch, 1-HS-201, in BOTH. 	
8. Open L/D CNTMT ISOL valves:	
 1-CVC-515-CV 1-CVC-516-CV 	
(continue)	

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IX. EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

ALTERNATE ACTIONS

T. (continued) CAUTION The setpoint of 1-PIC-201 must be above the saturation pressure for the letdown outlet temperature of the Regenerative Heat Exchanger. 9. Place L/D PRESS CONTR, 1-PIC-201 in service as follows: a. Adjust the setpoint on 1-PIC-201 to a value less than RCS pressure but greater than the expected saturation pressure for letdown temperature. b. Shift L/D PRESS CONTR, 1-PIC-201 to AUTO. 10. Adjust the LETDOWN THROTTLE VLV CONTROLLER, 1-HIC-110, to slowly restore letdown flow. 11. Shift the LETDOWN THROTTLE VLV CONTROLLER, 1-HIC-110, to AUTOMATIC. 12. Operate L/D HX TEMP CONTR, 1-TIC-223, to maintain Letdown Heat Exchanger letdown outlet temperature less than 120° F. 13.1 **IF** pressurizer level is **NOT** trending to 13. Check pressurizer level is trending to 160. 160 inches. THEN shift the PRZR LVL CONTR, 1-LIC-110X or 1-LIC-110Y, to Auto Local **AND** adjust the setpoint to 160 inches.

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IX. EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT **ACTIONS ALTERNATE ACTIONS** U. IF THE RCS IS WATER SOLID, THEN DRAW A BUBBLE IN THE RCS. 1. IF the RCS is water solid, AND it is desired to draw a bubble in the RCS. THEN perform the following actions: NOTE Pressurizer Backup Heater Banks 11 and 13 trip on U/V and SIAS. a. Energize the Pressurizer Heater(s). b. **IF EITHER** of the following conditions exist: BOTH SG pressures can be • maintained less than RCS pressure At least one RCP is running THEN draw a bubble in the RCS as follows: (1) **IF** the HPSI throttle/termination criteria are met, THEN reduce RCS pressure by reducing HPSI/Charging flow or raising letdown flow. (2) Cooldown the RCS, while NOT exceeding the following cooldown limits in any one hour, by using the TBVs or ADVs: [B0053] Greater than 256° F 100° F/hr 106° F to 256° F 40° F/hr • Less than 106° F 35° F/hr • (continue)

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IX. EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS

ALTERNATE ACTIONS

U.'	1 (c	ontinued)		
		 IF a bubble forms in the Pressurizer, THEN operate HPSI/Charging and Letdown as necessary to restore and maintain Pressurizer level between 101 and 170 inches. IF a bubble forms in the Reactor Vessel Head, THEN operate HPSI/Charging and Letdown as necessary to maintain RCS level above the top of the hotleg. 		
V.	E	STABLISH SHUTDOWN COOLING.		
1.	30 AN • TH a.	verify that radiation levels are low enough to allow valve repositioning. Initiate Shutdown Cooling PER the Initiation of Shutdown Cooling section of OI-3B, <u>SHUTDOWN COOLING -</u> <u>UNIT 1</u> .	1.1	 IF CET temperatures are less than 300° F, AND the following conditions exist: Conditions for establishing shutdown cooling can NOT be met RWT level is less than 0.75 feet Wide range Containment level indicator 1-LI-4146 indicates a level THEN commence alternate shutdown cooling as follows: a. Direct Radiation Safety Supervision to verify that radiation levels are low enough to allow valve repositioning.
		(continue)		(continue)

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IX. EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT

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ACTIONS	ALTERNATE ACTIONS
V.1 (continued)	V.1.1 (continued)
c. Operate HPSI, and Charging and Letdown to maintain the following:	 b. Verify that RCS pressure minus Containment pressure is less than 160 PSID.
 PZR level between 101 and 170 inches 	c. Shut 11 Containment Spray Pump Discharge Valve, 1-SI-314.
 RCS pressure within the specified limits PER EOP ATTACHMENT (1), RCS PRESSURE 	d. Shut 12 Containment Spray Pump Discharge Valve, 1-SI-324.
TEMPERATURE LIMITS	e. Shut 11 SDC HX Outlet To Spray Header Valve, 1-SI-319.
	f. Shut 12 SDC HX Outlet To Spray Header Valve, 1-SI-329.
	g. Open 11 SDC HX Inlet Cross Connect Valve, 1-SI-452.
	h. Open 11 SDC HX Outlet To RCS Valve, 1-SI-456.
	i. Open 12 SDC HX Inlet Cross Connect Valve, 1-SI-453.
	j. Open 12 SDC HX Outlet To RCS Valve, 1-SI-457.
	 k. Verify Component Cooling in service as follows:
	(1) Throttle open BOTH CC HX SALTWATER OUT valves:
	1-HIC-52061-HIC-5208
	(2) Verify BOTH CC HX CC OUT valves are open:
	 1-CC-3824-CV 1-CC-3826-CV
	(3) Verify TWO CC Pumps in operation.
(continue)	(continue)

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IX. EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS	ALTERNATE ACTIONS
V.1 (continued)	V.1.1 (continued)
	I. Open 11 SDC HX CC OUT valve, 1-CC-3828-CV.
	m. Open 12 SDC HX CC OUT valve, 1-CC-3830-CV.
	n. Open SDC HX LPSI INL isolation, 1-SI-658-MOV.
	 o. IF Hot Leg Injection is being used for core flush, THEN verify that 12A LPSI HDR valve, 1-SI-635-MOV, is shut.
	 p. IF PZR Injection is being used for core flush, THEN open 12A LPSI HDR valve, 1-SI-635-MOV.
	q. Open the LPSI HDR valves:
	 1-SI-615-MOV 1-SI-625-MOV 1-SI-645-MOV
	r. Place the keyswitch for SDC FLOW CONTR, 1-SI-306-CV in AUTO.
	s. Shift SDC FLOW CONTR, 1-FIC-306, to MANUAL with a 95% output signal.
	t. Open the 11 CNTMT SUMP DISCH valves:
	1-SI-4144-MOV1-SI-4145-MOV
	u. Shut the MINI FLOW RETURN TO RWT ISOL valves:
	● 1-SI-659-MOV ● 1-SI-660-MOV
(continue)	(continue)

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IX. EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS	ALTERNATE ACTIONS
V.1 (continued)	V.1.1 (continued)
	<u>CAUTION</u> The possibility of cavitation increases when taking suction from the CNTMT Sump.
	 v. IF the LPSI Pumps are NOT operating, THEN clear RAS from one operable LPSI Pump as follows:
	(1) Place LPSI PP RAS OVERRIDE switch in OVERRIDE.
	(2) Start the selected pump.
	<u>CAUTION</u> The cooldown limit changes from 100° F in any one hour period to 40° F in any one hour period when RCS temperatures are below 256° F.
	 w. Adjust the signal on 1-FIC-306 to raise flow to 3000 GPM, while maintaining cooldown rate within limits.
	 Place the keyswitch for the SDC Temperature Control Valve, 1-SI-657-CV, in AUTO.
	<u>CAUTION</u> The heatup rate limit for the SDC HXs is 14° F/Minute.
	 y. Adjust S/D COOLING TEMP CONTR, 1-HIC-3657 to obtain less than 14° F/minute heatup rate at the SDC HX Outlet, 1-TI-303X and 1-TI-303Y.
	 IF the desired RCS cooldown rate can NOT be maintained with one LPSI Pump, THEN start the second LPSI Pump and adjust 1-FIC-306 to 6000 GPM.
(continue)	(continue)

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IX. EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT

ACTIONS	ALTERNATE ACTIONS
V.1 (continued)	V.1.1 (continued)
	aa. Adjust the S/D COOLING TEMP CONTR, 1-HIC-3657, to obtain the desired cooldown rate.
	 1.2 IF RCS subcooling is less than 30° F based on CET temperatures AND SDC or Alternate SDC has NOT been established, THEN commence core flush between 8 and 11 hours after SIAS was actuated by lining up for Pressurizer Injection PER EOP-5, LOSS OF COOLANT ACCIDENT.
W. IMPLEMENT THE APPROPRIATE PROCEDURE.	
 IF core flush is in progress AND CET temperatures are less than 200° F, THEN secure core flush PER EOP-5, LOSS OF COOLANT ACCIDENT. 	
2. Ensure that the Safety Function Status Check Final Acceptance Criteria are met.	2.1 IF the Final Safety Function Status Check Acceptance Criteria are NOT met, THEN continue recovery actions as necessary until Final Acceptance Criteria are met.
 Reestablish normal plant configuration control as required: 	
 Locked Valves PER NO-1-205, <u>LOCKED VALVES</u> Component Manipulations PER NO-1-200, <u>CONTROL OF SHIFT</u> <u>ACTIVITIES</u> 	
 IMPLEMENT the appropriate procedure as directed by the Shift Manager. 	
END of Section IX	

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X. SAFETY FUNCTION STATUS CHECK FOR EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

- A. The STA (or person designated by the CRS) 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 15 minute intervals until plant conditions stabilize.
- C. Notify the Control Room Supervisor if any safety function is not being satisfied, promptly upon discovery.

REACTIVITY CONTROL PARAMATERS	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK
WRNI	less than 10 ⁻⁴		less than 10 ⁻ 4	
SUR (DPM)	negative or zero	<u>·</u>	negative or zero	
Boron concentration	appropriate S/D margin		appropriate S/D margin	

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X. SAFETY FUNCTION STATUS CHECK FOR EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

	VITAL	SAFETY FUNCTIO			
	AUXILIARIES	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL Check
a.	4KV vital buses 11 or 14	at least one energized		at least one energized	
b.	125V DC buses 11, 12 21 and 22	all greater than 106 volts	_ _ _ _	all greater than 106 volts	
c.	120V AC vital buses 11,12,13,14	at least THREE energized	_ _ _ _	at least THREE energized	
d.	208/120V instrument buses 11 or 12	at least one energized		at least one energized	

AOP-2A Rev 23/Unit 1 Page 153 of 165 X. SAFETY FUNCTION STATUS CHECK FOR EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT SAFETY FUNCTION ACCEPTANCE CRITERIA **RCS PRESSURE** INTERMEDIATE AND CRITERIA CRITERIA FINAL INVENTORY CHECK CHECK PARAMETERS a. Pressurizer within limits within limits ___ | ___ | ___ | ____ pressure (PSIA) EOP Att. (1) of EOP Att. (1) _____ OR all available Charging Pumps operating and SIS injecting AND less than MAX OPERATING PRESSURE of within limits EOP Att. (1) of EOP Att. (1) _____ Pressurizer b. 30 to 101 to level (inches) 250 170 (1)OR Charging and SIS 101 to ---|---|---170 operating (1) Water solid operation is acceptable provided the other parameters still indicate a SGTR.

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X. SAFETY FUNCTION STATUS CHECK FOR EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

RCS PRESSURE AND INVENTORY PARAMETERS (continued)	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK
RCS subcooling (°F)	25 to 140		greater than 25	
	OR Charging and SIS operating	_ _ _ _	greater than 25	
Reactor Vessel level	core covered		core covered	

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X. SAFETY FUNCTION STATUS CHECK FOR EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

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RCS HEAT REMOVAL PARAMETERS	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL Check
Т _{кот} (° F)	less than 385		less than 300	
Tcold (°F)	less than 385		less than 300	
Тнот minus Tcold (°F)				
natural circulation	less than 50	_ _ _ _	less than 50	
OR				
forced circulation	less than 10		less than 10	
S/G level (inches)(1)	(-)170 to (+)30		(-)24 to (+)30	
(inches)(1)	to (+)30	able only for the u		

AOP-2A Rev 23/Unit 1 Page 156 of 165 X. SAFETY FUNCTION STATUS CHECK FOR EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT SAFETY FUNCTION ACCEPTANCE CRITERIA CORE AND RCS HEAT CRITERIA INTERMEDIATE CRITERIA FINAL REMOVAL CHECK CHECK PARAMETERS (continued) Condensate e. Storage Tank greater greater Level than 5 ft than 5 ft OR shutdown cooling initiated SAFETY FUNCTION ACCEPTANCE CRITERIA CONTAINMENT ENVIRONMENT CRITERIA INTERMEDIATE CRITERIA FINAL PARAMETERS CHECK CHECK a. Containment less less pressure (PSIG) than 0.7 than 0.7 b. Containment Temperature less less (°F) than 120 than 120 Containment alarm alarm с. Radiation Monitor clear clear no no unexplained unexplained trend trend

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X. SAFETY FUNCTION STATUS CHECK FOR EXCESSIVE SG TUBE LEAKAGE WITH LTOP CONTROLS IN EFFECT

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	RADIATION	SAFETY FUNCTION ACCEPTANCE CRITERIA					
	LEVELS EXTERNAL TO CONTAINMENT	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL Check		
	Noble Gas Monitor	N/A	N/A	alarm clear			
5.	Condenser Off-Gas RMS	N/A	<u> N/A </u>	alarm clear			
с.	S/G B/D RMS	N/A	<u> N/A </u>	alarm clear			
d.	Main Vent Gaseous RMS (1-RI-5415)	N/A	<u> N/A </u>	alarm clear			
		STATUS CHECK NUMBER	COMPL TI	ETED AT ME			
		1					
		2					
		3	<u> </u>				
		4					
		5					
		6					
		8					

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XI.	SAFETY FUNC	TION STATU H LTOP CON	S CHECK FOR E ITROLS IN EFFE	EXCESSIVE RCS	S
Α.		function che	by the CRS) will cks respectively o		
Β.	Perform intermed until plant cond		unction status che ize.	cks at 15 minute	intervals
C.	Notify the Contr satisfied, promp		visor if any safet ery.	y function is not	being
D.	Record Time Of D	ay	·		
	<u>.</u> .	SAFETY FUNCT	ION ACCEPTANCE CRI	TERIA	
	REACTIVITY CONTROL PARAMATERS	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK
a.	WRNI	less than 10 ⁻ 4	_ _	less than 10-4	
b.	SUR (DPM)	negative or zero		negative or zero	
c.	Boration status:	appropriate S/D Margin		appropriate S/D margin	

AOP-2A Rev 23/Unit 1 Page 159 of 165 **XI. SAFETY FUNCTION STATUS CHECK FOR EXCESSIVE RCS** LEAKAGE WITH LTOP CONTROLS IN EFFECT SAFETY FUNCTION ACCEPTANCE CRITERIA VITAL AUXILIARIES CRITERIA INTERMEDIATE CRITERIA FINAL CHECK CHECK a. 4KV vital _____ buses at least one at least one 11 or 14 energized energized b. 125V DC buses all a]] _|_|__ 11, 12 greater than greater than 21 and 22 106 volts 106 volts c. 120V AC vital buses 11,12,13,14 at least THREE _____ at least THREE energized _____ energized d. 208/120V instrument ______ at least one _______ energized at least one buses 11 or 12 energized

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	RCS PRESSURE AND INVENTORY PARAMETERS	SAFETY FUNCTION ACCEPTANCE CRITERIA					
		CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK		
	Pressurizer pressure	within limits of EOP Att. (1 OR	.)	within limits of EOP Att. (1)			
		all available Charging Pumps operating and SIS injecting AND less than MAX OPERATING PRESSURE of EOP Att. (1)		within limits of EOP Att. (1)			
).	Pressurizer level (inches) (1)	30 to 170 OR		101 to 170			
		Charging and SIS operating		101 to 170			
1)		his is an accep		result in solid pre ovided the other pa			

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AOP-2A Rev 23/Unit 1 Page 161 of 165 **XI. SAFETY FUNCTION STATUS CHECK FOR EXCESSIVE RCS** LEAKAGE WITH LTOP CONTROLS IN EFFECT SAFETY FUNCTION ACCEPTANCE CRITERIA RCS PRESSURE CRITERIA INTERMEDIATE CRITERIA FINAL CHECK INVENTORY CHECK PARAMETERS (continued) RCS subcooling 30 to 30 to 140 140 OR Charging and 30 to ·|----|----SIS operating 140 Reactor Vessel core core covered covered

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AND

(°F)

level

c.

d.

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AOP-2A Rev 23/Unit 1 Page 162 of 165 XI. SAFETY FUNCTION STATUS CHECK FOR EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT SAFETY FUNCTION ACCEPTANCE CRITERIA

	CORE AND RCS HEAT REMOVAL PARAMETERS	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL Check
a.	CET Temperatures	less than superheated		less than superheated	
b.	Tcold (2)	constant or lowering		constant or lowering	
c.	Тнот minus Tcold (°F)(2)				
	natural circulation OR	less than 50		less than 50	
	forced circulation	less than 10		less than 10	
d.	S/G level (inches)	(-)170 to (+)30		(-)24 to (+)30	
e.	Condensate Storage Tank Level	greater than 5 ft		greater than 5 ft OR SDC initiated	

(2) THOT and TCOLD indication may be influenced by charging or SI temperatures during a large break LOCA. If this occurs, TCOLD and THOT minus TCOLD may be deleted from the check provided CET temperatures and S/G level meet their acceptance criteria.

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XI. SAFETY FUNCTION STATUS CHECK FOR EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT

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CONTAINMENT

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SAFETY FUNCTION ACCEPTANCE CRITERIA

PARAMETERS	CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL CHECK
Containment pressure (PSIG)	less than 50		less than 2.8	
Containment Temperature (°F)	less than 276	_ _ _ _	less than 220	
Containment Radiation Monitor	N/A	N/A	alarm clear	
	no unexplained trend		no unexplained trend	
Hydrogen Concentration (3)	less than 0.5% OR		less than 0.5%	
	all available hydrogen recombiners energized		less than 0.5%	
				chemistry
	Containment pressure (PSIG) Containment Temperature (°F) Containment Radiation Monitor Hydrogen Concentration (3)	PARAMETERSContainment pressure (PSIG)less than 50Containment Temperature (°F)less than 276Containment Radiation MonitorN/ANo unexplained trendHydrogen Concentration (3)less than 0.5%OR all available hydrogen recombiners energized	PARAMETERS CHECK Containment pressure (PSIG) less than 50	PARAMETERS CHECK Containment pressure (PSIG) less than 50 less than 2.8 Containment Temperature (°F) less than 276 less than 220 Containment Radiation Monitor N/A N/A alarm clear N/A N/A on unexplained trend alarm clear Hydrogen Concentration (3) less than 0.5% less than 0.5% OR all available hydrogen recombiners energized less than 0.5%

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XI. SAFETY FUNCTION STATUS CHECK FOR EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT

	RADIATION LEVELS EXTERNAL TO CONTAINMENT	SAFETY FUNCTION ACCEPTANCE CRITERIA							
		CRITERIA	INTERMEDIATE CHECK	CRITERIA	FINAL Check				
a.	Noble Gas Monitor	N/A	N/A	alarm clear					
		no unexplained trend	 	no unexplained trend	<u></u>				
).	Condenser Off-Gas RMS	alarm clear		alarm clear					
		no unexplained trend		no unexplained trend					
	S/G B/D RMS	alarm clear		alarm clear					
		no unexplained trend		no unexplained trend					
•	Main Vent Gaseous RMS (1-RI-5415)	N/A	N/A	alarm clear					
		no unexplained trend		no unexplained trend					

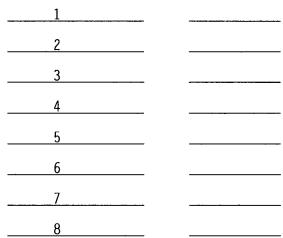
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XI. SAFETY FUNCTION STATUS CHECK FOR EXCESSIVE RCS LEAKAGE WITH LTOP CONTROLS IN EFFECT

STATUS CHECK NUMBER

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> COMPLETED AT TIME



ATTACHMENT (1) Page 1 of 2

ESTIMATE GROSS LEAK RATE

Record the following information:

a. Initial PZR Level	a	inches
b. Initial RCS Temp., TAVE	b	°F

- c. Initial Time c. _____
- d. Final PZR Level d. _____ inches
- e. Final RCS Temp., TAVE e. _____ °F
- f. Final Time f.
- g. RCS Pressure g. ____ psia
- h. Charging Flow h. _____gpm
- i. Letdown Flow (average) i. _____ gpm
- j. Total CBO Flow j. _____gpm

Determine Factors:

- k. Estimate PZR volume factor based on RCS Pressure Step g.
 - 2200 psia = 18.9 gallons/inch 1500 psia = 21.5 gallons/inch 1000 psia = 23.3 gallons/inch 500 psia = 25.5 gallons/inch 200 psia = 27.4 gallons/inch k.
- I. Estimate RCS expansion factor based on RCS Temp., TAVE Step e.

570°F = 86.2 gallons/°F		
$560^{\circ} F = 81.5 \text{ gallons/}^{\circ} F$		
550° F = 78.8 gallons/° F		
$540^\circ \text{F} = 73.1 \text{ gallons/}^\circ \text{F}$		
530° F = 72.3 gallons/° F		
$500^{\circ} F = 63.1 \text{ gallons/}^{\circ} F$		
$450^{\circ} F = 55.7 \text{ gallons/}^{\circ} F$		
400° F = 50.4 gallons/° F		
350° F = 43.1 gallons/° F		
300° F = 38.2 gallons/° F		
	_	
250° F = 32.1 gallons/° F	Ι.	
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				AOP-2/ Rev 23/Unit
		A	TTACHMENT (1) Page 2 of 2	
		ESTIMA	IE GROSS LEAK RATE	
alculate Lea	ak Rate:			
m. PZR Lev	vel			
(a	d) x k	gallons/inch = m	gallons
n. RCS Tei	mperature			
(b	e) x I	gallons/º F = n	gallons
o. RCS cha	ange			
(m	n) ÷ (f	c) = o	gpm
p. Calculat	e Leak Rate			
0	+ h	<u> </u>	j = p	gpm

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ATTACHMENT (2) Page 1 of 3

LEAK IDENTIFICATION

NOTE

The following are possible steps for locating a leak. These steps are to be used as applicable as determined by the Control Room Supervisor or Shift Manager.

1. Check the Charging Pump Rooms for the following indications of leaks:

- a. Check the Charging Pumps for packing leaks.
- b. Check the general vicinity of the Charging Pump room for leaks.

NOTE

Charging Pump Suction Relief Valve flow passes through the diversion integrator.

NOTE

Temperature is measured at a point at least five feet downstream of relief valves to avoid temperature readings being affected by thermal conduction.

- c. Check that the Charging Pump Suction Relief Valves are **NOT** leaking by measuring downstream temperature with a contact pyrometer at a point at least five feet downstream of relief valves:
 - (11 Charging Pump) 1-CVC-315-RV
 - (12 Charging Pump) 1-CVC-318-RV
 - (13 Charging Pump) 1-CVC-321-RV
- 2. Have Chemistry check the following:
 - a. The primary sample sink is properly aligned.
 - b. NO leaks exist at the Primary Sample Sink.
 - c. Sample Drain Return Valves to the Drain Tanks are shut.
 - 1-PS-6529-SV
 - 2-PS-6529-SV
- 3. Perform a visual inspection for leaks of the following areas:
 - 27 foot and 5 foot West Penetration rooms
 - Letdown Heat Exchanger Room
 - 27 foot Valve Alley
 - VCT room
- 4. Review the maintenance schedule to determine if the leak could be due to maintenance in progress or recently completed.
- 5. Notify Radiation Safety Supervision to conduct an airborne activity survey of the Auxiliary Building.

ATTACHMENT (2) Page 2 of 3

LEAK IDENTIFICATION

6. Bypass and isolate the CVCS Ion Exchangers as follows:

- a. Place IX BYPASS valve handswitch, 1-HS-2520, to BYPASS.
- b. Verify Shut Purification Ion Exchanger Inlet Valves:
 - 1-CVC-126
 - 1-CVC-136
 - 1-CVC-146
- c. Shut Letdown Basket Strainer Inlet Valve, 1-CVC-156.
- 7. Bypass and isolate the CVCS Letdown Filters as follows:
 - a. Open CVCS Filter Bypass Valve, 1-CVC-124.
 - b. Shut CVCS Filter Inlet Isolation Valves:
 - (11) 1-CVC-116
 - (12) 1-CVC-120.
 - c. Shut CVCS Filter Outlet Isolation Valves:
 - (11) 1-CVC-117
 - (12) 1-CVC-121.
- 8. Check RCS Drain Tank for raised leakage **PER** the applicable section of <u>REACTOR</u> <u>COOLANT LEAKAGE EVALUATION</u>, STP O-27-1.
- 9. Check Quench Tank level, pressure and temperature for indication of leak to the Quench Tank.
 - a. **IF** leakage to the Quench Tank is indicated, **THEN** determine if a leaking PORV or Safety Valve may be the cause. Check T106, T107 and T108 on the Plant Computer to determine which valve is leaking.
 - b. IF PORV leakage is indicated, AND PZR pressure is less than 2300 PSIA, THEN perform the following:
 - (1) Shut the appropriate PORV BLOCK valves:
 - 1-RC-403-MOV
 - 1-RC-405-MOV
 - (2) Place the appropriate PORV OVERRIDE handswitches in the OVERRIDE TO CLOSE position:
 - 1-HS-1402
 - 1-HS-1404

ATTACHMENT (2) Page 3 of 3

LEAK IDENTIFICATION

- 10. Verify that leak is not caused by improper seating of the CVCS Diversion Valve, 1-CVC-500-CV by shutting its Manual Isolation Valve, 1-CVC-325.
- 11. Verify that Letdown Relief Valves 1-CVC-345-RV and 1-CVC-354-RV are not leaking by measuring downstream temperature with a contact pyrometer. Measure downstream temperature at a point at least five feet downstream of relief valves to avoid temperature reading being affected by thermal conduction. When checking 1-CVC-354-RV, raise letdown temperature above ambient temperature of 1-CVC-354-RV, so that leakage may be detected by temperature rise.
- 12. Check that the VCT relief, 1-CVC-115-RV, is not leaking by measuring downstream temperature with a contact pyrometer. Measure downstream temperature at a point at least five feet downstream of relief valves to avoid temperature reading being affected by thermal conduction.
- 13. Check Safety Injection Tank Levels, RWT level, HPSI and LPSI header pressures to verify that leakage is not into the Safety Injection system.
- 14. Check for RCS leaks into the Component Cooling System by checking the CC Head Tank and Component Cooling RMS, 1-RI-3819.

AOP-2A UNIT 1 / Rev 23

AOP-2A UNIT 1 **EXCESSIVE REACTOR COOLANT LEAKAGE**

TRIP CRITERIA	TRIP CRITERIA	TRIP CRITERIA		
SECTION VI.	SECTION VI.	SECTION VI.		
PZR pressure reaches the TM/LP pretrip setpoint	 IF the leak is on the charging header, 	 The leak has NOT been isolated, 		
 IF a SG Tube Leak is indicated 	AND charging has been realigned	AND the leak is greater than the capacity of ONE		
 T_{AVE} is less than 537°F 	 PZR level does NOT rise with charging flow 	Charging Pump		
 PZR level can NOT be maintained above 	 Leakage into the CC System is indicated, 			
101 inches	AND shutting the Letdown CNTMT Isolation			

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setpoint

PZR pressure reaches the TM/LP pretrip

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valves did NOT stop the leak

START	FUNCTION	DONE	PAGE	START	FUNCTION	DONE	PAGE	START	FUNCTION	DONE	PAGE
	SECTION IV. PRELIMINARY				SECTION VII. RCS LEAKAGE EXCEEDS ONE				SECTION IX. EXCESSIVE RCS LEAKAGE WITH		
	A. DETERMINE PROPER SECTION	·	8	11	CHARGING PUMP, MODE 3	1			LTOP CONTROLS IN EFFECT.		
	 Evacuate ALL unnecessary personnel from the 	e	8	1	WITHOUT LTOP CONTROLS IN	1			A. STABILIZE RCS TEMPERATURE.		106
	Containment PER the CONTAINMENT	-			EFFECT.				B. BEGIN AN INTERMEDIATE SAFETY FUNCTION		
	EVACUATION Attachment of ERPIP 3.0.				A. ESTABLISH PROPER SAFETY INJECTION				STATUS CHECK PER SECTION XI., SAFETY		
	 Notify Radiation Safety Supervision that 		8		LINEUP.		44		FUNCTION STATUS CHECK FOR EXCESSIVE		
1	excessive RCS leakage exists, and that				B. PERFORM RCP TRIP STRATEGY.	C	46		RCS LEAKAGE WITH LTOP CONTROLS IN		
	radiation levels may be changing in the				C. CHECK FOR A SG TUBE LEAK.	C	46		EFFECT.	С	106
	Auxiliary Building and Containment.	1			D. ATTEMPT TO ISOLATE THE LEAK.		47		C. DETERMINE THE APPROPRIATE EMERGENCY		
1	 Direct Chemistry to perform qualitative 		8			•			RESPONSE ACTIONS PER THE ERPIP.	С	106
	samples on both SGs for activity PER CP-436.					1			D. ESTABLISH INVENTORY CONTROL.	C	107
	 IF the RCS is on Shutdown Cooling 		8		SECTION VIII. EXCESSIVE SG TUBE LEAKAGE		1 1		E. PERFORM THE RCP TRIP STRATEGY.	С	112
	THEN IMPLEMENT AOP-3B.			1 [WITH LTOP CONTROLS IN EFFECT.				F. ATTEMPT TO ISOLATE THE LEAK.		112
	 Determine the proper Section. 		8		A. STABILIZE RCS TEMPERATURE.		56		G. MONITOR CONTAINMENT ENVIRONMENT.	С	118
					B. BEGIN AN INTERMEDIATE SAFETY FUNCTION				H. VERIFY SG LEVEL CONTROL.		120
					STATUS CHECK PER SECTION X., SAFETY				I. IF THOT IS GREATER THAN 300°F.		1
1	SECTION V. RCS LEAKAGE WITHIN THE				FUNCTION STATUS CHECK FOR EXCESSIVE				THEN COMMENCE RCS COOLDOWN.	С	121
	CAPACITY OF ONE CHARGING				SG TUBE LEAKAGE WITH LTOP CONTROLS IN				J. MAINTAIN RCS SUBCOOLING AND		
	PUMP.	1			EFFECT.	C	56		PRESSURIZER LEVEL.	с	122
	A. DETERMINE THE APPROPRIATE EMERGENCY				C. DETERMINE THE APPROPRIATE EMERGENCY				K. MAINTAIN RCS FLOW VERIFICATION.	С	126
	RESPONSE.	С	11		RESPONSE ACTIONS PER THE ERPIP.	c	56		L. MONITOR FOR CORE AND RCS VOIDING.	Ċ	127
	B. ATTEMPT TO DETERMINE RCS LEAK RATE.	1	11			C	56		M. IF ESFAS ACTUATIONS OCCUR.		
	C. ATTEMPT TO LOCATE AND ISOLATE THE	1.				C	63		THEN COMMENCE VERIFICATION		
	LEAK.	C	12		F. IDENTIFY THE AFFECTED SG.	i i	64		CHECKLISTS.		131
	D. COMMENCE THE ACTIONS FOR A SG TUBE				G. ISOLATE THE AFFECTED SG.	1	64		N. IF SIAS HAS ACTUATED.		
	LEAK.	С	15		H. WHEN THE AFFECTED SG IS ISOLATED				THEN SHIFT THE CHARGING PP SUCTION TO		
		-		11	THEN COMMENCE AN RCS COOLDOWN.	c	68		THE RWT.	с	131
					I. DEPRESSURIZE THE RCS TO REDUCE				O. PREPARE FOR RAS ACTUATION.	С	132
	SECTION VI. RCS LEAKAGE EXCEEDS ONE				SUBCOOLING AND MAINTAIN PZR LEVEL.	С	72		P. VERIFY RAS ACTUATION.	С	132
1	CHARGING PUMP, MODES 182.				J. MAINTAIN PRESSURE AND LEVEL CONTOL OF	1			Q. IF SIAS HAS ACTUATED.		
1	A. DETERMINE THE APPROPRIATE EMERGENCY		_		THE AFFECTED SG.	С	77		THEN RESTORE CONTAINMENT		
	RESPONSE.	C	27		K. CONTINUE TO TAKE CHEMISTRY AND RAD				ENVIRONMENT.	С	137
	B. VERIFY THAT THE EVENT IS NOT				CON SAMPLES.	С	90		R. IF RAS ACTUATED,		
	CHALLENGING THE RPS.	C	27		L. IF RCPS ARE SECURED,	· · · · · · · · · · · · · · · · · · ·	1		THEN REFILL THE RWT.	С	139
L	C. CONTROL PRESSUIRZER LEVEL	C	27		THEN CONFIRM NATURAL CIRCULATION IN				S. IF SIAS HAS ACTUATED,		
	D. CHECK FOR A SG TUBE LEAK.	C	28		THE UNAFFECTED SG LOOP.	с	91		AND HAS BEEN RESET,		
	E. ATTEMPT TO SOLATE THE LEAK.	lc 🛛	35		M. RESTORE LETDOWN FLOW.		92		THEN RESTORE AUXILIARIES.		139
	 IF leakage into the CC System is indicated, 				N. IF THE RCS IS WATER SOLID,				T. RESTORE LETDOWN FLOW.		141
	AND shutting the Letdown CNTMT Isolation				THEN DRAW A BUBBLE IN THE RCS.		95		U. IF THE RCS IS WATER SOLID,		
	valves did NOT stop the leak,				O. MONITOR FOR CORE AND RCS VOIDING.	C	96		THEN DRAW A BUBBLE IN THE RCS.		145
	THEN:		1		P. CONTROL SECONDARY SYSTEM				V. ESTABLISH SHUTDOWN COOLING.	С	146
	Trip the Reactor.		1		CONTAMINATION.	С	99		W. IMPLEMENT THE APPROPRIATE		
	Perform Reactivity Control immediate		1 1		Q. ATTEMPT TO ESTABLISH SHUTDOWN		1 1		PROCEDURE.		150
	actions of EOP-0.				COOLING CONDITIONS.	C	104				
1	Stop ALL RCPs. Shut the CC CNTMT SUPPLY and			· ·	R. IMPLEMENT THE APPROPRIATE						
1					PROCEDURE.		105				
1	RETURN valves.	1	1 42								
	IMPLEMENT EOP-0.		42								
1	F. DETERMINE THE APPROPRIATE ACTIONS										
	FOR RCS LEAKAGE.		42	J							

NOTE: Continuously applicable steps are designated with a "C" in the DONE column.