

Facility: <u>ANO-2</u> Examination Level: RO <input checked="" type="checkbox"/> SRO <input type="checkbox"/>		Date of Examination: <u>07/17/2006</u> Operating Test Number: <u>1</u>
Administrative Topic (see note)	Type Code*	Describe activity to be performed
Conduct of Operations 2.1.23 RO (3.9)	N	Ability to perform specific system and integrated plant procedures during all modes of plant operation. Determine volume of Boric acid and DI water to makeup to RWT. JPM-ANO-2-JPM-NRC-ADMIN RWT
Conduct of Operations 2.1.23 RO (3.9)	M	Ability to perform specific system and integrated plant procedures during all modes of plant operation. Determine CEDM temperature using OP 2105.009. Modified-JPM-ANO-2-JPM-NRC-ADMIN XTCEA
Equipment Control 2.2.12 RO (3.0)	D/P	Knowledge of Surveillance procedures. Review 2P89B Surveillance as RO. Direct-JPM-ANO-2-NRC-ADMIN-Surveillance review 2P89B
Radiation Control 2.3.9 RO (2.5)	N	Knowledge of the process for performing a containment purge. Complete a containment purge release permit verification. New-JPM-ANO-2-JPM-NRC-ADMIN-complete containment purge release
Emergency Plan	NA	NA
NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when all 5 are required.		
*Type Codes & Criteria: (C)ontrol room, (S)imulator, or Class(R)oom (D)irect from bank (≤ 3 for ROs; ≤ 4 for SROs & ROretakes) (N)ew or (M)odified from bank (≥ 1) (P)revious 2 Exams (≤ 1; randomly selected)		

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Administrative Topic (see note)	Type Code*	Describe activity to be performed
Conduct of Operations 2.1.12 SRO (4.0)	D	Determine RPS trip set point due to inoperable MSSV is correct using Technical Specifications. Ability to apply technical specification for a system Direct- ANO-2-JPM-NRC-ADMIN MSSVINOP
Conduct of Operations 2.1.23 SRO (4.0)	M	Ability to perform specific system and integrated plant procedures during all modes of plant operation. Approve CEDM temperature calculation using OP 2105.009. Modified-ANO-2-JPM-NRC-ADMIN XTCEA
Equipment Control 2.2.12 SRO (3.4)	D/P	Knowledge of Surveillance procedures. Review 2P89B Surveillance. Direct-ANO-2-JPM-NRC-ADMIN-Surveillance review 2P89B
Radiation Control 2.3.9 SRO (3.4)	N	Knowledge of the process for performing a containment purge. Approve a containment purge release permit New-JPM-ANO-2-JPM-NRC-ADMIN-Approve containment purge release
Emergency Plan 2.4.29 SRO (4.0)	N	Knowledge of the emergency plan. Classify EAL and complete applicable Shift Manager forms. New-ANO-2-JPM-NRC-ADMIN-Classify event and Complete SM E-plan forms
NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when all 5 are required.		
*Type Codes & Criteria: <div style="margin-left: 20px;"> (C)ontrol room, (S)imulator, or Class(R)oom (D)irect from bank (≤ 3 for ROs; ≤ 4 for SROs & RO retakes) (N)ew or (M)odified from bank (≥ 1) (P)revious 2 Exams (≤ 1; randomly selected) </div>		

ENTERGY OPERATIONS INCORPORATED ARKANSAS NUCLEAR ONE

TITLE: CHEMICAL ADDITION

DOCUMENT NO.
2104.003

CHANGE NO.
032-03-0

SET #

WORK PLAN EXP. DATE
N/A

TC EXP. DATE
N/A

SAFETY-RELATED
☒ YES ☐ NO

IPTE
☐ YES ☒ NO

TEMP ALT
☒ YES ☐ NO

PROGRAMMATIC EXCLUSION PER ENS-LI-101
☐ YES ☒ NO

When you see these TRAPS

Get these TOOLS

Time Pressure
Distraction/Interruption
Multiple Tasks
Over Confidence
Vague or Interpretive Guidance
First Shift/Last Shift
Peer Pressure
Change/Off Normal
Physical Environment
Mental Stress (Home or Work)

Effective Communication
Questioning Attitude
Placekeeping
Self Check
Peer Check
Knowledge
Procedures
Job Briefing
Coaching
Turnover

VERIFIED BY

DATE

TIME

FORM TITLE:

VERIFICATION COVER SHEET

FORM NO.
1000.006A

CHANGE NO.
051-00-0

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ARKANSAS NUCLEAR ONE**

Page 1

TITLE: CHEMICAL ADDITION		DOCUMENT NO. 2104.003	CHANGE NO. 032-03-0
AFFECTED UNIT: <input type="checkbox"/> UNIT 1 <input checked="" type="checkbox"/> UNIT 2		<input checked="" type="checkbox"/> PROCEDURE <input type="checkbox"/> ELECTRONIC DOCUMENT <input type="checkbox"/> WORK PLAN, EXP. DATE _____	SAFETY-RELATED <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
TYPE OF CHANGE: <input type="checkbox"/> NEW <input checked="" type="checkbox"/> PC <input type="checkbox"/> TC <input type="checkbox"/> DELETION <input type="checkbox"/> REVISION <input type="checkbox"/> EZ EXP. DATE: <u>N/A</u>			
DOES THIS DOCUMENT: 1. Supersede or replace another procedure? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO (If YES, complete 1000.006B for deleted procedure.) 2. Alter or delete an existing regulatory commitment? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO (If YES, coordinate with Licensing before implementing.) 3. Require a 50.59 Review per Form 1000.006S? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO (If No, attach completed Form 1000.006S) (If 50.59 Evaluation, OSRC review required.) 4. Changes Surveillance Test Program (i.e. Technical Specifications, NRC Commitment, surveillance activity, see Step 7.5)? (If YES, complete 1000.009A) <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO 5. Create an Intent Change? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO (If YES, Standard Approval Process required.) 6. Implement or change IPTE requirements? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO (If YES, complete 1000.143A. OSRC review required.) 7. Implement or change a Temporary Alteration? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO (If YES, then OSRC review required.)			
Was the Master Electronic File used as the source document? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO			
INTERIM APPROVAL PROCESS		STANDARD APPROVAL PROCESS	
ORIGINATOR SIGNATURE: (Includes review of Att. 13) DATE: _____ Print and Sign name: NA PHONE #: _____		ORIGINATOR SIGNATURE: (Includes review of Att. 13) DATE: 3/21/2006 Print and Sign name: DVICK <i>D. Vick</i> PHONE #: 5475	
SUPERVISOR APPROVAL: * N/A DATE: _____		INDEPENDENT REVIEWER: <i>Small</i> DATE: 3-22-06	
SRO UNIT ONE **: N/A DATE: _____		ENGINEERING: N/A DATE: _____	
SRO UNIT TWO **: N/A DATE: _____		Code Programs - NDE: N/A DATE: _____	
Interim approval allowed for non-intent changes requiring no 50.59 evaluation that are stopping work in progress. Standard Approval required for intent changes or changes requiring a 50.59 evaluation. *If change not required to support work in progress, Department Head must sign. **If both units are affected by change, both SRO signatures are required. (SRO signature required for safety related procedures only.)		UNIT SURVEILLANCE COORDINATOR: N/A DATE: _____	
		SECTION LEADER: <i>Roger K. P... 3-27-06</i> DATE: 3-27-06	
		QUALITY ASSURANCE: N/A DATE: _____	
		OTHER SECTION LEADERS: N/A DATE: _____	
		OTHER SECTION LEADERS: N/A DATE: _____	
		OTHER SECTION LEADERS: N/A DATE: _____	
		OTHER SECTION LEADERS: N/A DATE: _____	
OSRC CHAIRMAN/TECHNICAL REVIEWER: <i>Roger K. P... 3-27-06</i> DATE: 3-27-06		OTHER SECTION LEADERS: N/A DATE: _____	
FINAL APPROVAL: <i>[Signature]</i> DATE: 3-29-06		OTHER SECTION LEADERS: N/A DATE: _____	
REQUIRED EFFECTIVE DATE: 3-30-06		OTHER SECTION LEADERS: N/A DATE: _____	
FORM TITLE: PROCEDURE/WORK PLAN APPROVAL REQUEST		FORM NO. 1000.006B	CHANGE NO. 054-00-0

**ENTERGY OPERATIONS INCORPORATED
ARKANSAS NUCLEAR ONE**

TITLE: CHEMICAL ADDITION

**DOCUMENT NO.
2104.003**

**CHANGE NO.
032-03-0**

☒ **PROCEDURE**

☐ **WORK PLAN, EXP. DATE** N/A

PAGE 1 **OF** 1

☐ **ELECTRONIC DOCUMENT**

TYPE OF CHANGE:

☐ **NEW**

☒ **PC**

☐ **TC**

☐ **DELETION**

☐ **REVISION**

☐ **EZ**

EXP. DATE: N/A

AFFECTED SECTION:
(Include step # if applicable)

Step 4.1

New Step 7.6, 8.5, 9.5 and 16.6 added.

DESCRIPTION OF CHANGE: (For each change made, include sufficient detail to describe reason for the change.)

Added CR ANO-1-2005-02539

Added continuous action step to verify no foreign material in tank and boric acid crystals prior to mixing and transfer from the mixing tank.
Renumbered remaining steps.

FORM TITLE:

DESCRIPTION OF CHANGE

**FORM NO.
1000.006C**

**CHANGE NO.
050-00-0**

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1.0 PURPOSE

This procedure provides instructions for mixing and feeding various chemicals to the Reactor Coolant System and Refueling Water Tank (2T-3).

2.0 SCOPE

This procedure pertains to mixing, storage, and transfer of boric acid in Unit 2 and chemical addition to the Unit 2 Reactor Coolant System. It also contains directions for mixing and transferring boric acid to U-1.

Supplements 1 through 4 of this procedure pertain to testing Boric Acid Makeup pumps and boration flow path valves including verification that stored boric acid concentration, volume, and temperature are within limits specified by ANO-2 Technical Specifications and Technical Requirements Manual.

Attachments J through O of this procedure pertain to boration and dilution of the Reactor Coolant System. These attachments provide instructions for controlling boric acid concentration in the RCS.

ANO-2 Tech Spec/ TRM LCOs are assessed using this procedure. Tests performed in this procedure satisfy the requirements of TRMs 4.1.2.1.a, 4.1.2.2.a, 4.1.2.5, 4.1.2.6, 4.1.2.7.a.1, 4.1.2.7.a.2, 4.1.2.7.a.3, 4.1.2.8.a.1, 4.1.2.8.a.2, 4.1.2.8.a.3. Tests performed in this procedure also implement Inservice Test Program requirements for Chemical Addition System components.

3.0 DESCRIPTION

The Chemical Addition System mixes, stores, and transfers boric acid and other chemical solutions to the following components:

- Reactor Coolant System
- Refueling Water Tank (2T-3)
- Spent Fuel Pool
- Safety Injection Tanks (2T-2A through 2T-2D)

Boric Acid Batching Tank (2T-7) located on 404' of the Aux Building is used to prepare boric acid solutions. 2T-7 is made of stainless steel and has a capacity of 630 gallons. Temperature Controller (2TIC-4901) controls electric immersion Boric Acid Batching Tank Heater (2M-33) to maintain boric acid solution above crystallization temperature.

Up to 12 weight percent boric acid can be mixed in the batching tank. After the solution is mixed using the permanently mounted electric mixer, it is gravity-drained to either BAM Tank (2T-6A OR 2T-6B) OR to Unit 1 Boric Acid Addition Tank (T-7).

Pipe connecting the 2T-7 with the BAM Tanks and Unit 1 Boric Acid Addition Tank is provided with redundant electrical heat tracing. Heat traced pipe is thermally insulated to conserve heat and protect personnel.

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Boric Acid Makeup (BAM) Tanks (2T-6A and 2T-6B) are made of stainless steel. The capacity of each tank is 11,700 gallons.

Each BAM Tank is insulated and has two independent full-capacity, strap-on BAM Tank Heaters (2M-43A through 2M-43D). They are controlled by handswitches on 2C09 and automatically control temperature between 55°F and 140°F. The heaters each supply 14 KW to compensate for heat lost through tank insulation.

Each BAM Tank is vented to the gas collection header and overflows through a loop seal to the floor drain system. Piping connects 2T-6A and 2T-6B outlets to the Charging pump suction through Gravity Feed valves (2CV-4920-1 and 2CV-4921-1). Both 2CV-4920-1 and 2CV-4921-1 are opened by SIAS.

BAM pumps (2P-39A and 2P-39B) are located in 2DG1 room. The pumps take suction from the BAM Tanks and supply boric acid to the mixing tee at a controlled flow rate or directly to the Charging pump suction header through 2CV-4916-2 upon SIAS. The BAM pumps also recirculate the BAMTs, pump from one tank to the other, and supply makeup to the RWT and Spent Fuel Pool.

2P-39A and 2P-39B are horizontal, single-stage centrifugal pumps with mechanical seals. The capacity of each pump is 143 gpm, which is greater than the combined capacity of the Charging pumps. A recirculation line is installed from the pumps back to 2T-6A and 2T-6B. Both air-operated recirc valves close on SIAS. Locked throttle valves (2CVC-53A and 2CVC-53B), set for minimum pump flow, bypass around the recircs.

The pumps can be started manually from 2C09. A Pump Select Switch allows either pump to be operated automatically from the Mode Select Switch (2HS-4928).

Reactor Makeup Water is stored in the stainless steel Reactor Makeup Water Tank (2T-73), located west of the Raw Water Holding Tank (T-61). 2T-73 has a capacity of 180,000 gallons. Temperature controller (2TIS-4961) cycles 2CV-4962 to maintain temperature between 90°F and 110°F. Steam is supplied from the auxiliary steam system. Alarms are provided for high and low tank level and temperature.

Reactor Makeup pumps (2P-109A and 2P-109B) are located on 335' of the Turbine Building. 2P-109A and 2P-109B can be started manually from 2C09 or either pump can be controlled automatically by using the Mode Select Switch (2HS-4928). The pumps take suction from 2T-73 and provide demineralized water to the reactor makeup water header.

Chemical additives for RCS chemistry control can be injected into the Charging pump suction through the Chemical Addition Tank (2T-8). The tank is located on 404' of the Aux building near 2T-7. 2T-8 is made of stainless steel and has a 4 gallon capacity. DI water is supplied from the Reactor Makeup Water System for chemical dilution and to mix and flush 2T-8.

The Chemical Addition Tank can be used to inject a chemical solution for oxygen scavenging during plant startup or lithium hydroxide for pH control.

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Mode Select Switch (2HS-4928) provides four modes for injecting boron solutions into the RCS via the CVCS:

- AUTO -- Makeup to the RCS at existing RCS boron concentration. The flow rates for boric acid and water injection are preset to provide a blended solution of the same boron concentration as the RCS. When VCT level lowers to 60%, automatic blending begins and continues until level rises to 75%. Preset flow rates are adjusted periodically to match RCS boric acid concentration.
- BORATE -- Raise RCS boron concentration. Allows a preset amount of concentrated boric acid to be added at a preset flow rate. The boric acid amount is automatically terminated when that amount has been added.
- DILUTE -- Reduce RCS boron concentration. Allows a preset amount of water to be added at a preset flow rate and automatically terminates when that amount has been added.
- MANUAL -- Add boric acid, DI water or a blended boric acid solution to the VCT. Also used to provide makeup at preselected flow rates and concentrations to the Refueling Water Tank (2T-3) and Spent Fuel Pool.

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4.0 REFERENCES

4.1 References Used In Procedure Preparation

- Chemical and Volume Control System, (ANO-2 SAR, Section 9.3.4)
- Functional Description and Logic Diagram M-2417, Sheets 1 through 8
- Chemical & Volume Control System, (P&ID M-2231, Sheets 1 through 3)
- IST Program, ASME Code Section XI, 1989 Edition with no Addenda
- ANO Unit 2 TRM 3/4.1.2.1, 3/4.1.2.2, 3/4.1.2.5, 3/4.1.2.6, 3/4.1.2.7, 3/4.1.2.8
- CR 2-91-0514, Notify EDG System Engineer if DG Room < 55°F
- CR 2-93-0300, SPING 7 failure due to water intrusion caused by 2T-7 heaters being left energized
- CR 2-99-0744 CA-005, Diluting the RWT while diluting the RCS
- LIC-01-017, ANO2 TS Am. 229, Relocation of Boric Acid Makeup Systems from TSs to TRM
- ER002344I211, BAMT Calculation
- CR-ANO-2-2002-01477, Dilution of 2T-6A while batching
- CR-ANO-2-2002-01914 & CALC-88-E-0200-13, BAMT recirc and component design temperatures
- CR-ANO-1-2002-1134, Potential hydrogen peroxide attack on tungsten carbide RCP seal faces
- CR-ANO-2-2004-0407, Boric Acid Makeup pump discharge check valve backleakage
- CR-ANO-2-2004-1136, 2CVC-61A Vibrated Closed
- CR-2-98-0459-03, Calcs 90-E-0100-03 & 90-E-0116-06, RWT volume
- CR-ANO-2-2001-0601/ER010827E201, Eval leaving BAM Pump Suction Pressure Gages unisolated
- CR-ANO-2-2005-1306, Failure of chemical addition to the RCS due to clogged strainer
- CR-ANO-2-2005-1362, RCS pH out of spec due to inadequate Lithium addition
- CALC-97-E-0020-05, instrument error analysis for boric acid mu pump local press ind to support boric acid mu pump surv testing
- CALC-97-E-0020-14, instrument error analysis for 2FT-4926 to support boric acid mu pump surv testing
- CR-ANO-1-2005-02539, Foreign materials in Boric Acid Batch tank

4.2 References Used In Conjunction With This Procedure

- Chemical and Volume Control (2104.002)
- Fuel Pool Systems (2104.006)
- LRW and BMS Operations (2104.014)
- Soluble Poison Concentration Control (2103.004)
- Conduct of Operations (1015.001)
- ANO-2 TRM 3/4.1.2 Boration Systems

4.3 NRC Commitments

- 4.3.1 P5389, Instruction for RCS dilution during power operations (Attachment J)
- 4.3.2 P12303, BAMT boron known prior to adding to RCS (Attachments K through N)

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5.0 LIMITS AND PRECAUTIONS

- 5.1 All lines and tanks containing boric acid solutions must be maintained at sufficient temperature so boric acid remains in solution. Refer to Attachment G for solubility curve.
- 5.2 Do not energize Boric Acid Batching Tank Heater (2M-33) when water level below heater elements.
- 5.3 Flow rate of reactor coolant through RCS shall be ≥ 2000 gpm whenever reduction in RCS boron concentration being made.
- 5.4 The following quantities must be maintained within boric acid solution limits given in TRM 3.1.2.7 and 3.1.2.8.
(Use Supplement 4 Figure 1 to verify TRM requirements met.)
 - Borated Water Volume
 - Boric Acid Concentration
 - Borated Water Temperature
- 5.5 BAM Tank (2T-6A/B) temperature controllers must be set at 70°F to ensure HI/LO tank temperature alarms are functional. Controllers may be temporarily adjusted to raise BAMT temperature as needed.
- 5.6 Volume of Blending Tee to VCT piping run is ~ 34 gallons. Each blend should be completed with ~ 50 gallons of water to ensure complete acid addition to VCT.
- 5.7 When isolating BAM pump suction pressure gauge (2PI-4935/2PI-4936) close outboard isolation valve (2CVC-4935B/4936B) prior to closing inboard isolation valve (2CVC-4935A/4936A). Not following this order for isolation can cause pressure in tubing to rise due to piston effect of valve stem. This condition combined with rise in #2 EDG room temperature can cause 2PI-4935/4936 to be overpressurized.
(CR-ANO-2-2001-0601/ER010827E201)
- 5.8 During Long Term Recirculation of BAMTs, temperature in tanks and piping shall not exceed 180°F to protect system components from exceeding design temperatures. (CR-ANO-2-2002-01914 & CALC-88-E-0200-13)
- 5.9 Per Fire Protection, a maximum of 35 barrels of boric acid can be stored in the Boric Acid Mix Tank room.

6.0 SETPOINTS

- 6.1 BAM Tank Heaters (2M-43A - D) turn on at 65°F and turn off at 75°F
- 6.2 RMWT Water Inlet (2CV-4960) opens at 10 ft and closes at 27 ft
- 6.3 RMWT Steam Inlet (2CV-4962) opens at 90°F and closes at 110°F
- 6.4 RMWT Steam Inlet (2CV-4962) closes at < 4 ft

NOTE

This method shall be used to makeup to BAM Tank whose volume is necessary to comply with TRM 3.1.2.7 OR 3.1.2.8. (Use Supplement 4 Figure 1 to verify TRM requirements met.)

7.0 BATCHING TO AN OPERABLE BAM TANK

- 7.1 Verify sufficient nuclear grade boric acid crystals available.
- 7.2 Verify Boric Acid Batching Tank heater 2M-33 handswitch 2HS-4901 in OFF.
- 7.3 Verify 2T-6A (2LIS-4906) OR 2T-6B level (2LIS-4908) low enough to receive intended batch without overflowing (< 87% for normal batch).
- 7.4 Verify EITHER Reactor Makeup pump (2P-109A OR 2P-109B) running.
- 7.5 Verify Batching Tank Drain (2DCH-58) closed.
- *7.6 Verify no foreign material in tank and boric acid crystals prior to mixing and transfer from the mixing tank.
- 7.7 Open RMW to Boric Acid Batching Tank valve (2CVC-76).

NOTE

A normal batch is defined as either 155 or 138 pounds of boric acid crystals dissolved in 2T-7 level of 39 inches. For off-normal batches, refer to Exhibit 1. (CR-ANO-2-2002-01477)

- 7.8 IF normal batch to be added,
THEN perform the following:
 - 7.8.1 WHEN 2T-7 level 39 inches,
THEN close 2CVC-76.
- 7.9 IF an off-normal batch to be added,
THEN perform the following:
 - 7.9.1 WHEN proper 2T-7 level reached,
THEN close 2CVC-76.
- 7.10 IF Boric Acid Batching Tank heater (2M-33) available,
THEN place Heater handswitch 2HS-4901 to ON.
- 7.11 Determine correct temperature for batch to be added by referring to Attachment G of this procedure.
- 7.12 WHEN correct temperature reached as read on 2M-33 Temperature controller (2TIC-4901),
THEN start Boric Acid Batching Tank Mixer Assembly (2M-31).
- 7.13 IF normal batch to be added,
THEN perform the following:
 - 7.13.1 IF this is first batch following 2T-7 flush,
THEN slowly add 155 pounds of boric acid crystals.
(CR-ANO-2-2002-01477)
 - 7.13.2 IF previous batches were added without flushing 2T-7,
THEN add 138 pounds of boric acid crystals.
(CR-ANO-2-2002-01477)

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- 7.14 IF off-normal batch to be added,
THEN add proper amount of boric acid crystals to obtain required Boron concentration.
- 7.15 Operate 2M-31 until crystals mix into solution.
- 7.16 Stop 2M-31.
- 7.17 Verify Boric Acid Batching Tank heater 2M-33 handswitch 2HS-4901 in OFF.
- 7.18 IF batching to 2T-6A,
THEN open Boric Acid Makeup Tank 2T-6A Inlet valve (2CVC-37A).
- 7.19 IF batching to 2T-6B,
THEN open Boric Acid Makeup Tank 2T-6B Inlet valve (2CVC-37B).
- 7.20 Notify Control Room before adding to EITHER 2T-6A OR 2T-6B.
- 7.21 WHEN desired to dump 2T-7 contents to EITHER 2T-6A OR 2T-6B,
THEN open Batching Tank Drain to Boric Acid Makeup Tank (2CVC-36).
- 7.22 WHEN 2T-7 has drained,
THEN verify the following valves closed:
- 2CVC-36
 - 2CVC-37A
 - 2CVC-37B
- *7.23 IF performing multiple normal batch operations,
THEN flush 2T-7 at least once each shift per step 7.27
- *7.24 IF performing multiple off-normal batch operations with Boric Acid concentrations greater than normal,
THEN flush 2T-7 at least once each shift per step 7.28.
- * 7.25 Repeat makeup sequence as needed to achieve required volume in 2T-6A OR 2T-6B.
- 7.26 WHEN 2T-6A OR 2T-6B filled,
THEN perform the following:
- 7.26.1 Contact Control Room to place 2T-6A or 2T-6B on recirculation using Recirculation of BAM Tanks section of this procedure.
- 7.26.2 Request boron sample from Chemistry.

NOTE

When batching higher than normal Boric Acid concentrations, it is important to dilute the remaining concentrated water with heated water prior to draining or 2T-7 drain line may rock up. Normal batches can be flushed with reactor makeup water without heating.

- 7.27 IF batching normal batches,
THEN perform the following to flush 2T-7 with Reactor Makeup water:
- 7.27.1 Open 2CVC-76.
 - 7.27.2 Open 2DCH-58.
 - 7.27.3 Flush 2T-7 for 4-5 minutes.
 - 7.27.4 Close 2CVC-76.
 - 7.27.5 WHEN 2T-7 drained,
THEN close 2DCH-58.
- 7.28 IF batching off-normal batches with Boric Acid concentrations greater than normal,
THEN perform the following to flush 2T-7:
- 7.28.1 Open 2CVC-76.
 - 7.28.2 WHEN 2T-7 level 38 inches,
THEN close 2CVC-76.
 - 7.28.3 Verify 2M-33 Temperature controller (2TIC-4901) set to 150°F in AUTO.
 - 7.28.4 WHEN 2T-7 temperature \geq 150°F,
THEN verify 2M-33 handswitch 2HS-4901 in OFF.
 - 7.28.5 Open 2DCH-58 to drain 2T-7.
 - * 7.28.6 Cycle 2CVC-76 as necessary to flush 2T-7 for at least 5 minutes.
 - 7.28.7 Verify 2CVC-76 closed.
 - 7.28.8 WHEN 2T-7 drained,
THEN close 2DCH-58.
- 7.29 IF batching operation complete,
THEN close 2T-7 lid to prevent foreign material from entering.

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8.0 BATCHING TO AN INOPERABLE BAM TANK

NOTE

- If this method used, then contents of BAMT being added to shall NOT be credited for stored volume required by TRM 3.1.2.7.a OR 3.1.2.8.a. until sample following addition confirms boric acid concentration within Tech Spec limits. (Use Supplement 4 Figure 1 to verify TRM requirements met.)
- These instructions are for adding ~ 3.45 wt% (6037 ppm) boric acid solution to selected BAMT. If different concentration desired, then use "Batching Unit 2 BAM Tank To A Desired Concentration" section of this procedure.

- 8.1 Verify sufficient nuclear grade boric acid crystals available.
- 8.2 Verify 2T-6A (2LIS-4906) OR 2T-6B (2LIS-4908) level < 78%.
- 8.3 Verify EITHER Reactor Makeup pump (2P-109A OR 2P-109B) running.
- 8.4 Verify Batching Tank Drain (2DCH-58) closed.
- *8.5 Verify no foreign material in tank and boric acid crystals prior to mixing and transfer from the mixing tank.
- 8.6 Open RMW to Boric Acid Batching Tank valve (2CVC-76).
- 8.7 WHEN 2T-7 level 38 inches,
THEN close 2CVC-76.
- 8.8 Verify 2M-33 Temperature controller (2TIC-4901) set to 150°F in AUTO.
- 8.9 WHEN 2T-7 temperature > 110°F,
THEN use Batching Tank Drain (2DCH-58) to drain 2T-7 to 38 inches.
- 8.10 Start Boric Acid Batching Tank mixer (2M-31).
- 8.11 Slowly add one full container (barrel OR bag) of boric acid crystals.
- 8.12 Run 2M-31 until crystals mix into solution.
- 8.13 Verify appropriate BAMT Heaters in AUTO on 2C09 and temperature > 55°F.
- 8.14 Stop 2M-31.
- 8.15 Verify Boric Acid Batching Tank heater 2M-33 handswitch 2HS-4901 in OFF.
- 8.16 Open selected BAMT Inlet valve (2CVC-37A OR 2CVC-37B).
- 8.17 WHEN desired to dump 2T-7 contents to 2T-6A OR 2T-6B,
THEN open Batching Tank Drain to Boric Acid Makeup Tank (2CVC-36).
- 8.18 WHEN 2T-7 has drained,
THEN close 2CVC-36.
- 8.19 Open RMW to Boric Acid Batching Tank valve (2CVC-76).

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- 8.20 WHEN 2T-7 level 30 inches,
THEN close 2CVC-76.
- 8.21 WHEN desired to dump 2T-7 contents to 2T-6A OR 2T-6B,
THEN open Batching Tank Drain to Boric Acid Makeup Tank (2CVC-36).
- 8.22 WHEN 2T-7 has drained,
THEN close 2CVC-36.
- 8.23 Open RMW to Boric Acid Batching Tank valve (2CVC-76).
- 8.24 WHEN level 24 inches,
THEN close 2CVC-76.
- 8.25 WHEN desired to dump 2T-7 contents to 2T-6A OR 2T-6B,
THEN open Batching Tank Drain to Boric Acid Makeup Tank (2CVC-36).
- 8.26 WHEN 2T-7 has drained,
THEN close 2CVC-36.
- 8.27 Verify the following valves are closed:
- 2CVC-37A
 - 2CVC-37B
- *8.28 IF performing multiple batch operations,
THEN flush 2T-7 using step 8.31 at least once each shift.
- *8.29 Repeat makeup sequence as many times as necessary.
- 8.30 WHEN 2T-6A OR 2T-6B filled,
THEN perform the following:
- 8.30.1 Contact Control Room to place 2T-6A OR 2T-6B on recirculation using Recirculation of BAM Tanks section of this procedure.
- 8.30.2 Request boron sample from Chemistry.
- 8.30.3 IF BAM Tank added to is to be credited for stored volume required by TRM 3.1.2.7.a OR 3.1.2.8.b,
(Use Supplement 4 Figure 1 to verify TRM requirements met.)
THEN verify contents of 2T-6A OR 2T-6B within acceptable region of TRM figure 3.1-1.
- 8.31 Perform the following to flush 2T-7 with reactor makeup water:
- 8.31.1 Open 2CVC-76.
- 8.31.2 Open 2DCH-58.
- 8.31.3 Flush 2T-7 for 4-5 minutes.
- 8.31.4 Close 2CVC-76.
- 8.31.5 Close 2DCH-58.
- 8.32 IF batching operation complete,
THEN close 2T-7 lid to prevent foreign material from entering.

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9.0 BATCHING TO UNIT 1 BAM TANK (T-6)

- 9.1 Obtain desired batch concentration from Unit 1.
- 9.2 Verify sufficient nuclear grade boric acid crystals available.
- 9.3 Verify EITHER Reactor Makeup pump (2P-109A OR 2P-109B) running.
- 9.4 Determine boric acid batch concentration AND amount of water required to meet Unit 1 request using Exhibit 1.
- *9.5 Verify no foreign material in tank and boric acid crystals prior to mixing and transfer from the mixing tank.
- 9.6 Verify Batching Tank Drain (2DCH-58) closed.
- 9.7 Open RMW to Boric Acid Batching Tank (2CVC-76).
- 9.8 WHEN 2T-7 at proper level for desired concentration,
THEN close 2CVC-76.
- 9.9 Verify 2M-33 Temperature controller (2TIC-4901) set to 150°F in AUTO.
- 9.10 WHEN 2T-7 temperature > 130°F as read on 2M-33 Temperature controller (2TIC-4901),
THEN use Batching Tank Drain (2DCH-58) to drain 2T-7 to desired level.
- 9.11 Start Boric Acid Batching Tank mixer (2M-31).
- 9.12 Add required amount of boric acid for desired batch concentration.
- 9.13 Run 2M-31 until crystals mix into solution.
- 9.14 Stop Mixer (2M-31).
- 9.15 Verify Boric Acid Batching Tank heater 2M-33 handswitch 2HS-4901 in OFF.
- 9.16 WHEN Unit 1 ready to receive batch,
THEN open Batching Tank Drain to Boric Acid Makeup Tank (2CVC-36) to drain 2T-7 contents to T-6.
- 9.17 WHEN 2T-7 drained,
THEN close 2CVC-36.
- 9.18 IF additional water needed,
THEN perform the following:
 - 9.18.1 Open 2CVC-76.
 - 9.18.2 Fill 2T-7 to level from Exhibit 1 for desired concentration.
 - 9.18.3 Open 2CVC-36.
 - 9.18.4 Drain water from 2T-7 to T-6.
 - 9.18.5 WHEN 2T-7 has drained,
THEN close 2CVC-36.

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- *9.19 IF performing multiple batch operations,
THEN flush 2T-7 using [step 9.21](#) at least once each shift.
- *9.20 Repeat makeup sequence as many times as necessary.
- 9.21 Flush 2T-7 with reactor makeup water as follows:
 - 9.21.1 Open 2CVC-76.
 - 9.21.2 WHEN 2T-7 level 38 inches,
THEN close 2CVC-76.
 - 9.21.3 Verify 2M-33 Temperature controller (2TIC-4901) set to 150°F in AUTO.
 - 9.21.4 WHEN 2T-7 temperature \geq 150°F,
THEN verify 2M-33 handswitch 2HS-4901 in OFF.
 - 9.21.5 Open 2DCH-58 to drain 2T-7.
 - *9.21.6 Cycle 2CVC-76 as necessary to flush 2T-7 for at least 5 minutes.
 - 9.21.7 Verify 2CVC-76 closed.
 - 9.21.8 WHEN 2T-7 drained,
THEN close 2DCH-58.
- 9.22 IF batching operation complete,
THEN close 2T-7 lid to prevent foreign material from entering.

10.0 RECIRCULATION OF BAM TANKS

- 10.1 IF recirculating 2T-6A,
THEN mix contents as follows:
 - 10.1.1 Start BAM pump (2P-39A).
 - 10.1.2 Open BAM Tank Recirc valve (2CV-4903-2).
 - 10.1.3 Inform Chemistry of time 2T-6A placed on recirc.
 - 10.1.4 WHEN recirculation AND sampling complete,
THEN stop 2P-39A.
 - 10.1.5 Close 2CV-4903-2.
- 10.2 IF recirculating 2T-6B,
THEN mix contents as follows:
 - 10.2.1 Start BAM pump (2P-39B).
 - 10.2.2 Open BAM Tank Recirc valve (2CV-4915-2).
 - 10.2.3 Inform Chemistry of time 2T-6B placed on recirc.
 - 10.2.4 WHEN recirculation AND sampling complete,
THEN stop 2P-39B.
 - 10.2.5 Close 2CV-4915-2.

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11.0 MAKEUP TO THE REFUELING WATER TANK

- 11.1 Determine volume of boric acid solution to be transferred using Attachment E OR BORON 2 program.
- 11.2 Verify boric acid stored volume sufficient to provide volume for transfer without violating TRM 3.1.2.7 OR 3.1.2.8.
(Use Supplement 4 Figure 1 to verify TRM requirements met.)
- 11.3 Review calculation performed in Step 11.1 to ensure final RWT boron concentration will be within the following admin limits:
 - Minimum per RWT Boron vs. RCS Boron curve in Supplement 4
 - Maximum of 2950 ppm
- 11.4 Verify the following valves closed:
 - VCT Makeup Isolation (2CV-4941-2)
 - Manual Makeup to Charging Pump Suction (2CVC-83)
 - Manual Makeup to VCT (2CVC-68)
 - Makeup to Spent Fuel Pool (2CVC-66)
- 11.5 Open Makeup to Refueling Water Tank (2CVC-64).

NOTE

Securing boric acid addition ~ 50 gallons before securing water addition will ensure the blending line is clear of boric acid.

- 11.6 IF addition to be made with Mode Select switch (2HS-4928) in MANUAL, THEN perform the following:
 - 11.6.1 Set Boric Acid Makeup Flow controller (2FIC-4926) setpoint to desired flow rate determined above.
 - 11.6.2 Set Reactor Makeup Water Flow controller (2FIC-4927) setpoint to desired flow rate determined above.
 - 11.6.3 Reset Boric Acid Makeup Flow totalizer (2FQI-4926) AND Reactor Makeup Water Flow totalizer (2FQI-4927) to zero so total gallons of makeup can be determined.
 - 11.6.4 Start any of the following pumps as necessary:
 - BAM pump (2P-39A)
 - BAM pump (2P-39B)
 - Reactor Makeup pump (2P-109A)
 - Reactor Makeup pump (2P-109B)
 - 11.6.5 Open appropriate BAM Tank Recirc valve as necessary:
 - 2CV-4903-2 for 2P-39A
 - 2CV-4915-2 for 2P-39B

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- 11.6.6 Place 2HS-4928 to MANUAL.
- 11.6.7 Verify 2FIC-4926 indicates desired flowrate.
- 11.6.8 Verify 2FIC-4927 indicates desired flowrate.
- 11.7 IF addition to be made with Mode Select Switch (2HS-4928) in BORATE,
THEN perform the following:
 - 11.7.1 Place Charging Pump Suction From Boric Acid (2CV-4930) in CLOSE.
 - 11.7.2 Place 2HS-4928 in BORATE.
 - 11.7.3 Verify selected BAM pump(2P-39A OR 2P-39B) starts.
 - 11.7.4 Open appropriate BAM Tank Recirc valve:
 - 2CV-4903-2
 - 2CV-4915-2
 - 11.7.5 Operate Boric Acid Makeup Flow Batch controller (2FQIS-4926) as follows:
 - A. Depress Red pushbutton.
 - B. Verify 2FQIS-4926 set for desired quantity.
 - C. Verify 2FIC-4926 indicates desired flow rate determined above.
 - 11.7.6 IF 2FIC-4926 in MANUAL,
THEN adjust 2FIC-4926 to desired flow rate determined above.
- 11.8 IF ANY of the following occur during transfer:
 - Fuel Pool Level High Alarm (2K11-J4),
 - RCS Tave begins to rise,
 - RCS Tave begins to lower,THEN secure ALL pumps started for RWT addition.
- 11.9 IF desired to prevent excessive Boron addition to RCS,
THEN flush makeup line to RWT with Reactor Makeup Water.
- 11.10 WHEN desired amount of boric acid has been added,
THEN secure boric acid addition.
- 11.11 WHEN desired amount of water has been added,
THEN secure water addition.
- 11.12 IF desired,
THEN stop the operating Boric Acid Makeup pump:
 - 2P-39A
 - 2P-39B

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11.13 IF any Boric Acid Makeup pump was secured,
THEN verify closed associated BAM Tank Recirc valve:

- 2CV-4903-2 for 2P-39A
- 2CV-4915-2 for 2P-39B

11.14 IF desired,
THEN stop the operating Reactor Makeup pump:

- 2P-109A
- 2P-109B

11.15 Close 2CVC-64.

11.16 Align 2CVC-83 as desired.

11.17 Align 2CVC-68 as desired.

11.18 Place 2HS-4928 in desired position.

11.19 Place RWT on purification recirc with Fuel Pool Purification pump (2P-66) per Fuel Pool Systems (2104.006).

11.20 Request recommended recirc time from Chemistry per Sampling the Refueling Water tank (2T-3) (2607.012).

11.21 Notify Chemistry for sampling.

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12.0 CHEMICAL ADDITION TO THE RCS

NOTE

Attachment Q of this procedure is the preferred method for hydrazine addition to the RCS while plant is shutdown (CR-ANO-2-2005-1306).

- 12.1 Verify chemical solution available from Chemistry.
- 12.2 IF chemicals NOT completely dissolved,
THEN contact Chemistry to remix chemicals to prevent clogging pipes.
- 12.3 Verify CVCS in operation per Chemical and Volume Control (2104.002).
- 12.4 Verify at least one Charging pump providing makeup to RCS.
- 12.5 Verify the following valves closed:
 - Chemical Addition Tank Outlet valve (2CVC-86)
 - Chemical Addition Tank Outlet Strainer Isolation (2CVC-87)
- 12.6 Open Chemical Addition Tank Drain valve (2DCH-57).
- 12.7 Open Chemical Addition Tank Water Isolation valve (2CVC-85).
- 12.8 Verify EITHER Reactor Makeup pump (2P-109A OR 2P-109B) running.
- 12.9 Flush 2T-8 for ~ 2 minutes.
- 12.10 Close 2CVC-85.
- 12.11 Open Chemical Addition Tank Vent valve (2CVC-1012).
- 12.12 Allow 2T-8 to drain for ~ 2 minutes.
- 12.13 Close 2DCH-57.
- 12.14 Open Chemical Addition Tank Fill valve (2CVC-89).
- 12.15 Slowly add chemical solution to funnel.
- 12.16 Flush funnel with at least 1 gallon of DI water obtained from Chemistry.
- 12.17 Close 2CVC-89.
- 12.18 Slowly throttle open 2CVC-85.
- 12.19 Add reactor makeup water to 2T-8.
- 12.20 WHEN water appears at vent line,
THEN close 2CVC-85.
- 12.21 Close 2CVC-1012.

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12.22 Notify Control Room of intent to add chemicals and water to RCS.

12.23 Fully open 2CVC-85.

12.24 Open 2CVC-86.

12.25 Open 2CVC-87.

NOTE

The VCT is approximately 34 gallons per percent.

12.26 Maintain flow until VCT level (L4857 OR L4861) has risen 1/2 of 1%.

12.27 Close 2CVC-87.

12.28 Close 2CVC-86.

12.29 Close 2CVC-85.

12.30 Open 2DCH-57.

12.31 Open 2CVC-1012.

12.32 Allow 2T-8 to drain for ~ 2 minutes.

12.33 Close 2DCH-57.

12.34 Close 2CVC-1012.

12.35 Notify Chemistry of chemical addition to RCS.

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13.0 REACTOR MAKEUP WATER PUMP OPERATIONS

13.1 IF both Reactor Makeup Water pumps (2P-109A AND 2P-109B) secured,
THEN start 2P-109A or 2P-109B as follows:

13.1.1 Close discharge valve for selected pump to be started:

- 2P-109A Discharge Stop Check valve (2CVC-61A)
- 2P-109B Discharge Stop Check valve (2CVC-61B)

13.1.2 Place 2P-109 Pump Select switch (2HS-4967) to pump that will remain secured.

13.1.3 Start selected pump (2P-109A OR 2P-109B).

CAUTION

Slowly open pump discharge valve to prevent water hammer.

13.1.4 Slowly open pump discharge valve for pump started:

- 2P-109A Discharge Stop Check valve (2CVC-61A)
- 2P-109B Discharge Stop Check valve (2CVC-61B)

13.1.5 WHEN header pressurized,
THEN fully open AND backseat selected discharge valve to prevent it from vibrating closed:

- 2P-109A Discharge Stop Check valve (2CVC-61A)
- 2P-109B Discharge Stop Check valve (2CVC-61B)

13.2 Perform the following to swap running Reactor Makeup Water pumps:

13.2.1 Verify both pump discharge valves backseated to prevent them from vibrating closed:

- 2P-109A Discharge Stop Check valve (2CVC-61A)
- 2P-109B Discharge Stop Check valve (2CVC-61B)

13.2.2 Start selected pump (2P-109A OR 2P-109B).

13.2.3 Secure selected pump (2P-109A OR 2P-109B).

13.2.4 IF secured pump rotating backwards
THEN close secured pump discharge valve:

- 2P-109A Discharge Stop Check valve (2CVC-61A)
- 2P-109B Discharge Stop Check valve (2CVC-61B)

13.2.5 Place 2P-109 Pump Select switch (2HS-4967) to secured pump.

13.3 Perform the following to secure Reactor Makeup Water:

13.3.1 Verify idle Reactor Makeup Water Pump secured (2P-109A OR 2P-109B).

13.3.2 Secure running Reactor Makeup Water pump (2P-109A OR 2P-109B).

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14.0 TRANSFERRING 2T-6A CONTENTS TO 2T-6B

- 14.1 IF in Modes 1-4,
THEN verify requirements of TRM 3.1.2.8 will be maintained.
(Use Supplement 4 Figure 1 to verify TRM requirements met.)
- 14.2 IF in Modes 5-6,
THEN verify requirements of TRM 3.1.2.7 will be maintained.
(Use Supplement 4 Figure 1 to verify TRM requirements met.)
- 14.3 Verify the following valves closed:
 - BA PPS 2P-39A & B Recirc Crossconnect (2CVC-55)
 - Manual Boric Acid Addition Line (2CVC-56)
 - Emergency Borate to Charging Pump Suction (2CV-4916-2)
- 14.4 Close the following valves:
 - BA Pump 2P-39B Recirc Valve (2CVC-54B)
 - 2FE-4926 Outlet (2CVC-43)
- 14.5 Open BA PPS 2P-39A & B Recirc Crossconnect (2CVC-135).
- 14.6 Start BAM Pump 2P-39A.
- 14.7 Open BAM Tank 2T-6B Recirc Valve (2CV-4915-2).
- 14.8 WHEN 2T-6A (2LIS-4906) and 2T-6B (2LIS-4908) reach desired level,
THEN secure 2P-39A.
- 14.9 Close 2CV-4915-2.
- 14.10 Close 2CVC-135.
- 14.11 Open the following valves:
 - 2CVC-54B
 - 2CVC-43

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15.0 TRANSFERRING 2T-6B CONTENTS TO 2T-6A

- 15.1 IF in Modes 1-4,
THEN verify requirements of TRM 3.1.2.8 will be maintained.
(Use Supplement 4 Figure 1 to verify TRM requirements met.)
- 15.2 IF in Modes 5-6,
THEN verify requirements of TRM 3.1.2.7 will be maintained.
(Use Supplement 4 Figure 1 to verify TRM requirements met.)
- 15.3 Verify the following valves closed:
- BA PPS 2P-39A & B Recirc Crossconnect (2CVC-135)
 - Manual Boric Acid Addition Line (2CVC-56)
 - Emergency Borate to Charging Pump Suction (2CV-4916-2)
- 15.4 Close the following valves:
- BA Pump 2P-39A Recirc Valve (2CVC-54A)
 - 2FE-4926 Outlet (2CVC-43)
- 15.5 Open BA Pumps 2P-39A & B Recirc Crossconnect (2CVC-55).
- 15.6 Start BAM Pump 2P-39B.
- 15.7 Open BAM Tank 2T-6A Recirc Valve (2CV-4903-2).
- 15.8 WHEN 2T-6A (2LIS-4906) and 2T-6B (2LIS-4908) reach desired level,
THEN secure 2P-39B.
- 15.9 Close 2CV-4903-2.
- 15.10 Close 2CVC-55.
- 15.11 Open the following valves:
- 2CVC-54A
 - 2CVC-43

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16.0 BATCHING UNIT 2 BAM TANK TO A DESIRED CONCENTRATION

- 16.1 Determine desired batch concentration for add.
- 16.2 Verify sufficient nuclear grade boric acid crystals available.
- 16.3 Verify EITHER Reactor Makeup pump (2P-109A OR 2P-109B) running.
- 16.4 Determine boric acid batch concentration AND amount of water required using Exhibit 1.
- 16.5 Verify Batching Tank Drain (2DCH-58) closed.
- *16.6 Verify no foreign material in tank and boric acid crystals prior to mixing and transfer from the mixing tank.
- 16.7 Open RMW to Boric Acid Batching Tank (2CVC-76).
- 16.8 WHEN 2T-7 at proper level for desired concentration,
THEN close 2CVC-76.
- 16.9 Verify 2M-33 Temperature controller (2TIC-4901) set to 150°F in AUTO.
- 16.10 WHEN 2T-7 temperature > 130°F on 2TIC-4901,
THEN cycle Batching Tank Drain (2DCH-58) as needed to drain 2T-7 to desired level.
- 16.11 Start Boric Acid Batching Tank mixer (2M-31).
- 16.12 Add required amount of boric acid for desired batch concentration.
- 16.13 Run 2M-31 until crystals mix into solution.
- 16.14 Stop Mixer 2M-31.
- 16.15 Verify Boric Acid Batching Tank heater 2M-33 handswitch 2HS-4901 in OFF.
- 16.16 IF batching to 2T-6A,
THEN open Boric Acid Makeup Tank 2T-6A Inlet valve (2CVC-37A).
- 16.17 IF batching to 2T-6B,
THEN open Boric Acid Makeup Tank 2T-6B Inlet valve (2CVC-37B).
- 16.18 Open Batching Tank Drain to Boric Acid Makeup Tank (2CVC-36).
- 16.19 WHEN 2T-7 drained,
THEN close 2CVC-36.
- 16.20 IF additional water needed,
THEN perform the following:
 - 16.20.1 Open 2CVC-76.
 - 16.20.2 WHEN 2T-7 to filled to required level from Exhibit 1,
THEN close 2CVC-76.
 - 16.20.3 Open 2CVC-36.
 - 16.20.4 WHEN 2T-7 has drained,
THEN close 2CVC-36.
 - 16.20.5 Repeat as needed until required amount of water added.

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16.21 WHEN 2T-7 has drained,
THEN verify the following valves closed:

- 2CVC-36
- 2CVC-37A
- 2CVC-37B

* 16.22 IF performing multiple batch operations,
THEN flush 2T-7 using [step 16.25](#) at least once each shift.

* 16.23 Repeat makeup sequence as many times as necessary.

16.24 WHEN 2T-6A OR 2T-6B filled,
THEN perform the following:

16.24.1 Contact Control Room to place 2T-6A OR 2T-6B on recirculation using Recirculation of BAM Tanks section of this procedure.

16.24.2 Request boron sample from Chemistry.

16.24.3 IF BAM Tank added to is to be credited for stored volume required by TRM 3.1.2.7.a OR 3.1.2.8.b,
(Use Supplement 4 Figure 1 to verify TRM requirements met.)
THEN verify contents of 2T-6A OR 2T-6B within acceptable region of TRM figure 3.1-1.

[16.25](#) Flush 2T-7 with reactor makeup water as follows:

16.25.1 Open 2CVC-76.

16.25.2 WHEN 2T-7 level 38 inches,
THEN close 2CVC-76.

16.25.3 Verify 2M-33 Temperature controller (2TIC-4901) set to 150°F in AUTO.

16.25.4 WHEN 2T-7 temperature \geq 150°F,
THEN verify 2M-33 handswitch 2HS-4901 in OFF.

16.25.5 Open 2DCH-58 to drain 2T-7.

* 16.25.6 Cycle 2CVC-76 as necessary to flush 2T-7 for at least 5 minutes.

16.25.7 Verify 2CVC-76 closed.

16.25.8 WHEN 2T-7 drained,
THEN close 2DCH-58.

16.26 IF batching operation complete,
THEN close 2T-7 lid to prevent foreign material from entering.

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CHEMICAL ADDITION VALVE LINEUP

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
#1 DG ROOM							
2CVC-4917	2PIS-4917 ISOLATION	M2231 D4 SH 2	#1 DG ROOM, DISCH 2P-39B, SE CORNER	OPEN			
2CVC-1005	2PIS-4917 VENT	M2231 D4 SH 2	#1 DG ROOM, DISCH 2P-39B, SE CORNER	CLOSED			
2CVC-40B	BA PUMP 2P-39B DISCHARGE VALVE	M2231 D4 SH 2	#1 DG ROOM, DISCH 2P-39B, SE CORNER	LOCKED OPEN			
2CVC-1015A	DRAIN VALVE ON 2P-39B DISCHARGE LINE	M2231 D3 SH 2	#1 DG ROOM, DISCH 2P-39B, SE CORNER	CLOSED			
2CVC-1015B	DRAIN VALVE ON 2P-39B DISCHARGE LINE	M2231 D3 SH 2	#1 DG ROOM, BY 2P-39B DISCH CK VLV, SE CORNER	CLOSED			
2CVC-57	MANUAL ISOLATION FOR 2CV-4930	M2231 D2 SH 2	#1 DG ROOM, BY 2P-39A, SE CORNER	OPEN			
2CVC-4935A	2PI-4935 SUCTION PRESS TO 2P-39B	M2231 C5 SH 2	#1 DG ROOM, 2P-39B SUCTION, SE CORNER	OPEN			
2CVC-4935B	2PI-4935 SUCTION PRESS TO 2P-39B	M2231 C5 SH 2	#1 DG ROOM, 2P-39B SUCTION, SE CORNER	OPEN			
2CVC-54B	BA PUMP 2P-39B RECIRC VALVE	M2231 E3 SH 2	#1 DG ROOM, BY 2P-39B, SE CORNER	OPEN			
2CVC-40A	BA PUMP 2P-39A DISCHARGE VALVE	M2231 B4 SH 2	#1 DG ROOM, 2P-39A SUCTION, 6 FT UP, SE CORNER	LOCKED OPEN			
2CVC-4936A	2PI-4936 SUCTION PRESS TO 2P-39A	M2231 B4 SH 2	#1 DG ROOM, 2P-39A SUCTION, SE CORNER	OPEN			
2CVC-4936B	2PI-4936 SUCTION PRESS TO 2P-39A	M2231 B5 SH 2	#1 DG ROOM, 2P-39A SUCTION, SE CORNER	OPEN			
2CVC-4918	2PIS-4918 ISOLATION	M2231 C4 SH 2	#1 DG ROOM, ON DISCH LINE ABOVE 2P-39A, SE CORNER	OPEN			
2CVC-1004	2PIS-4918 VENT	M2231 C4 SH 2	#1 DG ROOM, ON DISCH LINE ABOVE 2P-39A, SE CORNER	CLOSED			
2CVC-72	SAMPLE VALVE ON CHARGING PUMPS FEED LINE	M2231 G3 SH 2	#1 DG ROOM, NW CORNER BA PUMP AREA, SE CORNER	CLOSED			
2CVC-71	SAMPLE VALVE ON CHARGING PUMPS FEED LINE	M2231 G3 SH 2	#1 DG ROOM, NW CORNER BA PUMP AREA, SE CORNER	CLOSED			
2CVC-50	BAMT GRAVITY FEED TO CHARGING PUMPS SAMPLE	M2231 G6 SH 2	#1 DG ROOM, FRONT SIDE BA PUMP AREA, SE CORNER	CLOSED			

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2CVC-51	BAMT GRAVITY FEED TO CHARGING PUMPS SAMPLE	M2231 G6 SH 2	#1 DG ROOM, FRONT SIDE BA PUMP AREA, SE CORNER	CLOSED			
2CVC-42	2FE-4926 INLET VALVE	M2231 B3 SH 2	#1 DG ROOM, FRONT SIDE BA PUMP AREA, SE CORNER	OPEN			
2CVC-56	MANUAL BORIC ACID ADDITION LINE	M2231 C3 SH 2	#1 DG ROOM, FRONT SIDE BA PUMP AREA, SE CORNER	CLOSED			
2CV-4930	BORIC ACID TO CHARGING PUMP SUCTION	M2231 D2 SH 2	#1 DG ROOM, FRONT SIDE 2P-39B, 5 FT UP, SE CORNER	See 1015.001, Att. A.3			
2CVC-1219A	2FE-4926 DRAIN	M2231 B2 SH 2	#1 DG ROOM, FRONT BA PUMP AREA ON RECIRC LINE, 5 FT UP, SE CORNER	CLOSED			
2CVC-1219B	2FE-4926 DRAIN	M2231 B2 SH 2	#1 DG ROOM, FRONT BA PUMP AREA ON RECIRC LINE, 5 FT UP, SE CORNER	CLOSED			
2CVC-39B	BA PUMP 2P-39B SUCTION VALVE	M2231 D5 SH 2	#1 DG ROOM, 2P-39B SUCTION, FRONT BA PUMP AREA, SE	LOCKED OPEN			
2CVC-43	2FE-4926 OUTLET VALVE	M2231 C2 SH 2	#1 DG ROOM, FRONT SIDE BA PUMP AREA, SE CORNER	OPEN			
2CVC-39A	BA PUMP 2P-39A SUCTION VALVE	M2231 B5 SH 2	#1 DG ROOM, 2P-39A SUCTION, FRONT BA PUMP AREA, SE	LOCKED OPEN			
2CVC-52	BA PUMP SUCTION CROSS CONNECT VALVE	M2231 C5 SH 2	#1 DG ROOM, FRONT BA PUMP AREA, 6 FT UP, SE	LOCKED CLOSED			
2CVC-53B	BA PUMP 2P-39B RECIRC VALVE	M2231 E4 SH 2	#1 DG ROOM, FRONT BA PUMP AREA, SE CORNER	SEE COMMENTS			LOCKED 1 1/2 TURNS OPEN
2CVC-54A	BA PUMP 2P-39A RECIRC VALVE	M2231 A4 SH 2	#1 DG ROOM, FRONT BA PUMP AREA, SE CORNER	OPEN			
2CVC-55	BA PUMPS 2P-39A & B RECIRC CROSS CONNECT	M2231 B3 SH 2	#1 DG ROOM, FRONT BA PUMP AREA, SE CORNER	CLOSED			
2CV-4903-2	BAM TANK 2T-6A RECIRC VALVE	M2231 F8 SH 2	#1 DG ROOM, FRONT SIDE 2P-39A IN OVERHEAD, SE CORNER	See 1015.001, Att. A.3			
2CV-4915-2	BAM TANK 2T-6B RECIRC VALVE	M2231 F3 SH 2	#1 DG ROOM, FRONT SIDE 2P-39B IN OVERHEAD, SE CORNER	See 1015.001, Att. A.3			
2CVC-135	BA PPS 2P-39A AND B RECIRC CROSS CONNECT	M2231 C4 SH 2	#1 DG ROOM, OVERHEAD, SOUTH CORNER BA PUMP AREA, SE	CLOSED			
2CVC-53A	BA PUMP 2P-39A RECIRC VALVE	M2231 A5 SH 2	#1 DG ROOM, FRONT BA PUMP AREA, SE CORNER	SEE COMMENTS			LOCKED 1 1/2 TURNS OPEN

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
2CVC-4926-1	INLET VALVE TO 2CV-4926	M2231 C2 SH 2	#1 DG ROOM, FRONT BA PUMP AREA, SE CORNER	OPEN			
2CVC-4926-2	OUTLET VALVE FROM 2CV-4926	M2231 D2 SH 2	#1 DG ROM, FRONT BA PUMP AREA, SE CORNER	OPEN			
2CV-4926	BORIC ACID FLOW CONTROL VALVE	M2231 C2 SH 2	#1 DG ROOM, WEST OF 2P-39A, 3 FT OFF FLOOR, SE CORNER	See 1015.001, Att. A.3			
2CVC-4926-3	2CV-4926 BYPASS VALVE	M2231 C1 SH 2	#1 DG ROOM, FRONT BA PUMP AREA, SE CORNER	CLOSED			
2CVC-1152	DRAIN BEFORE 2CV-4926	M2231 C2 SH 2	#1 DG ROOM, FRONT BA PUMP AREA	CLOSED			
2CVC-1153	DRAIN BEFORE 2CV-4926	M2231 C2 SH 2	#1 DG ROOM, FRONT BA PUMP AREA	CLOSED			
2CVC-1148	VENT DOWNSTREAM 2CV-4926	M2231 D2 SH 2	#1 DG ROOM, FRONT BA PUMP AREA, IN OVERHEAD	CLOSED			
2CVC-1149	VENT DOWNSTREAM 2CV-4926	M2231 D2 SH 2	#1 DG ROOM, NW CORNER BA PUMP AREA, OVERHEAD, SE	CLOSED			
2CVC-1179	BA PUMPS DISCH TO CCP SUCTION VENT	M2231 G4 SH 2	#1 DG ROOM, NE CORNER, BA PUMP AREA DISCH 2CV-4916, SE CORNER	CLOSED			
2CVC-1180	BA PUMPS DISCH TO CCP SUCTION VENT	M2231 G4 SH 2	#1 DG ROOM, NE CORNER, BA PUMP AREA DISCH 2CV-4916, SE CORNER	CLOSED			
2DCH-31A	DRAIN ON BA PUMP 2P-39A	M2231 B4 SH 2	#1 DG ROOM, WEST SIDE 2P-39B, SE CORNER	CLOSED			
2DCH-32A	DRAIN ON BA PUMP 2P-39A	M2231 B4 SH 2	#1 DG ROOM, WEST SIDE 2P-39A, SE CORNER	CLOSED			
2DCH-31B	DRAIN ON BA PUMP 2P-39B	M2231 C4 SH 2	#1 DG ROOM, WEST SIDE 2P-39B, SE CORNER	CLOSED			
2DCH-32B	DRAIN ON BA PUMP 2P-39B	M2231 C4 SH 2	#1 DG ROOM, WEST SIDE 2P-39A, SE CORNER	CLOSED			
BORIC ACID BATCH TANK ROOM							
2CVC-76	RMW TO BA BATCHING TANK	M2231 H7 SH 2	IN LINE DOWNSTREAM, 1 FT SOUTH OF 2T-7 TANK, 5 FT OFF FLOOR	CLOSED			
2CVC-46	BATCHING TANK SAMPLE VALVE	M2231 G7 SH 2	2 FT. OFF FLOOR, EAST SIDE OF 2T-7 BA BATCH TANK	CLOSED			

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
2CVC-4900A	2LG-4900 TOP ISOL TO 2T-7	M2231 H7 SH 2	6 FT OFF FLOOR, EAST SIDE OF 2T-7 BA BATCH TANK	OPEN			
2CVC-4900B	2LG-4900 BOTTOM ISOL TO 2T-7	M2231 H7 SH 2	2.5 FT OFF FLOOR, EAST SIDE OF 2T-7 BA BATCH TANK	OPEN			
2CVC-36	BATCHING TANK DRAIN TO BA MAKEUP TANK	M2231 G7 SH 2	2 FT. OFF FLOOR, EAST SIDE OF 2T-7 BA BATCH TANK	CLOSED			
2CVC-37A	BA MAKEUP TANK 2T-6A INLET	M2231 F7 SH 2	IN LINE WITH 2T-7, SE SIDE	CLOSED			
2CVC-37B	BA MAKEUP TANK 2T-6B INLET	M2231 F5 SH 2	DOWN STREAM FROM 2T-7, 2 FT OFF FLOOR, SE SIDE OF 2T-7 BA BATCH TANK	CLOSED			
2CVC-1013	VENT ON BA BATCH TANK OUTLET STRAINER	M2231 G7 SH 2	2F-29 VENT EAST SIDE OF 2T-7 BA BATCH TANK	CLOSED			
2CVC-1014	DRAIN ON BA BATCH TANK OUTLET STRAINER	M2231 F7 SH 2	DOWNSTREAM OF 2T-7, 1 FT OFF FLOOR, 2F-29 DRAIN, EAST SIDE BA BATCH TANK	CLOSED			
2DCH-58	BATCHING TANK DRAIN	M2231 G7 SH 2	IN LINE & UNDER 2T-7 TANK, 1 FT OFF FLOOR	CLOSED			
2CVC-127	RMW TO BA MAKEUP TANK 2T-6A	M2231 F8 SH 2	TOP 2T-6A TANK (HANDWHEEL LOCATED EAST SIDE OF BA BATCH TANK (404))	CLOSED			
2BM-117	BORIC ACID CONCENTRATED MAKEUP TO 2T-6A	M2231 F7 SH 2	TOP 2T-6A TANK (HANDWHEEL LOCATED EAST SIDE OF BA BATCH TANK (404))	CLOSED			
BAM TANK ROOM							
2CVC-128	RMW TO BA MAKEUP TANK 2T-6B	M2231 F5 SH 2	TOP OF 2T-6B (HANDWHEEL IN STAIRWAY BY FD 283)	CLOSED			
2BM-118	BORIC ACID CONCENTRATED MAKEUP TO 2T-6B	M2231 F5 SH 2	TOP OF 2T-6B (HANDWHEEL IN STAIRWAY BY FD 283)	CLOSED			
2CVC-38B	BAMT 2T-6B OUTLET VALVE	M2231 D6 SH 2	WEST SIDE OF AND UNDERNEATH 2T-6B	LOCKED OPEN			
2CVC-47B	BAMT 2T-6B SAMPLE VALVE	M2231 E5 SH 2	UNDERNEATH AND ON WEST SIDE OF 2T-6B, 2 FT OFF FLOOR	CLOSED			
2CVC-48B	BAMT 2T-6B SAMPLE VALVE	M2231 E5 SH 2	WEST SIDE OF AND UNDERNEATH 2T-6B	CLOSED			
2DCH-29B	BAMT 2T-6B DRAIN VALVE	M2231 E5 SH 2	1 FT OFF FLOOR, DIRECTLY IN FRONT OF 2T-6B	CLOSED			
2DCH-30B	BAMT 2T-6B DRAIN VALVE	M2231 D5 SH 2	1 FT OFF FLOOR, IN FRONT OF 2T-6B, 10 INCHES FROM 2DCH-29	CLOSED			

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
2CVC-4908B	BAMT 2T-6B 2LIT-4908 LOWER ISOL	M2231 E5 SH 2	AT NORTH END OF 2T-6B, 5 FT OFF FLOOR	OPEN			
2CVC-4908C	BAMT 2T-6B 2LIT-4908 LOWER ISOL	M2231 E5 SH 2	NORTH END 2T-6B, 5 FT OFF FLOOR	OPEN			
2CVC-4908D	BAMT 2T-6B 2LIT-4908 UPPER ISOL	M2231 E6 SH 2	NORTH END 2T-6B	OPEN			
2CVC-4908E	BAMT 2T-6B 2LIT-4908 UPPER LINE VENT	M2231 F6 SH 2	TOP OF 2T-6B, CENTER OF TANK, EAST SIDE, 15 FT UP	CLOSED			
2CVC-4969	2LIT-4908 LOWER INLET LINE VENT	M2231 E5 SH 2	2 FT NORTH OF 2T-6B, 5 FT UP	CLOSED			
2CVC-4970	2LIT-4908 LOWER INLET LINE DRAIN	M2231 E5 SH 2	2 FT NORTH OF 2T-6B, 5 FT UP	CLOSED			
2CVC-4908A	BAMT 2T-6B 2LIT-4908 UPPER ISOL	M2231 F5 SH 2	ON TOP OF 2T-6B, CENTER OF TANK, 15 FT OFF FLOOR	OPEN			
2CVC-1136	BAMT 2T-6B LOOP SEAL DRAIN	M2231 E5 SH 2	ON TOP OF 2T-6B, CENTER OF TANK, EAST SIDE, 12 FT OFF FLOOR	CLOSED			
2CVC-1137	BAMT 2T-6B LOOP SEAL VENT	M2231 F5 SH 2	ON TOP OF 2T-6B, CENTER OF TANK, EAST SIDE, 13 FT OFF FLOOR	CLOSED			
2CVC-1154	BAMT 2T-6B RECIRC LINE VENT	M2231 F4 SH 2	TOP OF 2T-6B, NORTH END, NEXT TO CEILING	CLOSED			
2CVC-1155	BAMT 2T-6B RECIRC LINE VENT	M2231 F4 SH 2	ON TOP OF 2T-6B, NEXT TO CEILING, NORTH END	CLOSED			
2CVC-38A	BAMT 2T-6A OUTLET VALVE	M2231 D7 SH 2	EAST SIDE OF AND UNDERNEATH 2T-6A	LOCKED OPEN			
2CVC-47A	BAMT 2T-6A SAMPLE VALVE	M2231 D7 SH 2	UNDERNEATH 2T-6A, EAST SIDE, 1 FT OFF FLOOR	CLOSED			
2CVC-48A	BAMT 2T-6A SAMPLE VALVE	M2231 D7 SH 2	UNDERNEATH 2T-6A, 1 FT OFF FLOOR, EAST SIDE	CLOSED			
2DCH-29A	BAMT 2T-6A DRAIN VALVE	M2231 E7 SH 2	NORTH SIDE OF 2T-6A, 1 FT OFF FLOOR	CLOSED			
2DCH-30A	BAMT 2T-6A DRAIN VALVE	M2231 E7 SH 2	NORTH SIDE OF 2T-6A, 1 FT OFF FLOOR	CLOSED			
2CVC-4906C	BAMT 2T-6A 2LIT-4906 LOWER ISOL	M2231 E6 SH 2	SOUTH END OF 2T-6A, 5 FT OFF FLOOR	OPEN			
2CVC-4906D	BAMT 2T-6A 2LIT-4906 UPPER ISOL	M2231 F6 SH 2	SOUTH END OF 2T-6A, 5 FT OFF FLOOR, ON WALL	OPEN			

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
2CVC-4971	2LIT-4906 LOWER INLET LINE VENT	M2231 E7 SH 2	SOUTH END OF 2T-6A, 5 FT UP	CLOSED			
2CVC-4972	2LIT-4906 LOWER INLET LINE DRAIN	M2231 E7 SH 2	SOUTH END OF 2T-6A, 5 FT UP	CLOSED			
2CVC-4906B	BAMT 2T-6A 2LIT-4906 LOWER ISOL	M2231 E7 SH 2	SOUTH END OF 2T-6A, 4 FT OFF FLOOR	OPEN			
2CVC-4906E	BAMT 2T-6A 2LIT-4906 UPPER LINE VENT	M2231 F6 SH 2	TOP OF 2T-6A, SOUTH END, 15 FT IN AIR, AGAINST WALL	CLOSED			
2CVC-4906A	BAMT 2T-6A 2LIT-4906 UPPER ISOL	M2231 F7 SH 2	ON TOP OF 2T-6A, CENTERLINE, 15 FT OFF FLOOR	OPEN			
2CVC-1134	BAMT 2T-6A LOOP SEAL DRAIN	M2231 E7 SH 2	ON TOP OF 2T-6A, NORTH END, 15 FT UP	CLOSED			
2CVC-1135	BAMT 2T-6A LOOP SEAL VENT	M2231 F7 SH 2	ON TOP OF 2T-6A, NORTH END, 15 FT UP	CLOSED			
2CVC-1156	BAMT 2T-6A RECIRC LINE VENT	M2231 F7 SH 2	IN LINE FROM TOP OF 2T-6A, 1 FOOT OFF EAST WALL, SOUTH END AT TOP OF LADDER	CLOSED			
2CVC-1157	BAMT 2T-6A RECIRC LINE VENT	M2231 F7 SH 2	IN LINE FROM 2T-6A, 1 FOOT FROM EAST WALL, SOUTH END AT TOP OF LADDER	CLOSED			
2CVC-155	2P-39A RECIRC ISOLATION VALVE	M2231 F7 SH2	SOUTHEAST CORNER OF 2T-6A, 15 FT OFF FLOOR, AT TOP OF LADDER	LOCKED OPEN			
2CVC-156	BYPASS FROM 2T-6A RECIRC TO U1 BAMT	M2231 F7 SH2	SOUTHEAST CORNER OF 2T-6A, 15 FT OFF FLOOR, AT TOP OF LADDER	LOCKED CLOSED			
SFP VALVE GALLERY							
2CVC-120	SAMPLE VALVE ON RWT FEED LINE	M2231 G2 SH 2	SFP VLV GALLERY, WEST SIDE, 8 FT ABOVE 2CVC-64 (HW ON WALL N OF ELEVATOR)	CLOSED			
2CVC-121	SAMPLE VALVE ON RWT FEED LINE	M2231 H2 SH 2	SFP VLV GALLERY, WEST SIDE, 8 FT ABOVE 2CVC-64 (HW ON WALL N OF ELEVATOR)	CLOSED			
2CVC-91	SAMPLE VALVE ON VCT FEED LINE	M2231 G2 SH 2	SFP VLV GALLERY, WEST SIDE, 6 FT UP SH 2	CLOSED			
2CVC-122	SAMPLE VALVE ON FUEL POOL FEED LINE	M2231 H2 SH 2	SFP VALVE GALLERY, 8 FT UP	CLOSED			
2CVC-1146	DRAIN DOWNSTREAM 2CV-4926	M2231 F2 SH 2	SFP VALVE GALLERY, 2 FT OFF FLOOR	CLOSED			

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2CVC-1147	DRAIN DOWNSTREAM 2CV-4926	M2231 F2 SH 2	SFP VALVE GALLERY, 1 FT OFF FLOOR	CLOSED			
2CVC-66	MAKEUP TO SPENT FUEL POOL	M2231 G2 SH 2	SFP VALVE GALLERY, WEST WALL	CLOSED			
2CVC-1009	VENT VALVE ON FUEL POOL FEED LINE	M2231 H2 SH 2	SFP VALVE GALLERY, 10 FT UP, ABOVE ENTRANCE	CLOSED			
2CVC-64	MAKEUP TO REFUELING WATER TANK	M2231 G2 SH 2	SFP VALVE GALLERY, 3 FT OFF FLOOR, WEST WALL	CLOSED			
2CVC-1008	VENT VALVE ON RWT FEED LINE	M2231 H2 SH 2	SFP VALVE GALLERY, WEST WALL, 11 FT ABOVE 2CVC-66	CLOSED			
2CVC-1007	VENT VALVE ON RWT FEED LINE	M2231 H2 SH 2	SFP VALVE GALLERY, WEST SIDE, 10 FT ABOVE 2CVC-66	CLOSED			
AUX BLDG 354 HALL							
2CV-4941-2	VCT MAKEUP ISOL VALVE	M2231 H3 SH 2	WEST OF MCC 2B-62 PNL, 2.5 FT OFF FLOOR, IN WEST HALLWAY	See 1015.001, Att. A.3			
2T-4 VCT ROOM							
2CVC-68	MANUAL MAKEUP TO VCT	M2231 H4 SH 2	WEST SIDE OF 2T-4 (HANDWHEEL IN VCT HALLWAY ON SOUTH WALL)	CLOSED			
2CVC-83	MANUAL MAKEUP TO CHARGING PUMP SUCTION	M2231 H4 SH 2	IN VCT ROOM (HANDWHEEL BETWEEN CAGED DOORS TO VCT ROOM)	OPEN			
2CVC-1181	RMW TO VCT LINE DRAIN	M2231 G4 SH 2	ON WEST SIDE OF 2T-4, 1.5 FT UP	CLOSED			
2CVC-1063	DRAIN VALVE DOWNSTREAM 2CV-4941-2	M2231 G5 SH 2	VCT ROOM, WEST SIDE OF 2T-4, 4 FT UP	CLOSED			
2CVC-1064	DRAIN VALVE DOWNSTREAM 2CV-4941-2	M2231 G5 SH 2	VCT ROOM, WEST SIDE OF 2T-4, 3 FT UP	CLOSED			
2CVC-1006	VENT VALVE UPSTREAM 2CV-4941-2	M2231 H3 SH 2	VCT ROOM, NE CORNER, ON NORTH WALL, 12 FT UP	CLOSED			
AUX BLDG 335 N/S HALL							
2CVC-5027A	DRAIN VALVE ON RWT FEED LINE	M2231 H2 SH 2	335 N/S HALL, ACROSS FROM ELEVATOR, 8 FT OFF FLOOR	CLOSED			
2CVC-5027B	DRAIN VALVE ON RWT FEED LINE	M2231 H2 SH 2	335 N/S HALL, ACROSS FROM ELEVATOR, 8 FT OFF FLOOR	CLOSED			

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ATTACHMENT B

REACTOR MAKEUP WATER VALVE LINEUP

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
TURBINE BLDG 386							
2CVC-104	ISOLATION TO REGEN WASTE EVAP	M2231 A5 SH 3	TB ELEV 386', 10 FT NORTH OF 2E-1A/B, 3 FT WEST OF 2CV-0486	CLOSED			
2CVC-103	REGEN WASTE DESUPERHEAT ISOL	M2226 B8 SH 2	TB ELEV 386', 10 FT NORTH OF 2E-1A/B, 3 FT WEST OF 2CV-0486	CLOSED			
TURBINE BLDG 335							
2CVC-60A	RMW PUMP 2P-109A SUCTION VALVE	M2231 C6 SH 3	TB ELEV 335', IN LINE WITH 2P-109A	OPEN			
2CVC-61A	2P-109A DISCHARGE STOP CHECK VALVE	M2231 C6 SH 3	TB ELEV 335', IN LINE WITH 2P-109A	OPEN ON BACKSEAT			Backseat to prevent vibrating closed
2CVC-60B	RMW PUMP 2P-109B SUCTION VALVE	M2231 B6 SH 3	TB ELEV 335', IN LINE WITH 2P-109B	OPEN			
2CVC-61B	2P-109B DISCHARGE STOP CHECK VALVE	M2231 B6 SH 3	TB ELEV 335', IN LINE WITH 2P-109B	OPEN ON BACKSEAT			Backseat to prevent vibrating closed
2CVC-5018	RMW PUMP RECIRC LINE VENT	M2231 C5 SH 3	TB ELEV 335', 2P-109 AREA, SW CORNER, 15 FT UP	CLOSED			
2CVC-73	LOCAL SAMPLE VALVE	M2231 B5 SH 3	TB ELEV 335', IN LINE WITH 2P-109B	CLOSED			
2CVC-1065	2P-109A/B DRAIN	M2231 B4 SH 3	TB ELEV 335', SW CORNER OF DARK ROOM, 8 FT OFF FLOOR	CLOSED			
2CVC-5011	2P-109A/B VENT	M2231 B4 SH 3	TB ELEV 335', SW CORNER OF DARK ROOM, 10 FT OFF FLOOR	CLOSED			
2CVC-5016	BAC PUMP RETURN TO RMWT VENT	M2231 D7 SH 3	TB ELEV 335', DARK ROOM, MIDDLE OF SOUTH WALL, 15 FT UP	CLOSED			
2CVC-5019	DRAIN BEFORE 2CVC-104	M2231 B5 SH 3	TB ELEV 335', IN FRONT OF FIRE DOOR 366, 12 FT UP	CLOSED			
2CVC-5017	BAC PUMP RETURN TO RMWT DRAIN	M2231 C7 SH 3	TB ELEV 335', ABOVE S END AUX FW PUMP (2P-75), 10 FT UP	CLOSED			
AUX EXT BLDG 335							
2CVC-118	CHECK VALVE BYPASS	M2231 C7 SH 3	AUX EXT BLDG, SE CORNER AUX EXT CHILLER ROOM, 12 FT OFF UP	CLOSED			

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ATTACHMENT B

REACTOR MAKEUP WATER VALVE LINEUP

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
PIPE CHASE PIT BETWEEN CST PIT AND IONICS TRAILER							
2CVC-5007	RMWT DEMIN WATER FILL LINE VENT	M2231 G4 SH 3	PIPE PIT BETWEEN CST PIT AND IONICS TRAILER	CLOSED			
2CVC-5008	RMWT DEMIN WATER FILL LINE DRAIN	M2231 G4 SH 3	PIPE PIT BETWEEN CST PIT AND IONICS TRAILER	CLOSED			
2CVC-5002	RMWT OUTLET VENT	M2231 D6 SH 3	PIPE PIT BETWEEN CST PIT AND IONICS TRAILER	CLOSED			
2CVC-5003	RMWT OUTLET DRAIN	M2231 C6 SH 3	PIPE PIT BETWEEN CST PIT AND IONICS TRAILER	CLOSED			
RMWT PIPE CHASE PIT NE OF DW TANK							
2CVC-5004	RMWT OUTLET VENT	M2231 D6 SH 3	PIT NE OF DW TANK JUST UNDER LID, NORTH SIDE	CLOSED			N/A IF SECURITY GRATE INSTALLED
2CVC-5009	RMWT DEMIN WATER FILL LINE VENT	M2231 G4 SH 3	PIT NE OF DW TK JUST UNDER LID, NORTH SIDE	CLOSED			N/A IF SECURITY GRATE INSTALLED
2CVC-4960	2LIS-4960 ISOL	M2231 G5 SH 3	NORTH SIDE OF TANK 2T-73, 1 FT OFF GROUND	OPEN			
PIT NORTH SIDE OF RMWT (2T-73)							
2CVC-59	REACTOR MAKEUP WATER TANK OUTLET	M2231 F6 SH 3	IN PIT NORTH SIDE OF 2T-73 (RMWT)	OPEN			
2CVC-1010	RMWT 2T-73 DRAIN VALVE	M2231 G5 SH 3	IN PIT NORTH SIDE OF 2T-73 (RMWT)	CLOSED			
2CVC-90	RMW PUMP RECIRC VALVE	M2231 F6 SH 3	IN PIT NORTH SIDE OF 2T-73 (RMWT)	OPEN			
2CVC-5010	RMWT MAKEUP LINE DRAIN	M2231 G4 SH 3	IN PIT NORTH SIDE OF 2T-73 (RMWT)	CLOSED			
2CVC-1018	AAC BLDG HDR ISOL TO EXW DRAIN TANK	M2231 G4 SH 3	IN PIT NORTH OF 2T-73 (RMWT)	OPEN			
2PMU-82	RMWT DEMIN WATER FILL LINE STOP CHECK	M2231 F5 SH 3	IN PIT NORTH SIDE OF 2T-73 (RMWT)	OPEN			
2CVC-5006	RMWT OUTLET VENT	M2231 D5 SH 3	IN PIT NORTH SIDE 2T-73 (RMWT), SUMP PUMP AREA	CLOSED			
2CVC-5005	RMWT OUTLET DRAIN	M2231 C5 SH 3	IN PIT NORTH SIDE 2T-73 (RMWT), SUMP PUMP AREA	CLOSED			

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ATTACHMENT B

REACTOR MAKEUP WATER VALVE LINEUP

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
AUX BLDG ELEV 404 BA BATCH TANK ROOM							
2CVC-85	CHEMICAL ADDITION TANK WATER ISOL	M2231 E1 SH 2	BA BATCH TANK ROOM, EAST SIDE OF CHEM ADD POT (2T-8), 4 FT UP	CLOSED			
2CVC-89	CHEMICAL ADDITION TANK FILL VALVE	M2231 E2 SH 2	BA BATCH TANK ROOM, ON CHEM ADD POT (2T-8) PLATFORM	CLOSED			
2CVC-1012	CHEMICAL ADDITION TANK VENT VALVE	M2231 E2 SH 2	BA BATCH TANK ROOM, AT CHEM ADD POT (2T-8), 5 FT UP	CLOSED			
2DCH-57	CHEMICAL ADDITION TANK DRAIN VALVE	M2231 E1 SH 2	BA BATCH TANK ROOM, EAST CORNER, NORTH SIDE OF CHEM ADD TK (2T-8), ON FLOOR	CLOSED			
2CVC-86	CHEMICAL ADDITION TANK OUTLET VALVE	M2231 E2 SH 2	BA BATCH TANK ROOM, SOUTH SIDE OF CHEM ADD TK (2T-8), ON FLOOR	CLOSED			
2CVC-5028	CHEMICAL ADDITION TANK OUTLET STRAINER DRAIN	M2231 D1 SH 2	BA BATCH TANK ROOM, SOUTH SIDE OF CHEM ADD POT (2T-8)	CLOSED			
AUX BLDG 354 SFP VALVE GALLERY							
2CVC-62	2FE-4927 INLET ISOLATION	M2231 F1 SH 2	SFP VALVE GALLERY, NORTH WALL, 2 FT OFF FLOOR	OPEN			
2CVC-4927A	2FT-4927 ISOL	M2231 F1 SH 2	SFP VALVE GALLERY WALL, 7 FT UP	OPEN			
2CVC-4927B	2FT-4927 ISOL	M2231 F1 SH 2	SFP VALVE GALLERY WALL, 7 FT UP	OPEN			
2CVC-1011	VENT VALVE BEFORE 2CV-4927	M2231 G1 SH 2	SFP VALVE GALLERY, 10 FT OFF FLOOR, AGAINST WEST WALL	CLOSED			
2CVC-4927-1	2CV-4927 INLET VALVE	M2231 F1 SH 2	SFP VALVE GALLERY, WEST WALL	OPEN			
2CVC-4927-2	2CV-4927 OUTLET VALVE	M2231 F1 SH 2	SFP VALVE GALLERY, WEST WALL	OPEN			
2CVC-4927-3	2CV-4927 BYPASS VALVE	M2231 F2 SH 2	SFP VALVE GALLERY, WEST WALL	CLOSED			
2CV-4927	RMW FLOW CONTROL VALVE	M2231 F2 SH 2	SFP VLV GALLERY W WALL	See 1015.001, Att. A.3			
2CVC-1066	DRAIN VALVE BEFORE 2CV-4927	M2231 F2 SH 2	SFP VALVE GALLERY, WEST WALL	CLOSED			

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ATTACHMENT B

REACTOR MAKEUP WATER VALVE LINEUP

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
2CVC-1067	DRAIN VALVE AFTER 2CV-4927	M2231 F2 SH 2	SFP VALVE GALLERY, WEST WALL	CLOSED			
2CVC-77	CONTAINMENT DEMIN WATER HEADER ISOLATION	M2231 E3 SH 3	SFP VALVE GALLERY, NORTH SIDE OF ELEV., 2 FT ABOVE DIVIDER WALL	OPEN			
AUX BLDG 354 RESIN ADD TANK AREA							
2CVC-1182	CONTAINMENT DEMIN WATER HEADER VENT	M2231 E3 SH 3	RESIN ADD TK AREA, BETWEEN RESIN ADD TANK AND NORTH WALL, 10 FT UP	CLOSED			
2CVC-82	CHARGING PUMP SEALS ISOLATION	M2231 C3 SH 3	RESIN ADD TK AREA, EAST OF USPP ROOM STAIRS, 10 FT UP	OPEN			
2CVC-4978	CHARGING PUMP SEAL SUPPLY LINE VENT	M2231 C3 SH 3	RESIN ADD TK AREA, BETWEEN MCC 2B62 AND USPP ROOM STAIRS, 10 FT UP	CLOSED			
2CVC-5013	RESIN ADDITION WATER SUPPLY LINE DRAIN	M2231 E3 SH 3	RESIN ADD TK AREA, 8 FT EAST OF ELEV., 8 FT OFF FLOOR	CLOSED			
2CVC-5014	RESIN ADDITION WATER SUPPLY LINE VENT	M2231 E3 SH 3	RESIN ADD TK AREA, 2 FT EAST OF ELEV., EAST SIDE OF VENT DUCT AT CEILING	CLOSED			
2CVC-5025	RMW TO 2M-41 DESUPER HEATER VENT	M2231 D3 SH 3	RESIN ADD TK AREA, 6 FT ABOVE MCC 2B62, NEXT TO WALL	CLOSED			
AUX BLDG 354 WEST HALL							
2BS-5001	RMWT TO NaOH TANK DRAIN	M2231 B3 SH 3	354' EAST/WEST HALL, 2 FT NORTH OF 2UAV-3290, IN OVERHEAD	CLOSED			
2BS-5000	RMWT TO NaOH TANK VENT	M2231 C3 SH 3	354' EAST/WEST HALL, TOP OF 2BS-5001, ABOVE CABLE TRAYS	CLOSED			
2CVC-1205	CHEM ADD TO CHG PUMPS VENT	M2231 D1 SH 2	354' NORTH/SOUTH HALL, TOWARD UNIT 1 ACCESS DOOR, 7 FT UP BETWEEN SW LINES	CLOSED			
2BS-5002	RMWT TO NaOH TANK VENT	M2231 C3 SH 3	354' ELEV, WASTE GAS PANEL ROOM ABOVE 2RE-8231	CLOSED			
2CVC-87	CHEMICAL ADDITION TANK OUTLET STRAINER ISOL	M2231 D1 SH 2	354' ELEV, VCT (2T-4) TANK ROOM, 7 FT OFF FLOOR	CLOSED			
2CVC-1204	CHEM ADD TO CHG PUMPS DRAIN	M2231 D1 SH 2	354' ELEV, CONC. BOTTOM TANK ROOM AT SOUTH WALL, 7 FT OFF FLOOR	CLOSED			

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ATTACHMENT B

REACTOR MAKEUP WATER VALVE LINEUP

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
AUX BLDG 335 NORTH/SOUTH HALLWAY							
2CVC-1130	DRAIN BEFORE 2CVC-74	M2231 G3 SH 3	335' NORTH/SOUTH HALL, ACROSS FROM ELEVATOR, 3 FT OFF FLOOR	CLOSED			
2CVC-74	RESIN FLUSH LINE ISOLATION	M2231 H3 SH 3	335' NORTH/SOUTH HALL, ACROSS FROM ELEVATOR DOOR	CLOSED			
2CVC-151	PASS LIQUID SAMPLE FLUSH SUPPLY	M2231 G2 SH 3	335' NORTH/SOUTH HALL, ACROSS FROM ELEV, 6 FT OFF FLOOR	CLOSED			
2CVC-81	RESIN SLUICE LINE ISOLATION	M2231 F3 SH 3	335' NORTH/SOUTH HALL, EAST WALL ACROSS FROM 2VEF-38 SAMPLE PUMPS	CLOSED			
2CVC-5020	DRAIN VALVE AFTER 2CVC-81	M2231 F2 SH 3	335' NORTH/SOUTH HALL, EAST WALL ACROSS FROM 2VEF-38 SAMPLE PUMPS	CLOSED			
2CVC-140	ESF PUMP AREA DEMIN WATER HEADER ISOL	M2231 F3 SH 3	335' NORTH/SOUTH HALL, ACROSS FROM ELEVATOR ABOVE FIREWATER LINE	OPEN			
2CVC-5012	2P-109A/B DRAIN	M2231 F3 SH 3	335' NORTH/SOUTH HALL, AT TOP OF STAIRS TO EFW PUMP RMS, ON LEFT, 9 FT OFF FLOOR	CLOSED			
2CVC-97	RMW TO 2M-41 DESUPER HEATER	M2202 C3 SH 3	335' NORTH/SOUTH HALL, IN LINE AND WEST OF 2PCV-2102, 5 FT UP	CLOSED			
2CVC-75	PURIF ION EXCH RESIN DISCH HEADER ISOL	M2231 F3 SH 3	335' NORTH/SOUTH HALL, 2T-5 VLV GALLERY (HANDWHEEL OUTSIDE DOOR TO RIGHT OF FIRE HOSE)	CLOSED			
2CVC-1129	VENT AFTER 2CVC-74	M2231 H3 SH 3	335' NORTH/SOUTH HALL, 2T-5 VLV GALLERY, 10 FT UP, WEST OF WINDOW GOING TO 2M-39	CLOSED			
AUX BLDG 329 BAC CONTROL PANEL ROOM							
2CVC-5015	BAC PUMP RETURN TO RMWT VENT	M2231 D8 SH 3	BAC PANEL ROOM, SW CORNER, 2 FT FROM CEILING	CLOSED			

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REACTOR MAKEUP WATER VALVE LINEUP

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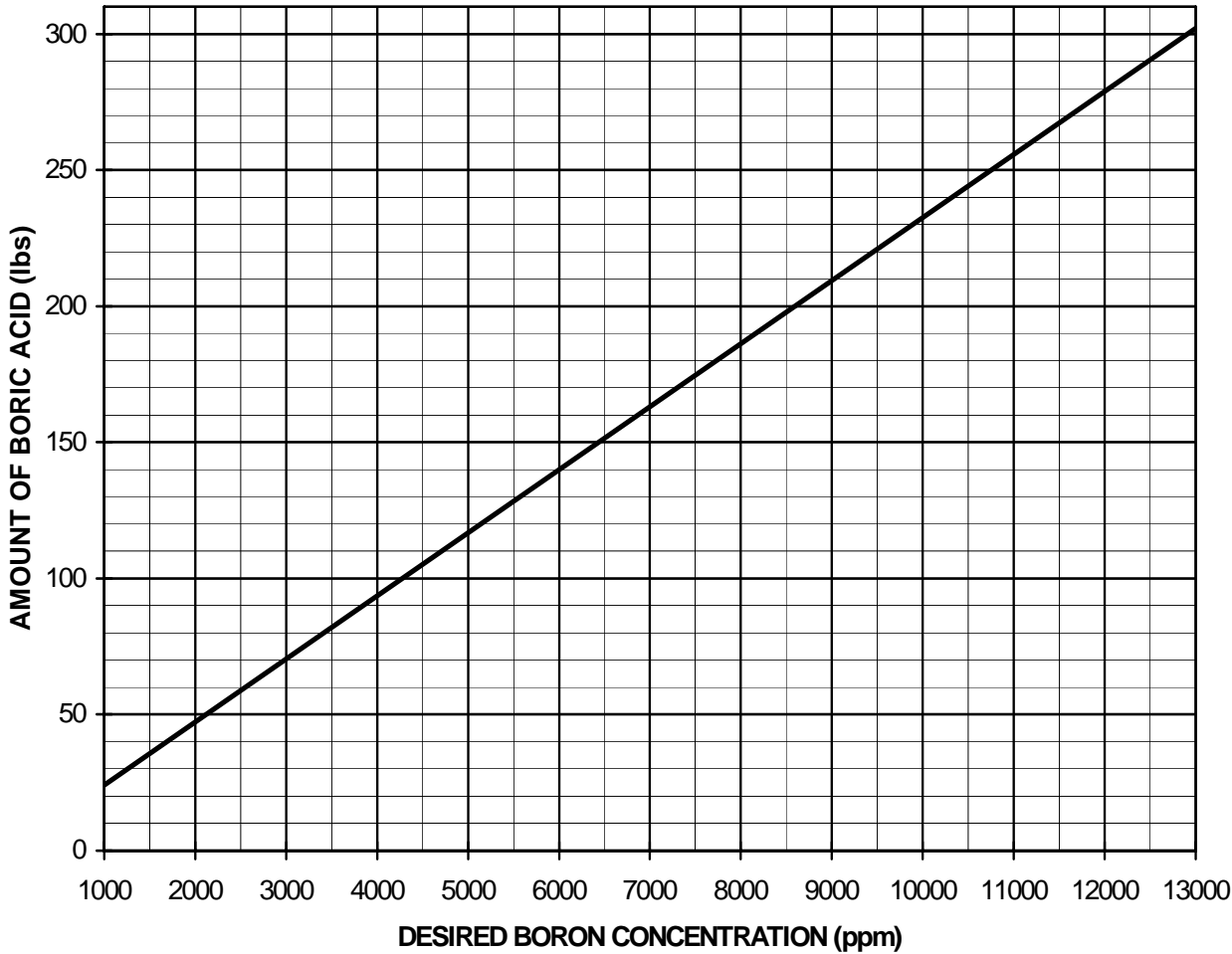
AUX BLDG 317							
2CVC-143	ESF PUMP AREA DEMIN WATER HOSE STATION ISOL	M2231 G1 SH 3	317' ELEV, "A" ESF ROOM ACROSS FROM ENTRANCE, 5 FT UP	CLOSED			
2CVC-145	ESF PUMP AREA DEMIN WATER HOSE STATION ISOL	M2231 G1 SH 3	317' ELEV, "A" ESF ROOM ACROSS FROM ENTRANCE, 5	CLOSED			
2CVC-142	ESF PUMP AREA DEMIN WATER HOSE STATION ISOL	M2231 G1 SH 3	317' ELEV, ON WALL BETWEEN "C" HPSI ROOM AND	CLOSED			
2CVC-141	ESF PUMP AREA DEMIN WATER HOSE STATION ISOL	M2231 G1 SH 3	317' ELEV, "B" ESF ROOM BETWEEN BARRIER AND	CLOSED			
2CVC-4968-1	2FI-4968 BYPASS	M2231 F2 SH 3	317' ELEV, "B" ESF ROOM, DOWNSTREAM OF 2FI-4968	OPEN			
2CVC-4968-2	2FI-4968 INLET ISOLATION	M2231 G2 SH 3	317' ELEV, 10 FT WEST OF 2E-35B, 6 FT OFF FLOOR	CLOSED			
2CVC-1225	2FI-4968 TEST CONNECTION ISOLATION	M2231 G2 SH 3	317' ELEV, WEST OF 2E-35B, 10 FT UP, 2 FT OFF FLOOR	CLOSED			
2CVC-4968-3	2FI-4968 OUTLET ISOLATION	M2231 G2 SH 3	317' ELEV, 10 FT WEST OF 2E-35B, 6 FT OFF FLOOR	CLOSED			
2CVC-144	ESF PUMP AREA DEMIN WATER HOSE STATION ISOL	M2231 F2 SH 3	317' ELEV, "B" ESF ROOM, ON COL BETWEEN LPSI AND	CLOSED			
2CVC-154	VENDOR PROCESSING SKID DI WATER SUPPLY	M2231 F1 SH 3	317' ELEV, 15 FT EAST OF AUX BLDG SUMP, 3 FT UP	CLOSED			

ATTACHMENT C

PAGE 1 OF 1

WEIGHT OF BORIC ACID TO BATCH VARIOUS CONCENTRATIONS

NOTE
Acid weight is based on volume of 486 gallon or 40 inches.



ATTACHMENT E

PAGE 1 OF 2

RWT MAKEUP AND CONCENTRATION ADJUSTMENT

NOTE

Any procedure change that affects calculations used in this attachment also affects attachments generated by Computer Support Group (CSG). Coordinate with CSG to make appropriate changes to computer generated attachment prior to any procedure change implementation affecting calculations.

1.0 RWT INFORMATION

Bottom of RWT to overflow pipe	44 ft, 9 in
Height of level taps from bottom	2 ft, 4 in
Level transmitter range	42 ft, 5 in (509 in)
1 inch inside diameter	940.7 gal
1 foot inside diameter	11,288.3 gal
509 inches inside diameter	478,814 gal
1% indicated level	4788 gal
Volume below level tap	25,766 gal

2.0 RWT BORATION (CONCENTRATION ADJUSTMENT)

Vi = Initial RWT volume

Vi = (Initial level _____ % x 4788 gal/%) + 25,766 gal. = _____ gal

Ci = Initial RWT concentration = _____ ppm

Cf = Final desired RWT concentration = _____ ppm

CF = BAM Tank (2T-6A/B) concentration = _____ ppm

VF = BAM Tank (2T-6A/B) feed volume required.

$$VF = \frac{Vi \times (CF - Ci)}{CF - Cf} - Vi$$

$$VF = \frac{(\text{_____}) \times (\text{_____} - \text{_____})}{(\text{_____} - \text{_____})} - (\text{_____})$$

VF = _____ gals (Amount of boric acid of concentration CF to add)

ATTACHMENT E

PAGE 2 OF 2

3.0 RWT MAKEUP AND CONCENTRATION ADJUSTMENT

V_i = Initial RWT volume

V_i = (Initial level _____ % x 4788 gal/%) + 25,766 gal = _____ gal

V_f = Final RWT volume

Final desired RWT level = _____%

V_f = (Final level _____ % x 4788 gal/%) + 25,766 gal = _____ gal

Feed Volume (F) = Final Volume (V_f) - Initial Volume (V_i) = _____ gal

C_i = Initial RWT Boron concentration = _____ ppm

C_f = Final desired RWT Boron concentration = _____ ppm

CF = Concentration of feed solution

$CF = \frac{(V_f \times C_f) - (V_i \times C_i)}{F}$

$CF = \frac{(\text{_____} \times \text{_____}) - (\text{_____} \times \text{_____})}{(\text{_____})}$

CF = _____ ppm Boron

If feed solution will be combination of Boric Acid and DI water:

F = Feed volume (see above)

V_B = Volume of Boric Acid to add

V_W = Volume of DI water to add

CB = Boron concentration of boric acid volume V_B = _____ ppm

$V_B = \frac{(F)(CF)}{(CB)} = \frac{(\text{_____})(\text{_____})}{(\text{_____})}$

V_B = _____ gal (Amount of Boric Acid of concentration CB to add)

$V_W = F - V_B = (\text{_____}) - (\text{_____})$

V_W = _____ gal (Amount of water to add)

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ATTACHMENT F

PAGE 1 OF 1

RATIO OF WATER & BORIC ACID MAKEUP TO MAINTAIN BORON CONCENTRATION

NOTE

Any procedure change that affects calculations used in this attachment also affects attachments generated by Computer Support Group (CSG). Coordinate with CSG to make appropriate changes to computer generated attachment prior to any procedure change implementation affecting calculations.

1.0 DEFINITION OF TERMS:

Cf = Desired Boron concentration of feed solution

VB = Boric acid volume

CB = Boron concentration of boric acid in BAM Tank (2T-6A OR 2T-6B) or RWT (2T-3)

VW = Demineralized water volume

$\frac{VW}{VB} = \frac{CB - Cf}{Cf}$ = Ratio of demineralized water to boric acid to obtain desired feed concentration Cf.

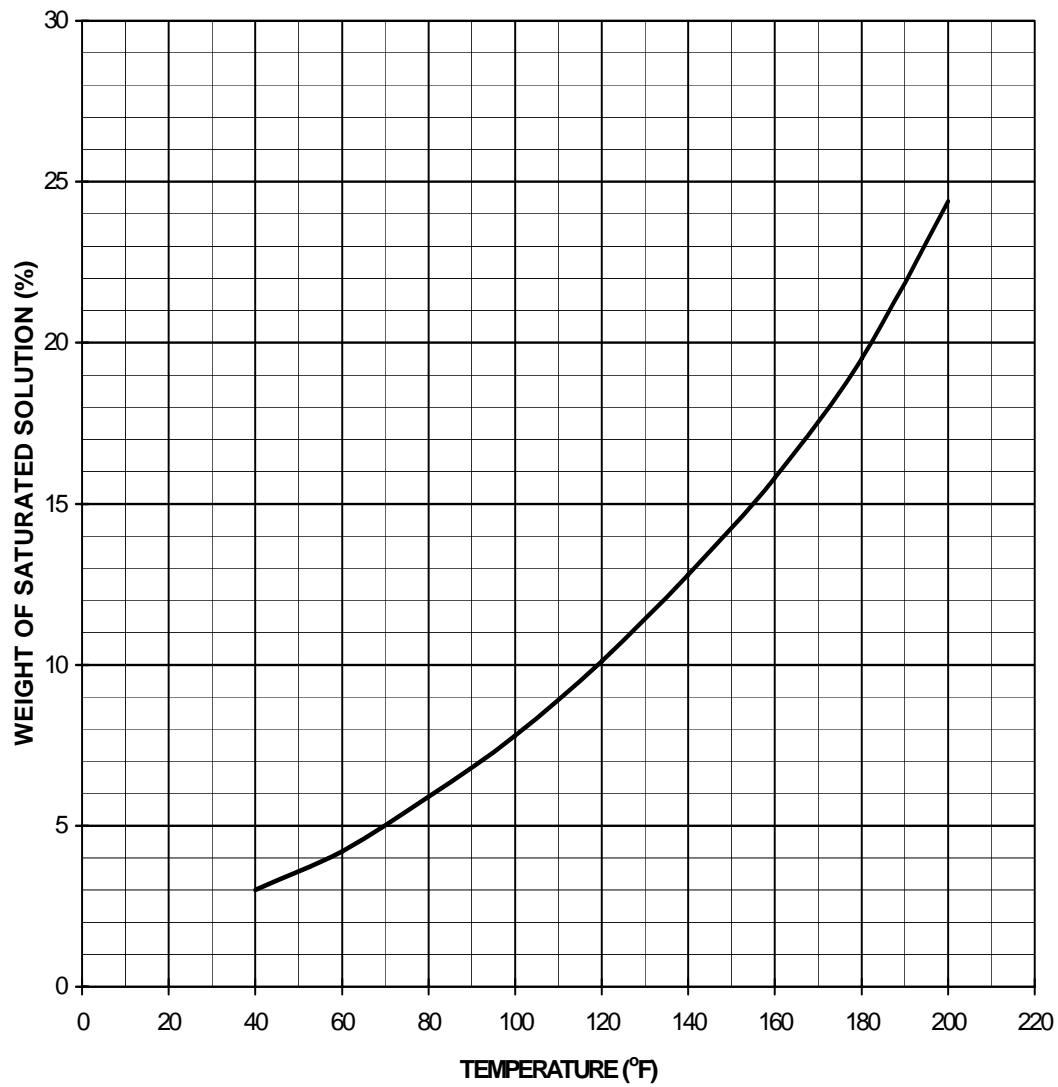
2.0 This ratio may be used to adjust flow rate settings on Boric Acid Makeup Flow Controller (2FIC-4926) and Reactor Makeup Water Flow Controller (2FIC-4927) to provide feed solution of desired concentration.

3.0 Have SRO review blending ratio for concentration desired.

ATTACHMENT G

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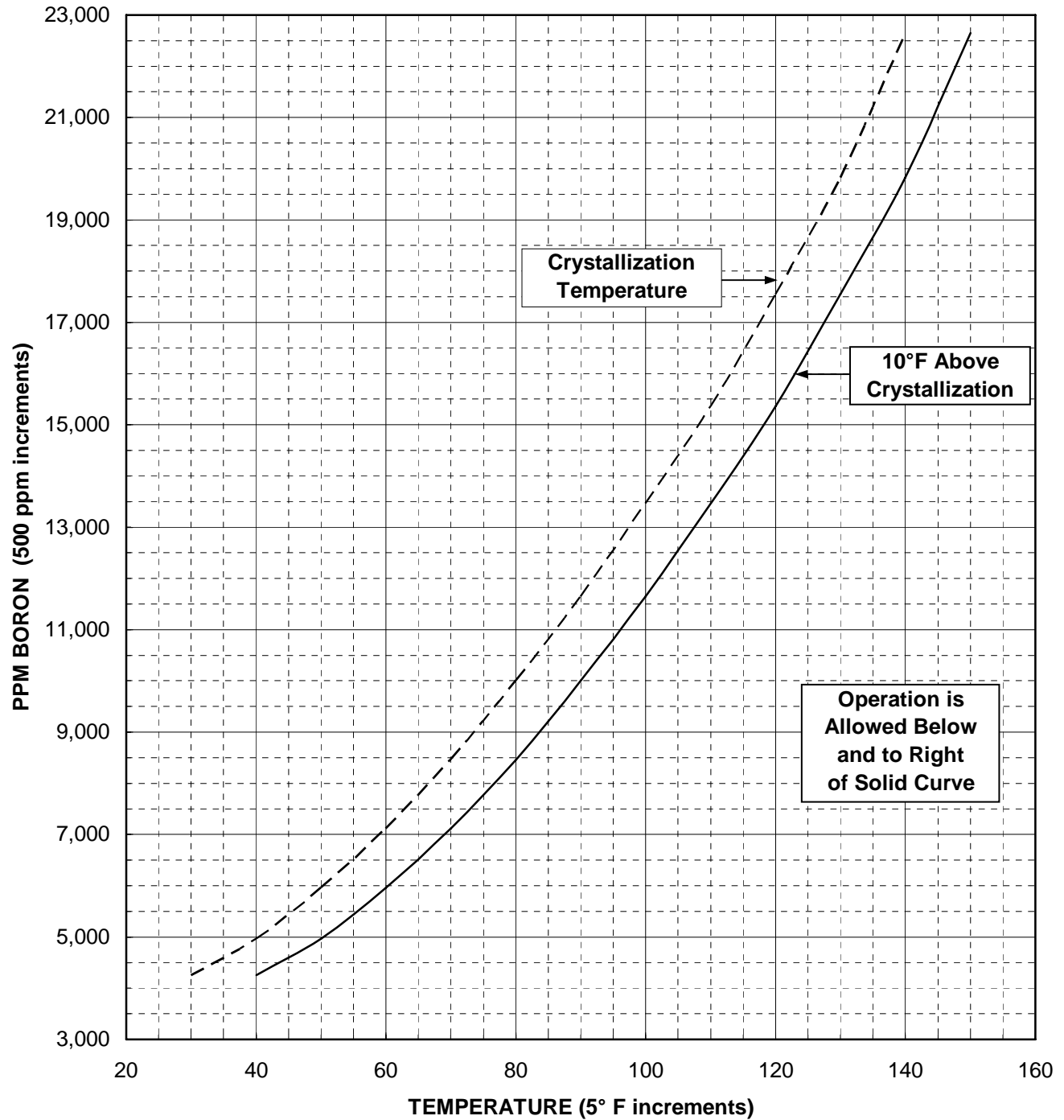
SOLUBILITY OF BORIC ACID IN WATER



ATTACHMENT G

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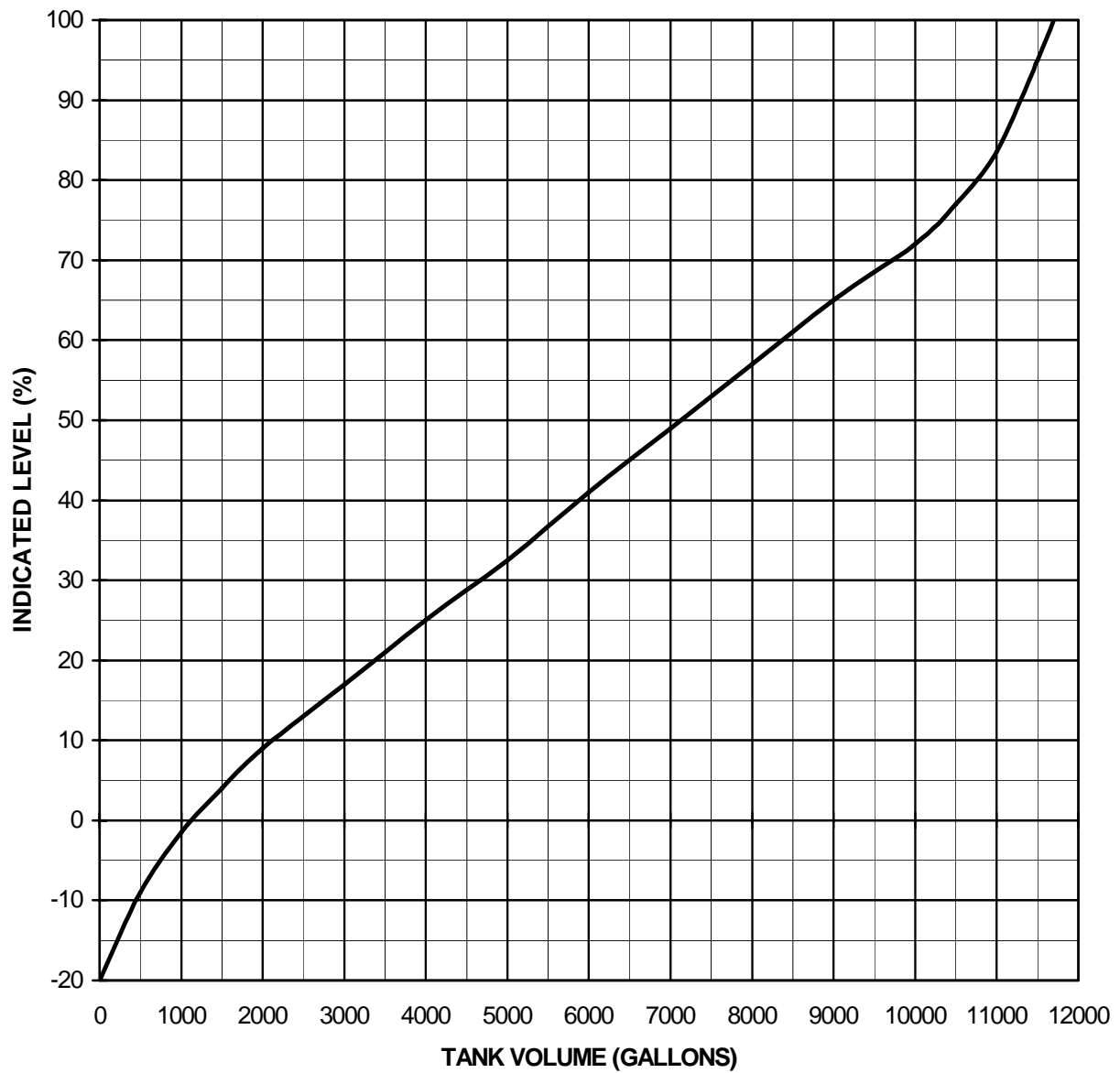
Solubility of Boric Acid in Water
(Crystallization Temperature)



ATTACHMENT H

PAGE 1 OF 1

BORIC ACID MAKEUP TANK



ATTACHMENT I

PAGE 1 OF 1

BAMT CONCENTRATION ADJUSTMENT FOR SHUTDOWN CHEMISTRY

1.0 INITIAL BAMT LEVEL = _____%

Vi = Initial 2T-6A level in gallons (Refer to Attachment H)

Vi = _____ gals

2.0 VA = VOLUME ADDED TO BAMT

Va = 95% - Vi

Va = 11,500 gal - Vi

Va = 11,500 gal - _____ = _____ gal

3.0 CI = INITIAL BAMT CONCENTRATION

Cf = 7 wt% Boron concentration

4.0 CA = CONCENTRATION TO ADD TO OBTAIN 7 WT% BORON

Ca = Cf (11,500) - ViCi

$$\frac{\quad}{Va}$$
Ca =
$$\frac{(12,250 \text{ ppm} \times 11,500) - (\text{_____} \times \text{_____})}{\text{_____}}$$

Ca = _____ ppm Boron

5.0 WT% =
$$\frac{Ca}{1750} = \frac{\quad}{1750} = \text{_____} \text{ WT\%}$$

6.0 BL = LBS OF BORIC ACID NEEDED

BL = wt% x 0.0833 x Va

BL = _____ x 0.0833 x _____ = _____ lbs

7.0 BB = BARRELS OF BORIC ACID NEEDED

BB =
$$\frac{BL}{\text{lbs per barrel (Exhibit 1)}} = \text{\# barrels}$$
BB =
$$\frac{(\text{_____})}{(\text{_____})} = \text{_____ barrels}$$

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ATTACHMENT J

PAGE 1 OF 3

RCS DILUTION DURING POWER OPERATION

{4.3.1}

1.0 INITIAL CONDITIONS

- Boric Acid Makeup System aligned per Attachment A.
- Reactor Makeup Water System aligned per Attachment B.
- CVCS in service per Chemical and Volume Control (2104.002).

NOTE

Step 2.0 duplicated as EXHIBIT 2, RCS Dilution During Power Operation. Exhibit 2 may be used for normal RCS dilution task.

2.0 DILUTE MODE

2.1 Verify EITHER Reactor Makeup pump (2P-109A OR 2P-109B) running.

2.2 Verify Mode Select switch (2HS-4928) in DILUTE.

2.3 Verify Reactor Makeup Water Flow controller (2FIC-4927) set up as follows:

- In MANUAL OR AUTO.
- Demand set to less than Charging flow.

2.4 Verify VCT Makeup Isol valve (2CV-4941-2) open.

2.5 Operate Reactor Makeup Water Flow Batch controller (2FQIS-4927) as follows:

2.5.1 Depress Red pushbutton.

2.5.2 Verify 2FQIS-4927 set for desired quantity.

2.5.3 Verify 2FIC-4927 indicates desired flow rate.

*2.6 Monitor the following parameters:

- RCS Tave (2TI-4650)
- Axial Shape Index
- Reactor power

2.7 IF desired to terminate dilution,
THEN reset 2FQIS-4927 to zero.

2.8 WHEN 2FQIS-4927 at zero,
THEN verify the following:

- RMW Flow Control valve (2CV-4927) closes
- No flow indicated on 2FIC-4927.

2.9 Close 2CV-4941-2.

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ATTACHMENT J

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3.0 MANUAL MODE

- 3.1 Verify Boric Acid Makeup Flow controller (2FIC-4926) set as follows:
 - In MANUAL.
 - Output demand set to less than zero.
- 3.2 Verify Reactor Makeup Water Flow controller (2FIC-4927) set as follows:
 - In MANUAL.
 - Setpoint set to desired setpoint BUT less than Charging flow.
- 3.3 IF desired,
THEN reset Reactor Makeup Water Flow Totalizer (2FQI-4927) to ZERO.
- 3.4 Verify EITHER Reactor Makeup pump (2P-109A OR 2P-109B) running.
- 3.5 Verify open VCT Makeup Isolation valve (2CV-4941-2).
- 3.6 Operate Mode Select switch (2HS-4928) as follows:
 - 3.6.1 Place to MANUAL.
 - 3.6.2 Verify the following:
 - 2FIC-4927 indicates desired flow rate.
 - 2CV-4926 remains closed.
- * 3.7 Monitor the following parameters:
 - RCS Tave (2TI-4650)
 - Axial Shape Index
 - Reactor power
- 3.8 IF expected VCT level change NOT observed,
THEN stop running Reactor Makeup pump (2P-109A OR 2P-109B).
 - Investigate and correct any problems prior to recommencing dilution.
- 3.9 WHEN desired to stop dilution,
THEN adjust 2FIC-4927 to Zero.
- 3.10 Close 2CV-4941-2.
- 3.11 IF desired,
THEN place Mode Select switch in DILUTE.

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ATTACHMENT J

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4.0 IF 2CV-4927 INOPERABLE
AND it is necessary to add water to RCS,
THEN perform the following:

4.1 IF first time this evolution performed on this shift,
THEN perform crew brief.

* 4.2 Verify operator status as follows:

- Operator stationed at 2CVC-4927-3.
- Operator in contact with Control Room for entire evolution.

4.3 Verify EITHER Reactor Makeup pump (2P-109A OR 2P-109B) running.

4.4 Open VCT Makeup Isol valve (2CV-4941-2).

CAUTION

Ensure flow rate established is less than total charging pump flow.

4.5 Throttle 2CVC-4927-3 open to establish desired flow rate indicated on 2FIC-4927.

* 4.6 Monitor the following parameters:

- RCS Tave (2TI-4650)
- Axial Shape Index
- Reactor power

4.7 IF immediate termination required,
THEN perform any of the following:

- Secure running 2P-109 pump.
- Close 2CVC-4927-3.
- Close 2CV-4941-2.

4.8 WHEN desired amount of water has been added as indicated on 2FQI-4927,
THEN perform the following:

4.8.1 Close 2CVC-4927-3.

4.8.2 Close 2CV-4941-2.

4.9 Verify flow stopped as indicated on 2FIC-4927.

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RCS BORATION DURING POWER OPERATION

NOTE

- Step 2.0 duplicated as EXHIBIT 3, NORMAL RCS Boration At Power. This Exhibit may be used for normal RCS boration task.

1.0 INITIAL CONDITIONS

- Boric Acid Makeup System aligned per Attachment A.
 - Reactor Makeup Water System aligned per Attachment B.
 - CVCS in service per Chemical And Volume Control (2104.002).
- {4.3.2} • Samples from RCS, BAM Tanks (2T-6A and 2T-6B) and RWT (2T-3) are current if used for boration per this attachment.
- BAM Tanks and RWT contain sufficient boric acid at proper concentration to meet requirements of TRM 3.1.2.7 OR 3.1.2 if used for boration as per this attachment (Use Supplement 4 Figure 1 to verify TRM requirements met.)

2.0 BORATE MODE TO CHARGING PUMP SUCTION (2CV-4930)

2.1 Verify Boric Acid Makeup Flow controller (2FIC-4926) set as follows:

- In MANUAL OR AUTO.
- Setpoint set to desired flowrate.

2.2 Verify desired BAM pump (2P-39A OR 2P-39B) selected for automatic operation using BAM Pump Select Switch (2HS-4911-2).

2.3 Verify selected BAM pump (2P-39A OR 2P-39B) in NORMAL AFTER STOP.

2.4 Operate Mode Select Switch (2HS-4928) as follows:

2.4.1 Place to BORATE.

2.4.2 Verify the following:

- Charging Pump Suction From Boric Acid (2CV-4930) opens.
- Selected BAM pump (2P-39A OR 2P-39B) starts.

* 2.5 IF additional boric acid flow required,
THEN manually start additional BAM pump (2P-39A OR 2P-39B).

* 2.6 Open BAM Tank Recirc Valve (2CV-4903-2 OR 2CV-4915-2) for running pumps.

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- 2.7 Operate Boric Acid Makeup Flow Batch controller (2FQIS-4926) as follows:
- 2.7.1 Depress Red pushbutton.
 - 2.7.2 Verify 2FQIS-4926 set for desired quantity.
 - 2.7.3 Verify 2FIC-4926 indicates desired flow rate.
- * 2.8 Monitor the following parameters:
- RCS Tave (2TI-4650)
 - Axial Shape Index
 - Reactor power
- 2.9 WHEN 2FQIS-4926 counts down to zero,
THEN verify the following:
- 2CV-4926 closes.
 - No flow indicated on 2FIC-4926.
- 2.10 WHEN desired to stop boric acid addition,
THEN perform the following:
- 2.10.1 Place 2HS-4928 to DILUTE.
 - 2.10.2 Secure running BAM pumps:
 - 2P-39A
 - 2P-39B
 - 2.10.3 Close BAM Tank Recirc valves for pumps placed in service:
 - 2CV-4903-2 for 2P-39A
 - 2CV-4915-2 for 2P-39B
 - 2.10.4 Verify 2CV-4930 closed.
- 3.0 MANUAL MODE TO CHARGING PUMP SUCTION (2CV-4930) OR VCT (2CV-4941-2)
- 3.1 Verify Boric Acid Makeup Flow controller (2FIC-4926) set as follows:
- 3.1.1 In MANUAL OR AUTO.
 - 3.1.2 Setpoint set to desired flowrate
- 3.2 Verify Reactor Makeup Water Flow controller (2FIC-4927) set as follows:
- 3.2.1 In MANUAL.
 - 3.2.2 Demand set to less than zero.

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- 3.3 Open VCT Makeup Isol valve (2CV-4941-2) OR Charging Pump Suction From Boric Acid valve (2CV-4930).
- 3.4 Manually start EITHER BAM pump:
 - 2P-39A
 - 2P-39B
- *3.5 IF additional boric acid flow required as determined by Attachment F of this procedure or BORON2 program,
THEN manually start additional BAM pump (2P-39A OR 2P-39B).
- *3.6 Open BAM Tank Recirc Valve (2CV-4903-2 OR 2CV-4915-2) for running pumps.
- 3.7 Operate Mode Select Switch (2HS-4928) as follows:
 - 3.7.1 Place to MANUAL.
 - 3.7.2 Verify the following:
 - 2FIC-4926 indicates desired flow rate.
 - 2CV-4927 remains closed.
- 3.8 IF expected VCT level change NOT observed,
THEN stop running BAM pump (2P-39A OR 2P-39B).
 - Investigate and correct any problems prior to recommencing boration.
- 3.9 WHEN desired to stop boric acid addition,
THEN perform the following:
 - 3.9.1 Place 2HS-4928 to DILUTE.
 - 3.9.2 Secure running BAM pumps:
 - 2P-39A
 - 2P-39B
 - 3.9.3 Close BAM Tank Recirc valves for pumps placed in service:
 - 2CV-4903-2 for 2P-39A
 - 2CV-4915-2 for 2P-39B
 - 3.9.4 Verify closed 2CV-4941-2 OR 2CV-4930 as appropriate.
- 3.10 IF BAM Tank used to supply acid approaching minimum level requirements of TRM 3.1.2.7 OR 3.1.2.8,
(Use Supplement 4 Figure 1 to verify TRM requirements met.)
THEN initiate batching to BAM tank.

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ATTACHMENT L

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MANUAL MAKEUP TO THE RCS

1.0 INITIAL CONDITIONS

- Boric Acid Makeup System aligned per Attachment A.
 - Reactor Makeup Water System aligned per Attachment B.
 - CVCS in service per Chemical And Volume Control (2104.002).
- {4.3.2}
- Samples from RCS, BAM Tanks (2T-6A and 2T-6B) and RWT (2T-3) are current if used for boration per this attachment.
 - BAM Tanks and RWT contain sufficient boric acid at proper concentration to meet requirements of TRM 3.1.2.7 OR 3.1.2.8 if used for boration per this attachment. (Use Supplement 4 Figure 1 to verify TRM requirements met.)

NOTE

- Volume of Blending Tee to VCT piping is \cong 34 gallons. Completing each blend with \cong 50 gallons of water will ensure complete acid addition to VCT.
- This section can be used to makeup to VCT/RCS during plant shutdown.

2.0 INSTRUCTIONS

- 2.1 Determine initial blending ratio using Attachment F OR BORON 2 program.
- 2.2 Adjust blend ratio to achieve desired shutdown rate and make-up rate.
- 2.3 IF making up to Volume Control Tank,
THEN align to VCT as follows:
 - 2.3.1 Open Manual Makeup to VCT valve (2CVC-68).
 - 2.3.2 Close Manual Makeup to Charging Pump Suction (2CVC-83).
- 2.4 Verify Boric Acid Makeup Flow controller (2FIC-4926) set as follows:
 - 2.4.1 Setpoint set to desired flowrate determined above.
 - 2.4.2 IF controller in MANUAL,
THEN controller demand set to desired value.
- 2.5 Verify Reactor Makeup Water Flow controller (2FIC-4927) set as follows:
 - 2.5.1 Setpoint set to desired flowrate determined above.
 - 2.5.2 IF controller in MANUAL,
THEN controller demand set to desired value.
- 2.6 Reset flow totalizers as follows:
 - Boric Acid Makeup Flow (2FQI-4926) to zero.
 - Reactor Makeup Water Flow (2FQI-4927) to zero.
- 2.7 Open VCT Makeup Isolation valve (2CV-4941-2).

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- 2.8 Verify EITHER Reactor Makeup pump (2P-109A OR 2P-109B) running.
- 2.9 Manually start BAM pumps (2P-39A AND/OR 2P-39B).
- 2.10 Open BAM Tank Recirc valve (2CV-4903-2 OR 2CV-4915-2) for running pumps.
- 2.11 Place Mode Select switch (2HS-4928) in MANUAL.
- *2.12 Verify 2FIC-4926 indicates desired flow rate.
- *2.13 Verify 2FIC-4927 indicates desired flow rate.
- 2.14 IF expected VCT level change NOT observed,
THEN perform the following:
 - 2.14.1 Secure running Reactor Makeup pump.
 - 2.14.2 Secure running BAM pump.
 - 2.14.3 Correct any problems prior to recommencing makeup.
- 2.15 WHEN desired amount of boric acid added,
THEN set 2FIC-4926 to minimum.
- 2.16 WHEN desired boric acid AND water quantities added,
THEN place Mode Select switch (2HS-4928) to DILUTE.
- 2.17 Stop operating BAM pumps:
 - 2P-39A
 - 2P-39B
- 2.18 Close BAM Tank Recirc valves for pumps placed in service:
 - 2CV-4903-2 for 2P-39A
 - 2CV-4915-2 for 2P-39B
- 2.19 IF desired,
THEN stop the operating Reactor Makeup pump.
- 2.20 IF aligned to VCT,
THEN realign to Charging pump suction as follows:
 - 2.20.1 Open 2CVC-83.
 - 2.20.2 Close 2CVC-68.
- 2.21 Close 2CV-4941-2.
- *2.22 Monitor the following parameters for adverse trends:
 - RCS Tave (2TI-4650)
 - Axial Shape Index
 - Reactor power
- 2.23 IF BAM Tank used to supply acid approaching minimum level requirements of TRM 3.1.2.7 OR 3.1.2.8, (Use Supplement 4 Figure 1)
THEN initiate batching to BAM Tank.

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- 2.24 Verify 2FIC-4927 set to less than Charging Pump capacity.
- 2.25 Verify Boric Acid Makeup Flow controller (2FIC-4926) set as follows:
 - 2.25.1 Setpoint set to pre-makeup flowrate.
 - 2.25.2 IF controller in MANUAL,
THEN controller demand set to pre-makeup value.
- 2.26 Reset flow totalizers to zero:
 - Boric Acid Makeup Flow (2FQI-4926)
 - Reactor Makeup Water Flow (2FQI-4927)

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ATTACHMENT M

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AUTOMATIC MAKEUP TO THE RCS

1.0 INITIAL CONDITIONS

- Boric Acid Makeup System aligned per Attachment A.
 - Reactor Makeup Water System aligned per Attachment B.
 - CVCS in service per Chemical And Volume Control (2104.002).
- {4.3.2} • **Samples from RCS and BAM Tanks (2T-6A and 2T-6B) are current.**
- **BAM Tanks contain sufficient boric acid at proper concentration to meet requirements of TRM 3.1.2.7 OR 3.1.2.8.**
(Use Supplement 4 Figure 1 to verify TRM requirements met.)

2.0 INSTRUCTIONS

- 2.1 Determine blending ratio using Attachment F OR BORON 2 program.
- 2.2 IF making up to VCT,
THEN align to VCT as follows:
- 2.2.1 Open Manual Makeup to VCT valve (2CVC-68).
- 2.2.2 Close Manual Makeup to Charging Pump Suction (2CVC-83).
- 2.3 Verify Boric Acid Makeup Flow controller (2FIC-4926) set as follows:
- 2.3.1 Setpoint set to desired flowrate determined above.
- 2.3.2 In MANUAL OR AUTO.
- 2.4 Verify Reactor Makeup Water Flow controller (2FIC-4927) set as follows:
- 2.4.1 Setpoint set to desired flowrate determined above.
- 2.4.2 In MANUAL OR AUTO.
- 2.5 Reset flow totalizers as follows:
- Boric Acid Makeup Flow (2FQI-4926) to zero.
 - Reactor Makeup Water Flow (2FQI-4927) to zero.
- 2.6 Verify EITHER Reactor Makeup pump (2P-109A OR 2P-109B) running.
- 2.7 Verify desired BAM pump (2P-39A OR 2P-39B) selected for automatic operation using BAM Pump Select Switch (2HS-4911-2).
- 2.8 Verify selected BAM pump in NORMAL AFTER STOP.

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- 2.9 Place VCT Makeup Isol valve (2CV-4941-2) to AUTO.
- 2.10 Place Mode Select switch (2HS-4928) to AUTO.
- 2.11 WHEN VCT level (2LIS-4857/2LR-4857) drops to 60%,
THEN check makeup starts automatically as follows:
 - 2CV-4941-2 opens.
 - 2FIC-4927 indicates desired flow rate.
 - 2FIC-4926 indicates desired flow rate.
 - Selected BAM pump (2P-39A OR 2P-39B) running.
- 2.12 IF expected VCT level change NOT observed,
THEN perform the following:
 - 2.12.1 Secure running Reactor Makeup pump.
 - 2.12.2 Secure running BAM pump:
 - 2P-39A
 - 2P-39B
 - 2.12.3 Correct any problems prior to recommencing makeup.
- 2.13 WHEN VCT level (2LIS-4857/2LR-4857) rises to ~ 75%,
THEN verify makeup stops as follows:
 - 2CV-4926 closes.
 - 2CV-4927 closes.
 - 2CV-4941-2 closes.
 - IF BAM pump running in AUTO,
THEN selected BAM pump stops.
- 2.14 IF desired,
THEN place 2HS-4928 to DILUTE.
- 2.15 IF desired,
THEN stop running BAM pump.
- 2.16 IF desired,
THEN stop running Reactor Makeup pump.
- 2.17 IF desired,
THEN align to Charging pump suction as follows:
 - 2.17.1 Open 2CVC-83.
 - 2.17.2 Close 2CVC-68.
- * 2.18 Monitor RCS Tave for any adverse trends.
- 2.19 IF BAM Tank used to supply acid approaching minimum level requirements
of TRM 3.1.2.7 OR 3.1.2.8,
(Use Supplement 4 Figure 1 to verify TRM requirements met.)
THEN initiate batching to BAM Tank.

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ATTACHMENT N

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BORATING THE RCS TO DESIRED BORON CONCENTRATION

1.0 INITIAL CONDITIONS

- Boric Acid Makeup System aligned per Attachment A.
- Reactor Makeup Water System aligned per Attachment B.
- CVCS in service per Chemical And Volume Control (2104.002).

- {4.3.2}
- **Samples from RCS and BAM Tanks (2T-6A and 2T-6B) are current.**
 - **BAM Tanks contain sufficient boric acid at proper concentration to meet requirements of TRM 3.1.2.7 OR 3.1.2.8.**
(Use Supplement 4 Figure 1 to verify TRM requirements met.)

2.0 INSTRUCTIONS

- 2.1 Determine blending ratio using BORON 2 program OR appropriate attachment from Soluble Poison Concentration Control (2103.004).
- 2.2 Verify Boric Acid Makeup Flow controller (2FIC-4926) set as follows:
 - 2.2.1 In MANUAL OR AUTO.
 - 2.2.2 Setpoint set to desired flowrate.
- 2.3 Reset Boric Acid Makeup Flow (2FQI-4926) to zero.
- 2.4 Select EITHER BAM pump (2P-39A OR 2P-39B) for automatic operation using BAM Pump Select Switch (2HS-4911-2).
- 2.5 Verify selected BAM pump in NORMAL AFTER STOP.
- 2.6 Verify VCT Makeup Isolation valve (2CV-4941-2) in AUTO OR CLOSED.
- 2.7 Verify Charging Pump Suction Source From Boric Acid valve (2CV-4930) in AUTO.
- 2.8 IF VCT level (2LIS-4857/2LR-4857) too high to allow adding total batch, THEN divert letdown flow to BMS by placing Bypass to BMS (2CV-4826) to AUTO OR BMS as desired.
- 2.9 Place Mode Select switch (2HS-4928) to BORATE.
- 2.10 Set Boric Acid Makeup Flow Batch Control (2FQIS-4926) to number of gallons of boric acid to be added.

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- 2.11 Verify the following actions occur:
- Selected BAM pump (2P-39A OR 2P-39B) starts.
 - 2FIC-4926 indicates desired flow rate.
 - 2CV-4930 opens to supply boric acid to Charging Pump Suction header.
 - VCT Makeup Isolation valve (2CV-4941-2) remains closed.
- 2.12 Open selected BAM Tank Recirc valve (2CV-4903-2 OR 2CV-4915-2).
- 2.13 Monitor VCT level (2LIS-4857/2LR-4857) during boration.
- 2.14 IF Fuel Pool Level High alarm (2K11-J4) received
OR RWT level begins to rise,
THEN stop running BAM pump:
- 2P-39A
 - 2P-39B
- 2.15 WHEN 2FQIS-4926 counts down to zero,
THEN verify 2CV-4926 closes.
- 2.16 IF desired,
THEN place 2HS-4928 to DILUTE.
- 2.17 Verify 2CV-4930 closed.
- 2.18 IF desired,
THEN stop running BAM pump:
- 2P-39A
 - 2P-39B
- 2.19 IF BAM pump secured,
THEN close associated BAM Tank Recirc valve:
- 2CV-4903-2 for 2P-39A
 - 2CV-4915-2 for 2P-39B
- * 2.20 Monitor RCS Tave for any adverse trends.
- 2.21 IF BAM Tank used to supply acid approaching minimum level requirements
of TRM 3.1.2.7 OR 3.1.2.8,
(Use Supplement 4 Figure 1 to verify TRM requirements met.)
THEN initiate batching to BAM Tank.

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ATTACHMENT O

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DILUTING THE RCS TO DESIRED BORON CONCENTRATION

1.0 INITIAL CONDITIONS

- Boric Acid Makeup System aligned per Attachment A.
- Reactor Makeup Water System aligned per Attachment B.
- CVCS in service per Chemical And Volume Control (2104.002).

2.0 INSTRUCTIONS

2.1 Verify flowrate through RCS > 2000 gpm.

2.2 Determine blending ratio using BORON 2 program OR appropriate attachment from Soluble Poison Concentration Control (2103.004).

2.3 IF plant heatup in progress with RCP running in each loop
AND shutdown cooling secured,
THEN perform the following:

2.3.1 Determine the following boron concentration requirements:

- Shutdown margin for current T_{ave} using RHOBAL program.
- Estimated critical boron concentration using RHOBAL program.
- Establishing Cocked CEA protection.
(If TCBs are OR will be closed prior to 545° F)

2.3.2 Calculate amount of water required to dilute RCS to most limiting concentration determined in step 2.3.1 (using BORON 2 program).

2.3.3 Obtain RCS boron sample at least once every hour until dilution secured.

2.3.4 Verify adequate SDM maintained during dilution.

2.4 Verify Makeup to Spent Fuel Pool (2CVC-66) closed.
(CR-ANO-2-1999-0744-005)

2.5 Verify Makeup to Refueling Water Tank (2CVC-64) closed.
(CR-ANO-2-1999-0744-005)

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- 2.6 Verify Reactor Makeup Water Flow controller (2FIC-4927) set as follows:
 - 2.6.1 In MANUAL OR AUTO.
 - 2.6.2 Setpoint set to desired flowrate determined above.
- 2.7 Reset Boric Acid Makeup Flow (2FQI-4927) to zero.
- 2.8 Verify EITHER Reactor Makeup pump (2P-109A OR 2P-109B) running.
- 2.9 Open VCT Makeup Isolation valve (2CV-4941-2).
- 2.10 IF VCT level (2LIS-4857/2LR-4857) too high to allow adding total batch,
THEN divert letdown flow to BMS using VCT Bypass to BMS (2CV-4826) in
MANUAL OR AUTOMATIC as desired.
- 2.11 Place Mode Select Switch (2HS-4928) to DILUTE.
- 2.12 Set Reactor Makeup Water Flow Batch Control (2FQIS-4927) to number of
gallons of demineralized water to be added.
- 2.13 Verify 2FIC-4927 indicates desired flow rate.
- 2.14 Monitor VCT level (2LIS-4857/2LR-4857).
- 2.15 IF Fuel Pool Level High alarm (2K11-J4) received
OR RWT level begins to rise,
THEN stop running Reactor Makeup pump:
 - 2P-109A
 - 2P-109B
- 2.16 WHEN 2FQIS-4927 counts down to zero,
THEN verify 2CV-4927 closes.
- 2.17 Close 2CV-4941-2.
- 2.18 IF desired,
THEN stop running Reactor Makeup pump:
 - 2P-109A
 - 2P-109B
- * 2.19 Monitor RCS Tave for any adverse trends.
- 2.20 IF desired,
THEN request Chemistry sample RCS for boron concentration.

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ATTACHMENT P

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PREPARATION AND RESTORATION OF 2T-6A FOR SHUTDOWN CHEMISTRY

This Attachment provides instructions for raising boric acid concentration in BAM Tank 2T-6A in preparation for acid reducing phase of shutdown chemistry control. Object is to make 2T-6A ~ 95% full with ~ 7.0 wt% boron. To make room for raising boron concentration, 2T-6A will be pumped down to ~ 40% or less by transferring to RWT. Since this will be done prior to entering Mode 5, 2T-6B and RWT will have to be operable to stay within TRM 3.1.2.8. 2T-6B will be filled to ~ 95% with ~ 3.45 wt% boron. Expected RWT boron concentration following transfer from 2T-6A will be calculated to ensure it will be < 2950 ppm.

1.0 INITIAL CONDITIONS (MAY BE PERFORMED IN ANY ORDER)

- 1.1 Boric Acid Makeup System aligned per Attachment A. _____
- 1.2 Reactor Makeup Water System aligned per Attachment B. _____
- 1.3 2T-6B level (2LIS-4908 OR L4908) ~ 95%. _____
- 1.4 RWT and BAM Tanks (2T-6A AND 2T-6B) samples have been taken and analyzed to determine current boron concentration. _____
- 1.5 2T-6B operable using Supplement 4 Figure 1. _____
- 1.6 Install Caution Tag on 2T-6B Inlet (2CVC-37B) to prevent inadvertent addition of highly concentrated Boric Acid to 2T-6B while batching to 2T-6A. _____

NOTE

BAMT alarms are NOT accurate when controller setpoints are NOT set at 70°F.

- 1.7 Raise the following Temperature Controller setpoints ~ 24 hours before batching:
 - 2T-6A Temp Cont (2TIC-4906) to 115°F _____
 - 2T-6A Temp Cont (2TIC-4907) to 115°F _____

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2.0 PREPARATION OF 2T-6A FOR ACID REDUCING SHUTDOWN CHEMISTRY

- 2.1 Determine gallons of boric acid to be transferred to RWT in order to reduce 2T-6A to ~ 40% OR desired final level using Attachment H.

VB = _____ gallons

- 2.2 Calculate initial RWT volume (Vi) as follows:

Vi = [Initial level (%) x 4788 gal/%) + 25,766 gal

Vi = _____ gallons

- 2.3 Verify sufficient capacity remains in 2T-3 to accept transfer from 2T-6A without exceeding 100% (504,566 gal).

- 2.4 Record initial RWT boron concentration (Ci) and initial 2T-6A concentration (CB).

Ci = _____ ppm (RWT) CB = _____ ppm (2T-6A)

- 2.5 Calculate RWT concentration after transfer (Cf) as follows:

Cf = (ViCi + VBCB) ÷ (Vi + VB) = _____ ppm

- 2.6 Verify RWT concentration will be < 2950 ppm after transfer.

- Independent verification of final RWT concentration.

- 2.7 Transfer necessary volume of boric acid from 2T-6A to the RWT using "Makeup To The Refueling Water Tank" section of this procedure.

- 2.8 Danger tag closed the following valves to prevent raising Boric Acid concentration in 2T-6B flow path above 3.5 wt%:

- BA Pump 2P-39A Discharge valve (2CVC-40A)
- BAMT (2T-6A) Gravity Feed valve (2CV-4920-1)
- BA Pump Suction Cross Connect valve (2CVC-52)
- BA PPS 2P-39A and 2P-39B Recirc Cross Connect (2CVC-55)

- 2.9 Determine the following:

- Boric Acid Batch Concentration and quantity of Boric Acid necessary to obtain ~ 95% level and ~ 7.0 wt% Boron in 2T-6A using Attachment I of this procedure.
- Quantity of water required to meet Boric Acid Batch Concentration using Exhibit 1 of this procedure.

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- 2.10 WHEN 2T-6A level (2LIS-4906) has been reduced to ~ 40% OR desired level,
THEN batch to 2T-6A using "Batching Unit 2 BAM Tank To A Desired Concentration" section of this procedure. _____

CAUTION

- During long term recirculation, tank and piping design temperature limit of 180°F shall NOT be exceeded (CR-ANO-2-2002-01914).
- 2T-6A should remain on recirc to prevent rocking up BAM pump or piping while borated to high concentration.

- 2.11 WHEN first batch complete,
THEN place 2T-6A on recirc using "Recirculation of BAM Tanks" section of this procedure. _____
- 2.12 WHEN 2T-6A (2LIS-4906) approximately 70%,
THEN perform the following:
- 2.12.1 Request boron sample from Chemistry. _____
- 2.12.2 WHEN boron sample result obtained,
THEN determine the following:
- Boric Acid Batch Concentration and quantity of Boric Acid necessary to obtain ~ 95% level and ~ 7.0 wt% Boron in 2T-6A using Attachment I of this procedure. _____
 - Quantity of water required to meet Boric Acid Batch Concentration using Exhibit 1 of this procedure. _____
- 2.12.3 Batch to 2T-6A using "Batching Unit 2 BAM Tank To A Desired Concentration" section of this procedure. _____
- 2.13 WHEN 2T-6A (2LIS-4906) approximately 95%,
THEN perform the following:
- 2.13.1 Request boron sample from Chemistry. _____
- 2.13.2 Check 2T-6A boric acid concentration ~ 7.0 wt%. _____

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ATTACHMENT P

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3.0 TRANSFER OF CONTENTS TO UNIT 1 (N/A IF TRANSFERRING TO UNIT 2)

- 3.1 Ensure 2T-6A boron concentration acceptable to Unit 1. _____
- 3.2 Verify U-1 ready to receive 2T-6A contents. _____
- 3.3 Verify BAM pump (2P-39A) running. _____
- 3.4 Verify open BAM Tank Recirc valve (2CV-4903-2). _____
- 3.5 Unlock and Open Bypass from 2T-6A to U1 BAMT (2CVC-156). _____
- 3.6 Unlock and Close 2P-39A Recirc Isolation valve (2CVC-155). _____
- 3.7 Request U-1 fill T-7 with ≥ 16 " of DI water at $\sim 110^{\circ}\text{F}$ in preparation for backflush. _____
- 3.8 WHEN desired amount of 2T-6A pumped to U-1, THEN lock open 2CVC-155. _____
- 3.9 Independent verification 2CVC-155 Locked Open. _____
- 3.10 Secure 2P-39A. _____
- 3.11 Request U-1 transfer at least 3" of T-7 to 2T-6A through 2CVC-156 and 2CVC-155 for line flush. _____
- 3.12 WHEN transfer complete, THEN perform the following:
 - 3.12.1 Lock closed 2CVC-156. _____
 - 3.12.2 Independent verification 2CVC-156 Locked closed. _____
 - 3.12.3 Start 2P-39A. _____

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ATTACHMENT P

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4.0 TRANSFER OF CONTENTS TO UNIT 2 (N/A if transferring to Unit 1)

4.1 Transfer 2T-6A contents to Unit 2 as follows:

4.1.1 Perform partial clear for 2T6A Gravity Feed valve (2CV-4920-1) danger tag. _____

4.1.2 Enter TRM 3.1.2.2 _____

4.1.3 Inject boric acid using Plant Cooldown (2102.010). _____

4.2 WHEN transfer of 2T-6A to Unit 2 complete,
THEN flush gravity feed line from 2T-6B to suction of
charging pumps as follows:

4.2.1 Verify open VCT Outlet (2CV-4873-1). _____

4.2.2 Verify 2CV-4920-1 closed. _____

4.2.3 Determine 2T-6B level (2LIS-4908) change required
for 250 gallon flush of gravity feed piping from 2T-6B
to charging pump suction using Attachment H. _____

% change _____

4.2.4 Verify at least one Charging pump running. _____

4.2.5 Flush Gravity Feed piping as follows: _____

A. Open 2T-6B Gravity Feed valve (2CV-4921-1). _____

B. Close 2CV-4873-1. _____

4.2.6 WHEN piping has been flushed with \cong 250 gallons,
THEN perform the following: _____

A. Open 2CV-4873-1. _____

B. Close 2CV-4921-1. _____

4.3 Flush BMT 2T-6A gravity feed piping using 2T-6B as follows:

4.3.1 Determine change in 2T-6B level(2LIS-4908) required
for 250 gallon flush of gravity feed piping from 2T-6B
to charging pump suction using Attachment H. _____

% change _____

4.3.2 Verify VCT pressure (2PIS-4866) > 20 psig. _____

4.3.3 Verify VCT Outlet (2CV-4873-1) open. _____

4.3.4 Open 2T-6B Gravity Feed valve (2CV-4921-1). _____

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CAUTION

Do not allow BAM Tank level to go below TRM level.
Sluice rate between tanks could be as high as 586 gpm.

4.3.5 Commence sluice by opening 2T-6A Gravity Feed valve (2CV-4920-1). _____

4.3.6 WHEN 2T-6B level (2LIS-4908) indicates piping has been flushed with ~ 250 gallons,
THEN close the following valves:

A. 2CV-4920-1 _____

B. 2CV-4921-1 _____

4.3.7 Rehang 2CV-4920-1 danger tag. _____

4.3.8 Exit TRM 3.1.2.2. _____

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ATTACHMENT P

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5.0 RESTORATION OF 2T-6A TO OPERABLE STATUS

- 5.1 Batch to 2T-6A using EITHER of the following: _____
- "Batching to an Operable BAMT" section of this procedure
 - "Batching to an Inoperable BAMT" section of this procedure
- 5.2 WHEN first batch complete,
THEN place 2T-6A on recirc using "Recirculation of BAM Tanks"
section of this procedure. _____
- 5.3 IF desired AND more than one hour has elapsed,
THEN request Boron sample from Chemistry. _____
- 5.4 WHEN 2T-6A filled,
THEN perform the following: _____
- 5.4.1 Verify 2T-6A recirc maintained for ~ one hour. _____
- 5.4.2 Request Boron sample from Chemistry. _____
- 5.4.3 Verify 2T-6A concentration ~ 3.45 wt%. _____
- 5.5 Verify Danger tags installed for this attachment removed. _____
- 5.6 Remove Caution Tag from 2T-6B Inlet (2CVC-37B). _____
- 5.7 Restore the following controllers to normal setpoint: _____
- 2T-6A Temp Cont (2TIC-4906): 70°F _____
 - 2T-6A Temp Cont (2TIC-4907): 70°F _____
- 5.8 Independently verify the following controllers at normal setpoint: _____
- 2T-6A Temp Cont (2TIC-4906): 70°F _____
 - 2T-6A Temp Cont (2TIC-4907): 70°F _____

Performed By _____ Date _____

Supervisor _____ Date _____

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ATTACHMENT Q

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CHEMICAL ADDITION TO THE RCS DURING SHUTDOWN

This Attachment implements a T-Alt for using a skid mounted pump to add chemicals to RCS. An ER is not required for the installation of this T-Alt per 1000.028, Control of Temporary Alterations. The Installation Engineer signature completes the verification process required by Control of Temporary Alterations (1000.028), and may be signed by a Shift Engineer, System Engineer or designee. Chemistry will provide guidance on type and amount of chemicals to add.

1.0 INITIAL CONDITIONS

- 1.1 IF chemical addition system still set up from previous addition, _____
THEN GO TO step 3.0.
- 1.2 Obtain authorization to install RCS Chemical Addition T-Alt.
Unit 2 SM/CRS _____ Date _____
- 1.3 Enter this procedure attachment in the Temporary Alteration Log (TAP number "2104.003 Att. Q"). _____

2.0 INSTALLATION AND TESTING

- 2.1 Connect Chemical Injection pump to system as shown in Figure 1. _____
- 2.2 Installation Engineer to perform independent verification of connection of Chemical Injection pump to system.
Installation Engineer: _____ Date _____
- 2.3 Leak check fittings as follows:
 - 2.3.1 Verify the following valves closed (refer to Figure 1):
 - Chemical Injection Pump Suction (H₂O₂-2) _____
 - Demin Water Supply (H₂O₂-3) _____
 - Chemical Injection Pump Discharge Vent (H₂O₂-5) _____
 - System Isolation valve _____
 - 2.3.2 Connect demineralized water supply to fitting at H₂O₂-3. _____
 - 2.3.3 Route Injection pump discharge vent to poly bottle OR floor drain. _____
 - 2.3.4 Open the following valves to fill addition system:
 - H₂O₂-3 _____
 - H₂O₂-5 _____
 - 2.3.5 WHEN steady stream of water observed from pump discharge vent,
THEN close H₂O₂-5. _____

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- 2.3.6 Inspect all fitting for leaks and tighten as necessary to stop leaks. _____
- 2.3.7 Close H₂O₂-3. _____
- 2.4 Check Chemical Injection pump as follows:
- 2.4.1 Add ~1/2 gallon of DI Water to Chemical Addition container by opening the following valves:
- H₂O₂-2 _____
 - H₂O₂-3 _____
- 2.4.2 WHEN ~1/2 gallon of DI Water in container, THEN close H₂O₂-3. _____
- 2.4.3 Disconnect DI water supply. _____
- 2.4.4 Open H₂O₂-5. _____
- 2.4.5 Start Chemical Injection pump. _____
- 2.4.6 IF discharge flow indicator available, THEN check flow. _____
- 2.4.7 Adjust pump stroke as necessary to obtain desired flow. _____
- 2.4.8 WHEN Chemical Addition container empty, THEN stop pump. _____
- 2.4.9 Close the following valves:
- H₂O₂-2 _____
 - H₂O₂-5 _____
- 2.5 Verify Temp Alt Integrated Drawing List 1000.028E updated with M-2231 SH 1 OR M-2232 SH 1 as appropriate. _____
- 2.6 Record date Temp Alt installed on Temporary Alteration Log Index Sheet. _____
- 2.7 Installation Engineer independently verify T-Alt installed. _____
- Installation Engineer: _____ Date _____
- 2.8 Place a copy of this Attachment in the Control Room Temporary Alteration File. _____

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3.0 OPERATION

3.1 Verify the following prior to injecting chemicals:

- Shutdown Cooling in service unless injection pump is aligned to Charging Pump suction header.
- RCS temperature < 250°F.
- Chemistry has determined quantity of chemicals to add.
- Chemistry personnel available to assist with chemical addition.
- Safety precautions identified for chemicals to be added

3.2 Verify all applicable safety precautions taken for chemical to be added.

3.3 Add chemical solution to RCS as follows:

CAUTION

The RCP seals are subject to chemical attack from H₂O₂. If adding H₂O₂ and RCPs are secure, consideration should be given to isolating RCP Controlled Bleedoff. Reference CR-ANO-1-2002-1134.

- 3.3.1 IF adding H₂O₂
AND all RCPs secure,
THEN consider isolating Controlled Bleedoff
using Plant Cooldown in Mode 5 section of Plant Cooldown
(2102.010).
- 3.3.2 IF SDC Purification in service,
AND hydrazine is chemical being added to RCS,
THEN verify L/D Ion Exch 2T-36A/B, 2T-70 Inlet/Bypass (2CV-4803)
handswitch in BYPASS.
- 3.3.3 Add amount of chemical specified by Chemistry to
Chemical Addition container.
- 3.3.4 Verify the following valves closed:
- H₂O₂-1
 - H₂O₂-3
 - H₂O₂-5
- 3.3.5 Open H₂O₂-2.

ATTACHMENT Q

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CAUTION

If Shutdown Cooling is secured, the only chemical injection method available is via the Charging Pump suction header.

3.3.6 Align pump discharge to one of the following:

- A. IF desired to use Shutdown Cooling Purification drain,
THEN open the following valves:
- SDC Purification Loop Drain (2SI-1069A)
 - SDC Purification Loop Drain (2SI-1069B)
- B. IF desired to use 2P-60A suction drain,
THEN open the following valves:
- LPSI 2P-60A Suction Drain (2SI-1033A)
 - LPSI 2P-60A Suction Drain (2SI-1032A)
- C. IF desired to use 2P-60B suction drain,
THEN open the following valves:
- LPSI 2P-60B Suction Drain (2SI-1033B)
 - LPSI 2P-60B Suction Drain (2SI-1032B)
- D. IF desired to use Shutdown Cooling suction vent,
THEN open the following valves:
- SDC Suct From RCS Vent Dwnstrm 2CV-5038-1 (2SI-1029)
 - SDC Suct From RCS Vent Dwnstrm 2CV-5038-1 (2SI-1028)
- E. IF desired to use Charging suction header,
THEN open the following valves:
- RWT Suction to Charging Pumps Drain (2CVC-1045)
 - RWT Suction to Charging Pumps Drain (2CVC-1044)

3.3.7 Notify Control Room of intent to begin chemical addition.

3.3.8 Start Chemical Injection pump.

3.3.9 WHEN specified amount of chemical has been added,
THEN stop pump.

3.3.10 Close H₂O₂-2.

3.3.11 Close valves opened in Step 3.3.6.

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3.4 Flush Chemical Injection pump as follows:

- 3.4.1 IF chemical addition was via SDC purification drain,
THEN verify the following valves closed:
 - SDC Purification Loop Drain (2SI-1069A)
 - SDC Purification Loop Drain (2SI-1069B)
- 3.4.2 IF chemical addition was via 2P-60A suction drain,
THEN verify the following valves closed:
 - LPSI 2P-60A Suction Drain (2SI-1033A)
 - LPSI 2P-60A Suction Drain (2SI-1032A)
- 3.4.3 IF chemical addition was via 2P-60B suction drain,
THEN verify the following valves closed:
 - LPSI 2P-60B Suction Drain (2SI-1033B)
 - LPSI 2P-60B Suction Drain (2SI-1032B)
- 3.4.4 IF chemical addition was via SDC suction vent,
THEN verify the following valves closed:
 - SDC Suct From RCS Vent Dwnstrm 2CV-5038-1 (2SI-1029)
 - SDC Suct From RCS Vent Dwnstrm 2CV-5038-1 (2SI-1028)
- 3.4.5 IF chemical addition was via Charging suction header,
THEN verify the following valves closed:
 - RWT Suction to Charging Pumps Drain (2CVC-1045)
 - RWT Suction to Charging Pumps Drain (2CVC-1044)
- 3.4.6 Verify pump discharge vent routed to poly bottle OR floor drain.
- 3.4.7 Connect demineralized water supply to fitting at H₂O₂-3.
- 3.4.8 Open the following valves:
 - H₂O₂-5
 - H₂O₂-3
- 3.4.9 WHEN pump and tubing have been flushed for ~ 2 minutes,
THEN close the following valves:
 - H₂O₂-5
 - H₂O₂-3

3.5 Flush connection to system as follows:

- 3.5.1 Add DI Water to Chemical Addition Container by opening the following valves:
 - H₂O₂-2
 - H₂O₂-3
- 3.5.2 WHEN enough DI Water is in container to flush tubing,
THEN close H₂O₂-3.

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3.5.3 Align pump discharge as follows:

- A. IF chem add was via Shutdown Cooling Purification drain,
THEN open the following valves:
 - SDC Purification Loop Drain (2SI-1069A)
 - SDC Purification Loop Drain (2SI-1069B)
- B. IF chem add was via 2P-60A suction drain,
THEN open the following valves:
 - LPSI 2P-60A Suction Drain (2SI-1033A)
 - LPSI 2P-60A Suction Drain (2SI-1032A)
- C. IF chem add was via 2P-60B suction drain,
THEN open the following valves:
 - LPSI 2P-60B Suction Drain (2SI-1033B)
 - LPSI 2P-60B Suction Drain (2SI-1032B)
- D. IF chem add was via Shutdown Cooling suction vent,
THEN open the following valves:
 - SDC Suct From RCS Vent Dwnstrm 2CV-5038-1 (2SI-1029)
 - SDC Suct From RCS Vent Dwnstrm 2CV-5038-1 (2SI-1028)
- E. IF chem add was via Charging suction header,
THEN open the following valves:
 - RWT Suction to Charging Pumps Drain (2CVC-1045)
 - RWT Suction to Charging Pumps Drain (2CVC-1044)

3.5.4 Start Chemical Injection pump.

3.5.5 WHEN H₂O₂ container empty,
THEN stop pump.

3.5.6 Close H₂O₂-2.

3.5.7 Close valves opened in Step 3.5.3.

3.6 IF Chemistry requests additional chemical addition,
THEN repeat steps as necessary.

3.7 Notify Control Room that chemical addition complete.

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4.0 REMOVAL

4.1 Obtain authorization to remove RCS Chemical Addition T-Alt.
Unit 2 SM/CRS _____ Date _____

4.2 Verify L/D Ion Exch 2T-36A/B, 2T-70 Inlet/Bypass (2CV-4803) _____
handswitch in AUTO.

4.3 Disconnect chemical addition tubing from system isolation _____
valve AND replace cap.

4.4 Flush pump suction tubing as follows:

4.4.1 Open the following valves:

- H₂O₂-2 _____
- H₂O₂-3 _____

4.4.2 WHEN pump suction tubing has been flushed for _____
~ 2 minutes,
THEN close H₂O₂-3.

4.4.3 Open H₂O₂-1. _____

4.4.4 WHEN tubing has drained, _____
THEN close H₂O₂-1.

4.4.5 Close H₂O₂-2. _____

4.5 Isolate AND disconnect DI water supply from fitting at H₂O₂-3. _____

4.6 Installation Engineer to independently verify T-Alt removed.
Installation Engineer: _____ Date _____

4.7 Rinse Chemical Addition container with DI water. _____

4.8 Perform the following:

- Record Temp Alt removal date on Temporary Alteration Log _____
Index Sheet.
- Verify Temp Alt Integrated Drawing List maintained in _____
the Control Room updated.
- Forward copy of this attachment to Manager, System _____
Engineering.

Performed By _____ Date _____

Supervisor _____ Date _____

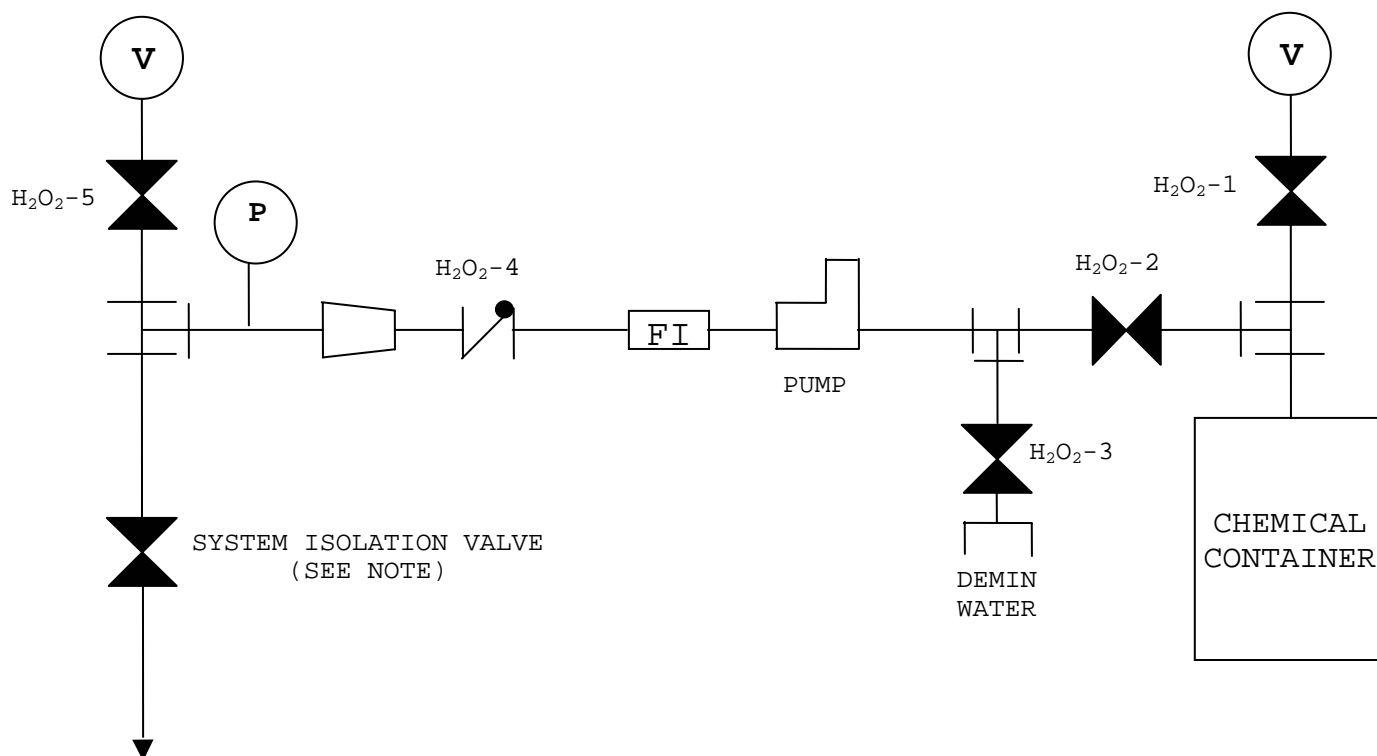
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FIGURE 1

NOTE

Chemical addition system should be connected to SDC Purification Drain (2SI-1069B) in 2T-21 tank room. If SDC purification secured, system can be connected to inservice LPSI Pump Suction Drain (2SI-1033A or 2SI-1033B) or SDC Suction Vent (2SI-1029). If charging available, system can be connected to suction header drain (2CVC-1045) in 2P-36A room.



ATTACHMENT R

PAGE 1 OF 1

RCS BORATION FROM THE RWT

CAUTIONS

- Do NOT use BAMT and RWT as boration sources at same time.
- Additional CCP starts while aligned to RWT suction will result in more boration.

1.0 Determine blend ratio as follows:

$$\frac{\text{RWT Boron Concentration} - \text{RCS Boron Concentration}}{\text{RCS Boron Concentration}}$$

2.0 Determine desired boration rate.

3.0 Open Charging Pump Suction From RWT (2CV-4950-2).

4.0 Close VCT Outlet (2CV-4873-1).

5.0 IF desired to raise power reduction rate,
THEN start additional Charging pumps.

6.0 IF desired to reduce power reduction rate,
THEN perform step 6.1 and/or step 6.2 as desired:

6.1 Lower number of running Charging pumps.

6.2 Initiate dilution as follows:

6.2.1 Verify RCS Makeup aligned to CCP Suction.

6.2.2 Refer to appropriate section of Attachment J,
RCS Dilution During Power Operation.

NOTE

Aligning CCP Suction to RWT may result in VCT Boron Concentration less than RCS Boron Concentration due to RCS with lower Boron Concentration returning to VCT.

7.0 WHEN desired to align CCP suction to VCT,
THEN perform the following:

7.1 IF aligned to dilute,
THEN secure diluting (refer to appropriate section of Attachment J).

7.2 Open VCT Outlet (2CV-4873-1).

7.3 Close Charging Pump Suction From RWT (2CV-4950-2).

7.4 Re-align RCS Makeup as desired.

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ATTACHMENT S

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PREPARATION AND RESTORATION OF 2T-6B FOR SHUTDOWN CHEMISTRY

This Attachment provides instructions for raising boric acid concentration in BAM Tank 2T-6B in preparation for acid reducing phase of shutdown chemistry control. Object is to make 2T-6B ~ 95% full with ~ 7.0 wt% boron. To make room for raising boron concentration, 2T-6B will be pumped down to ~ 40% or less by transferring to RWT. Since this will be done prior to entering Mode 5, 2T-6A and RWT will have to be operable to stay within TRM 3.1.2.8. 2T-6A will be filled to ~ 95% with ~ 3.45 wt% boron. Expected RWT boron concentration following transfer from 2T-6B will be calculated to ensure it will be < 2950 ppm.

1.0 INITIAL CONDITIONS (MAY BE PERFORMED IN ANY ORDER)

- 1.1 Boric Acid Makeup System aligned per Attachment A. _____
- 1.2 Reactor Makeup Water System aligned per Attachment B. _____
- 1.3 2T-6A level (2LIS-4906 OR L4906) ~ 95%. _____
- 1.4 RWT and BAM Tanks (2T-6A AND 2T-6B) samples have been taken and analyzed to determine current boron concentration. _____
- 1.5 2T-6A operable using Supplement 4 Figure 1. _____
- 1.6 Install Caution Tag on 2T-6A Inlet (2CVC-37A) to prevent inadvertent addition of highly concentrated Boric Acid to 2T-6A while batching to 2T-6B. _____

NOTE

BAMT alarms are NOT accurate when controller setpoints are NOT set at 70°F.

- 1.7 Raise the following Temperature Controller setpoints ~ 24 hours before batching:
 - 2T-6B Temp Cont (2TIC-4908) to 115°F _____
 - 2T-6B Temp Cont (2TIC-4912) to 115°F _____

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2.0 PREPARATION OF 2T-6B FOR ACID REDUCING SHUTDOWN CHEMISTRY

- 2.1 Determine gallons of boric acid to be transferred to RWT in order to reduce 2T-6B to ~ 40% OR desired final level using Attachment H.

VB = _____ gallons

- 2.2 Calculate initial RWT volume (Vi) as follows:

Vi = [Initial level (%) x 4788 gal/%] + 25,766 gal

Vi = _____ gallons

- 2.3 Verify sufficient capacity remains in 2T-3 to accept transfer from 2T-6B without exceeding 100% (504,566 gal).

- 2.4 Record initial RWT boron concentration (Ci) and initial 2T-6B concentration (CB):

Ci = _____ ppm (RWT) CB = _____ ppm (2T-6B)

- 2.5 Calculate RWT concentration after transfer (Cf) as follows:

Cf = (ViCi + VBCB) ÷ (Vi + VB) = _____ ppm

- 2.6 Verify RWT concentration will be < 2950 ppm after transfer.

- Independent verification of final RWT concentration.

- 2.7 Transfer necessary volume of boric acid from 2T-6B to the RWT using "Makeup To The Refueling Water Tank" section of this procedure.

- 2.8 Danger tag closed the following valves to prevent raising Boric Acid concentration in 2T-6A flow path above 3.5 wt%:

- BA Pump 2P-39B Discharge valve (2CVC-40B)
- BAMT (2T-6B) Gravity Feed valve (2CV-4921-1)
- BA Pump Suction Cross Connect valve (2CVC-52)
- BA PPS 2P-39A and 2P-39B Recirc Cross Connect (2CVC-135)

- 2.9 Determine the following:

- Boric Acid Batch Concentration and quantity of Boric Acid necessary to obtain ~ 95% level and ~ 7.0 wt% Boron in 2T-6A using Attachment I of this procedure.
- Quantity of water required to meet Boric Acid Batch Concentration using Exhibit 1 of this procedure.

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- 2.10 WHEN 2T-6B level (2LIS-4908) has been reduced to ~ 40% OR desired level,
THEN batch to 2T-6B using "Batching Unit 2 BAM Tank To A Desired Concentration" section of this procedure. _____

CAUTION

- During long term recirculation, tank and piping design temperature limit of 180°F shall NOT be exceeded (CR-ANO-2-2002-01914).
- 2T-6B should remain on recirc to prevent rocking up BAM pump or piping while borated to high concentration.

- 2.11 WHEN first batch complete,
THEN place 2T-6B on recirc using "Recirculation of BAM Tanks" section of this procedure. _____
- 2.12 WHEN 2T-6B (2LIS-4908) approximately 70%,
THEN perform the following:
- 2.12.1 Request boron sample from Chemistry. _____
- 2.12.2 WHEN boron sample result obtained,
THEN Determine the following:
- Boric Acid Batch Concentration and quantity of Boric Acid necessary to obtain ~ 95% level and ~ 7.0 wt% Boron in 2T-6B using Attachment I of this procedure. _____
 - Quantity of water required to meet Boric Acid Batch Concentration using Exhibit 1 of this procedure. _____
- 2.12.3 Batch to 2T-6B using "Batching Unit 2 BAM Tank To A Desired Concentration" section of this procedure. _____
- 2.13 WHEN 2T-6B (2LIS-4908) approximately 95%,
THEN perform the following:
- 2.13.1 Request boron sample from Chemistry. _____
- 2.13.2 Verify 2T-6B boric acid concentration ~ 7.0 wt%. _____

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ATTACHMENT S

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3.0 TRANSFER OF CONTENTS TO UNIT 2

3.1 Transfer 2T-6B contents to Unit 2 as follows:

- 3.1.1 Perform partial clear of 2T-6B Gravity Feed valve (2CV-4921-1) danger tag. _____
- 3.1.2 Enter TRM 3.1.2.2. _____
- 3.1.3 Inject boric acid using Plant Cooldown (2102.010). _____

3.2 WHEN transfer of 2T-6B to Unit 2 complete,
THEN flush gravity feed line from 2T-6A to suction of
charging pumps as follows: _____

- 3.2.1 Verify open VCT Outlet (2CV-4873-1). _____
- 3.2.2 Verify 2CV-4921-1 closed. _____
- 3.2.3 Determine 2T-6A level change required for
250 gallon flush of gravity feed piping from 2T-6A to
charging pump suction using Attachment H.
% change _____
- 3.2.4 Verify at least one Charging pump running. _____
- 3.2.5 Flush Gravity Feed piping as follows:
 - A. Open 2T-6A Gravity Feed valve (2CV-4920-1). _____
 - B. Close 2CV-4873-1. _____
- 3.2.6 WHEN piping has been flushed with \cong 250 gallons,
THEN perform the following:
 - A. Open 2CV-4873-1. _____
 - B. Close 2CV-4920-1. _____

3.3 Flush BAMT 2T-6B gravity feed piping using 2T-6A as follows:

- 3.3.1 Determine change in 2T-6A level (2LIS-4906) required
for 250 gallon flush of gravity feed piping from 2T-6A
to charging pump suction using Attachment H.
% change _____
- 3.3.2 Verify VCT pressure (2PIS-4866) > 20 psig. _____
- 3.3.3 Verify VCT Outlet (2CV-4873-1) open. _____
- 3.3.4 Open 2T-6A Gravity Feed valve (2CV-4920-1). _____

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ATTACHMENT S

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CAUTION

Do not allow BAM Tank level to go below TRM level.
Sluice rate between tanks could be as high as 586 gpm.

- 3.3.5 Commence sluice by opening 2T-6B Gravity Feed valve _____
(2CV-4921-1).
- 3.3.6 WHEN 2T-6A level (2LIS-4906) indicates piping has been
flushed with ~ 250 gallons,
THEN close the following valves:
 - A. 2CV-4921-1 _____
 - B. 2CV-4920-1 _____
- 3.3.7 Rehang 2CV-4921-1 danger tag. _____
- 3.3.8 Exit TRM 3.1.2.2. _____

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ATTACHMENT S

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4.0 RESTORATION OF 2T-6B TO OPERABLE STATUS

- 4.1 Batch to 2T-6B using EITHER of the following: _____
- "Batching to an Operable BAMT" section of this procedure
 - "Batching to an Inoperable BAMT" section of this procedure
- 4.2 WHEN first batch complete,
THEN place 2T-6B on recirc using "Recirculation of BAM Tanks"
section of this procedure. _____
- 4.3 IF desired AND more than one hour has elapsed,
THEN request Boron sample from Chemistry. _____
- 4.4 WHEN 2T-6B filled,
THEN perform the following: _____
- 4.4.1 Verify 2T-6B recirc maintained for ~ one hour. _____
- 4.4.2 Request Boron sample from Chemistry. _____
- 4.4.3 Verify 2T-6B concentration ~ 3.45 wt%. _____
- 4.5 Verify Danger tags installed for this attachment removed. _____
- 4.6 Remove Caution Tag from 2T-6A Inlet (2CVC-37A). _____
- 4.7 Restore following controllers to normal setpoint: _____
- 2T-6B Temp Cont (2TIC-4908): 70°F _____
 - 2T-6B Temp Cont (2TIC-4912): 70°F _____
- 4.8 Independently verify following controllers at normal setpoint: _____
- 2T-6B Temp Cont (2TIC-4908): 70°F _____
 - 2T-6B Temp Cont (2TIC-4912): 70°F _____

Performed By _____ Date _____

Supervisor _____ Date _____

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2104.003

EXHIBIT 1
BORIC ACID BATCH CONCENTRATION

Revised 5/15/05

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2T-7 LEVEL	WEIGHT (LBS)	
	325	330
28 "	20,026 ppm	20,334 ppm
29 "	19,345 ppm	19,642 ppm
30 "	18,706 ppm	18,993 ppm
32 "	17,500 ppm	17,769 ppm
34 "	16,492 ppm	16,746 ppm
36 "	15,588 ppm	15,826 ppm
38 "	14,778 ppm	15,005 ppm
40 "	14,175 ppm	14,393 ppm
46.5 "	12,250 ppm	12,438 ppm
48 "	11,847 ppm	12,029 ppm
50 "	11,375 ppm	11,550 ppm
52 "	10,937 ppm	11,105 ppm
54 "	10,500 ppm	10,661 ppm
56 "	10,150 ppm	10,306 ppm
58 "	9,800 ppm	9,951 ppm
93 "	6,125 ppm	6,219 ppm
100 "	5,687 ppm	5,774 ppm
130 "	4,375 ppm	4,442 ppm

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2104.003

EXHIBIT 2
NORMAL RCS DILUTION AT POWER

Revised 02/22/06

PAGE 1 OF 1

1.0 NORMAL DILUTE MODE

- 1.1 Verify EITHER Reactor Makeup pump (2P-109A OR 2P-109B) running.
- 1.2 Verify Mode Select switch (2HS-4928) in DILUTE.
- 1.3 Verify Reactor Makeup Water Flow controller (2FIC-4927) set up as follows:
 - In MANUAL OR AUTO.
 - Demand set to less than Charging flow.
- 1.4 Verify VCT Makeup Isol valve (2CV-4941-2) open.
- 1.5 Operate Reactor Makeup Water Flow Batch controller (2FQIS-4927) as follows:
 - 1.5.1 Depress Red pushbutton.
 - 1.5.2 Verify 2FQIS-4927 set for desired quantity.
 - 1.5.3 Verify 2FIC-4927 indicates desired flow rate.
- * 1.6 Monitor the following parameters:
 - RCS Tave (2TI-4650)
 - Axial Shape Index
 - Reactor power
- 1.7 IF desired to terminate dilution,
THEN reset 2FQIS-4927 to zero.
- 1.8 WHEN 2FQIS-4927 at zero,
THEN verify the following:
 - RMW Flow Control valve (2CV-4927) closes.
 - No flow indicated on 2FIC-4927.
- 1.9 Close 2CV-4941-2.
- 1.10 Verify 2FQIS-4927 Batch Volume placard updated to current batch volume.

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2104.003

EXHIBIT 3
NORMAL RCS BORATION AT POWER

Revised 02/22/06

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- 1.0 NORMAL BORATE MODE TO CHARGING PUMP SUCTION (2CV-4930)
 - 1.1 Verify Boric Acid Makeup Flow controller (2FIC-4926) set as follows:
 - In MANUAL OR AUTO.
 - Setpoint set to desired flowrate.
 - 1.2 Verify desired BAM pump (2P-39A OR 2P-39B) selected for automatic operating using BAM pump Select switch (2HS-4911-2).
 - 1.3 Verify selected BAM pump (2P-39A OR 2P-39B) in NORMAL AFTER STOP.
 - 1.4 Operate Mode Select Switch (2HS-4928) as follows:
 - 1.4.1 Place to BORATE.
 - 1.4.2 Verify the following:
 - Charging Pump Suction From Boric Acid (2CV-4930) opens.
 - Selected BAM pump (2P-39A OR 2P-39B) starts.
 - * 1.5 IF additional boric acid flow required,
THEN manually start additional BAM pump (2P-39A OR 2P-39B).
 - * 1.6 Open BAM Tank Recirc Valve (2CV-4903-2 OR 2CV-4915-2) for running pumps.
 - 1.7 Operate Boric Acid Makeup Flow Batch controller (2FQIS-4926) as follows:
 - 1.7.1 Depress Red pushbutton.
 - 1.7.2 Verify 2FQIS-4926 set for desired quantity.
 - 1.7.3 Verify 2FIC-4926 indicates desired flow rate.
 - * 1.8 Monitor the following parameters:
 - RCS Tave (2TI-4650)
 - Axial Shape Index
 - Reactor power
 - 1.9 WHEN 2FQIS-4926 at zero,
THEN verify the following:
 - Boric Acid Makeup Flow Control valve (2CV-4926) closes.
 - No flow indicated on 2FIC-4926.
 - 1.10 WHEN desired to stop boric acid addition,
THEN perform the following:
 - 1.10.1 Place 2HS-4928 to DILUTE.
 - 1.10.2 Secure running BAM pump(s).
 - 1.10.3 Close BAM tank Recirc valve(s) for pump(s) placed in service.
 - 1.10.4 Verify 2CV-4930 closed.
 - 1.11 Verify 2FQIS-4926 Batch Volume placard updated to current batch volume.

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SUPPLEMENT 1

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BAM PUMP (2P-39A) QUARTERLY TEST

This Supplement demonstrates operability of Boric Acid Makeup pump (2P-39A) per ASME Section XI (IST Program). This test also documents partial stroke test of 2P-39A Discharge Check valve (2CVC-41A).

1.0 INITIAL CONDITIONS

- Verify Boric Acid Makeup System aligned per Attachment A. _____
- Verify both BAM pumps (2P-39A AND 2P-39B) secured. _____
- Predictive Maintenance OR SE notified to take vibration data. _____
- IF at anytime during performance of this supplement temporary test gauge needed in place of permanently installed process gauge, THEN verify the following: _____

Test gage calibration date current.

Accuracy of test gauge within $\pm 2\%$ of full scale.

Full-scale range less than three times normal process value.

Test gauge number recorded in Test Inst column of Data Sheet.

Operator remains in area while gauge aligned for use.

2.0 TEST METHOD

NOTE

Steps 2.1 through 2.4 may be performed in any order.

- 2.1 Close 2P-39A Recirc valve (2CVC-54A). _____
- 2.2 Open Boric Acid Pumps Recirc Cross Connect valve (2CVC-55) 1 and 1/2 turns. _____
- 2.3 Close 2P-39A Recirc valve (2CVC-53A). _____
- 2.4 Verify 2P-39A oil level greater than $\frac{1}{2}$ full. _____
- 2.5 Place Boric Acid Makeup Flow controller (2FIC-4926) in MANUAL. _____
- 2.6 Verify Boric Acid Makeup Flow Control valve (2CV-4926) closed. _____

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SUPPLEMENT 1

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- 2.7 Start 2P-39A. _____
- 2.8 Open BAM Tank 2T-6A Recirc valve (2CV-4903-2). _____
- 2.9 Check flow indicated on EITHER of the following:
 - Boric Acid M/U Flow/Set Point recorder (2FR-4926) _____
 - Boric Acid Makeup Flow controller (2FIC-4926) _____
- 2.10 Adjust 2CVC-55 to establish 20 gpm test flow. _____
- 2.11 After at least two minutes of stable pump operation, record 2P-39A data as needed to complete Table 1. _____
- 2.12 WHEN data collection complete,
THEN stop 2P-39A. _____
- 2.13 Close 2CV-4903-2. _____
- 2.14 Return 2FIC-4926 to desired status. _____
- 2.15 Restore alignment for normal tank recirculation as follows:
 - 2.15.1 Open 2CVC-54A. _____
 - 2.15.2 Close 2CVC-55. _____
 - 2.15.3 Open 2CVC-53A 1½ turns and lock. _____
 - Concurrently verify 2CVC-53A locked 1½ turns open. _____
- 2.16 IF this test being performed following PMT,
THEN complete Unit 2 IST Data Collection (1015.0160). _____
- 2.17 IF temporary test gauge was used,
THEN verify gauge isolated and removed. _____

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SUPPLEMENT 1

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3.0 ACCEPTANCE CRITERIA

3.1 Record values observed during 2P-39A operation below and compare against LIMITING RANGE FOR OPERABILITY values.

TABLE 1					
TEST QUANTITY	INSTRUMENT (INCLUDE TEST INST)	MEASURED VALUES	ACCEPTABLE NORMAL RANGE	LIMITING RANGE FOR OPERABILITY	IS DATA IN LIMITING RANGE?
Run Suct Pressure	2PI-4936	psig	N/A	≥ 3 psig	YES NO
Discharge Pressure	2PIS-4918	psig	N/A	N/A	N/A
Pump ΔP	(Disch - Suction)	psid	N/A	104.0 to 127.0 psid	YES NO
PUMP I.B. Horiz Vib		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
PUMP I.B. Vert Vib		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
PUMP O.B. Horiz Vib		in/sec	≤ 0.252 in/sec	≤ 0.606 in/sec	YES NO
PUMP O.B. Vert Vib		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
PUMP O.B. Axial Vib		in/sec	≤ 0.250 in/sec	≤ 0.600 in/sec	YES NO

Vibration Instrument Number _____ Cal Due Date _____

Vibration Readings taken by _____

3.2 IF NO circled in Table 1,
THEN perform the following:

- Notify Shift Manager. _____
- Declare 2P-39A inoperable. _____
- Refer to TRM 3.1.2.5 and 3.1.2.6. _____
- Initiate WR/WO as applicable. _____

3.3 IF 2P-39A outside ΔP limiting range for operability
due to leakage past 2P-39B Discharge Check valve (2CVC-41B),
THEN declare 2CVC-41B inoperable. _____

3.4 Comments: _____

3.5 Pump data recorded in Data Base and reviewed by SRO. _____

Performed By _____ Date _____

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SUPPLEMENT 1

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4.0 SUPERVISOR REVIEW AND ANALYSIS

- 4.1 Do all measured values recorded in Acceptance Criteria fall within specified LIMITING RANGE FOR OPERABILITY? YES NO
- 4.2 Do all measured values recorded in Acceptance Criteria section fall within ACCEPTABLE NORMAL RANGE? (Circle N/A if only values outside Acceptable Normal Range are also outside Limiting Range For Operability) YES NO N/A
- 4.3 IF NO answered to 4.1,
THEN perform the following corrective actions:
- Verify LCO Tracking Record using Conduct of Operations (1015.001) completed. _____
 - Verify Condition Report initiated. _____
- 4.4 IF NO answered to 4.2,
THEN perform the following corrective actions:
- Verify WR/WO initiated. _____
 - Complete Surveillance Test Program Revise Sheet (1000.009D) to double test frequency. _____
- 4.5 Comments: _____

- 4.6 Are all administrative requirements of this test satisfied? YES NO
- Supervisor _____ Date _____

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SUPPLEMENT 2

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BAM PUMP (2P-39B) QUARTERLY TEST

This Supplement demonstrates operability of Boric Acid Makeup pump (2P-39B) per ASME Section XI (IST Program). This test also documents partial stroke test of 2P-39B Discharge Check valve (2CVC-41B).

1.0 INITIAL CONDITIONS

- Verify Boric Acid Makeup System aligned per Attachment A. _____
- Verify both BAM pumps (2P-39A and 2P-39B) secured _____
- Predictive Maintenance OR SE available to take vibration data. _____
- IF at anytime during performance of this supplement temporary test gauge needed in place of permanently installed process gauge, THEN verify the following: _____

Test gage calibration date current.
Accuracy of test gauge within ±2% of full scale.
Full-scale range less than three times normal process value.

Test gauge number recorded in Test Inst column of Data Sheet.
Operator remains in area while gage aligned for use.

2.0 TEST METHOD

NOTE

Steps 2.1 through 2.4 may be performed in any order.

- 2.1 Close 2P-39B Recirc valve (2CVC-54B). _____
- 2.2 Open Boric Acid Pumps Recirc Cross Connect valve (2CVC-135) 1 and 1/2 turns. _____
- 2.3 Close 2P-39B Recirc valve (2CVC-53B). _____
- 2.4 Verify 2P-39B oil level greater than ½ full. _____

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SUPPLEMENT 2

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- 2.5 Place Boric Acid Makeup Flow Controller (2FIC-4926) in MANUAL. _____
- 2.6 Verify Boric Acid Makeup Flow Control valve (2CV-4926) closed. _____
- 2.7 Start 2P-39B. _____
- 2.8 Open BAM Tank 2T-6B Recirc valve (2CV-4915-2). _____
- 2.9 Check flow indicated on EITHER of the following:
 - Boric Acid M/U Flow/Set Point Recorder (2FR-4926) _____
 - Boric Acid Makeup Flow Controller (2FIC-4926) _____
- 2.10 Adjust 2CVC-135 to establish 20 gpm test flow. _____
- 2.11 After at least two minutes of stable pump operation, record 2P-39B data needed to complete Table 1. _____
- 2.12 WHEN data collection complete,
THEN stop 2P-39B. _____
- 2.13 Close 2CV-4915-2. _____
- 2.14 Return 2FIC-4926 to desired status. _____
- 2.15 Restore alignment to normal tank recirculation as follows:
 - 2.15.1 Open 2CVC-54B. _____
 - 2.15.2 Close 2CVC-135. _____
 - 2.15.3 Open 2CVC-53B 1½ turns and lock. _____
 - Concurrently verify 2CVC-53B locked 1½ turns open. _____
- 2.16 IF this test being performed following PMT,
THEN complete Unit 2 IST Data Collection (1015.0160). _____
- 2.17 IF temporary test gauge was used,
THEN verify gauge isolated and removed. _____

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SUPPLEMENT 2

PAGE 3 OF 4

3.0 ACCEPTANCE CRITERIA

3.1 Record values observed during 2P-39B operation below and compare against LIMITING RANGE FOR OPERABILITY values.

TABLE 1					
TEST QUANTITY	INSTRUMENT (INCLUDE TEST INST)	MEASURED VALUES	ACCEPTABLE NORMAL RANGE	LIMITING RANGE FOR OPERABILITY	IS DATA IN LIMITING RANGE?
Run Suct Pressure	2PI-4935	psig	N/A	≥ 3 psig	YES NO
Discharge Pressure	2PIS-4917	psig	N/A	N/A	N/A
Pump ΔP	(Disch - Suction)	psid	N/A	109.3 to 133.5 psid	YES NO
PUMP I.B. Horiz Vib		in/sec	≤ 0.325 in/sec	≤ 0.7 in/sec	YES NO
PUMP I.B. Vert Vib		in/sec	≤ 0.212 in/sec	≤ 0.51 in/sec	YES NO
PUMP O.B. Horiz Vib		in/sec	≤ 0.325 in/sec	≤ 0.7 in/sec	YES NO
PUMP O.B. Vert Vib		in/sec	≤ 0.317 in/sec	≤ 0.7 in/sec	YES NO
PUMP O.B. Axial Vib		in/sec	≤ 0.305 in/sec	≤ 0.7 in/sec	YES NO

Vibration Instrument Number _____ Cal Due Date _____

Vibration Readings taken by _____

3.2 IF NO circled in Table 1,
THEN perform the following:

- Notify Shift Manager. _____
- Declare 2P-39B inoperable. _____
- Refer to TRM 3.1.2.5 and 3.1.2.6. _____
- Initiate WR/WO as applicable. _____

3.3 IF 2P-39B outside ΔP limiting range for operability due to leakage past 2P-39A Discharge Check valve (2CVC-41A),
THEN declare 2CVC-41A inoperable. _____

3.4 Comments: _____

3.5 Pump data recorded in Database and reviewed by SRO. _____

Performed By _____ Date _____

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SUPPLEMENT 2

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4.0 SUPERVISOR REVIEW AND ANALYSIS

- 4.1 Do all measured values recorded in Acceptance Criteria fall within specified LIMITING RANGE FOR OPERABILITY? YES NO
- 4.2 Do all measured values recorded in Acceptance Criteria section fall within ACCEPTABLE NORMAL RANGE? (Circle N/A if only values outside Acceptable Normal Range are also outside Limiting Range For Operability) YES NO N/A
- 4.3 IF NO answered to 4.1,
THEN perform the following corrective actions:
- Verify LCO Tracking Record using Conduct of Operations (1015.001) completed. _____
 - Verify Condition Report initiated. _____
- 4.4 IF NO answered to 4.2,
THEN perform the following corrective actions:
- Verify WR/WO initiated. _____
 - Complete Surveillance Test Program Revise Sheet (1000.009D) to double test frequency. _____
- 4.5 Comments: _____

- 4.6 Are all administrative requirements of this test satisfied? YES NO
- Supervisor _____ Date _____

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SUPPLEMENT 3A

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BORIC ACID VALVE QUARTERLY RED TRAIN STROKE TEST

This Supplement performed to satisfy ASME Section XI (IST Program). Valves are full stroked during this test while lights are observed. Elapsed time between actuation and indication of full stroke completion recorded and compared with "Limiting Value" and "Acceptable Normal Range".

1.0 INITIAL CONDITIONS

- Boric Acid Makeup System aligned per Attachment A. _____
- Volume Control Tank (2T-4) pressure(2PIS-4866) > 25 psig to prevent boric acid from entering Charging pumps suction; this required so system status/reactivity concerns will not be affected by stroking gravity feed valves. _____

OR

Plant status such that stroking of gravity feed valves will not have an undesirable impact. _____

- Both BAM pumps (2P-39A AND 2P-39B) secured. _____
- Stopwatch available for valve stroke timing. _____

M&TE No. _____ Cal due date _____

2.0 TEST METHOD

2.1 BAM Tank 2T-6A Gravity Feed valve (2CV-4920-1)

- 2.1.1 Verify BAM Tank 2T-6A Gravity Feed valve (2CV-4920-1) closed. _____
- 2.1.2 Open AND time 2CV-4920-1. _____
- 2.1.3 Record time in Table 1 to nearest tenth second. _____
- 2.1.4 Close 2CV-4920-1. _____

2.2 BAM Tank 2T-6B Gravity Feed valve (2CV-4921-1)

- 2.2.1 Verify BAM Tank 2T-6B Gravity Feed valve (2CV-4921-1) closed. _____
- 2.2.2 Open AND time 2CV-4921-1. _____
- 2.2.3 Record time in Table 1 to nearest tenth second. _____
- 2.2.4 Close 2CV-4921-1. _____

- 2.3 IF this test being performed following PMT,
THEN complete Unit 2 IST Data Collection (1015.0160). _____

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SUPPLEMENT 3A

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3.0 ACCEPTANCE CRITERIA

3.1 Compare measured stroke time with "Limiting Value" and "Acceptable Normal Range" to determine operability.

TABLE 1						
VALVE	DESCRIPTION	TEST DIR.	STROKE TIME (SEC)	ACCEPTABLE NORMAL RANGE TIME (SEC)	LIMITING VALUE	MEASURED TIME WITHIN ACCEPTABLE NORMAL RANGE?
2CV-4920-1	2T-6A Gravity Feed	O		9.0-12.0	13.6	YES NO
2CV-4921-1	2T-6B Gravity Feed	O		5.2-8.6	10.3	YES NO

3.2 IF stroke time greater than Limiting Value,
THEN perform the following:

- Notify Shift Manager. _____
- Declare valve inoperable. _____
- Refer to TRM 3.1.2.1 and 3.1.2.2. _____
- Initiate WR/WO as applicable. _____

3.3 IF NO circled in Table 1
AND stroke time less than Limiting Value,
THEN immediately retest OR declare valve inoperable. _____

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SUPPLEMENT 3A

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- 3.4 IF retest performed
AND new stroke time outside Acceptable Normal Range,
THEN initiate Condition Report. _____
- 3.5 IF retest was performed
AND new stroke time within Acceptable Normal Range,
THEN perform one of the following:
- 3.5.1 IF cause of initial failure known,
THEN record new stroke time AND reason for failure
in step 3.7. _____
- 3.5.2 IF cause of initial failure unknown,
THEN perform the following:
- Record new stroke time in step 3.7 _____
 - Perform actions of step 3.4. _____
- 3.6 Valve data recorded in Database and reviewed by SRO. _____
- 3.7 Comments: _____

Performed By _____ Date _____

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SUPPLEMENT 3A

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4.0 SUPERVISOR REVIEW AND ANALYSIS

4.1 Do all measured values recorded in Table 1 fall within
ACCEPTABLE NORMAL RANGE? YES NO

4.2 IF NO answered to 4.1,
THEN perform the following:

4.2.1 IF retest performed
AND new stroke time within Acceptable Normal Range
with cause of initial failure known,
THEN review step 3.5 for concurrence. _____

4.2.2 IF retest stroke time outside Acceptable Normal Range
OR retest stroke time within Acceptable Normal Range
with cause of initial failure unknown,
THEN verify Condition Report initiated. _____

4.2.3 IF stroke time exceeds Limiting Value,
THEN perform the following:

• Verify LCO Tracking Record using Conduct of Operations _____
(1015.001) completed.
• Verify Condition Report initiated. _____

4.3 Comments: _____

4.4 Are all administrative requirements of this test satisfied? YES NO
Supervisor _____ Date _____

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SUPPLEMENT 3B

PAGE 1 OF 4

BORIC ACID VALVE QUARTERLY GREEN TRAIN STROKE TEST

This Supplement performed to satisfy ASME Section XI (IST Program). Valves are full stroked during this test while lights are observed. Elapsed time between actuation and indication of full stroke completion recorded and compared with "Limiting Value" and "Acceptable Normal Range".

1.0 INITIAL CONDITIONS

- Boric Acid Makeup System aligned per Attachment A. _____
- Volume Control Tank (2T-4) pressure (2PIS-4866) > 25 psig to prevent boric acid from entering Charging pumps suction; this required so system status/reactivity concerns will not be affected by stroking Emergency Borate valve. _____

OR

Plant status such that stroking of Emergency Borate valve will not have an undesirable impact. _____

- Both BAM pumps (2P-39A and 2P-39B) secured. _____
- Stopwatch available for valve stroke timing. _____

M&TE No. _____ Cal due date _____

2.0 TEST METHOD

2.1 BAM Tank 2T-6A Recirc valve (2CV-4903-2)

- 2.1.1 Verify BAM Tank 2T-6A Recirc valve (2CV-4903-2) open. _____
- 2.1.2 Close AND time 2CV-4903-2. _____
- 2.1.3 Record time in Table 1 to nearest tenth second. _____

2.2 BAM Tank 2T-6B Recirc valve (2CV-4915-2)

- 2.2.1 Verify BAM Tank 2T-6B Recirc valve (2CV-4915-2) open. _____
- 2.2.2 Close AND time 2CV-4915-2. _____
- 2.2.3 Record time in Table 1 to nearest tenth second. _____

2.3 Emergency Borate to Charging Pump Suction (2CV-4916-2)

- 2.3.1 Verify Emergency Borate to Charging Pump Suction (2CV-4916-2) closed. _____
- 2.3.2 Open AND time 2CV-4916-2. _____
- 2.3.3 Record time in Table 1 to nearest tenth second. _____
- 2.3.4 Close 2CV-4916-2. _____

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SUPPLEMENT 3B

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2.4 VCT Makeup Isol valve (2CV-4941-2)

2.4.1 Verify VCT Makeup Isol valve (2CV-4941-2) open. _____

2.4.2 Close AND time 2CV-4941-2. _____

2.4.3 Record time in Table 1 to nearest tenth second. _____

2.5 IF this test being performed following PMT,
THEN complete Unit 2 IST Data Collection (1015.0160). _____

3.0 ACCEPTANCE CRITERIA

3.1 Compare measured stroke time with "Limiting Value" and "Acceptable Normal Range" to determine operability.

TABLE 1						
VALVE	DESCRIPTION	TEST DIR.	STROKE TIME (SEC)	ACCEPTABLE NORMAL RANGE TIME (SEC)	LIMITING VALUE	MEASURED TIME WITHIN ACCEPTABLE NORMAL RANGE?
2CV-4903-2*	2T-6A Recirc	C		< 2.0	2.0	YES NO
2CV-4915-2*	2T-6B Recirc	C		< 2.0	2.0	YES NO
2CV-4916-2	BA to Chg Pumps	O		8.7-11.7	14.8	YES NO
2CV-4941-2*	VCT Makeup Isol	C		1.6-4.6	6.2	YES NO
* Stroke testing this valve also tests its Fail Safe Function.						

3.2 IF stroke time greater than Limiting Value,
THEN perform the following:

- Notify Shift Manager. _____
- Declare valve inoperable. _____
- Refer to TRM 3.1.2.1 and 3.1.2.2. _____
- Initiate WR/WO as applicable. _____

3.3 IF NO circled in Table 1
AND stroke time less than Limiting Value,
THEN immediately retest OR declare valve inoperable. _____

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SUPPLEMENT 3B

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- 3.4 IF retest performed
AND new stroke time outside Acceptable Normal Range,
THEN initiate Condition Report. _____
- 3.5 IF retest was performed
AND new stroke time within Acceptable Normal Range,
THEN perform one of the following:
- 3.5.1 IF cause of initial failure known,
THEN record new stroke time AND reason for failure
in step 3.7. _____
- 3.5.2 IF cause of initial failure unknown,
THEN perform the following:
- Record new stroke time in step 3.7. _____
 - Perform actions of step 3.4. _____
- 3.6 Valve data recorded in Database and reviewed by SRO. _____
- 3.7 Comments: _____

Performed By _____ Date _____

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SUPPLEMENT 3B

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4.0 SUPERVISOR REVIEW AND ANALYSIS

4.1 Do all measured values recorded in Table 1 fall within
ACCEPTABLE NORMAL RANGE? YES NO

4.2 IF NO answered to 4.1,
THEN perform the following:

4.2.1 IF retest performed
AND new stroke time within Acceptable Normal Range _____
with cause of initial failure known,
THEN review step 3.5 for concurrence.

4.2.2 IF retest stroke time outside Acceptable Normal Range _____
OR retest stroke time within Acceptable Normal Range
with cause of initial failure unknown,
THEN verify Condition Report initiated.

4.2.3 IF stroke time exceeds Limiting Value,
THEN perform the following:

- Verify LCO Tracking Record using Conduct of Operations _____
(1015.001) completed.
- Verify Condition Report initiated. _____

4.3 Comments: _____

4.4 Are all administrative requirements of this test satisfied? YES NO
Supervisor _____ Date _____

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SUPPLEMENT 4

PAGE 1 OF 5

WEEKLY BORIC ACID SURVEILLANCE

This Supplement accomplishes TS/TRM Surveillances TRM 4.1.2.7.a, TRM 4.1.2.8.a and TS 4.5.4.a by verifying level and boron concentration in RWT and both BAM Tanks. TRM 3.1.2.8 requires boric acid volume in 2T-6A and 2T-6B during Modes 1-4 to be greater than volume specified by TRM Figure 3.1-1 (use Supplement 4 Figure 1 as it is adjusted for instrument uncertainty), which depends on boron concentration in 2T-6A, 2T-6B and 2T-3. Combined contents of both BAM Tanks may be used to satisfy TRM 3.1.2.8. Temperature of flow path from 2T-6A OR 2T-6B to suction of charging pumps determined per TRM Surveillances 4.1.2.1.a and 4.1.2.2.a.

1.0 INITIAL CONDITIONS

- 1.1 Thermistor Digital Thermometer (TDT) available and currently calibrated.

M&TE No. _____ Cal. due date _____

- 1.2 IF tank being used to satisfy TRM requirements, THEN current boron concentration analysis results available for the following:

- BAM Tank (2T-6A) _____
- BAM Tank (2T-6B) _____
- Refueling Water Tank (2T-3) _____

2.0 TEST METHOD (Steps 2.1 through 2.3 may be performed in any order.)

- 2.1 Record temperature in each of the following areas containing boric acid pipe using thermistor digital thermometer (TDT).

AREA	TEMPERATURE
2DG1 Room	°F
2DG2 Room	°F
BAM Tank Room	°F
Vac Degas Room	°F
VCT Room	°F

- 2.2 IF tank being used to satisfy TRM requirements, THEN record the following data:

TANK	TEMPERATURE	INSTRUMENT	LEVEL	BORON CONCENTRATION	SAMPLE DATE
2T-6A	°F	2TIC-4906 OR 4907	%	ppm	
2T-6B	°F	2TIC-4908 OR 4912	%	ppm	
RWT	N/A	N/A	%	ppm	

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SUPPLEMENT

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- 2.3 Determine heat trace temperature on piping from Boric Acid Batching Tank to BAM Tanks and Unit 1 Boric Acid Addition Tank by adding OR subtracting, as appropriate, indicated variance from controller setpoint of 120°F and record below: (N/A if circuit inoperable)

HEAT TRACE CIRCUIT	2C330 (A)	2C333 (B)
2HT-272	°F	°F
2HT-291	°F	°F
2HT-292	°F	°F
2HT-293	°F	°F
2HT-294	°F	°F

- 2.4 Plot point indicating boric acid concentration and volume on Figure 1 for each BAM Tank being used to satisfy TRM requirements (last page of supplement).
(Designate which point is for which BAMT)

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SUPPLEMENT 4

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3.0 ACCEPTANCE CRITERIA

- 3.1 IF Plant in Mode 5 OR 6,
AND 2T-6A OR 2T-6B used as operable Borated Water Source,
THEN perform the following:
- 3.1.1 Is flow path from Operable BAM Tank to Charging pump suction > 55°F? (Step 2.1) YES NO N/A
- 3.1.2 Is Operable BAM Tank temperature > 55°F? (Step 2.2) YES NO N/A
- 3.1.3 Is Operable BAM Tank level > 36.5%? (CR-ANO-2-2004-0407) (Step 2.2) YES NO N/A
- 3.1.4 Is Operable BAM Tank boron between 5250 and 6125 ppm? (Step 2.2) YES NO N/A
- 3.2 IF Plant in Mode 5 OR 6
AND RWT used as an Operable Borated Water Source,
THEN perform the following:
- 3.2.1 Is RWT level \geq 7.5% (Step 2.2) YES NO N/A
- 3.2.2 Is RWT Boron \geq 2500 PPM? (Step 2.2) YES NO N/A
- 3.3 IF Plant in Modes 1, 2, 3 OR 4,
THEN perform the following:
- 3.3.1 Are BAM Tanks 2T-6A and/or 2T-6B in acceptable region of Figure 1 of this supplement? YES NO N/A
- 3.3.2 Is flow path from Operable BAM Tank 2T-6A and/or 2T-6B to charging pump suction > 55°F? (Step 2.1). YES NO N/A
- 3.3.3 Is required BAM Tank, 2T-6A and/or 2T-6B, temperature > 55°F? (Step 2.2) YES NO N/A
- 3.3.4 Is RWT Boron between 2500 and 3000 ppm? (Step 2.2) YES NO N/A
- 3.3.5 Is RWT level between 91.7% and 100%? (Step 2.2) YES NO N/A

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3.4 IF NO circled in Steps 3.1, 3.2, OR 3.3,
THEN perform the following:

- Declare affected component inoperable. _____
- Inform Shift Manager. _____
- Refer to TRM 3.1.2.7, 3.1.2.8, and TS 3.5.4.
(Use Supplement 4 Figure 1 to verify TRM requirements met.) _____

3.5 IF temperature in EITHER Diesel Generator Room < 55°F,
THEN notify EDG System Engineer. _____

Performed By _____ Date _____

4.0 SUPERVISOR REVIEW AND ANALYSIS

4.1 Do all measured values evaluated in Acceptance Criteria
section fall within specified limiting value?

YES NO

4.2 IF answer to 4.1 NO,
THEN perform the following corrective actions:

- Verify LCO Tracking Record using Conduct of Operations
(1015.001) completed. _____
- Verify Condition Report initiated. _____

4.3 Comments: _____

4.4 Are all administrative requirements of this test satisfied?

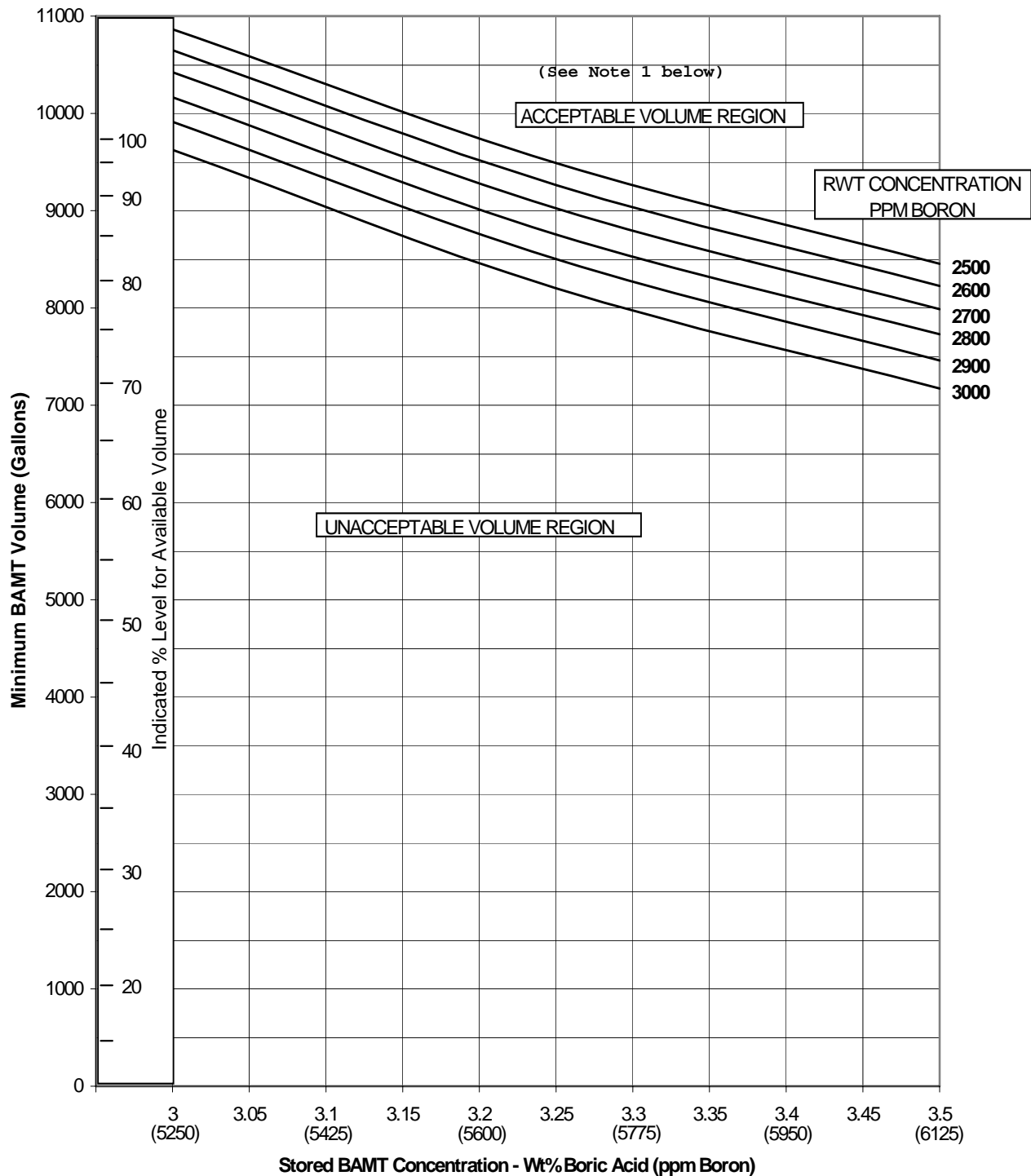
Supervisor _____ Date _____

YES NO

SUPPLEMENT 4

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Figure 1
Minimum Boric Acid Makeup Tank Volume as a Function of Stored BAMT Concentration and
Refueling Water Storage Tank Concentration
(TRM Figure 3.1-1 adjusted for instrument uncertainty)



Note 1--Add 0.5% for required minimum level (CR-ANO-2-2004-0407).

Example: If required level per Figure 1 is 80%, then minimum acceptable level is 80.5%.

ADMINISTRATIVE JOB PERFORMANCE MEASUREUNIT: 2 REV #: 000 DATE: _____SYSTEM/DUTY AREA: Conduct of Operations (A.1)TASK: Determine volume of boric acid and DI water to makeup to RWTJTA#: ANO2ROCHADDNORM110KA VALUE RO: 3.9 SRO: _____ KA REFERENCE: 2.1.23APPROVED FOR ADMINISTRATION TO: RO: X SRO: _____TASK LOCATION: INSIDE CR: _____ OUTSIDE CR: _____ BOTH: X

SUGGESTED TESTING ENVIRONMENT AND METHOD (PERFORM OR SIMULATE):

PLANT SITE: _____ SIMULATOR: Perform CLASSROOM: Perform

POSITION EVALUATED: RO: _____ SRO: _____

ACTUAL TESTING ENVIRONMENT: SIMULATOR: _____ PLANT SITE: _____ CLASSROOM: _____

TESTING METHOD: SIMULATE: _____ PERFORM: _____

APPROXIMATE COMPLETION TIME IN MINUTES: 30 MinutesREFERENCE(S): OP 2104.003 Attachment E REV 032-02-0

EXAMINEE'S NAME: _____ SSN: _____

EVALUATOR'S NAME: _____

THE EXAMINEE'S PERFORMANCE WAS EVALUATED AGAINST THE STANDARDS CONTAINED IN THIS JPM AND IS DETERMINED TO BE:

SATISFACTORY: _____ UNSATISFACTORY: _____

PERFORMANCE CHECKLIST COMMENTS:

Start Time _____ Stop Time _____ Total Time _____

SIGNED: _____ DATE: _____

SIGNATURE INDICATES THIS JPM HAS BEEN COMPARED TO ITS APPLICABLE PROCEDURE BY A QUALIFIED INDIVIDUAL (NOT THE EXAMINEE) AND IS CURRENT WITH THAT REVISION.

ADMINISTRATIVE JOB PERFORMANCE MEASURE**THE EXAMINER SHALL REVIEW THE FOLLOWING WITH THE EXAMINEE:**

The examiner shall review the "Briefing Checklist - System Walkthrough" portion of OP 1064.023 Attachment 6 with the examinee.

JPM INITIAL TASK CONDITIONS:

- Initial RWT Level 92%
- Initial RWT concentration 2700 ppmb
- Final RWT level 95%
- Final RWT Concentration 2725 ppmb
- 'A' BAMT concentration 5965 ppmb

TASK STANDARD: Determine that the amount of Boric Acid needed is 8516 gallons \pm 85 gallons and the amount of DI water needed is 5848 gallons \pm 58 gallons

TASK PERFORMANCE AIDS: OP 2104.003 Attachment E.

ADMINISTRATIVE JOB PERFORMANCE MEASURE**INITIATING CUE:**

The CRS directs: "Given the information from initial conditions, determine the boric acid and DI water feed volumes required using OP 2104.003 Attachment E.

CRITICAL ELEMENTS (C) 5, 6, 7, 8

		PERFORMANCE CHECKLIST	STANDARD	(Circle One)
	1	Enter initial RWT level.	Entered 92% as initial RWT level.	N/A SAT UNSAT
	2	Calculate initial RWT volume as 466262 gallons	Calculated initial RWT volume and entered 466262 gals.	N/A SAT UNSAT
	3	Enter final RWT level.	Entered 95% as initial RWT level.	N/A SAT UNSAT
	4	Calculate initial RWT volume as 480626 gallons	Calculated initial RWT volume and entered 480626 gals.	N/A SAT UNSAT
(C)	5	Determine total feed volume needed. Entered 14364 gallons \pm 100 gallons.	Calculated feed volume required to be added and entered 14364 gallons.	N/A SAT UNSAT
(C)	6	Calculate concentration of feed volume. Entered 3536 ppm boron \pm 25ppm boron.	Calculated concentration of feed volume and entered 3536 ppm boron.	N/A SAT UNSAT

ADMINISTRATIVE JOB PERFORMANCE MEASURE

		PERFORMANCE CHECKLIST	STANDARD	(Circle One)
(C)	7	Calculate boric acid feed volume. Entered 8516 gal \pm 100 gal.	Calculate boric acid feed volume. Entered 8516 gal.	N/A SAT UNSAT
(C)	8	Calculate DI water feed volume. Entered total feed volume – boric acid feed volume. Entered 5846 gals \pm 100 gal.	Calculated DI water feed volume and entered 5846 gals.	N/A SAT UNSAT
END				

ADMINISTRATIVE JOB PERFORMANCE MEASURE**EXAMINER'S COPY****JPM INITIAL TASK CONDITIONS:**

- Initial RWT Level 92%
- Initial RWT concentration 2700 ppmb
- Final RWT level 95%
- Final RWT Concentration 2725 ppmb
- 'A' BAMT concentration 5965 ppmb

INITIATING CUE:

Determine the boric acid and DI water feed volumes required to raise the RWT from 92% to 95% and change boron concentration to 2725ppmb using OP 2104.003 Attachment E.

ADMINISTRATIVE JOB PERFORMANCE MEASURE**EXAMINEE'S COPY****JPM INITIAL TASK CONDITIONS:**

- Initial RWT Level 92%
- Initial RWT concentration 2700 ppmb
- Final RWT level 95%
- Final RWT Concentration 2725 ppmb
- 'A' BAMT concentration 5965 ppmb

INITIATING CUE:

Determine the boric acid and DI water feed volumes required to raise the RWT from 92% to 95% and change boron concentration to 2725ppmb using OP 2104.003 Attachment E.

JOB PERFORMANCE MEASURE

UNIT: 2 REV #: 00 DATE: _____SYSTEM/DUTY AREA: A1: Control Element Drive Mechanism Control SystemTASK: Determine CEA#1 Upper Gripper Coil TemperatureJTA#: ANO2-RO-CEDM-NORM-10KA VALUE RO: 3.9 SRO: 4.0 KA REFERENCE: 2.1.23APPROVED FOR ADMINISTRATION TO: RO: X SRO: _____TASK LOCATION: INSIDE CR: _____ OUTSIDE CR: _____ BOTH: X

SUGGESTED TESTING ENVIRONMENT AND METHOD (PERFORM OR SIMULATE):

PLANT SITE: _____ SIMULATOR: Perform Classroom: Perform

POSITION EVALUATED: RO: _____ SRO: _____

ACTUAL TESTING ENVIRONMENT: SIMULATOR: _____ PLANT SITE: _____ LAB: _____

TESTING METHOD: SIMULATE: _____ PERFORM: _____

APPROXIMATE COMPLETION TIME IN MINUTES: 15 MinutesREFERENCE(S): OP 2105.009, Rev. 022-01-0

EXAMINEE'S NAME: _____ SSN: _____

EVALUATOR'S NAME: _____

THE EXAMINEE'S PERFORMANCE WAS EVALUATED AGAINST THE STANDARDS CONTAINED IN THIS JPM AND IS DETERMINED TO BE:

SATISFACTORY: _____ UNSATISFACTORY: _____

PERFORMANCE CHECKLIST COMMENTS:

Start Time	Stop Time	Total Time
_____	_____	_____

SIGNED: _____ DATE: _____

SIGNATURE INDICATES THIS JPM HAS BEEN COMPARED TO ITS APPLICABLE PROCEDURE BY A QUALIFIED INDIVIDUAL (NOT THE EXAMINEE) AND IS CURRENT WITH THAT REVISION.

JOB PERFORMANCE MEASURE**THE EXAMINER SHALL REVIEW THE FOLLOWING WITH THE EXAMINEE:**

The examiner shall review the "Briefing Checklist - System Walkthrough" portion of OP 1064.023 Attachment 6 with the examinee.

JPM INITIAL TASK CONDITIONS:

1. Plant is at full power.
2. Both Main Chillers have tripped and cannot be started.
3. I&C is not available to obtain CEDM Coil temperatures.
4. OP 2203.012M, 2K13 ACA, for window C3, Main Chiller 2VCH1A overload is in alarm.
5. Readings obtained from the CEDM coil using a calibrated DVM are: 1) Upper Gripper coil voltage, $V_{ug} = 44V$; 2) Upper Gripper Shunt voltage $V_{shunt} = 7.12 \text{ mV}$

TASK STANDARD:

Calculate CEA #01 coil temperature to be $\geq 406.709^{\circ}\text{F}$ but $\leq 420.043^{\circ}\text{F}$.

TASK PERFORMANCE AIDS:

1. OP 2105.009 Exhibit 2
2. Calculator.

JOB PERFORMANCE MEASURE**INITIATING CUE:**

The SM directs, "As directed by OP 2203012M, 2K13-C4, CEDM Cooling coils Water Flow Low ACA, calculate the Upper Gripper temperature for CEA 01 using 2105.009, Exhibit 2."

CRITICAL ELEMENTS (C): 3, 4, 6, 7 & 8

START TIME: _____

PERFORMANCE CHECKLIST			STANDARDS	(Circle One)
	1. (Step 3.2)	Record Upper Gripper Coil voltage from initial conditions.	Recorded 44V from given data.	N/A SAT UNSAT
	2. (Step 4.3.1)	Record Upper Gripper Coil shunt voltage from initial conditions.	Recorded 7.12 mV from given data.	N/A SAT UNSAT
	3. (step 4.3.1)	Convert Upper Gripper Coil shunt voltage from mV to Volts.	Calculated 0.00712 Volts.	N/A SAT UNSAT
	4. (step 5.1)	Record Upper Gripper Coil shunt voltage (in Volts from previous step).	Recorded 0.00712 Volts.	N/A SAT UNSAT
(C)	5. (step 5.2)	Using OHMS law calculate coil current. (3.56 amps \pm 0.05 amps)	Calculated 3.56 amps.	N/A SAT UNSAT
	6. (step 6.1)	Record coil voltage and coil current.	Recorded coil voltage and coil current.	N/A SAT UNSAT
(C)	7. (step 6.1)	Calculate coil resistance. (12.36 \pm 0.1 ohms)	Calculated 12.36 ohms.	N/A SAT UNSAT
	8. (step 6.2)	Record coil resistance.	Enter resistance from previous step.	N/A SAT UNSAT
(C)	9. (step 6.3)	Calculate accurate coil resistance by subtracting known CEA#01 lead resistance. (11.83 \pm 0.1 ohms)	Calculated 11.83 ohms.	N/A SAT UNSAT

JOB PERFORMANCE MEASURE

PERFORMANCE CHECKLIST		STANDARDS		(Circle One)
Examiner's Cue: Tell examinee that interpolation is not required and to use resistance reading rounded to nearest tenth.				
(C)	10. (step 7.1)	Obtain CEA#01 coil temperature from table resistance vs temperature. ($\geq 406.709^{\circ}\text{F}$ but $\leq 420.043^{\circ}\text{F}$)	Calculate correct CEA 01 upper gripper coil temperature to be 413.376°F .	N/A SAT UNSAT
END				

STOP TIME: _____

JOB PERFORMANCE MEASURE**EXAMINER's COPY****JPM INITIAL TASK CONDITIONS:**

- Plant is at full power.
- Both Main Chillers have tripped and cannot be started.
- I&C is not available to obtain CEDM Coil temperatures.
- OP 2203.012M, 2K13 ACA, for window C3, Main Chiller 2VCH1A overload is in alarm.
- Readings obtained from the CEDM coil using a calibrated DVM are: 1) Upper Gripper coil voltage, $V_{ug} = 44V$; 2) Upper Gripper Shunt voltage $V_{shunt} = 7.12 \text{ mV}$

INITIATING CUE:

The CRS directs, "As directed by OP 2203012M, 2K13-C4, CEDM Cooling coils Water Flow Low ACA, calculate the Upper Gripper temperature for CEA 01 using 2105.009, Exhibit 2."

JOB PERFORMANCE MEASURE**EXAMINEE's COPY****JPM INITIAL TASK CONDITIONS:**

- Plant is at full power.
- Both Main Chillers have tripped and cannot be started.
- I&C is not available to obtain CEDM Coil temperatures.
- OP 2203.012M, 2K13 ACA, for window C3, Main Chiller 2VCH1A overload is in alarm.
- Readings obtained from the CEDM coil using a calibrated DVM are: 1) Upper Gripper coil voltage, $V_{ug} = 44V$; 2) Upper Gripper Shunt voltage $V_{shunt} = 7.12 \text{ mV}$

INITIATING CUE:

The CRS directs, "As directed by OP 2203012M, 2K13-C4, CEDM Cooling coils Water Flow Low ACA, calculate the Upper Gripper temperature for CEA 01 using 2105.009, Exhibit 2."

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ANNUNCIATOR 2K13

C-4

CEDM COOLING COILS WATER FLOW LOW

1.0 CAUSES

1.1 Chilled water flow \leq 150 gpm through any of the following CEDM Cooling coils with its associated Chilled Water Inlet valve open:

- 2VCC-16A (2FIS-3845) and 2CV-3861
- 2VCC-16B (2FIS-3819) and 2CV-3849
- 2VCC-16C (2FIS-3859) and 2CV-3860
- 2VCC-16D (2FIS-3874) and 2CV-3875

2.0 ACTION REQUIRED

2.1 Check amber lights above valve handswitches on 2C22 to determine affected cooling unit.

2.2 Verify the following valves open:

- CNTMT Chill Water Return (2CV-3850-2)
- CNTMT Chill Water Return (2CV-3851-1)
- CNTMT Chill Water Supply (2CV-3852-1)

2.3 Verify Chilled Water Inlet valve for standby CEDM Cooler closed.

NOTE

Two Main Chilled Water pumps running in parallel provides maximum flow to reset flow switch.

2.4 Swap Main Chilled Water pumps using Main Chilled Water System (2104.026).

2.5 IF alarm occurs following Main Chilled Water pump shift,
THEN perform the following using Containment Atmosphere Control (2104.033):

2.5.1 Secure affected cooler

2.5.2 Place CEDM Cooling fan (2VSF-35B) in service.

2.6 IF Containment Building accessible,
THEN check local flow indication.

- Vent cooler as necessary using Main Chilled Water System (2104.026).

(C-4 Continued on next page)

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ANNUNCIATOR 2K13

C-4

COOLING COILS WATER FLOW LOW
(Continued)

NOTES

Consideration should be given to de-energizing the CEDM coils if temperatures are projected to exceed 450°F for an extended period of time. However, operation above 450°F for short durations may be allowed if restoration of CEDM cooling is imminent.

2.6 IF all CEDM chill water flow lost or severely degraded,
THEN perform the following:

2.6.1 Minimize CEA movement.

2.6.2 IF any CEA dropped or misaligned,
THEN GO TO CEA Malfunction (2203.003).

2.6.3 Contact I&C to determine coil temperatures.

2.6.4 IF I&C NOT available,
THEN refer to 2105.009 Exhibit #2, CEA #01 Upper Gripper Coil Temperature Measurement to determine coil temperatures.

2.6.5 Contact System Engineer for assistance.

2.6.6 IF coil temperatures projected to be > 450°F for an extended period
AND restoration of chill water flow NOT imminent,
THEN commence plant shutdown.

2.6.7 IF coil temperatures exceed 500°F
AND System Engineer NOT available,
THEN perform the following:

A. Trip the Reactor.

B. GO TO Standard Post Trip Actions (2202.001)

3.0 TO CLEAR ALARM

3.1 Restore flow to > 150 gpm.

3.2 Close Chilled Water Inlet valve for affected cooler.

4.0 REFERENCES

4.1 E-2458-1

4.2 Tech Manual C490.0140

4.3 CR-ANO-2-1999-0433

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ANNUNCIATOR 2K13

C-4

CEDM COOLING COILS WATER FLOW LOW

1.0 CAUSES

1.1 Chilled water flow \leq 150 gpm through any of the following CEDM Cooling coils with its associated Chilled Water Inlet valve open:

- 2VCC-16A (2FIS-3845) and 2CV-3861
- 2VCC-16B (2FIS-3819) and 2CV-3849
- 2VCC-16C (2FIS-3859) and 2CV-3860
- 2VCC-16D (2FIS-3874) and 2CV-3875

2.0 ACTION REQUIRED

2.1 Check amber lights above valve handswitches on 2C22 to determine affected cooling unit.

2.2 Verify the following valves open:

- CNTMT Chill Water Return (2CV-3850-2)
- CNTMT Chill Water Return (2CV-3851-1)
- CNTMT Chill Water Supply (2CV-3852-1)

2.3 Verify Chilled Water Inlet valve for standby CEDM Cooler closed.

NOTE

Two Main Chilled Water pumps running in parallel provides maximum flow to reset flow switch.

2.4 Swap Main Chilled Water pumps using Main Chilled Water System (2104.026).

2.5 IF alarm occurs following Main Chilled Water pump shift,
THEN perform the following using Containment Atmosphere Control (2104.033):

2.5.1 Secure affected cooler

2.5.2 Place CEDM Cooling fan (2VSF-35B) in service.

2.6 IF Containment Building accessible,
THEN check local flow indication.

- Vent cooler as necessary using Main Chilled Water System (2104.026).

(C-4 Continued on next page)

PROC./WORK PLAN NO. 2203.012M	PROCEDURE/WORK PLAN TITLE: ANNUNCIATOR 2K13 CORRECTIVE ACTION	PAGE: 21 of 50 CHANGE: 016-00-0
---	---	--

ANNUNCIATOR 2K13

C-4

COOLING COILS WATER FLOW LOW
(Continued)

NOTES

Consideration should be given to de-energizing the CEDM coils if temperatures are projected to exceed 450°F for an extended period of time. However, operation above 450°F for short durations may be allowed if restoration of CEDM cooling is imminent.

2.6 IF all CEDM chill water flow lost or severely degraded,
THEN perform the following:

2.6.1 Minimize CEA movement.

2.6.2 IF any CEA dropped or misaligned,
THEN GO TO CEA Malfunction (2203.003).

2.6.3 Contact I&C to determine coil temperatures.

2.6.4 IF I&C NOT available,
THEN refer to 2105.009 Exhibit #2, CEA #01 Upper Gripper Coil Temperature Measurement to determine coil temperatures.

2.6.5 Contact System Engineer for assistance.

2.6.6 IF coil temperatures projected to be > 450°F for an extended period
AND restoration of chill water flow NOT imminent,
THEN commence plant shutdown.

2.6.7 IF coil temperatures exceed 500°F
AND System Engineer NOT available,
THEN perform the following:

A. Trip the Reactor.

B. GO TO Standard Post Trip Actions (2202.001)

3.0 TO CLEAR ALARM

3.1 Restore flow to > 150 gpm.

3.2 Close Chilled Water Inlet valve for affected cooler.

4.0 REFERENCES

4.1 E-2458-1

4.2 Tech Manual C490.0140

4.3 CR-ANO-2-1999-0433

Correct Exhibit 2

PROC./WORK PLAN NO. 2105.009	PROCEDURE/WORK PLAN TITLE: CEDM CONTROL SYSTEM OPERATION	PAGE: 10 of 30 CHANGE: 022-01-0
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2105.009

EXHIBIT 2

Revised 09/22/05

CEA #01 UPPER GRIPPER COIL TEMPERATURE MEASUREMENT

PAGE 1 OF 2

This exhibit provides Operations the ability to measure and trend CEA-01 upper gripper coil temperature. Other historically hot CEAs (2, 4, 8, 14, 15, 18, 55, 63, and 72) can also be measured by referring to WO# 50654677 CR-ANO-2-1999-0433-004.

- 1.0 Obtain currently calibrated Handheld Digital Voltmeter (DVM) or equivalent multimeter (Refer to 2OPG-012 for DVM usage).

NOTE

- Hold bus voltage prevents obtaining proper temperature readings.
- Record absolute values of voltage readings obtained.

- 2.0 Check CEA #01 NOT on Hold Bus.

- 3.0 Obtain CEA #01 Upper Gripper coil voltage (Vug) as follows:

- 3.1 Locate CEA #1 power cables in panel on TBC4C6, (behind access panel to left of 2C72 door).
- 3.2 With DVM scale set on 200, take voltage reading across "Black" and "White" cables located on TBC4C6, terminals #4 and #5. (A typical reading is 44 VDC).

$$(V_{ug}) = \underline{44} \text{ V}$$

- 4.0 Obtain CEA #01 Upper Gripper shunt voltage (Vshunt) as follows:

- 4.1 Locate CEA #01 coil monitor connector on front side of 2C72. (This is a round, capped connector with (#1) located directly above it.
- 4.2 Remove connector cap by unscrewing.
- 4.3 With DVM scale set on 200mV, take voltage reading across pins "C" and "D". (A typical reading is 8 millivolts DC.)

$$4.3.1 \quad \text{Record DVM reading} = \underline{6.46} \text{ mV}$$

$$\text{Convert mV to Volts: } \underline{6.46} \text{ mV} \times \frac{1 \text{ V}}{1000 \text{ mV}} = \underline{0.00646 \text{ V}}$$

$$\text{Record (Vshunt)} = \underline{0.00646} \text{ V}$$

- 4.4 Screw connector cap back on CEA #01 coil monitor connector.

PROC./WORK PLAN NO. 2105.009	PROCEDURE/WORK PLAN TITLE: CEDM CONTROL SYSTEM OPERATION	PAGE: 11 of 30 CHANGE: 022-01-0
--	--	--

2105.009

EXHIBIT 2

Revised 09/22/05

CEA #01 UPPER GRIPPER COIL TEMPERATURE MEASUREMENT

PAGE 2 OF 2

5.0 Utilize ohms law to calculate coil current (Icoil) as follows.

5.1 (Icoil) = (Vshunt) 0.00646 V ÷ .002 ohms.

5.2 (Icoil) = 3.23 amps

6.0 Calculate coil resistance (Rcoil₁) as follows:

6.1 (Rcoil₁) = (Vug) 44 V ÷ (Icoil) 3.23 amps

(Rcoil₁) = 13.622 ohms

NOTE

Lead resistance must be subtracted to obtain accurate reading. Lead resistance for CEA #1 is provided in this calculation. However, a lookup table for lead resistance is provided when using WO# 50654677 to calculate other CEA coil temperatures.

6.2 (Rcoil₂) = 13.62 (Rcoil₁) - .525 ohms (CEA #01 lead resistance).

6.3 (Rcoil₂) = 13.1 ohms

7.0 Obtain CEA #01 coil temperature as follows:

7.1 Use the following to obtain CEA #01 coil temperature:

- Coil resistance (Rcoil₂) calculated in step 6.0
- Table below

Resistance	Temp.	Resistance	Temp.	Resistance	Temp.	Resistance	Temp.
5.6	0.022	7.5	126.695	9.4	253.368	11.3	380.041
5.7	6.689	7.6	133.362	9.5	260.035	11.4	386.708
5.8	13.356	7.7	140.029	9.6	266.702	11.5	393.375
5.9	20.023	7.8	146.696	9.7	273.369	11.6	400.042
6	26.69	7.9	153.363	9.8	280.036	11.7	406.709
6.1	33.357	8	160.03	9.9	286.703	11.8	413.376
6.2	40.024	8.1	166.697	10	293.37	11.9	420.043
6.3	46.691	8.2	173.364	10.1	300.037	12	426.71
6.4	53.358	8.3	180.031	10.2	306.704	12.1	433.377
6.5	60.025	8.4	186.698	10.3	313.371	12.2	440.044
6.6	66.692	8.5	193.365	10.4	320.038	12.3	446.711
6.7	73.359	8.6	200.032	10.5	326.705	12.4	453.378
6.8	80.026	8.7	206.699	10.6	333.372	12.5	460.045
6.9	86.693	8.8	213.366	10.7	340.039	12.6	466.705
7	93.36	8.9	220.033	10.8	346.706	12.7	473.365
7.1	100.027	9	226.7	10.9	353.373	12.8	480.025
7.2	106.694	9.1	233.367	11	360.04	12.9	493.345
7.3	113.361	9.2	240.034	11.1	366.707	13	500.050
7.4	120.028	9.3	246.701	11.2	373.374	13.1	506.665

ADMINISTRATIVE JOB PERFORMANCE MEASUREUNIT: 2 REV #: 000 DATE: _____SYSTEM/DUTY AREA: A.2: Equipment ControlTASK: Review completed 2P89B surveillance and determine 2P-89B operabilityJTA#: ANO2ROHPSISURV16KA VALUE RO: 3.5 SRO: 3.9 KA REFERENCE: 2.2.12APPROVED FOR ADMINISTRATION TO: RO: X SRO: _____TASK LOCATION: INSIDE CR: _____ OUTSIDE CR: _____ BOTH: X

SUGGESTED TESTING ENVIRONMENT AND METHOD (PERFORM OR SIMULATE):

PLANT SITE: _____ SIMULATOR: Perform LAB: _____

POSITION EVALUATED: RO: _____ SRO: _____

ACTUAL TESTING ENVIRONMENT: SIMULATOR: _____ PLANT SITE: _____ LAB: _____

TESTING METHOD: SIMULATE: _____ PERFORM: _____

APPROXIMATE COMPLETION TIME IN MINUTES: 15 MinutesREFERENCE(S): OP 2104.039 Supplement 2 Rev. 043-03-0

EXAMINEE'S NAME: _____ SSN: _____

EVALUATOR'S NAME: _____

THE EXAMINEE'S PERFORMANCE WAS EVALUATED AGAINST THE STANDARDS CONTAINED IN THIS JPM AND IS DETERMINED TO BE:

SATISFACTORY: _____ UNSATISFACTORY: _____

PERFORMANCE CHECKLIST COMMENTS:

Start Time _____ Stop Time _____ Total Time _____

SIGNED: _____ DATE: _____

SIGNATURE INDICATES THIS JPM HAS BEEN COMPARED TO ITS APPLICABLE PROCEDURE BY A QUALIFIED INDIVIDUAL (NOT THE EXAMINEE) AND IS CURRENT WITH THAT REVISION.

ADMINISTRATIVE JOB PERFORMANCE MEASURE

INITIAL PLANT CONDITIONS

Plant is at 100% power and all ESF equipment is in normal alignment.

2P89C is aligned to the GREN side.

The 2P-89B Quarterly test has been completed using OP 2104.039 Supplement 2.

TASK STANDARD: (Identification of three of the four errors is required and one of the three must be the Pump D/P)

- Pump ΔP is out of LIMITING RANGE FOR OPERABILITY.
- Calculation for determining lower pump ΔP limit is in error.
- Inboard Radial Bearing #1 Vibes is out of LIMITING RANGE FOR OPERABILITY.
- Outboard Bearing AXIAL Vibes is out of LIMITING RANGE FOR OPERABILITY.

TASK PERFORMANCE AIDS: marked-up copy of Supplement 2 2P-89B quarterly test

SIMULATOR SETUP: NA

ADMINISTRATIVE JOB PERFORMANCE MEASURE**Initiating CUE:**

The Control Room Supervisor directs determination of the operability of the 'B' HPSI pump, 2P89B, by reviewing the completed surveillance data OP 2104.039 Supplement 2, complete all reviews for operability, calculations performed and identify all errors.

CRITICAL STEPS: 2, 3, 4, 5

START TIME: _____

<u>PERFORMANCECHECKLIST</u>		<u>STANDARD</u>	<u>CIRCLE ONE</u>	
NOTE: Provide a marked-up copy of Supplement 2, 2P-89B quarterly test				
	1.	Perform review of the surveillance procedure results.	Reviews the surveillance procedure provided.	N/A
(C)	2.	Pump ΔP is out of LIMITING RANGE FOR OPERABILITY.	Pump D/P is out of LIMITING RANGE FOR OPERABILITY.	N/A SAT UNSAT
(C)	3.	Calculation for determining lower pump ΔP limit is in error. This calculation is below the table in supplement 2 section 3 and recorded in the table on the line for pump ΔP.	Calculation for determining lower pump ΔP limit should be 1380.81 psid.	N/A SAT UNSAT
(C)	4.	Inboard Radial Bearing #1 Vibes is out of LIMITING RANGE FOR OPERABILITY.	Inboard Radial Bearing #1 Vibes is out of LIMITING RANGE FOR OPERABILITY.	N/A SAT UNSAT
(C)	5.	Outboard Bearing AXIAL Vibes is out of LIMITING RANGE FOR OPERABILITY.	Outboard Bearing AXIAL Vibes is out of LIMITING RANGE FOR OPERABILITY.	N/A SAT UNSAT
EXAMINER's CUE: The Shift Engineer will enter the pump data into the database.				
	6.	Report to CRS that the results of the surveillance are unsatisfactory and 2P89B is inoperable.	Reports to CRS that results of the surveillance are unsatisfactory and 2P89B is inoperable.	N/A SAT UNSAT
END				

STOP TIME: _____

ADMINISTRATIVE JOB PERFORMANCE MEASURE

EXAMINER's COPY

INITIAL PLANT CONDITIONS

Plant is at 100% power and all ESF equipment is in normal alignment. 2P89C is aligned to the GREEN side. The 2P-89B Quarterly test has been completed using OP 2104.039 Supplement 2.

Initiating CUE:

The Control Room Supervisor directs determination of the operability of the 'B' HPSI pump, 2P89B, by reviewing the completed surveillance data OP 2104.039 Supplement 2, complete all reviews for operability, calculations performed and identify all errors.

ADMINISTRATIVE JOB PERFORMANCE MEASURE

EXAMINEE's COPY

INITIAL PLANT CONDITIONS

Plant is at 100% power and all ESF equipment is in normal alignment. 2P89C is aligned to the GREEN side. The 2P-89B Quarterly test has been completed using OP 2104.039 Supplement 2.

Initiating CUE:

The Control Room Supervisor directs determination of the operability of the 'B' HPSI pump, 2P89B, by reviewing the completed surveillance data OP 2104.039 Supplement 2, complete all reviews for operability, calculations performed and identify all errors.

PROC./WORK PLAN NO. 2104.039	PROCEDURE/WORK PLAN TITLE: HPSI SYSTEM OPERATION	PAGE: 64 of 148 CHANGE: 043-03-0
--	--	---

SUPPLEMENT 2

PAGE 7 OF 9

3.0 ACCEPTANCE CRITERIA

3.1 Record values observed during 2P-89B operation below AND compare with limiting range of values for operability.

TABLE 1					
TEST QUANTITY	INSTRUMENT (INCLUDE TEST INST)	MEASURED VALUE	ACCEPTABLE NORMAL RANGE	LIMITING RANGE FOR OPERABILITY	IS DATA IN LIMITING RANGE?
Running Suct. Pressure	2PI-5100 (local)	33.5 psig	≥ 8 psig	≥ 8 psig	YES NO
Discharge Pressure	2PI-5101 (local)	1389 psig	N/A	N/A	N/A
	2PI-5109 (2C16)	1379 psig	N/A	N/A	N/A
RWT Temperature	2TIS-5675 (2C17)	90 °F	40 to 110°F	N/A	N/A
Pump ΔP {4.3.1}	2PI-5101 - 2PI-5100	1355.5 psid	N/A	1360.81 (1) to 1612.8 psid	YES NO
Motor Running Amps (CR-1-96-0272- 07)	Ammeter at 2A-406	$\emptyset A$ <u>34</u> Amps $\emptyset B$ <u>33</u> Amps $\emptyset C$ <u>35</u> Amps	N/A	N/A	N/A
Inboard Brg Radial #1 Vibes	VIB001	0.825 in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Inboard Brg Radial #2 Vibes	VIB001	0.22 in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Inboard Brg Axial Vibes	VIB001	0.073 in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Outboard Brg Radial #1 Vibes	VIB001	0.187 in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Outboard Brg Radial #2 Vibes	VIB001	0.207 In/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Outboard Brg Axial Vibes	VIB001	0.610 In/sec	≤ 0.232 in/sec	≤ 0.558 in/sec	YES NO

Vibration Instrument Cal Due Date 7 Days from TODAY

Vibration Data Collected By Eddy Electrician

Note 1: For RWT temperature (T), minimum acceptable pump ΔP is:

$$1372.9 + 20.41 \text{ (Instrument error)} - [(T-40)/4] \text{ psid}$$

$$\text{Minimum } \Delta P = 1393.31 - [(\underline{90} - 40)/4] = \underline{1360.81} \text{ psid}$$

3.2 Independently verify pump ΔP calculation.

PROC./WORK PLAN NO. 2104.039	PROCEDURE/WORK PLAN TITLE: HPSI SYSTEM OPERATION	PAGE: 65 of 148 CHANGE: 043-03-0
--	--	---

SUPPLEMENT 2

PAGE 8 OF 9

3.3 Document observation of check valve stroke in Table 2.

TABLE 2			
CHECK VALVE	TEST DIRECTION	TEST CRITERIA	IS PROPER VALVE STROKE INDICATED?
2SI-10C	Closed	2P-89C NOT rotating	<u>YES</u> NO N/A
2SI-10B	Closed	2P-89B NOT rotating	<u>YES</u> NO N/A

3.4 IF NO circled in Table 1 OR 2,
THEN perform the following:

- Declare affected component inoperable.
- Refer to Tech Spec 3.5.2 OR 3.5.3.
- Notify Shift Manager.
- Initiate WR/WO as applicable.

NOTE

If HPSI pump 2P-89A OR 2P-89C inoperable, then 2SI-10C/2SI-10B testing may be deferred until inoperable HPSI pump restored to operable as per IST Coordinator.

3.5 IF 2SI-10C AND/OR 2SI-10B NOT tested (N/A circled in Table 2),
THEN perform the following:

- Initiate notification to perform test during current quarter OR as directed by IST Coordinator.
- Annotate on status board.
- Annotate in Work Exceptions section of WR/WO.

N/A

N/A

N/A

3.6 Pump Data recorded in database AND reviewed by SRO.

3.7 IF this surveillance performed as PMT,
THEN complete Unit 2 IST Data Collection (1015.0160).

N/A

Comments _____

Performed By Jimmy Reactor Date TODAY

PROC./WORK PLAN NO. 2104.039	PROCEDURE/WORK PLAN TITLE: HPSI SYSTEM OPERATION	PAGE: 66 of 148 CHANGE: 043-03-0
--	--	---

SUPPLEMENT 2

PAGE 9 OF 9

4.0 SUPERVISOR REVIEW AND ANALYSIS

- 4.1 Do all measured values recorded in ACCEPTANCE CRITERIA fall within specified LIMITING RANGE FOR OPERABILITY? YES NO
- 4.2 Do all measured values recorded in ACCEPTANCE CRITERIA fall within ACCEPTABLE NORMAL RANGE? (N/A if all results outside normal range also outside limiting range.) YES NO NA
- 4.3 IF NO answered to 4.1,
THEN perform the following corrective actions:
- Verify Inoperable Equipment Checklist (1015.001, Conduct of Operations) completed. _____
 - Verify Condition Report initiated. _____
- 4.4 IF NO circled in 4.2,
THEN perform the following corrective actions:
- Verify WR/WO has been initiated. _____
 - Complete Surveillance Test Schedule Change Request (1000.009D) to double test frequency. _____

Comments _____

- 4.5 Are all administrative requirements of this test satisfied? YES NO

Supervisor _____ Date _____

PROC./WORK PLAN NO. 2104.039	PROCEDURE/WORK PLAN TITLE: HPSI SYSTEM OPERATION	PAGE: 64 of 148 CHANGE: 043-03-0
--	--	---

SUPPLEMENT 2

PAGE 7 OF 9

3.0 ACCEPTANCE CRITERIA

3.1 Record values observed during 2P-89B operation below AND compare with limiting range of values for operability.

TABLE 1					
TEST QUANTITY	INSTRUMENT (INCLUDE TEST INST)	MEASURED VALUE	ACCEPTABLE NORMAL RANGE	LIMITING RANGE FOR OPERABILITY	IS DATA IN LIMITING RANGE?
Running Suct. Pressure	2PI-5100 (local)	33.5 psig	≥ 8 psig	≥ 8 psig	YES NO
Discharge Pressure	2PI-5101 (local)	1389 psig	N/A	N/A	N/A
	2PI-5109 (2C16)	1379 psig	N/A	N/A	N/A
RWT Temperature	2TIS-5675 (2C17)	90 °F	40 to 110°F	N/A	N/A
Pump ΔP {4.3.1}	2PI-5101 - 2PI-5100	1355.5 psid	N/A	<u>1360.81</u> (1) to 1612.8 psid	YES NO
Motor Running Amps (CR-1-96-0272- 07)	Ammeter at 2A-406	$\emptyset A$ <u>34</u> Amps $\emptyset B$ <u>33</u> Amps $\emptyset C$ <u>35</u> Amps	N/A	N/A	N/A
Inboard Brg Radial #1 Vibes	VIB001	0.825 in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Inboard Brg Radial #2 Vibes	VIB001	0.22 in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Inboard Brg Axial Vibes	VIB001	0.073 in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Outboard Brg Radial #1 Vibes	VIB001	0.187 in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Outboard Brg Radial #2 Vibes	VIB001	0.207 In/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Outboard Brg Axial Vibes	VIB001	0.610 In/sec	≤ 0.232 in/sec	≤ 0.558 in/sec	YES NO

Vibration Instrument Cal Due Date 7 Days from TODAY

Vibration Data Collected By Eddy Electrician

Note 1: For RWT temperature (T), minimum acceptable pump ΔP is:

$$1372.9 + 20.41 \text{ (Instrument error)} - [(T-40)/4] \text{ psid}$$

$$\text{Minimum } \Delta P = 1393.31 - [(\underline{90} - 40)/4] = \underline{1360.81} \text{ psid}$$

3.2 Independently verify pump ΔP calculation.

PROC./WORK PLAN NO. 2104.039	PROCEDURE/WORK PLAN TITLE: HPSI SYSTEM OPERATION	PAGE: 65 of 148 CHANGE: 043-03-0
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SUPPLEMENT 2

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3.3 Document observation of check valve stroke in Table 2.

TABLE 2			
CHECK VALVE	TEST DIRECTION	TEST CRITERIA	IS PROPER VALVE STROKE INDICATED?
2SI-10C	Closed	2P-89C NOT rotating	<u>YES</u> NO N/A
2SI-10B	Closed	2P-89B NOT rotating	<u>YES</u> NO N/A

3.4 IF NO circled in Table 1 OR 2,
THEN perform the following:

- Declare affected component inoperable.
- Refer to Tech Spec 3.5.2 OR 3.5.3.
- Notify Shift Manager.
- Initiate WR/WO as applicable.

NOTE

If HPSI pump 2P-89A OR 2P-89C inoperable, then 2SI-10C/2SI-10B testing may be deferred until inoperable HPSI pump restored to operable as per IST Coordinator.

3.5 IF 2SI-10C AND/OR 2SI-10B NOT tested (N/A circled in Table 2),
THEN perform the following:

- Initiate notification to perform test during current quarter
OR as directed by IST Coordinator.
- Annotate on status board.
- Annotate in Work Exceptions section of WR/WO.

N/A

N/A

N/A

3.6 Pump Data recorded in database AND reviewed by SRO.

3.7 IF this surveillance performed as PMT,
THEN complete Unit 2 IST Data Collection (1015.0160).

N/A

Comments _____

Performed By Jimmy Reactor Date TODAY

PROC./WORK PLAN NO. 2104.039	PROCEDURE/WORK PLAN TITLE: HPSI SYSTEM OPERATION	PAGE: 66 of 148 CHANGE: 043-03-0
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SUPPLEMENT 2

PAGE 9 OF 9

4.0 SUPERVISOR REVIEW AND ANALYSIS

- 4.1 Do all measured values recorded in ACCEPTANCE CRITERIA fall within specified LIMITING RANGE FOR OPERABILITY? YES NO
- 4.2 Do all measured values recorded in ACCEPTANCE CRITERIA fall within ACCEPTABLE NORMAL RANGE? (N/A if all results outside normal range also outside limiting range.) YES NO NA
- 4.3 IF NO answered to 4.1,
THEN perform the following corrective actions:
- Verify Inoperable Equipment Checklist (1015.001, Conduct of Operations) completed. _____
 - Verify Condition Report initiated. _____
- 4.4 IF NO circled in 4.2,
THEN perform the following corrective actions:
- Verify WR/WO has been initiated. _____
 - Complete Surveillance Test Schedule Change Request (1000.009D) to double test frequency. _____

Comments _____

- 4.5 Are all administrative requirements of this test satisfied? YES NO

Supervisor _____ Date _____

ENTERGY OPERATIONS INCORPORATED
ARKANSAS NUCLEAR ONE

TITLE: HPSI SYSTEM OPERATION SET #	DOCUMENT NO. 2104.039	CHANGE NO. 043-03-0
	WORK PLAN EXP. DATE N/A	TC EXP. DATE N/A
	SAFETY-RELATED <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	IPTE <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
	TEMP ALT <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	
	PROGRAMMATIC EXCLUSION PER ENS-LI-101 <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	

When you see these TRAPS

- Time Pressure**
- Distraction/Interruption**
- Multiple Tasks**
- Over Confidence**
- Vague or Interpretive Guidance**
- First Shift/Last Shift**
- Peer Pressure**
- Change/Off Normal**
- Physical Environment**
- Mental Stress (Home or Work)**

Get these **TOOLS**

- Effective Communication**
- Questioning Attitude**
- Placekeeping**
- Self Check**
- Peer Check**
- Knowledge**
- Procedures**
- Job Briefing**
- Coaching**
- Turnover**

[illegible]

FORM TITLE: VERIFICATION COVER SHEET	FORM NO. 1000.006A	CHANGE NO. 051-00-0
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**ENTERGY OPERATIONS INCORPORATED
ARKANSAS NUCLEAR ONE**

TITLE: HPSI SYSTEM OPERATION

**DOCUMENT NO.
2104.039**

**CHANGE NO.
043-03-0**

☒ **PROCEDURE**

☐ **WORK PLAN, EXP. DATE** N/A

PAGE 1 **OF** 1

☐ **ELECTRONIC DOCUMENT**

TYPE OF CHANGE:

☐ **NEW**

☒ **PC**

☐ **TC**

☐ **DELETION**

☐ **REVISION**

☐ **EZ**

EXP. DATE: N/A

AFFECTED SECTION:
(Include step # if applicable)

DESCRIPTION OF CHANGE: (For each change made, include sufficient detail to describe reason for the change.)

5.9

New L&P from CR-ANO-1-2005-1385 CA5: (1000.006S #3)

ESF Room Cooling fans operated without Service Water aligned to their respective room cooler can impose a larger heat load on the room than originally designed. If SW is isolated to a cooling coil of 2VUC-1A, 2VUC-1B, 2VUC-1C, 2VUC-1D, 2VUC-1E, 2VUC-1F or 2VUC-11A/B, and it is desired to maintain the components in that room operable, then either of the following shall be performed to prevent start: (CR-ANO-1-2005-1385, CA2 and CA4)

- The respective room cooler HS placed in PTL
- The respective breaker for that room cooler opened

4.1

Added CR-ANO-1-2005-1385 to references. (1000.006S #10)

Supp 7A, 7B, 7C-

New initial condition to obtain camera if available to photograph boric acid leaks for the boric acid leak program. Added reference to 1032.047, Inspection and Evaluation of Boric Acid Leaks. (1000.006S #3, 10, 12)

Added step in section 2.0 to obtain photograph of any previously unidentified boric acid leak. (1000.006S #12)

PIF 2-06-0045

8.7

New step to verify Service Water aligned to room coolers with contingency to place HS in PTL or open breaker if Service Water not aligned. (1000.006S #3)

FORM TITLE:

DESCRIPTION OF CHANGE

**FORM NO.
1000.006C**

**CHANGE NO.
050-00-0**

PROC./WORK PLAN NO. 2104.039	PROCEDURE/WORK PLAN TITLE: HPSI SYSTEM OPERATION	PAGE: 1 of 151 CHANGE: 043-03-0
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1.0 PURPOSE

This procedure provides instructions for operation and testing of HPSI System components.

2.0 SCOPE

This procedure includes instructions for operating the Unit 2 HPSI System. This procedure satisfies the requirements of Tech Spec 4.5.2.f.1 and partially satisfies Tech Specs 4.5.2.g, 4.5.2.h and IST Requirements.

3.0 DESCRIPTION

HPSI pumps (2P-89A, 2P-89B and 2P-89C) are 9 stage centrifugal pumps with a shutoff head of ~ 1500 psi. They are powered from 2A3 and 2A4, with 2P-89C capable of being powered from either bus. Each pump has a recirculation path back to the RWT and a recirculation path back to the pump suction. Flow restricting orifices (2FO-5101, 2FO-5102) are sized to preclude pump runoff.

There are eight HPSI injection valves, four on each header. These valves can be used to throttle HPSI flow to each RCS cold leg. There is a manual throttle valve upstream of each injection valve that is throttled to balance flow between injection legs. A handle restraint is welded to the yoke of the manual throttle valves to prevent operation except during flow balancing.

Th Injection valves; used in conjunction with the HPSI Orifice Bypass valves provide injection into the hot legs after a LOCA. This provides flow through the core to prevent boron precipitation regardless of break location.

The auto circuit for HPSI pump (2P-89C) was modified by PC-94-8060. If 2P-89A and 2P-89B are in normal after stop, then 2P-89C will not start on an SIAS regardless of its handswitch position. Therefore, 2P-89C may be in normal after stop without entering a Tech Spec Action. The SIAS INOP alarm was also modified to prevent an alarm with both pump handswitches on the same train in normal after stop.

ESFAS actuates the HPSI system upon receipt of 2-out-of-4 low Pressurizer pressure or high containment pressure signals. HPSI actuates in conjunction with LPSI. Upon actuation, the following re-align:

- RWT Outlet valves (2CV-5630-1 and 2CV-5631-2) receive an open signal.
- Two HPSI pumps start, pressurizing both headers.
- 2CV-5015-1, 5035-1, 5055-1 and 5075-1 on header #1, and 2CV-5016-2, 5036-2, 5056-2 and 5076-2 on header #2 open, supplying flow to a combined LPSI/HPSI header which discharges to the Tc loops downstream of the RCPs.
- Normally open HPSI pump Recirculation valves (2CV-5126-1, 2CV-5127-1 and 2CV-5128-1) will close upon receipt of a Recirculation Actuation Signal (RAS) on low RWT level and will remain closed after RAS reset.

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4.0 REFERENCES

4.1 References Used in Procedure Preparation

- P&ID M-2230, Reactor Coolant System
- P&ID M-2232, Safety Injection System
- Tech Spec 4.5.2.f.1, 4.5.2.h and IST Program, ASME Code Section XI, 1989 Edition with no Addenda
- PSC Action 85-179-02
- CR-2-90-101, Check oil levels before starting pumps
- NRC Generic Letter 89-04, Guidance on Inservice Testing Programs
- CR-2-91-582, Full Flow Test (Supplement 6) acceptance criteria
- Engineering Calc 85-EQ-0004-01 Rev 5, Instrument error associated with flow balance test acceptance criteria (Supplement 6)
- CR-2-93-0136, Open RWT Outlet and HPSI pump recirc valves before starting a HPSI pump
- CR-2-93-0162, Instructions for closing check valve in Supplement 4
- DCP 93-2012, DCP-94-2002 HPSI Injection valve Replacement
- LCP 93-6025, 2P-89C Room Floor Drain Modification
- PC-94-8060, Swing pump Auto Start Interlock Modification
- Engineering Calc 92-E-0078-02, Unit 2 HPSI System Pump Performance Requirements (Supplement 6)
- LER-98-021-00 (OEE99-1359) Waterford event SIT boron concentration
- Engineering Calc 94-E-0095-18 Rev. 0 B ESF Room Heat Load evaluation
- Engineering Calc 94-E-0095-19 Rev. 0 C ESF Room Heat Load evaluation
- Engineering Calc 94-E-0095-20 Rev. 0 A ESF Room Heat Load evaluation
- ER991864R204, Revision of Full Flow DP Acceptance Criteria
- CR-ANO-2-2000-0276, High Radiation Levels in "A" HPSI Room During Full Flow Test
- ER003258N201, HPSI Test Connections
- CR-ANO-2-2000-0270, 2SI-26A Check valve Leakage
- CR-ANO-2-2001-0032, Design temperature of 2DCB-2-4" and 2HCB-23-6"
- CR-1-96-272-07, Large Motor Performance Monitoring
- LIC-01-017, ANO2 TS Am 229, Relocation of Boric Acid Makeup Systems from TS to TRM
- ER010457A201 (MAI40808 2P-89B PMT Results)
- NEI 99-02, CR-ANO-C-2001-0099, Availability of Equipment
- CR-ANO-2-2001-403, TS 3.6.3.1 reference
- CR-ANO-2-2001-100, Quantify amount of leakage allowed
- CR-ANO-2-2002-00929, Change B HPSI pump flow to 880 GPM
- ER-ANO-2002-0528-005 HPSI NPSH improvement
- ER-ANO-2000-2804-017, HPSI Pump Housing Upgrade (2P-89C)

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- CR-ANO-2-2003-1049, SAR Table 15.1.13-5 deleted; reference "The latest revision of Calculation 97-R-2002-01."
- ER-ANO-2000-3275-003/010, TAP 04-02-002, Installation of HPSI Pressurization System and installation of suction filters
- CR-ANO-2-2005-0414, HPSI Full Flow Test Acceptance Criteria Non-conservative
- CR-ANO-2-2005-2111, 2SI-26B not tested for leakage following maintenance during 2R17
- ER-ANO-2-2005-0561, open stroke time changes due to valve maintenance on 2CV-5055-1, 2CV-5016-2, and 2CV-5056-2
- CR-ANO-2-2003-01299 CA4, Remove actions for leak rates < 1 gpm
- CALC-93-E-0037-01, Inst Error Analysis for HPSI and LPSI Pump Local Pressure Indicators
- CALC-97-E-0020-06, Loop Error Analysis for LPSI Pumps Disch Header Pressure Remote Ind To Support LPSI Pumps Surveillance Testing
- CALC-97-E-0020-07, Loop Error Analysis for HPSI Pumps Disch Header Remote Pressure Ind To Support HPSI Pumps Surveillance Testing
- CR-ANO-1-2005-1385, Decay Heat Room Cooler calculation (Calc-87-E-0006-08 Rev. 0) did not consider additional heat input due to operation of a cooling fan without Service Water in service

4.2 References Used in Conjunction with this Procedure

- Service Water System Operations (2104.029)
- Safety Injection Tank Operations (2104.001)
- Unit 2 Tech Specs 3.5.2, 3.5.3, and 3.4.6.2
- Unit 2 TRM 3.1.2.1
- ER002409E201, SW to HPSI Seal Coolers
- Calc 97-R-2002-01 ECCS Leakage Quantities into Aux Bldg

4.3 NRC Commitments

- 4.3.1 P8085, Use local discharge pressure gauge for HPSI pump DP calculation. (Supplements 1, 2, 3 & 6)
- 4.3.2 P7262, Close both valves to isolate suction and discharge pressure gauges. (Supplements 1, 2, 3 & 6)
- 4.3.3 P3588, P3834 Perform HPSI flow balance each refueling outage. (Supplement 6)
- 4.3.4 P14711, Operation of CNTMT penetration valves above Mode 5. (Section 7.0, Supplements 4, 8 & 9)

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5.0 LIMITS AND PRECAUTIONS

- 5.1 Immediately notify SM if Acceptance Criteria NOT met during surveillance testing.
- 5.2 With RCS pressure less than RWT head, RCS level will rise if HPSI Cold Leg or Hot Leg injection valves open and RWT Outlet in same train or HPSI pump recirc path to RWT open. Recirc flow path from RWT, through recirc header, through mini-mini recirc line to suction of HPSI pumps.
- 5.3 2P-89C breaker (2A-307 or 2A-407) NOT required to be in service shall be locked open using Kirk Key Lock with closing springs discharged. Both breakers (2A-307 and 2A-407) should remain normally racked up due to seismic concerns.
- 5.4 Evaluation of HPSI pump operability without service water cooling was submitted to NRC, which concluded that loss of service water during accident would not cause bearing or seal failure. Therefore, HPSI pumps remain operable without service water cooling.
- 5.5 Room Coolers
 - A/B ESF Room coolers 2VUC-1A&B, 2VUC-1D&E auto start capability not required for respective HPSI pump to be operable. However, for A ESF Room any two coolers 2VUC-1A, 2VUC-1B or 2VUC-1C must be operable and capable of manual start; for B ESF Room any two coolers 2VUC-1D, 2VUC-1E or 2VUC-1F must be operable and capable of manual start.
 - C ESF Room coolers - one of two coolers, 2VUC-11A or 2VUC-11B (associated with same train as 2P-89C alignment - Red or Green) must be operable AND capable of manual start (no auto start capability requirement.) (Calc-94-E-0095-19)
- 5.6 Limit HPSI pump motor starts to two from ambient or one from rated temperature for initial starting. For subsequent starts, allow 30 minutes run time or 60 minutes idle time.
- 5.7 Any RCS and/or SIT back-leakage into the HPSI system should be documented with a Condition Report due to the potential gas intrusion and piping voiding concern. The gas intrusion/piping voiding occurs when high-pressure, gas-entrained fluid is allowed to depressurize, thereby allowing a portion of the entrained gas to come out of solution. Refer to CR-ANO-2-2004-0065.
- 5.8 When closing HPSI Injection MOVs previously opened, maintain handswitch in close position for ~ 2 seconds after red light out. This ensures proper torquing of MOV on its shut seat.
- 5.9 ESF Room Cooling fans operated without Service Water aligned to their respective room cooler can impose a larger heat load on the room than originally designed. If SW is isolated to a cooling coil of 2VUC-1A, 2VUC-1B, 2VUC-1C, 2VUC-1D, 2VUC-1E, 2VUC-1F or 2VUC-11A/B, and it is desired to maintain the components in that room operable, then either of the following shall be performed to prevent start: (CR-ANO-1-2005-1385, CA2 and CA4)
 - The respective room cooler HS placed in PTL
 - The respective breaker for that room cooler opened

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6.0 SETPOINTS

- 6.1 HPSI Header #1 and #2 Reliefs (2PSV-5110 and 2PSV-5111) - 1950 psig.
- 6.2 HPSI Header #1 Relief (2PSV-5112) - 2485 psig.
- 6.3 Sequential loading on diesel - 10 seconds after EDG Output breaker (2A-308/2A-408) closes when SIAS present.
- 6.4 Sequential loading on offsite power - 10 seconds after SIAS.
- 6.5 Standby pump starts on SIAS if normal pump breaker open.
- 6.6 Kirk Key interlock prevents closing both 2P-89C breakers at same time. (2A-307/2A-407)
- 6.7 Recircs 2CV-5126-1, 2CV-5127-1, 2CV-5128-1 and 2CV-5628-2 close on RAS.
- 6.8 Handswitch contacts from 2P-89A and 2P-89B used in Auto Start circuit of 2P-89C to prevent 2P-89C from starting on same bus when 2P-89A and 2P-89B available.

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7.0 SYSTEM FILL AND VENT

7.1 Initial Conditions

- RWT Boron concentration between 2500 and 3000 PPM.
- RWT level > 95% in Mode 1 through 4, otherwise > 9%.
- LPSI header filled and vented up to SIT check valves OR on SDC using LPSI System Operations (2104.040).
- Applicable portions of HPSI system aligned per Attachment A.

7.2 IF desired to fill and vent the Red Train RWT suction header, THEN perform the following:

7.2.1 Verify RWT 2T-3 Outlet (2CV-5630-1) open.

7.2.2 Open the following valves:

- 2P-89A Suction Vent (2SI-1004A)
- 2P-89A Suction Vent (2SI-1005A)

7.2.3 WHEN steady stream of water issues, THEN perform the following:

- Close 2SI-1004A.
- Close AND cap 2SI-1005A.

7.3 IF desired to fill and vent the Green Train RWT suction header, THEN perform the following:

7.3.1 Verify RWT 2T-3 Outlet (2CV-5631-2) open.

7.3.2 Open the following valves:

- 2P-89B Suction Vent (2SI-1004B)
- 2P-89B Suction Vent (2SI-1005B)

7.3.3 WHEN steady stream of water issues, THEN perform the following:

- Close 2SI-1004B.
- Close AND cap 2SI-1005B.

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- 7.4 IF HPSI Pump 2P-89A drained,
THEN fill and vent as follows:
- 7.4.1 Verify the following valves open:
- RWT 2T-3 Outlet (2CV-5630-1)
 - HPSI 2P-89A Suction (2SI-8A)
- 7.4.2 Open the following valves:
- HPSI 2P-89A Mini Flow Recirc Vent (2SI-1093)
 - HPSI 2P-89A Mini Flow Recirc Vent (2SI-1094)
- 7.4.3 WHEN steady stream of water issues,
THEN perform the following:
- Close 2SI-1093.
 - Close AND cap 2SI-1094.
- 7.4.4 Notify System Engineer to coordinate with Mechanical Maintenance to vent 2P-89A Inboard and Outboard mechanical seals.
- 7.4.5 Notify System Engineer to coordinate with NDE to perform UT on selected piping prior to pump start.
- 7.5 IF HPSI Pump 2P-89B drained,
THEN fill and vent as follows:
- 7.5.1 Verify the following valves open:
- RWT 2T-3 Outlet (2CV-5631-2)
 - HPSI 2P-89B Suction (2SI-8B)
- 7.5.2 Open the following valves:
- HPSI 2P-89B Mini Flow Recirc Vent (2SI-1063)
 - HPSI 2P-89B Mini Flow Recirc Vent (2SI-5135)
- 7.5.3 WHEN steady stream of water issues,
THEN perform the following:
- Close 2SI-1063.
 - Close AND cap 2SI-5135.
- 7.5.4 Notify System Engineer to coordinate with Mechanical Maintenance to vent 2P-89B Inboard and Outboard mechanical seals.
- 7.5.5 Notify System Engineer to coordinate with NDE to perform UT on selected piping prior to pump start.

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- 7.6 IF HPSI Pump 2P-89C drained,
THEN fill and vent as follows:
- 7.6.1 IF desired to fill and vent 2P-89C from HPSI header #1 (red),
THEN perform the following:
- A. Verify the following valves open:
- RWT 2T-3 Outlet (2CV-5630-1)
 - HPSI Suction X-connect (2SI-9A)
- B. Open the following valves:
- HPSI Suction X-Connect Vent (2SI-1002)
 - HPSI Suction X-Connect Vent (2SI-1003)
- C. WHEN steady stream of water issues,
THEN perform the following:
- Close 2SI-1002.
 - Close AND cap 2SI-1003.
- 7.6.2 IF desired to fill and vent 2P-89C from HPSI header #2
(green),
THEN perform the following:
- A. Verify the following valves open:
- RWT 2T-3 Outlet (2CV-5631-2)
 - HPSI Suction X-connect (2SI-9B)
- B. Open the following valves:
- HPSI Suction X-Connect Vent (2SI-1000)
 - HPSI Suction X-Connect Vent (2SI-1001)
- C. WHEN steady stream of water issues,
THEN perform the following:
- Close 2SI-1000.
 - Close AND cap 2SI-1001.
- 7.6.3 Open the following valves:
- HPSI 2P-89C Mini Flow Recirc Vent (2SI-1067)
 - HPSI 2P-89C Mini Flow Recirc Vent (2SI-1068)
- 7.6.4 WHEN steady stream of water issues,
THEN perform the following:
- Close 2SI-1067.
 - Close AND cap 2SI-1068.
- 7.6.5 Notify System Engineer to coordinate with Mechanical
Maintenance to vent 2P-89C Inboard and Outboard mechanical
seals.
- 7.6.6 Notify System Engineer to coordinate with NDE to perform UT
on selected piping prior to pump start.

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7.7 IF desired to vent 2P-89C discharge cross-connect piping,
THEN perform the following:

7.7.1 Perform ONE of the following:

A. Verify the following valves open to align flow via 2P-89A:

- RWT 2T-3 Outlet (2CV-5630-1)
- HPSI 2P-89A Suction (2SI-8A)
- HPSI 2P-89A Discharge Stop Check (2SI-10A)
- HPSI 2P-89C Discharge To A Loop (2SI-11A)

B. Verify the following valves open to align flow via 2P-89B:

- RWT 2T-3 Outlet (2CV-5631-2)
- HPSI 2P-89B Suction (2SI-8B)
- HPSI 2P-89B Discharge Stop Check (2SI-10B)
- HPSI 2P-89C Discharge To B Loop (2SI-11B)

C. Verify the following valves open to align flow via 2P-89C aligned to red:

- RWT 2T-3 Outlet (2CV-5630-1)
- HPSI Suction X-connect (2SI-9A)
- HPSI 2P-89C Discharge Stop Check (2SI-10C)

D. Verify the following valves open to align flow via 2P-89C aligned to green:

- RWT 2T-3 Outlet (2CV-5631-2)
- HPSI Suction X-connect (2SI-9B)
- HPSI 2P-89C Discharge Stop Check (2SI-10C)

7.7.2 Open the following valves:

- HPSI Pumps Discharge X-connect Vent (2SI-1006)
- HPSI Pumps Discharge X-connect Vent (2SI-1007)

7.7.3 WHEN steady stream of water issues,
THEN perform the following:

- Close 2SI-1006
- Close AND cap 2SI-1007

7.7.4 Open the following valves:

- HPSI Pumps Discharge X-connect Vent (2SI-1008)
- HPSI Pumps Discharge X-connect Vent (2SI-1009)

7.7.5 WHEN steady stream of water issues,
THEN perform the following:

- Close 2SI-1008
- Close AND cap 2SI-1009

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7.8 IF desired to vent HPSI discharge header #1 up to injection MOVs,
THEN perform the following:

7.8.1 Verify RWT 2T-3 Outlet (2CV-5630-1) open.

7.8.2 Perform EITHER of the following to establish a flowpath:

A. Verify the following valves open:

- HPSI 2P-89A Suction (2SI-8A)
- HPSI 2P-89A Discharge Stop Check (2SI-10A)

B. Verify the following valves open:

- HPSI Suction X-connect (2SI-9A)
- HPSI 2P-89C Discharge Stop Check (2SI-10C)
- HPSI 2P-89C Discharge To A Loop (2SI-11A)

NOTE

Headers may be vented in any order.

7.8.3 Open the following valves to vent "A" Header:

- Vent before 2CV-5015-1 (2SI-1022A)
- Vent before 2CV-5015-1 (2SI-1023A)

7.8.4 WHEN steady stream of water issues,
THEN perform the following:

- Close 2SI-1022A.
- Close AND cap 2SI-1023A.

7.8.5 Open the following valves to vent "B" Header:

- Vent before 2CV-5035-1 (2SI-1022B)
- Vent before 2CV-5035-1 (2SI-1023B)

7.8.6 WHEN steady stream of water issues,
THEN perform the following:

- Close 2SI-1022B.
- Close AND cap 2SI-1023B.

7.8.7 Open the following valves to vent "C" Header:

- Vent before 2CV-5055-1 (2SI-1022C)
- Vent before 2CV-5055-1 (2SI-1023C)

7.8.8 WHEN steady stream of water issues,
THEN perform the following:

- Close 2SI-1022C.
- Close AND cap 2SI-1023C.

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- 7.8.9 Open the following valves to vent "D" Header:
- Vent before 2CV-5075-1 (2SI-1022D)
 - Vent before 2CV-5075-1 (2SI-1023D)
- 7.8.10 WHEN steady stream of water issues,
THEN perform the following:
- Close 2SI-1022D.
 - Close AND cap 2SI-1023D.
- 7.8.11 Monitor HPSI Header #1 Pressure Indication (2PI-5108) for evidence of back leakage through SI check valves.
- 7.9 IF desired to vent HPSI discharge header #2 up to injection MOVs,
THEN perform the following:
- 7.9.1 Verify RWT 2T-3 Outlet (2CV-5631-2) open.
- 7.9.2 Perform EITHER of the following:
- A. Verify the following valves open:
- HPSI 2P-89B Suction (2SI-8B)
 - HPSI 2P-89B Discharge Stop Check (2SI-10B)
- B. Verify the following valves open:
- HPSI Suction X-connect (2SI-9B)
 - HPSI 2P-89C Discharge Stop Check (2SI-10C)
 - HPSI 2P-89C Discharge To B Loop (2SI-11B)

NOTE

Headers may be vented in any order.

- 7.9.3 Open the following valves to vent "A" Header:
- Vent before 2CV-5016-2 (2SI-1024A)
 - Vent before 2CV-5016-2 (2SI-1025A)
- 7.9.4 WHEN steady stream of water issues,
THEN perform the following:
- Close 2SI-1024A.
 - Close AND cap 2SI-1025A.

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- 7.9.5 IF CAT E controls in effect,
THEN refer to Category E controls of Conduct of Operations,
(1015.001) for 2SI-1024B and 2SI-1025B.
- 7.9.6 Open the following valves to vent "B" Header:
- HPSI Low Pressure Fill to SIT Drain Header (2SI-1024B)
 - HPSI Low Pressure Fill to SIT Drain Header (2SI-1025B)
 - 2PP-5115 Isolation (2SI-5115C)
 - 2PP-5115 Isolation (2SI-5115D)
- 7.9.7 WHEN steady stream of water issues ,
THEN perform the following:
- Close AND lock 2SI-1024B.
 - Close AND lock 2SI-1025B.
 - Close 2SI-5115C.
 - Close AND cap 2SI-5115D.
- 7.9.8 Open the following valves to vent "C" Header:
- Vent before 2CV-5056-2 (2SI-1024C)
 - Vent before 2CV-5056-2 (2SI-1025C)
- 7.9.9 WHEN steady stream of water issues,
THEN perform the following:
- Close 2SI-1024C
 - Close AND cap 2SI-1025C
- 7.9.10 Open the following valves to vent "D" Header:
- Vent before 2CV-5076-2 (2SI-1024D)
 - Vent before 2CV-5076-2 (2SI-1025D)
- 7.9.11 WHEN steady stream of water issues,
THEN perform the following:
- Close 2SI-1024D.
 - Close AND cap 2SI-1025D.
- 7.9.12 IF CAT E controls in effect,
THEN complete Category E/Lock Component Log (E-DOC
1015.001H) .
- 7.9.13 Monitor HPSI Header #2 Pressure Indication (2PI-5109) for
evidence of back leakage through SI check valves.

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7.10 IF desired to vent downstream of HPSI injection MOVs,
THEN perform the following:

7.10.1 Verify flowpath aligned from RWT to desired injection MOV.

NOTE

Headers may be vented in any order.

- {4.3.4} 7.10.2 **IF Containment penetration controls in effect,
THEN refer to Containment Penetration Admin Controls in
Conduct of Operations (1015.001) for HPSI Header to 2P-32
Vent valves.**
- 7.10.3 Throttle open desired HPSI Injection Header "A" MOV:
- 2CV-5015-1
 - 2CV-5016-2
- 7.10.4 Open the following valves to vent "A" Header:
- HPSI Header to 2P-32A vent (2SI-1026A)
 - HPSI Header to 2P-32A vent (2SI-1027A)
- 7.10.5 WHEN steady stream of water issues,
THEN perform the following:
- Close 2SI-1026A.
 - Close AND cap 2SI-1027A.
- 7.10.6 Verify the following valves closed:
- 2CV-5015-1
 - 2CV-5016-2
- 7.10.7 Throttle open desired HPSI Injection Header "B" MOV:
- 2CV-5035-1
 - 2CV-5036-2
- 7.10.8 Open the following valves to vent "B" Header:
- HPSI Header to 2P-32B vent (2SI-1026B)
 - HPSI Header to 2P-32B vent (2SI-1027B)
- 7.10.9 WHEN steady stream of water issues,
THEN perform the following:
- Close AND cap 2SI-1026B.
 - Close 2SI-1027B.
- 7.10.10 Verify the following valves closed:
- 2CV-5035-1
 - 2CV-5036-2

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- 7.10.11 Throttle open desired HPSI Injection Header "C" MOV:
- 2CV-5055-1
 - 2CV-5056-2
- 7.10.12 Open the following valves to vent "C" Header:
- HPSI Header to 2P-32C vent (2SI-1026C)
 - HPSI Header to 2P-32C vent (2SI-1027C)
- 7.10.13 WHEN steady stream of water issues,
THEN perform the following:
- Close 2SI-1026C
 - Close AND cap 2SI-1027C
- 7.10.14 Verify the following valves closed:
- 2CV-5055-1
 - 2CV-5056-2
- 7.10.15 Throttle open desired HPSI Injection Header "D" MOV:
- 2CV-5075-1
 - 2CV-5076-2
- 7.10.16 Open the following valves to vent "D" Header:
- HPSI Header to 2P-32D vent (2SI-1026D)
 - HPSI Header to 2P-32D vent (2SI-1027D)
- 7.10.17 WHEN steady stream of water issues,
THEN perform the following:
- Close 2SI-1026D
 - Close AND cap 2SI-1027D
- 7.10.18 Verify the following valves closed:
- 2CV-5075-1
 - 2CV-5076-2
- 7.10.19 IF Containment Penetration Controls in effect,
THEN complete Containment Penetration Valve Log (1015.001D).

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8.0 NORMAL SYSTEM ALIGNMENT

8.1 Verify valves aligned per Attachment A.

8.2 IF any part of system drained,
THEN verify appropriate portion filled AND vented using Section 7.0
of this procedure.

8.3 Verify the following valves closed:

- Th Injection MOV (2CV-5101-1)
- Th Injection MOV (2CV-5102-2)

8.4 Verify the following breakers open:

- 2CV-5101-1 breaker (2B52-L5)
- 2CV-5102-2 breaker (2B62-G2)

8.5 Verify the following valves open:

- RWT 2T-3 Outlet (2CV-5630-1)
- RWT 2T-3 Outlet (2CV-5631-2)
- HPSI 2P-89A Recirc Isol (2CV-5126-1)
- HPSI 2P-89B Recirc Isol (2CV-5128-1)
- HPSI 2P-89C Recirc Isol (2CV-5127-1)
- ESF Mini-Recirc Header Isol (2CV-5628-2)
- SW ESF Header Isol (2CV-1400-1)
- SW ESF Header Isol (2CV-1406-2)
- 2VUC-11A SW Inlet (2CV-1407-1)
- 2VUC-11B SW Inlet (2CV-1408-2)
- RWT Recirc and Test Line Inlet to RWT (2BS-26)

8.6 Verify 2P-89C aligned to desired HPSI Train per Attachment B or C.

8.7 Perform the following for operable HPSI pumps:

8.7.1 Verify Service Water aligned to room coolers:

- 2VUC-1A
- 2VUC-1B
- 2VUC-1C
- 2VUC-1D
- 2VUC-1E
- 2VUC-1F
- 2VUC-11A
- 2VUC-11B

8.7.2 IF Service Water isolated to any room cooler,
THEN verify either of the following to prevent
room cooler start:

- The respective room cooler HS placed in PTL
- The respective breaker for that room cooler opened

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9.0 STARTING ANY HPSI PUMP ON RECIRC

- 9.1 IF starting 2P-89A
THEN verify the following valves open:
- HPSI 2P-89A Recirc Isol (2CV-5126-1)
 - ESF Mini-Recirc Header Isol (2CV-5628-2)
 - RWT Recirc and Test Line Inlet to RWT (2BS-26)
 - RWT 2T-3 Outlet (2CV-5630-1)
 - SW ESF Header Isol (2CV-1400-1)
- 9.2 IF starting 2P-89B
THEN verify the following valves open:
- HPSI 2P-89B Recirc Isol (2CV-5128-1)
 - ESF Mini-Recirc Header Isol (2CV-5628-2)
 - RWT Recirc and Test Line Inlet to RWT (2BS-26)
 - RWT 2T-3 Outlet (2CV-5631-2)
 - SW ESF Header Isol (2CV-1406-2)
- 9.3 IF starting 2P-89C
THEN perform the following:
- 9.3.1 Verify the following valves open:
- HPSI 2P-89C Recirc Isol (2CV-5127-1)
 - ESF Mini-Recirc Header Isol (2CV-5628-2)
 - RWT Recirc and Test Line Inlet to RWT (2BS-26)
- 9.3.2 IF 2P-89C powered from 2A3,
THEN verify the following valves open:
- RWT 2T-3 Outlet (2CV-5630-1)
 - SW ESF Header Isol (2CV-1400-1)
 - 2VUC-11A SW Inlet (2CV-1407-1)
- 9.3.3 IF 2P-89C powered from 2A4,
THEN verify the following valves open:
- RWT 2T-3 Outlet (2CV-5631-2)
 - SW ESF Header Isol (2CV-1406-2)
 - 2VUC-11B SW Inlet (2CV-1408-2)

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NOTE

- 2P-89A and 2P-89B HPSI pumps operable if oil level visible in Oiler Glass bubbler.
- 2P-89C HPSI pump is operable if the oil level in the sight glass is between the high and low level marks. The sight glass is located on the opposite side of the bearing housing from the oiler.

9.4 Check pump AND motor oil levels.

9.5 Start selected HPSI pump.

9.6 Check discharge pressure developed.
(2PI-5108 on 2C17 or 2PI-5109 on 2C16)

9.7 Verify appropriate room coolers running. (70 second time delay)

9.8 Stop HPSI pump as desired.

9.9 Stop the following fans as desired:

- 2VUC-1A
- 2VUC-1B
- 2VUC-1D
- 2VUC-1E
- 2VUC-11A
- 2VUC-11B

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ATTACHMENT A HPSI SYSTEM VALVE LINEUP							PAGE 1 OF 13
COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
A ESF RM 2P-89A AREA							
2SI-9A	C HPSI Pump Suction from A Loop	M2232 D1 SH 1	ESF RM A, 2P-89A HPSI PUMP, N SIDE, 7.5 FT UP	LOCKED OPEN			LC if 2P-89C aligned to Green train
2SI-11A	C HPSI Pump Discharge To A Loop	M2232 D3 SH 1	ESF RM A, 2P-89A HPSI PUMP, EAST END, 6 FT UP	LOCKED OPEN			LC if 2P-89C aligned to Green train
2SI-8A	HPSI 2P-89A Suction Valve	M2232 D1 SH 1	ESF RM A, ABOVE 2P-89A HPSI PUMP, 8 FT UP	LOCKED OPEN			
2SI-5090A	HPSI 2P-89A Suction 2PI-5090	M2232 D2 SH 1	ESF RM A, ABOVE 2P-89A HPSI PUMP, 4 FT UP	CLOSED			
2SI-5090B	HPSI 2P-89A Suction 2PI-5090	M2232 E2 SH 1	ESF RM A, ABOVE 2P-89A HPSI PUMP, 4 FT UP	CLOSED			
2SI-5062A	HPSI 2P-89A Suction 2PP-5062 Before Strainer	M2232 D1 SH 1	ESF RM A, ABOVE 2P-89A HPSI PUMP, 7 FT UP	CLOSED			
2SI-5062B	HPSI 2P-89A Suction 2PP-5062 Before Strainer	M2232 D1 SH 1	ESF RM A, ABOVE 2P-89A HPSI PUMP, 7 FT UP	CLOSED CAPPED			
2SI-10A	HPSI 2P-89A Discharge Stop Check	M2232 D3 SH 1	ESF RM A, ABOVE 2P-89A HPSI PUMP, 4 FT UP	LOCKED OPEN			
2SI-1042A	HPSI 2P-89A Discharge Line Drain & 2PI-5091	M2232 D3 SH 1	ESF RM A, ABOVE 2P-89A HPSI PUMP, 4 FT UP	CLOSED			
2SI-1043A	HPSI 2P-89A Discharge Line Drain & 2PI-5091	M2232 E3 SH 1	ESF RM A, 2P-89A HPSI PUMP, EAST END, 3.5 FT UP	CLOSED CAPPED			
2SI-5101A	HPSI Header #1 2FT-5101 Isol	M2232 D3 SH 1	ESF RM A, 2P-89A HPSI PUMP, 4 FT N, 8.5 FT UP	OPEN			
2SI-5101B	HPSI Header #1 2FT-5101 Isol	M2232 D3 SH 1	ESF RM A, 2P-89A HPSI PUMP, 4 FT N, 8.5 FT UP	OPEN			
2SI-64	HPSI 2P-89A Recirc to Suction	M2232 E3 SH 1	ESF RM A, S WALL, BET 2P-89A HPSI PUMP AND RECIRC ISOL 2CV-5126-1, 8 FT UP	LOCKED OPEN			
2SI-1093	HPSI 2P-89A Mini Flow Vent	M2232 E3 SH 1	ESF RM A, 1 FT FROM S WALL, 8 FT ABOVE 2P-89A HPSI PUMP RECIRC VLV	CLOSED			

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
2SI-1094	HPSI 2P-89A Mini Flow Vent	M2232 E3 SH 1	ESF RM A, SE CORNER OF 2P-89A HPSI PUMP, 12 FT UP	CLOSED CAPPED			
2SI-1095	HPSI 2P-89A Mini Flow Drain	M2232 E2 SH 1	ESF RM A, 1.5 FT FROM S WALL, BELOW 2CV-5126-1 2P-89A RECIRC VALVE	CLOSED			
2SI-1096	HPSI 2P-89A Mini Flow Drain	M2232 D3 SH 1	ESF RM A, 1.5 FT FROM S WALL, BELOW 2CV-5126-1 2P-89A RECIRC VALVE	CLOSED CAPPED			
2SI-1079	HPSI 2P-89A Recirc Line Drain	M2236 E2 SH 1	ESF RM A, 2P-89A HPSI PUMP, 2 FT SOUTH, 8 FT UP	CLOSED			
2SI-1080	HPSI 2P-89A Recirc Line Drain	M2236 E2 SH 1	ESF RM A, 2P-89A HPSI PUMP, 2 FT SOUTH, 8 FT UP	CLOSED CAPPED			
2SI-1004A	HPSI 2P-89A Suction Vent	M2232 D1 SH 1	ESF RM A, 2P-89A HPSI PUMP, 12 FT ABOVE	CLOSED			
2SI-1005A	HPSI 2P-89A Suction Vent	M2232 E1 SH 1	ESF RM A, 2P-89A HPSI PUMP, 12 FT ABOVE	CLOSED CAPPED			
2ABS-21A	HPSI 2P-89A Casing Drain	M2232 D2 SH 1	ESF RM A, BET 2P-89A PUMP AND RECIRC VALVE 2CV-5126-1, 1 FT UP	CLOSED			
2ABS-22A	HPSI 2P-89A Casing Drain	M2232 D2 SH 1	ESF RM A, BET 2P-89A PUMP AND RECIRC VALVE 2CV-5126-1, 1 FT UP	CLOSED			

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
A ESF RM 2P-60A AND 2P-35A AREA							
2SI-1073	HPSI 2P-89A Recirc Line Vent	M2236 E2 SH 1	ESF RM A, LPSI PUMP AREA, NW CORNER, N WALL, ABOVE PLATFORM NEXT TO 2P-60A LPSI PUMP	CLOSED			
2SI-1074	HPSI 2P-89A Recirc Line Vent	M2236 E2 SH 1	ESF RM A, LPSI PUMP AREA, NW CORNER, N WALL, ABOVE PLATFORM NEXT TO 2P-60A LPSI PUMP	CLOSED CAPPED			
2BS-53	HPSI 2P-89A Recirc to Suction	M2236 E2 SH 1	ESF RM A, W WALL, BEHIND 2P-35A SPRAY PUMP, 7 FT UP	LOCKED OPEN			
2SI-1081	HPSI Suction Header Recirc Drain	M2236 E2 SH 1	ESF RM A, 2P-136 NaOH PUMP, 7 FT WEST, 7 FT UP	CLOSED			
2SI-1082	HPSI Suction Header Recirc Drain	M2236 E2 SH 1	ESF RM A, 2P-136 NaOH PUMP, 7 FT WEST, 7 FT UP	CLOSED CAPPED			
2SI-1075	HPSI Suction Header Recirc Vent	M2236 E2 SH 1	ESF RM A, SW SIDE, ABOVE 2P-136A NaOH PUMP, 2 FT FROM CEILING	CLOSED			
2SI-1076	HPSI Suction Header Recirc Vent	M2236 E2 SH 1	ESF RM A, SW SIDE, ABOVE 2P-136A NaOH PUMP, 2 FT FROM CEILING	CLOSED CAPPED			
TENDON GALLERY ACCESS							
2SI-1000	HPSI Suction Xconn Vent	M2232 D1 SH 1	TENDON GALLERY ACCESS, 6 FT NORTH OF 2CV-1400 LOOP 1 SW ESF ISOL, 15 FT UP	CLOSED			
2SI-1001	HPSI Suction Xconn Vent	M2232 D1 SH 1	TENDON GALLERY ACCESS, 6 FT NORTH OF 2CV-1400 LOOP 1 SW ESF ISOL, 15 FT UP	CLOSED CAPPED			
2SI-1006	HPSI Pumps Discharge Xconn Vent	M2232 D3 SH 1	TENDON GALLERY ACCESS, 3 FT SE OF 2CV-1400 LOOP 1 SW ESF ISOL, 15 FT UP	CLOSED			
2SI-1007	HPSI Pumps Discharge Xconn Vent	M2232 D3 SH 1	TENDON GALLERY ACCESS, 15 FT ABOVE DRAIN AT ENTRANCE TO AREA	CLOSED CAPPED			
2SI-76	HPSI 2P-89A/B/C Test Hdr Isol	M2232 D3 SH 1	TENDON GALLERY ACCESS, 4 FT BELOW 2SI-1006/2SI-1007 VENT STACK	CLOSED BLIND INSTALLED			
2BS-58	Test Hdr Rtn Isol to RWT	M2236 F6 SH 1	TENDON GALLERY ACCESS, 3 FT ABOVE 2SI-18 CS/LPSI SYSTEM RECIRC TO RWT	CLOSED BLIND INSTALLED			

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
C HPSI RM							
2SI-66	C HPSI Pump Recirc to A Suction	M2236 D2 SH 1	2P-89C HPSI PUMP RM, 8 FT SW OF PUMP, AT W WALL, 8 FT UP	LOCKED OPEN			LC if 2P-89C aligned to Green train
2SI-1083	HPSI Suction Header Recirc Drain	M2236 E2 SH 1	2P-89C HPSI PUMP RM, 8 FT SW OF PUMP, 6 FT UP	CLOSED			
2SI-1084	HPSI Suction Header Recirc Drain	M2236 E2 SH 1	2P-89C HPSI PUMP RM, 8 FT SW OF PUMP, 6 FT UP	CLOSED CAPPED			
2SI-5098A	HPSI 2P-89C Suction 2PI-5098	M2232 D2 SH 1	2P-89C HPSI PUMP RM, 2 FT ABOVE PUMP	CLOSED			
2SI-5098B	HPSI 2P-89C Suction 2PI-5098	M2232 D2 SH 1	2P-89C HPSI PUMP RM, 2 FT ABOVE PUMP	CLOSED			
2SI-10C	HPSI 2P-89C Discharge Stop Check	M2232 C3 SH 1	2P-89C HPSI PUMP RM, ABOVE S END OF PUMP, 2 FT UP	LOCKED OPEN			
2ABS-21C	HPSI 2P-89C Casing Drain	M2232 D3 SH 1	2P-89C HPSI PUMP RM, 4 FT SW OF PUMP, 1 FT UP	CLOSED			
2ABS-22C	HPSI 2P-89C Casing Drain	M2232 C2 SH 1	2P-89C HPSI PUMP RM, 4 FT SW OF PUMP, 1 FT UP	CLOSED			
2SI-1089	Equipment Drain Pan Valve for 2P-89C	M2232 C2 SH1	2P-89C HPSI PUMP ROOM	CLOSED			
2M-4	HPSI Pump Room C Floor Drain Plug	M2213 E4 SH4	2P-89C HPSI PUMP ROOM	INSTALLED			
2SI-62	HPSI 2P-89C Recirc to Suction	M2232 D3 SH 1	2P-89C HPSI PUMP RM, 6 FT S OF PUMP, 10 FT UP	LOCKED OPEN			
2SI-1069	HPSI 2P-89C Mini Flow Recirc Drain	M2232 D3 SH 1	2P-89C HPSI PUMP RM, BELOW PUMP RECIRC ISOL 2CV-5127, 1 FT FROM FLOOR	CLOSED			
2SI-1070	HPSI 2P-89C Mini Flow Recirc Drain	M2232 D3 SH 1	2P-89C HPSI PUMP RM, BELOW PUMP RECIRC ISOL 2CV-5127, 6 IN FROM FLOOR	CLOSED CAPPED			

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
2SI-1067	HPSI 2P-89C Mini Flow Recirc Vent	M2232 D3 SH 1	2P-89C HPSI PUMP RM, 6 FT S OF PUMP SKID, ABOVE RECIRC ISOL 2CV-5127, 8.5 FT UP	CLOSED			
2SI-1068	HPSI 2P-89C Mini Flow Recirc Vent	M2232 D3 SH 1	2P-89C HPSI PUMP RM, 6 FT S OF PUMP SKID, ABOVE RECIRC ISOL 2CV-5127, 8.5 FT UP	CLOSED CAPPED			
2SI-37	HPSI 2P-89C Mini Flow Recirc Isol	M2232 D3 SH 1	2P-89C HPSI PUMP RM, 6 FT S OF PUMP, 6 FT UP	LOCKED OPEN			
2SI-1042C	HPSI 2P-89C Discharge Line Drain & 2PI-5102	M2232 C3 SH 1	2P-89C HPSI PUMP RM, 1 FT E OF PUMP, 5 FT UP	CLOSED			
2SI-1043C	HPSI 2P-89C Discharge Line Drain & 2PI-5102	M2232 C3 SH 1	2P-89C HPSI PUMP RM, 1 FT E OF PUMP, 4.5 FT UP	CLOSED CAPPED			
2SI-67	C HPSI Pump Recirc to B Suction	M2236 D2 SH 1	2P-89C HPSI PUMP RM, 4 FT S OF PUMP, BY 2VUC-11B, 12 FT UP	LOCKED CLOSED			LO if 2P-89C aligned to Green train
B ESF RM 2P-89B AREA							
2SI-9B	C HPSI Pump Suction From B Loop	M2232 C1 SH 1	ESF RM B, HPSI PUMP AREA, W END 2P-89B, 6 FT UP	LOCKED CLOSED			LO if 2P-89C aligned to Green train
2SI-11B	C HPSI Pump Discharge To B Loop	M2232 C3 SH 1	ESF RM B, HPSI PUMP AREA, E END OF 2P-89B, 6 FT UP	LOCKED CLOSED			LO if 2P-89C aligned to Green train
2SI-5102A	HPSI Header #2 2FT-5102 Isol	M2232 C3 SH 1	ESF RM B, HPSI PUMP AREA, 5 FT S OF 2CV-5650-2 CONT SUMP ISOL, 12 FT UP	OPEN			
2SI-5102B	HPSI Header #2 2FT-5102 Isol	M2232 C3 SH 1	ESF RM B, HPSI PUMP AREA, 5 FT S OF 2CV-5650-2 CONT SUMP ISOL, 12 FT UP	OPEN			
2SI-1002	HPSI Suction Xconn Vent	M2232 D1 SH 1	ESF RM B, HPSI PUMP AREA, 6 FT W OF PUMP, 5 FT E OF 2CV-5650-2 PLATFORM, 12 FT UP	CLOSED			
2SI-1003	HPSI Suction Xconn Vent	M2232 D1 SH 1	ESF RM B, HPSI PUMP AREA, 6 FT W OF PUMP, 5 FT E OF 2CV-5650-2 PLATFORM, 12 FT UP	CLOSED CAPPED			
2SI-1008	HPSI Pumps Discharge Xconn Vent	M2232 C3 SH 1	ESF RM B, HPSI PUMP AREA, 8 FT W OF 2P-89B MOTOR, 15 FT UP	CLOSED			
2SI-1009	HPSI Pumps Discharge Xconn Vent	M2232 C3 SH 1	ESF RM B, HPSI PUMP AREA, 8 FT W OF 2P-89B MOTOR, 15 FT UP	CLOSED CAPPED			

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
2ABS-21B	HPSI 2P-89B Casing Drain	M2232 C2 SH 1	ESF RM B, HPSI PUMP AREA, 1 FT N OF 2P-89B, 1 FT UP	CLOSED			
2ABS-22B	HPSI 2P-89B Casing Drain	M2232 C2 SH 1	ESF RM B, HPSI PUMP AREA, 1 FT N OF 2P-89B, 1 FT UP	CLOSED			
2SI-1042B	HPSI 2P-89B Discharge Line Drain & 2PI-5101	M2232 C3 SH 1	ESF RM B, HPSI PUMP AREA, E END OF 2P-89B, 4 FT UP	CLOSED			
2SI-1043B	HPSI 2P-89B Discharge Line Drain & 2PI-5101	M2232 C3 SH 1	ESF RM B, HPSI PUMP AREA, E END OF 2P-89B, 4 FT UP	CLOSED CAPPED			
2SI-10B	HPSI 2P-89B Discharge Stop Check	M2232 C3 SH 1	ESF RM B, HPSI PUMP AREA, E END OF 2P-89B, 5 FT UP	LOCKED OPEN			
2SI-5134	HPSI 2P-89B Mini Flow Recirc Drain	M2232 C2 SH 1	ESF RM B, HPSI PUMP AREA, 5 FT SE OF 2P-89B, BELOW RECIRC ISOL 2CV-5128, 1 FT UP	CLOSED CAPPED			
2SI-5133	HPSI 2P-89B Mini Flow Recirc Drain	M2232 C3 SH 1	ESF RM B, HPSI PUMP AREA, 5 FT SE OF 2P-89B, BELOW RECIRC ISOL 2CV-5128, 1.5 FT	CLOSED			
2SI-1086	HPSI 2P-89B Recirc Line Drain	M2236 D2 SH 1	ESF RM B, HPSI PUMP AREA, 1 FT W OF 2CV-5128 RECIRC ISOL, AT S WALL, 4.5 FT UP	CLOSED CAPPED			
2SI-1085	HPSI 2P-89B Recirc Line Drain	M2236 D2 SH 1	ESF RM B, HPSI PUMP AREA, 1 FT W OF 2CV-5128 RECIRC ISOL, AT S WALL, 5 FT UP	CLOSED			
2SI-65	HPSI 2P-89B Recirc to Suction	M2232 C3 SH 1	ESF RM B, HPSI PUMP AREA, 6 FT SE OF 2P-89B, ABOVE 2CV-5128 RECIRC ISOL, 6 FT UP	LOCKED OPEN			
2SI-1063	HPSI 2P-89B Mini Flow Recirc Vent	M2232 C3 SH 1	ESF RM B, HPSI PUMP AREA, SOUTH OF 2P-89B, AT S WALL	CLOSED			
2SI-32	B HPSI Pump Discharge Recirc Orifice Bypass Isolation Valve	M2232 C3 SH 1	ESF RM B, HPSI PUMP AREA, SOUTH OF 2P-89B, 10' UP	LOCKED CLOSED			
2SI-33	B HPSI Pump Discharge Orifice Bypass Throttling Valve	M2232 C3 SH 1	ESF RM B, HPSI PUMP AREA, SOUTH OF 2P-89B, 10' UP	LOCKED CLOSED			

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
2SI-5001A	HPSI 2P-89B Discharge Pressure Point Isolation Valve	M2232 C3 SH 1	ESF RM B, HPSI PUMP AREA, SOUTH OF 2P-89B, 10' UP	CLOSED			
2SI-5001B	HPSI 2P-89B Discharge Pressure Point Isolation Valve	M2232 C3 SH 1	ESF RM B, HPSI PUMP AREA, SOUTH OF 2P-89B, 10' UP	CLOSED			
2SI-5135	HPSI 2P-89B Mini Flow Recirc Vent	M2232 C3 SH 1	ESF RM B, 5 FT SE OF 2P-89B, ABOVE 2CV-5128 RECIRC ISOL, 8 FT UP	CLOSED CAPPED			
2SI-8B	HPSI 2P-89B Suction Valve	M2232 C1 SH 1	ESF RM B, HPSI PUMP AREA, ABOVE 2P-89B, 7 FT UP	LOCKED OPEN			
2SI-5099B	HPSI 2P-89B Suction 2PP-5099 Before Strainer	M2232 C2 SH 1	ESF RM B, HPSI PUMP AREA, S SIDE OF 2P-89B, 6 FT UP	CLOSED			
2SI-5099A	HPSI 2P-89B Suction 2PP-5099 Before Strainer	M2232 C2 SH 1	ESF RM B, HPSI PUMP AREA, S SIDE OF 2P-89B, 6 FT UP	CLOSED CAPPED			
2SI-5100A	HPSI 2P-89B Suction 2PI-5100	M2232 C2 SH 1	ESF RM B, HPSI PUMP AREA, S SIDE OF 2P-89B, 4.5 FT ABOVE PUMP	CLOSED			
2SI-5100B	HPSI 2P-89B Suction 2PI-5100	M2232 C2 SH 1	ESF RM B, HPSI PUMP AREA, S SIDE OF 2P-89B, 4.5 FT ABOVE PUMP	CLOSED			
2SI-1004B	HPSI 2P-89B Suction Vent	M2232 C1 SH 1	ESF RM B, HPSI PUMP AREA, S SIDE OF 2P-89B, 12 FT ABOVE PUMP	CLOSED			
2SI-1005B	HPSI 2P-89B Suction Vent	M2232 C1 SH 1	ESF RM B, HPSI PUMP AREA, S SIDE OF 2P-89B, 12 FT ABOVE PUMP	CLOSED CAPPED			
B ESF RM 2P-60A AND 2P-35A AREA							
2BS-54	HPSI 2P-89B Recirc to Suction	M2236 D2 SH 1	ESF RM B, AT W WALL, BEHIND 2P-35B CNTMT SPRAY PUMP	LOCKED OPEN			
2SI-1078	HPSI 2P-89B Recirc Line Vent	M2236 D2 SH 1	ESF RM B, 2P-35B LPSI PUMP, 15 FT W, AT CEILING	CLOSED CAPPED			
2SI-1077	HPSI 2P-89B Recirc Line Vent	M2236 D2 SH 1	ESF RM B, 2P-35B LPSI PUMP, 15 FT W, AT CEILING	CLOSED			

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
LSPP 335'							
2SI-5108A	HPSI Header #1 2PT-5108	M2232 D4 SH 1	LSPP, BEHIND 2CV-5103-1 HPSI ORIFICE BYPASS MOTOR, 1 FT FROM WALL, 5 FT UP	OPEN			
2SI-5108B	HPSI Header #1 2PT-5108	M2232 D4 SH 1	LSPP, BEHIND 2CV-5103-1 HPSI ORIFICE BYPASS MOTOR, 1 FT FROM WALL, 5 FT UP	OPEN			
2SI-1044	HPSI Header #1 Drain	M2232 D4 SH 1	LSPP, 1 FT E OF 2CV-5103-1 HPSI ORIFICE BYPASS, 1 FT FROM WALL, 5 FT UP	CLOSED			
2SI-1045	HPSI Header #1 Drain	M2232 D4 SH 1	LSPP, 2 FT E OF 2CV-5103-1 HPSI ORIFICE BYPASS, 1 FT FROM WALL, 5 FT UP	CLOSED CAPPED			
2SI-1056A	HPSI Header #1 Drain	M2232 D4 SH 1	LSPP, 1 FT E OF 2CV-5103-1 HPSI ORIFICE BYPASS, AT FLOOR	CLOSED			
2SI-1057A	HPSI Header #1 Drain	M2232 D4 SH 1	LSPP, 1 FT E OF 2CV-5103-1 HPSI ORIFICE BYPASS, AT FLOOR	CLOSED CAPPED			
2SI-5109	HPSI Header #2 2PT-5109	M2232 C3 SH 1	LSPP, SE SIDE, 4 FT FROM 2CV-0714-1, 2 FT FROM WALL, 4 FT UP	OPEN			
2SI-1056B	HPSI Header #2 Drain	M2232 C4 SH 1	LSPP, SE SIDE, 3 FT BELOW 2CV-5104-2 HPSI ORIFICE BYPASS	CLOSED (1)			
2SI-1057B	HPSI Header #2 Drain	M2232 C4 SH 1	LSPP, SE SIDE, 3.5 FT BELOW 2CV-5104-2 HPSI ORIFICE BYPASS	CLOSED CAPPED (2)			
USPP 354'							
2SI-68	2CV-5015-1 Manual Throttle Valve	M2232 F5 SH 1	USPP, PENET 2P5, 2FT IN FRONT OF 2CV-5015-1, 1 FT UP	THROTTLED OPEN			Handwheel restraint welded to yoke
2SI-1022A	HPSI Header #1 Vent Before 2CV-5015-1	M2232 F5 SH 1	USPP, PENET 2P5, 1.5 FT IN FRONT OF 2CV-5015, 3 FT UP	CLOSED			
2SI-1023A	HPSI Header #1 Vent Before 2CV-5015-1	M2232 F5 SH 1	USPP, PENET 2P5, 1.5 FT IN FRONT OF 2CV-5015, 3 FT UP	CLOSED CAPPED			
2SI-69	2CV-5016-2 Manual Throttle Valve	M2232 E5 SH 1	USPP, PENET 2P5, 2 FT FROM 2CV-5016-2	THROTTLED OPEN			Handwheel restraint welded to yoke
2SI-1024A	HPSI Header #2 Vent Before 2CV-5016-2	M2232 E5 SH 1	USPP, PENET 2P5, 1 FT FROM 2CV-5016-2, 3.5 FT UP	CLOSED			
2SI-1025A	HPSI Header #2 Vent Before 2CV-5016-2	M2232 E5 SH 1	USPP, PENET 2P5, 1 FT FROM 2CV-5016-2, 4 FT UP	CLOSED CAPPED			

- (1) May be OPEN if TAP 04-02-002 installed AND HPSI Pressurization System in service per Att. F of this procedure.
- (2) May be OPEN with cap removed if TAP 04-02-002 installed AND HPSI Pressurization System in service per Att. F of this procedure.

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
2SI-1048	Combined HPSI Header to RCP A Drain	M2232 E5 SH 1	USPP, PENET 2P5, 1.5 FT BELOW 2CV-5016	LOCKED CLOSED			
2SI-1049	Combined HPSI Header to RCP A Drain	M2232 E5 SH 1	USPP, PENET 2P5, 1.5 FT BELOW 2CV-5016	LC CAPPED			
2SI-5014A	Combined HPSI Header to RCP A 2FT-5014-1	M2232 E6 SH 1	USPP, PENET 2P27, 2.5 FT N OF 2CV-5038, 8 FT UP	OPEN			
2SI-5014B	Combined HPSI Header to RCP A 2FT-5014-1	M2232 E6 SH 1	USPP, PENET 2P27, 2.5 FT N OF 2CV-5038, 8 FT UP	OPEN			
2SI-5014C	Combined HPSI Header to RCP A 2FT-5014-1	M2232 E6 SH 1	USPP, PENET 2P27, 2 FT NORTH OF 2CV-5038, 8 FT UP	OPEN			
2SI-5014D	Combined HPSI Header to RCP A 2FT-5014-1	M2232 E6 SH 1	USPP, PENET 2P27, 2 FT NORTH OF 2CV-5038, 8 FT UP	OPEN			
2SI-1026A	Combined HPSI Header to RCP A Vent	M2232 E6 SH 1	USPP, PENET 2P5, 3 FT NORTH, 10 FT UP	LOCKED CLOSED			
2SI-1027A	Combined HPSI Header to RCP A Vent	M2232 E6 SH 1	USPP, PENET 2P5, 3 FT NORTH, 10 FT UP	LC CAPPED			
2SI-70	2CV-5055-1 Manual Throttle Valve	M2232 B4 SH 1	USPP, PENET 2P30, 1 FT S OF 2CV-5055-1, 1 FT UP	THROTTLED OPEN			Handwheel restraint welded to yoke
2SI-1022C	HPSI Header #1 Vent Before 2CV-5055-1	M2232 B4 SH 1	USPP, PENET 2P30, 1 FT S OF 2CV-5055, 3 FT UP	CLOSED			
2SI-1023C	HPSI Header #1 Vent Before 2CV-5055-1	M2232 B4 SH 1	USPP, PENET 2P30, 1 FT S OF 2CV-5055, 3 FT UP	CLOSED CAPPED			
2SI-71	2CV-5056-2 Manual Throttle Valve	M2232 A5 SH 1	USPP, PENET 2P30, S SIDE OF 2CV-5056-2, 1 FT UP	THROTTLED OPEN			Handwheel restraint welded to yoke
2SI-1024C	HPSI Header #2 Vent Before 2CV-5056-2	M2232 A5 SH 1	USPP, PENET 2P30, S SIDE OF 2CV-5056-2, 3 FT UP	CLOSED			
2SI-1025C	HPSI Header #2 Vent Before 2CV-5056-2	M2232 A5 SH 1	USPP, PENET 2P30, S SIDE OF 2CV-5056-2, 3 FT UP	CLOSED CAPPED			
2SI-1071	Combined HPSI Header to RCP C Drain	M2232 B5 SH 1	USPP, PENET 2P30, DIRECTLY BELOW 2CV-5056-2, AT FLOOR	LOCKED CLOSED			
2SI-1072	Combined HPSI Header to RCP C Drain	M2232 B5 SH 1	USPP, PENET 2P30, DIRECTLY BELOW 2CV-5056-2, AT FLOOR	LC CAPPED			

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
2SI-1026C	Combined HPSI Header to RCP C Vent	M2232 B5 SH 1	USPP, PENET 2P30, 1 FT NORTH OF 2CV-5056-2, 2.5 FT UP	LOCKED CLOSED			
2SI-1027C	Combined HPSI Header to RCP C Vent	M2232 C5 SH 1	USPP, PENET 2P30, 1 FT NORTH OF 2CV-5056-2, 3 FT UP	LC CAPPED			
2SI-5054A	Combined HPSI Header to RCP C 2FT-5054-2	M2232 B5 SH 1	USPP, PENET 2P30, 4 FT FROM WALL, 1 FT UP	OPEN			
2SI-5054B	Combined HPSI Header to RCP C 2FT-5054-2	M2232 B6 SH 1	USPP, PENET 2P30, 4 FT FROM WALL, 1 FT UP	OPEN			
2SI-5054C	Combined HPSI Header to RCP C 2FT-5054-2	M2232 A5 SH 1	USPP, PENET 2P30, 3 FT FROM WALL, 1 FT UP	OPEN			
2SI-5054D	Combined HPSI Header to RCP C 2FT-5054-2	M2232 A6 SH 1	USPP, PENET 2P30, 3 FT FROM WALL, 1 FT UP	OPEN			
2SI-72	2CV-5035-1 Manual Throttle Valve	M2232 H5 SH 1	USPP, PENET 2P11, NEAR 2CV-5035-1	THROTTLED OPEN			Handwheel restraint welded to yoke
2SI-1022B	HPSI Header #1 Vent Before 2CV-5035-1	M2232 H4 SH 1	USPP, PENET 2P30, 1 FT S OF 2CV-5035, 3 FT UP	CLOSED			
2SI-1023B	HPSI Header #1 Vent Before 2CV-5035-1	M2232 H4 SH 1	USPP PENET 2P30, 1 FT S OF 2CV-5035, 4 FT UP	CLOSED CAPPED			
2SI-1024B	HPSI Low Pressure Fill to SIT Drain Header	M2232 G5 SH 1	USPP, PENET 2P30 BETWEEN 2CV-5037 & 5036, 3.5 FT UP	LOCKED CLOSED			
2SI-1025B	HPSI Low Pressure Fill to SIT Drain Header	M2232 G5 SH 1	USPP, PENET 2P30 BETWEEN 2CV-5037 & 5036, 4 FT UP	LOCKED CLOSED			
2SI-73	2CV-5036-2 Manual Throttle Valve	M2232 G5 SH 1	USPP, PENET 2P11, NEAR 2CV-5036-2	THROTTLED OPEN			Handwheel restraint welded to yoke
2SI-1046	Combined HPSI Header to RCP B Drain	M2232 H5 SH 1	USPP, PENET 2P30 UNDER 2CV-5036, 1.5 FT UP	LC CAPPED			
2SI-1047	Combined HPSI Header to RCP B Drain	M2232 H5 SH 1	USPP, PENET 2P30 UNDER 2CV-5036, 2 FT UP	LOCKED CLOSED			
2SI-5034A	Combined HPSI Header to RCP B 2FT-5034-1	M2232 G5 SH 1	USPP, PENET 2P30, 2 FT N OF 2CV-5036, 8 FT UP	OPEN			
2SI-5034B	Combined HPSI Header to RCP B 2FT-5034-1	M2232 H5 SH 1	USPP, PENET 2P30, 2 FT N OF 2CV-5036, 8 FT UP	OPEN			

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
2SI-5034C	Combined HPSI Header to RCP B 2FT-5034-1	M2232 G6 SH 1	USPP, PENET 2P30, 2 FT N OF 2CV-5036, 8 FT UP	OPEN			
2SI-5034D	Combined HPSI Header to RCP B 2FT-5034-1	M2232 G6 SH 1	USPP, PENET 2P30, 2 FT N OF 2CV-5036, 8 FT UP	OPEN			
2SI-1026B	Combined HPSI Header to RCP B Vent	M2232 G5 SH 1	USPP, PENET 2P11, 5 FT OUT FROM 2P11, ABOVE 2CV-5101, 12 FT OFF FLOOR	LC CAPPED			
2SI-1027B	Combined HPSI Header to RCP B Vent	M2232 G5 SH 1	USPP, PENET 2P11, 5 FT OUT FROM 2P11, ABOVE 2CV-5101, 12 FT OFF FLOOR	LOCKED CLOSED			
2SI-1058A	HPSI Header #1 Th Injection Vent	M2232 E4 SH 1	USPP, PENET 2P12, 4 FT FROM 2P12, 14 FT UP	LOCKED CLOSED			
2SI-1059A	HPSI Header #1 Th Injection Vent	M2232 E4 SH 1	USPP, PENET 2P12, 4 FT FROM 2P12, 14 FT UP	LC CAPPED			
2SI-1022D	HPSI Header #1 Vent Before 2CV-5075-1	M2232 D4 SH 1	USPP, PENET 2P25, 2 FT SOUTH OF 2CV-5075, 4 FT UP	CLOSED			
2SI-1023D	HPSI Header #1 Vent Before 2CV-5075-1	M2232 D5 SH 1	USPP, PENET 2P25, 2 FT SOUTH OF 2CV-5075, 4 FT UP	CLOSED CAPPED			
2SI-74	2CV-5075-1 Manual Throttle Valve	M2232 D5 SH 1	USPP, PENET 2P25, NEAR 2CV-5075-1	THROTTLED OPEN			Handwheel restraint welded to yoke
2SI-1024D	HPSI Header #2 Vent Before 2CV-5076-2	M2232 C5 SH 1	USPP, PENET 2P25, 2 FT SOUTH OF 2CV-5076, 3 FT UP	CLOSED			
2SI-1025D	HPSI Header #2 Vent Before 2CV-5076-2	M2232 C5 SH 1	USPP, PENET 2P25, 2 FT SOUTH OF 2CV-5076, 3 FT UP	CLOSED CAPPED			
2SI-75	2CV-5076-2 Manual Throttle Valve	M2232 C5 SH 1	USPP, PENET 2P25, NEAR 2CV-5076-2	THROTTLED OPEN			Handwheel restraint welded to yoke
2SI-1050	Combined HPSI Header to RCP D Drain	M2232 C5 SH 1	USPP, PENET 2P36, 6 FT FROM 2P36, 1 FT UP	LOCKED CLOSED			
2SI-1051	Combined HPSI Header to RCP D Drain	M2232 C5 SH 1	USPP, PENET 2P36, 6 FT FROM 2P36, 1 FT UP	LC CAPPED			
2SI-1026D	Combined HPSI Header to RCP D Vent	M2232 D5 SH 1	USPP, PENET 2P25, 6 FT FROM 2P25, 6.5 FT UP	LOCKED CLOSED			
2SI-1027D	Combined HPSI Header to RCP D Vent	M2232 D6 SH 1	USPP, PENET 2P25, 6 FT FROM 2P25, 6 FT UP	LC CAPPED			

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
2SI-5074A	Combined HPSI Header to RCP D 2FT-5074-2	M2232 C5 SH 1	USPP, PENET 2P25, 2 FT FROM 2P25, 6 FT UP	OPEN			
2SI-5074B	Combined HPSI Header to RCP D 2FT-5074-2	M2232 C5 SH 1	USPP, PENET 2P25, 2.5 FT FROM 2P25, 6 FT UP	OPEN			
2SI-5074C	Combined HPSI Header to RCP D 2FT-5074-2	M2232 D5 SH 1	USPP, PENET 2P25, 1 FT FROM 2P25, 6 FT UP	OPEN			
2SI-5074D	Combined HPSI Header to RCP D 2FT-5074-2	M2232 C5 SH 1	USPP, PENET 2P25, 1 FT FROM 2P25, 6 FT UP	OPEN			
2SI-1058B	HPSI Header #2 Th Injection Vent	M2232 B4 SH 1	USPP, PENET 2P13, 1.5 FT FROM 2P13, 2 FT FROM CEILING	LOCKED CLOSED			
2SI-1059B	HPSI Header #2 Th Injection Vent	M2232 B4 SH 1	USPP, PENET 2P13, 1.5 FT FROM 2P13, 1 FT FROM CEILING	LC CAPPED			
2SI-30	HPSI Header #1 to #2 Header Th Injection	M2232 C4 SH 1	USPP, PENET 2P13, NEXT TO 2CV-5613-2, 5.5 FT UP	LOCKED CLOSED			
2SI-31	HPSI Header #1 to #2 Header Th Injection	M2232 C4 SH 1	USPP, PENET 2P13, NEXT TO 2CV-5613-2, 4 FT UP	LOCKED CLOSED			
CNTMT BLDG BASEMENT - HPSI HEADER #1							
2SI-1060A	HPSI Header #1 Th Injection Drain	M2230 D4 SH 1	CONTAINMENT BLDG BASEMENT, NORTHWEST "D" RING WALL, 8 FT FROM FLOOR	CLOSED			
2SI-1061A	HPSI Header #1 Th Injection Drain	M2230 D4 SH 1	CONTAINMENT BLDG BASEMENT, NORTHWEST "D" RING WALL, 8 FT FROM FLOOR	CLOSED CAPPED			
2SI-29A	HPSI Header #1 Th Injection Isolation	M2230 D3 SH 1	CONTAINMENT BLDG BASEMENT, NORTHWEST "D" RING WALL, 20 FT FROM FLOOR	OPEN			
CNTMT BLDG BASEMENT - HPSI HEADER #2							
2SI-1060B	HPSI Header #2 Th Injection Drain	M2230 C4 SH 1	CONTAINMENT BLDG BASEMENT, NORTHWEST "D" RING WALL, 8 FT FROM FLOOR	CLOSED			
2SI-1061B	HPSI Header #2 Th Injection Drain	M2230 C4 SH 1	CONTAINMENT BLDG BASEMENT, NORTHWEST "D" RING WALL, 8 FT FROM FLOOR	CLOSED CAPPED			
2SI-29B	HPSI Header #2 Th Injection Isolation	M2230 C3 SH 1	CONTAINMENT BLDG BASEMENT, NORTHWEST "D" RING WALL, 20 FT FROM FLOOR	OPEN			

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
CNTMT BLDG SOUTH PIPING PENET AREA - HPSI HEADER #1							
2SI-5105B	HPSI Header #1 Th Injection 2PT-5105	M2232 E4 SH 1	CNTMT BLDG, SOUTH PIPING PENETRATION AREA, AT PENET 2P12, 1 FT E OF 2CV-5082, 8 FT UP	OPEN			
2SI-5105A	HPSI Header #1 Th Injection 2PT-5105	M2232 E4 SH 1	CNTMT BLDG, SOUTH PIPING PENETRATION AREA, AT PENET 2P12, 1 FT E OF 2CV-5082, 8 FT UP	OPEN			
CNTMT BLDG SOUTH PIPING PENET AREA - HPSI HEADER #2							
2SI-5106B	HPSI Header #2 Th Injection 2PT-5106	M2232 C4 SH 1	CNTMT BLDG, SOUTH PIPING PENETRATION AREA, 3 FT FROM PENET 2P13, 8 FT UP	OPEN			
2SI-5106A	HPSI Header #2 Th Injection 2PT-5106	M2232 C4 SH 1	CNTMT BLDG, SOUTH PIPING PENETRATION AREA, 3 FT FROM PENET 2P13, 8 FT UP	OPEN			

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ATTACHMENT B

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ALIGNING HPSI PUMP 2P-89C FOR RED TRAIN STANDBY

1.0 Verify the following Initial Conditions:

- 2P-89B handswitch (2HS-5079-2) out of PULL TO LOCK. _____
- 2P-89C handswitch on 2C17 (2HS-5080-1) in PULL TO LOCK. _____
- 2P-89C handswitch on 2C16 (2HS-5080-2) in PULL TO LOCK. _____
- SW ESF Header Isol (2CV-1400-1) open. _____
- 2VUC-11A SW Inlet (2CV-1407-1) open. _____

NOTE

Step 4.0 may be performed simultaneously with Steps 2.0 and 3.0.

2.0 Align Service Water and Safety Injection system valves for 2P-89C as follows:

2.1 Lock closed the following Safety Injection valves:

2.1.1 HPSI Discharge X-connect (2SI-11B) _____

2.1.2 HPSI Suction X-connect (2SI-9B) _____

2.2 Lock closed the following Service Water valves:

- 2E-53C Supply from Loop 2 (2SW-20A) _____
- 2E-53C Supply from Loop 2 (2SW-20B) _____
- 2E-53C Return to Loop 2 (2SW-21A) _____
- 2E-53C Return to Loop 2 (2SW-21B) _____

2.3 Lock closed HPSI 2P-89C Recirc to B Train Suction (2SI-67). _____

2.4 Lock open HPSI 2P-89C Recirc to A Train Suction (2SI-66). _____

2.5 Lock open the following Service Water valves:

- 2E-53C Supply from Loop 1 (2SW-18A) _____
- 2E-53C Supply from Loop 1 (2SW-18B) _____
- 2E-53C Return to Loop 1 (2SW-19A) _____
- 2E-53C Return to Loop 1 (2SW-19B) _____

2.6 Lock open the following Safety Injection valves:

2.6.1 HPSI Suction X-connect (2SI-9A) _____

2.6.2 HPSI Discharge X-connect (2SI-11A) _____

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3.0 Independently verify Service Water and Safety Injection system valves for 2P-89C as follows:

3.1 Independently verify the following valves locked closed:

- 2E-53C Supply from Loop 2 (2SW-20A) _____
- 2E-53C Supply from Loop 2 (2SW-20B) _____
- 2E-53C Return to Loop 2 (2SW-21A) _____
- 2E-53C Return to Loop 2 (2SW-21B) _____

- HPSI Discharge X-connect (2SI-11B) _____
- HPSI Suction X-connect (2SI-9B) _____
- HPSI 2P-89C Recirc to B Train Suction (2SI-67) _____

3.2 Independently verify the following valves Locked Open:

- HPSI 2P-89C Recirc to A Train Suction (2SI-66) _____
- 2E-53C Supply from Loop 1 (2SW-18A) _____
- 2E-53C Supply from Loop 1 (2SW-18B) _____
- 2E-53C Return to Loop 1 (2SW-19A) _____

- 2E-53C Return to Loop 1 (2SW-19B) _____
- HPSI Suction X-connect (2SI-9A) _____
- HPSI Discharge X-connect (2SI-11A) _____

4.0 Align 2P-89C Electrical System as follows:

- 4.1 Verify Electrical Safety requirements established using Electrical System Operations (2107.001), Exhibit 9, Electrical Safety Requirements. _____
- 4.2 Rack down 2P-89C breaker (2A-407) per Electrical System Operations (2107.001) to discharge springs. _____
- 4.3 Rack up 2A-407 per 2107.001 without letting springs charge. _____
- 4.4 Lock 2A-407 with Kirk key AND remove key. _____
- 4.5 Unlock 2P-89C breaker (2A-307) using Kirk key from 2A-407 AND allow springs to charge. _____
- 4.6 Check Control Room indications for Red Train 2P-89C available. _____
- 4.7 Move "Manual Valves Aligned" placard from 2A-407 to 2A-307. _____

5.0 Verify "Manual Valves Aligned to Red Train" status updated on Control Room status board. _____

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ATTACHMENT B

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6.0 Verify the following valves open:

- HPSI 2P-89C Recirc Isol (2CV-5127-1) _____
- ESF Mini-Recirc Header Isol (2CV-5628-2) _____
- RWT Recirc and Test Line Inlet to RWT (2BS-26) _____
- RWT 2T-3 Outlet (2CV-5630-1) _____

NOTE

2P-89C HPSI pump is operable if the oil level in the sight glass is between the high and low level marks. The sight glass is located on the opposite side of the bearing housing from the oiler.

7.0 Check 2P-89C pump AND motor oil levels. _____

8.0 IF Supplement 1, 2P-89A Quarterly Test will NOT immediately follow, THEN perform the following:

- 8.1 Remove 2P-89C handswitch (2HS-5080-1) out of PULL TO LOCK. _____
- 8.2 Verify 2P-89A handswitch (2HS-5078-1) in PULL TO LOCK. _____
- 8.3 Start 2P-89C. _____
- 8.4 Check discharge pressure developed (2PI-5108). _____
- 8.5 Verify 2P-89A Discharge Stop Check (2SI-10A) closed by checking 2P-89A NOT rotating. _____
- 8.6 Verify "C" ESF Room cooler (2VUC-11A) running (70 sec time delay). _____
- 8.7 Secure 2P-89C. _____
- 8.8 Verify 2VUC-11A secured. _____

9.0 IF desired to place 2P-89A in service, THEN verify the following:

- 9.1 2P-89A handswitch (2HS-5078-1) out of PULL TO LOCK. _____
- 9.2 2P-89C handswitch (2HS-5080-1) in PULL TO LOCK. _____

10.0 IF desired to place 2P-89C in service, THEN verify the following:

- 10.1 2P-89C handswitch (2HS-5080-1) out of PULL TO LOCK. _____
- 10.2 2P-89A handswitch (2HS-5078-1) in PULL TO LOCK. _____

Performed By _____ Date _____

Supervisor _____ Date _____

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ATTACHMENT C

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ALIGNING HPSI PUMP 2P-89C FOR GREEN TRAIN STANDBY

1.0 Verify the following initial conditions:

- 2P-89A handswitch (2HS-5078-1) out of PULL TO LOCK. _____
- 2P-89C handswitch on 2C17 (2HS-5080-1) in PULL TO LOCK. _____
- 2P-89C handswitch on 2C16 (2HS-5080-2) in PULL TO LOCK. _____
- SW ESF Header Isol (2CV-1406-2) open. _____
- 2VUC-11B SW Inlet (2CV-1408-2) open. _____

NOTE

Step 4.0 may be performed simultaneously with Steps 2.0 and 3.0.

2.0 Align Service Water and Safety Injection valves for 2P-89C as follows:

2.1 Lock closed the following Safety Injection valves:

2.1.1 HPSI Discharge X-connect (2SI-11A) _____

2.1.2 HPSI Suction X-connect (2SI-9A) _____

2.2 Lock closed the following Service Water valves:

- 2E-53C Supply from Loop 1 (2SW-18A) _____
- 2E-53C Supply from Loop 1 (2SW-18B) _____
- 2E-53C Return to Loop 1 (2SW-19A) _____
- 2E-53C Return to Loop 1 (2SW-19B) _____

2.3 Lock closed HPSI 2P-89C Recirc to A Train Suction (2SI-66). _____

2.4 Lock open HPSI 2P-89C Recirc to B Train Suction (2SI-67). _____

2.5 Lock open the following service water valves:

- 2E-53C Supply from Loop 2 (2SW-20A) _____
- 2E-53C Supply from Loop 2 (2SW-20B) _____
- 2E-53C Return to Loop 2 (2SW-21A) _____
- 2E-53C Return to Loop 2 (2SW-21B) _____

2.6 Lock open the following Safety Injection valves:

2.6.1 HPSI Suction X-connect (2SI-9B) _____

2.6.2 HPSI Discharge X-connect (2SI-11B) _____

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ATTACHMENT C

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3.0 Independently verify Service Water and Safety Injection system valves for 2P-89C as follows:

3.1 Independently verify the following valves locked closed:

- 2E-53C Supply from Loop 1 (2SW-18A) _____
- 2E-53C Supply from Loop 1 (2SW-18B) _____
- 2E-53C Return to Loop 1 (2SW-19A) _____
- 2E-53C Return to Loop 1 (2SW-19B) _____

- HPSI Suction X-connect (2SI-9A) _____
- HPSI Discharge X-connect (2SI-11A) _____
- HPSI 2P-89C Recirc to A Train Suction (2SI-66) _____

3.2 Independently verify the following valves locked open:

- 2E-53C Supply from Loop 2 (2SW-20A) _____
- 2E-53C Supply from Loop 2 (2SW-20B) _____
- 2E-53C Return to Loop 2 (2SW-21A) _____
- 2E-53C Return to Loop 2 (2SW-21B) _____

- HPSI Discharge X-connect (2SI-11B) _____
- HPSI Suction X-connect (2SI-9B) _____
- HPSI 2P-89C Recirc to B Train Suction (2SI-67) _____

4.0 Align 2P-89C Electrical System as follows:

- 4.1 Verify Electrical Safety requirements established using Electrical System Operations (2107.001), Exhibit 9, Electrical Safety Requirements. _____
- 4.2 Pull AND hold racking lever on 2A-307. _____
- 4.3 Verify 2A-307 closing springs discharged. _____
- 4.4 Lock 2A-307 with Kirk key AND remove key. _____
- 4.5 Unlock 2P-89C breaker (2A-407) using Kirk key from 2A-307 AND allow springs to charge. _____
- 4.6 Check Control Room indications for Green Train 2P-89C available. _____
- 4.7 Move "Manual Valve Aligned" placard from 2A-307 to 2A-407. _____

5.0 Verify "Manual Valves Aligned to Green Train" status updated on Control Room status board. _____

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ATTACHMENT C

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6.0 Verify the following valves open:

- HPSI 2P-89C Recirc Isol (2CV-5127-1) _____
- ESF Mini-Recirc Header Isol (2CV-5628-2) _____
- RWT Recirc and Test Line Inlet to RWT (2BS-26) _____
- RWT 2T-3 Outlet (2CV-5631-2) _____

NOTE

2P-89C HPSI pump is operable if the oil level in the sight glass is between the high and low level marks. The sight glass is located on the opposite side of the bearing housing from the oiler.

7.0 Check 2P-89C pump AND motor oil levels. _____

8.0 IF Supplement 2, 2P-89B Quarterly Test will NOT immediately follow, THEN perform the following:

- 8.1 Take 2P-89C handswitch (2HS-5080-2) out of PULL TO LOCK. _____
- 8.2 Verify 2P-89B handswitch (2HS-5079-2) in PULL TO LOCK. _____
- 8.3 Start 2P-89C. _____
- 8.4 Check discharge pressure developed (2PI-5109). _____
- 8.5 Verify 2P-89B Discharge Stop Check (2SI-10B) closed by checking 2P-89B NOT rotating. _____
- 8.6 Verify "C" ESF Room cooler (2VUC-11B) running (70 sec time delay). _____
- 8.7 Secure 2P-89C. _____
- 8.8 Verify 2VUC-11B secured. _____

9.0 IF desired to place 2P-89B in service, THEN verify the following:

- 9.1 2P-89B handswitch (2HS-5079-2) out of PULL TO LOCK. _____
- 9.2 2P-89C handswitch (2HS-5080-2) in PULL TO LOCK. _____

10.0 IF desired to place 2P-89C in service, THEN verify the following:

- 10.1 2P-89C handswitch (2HS-5080-2) out of PULL TO LOCK. _____
- 10.2 2P-89B handswitch (2HS-5079-2) in PULL TO LOCK. _____

Performed By _____ Date _____

Supervisor _____ Date _____

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ATTACHMENT D

PAGE 1 OF 1

VENTING HPSI HEADER UPSTREAM OF 2CV-5016-2

1.0 INITIAL CONDITIONS

- Conduct brief using Crew Brief Checklist, 1015.001A.
- Verify RP briefed on this evolution.

2.0 INSTRUCTIONS

2.1 Establish communication between Control Room and the Upper South Piping Penetration Room(USPPR).

* 2.2 IF EITHER of the following occur:

- Communication lost between USPPR and Control Room
- SIAS

THEN perform the following:

2.2.1 Close any open vent valves.

2.2.2 Verify vent rig removed.

2.2.3 Install any pipe caps that are removed.

2.3 Remove pipe cap AND install vent rig (Chicago fitting and hose) on the down stream side of HPSI Header #2 Vent valve before 2CV-5016-2 (2SI-1025A).

2.4 Commence venting by slowly throttling open the following HPSI Header #2 Vent valves:

- Vent Before 2CV-5016-2 (2SI-1024A)
- Vent Before 2CV-5016-2 (2SI-1025A)

2.5 WHEN all gas has been vented from header (no gas and water is clear),
THEN close the following valves:

- 2SI-1024A
- 2SI-1025A

3.0 RESTORATION

3.1 Remove vent rig AND install cap on down stream side of 2SI-1025A.

Performed by: _____ Date _____

Supervisor: _____ Date _____

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ATTACHMENT E

PAGE 1 OF 2

VENTING HPSI HEADER DOWNSTREAM OF 2CV-5016-2

1.0 INITIAL CONDITIONS

- Conduct brief using Crew Brief Checklist, 1015.001A.
- Verify RP briefed on this evolution.

2.0 INSTRUCTIONS

2.1 Establish communication between Control Room and the Upper South Piping Penetration Room(USPPR).

2.2 Verify Containment penetration administrative controls established per 1015.001, Conduct of Operations, for the following valves:

- 2SI-1026A
- 2SI-1027A

* 2.3 IF EITHER of the following occur:

- Communication lost between USPPR and Control Room
- SIAS

THEN perform the following:

2.3.1 Close any open vent valves.

2.3.2 Verify vent rig removed.

2.3.3 Install any pipe caps that are removed.

2.4 Remove pipe cap AND install vent rig (Chicago fitting and hose) on the down stream side of HPSI Header #2 Vent valve after 2CV-5016-2 (2SI-1027A).

2.5 Commence venting by unlocking AND slowly throttling open the following HPSI Header #2 Vent valves:

- Vent After 2CV-5016-2 (2SI-1026A)
- Vent After 2CV-5016-2 (2SI-1027A)

2.6 WHEN piping is depressurized,
THEN slowly open HPSI injection MOV 2CV-5016-2 fully to purge RWT liquid though this line.

2.7 WHEN all gas has been vented from header (no gas and water is clear),
THEN perform the following:

2.7.1 Close 2CV-5016-2.

2.7.2 Close AND lock the following valves:

- 2SI-1026A
- 2SI-1027A

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ATTACHMENT E

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3.0 RESTORATION

3.1 Remove vent rig AND install cap on down stream side of 2SI-1027A. _____

3.2 Independently verify the following:

- The following valves closed AND locked:
 - 2SI-1026A _____
 - 2SI-1027A _____
- Cap installed on down stream side of 2SI-1027A _____

Performed by: _____ Date _____

Supervisor: _____ Date _____

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ATTACHMENT F

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OPERATION OF HPSI PRESSURIZATION SYSTEM (HPS)

The HPSI Pressurization System (HPS) was installed by Temporary Alteration 04-02-002 as a method of maintaining the Green HPSI train pressurized to slightly above Safety Injection Tank (SIT) pressure to minimize SIT and RCS back leakage into this ECCS train. This system is tied into the Green HPSI train because it has a known leakage path through 2SI-15A, 2SI-13A, 2CV-5016-2 and 2SI-10B to the RWT. RCS and SIT back leakage into the ECCS creates a problem due to the gas intrusion and piping voiding concerns associated with this leakage. Gas intrusion and piping voiding can occur when high pressure, gas entrained fluid is allowed to depressurize, thereby allowing a portion of the entrained gas to come out of solution. Refer to CR-ANO-2-2004-0065 and SOER 97-01 for additional information on this issue.

The HPS pump has a variable output capacity depending on its discharge pressure and its air supply pressure. At ~ 90 psig IA supply pressure to the HPS pump, it will produce ~ 2.5 gpm output at ~ 650 psig discharge pressure. The HPS pump is expected to remain in operation even when operating a Green train HPSI Pump. The HPS pump can only develop a maximum discharge pressure of ~ 10 times its air supply. At this point its discharge check valves (2HPS-08 and 2HPS-09) will close.

This pump will normally stay in operation maintaining the Green HPSI header pressure in a band that minimizes SIT and RCS back leakage. This pressure band will be established during the initial testing of this system and a PMS alarm should normally be set to annunciate if outside the pressure band.

1.0 Verify the following initial conditions:

- RWT Level \geq 95%.
- Temporary Alteration 04-02-002 installed.
- HPSI Pressurization System filled and vented.
- HPSI Pressurization System Valve Closure Test (Supplement 10) has been performed within 90 days (refer to PMRQ # 00010151 in Passport).
- HPSI Pressurization System valves aligned as indicated below:

Component Number	Component Description	Additional Component Information	Required Position	√
2HPS-01	RWT Outlet Sample	2T-21 Tank Room, SW corner of room	Closed	
2HPS-02	HPS Pump Suction Drain	2T-21 Tank Room, West side	Closed	
2HPS-03	HPS Pump Discharge Pressure Gage Isolation	2T-21 Tank Room, West side	Open	
2HPS-04	HPS Pump Discharge Drain	2T-21 Tank Room, West side	Closed	
2HPS-05	HPS Pump Discharge Isolation	2T-21 Tank Room, West side	Open	
2HPS-06	HPS Discharge Header Vent	2T-21 Tank Room, North side	Closed	
2HPS-07	HPS Discharge Header Drain	2T-21 Tank Room, West side	Closed	
2HPS-10	Air Supply Drain	2T-21 Tank Room, NW side	Closed	
2HPS-11	HPS Pump Air Supply Isolation	2T-21 Tank Room, West side	Open	
2HPS-12	2HPS-09 Check Bypass	LSPP Room	Closed	
2HPS-14	HPS Check Valve Drain	LSPP Room	Closed	

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- IF ER-ANO-2000-3275-**010** installed (modification to add suction filters),
THEN HPSI Pressurization System valves aligned as indicated below:

Component Number	Component Description	Additional Component Information	Required Position	√
2HPS-15	2HPS-F-2A Inlet Isol	2T-21 Tank Room, West side	Open (1)	
2HPS-16	2HPS-F-2A Outlet Isol	2T-21 Tank Room, West side	Open (1)	
2HPS-17	2HPS-F-2B Inlet Isol	2T-21 Tank Room, West side	Closed (2)	
2HPS-18	2HPS-F-2B Outlet Isol	2T-21 Tank Room, West side	Closed (2)	
2HPS-19	HPS Pump Suction Press gage Isol	2T-21 Tank Room, West side	Closed	
2HPS-20	HPS Pump Suction Drain Isol	2T-21 Tank Room, West side	Closed	
2HPS-21	HPS Pump Suction Isol	2T-21 Tank Room, West side	Open	

(1) May be closed if 2HPS-F-2B in service.

(2) May be open if 2HPS-F-2B in service.

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ATTACHMENT F

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2.0 IF desired to place the HPSI Pressurization System in service,
THEN perform the following:

- 2.1 Align the HPS pump (2HPS-P-1) suction from RWT by verifying the following valves open:
 - RWT Outlet Local Sample (2BS-13)
 - RWT Outlet Local Sample (2BS-14)
- 2.2 Align the HPS pump (2HPS-P-1) discharge to HPSI Header #2 by verifying the following valves open:
 - HPSI Header #2 Drain (2SI-1056B)
 - HPSI Header #2 Drain (2SI-1057B)

NOTE

If the HPS Pump Air Regulator was previously set, the HPS Pump will begin pumping when its air supply is aligned.

- 2.3 Align air to HPS pump (2HPS-P-1) by slowly opening Drain Downstream of 2IA-5092 (2IA-1461).
- * 2.4 While monitoring pressure on ANY of the following:
 - HPS Pump Discharge Pressure Gage (2HPS-PI-1)
 - HPSI Header #2 Pressure on 2C16 (2PI-5109)
 - HPSI Header #2 Pressure on PMS/PDS (P5109)

Adjust HPS Pump Air Regulator (2HPS-PCV-1) as necessary to pressurize the Green HPSI train to slightly above SIT pressure.

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- 3.0 IF desired to secure the HPSI Pressurization System,
THEN perform the following:

NOTE

The air pressure down stream of 2IA-1461 will gradually bleed out by design after the HPS pump is secured.

- 3.1 Secure the HPS pump by closing Drain Downstream of 2IA-5092 (2IA-1461).
- 3.2 Isolate the HPS discharge from HPSI Header #2 by closing the following valves:
 - HPSI Header #2 Drain (2SI-1056B)
 - HPSI Header #2 Drain (2SI-1057B)
- 3.3 Isolate the HPS suction from the RWT by closing the following valves:
 - RWT Outlet Local Sample (2BS-13)
 - RWT Outlet Local Sample (2BS-14)
- 3.4 IF back leakage exists from the RCS OR SITs into HPSI Header #2,
AND SIT Outlet valves open,
AND HPSI Header #2 NOT pressurized to prevent leakage,
THEN establish a system venting requirement as follows:

NOTE

The venting frequency and location may be modified based on an engineering review of the present back leakage and the location of the resulting gas formation location.

- Enter the 24 hour venting requirement in the station log.
- Enter the 24 hour venting requirement (per Attachment D or Attachment E of this procedure) on the Shift relief sheet with time and date due.
- Verify a condition report exists for this condition.

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ATTACHMENT F

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4.0 IF BOTH of the following are TRUE:

- 2HPS-F-2A filter AND HPS in service
- Desired to determine differential pressure across 2HPS-F-2A

THEN perform the following:

4.1 Secure the HPS pump by closing Drain Downstream of 2IA-5092 (2IA-1461).

4.2 Close HPS Pump Suction Isol (2HPS-21).

4.3 Verify the following valves open:

- 2HPS-F-2A Inlet Isol (2HPS-15)
- 2HPS-F-2A Outlet Isol (2HPS-16)

4.4 Verify the following valves closed:

- 2HPS-F-2B Inlet Isol (2HPS-17)
- 2HPS-F-2B Outlet Isol (2HPS-18)

4.5 Open HPS Pump Suction Press gage 2HPS-PI-3 Isol (2HPS-19).

- Record suction pressure head _____ (P1)

4.6 Open HPS Pump Suction Drain Isol (2HPS-20) - Water will flow to floor drain.

- Record pressure _____ (P2)

4.7 Close 2HPS-20.

4.8 Close 2HPS-19.

4.9 Open 2HPS-21.

4.10 Calculate 2HPS-F-2A differential pressure P3:

$$\begin{array}{rclcl} \text{P1 (psig)} & - & \text{P2 (psig)} & = & \text{P3 (psid)} \\ \text{_____} & - & \text{_____} & = & \text{_____ psid} \end{array}$$

4.11 IF 2HPS-F-2A differential pressure (P3) \geq 20 psid
AND desired to continue HPS operation,
THEN GO TO step 6.0 of this attachment to align 2HPS-F-2B.

4.12 IF 2HPS-F-2A differential pressure (P3) $<$ 20 psid
AND desired to continue HPS operation,
THEN align air to HPS pump (2HPS-P-1) by slowly opening 2IA-1461.

4.13 IF 2HPS-F-2A differential pressure (P3) \geq 20 psid
AND desired to secure HPS operation,
THEN GO TO step 3.0 of this attachment.

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5.0 IF BOTH of the following are TRUE:

- 2HPS-F-2B filter AND HPS in service
- Desired to determine differential pressure across 2HPS-F-2B

THEN perform the following:

5.1 Secure the HPS pump by closing Drain Downstream of 2IA-5092 (2IA-1461).

5.2 Close HPS Pump Suction Isol (2HPS-21).

5.3 Verify the following valves open:

- 2HPS-F-2B Inlet Isol (2HPS-17)
- 2HPS-F-2B Outlet Isol (2HPS-18)

5.4 Verify the following valves closed:

- 2HPS-F-2A Inlet Isol (2HPS-15)
- 2HPS-F-2A Outlet Isol (2HPS-16)

5.5 Open HPS Pump Suction Press gage 2HPS-PI-3 Isol (2HPS-19).

- Record suction pressure head _____ (P1)

5.6 Open HPS Pump Suction Drain Isol (2HPS-20) - Water will flow to floor drain.

- Record pressure _____ (P2)

5.7 Close 2HPS-20.

5.8 Close 2HPS-19

5.9 Open 2HPS-21.

5.10 Calculate 2HPS-F-2B differential pressure P3:

$$\begin{array}{rclcl}
 P1 \text{ (psig)} & - & P2 \text{ (psig)} & = & P3 \text{ (psid)} \\
 \text{_____} & - & \text{_____} & = & \text{_____ psid}
 \end{array}$$

5.11 IF 2HPS-F-2B differential pressure (P3) \geq 20 psid
AND desired to continue HPS operation,
THEN GO TO step 7.0 of this attachment to align 2HPS-F-2A.

5.12 IF 2HPS-F-2B differential pressure (P3) $<$ 20 psid
AND desired to continue HPS operation,
THEN align air to HPS pump (2HPS-P-1) by slowly opening 2IA-1461.

5.13 IF 2HPS-F-2B differential pressure (P3) \geq 20 psid
AND desired to secure HPS operation,
THEN GO TO step 3.0 of this attachment.

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6.0 IF BOTH of the following are TRUE:

- 2HPS-F-2A filter AND HPS in service.
- Desired to align for HPS operation with 2HPS-F-2B in service

THEN perform the following:

6.1 Secure the HPS pump by closing Drain Downstream of 2IA-5092 (2IA-1461).

6.2 Verify the following valves open:

- 2HPS-F-2B Inlet Isol (2HPS-17)
- 2HPS-F-2B Outlet Isol (2HPS-18)

6.3 Verify the following valves closed:

- 2HPS-F-2A Inlet Isol (2HPS-15)
- 2HPS-F-2A Outlet Isol (2HPS-16)

6.4 Align air to HPS pump (2HPS-P-1) by slowly opening 2IA-1461.

7.0 IF BOTH of the following are TRUE:

- 2HPS-F-2B filter AND HPS in service.
- Desired to align for HPS operation with 2HPS-F-2A in service

THEN perform the following:

7.1 Secure the HPS pump by closing Drain Downstream of 2IA-5092 (2IA-1461).

7.2 Verify the following valves open:

- 2HPS-F-2A Inlet Isol (2HPS-15)
- 2HPS-F-2A Outlet Isol (2HPS-16)

7.3 Verify the following valves closed:

- 2HPS-F-2B Inlet Isol (2HPS-17)
- 2HPS-F-2B Outlet Isol (2HPS-18)

7.4 Align air to HPS pump (2HPS-P-1) by slowly opening 2IA-1461.

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SUPPLEMENT 1

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2P-89A QUARTERLY TEST

This test demonstrates operability of HPSI System components associated with HPSI pump (2P-89A) per IST Program and Tech Spec Surveillance Requirement 4.5.2.f.1.

1.0 INITIAL CONDITIONS

- 2P-89A aligned per Section 8.0 of this procedure. _____
- RWT Boron concentration between 2500 and 3000 ppm. _____
- IF plant in Mode 1, 2, 3, OR 4,
THEN RWT level between 91.7% and 100%. _____
- IF plant in Mode 5 OR 6,
THEN RWT level > 7.5%. _____
- Recirc line to RWT NOT being used for any other evolution. _____
- Predictive Maintenance or SE available to take vibration readings. _____
- IF 2P-89B AND 2P-89C operable,
THEN 2P-89C aligned to Red Train per Attachment B of this procedure. _____
- IF anytime during performance of this Supplement temporary test gauge needed in place of permanently installed gauge,
THEN verify the following:
 - Test gauge calibration date current.
 - Accuracy of test gauge within $\pm 1\%$ of full scale.
 - Range of test gauge less than three times normal process value.
 - Test gauge number recorded in TEST INST column of Section 3.0.
 - Operator remains in area while gage aligned for use.

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SUPPLEMENT 1

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2.0 TEST METHOD

NOTE

Steps 2.1 through 2.5 may be performed in any order.

2.1 Verify the following valves open:

- HPSI 2P-89A Recirc Isol (2CV-5126-1) _____
- ESF Mini-Recirc Header Isol (2CV-5628-2) _____
- RWT Recirc and Test Line Inlet to RWT (2BS-26) _____
- RWT Outlet (2CV-5630-1) _____
- SW ESF Header Isol (2CV-1400-1) _____

2.2 Verify SDC Hx Room Coolers secured AND in NORMAL AFTER STOP:

- 2VUC-1A _____
- 2VUC-1B _____

NOTE

- 2P-89A is operable if oil level visible in Oiler Glass bubbler.
- 2P-89C is operable if the oil level in the sight glass is between the high and low level marks. The sight glass is located on the opposite side of the bearing housing from the oiler.

2.3 Check 2P-89C pump AND motor oil levels. _____

2.4 Check 2P-89A pump AND motor oil levels. _____

2.5 Align suction pressure gauge (2PI-5090) by opening the following valves:

- 2SI-5090A _____
- 2SI-5090B _____

2.6 Start 2P-89A. _____

2.7 Check the following fans auto start:

- SDC Hx Room cooler (2VUC-1A) _____
- SDC Hx Room cooler (2VUC-1B) _____

2.8 IF 2P-89C aligned to A ESF train,
THEN check 2P-89C Discharge Stop Check (2SI-10C) closed by
2P-89C NOT rotating AND document in Table 2. _____

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SUPPLEMENT 1

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- 2.9 Align discharge pressure gage (2PI-5091) by opening the following valves:
- 2SI-1042A _____
 - 2SI-1043A _____
- 2.10 Open EITHER of the following to bleed off pressure trapped between discharge check valve and injection MOVs: _____
- HPSI Hdr 1 to 2P-32A Loop valve (2CV-5015-1)
 - HPSI Hdr 1 to 2P-32B Loop valve (2CV-5035-1)
- 2.11 Close valve opened (2CV-5015-1 or 2CV-5035-1). _____
- 2.12 IF SIT Outlet valves open
AND 2PIS-5000/P5000 OR 2PIS-5020/P5020 > 750 psig, (2K07-A6)
AND relieving pressure to SIT desired
(MOST preferred method - does NOT cause SIT leakage),
THEN perform the following:
- * 2.12.1 Monitor SIT pressures.
- 2.12.2 Open affected SIT Check Valve Bypass:
- 2SV-5004 for A SIT _____
 - 2SV-5024 for B SIT _____
- 2.12.3 Cycle affected SIT Drain open and closed as necessary to relieve trapped pressure:
- 2SV-5001-1 for A SIT _____
 - 2SV-5021-1 for B SIT _____
- 2.12.4 Verify 2PIS-5000 and 2PIS-5020 at SIT pressure. _____
- 2.12.5 Close SIT Check Valve Bypass opened in previous step: _____
- 2SV-5004 for A SIT
 - 2SV-5024 for B SIT

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SUPPLEMENT 1

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CAUTION

Opening 2CV-5081 and any SIT drain will rapidly lower SIT level and pressure.

- 2.13 IF SIT Outlet valves open
 AND 2PIS-5000/P5000 OR 2PIS-5020/P5020 > 750 psig, (2K07-A6)
 AND relieving pressure to SIT Drain Header desired
 (LEAST preferred method - causes SIT leakage during header
 repressurization),
 THEN perform the following:
- * 2.13.1 Monitor SIT pressures.
- 2.13.2 Cycle SIT Drain to RDT (2CV-5081) open and closed. _____
- 2.13.3 Cycle affected SIT Drain open and closed: _____
- 2SV-5001-1 for A SIT
- 2SV-5021-1 for B SIT
- 2.13.4 Verify 2PIS-5000 and 2PIS-5020 at SIT pressure. _____
- 2.14 WHEN at least two minutes of stable pump operation complete, _____
 THEN record pump data in Table 1.
- 2.15 Inspect pump seals, valve packing, and flange gaskets in _____
 HPSI pump room for atmospheric leakage. Record any
 discrepancies in Comments section.
- 2.16 IF mechanical seal leakage greater than 17 DPM, _____
 THEN initiate Condition Report.
- 2.17 WHEN data collection and inspection complete, _____
 THEN stop 2P-89A.
- {4.3.2} 2.18 **Isolate gauges by closing the following valves:**
 (outboard then inboard - will not over range gage due to
 piston affect - ER010827E201)
- 2.18.1 2SI-5090B _____
- 2.18.2 2SI-5090A _____
- 2.18.3 2SI-1043A _____
- 2.18.4 2SI-1042A _____

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SUPPLEMENT 1

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- 2.19 IF in Mode 1, 2, 3, OR 4 with 2P-89C aligned to A ESF train
AND 2P-89C operable,
THEN perform the following:
- 2.19.1 Place 2P-89C in NORMAL AFTER STOP. _____
- 2.19.2 Place 2P-89A in PULL TO LOCK. _____
- 2.19.3 Verify the following valves open:
- HPSI 2P-89C Recirc Isol (2CV-5127-1) _____
 - 2VUC-11A SW Inlet (2CV-1407-1) _____
- 2.19.4 Start 2P-89C and verify proper discharge pressure (2PI-5108). _____
- 2.19.5 Check 2P-89A Discharge Stop Check (2SI-10A) closed by 2P-89A NOT rotating AND document in Table 2. _____
- 2.19.6 Secure 2P-89C. _____
- 2.19.7 IF desired to place 2P-89A in service,
THEN perform the following:
- A. Place 2P-89A in NORMAL AFTER STOP. _____
- B. Place 2P-89C in PULL TO LOCK. _____
- 2.20 IF in Mode 5 OR 6 with 2P-89C aligned to A ESF train
AND 2P-89C operable,
THEN perform the following:
- 2.20.1 Place 2P-89A in PULL TO LOCK. _____
- 2.20.2 Place 2P-89C in NORMAL AFTER STOP. _____
- 2.20.3 Verify the following valves open:
- HPSI 2P-89C Recirc Isol (2CV-5127-1) _____
 - 2VUC-11A SW Inlet (2CV-1407-1) _____
- 2.20.4 Start 2P-89C and verify proper discharge pressure (2PI-5108). _____
- 2.20.5 Check 2P-89A Discharge Stop Check (2SI-10A) closed by 2P-89A NOT rotating AND document in Table 2. _____
- 2.20.6 Secure 2P-89C. _____

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SUPPLEMENT 1

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2.20.7 IF desired to place 2P-89A in service,
THEN perform the following:

A. Verify at least two HPSI pumps in PULL TO LOCK. _____

B. Place 2P-89A in NORMAL AFTER STOP. _____

2.21 Stop the following fans as desired:

- 2VUC-1A _____
- 2VUC-1B _____
- 2VUC-11A _____
- 2VUC-11B _____

2.22 IF 2PI-5091 AND 2PI-5108 differ by > 30 psig,
THEN submit WR/WO to have instruments calibrated. _____

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SUPPLEMENT 1

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3.0 ACCEPTANCE CRITERIA

3.1 Record values observed during 2P-89A operation below AND compare with limiting range of values for operability.

TABLE 1					
TEST QUANTITY	INSTRUMENT (INCLUDE TEST INST)	MEASURED VALUE	ACCEPTABLE NORMAL RANGE	LIMITING RANGE FOR OPERABILITY	IS DATA IN LIMITING RANGE?
Running Suct. Pressure	2PI-5090 (local)	psig	≥ 8 psig	≥ 8 psig	YES NO
Discharge Pressure	2PI-5091 (local)	psig	N/A	N/A	N/A
	2PI-5108 (2C17)	psig	N/A	N/A	N/A
RWT Temperature	2TIS-5675 (2C17)	°F	40 to 110°F	N/A	N/A
Pump ΔP {4.3.1}	2PI-5091 - 2PI-5090	psid	N/A	(1) to 1593.2 psid	YES NO
Motor Running Amps (CR-1-96-0272-07)	Ammeter at 2A-306	ØA _____ Amps ØB _____ Amps ØC _____ Amps	N/A	N/A	N/A
Inboard Brg Radial #1 Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Inboard Brg Radial #2 Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Inboard Brg Axial Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Outboard Brg Radial #1 Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Outboard Brg Radial #2 Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Outboard Brg Axial Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO

Vibration Instrument Cal Due Date _____

Vibration Data Collected By _____

Note 1: For RWT temperature (T), minimum acceptable pump ΔP is:

$$1372.9 + 20.41 \text{ (Instrument error)} - [(T-40)/4] \text{ psid}$$

$$\text{Minimum } \Delta P = 1393.31 - [(\text{_____} - 40)/4] = \text{_____ psid}$$

3.2 Independently verify pump ΔP calculation. _____

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SUPPLEMENT 1

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3.3 Document observation of check valve stroke in Table 2.

TABLE 2			
CHECK VALVE	TEST DIRECTION	TEST CRITERIA	IS PROPER VALVE STROKE INDICATED?
2SI-10C	Closed	2P-89C NOT rotating	YES NO N/A
2SI-10A	Closed	2P-89A NOT rotating	YES NO N/A

3.4 IF NO circled in Table 1 or 2,
THEN perform the following:

- Declare affected component inoperable.
- Refer to Tech Spec 3.5.2 or 3.5.3.
- Notify Shift Manager.
- Initiate WR/WO as applicable.

NOTE

If HPSI pump 2P-89B OR 2P-89C inoperable, then 2SI-10C/2SI-10A testing may be deferred until inoperable HPSI pump restored to operable as per IST Coordinator.

3.5 IF 2SI-10C AND/OR 2SI-10A NOT tested (N/A circled in Table 2),
THEN perform the following:

- Initiate notification to perform test during current quarter OR as directed by IST Coordinator.
- Annotate on status board.
- Annotate in Work Exceptions section of WR/WO.

3.6 Pump Data recorded in database AND reviewed by SRO.

3.7 IF this surveillance performed as PMT,
THEN complete Unit 2 IST Data Collection (1015.0160).

Comments _____

Performed By _____ Date _____

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SUPPLEMENT 1

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4.0 SUPERVISOR REVIEW AND ANALYSIS

- 4.1 Do all measured values recorded in ACCEPTANCE CRITERIA fall within specified LIMITING RANGE FOR OPERABILITY? YES NO
- 4.2 Do all measured values recorded in ACCEPTANCE CRITERIA fall within ACCEPTABLE NORMAL RANGE? (N/A if all results outside normal range also outside limiting range.) YES NO N/A
- 4.3 IF NO answered to 4.1,
THEN perform the following corrective actions:
- Verify LCO Tracking Record initiated per Conduct of Operations (1015.001). _____
 - Verify Condition Report initiated. _____
- 4.4 IF NO circled in 4.2,
THEN perform the following corrective actions:
- Verify WR/WO has been initiated. _____
 - Complete Surveillance Test Schedule Change Request (1000.009D) to double test frequency. _____

Comments _____

- 4.5 Are all administrative requirements of this test satisfied? YES NO

Supervisor _____ Date _____

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SUPPLEMENT 2

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2P-89B QUARTERLY TEST

This test demonstrates operability of HPSI System components associated with HPSI pump (2P-89B) per IST Program AND Tech Spec Surveillance Requirement 4.5.2.f.1.

1.0 INITIAL CONDITIONS

- 2P-89B aligned per Section 8.0 of this procedure. _____
- RWT Boron concentration between 2500 and 3000 ppm. _____
- IF plant in Mode 1, 2, 3 OR 4,
THEN RWT level between 91.7% and 100%. _____
- IF plant in Mode 5 OR 6,
THEN RWT level > 7.5%. _____
- Recirc line to RWT NOT being used for any other evolution. _____
- Predictive Maintenance OR SE available to take vibration readings. _____
- IF 2P-89A AND 2P-89C operable,
THEN 2P-89C aligned to Green Train per Attachment C of
this procedure. _____
- IF anytime during performance of this Supplement temporary
test gauge needed in place of permanently installed gauge,
THEN verify the following:
 - Test gauge calibration date current.
 - Accuracy of test gauge within $\pm 1\%$ of full scale.
 - Range of test gauge less than three times normal process value.
 - Test gauge number recorded in TEST INST column of Section 3.0.
 - Operator remains in area while gage aligned for use.

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SUPPLEMENT 2

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2.0 TEST METHOD

NOTE

Steps 2.1 through 2.5 may be performed in any order.

2.1 Verify the following valves open:

- HPSI 2P-89B Recirc Isol (2CV-5128-1) _____
- ESF Mini-Recirc Header Isol (2CV-5628-2) _____
- RWT Recirc and Test Line Inlet to RWT (2BS-26) _____
- RWT 2T-3 Outlet (2CV-5631-2) _____
- SW ESF Header Isol (2CV-1406-2) _____

2.2 Verify SDC Hx Room Coolers secured AND in NORMAL AFTER STOP:

- 2VUC-1D _____
- 2VUC-1E _____

NOTE

- 2P-89B is operable if oil level visible in Oiler Glass bubbler.
- 2P-89C is operable if the oil level in the sight glass is between the high and low level marks. The sight glass is located on the opposite side of the bearing housing from the oiler.

2.3 Check 2P-89C pump AND motor oil levels. _____

2.4 Check 2P-89B pump AND motor oil levels. _____

2.5 Align suction pressure gauge (2PI-5100) by opening the following valves:

- 2SI-5100A _____
- 2SI-5100B _____

2.6 Start 2P-89B. _____

2.7 Check the following fans auto start:

- SDC Hx Room cooler (2VUC-1D) _____
- SDC Hx Room cooler (2VUC-1E) _____

2.8 IF 2P-89C aligned to B ESF train,
THEN check 2P-89C Discharge Stop Check (2SI-10C) closed by
2P-89C NOT rotating AND document in Table 2. _____

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SUPPLEMENT 2

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- 2.9 Align discharge pressure gage (2PI-5101) by opening the following valves:
- 2SI-1042B _____
 - 2SI-1043B _____
- 2.10 Open EITHER of the following to bleed off pressure trapped between discharge check valve and injection MOVs: _____
- HPSI Hdr 2 to 2P-32A Loop valve (2CV-5016-2)
 - HPSI Hdr 2 to 2P-32B Loop valve (2CV-5036-2)
- 2.11 Close valve opened (2CV-5016-2 or 2CV-5036-2). _____
- 2.12 IF SIT Outlet valves open
AND 2PIS-5000/P5000 OR 2PIS-5020/P5020 > 750 psig, (2K07-A6)
AND relieving pressure to SIT desired
(MOST preferred method - does NOT cause SIT leakage),
THEN perform the following:
- * 2.12.1 Monitor SIT pressures.
- 2.12.2 Open affected SIT Check Valve Bypass: _____
- 2SV-5004 for A SIT
 - 2SV-5024 for B SIT
- 2.12.3 Cycle affected SIT Drain open and closed as necessary to relieve trapped pressure: _____
- 2SV-5001-1 for A SIT
 - 2SV-5021-1 for B SIT
- 2.12.4 Verify 2PIS-5000 and 2PIS-5020 at SIT pressure. _____
- 2.12.5 Close SIT Check Valve Bypass opened in previous step: _____
- 2SV-5004 for A SIT
 - 2SV-5024 for B SIT

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SUPPLEMENT 2

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CAUTION

Opening 2CV-5081 and any SIT drain will rapidly lower SIT level and pressure.

- 2.13 IF SIT Outlet valves open
 AND 2PIS-5000/P5000 OR 2PIS-5020/P5020 > 750 psig, (2K07-A6)
 AND relieving pressure to SIT Drain Header desired
 (LEAST preferred method - causes SIT leakage during header
 repressurization),
 THEN perform the following:
- * 2.13.1 Monitor SIT pressures.
- 2.13.2 Cycle SIT Drain to RDT (2CV-5081) open and closed. _____
- 2.13.3 Cycle affected SIT Drain open and closed: _____
- 2SV-5001-1 for A SIT
- 2SV-5021-1 for B SIT
- 2.13.4 Verify 2PIS-5000 and 2PIS-5020 at SIT pressure. _____
- 2.14 WHEN at least two minutes of stable pump operation complete, _____
 THEN record pump data in Table 1.
- 2.15 Inspect pump seals, valve packing, and flange gaskets in _____
 HPSI pump room for atmospheric leakage. Record any
 discrepancies in Comments section.
- 2.16 IF mechanical seal leakage greater than 17 DPM, _____
 THEN initiate Condition Report.
- 2.17 WHEN data collection and inspection complete, _____
 THEN stop 2P-89B.
- {4.3.2} 2.18 **Isolate gauges by closing the following valves:**
 (outboard then inboard - will not over-range gage due to
 piston affect - ER010827E201)
- 2.18.1 2SI-5100B _____
- 2.18.2 2SI-5100A _____
- 2.18.3 2SI-1043B _____
- 2.18.4 2SI-1042B _____

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2.19 IF in Mode 1, 2, 3, or 4 with 2P-89C aligned to B ESF train
AND operable,
THEN perform the following:

2.19.1 Place 2P-89C in NORMAL AFTER STOP. _____

2.19.2 Place 2P-89B in PULL TO LOCK. _____

2.19.3 Verify the following valves open:

- HPSI 2P-89C Recirc Isol (2CV-5127-1) _____
- 2VUC-11B SW Inlet (2CV-1408-2) _____

2.19.4 Start 2P-89C and verify proper discharge pressure
(2PI-5109). _____

2.19.5 Check 2P-89B Discharge Stop Check (2SI-10B) closed
by 2P-89B NOT rotating and document in Table 2. _____

2.19.6 Secure 2P-89C. _____

2.19.7 IF desired to place 2P-89B in service,
THEN perform the following:

A. Place 2P-89B in NORMAL AFTER STOP. _____

B. Place 2P-89C in PULL TO LOCK. _____

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SUPPLEMENT 2

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- 2.20 IF in Mode 5 OR 6 with 2P-89C aligned to B ESF Train
AND operable,
THEN perform the following:
- 2.20.1 Place 2P-89B in PULL TO LOCK. _____
- 2.20.2 Place 2P-89C in NORMAL AFTER STOP. _____
- 2.20.3 Verify the following valves open:
- HPSI 2P-89C Recirc Isol (2CV-5127-1) _____
 - 2VUC-11B SW Inlet (2CV-1408-2) _____
- 2.20.4 Start 2P-89C AND verify proper discharge pressure (2PI-5109). _____
- 2.20.5 Check 2P-89B Discharge Stop Check (2SI-10B) closed by 2P-89B NOT rotating AND document in Table 2. _____
- 2.20.6 Secure 2P-89C. _____
- 2.20.7 IF desired to place 2P-89B in service,
THEN perform the following:
- A. Verify at least two HPSI pumps in PULL TO LOCK. _____
- B. Place 2P-89B in NORMAL AFTER STOP. _____
- 2.21 Stop the following fans as desired:
- 2VUC-1D _____
 - 2VUC-1E _____
 - 2VUC-11A _____
 - 2VUC-11B _____
- 2.22 IF 2PI-5101 AND 2PI-5109 differ by > 30 psig,
THEN submit WR/WO to have instruments calibrated. _____

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SUPPLEMENT 2

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3.0 ACCEPTANCE CRITERIA

3.1 Record values observed during 2P-89B operation below AND compare with limiting range of values for operability.

TABLE 1					
TEST QUANTITY	INSTRUMENT (INCLUDE TEST INST)	MEASURED VALUE	ACCEPTABLE NORMAL RANGE	LIMITING RANGE FOR OPERABILITY	IS DATA IN LIMITING RANGE?
Running Suct. Pressure	2PI-5100 (local)	psig	≥ 8 psig	≥ 8 psig	YES NO
Discharge Pressure	2PI-5101 (local)	psig	N/A	N/A	N/A
	2PI-5109 (2C16)	psig	N/A	N/A	N/A
RWT Temperature	2TIS-5675 (2C17)	°F	40 to 110°F	N/A	N/A
Pump ΔP {4.3.1}	2PI-5101 - 2PI-5100	psid	N/A	(1) to 1612.8 psid	YES NO
Motor Running Amps (CR-1-96-0272-07)	Ammeter at 2A-406	ØA _____ Amps ØB _____ Amps ØC _____ Amps	N/A	N/A	N/A
Inboard Brg Radial #1 Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Inboard Brg Radial #2 Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Inboard Brg Axial Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Outboard Brg Radial #1 Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Outboard Brg Radial #2 Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Outboard Brg Axial Vibes		in/sec	≤ 0.232 in/sec	≤ 0.558 in/sec	YES NO

Vibration Instrument Cal Due Date _____

Vibration Data Collected By _____

Note 1: For RWT temperature (T), minimum acceptable pump ΔP is:

$$1372.9 + 20.41 \text{ (Instrument error)} - [(T-40)/4] \text{ psid}$$

$$\text{Minimum } \Delta P = 1393.31 - [(\text{_____} - 40)/4] = \text{_____ psid}$$

3.2 Independently verify pump ΔP calculation. _____

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SUPPLEMENT 2

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3.3 Document observation of check valve stroke in Table 2.

TABLE 2			
CHECK VALVE	TEST DIRECTION	TEST CRITERIA	IS PROPER VALVE STROKE INDICATED?
2SI-10C	Closed	2P-89C NOT rotating	YES NO N/A
2SI-10B	Closed	2P-89B NOT rotating	YES NO N/A

3.4 IF NO circled in Table 1 or 2,
THEN perform the following:

- Declare affected component inoperable.
- Refer to Tech Spec 3.5.2 OR 3.5.3.
- Notify Shift Manager.
- Initiate WR/WO as applicable.

NOTE

If HPSI pump 2P-89A OR 2P-89C inoperable, then 2SI-10C/2SI-10B testing may be deferred until inoperable HPSI pump restored to operable as per IST Coordinator.

3.5 IF 2SI-10C AND/OR 2SI-10B NOT tested (N/A circled in Table 2),
THEN perform the following:

- Initiate notification to perform test during current quarter OR as directed by IST Coordinator.
- Annotate on status board.
- Annotate in Work Exceptions section of WR/WO.

3.6 Pump Data recorded in database AND reviewed by SRO.

3.7 IF this surveillance performed as PMT,
THEN complete Unit 2 IST Data Collection (1015.0160).

Comments _____

Performed By _____ Date _____

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SUPPLEMENT 2

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4.0 SUPERVISOR REVIEW AND ANALYSIS

- 4.1 Do all measured values recorded in ACCEPTANCE CRITERIA fall within specified LIMITING RANGE FOR OPERABILITY? YES NO
- 4.2 Do all measured values recorded in ACCEPTANCE CRITERIA fall within ACCEPTABLE NORMAL RANGE? (N/A if all results outside normal range also outside limiting range.) YES NO N/A
- 4.3 IF NO answered to 4.1,
THEN perform the following corrective actions:
- Verify LCO Tracking Record initiated per Conduct of Operations (1015.001). _____
 - Verify Condition Report initiated. _____
- 4.4 IF NO circled in 4.2,
THEN perform the following corrective actions:
- Verify WR/WO has been initiated. _____
 - Complete Surveillance Test Schedule Change Request (1000.009D) to double test frequency. _____
- Comments _____

- 4.5 Are all administrative requirements of this test satisfied? YES NO

Supervisor _____ Date _____

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SUPPLEMENT 3

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2P-89C QUARTERLY TEST

This test demonstrates operability of HPSI System components associated with HPSI pump (2P-89C) per IST Program AND Tech Spec Surveillance Requirement 4.5.2.f.1.

1.0 INITIAL CONDITIONS

- 2P-89C aligned per Section 8.0 of this procedure. _____
- RWT Boron concentration between 2500 and 3000 ppm. _____
- IF plant in Mode 1, 2, 3 OR 4,
THEN RWT level between 91.7% and 100%. _____
- IF plant in Mode 5 OR 6,
THEN RWT level > 7.5%. _____
- Recirc line to RWT NOT being used for any other evolution. _____
- Predictive Maintenance OR SE available to take vibration readings. _____
- IF anytime during performance of this Supplement temporary test gauge needed in place of permanently installed gauge, THEN verify the following:
 - Test gauge calibration date current. _____
 - Accuracy of test gauge within $\pm 1\%$ of full scale. _____
 - Range of test gauge less than three times normal process value. _____
 - Test gauge number recorded in TEST INST column of Section 3.0. _____
 - Operator remains in area while gage aligned for use. _____

2.0 TEST METHOD

NOTE

Steps 2.1 through 2.5 may be performed in any order.

2.1 Verify the following valves open:

- HPSI 2P-89C Recirc Isol (2CV-5127-1) _____
- ESF Mini-Recirc Header Isol (2CV-5628-2) _____
- RWT Recirc and Test Line Inlet to RWT (2BS-26) _____

2.2 IF 2P-89C powered from 2A3,
THEN verify the following:

- RWT 2T-3 Outlet (2CV-5630-1) open. _____
- SW ESF Header Isol (2CV-1400-1) open. _____
- 2VUC-11A SW Inlet (2CV-1407-1) open. _____
- Room Cooler (2VUC-11A) secured in NORMAL AFTER STOP. _____

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2.3 IF 2P-89C powered from 2A4,
THEN verify the following:

- RWT 2T-3 Outlet (2CV-5631-2) open. _____
- SW ESF Header Isol (2CV-1406-2) open. _____
- 2VUC-11B SW Inlet (2CV-1408-2) open. _____
- Room Cooler (2VUC-11B) secured in NORMAL AFTER STOP. _____

NOTE

2P-89C HPSI pump is operable if the oil level in the sight glass is between the high and low level marks. The sight glass is located on the opposite side of the bearing housing from the oiler.

2.4 Check 2P-89C pump AND motor oil levels. _____

2.5 Align suction pressure gage (2PI-5098) by opening the following valves:

- 2SI-5098A _____
- 2SI-5098B _____

2.6 Start 2P-89C. _____

2.7 IF 2P-89C powered from 2A3,
THEN check 2VUC-11A starts. _____

2.8 IF 2P-89C powered from 2A4,
THEN check 2VUC-11B starts. _____

2.9 Align discharge pressure gage (2PI-5102) by opening the following valves:

- 2SI-1042C _____
- 2SI-1043C _____

2.10 IF 2P-89C aligned to HPSI Header #1,
THEN open either of the following to bleed off pressure trapped between discharge check valve and injection MOVs:

- HPSI Hdr 1 to 2P-32A Loop valve (2CV-5015-1) _____
- HPSI Hdr 1 to 2P-32C Loop valve (2CV-5055-1) _____

2.11 IF 2P-89C aligned to HPSI Header #2,
THEN open either of the following to bleed off pressure trapped between discharge check valve and injection MOVs.

- HPSI Hdr 2 to 2P-32A Loop valve (2CV-5016-2) _____
- HPSI Hdr 2 to 2P-32C Loop valve (2CV-5056-2) _____

2.12 Close valve opened above. _____

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2.13 IF SIT Outlet valves open
AND 2PIS-5000/P5000 OR 2PIS-5040/P5040 > 750 psig, (2K07-A6)
AND relieving pressure to SIT desired (preferred method),
THEN perform the following:

* 2.13.1 Monitor SIT pressures.

2.13.2 Open affected SIT Check Valve Bypass: _____

- 2SV-5004 for A SIT
- 2SV-5044 for C SIT

2.13.3 Cycle affected SIT Drain open AND closed as necessary to relieve trapped pressure: _____

- 2SV-5001-1 for A SIT
- 2SV-5041-2 for C SIT

2.13.4 Verify 2PIS-5000 and 2PIS-5040 at SIT pressure. _____

2.13.5 Close SIT Check Valve Bypass opened above: _____

- 2SV-5004 for A SIT
- 2SV-5044 for C SIT

CAUTION

Opening 2CV-5081 and any SIT drain will rapidly lower SIT level and pressure.

2.14 IF SIT Outlet valves open,
AND 2PIS-5000/P5000 OR 2PIS-5040/P5040 > 750 psig, (2K07-A6),
AND relieving pressure to SIT Drain Header desired
(LEAST preferred method - causes SIT leakage during header
repressurization),
THEN perform the following:

* 2.14.1 Monitor SIT pressures.

2.14.2 Cycle SIT Drain to RDT (2CV-5081) open AND closed. _____

2.14.3 Cycle affected SIT Drain open AND closed: _____

- 2SV-5001-1 for A SIT
- 2SV-5041-2 for C SIT

2.14.4 Verify 2PIS-5000 and 2PIS-5040 at SIT pressure. _____

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- 2.15 WHEN at least two minutes of stable pump operation complete, THEN record pump data in Table 1. _____
- 2.16 Inspect pump seals, valve packing, AND flange gaskets in HPSI pump room for atmospheric leakage. Record any discrepancies in Comments section. _____
- 2.17 IF mechanical seal leakage greater than 17 DPM, THEN initiate Condition Report. _____
- 2.18 WHEN data collection AND inspection complete, THEN stop 2P-89C. _____
- 2.19 IF 2P-89C NOT required to be aligned for auto start on SIAS, THEN place 2P-89C in PULL TO LOCK. _____
- {4.3.2} 2.20 **Isolate gauges by closing the following valves:
(outboard then inboard - will not overrange gage due to
piston affect - ER010827E201)**
- 2.20.1 2SI-5098B _____
- 2.20.2 2SI-5098A _____
- 2.20.3 2SI-1043C _____
- 2.20.4 2SI-1042C _____
- 2.21 Verify the following fans secured as desired:
- 2VUC-11A _____
 - 2VUC-11B _____
- 2.22 IF 2PI-5102 AND 2PI-5108/2PI-5109 differ by > 30 psig, THEN submit WR/WO to have instruments calibrated. _____

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3.0 ACCEPTANCE CRITERIA

3.1 Record values observed during 2P-89C operation below AND compare with limiting range of values for operability.

TABLE 1					
TEST QUANTITY	INSTRUMENT (INCLUDE TEST INST)	MEASURED VALUE	ACCEPTABLE NORMAL RANGE	LIMITING RANGE FOR OPERABILITY	IS DATA IN LIMITING RANGE?
Running Suct. Pressure	2PI-5098 (local)	psig	≥ 8 psig	≥ 8 psig	YES NO
Discharge Pressure	2PI-5102 (local)	psig	N/A	N/A	N/A
	2PI-5108 or 2PI-5109	psig	N/A	N/A	N/A
RWT Temperature	2TIS-5675 (2C17)	°F	40 to 110°F	N/A	N/A
Pump ΔP {4.3.1}	2PI-5102 - 2PI-5098	Psid	N/A	(1) to 1630.2 psid	YES NO
Motor Running Amps (CR-1-96-0272-07)	Ammeter at 2A-307/407 (Circle meter used)	ØA _____ Amps ØB _____ Amps ØC _____ Amps	N/A	N/A	N/A
Inboard Brg Radial #1 Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Inboard Brg Radial #2 Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Inboard Brg Axial Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Outboard Brg Radial #1 Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Outboard Brg Radial #2 Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Outboard Brg Axial Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO

Vibration Instrument Cal Due Date _____

Vibration Data Collected By _____

Note 1: For RWT temperature (T), minimum acceptable pump ΔP is:

$$1372.9 + 20.41 \text{ (Instrument error)} - [(T-40)/4] \text{ psid}$$

$$\text{Minimum } \Delta P = 1393.31 - [(\text{_____} - 40)/4] = \text{_____ psid}$$

3.2 Independently verify pump ΔP calculation. _____

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3.3 IF NO circled in Table 1
THEN perform the following:

- Declare affected component inoperable.
- Refer to Tech Spec 3.5.2 or 3.5.3.
- Notify Shift Manager.
- Initiate WR/WO as applicable.

3.4 Pump Data recorded in database and reviewed by SRO.

3.5 IF this surveillance performed as PMT,
THEN complete Unit 2 IST Data Collection (1015.0160).

Comments _____

Performed By _____ Date _____

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4.0 SUPERVISOR REVIEW AND ANALYSIS

- 4.1 Do all measured values recorded in ACCEPTANCE CRITERIA fall within specified LIMITING RANGE FOR OPERABILITY? YES NO
- 4.2 Do all measured values recorded in ACCEPTANCE CRITERIA fall within ACCEPTABLE NORMAL RANGE? (N/A if all results outside normal range also outside limiting range.) YES NO N/A
- 4.3 IF NO answered to 4.1,
THEN perform the following corrective actions:
- Verify LCO Tracking Record initiated per Conduct of Operations (1015.001). _____
 - Verify Condition Report initiated. _____
- 4.4 IF NO circled in 4.2,
THEN perform the following corrective actions:
- Verify WR/WO has been initiated. _____
 - Complete Surveillance Test Schedule Change Request (1000.009D) to double test frequency. _____

Comments _____

- 4.5 Are all administrative requirements of this test satisfied? YES NO

Supervisor _____ Date _____

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QUARTERLY HPSI VALVE STROKE TEST

This test demonstrates operability of HPSI motor-operated valves per IST Program. This test also demonstrates HPSI check valves will close to prevent reverse flow per IST Program.

1.0 INITIAL CONDITIONS

NOTE

If 2PIS-5000, 2PIS-5020, 2PIS-5040 OR 2PIS-5060 inoperable, then their respective computer points P5000, P5020, P5040 OR P5060 may be used. Indicate any computer points used in Remarks section of this supplement.

- Verify all HPSI pumps secured. _____
- Currently calibrated Stopwatch Serial No. _____. _____
- IF SIT Outlet valves open,
THEN verify 2PIS-5000, 2PIS-5020, 2PIS-5040, and 2PIS-5060 read approximately SIT pressure. _____
- IF SIT Outlet valves closed,
THEN verify RCS Pressure > 350 psia. _____
- Verify RDT available to depressurize SIT drain header. _____
- IF RCS pressure > 1500 psia,
THEN verify HPSI pump on HPSI Header #1 available. _____

2.0 TEST METHOD

- 2.1 Open and time HPSI HDR #2 to 2P-32A (2CV-5016-2). _____
- 2.2 Record stroke time to nearest tenth second in Table 2. _____
- 2.3 Close 2CV-5016-2. _____
- 2.4 Open and time HPSI HDR #2 to 2P-32B (2CV-5036-2). _____
- 2.5 Record stroke time to nearest tenth second in Table 2. _____
- 2.6 Close 2CV-5036-2. _____
- 2.7 Open and time HPSI HDR #2 to 2P-32C (2CV-5056-2). _____
- 2.8 Record stroke time to nearest tenth second in Table 2. _____
- 2.9 Close 2CV-5056-2. _____
- 2.10 Open and time HPSI HDR #2 to 2P-32D (2CV-5076-2). _____
- 2.11 Record stroke time to nearest tenth second in Table 2. _____
- 2.12 Close 2CV-5076-2. _____

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2.13 Stroke HPSI HDR #1 to 2P-32A (2CV-5015-1) AND verify check valve 2SI-13A closure as follows:

- 2.13.1 Determine 2SI-13A differential pressure. _____

$$\frac{\text{_____}}{(2\text{PIS}-5000)} \text{ psig} - \frac{\text{_____}}{(2\text{PI}-5108)} \text{ psig} = \text{_____} \text{ psid}$$
- 2.13.2 IF 2SI-13A differential pressure < 300 psid,
THEN lower HPSI header pressure using Section 3.0. _____
- 2.13.3 Open and time 2CV-5015-1. _____
- 2.13.4 Record stroke time to nearest tenth second in Table 1. _____

NOTE

Following steps verify check valve closure, but do NOT determine leakage. Readings need to be taken in timely manner because differential pressure might decay. When 2CV-5015-1 reaches full open, if DP above minimum requirements then check valve closure verified.

- 2.13.5 WHEN 2CV-5015-1 fully open,
THEN determine 2SI-13A differential pressure. _____

$$\frac{\text{_____}}{(2\text{PIS}-5000)} \text{ psig} - \frac{\text{_____}}{(2\text{PI}-5108)} \text{ psig} = \text{_____} \text{ psid}$$
- 2.13.6 Restore 2CV-5015-1 to original position. _____
- 2.13.7 IF 2SI-13A differential pressure > 30 psid,
THEN record ΔP in Table 3. _____
- 2.13.8 IF 2SI-13A differential pressure ≤ 30 psid,
AND RCS pressure > 1500 psia,
THEN perform the following:
- A. Flush 2SI-13A using Section 4.0. _____
- B. Open 2CV-5015-1. _____
- C. Determine 2SI-13A differential pressure. _____

$$\frac{\text{_____}}{2\text{PIS}-5000} \text{ psig} - \frac{\text{_____}}{2\text{PI}-5108} \text{ psig} = \text{_____} \text{ psid}$$
- D. Restore 2CV-5015-1 to original position. _____
- E. Record 2SI-13A ΔP in Table 3. _____

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2.14 Stroke HPSI HDR #1 to 2P-32B (2CV-5035-1) AND verify check valve 2SI-13B closure as follows:

- 2.14.1 Determine 2SI-13B differential pressure.

$$\frac{\text{_____}}{(2\text{PIS-5020})} \text{ psig} - \frac{\text{_____}}{(2\text{PI-5108})} \text{ psig} = \text{_____} \text{ psid}$$
- 2.14.2 IF 2SI-13B differential pressure < 300 psid,
THEN lower HPSI header pressure using Section 3.0.
- 2.14.3 Open and time 2CV-5035-1.
- 2.14.4 Record stroke time to nearest tenth second in Table 1.

NOTE

Following steps verify check valve closure, but do NOT determine leakage. Readings need to be taken in timely manner because differential pressure might decay. When 2CV-5035-1 reaches full open, if DP above minimum requirements then check valve closure verified.

- 2.14.5 WHEN 2CV-5035-1 fully open,
THEN determine 2SI-13B differential pressure.

$$\frac{\text{_____}}{(2\text{PIS-5020})} \text{ psig} - \frac{\text{_____}}{(2\text{PI-5108})} \text{ psig} = \text{_____} \text{ psid}$$
- 2.14.6 Restore 2CV-5035-1 to original position.
- 2.14.7 IF 2SI-13B differential pressure > 30 psid,
THEN record ΔP in Table 3.
- 2.14.8 IF 2SI-13B differential pressure ≤ 30 psid,
AND RCS pressure > 1500 psia,
THEN perform the following:
- A. Flush 2SI-13B using Section 4.0.
- B. Open 2CV-5035-1.
- C. Determine 2SI-13B differential pressure.

$$\frac{\text{_____}}{2\text{PIS-5020}} \text{ psig} - \frac{\text{_____}}{2\text{PI-5108}} \text{ psig} = \text{_____} \text{ psid}$$
- D. Restore 2CV-5035-1 to original position
- E. Record 2SI-13B ΔP in Table 3.

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2.15 Stroke time HPSI HDR #1 to 2P-32C (2CV-5055-1) AND verify check valve 2SI-13C closure as follows:

- 2.15.1 Determine 2SI-13C differential pressure. _____

$$\frac{\text{_____}}{(2\text{PIS-5040})} \text{ psig} - \frac{\text{_____}}{(2\text{PI-5108})} \text{ psig} = \text{_____} \text{ psid}$$
- 2.15.2 IF 2SI-13C differential pressure < 300 psid, _____
THEN lower HPSI header pressure using Section 3.0. _____
- 2.15.3 Open and time 2CV-5055-1. _____
- 2.15.4 Record stroke time to nearest tenth second in _____
Table 1. _____

NOTE

Following steps verify check valve closure, but do NOT determine leakage. Readings need to be taken in timely manner because differential pressure might decay. When 2CV-5055-1 reaches full open, if DP above minimum requirements then check valve closure verified.

- 2.15.5 WHEN 2CV-5055-1 fully open, _____
THEN determine 2SI-13C differential pressure. _____

$$\frac{\text{_____}}{(2\text{PIS-5040})} \text{ psig} - \frac{\text{_____}}{(2\text{PI-5108})} \text{ psig} = \text{_____} \text{ psid}$$
- 2.15.6 Restore 2CV-5055-1 to original position. _____
- 2.15.7 IF 2SI-13C differential pressure > 30 psid, _____
THEN record ΔP in Table 3. _____
- 2.15.8 IF 2SI-13C differential pressure ≤ 30 psid _____
AND RCS pressure > 1500 psia, _____
THEN perform the following: _____
- A. Flush 2SI-13C using Section 4.0. _____
- B. Open 2CV-5055-1. _____
- C. Determine 2SI-13C differential pressure. _____

$$\frac{\text{_____}}{2\text{PIS-5040}} \text{ psig} - \frac{\text{_____}}{2\text{PI-5108}} \text{ psig} = \text{_____} \text{ psid}$$
- D. Restore 2CV-5055-1 to original position. _____
- E. Record 2SI-13C ΔP in Table 3. _____

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2.16 Stroke time HPSI HDR #1 to 2P-32D (2CV-5075-1) AND verify check valve 2SI-13D closure as follows:

- 2.16.1 Determine 2SI-13D differential pressure.

$$\frac{\text{_____}}{(2PIS-5060)} \text{ psig} - \frac{\text{_____}}{(2PI-5108)} \text{ psig} = \text{_____} \text{ psid}$$
- 2.16.2 IF 2SI-13D differential pressure < 300 psid,
THEN lower HPSI header pressure using Section 3.0.
- 2.16.3 Open and time 2CV-5075-1.
- 2.16.4 Record stroke time to nearest tenth second in Table 1.

NOTE

Following steps verify check valve closure, but do NOT determine leakage. Readings need to be taken in timely manner because differential pressure might decay. When 2CV-5075-1 reaches full open, if DP above minimum requirements then check valve closure verified.

- 2.16.5 WHEN 2CV-5075-1 fully open,
THEN determine 2SI-13D differential pressure.

$$\frac{\text{_____}}{(2PIS-5060)} \text{ psig} - \frac{\text{_____}}{(2PI-5108)} \text{ psig} = \text{_____} \text{ psid}$$
- 2.16.6 Restore 2CV-5075-1 to original position.
- 2.16.7 IF 2SI-13D differential pressure > 30 psid,
THEN record ΔP in Table 3.
- 2.16.8 IF 2SI-13D differential pressure ≤ 30 psid
AND RCS pressure > 1500 psia,
THEN perform the following:
- A. Flush 2SI-13D using Section 4.0.
- B. Open 2CV-5075-1.
- C. Determine 2SI-13D differential pressure.

$$\frac{\text{_____}}{2PIS-5060} \text{ psig} - \frac{\text{_____}}{2PI-5108} \text{ psig} = \text{_____} \text{ psid}$$
- D. Restore 2CV-5075-1 to original position.
- E. Record 2SI-13D ΔP in Table 3.

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- 2.17 IF in Mode 1, 2, 3 OR 4, _____
THEN enter TS 3.5.2 OR 3.5.3 to stroke Th Injection valves.
- {4.3.4} 2.18 IF Containment penetration controls in effect, _____
THEN refer to Containment penetration administrative controls
section of Conduct of Operations (1015.001) for 2CV-5101-1 AND
2CV-5102-2.

CAUTION

Both HPSI Trains inoperable if both Th Injection MOVs energized.

NOTE

Operator shall be designated to close Th Injection valves as directed by Control Room upon receipt of SIAS signal. This maintains System Availability. (NEI 99-02, CR-ANO-C-2001-0099)

- 2.19 Designate operator to close Th Injection valves if directed _____
by Control Room.
- * 2.20 IF SIAS signal received, _____
THEN direct operator to close Th Injection valves.
- 2.21 Verify 2CV-5101-1 breaker (2B52-L5) closed. _____
- 2.22 Open and time 2CV-5101-1. _____
- 2.23 Record stroke time to nearest tenth second in Table 1. _____
- 2.24 Close and time 2CV-5101-1. _____
- 2.25 Record stroke time to nearest tenth second in Table 1. _____
- 2.26 IF Containment Penetration controls in effect, _____
THEN independently verify 2CV-5101-1 closed.
- 2.27 IF in Mode 1, 2, 3, OR 4, _____
THEN Danger Tag 2B52-L5 open.

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- 2.28 Close 2CV-5102-2 breaker (2B62-G2). _____
- 2.29 Open and time 2CV-5102-2. _____
- 2.30 Record stroke time to nearest tenth second in Table 2. _____
- 2.31 Close and time 2CV-5102-2. _____
- 2.32 Record stroke time to nearest tenth second in Table 2. _____
- 2.33 IF Containment Penetration controls in effect,
THEN independently verify 2CV-5102-2 closed. _____
- 2.34 IF in Mode 1, 2, 3, OR 4,
THEN perform the following:
 - 2.34.1 Danger Tag 2B62-G2 open. _____
 - 2.34.2 Exit Tech Spec 3.5.2 or 3.5.3 _____
- 2.35 Close and time HPSI HDR #2 Orifice Bypass (2CV-5104-2). _____
- 2.36 Record stroke time to nearest tenth second in Table 2. _____
- 2.37 Open and time 2CV-5104-2. _____
- 2.38 Record stroke time to nearest tenth second in Table 2. _____
- 2.39 Close and time HPSI 2P-89A Recirc Isol (2CV-5126-1). _____
- 2.40 Record stroke time to nearest tenth second in Table 1. _____
- 2.41 Open and time 2CV-5126-1. _____
- 2.42 Record stroke time to nearest tenth second in Table 1. _____
- 2.43 Close and time HPSI 2P-89C Recirc Isol (2CV-5127-1). _____
- 2.44 Record stroke time to nearest tenth second in Table 1. _____
- 2.45 Open and time 2CV-5127-1. _____
- 2.46 Record stroke time to nearest tenth second in Table 1. _____
- 2.47 Close and time HPSI 2P-89B Recirc Isol (2CV-5128-1). _____
- 2.48 Record stroke time to nearest tenth second in Table 1. _____
- 2.49 Open and time 2CV-5128-1. _____
- 2.50 Record stroke time to nearest tenth second in Table 1. _____

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- 2.51 Close and time HPSI HDR #1 Orifice Bypass (2CV-5103-1). _____
- 2.52 Record stroke time to nearest tenth second in Table 1. _____
- 2.53 Open and time 2CV-5103-1. _____
- 2.54 Record stroke time to nearest tenth second in Table 1. _____

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3.0 HPSI HEADER PRESSURE REDUCTION

NOTE

This Section used as many times as needed to depressurize HPSI Header #1.

HPSI Header being depressurized

A /B /C /D

3.1 Enter Tech Spec 3.5.2 OR 3.5.3 as appropriate.

/ / /

{4.3.4}

3.2 **IF Containment penetration controls in effect,
THEN refer to Containment penetration admin controls
section of Conduct of Operations (1015.001) for
2CV-5101-1.**

/ / /

3.3 Designate operator to close Th Injection valves if
directed by Control Room.

/ / /

NOTE

Operator shall be designated to close Th Injection valves as directed by
Control Room upon receipt of SIAS signal. This maintains System
Availability. (NEI 99-02, CR-ANO-C-2001-0099)

* 3.4 IF SIAS signal received,
THEN direct operator to close Th Injection valves.

3.5 Close 2B52-L5 to energize Th Injection valve
(2CV-5101-1).

/ / /

3.6 Open SIT Drain to RDT (2CV-5081).

/ / /

3.7 Open CV Leakage (2CV-5105-1).

/ / /

3.8 Throttle open Th Injection (2CV-5101-1).

/ / /

3.9 Verify ΔP between appropriate SIS Injection to 2P-32
Loop (2PIS-5000/5020/5040/5060) and SIS Header #1
(2PI-5108) > 300 psid.

/ / /

3.10 Close the following valves:

- 2CV-5101-1
- 2CV-5105-1
- 2CV-5081

/ / /

/ / /

/ / /

3.11 IF Containment Penetration Controls in effect,
THEN independently verify 2CV-5101-1 closed.

/ / /

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3.12 Open desired SIT Drain valve to repressurize SIT
Drain header:

 / / /

- For 2T-2A, SIT A Drain valve (2SV-5001-1)
- For 2T-2B, SIT B Drain valve (2SV-5021-1)
- For 2T-2C, SIT C Drain valve (2SV-5041-2)
- For 2T-2D, SIT D Drain valve (2SV-5061-2)

3.13 WHEN SIT Drain header pressurized,
THEN close SIT Drain valve opened in previous step:

 / / /

- For 2T-2A, SIT A Drain valve (2SV-5001-1)
- For 2T-2B, SIT B Drain valve (2SV-5021-1)
- For 2T-2C, SIT C Drain valve (2SV-5041-2)
- For 2T-2D, SIT D Drain valve (2SV-5061-2)

3.13 Return to applicable step.

 / / /

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4.0 FLUSHING 2SI-13A/B/C/D

NOTE

This Section used as many times as needed to flush 2SI-13A/B/C/D.

Header being Flushed

A / B / C / D

4.1 Verify ALL HPSI Injection valves closed:

- 2CV-5015-1
- 2CV-5035-1
- 2CV-5055-1
- 2CV-5075-1

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/ / /
/ / /

4.2 Verify RCS pressure > 1500 psia.

/ / /

4.3 Verify the following valves open:

- RWT Outlet (2CV-5630-1)
- ESF Mini-Recirc Header Isol (2CV-5628-2)
- SW ESF Header Isol (2CV-1400-1)
- HPSI 2P-89A Recirc Isol (2CV-5126-1)
- RWT Recirc and Test Line Inlet to RWT (2BS-26)

/ / /
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/ / /
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/ / /

4.4 Check pump AND motor bearing oil levels on selected HPSI Header #1 pump.

/ / /

4.5 Start selected HPSI Header #1 pump.

/ / /

4.6 Open SIT Drain to RDT (2CV-5081).

/ / /

4.7 Open appropriate HPSI Injection valve:

- 2CV-5015-1 to flush 2SI-13A
- 2CV-5035-1 to flush 2SI-13B
- 2CV-5055-1 to flush 2SI-13C
- 2CV-5075-1 to flush 2SI-13D

/ / /
/ / /
/ / /
/ / /

4.8 Open appropriate SIT Drain valve:

- 2SV-5001-1 to flush 2SI-13A
- 2SV-5021-1 to flush 2SI-13B
- 2SV-5041-2 to flush 2SI-13C
- 2SV-5061-2 to flush 2SI-13D

/ / /
/ / /
/ / /
/ / /

4.9 WHEN HPSI flow > 100 GPM (2FI-5101-1),
THEN close SIT Drain valve.

/ / /

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Header being flushed

A / B / C / D

4.10 Close HPSI Injection valve:

- 2CV-5015-1
- 2CV-5035-1
- 2CV-5055-1
- 2CV-5075-1

/ / /
/ / /
/ / /
/ / /

4.11 IF flushing of all required Injection Headers complete,
THEN stop selected HPSI pump.

/ / /

4.12 Enter Tech Spec 3.5.2 OR 3.5.3 as appropriate.

/ / /

{4.3.4}

4.13 **IF Containment penetration controls in effect,
THEN refer to Containment Penetration Admin Controls
section of Conduct of Operations (1015.001) for
2CV-5101-1.**

/ / /

NOTE

Operator shall be designated to close Th Injection valves as directed by Control Room upon receipt of SIAS signal. This maintains System Availability. (NEI 99-02, CR-ANO-C-2001-0099)

4.14 Designate operator to close Th Injection valves if directed by Control Room.

/ / /

* 4.15 IF SIAS signal received,
THEN direct operator to close Th Injection valves.

4.16 Close 2B52-L5 to energize Th Injection valve (2CV-5101-1).

/ / /

4.17 Open CV Leakage (2CV-5105-1).

/ / /

4.18 Throttle open Th Injection (2CV-5101-1).

/ / /

4.19 Verify ΔP between appropriate SIS Injection to 2P-32 Loop (2PIS-5000/5020/5040/5060) and SIS Header #1 (2PI-5108) > 300 psid.

/ / /

4.20 Close the following valves:

- 2CV-5101-1
- 2CV-5105-1
- 2CV-5081

/ / /
/ / /
/ / /

4.21 IF Containment Penetration Controls in effect,
THEN independently verify 2CV-5101-1 closed.

/ / /

4.22 Return to applicable step.

/ / /

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5.0 ACCEPTANCE CRITERIA

5.1 Compare measured stroke time with "Limiting Values" AND "Acceptable Normal Range" to determine operability.

TABLE 1						
VALVE	DESCRIPTION	TEST DIR.	STROKE TIME (SEC)	ACCEPTABLE NORMAL RANGE TIME (SEC)	LIMITING VALUE	MEASURED TIME WITHIN ACCEPTABLE NORMAL RANGE?
2CV-5015-1	HPSI HDR #1 To 2P-32A	O		9.3-12.5	14.1	YES NO
2CV-5035-1	HPSI HDR #1 To 2P-32B	O		10.4-14.0	14.1	YES NO
2CV-5055-1	HPSI HDR #1 To 2P-32C	O		9.6-12.8	14.1	YES NO
2CV-5075-1	HPSI HDR #1 To 2P-32D	O		10.5-14.1	14.1	YES NO
2CV-5101-1	HPSI HDR #1 Thot injection	O		17.0-23.0	26.0	YES NO
2CV-5101-1	HPSI HDR #1 Thot injection	C		17.3-23.3	26.3	YES NO
2CV-5126-1	HPSI 2P-89A Recirc Isol	C		15.6-20.0	23.7	YES NO
2CV-5126-1	HPSI 2P-89A Recirc Isol	O		15.7-20.0	23.9	YES NO
2CV-5127-1	HPSI 2P-89C Recirc Isol	C		14.5-19.5	22.1	YES NO
2CV-5127-1	HPSI 2P-89C Recirc Isol	O		14.6-19.6	22.2	YES NO
2CV-5128-1	HPSI 2P-89B Recirc Isol	C		14.4-19.4	21.9	YES NO
2CV-5128-1	HPSI 2P-89B Recirc Isol	O		14.9-20.0	22.7	YES NO
2CV-5103-1	HPSI HDR #1 Orifice Bypass	C		18.7-25.3	28.6	YES NO
2CV-5103-1	HPSI HDR #1 Orifice Bypass	O		19.0-25.6	28.9	YES NO

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TABLE 2						
VALVE	DESCRIPTION	TEST DIR.	STROKE TIME (SEC)	ACCEPTABLE NORMAL RANGE TIME (SEC)	LIMITING VALUE	MEASURED TIME WITHIN ACCEPTABLE NORMAL RANGE?
2CV-5016-2	HPSI HDR #2 To 2P-32A	O		10.5-14.1	14.1	YES NO
2CV-5036-2	HPSI HDR #2 To 2P-32B	O		11.0-14.1	14.1	YES NO
2CV-5056-2	HPSI HDR #2 To 2P-32C	O		7.2-12.0	14.1	YES NO
2CV-5076-2	HPSI HDR #2 To 2P-32D	O		11.3-14.1	14.1	YES NO
2CV-5102-2	HPSI HDR #2 Thot injection	O		18.7-25.1	28.4	YES NO
2CV-5102-2	HPSI HDR #2 Thot injection	C		19.0-25.6	28.9	YES NO
2CV-5104-2	HPSI HDR #2 Orifice Bypass	C		19.1-25.7	29.1	YES NO
2CV-5104-2	HPSI HDR #2 Orifice Bypass	O		19.3-26.1	29.5	YES NO

5.2 IF stroke time greater than Limiting Value,
THEN perform the following:

- Notify Shift Manager. _____
- Declare valve inoperable. _____
- Refer to Tech Specs 3.5.2 and 3.5.3. _____
- Initiate WR/WO as applicable. _____

5.3 IF NO circled in Table 1 or 2
AND stroke time less than Limiting Value,
THEN immediately retest OR declare valve inoperable. _____

5.4 IF retest was performed
AND new stroke time outside Acceptable Normal Range,
THEN perform the following:

- Initiate Condition Report _____
- Initiate Operability Determination using 1015.047,
Condition Reporting Operability and Immediate
Reportability Determinations _____

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5.5 IF retest was performed
AND new stroke time within Acceptable Normal Range,
THEN perform ONE of the following:

5.5.1 IF cause of initial failure known,
THEN record new stroke time AND reason for failure
in section 5.0 comments. _____

5.5.2 IF cause of initial failure unknown,
THEN perform the following:

- Record new stroke time in section 5.0 Comments. _____
- Perform actions of step 5.4. _____

5.6 Record check valve ΔP AND compare with limiting value to
verify each Safety Injection check valve closed.

TABLE 3			
CHECK VALVE	DIFFERENTIAL PRESSURE	LIMITING VALUE	IS ΔP > LIMITING VALUE?
2SI-13A	psid	30 psid	YES NO
2SI-13B	psid	30 psid	YES NO
2SI-13C	psid	30 psid	YES NO
2SI-13D	psid	30 psid	YES NO

5.7 IF NO circled in Table 3,
THEN perform the following:

- Declare valve inoperable. _____
- Refer to Tech Spec 3.4.6.2. _____
- Notify Shift Manager. _____
- Initiate WR/WO as applicable. _____
- Refer to TS 3.6.3.1 (CR-ANO-2-2001-0403) _____

5.8 Valve Data recorded in database AND reviewed by SRO. _____

5.9 IF this surveillance performed as PMT,
THEN complete Unit 2 IST Data Collection (1015.0160). _____

Comments _____

Performed By _____ Date _____

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6.0 SUPERVISOR REVIEW AND ANALYSIS

- 6.1 Do all measured values recorded in Table 1 AND 2 fall within ACCEPTABLE NORMAL RANGE? YES NO
- 6.2 Do all measured values recorded in Table 3 fall within Limiting Values? YES NO
- 6.3 IF NO answered in 6.1,
THEN perform the following:
- 6.3.1 IF retest performed
AND new stroke time within Acceptable Normal Range with cause of initial failure known,
THEN review step 5.5 for concurrence. _____
- 6.3.2 IF retest stroke time outside Acceptable Normal Range OR retest stroke time within Acceptable Normal Range with cause of initial failure unknown,
THEN verify the following initiated:
- Condition Report _____
 - Operability Determination using 1015.047,
Condition Reporting Operability and Immediate
Reportability Determinations _____
- 6.3.3 IF stroke time exceeds Limiting Value,
THEN perform the following:
- Verify LCO Tracking Record initiated per
Conduct of Operations (1015.001). _____
 - Verify Condition Report initiated. _____
- 6.4 IF NO answered in 6.2,
THEN verify WR/WO initiated. _____

Comments _____

- 6.5 Are all administrative requirements of this test satisfied? YES NO

Supervisor _____ Date _____

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FULL FLOW HPSI TEST

This test demonstrates full open stroke of HPSI check valves 2SI-13A/B/C/D, 2SI-12, 2SI-10A/B/C, 2SI-26A/B, 2SI-27A/B, 2SI-28A/B AND 2SI-23A/B/C per IST Program. HPSI pump suction is aligned to RCS through LPSI pump suction valves and water returned to RCS through HPSI injection valves. HPSI pump data taken at full flow condition per GL 89-04. This test also confirms HPSI flow balance and capacity required by Tech Spec 4.5.2.h. **This Supplement satisfies NRC Commitments per Step 4.3.3.**

Individual Sections may be performed after Initial Conditions in Section 1.0 met. During Cold Shutdown outage other than refueling, 2P-89C required to be tested on one train only and Section 3.0 or 5.0 may be N/A'd. Sections not being performed may be N/A'd. All sections must be completed each refueling outage.

NOTE

If this surveillance performed with RCS boron concentration < 2500 ppm, then HPSI system will not be available as Tech Spec Boration source.

1.0 INITIAL CONDITIONS

- Shutdown Cooling in service. _____
- Pressurizer bubble collapsed (PZR < 212°F). _____
- RCS level greater than reduced inventory. _____
- Following instruments in service AND calibration not overdue.
(Repetitive Tasks 017812-RED, 017811-GREEN) _____

2FI-5101-1	2FI-5014-1	2FI-5054-2
2FI-5102-2	2FI-5034-1	2FI-5074-2
- This surveillance requires extensive local operations. RCS chemical cleaning results in elevated dose rates. Therefore this surveillance should not be conducted during RCS Chemical Cleaning and should be scheduled either before chemical cleaning has been performed or after elevated dose rates have subsided. Coordinate with Chemistry, System Engineering and Radiation Protection in order to prevent unnecessary radiation exposure due to elevated dose rates. _____

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- Notify System Engineering to measure flow on the respective HPSI pump recirc line being tested using ultrasonic flow-measuring device. Serial No. _____ Calibration Due Date _____
- Independently verify installation of ultrasonic flow-measuring device. _____
- IF HPSI pump suction source temperature greater than 86°F, THEN verify calibrated Digital Thermometer available to measure 2HCB-23-6" piping downstream of ESF Mini Recirc Header Isol (2CV-5628-2). Record M&TE # _____
- IF HPSI pump suction source temperature greater than 146°F, THEN verify calibrated Digital Thermometer available to measure 2DCB-2-4" piping downstream of Recirc Isol: 2CV-5126-1 (2P89A), 2CV-5127-1 (2P89C), OR 2CV-5128-1 (2P89B). Record M&TE # _____
- Predictive Maintenance OR SE available to take vibration readings. _____

NOTE

HPSI Header Flush (2103.002, Attachment G) will be required if RCS boron < 2500 ppm OR > 3000 ppm. If no RCS fills planned, then it may be preferable to raise RCS boron above 2500 ppm due to amount of water used for flush. If HPSI header boron concentration > 3000 ppm, then flush would be required to ensure that no slugs of boron would be sitting or left in injection headers.

- Record RCS boron concentration: _____ ppm _____
- Conduct crew brief using Conduct of Operations (1015.001). _____
- IF anytime during performance of this Supplement temporary test gauge needed in place of permanently installed gauge, THEN verify the following:
 - Test gauge calibration date current.
 - Accuracy of test gauge within $\pm 1\%$ of full scale.
 - Range of test gauge less than three times normal process value.
 - Test gauge number recorded in TEST INST column of Section 7.0.

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2.0 2P-89A TEST

NOTE

Steps 2.1 through 2.6 may be performed in any order.

- | | | |
|-----|---|-------|
| 2.1 | Verify Initial Conditions (Section 1.0). | _____ |
| 2.2 | Verify Hot Leg Injection valve (2CV-5101-1) closed AND energized (2B52-L5). | _____ |
| 2.3 | Verify calibrated 3-D Model 2554x-32y (where x and y can be anything) test gauge with range of 0 to 2000 psig AND accuracy of 1/4% full scale installed on mini-recirc vent at 2SI-1093 and 2SI-1094. | _____ |
| 2.4 | Verify LPSI pump (2P-60A) suction valves aligned for SDC: | |
| | • 2P-60A Suction From RWT (2SI-2A) closed. | _____ |
| | • 2P-60A Suction From RCS (2SI-1A) open. | _____ |
| 2.5 | Verify the following valves closed: | |
| | • CNTMT Sump Isolation (2CV-5649-1 OR 2CV-5647-1) | _____ |
| | • RWT 2T-3 Outlet (2CV-5630-1) | _____ |
| | • 2P-89C Recirc (2CV-5127-1) | _____ |
| | • 2P-35A Recirc (2CV-5673-1) | _____ |
| | • RWT Recirc and Test Isolation (2BS-25) | _____ |
| 2.6 | Verify the following valves open: | |
| | • HPSI Recirc to Train A Suction (2BS-53) | _____ |
| | • 2P-89A Recirc Isol (2SI-64) | _____ |
| | • 2P-89A Suction Isol (2SI-8A) | _____ |
| | • 2P-89A Discharge Isol (2SI-10A) | _____ |
| | • RWT Recirc and Test Line Inlet to RWT (2BS-26) | _____ |
| | • HPSI 2P-89A Recirc Isol (2CV-5126-1) | _____ |
| | • ESF Mini Recirc Header Isol (2CV-5628-2) | _____ |
| | • SW ESF Header Isol (2CV-1400-1) | _____ |

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CAUTION

Opening 2SI-2A aligns flow path between RCS and RWT via HPSI recirc header. Flow could be in either direction depending on RCS pressure and RWT level. Action may be necessary to control RCS level.

- 2.7 Open 2P-60A Suction From RWT (2SI-2A). _____
- * 2.8 Monitor RCS level AND adjust as necessary during this test.
- 2.9 Align suction pressure gage (2PI-5090) by opening the following valves:
 - 2SI-5090A _____
 - 2SI-5090B _____

NOTE

2P-89A is operable if oil level visible in Oiler Glass bubbler.

- 2.10 Check 2P-89A pump AND motor oil levels. _____
- 2.11 Start 2P-89A. _____
- 2.12 Notify System Engineer to measure 2P-89A recirc flow upstream of HPSI Recirc Check valve (2SI-23A) to verify 2SI-23A open AND record in Table 15. _____
- * 2.13 Monitor temperature of applicable piping per Initial Conditions AND submit CR if piping downstream master mini recirc exceeds 140°F OR piping downstream applicable mini recirc isolation valve exceeds 200°F. (CR-2-2001-0032 determined piping operable to 255°F)
- 2.14 Align discharge pressure gage (2PI-5090) by opening the following valves:
 - 2SI-1042A _____
 - 2SI-1043A _____
- 2.15 Align mini-recirc pressure gage by opening the following valves:
 - 2SI-1093 _____
 - 2SI-1094 _____
- 2.16 Cycle HPSI Injection valves open AND closed one at a time AND record flow rate for each valve in Table 1:
 - 2CV-5015-1 _____
 - 2CV-5035-1 _____
 - 2CV-5055-1 _____
 - 2CV-5075-1 _____

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- 2.17 Throttle open Th Injection valve (2CV-5101-1) until _____
> 392 GPM indicated on 2FI-5101-1 AND record flow in Table 2.

CAUTION

HPSI pump flow > 852 GPM could cause pump runout and excessive motor amps.

- 2.18 Throttle open HPSI Injection valves as necessary to obtain _____
> 770 GPM on 2FI-5101-1 AND record 2P-89A flow in Table 3.
- 2.19 Throttle HPSI Injection valves to set total header flow _____
(F5084) between 770 and 780 GPM.
- 2.20 Record Header flow: _____ GPM _____
- 2.21 Isolate 2P-89A recirc by closing the following valves: _____
 - 2CV-5126-1 _____
 - 2SI-64 _____
- 2.22 Record Header flow: _____ GPM _____
- 2.23 Close 2CV-5101-1. _____
- 2.24 Throttle HPSI Injection valves to set total header flow _____
(F5084) between 770 and 780 GPM.
- 2.25 Collect pump data listed in Table 4. _____
- 2.26 IF System Engineer desires data at various flow rates, _____
THEN throttle HPSI Injection valves as needed AND attach
results.
- 2.27 Restore 2P-89A recirc by opening the following valves: _____
 - 2CV-5126-1 _____
 - 2SI-64 _____
- 2.28 Verify all Cold Leg Injection valves open to electrical limit: _____
 - 2CV-5015-1 _____
 - 2CV-5035-1 _____
 - 2CV-5055-1 _____
 - 2CV-5075-1 _____
- 2.29 Record individual flows in Table 7. _____

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2.30 IF during refueling outage
OR any ECCS subsystem modifications have been performed that
may have altered flow characteristics,
THEN check flow balance between hot and cold leg as follows:

2.30.1 Close Orifice Bypass valve (2CV-5103-1). _____

2.30.2 Open Th Injection valve (2CV-5101-1) _____

2.30.3 Record Total Cold Leg Injection flow (F5084)
AND HPSI Header flow (2FI-5101-1) in Table 8. _____

2.30.4 Close 2CV-5101-1. _____

2.30.5 Open 2CV-5103-1. _____

2.31 Verify ALL Loop 1 HPSI Injection valves closed. _____

2.32 Stop 2P-89A AND place in PULL TO LOCK. _____

2.33 IF desired to stop EITHER of the following fans,
THEN place in NORMAL AFTER STOP:

- 2VUC-1A _____
- 2VUC-1B _____

{4.3.2} 2.34 **Isolate pressure gauges by closing the following valves:**
(outboard then inboard - will not overrange gage due to
piston affect - ER010827E201)

2.34.1 **2SI-5090B** _____

2.34.2 **2SI-5090A** _____

2.34.3 **2SI-1043A** _____

2.34.4 **2SI-1042A** _____

2.34.5 **2SI-1094** _____

2.34.6 **2SI-1093** _____

2.35 Close 2SI-2A as desired. _____

2.36 Restore 2CV-5630-1 to desired position. _____

2.37 Remove test gauge from mini-recirc vent AND replace cap. _____

2.38 Independently verify test gauge removed AND cap replaced. _____

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3.0 2P-89C (RED TRAIN) TEST

NOTE

Steps 3.1 through 3.6 may be performed in any order.

- 3.1 Verify Initial Conditions (Section 1.0). _____
- 3.2 Verify Hot Leg Injection valve (2CV-5101-1) closed AND energized (2B52-L5). _____
- 3.3 Verify calibrated 3-D Model 2554x-32y (where x and y can be anything) test gauge with range of 0 to 2000 psig and accuracy of 1/4% full scale installed on mini-recirc vent at 2SI-1067 AND 2SI-1068. (N/A this step if already performed in section 5.0) _____
- 3.4 Verify LPSI pump (2P-60A) suction valves aligned for SDC.
 - 2P-60A Suction From RWT (2SI-2A) closed. _____
 - 2P-60A Suction From RCS (2SI-1A) open. _____
- 3.5 Verify the following valves open:
 - HPSI Recirc to Train A Suction (2BS-53) _____
 - 2P-89C Recirc to Train A Suction (2SI-66) _____
 - 2P-89C Recirc Isol (2SI-62) _____
 - 2P-89C Suction Isol (2SI-9A) _____
 - 2P-89C Discharge Isol (2SI-10C) _____
 - 2P-89C Discharge Cross Connect (2SI-11A) _____
 - RWT Recirc and Test Line Inlet to RWT (2BS-26) _____
 - HPSI 2P-89C Recirc Isol (2CV-5127-1) _____
 - ESF Mini Recirc Header Isol (2CV-5628-2) _____
 - SW ESF Header Isol (2CV-1400-1) _____
- 3.6 Verify the following valves closed:
 - CNTMT Sump Isolation (2CV-5649-1 OR 2CV-5647-1) _____
 - RWT 2T-3 Outlet (2CV-5630-1) _____
 - 2P-89A Recirc (2CV-5126-1) _____
 - 2P-35A Recirc (2CV-5673-1) _____
 - RWT Recirc and Test Isolation (2BS-25) _____
 - 2P-89C Suction X-Connect (2SI-9B) _____
 - 2P-89C Discharge X-Connect (2SI-11B) _____
 - 2P-89C Recirc to B Train Suction (2SI-67) _____

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CAUTION

Opening 2SI-2A aligns flow path between RCS and RWT via HPSI recirc header. Flow could be in either direction depending on RCS pressure and RWT level. Action may be necessary to control RCS level.

3.7 Open 2P-60A Suction From RWT (2SI-2A). _____

3.8 Monitor RCS level AND adjust as necessary during this test. _____

*

NOTE

If Section 5.0 of this Supplement has been completed during this outage, then steps 3.9 and 3.13 through 3.26 may be N/A'd.

3.9 Align suction pressure gage (2PI-5098) by opening the following valves:

- 2SI-5098A _____
- 2SI-5098B _____

NOTE

2P-89C is operable if the oil level in the sight glass is between the high and low level marks. The sight glass is located on the opposite side of the bearing housing from the oiler.

3.10 Check 2P-89C pump AND motor oil levels. _____

3.11 Start 2P-89C. _____

*

3.12 Monitor temperature of applicable piping per Initial Conditions AND submit CR if piping downstream master mini recirc exceeds 140°F OR piping downstream applicable mini recirc isolation valve exceeds 200°F. (CR-2-2001-0032 determined piping operable to 255°F)

3.13 Notify System Engineer to measure 2P-89C recirc flow upstream of HPSI Recirc Check valve (2SI-23C) to verify 2SI-23C open AND record in Table 15. _____

3.14 Align discharge pressure gage (2PI-5102) by opening the following valves:

- 2SI-1042C _____
- 2SI-1043C _____

3.15 Align mini-recirc pressure gage by opening the following valves:

- 2SI-1067 _____
- 2SI-1068 _____

3.16 Throttle open Th Injection valve (2CV-5101-1) until > 392 GPM indicated on 2FI-5101-1. _____

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CAUTION

HPSI pump flow > 852 GPM could cause pump runout and excessive motor amps.

- 3.17 Throttle open HPSI Injection valves as necessary to obtain _____
> 770 GPM on 2FI-5101-1 AND record 2P-89C flow in Table 3.
- 3.18 Throttle HPSI Injection valves to set total header flow (F5084) _____
between 770 and 780 GPM.
- 3.19 Record Header flow: _____ GPM. _____
- 3.20 Isolate 2P-89C recirc by closing the following valves:
 - 2SI-62 _____
 - 2CV-5127-1 _____
- 3.21 Record Header flow: _____ GPM. _____
- 3.22 Close 2CV-5101-1. _____
- 3.23 Throttle HPSI Injection valves to set total header flow (F5084) _____
between 770 and 780 GPM.
- 3.24 Collect pump data listed in Table 6. _____
- 3.25 IF System Engineer desires data at various flow rates, _____
THEN throttle HPSI Injection valves as needed AND attach _____
results.
- 3.26 Restore 2P-89C recirc by opening the following valves:
 - 2CV-5127-1 _____
 - 2SI-62 _____
- 3.27 Verify all Cold Leg Injection valves open to electrical limit:
 - 2CV-5015-1 _____
 - 2CV-5035-1 _____
 - 2CV-5055-1 _____
 - 2CV-5075-1 _____
- 3.28 Record individual flows in Table 9. _____

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- 3.29 IF during refueling outage
OR any ECCS subsystem modifications have been performed that
may have altered flow characteristics,
THEN check flow balance between hot and cold leg as follows:
- 3.29.1 Close Orifice Bypass valve (2CV-5103-1). _____
- 3.29.2 Open Th Injection valve (2CV-5101-1) _____
- 3.29.3 Record Total Cold Leg Injection flow (F5084)
AND HPSI Header flow (2FI-5101-1) in Table 10. _____
- 3.29.4 Close 2CV-5101-1. _____
- 3.29.5 Open 2CV-5103-1. _____
- 3.30 Verify all HPSI Injection valves closed. _____
- 3.31 Stop 2P-89C AND place in PULL TO LOCK. _____
- 3.32 IF desired to stop 2VUC-11A,
THEN place in NORMAL AFTER STOP. _____
- {4.3.2} 3.33 IF used to collect 2P-89C test data,
THEN isolate gauges by closing the following valves:
(outboard then inboard - will not overrange gage due to
piston affect - ER010827E201)
- 3.33.1 2SI-5098B _____
- 3.33.2 2SI-5098A _____
- 3.33.3 2SI-1043C _____
- 3.33.4 2SI-1042C _____
- 3.33.5 2SI-1068 _____
- 3.33.6 2SI-1067 _____
- 3.34 Close 2SI-2A as desired. _____
- 3.35 Restore 2CV-5630-1 to desired position. _____
- 3.36 IF 2P-89C test data collection (Table 6) complete,
THEN remove test gauge from mini-recirc vent
AND replace cap. _____
- 3.37 IF test gauge removed,
THEN independently verify test gauge removed AND cap replaced. _____

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4.0 2P-89B TEST

NOTE

Steps 4.1 through 4.6 may be performed in any order.

- 4.1 Verify Initial Conditions (Section 1.0). _____
- 4.2 Verify Hot Leg Injection valve (2CV-5102-2) closed AND energized (2B62-G2). _____
- 4.3 Verify calibrated 3-D Model 2554x-32y (where x and y can be anything) test gauge with range of 0 to 2000 psig AND accuracy of 1/4% full scale installed at 2P-89B Discharge 2SI-5001A and 2SI-5001B. _____
- 4.4 Verify LPSI pump (2P-60B) suction valves aligned for SDC:
 - 2P-60B Suction From RWT (2SI-2B) closed. _____
 - 2P-60B Suction From RCS (2SI-1B) open. _____
- 4.5 Verify the following valves closed:
 - CNTMT Sump Isolation (2CV-5650-2 OR 2CV-5648-2) _____
 - RWT 2T-3 Outlet (2CV-5631-2) _____
 - 2P-89C Recirc (2CV-5127-1) _____
 - 2P-35B Recirc (2CV-5672-1) _____
 - B HPSI pump Discharge Orifice Bypass Isolation (2SI-32) _____
 - B HPSI pump Discharge Orifice Bypass Throttling (2SI-33) _____
 - RWT Recirc and Test Isolation (2BS-25) _____
- 4.6 Verify the following valves open:
 - HPSI Recirc to Train B Suction (2BS-54) _____
 - 2P-89B Suction Isol (2SI-8B) _____
 - 2SI-65 _____
 - 2P-89B Discharge Isol (2SI-10B) _____
 - RWT Recirc and Test Line Inlet to RWT (2BS-26) _____
 - HPSI 2P-89B Recirc Isol (2CV-5128-1) _____
 - ESF Mini Recirc Header Isol (2CV-5628-2) _____
 - SW ESF Header Isol (2CV-1406-2) _____

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CAUTION

Opening 2SI-2B aligns flow path between RCS and RWT via HPSI recirc header. Flow could be in either direction depending on RCS pressure and RWT level. Action may be necessary to control RCS level.

- 4.7 Open 2P-60B Suction From RWT (2SI-2B). _____
- * 4.8 Monitor RCS level AND adjust as necessary during this test.
- 4.9 Align suction gage (2PI-5100) by opening the following valves:
 - 2SI-5100A _____
 - 2SI-5100B _____

NOTE

2P-89B is operable if oil level visible in Oiler Glass bubbler.

- 4.10 Check 2P-89B pump AND motor oil levels. _____
- 4.11 Start 2P-89B. _____
- 4.12 Notify System Engineer to measure 2P-89B recirc flow downstream of HPSI Recirc Check valve (2SI-23B) (but upstream of "T" for 2SI-65) to verify 2SI-23B open AND record in Table 15. _____
- * 4.13 Monitor temperature of applicable piping per Initial Conditions AND submit CR if piping downstream master mini recirc exceeds 140°F OR piping downstream applicable mini recirc isolation valve exceeds 200°F. (CR-2-2001-0032 determined piping operable to 255°F)
- 4.14 Align discharge gage (2PI-5101) by opening the following valves:
 - 2SI-1042B _____
 - 2SI-1043B _____
- 4.15 Align temporary discharge pressure gage by opening the following valves:
 - 2SI-5001A _____
 - 2SI-5001B _____
- 4.16 Cycle HPSI Injection valves open AND closed one at a time AND record flow rate for each valve in Table 1:
 - 2CV-5016-2 _____
 - 2CV-5036-2 _____
 - 2CV-5056-2 _____
 - 2CV-5076-2 _____

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- 4.17 Throttle open Th Injection valve (2CV-5102-2) until _____
> 392 GPM indicated on 2FI-5102-2 AND record flow in Table 2.

CAUTION

HPSI pump flow > 852 GPM could cause pump runout and excessive motor amps.

- 4.18 Throttle open HPSI Injection valves as necessary to obtain _____
> 770 GPM on 2FI-5102-2 AND record 2P-89B flow in Table 3.
- 4.19 Throttle HPSI Injection valves to set total header flow (F5084) _____
between 770 and 780 GPM.
- 4.20 Record header flow: _____ GPM. _____
- 4.21 Isolate 2P-89B recirc by closing the following valves:
- 2CV-5128-1 _____
 - 2SI-65 _____
- 4.22 Record header flow: _____ GPM. _____
- 4.23 Close 2CV-5102-2. _____
- 4.24 Throttle HPSI Injection valves to set total header flow (F5084) _____
between 770 and 780 GPM.
- 4.25 Collect pump data listed in Table 5. _____
- 4.26 IF System Engineer desires data at various flow rates,
THEN throttle HPSI Injection valves as needed AND attach
results. _____
- 4.27 Restore 2P-89B recirc by opening the following valves:
- 2CV-5128-1 _____
 - 2SI-65 _____
- 4.28 Verify all Cold Leg Injection valves open to electrical limit:
- 2CV-5016-2 _____
 - 2CV-5036-2 _____
 - 2CV-5056-2 _____
 - 2CV-5076-2 _____
- 4.29 Record individual flows in Table 11. _____

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- 4.30 IF during refueling outage
OR any ECCS subsystem modifications have been performed that
may have altered flow characteristics,
THEN check flow balance between hot and cold leg as follows:
- 4.30.1 Close Orifice Bypass valve (2CV-5104-2). _____
- 4.30.2 Open Th Injection valve (2CV-5102-2). _____
- 4.30.3 Record Total Cold Leg Injection flow (F5084)
AND HPSI Header flow (2FI-5102-2) in Table 12. _____
- 4.30.4 Close 2CV-5102-2. _____
- 4.30.5 Open 2CV-5104-2. _____
- 4.31 Verify ALL Loop 2 HPSI Injection valves closed. _____
- 4.32 Stop 2P-89B AND place in PULL TO LOCK. _____
- 4.33 IF desired to stop EITHER of the following fans,
THEN place in NORMAL AFTER STOP:
- 2VUC-1D _____
 - 2VUC-1E _____
- {4.3.2} 4.34 **Isolate gauges by closing the following valves:**
(outboard then inboard - will not overrange gage due to
piston affect - ER010827E201)
- 4.34.1 **2SI-5100B** _____
- 4.34.2 **2SI-5100A** _____
- 4.34.3 **2SI-1043B** _____
- 4.34.4 **2SI-1042B** _____
- 4.34.5 **2SI-5001B** _____
- 4.34.6 **2SI-5001A** _____
- 4.35 Close 2SI-2B as desired. _____
- 4.36 Restore 2CV-5631-2 to desired position. _____
- 4.37 Independently verify test gauge removed AND cap replaced. _____

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5.0 2P-89C (GREEN TRAIN) TEST

NOTE

Steps 5.1 through 5.6 may be performed in any order.

- 5.1 Verify Initial Conditions (Section 1.0). _____
- 5.2 Verify Hot Leg Injection valve (2CV-5102-2) closed AND energized (2B62-G2). _____
- 5.3 Verify calibrated 3-D Model 2554x-32y (where x and y can be anything) test gauge with range of 0 to 2000 psig AND accuracy of 1/4% full scale installed on mini-recirc vent at 2SI-1067 AND 2SI-1068. (N/A this step if already performed in section 3.0) _____
- 5.4 Verify LPSI pump (2P-60B) suction valves aligned for SDC:
 - 2P-60B Suction From RWT (2SI-2B) closed. _____
 - 2P-60B Suction From RCS (2SI-1B) open. _____
- 5.5 Verify the following valves open:
 - HPSI Recirc to Train B Suction (2BS-54) _____
 - 2P-89C Recirc to Train B Suction (2SI-67) _____
 - 2P-89C Recirc Isol (2SI-62) _____
 - 2P-89C Suction Isol (2SI-9B) _____
 - 2P-89C Discharge Isol (2SI-10C) _____
 - 2P-89C Discharge Cross Connect (2SI-11B) _____
 - RWT Recirc and Test Line Inlet to RWT (2BS-26) _____
 - HPSI 2P-89C Recirc Isol (2CV-5127-1) _____
 - ESF Mini Recirc Header Isol (2CV-5628-2) _____
 - SW ESF Header Isol (2CV-1406-2) _____
- 5.6 Verify the following valves closed:
 - CNTMT Sump Isolation (2CV-5650-2 OR 2CV-5648-2) _____
 - RWT 2T-3 Outlet (2CV-5631-2) _____
 - 2P-89B Recirc (2CV-5128-1) _____
 - 2P-35B Recirc (2CV-5672-1) _____
 - RWT Recirc and Test Isolation (2BS-25) _____
 - 2P-89C HPSI Suction X-Connect (2SI-9A) _____
 - 2P-89C Discharge X-Connect (2SI-11A) _____
 - 2P-89C Recirc to A Train Suction (2SI-66) _____

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CAUTION

Opening 2SI-2B aligns flow path between RCS and RWT via HPSI recirc header. Flow could be in either direction depending on RCS pressure and RWT level. Action may be necessary to control RCS level.

5.7 Open 2P-60B Suction From RWT (2SI-2B). _____

* 5.8 Monitor RCS level AND adjust as necessary during this test.

NOTE

If Section 3.0 of this Supplement has been completed during this outage, then steps 5.9 and 5.13 through 5.26 may be N/A'd.

5.9 Align suction gage (2PI-5098) by opening the following valves:

- 2SI-5098A _____
- 2SI-5098B _____

NOTE

2P-89C HPSI pump is operable if the oil level in the sight glass is between the high and low level marks. The sight glass is located on the opposite side of the bearing housing from the oiler.

5.10 Check 2P-89C pump AND motor oil levels. _____

5.11 Start 2P-89C. _____

* 5.12 Monitor temperature of applicable piping per Initial Conditions AND submit CR if piping downstream master mini recirc exceeds 140°F OR piping downstream applicable mini recirc isolation valve exceeds 200°F. (CR-2-2001-0032 determined piping operable to 255°F)

5.13 Notify System Engineer to measure 2P-89C recirc flow upstream of HPSI Recirc Check valve (2SI-23C) to verify 2SI-23C open AND record in Table 15. _____

5.14 Align discharge gage (2PI-5102) by opening the following valves:

- 2SI-1042C _____
- 2SI-1043C _____

5.15 Align mini-recirc gauge by opening the following valves:

- 2SI-1067 _____
- 2SI-1068 _____

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- 5.16 Throttle open Th Injection valve (2CV-5102-2) until > 392 GPM _____
indicated on 2FI-5102-2.

CAUTION

HPSI pump flow > 852 GPM could cause pump runout and excessive motor amps.

- 5.17 Throttle open HPSI Injection valves as necessary to obtain _____
> 770 GPM on 2FI-5102-2 AND record 2P-89C flow in Table 3.
- 5.18 Throttle HPSI Injection valves to set total header flow (F5084) _____
between 770 and 780 GPM.
- 5.19 Record header flow: _____ GPM _____
- 5.20 Isolate 2P-89C recirc by closing the following valves:
- 2CV-5127-1 _____
 - 2SI-62 _____
- 5.21 Record header flow: _____ GPM. _____
- 5.22 Close 2CV-5102-2. _____
- 5.23 Throttle HPSI Injection valves to set total header flow (F5084) _____
between 770 and 780 GPM.
- 5.24 Collect pump data listed in Table 6. _____
- 5.25 IF System Engineer desires data at various flow rates,
THEN throttle HPSI Injection valves as needed AND attach
results. _____
- 5.26 Restore 2P-89C recirc by opening the following valves:
- 2CV-5127-1 _____
 - 2SI-62 _____
- 5.27 Verify the following valves open to electrical limit:
- 2CV-5016-2 _____
 - 2CV-5036-2 _____
 - 2CV-5056-2 _____
 - 2CV-5076-2 _____
- 5.28 Record individual flows in Table 13. _____

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- 5.29 IF during refueling outage
OR any ECCS subsystem modifications have been performed that
may have altered flow characteristics,
THEN check flow balance between hot and cold leg as follows:
- 5.29.1 Close Orifice Bypass valve (2CV-5104-2). _____
- 5.29.2 Open Th Injection valve (2CV-5102-2). _____
- 5.29.3 Record Total Cold Leg Injection flow (F5084) AND
HPSI Header flow (2FI-5102-2) in Table 14. _____
- 5.29.4 Close 2CV-5102-2. _____
- 5.29.5 Open 2CV-5104-2. _____
- 5.30 Close all four HPSI Injection valves. _____
- 5.31 Stop 2P-89C AND place in PULL TO LOCK. _____
- 5.32 IF desired to stop 2VUC-11B,
THEN place in NORMAL AFTER STOP. _____
- {4.3.2} 5.33 IF used to collect 2P-89C test data,
THEN isolate suction AND discharge pressure gauges by closing
the following valves: (outboard then inboard - will not
overrange gage due to piston affect - ER010827E201)
- 5.33.1 **2SI-5098B** _____
- 5.33.2 **2SI-5098A** _____
- 5.33.3 **2SI-1043C** _____
- 5.33.4 **2SI-1042C** _____
- 5.33.5 **2SI-1068** _____
- 5.33.6 **2SI-1067** _____
- 5.34 Close 2SI-2B as desired. _____
- 5.35 Restore 2CV-5631-2 to desired position. _____
- 5.36 IF 2P-89C test data collection (Table 6) complete,
THEN remove test gauge from mini-recirc vent AND replace cap. _____
- 5.37 IF test gauge removed,
THEN independently verify test gauge removed AND cap replaced. _____

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6.0 RESTORATION

6.1 IF Ultrasonic flow measuring device was installed,
THEN perform the following:

6.1.1 Remove ultrasonic flow measuring device. _____

6.1.2 Independently verify removal of ultrasonic flow
measuring device. _____

6.2 IF any temporary test gauge(s) were installed during this
test other than those used on mini-recirc vent,
THEN perform the following:

6.2.1 Verify all temporary test gauges removed. _____

6.2.2 Independently verify removal of temporary test
gauges. _____

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7.0 ACCEPTANCE CRITERIA

7.1 Record data AND compare with acceptance criteria.

TABLE 1				
INJECTION VALVE	VALVES TESTED	FLOW INDICATOR	FLOW RATE	IS FLOW RATE > 196 GPM?
2CV-5015-1	2CV-5015-1 2SI-13A	2FI-5014-1	GPM	YES NO
2CV-5035-1	2CV-5035-1 2SI-13B	2FI-5034-1	GPM	YES NO
2CV-5055-1	2CV-5055-1 2SI-13C	2FI-5054-2	GPM	YES NO
2CV-5075-1	2CV-5075-1 2SI-13D	2FI-5074-2	GPM	YES NO
2CV-5016-2	2CV-5016-2 2SI-13A	2FI-5014-1	GPM	YES NO
2CV-5036-2	2CV-5036-2 2SI-13B	2FI-5034-1	GPM	YES NO
2CV-5056-2	2CV-5056-2 2SI-13C	2FI-5054-2	GPM	YES NO
2CV-5076-2	2CV-5076-2 2SI-13D	2FI-5074-2	GPM	YES NO

TABLE 2				
INJECTION VALVE	VALVES TESTED	FLOW INDICATOR	FLOW RATE	IS FLOW RATE > 392 GPM?
2CV-5101-1	2SI-26A 2SI-27A 2SI-28A	2FI-5101-1	GPM	YES NO
2CV-5102-2	2SI-26B 2SI-27B 2SI-28B	2FI-5102-2	GPM	YES NO

TABLE 3				
PUMP	VALVES TESTED	FLOW INDICATOR	FLOW RATE	IS FLOW RATE > 770 GPM?
2P-89A	2SI-10A 2SI-12	2FI-5101-1	GPM	YES NO
2P-89B	2SI-10B	2FI-5102-2	GPM	YES NO
2P-89C	2SI-10C	2FI-5101-1/ 2FI-5102-2	GPM	YES NO

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TABLE 4					
2P-89A TEST QUANTITY	INSTRUMENT (INCLUDE TEST INST)	MEASURED VALUE	ACCEPTABLE NORMAL RANGE	LIMITING RANGE FOR OPERABILITY	IS DATA IN LIMITING RANGE?
Running Suction Pressure	2PI-5090 (local)	psig	≥ 8 psig	≥ 8 psig	YES NO
Pump Flow	F5084	GPM	770 to 780 GPM	N/A	N/A
Discharge Pressure	Mini-Recirc Test Gage	psig	N/A	N/A	N/A
	2PI-5091 (local)	psig	N/A	N/A	N/A
	2PI-5108 (2C17)	psig	N/A	N/A	N/A
Pump ΔP {4.3.1}	Mini Recirc Test Gage - 2PI-5090	psid	N/A	611.9 to 733.4 psid	YES NO
Inboard Brg Radial #1 Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Inboard Brg Radial #2 Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Inboard Brg Axial Vibes		in/sec	≤ 0.177 in/sec	≤ 0.426 in/sec	YES NO
Outboard Brg Radial #1 Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Outboard Brg Radial #2 Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Outboard Brg Axial Vibes		in/sec	≤ 0.282 in/sec	≤ 0.678 in/sec	YES NO

Vibration Instrument Cal Due Date _____

Vibration Data Collected By _____

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TABLE 5 (Pump Vib data = ER-2002-0844)					
2P-89B TEST QUANTITY	INSTRUMENT (INCLUDE TEST INST)	MEASURED VALUE	ACCEPTABLE NORMAL RANGE	LIMITING RANGE FOR OPERABILITY	IS DATA IN LIMITING RANGE?
Running Suction Pressure	2PI-5100 (local)	psig	≥ 8 psig	≥ 8 psig	YES NO
Pump Flow	F5084	GPM	770 to 780 GPM	N/A	N/A
Discharge Pressure	2PI-5101 (local)	psig	N/A	N/A	N/A
	2PI-5109 (2C16)	psig	N/A	N/A	N/A
	2PP-5001 Test Gage	psig	N/A	N/A	N/A
Pump ΔP {4.3.1}	2PI-5001 - 2PI-5100	psid	N/A	685 to 837 psid	YES NO
Inboard Brg Radial #1 Vibes		in/sec	≤ 0.237 in/sec	≤ 0.570 in/sec	YES NO
Inboard Brg Radial #2 Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Inboard Brg Axial Vibes		in/sec	≤ 0.227 in/sec	≤ 0.546 in/sec	YES NO
Outboard Brg Radial #1 Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Outboard Brg Radial #2 Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Outboard Brg Axial Vibes		in/sec	≤ 0.180 in/sec	≤ 0.432 in/sec	YES NO

Vibration Instrument Cal Due Date _____

Vibration Data Collected By _____

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TABLE 6					
2P-89C TEST QUANTITY	INSTRUMENT (INCLUDE TEST INST)	MEASURED VALUE	ACCEPTABLE NORMAL RANGE	LIMITING RANGE FOR OPERABILITY	IS DATA IN LIMITING RANGE?
Running Suction Pressure	2PI-5098 (local)	psig	≥ 8 psig	≥ 8 psig	YES NO
Pump Flow	F5084	GPM	770 to 780 GPM	N/A	N/A
Discharge Pressure	Mini-Recirc Test Gage	psig	N/A	N/A	N/A
	2PI-5102 (local)	psig	N/A	N/A	N/A
	2PI-5108 or 2PI-5109	psig	N/A	N/A	N/A
Pump ΔP {4.3.1}	Mini-Recirc Test Gage - 2PI-5098	psid	N/A	686.3 to 838.7 psid	YES NO
Inboard Brg Radial #1 Vibes		in/sec	≤ 0.195 in/sec	≤ 0.468 in/sec	YES NO
Inboard Brg Radial #2 Vibes		in/sec	≤ 0.320 in/sec	≤ 0.700 in/sec	YES NO
Inboard Brg Axial Vibes		in/sec	≤ 0.242 in/sec	≤ 0.582 in/sec	YES NO
Outboard Brg Radial #1 Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Outboard Brg Radial #2 Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Outboard Brg Axial Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO

Vibration Instrument Cal Due Date _____

Vibration Data Collected By _____

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7.2 Record data AND compare to acceptance criteria.

TABLE 7		
HEADER #1 VALVE	FLOW INDICATOR	FLOW RATE
2CV-5015-1	F5014-1	GPM
2CV-5035-1	F5034-1	GPM
2CV-5055-1	F5054-2	GPM
2CV-5075-1	F5074-2	GPM

7.2.1 Add three lowest flows from Table 7:
_____ + _____ + _____ = _____ GPM

7.2.2 Is sum of three lowest flows \geq 594 GPM? YES NO

7.2.3 Is the total flow \leq 852 GPM? YES NO

7.3 Calculate ratio of cold leg flow to total header flow.

TABLE 8		
TOTAL COLD LEG INJECTION FLOW (F5084)	HPSI HEADER #1 FLOW (2FI-5101)	RATIO OF COLD LEG FLOW TO HEADER FLOW (F5084 \div 2FI-5101)
GPM	GPM	

7.4 IF required to test 2P-89C on Header #1,
THEN record data AND compare with acceptance criteria.

TABLE 9		
HEADER #1 VALVE	FLOW INDICATOR	FLOW RATE
2CV-5015-1	F5014-1	GPM
2CV-5035-1	F5034-1	GPM
2CV-5055-1	F5054-2	GPM
2CV-5075-1	F5074-2	GPM

7.4.1 Add three lowest flows from Table 9:
_____ + _____ + _____ = _____ GPM

7.4.2 Is sum of three lowest flows \geq 594 GPM? YES NO N/A

7.4.3 Is the total flow \leq 852 GPM? YES NO N/A

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- 7.5 Calculate ratio of cold leg flow to total header flow
(add to Table 10).

TABLE 10		
TOTAL COLD LEG INJECTION FLOW (F5084)	HPSI HEADER #1 FLOW (2FI-5101-1)	RATIO OF COLD LEG FLOW TO HEADER FLOW (F5084 ÷ 2FI-5101-1)
GPM	GPM	

- 7.6 Record data AND compare to acceptance criteria.

TABLE 11		
HEADER #2 VALVE	FLOW INDICATOR	FLOW RATE
2CV-5016-2	F5014-1	GPM
2CV-5036-2	F5034-1	GPM
2CV-5056-2	F5054-2	GPM
2CV-5076-2	F5074-2	GPM

- 7.6.1 Add three lowest flows from Table 11:
_____ + _____ + _____ = _____ GPM _____
- 7.6.2 Is sum of three lowest flows \geq 594 GPM? YES NO
- 7.6.3 Is the total flow \leq 852 GPM? YES NO

- 7.7 Calculate ratio of cold leg flow to total header flow.

TABLE 12		
TOTAL COLD LEG INJECTION FLOW (F5084)	HPSI HEADER #2 FLOW (2FI-5102)	RATIO OF COLD LEG FLOW TO HEADER FLOW (F5084 ÷ 2FI-5102)
GPM	GPM	

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- 7.8 IF required to test 2P-89C on Header #2,
THEN record data AND compare with acceptance criteria.

TABLE 13		
HEADER #2 VALVE	FLOW INDICATOR	FLOW RATE
2CV-5016-2	F5014-1	GPM
2CV-5036-2	F5034-1	GPM
2CV-5056-2	F5054-2	GPM
2CV-5076-2	F5074-2	GPM

- 7.8.1 Add three lowest flows from Table 13:
_____ + _____ + _____ = _____ GPM
- 7.8.2 Is sum of three lowest flows \geq 594 GPM? YES NO N/A
- 7.8.3 Is the total flow \leq 852 GPM? YES NO N/A

- 7.9 Calculate the ratio of cold leg to total header flow

TABLE 14		
TOTAL COLD LEG INJECTION FLOW (F5084)	HPSI HEADER #2 FLOW (2FI-5102)	RATIO OF COLD LEG FLOW TO HEADER FLOW (F5084 \div 2FI-5102)
GPM	GPM	

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7.10 Record data AND compare to acceptance criteria.

Table 15				
Valve	Instrument	Measured Value	Acceptance Criteria	Acceptance Criteria met?
2SI-23A		GPM	2SI-23A flow \geq 20 GPM	YES NO N/A
2SI-23B		GPM	2SI-23B flow \geq 20 GPM	YES NO N/A
2SI-23C		GPM	2SI-23C flow \geq 20 GPM	YES NO N/A

7.11 IF NO circled,
THEN perform the following:

- Declare applicable component inoperable.
- Refer to Tech Spec 3.5.2 and 3.5.3.
- Notify SM.
- Initiate Condition Report.

7.12 Send copy of completed supplement to System Engineer.

7.13 IF test performed with RCS boron concentration < 2500 ppm,
THEN perform the following:

- Initiate action to perform HPSI Header Flush (2103.002, Attachment G) during RCS fill OR prior to heatup.
- Notify SM/CRS HPSI system not available for Tech Spec Boration source.
- Make Status Board entries as required.

Comments _____

Performed By _____ Date _____

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8.0 SUPERVISOR REVIEW AND ANALYSIS

NOTE

Failure of HPSI pumps to meet specified flow or DP criteria of this test does NOT affect HPSI pump availability in Mode 5 or 6. Results outside acceptable normal range require resolution prior to heatup.

- 8.1 Do all measured values recorded in Acceptance Criteria section fall within specified Limiting Range for Operability? YES NO
- 8.2 Do all measured values recorded in Acceptance Criteria section fall within acceptable normal range? (Circle YES NO N/A N/A if only values outside Acceptable Normal Range are also outside Limiting Range for Operability).
- 8.3 IF NO circled in step 8.2, THEN perform the following corrective actions:
- 8.3.1 Notify IST Engineer to evaluate test results. _____
- 8.3.2 IF corrective maintenance required OR recommended, THEN initiate WR/WO indicating heatup restraint. _____
- 8.3.3 Make Control Room Log AND Status Board entries. _____

Comments _____

- 8.4 Are all administrative requirements of this test satisfied? YES NO

Supervisor _____ Date _____

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SUPPLEMENT 7A

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HPSI TRAIN A INTEGRITY TEST AND LEAK RATE DETERMINATION

This test assesses integrity of HPSI Train A by performing walkdown of system at pressure to satisfy Facility Operating License and NUREG 0578, Section 2.1.6.a.

1.0 INITIAL CONDITIONS

- Stopwatch, graduated cylinder, and containers for leak detection available. Stopwatch Serial Number _____
- IF available,
THEN obtain camera to capture photo of any boric acid leaks for the boric acid leak program (refer to 1032.047, Inspection and Evaluation of Boric Acid Leaks).

2.0 TEST PROCEDURE

- 2.1 Verify 2P-89A running on mini-recirc using Section 9.0 or Supplement 1 of this procedure. _____
- 2.2 After 5 minutes of pump operation, inspect portions of HPSI Train A outside Containment AND pressurized. Using P&ID M-2232 as guide, locate AND inspect each potential leakage source (valves, flanges, pump seals, etc.). _____
- 2.3 IF camera available,
THEN obtain photograph of any previously unidentified boric acid leak. _____
- 2.4 IF visible source of leakage identified,
THEN perform EITHER of the following (NA method NOT used):
 - Collect measured sample volume during timed interval to determine leak rate.
Record Initial Leak Rate on Leak Rate Data Sheet. _____
 - Count drops during timed interval (20 drops ~ 1 cc).
Record Initial Leak Rate on Leak Rate Data Sheet. _____
- 2.5 IF anything can be done during inspection to stop OR reduce leakage (i.e., adjust packing, tighten valves, etc.),
THEN take action to stop OR reduce leakage from each source. _____
- 2.6 IF anything was done to reduce leakage,
THEN record Final Leak Rate on Leak Rate Data Sheet. _____
- 2.7 Stop 2P-89A. _____

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SUPPLEMENT 7A

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3.0 ACCEPTANCE CRITERIA

3.1 Record total Final HPSI Train A leak rate: _____cc/min. _____

3.2 IF HPSI pump mechanical seal leak rate > 17 dpm
OR any other component final leak rate > 0 dpm,
THEN verify WR/WO submitted. _____

3.3 IF total HPSI Train A leakage > 6.5 cc/min (390 cc/hr),
THEN perform the following:

- Notify Shift Manager _____
- Refer to Calculation 97-R-2002-01 _____
- Notify System Engineering to evaluate leakage for impact
to ECCS SAR leakage criteria _____

3.4 IF any component final leak rate > 0 dpm,
THEN verify Condition Report initiated. _____

3.5 Forward copy of this test to System Engineering. _____

Performed By _____ Date _____

4.0 SUPERVISOR REVIEW AND ANALYSIS

4.1 IF any components have final leakrate > 0 cc/min,
THEN describe action taken below: _____

4.2 Are all administrative requirements of this test satisfied? YES NO

Supervisor _____ Date _____

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SUPPLEMENT 7A

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LEAK RATE DATA SHEET

Sheet ____ of ____

COMPONENT	INITIAL SAMPLE SIZE (3)	INITIAL TEST DURATION	INITIAL LEAK RATE (cc/min) (1)	CORRECTIVE ACTION TAKEN? (2)	FINAL SAMPLE SIZE (3)	FINAL TEST DURATION	FINAL LEAK RATE (cc/min) (1)
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			

(1) Leak Rate = Sample Volume ÷ Test Duration (20 drops = 1 cc)

(2) IF NO circled,
THEN N/A next two columns AND write initial leak rate for final leak rate.

(3) N/A if leak collection not performed.

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SUPPLEMENT 7B

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HPSI TRAIN B INTEGRITY TEST AND LEAK RATE DETERMINATION

This test assesses integrity of HPSI Train B by performing walkdown of system at pressure to satisfy Facility Operating License and NUREG 0578, Section 2.1.6.a.

1.0 INITIAL CONDITIONS

- Stopwatch, graduated cylinder, and containers for leak detection available. Stopwatch Serial Number _____
- IF available,
THEN obtain camera to capture photo of any boric acid leaks for the boric acid leak program (refer to 1032.047, Inspection and Evaluation of Boric Acid Leaks).

2.0 TEST PROCEDURE

- 2.1 Verify 2P-89B running on mini-recirc using Section 9.0 or Supplement 2 of this procedure. _____
- 2.2 After 5 minutes of pump operation, inspect portions of HPSI Train B outside Containment AND pressurized. Using P&ID M-2232 as guide, locate AND inspect each potential leakage source (valves, flanges, pump seals, etc.). _____
- 2.3 IF camera available,
THEN obtain photograph of any previously unidentified boric acid leak. _____
- 2.4 IF visible source of leakage identified,
THEN perform EITHER of the following (NA method NOT used):
 - Collect measured sample volume during timed interval to determine leak rate.
Record Initial Leak Rate on Leak Rate Data Sheet. _____
 - Count drops during timed interval (20 drops ~ 1 cc).
Record Initial Leak Rate on Leak Rate Data Sheet. _____
- 2.5 IF anything can be done during inspection to stop OR reduce leakage (i.e., adjust packing, tighten valves, etc.),
THEN take action to stop OR reduce leakage from each source. _____
- 2.6 IF anything was done to reduce leakage,
THEN record Final Leak Rate on Leak Rate Data Sheet. _____
- 2.7 Stop 2P-89B. _____

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SUPPLEMENT 7B

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3.0 ACCEPTANCE CRITERIA

3.1 Record total Final HPSI Train B leak rate: _____cc/min. _____

3.2 IF HPSI pump mechanical seal leak rate > 17 dpm
OR any other component final leak rate > 0 dpm,
THEN verify WR/WO submitted. _____

3.3 IF total HPSI Train B leakage > 6.5 cc/min (390 cc/hr),
THEN perform the following:

- Notify Shift Manager. _____
- Refer to Calculation 97-R-2002-01. _____
- Notify System Engineering to evaluate leakage for impact
to ECCS SAR leakage criteria. _____

3.4 IF ANY component final leak rate > 0 dpm,
THEN verify Condition Report initiated. _____

3.5 Forward copy of this test to System Engineering. _____

Performed By _____ Date _____

4.0 SUPERVISOR REVIEW AND ANALYSIS

4.1 IF any components have final leakrate > 0 cc/min,
THEN describe action taken below:

4.2 Are all administrative requirements of this test satisfied? YES NO

Supervisor _____ Date _____

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SUPPLEMENT 7B

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LEAK RATE DATA SHEET

Sheet ____ of ____

COMPONENT	INITIAL SAMPLE SIZE (3)	INITIAL TEST DURATION	INITIAL LEAK RATE (cc/min) (1)	CORRECTIVE ACTION TAKEN? (2)	FINAL SAMPLE Size (3)	FINAL TEST DURATION	FINAL LEAK RATE (cc/min) (1)
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			

(1) Leak Rate = Sample Volume ÷ Test Duration (20 drops = 1 cc)

(2) IF NO circled,
THEN N/A next two columns AND write initial leak rate for final leak rate.

(3) N/A if leak collection not performed.

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SUPPLEMENT 7C

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HPSI TRAIN C INTEGRITY TEST AND LEAK RATE DETERMINATION

This test assesses integrity of HPSI Train C (2P-89C suction AND discharge to Cross-Connect valves) by performing walkdown of system at pressure to satisfy Facility Operating License and NUREG 0578, Section 2.1.6.a.

1.0 INITIAL CONDITIONS

- Stopwatch, graduated cylinder, and containers for leak detection available. Stopwatch Serial Number _____
- IF available,
THEN obtain camera to capture photo of any boric acid leaks for the boric acid leak program (refer to 1032.047, Inspection and Evaluation of Boric Acid Leaks).

2.0 TEST PROCEDURE

- 2.1 Verify 2P-89C running on mini-recirc using Section 9.0 or Supplement 3 of this procedure. _____
- 2.2 After 5 minutes of pump operation, inspect portions of HPSI Train C which are pressurized AND not in Train A OR B. Using P&ID M-2232 as guide, locate AND inspect each potential leakage source (valves, flanges, pump seals, etc.). _____
- 2.3 IF camera available,
THEN obtain photograph of any previously unidentified boric acid leak. _____
- 2.4 IF visible source of leakage identified,
THEN perform EITHER of the following (NA method NOT used):
 - Collect measured sample volume during timed interval to determine leak rate.
Record Initial Leak Rate on Leak Rate Data Sheet. _____
 - Count drops during timed interval (20 drops ~ 1 cc).
Record Initial Leak Rate on Leak Rate Data Sheet. _____
- 2.5 IF anything can be done during inspection to stop OR reduce leakage (i.e., adjust packing, tighten valves, etc.),
THEN take action to stop OR reduce leakage from each source. _____
- 2.6 IF anything was done to reduce leakage,
THEN record Final Leak Rate on Leak Rate Data Sheet. _____
- 2.7 Stop 2P-89C. _____

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SUPPLEMENT 7C

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3.0 ACCEPTANCE CRITERIA

3.1 Record total Final HPSI Train C leak rate: _____cc/min. _____

3.2 IF HPSI pump mechanical seal leak rate > 17 dpm
OR any other component final leak rate > 0 dpm,
THEN verify WR/WO submitted. _____

3.3 IF total HPSI Train C leakage > 6.5 cc/min (390 cc/hr),
THEN perform the following:

- Notify Shift Manager. _____
- Refer to Calculation 97-R-2002-01. _____
- Notify System Engineering to evaluate leakage for impact
to ECCS SAR leakage criteria. _____

3.4 IF any component final leak rate > 0 dpm,
THEN verify Condition Report initiated. _____

3.5 Forward copy of this test to System Engineering. _____

Performed By _____ Date _____

4.0 SUPERVISOR REVIEW AND ANALYSIS

4.1 IF any components have final leakrate > 0 cc/min,
THEN describe action taken below: _____

4.2 Are all administrative requirements of this test satisfied? YES NO

Supervisor _____ Date _____

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SUPPLEMENT 7C

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LEAK RATE DATA SHEET

Sheet ____ of ____

COMPONENT	INITIAL SAMPLE SIZE (3)	INITIAL TEST DURATION	INITIAL LEAK RATE (cc/min) (1)	CORRECTIVE ACTION TAKEN? (2)	FINAL SAMPLE SIZE (3)	FINAL TEST DURATION	FINAL LEAK RATE (cc/min) (1)
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			

(1) Leak Rate = Sample Volume ÷ Test Duration (20 drops = 1 cc)

(2) IF NO circled,
THEN N/A next two columns AND write initial leak rate for final leak rate.

(3) N/A if leak collection not performed.

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SUPPLEMENT 8

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HPSI HEADER #1 HOT LEG INJECTION CHECK VALVE TEST

This test checks leakage for Hot Leg Injection check valves 2SI-26A, 2SI-27A and 2SI-28A per IST Program. For purpose of this test 2SI-27A and 2SI-28A considered one valve. All valves normally tested on refueling outage frequency.

Sections of this Supplement required as follows:

Section 2.0: 2SI-27A/2SI-28A Shutdown for Refueling Outage.

Section 3.0: 2SI-27A/2SI-28A leak rate determination OR PMT.

Section 4.0: 2SI-26A leakrate determination in Modes 1-3.

Section 5.0: 2SI-26A leakrate determination in Mode 5.

1.0 INITIAL CONDITIONS (May be performed in any order)

1.1 HPSI pumps aligned to Header #1 (2P-89A/C) secured. _____

1.2 IF performing Section 2.0,
THEN plant in Mode 3. _____

1.3 IF performing Section 3.0 only,
THEN plant in Mode 3, 4, or 5. _____

1.4 Obtain Tygon Tubing or hose. _____

1.5 IF performing Section 3.0 or 4.0,
THEN perform the following:

- Obtain Graduated cylinder or poly bottle to measure leakage. _____
- Verify Leak Collection Rig as described in Supplement 1 of 2104.004, Shutdown Cooling System available. _____

1.6 IF performing Section 5.0,
THEN verify the following:

- Plant in Mode 5. _____
- At least one SIT pressurized to > 250 psig. _____
- HPSI #1 Hot Leg Injection header filled AND vented. _____
- SIT Drain header not in use. _____
- All SIT outlet MOV's closed. _____
- HPSI #1 Hot Leg Injection not relied on for RCS Makeup per 1015.008 Att C. _____
- Obtain Graduated cylinder or poly bottle to measure leakage. _____
- WR/WO initiated for removal AND installation of restraint on 2SI-29A if required. WR/WO# _____

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2.0	2SI-27A AND 2SI-28A LEAK CHECK (N/A IF NOT REQUIRED)	
2.1	Verify Plant in Mode 3. Mode 3 required for duration of this test.	_____
2.2	Enter Tech Spec 3.5.2.	_____
{4.3.4}	2.3 Refer to Containment penetration administrative controls section of Conduct of Operations (1015.001) for 2CV-5101-1.	_____
2.4	Energize Th Injection valve (2CV-5101-1) by closing 2B52-L5.	_____
2.5	Monitor SIT level AND pressure while opening the following valves:	
	• SIT Drain to RDT (2CV-5081)	_____
	• CV Leakage (2CV-5105-1)	_____
2.6	Throttle open Th Injection (2CV-5101-1).	_____
2.7	<u>WHEN</u> pressure on 2PI-5105 has stabilized, <u>THEN</u> close the following valves:	
	• 2CV-5101-1	_____
	• 2CV-5105-1	_____
	• 2CV-5081	_____
2.8	Independently verify 2CV-5101-1 closed.	_____
2.9	Open 2CV-5101-1 breaker 2B52-L5.	_____
2.10	Exit Tech Spec 3.5.2.	_____
2.11	Verify RCS pressure ~ 2200 psia.	_____
2.12	Record initial pressure on 2PI-5105 in Table 1.	_____
2.13	<u>WHEN</u> 15 minutes have elapsed, <u>THEN</u> record final pressure on 2PI-5105 in Table 1.	_____
2.14	<u>IF</u> ΔP recorded in Table 1 greater than zero <u>AND</u> System Engineering determines need to quantify leakage, <u>THEN</u> perform the following:	
2.14.1	Complete Section 4.0 while preparing for CNTMT entry.	_____
2.14.2	<u>WHEN</u> CNTMT ready for entry, <u>THEN</u> perform Section 3.0.	_____

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NOTE

Leak test should be performed at ~ 250 psia RCS pressure in Mode 5. There is ~ 200 feet of pipe from 2SI-29A to 2CV-5101-1. This piping will have to be drained to quantify leakage from check valves. There may be 75 to 100 gallons of water in this line plus volume leaking into pipe.

3.0 2SI-27A AND 2SI-28A LEAK RATE DETERMINATION (N/A if not required)

3.1 Verify plant in Mode 3, 4, or 5. _____

3.2 IF this section being performed for PMT
THEN verify Supplement 6, of HPSI System Operations (2104.039)
has been performed after maintenance completed. _____

3.3 Verify HPSI Header #2 available for duration of test. _____

3.4 WHEN SITs removed from service,
THEN monitor RDT level/pressure AND open the following valves
to drain header as much as possible (L2200/P2200):

- 2CV-5105-1 _____
- 2CV-5081 _____

3.5 Connect hose to HPSI Header #1 Th Injection Drain (2SI-1061A)
AND route to floor drain. _____

3.6 Commence draining header by opening HPSI Header #1 Th
Injection Drains (2SI-1061A AND 2SI-1060A). _____

3.7 Continue draining header until slow, steady state
drain rate achieved. _____

3.8 Close the following valves:

- 2CV-5105-1 _____
- 2CV-5081 _____
- 2SI-1061A _____
- 2SI-1060A _____

3.9 Record RCS pressure in Table 2. _____

3.10 Attempt to maintain above pressure constant. _____

3.11 Open 2SI-1061A and 2SI-1060A AND continue draining header
until slow, steady state drain rate achieved. _____

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- 3.12 IF steam emitted from drain valves,
THEN perform the following:
- 3.12.1 Close the following valves:
- 2SI-1060A _____
 - 2SI-1061A _____
- 3.12.2 Obtain approximately 10 pounds of ice. _____
- 3.12.3 Connect Copper Cooling Coil as shown in Figure 1 of Supplement 1, 2104.004. _____
- 3.12.4 Connect Leak Collection Rig at 2SI-1061A. _____
- 3.12.5 Slowly open 2SI-1061A. _____
- 3.12.6 Slowly open 2SI-1060A while monitoring Leak Collection Rig pressure. _____
- 3.12.7 WHEN 2SI-1060A fully open,
THEN continue draining header until slow, steady state drain rate achieved. _____
- 3.13 Move hose from floor drain to measuring device
AND record initial time in Table 2. _____
- 3.14 WHEN five minutes have elapsed
OR at least two gallons collected,
THEN close the following valves:
- 2SI-1060A _____
 - 2SI-1061A _____
- 3.15 Record final time AND volume collected in Table 2. _____
- 3.16 IF Leak Collection Rig was used,
THEN remove AND store Leak Collection Rig. _____
- 3.17 Independently verify the following:
- 2SI-1060A closed. _____
 - 2SI-1061A closed AND capped. _____

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4.0 2SI-26A LEAK RATE DETERMINATION IN MODES 1-3 (N/A IF NOT REQUIRED)

4.1 Verify Plant in Mode 1, 2, or 3. _____

4.2 Connect hose to HPSI Header #1 Th Injection Vent (2SI-1059A) AND route to floor drain. _____

4.3 Open 2CV-5105-1. _____

4.4 Open any SIT Drain valve while monitoring SIT level AND pressure: _____

- 2SV-5001-1
- 2SV-5021-1
- 2SV-5041-2
- 2SV-5061-2

{4.3.4} 4.5 **Refer to Containment penetration administrative controls section of Conduct of Operations (1015.001) for 2SI-1058A AND 2SI-1059A.** _____

4.6 Open the following HPSI Header #1 Th Injection Vent valves: _____

- 2SI-1058A _____
- 2SI-1059A _____

4.7 Continue draining header until slow, steady state drain rate achieved. _____

4.8 IF steam emitted from vent valves,
THEN perform the following:

4.8.1 Close the following valves:

- 2SI-1058A _____
- 2SI-1059A _____

4.8.2 Obtain approximately 10 pounds of ice. _____

4.8.3 Connect Copper Cooling Coil per Figure 1 of Supplement 1, Shutdown Cooling System (2104.004). _____

4.8.4 Connect Leak Collection Rig at 2SI-1059A. _____

4.8.5 Open any SIT Drain valve while monitoring SIT level AND pressure. _____

4.8.6 Slowly open 2SI-1059A. _____

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- 4.8.7 Slowly open 2SI-1058A while monitoring Leak Collection Rig pressure. _____
- 4.8.8 WHEN 2SI-1058A fully open,
THEN continue draining header until slow, steady state drain rate achieved. _____
- 4.9 Move hose from floor drain to measuring device AND record initial time AND 2PI-5105 test pressure in Table 3. _____
- 4.10 WHEN five minutes have elapsed
OR at least two gallons collected,
THEN record final time AND volume collected in Table 3. _____
- 4.11 Perform the following:
- Lock close 2SI-1058A. _____
 - Lock close AND cap 2SI-1059A. _____
- 4.12 Close SIT Drain valve opened previously: _____
- 2SV-5001-1
 - 2SV-5021-1
 - 2SV-5041-2
 - 2SV-5061-2
- 4.13 Close 2CV-5105-1. _____
- 4.14 IF Leak Collection Rig was used,
THEN remove AND store Leak Collection Rig. _____
- 4.15 Independently verify the following:
- 2SI-1058A locked closed. _____
 - 2SI-1059A locked closed AND capped. _____

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5.0 2SI-26A LEAK RATE DETERMINATION IN MODE 5 (N/A IF NOT REQUIRED)

5.1 Verify Supplement 6, of HPSI System Operations (2104.039) _____
has been performed after maintenance completed.

5.2 Verify the following valves closed:

- 2CV-5081 _____
- 2CV-5082 _____
- 2CV-5101-1 _____
- 2SV-5001-1 _____

- 2SV-5021-1 _____
- 2SV-5041-2 _____
- 2SV-5061-2 _____

5.3 IF RCS pressure less than SIT pressure, _____
THEN close 2SI-29A (refer to 1015.008, SDC Control for
RCS Perturbation Determination).

5.4 Connect hose to HPSI Header #1 Th Injection Vent (2SI-1059A) _____
AND route to floor drain.

5.5 Open 2CV-5105-1. _____

NOTE

- Using highest available test pressure and maintaining constant pressure on 2SI-26A will ensure accurate test results.
- Monitor SIT pressure and level during test.

5.6 Open SIT Fill Bypass for desired SIT (Circle valve opened): _____

- A SIT 2SI-46
- B SIT 2SI-40
- C SIT 2SI-58
- D SIT 2SI-52

5.7 Refer to SDC Control, 1015.008 for Containment Closure control. _____

5.8 Unlock AND open the following HPSI Header #1 Th Injection Vent
valves:

- 2SI-1058A _____
- 2SI-1059A _____

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- 5.9 Continue draining header until slow, steady state drain rate achieved. _____
- 5.10 Move hose from floor drain to measuring device
AND record initial time AND 2PI-5105 test pressure
in Table 3. _____
- 5.11 WHEN five minutes have elapsed
OR at least two gallons collected,
THEN record final time AND volume collected in Table 3. _____
- 5.12 Perform the following:
- Lock close 2SI-1058A. _____
 - Lock close AND cap 2SI-1059A. _____
 - Close applicable SIT Fill Byp valve. _____
- 5.13 Cycle 2CV-5081 to depressurize Th injection header AND SIT
drain header as necessary. _____
- 5.14 Close 2CV-5105-1. _____
- 5.15 Open 2SI-29A _____
- 5.16 Independently verify the following:
- 2SI-1058A locked closed. _____
 - 2SI-1059A locked closed AND capped. _____
 - Applicable SIT Fill Byp valve closed. _____
 - 2SI-29A open. _____

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6.0 ACCEPTANCE CRITERIA

NOTE 2R17 leakage for 2SI-27A and 2SI-28A was 0.0 GPM. (WO#50966182)
--

6.1 IF Section 2.0 was performed, _____
THEN record data in Table 1 AND determine leak rate.

TABLE 1				
VALVES	2PI-5105 INITIAL PRESSURE	2PI-5105 FINAL PRESSURE	ΔP FINAL - INITIAL	IS $\Delta P > 0$?
2SI-27A 2SI-28A				YES NO N/A

6.2 IF Section 3.0 was performed, _____
THEN complete Table 2 AND determine leak rate.

TABLE 2						
VALVES	INITIAL TIME	FINAL TIME	ELAPSED TIME	VOLUME COLLECTED	LEAK RATE VOLUME \div TIME	ADJUSTED LEAK RATE (1)
2SI-27A 2SI-28A						

Note 1: Adjusted Leak Rate = Leak Rate x Extrapolation Constant (EC)

Extrapolation Constant = $\sqrt{2250 \div \text{test pressure}}$

Test Pressure = _____ psia

6.2.1 Is Adjusted Leak Rate in Table 2 > 1.0 GPM?

YES NO N/A

6.2.2 IF YES circled in 6.2.1,
THEN perform the following:

- Notify Shift Manager. _____
- Initiate WR/WO. _____
- Coordinate with System Engineering to determine operability AND source of leakage. _____
- Initiate Condition Report. _____

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<u>NOTE</u>
2R17 leakage adjusted to 2250 psia for 2SI-26A was 0.46 GPM. (WO#50966182)

6.3 IF Section 4.0 or 5.0 was performed,
 THEN record data in Table 3 AND determine leak rate. _____

TABLE 3						
VALVE	INITIAL TIME	FINAL TIME	ELAPSED TIME	VOLUME COLLECTED	LEAK RATE VOLUME ÷ TIME	ADJUSTED LEAK RATE (1)
2SI-26A						

Note 1: Adjusted Leak Rate = Leak Rate x Extrapolation Constant (EC)

Extrapolation Constant = $\sqrt{2250 \div \text{test pressure}}$

Test Pressure = _____ psia

6.3.1 Is Adjusted Leak Rate in Table 4 > 1.0 GPM? YES NO N/A

6.3.2 IF YES circled in 6.3.1,
 THEN perform the following:

- Notify Shift Manager. _____
- Initiate WR/WO. _____
- Coordinate with System Engineering to determine operability AND source of leakage. _____
- Initiate Condition Report. _____

6.3.3 IF 2SI-29A was closed for this test
 AND test results acceptable,
 THEN verify restraint installed with 2SI-29A open. _____

Performed By _____ Date _____

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7.0 SUPERVISOR REVIEW AND ANALYSIS

7.1 Is leakage for 2SI-27A AND 2SI-28A < 5.0 GPM? YES NO N/A

7.2 Is leakage for 2SI-26A < 5.0 GPM? YES NO N/A

7.3 IF NO answered to 7.1 AND 7.2,
THEN verify Condition Report initiated. _____

Comments _____

7.4 Are all administrative requirements of this test satisfied? YES NO

7.5 IF Section 2.0, 3.0, 4.0 or 5.0 performed,
THEN forward copy of completed test to Operations Standards
to revise procedure for data collected. _____

Supervisor _____ Date _____

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HPSI HEADER #2 HOT LEG INJECTION CHECK VALVE TEST

This test checks leakage for Hot Leg Injection check valves 2SI-26B, 2SI-27B and 2SI-28B per IST Program. For purpose of this test 2SI-27B and 2SI-28B considered one valve. All valves normally tested on refueling outage frequency.

Sections of this Supplement required as follows:

Section 2.0: 2SI-27B/2SI-28B Shutdown for Refueling Outage.

Section 3.0: 2SI-27B/2SI-28B leak rate determination OR PMT.

Section 4.0: 2SI-26B leakrate determination in Modes 1-3.

Section 5.0: 2SI-26B leakrate determination in Mode 5.

1.0 INITIAL CONDITIONS (May be performed in any order)

1.1 HPSI pumps aligned to Header #2 (2P-89B/C) secured. _____

1.2 IF performing Section 2.0,
THEN plant in Mode 3. _____

1.3 IF performing Section 3.0 only,
THEN plant in Mode 3, 4, OR 5. _____

1.4 Obtain Tygon Tubing or hose. _____

1.5 IF performing Section 3.0 or 4.0,
THEN perform the following:

- Obtain Graduated cylinder or poly bottle to measure leakage. _____
- Verify Leak Collection Rig as described in Supplement 1 of 2104.004, Shutdown Cooling System available. _____

1.6 IF performing Section 5.0,
THEN verify the following:

- Plant in Mode 5. _____
- At least one SIT pressurized to > 250 psig. _____
- HPSI #2 Hot Leg Injection header filled AND vented. _____
- SIT Drain header not in use. _____
- All SIT outlet MOV's closed. _____
- HPSI #2 Hot Leg Injection not relied on for RCS Makeup per 1015.008 Att C. _____
- Obtain Graduated cylinder or poly bottle to measure leakage. _____
- WR/WO initiated for removal AND installation of restraint on 2SI-29B if required. WR/WO# _____

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2.0 2SI-27B AND 2SI-28B LEAK CHECK (N/A IF NOT REQUIRED)

{4.3.4}

- | | | |
|--------|--|-----------------------------|
| 2.1 | Verify Plant in Mode 3. Mode 3 required for duration of this test. | _____ |
| 2.2 | Enter Tech Spec 3.5.2. | _____ |
| 2.3 | Refer to Containment penetration administrative controls section of Conduct of Operations (1015.001) for 2CV-5102-2. | _____ |
| 2.4 | Energize Th Injection valve (2CV-5102-2) by closing 2B62-G2. | _____ |
| 2.5 | Monitor SIT level AND pressure while opening the following valves: | |
| | <ul style="list-style-type: none"> • SIT Drain to RDT (2CV-5081) • CV Leakage (2CV-5106-2) |

_____ |
| 2.6 | Throttle open Th Injection (2CV-5102-2). | _____ |
| 2.7 | <u>WHEN</u> pressure on 2PI-5106 has stabilized,
<u>THEN</u> close the following valves: | |
| | <ul style="list-style-type: none"> • 2CV-5102-2 • 2CV-5106-2 • 2CV-5081 |

_____ |
| 2.8 | Independently verify 2CV-5102-2 closed. | _____ |
| 2.9 | Open 2CV-5102-2 breaker 2B62-G2. | _____ |
| 2.10 | Exit Tech Spec 3.5.2. | _____ |
| 2.11 | Verify RCS pressure ~ 2200 psia. | _____ |
| 2.12 | Record initial pressure on 2PI-5106 in Table 1. | _____ |
| 2.13 | <u>WHEN</u> 15 minutes have elapsed,
<u>THEN</u> record final pressure on 2PI-5106 in Table 1. | _____ |
| 2.14 | <u>IF</u> ΔP recorded in Table 1 greater than zero
<u>AND</u> System Engineering determines need to quantify leakage,
<u>THEN</u> perform the following: | |
| 2.14.1 | Complete Section 4.0 while preparing for CNTMT entry. | _____ |
| 2.14.2 | <u>WHEN</u> CNTMT ready for entry,
<u>THEN</u> perform Section 3.0. | _____ |

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NOTE

Leak test should be performed at ~ 250 psia RCS pressure in Mode 5. There is ~ 200 feet of pipe from 2SI-29B to 2CV-5102-2. This piping will have to be drained to quantify leakage from check valves. There may be 75 to 100 gallons of water in this line plus volume leaking into pipe.

3.0 2SI-27B AND 2SI-28B LEAK RATE DETERMINATION (N/A IF NOT REQUIRED)

- 3.1 Verify plant in Mode 3, 4, or 5. _____
- 3.2 IF this section being performed for PMT
THEN verify Supplement 6, of HPSI System Operations (2104.039)
has been performed after maintenance completed. _____
- 3.3 Verify HPSI Header #1 available for duration of test. _____
- 3.4 WHEN SITs removed from service,
THEN monitor RDT level/pressure AND open the following
valves to drain header as much as possible (L2200/P2200):
 - 2CV-5106-2 _____
 - 2CV-5081 _____
- 3.5 Connect hose to HPSI Header #2 Th Injection Drain (2SI-1061B)
AND route to floor drain. _____
- 3.6 Commence draining header by opening HPSI Header #2 Th
Injection Drains (2SI-1061B AND 2SI-1060B). _____
- 3.7 Continue draining header until slow, steady state
drain rate achieved. _____
- 3.8 Close the following valves:
 - 2CV-5106-2 _____
 - 2CV-5081 _____
 - 2SI-1061B _____
 - 2SI-1060B _____
- 3.9 Record RCS pressure in Table 2. _____
- 3.10 Attempt to maintain above pressure constant. _____
- 3.11 Open 2SI-1061B and 2SI-1060B AND continue draining header
until slow, steady state drain rate achieved. _____

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- 3.12 IF steam emitted from the drain valves,
THEN perform the following:
- 3.12.1 Close the following valves:
- 2SI-1060B _____
 - 2SI-1061B _____
- 3.12.2 Obtain approximately 10 pounds of ice. _____
- 3.12.3 Connect Copper Cooling Coil as shown in Figure 1 of Supplement 1, 2104.004. _____
- 3.12.4 Connect Leak Collection Rig at 2SI-1061B. _____
- 3.12.5 Slowly open 2SI-1061B. _____
- 3.12.6 Slowly open 2SI-1060B while monitoring Leak Collection Rig pressure. _____
- 3.12.7 WHEN 2SI-1060B fully open,
THEN Continue draining header until slow, steady state drain rate achieved. _____
- 3.13 Move hose from floor drain to measuring device
AND record initial time in Table 2. _____
- 3.14 WHEN five minutes have elapsed
OR at least two gallons collected,
THEN close the following valves:
- 2SI-1060B _____
 - 2SI-1061B _____
- 3.15 Record final time AND volume collected in Table 2. _____
- 3.16 IF Leak Collection Rig was used,
THEN remove AND store Leak Collection Rig. _____
- 3.17 Independently verify the following:
- 2SI-1060B closed. _____
 - 2SI-1061B closed AND capped. _____

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4.0 2SI-26B LEAK RATE DETERMINATION IN MODES 1-3 (N/A IF NOT REQUIRED)

4.1 Verify Plant in Mode 1, 2, or 3. _____

4.2 Connect hose to HPSI Header #2 Th Injection Vent (2SI-1059B) AND route to floor drain. _____

4.3 Open 2CV-5106-2. _____

4.4 Open any SIT Drain valve while monitoring SIT level AND pressure: _____

- 2SV-5001-1
- 2SV-5021-1
- 2SV-5041-2
- 2SV-5061-2

{4.3.4} 4.5 **Refer to Containment penetration administrative controls section of Conduct of Operations (1015.001) for 2SI-1058B AND 2SI-1059B.** _____

4.6 Open the following HPSI Header #2 Th Injection Vent valves:

- 2SI-1058B _____
- 2SI-1059B _____

4.7 Continue draining header until slow, steady state drain rate achieved. _____

4.8 IF steam emitted from the vent valves,
THEN perform the following:

4.8.1 Close the following valves:

- 2SI-1058B _____
- 2SI-1059B _____

4.8.2 Obtain approximately 10 pounds of ice. _____

4.8.3 Connect Copper Cooling Coil per Figure 1 of Supplement 1, Shutdown Cooling System (2104.004). _____

4.8.4 Connect Leak Collection Rig at 2SI-1059B. _____

4.8.5 Open any SIT Drain valve while monitoring SIT level AND pressure. _____

4.8.6 Slowly open 2SI-1059B. _____

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- 4.8.7 Slowly open 2SI-1058B while monitoring Leak Collection Rig pressure. _____
- 4.8.8 WHEN 2SI-1058B fully open,
THEN continue draining header until slow, steady state drain rate achieved. _____
- 4.9 Move hose from floor drain to measuring device AND record initial time AND 2PI-5106 test pressure in Table 3. _____
- 4.10 WHEN five minutes have elapsed
OR at least two gallons collected,
THEN record final time AND volume collected in Table 3. _____
- 4.11 Perform the following:
- Lock close 2SI-1058B. _____
 - Lock close AND cap 2SI-1059B. _____
- 4.12 Close SIT Drain valve opened previously: _____
- 2SV-5001-1
 - 2SV-5021-1
 - 2SV-5041-2
 - 2SV-5061-2
- 4.13 Close 2CV-5106-2. _____
- 4.14 IF Leak Collection Rig was used,
THEN remove AND store Leak Collection Rig. _____
- 4.15 Independently verify the following:
- 2SI-1058B locked closed. _____
 - 2SI-1059B locked closed AND capped. _____

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5.0 2SI-26B LEAK RATE DETERMINATION IN MODE 5 (N/A IF NOT REQUIRED)

5.1 Verify Supplement 6, of HPSI System Operations (2104.039) _____
has been performed after maintenance completed.

5.2 Verify the following valves closed:

- 2CV-5081 _____
- 2CV-5082 _____
- 2CV-5102-2 _____
- 2SV-5001-1 _____

- 2SV-5021-1 _____
- 2SV-5041-2 _____
- 2SV-5061-2 _____

5.3 IF RCS pressure less than SIT pressure, _____
THEN close 2SI-29B (refer to 1015.008, SDC Control for
RCS Perturbation Determination).

5.4 Connect hose to HPSI Header #2 Th Injection Vent (2SI-1059B) _____
AND route to floor drain.

5.5 Open 2CV-5106-2. _____

NOTE

- Using highest available test pressure and maintaining constant pressure on 2SI-26B will ensure accurate test results.
- Monitor SIT pressure and level during test.

5.6 Open SIT Fill Bypass for desired SIT (Circle valve opened): _____

- A SIT 2SI-46
- B SIT 2SI-40
- C SIT 2SI-58
- D SIT 2SI-52

5.7 Refer to SDC Control, 1015.008 for Containment Closure control. _____

5.8 Unlock AND open the following HPSI Header #2 Th Injection Vent
valves:

- 2SI-1058B _____
- 2SI-1059B _____

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- 5.9 Continue draining header until slow, steady state drain rate achieved. _____
- 5.10 Move hose from floor drain to measuring device AND record initial time AND 2PI-5106 test pressure in Table 3. _____
- 5.11 WHEN five minutes have elapsed _____
OR at least two gallons collected,
THEN record final time AND volume collected in Table 3. _____
- 5.12 Perform the following:
- Lock close 2SI-1058B. _____
 - Lock close AND cap 2SI-1059B. _____
 - Close applicable SIT Fill Byp valve. _____
- 5.13 Cycle 2CV-5081 to depressurize Th injection header AND SIT drain header as necessary. _____
- 5.14 Close 2CV-5106-2. _____
- 5.15 Open 2SI-29B. _____
- 5.16 Independently verify the following:
- 2SI-1058B locked closed. _____
 - 2SI-1059B locked closed AND capped. _____
 - Applicable SIT Fill Byp valve closed. _____
 - 2SI-29B open. _____

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6.0 ACCEPTANCE CRITERIA

NOTE
2R17 leakage for 2SI-27B and 2SI-28B was 0.0 GPM. (WO#50966181)

- 6.1 IF Section 2.0 was performed,
THEN record data in Table 1 AND determine leak rate. _____

TABLE 1				
VALVES	2PI-5106 INITIAL PRESSURE	2PI-5106 FINAL PRESSURE	ΔP FINAL - INITIAL	IS ΔP > 0?
2SI-27B 2SI-28B				YES NO N/A

- 6.2 IF Section 3.0 was performed,
THEN complete Table 2 AND determine leak rate. _____

TABLE 2						
VALVES	INITIAL TIME	FINAL TIME	ELAPSED TIME	VOLUME COLLECTED	LEAK RATE VOLUME ÷ TIME	ADJUSTED LEAK RATE (1)
2SI-27B 2SI-28B						

Note 1: Adjusted Leak Rate = Leak Rate x Extrapolation Constant (EC)

Extrapolation Constant = $\sqrt{2250 \div \text{test pressure}}$

Test Pressure = _____ psia

6.2.1 Is Adjusted Leak Rate in Table 2 > 1.0 GPM? YES NO N/A

6.2.2 IF YES circled in 6.2.1,
THEN perform the following:

- Notify Shift Manager. _____
- Initiate WR/WO. _____
- Coordinate with System Engineering to determine operability AND source of leakage. _____
- Initiate Condition Report. _____

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<u>NOTE</u>
2R17 leakage adjusted to 2250 psia for 2SI-26B was 0.0 GPM. (WO#50966181)

6.3 IF Section 4.0 or 5.0 was performed,
THEN record data in Table 3 AND determine leak rate. _____

TABLE 3						
VALVE	INITIAL TIME	FINAL TIME	ELAPSED TIME	VOLUME COLLECTED	LEAK RATE VOLUME ÷ TIME	ADJUSTED LEAK RATE (1)
2SI-26B						

Note 1: Adjusted Leak Rate = Leak Rate x Extrapolation Constant (EC)

Extrapolation Constant = $\sqrt{2250 \div \text{test pressure}}$

Test Pressure = _____ psia

6.3.1 Is Adjusted Leak Rate in Table 4 > 1.0 GPM? YES NO N/A

6.3.2 IF YES circled in 6.3.1,
THEN perform the following:

- Notify Shift Manager. _____
- Initiate WR/WO. _____
- Coordinate with System Engineering to
determine operability AND source of leakage. _____
- Initiate Condition Report. _____

6.3.3 IF 2SI-29B was closed for this test
AND test results acceptable,
THEN verify restraint reinstalled with 2SI-29B open. _____

Performed By _____ Date _____

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7.0 SUPERVISOR REVIEW AND ANALYSIS

7.1 Is leakage for 2SI-27B AND 2SI-28B < 5.0 GPM? YES NO N/A

7.2 Is leakage for 2SI-26B < 5.0 GPM? YES NO N/A

7.3 IF NO answered to 7.1 AND 7.2,
THEN verify Condition Report initiated. _____

Comments _____

7.4 Are all administrative requirements of this test satisfied? YES NO

7.5 IF Section 2.0, 3.0, 4.0 or 5.0 performed,
THEN forward copy of completed test to Operations Standards
to revise procedure for data collected. _____

Supervisor _____ Date _____

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HPSI PRESSURIZATION SYSTEM VALVE CLOSURE TEST

This test demonstrates the operability of HPSI Pressurization System (HPS) suction valves (2BS-13 and 2BS-14) and discharge check valves (2HPS-08 and 2HPS-09) that were installed by Temporary Alteration 04-02-002. The suction valves are required to be stroked quarterly to ensure they can be closed per the IST program. The check valves are required to be tested quarterly to ensure they will prevent reverse flow per the IST Program.

This test is normally performed when the HPS system is in service and is expected to be performed along with 2P-89B or 2P-89C (Green train) Quarterly test because a Green HPSI pump is required to be in operation. Once a Green HPSI pump is operating, the HPS discharge header will be isolated and vented to determine if 2HPS-08 and 2HPS-09 will close. This is not a leak rate determination test. If the HPS system is not in service, then this test is not required.

1.0 INITIAL CONDITIONS:

1.1 Verify the following valves open:

- HPSI Header #2 Drain (2SI-1056B) _____
- HPSI Header #2 Drain (2SI-1057B) _____

1.2 Verify HPSI pump in operation on Green Train
IAW ANY of the following methods: _____

- Supplement 2 of this procedure
- Supplement 3 of this procedure (aligned to Green train)
- Section 9.0 of this procedure

1.3 Check HPSI Header #2 Pressure > 1400 psig (2PI-5109). _____

2.0 TEST METHOD:

2.1 Close Drain Downstream of 2IA-5092 (2IA-1461). _____

2.2 Close HPS Pump Discharge Isolation (2HPS-05). _____

2.3 Open 2HPS-09 Check Bypass (2HPS-12). _____

2.4 Open HPS Discharge Header Drain (2HPS-07). _____

2.5 Determine if check valve 2HPS-08 closed by minimal
leakage (less than steady stream) out 2HPS-07 drain and
record in Table 1. _____

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- | | | |
|------|---|-------|
| 2.6 | Close 2HPS-07. | _____ |
| 2.7 | Close 2HPS-12. | _____ |
| 2.8 | Open HPS Check Valve Drain (2HPS-14). | _____ |
| 2.9 | Determine if check valve 2HPS-09 closed by minimal leakage (less than steady stream) out 2HPS-14 drain and record in Table 1. | _____ |
| 2.10 | Close 2HPS-14. | _____ |
| 2.11 | Open 2HPS-05. | _____ |
| 2.12 | Close the following valves: | |
| | • RWT Outlet Local Sample (2BS-13) | _____ |
| | • RWT Outlet Local Sample (2BS-14) | _____ |
| 2.13 | Record 2BS-13/2BS-14 closure in Table 2. | _____ |
| 2.14 | Open the following valves: | |
| | • 2BS-13 | _____ |
| | • 2BS-14 | _____ |
| 2.15 | Open 2IA-1461. | _____ |
| 2.16 | Return to associated supplement or section of this procedure to secure the running HPSI pump. | _____ |

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3.0 ACCEPTANCE CRITERIA

3.1 Document observation of check valve closure in Table 1. _____

TABLE 1			
CHECK VALVE	TEST DIRECTION	TEST CRITERIA	IS PROPER VALVE CLOSURE INDICATED?
2HPS-08	Closed	Minimal leakage out 2HPS-07 drain	YES NO
2HPS-09	Closed	Minimal leakage out 2HPS-14 drain	YES NO

3.2 Document suction valve closure in Table 2. _____

TABLE 2			
VALVE	TEST DIRECTION	TEST CRITERIA	IS PROPER VALVE STROKE INDICATED?
2BS-13 OR 2BS-14	Closed	At least ONE valve closed	YES NO

3.3 IF NO circled in Table 1 or Table 2,
THEN perform the following:

- Declare affected valves inoperable. _____
- Secure the HPS IAW Attachment F of this procedure.
(This action isolates inoperable valves from
Green HPSI train.) _____
- Refer to Tech Spec 3.5.2 or 3.5.3. _____
- Notify Shift Manager. _____
- Initiate WR/WO as applicable. _____

Comments _____

Performed By _____ Date _____

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4.0 SUPERVISOR REVIEW AND ANALYSIS

4.1 Was proper valve closure determined in Section 3.0? YES NO

4.2 IF NO answered to 4.1,
THEN perform the following corrective actions:

- Verify the HPSI Pressurization System isolated from the Green HPSI Header IAW Attachment F of this procedure. _____
- Verify Condition Report initiated. _____

Comments _____

4.3 Are all administrative requirements of this test satisfied? YES NO

Supervisor _____ Date _____

ADMINISTRATIVE JOB PERFORMANCE MEASUREUNIT: 2 REV #: 000 DATE: _____SYSTEM/DUTY AREA: A.3: Radiation ControlTASK: Complete a Containment Purge Gaseous ReleaseJTA#: ANO2ROGRWNORM10KA VALUE RO: 2.5 SRO: 3.4 KA REFERENCE: 2.3.9APPROVED FOR ADMINISTRATION TO: RO: X SRO: _____TASK LOCATION: INSIDE CR: _____ OUTSIDE CR: _____ BOTH: X

SUGGESTED TESTING ENVIRONMENT AND METHOD (PERFORM OR SIMULATE):

PLANT SITE: _____ SIMULATOR: Perform CLASSROOM: Perform

POSITION EVALUATED: RO: _____ SRO: _____

ACTUAL TESTING ENVIRONMENT: SIMULATOR: _____ PLANT SITE: _____ LAB: _____

TESTING METHOD: SIMULATE: _____ PERFORM: _____

APPROXIMATE COMPLETION TIME IN MINUTES: 15 MinutesREFERENCE(S): OP 2104.033 Supplement 1 Rev. 043-02-0

EXAMINEE'S NAME: _____ SSN: _____

EVALUATOR'S NAME: _____

THE EXAMINEE'S PERFORMANCE WAS EVALUATED AGAINST THE STANDARDS CONTAINED IN THIS JPM AND IS DETERMINED TO BE:

SATISFACTORY: _____ UNSATISFACTORY: _____

PERFORMANCE CHECKLIST COMMENTS:

Start Time _____ Stop Time _____ Total Time _____

SIGNED: _____ DATE: _____

SIGNATURE INDICATES THIS JPM HAS BEEN COMPARED TO ITS APPLICABLE PROCEDURE BY A QUALIFIED INDIVIDUAL (NOT THE EXAMINEE) AND IS CURRENT WITH THAT REVISION.

ADMINISTRATIVE JOB PERFORMANCE MEASURE

INITIAL PLANT CONDITIONS

Plant is in Mode 5.

Today's date is 3/15/2005.

Chemistry has completed Containment atmosphere radioactivity analysis.

Initial flow from 2RITS-8233, Containment Purge, is 8.5 SCFM.

Initial count rate on 2RITS-8233, Containment Purge, is 60 cpm.

Initial CAM's Particulate reading is 1084 CPM and Gaseous is 928 CPM.

Current four hour averaged CAM's Particulate reading is 1142 CPM and Gaseous is 1012 CPM.

Last test reading run-time from engineering programs group is 7532.5 hrs.

Current run-time reading from 2B85-C7 is 8284.9 hrs.

Plant heating is not required to be aligned to containment.

No other Gaseous Release is in progress.

TASK STANDARD:

Correctly complete applicable portions of Supplement 1 of Containment Purge Gaseous Release Permit.

TASK PERFORMANCE AIDS: A partially marked-up copy of Supplement 1 Containment Purge Gaseous Release

Permit through section 4 and chemistry release data.

SIMULATOR SETUP: NA

ADMINISTRATIVE JOB PERFORMANCE MEASURE**Initiating CUE:**

The CRS directs "Complete purge system verification section of OP 2104.033 supplement 1, Containment Purge Gaseous Release Permit. Sections 4.9, 4.10 and 4.11 have already been completed."

CRITICAL STEPS: 4, 5, 11, 14

START TIME: _____

<u>PERFORMANCECHECKLIST</u>			<u>STANDARD</u>	<u>CIRCLE ONE</u>
	1. (Step 4.1.1)	Record last reading from given data.	Records 7532.5 hrs.	N/A SAT UNSAT
	2. (Step 4.1.2)	Record present run-time data from given data.	Records 8284.9 hrs.	N/A SAT UNSAT
	3. (Step 4.1.3)	Record estimated release duration from chemistry release data form.	Records 1.0 hr from page one of chemistry data.	N/A SAT UNSAT
(C)	4. (Step 4.1.4)	Calculate projected filter run-time. (> 720 hours)	Calculates 753.4 hrs.	N/A SAT UNSAT
(C)	5. (Step 4.1.5)	Determine that filter run time is greater than 720 hrs and notify Engineering programs. Examiner's Cue: "Engineering is calculating new initial run-time data. Continue on with form and will provide corrected data before starting release."	Determines calculated filter run-time is >720hrs and contacts Engineering programs or CRS.	N/A SAT UNSAT
Examiner's Note: The following equipment is located outside the control room.				
	6. (Step 4.2)	Verify Purge Exhaust Filter doors closed and dogged. Examiner's Cue: "The Purge Exhaust filter Unit doors are verified closed and dogged by the inside AO."	Tells examiner that filter doors must be verified closed and dogged.	N/A SAT UNSAT
	7. (Step 4.3)	Provide plant heating to containment.	NA step for plant heating per initial conditions.	N/A SAT UNSAT
	8. (Step 4.4)	Verify no other gaseous release is in progress.	Initials step per initial data.	N/A SAT UNSAT
	9. (Step 4.5)	Recorded initial CAM's readings from initial data.	Records Particulate reading is 1084 CPM and Gaseous is 928 CPM from initial data.	N/A SAT UNSAT
	10. (Step 4.6)	Record current CAM's readings from initial data.	Records Particulate reading is 1142 CPM and Gaseous is 1012 CPM from initial data.	N/A SAT UNSAT
(C)	11. (Step 4.7)	Calculate allowable count rate limits (both particulate and gaseous). (Particulate – 1355 CPM Gaseous – 1160CPM ± 15 CPM)	Calculates allowable limits for particulate to be 1355 CPM and for gaseous to be 1160 CPM.	N/A SAT UNSAT

ADMINISTRATIVE JOB PERFORMANCE MEASURE

<u>PERFORMANCECHECKLIST</u>			<u>STANDARD</u>	<u>CIRCLE ONE</u>
	12. (Step 4.8)	Step is NA since current count rates are less than allowable limits.	Determines that entire step 4.8 is NA'd.	N/A SAT UNSAT
EXAMINER'S NOTE: Steps 4.9, 4.10 and 4.11 have been completed previously.				
	13. (Step 4.12)	Records preliminary report 2RITS-8233 set point to be 150 CPM.	Records 2RITS-8233 set point to be 150 CPM from initial chemistry report (page 3)	N/A SAT UNSAT
(C)	14. (Step 4.12)	Determine 2RITS 8233 potentiometer set point. (1.0 E3 = 3.84)	Determined that since set point was less than 1000CPM, the potentiometer set point was 3.84.	N/A SAT UNSAT
	15. (Step 4.13)	Contact CRS to have independent verifications completed. Examiner's Cue: Independent verification has been completed completed.	Contacted CRS to designate someone to independently verify steps per 4.13.	N/A SAT UNSAT
	16. (Step 4.14)	Declare 2RITS-8233 operable and give form to shift manager for approval.	Declare 2RITS-8233 operable and give form to shift manager for approval.	N/A SAT UNSAT
END				

STOP TIME: _____

ADMINISTRATIVE JOB PERFORMANCE MEASURE

EXAMINER's COPY

INITIAL PLANT CONDITIONS

- Plant is in Mode 5.
- Chemistry has completed Containment atmosphere radioactivity analysis.
- Initial flow from 2RITS-8233, Containment Purge, is 8.5 SCFM.
- Initial count rate on 2RITS-8233, Containment Purge, is 60 CPM.
- Initial CAM's Particulate reading is 1084 CPM and Gaseous is 928 CPM.
- Current four hour averaged CAM's Particulate reading is 1142 CPM and Gaseous is 1012 CPM.
- Last test reading run-time from engineering programs group is 7532.5 hrs.
- Current run-time reading from 2B85-C7 is 8284.9 hrs.
- Plant heating is not required to be aligned to containment.
- No other Gaseous Release is in progress.

Initiating CUE:

The CRS directs "Complete purge system verification section of OP 2104.033 supplement 1, Containment Purge Gaseous Release Permit. Sections 4.9, 4.10 and 4.11 have already been completed."

ADMINISTRATIVE JOB PERFORMANCE MEASURE

EXAMINEE's COPY

INITIAL PLANT CONDITIONS

- Plant is in Mode 5.
- Chemistry has completed Containment atmosphere radioactivity analysis.
- Initial flow from 2RITS-8233, Containment Purge, is 8.5 SCFM.
- Initial count rate on 2RITS-8233, Containment Purge, is 60 CPM.
- Initial CAM's Particulate reading is 1084 CPM and Gaseous is 928 CPM.
- Current four hour averaged CAM's Particulate reading is 1142 CPM and Gaseous is 1012 CPM.
- Last test reading run-time from engineering programs group is 7532.5 hrs.
- Current run-time reading from 2B85-C7 is 8284.9 hrs.
- Plant heating is not required to be aligned to containment.
- No other Gaseous Release is in progress.

Initiating CUE:

The CRS directs "Complete purge system verification section of OP 2104.033 supplement 1, Containment Purge Gaseous Release Permit. Sections 4.9, 4.10 and 4.11 have already been completed."

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SUPPLEMENT 1

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CONTAINMENT PURGE GASEOUS RELEASE PERMIT

This Supplement provides instructions for Containment Purge and satisfies Tech Spec 3.3.3.1, Table 4.3-3.2.a.i.a and ODCM App 2, L2.2.1, Table 2.2-2.2.A.

1.0 REQUEST (Operations)

- 1.1 Initiate WR/WO for I&C to perform Channel Functional Test of 2RX-9820 SPING 5 (2304.149). P
- 1.2 Verify valves aligned per Attachment A of this procedure, 2RE-8233 Shed on Top of Aux Bldg Roof section only. P
- 1.3 Start CNTMT Purge (2RITS-8233) Sample pump (2C-49) as follows:
 - 1.3.1 Place local handswitch 2HS-8233 in START. P
 - 1.3.2 Verify flow between 8.0 and 12.0 SCFM (2FIS-8233).
Flow = 8.5 SCFM P
 - 1.3.3 Record count rate on 2RE-8233: 60 cpm P
- 1.4 Record SPING 5, Channel 5 activity: 1.09E-6 µci/cc P
- 1.5 Record count rate on running CAMS:
 - CAMS 8271-2 Particulate 1064 Gaseous 928 P
- 1.6 Record CNTMT Building average pressure from PMS/PDS P5601-A or Supplement 4: 14.1 psia P
- 1.7 Submit to Chemistry for sampling and analysis. P

Performed By B. M. O'Connell Date 3/10/05

2.0 ANALYSIS (Chemistry)

- 2.1 Verify plant in Mode 4, 5, or 6. P
- 2.2 Sample Containment Building atmosphere. P
 - Date 3/10/05 Time 0800
 - Sample flowmeter M&TE number CLO-026 Cal due date 8/17/05
- 2.3 Performed Gamma spectroscopy. P
- 2.4 Review Gamma spectroscopy report. P
- 2.5 Generate Preliminary report. P

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SUPPLEMENT 1

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3.0 SPING 5 VALIDATION Prior to Purge (Chemistry)

3.1 Verify SPING 5 Channel Functional Test (2304.149) successfully performed AND sample pump restarted. tc

3.2 Perform the following using Eberline Radiation Monitoring System (1604.051):

- Verify SPING 5 operable by performing source check using Attachment 5. tc
- Verify SPING 5 channels 1, 3, 5, 7, 9, 10, 14, & 15 operable using Attachment 4. tc
- Set new SPING 5 channel 5 and/or channel 7 alarm setpoints using Form 1604.051E. tc
- Edit isotopic distribution using analysis data. tc

3.3 Record activities in step 6.9, column 3 of this Supplement. tc

3.4 Are doses from Gaseous Effluent release projected to exceed 25% of yearly design objectives on quarterly basis? (ODCM App. 2, L 2.4.4.A) YES (NO)

3.5 Return this Supplement and Permit to Unit 2 Control Room. tc

Performed By Joe Chant Date 3/16/05

4.0 PURGE SYSTEM VERIFICATION (Operations)

4.1 Verify adequate Purge Exhaust filter run-time remaining for duration of purge as follows:

4.1.1 Record Last Test reading from last Air Purification System Surveillance (5120.420) or from Engineering Programs group: _____ hrs

4.1.2 Record present run-time from 2B85-C7: _____ hrs

4.1.3 Record estimated release duration: _____ hrs

4.1.4 Calculate projected filter run-time as follows:

$$\frac{\text{_____}}{(4.1.2)} + \frac{\text{_____}}{(4.1.3)} - \frac{\text{_____}}{(4.1.1)} = \text{_____ hrs}$$

4.1.5 IF projected run-time since last test > 720 hours, THEN notify Engineering Programs. _____

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- 4.2 Verify Purge Exhaust Filter Unit doors closed AND dogged. _____
- 4.3 IF desired to align plant heating to 2VSF-2,
THEN verify plant heating aligned to 2VSF-2 per Attachment A
of Plant Heating Systems (2106.017). _____
- 4.4 Verify NO other Gaseous Release in progress. _____
- 4.5 Record Initial CAMS readings from Section 1.0: _____
Particulate _____ Gaseous _____
- 4.6 Record Current 4 hour averaged count rate on running CAMS: _____
Particulate _____ Gaseous _____
- 4.7 Calculate allowable count rate Limits as follows: _____
Initial Particulate _____ x 1.25 = _____ CPM
Initial Gaseous _____ x 1.25 = _____ CPM
- 4.8 IF Current Gaseous and Particulate averaged count rates greater
than allowable Limits,
THEN perform the following:
 - 4.8.1 Notify Chemistry to obtain Containment Air
Sample and perform Gross Count. _____
 - 4.8.2 Compare activity obtained in above step to previous
Containment Air Sample. _____
 - 4.8.3 IF sample results indicate < 10% rise,
THEN continue with purge. _____
 - 4.8.4 IF sample results indicate > 10% rise,
THEN resubmit Purge Permit. _____

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- 4.9 Perform Source Check on Containment Purge Exhaust Rad Monitor (2RITS-8233) as follows:
- 4.9.1 Hold Selector switch in CHECK SOURCE. Ⓟ
- 4.9.2 IF meter does NOT move up scale,
THEN determine reason for no meter movement
AND obtain SM permission prior to starting release.
SM ✓ NA NA
- 4.9.3 Return Selector switch to OPERATE. Ⓟ
- 4.9.4 Check meter reading returns to initial background reading. Ⓟ
- 4.10 Verify plant in Mode 5 or 6. Ⓟ
- 4.11 Verify alarm and interlock functions of 2RITS-8233 as follows:
- 4.11.1 Open CNTMT Purge Supply Isolation (2CV-8283-1). Ⓟ
- 4.11.2 Open CNTMT Purge Exhaust Isolation (2CV-8285-1). Ⓟ
- 4.11.3 Place 2RITS-8233 to PULSE CAL. Ⓟ
- 4.11.4 IF 2RITS-8233 setpoint higher than Pulse Cal,
THEN release Potentiometer stop
AND lower setpoint. Ⓟ
- 4.11.5 Check the following:
- Alarm on 2RITS-8233 Ⓟ
 - Alarm on 2C14 Ⓟ
 - 2CV-8283-1 closes Ⓟ
 - 2CV-8285-1 closes Ⓟ
- 4.11.6 Reset 2RITS-8233 AND place in OPERATE. Ⓟ

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4.12 Release stop AND adjust 2RITS-8233 potentiometer to dial setpoint in Table below corresponding to setpoint from Preliminary Report. _____

- Preliminary Report Setpoint: _____ CPM
- IF setpoint from Preliminary Report < 1000 cpm, THEN 1E3 should be used as alarm setpoint value.

Alarm Stpt	Dial Stpt	Alarm Stpt	Dial Stpt	Alarm Stpt	Dial Stpt	Alarm Stpt	Dial Stpt	Alarm Stpt	Dial Stpt
10 = 0.00		120 = 2.04		4E2 = 3.10		6E3 = 5.28		8E4 = 7.39	
20 = 0.53		130 = 2.11		5E2 = 3.29		7E3 = 5.39		9E4 = 7.48	
30 = 0.86		140 = 2.18		6E2 = 3.44		8E3 = 5.51		1E5 = 7.55	
40 = 1.13		150 = 2.24		7E2 = 3.55		9E3 = 5.60		2E5 = 8.14	
50 = 1.32		160 = 2.30		8E2 = 3.67		1E4 = 5.68		3E5 = 8.46	
60 = 1.46		170 = 2.35		9E2 = 3.77		2E4 = 6.25		4E5 = 8.70	
70 = 1.61		180 = 2.40		1E3 = 3.84		3E4 = 6.56		5E5 = 8.86	
80 = 1.73		190 = 2.45		2E3 = 4.40		4E4 = 6.85		6E5 = 9.00	
90 = 1.82		200 = 2.50		3E3 = 4.72		5E4 = 7.03		7E5 = 9.14	
100 = 1.88		250 = 2.69		4E3 = 4.95		6E4 = 7.17		8E5 = 9.24	
110 = 1.96		300 = 2.85		5E3 = 5.13		7E4 = 7.29		9E5 = 9.35	
								1E6 = 9.39	

4.13 Perform Independent Verification of the following:

- Preliminary Report setpoint in step 4.12 correct. _____
- 2RITS-8233 dial setpoint correct per Table above. _____
- 2RITS-8233 in OPERATE. _____

I/V Performed by: _____

4.14 Declare 2RITS-8233 operable. _____

RELEASE APPROVAL (SM) _____

Entergy Operations Inc.
Arkansas Nuclear One Unit 2
Gaseous Radioactive Waste Release Permit
Post-Release Permit Update

26R2005-Test

PART III: ACTUAL RELEASE DATA

Release Point (44): 2RBPRG RX BUILDING PURGE
Discharge Point (12): DISC. PT. 12 - 2 CONT. PURGE

Permit Issued: 09-mar-2005 17:25:06 Release Type: Batch

Sample entry number: 28

Average Waste Flow:	4.0000E+04 CFM		
Total Waste Volume:	2.4000E+06 CF		
Actual Release Start:	10-mar-2005 05:41:00	Initial Pressure :	0.00
Actual Release End:	10-mar-2005 06:41:00	Final Pressure :	0.00
Release Duration:	60.0000 MIN		

Performed By:

Belant

Date

3/10/05

Approved By:

Sp. Supervisor

3/15/05

 Entergy Operations Inc.
 Arkansas Nuclear One Unit 2
 Gaseous Radioactive Waste Release Permit
 Post-Release Permit Update

261-205-547

RELEASE ACTIVITY - Unit 2

Isotope	Pre-Disp. Measured uCi/cc	Pre-Disp. Measured Conc/MPC	Pre-Disp. Measured Conc/Total	Conc/Total by Type	Release Rate uCi/sec	Curies Released
H-3 O:	4.37E-07	2.18E+00	3.33E-01	1.00E+00	8.24E+00	2.97E-02
XE-133 N:	8.75E-07	2.92E+00	6.67E-01	1.00E+00	1.65E+01	5.95E-02
Totals :	1.31E-06	5.10E+00	:	:	2.48E+01	8.92E-02

Intergrity Operations Inc.
Arkansas Nuclear One
Gaseous Radioactive Waste Release Permit
Pre-Release Supplementary Data

Unit 2

260205-Test

PART I: PRE-RELEASE DATA

Release Point (44): 2RBPRG RX BUILDING PURGE
Discharge Point (12): DISC. PT. 12 - 2 CONT. PURGE

Permit Issued: 09-mar-2005 17:25:06

Release Type: Batch

Rad Monitor: (8233) 2RE-8233 ✓
Rad Monitor Bckgrnd: 6.0000E+01 CPM

Estim. Waste Flow: 4.0000E+04 CFM
Estim. Waste Volume: 1.2000E+07 CF
Estim. Release Start: 09-mar-2005 17:24:29
Estim. Release End: 09-mar-2005 22:24:29 18:24
Estim. Duration: 300.0000 MIN
3-9-05 60 min

Initial Pressure : 0.00
Final Pressure : 0.00

PART II: PRE-RELEASE CALCULATIONS

Sample Entry # : 28
Gas sample time:

Sampled by:

Gas Monitor Response: 8.44E+01 CPM
Total Body Dose Rate: 2.25E-03 mrem/yr
Skin Dose Rate: ~~5.32E-03 mrem/yr~~
Max Organ Dose Rate: 1.65E-02 mrem/yr

% Limit = 0.0%
% Limit = 0.0%
% Limit = 0.0%

3.17E-2 3-9-05 Jbl

Max Monitor Setpoints: 2RE-8233
CPM

2RX-9820
uCi/cc

Noble Gas : 1.5E+02

5.0E-06

Flag:

Flags: A-Release Curies > Local Limit
S-Release Curies > Site Limit

N-Noble Gas Dose Rate > Limit
O-Organ Dose Rate > Limit

	Analysis Date	Measured Concen.	Est. Curies
Noble Gases		2.07E-07 uCi/cc	7.03E-02
Particulates	09-mar-2005 16:12:49	0.00E+00 uCi/cc	0.00E+00
Radioiodines	09-mar-2005 16:11:57	0.00E+00 uCi/cc	0.00E+00

Performed By:

Approved By:

Date
3/9/05
3/9/05

Energy Operations Inc.
 Arkansas Nuclear One Unit 2
 Gaseous Radioactive Waste Release Permit
 Pre-Release Supplementary Data

26R2005-Test

ISOTOPIC IDENTIFICATION - Unit 2

Isotope	: uCi/cc	: Conc/MPC	: Conc/Total	: Type	: Conc/Total	: Release Rate	: Estimated Curies Released
H-3	O: 1.03E-07	5.16E-01	3.33E-01	1.00E+00	1.95E+00	3.51E-02	
XE-133	N: 2.07E-07	6.90E-01	6.67E-01	1.00E+00	3.91E+00	7.03E-02	
Totals	: 3.10E-07	: 1.21E+00	:	:	: 5.86E+00	: 1.05E-01	

Entergy Operations Inc.
Arkansas Nuclear One
Unit 2
Containment Purge Fan Run Time Report
Pre-Release Report

09-mar-2005

262005-test

Hour	Run Time	Start TOD	Stop TOD	Initialed By
1	1 hrs	<u>0541</u>	<u>0641</u>	<u>BS</u>

Purge considered complete after an additional 0 hours and 0 minutes.

Entergy Operations Inc.
Arkansas Nuclear One
Unit 2
09-mar-2005 17:34:00

26R2005-Test

1. The noble gases Total Body dose rate = $2.251\text{e-}03$ mRem/yr. It must be ≤ 500 mRem/yr per ODCM L-2.4.1.A.1. If exceeding this limit, without delay restore the release rate to comply with this limit. During periods of containment purging the dose rate may be averaged over a one hour interval.
 $3.17\text{E-}2$ 3-9-05 JD
2. The noble gases Skin dose rate = ~~$5.316\text{e-}03$~~ mRem/yr. It must be ≤ 3000 mRem/yr per ODCM L-2.4.1.A.1. If exceeding this limit, without delay restore the release rate to comply with this limit. During periods of containment purging the dose rate may be averaged over a one hour interval.
3. The ITP critical organ dose rate = $1.653\text{e-}02$ mRem/yr. It must be ≤ 1500 mRem/yr per ODCM L-2.4.1.A.2. If exceeding this limit, without delay restore the release rate to comply with this limit. During periods of containment purging the dose rate may be averaged over a one hour interval.
4. The quarterly Gamma Air dose = $2.203\text{e-}06$ mRad. If the dose exceeds 5 mRad per ODCM L-2.4.2.A.1 notify the NRC per ODCM L-2.4.2.A ACTION 1. The total dose limit is 10 mRad per ODCM L-2.5.1.A. The NRC must be notified if this value is exceeded per ODCM L-2.5.1.A ACTIONS 1 and 2.
5. The quarterly Beta Air dose = $6.554\text{e-}06$ mRad. If the dose exceeds 10 mRad per ODCM L-2.4.2.A.1 notify the NRC per ODCM L-2.4.2.A ACTION 1. The total dose limit is 20 mRad per ODCM L-2.5.1.A. The NRC must be notified if this value is exceeded per ODCM L-2.5.1.A ACTIONS 1 and 2.
6. The quarterly ITP dose = ~~$1.692\text{e-}03$~~ mRem. If the dose exceeds 7.5 mRem per ODCM L-2.4.3.A.1 notify the NRC per ODCM L-2.4.3.A ACTION 1. The total dose limit is 15 mRem per ODCM L-2.5.1.A. The NRC must be notified if this value is exceeded per ODCM L-2.5.1.A ACTIONS 1 and 2.
 $2.8149\text{E-}4$ 3-9-05 JD
7. The yearly Gamma Air dose = $2.203\text{e-}06$ mRad. If the dose exceeds 10 mRad per ODCM L-2.4.2.A.2 notify the NRC per ODCM L-2.4.2.A ACTION 1. The total dose limit is 20 mRad per ODCM L-2.5.1.A. The NRC must be notified if this value is exceeded per ODCM L-2.5.1.A ACTIONS 1 and 2.
8. The yearly Beta Air dose = $6.554\text{e-}06$ mRad. If the dose exceeds 20 mRad per ODCM L-2.4.2.A.2 notify the NRC per ODCM L-2.4.2.A ACTION 1. The total dose limit is 40 mRad per ODCM L-2.5.1.A. The NRC must be notified if this value is exceeded per ODCM L-2.5.1.A ACTIONS 1 and 2.
9. The yearly ITP dose = ~~$1.692\text{e-}03$~~ mRem. If the dose exceeds 15 mRad per ODCM L-2.4.3.A.2 notify the NRC per ODCM L-2.4.3.A ACTION 1. The total dose limit is 30 mRad per ODCM L-2.5.1.A. The NRC must be notified if this value is exceeded per ODCM L-2.5.1.A ACTIONS 1 and 2.
 $2.8149\text{E-}4$ 3-9-05 JD
10. The projected quarterly Gamma Air Dose = $2.984\text{e-}06$ mRad. If the dose exceeds 0.625 mRad ODCM L-2.4.4.A and ODCM L-2.4.4.B and releases being discharged without treatment notify NRC per ODCM L-2.4.4 ACTION 1. Contact Engineering Programs to verify Treatment System Operability if the projected quarterly dose exceeds 0.625 mRad.

Entergy Operations Inc.

Arkansas Nuclear One
Unit 2
09-mar-2005 17:34:0

2002005-test

11. The projected quarterly Beta Air Dose = $8.875e-06$ mRad. If the dose exceeds 1.25 mRad ODCM L-2.4.4.A and ODCM L-2.4.4.B and releases being discharged without treatment notify NRC per ODCM L-2.4.4 ACTIONS 1&2. Contact Engineering Programs to verify Treatment System Operability if the projected quarterly dose exceeds 1.25 mRad.
12. The projected quarterly ITP Dose = $2.292e-03$ mRem. If the dose exceeds 1.0 mRem ODCM L-2.4.4.A and releases are being discharged without treatment notify the NRC per ODCM L-2.4.4 ACTION 1 Contact Engineering Programs to verify Treatment System Operability if the projected quarterly dose exceeds 1.0 mRem.

13. Additional comments:

Gamma Air Dose for release = $2.203e-06$ mRad
Beta Air Dose for release = $6.554e-06$ mRad
ITP Dose for the release = ~~$2.160e-05$~~ mRem

$3.59E-6$ 3-9-05 JDD

ITP = I-131, H-3, and particulates with halflives > 8 days

Gaseous Release Number 2GR-2005-0028

Release time in minutes: 60

Nuclide	Total		Annual		Product	Gamma Dose Factor	Product
	Curies this release	Ground level conc pCi/m3	Skin Dose Factor				
Kr-83m			1.46E-03			1.93E-05	
Kr-85m			1.23E-03			1.23E-03	
Kr-85			1.34E-03			1.72E-05	
Kr-87			9.73E-03			6.17E-03	
Kr-88			2.37E-03			1.52E-02	
Kr-89			1.01E-02			1.73E-02	
Kr-90			7.29E-03			1.63E-02	
Xe-131m			4.76E-04			1.56E-04	
Xe-133m			9.94E-04			3.27E-04	
Xe-133	7.03E-02	5.47E+01	3.06E-04	1.67E-02		3.53E-04	1.93E-02
Xe-135m			7.11E-04			3.36E-03	
Xe-135			1.86E-03			1.92E-03	
Xe-137			1.22E-02			1.51E-03	
Xe-138			4.13E-03			9.21E-03	
Ar-41			2.69E-03			9.30E-03	
			Total	1.67E-02	Total	1.50E-02	

1.72E-05
1.56E-04
3.27E-04
3.53E-04
1.92E-04

Update date 3/9/2005 18:24
3.17E-02 mRem/yr Skin Dose Rate
3.59E-06 mRem Dose for ITP

Unit 2 Quarterly & Yearly Dose Total
Last updated 03/09/05 18:24

3.8243E-04	mRem Quarterly ITP Dose
7.6613E-04	mRem Quarterly ITP Dose
9.5516E-04	mRem Quarterly ITP Dose
7.6583E-04	mRem Quarterly ITP Dose
2.8614E-03	mRem Yearly ITP Dose
7.2915E-04	mRem Quarterly ITP Dose
4.3032E-04	mRem Quarterly ITP Dose
5.6461E-04	mRem Quarterly ITP Dose
8.4791E-04	mRem Quarterly ITP Dose
2.5720E-03	mRem Yearly ITP Dose
5.9550E-04	mRem Quarterly ITP Dose
1.1152E-03	mRem Quarterly ITP Dose
9.6798E-04	mRem Quarterly ITP Dose
6.2090E-04	mRem Quarterly ITP Dose
3.2997E-03	mRem Yearly ITP Dose
2.8149E-04	mRem Quarterly ITP Dose
0.0000E+00	mRem Quarterly ITP Dose

Unit 1 Quarterly & Yearly Dose Total
Last updated 03/08/05 00:00

Qtr. #1 2002	1.1372E-03	mRem Quarterly ITP Dose
Qtr. #2 2002	8.0344E-04	mRem Quarterly ITP Dose
Qtr. #3 2002	3.5397E-04	mRem Quarterly ITP Dose
Qtr. #4 2002	1.2026E-03	mRem Quarterly ITP Dose
Yearly 2002	3.4017E-03	mRem Yearly ITP Dose
Qtr. #1 2003	1.0948E-03	mRem Quarterly ITP Dose
Qtr. #2 2003	1.0929E-03	mRem Quarterly ITP Dose
Qtr. #3 2003	9.7329E-04	mRem Quarterly ITP Dose
Qtr. #4 2003	7.6463E-04	mRem Quarterly ITP Dose
Yearly 2003	3.9257E-03	mRem Yearly ITP Dose
Qtr. #1 2004	9.2199E-04	mRem Quarterly ITP Dose
Qtr. #2 2004	1.8819E-03	mRem Quarterly ITP Dose
Qtr. #3 2004	1.1674E-03	mRem Quarterly ITP Dose
Qtr. #4 2004	1.0121E-03	mRem Quarterly ITP Dose
Yearly 2004	4.9230E-03	mRem Yearly ITP Dose
Qtr. #1 2005	6.4660E-04	mRem Quarterly ITP Dose
Qtr. #2 2005	0.0000E+00	mRem Quarterly ITP Dose

	0.0000E+00 mRem Quarterly ITP Dose
	0.0000E+00 mRem Quarterly ITP Dose
	2.8149E-04 mRem Yearly ITP Dose
	0.0000E+00 mRem Quarterly ITP Dose
	0.0000E+00 mRem Quarterly ITP Dose
	0.0000E+00 mRem Quarterly ITP Dose
	0.0000E+00 mRem Quarterly ITP Dose
	0.0000E+00 mRem Quarterly ITP Dose
	0.0000E+00 mRem Yearly ITP Dose
	0.0000E+00 mRem Quarterly ITP Dose
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	0.0000E+00 mRem Yearly ITP Dose
	0.0000E+00 mRem Quarterly ITP Dose
	0.0000E+00 mRem Quarterly ITP Dose
	0.0000E+00 mRem Quarterly ITP Dose
	0.0000E+00 mRem Quarterly ITP Dose
	0.0000E+00 mRem Quarterly ITP Dose
	0.0000E+00 mRem Quarterly ITP Dose
	0.0000E+00 mRem Yearly ITP Dose

Qtr. #3 2005	0.0000E+00 mRem Quarterly ITP Dose
Qtr. #4 2005	0.0000E+00 mRem Quarterly ITP Dose
Yearly 2005	6.4660E-04 mRem Yearly ITP Dose
Qtr. #1 2006	0.0000E+00 mRem Quarterly ITP Dose
Qtr. #2 2006	0.0000E+00 mRem Quarterly ITP Dose
Qtr. #3 2006	0.0000E+00 mRem Quarterly ITP Dose
Qtr. #4 2006	0.0000E+00 mRem Quarterly ITP Dose
Yearly 2006	0.0000E+00 mRem Yearly ITP Dose
Qtr. #1 2007	0.0000E+00 mRem Quarterly ITP Dose
Qtr. #2 2007	0.0000E+00 mRem Quarterly ITP Dose
Qtr. #3 2007	0.0000E+00 mRem Quarterly ITP Dose
Qtr. #4 2007	0.0000E+00 mRem Quarterly ITP Dose
Yearly 2007	0.0000E+00 mRem Yearly ITP Dose
Qtr. #1 2008	0.0000E+00 mRem Quarterly ITP Dose
Qtr. #2 2008	0.0000E+00 mRem Quarterly ITP Dose
Qtr. #3 2008	0.0000E+00 mRem Quarterly ITP Dose
Qtr. #4 2008	0.0000E+00 mRem Quarterly ITP Dose
Yearly 2008	0.0000E+00 mRem Yearly ITP Dose
Qtr. #1 2009	0.0000E+00 mRem Quarterly ITP Dose
Qtr. #2 2009	0.0000E+00 mRem Quarterly ITP Dose
Qtr. #3 2009	0.0000E+00 mRem Quarterly ITP Dose
Qtr. #4 2009	0.0000E+00 mRem Quarterly ITP Dose
Yearly 2009	0.0000E+00 mRem Yearly ITP Dose
Qtr. #1 2010	0.0000E+00 mRem Quarterly ITP Dose
Qtr. #2 2010	0.0000E+00 mRem Quarterly ITP Dose
Qtr. #3 2010	0.0000E+00 mRem Quarterly ITP Dose
Qtr. #4 2010	0.0000E+00 mRem Quarterly ITP Dose
Yearly 2010	0.0000E+00 mRem Yearly ITP Dose
Qtr. #1 2011	0.0000E+00 mRem Quarterly ITP Dose
Qtr. #2 2011	0.0000E+00 mRem Quarterly ITP Dose
Qtr. #3 2011	0.0000E+00 mRem Quarterly ITP Dose
Qtr. #4 2011	0.0000E+00 mRem Quarterly ITP Dose
Yearly 2011	0.0000E+00 mRem Yearly ITP Dose
Qtr. #1 2012	0.0000E+00 mRem Quarterly ITP Dose
Qtr. #2 2012	0.0000E+00 mRem Quarterly ITP Dose
Qtr. #3 2012	0.0000E+00 mRem Quarterly ITP Dose
Qtr. #4 2012	0.0000E+00 mRem Quarterly ITP Dose
Yearly 2012	0.0000E+00 mRem Yearly ITP Dose

Rb-86	
Rb-88	
Rb-89	
Sr-89	
Sr-90	
Sr-91	
Sr-92	
Y-90	
Y-91m	
Y-91	
Y-92	
Y-93	
Zr-95	
Zr-97	
Nb-95	
Mo-99	
Tc-99m	
Tc-101	
Ru-103	
Ru-105	
Ru-106	
Ag-110m	
Te-125m	
Te-127m	
Te-127	
Tc-129m	
Te-129	
Te-131m	
Te-131	
Tc-132	
I-130	
I-131	
I-132	
I-133	
I-134	
I-135	
Cs-134	
Cs-136	
Cs-137	
Cs-138	
Ba-139	
Ba-140	

Entergy Operations : ANO - Nuclear Chemistry Department - 9-MAR-2005 16:24

Main Spectra: 05-02588 Bkg Spectra : 05-02505

Sample date : 9-MAR-2005 15:14:00 Isolation date : 9-MAR-2005 15:14:00
Sample ID : 2REP Gas 2GR- Sample Quantity : 1.65000E+03 mls
Comments :
Geometry : TABLE 222 1L GAS MARINELLI CAVE 2 SHELF 1

Calib date : 8-MAR-2005 18:07:24 Acquisition date : 9-MAR-2005 16:09:35
keV/channel : 4.99636E-01 Elapsed live time: 0 00:15:00.00
offset : 6.10107E-02 Percent deadtime : 0.0%

Decay limit : 8.00000 Peak Sensitivity : 4.66000
Abundance : 30.00000 Energy tolerance : 1.50000
Library : Libark Nuclear Chemist : DMCENTY

Peak Search performed from channel : 100 to 4050

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
1	81.29	111	22	1.02	162.58	158	10	12.6	7.72E-01	XE-133

Nuclide Line Activity Report

Sample ID : 2RBP Gas 2GR- Acquisition date : 9-MAR-2005 16:09:35

Nuclide	Sbhr	Energy	Area	%Abn	Eff	uCi/unit	1 Sig Err
XE-133	FG	81.00	111.	37.10*	2.825E-03	1.934E-06	2.434E-07

Unidentified Energy Lines

None

Flags: "T" = Tentatively associated

Summary of Nuclide Activity

Total number of peaks in spectrum 1
Number of peaks identified by NID 1 100.00%

Nuclide	Sbhr	Halflife	Decay	uCi/unit	1 Sig Err
XE-133	FG	5.29D	1.006	1.934E-06	2.434E-07

Interference correction summary

Isotope uCi/cc Corrections applied BPS : below peak sensitivity

XE-133 = 1.934E-06

Xe-133eq= 2.027E-06

Interference report Completed

Monitor Bkg
cpm
2RE-8233 = 60 cpm
Spring#5
chnl5 - 2RX-9820 = 1.29E-6 uCi/cc
3-9-05 @ 1730

Entergy Operations : ANO - Nuclear Chemistry Department - 9-MAR-2005 16:27

Main Spectra: 05-02590

Bkg Spectra : 05-02508

Sample date : 9-MAR-2005 15:20:00 Isolation date : 9-MAR-2005 15:20:00
Sample ID : 2REP Part 2GR- Sample Quantity : 5.00000E+04 ml

Comments :
Geometry : TABLE 317 2 IN PART FLTR CAVE 3 SHELF 1

Calib date : 8-MAR-2005 19:19:26 Acquisition date : 9-MAR-2005 16:12:49
keV/channel : 4.99684E-01 Elapsed live time: 0 00:15:00.00
offset : -8.34717E-02 Percent deadtime : 0.2%

Decay limit : 8.00000 Peak Sensitivity : 4.66000
Abundance : 30.00000 Energy tolerance : 1.50000
Library : Libark Nuclear Chemist : DMCENTY

Peak Search performed from channel : 100 to 4050

Post-NID Peak Search Report
***** No peaks found *****

Nuclide Line Activity Report

Sample ID : 2RBP Part 2GR-

Acquisition date : 9-MAR-2005 16:12:49

Nuclide	Sbhr	Energy	Area	%Abn	Eff	uCi/unit	1 Sig Err
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Unidentified Energy Lines

None

Flags: "T" = Tentatively associated

Summary of Nuclide Activity

Total number of peaks in spectrum	0
Number of peaks identified by NID	0 100.00%

Nuclide	Sbhr	Halflife	Decay	uCi/unit	1 Sig Err
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Interference correction summary

Isotope	uCi/cc	Corrections applied BPS : below peak sensitivity
---------	--------	--

Cs-137eq= < 1.631E-10

Xe-133eq= < 1.560E-10

Interference report Completed

Entergy Operations : ANO - Nuclear Chemistry Department - 9-MAR-2005 16:27

Main Spectra: 05-02589

Bkg Spectra : 05-02510

Sample date : 9-MAR-2005 15:20:00 Isolation date : 9-MAR-2005 15:20:00

Sample ID : 2REP Char 2GR- Sample Quantity : 5.00000E+04 ml

Comments :

Geometry : TABLE 427 SPING CHAR CART CAVE 4 SHELF 1

Calib date : 8-MAR-2005 20:09:31 Acquisition date : 9-MAR-2005 16:11:57

keV/channel : 4.99521E-01 Elapsed live time: 0 00:15:00.00

offset : 1.04492E-02 Percent deadtime : 0.0%

Decay limit : 8.00000 Peak Sensitivity : 4.66000

Abundance : 30.00000 Energy tolerance : 1.50000

Library : Libark Nuclear Chemist : DMCENTY

Peak Search performed from channel : 100 to 4050

```
#####  
#  
# No Peaks Identified #  
#  
#####
```

Interference correction summary

Isotope uCi/cc Corrections applied BPS : below peak sensitivity

Cs-137eq= < 2.628E-10 ✓

Interference report Completed

ANO - Nuclear Chemistry : Gross Beta & Tritium Report : 9-MAR-2005 16:57

Analysis Num: 05-02592

Sample date : 9-MAR-2005 15:26:00

Sample ID : 2RBP H3

Instrument : Packard 2300TR

Background Data

H-3 [cpm] : 13.90
Beta [cpm] : 23.60
Count time [min] : 10.00
QIP [glass bkg] : 380.00
H-3 MDA [uCi/ml] : 3.110E-09
Beta MDA [uCi/ml] : 4.986E-09

Sample Data

H-3 [cpm] : 2016.79
H-3 [dpm] : 5356.98
Count time [min] : 10.00
Beta [cpm] : 0.00
Beta [dpm] : 0.00
Equiv. Volume [ml] : 2500.00
Collected Volume [ml] : 50000.00
Total Dil Volume [ml] : 100.00
Aliquot Volume [ml] : 5.00

Activity

Beta < 4.986E-09

H-3 = 9.652E-07

Error

N/A uCi/ml

+/- 5.118E-09 uCi/ml

Calculated by : DMCENTY

Protocol #: 2 Name: 3 Cnts. 10 Min 09-Mar-2005 16:31

Region A: LL-UL= 0.0-18.6 Lcr= 0 Bkg=13.90 %2 Sigma=0.00

Region B: LL-UL=18.6-2000 Lcr= 0 Bkg=23.60 %2 Sigma=0.00

Region C: LL-UL= 0.0- 0.0 Lcr= 0 Bkg= 0.00 %2 Sigma=0.00

Time = 10.00 QIP = tSIE

ES Terminator = Count

Conventional DPM

Nuclide 1 = 220525

Nuclide 2 = 114953

2 Rx Oldg H-3

S#	TIME	CPMA	DPM1	CPMB	DPM2	tSIE FLAG
1	10.00	2025.66	5380.06	8.44	8.45	387.
1	10.00	2020.06	5378.08	7.54	7.54	385.
1	10.00	2004.64	5312.80	9.56	9.58	388.
	10.00	2016.79	5356.98	8.51	8.53	387. A

RBP

Rx Bldg Purge - Completion Time Evaluation			RBP Flowrate*x/q	RB Vol	
✓ RBP cfm	4.00E+04 ✓		5.286E-05	✓ 1.820E+06	U1=1.81E+6 CF Unit 1
Isotope	uCi/cc	Air-ECLs		ECL-fraction	(U2=1.82E+6 CF) Unit 2
✓ H ³	✓ 9.652E-07	1.000E-07	bldg t-1/2, mins.	5.102E-04	Initial ECL Sum
Xe ^{131m}		2.000E-06	22.75	0.000E+00	
Xe ^{133m}		6.000E-07		0.000E+00	
✓ Xe ¹³³	✓ 1.934E-06	5.000E-07		2.045E-04	Time to Purge to 0.00
Xe ¹³⁵		7.000E-08		0.000E+00	After Initial 60 Minute
Kr ⁸⁵		7.000E-07		0.000E+00	Minutes
Kr ^{85m}		1.000E-07		0.000E+00	
Kr ⁸⁷		2.000E-08		0.000E+00	
Kr ⁸⁸		9.000E-09		0.000E+00	hours
Ar ⁴¹		1.000E-08		0.000E+00	minutes
Na24		7.000E-09		0.000E+00	
Cr51		3.000E-08		0.000E+00	
Mn54		1.000E-09		0.000E+00	
Fe59		5.000E-10		0.000E+00	
Co57		9.000E-10		0.000E+00	
Co58		1.000E-09		0.000E+00	
Co60		5.000E-11		0.000E+00	
Rb88		9.000E-08		0.000E+00	
Zr95		4.000E-10		0.000E+00	
Nb95		2.000E-09		0.000E+00	
Ag110m		1.000E-10		0.000E+00	
Sb122		2.000E-09		0.000E+00	
Sb124		3.000E-10		0.000E+00	
Sb125		7.000E-10		0.000E+00	
Te132		9.000E-10		0.000E+00	
I131		2.000E-10		0.000E+00	
I132		2.000E-08		0.000E+00	
I133		1.000E-09		0.000E+00	
I134		6.000E-08		0.000E+00	
I135		6.000E-09		0.000E+00	
Cs134		2.000E-10		0.000E+00	
Cs136		9.000E-10		0.000E+00	
Cs137		2.000E-10		0.000E+00	
Cs138		8.000E-08		0.000E+00	

✓ 3-9-05
JED

RBP

[illegible]

ROC/WORK PLAN NO. 1604.051	PROCEDURE/WORK PLAN TITLE: EBERLINE RADIATION MONITORING SYSTEM	PAGE: 51 of 95 CHANGE: 011-00-0
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ATTACHMENT 5

Page 1 of 5

NOBLE GAS MONITOR SOURCE CHECK

This test demonstrates operability of both Unit 1 and Unit 2 related SPING noble gas monitors by performing a source check of each detector channel and satisfies the source check requirements of ODCM Appendix 1 Surveillance Limitation S2.2.1 and Limitation L2.2.1 and ODCM Appendix 2 Surveillance Limitation S2.2.1 and Limitation L2.2.1. Particulate and iodine monitor channels are tested quarterly in accordance with I&C channel test procedures.

~~1.0~~ INITIAL CONDITIONS

~~1.1~~ Check the purpose of this test:

- ~~___~~ A) Regularly scheduled monthly test. It is not required to perform the surveillance on SPINGs that have been taken out of service for maintenance or calibration and gas channels that are inoperable. However, SPINGs that missed the monthly surveillance shall be source checked upon placing the SPING back in service.
- ~~___~~ B) Operability test following significant maintenance (describe maintenance performed in section 5.0).
Other (describe in section 5.0).

~~1.2~~ Complete the applicable portions of the Inoperable Equipment Checklist (computer generated form) and take the form to the Control Room. (N/A if already performed).

~~1.3~~ Notify Operations just prior to performing source check. Noble gas monitor will be inoperable during source check. It should be noted that a SPING may be taken out of service, with an operating vent, for source check without performing ODCM actions as long as the SPING is not out of service over four hour.

Performed By (Section 1.0) *Joe Chent*

~~2.0~~ TEST METHOD

~~2.1~~ IF SPING 1 and/or SPING 5 is to be source checked and SPING is in "STANDBY ON" mode,
THEN return SPING to "STANDBY OFF" mode and clear alarms.

~~2.2~~ Set Stack Flow rate to zero (off scan) as follows:

~~2.2.1~~ From the Main Menu, select option 8, "Data Acquisition Maintenance".

~~2.2.2~~ From the Data Acquisition Maintenance Menu, select option 1, "Substitute Value".

~~2.2.3~~ Press [F1] for a list of options.

~~2.2.4~~ Select option 1, "SPING Release Channel".

~~2.2.5~~ Select the affected SPING.

~~2.2.6~~ Select option 4, "Flow Rate".

~~2.2.7~~ Select option 1, "Two Minute" time period.

~~2.2.8~~ Enter the manual value of 0.0 for stack flow rate.

ROC/WORK PLAN NO. 1604.051	PROCEDURE/WORK PLAN TITLE: EBERLINE RADIATION MONITORING SYSTEM	PAGE: 52 of 96 CHANGE: 011-00-0
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ATTACHMENT 5

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NOBLE GAS MONITOR SOURCE CHECK

~~2.2.9~~ Press [F2] to update the file.

~~2.2.10~~ Press [F10] to exit OR [F8] to select another SPING (step 2.2.3).

~~2.2.11~~ Ensure manual values have been entered for stack flow on applicable SPINGS as follows:

~~A.~~ From the Main Menu, select option 8, "Data Acquisition Maintenance".

~~B.~~ From the Data Acquisition Maintenance Menu, select option 1, "Substitute Value".

~~C.~~ Press [F1] for a list of options.

~~D.~~ Select option 1, "SPING Release Channel".

~~E.~~ Select affected SPING.

~~F.~~ Select option 4, "Flow Rate".

~~G.~~ Select option 1, "Two Minute" time period.

~~H.~~ Verify the status of the SPING is "Off Scan".

~~I.~~ Press [F10] to exit.

~~2.3~~ Disable RDACS Annunciator Alarm function for applicable SPINGS as follows:

~~2.3.1~~ From the Main Menu, select option 8, "Data Acquisition Maintenance".

~~2.3.2~~ From the Data Acquisition Maintenance Menu, select option 1, "Substitute Value".

~~2.3.3~~ Enter "SPNGX_TBL" for Point ID, where X is the applicable SPING number.

~~2.3.4~~ Enter the manual value of 0.0.

~~2.3.5~~ Press [F2] to update the file.

~~2.3.6~~ Press [F10] to exit OR [F8] to select another SPING (step 2.3.3).

~~2.3.7~~ Verify "ANN OFF" is displayed in the Channel Offscan window of the affected SPING.

~~2.4~~ Perform status check and ensure channels to be tested are normal.

~~2.4.1~~ From the Gaseous Effluent Monitor main menu select option 3, "SPING Status". All data blocks with a normal status condition will appear dark green.

[F1] toggles between Unit 1 and Unit 2 SPINGS.

~~2.4.2~~ Ensure channels 5, 7 and 9 have a status of NORMAL for each SPING for which a source check will be performed. (SPING 11 does not have channel 9.)

ROC/WORK PLAN NO. 1604.051	PROCEDURE/WORK PLAN TITLE: EBERLINE RADIATION MONITORING SYSTEM	PAGE: 53 of 95 CHANGE: 011-00-0
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ATTACHMENT 5

NOBLE GAS MONITOR SOURCE CHECK

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2.5 Record initial monitor readings in section 3.0.

NOTE

1. Section 2.6 can be performed in any order and on any channel that possesses a source provided the source is never invoked on channels 7 and 9 at the same time or when the channel is in maintenance.
2. Since channels 5 and 7 share the same source, they are source checked at the same time by invoking the source on channel 7.
3. More than one SPING can be source checked at a time provided Operations is notified prior to beginning.
4. Source will stay exposed to detector until 1530 counts in less than 10 minutes are observed.

2.6 Perform source check and record data in section 3.0.

2.6.1 From the Gaseous Effluent Monitor main menu, select option 2, "SPING Subsystem" followed by option 1, "SPING Control."

2.6.2 Select option 5, "Check Source".

2.6.3 Enter the appropriate SPING number.

2.6.4 Enter channel 7, "Medium Range Noble Gas (gamma)".

2.6.5 Press [F2] to send the command to the SPING. Respond appropriately to the prompts.

2.6.6 Press the up arrow until the cursor moves to the SPING channel window.

2.6.7 Enter channel 9, "High Range Noble Gas (gamma)".

2.6.8 Press [F2] to send the command to the SPING. Respond appropriately to the prompts.

2.6.9 Press [F10] to exit.

2.6.10 From the Gaseous Effluent Monitor Main Menu, select option 3, "SPING Status". The SPING channel data block selected will change to dark blue. Record a reading that reflects the count rate increase in section 3.0.

2.6.11 Repeat steps 2.6.1 through 2.6.10 for the remaining SPINGS that are in service as necessary.

2.6.12 IF this is a monthly surveillance,
THEN record out of service SPINGS in Section 5.0 and in the Work Order work exceptions.

2.6.13 IF a SPING is out of service when performing the monthly noble gas monitor source check,
THEN document that the source check must be done prior to returning the SPING to service on 1604.051A for Unit 1 or 1604.051B for Unit 2.

Performed By (Section 2.0) _____

Joe Chant

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ATTACHMENT 5

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NOBLE GAS MONITOR SOURCE CHECK

3.0 ACCEPTANCE CRITERIA

3.1 Compare measured values observed during SPING testing with "Limiting Range For Operability".

TEST QUANTITY (SPING MONITOR)	CHANNEL #	MEASURED VALUES $\mu\text{Ci/cc}$		LIMITING RANGE FOR OPERABILITY	IS DATA WITHIN LIMITING RANGE (CIRCLE YES OR NO)	
		INITIAL	SOURCE CHECK		YES	NO
001 RX-9820	5	NA	NA	count rate	YES	NO
	7			increases	YES	NO
	9				YES	NO
Contain. Purge	9				YES	NO
002 RX-9825	5			count rate	YES	NO
	7			increases	YES	NO
	9				YES	NO
Radwaste Area	9				YES	NO
003 RX-9830	5			count rate	YES	NO
	7			increases	YES	NO
	9				YES	NO
Fuel Hndlg Area	9				YES	NO
004 RX-9835	5			count rate	YES	NO
	7			increases	YES	NO
	9				YES	NO
Emerg. Pen. Rm	9				YES	NO
005 2RX-9820	5	1.31E-6	3.40E-4	count rate	YES	NO
	7	1.06E-3	7.39E-2	increases	YES	NO
	9	6.06E-1	1.33E+2		YES	NO
Contain. Purge	9				YES	NO
006 2RX-9825	5	NA	NA	count rate	YES	NO
	7			increases	YES	NO
	9				YES	NO
Radwaste Area	9				YES	NO
007 2RX-9830	5			count rate	YES	NO
	7			increases	YES	NO
	9				YES	NO
Fuel Hndlg Area	9				YES	NO
008 2RX-9835	5			count rate	YES	NO
	7			increases	YES	NO
	9				YES	NO
Emerg. Pen. Rm	9				YES	NO
009 2RX-9840	5			count rate	YES	NO
	7			increases	YES	NO
	9				YES	NO
PASS Bldg	9				YES	NO
010 2RX-9845	5			count rate	YES	NO
	7			increases	YES	NO
	9				YES	NO
Aux Bldg Ext	9				YES	NO
011 2RX-9850	5			count rate	YES	NO
	7			increases	YES	NO
Radwst Stg Bldg	7				YES	NO

ROC/WORK PLAN NO. 1604.051	PROCEDURE/WORK PLAN TITLE: EBERLINE RADIATION MONITORING SYSTEM	PAGE: 55 of 95 CHANGE: 011-00-0
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ATTACHMENT 5

Page 5 of 5

NOBLE GAS MONITOR SOURCE CHECK

3.1 IF "NO" is circled for any listed channel in the above table,
THEN perform the following:

- 3.2.1 Immediately notify the Shift Manager or Control Room Supervisor and a Chemistry Supervisor.
- 3.2.2 Declare the SPING noble gas monitor inoperable.
- 3.2.3 Write a Condition Report and a Work Request.
- 3.2.4 Implement action required in ODCM Appendix 1 Table 2.2-1 Action 3 or 5 and Table 2.4-1 OR ODCM Appendix 2 Table 2.2-1 Action 3 or 6 and Table 2.4-1.

3.3 IF the source fails to retract,
THEN leave the stack flow set to zero. Write a Work Request and Condition Report. The SPING noble gas channel is inoperable. Implement action required in ODCM Appendix 1 Table 2.2-1 Action 3 or 5 and Table 2.4-1 OR ODCM Appendix 2 Table 2.2-1 Action 3 or 6 and Table 2.4-1.

3.4 WHEN the channel status for all three detectors have returned to NORMAL,
THEN perform the following:

- 3.4.1 Restore stack flow rate to normal by performing steps 2.2.1 through 2.2.10 and typing "none" in step 2.2.8 instead of 0.0.
- 3.4.2 Enable RDACS Annunciator Alarm function by performing steps 2.3.1 through 2.3.6 and typing "none" instead of 0.0.
- 3.4.3 Verify that the Channel Offscan window on the RDACS terminal has been cleared of the "Chnl Off" and "Ann Off" indicators for the applicable SPING.

3.5 Verify live, 2 minute average, and 10 minute average stack flow are "Normal" and not in "Manual".

#1 1CP	<input type="checkbox"/>	#4 1EPR	<input type="checkbox"/>	#7 2FHA	<input type="checkbox"/>	#10 ABE	<input type="checkbox"/>
#2 1RWA	<input type="checkbox"/>	#5 2CP	<input checked="" type="checkbox"/>	#8 2EPR	<input type="checkbox"/>	#11 LLRW	<input type="checkbox"/>
#3 1FHA	<input type="checkbox"/>	#6 2RWA	<input type="checkbox"/>	#9 PASS	<input type="checkbox"/>		

3.6 IF SPING 1 and/or SPING 5 was source checked and containment purge ventilation is secured and no other maintenance is to be performed,
THEN return SPING 1 and/or SPING 5 to "STANDBY ON" mode

Performed By (Section 3.0) John Christ

Independent Verification (Section 3.0) John Christ

3.7 IF noble gas monitor source check was performed as a result of Step 2.5 of Attachment 10 of this procedure,
THEN N/A Steps 4.0 and 5.0 and proceed to Step 2.8 of Attachment 10.

4.0 Notify Operations that the SPING is back in service

Performed By (Section 4.0) John Christ

5.0 COMMENTS ① NGMSC prior to purge.

Supervisor: Kelly Sullivan

3/9/05 1940
(Date & Time)

For the duration of a waste gas tank release, Makeup Tank (MUT) gas space release, or Volume Control Tank (VCT) gas space release, SPING 2 channel 5 or SPING 6 channel 5 high alarm setpoint shall be changed to maintain its validity during the release. After the release, the high alarm setpoint will be changed and the total allocation fraction will be less than or equal to 1.

For the duration of a containment purge, SPING 1 channel 5 or SPING 5 channel 5 high alarm setpoint shall be changed to maintain its validity during these short, high activity releases. During the permit period of the purge, the total of the allocation fractions may be greater than 1, due to fractional hour releases in the early hours of the purge. After the purge, setpoints will be changed and the total allocation fraction will be less than or equal to 1.

☐ Unit 1 ☒ Unit 2
 SPING 5, 2 Containment Purge
 No. Name

PRE-RELEASE SETPOINT CHANGE

1.0 Alarm Setpoint for Channel 5 (from release permit): 5.0E-6 $\mu\text{Ci/cc}$

1.1 IF performing a waste gas decay tank, MUT, or VCT release
 THEN calculate the flow corrected Alarm setpoint as follows:

For Unit 1 releases:

$$\frac{\text{NA}}{\text{Step 1.0}} * \frac{11.5 \text{ cfm}}{11.5 \text{ cfm} + 47000 \text{ cfm}} = \text{NA} \mu\text{Ci/cc}$$

For Unit 2 releases:

$$\frac{\text{NA}}{\text{Step 1.0}} * \frac{20 \text{ cfm}}{20 \text{ cfm} + 49200 \text{ cfm}} = \text{NA} \mu\text{Ci/cc}$$

1.1.1 Line through the SPING Alarm Setpoint on page 1 of the preliminary release report and write in value calculated in Step 1.1 for the applicable unit.

2.0 Determine current Channel 5 and Channel 7 alarm setpoints by performing the following:

2.1 From Main Menu, select Option 2, "SPING Subsystem" followed by Option 2, "Channel Parameter Editor".

2.2 Select appropriate SPING.

2.3 Select appropriate channel and press [F3]. Log indicated values below.

Channel 5 High Alarm 4.4E-3 $\mu\text{Ci/cc}$

Channel 5 Alert Alarm 2.2E-3 $\mu\text{Ci/cc}$

Channel 7 High Alarm 2.23E-1 $\mu\text{Ci/cc}$

Channel 7 Alert Alarm 2.23E-2 $\mu\text{Ci/cc}$

2.4 WHEN alarm values have been logged,
 THEN press [F10] to exit to Main Menu.

FORM TITLE:

DETERMINING SETPOINTS FOR GASEOUS RELEASES

FORM NO.

1604.051E

CHANGE

011-00-0

3.0

IF alarm setpoint in Step 1.0 (for containment purges) or Step 1.1 (for waste gas decay tanks, MUT, & VCT) is less than OR equal to current Channel 5 High Alarm Setpoint listed in Step 2.3, THEN proceed to Line 6.0.

NOTE

The Alert Alarm Setpoint for Channel 5 represents 50% of the High Alarm Value. Should the release exceed the Alert Alarm Setpoint, an alarm will occur locally at the SPING.

- 4.0 IF alarm setpoint in Line 1.0 (for containment purges) or Step 1.1 (for waste gas decay tanks, MUT, & VCT) is greater than current Channel 5 High Alarm Setpoint listed in Step 2.3, THEN perform the following steps:

- 4.1 Complete Form 1604.051D using Line 1.0 alarm setpoint as highest expected activity value.
- 4.2 Enter new SPING setpoints from Form 1604.051D, Column 4 and Column 5 in the indicated channel(s) as follows:

A. AFFECTED SPING

1. IF current Channel 5 alert or high alarm setpoint recorded in Line 2.0 is less than the new Channel 5 setpoint, THEN raise the setpoint to equal the new Channel 5 setpoint.
 - a. From Main Menu, select Option 2, "SPING Subsystem" followed by Option 2, "Channel Parameter Editor".
 - b. Select appropriate SPING.
 - c. Select appropriate channel and press [F3].
 - d. Position cursor in the field to be changed and enter new value. Press [TAB] or [ENTER].
 - e. Press [F2] to update file.
 - f. WHEN all SPING channel parameters have been entered, THEN press [F10] to exit to Main Menu.
2. IF Channel 7 alert or high alarm setpoints recorded in Line 2.0 are less than the new Channel 5 setpoint, THEN raise the setpoint(s) to equal the Channel 5 setpoint in the same manner described in Steps 4.2.A.1.a-f.

B. UNAFFECTED SPINGS

1. Enter new Channel 5 high alarm setpoints from Form 1604.051D and new Channel 5 alert alarm setpoint as 50% of the high alarm setpoint from Form 1604.051D for the remaining SPINGS in the same manner described in Steps 4.2.A.1.a-f.

- 5.0 Ensure the setpoints are correct by generating a printout and comparing the values. DO NOT use the [F9] key to print the screen. Generate the printout by selecting option 2 from the Main Menu, followed by option 3, then select the SPING of interest. Attach the printout to this form.

6.0

Performed by Torchist
Independent Verification Jim Chung

Date 3-9-05
Date 3/8/05

FORM TITLE:

DETERMINING SETPOINTS FOR GASEOUS RELEASES

FORM NO.

1604.051E

CHANGE

011-00-0

POST-RELEASE SETPOINT RESTORATION

- 7.0 WHEN permit period of release is complete,
THEN record current Channel 5 activity.

2.5 E-6 $\mu\text{Ci/cc}$

- NA* 7.1 IF the AFFECTED SPING's activity is greater than or equal to Channel 5
 or Channel 7 setpoint recorded in 1604.051 Attachment 2,
THEN complete 1604.051D to determine new Channel 5 setpoints.

- NA* 7.2 IF the AFFECTED SPING's activity is less than Channel 5 setpoint
 recorded in Line 2.0,
THEN return all SPING Channel 5 setpoints to 1604.051 Attachment 2
 values in the same manner described in Line 4.0.

- NA* 7.3 IF Channel 7 setpoints were changed,
THEN return them to 1604.051 Attachment 2 values in the same manner
 described in Line 4.0.

- 8.0 Ensure the setpoints are correct by generating a printout and comparing the
 values. DO NOT use the [F9] key to print the screen. Generate the printout
 by selecting option 2 from the Main Menu, followed by option 3, then select
 the SPING of interest. Attach the printout to this form.

- 9.0 Performed by *Doc Gant* Date 3-10-05
 Independent Verification *Son Ch...* Date 3-10-05

FORM TITLE:

DETERMINING SETPOINTS FOR GASEOUS RELEASES

FORM NO.

1604.051E

CHANGE

011-00-0

ADMINISTRATIVE JOB PERFORMANCE MEASUREUNIT: 2REV #: 001

DATE: _____

SYSTEM/DUTY AREA: Conduct of Operations (A.1)TASK: Verify RPS trip set point determination for inoperable MSSVJTA#: ANOROADMINNORM195KA VALUE RO: 3.0 SRO: 3.4 KA REFERENCE: 2.1.3APPROVED FOR ADMINISTRATION TO: RO: _____ SRO: XTASK LOCATION: INSIDE CR: _____ OUTSIDE CR: _____ BOTH: X

SUGGESTED TESTING ENVIRONMENT AND METHOD (PERFORM OR SIMULATE):

PLANT SITE: _____ SIMULATOR: Perform CLASSROOM: Perform

POSITION EVALUATED: RO: _____ SRO: _____

ACTUAL TESTING ENVIRONMENT: SIMULATOR: _____ PLANT SITE: _____ CLASSROOM: _____

TESTING METHOD: SIMULATE: _____ PERFORM: _____

APPROXIMATE COMPLETION TIME IN MINUTES: 15 MinutesREFERENCE(S): OPS B46 Rev 3, 1015.016Q Rev 027-00-0, Unit 2 Tech Specs

EXAMINEE'S NAME: _____ SSN: _____

EVALUATOR'S NAME: _____

THE EXAMINEE'S PERFORMANCE WAS EVALUATED AGAINST THE STANDARDS CONTAINED IN THIS JPM AND IS DETERMINED TO BE:

SATISFACTORY: _____ UNSATISFACTORY: _____

PERFORMANCE CHECKLIST COMMENTS:

Start Time _____ Stop Time _____ Total Time _____

SIGNED: _____ DATE: _____

SIGNATURE INDICATES THIS JPM HAS BEEN COMPARED TO ITS APPLICABLE PROCEDURE BY A QUALIFIED INDIVIDUAL (NOT THE EXAMINEE) AND IS CURRENT WITH THAT REVISION.

ADMINISTRATIVE JOB PERFORMANCE MEASURE**THE EXAMINER SHALL REVIEW THE FOLLOWING WITH THE EXAMINEE:**

The examiner shall review the "Briefing Checklist - System Walkthrough" portion of OP 1064.023 Attachment 6 with the examinee.

JPM INITIAL TASK CONDITIONS:

- The plant is at 80% power, 375 EFPD, Steady State.
- MSSV testing is in progress.
- One MSSV, 2PSV-1054 has been declared inoperable just prior to shift turnover.
- The CBOT has completed the Shift Turnover checklist.

TASK STANDARD: Determine the maximum High Linear Power Level and RPS trip set point to be $\geq 86.5\%$ but $\leq 87.5\%$ to comply with Technical Specification 3.7.1.1.

TASK PERFORMANCE AIDS: Shift Turnover Checklist, OPS B46, Unit 2 Tech Specs, Moderator Temperature Coefficient VS EFPD and Power, form 1015.016Q, and a straight edge.

ADMINISTRATIVE JOB PERFORMANCE MEASURE**INITIATING CUE:**

Determine the Maximum High Linear Power Level and RPS Trip Set point vs. MTC per Tech Specs using OPS B46, form 1015.016Q and technical specifications.

CRITICAL ELEMENTS (C) 2, 3

	PERFORMANCE CHECKLIST	STANDARD	(Circle One)
	1. Review Shift turnover checklist MSSV(s) operable. EXAMINER's CUE: Inform examinee that values for MTC and linear power trip set point derived by CBOT will not be given.	Examinee reviewed applicable step for inoperable MSSVs.	N/A SAT UNSAT
(C)	2. Using form 1015.016Q, determine MTC for 375 EFPD to be -1.30×10^{-4} delta K/K/degree F ($\pm 0.05 \times 10^{-4}$).	Examinee correctly derived from graph or table based on 375 EFPD and 80% power curve that MTC is approximately -1.30×10^{-4} delta K/K/degree F.	N/A SAT UNSAT
(C)	3. Using Tech Spec 3.7.1 figure 3.7-1 determines new maximum power and RPS linear power trip set point to be $\geq 86.5\%$ but $\leq 87.5\%$.	Examinee correctly derived from graph based on MTC of -1.30×10^{-4} delta K/K/degree F and knowing that one MSSV is inoperable determined that maximum power and RPS linear power trip set point should be 87.0%.	N/A SAT UNSAT
EXAMINER's NOTE: Examinee may discuss the Tech Spec applicability at this point stating that Tech Spec 3.7.1.1 LCO to allow power operations to continue provided that within 4 hours power is reduced to the maximum power of 79% or as allowed by figure 3.7-1 (87%) and within 12 hours, the RPS trip set point adjusted to be less than the value of 79% or as allowed in figure 3.7-1 (87%), but this discussion is not required for successful completion of the JPM.			
END			

ADMINISTRATIVE JOB PERFORMANCE MEASURE

EXAMINER'S COPY

JPM INITIAL TASK CONDITIONS:

- The plant is at 80% power, 375 EFPD.
- MSSV testing is in progress.
- One MSSV, 2PSV 1054 has been declared inoperable just prior to shift turnover.
- CBOT has completed the Shift Turnover checklist.

INITIATING CUE:

Determine the Maximum High Linear Power Level and RPS Trip Set point vs. MTC per Tech Specs using OPS B46, form 1015.016Q and technical specifications.

ADMINISTRATIVE JOB PERFORMANCE MEASURE

EXAMINEE'S COPY

JPM INITIAL TASK CONDITIONS:

- The plant is at 80% power, 375 EFPD.
- MSSV testing is in progress.
- One MSSV, 2PSV 1054 has been declared inoperable just prior to shift turnover.
- CBOT has completed the Shift Turnover checklist.

INITIATING CUE:

Determine the Maximum High Linear Power Level and RPS Trip Set point vs. MTC per Tech Specs using OPS B46, form 1015.016Q and technical specifications.

ENTERGY OPERATIONS
ARKANSAS NUCLEAR ONE

U2 SHIFT TURNOVER CHECKLIST

FROM ___/___/___ AT ___:___ TO ___/___/___ AT ___:___

POINTS	Comp ID	SPECIAL INST.	Min	Max	Units			0800	2000
ALARM REFASH UNITS 2C-14 2K425	2C14	Alarms acknowledged on reflash unit 2K425 in 2C14?			YES/NO				
ALARM REFASH UNITS 2C-14 2K426	2C14	Alarms acknowledged on reflash unit 2K426 in 2C14?			YES/NO				
ALARM REFASH UNITS 2C-14 2K429	2C14	Alarms acknowledged on reflash unit 2K429 in 2C14?			YES/NO				
ALARM REFASH UNITS 2C-14 2K434	2C14	Alarms acknowledged on reflash unit 2K434 in 2C14?			YES/NO				
ANNUNCIATOR TOGGLE SWITCHES	SWITCHES	ALL annunciator disabling toggle switches ON (UP)?			YES/NO				
ANNUNCIATOR TEST	ANNUNCIATORS	Annunciator test for all Control Room Annunciators completed?			YES/NO				
FIRE BRIGADE ASSIGNED?	FIRE	Qualified Fire Brigade assigned?			YES/NO				
MSSV(s) OPERABLE?	MSSV	ARE ALL MAIN STEAM SAFETY VALVES OPERABLE?			YES/NO				
REFER TO 1015.016Q LIMITING MTC VALUE	1015.016Q	Refer to 1015.016Q (MTC vs EFDP AND POWER) to obtain limiting MTC value.			Deg F		////	////	////
REFER TECH SPECS FOR HIGH PWR TRIP	TECH SPEC	Refer to Tech Spec Figure 3.7.1 (Maximum High Linear Power Level and Trip Setpoint Versus MTC) and use MTC value obtained from 1015.016Q to obtain High Linear Power Level Trip setpoint for 1 MSSV inoperable or 1 MSSV/header inoperable.			%		////	////	////
MAIN FEEDWATER ISOLATION	NOTE	IF a component required for MPW isolation becomes inoperable (i.e., a Condensate, MPW, or Heater Drain pump will not trip on MSIS or CSAS), THEN restore the component within 48 hours or place it in its MSIS or CSAS actuated state. Otherwise be in Hot Standby in 6 hours. (TS 3.3.2.1 Action 12)			NOTE				
VERIFY ALT SD LOCKER PWR AVAIL	ALT SD	VERIFY THAT THE ALT SHUTDOWN LOCKER IN CR EXTENSION HAS POWER BY CHECKING LIGHT IS ON			VERIFY	////	////	////	////
IS RX HEAD REMOVED?	RX	IS THE RX VESSEL HEAD REMOVED? (TS 3.4.12, 4.4.12.2)			YES/NO		////	////	////
ANY SIT PRESSURE >OR=280 PSIG?	SIT	IS ANY SAFETY INJECTION TANK PRESURIZED TO GREATER THAN OR EQUAL TO 280 PSIG?			YES/NO	////	////	////	////
A SIT >OR=280 PSIG?	2T-1A	IS THE A SIT PRESSURE >OR=280 PSIG			YES/NO		////	////	////
B SIT >OR=280 PSIG?	2T-1B	IS THE B SIT PRESSURE >OR=280 PSIG			YES/NO		////	////	////
C SIT >OR=280 PSIG?	2T-1C	IS THE C SIT PRESSURE >OR=280 PSIG			YES/NO		////	////	////
D SIT >OR=280 PSIG?	2T-1D	IS THE D SIT PRESSURE >OR=280 PSIG			YES/NO		////	////	////
2CV-4741-1 OPEN?	2CV-4741-1	IS LTOP RELIEF ISOL 2CV-4741-1 OPEN?			YES/NO	////	////	////	////
IS SG MANWAY REMOVED?	SG	IS RCS DEPRESSURIZED WITH RCS OPEN BY SIG PRIMARY MANWAY REMOVED WITHOUT A NOZZLE DAM INSTALLED?			YES/NO	////	////	////	////
PZR CODE SAFETY REMOVED?	PZR SAFETY	IS RCS DEPRESSURIZED WITH RCS OPEN BY PZR CODE SAFETY VALVE REMOVED?			YES/NO	////	////	////	////
PZR MANWAY REMOVED?	PZR	IS RCS DEPRESSURIZED WITH RCS OPEN BY PZR MANWAY REMOVED?			YES/NO	////	////	////	////

U2 SHIFT TURNOVER CHECKLIST

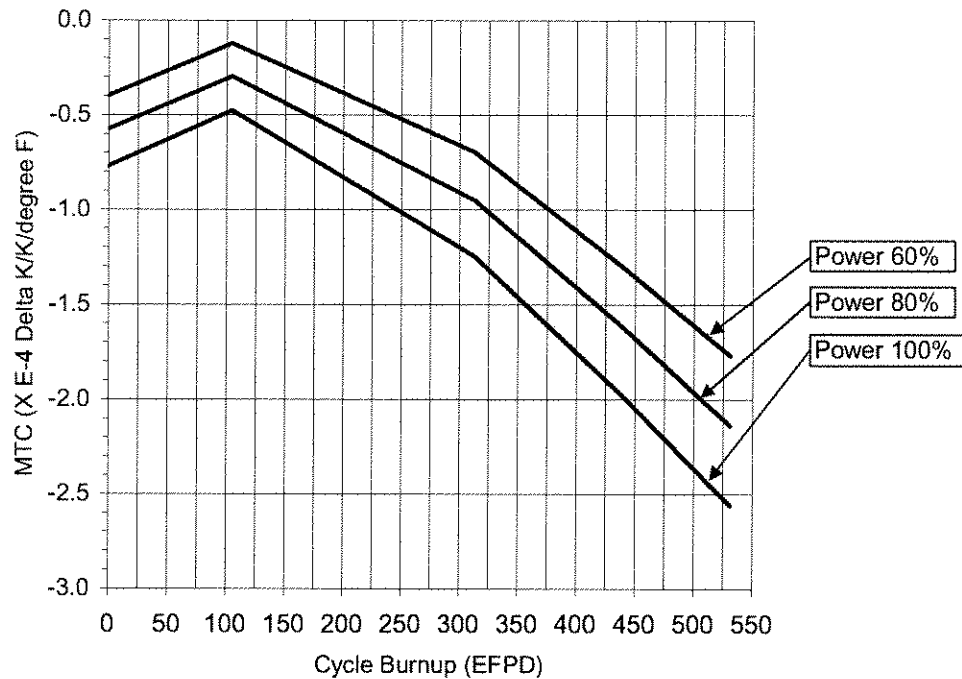
FROM ___/___/___ AT ___:___ TO ___/___/___ AT ___:___

<u>POINTS</u>	<u>CompID</u>	<u>SPECIAL INST.</u>	<u>Min</u>	<u>Max</u>	<u>Units</u>	<u>0800</u>	<u>2000</u>
---------------	---------------	----------------------	------------	------------	--------------	-------------	-------------

NOTES/COMMENTS	
PERFORMED BY _____	DATE/TIME _____/_____/_____
APPROVED BY _____	DATE/TIME _____/_____/_____
SM	
<u>References</u>	<u>FileName</u>

MODERATOR TEMPERATURE COEFFICIENT VS EFPD AND POWER

Westinghouse letter ANO-2 Cycle 18 MTC Data in Support of TS 3/4.7.1,
Enclosure 1 to PCT-05-260



NOTES:

1. Data can be interpolated between power levels and burnups if required.

Data used to
generate graph

TIL	EFPD	MTC100	MTC80	MTC60
BOC	0	-0.771	-0.574	-0.395
MOC1	104.2	-0.479	-0.295	-0.121
MOC2	312.5	-1.245	-0.950	-0.696
MOC3	437.5	-1.969	-1.608	-1.292
EOC	531.1	-2.562	-2.137	-1.771

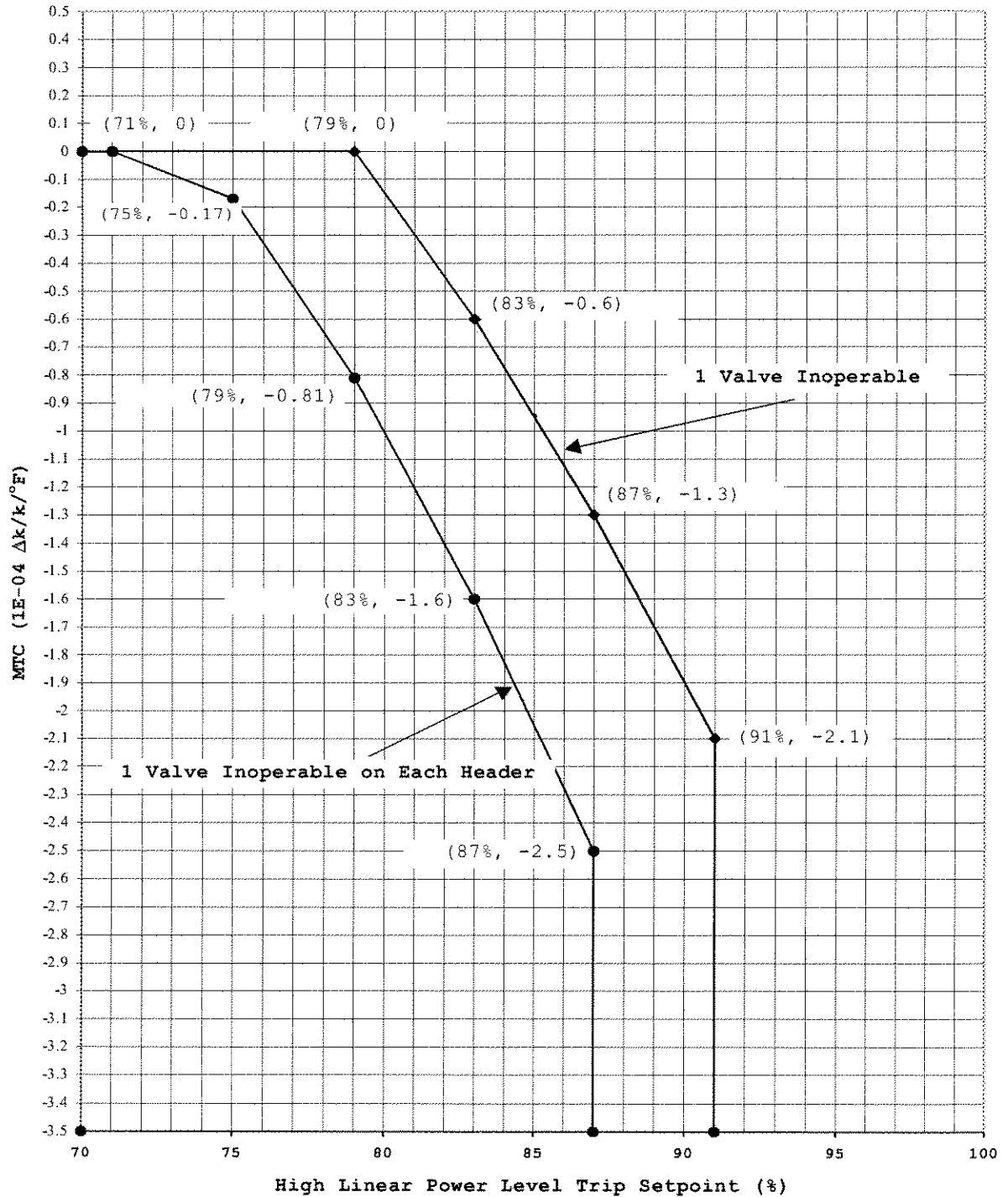
2. The figure should be used only for MSSV inoperable application.

INSTRUCTIONS

1. Use existing EFPD and Power level and perform cross-reference to obtain MTC value.
2. Apply MTC obtained in step 1.0 to TS Figure 3.7-1 to obtain Linear Power level trip setpoint (one MSSV inoperable or 1 MSSV/header inoperable).

FIGURE 3.7-1

Maximum High Linear Power Level And Trip Setpoint Versus MTC



3/4.7 PLANT SYSTEMS

3/4.7.1 TURBINE CYCLE

SAFETY VALVES

LIMITING CONDITION FOR OPERATION

3.7.1.1 All main steam line code safety valves shall be OPERABLE with lift settings as specified in Table 3.7-5.

APPLICABILITY: MODES 1, 2 and 3*

ACTION:

MODES 1 and 2

With one or more main steam line code safety valves inoperable, operation in MODES 1 and 2 may proceed provided that within 4 hours, power is reduced to less than or equal to the applicable percent of RATED THERMAL POWER as listed in Table 3.7-1 and within 12 hours, the Linear Power Level – High trip setpoint is reduced per Table 3.7-1; otherwise, be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 12 hours.

MODE 3

With one or more main steam line code safety valves inoperable, operation in MODE 3 may proceed provided that at least 2 main steam line code safety valves are OPERABLE on each steam generator; otherwise, be in at least HOT SHUTDOWN within the next 12 hours.

SURVEILLANCE REQUIREMENTS

4.7.1.1 No additional Surveillance Requirements other than those required by the Inservice Testing Program.

* Except that during hydrostatic testing in Mode 3, eight of the main steam line code safety valves may be gagged and two (one on each header) may be reset for the duration of the test to allow the required pressure for the test to be attained. The Reactor Trip Breakers shall be open for the duration of the test.

TABLE 3.7-1

MAXIMUM ALLOWABLE LINEAR POWER LEVEL AND HIGH TRIP SETPOINT WITH INOPERABLE
STEAM LINE SAFETY VALVES DURING OPERATION WITH BOTH STEAM GENERATORS

Number of Inoperable Safety Valves	Maximum Allowable Linear Power Level And High Trip Setpoint (Percent of RATED THERMAL POWER)
1 Valve Inoperable	79% (except as allowed by Figure 3.7-1)
1 Valve Inoperable on Each Header	71% (except as allowed by Figure 3.7-1)
Maximum of 2 Valves Inoperable on Each Header	43.0
Maximum of 3 Valves Inoperable on Each Header	25.0

FIGURE 3.7-1

Maximum High Linear Power Level And Trip Setpoint Versus MTC

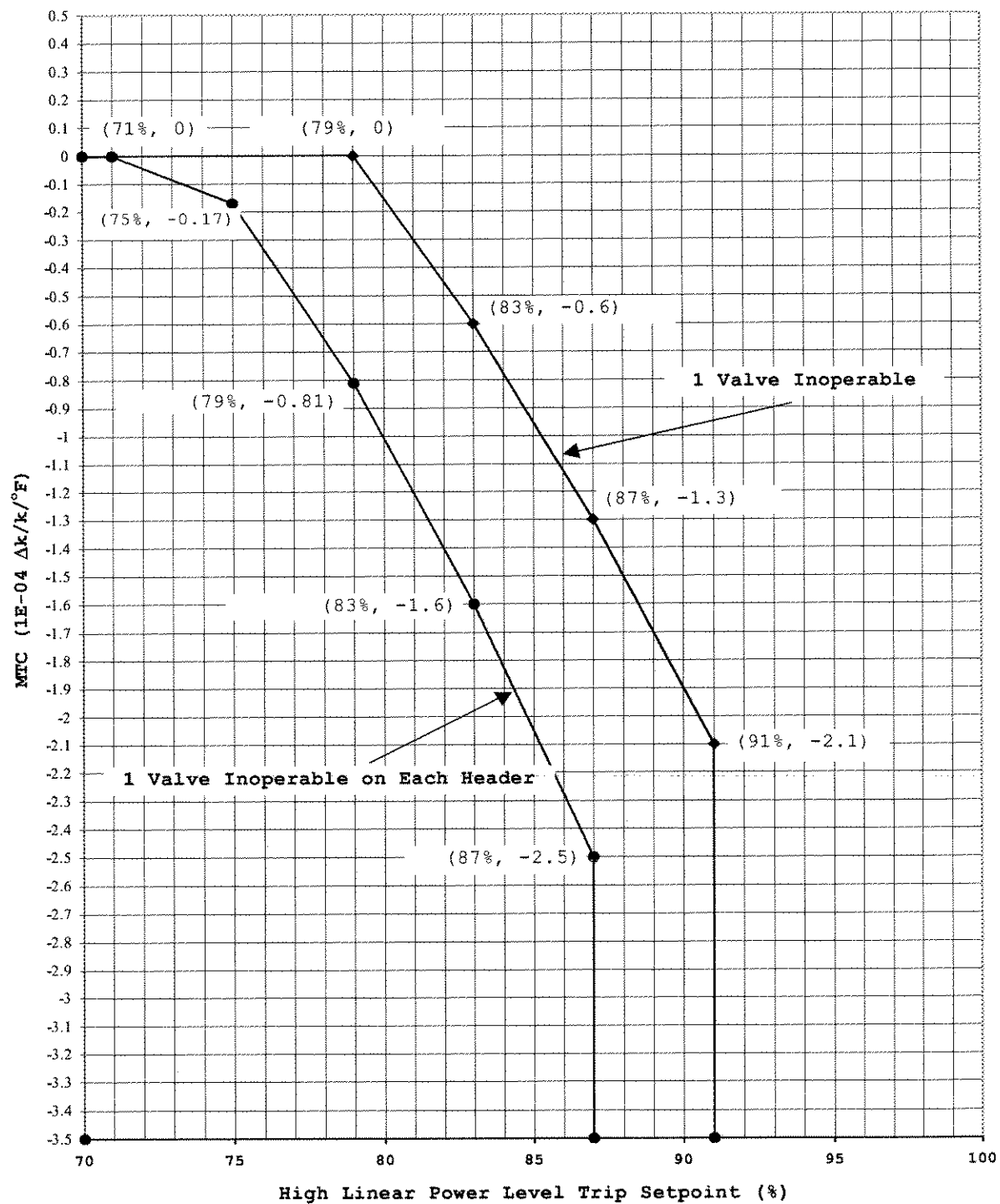


TABLE 3.7-5

STEAM LINE SAFETY VALVES

<u>VALVE NUMBER</u>		<u>LIFT SETTING (± 3%) *</u>
<u>Line No. 1</u>	<u>Line No. 2</u>	
a. 2PSV-1002	2PSV-1052	1078 psig
b. 2PSV-1003	2PSV-1053	1105 psig
c. 2PSV-1004	2PSV-1054	1105 psig
d. 2PSV-1005	2PSV-1055	1132 psig
e. 2PSV-1006	2PSV-1056	1132 psig

* The lift setting pressure shall correspond to ambient conditions of the valve at nominal operating temperature and pressure. If found outside of a ± 1% tolerance band, the setting shall be adjusted to within ± 1% of the lift setting shown.

JOB PERFORMANCE MEASURE

UNIT: 2 REV #: 00 DATE: _____SYSTEM/DUTY AREA: A1: Control Element Drive Mechanism Control SystemTASK: Verify and determine CEA#1 Upper Gripper Coil TemperatureJTA#: ANO2-RO-CEDM-NORM-10KA VALUE RO: 3.9 SRO: 4.0 KA REFERENCE: 2.1.23APPROVED FOR ADMINISTRATION TO: RO: _____ SRO: XTASK LOCATION: INSIDE CR: _____ OUTSIDE CR: _____ BOTH: X

SUGGESTED TESTING ENVIRONMENT AND METHOD (PERFORM OR SIMULATE):

PLANT SITE: _____ SIMULATOR: Perform Classroom: Perform

POSITION EVALUATED: RO: _____ SRO: _____

ACTUAL TESTING ENVIRONMENT: SIMULATOR: _____ PLANT SITE: _____ LAB: _____

TESTING METHOD: SIMULATE: _____ PERFORM: _____

APPROXIMATE COMPLETION TIME IN MINUTES: 15 MinutesREFERENCE(S): OP 2105.009, Rev. 021-01-0

EXAMINEE'S NAME: _____ SSN: _____

EVALUATOR'S NAME: _____

THE EXAMINEE'S PERFORMANCE WAS EVALUATED AGAINST THE STANDARDS CONTAINED IN THIS JPM AND IS DETERMINED TO BE:

SATISFACTORY: _____ UNSATISFACTORY: _____

PERFORMANCE CHECKLIST COMMENTS:

Start Time	Stop Time	Total Time
_____	_____	_____

SIGNED: _____ DATE: _____

SIGNATURE INDICATES THIS JPM HAS BEEN COMPARED TO ITS APPLICABLE PROCEDURE BY A QUALIFIED INDIVIDUAL (NOT THE EXAMINEE) AND IS CURRENT WITH THAT REVISION.

JOB PERFORMANCE MEASURE**THE EXAMINER SHALL REVIEW THE FOLLOWING WITH THE EXAMINEE:**

The examiner shall review the "Briefing Checklist - System Walkthrough" portion of OP 1064.023 Attachment 6 with the examinee.

JPM INITIAL TASK CONDITIONS:

1. Plant is at full power.
2. Both Main Chillers have tripped and cannot be started.
3. I&C is not available to obtain CEDM Coil temperatures.
4. OP 2203.012M, 2K13 ACA, for window C3, Main Chiller 2VCH1A overload is in alarm.
5. Readings obtained from the CEDM coil using a calibrated DVM are: 1) Upper Gripper coil voltage, $V_{ug} = 44V$; 2) Upper Gripper Shunt voltage $V_{shunt} = 6.46 \text{ mV}$

TASK STANDARD:

Two of the three errors on the completed Exhibit 2 must be identified:

1. 8.46mV was recorded instead of the 6.46mV in step 4.3.1 and 0.00846 V instead of 0.0046 V in step 4.4.
2. 10.4 ohms was recorded instead of 9.88 ohms in step 6.3.
3. Temperature of upper gripper coil was recorded as 353.373°F instead of 320.038°F.

And

Correct CEA 01 upper gripper coil temperature of $\geq 500.050^\circ\text{F}$ must be calculated.

TASK PERFORMANCE AIDS:

1. OP 2105.009 Exhibit 2 (completed)
2. Calculator.

JOB PERFORMANCE MEASURE**INITIATING CUE:**

The SM directs, "As directed by OP 2203012M, 2K13-C4, CEDM Cooling coils Water Flow Low ACA, the Upper Gripper temperature for CEA 01 has been calculated using 2105.009, Exhibit 2. Verify and identify all errors in the calculation."

CRITICAL ELEMENTS (C): _____

START TIME: _____

PERFORMANCE CHECKLIST			STANDARDS	(Circle One)
	1.	Review OP 2105.009 Exhibit 2.	Review the completed OP 2105.009 Exhibit 2.	N/A SAT UNSAT
	2.	Two of the three errors on the completed Exhibit 2 must be identified.	Errors present on Exhibit 2: 1. 8.46mV was recorded instead of the 6.46mV in step 4.3.1 and 0.00846 V instead of 0.0046 V in step 4.4. 2. 10.4 ohms was recorded instead of 9.88 ohms in step 6.3. 3. Temperature of upper gripper coil was recorded as 353.373°F instead of 320.038.	N/A SAT UNSAT
(C)	3.	Calculated the correct CEA 01 upper gripper coil temperature as 506.665°F (acceptance criteria is $\geq 500.050^\circ\text{F}$).	Calculate correct CEA 01 upper gripper coil temperature to be 506.665°F.	N/A SAT UNSAT
END				

STOP TIME: _____

JOB PERFORMANCE MEASURE**EXAMINER's COPY****JPM INITIAL TASK CONDITIONS:**

- Plant is at full power.
- Both Main Chillers have tripped and cannot be started.
- I&C is not available to obtain CEDM Coil temperatures.
- OP 2203.012M, 2K13 ACA, for window C4, CEDM cooling coils water flow low ACA is in alarm.
- Readings obtained from the CEDM coil using a calibrated DVM are:
 - 1) Upper Gripper coil voltage, $V_{ug} = 44V$
 - 2) Upper Gripper Shunt voltage $V_{shunt} = 6.46 \text{ mV}$

INITIATING CUE:

The SM directs, "As directed by OP 2203012M, 2K13-C4, CEDM Cooling coils Water Flow Low ACA, the Upper Gripper temperature for CEA 01 has been calculated using 2105.009, Exhibit 2. Verify and identify all errors in the calculation."

JOB PERFORMANCE MEASURE**EXAMINEE's COPY****JPM INITIAL TASK CONDITIONS:**

- Plant is at full power.
- Both Main Chillers have tripped and cannot be started.
- I&C is not available to obtain CEDM Coil temperatures.
- OP 2203.012M, 2K13 ACA, for window C4, CEDM cooling coils water flow low ACA is in alarm.
- Readings obtained from the CEDM coil using a calibrated DVM are:
 - 1) Upper Gripper coil voltage, $V_{ug} = 44V$
 - 2) Upper Gripper Shunt voltage $V_{shunt} = 6.46 \text{ mV}$

INITIATING CUE:

The SM directs, "As directed by OP 2203012M, 2K13-C4, CEDM Cooling coils Water Flow Low ACA, the Upper Gripper temperature for CEA 01 has been calculated using 2105.009, Exhibit 2. Verify and identify all errors in the calculation."

PROC./WORK PLAN NO. 2105.009	PROCEDURE/WORK PLAN TITLE: CEDM CONTROL SYSTEM OPERATION	PAGE: 10 of 30 CHANGE: 022-01-0
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2105.009

EXHIBIT 2

Revised 09/22/05

CEA #01 UPPER GRIPPER COIL TEMPERATURE MEASUREMENT

PAGE 1 OF 2

This exhibit provides Operations the ability to measure and trend CEA-01 upper gripper coil temperature. Other historically hot CEAs (2, 4, 8, 14, 15, 18, 55, 63, and 72) can also be measured by referring to WO# 50654677 CR-ANO-2-1999-0433-004.

- 1.0 Obtain currently calibrated Handheld Digital Voltmeter (DVM) or equivalent multimeter (Refer to ZOPG-012 for DVM usage).

NOTE

- Hold bus voltage prevents obtaining proper temperature readings.
- Record absolute values of voltage readings obtained.

- 2.0 Check CEA #01 NOT on Hold Bus.

- 3.0 Obtain CEA #01 Upper Gripper coil voltage (Vug) as follows:

- 3.1 Locate CEA #1 power cables in panel on TBC4C6, (behind access panel to left of 2C72 door).
- 3.2 With DVM scale set on 200, take voltage reading across "Black" and "White" cables located on TBC4C6, terminals #4 and #5. (A typical reading is 44 VDC).

$$(V_{ug}) = \underline{44} \text{ V}$$

- 4.0 Obtain CEA #01 Upper Gripper shunt voltage (Vshunt) as follows:

- 4.1 Locate CEA #01 coil monitor connector on front side of 2C72. (This is a round, capped connector with (#1) located directly above it.
- 4.2 Remove connector cap by unscrewing.
- 4.3 With DVM scale set on 200mV, take voltage reading across pins "C" and "D". (A typical reading is 8 millivolts DC.)

$$4.3.1 \quad \text{Record DVM reading} = \underline{6.46} \text{ mV}$$

$$\text{Convert mV to Volts: } \underline{8.46} \text{ mV} \times \frac{1 \text{ V}}{1000 \text{ mV}} = \underline{0.00846} \text{ V}$$

$$\text{Record (Vshunt)} = \underline{0.00846} \text{ V}$$

- 4.4 Screw connector cap back on CEA #01 coil monitor connector.

PROC./WORK PLAN NO. 2105.009	PROCEDURE/WORK PLAN TITLE: CEDM CONTROL SYSTEM OPERATION	PAGE: 11 of 30 CHANGE: 022-01-0
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2105.009

EXHIBIT 2

Revised 09/22/05

CEA #01 UPPER GRIPPER COIL TEMPERATURE MEASUREMENT

PAGE 2 OF 2

5.0 Utilize ohms law to calculate coil current (Icoil) as follows.

$$5.1 \quad (I_{coil}) = (V_{shunt}) \frac{0.08846}{.002 \text{ ohms.}}$$

$$5.2 \quad (I_{coil}) = \underline{4.23} \text{ amps}$$

6.0 Calculate coil resistance (Rcoil₁) as follows:

$$6.1 \quad (R_{coil_1}) = (V_{ug}) \frac{44 \text{ V}}{(I_{coil}) \underline{4.23} \text{ amps}}$$

$$(R_{coil_1}) = \underline{10.40} \text{ ohms}$$

NOTE

Lead resistance must be subtracted to obtain accurate reading. Lead resistance for CEA #1 is provided in this calculation. However, a lookup table for lead resistance is provided when using WO# 50654677 to calculate other CEA coil temperatures.

$$6.2 \quad (R_{coil_2}) = \underline{10.40} (R_{coil_1}) - .525 \text{ ohms (CEA \#01 lead resistance).}$$

$$6.3 \quad (R_{coil_2}) = \underline{10.40} \text{ ohms}$$

7.0 Obtain CEA #01 coil temperature as follows:

7.1 Use the following to obtain CEA #01 coil temperature:

- Coil resistance (Rcoil₂) calculated in step 6.0
- Table below

Resistance	Temp.	Resistance	Temp.	Resistance	Temp.	Resistance	Temp.
5.6	0.022	7.5	126.695	9.4	253.368	11.3	380.041
5.7	6.689	7.6	133.362	9.5	260.035	11.4	386.708
5.8	13.356	7.7	140.029	9.6	266.702	11.5	393.375
5.9	20.023	7.8	146.696	9.7	273.369	11.6	400.042
6	26.69	7.9	153.363	9.8	280.036	11.7	406.709
6.1	33.357	8	160.03	9.9	286.703	11.8	413.376
6.2	40.024	8.1	166.697	10	293.37	11.9	420.043
6.3	46.691	8.2	173.364	10.1	300.037	12	426.71
6.4	53.358	8.3	180.031	10.2	306.704	12.1	433.377
6.5	60.025	8.4	186.698	10.3	313.371	12.2	440.044
6.6	66.692	8.5	193.365	10.4	320.038	12.3	446.711
6.7	73.359	8.6	200.032	10.5	326.705	12.4	453.378
6.8	80.026	8.7	206.699	10.6	333.372	12.5	460.045
6.9	86.693	8.8	213.366	10.7	340.039	12.6	466.705
7	93.36	8.9	220.033	10.8	346.706	12.7	473.365
7.1	100.027	9	226.7	10.9	353.373	12.8	480.025
7.2	106.694	9.1	233.367	11	360.04	12.9	493.345
7.3	113.361	9.2	240.034	11.1	366.707	13	500.050
7.4	120.028	9.3	246.701	11.2	373.374	13.1	506.665

PROC./WORK PLAN NO. 2105.009	PROCEDURE/WORK PLAN TITLE: CEDM CONTROL SYSTEM OPERATION	PAGE: 10 of 30 CHANGE: 022-01-0
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2105.009

EXHIBIT 2
CEA #01 UPPER GRIPPER COIL TEMPERATURE MEASUREMENT

Revised 09/22/05

PAGE 1 OF 2

This exhibit provides Operations the ability to measure and trend CEA-01 upper gripper coil temperature. Other historically hot CEAs (2, 4, 8, 14, 15, 18, 55, 63, and 72) can also be measured by referring to WO# 50654677 CR-ANO-2-1999-0433-004.

- 1.0 Obtain currently calibrated Handheld Digital Voltmeter (DVM) or equivalent multimeter (Refer to 2OPG-012 for DVM usage).

NOTE

- Hold bus voltage prevents obtaining proper temperature readings.
- Record absolute values of voltage readings obtained.

- 2.0 Check CEA #01 NOT on Hold Bus.

- 3.0 Obtain CEA #01 Upper Gripper coil voltage (V_{ug}) as follows:

- 3.1 Locate CEA #1 power cables in panel on TBC4C6, (behind access panel to left of 2C72 door).

- 3.2 With DVM scale set on 200, take voltage reading across "Black" and "White" cables located on TBC4C6, terminals #4 and #5. (A typical reading is 44 VDC).

(V_{ug}) = _____ V

- 4.0 Obtain CEA #01 Upper Gripper shunt voltage (V_{shunt}) as follows:

- 4.1 Locate CEA #01 coil monitor connector on front side of 2C72. (This is a round, capped connector with (#1) located directly above it.

- 4.2 Remove connector cap by unscrewing.

- 4.3 With DVM scale set on 200mV, take voltage reading across pins "C" and "D". (A typical reading is 8 millivolts DC.)

- 4.3.1 Record DVM reading = _____ mV

Convert mV to Volts: _____ mV X $\frac{1 \text{ V}}{1000 \text{ mV}}$ = _____ V

Record (V_{shunt}) = _____ V

- 4.4 Screw connector cap back on CEA #01 coil monitor connector.

PROC./WORK PLAN NO. 2105.009	PROCEDURE/WORK PLAN TITLE: CEDM CONTROL SYSTEM OPERATION	PAGE: 11 of 30 CHANGE: 022-01-0
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2105.009

EXHIBIT 2

Revised 09/22/05

CEA #01 UPPER GRIPPER COIL TEMPERATURE MEASUREMENT

PAGE 2 OF 2

5.0 Utilize ohms law to calculate coil current (I_{coil}) as follows.

5.1 (I_{coil}) = (V_{shunt}) _____ V ÷ .002 ohms.

5.2 (I_{coil}) = _____ amps

6.0 Calculate coil resistance (R_{coil_1}) as follows:

6.1 (R_{coil_1}) = (V_{ug}) _____ V ÷ (I_{coil}) _____ amps

(R_{coil_1}) = _____ ohms

NOTE

Lead resistance must be subtracted to obtain accurate reading. Lead resistance for CEA #1 is provided in this calculation. However, a lookup table for lead resistance is provided when using WO# 50654677 to calculate other CEA coil temperatures.

6.2 (R_{coil_2}) = _____ (R_{coil_1}) - .525 ohms (CEA #01 lead resistance).

6.3 (R_{coil_2}) = _____ ohms

7.0 Obtain CEA #01 coil temperature as follows:

7.1 Use the following to obtain CEA #01 coil temperature:

- Coil resistance (R_{coil_2}) calculated in step 6.0
- Table below

Resistance	Temp.	Resistance	Temp.	Resistance	Temp.	Resistance	Temp.
5.6	0.022	7.5	126.695	9.4	253.368	11.3	380.041
5.7	6.689	7.6	133.362	9.5	260.035	11.4	386.708
5.8	13.356	7.7	140.029	9.6	266.702	11.5	393.375
5.9	20.023	7.8	146.696	9.7	273.369	11.6	400.042
6	26.69	7.9	153.363	9.8	280.036	11.7	406.709
6.1	33.357	8	160.03	9.9	286.703	11.8	413.376
6.2	40.024	8.1	166.697	10	293.37	11.9	420.043
6.3	46.691	8.2	173.364	10.1	300.037	12	426.71
6.4	53.358	8.3	180.031	10.2	306.704	12.1	433.377
6.5	60.025	8.4	186.698	10.3	313.371	12.2	440.044
6.6	66.692	8.5	193.365	10.4	320.038	12.3	446.711
6.7	73.359	8.6	200.032	10.5	326.705	12.4	453.378
6.8	80.026	8.7	206.699	10.6	333.372	12.5	460.045
6.9	86.693	8.8	213.366	10.7	340.039	12.6	466.705
7	93.36	8.9	220.033	10.8	346.706	12.7	473.365
7.1	100.027	9	226.7	10.9	353.373	12.8	480.025
7.2	106.694	9.1	233.367	11	360.04	12.9	493.345
7.3	113.361	9.2	240.034	11.1	366.707	13	500.050
7.4	120.028	9.3	246.701	11.2	373.374	13.1	506.665

PROC./WORK PLAN NO. 2203.012M	PROCEDURE/WORK PLAN TITLE: ANNUNCIATOR 2K13 CORRECTIVE ACTION	PAGE: 20 of 50 CHANGE: 016-00-0
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ANNUNCIATOR 2K13

C-4

CEDM COOLING COILS WATER FLOW LOW

1.0 CAUSES

1.1 Chilled water flow \leq 150 gpm through any of the following CEDM Cooling coils with its associated Chilled Water Inlet valve open:

- 2VCC-16A (2FIS-3845) and 2CV-3861
- 2VCC-16B (2FIS-3819) and 2CV-3849
- 2VCC-16C (2FIS-3859) and 2CV-3860
- 2VCC-16D (2FIS-3874) and 2CV-3875

2.0 ACTION REQUIRED

2.1 Check amber lights above valve handswitches on 2C22 to determine affected cooling unit.

2.2 Verify the following valves open:

- CNTMT Chill Water Return (2CV-3850-2)
- CNTMT Chill Water Return (2CV-3851-1)
- CNTMT Chill Water Supply (2CV-3852-1)

2.3 Verify Chilled Water Inlet valve for standby CEDM Cooler closed.

NOTE

Two Main Chilled Water pumps running in parallel provides maximum flow to reset flow switch.

2.4 Swap Main Chilled Water pumps using Main Chilled Water System (2104.026).

2.5 IF alarm occurs following Main Chilled Water pump shift,
THEN perform the following using Containment Atmosphere Control (2104.033):

2.5.1 Secure affected cooler

2.5.2 Place CEDM Cooling fan (2VSF-35B) in service.

2.6 IF Containment Building accessible,
THEN check local flow indication.

- Vent cooler as necessary using Main Chilled Water System (2104.026).

(C-4 Continued on next page)

PROC./WORK PLAN NO. 2203.012M	PROCEDURE/WORK PLAN TITLE: ANNUNCIATOR 2K13 CORRECTIVE ACTION	PAGE: 21 of 50 CHANGE: 016-00-0
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ANNUNCIATOR 2K13

C-4

COOLING COILS WATER FLOW LOW
(Continued)

NOTES

Consideration should be given to de-energizing the CEDM coils if temperatures are projected to exceed 450°F for an extended period of time. However, operation above 450°F for short durations may be allowed if restoration of CEDM cooling is imminent.

2.6 IF all CEDM chill water flow lost or severely degraded,
THEN perform the following:

2.6.1 Minimize CEA movement.

2.6.2 IF any CEA dropped or misaligned,
THEN GO TO CEA Malfunction (2203.003).

2.6.3 Contact I&C to determine coil temperatures.

2.6.4 IF I&C NOT available,
THEN refer to 2105.009 Exhibit #2, CEA #01 Upper Gripper Coil Temperature Measurement to determine coil temperatures.

2.6.5 Contact System Engineer for assistance.

2.6.6 IF coil temperatures projected to be > 450°F for an extended period
AND restoration of chill water flow NOT imminent,
THEN commence plant shutdown.

2.6.7 IF coil temperatures exceed 500°F
AND System Engineer NOT available,
THEN perform the following:

A. Trip the Reactor.

B. GO TO Standard Post Trip Actions (2202.001)

3.0 TO CLEAR ALARM

3.1 Restore flow to > 150 gpm.

3.2 Close Chilled Water Inlet valve for affected cooler.

4.0 REFERENCES

4.1 E-2458-1

4.2 Tech Manual C490.0140

4.3 CR-ANO-2-1999-0433

ADMINISTRATIVE JOB PERFORMANCE MEASUREUNIT: 2 REV #: 001 DATE: _____SYSTEM/DUTY AREA: A.2: Equipment ControlTASK: Review and approve as a supervisor the completed 2P89B surveillance.JTA#: ANOSROADMINNORM22KA VALUE RO: 3.5 SRO: 3.9 KA REFERENCE: 2.2.12APPROVED FOR ADMINISTRATION TO: RO: _____ SRO: XTASK LOCATION: INSIDE CR: _____ OUTSIDE CR: _____ BOTH: X

SUGGESTED TESTING ENVIRONMENT AND METHOD (PERFORM OR SIMULATE):

PLANT SITE: _____ SIMULATOR: Perform CLASSROOM: Perform

POSITION EVALUATED: RO: _____ SRO: _____

ACTUAL TESTING ENVIRONMENT: SIMULATOR: _____ PLANT SITE: _____ LAB: _____

TESTING METHOD: SIMULATE: _____ PERFORM: _____

APPROXIMATE COMPLETION TIME IN MINUTES: 15 MinutesREFERENCE(S): OP 2104.039 Supplement 2 Rev. 043-03-0

EXAMINEE'S NAME: _____ SSN: _____

EVALUATOR'S NAME: _____

THE EXAMINEE'S PERFORMANCE WAS EVALUATED AGAINST THE STANDARDS CONTAINED IN THIS JPM AND IS DETERMINED TO BE:

SATISFACTORY: _____ UNSATISFACTORY: _____

PERFORMANCE CHECKLIST COMMENTS:

Start Time _____ Stop Time _____ Total Time _____

SIGNED: _____ DATE: _____

SIGNATURE INDICATES THIS JPM HAS BEEN COMPARED TO ITS APPLICABLE PROCEDURE BY A QUALIFIED INDIVIDUAL (NOT THE EXAMINEE) AND IS CURRENT WITH THAT REVISION.

ADMINISTRATIVE JOB PERFORMANCE MEASURE

INITIAL PLANT CONDITIONS

Plant is at 100% power and all ESF equipment is in normal alignment.

2P89C is aligned to the RED side.

The 2P-89B Quarterly test has been completed using OP 2104.039 Supplement 2.

TASK STANDARD:

- 1) Identify that parameters recorded are outside the LIMITING RANGE FOR OPERABILITY in step 4.1.
- 2) Identification of four of the five errors, in Supplement 2, is required and two of the five must be the Pump D/P and the tech spec applicability.

Errors present in OP 2104.036 Supplement 2:

- Pump ΔP is out of LIMITING RANGE FOR OPERABILITY.
- Calculation for determining lower pump ΔP limit is in error.
- Inboard Radial Bearing #1 Vibes is out of LIMITING RANGE FOR OPERABILITY.
- Outboard Bearing AXIAL Vibes is out of LIMITING RANGE FOR OPERABILITY.
- Determine TS 3.5.2 applicability

TASK PERFORMANCE AIDS: marked-up copy of Supplement 2 2P-89B quarterly test

SIMULATOR SETUP: NA

ADMINISTRATIVE JOB PERFORMANCE MEASURE**Initiating CUE:**

The Shift Manager directs "perform a supervisor review and analysis of the 'B' HPSI pump, 2P89B, surveillance, by reviewing and identifying all errors on the completed surveillance data, OP 2104.039 Supplement 2."

CRITICAL STEPS: 2, 3

START TIME: _____

<u>PERFORMANCECHECKLIST</u>		<u>STANDARD</u>		<u>CIRCLE ONE</u>
EXAMINER'S NOTE: Provide a marked-up copy of Supplement 2, 2P-89B quarterly test				
	1.	Perform supervisor review of the surveillance procedure results and determine errors.	Reviews the surveillance acceptance criteria provided.	N/A
EXAMINER'S NOTE: The following list identify errors in the supplement 2 provided. The acceptance criterion is given in the task standard.				
(C)	2.	<ul style="list-style-type: none"> Pump ΔP is out of LIMITING RANGE FOR OPERABILITY. Calculation for determining lower pump ΔP limit is in error. (This calculation is below the table in supplement 2 section 3 and recorded in the table on the line for pump ΔP.) Inboard Radial Bearing #1 Vibes is out of LIMITING RANGE FOR OPERABILITY. Outboard Bearing AXIAL Vibes is out of LIMITING RANGE FOR OPERABILITY. Identify the technical specification applicability error. 	<ul style="list-style-type: none"> Pump D/P is out of LIMITING RANGE FOR OPERABILITY. Calculation for determining lower pump ΔP limit should be 1380.81 psid. Inboard Radial Bearing #1 Vibes is out of LIMITING RANGE FOR OPERABILITY. Outboard Bearing AXIAL Vibes is out of LIMITING RANGE FOR OPERABILITY. Identifies TS 3.5.2 applicability. 	N/A SAT UNSAT
EXAMINER'S NOTE: The examinee will probably require another RO to review the data table before proceeding. Then, provide the following CUE:				
EXAMINER'S CUE: Direct the examinee to continue on with completing section 4.0 as though that review matched the same errors previously identified.				
(C)	3. (Step 4.1)	In Step 4.1, marked NO to identify all measured values recorded in ACCEPTANCE CRITERIA do not fall within LIMITING RANGE FOR OPERABILITY.	Marked Step 4.1 as NO.	N/A SAT UNSAT

ADMINISTRATIVE JOB PERFORMANCE MEASURE

<u>PERFORMANCECHECKLIST</u>			<u>STANDARD</u>	<u>CIRCLE ONE</u>
4. (Step 4.2)	In Step 4.2, marked NA to identify all measured values recorded in ACCEPTANCE CRITERIA are outside both the NORMAL RANGE and the LIMITING RANGE FOR OPERABILITY.		Marked Step 4.2 as NA.	N/A SAT UNSAT
5. (Step 4.3)	LCO Tracking Record needed. EXAMINER's CUE: The CRS ADMIN will initiate LCO Tracking Record.		Identifies need to initiate LCO Tracking Record.	N/A SAT UNSAT
6. (Step 4.3)	Condition Report needed. EXAMINER's CUE: The Shift Technical Advisor will initiate the condition report.		Identifies need to generate condition report.	N/A SAT UNSAT
7. (Step 4.4)	Step 4.4 marked NA since step 4.2 was identified as NA.		Marked Step 4.4 as NA.	N/A SAT UNSAT
END				

STOP TIME: _____

ADMINISTRATIVE JOB PERFORMANCE MEASURE

EXAMINER's COPY

INITIAL PLANT CONDITIONS

Plant is at 100% power and all ESF equipment is in normal alignment.
2P89C is aligned to the RED side.

The 2P-89B Quarterly test has been completed using OP 2104.039 Supplement 2.

Initiating CUE:

The Shift Manager directs "perform a supervisor review and analysis of the 'B' HPSI pump, 2P89B, surveillance, by reviewing and identifying all errors on the completed surveillance data, OP 2104.039 Supplement 2."

ADMINISTRATIVE JOB PERFORMANCE MEASURE

EXAMINEE's COPY

INITIAL PLANT CONDITIONS

Plant is at 100% power and all ESF equipment is in normal alignment.
2P89C is aligned to the RED side.

The 2P-89B Quarterly test has been completed using OP 2104.039 Supplement 2.

Initiating CUE:

The Shift Manager directs "perform a supervisor review and analysis of the 'B' HPSI pump, 2P89B, surveillance, by reviewing and identifying all errors on the completed surveillance data, OP 2104.039 Supplement 2."

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SUPPLEMENT 2

PAGE 7 OF 9

3.0 ACCEPTANCE CRITERIA

3.1 Record values observed during 2P-89B operation below AND compare with limiting range of values for operability.

TABLE 1					
TEST QUANTITY	INSTRUMENT (INCLUDE TEST INST)	MEASURED VALUE	ACCEPTABLE NORMAL RANGE	LIMITING RANGE FOR OPERABILITY	IS DATA IN LIMITING RANGE?
Running Suct. Pressure	2PI-5100 (local)	33.5 psig	≥ 8 psig	≥ 8 psig	<input checked="" type="radio"/> YES <input type="radio"/> NO
Discharge Pressure	2PI-5101 (local)	1389 psig	N/A	N/A	N/A
	2PI-5109 (2C16)	1379 psig	N/A	N/A	N/A
RWT Temperature	2TIS-5675 (2C17)	90 °F	40 to 110°F	N/A	N/A
Pump ΔP { 4.3.1 }	2PI-5101 - 2PI-5100	1355.5 psid	N/A	1360.81 (1) to 1612.8 psid	<input checked="" type="radio"/> YES <input type="radio"/> NO
Motor Running Amps (CR-1-96-0272-07)	Ammeter at 2A-406	$\emptyset A$ <u>34</u> Amps $\emptyset B$ <u>33</u> Amps $\emptyset C$ <u>35</u> Amps	N/A	N/A	N/A
Inboard Brg Radial #1 Vibes	VIB001	0.825 in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	<input checked="" type="radio"/> YES <input type="radio"/> NO
Inboard Brg Radial #2 Vibes	VIB001	0.22 in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	<input checked="" type="radio"/> YES <input type="radio"/> NO
Inboard Brg Axial Vibes	VIB001	0.073 in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	<input checked="" type="radio"/> YES <input type="radio"/> NO
Outboard Brg Radial #1 Vibes	VIB001	0.187 in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	<input checked="" type="radio"/> YES <input type="radio"/> NO
Outboard Brg Radial #2 Vibes	VIB001	0.207 In/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	<input checked="" type="radio"/> YES <input type="radio"/> NO
Outboard Brg Axial Vibes	VIB001	0.610 In/sec	≤ 0.232 in/sec	≤ 0.558 in/sec	<input checked="" type="radio"/> YES <input type="radio"/> NO

Vibration Instrument Cal Due Date 7 Days from TODAY

Vibration Data Collected By Eddy Electrician

Note 1: For RWT temperature (T), minimum acceptable pump ΔP is:

$$1372.9 + 20.41 \text{ (Instrument error)} - [(T-40)/4] \text{ psid}$$

$$\text{Minimum } \Delta P = 1393.31 - [(\underline{90} - 40)/4] = \underline{1360.81} \text{ psid}$$

3.2 Independently verify pump ΔP calculation.

JJB

PROC./WORK PLAN NO. 2104.039	PROCEDURE/WORK PLAN TITLE: HPSI SYSTEM OPERATION	PAGE: 64 of 151 CHANGE: 043-03-0
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SUPPLEMENT 2

PAGE 8 OF 9

3.3 Document observation of check valve stroke in Table 2.

TABLE 2			
CHECK VALVE	TEST DIRECTION	TEST CRITERIA	IS PROPER VALVE STROKE INDICATED?
2SI-10C	Closed	2P-89C NOT rotating	<u>YES</u> NO N/A
2SI-10B	Closed	2P-89B NOT rotating	<u>YES</u> NO N/A

3.4 IF NO circled in Table 1 OR 2,
THEN perform the following:

- Declare affected component inoperable. N/A
- Refer to Tech Spec 3.5.2 OR 3.5.3. N/A
- Notify Shift Manager. N/A
- Initiate WR/WO as applicable. N/A

NOTE

If HPSI pump 2P-89A OR 2P-89C inoperable, then 2SI-10C/2SI-10B testing may be deferred until inoperable HPSI pump restored to operable as per IST Coordinator.

3.5 IF 2SI-10C AND/OR 2SI-10B NOT tested (N/A circled in Table 2),
THEN perform the following:

- Initiate notification to perform test during current quarter OR as directed by IST Coordinator. N/A
- Annotate on status board. N/A
- Annotate in Work Exceptions section of WR/WO. N/A

3.6 Pump Data recorded in database AND reviewed by SRO. SBR

3.7 IF this surveillance performed as PMT,
THEN complete Unit 2 IST Data Collection (1015.0160). N/A

Comments _____

Performed By Sammy Reactor Date TODAY
Jimmy Reactor

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SUPPLEMENT 2

PAGE 9 OF 9

4.0 SUPERVISOR REVIEW AND ANALYSIS

- 4.1 Do all measured values recorded in ACCEPTANCE CRITERIA fall within specified LIMITING RANGE FOR OPERABILITY? YES NO
- 4.2 Do all measured values recorded in ACCEPTANCE CRITERIA fall within ACCEPTABLE NORMAL RANGE? (N/A if all results outside normal range also outside limiting range.) YES NO NA
- 4.3 IF NO answered to 4.1,
THEN perform the following corrective actions:
- Verify LCO Tracking Record initiated per Conduct of Operations (1015.001). _____
 - Verify Condition Report initiated. _____
- 4.4 IF NO circled in 4.2,
THEN perform the following corrective actions:
- Verify WR/WO has been initiated. _____
 - Complete Surveillance Test Schedule Change Request (1000.009D) to double test frequency. _____

Comments _____

- 4.5 Are all administrative requirements of this test satisfied? YES NO

Supervisor _____ Date _____

PROC./WORK PLAN NO. 2104.039	PROCEDURE/WORK PLAN TITLE: HPSI SYSTEM OPERATION	PAGE: 63 of 151 CHANGE: 043-03-0
--	--	---

SUPPLEMENT 2

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3.0 ACCEPTANCE CRITERIA

3.1 Record values observed during 2P-89B operation below AND compare with limiting range of values for operability.

TABLE 1					
TEST QUANTITY	INSTRUMENT (INCLUDE TEST INST)	MEASURED VALUE	ACCEPTABLE NORMAL RANGE	LIMITING RANGE FOR OPERABILITY	IS DATA IN LIMITING RANGE?
Running Suct. Pressure	2PI-5100 (local)	33.5 psig	≥ 8 psig	≥ 8 psig	<input checked="" type="radio"/> YES <input type="radio"/> NO
Discharge Pressure	2PI-5101 (local)	1389 psig	N/A	N/A	N/A
	2PI-5109 (2C16)	1379 psig	N/A	N/A	N/A
RWT Temperature	2TIS-5675 (2C17)	90 °F	40 to 110°F	N/A	N/A
Pump ΔP {4.3.1}	2PI-5101 - 2PI-5100	1355.5 psid	N/A	1360.81 (1) to 1612.8 psid	<input checked="" type="radio"/> YES <input type="radio"/> NO
Motor Running Amps (CR-1-96-0272-07)	Ammeter at 2A-406	ØA <u>34</u> Amps ØB <u>33</u> Amps ØC <u>35</u> Amps	N/A	N/A	N/A
Inboard Brg Radial #1 Vibes	VIB001	0.825 in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	<input checked="" type="radio"/> YES <input type="radio"/> NO
Inboard Brg Radial #2 Vibes	VIB001	0.22 in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	<input checked="" type="radio"/> YES <input type="radio"/> NO
Inboard Brg Axial Vibes	VIB001	0.073 in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	<input checked="" type="radio"/> YES <input type="radio"/> NO
Outboard Brg Radial #1 Vibes	VIB001	0.187 in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	<input checked="" type="radio"/> YES <input type="radio"/> NO
Outboard Brg Radial #2 Vibes	VIB001	0.207 In/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	<input checked="" type="radio"/> YES <input type="radio"/> NO
Outboard Brg Axial Vibes	VIB001	0.610 In/sec	≤ 0.232 in/sec	≤ 0.558 in/sec	<input checked="" type="radio"/> YES <input type="radio"/> NO

Vibration Instrument Cal Due Date 7 Days from TODAY

Vibration Data Collected By Eddy Electrician

Note 1: For RWT temperature (T), minimum acceptable pump ΔP is:

$$1372.9 + 20.41 \text{ (Instrument error)} - [(T-40)/4] \text{ psid}$$

$$\text{Minimum } \Delta P = 1393.31 - [(\underline{90} - 40)/4] = \underline{1360.81} \text{ psid}$$

3.2 Independently verify pump ΔP calculation.

JJB

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SUPPLEMENT 2

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3.3 Document observation of check valve stroke in Table 2.

TABLE 2			
CHECK VALVE	TEST DIRECTION	TEST CRITERIA	IS PROPER VALVE STROKE INDICATED?
2SI-10C	Closed	2P-89C NOT rotating	<u>YES</u> NO N/A
2SI-10B	Closed	2P-89B NOT rotating	<u>YES</u> NO N/A

3.4 IF NO circled in Table 1 OR 2,
THEN perform the following:

- Declare affected component inoperable. N/A
- Refer to Tech Spec 3.5.2 OR 3.5.3. N/A
- Notify Shift Manager. N/A
- Initiate WR/WO as applicable. N/A

NOTE

If HPSI pump 2P-89A OR 2P-89C inoperable, then 2SI-10C/2SI-10B testing may be deferred until inoperable HPSI pump restored to operable as per IST Coordinator.

3.5 IF 2SI-10C AND/OR 2SI-10B NOT tested (N/A circled in Table 2),
THEN perform the following:

- Initiate notification to perform test during current quarter OR as directed by IST Coordinator. N/A
- Annotate on status board. N/A
- Annotate in Work Exceptions section of WR/WO. N/A

3.6 Pump Data recorded in database AND reviewed by SRO. SBR

3.7 IF this surveillance performed as PMT,
THEN complete Unit 2 IST Data Collection (1015.0160). N/A

Comments _____

Performed By Sammy Reactor Date TODAY
Jimmy Reactor

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SUPPLEMENT 2

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4.0 SUPERVISOR REVIEW AND ANALYSIS

- 4.1 Do all measured values recorded in ACCEPTANCE CRITERIA fall within specified LIMITING RANGE FOR OPERABILITY? YES NO
- 4.2 Do all measured values recorded in ACCEPTANCE CRITERIA fall within ACCEPTABLE NORMAL RANGE? (N/A if all results outside normal range also outside limiting range.) YES NO NA
- 4.3 IF NO answered to 4.1,
THEN perform the following corrective actions:
- Verify LCO Tracking Record initiated per Conduct of Operations (1015.001). _____
 - Verify Condition Report initiated. _____
- 4.4 IF NO circled in 4.2,
THEN perform the following corrective actions:
- Verify WR/WO has been initiated. _____
 - Complete Surveillance Test Schedule Change Request (1000.009D) to double test frequency. _____

Comments _____

- 4.5 Are all administrative requirements of this test satisfied? YES NO

Supervisor _____ Date _____

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SUPPLEMENT 2

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3.0 ACCEPTANCE CRITERIA

3.1 Record values observed during 2P-89B operation below AND compare with limiting range of values for operability.

TABLE 1					
TEST QUANTITY	INSTRUMENT (INCLUDE TEST INST)	MEASURED VALUE	ACCEPTABLE NORMAL RANGE	LIMITING RANGE FOR OPERABILITY	IS DATA IN LIMITING RANGE?
Running Suct. Pressure	2PI-5100 (local)	33.5 psig	≥ 8 psig	≥ 8 psig	<input checked="" type="radio"/> YES <input type="radio"/> NO
Discharge Pressure	2PI-5101 (local)	1389 psig	N/A	N/A	N/A
	2PI-5109 (2C16)	1379 psig	N/A	N/A	N/A
RWT Temperature	2TIS-5675 (2C17)	90 °F	40 to 110°F	N/A	N/A
Pump ΔP {4.3.1}	2PI-5101 - 2PI-5100	1355.5 psid	N/A	1360.81 (1) to 1612.8 psid	<input checked="" type="radio"/> YES <input type="radio"/> NO
Motor Running Amps (CR-1-96-0272-07)	Ammeter at 2A-406	$\varnothing A$ <u>34</u> Amps $\varnothing B$ <u>33</u> Amps $\varnothing C$ <u>35</u> Amps	N/A	N/A	N/A
Inboard Brg Radial #1 Vibes	VIB001	0.825 in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	<input checked="" type="radio"/> YES <input type="radio"/> NO
Inboard Brg Radial #2 Vibes	VIB001	0.22 in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	<input checked="" type="radio"/> YES <input type="radio"/> NO
Inboard Brg Axial Vibes	VIB001	0.073 in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	<input checked="" type="radio"/> YES <input type="radio"/> NO
Outboard Brg Radial #1 Vibes	VIB001	0.187 in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	<input checked="" type="radio"/> YES <input type="radio"/> NO
Outboard Brg Radial #2 Vibes	VIB001	0.207 In/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	<input checked="" type="radio"/> YES <input type="radio"/> NO
Outboard Brg Axial Vibes	VIB001	0.610 In/sec	≤ 0.232 in/sec	≤ 0.558 in/sec	<input checked="" type="radio"/> YES <input type="radio"/> NO

Vibration Instrument Cal Due Date 7 Days from TODAY

Vibration Data Collected By Eddy Electrician

Note 1: For RWT temperature (T), minimum acceptable pump ΔP is:

$$1372.9 + 20.41 \text{ (Instrument error)} - [(T-40)/4] \text{ psid}$$

$$\text{Minimum } \Delta P = 1393.31 - [(\underline{90} - 40)/4] = \underline{1360.81} \text{ psid}$$

3.2 Independently verify pump ΔP calculation.

JJB

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SUPPLEMENT 2

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3.3 Document observation of check valve stroke in Table 2.

TABLE 2			
CHECK VALVE	TEST DIRECTION	TEST CRITERIA	IS PROPER VALVE STROKE INDICATED?
2SI-10C	Closed	2P-89C NOT rotating	<u>YES</u> NO N/A
2SI-10B	Closed	2P-89B NOT rotating	<u>YES</u> NO N/A

3.4 IF NO circled in Table 1 OR 2,
THEN perform the following:

- Declare affected component inoperable. N/A
- Refer to Tech Spec 3.5.2 OR 3.5.3. N/A
- Notify Shift Manager. N/A
- Initiate WR/WO as applicable. N/A

NOTE

If HPSI pump 2P-89A OR 2P-89C inoperable, then 2SI-10C/2SI-10B testing may be deferred until inoperable HPSI pump restored to operable as per IST Coordinator.

3.5 IF 2SI-10C AND/OR 2SI-10B NOT tested (N/A circled in Table 2),
THEN perform the following:

- Initiate notification to perform test during current quarter OR as directed by IST Coordinator. N/A
- Annotate on status board. N/A
- Annotate in Work Exceptions section of WR/WO. N/A

3.6 Pump Data recorded in database AND reviewed by SRO. SBR

3.7 IF this surveillance performed as PMT,
THEN complete Unit 2 IST Data Collection (1015.0160). N/A

Comments _____

Performed By Sammy Reactor Date TODAY
Jimmy Reactor

PROC./WORK PLAN NO. 2104.039	PROCEDURE/WORK PLAN TITLE: HPSI SYSTEM OPERATION	PAGE: 65 of 151 CHANGE: 043-03-0
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SUPPLEMENT 2

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4.0 SUPERVISOR REVIEW AND ANALYSIS

- 4.1 Do all measured values recorded in ACCEPTANCE CRITERIA fall within specified LIMITING RANGE FOR OPERABILITY? YES NO
- 4.2 Do all measured values recorded in ACCEPTANCE CRITERIA fall within ACCEPTABLE NORMAL RANGE? (N/A if all results outside normal range also outside limiting range.) YES NO NA
- 4.3 IF NO answered to 4.1,
THEN perform the following corrective actions:
- Verify LCO Tracking Record initiated per Conduct of Operations (1015.001). _____
 - Verify Condition Report initiated. _____
- 4.4 IF NO circled in 4.2,
THEN perform the following corrective actions:
- Verify WR/WO has been initiated. _____
 - Complete Surveillance Test Schedule Change Request (1000.009D) to double test frequency. _____

Comments _____

- 4.5 Are all administrative requirements of this test satisfied? YES NO

Supervisor _____ Date _____

ENTERGY OPERATIONS INCORPORATED
ARKANSAS NUCLEAR ONE

TITLE: HPSI SYSTEM OPERATION SET #	DOCUMENT NO. 2104.039	CHANGE NO. 043-03-0
	WORK PLAN EXP. DATE N/A	TC EXP. DATE N/A
	SAFETY-RELATED <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	IPTE <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
	TEMP ALT <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	
	PROGRAMMATIC EXCLUSION PER ENS-LI-101 <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	

When you see these **TRAPS**

Time Pressure
Distraction/Interruption
Multiple Tasks
Over Confidence
Vague or Interpretive Guidance
First Shift/Last Shift
Peer Pressure
Change/Off Normal
Physical Environment
Mental Stress (Home or Work)

Get these **TOOLS**

Effective Communication
Questioning Attitude
Placekeeping
Self Check
Peer Check
Knowledge
Procedures
Job Briefing
Coaching
Turnover

VERIFIED BY	DATE	TIME

FORM TITLE: VERIFICATION COVER SHEET	FORM NO. 1000.006A	CHANGE NO. 051-00-0
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**ENTERGY OPERATIONS INCORPORATED
ARKANSAS NUCLEAR ONE**

TITLE: HPSI SYSTEM OPERATION

**DOCUMENT NO.
2104.039**

**CHANGE NO.
043-03-0**

☒ **PROCEDURE**

☐ **WORK PLAN, EXP. DATE** N/A

PAGE 1 **OF** 1

☐ **ELECTRONIC DOCUMENT**

TYPE OF CHANGE:

☐ **NEW**

☒ **PC**

☐ **TC**

☐ **DELETION**

☐ **REVISION**

☐ **EZ**

EXP. DATE: N/A

AFFECTED SECTION:
(Include step # if applicable)

DESCRIPTION OF CHANGE: (For each change made, include sufficient detail to describe reason for the change.)

5.9

New L&P from CR-ANO-1-2005-1385 CA5: (1000.006S #3)

ESF Room Cooling fans operated without Service Water aligned to their respective room cooler can impose a larger heat load on the room than originally designed. If SW is isolated to a cooling coil of 2VUC-1A, 2VUC-1B, 2VUC-1C, 2VUC-1D, 2VUC-1E, 2VUC-1F or 2VUC-11A/B, and it is desired to maintain the components in that room operable, then either of the following shall be performed to prevent start: (CR-ANO-1-2005-1385, CA2 and CA4)

- The respective room cooler HS placed in PTL
- The respective breaker for that room cooler opened

4.1

Added CR-ANO-1-2005-1385 to references. (1000.006S #10)

Supp 7A, 7B, 7C-

New initial condition to obtain camera if available to photograph boric acid leaks for the boric acid leak program. Added reference to 1032.047, Inspection and Evaluation of Boric Acid Leaks. (1000.006S #3, 10, 12)

Added step in section 2.0 to obtain photograph of any previously unidentified boric acid leak. (1000.006S #12)

PIF 2-06-0045

8.7

New step to verify Service Water aligned to room coolers with contingency to place HS in PTL or open breaker if Service Water not aligned. (1000.006S #3)

FORM TITLE:

DESCRIPTION OF CHANGE

**FORM NO.
1000.006C**

**CHANGE NO.
050-00-0**

PROC./WORK PLAN NO. 2104.039	PROCEDURE/WORK PLAN TITLE: HPSI SYSTEM OPERATION	PAGE: 1 of 151 CHANGE: 043-03-0
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PROC./WORK PLAN NO. 2104.039	PROCEDURE/WORK PLAN TITLE: HPSI SYSTEM OPERATION	PAGE: 2 of 151 CHANGE: 043-03-0
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1.0 PURPOSE

This procedure provides instructions for operation and testing of HPSI System components.

2.0 SCOPE

This procedure includes instructions for operating the Unit 2 HPSI System. This procedure satisfies the requirements of Tech Spec 4.5.2.f.1 and partially satisfies Tech Specs 4.5.2.g, 4.5.2.h and IST Requirements.

3.0 DESCRIPTION

HPSI pumps (2P-89A, 2P-89B and 2P-89C) are 9 stage centrifugal pumps with a shutoff head of ~ 1500 psi. They are powered from 2A3 and 2A4, with 2P-89C capable of being powered from either bus. Each pump has a recirculation path back to the RWT and a recirculation path back to the pump suction. Flow restricting orifices (2FO-5101, 2FO-5102) are sized to preclude pump runoff.

There are eight HPSI injection valves, four on each header. These valves can be used to throttle HPSI flow to each RCS cold leg. There is a manual throttle valve upstream of each injection valve that is throttled to balance flow between injection legs. A handle restraint is welded to the yoke of the manual throttle valves to prevent operation except during flow balancing.

Th Injection valves; used in conjunction with the HPSI Orifice Bypass valves provide injection into the hot legs after a LOCA. This provides flow through the core to prevent boron precipitation regardless of break location.

The auto circuit for HPSI pump (2P-89C) was modified by PC-94-8060. If 2P-89A and 2P-89B are in normal after stop, then 2P-89C will not start on an SIAS regardless of its handswitch position. Therefore, 2P-89C may be in normal after stop without entering a Tech Spec Action. The SIAS INOP alarm was also modified to prevent an alarm with both pump handswitches on the same train in normal after stop.

ESFAS actuates the HPSI system upon receipt of 2-out-of-4 low Pressurizer pressure or high containment pressure signals. HPSI actuates in conjunction with LPSI. Upon actuation, the following re-align:

- RWT Outlet valves (2CV-5630-1 and 2CV-5631-2) receive an open signal.
- Two HPSI pumps start, pressurizing both headers.
- 2CV-5015-1, 5035-1, 5055-1 and 5075-1 on header #1, and 2CV-5016-2, 5036-2, 5056-2 and 5076-2 on header #2 open, supplying flow to a combined LPSI/HPSI header which discharges to the Tc loops downstream of the RCPs.
- Normally open HPSI pump Recirculation valves (2CV-5126-1, 2CV-5127-1 and 2CV-5128-1) will close upon receipt of a Recirculation Actuation Signal (RAS) on low RWT level and will remain closed after RAS reset.

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4.0 REFERENCES

4.1 References Used in Procedure Preparation

- P&ID M-2230, Reactor Coolant System
- P&ID M-2232, Safety Injection System
- Tech Spec 4.5.2.f.1, 4.5.2.h and IST Program, ASME Code Section XI, 1989 Edition with no Addenda
- PSC Action 85-179-02
- CR-2-90-101, Check oil levels before starting pumps
- NRC Generic Letter 89-04, Guidance on Inservice Testing Programs
- CR-2-91-582, Full Flow Test (Supplement 6) acceptance criteria
- Engineering Calc 85-EQ-0004-01 Rev 5, Instrument error associated with flow balance test acceptance criteria (Supplement 6)
- CR-2-93-0136, Open RWT Outlet and HPSI pump recirc valves before starting a HPSI pump
- CR-2-93-0162, Instructions for closing check valve in Supplement 4
- DCP 93-2012, DCP-94-2002 HPSI Injection valve Replacement
- LCP 93-6025, 2P-89C Room Floor Drain Modification
- PC-94-8060, Swing pump Auto Start Interlock Modification
- Engineering Calc 92-E-0078-02, Unit 2 HPSI System Pump Performance Requirements (Supplement 6)
- LER-98-021-00 (OEE99-1359) Waterford event SIT boron concentration
- Engineering Calc 94-E-0095-18 Rev. 0 B ESF Room Heat Load evaluation
- Engineering Calc 94-E-0095-19 Rev. 0 C ESF Room Heat Load evaluation
- Engineering Calc 94-E-0095-20 Rev. 0 A ESF Room Heat Load evaluation
- ER991864R204, Revision of Full Flow DP Acceptance Criteria
- CR-ANO-2-2000-0276, High Radiation Levels in "A" HPSI Room During Full Flow Test
- ER003258N201, HPSI Test Connections
- CR-ANO-2-2000-0270, 2SI-26A Check valve Leakage
- CR-ANO-2-2001-0032, Design temperature of 2DCB-2-4" and 2HCB-23-6"
- CR-1-96-272-07, Large Motor Performance Monitoring
- LIC-01-017, ANO2 TS Am 229, Relocation of Boric Acid Makeup Systems from TS to TRM
- ER010457A201 (MAI40808 2P-89B PMT Results)
- NEI 99-02, CR-ANO-C-2001-0099, Availability of Equipment
- CR-ANO-2-2001-403, TS 3.6.3.1 reference
- CR-ANO-2-2001-100, Quantify amount of leakage allowed
- CR-ANO-2-2002-00929, Change B HPSI pump flow to 880 GPM
- ER-ANO-2002-0528-005 HPSI NPSH improvement
- ER-ANO-2000-2804-017, HPSI Pump Housing Upgrade (2P-89C)

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- CR-ANO-2-2003-1049, SAR Table 15.1.13-5 deleted; reference "The latest revision of Calculation 97-R-2002-01."
- ER-ANO-2000-3275-003/010, TAP 04-02-002, Installation of HPSI Pressurization System and installation of suction filters
- CR-ANO-2-2005-0414, HPSI Full Flow Test Acceptance Criteria Non-conservative
- CR-ANO-2-2005-2111, 2SI-26B not tested for leakage following maintenance during 2R17
- ER-ANO-2-2005-0561, open stroke time changes due to valve maintenance on 2CV-5055-1, 2CV-5016-2, and 2CV-5056-2
- CR-ANO-2-2003-01299 CA4, Remove actions for leak rates < 1 gpm
- CALC-93-E-0037-01, Inst Error Analysis for HPSI and LPSI Pump Local Pressure Indicators
- CALC-97-E-0020-06, Loop Error Analysis for LPSI Pumps Disch Header Pressure Remote Ind To Support LPSI Pumps Surveillance Testing
- CALC-97-E-0020-07, Loop Error Analysis for HPSI Pumps Disch Header Remote Pressure Ind To Support HPSI Pumps Surveillance Testing
- CR-ANO-1-2005-1385, Decay Heat Room Cooler calculation (Calc-87-E-0006-08 Rev. 0) did not consider additional heat input due to operation of a cooling fan without Service Water in service

4.2 References Used in Conjunction with this Procedure

- Service Water System Operations (2104.029)
- Safety Injection Tank Operations (2104.001)
- Unit 2 Tech Specs 3.5.2, 3.5.3, and 3.4.6.2
- Unit 2 TRM 3.1.2.1
- ER002409E201, SW to HPSI Seal Coolers
- Calc 97-R-2002-01 ECCS Leakage Quantities into Aux Bldg

4.3 NRC Commitments

- 4.3.1 P8085, Use local discharge pressure gauge for HPSI pump DP calculation. (Supplements 1, 2, 3 & 6)
- 4.3.2 P7262, Close both valves to isolate suction and discharge pressure gauges. (Supplements 1, 2, 3 & 6)
- 4.3.3 P3588, P3834 Perform HPSI flow balance each refueling outage. (Supplement 6)
- 4.3.4 P14711, Operation of CNTMT penetration valves above Mode 5. (Section 7.0, Supplements 4, 8 & 9)

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5.0 LIMITS AND PRECAUTIONS

- 5.1 Immediately notify SM if Acceptance Criteria NOT met during surveillance testing.
- 5.2 With RCS pressure less than RWT head, RCS level will rise if HPSI Cold Leg or Hot Leg injection valves open and RWT Outlet in same train or HPSI pump recirc path to RWT open. Recirc flow path from RWT, through recirc header, through mini-mini recirc line to suction of HPSI pumps.
- 5.3 2P-89C breaker (2A-307 or 2A-407) NOT required to be in service shall be locked open using Kirk Key Lock with closing springs discharged. Both breakers (2A-307 and 2A-407) should remain normally racked up due to seismic concerns.
- 5.4 Evaluation of HPSI pump operability without service water cooling was submitted to NRC, which concluded that loss of service water during accident would not cause bearing or seal failure. Therefore, HPSI pumps remain operable without service water cooling.
- 5.5 Room Coolers
 - A/B ESF Room coolers 2VUC-1A&B, 2VUC-1D&E auto start capability not required for respective HPSI pump to be operable. However, for A ESF Room any two coolers 2VUC-1A, 2VUC-1B or 2VUC-1C must be operable and capable of manual start; for B ESF Room any two coolers 2VUC-1D, 2VUC-1E or 2VUC-1F must be operable and capable of manual start.
 - C ESF Room coolers - one of two coolers, 2VUC-11A or 2VUC-11B (associated with same train as 2P-89C alignment - Red or Green) must be operable AND capable of manual start (no auto start capability requirement.) (Calc-94-E-0095-19)
- 5.6 Limit HPSI pump motor starts to two from ambient or one from rated temperature for initial starting. For subsequent starts, allow 30 minutes run time or 60 minutes idle time.
- 5.7 Any RCS and/or SIT back-leakage into the HPSI system should be documented with a Condition Report due to the potential gas intrusion and piping voiding concern. The gas intrusion/piping voiding occurs when high-pressure, gas-entrained fluid is allowed to depressurize, thereby allowing a portion of the entrained gas to come out of solution. Refer to CR-ANO-2-2004-0065.
- 5.8 When closing HPSI Injection MOVs previously opened, maintain handswitch in close position for ~ 2 seconds after red light out. This ensures proper torquing of MOV on its shut seat.
- 5.9 ESF Room Cooling fans operated without Service Water aligned to their respective room cooler can impose a larger heat load on the room than originally designed. If SW is isolated to a cooling coil of 2VUC-1A, 2VUC-1B, 2VUC-1C, 2VUC-1D, 2VUC-1E, 2VUC-1F or 2VUC-11A/B, and it is desired to maintain the components in that room operable, then either of the following shall be performed to prevent start: (CR-ANO-1-2005-1385, CA2 and CA4)
 - The respective room cooler HS placed in PTL
 - The respective breaker for that room cooler opened

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6.0 SETPOINTS

- 6.1 HPSI Header #1 and #2 Reliefs (2PSV-5110 and 2PSV-5111) - 1950 psig.
- 6.2 HPSI Header #1 Relief (2PSV-5112) - 2485 psig.
- 6.3 Sequential loading on diesel - 10 seconds after EDG Output breaker (2A-308/2A-408) closes when SIAS present.
- 6.4 Sequential loading on offsite power - 10 seconds after SIAS.
- 6.5 Standby pump starts on SIAS if normal pump breaker open.
- 6.6 Kirk Key interlock prevents closing both 2P-89C breakers at same time. (2A-307/2A-407)
- 6.7 Recircs 2CV-5126-1, 2CV-5127-1, 2CV-5128-1 and 2CV-5628-2 close on RAS.
- 6.8 Handswitch contacts from 2P-89A and 2P-89B used in Auto Start circuit of 2P-89C to prevent 2P-89C from starting on same bus when 2P-89A and 2P-89B available.

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7.0 SYSTEM FILL AND VENT

7.1 Initial Conditions

- RWT Boron concentration between 2500 and 3000 PPM.
- RWT level > 95% in Mode 1 through 4, otherwise > 9%.
- LPSI header filled and vented up to SIT check valves OR on SDC using LPSI System Operations (2104.040).
- Applicable portions of HPSI system aligned per Attachment A.

7.2 IF desired to fill and vent the Red Train RWT suction header, THEN perform the following:

7.2.1 Verify RWT 2T-3 Outlet (2CV-5630-1) open.

7.2.2 Open the following valves:

- 2P-89A Suction Vent (2SI-1004A)
- 2P-89A Suction Vent (2SI-1005A)

7.2.3 WHEN steady stream of water issues, THEN perform the following:

- Close 2SI-1004A.
- Close AND cap 2SI-1005A.

7.3 IF desired to fill and vent the Green Train RWT suction header, THEN perform the following:

7.3.1 Verify RWT 2T-3 Outlet (2CV-5631-2) open.

7.3.2 Open the following valves:

- 2P-89B Suction Vent (2SI-1004B)
- 2P-89B Suction Vent (2SI-1005B)

7.3.3 WHEN steady stream of water issues, THEN perform the following:

- Close 2SI-1004B.
- Close AND cap 2SI-1005B.

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- 7.4 IF HPSI Pump 2P-89A drained,
THEN fill and vent as follows:
- 7.4.1 Verify the following valves open:
- RWT 2T-3 Outlet (2CV-5630-1)
 - HPSI 2P-89A Suction (2SI-8A)
- 7.4.2 Open the following valves:
- HPSI 2P-89A Mini Flow Recirc Vent (2SI-1093)
 - HPSI 2P-89A Mini Flow Recirc Vent (2SI-1094)
- 7.4.3 WHEN steady stream of water issues,
THEN perform the following:
- Close 2SI-1093.
 - Close AND cap 2SI-1094.
- 7.4.4 Notify System Engineer to coordinate with Mechanical Maintenance to vent 2P-89A Inboard and Outboard mechanical seals.
- 7.4.5 Notify System Engineer to coordinate with NDE to perform UT on selected piping prior to pump start.
- 7.5 IF HPSI Pump 2P-89B drained,
THEN fill and vent as follows:
- 7.5.1 Verify the following valves open:
- RWT 2T-3 Outlet (2CV-5631-2)
 - HPSI 2P-89B Suction (2SI-8B)
- 7.5.2 Open the following valves:
- HPSI 2P-89B Mini Flow Recirc Vent (2SI-1063)
 - HPSI 2P-89B Mini Flow Recirc Vent (2SI-5135)
- 7.5.3 WHEN steady stream of water issues,
THEN perform the following:
- Close 2SI-1063.
 - Close AND cap 2SI-5135.
- 7.5.4 Notify System Engineer to coordinate with Mechanical Maintenance to vent 2P-89B Inboard and Outboard mechanical seals.
- 7.5.5 Notify System Engineer to coordinate with NDE to perform UT on selected piping prior to pump start.

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- 7.6 IF HPSI Pump 2P-89C drained,
 THEN fill and vent as follows:
- 7.6.1 IF desired to fill and vent 2P-89C from HPSI header #1 (red),
 THEN perform the following:
- A. Verify the following valves open:
- RWT 2T-3 Outlet (2CV-5630-1)
 - HPSI Suction X-connect (2SI-9A)
- B. Open the following valves:
- HPSI Suction X-Connect Vent (2SI-1002)
 - HPSI Suction X-Connect Vent (2SI-1003)
- C. WHEN steady stream of water issues,
 THEN perform the following:
- Close 2SI-1002.
 - Close AND cap 2SI-1003.
- 7.6.2 IF desired to fill and vent 2P-89C from HPSI header #2
 (green),
 THEN perform the following:
- A. Verify the following valves open:
- RWT 2T-3 Outlet (2CV-5631-2)
 - HPSI Suction X-connect (2SI-9B)
- B. Open the following valves:
- HPSI Suction X-Connect Vent (2SI-1000)
 - HPSI Suction X-Connect Vent (2SI-1001)
- C. WHEN steady stream of water issues,
 THEN perform the following:
- Close 2SI-1000.
 - Close AND cap 2SI-1001.
- 7.6.3 Open the following valves:
- HPSI 2P-89C Mini Flow Recirc Vent (2SI-1067)
 - HPSI 2P-89C Mini Flow Recirc Vent (2SI-1068)
- 7.6.4 WHEN steady stream of water issues,
 THEN perform the following:
- Close 2SI-1067.
 - Close AND cap 2SI-1068.
- 7.6.5 Notify System Engineer to coordinate with Mechanical
 Maintenance to vent 2P-89C Inboard and Outboard mechanical
 seals.
- 7.6.6 Notify System Engineer to coordinate with NDE to perform UT
 on selected piping prior to pump start.

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7.7 IF desired to vent 2P-89C discharge cross-connect piping,
THEN perform the following:

7.7.1 Perform ONE of the following:

A. Verify the following valves open to align flow via 2P-89A:

- RWT 2T-3 Outlet (2CV-5630-1)
- HPSI 2P-89A Suction (2SI-8A)
- HPSI 2P-89A Discharge Stop Check (2SI-10A)
- HPSI 2P-89C Discharge To A Loop (2SI-11A)

B. Verify the following valves open to align flow via 2P-89B:

- RWT 2T-3 Outlet (2CV-5631-2)
- HPSI 2P-89B Suction (2SI-8B)
- HPSI 2P-89B Discharge Stop Check (2SI-10B)
- HPSI 2P-89C Discharge To B Loop (2SI-11B)

C. Verify the following valves open to align flow via 2P-89C aligned to red:

- RWT 2T-3 Outlet (2CV-5630-1)
- HPSI Suction X-connect (2SI-9A)
- HPSI 2P-89C Discharge Stop Check (2SI-10C)

D. Verify the following valves open to align flow via 2P-89C aligned to green:

- RWT 2T-3 Outlet (2CV-5631-2)
- HPSI Suction X-connect (2SI-9B)
- HPSI 2P-89C Discharge Stop Check (2SI-10C)

7.7.2 Open the following valves:

- HPSI Pumps Discharge X-connect Vent (2SI-1006)
- HPSI Pumps Discharge X-connect Vent (2SI-1007)

7.7.3 WHEN steady stream of water issues,
THEN perform the following:

- Close 2SI-1006
- Close AND cap 2SI-1007

7.7.4 Open the following valves:

- HPSI Pumps Discharge X-connect Vent (2SI-1008)
- HPSI Pumps Discharge X-connect Vent (2SI-1009)

7.7.5 WHEN steady stream of water issues,
THEN perform the following:

- Close 2SI-1008
- Close AND cap 2SI-1009

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7.8 IF desired to vent HPSI discharge header #1 up to injection MOVs,
THEN perform the following:

7.8.1 Verify RWT 2T-3 Outlet (2CV-5630-1) open.

7.8.2 Perform EITHER of the following to establish a flowpath:

A. Verify the following valves open:

- HPSI 2P-89A Suction (2SI-8A)
- HPSI 2P-89A Discharge Stop Check (2SI-10A)

B. Verify the following valves open:

- HPSI Suction X-connect (2SI-9A)
- HPSI 2P-89C Discharge Stop Check (2SI-10C)
- HPSI 2P-89C Discharge To A Loop (2SI-11A)

NOTE

Headers may be vented in any order.

7.8.3 Open the following valves to vent "A" Header:

- Vent before 2CV-5015-1 (2SI-1022A)
- Vent before 2CV-5015-1 (2SI-1023A)

7.8.4 WHEN steady stream of water issues,
THEN perform the following:

- Close 2SI-1022A.
- Close AND cap 2SI-1023A.

7.8.5 Open the following valves to vent "B" Header:

- Vent before 2CV-5035-1 (2SI-1022B)
- Vent before 2CV-5035-1 (2SI-1023B)

7.8.6 WHEN steady stream of water issues,
THEN perform the following:

- Close 2SI-1022B.
- Close AND cap 2SI-1023B.

7.8.7 Open the following valves to vent "C" Header:

- Vent before 2CV-5055-1 (2SI-1022C)
- Vent before 2CV-5055-1 (2SI-1023C)

7.8.8 WHEN steady stream of water issues,
THEN perform the following:

- Close 2SI-1022C.
- Close AND cap 2SI-1023C.

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7.8.9 Open the following valves to vent "D" Header:

- Vent before 2CV-5075-1 (2SI-1022D)
- Vent before 2CV-5075-1 (2SI-1023D)

7.8.10 WHEN steady stream of water issues,
THEN perform the following:

- Close 2SI-1022D.
- Close AND cap 2SI-1023D.

7.8.11 Monitor HPSI Header #1 Pressure Indication (2PI-5108) for evidence of back leakage through SI check valves.

7.9 IF desired to vent HPSI discharge header #2 up to injection MOVs,
THEN perform the following:

7.9.1 Verify RWT 2T-3 Outlet (2CV-5631-2) open.

7.9.2 Perform EITHER of the following:

A. Verify the following valves open:

- HPSI 2P-89B Suction (2SI-8B)
- HPSI 2P-89B Discharge Stop Check (2SI-10B)

B. Verify the following valves open:

- HPSI Suction X-connect (2SI-9B)
- HPSI 2P-89C Discharge Stop Check (2SI-10C)
- HPSI 2P-89C Discharge To B Loop (2SI-11B)

NOTE

Headers may be vented in any order.

7.9.3 Open the following valves to vent "A" Header:

- Vent before 2CV-5016-2 (2SI-1024A)
- Vent before 2CV-5016-2 (2SI-1025A)

7.9.4 WHEN steady stream of water issues,
THEN perform the following:

- Close 2SI-1024A.
- Close AND cap 2SI-1025A.

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- 7.9.5 IF CAT E controls in effect,
THEN refer to Category E controls of Conduct of Operations,
(1015.001) for 2SI-1024B and 2SI-1025B.
- 7.9.6 Open the following valves to vent "B" Header:
- HPSI Low Pressure Fill to SIT Drain Header (2SI-1024B)
 - HPSI Low Pressure Fill to SIT Drain Header (2SI-1025B)
 - 2PP-5115 Isolation (2SI-5115C)
 - 2PP-5115 Isolation (2SI-5115D)
- 7.9.7 WHEN steady stream of water issues ,
THEN perform the following:
- Close AND lock 2SI-1024B.
 - Close AND lock 2SI-1025B.
 - Close 2SI-5115C.
 - Close AND cap 2SI-5115D.
- 7.9.8 Open the following valves to vent "C" Header:
- Vent before 2CV-5056-2 (2SI-1024C)
 - Vent before 2CV-5056-2 (2SI-1025C)
- 7.9.9 WHEN steady stream of water issues,
THEN perform the following:
- Close 2SI-1024C
 - Close AND cap 2SI-1025C
- 7.9.10 Open the following valves to vent "D" Header:
- Vent before 2CV-5076-2 (2SI-1024D)
 - Vent before 2CV-5076-2 (2SI-1025D)
- 7.9.11 WHEN steady stream of water issues,
THEN perform the following:
- Close 2SI-1024D.
 - Close AND cap 2SI-1025D.
- 7.9.12 IF CAT E controls in effect,
THEN complete Category E/Lock Component Log (E-DOC
1015.001H) .
- 7.9.13 Monitor HPSI Header #2 Pressure Indication (2PI-5109) for
evidence of back leakage through SI check valves.

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7.10 IF desired to vent downstream of HPSI injection MOVs,
THEN perform the following:

7.10.1 Verify flowpath aligned from RWT to desired injection MOV.

NOTE

Headers may be vented in any order.

- {4.3.4} 7.10.2 IF Containment penetration controls in effect,
THEN refer to Containment Penetration Admin Controls in
Conduct of Operations (1015.001) for HPSI Header to 2P-32
Vent valves.
- 7.10.3 Throttle open desired HPSI Injection Header "A" MOV:
- 2CV-5015-1
 - 2CV-5016-2
- 7.10.4 Open the following valves to vent "A" Header:
- HPSI Header to 2P-32A vent (2SI-1026A)
 - HPSI Header to 2P-32A vent (2SI-1027A)
- 7.10.5 WHEN steady stream of water issues,
THEN perform the following:
- Close 2SI-1026A.
 - Close AND cap 2SI-1027A.
- 7.10.6 Verify the following valves closed:
- 2CV-5015-1
 - 2CV-5016-2
- 7.10.7 Throttle open desired HPSI Injection Header "B" MOV:
- 2CV-5035-1
 - 2CV-5036-2
- 7.10.8 Open the following valves to vent "B" Header:
- HPSI Header to 2P-32B vent (2SI-1026B)
 - HPSI Header to 2P-32B vent (2SI-1027B)
- 7.10.9 WHEN steady stream of water issues,
THEN perform the following:
- Close AND cap 2SI-1026B.
 - Close 2SI-1027B.
- 7.10.10 Verify the following valves closed:
- 2CV-5035-1
 - 2CV-5036-2

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- 7.10.11 Throttle open desired HPSI Injection Header "C" MOV:
- 2CV-5055-1
 - 2CV-5056-2
- 7.10.12 Open the following valves to vent "C" Header:
- HPSI Header to 2P-32C vent (2SI-1026C)
 - HPSI Header to 2P-32C vent (2SI-1027C)
- 7.10.13 WHEN steady stream of water issues,
THEN perform the following:
- Close 2SI-1026C
 - Close AND cap 2SI-1027C
- 7.10.14 Verify the following valves closed:
- 2CV-5055-1
 - 2CV-5056-2
- 7.10.15 Throttle open desired HPSI Injection Header "D" MOV:
- 2CV-5075-1
 - 2CV-5076-2
- 7.10.16 Open the following valves to vent "D" Header:
- HPSI Header to 2P-32D vent (2SI-1026D)
 - HPSI Header to 2P-32D vent (2SI-1027D)
- 7.10.17 WHEN steady stream of water issues,
THEN perform the following:
- Close 2SI-1026D
 - Close AND cap 2SI-1027D
- 7.10.18 Verify the following valves closed:
- 2CV-5075-1
 - 2CV-5076-2
- 7.10.19 IF Containment Penetration Controls in effect,
THEN complete Containment Penetration Valve Log (1015.001D).

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8.0 NORMAL SYSTEM ALIGNMENT

8.1 Verify valves aligned per Attachment A.

8.2 IF any part of system drained,
THEN verify appropriate portion filled AND vented using Section 7.0
of this procedure.

8.3 Verify the following valves closed:

- Th Injection MOV (2CV-5101-1)
- Th Injection MOV (2CV-5102-2)

8.4 Verify the following breakers open:

- 2CV-5101-1 breaker (2B52-L5)
- 2CV-5102-2 breaker (2B62-G2)

8.5 Verify the following valves open:

- RWT 2T-3 Outlet (2CV-5630-1)
- RWT 2T-3 Outlet (2CV-5631-2)
- HPSI 2P-89A Recirc Isol (2CV-5126-1)
- HPSI 2P-89B Recirc Isol (2CV-5128-1)
- HPSI 2P-89C Recirc Isol (2CV-5127-1)
- ESF Mini-Recirc Header Isol (2CV-5628-2)
- SW ESF Header Isol (2CV-1400-1)
- SW ESF Header Isol (2CV-1406-2)
- 2VUC-11A SW Inlet (2CV-1407-1)
- 2VUC-11B SW Inlet (2CV-1408-2)
- RWT Recirc and Test Line Inlet to RWT (2BS-26)

8.6 Verify 2P-89C aligned to desired HPSI Train per Attachment B or C.

8.7 Perform the following for operable HPSI pumps:

8.7.1 Verify Service Water aligned to room coolers:

- 2VUC-1A
- 2VUC-1B
- 2VUC-1C
- 2VUC-1D
- 2VUC-1E
- 2VUC-1F
- 2VUC-11A
- 2VUC-11B

8.7.2 IF Service Water isolated to any room cooler,
THEN verify either of the following to prevent
room cooler start:

- The respective room cooler HS placed in PTL
- The respective breaker for that room cooler opened

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9.0 STARTING ANY HPSI PUMP ON RECIRC

- 9.1 IF starting 2P-89A
THEN verify the following valves open:
- HPSI 2P-89A Recirc Isol (2CV-5126-1)
 - ESF Mini-Recirc Header Isol (2CV-5628-2)
 - RWT Recirc and Test Line Inlet to RWT (2BS-26)
 - RWT 2T-3 Outlet (2CV-5630-1)
 - SW ESF Header Isol (2CV-1400-1)
- 9.2 IF starting 2P-89B
THEN verify the following valves open:
- HPSI 2P-89B Recirc Isol (2CV-5128-1)
 - ESF Mini-Recirc Header Isol (2CV-5628-2)
 - RWT Recirc and Test Line Inlet to RWT (2BS-26)
 - RWT 2T-3 Outlet (2CV-5631-2)
 - SW ESF Header Isol (2CV-1406-2)
- 9.3 IF starting 2P-89C
THEN perform the following:
- 9.3.1 Verify the following valves open:
- HPSI 2P-89C Recirc Isol (2CV-5127-1)
 - ESF Mini-Recirc Header Isol (2CV-5628-2)
 - RWT Recirc and Test Line Inlet to RWT (2BS-26)
- 9.3.2 IF 2P-89C powered from 2A3,
THEN verify the following valves open:
- RWT 2T-3 Outlet (2CV-5630-1)
 - SW ESF Header Isol (2CV-1400-1)
 - 2VUC-11A SW Inlet (2CV-1407-1)
- 9.3.3 IF 2P-89C powered from 2A4,
THEN verify the following valves open:
- RWT 2T-3 Outlet (2CV-5631-2)
 - SW ESF Header Isol (2CV-1406-2)
 - 2VUC-11B SW Inlet (2CV-1408-2)

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NOTE

- 2P-89A and 2P-89B HPSI pumps operable if oil level visible in Oiler Glass bubbler.
- 2P-89C HPSI pump is operable if the oil level in the sight glass is between the high and low level marks. The sight glass is located on the opposite side of the bearing housing from the oiler.

9.4 Check pump AND motor oil levels.

9.5 Start selected HPSI pump.

9.6 Check discharge pressure developed.
(2PI-5108 on 2C17 or 2PI-5109 on 2C16)

9.7 Verify appropriate room coolers running. (70 second time delay)

9.8 Stop HPSI pump as desired.

9.9 Stop the following fans as desired:

- 2VUC-1A
- 2VUC-1B
- 2VUC-1D
- 2VUC-1E
- 2VUC-11A
- 2VUC-11B

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
A ESF RM 2P-89A AREA							
2SI-9A	C HPSI Pump Suction from A Loop	M2232 D1 SH 1	ESF RM A, 2P-89A HPSI PUMP, N SIDE, 7.5 FT UP	LOCKED OPEN			LC if 2P-89C aligned to Green train
2SI-11A	C HPSI Pump Discharge To A Loop	M2232 D3 SH 1	ESF RM A, 2P-89A HPSI PUMP, EAST END, 6 FT UP	LOCKED OPEN			LC if 2P-89C aligned to Green train
2SI-8A	HPSI 2P-89A Suction Valve	M2232 D1 SH 1	ESF RM A, ABOVE 2P-89A HPSI PUMP, 8 FT UP	LOCKED OPEN			
2SI-5090A	HPSI 2P-89A Suction 2PI-5090	M2232 D2 SH 1	ESF RM A, ABOVE 2P-89A HPSI PUMP, 4 FT UP	CLOSED			
2SI-5090B	HPSI 2P-89A Suction 2PI-5090	M2232 E2 SH 1	ESF RM A, ABOVE 2P-89A HPSI PUMP, 4 FT UP	CLOSED			
2SI-5062A	HPSI 2P-89A Suction 2PP-5062 Before Strainer	M2232 D1 SH 1	ESF RM A, ABOVE 2P-89A HPSI PUMP, 7 FT UP	CLOSED			
2SI-5062B	HPSI 2P-89A Suction 2PP-5062 Before Strainer	M2232 D1 SH 1	ESF RM A, ABOVE 2P-89A HPSI PUMP, 7 FT UP	CLOSED CAPPED			
2SI-10A	HPSI 2P-89A Discharge Stop Check	M2232 D3 SH 1	ESF RM A, ABOVE 2P-89A HPSI PUMP, 4 FT UP	LOCKED OPEN			
2SI-1042A	HPSI 2P-89A Discharge Line Drain & 2PI-5091	M2232 D3 SH 1	ESF RM A, ABOVE 2P-89A HPSI PUMP, 4 FT UP	CLOSED			
2SI-1043A	HPSI 2P-89A Discharge Line Drain & 2PI-5091	M2232 E3 SH 1	ESF RM A, 2P-89A HPSI PUMP, EAST END, 3.5 FT UP	CLOSED CAPPED			
2SI-5101A	HPSI Header #1 2FT-5101 Isol	M2232 D3 SH 1	ESF RM A, 2P-89A HPSI PUMP, 4 FT N, 8.5 FT UP	OPEN			
2SI-5101B	HPSI Header #1 2FT-5101 Isol	M2232 D3 SH 1	ESF RM A, 2P-89A HPSI PUMP, 4 FT N, 8.5 FT UP	OPEN			
2SI-64	HPSI 2P-89A Recirc to Suction	M2232 E3 SH 1	ESF RM A, S WALL, BET 2P-89A HPSI PUMP AND RECIRC ISOL 2CV-5126-1, 8 FT UP	LOCKED OPEN			
2SI-1093	HPSI 2P-89A Mini Flow Vent	M2232 E3 SH 1	ESF RM A, 1 FT FROM S WALL, 8 FT ABOVE 2P-89A HPSI PUMP RECIRC VLV	CLOSED			

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ATTACHMENT A HPSI SYSTEM VALVE LINEUP						PAGE 2 OF 13	
COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
2SI-1094	HPSI 2P-89A Mini Flow Vent	M2232 E3 SH 1	ESF RM A, SE CORNER OF 2P-89A HPSI PUMP, 12 FT UP	CLOSED CAPPED			
2SI-1095	HPSI 2P-89A Mini Flow Drain	M2232 E2 SH 1	ESF RM A, 1.5 FT FROM S WALL, BELOW 2CV-5126-1 2P-89A RECIRC VALVE	CLOSED			
2SI-1096	HPSI 2P-89A Mini Flow Drain	M2232 D3 SH 1	ESF RM A, 1.5 FT FROM S WALL, BELOW 2CV-5126-1 2P-89A RECIRC VALVE	CLOSED CAPPED			
2SI-1079	HPSI 2P-89A Recirc Line Drain	M2236 E2 SH 1	ESF RM A, 2P-89A HPSI PUMP, 2 FT SOUTH, 8 FT UP	CLOSED			
2SI-1080	HPSI 2P-89A Recirc Line Drain	M2236 E2 SH 1	ESF RM A, 2P-89A HPSI PUMP, 2 FT SOUTH, 8 FT UP	CLOSED CAPPED			
2SI-1004A	HPSI 2P-89A Suction Vent	M2232 D1 SH 1	ESF RM A, 2P-89A HPSI PUMP, 12 FT ABOVE	CLOSED			
2SI-1005A	HPSI 2P-89A Suction Vent	M2232 E1 SH 1	ESF RM A, 2P-89A HPSI PUMP, 12 FT ABOVE	CLOSED CAPPED			
2ABS-21A	HPSI 2P-89A Casing Drain	M2232 D2 SH 1	ESF RM A, BET 2P-89A PUMP AND RECIRC VALVE 2CV-5126-1, 1 FT UP	CLOSED			
2ABS-22A	HPSI 2P-89A Casing Drain	M2232 D2 SH 1	ESF RM A, BET 2P-89A PUMP AND RECIRC VALVE 2CV-5126-1, 1 FT UP	CLOSED			

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
A ESF RM 2P-60A AND 2P-35A AREA							
2SI-1073	HPSI 2P-89A Recirc Line Vent	M2236 E2 SH 1	ESF RM A, LPSI PUMP AREA, NW CORNER, N WALL, ABOVE PLATFORM NEXT TO 2P-60A LPSI PUMP	CLOSED			
2SI-1074	HPSI 2P-89A Recirc Line Vent	M2236 E2 SH 1	ESF RM A, LPSI PUMP AREA, NW CORNER, N WALL, ABOVE PLATFORM NEXT TO 2P-60A LPSI PUMP	CLOSED CAPPED			
2BS-53	HPSI 2P-89A Recirc to Suction	M2236 E2 SH 1	ESF RM A, W WALL, BEHIND 2P-35A SPRAY PUMP, 7 FT UP	LOCKED OPEN			
2SI-1081	HPSI Suction Header Recirc Drain	M2236 E2 SH 1	ESF RM A, 2P-136 NaOH PUMP, 7 FT WEST, 7 FT UP	CLOSED			
2SI-1082	HPSI Suction Header Recirc Drain	M2236 E2 SH 1	ESF RM A, 2P-136 NaOH PUMP, 7 FT WEST, 7 FT UP	CLOSED CAPPED			
2SI-1075	HPSI Suction Header Recirc Vent	M2236 E2 SH 1	ESF RM A, SW SIDE, ABOVE 2P-136A NaOH PUMP, 2 FT FROM CEILING	CLOSED			
2SI-1076	HPSI Suction Header Recirc Vent	M2236 E2 SH 1	ESF RM A, SW SIDE, ABOVE 2P-136A NaOH PUMP, 2 FT FROM CEILING	CLOSED CAPPED			
TENDON GALLERY ACCESS							
2SI-1000	HPSI Suction Xconn Vent	M2232 D1 SH 1	TENDON GALLERY ACCESS, 6 FT NORTH OF 2CV-1400 LOOP 1 SW ESF ISOL, 15 FT UP	CLOSED			
2SI-1001	HPSI Suction Xconn Vent	M2232 D1 SH 1	TENDON GALLERY ACCESS, 6 FT NORTH OF 2CV-1400 LOOP 1 SW ESF ISOL, 15 FT UP	CLOSED CAPPED			
2SI-1006	HPSI Pumps Discharge Xconn Vent	M2232 D3 SH 1	TENDON GALLERY ACCESS, 3 FT SE OF 2CV-1400 LOOP 1 SW ESF ISOL, 15 FT UP	CLOSED			
2SI-1007	HPSI Pumps Discharge Xconn Vent	M2232 D3 SH 1	TENDON GALLERY ACCESS, 15 FT ABOVE DRAIN AT ENTRANCE TO AREA	CLOSED CAPPED			
2SI-76	HPSI 2P-89A/B/C Test Hdr Isol	M2232 D3 SH 1	TENDON GALLERY ACCESS, 4 FT BELOW 2SI-1006/2SI-1007 VENT STACK	CLOSED BLIND INSTALLED			
2BS-58	Test Hdr Rtn Isol to RWT	M2236 F6 SH 1	TENDON GALLERY ACCESS, 3 FT ABOVE 2SI-18 CS/LPSI SYSTEM RECIRC TO RWT	CLOSED BLIND INSTALLED			

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
C HPSI RM							
2SI-66	C HPSI Pump Recirc to A Suction	M2236 D2 SH 1	2P-89C HPSI PUMP RM, 8 FT SW OF PUMP, AT W WALL, 8 FT UP	LOCKED OPEN			LC if 2P-89C aligned to Green train
2SI-1083	HPSI Suction Header Recirc Drain	M2236 E2 SH 1	2P-89C HPSI PUMP RM, 8 FT SW OF PUMP, 6 FT UP	CLOSED			
2SI-1084	HPSI Suction Header Recirc Drain	M2236 E2 SH 1	2P-89C HPSI PUMP RM, 8 FT SW OF PUMP, 6 FT UP	CLOSED CAPPED			
2SI-5098A	HPSI 2P-89C Suction 2PI-5098	M2232 D2 SH 1	2P-89C HPSI PUMP RM, 2 FT ABOVE PUMP	CLOSED			
2SI-5098B	HPSI 2P-89C Suction 2PI-5098	M2232 D2 SH 1	2P-89C HPSI PUMP RM, 2 FT ABOVE PUMP	CLOSED			
2SI-10C	HPSI 2P-89C Discharge Stop Check	M2232 C3 SH 1	2P-89C HPSI PUMP RM, ABOVE S END OF PUMP, 2 FT UP	LOCKED OPEN			
2ABS-21C	HPSI 2P-89C Casing Drain	M2232 D3 SH 1	2P-89C HPSI PUMP RM, 4 FT SW OF PUMP, 1 FT UP	CLOSED			
2ABS-22C	HPSI 2P-89C Casing Drain	M2232 C2 SH 1	2P-89C HPSI PUMP RM, 4 FT SW OF PUMP, 1 FT UP	CLOSED			
2SI-1089	Equipment Drain Pan Valve for 2P-89C	M2232 C2 SH1	2P-89C HPSI PUMP ROOM	CLOSED			
2M-4	HPSI Pump Room C Floor Drain Plug	M2213 E4 SH4	2P-89C HPSI PUMP ROOM	INSTALLED			
2SI-62	HPSI 2P-89C Recirc to Suction	M2232 D3 SH 1	2P-89C HPSI PUMP RM, 6 FT S OF PUMP, 10 FT UP	LOCKED OPEN			
2SI-1069	HPSI 2P-89C Mini Flow Recirc Drain	M2232 D3 SH 1	2P-89C HPSI PUMP RM, BELOW PUMP RECIRC ISOL 2CV-5127, 1 FT FROM FLOOR	CLOSED			
2SI-1070	HPSI 2P-89C Mini Flow Recirc Drain	M2232 D3 SH 1	2P-89C HPSI PUMP RM, BELOW PUMP RECIRC ISOL 2CV-5127, 6 IN FROM FLOOR	CLOSED CAPPED			

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
2SI-1067	HPSI 2P-89C Mini Flow Recirc Vent	M2232 D3 SH 1	2P-89C HPSI PUMP RM, 6 FT S OF PUMP SKID, ABOVE RECIRC ISOL 2CV-5127, 8.5 FT UP	CLOSED			
2SI-1068	HPSI 2P-89C Mini Flow Recirc Vent	M2232 D3 SH 1	2P-89C HPSI PUMP RM, 6 FT S OF PUMP SKID, ABOVE RECIRC ISOL 2CV-5127, 8.5 FT UP	CLOSED CAPPED			
2SI-37	HPSI 2P-89C Mini Flow Recirc Isol	M2232 D3 SH 1	2P-89C HPSI PUMP RM, 6 FT S OF PUMP, 6 FT UP	LOCKED OPEN			
2SI-1042C	HPSI 2P-89C Discharge Line Drain & 2PI-5102	M2232 C3 SH 1	2P-89C HPSI PUMP RM, 1 FT E OF PUMP, 5 FT UP	CLOSED			
2SI-1043C	HPSI 2P-89C Discharge Line Drain & 2PI-5102	M2232 C3 SH 1	2P-89C HPSI PUMP RM, 1 FT E OF PUMP, 4.5 FT UP	CLOSED CAPPED			
2SI-67	C HPSI Pump Recirc to B Suction	M2236 D2 SH 1	2P-89C HPSI PUMP RM, 4 FT S OF PUMP, BY 2VUC-11B, 12 FT UP	LOCKED CLOSED			LO if 2P-89C aligned to Green train
B ESF RM 2P-89B AREA							
2SI-9B	C HPSI Pump Suction From B Loop	M2232 C1 SH 1	ESF RM B, HPSI PUMP AREA, W END 2P-89B, 6 FT UP	LOCKED CLOSED			LO if 2P-89C aligned to Green train
2SI-11B	C HPSI Pump Discharge To B Loop	M2232 C3 SH 1	ESF RM B, HPSI PUMP AREA, E END OF 2P-89B, 6 FT UP	LOCKED CLOSED			LO if 2P-89C aligned to Green train
2SI-5102A	HPSI Header #2 2FT-5102 Isol	M2232 C3 SH 1	ESF RM B, HPSI PUMP AREA, 5 FT S OF 2CV-5650-2 CONT SUMP ISOL, 12 FT UP	OPEN			
2SI-5102B	HPSI Header #2 2FT-5102 Isol	M2232 C3 SH 1	ESF RM B, HPSI PUMP AREA, 5 FT S OF 2CV-5650-2 CONT SUMP ISOL, 12 FT UP	OPEN			
2SI-1002	HPSI Suction Xconn Vent	M2232 D1 SH 1	ESF RM B, HPSI PUMP AREA, 6 FT W OF PUMP, 5 FT E OF 2CV-5650-2 PLATFORM, 12 FT UP	CLOSED			
2SI-1003	HPSI Suction Xconn Vent	M2232 D1 SH 1	ESF RM B, HPSI PUMP AREA, 6 FT W OF PUMP, 5 FT E OF 2CV-5650-2 PLATFORM, 12 FT UP	CLOSED CAPPED			
2SI-1008	HPSI Pumps Discharge Xconn Vent	M2232 C3 SH 1	ESF RM B, HPSI PUMP AREA, 8 FT W OF 2P-89B MOTOR, 15 FT UP	CLOSED			
2SI-1009	HPSI Pumps Discharge Xconn Vent	M2232 C3 SH 1	ESF RM B, HPSI PUMP AREA, 8 FT W OF 2P-89B MOTOR, 15 FT UP	CLOSED CAPPED			

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
2ABS-21B	HPSI 2P-89B Casing Drain	M2232 C2 SH 1	ESF RM B, HPSI PUMP AREA, 1 FT N OF 2P-89B, 1 FT UP	CLOSED			
2ABS-22B	HPSI 2P-89B Casing Drain	M2232 C2 SH 1	ESF RM B, HPSI PUMP AREA, 1 FT N OF 2P-89B, 1 FT UP	CLOSED			
2SI-1042B	HPSI 2P-89B Discharge Line Drain & 2PI-5101	M2232 C3 SH 1	ESF RM B, HPSI PUMP AREA, E END OF 2P-89B, 4 FT UP	CLOSED			
2SI-1043B	HPSI 2P-89B Discharge Line Drain & 2PI-5101	M2232 C3 SH 1	ESF RM B, HPSI PUMP AREA, E END OF 2P-89B, 4 FT UP	CLOSED CAPPED			
2SI-10B	HPSI 2P-89B Discharge Stop Check	M2232 C3 SH 1	ESF RM B, HPSI PUMP AREA, E END OF 2P-89B, 5 FT UP	LOCKED OPEN			
2SI-5134	HPSI 2P-89B Mini Flow Recirc Drain	M2232 C2 SH 1	ESF RM B, HPSI PUMP AREA, 5 FT SE OF 2P-89B, BELOW RECIRC ISOL 2CV-5128, 1 FT UP	CLOSED CAPPED			
2SI-5133	HPSI 2P-89B Mini Flow Recirc Drain	M2232 C3 SH 1	ESF RM B, HPSI PUMP AREA, 5 FT SE OF 2P-89B, BELOW RECIRC ISOL 2CV-5128, 1.5 FT	CLOSED			
2SI-1086	HPSI 2P-89B Recirc Line Drain	M2236 D2 SH 1	ESF RM B, HPSI PUMP AREA, 1 FT W OF 2CV-5128 RECIRC ISOL, AT S WALL, 4.5 FT UP	CLOSED CAPPED			
2SI-1085	HPSI 2P-89B Recirc Line Drain	M2236 D2 SH 1	ESF RM B, HPSI PUMP AREA, 1 FT W OF 2CV-5128 RECIRC ISOL, AT S WALL, 5 FT UP	CLOSED			
2SI-65	HPSI 2P-89B Recirc to Suction	M2232 C3 SH 1	ESF RM B, HPSI PUMP AREA, 6 FT SE OF 2P-89B, ABOVE 2CV-5128 RECIRC ISOL, 6 FT UP	LOCKED OPEN			
2SI-1063	HPSI 2P-89B Mini Flow Recirc Vent	M2232 C3 SH 1	ESF RM B, HPSI PUMP AREA, SOUTH OF 2P-89B, AT S WALL	CLOSED			
2SI-32	B HPSI Pump Discharge Recirc Orifice Bypass Isolation Valve	M2232 C3 SH 1	ESF RM B, HPSI PUMP AREA, SOUTH OF 2P-89B, 10' UP	LOCKED CLOSED			
2SI-33	B HPSI Pump Discharge Orifice Bypass Throttling Valve	M2232 C3 SH 1	ESF RM B, HPSI PUMP AREA, SOUTH OF 2P-89B, 10' UP	LOCKED CLOSED			

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
2SI-5001A	HPSI 2P-89B Discharge Pressure Point Isolation Valve	M2232 C3 SH 1	ESF RM B, HPSI PUMP AREA, SOUTH OF 2P-89B, 10' UP	CLOSED			
2SI-5001B	HPSI 2P-89B Discharge Pressure Point Isolation Valve	M2232 C3 SH 1	ESF RM B, HPSI PUMP AREA, SOUTH OF 2P-89B, 10' UP	CLOSED			
2SI-5135	HPSI 2P-89B Mini Flow Recirc Vent	M2232 C3 SH 1	ESF RM B, 5 FT SE OF 2P-89B, ABOVE 2CV-5128 RECIRC ISOL, 8 FT UP	CLOSED CAPPED			
2SI-8B	HPSI 2P-89B Suction Valve	M2232 C1 SH 1	ESF RM B, HPSI PUMP AREA, ABOVE 2P-89B, 7 FT UP	LOCKED OPEN			
2SI-5099B	HPSI 2P-89B Suction 2PP-5099 Before Strainer	M2232 C2 SH 1	ESF RM B, HPSI PUMP AREA, S SIDE OF 2P-89B, 6 FT UP	CLOSED			
2SI-5099A	HPSI 2P-89B Suction 2PP-5099 Before Strainer	M2232 C2 SH 1	ESF RM B, HPSI PUMP AREA, S SIDE OF 2P-89B, 6 FT UP	CLOSED CAPPED			
2SI-5100A	HPSI 2P-89B Suction 2PI-5100	M2232 C2 SH 1	ESF RM B, HPSI PUMP AREA, S SIDE OF 2P-89B, 4.5 FT ABOVE PUMP	CLOSED			
2SI-5100B	HPSI 2P-89B Suction 2PI-5100	M2232 C2 SH 1	ESF RM B, HPSI PUMP AREA, S SIDE OF 2P-89B, 4.5 FT ABOVE PUMP	CLOSED			
2SI-1004B	HPSI 2P-89B Suction Vent	M2232 C1 SH 1	ESF RM B, HPSI PUMP AREA, S SIDE OF 2P-89B, 12 FT ABOVE PUMP	CLOSED			
2SI-1005B	HPSI 2P-89B Suction Vent	M2232 C1 SH 1	ESF RM B, HPSI PUMP AREA, S SIDE OF 2P-89B, 12 FT ABOVE PUMP	CLOSED CAPPED			
B ESF RM 2P-60A AND 2P-35A AREA							
2BS-54	HPSI 2P-89B Recirc to Suction	M2236 D2 SH 1	ESF RM B, AT W WALL, BEHIND 2P-35B CNTMT SPRAY PUMP	LOCKED OPEN			
2SI-1078	HPSI 2P-89B Recirc Line Vent	M2236 D2 SH 1	ESF RM B, 2P-35B LPSI PUMP, 15 FT W, AT CEILING	CLOSED CAPPED			
2SI-1077	HPSI 2P-89B Recirc Line Vent	M2236 D2 SH 1	ESF RM B, 2P-35B LPSI PUMP, 15 FT W, AT CEILING	CLOSED			

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ATTACHMENT A HPSI SYSTEM VALVE LINEUP							PAGE 8 OF 13
COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
LSPP 335'							
2SI-5108A	HPSI Header #1 2PT-5108	M2232 D4 SH 1	LSPP, BEHIND 2CV-5103-1 HPSI ORIFICE BYPASS MOTOR, 1 FT FROM WALL, 5 FT UP	OPEN			
2SI-5108B	HPSI Header #1 2PT-5108	M2232 D4 SH 1	LSPP, BEHIND 2CV-5103-1 HPSI ORIFICE BYPASS MOTOR, 1 FT FROM WALL, 5 FT UP	OPEN			
2SI-1044	HPSI Header #1 Drain	M2232 D4 SH 1	LSPP, 1 FT E OF 2CV-5103-1 HPSI ORIFICE BYPASS, 1 FT FROM WALL, 5 FT UP	CLOSED			
2SI-1045	HPSI Header #1 Drain	M2232 D4 SH 1	LSPP, 2 FT E OF 2CV-5103-1 HPSI ORIFICE BYPASS, 1 FT FROM WALL, 5 FT UP	CLOSED CAPPED			
2SI-1056A	HPSI Header #1 Drain	M2232 D4 SH 1	LSPP, 1 FT E OF 2CV-5103-1 HPSI ORIFICE BYPASS, AT FLOOR	CLOSED			
2SI-1057A	HPSI Header #1 Drain	M2232 D4 SH 1	LSPP, 1 FT E OF 2CV-5103-1 HPSI ORIFICE BYPASS, AT FLOOR	CLOSED CAPPED			
2SI-5109	HPSI Header #2 2PT-5109	M2232 C3 SH 1	LSPP, SE SIDE, 4 FT FROM 2CV-0714-1, 2 FT FROM WALL, 4 FT UP	OPEN			
2SI-1056B	HPSI Header #2 Drain	M2232 C4 SH 1	LSPP, SE SIDE, 3 FT BELOW 2CV-5104-2 HPSI ORIFICE BYPASS	CLOSED (1)			
2SI-1057B	HPSI Header #2 Drain	M2232 C4 SH 1	LSPP, SE SIDE, 3.5 FT BELOW 2CV-5104-2 HPSI ORIFICE BYPASS	CLOSED CAPPED (2)			
USPP 354'							
2SI-68	2CV-5015-1 Manual Throttle Valve	M2232 F5 SH 1	USPP, PENET 2P5, 2FT IN FRONT OF 2CV-5015-1, 1 FT UP	THROTTLED OPEN			Handwheel restraint welded to yoke
2SI-1022A	HPSI Header #1 Vent Before 2CV-5015-1	M2232 F5 SH 1	USPP, PENET 2P5, 1.5 FT IN FRONT OF 2CV-5015, 3 FT UP	CLOSED			
2SI-1023A	HPSI Header #1 Vent Before 2CV-5015-1	M2232 F5 SH 1	USPP, PENET 2P5, 1.5 FT IN FRONT OF 2CV-5015, 3 FT UP	CLOSED CAPPED			
2SI-69	2CV-5016-2 Manual Throttle Valve	M2232 E5 SH 1	USPP, PENET 2P5, 2 FT FROM 2CV-5016-2	THROTTLED OPEN			Handwheel restraint welded to yoke
2SI-1024A	HPSI Header #2 Vent Before 2CV-5016-2	M2232 E5 SH 1	USPP, PENET 2P5, 1 FT FROM 2CV-5016-2, 3.5 FT UP	CLOSED			
2SI-1025A	HPSI Header #2 Vent Before 2CV-5016-2	M2232 E5 SH 1	USPP, PENET 2P5, 1 FT FROM 2CV-5016-2, 4 FT UP	CLOSED CAPPED			

- (1) May be OPEN if TAP 04-02-002 installed AND HPSI Pressurization System in service per Att. F of this procedure.
- (2) May be OPEN with cap removed if TAP 04-02-002 installed AND HPSI Pressurization System in service per Att. F of this procedure.

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
2SI-1048	Combined HPSI Header to RCP A Drain	M2232 E5 SH 1	USPP, PENET 2P5, 1.5 FT BELOW 2CV-5016	LOCKED CLOSED			
2SI-1049	Combined HPSI Header to RCP A Drain	M2232 E5 SH 1	USPP, PENET 2P5, 1.5 FT BELOW 2CV-5016	LC CAPPED			
2SI-5014A	Combined HPSI Header to RCP A 2FT-5014-1	M2232 E6 SH 1	USPP, PENET 2P27, 2.5 FT N OF 2CV-5038, 8 FT UP	OPEN			
2SI-5014B	Combined HPSI Header to RCP A 2FT-5014-1	M2232 E6 SH 1	USPP, PENET 2P27, 2.5 FT N OF 2CV-5038, 8 FT UP	OPEN			
2SI-5014C	Combined HPSI Header to RCP A 2FT-5014-1	M2232 E6 SH 1	USPP, PENET 2P27, 2 FT NORTH OF 2CV-5038, 8 FT UP	OPEN			
2SI-5014D	Combined HPSI Header to RCP A 2FT-5014-1	M2232 E6 SH 1	USPP, PENET 2P27, 2 FT NORTH OF 2CV-5038, 8 FT UP	OPEN			
2SI-1026A	Combined HPSI Header to RCP A Vent	M2232 E6 SH 1	USPP, PENET 2P5, 3 FT NORTH, 10 FT UP	LOCKED CLOSED			
2SI-1027A	Combined HPSI Header to RCP A Vent	M2232 E6 SH 1	USPP, PENET 2P5, 3 FT NORTH, 10 FT UP	LC CAPPED			
2SI-70	2CV-5055-1 Manual Throttle Valve	M2232 B4 SH 1	USPP, PENET 2P30, 1 FT S OF 2CV-5055-1, 1 FT UP	THROTTLED OPEN			Handwheel restraint welded to yoke
2SI-1022C	HPSI Header #1 Vent Before 2CV-5055-1	M2232 B4 SH 1	USPP, PENET 2P30, 1 FT S OF 2CV-5055, 3 FT UP	CLOSED			
2SI-1023C	HPSI Header #1 Vent Before 2CV-5055-1	M2232 B4 SH 1	USPP, PENET 2P30, 1 FT S OF 2CV-5055, 3 FT UP	CLOSED CAPPED			
2SI-71	2CV-5056-2 Manual Throttle Valve	M2232 A5 SH 1	USPP, PENET 2P30, S SIDE OF 2CV-5056-2, 1 FT UP	THROTTLED OPEN			Handwheel restraint welded to yoke
2SI-1024C	HPSI Header #2 Vent Before 2CV-5056-2	M2232 A5 SH 1	USPP, PENET 2P30, S SIDE OF 2CV-5056-2, 3 FT UP	CLOSED			
2SI-1025C	HPSI Header #2 Vent Before 2CV-5056-2	M2232 A5 SH 1	USPP, PENET 2P30, S SIDE OF 2CV-5056-2, 3 FT UP	CLOSED CAPPED			
2SI-1071	Combined HPSI Header to RCP C Drain	M2232 B5 SH 1	USPP, PENET 2P30, DIRECTLY BELOW 2CV-5056-2, AT FLOOR	LOCKED CLOSED			
2SI-1072	Combined HPSI Header to RCP C Drain	M2232 B5 SH 1	USPP, PENET 2P30, DIRECTLY BELOW 2CV-5056-2, AT FLOOR	LC CAPPED			

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
2SI-1026C	Combined HPSI Header to RCP C Vent	M2232 B5 SH 1	USPP, PENET 2P30, 1 FT NORTH OF 2CV-5056-2, 2.5 FT UP	LOCKED CLOSED			
2SI-1027C	Combined HPSI Header to RCP C Vent	M2232 C5 SH 1	USPP, PENET 2P30, 1 FT NORTH OF 2CV-5056-2, 3 FT UP	LC CAPPED			
2SI-5054A	Combined HPSI Header to RCP C 2FT-5054-2	M2232 B5 SH 1	USPP, PENET 2P30, 4 FT FROM WALL, 1 FT UP	OPEN			
2SI-5054B	Combined HPSI Header to RCP C 2FT-5054-2	M2232 B6 SH 1	USPP, PENET 2P30, 4 FT FROM WALL, 1 FT UP	OPEN			
2SI-5054C	Combined HPSI Header to RCP C 2FT-5054-2	M2232 A5 SH 1	USPP, PENET 2P30, 3 FT FROM WALL, 1 FT UP	OPEN			
2SI-5054D	Combined HPSI Header to RCP C 2FT-5054-2	M2232 A6 SH 1	USPP, PENET 2P30, 3 FT FROM WALL, 1 FT UP	OPEN			
2SI-72	2CV-5035-1 Manual Throttle Valve	M2232 H5 SH 1	USPP, PENET 2P11, NEAR 2CV-5035-1	THROTTLED OPEN			Handwheel restraint welded to yoke
2SI-1022B	HPSI Header #1 Vent Before 2CV-5035-1	M2232 H4 SH 1	USPP, PENET 2P30, 1 FT S OF 2CV-5035, 3 FT UP	CLOSED			
2SI-1023B	HPSI Header #1 Vent Before 2CV-5035-1	M2232 H4 SH 1	USPP PENET 2P30, 1 FT S OF 2CV-5035, 4 FT UP	CLOSED CAPPED			
2SI-1024B	HPSI Low Pressure Fill to SIT Drain Header	M2232 G5 SH 1	USPP, PENET 2P30 BETWEEN 2CV-5037 & 5036, 3.5 FT UP	LOCKED CLOSED			
2SI-1025B	HPSI Low Pressure Fill to SIT Drain Header	M2232 G5 SH 1	USPP, PENET 2P30 BETWEEN 2CV-5037 & 5036, 4 FT UP	LOCKED CLOSED			
2SI-73	2CV-5036-2 Manual Throttle Valve	M2232 G5 SH 1	USPP, PENET 2P11, NEAR 2CV-5036-2	THROTTLED OPEN			Handwheel restraint welded to yoke
2SI-1046	Combined HPSI Header to RCP B Drain	M2232 H5 SH 1	USPP, PENET 2P30 UNDER 2CV-5036, 1.5 FT UP	LC CAPPED			
2SI-1047	Combined HPSI Header to RCP B Drain	M2232 H5 SH 1	USPP, PENET 2P30 UNDER 2CV-5036, 2 FT UP	LOCKED CLOSED			
2SI-5034A	Combined HPSI Header to RCP B 2FT-5034-1	M2232 G5 SH 1	USPP, PENET 2P30, 2 FT N OF 2CV-5036, 8 FT UP	OPEN			
2SI-5034B	Combined HPSI Header to RCP B 2FT-5034-1	M2232 H5 SH 1	USPP, PENET 2P30, 2 FT N OF 2CV-5036, 8 FT UP	OPEN			

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
2SI-5034C	Combined HPSI Header to RCP B 2FT-5034-1	M2232 G6 SH 1	USPP, PENET 2P30, 2 FT N OF 2CV-5036, 8 FT UP	OPEN			
2SI-5034D	Combined HPSI Header to RCP B 2FT-5034-1	M2232 G6 SH 1	USPP, PENET 2P30, 2 FT N OF 2CV-5036, 8 FT UP	OPEN			
2SI-1026B	Combined HPSI Header to RCP B Vent	M2232 G5 SH 1	USPP, PENET 2P11, 5 FT OUT FROM 2P11, ABOVE 2CV-5101, 12 FT OFF FLOOR	LC CAPPED			
2SI-1027B	Combined HPSI Header to RCP B Vent	M2232 G5 SH 1	USPP, PENET 2P11, 5 FT OUT FROM 2P11, ABOVE 2CV-5101, 12 FT OFF FLOOR	LOCKED CLOSED			
2SI-1058A	HPSI Header #1 Th Injection Vent	M2232 E4 SH 1	USPP, PENET 2P12, 4 FT FROM 2P12, 14 FT UP	LOCKED CLOSED			
2SI-1059A	HPSI Header #1 Th Injection Vent	M2232 E4 SH 1	USPP, PENET 2P12, 4 FT FROM 2P12, 14 FT UP	LC CAPPED			
2SI-1022D	HPSI Header #1 Vent Before 2CV-5075-1	M2232 D4 SH 1	USPP, PENET 2P25, 2 FT SOUTH OF 2CV-5075, 4 FT UP	CLOSED			
2SI-1023D	HPSI Header #1 Vent Before 2CV-5075-1	M2232 D5 SH 1	USPP, PENET 2P25, 2 FT SOUTH OF 2CV-5075, 4 FT UP	CLOSED CAPPED			
2SI-74	2CV-5075-1 Manual Throttle Valve	M2232 D5 SH 1	USPP, PENET 2P25, NEAR 2CV-5075-1	THROTTLED OPEN			Handwheel restraint welded to yoke
2SI-1024D	HPSI Header #2 Vent Before 2CV-5076-2	M2232 C5 SH 1	USPP, PENET 2P25, 2 FT SOUTH OF 2CV-5076, 3 FT UP	CLOSED			
2SI-1025D	HPSI Header #2 Vent Before 2CV-5076-2	M2232 C5 SH 1	USPP, PENET 2P25, 2 FT SOUTH OF 2CV-5076, 3 FT UP	CLOSED CAPPED			
2SI-75	2CV-5076-2 Manual Throttle Valve	M2232 C5 SH 1	USPP, PENET 2P25, NEAR 2CV-5076-2	THROTTLED OPEN			Handwheel restraint welded to yoke
2SI-1050	Combined HPSI Header to RCP D Drain	M2232 C5 SH 1	USPP, PENET 2P36, 6 FT FROM 2P36, 1 FT UP	LOCKED CLOSED			
2SI-1051	Combined HPSI Header to RCP D Drain	M2232 C5 SH 1	USPP, PENET 2P36, 6 FT FROM 2P36, 1 FT UP	LC CAPPED			
2SI-1026D	Combined HPSI Header to RCP D Vent	M2232 D5 SH 1	USPP, PENET 2P25, 6 FT FROM 2P25, 6.5 FT UP	LOCKED CLOSED			
2SI-1027D	Combined HPSI Header to RCP D Vent	M2232 D6 SH 1	USPP, PENET 2P25, 6 FT FROM 2P25, 6 FT UP	LC CAPPED			

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ATTACHMENT A HPSI SYSTEM VALVE LINEUP							PAGE 12 OF 13
COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
2SI-5074A	Combined HPSI Header to RCP D 2FT-5074-2	M2232 C5 SH 1	USPP, PENET 2P25, 2 FT FROM 2P25, 6 FT UP	OPEN			
2SI-5074B	Combined HPSI Header to RCP D 2FT-5074-2	M2232 C5 SH 1	USPP, PENET 2P25, 2.5 FT FROM 2P25, 6 FT UP	OPEN			
2SI-5074C	Combined HPSI Header to RCP D 2FT-5074-2	M2232 D5 SH 1	USPP, PENET 2P25, 1 FT FROM 2P25, 6 FT UP	OPEN			
2SI-5074D	Combined HPSI Header to RCP D 2FT-5074-2	M2232 C5 SH 1	USPP, PENET 2P25, 1 FT FROM 2P25, 6 FT UP	OPEN			
2SI-1058B	HPSI Header #2 Th Injection Vent	M2232 B4 SH 1	USPP, PENET 2P13, 1.5 FT FROM 2P13, 2 FT FROM CEILING	LOCKED CLOSED			
2SI-1059B	HPSI Header #2 Th Injection Vent	M2232 B4 SH 1	USPP, PENET 2P13, 1.5 FT FROM 2P13, 1 FT FROM CEILING	LC CAPPED			
2SI-30	HPSI Header #1 to #2 Header Th Injection	M2232 C4 SH 1	USPP, PENET 2P13, NEXT TO 2CV-5613-2, 5.5 FT UP	LOCKED CLOSED			
2SI-31	HPSI Header #1 to #2 Header Th Injection	M2232 C4 SH 1	USPP, PENET 2P13, NEXT TO 2CV-5613-2, 4 FT UP	LOCKED CLOSED			
CNTMT BLDG BASEMENT - HPSI HEADER #1							
2SI-1060A	HPSI Header #1 Th Injection Drain	M2230 D4 SH 1	CONTAINMENT BLDG BASEMENT, NORTHWEST "D" RING WALL, 8 FT FROM FLOOR	CLOSED			
2SI-1061A	HPSI Header #1 Th Injection Drain	M2230 D4 SH 1	CONTAINMENT BLDG BASEMENT, NORTHWEST "D" RING WALL, 8 FT FROM FLOOR	CLOSED CAPPED			
2SI-29A	HPSI Header #1 Th Injection Isolation	M2230 D3 SH 1	CONTAINMENT BLDG BASEMENT, NORTHWEST "D" RING WALL, 20 FT FROM FLOOR	OPEN			
CNTMT BLDG BASEMENT - HPSI HEADER #2							
2SI-1060B	HPSI Header #2 Th Injection Drain	M2230 C4 SH 1	CONTAINMENT BLDG BASEMENT, NORTHWEST "D" RING WALL, 8 FT FROM FLOOR	CLOSED			
2SI-1061B	HPSI Header #2 Th Injection Drain	M2230 C4 SH 1	CONTAINMENT BLDG BASEMENT, NORTHWEST "D" RING WALL, 8 FT FROM FLOOR	CLOSED CAPPED			
2SI-29B	HPSI Header #2 Th Injection Isolation	M2230 C3 SH 1	CONTAINMENT BLDG BASEMENT, NORTHWEST "D" RING WALL, 20 FT FROM FLOOR	OPEN			

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
CNTMT BLDG SOUTH PIPING PENET AREA - HPSI HEADER #1							
2SI-5105B	HPSI Header #1 Th Injection 2PT-5105	M2232 E4 SH 1	CNTMT BLDG, SOUTH PIPING PENETRATION AREA, AT PENET 2P12, 1 FT E OF 2CV-5082, 8 FT UP	OPEN			
2SI-5105A	HPSI Header #1 Th Injection 2PT-5105	M2232 E4 SH 1	CNTMT BLDG, SOUTH PIPING PENETRATION AREA, AT PENET 2P12, 1 FT E OF 2CV-5082, 8 FT UP	OPEN			
CNTMT BLDG SOUTH PIPING PENET AREA - HPSI HEADER #2							
2SI-5106B	HPSI Header #2 Th Injection 2PT-5106	M2232 C4 SH 1	CNTMT BLDG, SOUTH PIPING PENETRATION AREA, 3 FT FROM PENET 2P13, 8 FT UP	OPEN			
2SI-5106A	HPSI Header #2 Th Injection 2PT-5106	M2232 C4 SH 1	CNTMT BLDG, SOUTH PIPING PENETRATION AREA, 3 FT FROM PENET 2P13, 8 FT UP	OPEN			

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ATTACHMENT B

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ALIGNING HPSI PUMP 2P-89C FOR RED TRAIN STANDBY

1.0 Verify the following Initial Conditions:

- 2P-89B handswitch (2HS-5079-2) out of PULL TO LOCK. _____
- 2P-89C handswitch on 2C17 (2HS-5080-1) in PULL TO LOCK. _____
- 2P-89C handswitch on 2C16 (2HS-5080-2) in PULL TO LOCK. _____
- SW ESF Header Isol (2CV-1400-1) open. _____
- 2VUC-11A SW Inlet (2CV-1407-1) open. _____

NOTE

Step 4.0 may be performed simultaneously with Steps 2.0 and 3.0.

2.0 Align Service Water and Safety Injection system valves for 2P-89C as follows:

2.1 Lock closed the following Safety Injection valves:

2.1.1 HPSI Discharge X-connect (2SI-11B) _____

2.1.2 HPSI Suction X-connect (2SI-9B) _____

2.2 Lock closed the following Service Water valves:

- 2E-53C Supply from Loop 2 (2SW-20A) _____
- 2E-53C Supply from Loop 2 (2SW-20B) _____
- 2E-53C Return to Loop 2 (2SW-21A) _____
- 2E-53C Return to Loop 2 (2SW-21B) _____

2.3 Lock closed HPSI 2P-89C Recirc to B Train Suction (2SI-67). _____

2.4 Lock open HPSI 2P-89C Recirc to A Train Suction (2SI-66). _____

2.5 Lock open the following Service Water valves:

- 2E-53C Supply from Loop 1 (2SW-18A) _____
- 2E-53C Supply from Loop 1 (2SW-18B) _____
- 2E-53C Return to Loop 1 (2SW-19A) _____
- 2E-53C Return to Loop 1 (2SW-19B) _____

2.6 Lock open the following Safety Injection valves:

2.6.1 HPSI Suction X-connect (2SI-9A) _____

2.6.2 HPSI Discharge X-connect (2SI-11A) _____

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3.0 Independently verify Service Water and Safety Injection system valves for 2P-89C as follows:

3.1 Independently verify the following valves locked closed:

- 2E-53C Supply from Loop 2 (2SW-20A) _____
- 2E-53C Supply from Loop 2 (2SW-20B) _____
- 2E-53C Return to Loop 2 (2SW-21A) _____
- 2E-53C Return to Loop 2 (2SW-21B) _____

- HPSI Discharge X-connect (2SI-11B) _____
- HPSI Suction X-connect (2SI-9B) _____
- HPSI 2P-89C Recirc to B Train Suction (2SI-67) _____

3.2 Independently verify the following valves Locked Open:

- HPSI 2P-89C Recirc to A Train Suction (2SI-66) _____
- 2E-53C Supply from Loop 1 (2SW-18A) _____
- 2E-53C Supply from Loop 1 (2SW-18B) _____
- 2E-53C Return to Loop 1 (2SW-19A) _____

- 2E-53C Return to Loop 1 (2SW-19B) _____
- HPSI Suction X-connect (2SI-9A) _____
- HPSI Discharge X-connect (2SI-11A) _____

4.0 Align 2P-89C Electrical System as follows:

- 4.1 Verify Electrical Safety requirements established using Electrical System Operations (2107.001), Exhibit 9, Electrical Safety Requirements. _____
- 4.2 Rack down 2P-89C breaker (2A-407) per Electrical System Operations (2107.001) to discharge springs. _____
- 4.3 Rack up 2A-407 per 2107.001 without letting springs charge. _____
- 4.4 Lock 2A-407 with Kirk key AND remove key. _____
- 4.5 Unlock 2P-89C breaker (2A-307) using Kirk key from 2A-407 AND allow springs to charge. _____
- 4.6 Check Control Room indications for Red Train 2P-89C available. _____
- 4.7 Move "Manual Valves Aligned" placard from 2A-407 to 2A-307. _____

5.0 Verify "Manual Valves Aligned to Red Train" status updated on Control Room status board. _____

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ATTACHMENT B

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6.0 Verify the following valves open:

- HPSI 2P-89C Recirc Isol (2CV-5127-1) _____
- ESF Mini-Recirc Header Isol (2CV-5628-2) _____
- RWT Recirc and Test Line Inlet to RWT (2BS-26) _____
- RWT 2T-3 Outlet (2CV-5630-1) _____

NOTE

2P-89C HPSI pump is operable if the oil level in the sight glass is between the high and low level marks. The sight glass is located on the opposite side of the bearing housing from the oiler.

7.0 Check 2P-89C pump AND motor oil levels. _____

8.0 IF Supplement 1, 2P-89A Quarterly Test will NOT immediately follow, THEN perform the following:

- 8.1 Remove 2P-89C handswitch (2HS-5080-1) out of PULL TO LOCK. _____
- 8.2 Verify 2P-89A handswitch (2HS-5078-1) in PULL TO LOCK. _____
- 8.3 Start 2P-89C. _____
- 8.4 Check discharge pressure developed (2PI-5108). _____
- 8.5 Verify 2P-89A Discharge Stop Check (2SI-10A) closed by checking 2P-89A NOT rotating. _____
- 8.6 Verify "C" ESF Room cooler (2VUC-11A) running (70 sec time delay). _____
- 8.7 Secure 2P-89C. _____
- 8.8 Verify 2VUC-11A secured. _____

9.0 IF desired to place 2P-89A in service, THEN verify the following:

- 9.1 2P-89A handswitch (2HS-5078-1) out of PULL TO LOCK. _____
- 9.2 2P-89C handswitch (2HS-5080-1) in PULL TO LOCK. _____

10.0 IF desired to place 2P-89C in service, THEN verify the following:

- 10.1 2P-89C handswitch (2HS-5080-1) out of PULL TO LOCK. _____
- 10.2 2P-89A handswitch (2HS-5078-1) in PULL TO LOCK. _____

Performed By _____ Date _____

Supervisor _____ Date _____

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ATTACHMENT C

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ALIGNING HPSI PUMP 2P-89C FOR GREEN TRAIN STANDBY

1.0 Verify the following initial conditions:

- 2P-89A handswitch (2HS-5078-1) out of PULL TO LOCK. _____
- 2P-89C handswitch on 2C17 (2HS-5080-1) in PULL TO LOCK. _____
- 2P-89C handswitch on 2C16 (2HS-5080-2) in PULL TO LOCK. _____
- SW ESF Header Isol (2CV-1406-2) open. _____
- 2VUC-11B SW Inlet (2CV-1408-2) open. _____

NOTE

Step 4.0 may be performed simultaneously with Steps 2.0 and 3.0.

2.0 Align Service Water and Safety Injection valves for 2P-89C as follows:

2.1 Lock closed the following Safety Injection valves:

2.1.1 HPSI Discharge X-connect (2SI-11A) _____

2.1.2 HPSI Suction X-connect (2SI-9A) _____

2.2 Lock closed the following Service Water valves:

- 2E-53C Supply from Loop 1 (2SW-18A) _____
- 2E-53C Supply from Loop 1 (2SW-18B) _____
- 2E-53C Return to Loop 1 (2SW-19A) _____
- 2E-53C Return to Loop 1 (2SW-19B) _____

2.3 Lock closed HPSI 2P-89C Recirc to A Train Suction (2SI-66). _____

2.4 Lock open HPSI 2P-89C Recirc to B Train Suction (2SI-67). _____

2.5 Lock open the following service water valves:

- 2E-53C Supply from Loop 2 (2SW-20A) _____
- 2E-53C Supply from Loop 2 (2SW-20B) _____
- 2E-53C Return to Loop 2 (2SW-21A) _____
- 2E-53C Return to Loop 2 (2SW-21B) _____

2.6 Lock open the following Safety Injection valves:

2.6.1 HPSI Suction X-connect (2SI-9B) _____

2.6.2 HPSI Discharge X-connect (2SI-11B) _____

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ATTACHMENT C

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3.0 Independently verify Service Water and Safety Injection system valves for 2P-89C as follows:

3.1 Independently verify the following valves locked closed:

- 2E-53C Supply from Loop 1 (2SW-18A) _____
- 2E-53C Supply from Loop 1 (2SW-18B) _____
- 2E-53C Return to Loop 1 (2SW-19A) _____
- 2E-53C Return to Loop 1 (2SW-19B) _____

- HPSI Suction X-connect (2SI-9A) _____
- HPSI Discharge X-connect (2SI-11A) _____
- HPSI 2P-89C Recirc to A Train Suction (2SI-66) _____

3.2 Independently verify the following valves locked open:

- 2E-53C Supply from Loop 2 (2SW-20A) _____
- 2E-53C Supply from Loop 2 (2SW-20B) _____
- 2E-53C Return to Loop 2 (2SW-21A) _____
- 2E-53C Return to Loop 2 (2SW-21B) _____

- HPSI Discharge X-connect (2SI-11B) _____
- HPSI Suction X-connect (2SI-9B) _____
- HPSI 2P-89C Recirc to B Train Suction (2SI-67) _____

4.0 Align 2P-89C Electrical System as follows:

- 4.1 Verify Electrical Safety requirements established using Electrical System Operations (2107.001), Exhibit 9, Electrical Safety Requirements. _____
- 4.2 Pull AND hold racking lever on 2A-307. _____
- 4.3 Verify 2A-307 closing springs discharged. _____
- 4.4 Lock 2A-307 with Kirk key AND remove key. _____
- 4.5 Unlock 2P-89C breaker (2A-407) using Kirk key from 2A-307 AND allow springs to charge. _____
- 4.6 Check Control Room indications for Green Train 2P-89C available. _____
- 4.7 Move "Manual Valve Aligned" placard from 2A-307 to 2A-407. _____

5.0 Verify "Manual Valves Aligned to Green Train" status updated on Control Room status board. _____

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ATTACHMENT C

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6.0 Verify the following valves open:

- HPSI 2P-89C Recirc Isol (2CV-5127-1) _____
- ESF Mini-Recirc Header Isol (2CV-5628-2) _____
- RWT Recirc and Test Line Inlet to RWT (2BS-26) _____
- RWT 2T-3 Outlet (2CV-5631-2) _____

NOTE

2P-89C HPSI pump is operable if the oil level in the sight glass is between the high and low level marks. The sight glass is located on the opposite side of the bearing housing from the oiler.

7.0 Check 2P-89C pump AND motor oil levels. _____

8.0 IF Supplement 2, 2P-89B Quarterly Test will NOT immediately follow, THEN perform the following:

- 8.1 Take 2P-89C handswitch (2HS-5080-2) out of PULL TO LOCK. _____
- 8.2 Verify 2P-89B handswitch (2HS-5079-2) in PULL TO LOCK. _____
- 8.3 Start 2P-89C. _____
- 8.4 Check discharge pressure developed (2PI-5109). _____
- 8.5 Verify 2P-89B Discharge Stop Check (2SI-10B) closed by checking 2P-89B NOT rotating. _____
- 8.6 Verify "C" ESF Room cooler (2VUC-11B) running (70 sec time delay). _____
- 8.7 Secure 2P-89C. _____
- 8.8 Verify 2VUC-11B secured. _____

9.0 IF desired to place 2P-89B in service, THEN verify the following:

- 9.1 2P-89B handswitch (2HS-5079-2) out of PULL TO LOCK. _____
- 9.2 2P-89C handswitch (2HS-5080-2) in PULL TO LOCK. _____

10.0 IF desired to place 2P-89C in service, THEN verify the following:

- 10.1 2P-89C handswitch (2HS-5080-2) out of PULL TO LOCK. _____
- 10.2 2P-89B handswitch (2HS-5079-2) in PULL TO LOCK. _____

Performed By _____ Date _____

Supervisor _____ Date _____

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ATTACHMENT D

PAGE 1 OF 1

VENTING HPSI HEADER UPSTREAM OF 2CV-5016-2

1.0 INITIAL CONDITIONS

- Conduct brief using Crew Brief Checklist, 1015.001A.
- Verify RP briefed on this evolution.

2.0 INSTRUCTIONS

2.1 Establish communication between Control Room and the Upper South Piping Penetration Room(USPPR).

* 2.2 IF EITHER of the following occur:

- Communication lost between USPPR and Control Room
- SIAS

THEN perform the following:

2.2.1 Close any open vent valves.

2.2.2 Verify vent rig removed.

2.2.3 Install any pipe caps that are removed.

2.3 Remove pipe cap AND install vent rig (Chicago fitting and hose) on the down stream side of HPSI Header #2 Vent valve before 2CV-5016-2 (2SI-1025A).

2.4 Commence venting by slowly throttling open the following HPSI Header #2 Vent valves:

- Vent Before 2CV-5016-2 (2SI-1024A)
- Vent Before 2CV-5016-2 (2SI-1025A)

2.5 WHEN all gas has been vented from header (no gas and water is clear),
THEN close the following valves:

- 2SI-1024A
- 2SI-1025A

3.0 RESTORATION

3.1 Remove vent rig AND install cap on down stream side of 2SI-1025A.

Performed by: _____ Date _____

Supervisor: _____ Date _____

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ATTACHMENT E

PAGE 1 OF 2

VENTING HPSI HEADER DOWNSTREAM OF 2CV-5016-2

1.0 INITIAL CONDITIONS

- Conduct brief using Crew Brief Checklist, 1015.001A.
- Verify RP briefed on this evolution.

2.0 INSTRUCTIONS

2.1 Establish communication between Control Room and the Upper South Piping Penetration Room(USPPR).

2.2 Verify Containment penetration administrative controls established per 1015.001, Conduct of Operations, for the following valves:

- 2SI-1026A
- 2SI-1027A

* 2.3 IF EITHER of the following occur:

- Communication lost between USPPR and Control Room
- SIAS

THEN perform the following:

2.3.1 Close any open vent valves.

2.3.2 Verify vent rig removed.

2.3.3 Install any pipe caps that are removed.

2.4 Remove pipe cap AND install vent rig (Chicago fitting and hose) on the down stream side of HPSI Header #2 Vent valve after 2CV-5016-2 (2SI-1027A).

2.5 Commence venting by unlocking AND slowly throttling open the following HPSI Header #2 Vent valves:

- Vent After 2CV-5016-2 (2SI-1026A)
- Vent After 2CV-5016-2 (2SI-1027A)

2.6 WHEN piping is depressurized,
THEN slowly open HPSI injection MOV 2CV-5016-2 fully to purge RWT liquid through this line.

2.7 WHEN all gas has been vented from header (no gas and water is clear),
THEN perform the following:

2.7.1 Close 2CV-5016-2.

2.7.2 Close AND lock the following valves:

- 2SI-1026A
- 2SI-1027A

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ATTACHMENT E

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3.0 RESTORATION

3.1 Remove vent rig AND install cap on down stream side of 2SI-1027A. _____

3.2 Independently verify the following:

- The following valves closed AND locked:
 - 2SI-1026A _____
 - 2SI-1027A _____
- Cap installed on down stream side of 2SI-1027A _____

Performed by: _____ Date _____

Supervisor: _____ Date _____

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ATTACHMENT F

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OPERATION OF HPSI PRESSURIZATION SYSTEM (HPS)

The HPSI Pressurization System (HPS) was installed by Temporary Alteration 04-02-002 as a method of maintaining the Green HPSI train pressurized to slightly above Safety Injection Tank (SIT) pressure to minimize SIT and RCS back leakage into this ECCS train. This system is tied into the Green HPSI train because it has a known leakage path through 2SI-15A, 2SI-13A, 2CV-5016-2 and 2SI-10B to the RWT. RCS and SIT back leakage into the ECCS creates a problem due to the gas intrusion and piping voiding concerns associated with this leakage. Gas intrusion and piping voiding can occur when high pressure, gas entrained fluid is allowed to depressurize, thereby allowing a portion of the entrained gas to come out of solution. Refer to CR-ANO-2-2004-0065 and SOER 97-01 for additional information on this issue.

The HPS pump has a variable output capacity depending on its discharge pressure and its air supply pressure. At ~ 90 psig IA supply pressure to the HPS pump, it will produce ~ 2.5 gpm output at ~ 650 psig discharge pressure. The HPS pump is expected to remain in operation even when operating a Green train HPSI Pump. The HPS pump can only develop a maximum discharge pressure of ~ 10 times its air supply. At this point its discharge check valves (2HPS-08 and 2HPS-09) will close.

This pump will normally stay in operation maintaining the Green HPSI header pressure in a band that minimizes SIT and RCS back leakage. This pressure band will be established during the initial testing of this system and a PMS alarm should normally be set to annunciate if outside the pressure band.

1.0 Verify the following initial conditions:

- RWT Level \geq 95%.
- Temporary Alteration 04-02-002 installed.
- HPSI Pressurization System filled and vented.
- HPSI Pressurization System Valve Closure Test (Supplement 10) has been performed within 90 days (refer to PMRQ # 00010151 in Passport).
- HPSI Pressurization System valves aligned as indicated below:

Component Number	Component Description	Additional Component Information	Required Position	√
2HPS-01	RWT Outlet Sample	2T-21 Tank Room, SW corner of room	Closed	
2HPS-02	HPS Pump Suction Drain	2T-21 Tank Room, West side	Closed	
2HPS-03	HPS Pump Discharge Pressure Gage Isolation	2T-21 Tank Room, West side	Open	
2HPS-04	HPS Pump Discharge Drain	2T-21 Tank Room, West side	Closed	
2HPS-05	HPS Pump Discharge Isolation	2T-21 Tank Room, West side	Open	
2HPS-06	HPS Discharge Header Vent	2T-21 Tank Room, North side	Closed	
2HPS-07	HPS Discharge Header Drain	2T-21 Tank Room, West side	Closed	
2HPS-10	Air Supply Drain	2T-21 Tank Room, NW side	Closed	
2HPS-11	HPS Pump Air Supply Isolation	2T-21 Tank Room, West side	Open	
2HPS-12	2HPS-09 Check Bypass	LSPP Room	Closed	
2HPS-14	HPS Check Valve Drain	LSPP Room	Closed	

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- IF ER-ANO-2000-3275-**010** installed (modification to add suction filters),
THEN HPSI Pressurization System valves aligned as indicated below:

Component Number	Component Description	Additional Component Information	Required Position	√
2HPS-15	2HPS-F-2A Inlet Isol	2T-21 Tank Room, West side	Open (1)	
2HPS-16	2HPS-F-2A Outlet Isol	2T-21 Tank Room, West side	Open (1)	
2HPS-17	2HPS-F-2B Inlet Isol	2T-21 Tank Room, West side	Closed (2)	
2HPS-18	2HPS-F-2B Outlet Isol	2T-21 Tank Room, West side	Closed (2)	
2HPS-19	HPS Pump Suction Press gage Isol	2T-21 Tank Room, West side	Closed	
2HPS-20	HPS Pump Suction Drain Isol	2T-21 Tank Room, West side	Closed	
2HPS-21	HPS Pump Suction Isol	2T-21 Tank Room, West side	Open	

(1) May be closed if 2HPS-F-2B in service.

(2) May be open if 2HPS-F-2B in service.

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2.0 IF desired to place the HPSI Pressurization System in service,
THEN perform the following:

- 2.1 Align the HPS pump (2HPS-P-1) suction from RWT by verifying the following valves open:
 - RWT Outlet Local Sample (2BS-13)
 - RWT Outlet Local Sample (2BS-14)
- 2.2 Align the HPS pump (2HPS-P-1) discharge to HPSI Header #2 by verifying the following valves open:
 - HPSI Header #2 Drain (2SI-1056B)
 - HPSI Header #2 Drain (2SI-1057B)

NOTE

If the HPS Pump Air Regulator was previously set, the HPS Pump will begin pumping when its air supply is aligned.

- 2.3 Align air to HPS pump (2HPS-P-1) by slowly opening Drain Downstream of 2IA-5092 (2IA-1461).
- * 2.4 While monitoring pressure on ANY of the following:
 - HPS Pump Discharge Pressure Gage (2HPS-PI-1)
 - HPSI Header #2 Pressure on 2C16 (2PI-5109)
 - HPSI Header #2 Pressure on PMS/PDS (P5109)

Adjust HPS Pump Air Regulator (2HPS-PCV-1) as necessary to pressurize the Green HPSI train to slightly above SIT pressure.

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- 3.0 IF desired to secure the HPSI Pressurization System,
THEN perform the following:

NOTE

The air pressure down stream of 2IA-1461 will gradually bleed out by design after the HPS pump is secured.

- 3.1 Secure the HPS pump by closing Drain Downstream of 2IA-5092 (2IA-1461).
- 3.2 Isolate the HPS discharge from HPSI Header #2 by closing the following valves:
 - HPSI Header #2 Drain (2SI-1056B)
 - HPSI Header #2 Drain (2SI-1057B)
- 3.3 Isolate the HPS suction from the RWT by closing the following valves:
 - RWT Outlet Local Sample (2BS-13)
 - RWT Outlet Local Sample (2BS-14)
- 3.4 IF back leakage exists from the RCS OR SITs into HPSI Header #2,
AND SIT Outlet valves open,
AND HPSI Header #2 NOT pressurized to prevent leakage,
THEN establish a system venting requirement as follows:

NOTE

The venting frequency and location may be modified based on an engineering review of the present back leakage and the location of the resulting gas formation location.

- Enter the 24 hour venting requirement in the station log.
- Enter the 24 hour venting requirement (per Attachment D or Attachment E of this procedure) on the Shift relief sheet with time and date due.
- Verify a condition report exists for this condition.

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ATTACHMENT F

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4.0 IF BOTH of the following are TRUE:

- 2HPS-F-2A filter AND HPS in service
- Desired to determine differential pressure across 2HPS-F-2A

THEN perform the following:

4.1 Secure the HPS pump by closing Drain Downstream of 2IA-5092 (2IA-1461).

4.2 Close HPS Pump Suction Isol (2HPS-21).

4.3 Verify the following valves open:

- 2HPS-F-2A Inlet Isol (2HPS-15)
- 2HPS-F-2A Outlet Isol (2HPS-16)

4.4 Verify the following valves closed:

- 2HPS-F-2B Inlet Isol (2HPS-17)
- 2HPS-F-2B Outlet Isol (2HPS-18)

4.5 Open HPS Pump Suction Press gage 2HPS-PI-3 Isol (2HPS-19).

- Record suction pressure head _____ (P1)

4.6 Open HPS Pump Suction Drain Isol (2HPS-20) - Water will flow to floor drain.

- Record pressure _____ (P2)

4.7 Close 2HPS-20.

4.8 Close 2HPS-19.

4.9 Open 2HPS-21.

4.10 Calculate 2HPS-F-2A differential pressure P3:

$$\begin{array}{rclcl} \text{P1 (psig)} & - & \text{P2 (psig)} & = & \text{P3 (psid)} \\ \text{_____} & - & \text{_____} & = & \text{_____ psid} \end{array}$$

4.11 IF 2HPS-F-2A differential pressure (P3) \geq 20 psid
AND desired to continue HPS operation,
THEN GO TO step 6.0 of this attachment to align 2HPS-F-2B.

4.12 IF 2HPS-F-2A differential pressure (P3) $<$ 20 psid
AND desired to continue HPS operation,
THEN align air to HPS pump (2HPS-P-1) by slowly opening 2IA-1461.

4.13 IF 2HPS-F-2A differential pressure (P3) \geq 20 psid
AND desired to secure HPS operation,
THEN GO TO step 3.0 of this attachment.

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5.0 IF BOTH of the following are TRUE:

- 2HPS-F-2B filter AND HPS in service
- Desired to determine differential pressure across 2HPS-F-2B

THEN perform the following:

5.1 Secure the HPS pump by closing Drain Downstream of 2IA-5092 (2IA-1461).

5.2 Close HPS Pump Suction Isol (2HPS-21).

5.3 Verify the following valves open:

- 2HPS-F-2B Inlet Isol (2HPS-17)
- 2HPS-F-2B Outlet Isol (2HPS-18)

5.4 Verify the following valves closed:

- 2HPS-F-2A Inlet Isol (2HPS-15)
- 2HPS-F-2A Outlet Isol (2HPS-16)

5.5 Open HPS Pump Suction Press gage 2HPS-PI-3 Isol (2HPS-19).

- Record suction pressure head _____ (P1)

5.6 Open HPS Pump Suction Drain Isol (2HPS-20) - Water will flow to floor drain.

- Record pressure _____ (P2)

5.7 Close 2HPS-20.

5.8 Close 2HPS-19

5.9 Open 2HPS-21.

5.10 Calculate 2HPS-F-2B differential pressure P3:

$$\begin{array}{rclcl} \text{P1 (psig)} & - & \text{P2 (psig)} & = & \text{P3 (psid)} \\ \text{_____} & - & \text{_____} & = & \text{_____ psid} \end{array}$$

5.11 IF 2HPS-F-2B differential pressure (P3) \geq 20 psid
AND desired to continue HPS operation,
THEN GO TO step 7.0 of this attachment to align 2HPS-F-2A.

5.12 IF 2HPS-F-2B differential pressure (P3) $<$ 20 psid
AND desired to continue HPS operation,
THEN align air to HPS pump (2HPS-P-1) by slowly opening 2IA-1461.

5.13 IF 2HPS-F-2B differential pressure (P3) \geq 20 psid
AND desired to secure HPS operation,
THEN GO TO step 3.0 of this attachment.

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ATTACHMENT F

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6.0 IF BOTH of the following are TRUE:

- 2HPS-F-2A filter AND HPS in service.
- Desired to align for HPS operation with 2HPS-F-2B in service

THEN perform the following:

6.1 Secure the HPS pump by closing Drain Downstream of 2IA-5092 (2IA-1461).

6.2 Verify the following valves open:

- 2HPS-F-2B Inlet Isol (2HPS-17)
- 2HPS-F-2B Outlet Isol (2HPS-18)

6.3 Verify the following valves closed:

- 2HPS-F-2A Inlet Isol (2HPS-15)
- 2HPS-F-2A Outlet Isol (2HPS-16)

6.4 Align air to HPS pump (2HPS-P-1) by slowly opening 2IA-1461.

7.0 IF BOTH of the following are TRUE:

- 2HPS-F-2B filter AND HPS in service.
- Desired to align for HPS operation with 2HPS-F-2A in service

THEN perform the following:

7.1 Secure the HPS pump by closing Drain Downstream of 2IA-5092 (2IA-1461).

7.2 Verify the following valves open:

- 2HPS-F-2A Inlet Isol (2HPS-15)
- 2HPS-F-2A Outlet Isol (2HPS-16)

7.3 Verify the following valves closed:

- 2HPS-F-2B Inlet Isol (2HPS-17)
- 2HPS-F-2B Outlet Isol (2HPS-18)

7.4 Align air to HPS pump (2HPS-P-1) by slowly opening 2IA-1461.

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SUPPLEMENT 1

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2P-89A QUARTERLY TEST

This test demonstrates operability of HPSI System components associated with HPSI pump (2P-89A) per IST Program and Tech Spec Surveillance Requirement 4.5.2.f.1.

1.0 INITIAL CONDITIONS

- 2P-89A aligned per Section 8.0 of this procedure. _____
- RWT Boron concentration between 2500 and 3000 ppm. _____
- IF plant in Mode 1, 2, 3, OR 4,
THEN RWT level between 91.7% and 100%. _____
- IF plant in Mode 5 OR 6,
THEN RWT level > 7.5%. _____
- Recirc line to RWT NOT being used for any other evolution. _____
- Predictive Maintenance or SE available to take vibration readings. _____
- IF 2P-89B AND 2P-89C operable,
THEN 2P-89C aligned to Red Train per Attachment B of this procedure. _____
- IF anytime during performance of this Supplement temporary test gauge needed in place of permanently installed gauge,
THEN verify the following:
 - Test gauge calibration date current.
 - Accuracy of test gauge within $\pm 1\%$ of full scale.
 - Range of test gauge less than three times normal process value.
 - Test gauge number recorded in TEST INST column of Section 3.0.
 - Operator remains in area while gage aligned for use.

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SUPPLEMENT 1

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2.0 TEST METHOD

NOTE

Steps 2.1 through 2.5 may be performed in any order.

2.1 Verify the following valves open:

- HPSI 2P-89A Recirc Isol (2CV-5126-1) _____
- ESF Mini-Recirc Header Isol (2CV-5628-2) _____
- RWT Recirc and Test Line Inlet to RWT (2BS-26) _____
- RWT Outlet (2CV-5630-1) _____
- SW ESF Header Isol (2CV-1400-1) _____

2.2 Verify SDC Hx Room Coolers secured AND in NORMAL AFTER STOP:

- 2VUC-1A _____
- 2VUC-1B _____

NOTE

- 2P-89A is operable if oil level visible in Oiler Glass bubbler.
- 2P-89C is operable if the oil level in the sight glass is between the high and low level marks. The sight glass is located on the opposite side of the bearing housing from the oiler.

2.3 Check 2P-89C pump AND motor oil levels. _____

2.4 Check 2P-89A pump AND motor oil levels. _____

2.5 Align suction pressure gauge (2PI-5090) by opening the following valves:

- 2SI-5090A _____
- 2SI-5090B _____

2.6 Start 2P-89A. _____

2.7 Check the following fans auto start:

- SDC Hx Room cooler (2VUC-1A) _____
- SDC Hx Room cooler (2VUC-1B) _____

2.8 IF 2P-89C aligned to A ESF train,
THEN check 2P-89C Discharge Stop Check (2SI-10C) closed by
2P-89C NOT rotating AND document in Table 2. _____

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SUPPLEMENT 1

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- 2.9 Align discharge pressure gage (2PI-5091) by opening the following valves:
- 2SI-1042A _____
 - 2SI-1043A _____
- 2.10 Open EITHER of the following to bleed off pressure trapped between discharge check valve and injection MOVs: _____
- HPSI Hdr 1 to 2P-32A Loop valve (2CV-5015-1)
 - HPSI Hdr 1 to 2P-32B Loop valve (2CV-5035-1)
- 2.11 Close valve opened (2CV-5015-1 or 2CV-5035-1). _____
- 2.12 IF SIT Outlet valves open
AND 2PIS-5000/P5000 OR 2PIS-5020/P5020 > 750 psig, (2K07-A6)
AND relieving pressure to SIT desired
(MOST preferred method - does NOT cause SIT leakage),
THEN perform the following:
- * 2.12.1 Monitor SIT pressures.
- 2.12.2 Open affected SIT Check Valve Bypass:
- 2SV-5004 for A SIT _____
 - 2SV-5024 for B SIT _____
- 2.12.3 Cycle affected SIT Drain open and closed as necessary to relieve trapped pressure:
- 2SV-5001-1 for A SIT _____
 - 2SV-5021-1 for B SIT _____
- 2.12.4 Verify 2PIS-5000 and 2PIS-5020 at SIT pressure. _____
- 2.12.5 Close SIT Check Valve Bypass opened in previous step: _____
- 2SV-5004 for A SIT
 - 2SV-5024 for B SIT

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SUPPLEMENT 1

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CAUTION

Opening 2CV-5081 and any SIT drain will rapidly lower SIT level and pressure.

- 2.13 IF SIT Outlet valves open
 AND 2PIS-5000/P5000 OR 2PIS-5020/P5020 > 750 psig, (2K07-A6)
 AND relieving pressure to SIT Drain Header desired
 (LEAST preferred method - causes SIT leakage during header
 repressurization),
 THEN perform the following:
- * 2.13.1 Monitor SIT pressures.
- 2.13.2 Cycle SIT Drain to RDT (2CV-5081) open and closed. _____
- 2.13.3 Cycle affected SIT Drain open and closed: _____
- 2SV-5001-1 for A SIT
- 2SV-5021-1 for B SIT
- 2.13.4 Verify 2PIS-5000 and 2PIS-5020 at SIT pressure. _____
- 2.14 WHEN at least two minutes of stable pump operation complete, _____
 THEN record pump data in Table 1.
- 2.15 Inspect pump seals, valve packing, and flange gaskets in _____
 HPSI pump room for atmospheric leakage. Record any
 discrepancies in Comments section.
- 2.16 IF mechanical seal leakage greater than 17 DPM, _____
 THEN initiate Condition Report.
- 2.17 WHEN data collection and inspection complete, _____
 THEN stop 2P-89A.
- {4.3.2} 2.18 **Isolate gauges by closing the following valves:**
 (outboard then inboard - will not over range gage due to
 piston affect - ER010827E201)
- 2.18.1 2SI-5090B _____
- 2.18.2 2SI-5090A _____
- 2.18.3 2SI-1043A _____
- 2.18.4 2SI-1042A _____

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SUPPLEMENT 1

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- 2.19 IF in Mode 1, 2, 3, OR 4 with 2P-89C aligned to A ESF train
AND 2P-89C operable,
THEN perform the following:
- 2.19.1 Place 2P-89C in NORMAL AFTER STOP. _____
- 2.19.2 Place 2P-89A in PULL TO LOCK. _____
- 2.19.3 Verify the following valves open:
- HPSI 2P-89C Recirc Isol (2CV-5127-1) _____
 - 2VUC-11A SW Inlet (2CV-1407-1) _____
- 2.19.4 Start 2P-89C and verify proper discharge pressure (2PI-5108). _____
- 2.19.5 Check 2P-89A Discharge Stop Check (2SI-10A) closed by 2P-89A NOT rotating AND document in Table 2. _____
- 2.19.6 Secure 2P-89C. _____
- 2.19.7 IF desired to place 2P-89A in service,
THEN perform the following:
- A. Place 2P-89A in NORMAL AFTER STOP. _____
- B. Place 2P-89C in PULL TO LOCK. _____
- 2.20 IF in Mode 5 OR 6 with 2P-89C aligned to A ESF train
AND 2P-89C operable,
THEN perform the following:
- 2.20.1 Place 2P-89A in PULL TO LOCK. _____
- 2.20.2 Place 2P-89C in NORMAL AFTER STOP. _____
- 2.20.3 Verify the following valves open:
- HPSI 2P-89C Recirc Isol (2CV-5127-1) _____
 - 2VUC-11A SW Inlet (2CV-1407-1) _____
- 2.20.4 Start 2P-89C and verify proper discharge pressure (2PI-5108). _____
- 2.20.5 Check 2P-89A Discharge Stop Check (2SI-10A) closed by 2P-89A NOT rotating AND document in Table 2. _____
- 2.20.6 Secure 2P-89C. _____

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SUPPLEMENT 1

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2.20.7 IF desired to place 2P-89A in service,
THEN perform the following:

A. Verify at least two HPSI pumps in PULL TO LOCK. _____

B. Place 2P-89A in NORMAL AFTER STOP. _____

2.21 Stop the following fans as desired:

- 2VUC-1A _____
- 2VUC-1B _____
- 2VUC-11A _____
- 2VUC-11B _____

2.22 IF 2PI-5091 AND 2PI-5108 differ by > 30 psig,
THEN submit WR/WO to have instruments calibrated. _____

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SUPPLEMENT 1

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3.0 ACCEPTANCE CRITERIA

3.1 Record values observed during 2P-89A operation below AND compare with limiting range of values for operability.

TABLE 1					
TEST QUANTITY	INSTRUMENT (INCLUDE TEST INST)	MEASURED VALUE	ACCEPTABLE NORMAL RANGE	LIMITING RANGE FOR OPERABILITY	IS DATA IN LIMITING RANGE?
Running Suct. Pressure	2PI-5090 (local)	psig	≥ 8 psig	≥ 8 psig	YES NO
Discharge Pressure	2PI-5091 (local)	psig	N/A	N/A	N/A
	2PI-5108 (2C17)	psig	N/A	N/A	N/A
RWT Temperature	2TIS-5675 (2C17)	°F	40 to 110°F	N/A	N/A
Pump ΔP {4.3.1}	2PI-5091 - 2PI-5090	psid	N/A	(1) to 1593.2 psid	YES NO
Motor Running Amps (CR-1-96-0272-07)	Ammeter at 2A-306	ØA _____ Amps ØB _____ Amps ØC _____ Amps	N/A	N/A	N/A
Inboard Brg Radial #1 Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Inboard Brg Radial #2 Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Inboard Brg Axial Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Outboard Brg Radial #1 Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Outboard Brg Radial #2 Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Outboard Brg Axial Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO

Vibration Instrument Cal Due Date _____

Vibration Data Collected By _____

Note 1: For RWT temperature (T), minimum acceptable pump ΔP is:

$$1372.9 + 20.41 \text{ (Instrument error)} - [(T-40)/4] \text{ psid}$$

$$\text{Minimum } \Delta P = 1393.31 - [(\text{_____} - 40)/4] = \text{_____} \text{ psid}$$

3.2 Independently verify pump ΔP calculation. _____

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SUPPLEMENT 1

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3.3 Document observation of check valve stroke in Table 2.

TABLE 2			
CHECK VALVE	TEST DIRECTION	TEST CRITERIA	IS PROPER VALVE STROKE INDICATED?
2SI-10C	Closed	2P-89C NOT rotating	YES NO N/A
2SI-10A	Closed	2P-89A NOT rotating	YES NO N/A

3.4 IF NO circled in Table 1 or 2,
THEN perform the following:

- Declare affected component inoperable.
- Refer to Tech Spec 3.5.2 or 3.5.3.
- Notify Shift Manager.
- Initiate WR/WO as applicable.

NOTE

If HPSI pump 2P-89B OR 2P-89C inoperable, then 2SI-10C/2SI-10A testing may be deferred until inoperable HPSI pump restored to operable as per IST Coordinator.

3.5 IF 2SI-10C AND/OR 2SI-10A NOT tested (N/A circled in Table 2),
THEN perform the following:

- Initiate notification to perform test during current quarter OR as directed by IST Coordinator.
- Annotate on status board.
- Annotate in Work Exceptions section of WR/WO.

3.6 Pump Data recorded in database AND reviewed by SRO.

3.7 IF this surveillance performed as PMT,
THEN complete Unit 2 IST Data Collection (1015.0160).

Comments _____

Performed By _____ Date _____

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SUPPLEMENT 1

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4.0 SUPERVISOR REVIEW AND ANALYSIS

- 4.1 Do all measured values recorded in ACCEPTANCE CRITERIA fall within specified LIMITING RANGE FOR OPERABILITY? YES NO
- 4.2 Do all measured values recorded in ACCEPTANCE CRITERIA fall within ACCEPTABLE NORMAL RANGE? (N/A if all results outside normal range also outside limiting range.) YES NO N/A
- 4.3 IF NO answered to 4.1,
THEN perform the following corrective actions:
- Verify LCO Tracking Record initiated per Conduct of Operations (1015.001). _____
 - Verify Condition Report initiated. _____
- 4.4 IF NO circled in 4.2,
THEN perform the following corrective actions:
- Verify WR/WO has been initiated. _____
 - Complete Surveillance Test Schedule Change Request (1000.009D) to double test frequency. _____

Comments _____

- 4.5 Are all administrative requirements of this test satisfied? YES NO

Supervisor _____ Date _____

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SUPPLEMENT 2

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2P-89B QUARTERLY TEST

This test demonstrates operability of HPSI System components associated with HPSI pump (2P-89B) per IST Program AND Tech Spec Surveillance Requirement 4.5.2.f.1.

1.0 INITIAL CONDITIONS

- 2P-89B aligned per Section 8.0 of this procedure. _____
- RWT Boron concentration between 2500 and 3000 ppm. _____
- IF plant in Mode 1, 2, 3 OR 4,
THEN RWT level between 91.7% and 100%. _____
- IF plant in Mode 5 OR 6,
THEN RWT level > 7.5%. _____
- Recirc line to RWT NOT being used for any other evolution. _____
- Predictive Maintenance OR SE available to take vibration readings. _____
- IF 2P-89A AND 2P-89C operable,
THEN 2P-89C aligned to Green Train per Attachment C of
this procedure. _____
- IF anytime during performance of this Supplement temporary
test gauge needed in place of permanently installed gauge,
THEN verify the following:
 - Test gauge calibration date current.
 - Accuracy of test gauge within $\pm 1\%$ of full scale.
 - Range of test gauge less than three times normal process value.
 - Test gauge number recorded in TEST INST column of Section 3.0.
 - Operator remains in area while gage aligned for use.

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SUPPLEMENT 2

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2.0 TEST METHOD

NOTE

Steps 2.1 through 2.5 may be performed in any order.

2.1 Verify the following valves open:

- HPSI 2P-89B Recirc Isol (2CV-5128-1) _____
- ESF Mini-Recirc Header Isol (2CV-5628-2) _____
- RWT Recirc and Test Line Inlet to RWT (2BS-26) _____
- RWT 2T-3 Outlet (2CV-5631-2) _____
- SW ESF Header Isol (2CV-1406-2) _____

2.2 Verify SDC Hx Room Coolers secured AND in NORMAL AFTER STOP:

- 2VUC-1D _____
- 2VUC-1E _____

NOTE

- 2P-89B is operable if oil level visible in Oiler Glass bubbler.
- 2P-89C is operable if the oil level in the sight glass is between the high and low level marks. The sight glass is located on the opposite side of the bearing housing from the oiler.

2.3 Check 2P-89C pump AND motor oil levels. _____

2.4 Check 2P-89B pump AND motor oil levels. _____

2.5 Align suction pressure gauge (2PI-5100) by opening the following valves:

- 2SI-5100A _____
- 2SI-5100B _____

2.6 Start 2P-89B. _____

2.7 Check the following fans auto start:

- SDC Hx Room cooler (2VUC-1D) _____
- SDC Hx Room cooler (2VUC-1E) _____

2.8 IF 2P-89C aligned to B ESF train,
THEN check 2P-89C Discharge Stop Check (2SI-10C) closed by
2P-89C NOT rotating AND document in Table 2. _____

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SUPPLEMENT 2

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- 2.9 Align discharge pressure gage (2PI-5101) by opening the following valves:
- 2SI-1042B _____
 - 2SI-1043B _____
- 2.10 Open EITHER of the following to bleed off pressure trapped between discharge check valve and injection MOVs: _____
- HPSI Hdr 2 to 2P-32A Loop valve (2CV-5016-2)
 - HPSI Hdr 2 to 2P-32B Loop valve (2CV-5036-2)
- 2.11 Close valve opened (2CV-5016-2 or 2CV-5036-2). _____
- 2.12 IF SIT Outlet valves open
AND 2PIS-5000/P5000 OR 2PIS-5020/P5020 > 750 psig, (2K07-A6)
AND relieving pressure to SIT desired
(MOST preferred method - does NOT cause SIT leakage),
THEN perform the following:
- * 2.12.1 Monitor SIT pressures.
- 2.12.2 Open affected SIT Check Valve Bypass: _____
- 2SV-5004 for A SIT
 - 2SV-5024 for B SIT
- 2.12.3 Cycle affected SIT Drain open and closed as necessary to relieve trapped pressure: _____
- 2SV-5001-1 for A SIT
 - 2SV-5021-1 for B SIT
- 2.12.4 Verify 2PIS-5000 and 2PIS-5020 at SIT pressure. _____
- 2.12.5 Close SIT Check Valve Bypass opened in previous step: _____
- 2SV-5004 for A SIT
 - 2SV-5024 for B SIT

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SUPPLEMENT 2

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CAUTION

Opening 2CV-5081 and any SIT drain will rapidly lower SIT level and pressure.

- 2.13 IF SIT Outlet valves open
 AND 2PIS-5000/P5000 OR 2PIS-5020/P5020 > 750 psig, (2K07-A6)
 AND relieving pressure to SIT Drain Header desired
 (LEAST preferred method - causes SIT leakage during header
 repressurization),
 THEN perform the following:
- * 2.13.1 Monitor SIT pressures.
- 2.13.2 Cycle SIT Drain to RDT (2CV-5081) open and closed. _____
- 2.13.3 Cycle affected SIT Drain open and closed: _____
- 2SV-5001-1 for A SIT
- 2SV-5021-1 for B SIT
- 2.13.4 Verify 2PIS-5000 and 2PIS-5020 at SIT pressure. _____
- 2.14 WHEN at least two minutes of stable pump operation complete, _____
 THEN record pump data in Table 1.
- 2.15 Inspect pump seals, valve packing, and flange gaskets in _____
 HPSI pump room for atmospheric leakage. Record any
 discrepancies in Comments section.
- 2.16 IF mechanical seal leakage greater than 17 DPM, _____
 THEN initiate Condition Report.
- 2.17 WHEN data collection and inspection complete, _____
 THEN stop 2P-89B.
- {4.3.2} 2.18 **Isolate gauges by closing the following valves:**
 (outboard then inboard - will not over-range gage due to
 piston affect - ER010827E201)
- 2.18.1 2SI-5100B _____
- 2.18.2 2SI-5100A _____
- 2.18.3 2SI-1043B _____
- 2.18.4 2SI-1042B _____

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SUPPLEMENT 2

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2.19 IF in Mode 1, 2, 3, or 4 with 2P-89C aligned to B ESF train
AND operable,
THEN perform the following:

2.19.1 Place 2P-89C in NORMAL AFTER STOP. _____

2.19.2 Place 2P-89B in PULL TO LOCK. _____

2.19.3 Verify the following valves open:

- HPSI 2P-89C Recirc Isol (2CV-5127-1) _____
- 2VUC-11B SW Inlet (2CV-1408-2) _____

2.19.4 Start 2P-89C and verify proper discharge pressure
(2PI-5109). _____

2.19.5 Check 2P-89B Discharge Stop Check (2SI-10B) closed
by 2P-89B NOT rotating and document in Table 2. _____

2.19.6 Secure 2P-89C. _____

2.19.7 IF desired to place 2P-89B in service,
THEN perform the following:

A. Place 2P-89B in NORMAL AFTER STOP. _____

B. Place 2P-89C in PULL TO LOCK. _____

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SUPPLEMENT 2

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- 2.20 IF in Mode 5 OR 6 with 2P-89C aligned to B ESF Train
AND operable,
THEN perform the following:
- 2.20.1 Place 2P-89B in PULL TO LOCK. _____
- 2.20.2 Place 2P-89C in NORMAL AFTER STOP. _____
- 2.20.3 Verify the following valves open:
- HPSI 2P-89C Recirc Isol (2CV-5127-1) _____
 - 2VUC-11B SW Inlet (2CV-1408-2) _____
- 2.20.4 Start 2P-89C AND verify proper discharge pressure (2PI-5109). _____
- 2.20.5 Check 2P-89B Discharge Stop Check (2SI-10B) closed by 2P-89B NOT rotating AND document in Table 2. _____
- 2.20.6 Secure 2P-89C. _____
- 2.20.7 IF desired to place 2P-89B in service,
THEN perform the following:
- A. Verify at least two HPSI pumps in PULL TO LOCK. _____
- B. Place 2P-89B in NORMAL AFTER STOP. _____
- 2.21 Stop the following fans as desired:
- 2VUC-1D _____
 - 2VUC-1E _____
 - 2VUC-11A _____
 - 2VUC-11B _____
- 2.22 IF 2PI-5101 AND 2PI-5109 differ by > 30 psig,
THEN submit WR/WO to have instruments calibrated. _____

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SUPPLEMENT 2

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3.0 ACCEPTANCE CRITERIA

3.1 Record values observed during 2P-89B operation below AND compare with limiting range of values for operability.

TABLE 1					
TEST QUANTITY	INSTRUMENT (INCLUDE TEST INST)	MEASURED VALUE	ACCEPTABLE NORMAL RANGE	LIMITING RANGE FOR OPERABILITY	IS DATA IN LIMITING RANGE?
Running Suct. Pressure	2PI-5100 (local)	psig	≥ 8 psig	≥ 8 psig	YES NO
Discharge Pressure	2PI-5101 (local)	psig	N/A	N/A	N/A
	2PI-5109 (2C16)	psig	N/A	N/A	N/A
RWT Temperature	2TIS-5675 (2C17)	°F	40 to 110°F	N/A	N/A
Pump ΔP {4.3.1}	2PI-5101 - 2PI-5100	psid	N/A	(1) to 1612.8 psid	YES NO
Motor Running Amps (CR-1-96-0272-07)	Ammeter at 2A-406	ØA _____ Amps ØB _____ Amps ØC _____ Amps	N/A	N/A	N/A
Inboard Brg Radial #1 Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Inboard Brg Radial #2 Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Inboard Brg Axial Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Outboard Brg Radial #1 Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Outboard Brg Radial #2 Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Outboard Brg Axial Vibes		in/sec	≤ 0.232 in/sec	≤ 0.558 in/sec	YES NO

Vibration Instrument Cal Due Date _____

Vibration Data Collected By _____

Note 1: For RWT temperature (T), minimum acceptable pump ΔP is:

$$1372.9 + 20.41 \text{ (Instrument error)} - [(T-40)/4] \text{ psid}$$

$$\text{Minimum } \Delta P = 1393.31 - [(\text{_____} - 40)/4] = \text{_____} \text{ psid}$$

3.2 Independently verify pump ΔP calculation. _____

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SUPPLEMENT 2

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3.3 Document observation of check valve stroke in Table 2.

TABLE 2			
CHECK VALVE	TEST DIRECTION	TEST CRITERIA	IS PROPER VALVE STROKE INDICATED?
2SI-10C	Closed	2P-89C NOT rotating	YES NO N/A
2SI-10B	Closed	2P-89B NOT rotating	YES NO N/A

3.4 IF NO circled in Table 1 or 2,
THEN perform the following:

- Declare affected component inoperable.
- Refer to Tech Spec 3.5.2 OR 3.5.3.
- Notify Shift Manager.
- Initiate WR/WO as applicable.

NOTE

If HPSI pump 2P-89A OR 2P-89C inoperable, then 2SI-10C/2SI-10B testing may be deferred until inoperable HPSI pump restored to operable as per IST Coordinator.

3.5 IF 2SI-10C AND/OR 2SI-10B NOT tested (N/A circled in Table 2),
THEN perform the following:

- Initiate notification to perform test during current quarter OR as directed by IST Coordinator.
- Annotate on status board.
- Annotate in Work Exceptions section of WR/WO.

3.6 Pump Data recorded in database AND reviewed by SRO.

3.7 IF this surveillance performed as PMT,
THEN complete Unit 2 IST Data Collection (1015.0160).

Comments _____

Performed By _____ Date _____

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SUPPLEMENT 2

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4.0 SUPERVISOR REVIEW AND ANALYSIS

- 4.1 Do all measured values recorded in ACCEPTANCE CRITERIA fall within specified LIMITING RANGE FOR OPERABILITY? YES NO
- 4.2 Do all measured values recorded in ACCEPTANCE CRITERIA fall within ACCEPTABLE NORMAL RANGE? (N/A if all results outside normal range also outside limiting range.) YES NO N/A
- 4.3 IF NO answered to 4.1,
THEN perform the following corrective actions:
- Verify LCO Tracking Record initiated per Conduct of Operations (1015.001). _____
 - Verify Condition Report initiated. _____
- 4.4 IF NO circled in 4.2,
THEN perform the following corrective actions:
- Verify WR/WO has been initiated. _____
 - Complete Surveillance Test Schedule Change Request (1000.009D) to double test frequency. _____
- Comments _____

- 4.5 Are all administrative requirements of this test satisfied? YES NO

Supervisor _____ Date _____

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SUPPLEMENT 3

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2P-89C QUARTERLY TEST

This test demonstrates operability of HPSI System components associated with HPSI pump (2P-89C) per IST Program AND Tech Spec Surveillance Requirement 4.5.2.f.1.

1.0 INITIAL CONDITIONS

- 2P-89C aligned per Section 8.0 of this procedure. _____
- RWT Boron concentration between 2500 and 3000 ppm. _____
- IF plant in Mode 1, 2, 3 OR 4,
THEN RWT level between 91.7% and 100%. _____
- IF plant in Mode 5 OR 6,
THEN RWT level > 7.5%. _____
- Recirc line to RWT NOT being used for any other evolution. _____
- Predictive Maintenance OR SE available to take vibration readings. _____
- IF anytime during performance of this Supplement temporary test gauge needed in place of permanently installed gauge,
THEN verify the following:
 - Test gauge calibration date current. _____
 - Accuracy of test gauge within $\pm 1\%$ of full scale. _____
 - Range of test gauge less than three times normal process value. _____
 - Test gauge number recorded in TEST INST column of Section 3.0. _____
 - Operator remains in area while gage aligned for use. _____

2.0 TEST METHOD

NOTE

Steps 2.1 through 2.5 may be performed in any order.

2.1 Verify the following valves open:

- HPSI 2P-89C Recirc Isol (2CV-5127-1) _____
- ESF Mini-Recirc Header Isol (2CV-5628-2) _____
- RWT Recirc and Test Line Inlet to RWT (2BS-26) _____

2.2 IF 2P-89C powered from 2A3,
THEN verify the following:

- RWT 2T-3 Outlet (2CV-5630-1) open. _____
- SW ESF Header Isol (2CV-1400-1) open. _____
- 2VUC-11A SW Inlet (2CV-1407-1) open. _____
- Room Cooler (2VUC-11A) secured in NORMAL AFTER STOP. _____

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SUPPLEMENT 3

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2.3 IF 2P-89C powered from 2A4,
THEN verify the following:

- RWT 2T-3 Outlet (2CV-5631-2) open. _____
- SW ESF Header Isol (2CV-1406-2) open. _____
- 2VUC-11B SW Inlet (2CV-1408-2) open. _____
- Room Cooler (2VUC-11B) secured in NORMAL AFTER STOP. _____

NOTE

2P-89C HPSI pump is operable if the oil level in the sight glass is between the high and low level marks. The sight glass is located on the opposite side of the bearing housing from the oiler.

2.4 Check 2P-89C pump AND motor oil levels. _____

2.5 Align suction pressure gage (2PI-5098) by opening the following valves:

- 2SI-5098A _____
- 2SI-5098B _____

2.6 Start 2P-89C. _____

2.7 IF 2P-89C powered from 2A3,
THEN check 2VUC-11A starts. _____

2.8 IF 2P-89C powered from 2A4,
THEN check 2VUC-11B starts. _____

2.9 Align discharge pressure gage (2PI-5102) by opening the following valves:

- 2SI-1042C _____
- 2SI-1043C _____

2.10 IF 2P-89C aligned to HPSI Header #1,
THEN open either of the following to bleed off pressure trapped between discharge check valve and injection MOVs:

- HPSI Hdr 1 to 2P-32A Loop valve (2CV-5015-1) _____
- HPSI Hdr 1 to 2P-32C Loop valve (2CV-5055-1) _____

2.11 IF 2P-89C aligned to HPSI Header #2,
THEN open either of the following to bleed off pressure trapped between discharge check valve and injection MOVs.

- HPSI Hdr 2 to 2P-32A Loop valve (2CV-5016-2) _____
- HPSI Hdr 2 to 2P-32C Loop valve (2CV-5056-2) _____

2.12 Close valve opened above. _____

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2.13 IF SIT Outlet valves open
AND 2PIS-5000/P5000 OR 2PIS-5040/P5040 > 750 psig, (2K07-A6)
AND relieving pressure to SIT desired (preferred method),
THEN perform the following:

* 2.13.1 Monitor SIT pressures.

2.13.2 Open affected SIT Check Valve Bypass: _____

- 2SV-5004 for A SIT
- 2SV-5044 for C SIT

2.13.3 Cycle affected SIT Drain open AND closed as necessary to relieve trapped pressure: _____

- 2SV-5001-1 for A SIT
- 2SV-5041-2 for C SIT

2.13.4 Verify 2PIS-5000 and 2PIS-5040 at SIT pressure. _____

2.13.5 Close SIT Check Valve Bypass opened above: _____

- 2SV-5004 for A SIT
- 2SV-5044 for C SIT

CAUTION

Opening 2CV-5081 and any SIT drain will rapidly lower SIT level and pressure.

2.14 IF SIT Outlet valves open,
AND 2PIS-5000/P5000 OR 2PIS-5040/P5040 > 750 psig, (2K07-A6),
AND relieving pressure to SIT Drain Header desired
(LEAST preferred method - causes SIT leakage during header
repressurization),
THEN perform the following:

* 2.14.1 Monitor SIT pressures.

2.14.2 Cycle SIT Drain to RDT (2CV-5081) open AND closed. _____

2.14.3 Cycle affected SIT Drain open AND closed: _____

- 2SV-5001-1 for A SIT
- 2SV-5041-2 for C SIT

2.14.4 Verify 2PIS-5000 and 2PIS-5040 at SIT pressure. _____

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- 2.15 WHEN at least two minutes of stable pump operation complete, THEN record pump data in Table 1. _____
- 2.16 Inspect pump seals, valve packing, AND flange gaskets in HPSI pump room for atmospheric leakage. Record any discrepancies in Comments section. _____
- 2.17 IF mechanical seal leakage greater than 17 DPM, THEN initiate Condition Report. _____
- 2.18 WHEN data collection AND inspection complete, THEN stop 2P-89C. _____
- 2.19 IF 2P-89C NOT required to be aligned for auto start on SIAS, THEN place 2P-89C in PULL TO LOCK. _____
- {4.3.2} 2.20 **Isolate gauges by closing the following valves:
(outboard then inboard - will not overrange gage due to
piston affect - ER010827E201)**
- 2.20.1 2SI-5098B _____
- 2.20.2 2SI-5098A _____
- 2.20.3 2SI-1043C _____
- 2.20.4 2SI-1042C _____
- 2.21 Verify the following fans secured as desired:
- 2VUC-11A _____
 - 2VUC-11B _____
- 2.22 IF 2PI-5102 AND 2PI-5108/2PI-5109 differ by > 30 psig, THEN submit WR/WO to have instruments calibrated. _____

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3.0 ACCEPTANCE CRITERIA

3.1 Record values observed during 2P-89C operation below AND compare with limiting range of values for operability.

TABLE 1					
TEST QUANTITY	INSTRUMENT (INCLUDE TEST INST)	MEASURED VALUE	ACCEPTABLE NORMAL RANGE	LIMITING RANGE FOR OPERABILITY	IS DATA IN LIMITING RANGE?
Running Suct. Pressure	2PI-5098 (local)	psig	≥ 8 psig	≥ 8 psig	YES NO
Discharge Pressure	2PI-5102 (local)	psig	N/A	N/A	N/A
	2PI-5108 or 2PI-5109	psig	N/A	N/A	N/A
RWT Temperature	2TIS-5675 (2C17)	°F	40 to 110°F	N/A	N/A
Pump ΔP {4.3.1}	2PI-5102 - 2PI-5098	Psid	N/A	(1) to 1630.2 psid	YES NO
Motor Running Amps (CR-1-96-0272-07)	Ammeter at 2A-307/407 (Circle meter used)	ØA _____ Amps ØB _____ Amps ØC _____ Amps	N/A	N/A	N/A
Inboard Brg Radial #1 Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Inboard Brg Radial #2 Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Inboard Brg Axial Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Outboard Brg Radial #1 Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Outboard Brg Radial #2 Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Outboard Brg Axial Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO

Vibration Instrument Cal Due Date _____

Vibration Data Collected By _____

Note 1: For RWT temperature (T), minimum acceptable pump ΔP is:

$$1372.9 + 20.41 \text{ (Instrument error)} - [(T-40)/4] \text{ psid}$$

$$\text{Minimum } \Delta P = 1393.31 - [(\text{_____} - 40)/4] = \text{_____ psid}$$

3.2 Independently verify pump ΔP calculation. _____

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3.3 IF NO circled in Table 1
THEN perform the following:

- Declare affected component inoperable.
- Refer to Tech Spec 3.5.2 or 3.5.3.
- Notify Shift Manager.
- Initiate WR/WO as applicable.

3.4 Pump Data recorded in database and reviewed by SRO.

3.5 IF this surveillance performed as PMT,
THEN complete Unit 2 IST Data Collection (1015.0160).

Comments _____

Performed By _____ Date _____

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4.0 SUPERVISOR REVIEW AND ANALYSIS

- 4.1 Do all measured values recorded in ACCEPTANCE CRITERIA fall within specified LIMITING RANGE FOR OPERABILITY? YES NO
- 4.2 Do all measured values recorded in ACCEPTANCE CRITERIA fall within ACCEPTABLE NORMAL RANGE? (N/A if all results outside normal range also outside limiting range.) YES NO N/A
- 4.3 IF NO answered to 4.1,
THEN perform the following corrective actions:
- Verify LCO Tracking Record initiated per Conduct of Operations (1015.001). _____
 - Verify Condition Report initiated. _____
- 4.4 IF NO circled in 4.2,
THEN perform the following corrective actions:
- Verify WR/WO has been initiated. _____
 - Complete Surveillance Test Schedule Change Request (1000.009D) to double test frequency. _____

Comments _____

- 4.5 Are all administrative requirements of this test satisfied? YES NO

Supervisor _____ Date _____

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QUARTERLY HPSI VALVE STROKE TEST

This test demonstrates operability of HPSI motor-operated valves per IST Program. This test also demonstrates HPSI check valves will close to prevent reverse flow per IST Program.

1.0 INITIAL CONDITIONS

NOTE

If 2PIS-5000, 2PIS-5020, 2PIS-5040 OR 2PIS-5060 inoperable, then their respective computer points P5000, P5020, P5040 OR P5060 may be used. Indicate any computer points used in Remarks section of this supplement.

- Verify all HPSI pumps secured. _____
- Currently calibrated Stopwatch Serial No. _____. _____
- IF SIT Outlet valves open,
THEN verify 2PIS-5000, 2PIS-5020, 2PIS-5040, and 2PIS-5060 read approximately SIT pressure. _____
- IF SIT Outlet valves closed,
THEN verify RCS Pressure > 350 psia. _____
- Verify RDT available to depressurize SIT drain header. _____
- IF RCS pressure > 1500 psia,
THEN verify HPSI pump on HPSI Header #1 available. _____

2.0 TEST METHOD

- 2.1 Open and time HPSI HDR #2 to 2P-32A (2CV-5016-2). _____
- 2.2 Record stroke time to nearest tenth second in Table 2. _____
- 2.3 Close 2CV-5016-2. _____
- 2.4 Open and time HPSI HDR #2 to 2P-32B (2CV-5036-2). _____
- 2.5 Record stroke time to nearest tenth second in Table 2. _____
- 2.6 Close 2CV-5036-2. _____
- 2.7 Open and time HPSI HDR #2 to 2P-32C (2CV-5056-2). _____
- 2.8 Record stroke time to nearest tenth second in Table 2. _____
- 2.9 Close 2CV-5056-2. _____
- 2.10 Open and time HPSI HDR #2 to 2P-32D (2CV-5076-2). _____
- 2.11 Record stroke time to nearest tenth second in Table 2. _____
- 2.12 Close 2CV-5076-2. _____

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2.13 Stroke HPSI HDR #1 to 2P-32A (2CV-5015-1) AND verify check valve 2SI-13A closure as follows:

- 2.13.1 Determine 2SI-13A differential pressure. _____

$$\frac{\text{_____}}{(2\text{PIS}-5000)} \text{ psig} - \frac{\text{_____}}{(2\text{PI}-5108)} \text{ psig} = \text{_____} \text{ psid}$$
- 2.13.2 IF 2SI-13A differential pressure < 300 psid,
THEN lower HPSI header pressure using Section 3.0. _____
- 2.13.3 Open and time 2CV-5015-1. _____
- 2.13.4 Record stroke time to nearest tenth second in Table 1. _____

NOTE

Following steps verify check valve closure, but do NOT determine leakage. Readings need to be taken in timely manner because differential pressure might decay. When 2CV-5015-1 reaches full open, if DP above minimum requirements then check valve closure verified.

- 2.13.5 WHEN 2CV-5015-1 fully open,
THEN determine 2SI-13A differential pressure. _____

$$\frac{\text{_____}}{(2\text{PIS}-5000)} \text{ psig} - \frac{\text{_____}}{(2\text{PI}-5108)} \text{ psig} = \text{_____} \text{ psid}$$
- 2.13.6 Restore 2CV-5015-1 to original position. _____
- 2.13.7 IF 2SI-13A differential pressure > 30 psid,
THEN record ΔP in Table 3. _____
- 2.13.8 IF 2SI-13A differential pressure ≤ 30 psid,
AND RCS pressure > 1500 psia,
THEN perform the following:
- A. Flush 2SI-13A using Section 4.0. _____
- B. Open 2CV-5015-1. _____
- C. Determine 2SI-13A differential pressure. _____

$$\frac{\text{_____}}{2\text{PIS}-5000} \text{ psig} - \frac{\text{_____}}{2\text{PI}-5108} \text{ psig} = \text{_____} \text{ psid}$$
- D. Restore 2CV-5015-1 to original position. _____
- E. Record 2SI-13A ΔP in Table 3. _____

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2.14 Stroke HPSI HDR #1 to 2P-32B (2CV-5035-1) AND verify check valve 2SI-13B closure as follows:

- 2.14.1 Determine 2SI-13B differential pressure.

$$\frac{\text{_____}}{(2PIS-5020)} \text{ psig} - \frac{\text{_____}}{(2PI-5108)} \text{ psig} = \text{_____} \text{ psid}$$
- 2.14.2 IF 2SI-13B differential pressure < 300 psid,
THEN lower HPSI header pressure using Section 3.0.
- 2.14.3 Open and time 2CV-5035-1.
- 2.14.4 Record stroke time to nearest tenth second in Table 1.

NOTE

Following steps verify check valve closure, but do NOT determine leakage. Readings need to be taken in timely manner because differential pressure might decay. When 2CV-5035-1 reaches full open, if DP above minimum requirements then check valve closure verified.

- 2.14.5 WHEN 2CV-5035-1 fully open,
THEN determine 2SI-13B differential pressure.

$$\frac{\text{_____}}{(2PIS-5020)} \text{ psig} - \frac{\text{_____}}{(2PI-5108)} \text{ psig} = \text{_____} \text{ psid}$$
- 2.14.6 Restore 2CV-5035-1 to original position.
- 2.14.7 IF 2SI-13B differential pressure > 30 psid,
THEN record ΔP in Table 3.
- 2.14.8 IF 2SI-13B differential pressure ≤ 30 psid,
AND RCS pressure > 1500 psia,
THEN perform the following:
- A. Flush 2SI-13B using Section 4.0.
- B. Open 2CV-5035-1.
- C. Determine 2SI-13B differential pressure.

$$\frac{\text{_____}}{2PIS-5020} \text{ psig} - \frac{\text{_____}}{2PI-5108} \text{ psig} = \text{_____} \text{ psid}$$
- D. Restore 2CV-5035-1 to original position
- E. Record 2SI-13B ΔP in Table 3.

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2.15 Stroke time HPSI HDR #1 to 2P-32C (2CV-5055-1) AND verify check valve 2SI-13C closure as follows:

- 2.15.1 Determine 2SI-13C differential pressure. _____

$$\frac{\text{_____}}{(2\text{PIS-5040})} \text{ psig} - \frac{\text{_____}}{(2\text{PI-5108})} \text{ psig} = \text{_____} \text{ psid}$$
- 2.15.2 IF 2SI-13C differential pressure < 300 psid, _____
THEN lower HPSI header pressure using Section 3.0. _____
- 2.15.3 Open and time 2CV-5055-1. _____
- 2.15.4 Record stroke time to nearest tenth second in _____
Table 1. _____

NOTE

Following steps verify check valve closure, but do NOT determine leakage. Readings need to be taken in timely manner because differential pressure might decay. When 2CV-5055-1 reaches full open, if DP above minimum requirements then check valve closure verified.

- 2.15.5 WHEN 2CV-5055-1 fully open, _____
THEN determine 2SI-13C differential pressure. _____

$$\frac{\text{_____}}{(2\text{PIS-5040})} \text{ psig} - \frac{\text{_____}}{(2\text{PI-5108})} \text{ psig} = \text{_____} \text{ psid}$$
- 2.15.6 Restore 2CV-5055-1 to original position. _____
- 2.15.7 IF 2SI-13C differential pressure > 30 psid, _____
THEN record ΔP in Table 3. _____
- 2.15.8 IF 2SI-13C differential pressure ≤ 30 psid _____
AND RCS pressure > 1500 psia, _____
THEN perform the following: _____
- A. Flush 2SI-13C using Section 4.0. _____
- B. Open 2CV-5055-1. _____
- C. Determine 2SI-13C differential pressure. _____

$$\frac{\text{_____}}{2\text{PIS-5040}} \text{ psig} - \frac{\text{_____}}{2\text{PI-5108}} \text{ psig} = \text{_____} \text{ psid}$$
- D. Restore 2CV-5055-1 to original position. _____
- E. Record 2SI-13C ΔP in Table 3. _____

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2.16 Stroke time HPSI HDR #1 to 2P-32D (2CV-5075-1) AND verify check valve 2SI-13D closure as follows:

- 2.16.1 Determine 2SI-13D differential pressure.

$$\frac{\text{_____}}{(2PIS-5060)} \text{ psig} - \frac{\text{_____}}{(2PI-5108)} \text{ psig} = \text{_____} \text{ psid}$$
- 2.16.2 IF 2SI-13D differential pressure < 300 psid,
THEN lower HPSI header pressure using Section 3.0.
- 2.16.3 Open and time 2CV-5075-1.
- 2.16.4 Record stroke time to nearest tenth second in Table 1.

NOTE

Following steps verify check valve closure, but do NOT determine leakage. Readings need to be taken in timely manner because differential pressure might decay. When 2CV-5075-1 reaches full open, if DP above minimum requirements then check valve closure verified.

- 2.16.5 WHEN 2CV-5075-1 fully open,
THEN determine 2SI-13D differential pressure.

$$\frac{\text{_____}}{(2PIS-5060)} \text{ psig} - \frac{\text{_____}}{(2PI-5108)} \text{ psig} = \text{_____} \text{ psid}$$
- 2.16.6 Restore 2CV-5075-1 to original position.
- 2.16.7 IF 2SI-13D differential pressure > 30 psid,
THEN record ΔP in Table 3.
- 2.16.8 IF 2SI-13D differential pressure ≤ 30 psid
AND RCS pressure > 1500 psia,
THEN perform the following:
- A. Flush 2SI-13D using Section 4.0.
- B. Open 2CV-5075-1.
- C. Determine 2SI-13D differential pressure.

$$\frac{\text{_____}}{2PIS-5060} \text{ psig} - \frac{\text{_____}}{2PI-5108} \text{ psig} = \text{_____} \text{ psid}$$
- D. Restore 2CV-5075-1 to original position.
- E. Record 2SI-13D ΔP in Table 3.

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- 2.17 IF in Mode 1, 2, 3 OR 4,
THEN enter TS 3.5.2 OR 3.5.3 to stroke Th Injection valves. _____
- {4.3.4} 2.18 IF Containment penetration controls in effect,
THEN refer to Containment penetration administrative controls
section of Conduct of Operations (1015.001) for 2CV-5101-1 AND
2CV-5102-2. _____

CAUTION

Both HPSI Trains inoperable if both Th Injection MOVs energized.

NOTE

Operator shall be designated to close Th Injection valves as directed by Control Room upon receipt of SIAS signal. This maintains System Availability. (NEI 99-02, CR-ANO-C-2001-0099)

- 2.19 Designate operator to close Th Injection valves if directed
by Control Room. _____
- * 2.20 IF SIAS signal received,
THEN direct operator to close Th Injection valves. _____
- 2.21 Verify 2CV-5101-1 breaker (2B52-L5) closed. _____
- 2.22 Open and time 2CV-5101-1. _____
- 2.23 Record stroke time to nearest tenth second in Table 1. _____
- 2.24 Close and time 2CV-5101-1. _____
- 2.25 Record stroke time to nearest tenth second in Table 1. _____
- 2.26 IF Containment Penetration controls in effect,
THEN independently verify 2CV-5101-1 closed. _____
- 2.27 IF in Mode 1, 2, 3, OR 4,
THEN Danger Tag 2B52-L5 open. _____

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- 2.28 Close 2CV-5102-2 breaker (2B62-G2). _____
- 2.29 Open and time 2CV-5102-2. _____
- 2.30 Record stroke time to nearest tenth second in Table 2. _____
- 2.31 Close and time 2CV-5102-2. _____
- 2.32 Record stroke time to nearest tenth second in Table 2. _____
- 2.33 IF Containment Penetration controls in effect,
THEN independently verify 2CV-5102-2 closed. _____
- 2.34 IF in Mode 1, 2, 3, OR 4,
THEN perform the following:
 - 2.34.1 Danger Tag 2B62-G2 open. _____
 - 2.34.2 Exit Tech Spec 3.5.2 or 3.5.3 _____
- 2.35 Close and time HPSI HDR #2 Orifice Bypass (2CV-5104-2). _____
- 2.36 Record stroke time to nearest tenth second in Table 2. _____
- 2.37 Open and time 2CV-5104-2. _____
- 2.38 Record stroke time to nearest tenth second in Table 2. _____
- 2.39 Close and time HPSI 2P-89A Recirc Isol (2CV-5126-1). _____
- 2.40 Record stroke time to nearest tenth second in Table 1. _____
- 2.41 Open and time 2CV-5126-1. _____
- 2.42 Record stroke time to nearest tenth second in Table 1. _____
- 2.43 Close and time HPSI 2P-89C Recirc Isol (2CV-5127-1). _____
- 2.44 Record stroke time to nearest tenth second in Table 1. _____
- 2.45 Open and time 2CV-5127-1. _____
- 2.46 Record stroke time to nearest tenth second in Table 1. _____
- 2.47 Close and time HPSI 2P-89B Recirc Isol (2CV-5128-1). _____
- 2.48 Record stroke time to nearest tenth second in Table 1. _____
- 2.49 Open and time 2CV-5128-1. _____
- 2.50 Record stroke time to nearest tenth second in Table 1. _____

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- 2.51 Close and time HPSI HDR #1 Orifice Bypass (2CV-5103-1). _____
- 2.52 Record stroke time to nearest tenth second in Table 1. _____
- 2.53 Open and time 2CV-5103-1. _____
- 2.54 Record stroke time to nearest tenth second in Table 1. _____

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3.0 HPSI HEADER PRESSURE REDUCTION

NOTE

This Section used as many times as needed to depressurize HPSI Header #1.

HPSI Header being depressurized

A /B /C /D

3.1 Enter Tech Spec 3.5.2 OR 3.5.3 as appropriate.

/ / /

{4.3.4}

**3.2 IF Containment penetration controls in effect,
THEN refer to Containment penetration admin controls
section of Conduct of Operations (1015.001) for
2CV-5101-1.**

/ / /

3.3 Designate operator to close Th Injection valves if
directed by Control Room.

/ / /

NOTE

Operator shall be designated to close Th Injection valves as directed by
Control Room upon receipt of SIAS signal. This maintains System
Availability. (NEI 99-02, CR-ANO-C-2001-0099)

* 3.4 IF SIAS signal received,
THEN direct operator to close Th Injection valves.

3.5 Close 2B52-L5 to energize Th Injection valve
(2CV-5101-1).

/ / /

3.6 Open SIT Drain to RDT (2CV-5081).

/ / /

3.7 Open CV Leakage (2CV-5105-1).

/ / /

3.8 Throttle open Th Injection (2CV-5101-1).

/ / /

3.9 Verify ΔP between appropriate SIS Injection to 2P-32
Loop (2PIS-5000/5020/5040/5060) and SIS Header #1
(2PI-5108) > 300 psid.

/ / /

3.10 Close the following valves:

- 2CV-5101-1
- 2CV-5105-1
- 2CV-5081

/ / /

/ / /

/ / /

3.11 IF Containment Penetration Controls in effect,
THEN independently verify 2CV-5101-1 closed.

/ / /

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3.12 Open desired SIT Drain valve to repressurize SIT
Drain header:

 / / /

- For 2T-2A, SIT A Drain valve (2SV-5001-1)
- For 2T-2B, SIT B Drain valve (2SV-5021-1)
- For 2T-2C, SIT C Drain valve (2SV-5041-2)
- For 2T-2D, SIT D Drain valve (2SV-5061-2)

3.13 WHEN SIT Drain header pressurized,
THEN close SIT Drain valve opened in previous step:

 / / /

- For 2T-2A, SIT A Drain valve (2SV-5001-1)
- For 2T-2B, SIT B Drain valve (2SV-5021-1)
- For 2T-2C, SIT C Drain valve (2SV-5041-2)
- For 2T-2D, SIT D Drain valve (2SV-5061-2)

3.13 Return to applicable step.

 / / /

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4.0 FLUSHING 2SI-13A/B/C/D

NOTE

This Section used as many times as needed to flush 2SI-13A/B/C/D.

Header being Flushed

A / B / C / D

4.1 Verify ALL HPSI Injection valves closed:

- 2CV-5015-1
- 2CV-5035-1
- 2CV-5055-1
- 2CV-5075-1

/ / /
/ / /
/ / /
/ / /

4.2 Verify RCS pressure > 1500 psia.

/ / /

4.3 Verify the following valves open:

- RWT Outlet (2CV-5630-1)
- ESF Mini-Recirc Header Isol (2CV-5628-2)
- SW ESF Header Isol (2CV-1400-1)
- HPSI 2P-89A Recirc Isol (2CV-5126-1)
- RWT Recirc and Test Line Inlet to RWT (2BS-26)

/ / /
/ / /
/ / /
/ / /
/ / /

4.4 Check pump AND motor bearing oil levels on selected HPSI Header #1 pump.

/ / /

4.5 Start selected HPSI Header #1 pump.

/ / /

4.6 Open SIT Drain to RDT (2CV-5081).

/ / /

4.7 Open appropriate HPSI Injection valve:

- 2CV-5015-1 to flush 2SI-13A
- 2CV-5035-1 to flush 2SI-13B
- 2CV-5055-1 to flush 2SI-13C
- 2CV-5075-1 to flush 2SI-13D

/ / /
/ / /
/ / /
/ / /

4.8 Open appropriate SIT Drain valve:

- 2SV-5001-1 to flush 2SI-13A
- 2SV-5021-1 to flush 2SI-13B
- 2SV-5041-2 to flush 2SI-13C
- 2SV-5061-2 to flush 2SI-13D

/ / /
/ / /
/ / /
/ / /

4.9 WHEN HPSI flow > 100 GPM (2FI-5101-1),
THEN close SIT Drain valve.

/ / /

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Header being flushed

A / B / C / D

4.10 Close HPSI Injection valve:

- 2CV-5015-1
- 2CV-5035-1
- 2CV-5055-1
- 2CV-5075-1

/ / /
/ / /
/ / /
/ / /

4.11 IF flushing of all required Injection Headers complete,
THEN stop selected HPSI pump.

/ / /

4.12 Enter Tech Spec 3.5.2 OR 3.5.3 as appropriate.

/ / /

{4.3.4}

4.13 **IF Containment penetration controls in effect,
THEN refer to Containment Penetration Admin Controls
section of Conduct of Operations (1015.001) for
2CV-5101-1.**

/ / /

NOTE

Operator shall be designated to close Th Injection valves as directed by Control Room upon receipt of SIAS signal. This maintains System Availability. (NEI 99-02, CR-ANO-C-2001-0099)

4.14 Designate operator to close Th Injection valves if directed by Control Room.

/ / /

* 4.15 IF SIAS signal received,
THEN direct operator to close Th Injection valves.

4.16 Close 2B52-L5 to energize Th Injection valve (2CV-5101-1).

/ / /

4.17 Open CV Leakage (2CV-5105-1).

/ / /

4.18 Throttle open Th Injection (2CV-5101-1).

/ / /

4.19 Verify ΔP between appropriate SIS Injection to 2P-32 Loop (2PIS-5000/5020/5040/5060) and SIS Header #1 (2PI-5108) > 300 psid.

/ / /

4.20 Close the following valves:

- 2CV-5101-1
- 2CV-5105-1
- 2CV-5081

/ / /
/ / /
/ / /

4.21 IF Containment Penetration Controls in effect,
THEN independently verify 2CV-5101-1 closed.

/ / /

4.22 Return to applicable step.

/ / /

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5.0 ACCEPTANCE CRITERIA

5.1 Compare measured stroke time with "Limiting Values" AND "Acceptable Normal Range" to determine operability.

TABLE 1						
VALVE	DESCRIPTION	TEST DIR.	STROKE TIME (SEC)	ACCEPTABLE NORMAL RANGE TIME (SEC)	LIMITING VALUE	MEASURED TIME WITHIN ACCEPTABLE NORMAL RANGE?
2CV-5015-1	HPSI HDR #1 To 2P-32A	O		9.3-12.5	14.1	YES NO
2CV-5035-1	HPSI HDR #1 To 2P-32B	O		10.4-14.0	14.1	YES NO
2CV-5055-1	HPSI HDR #1 To 2P-32C	O		9.6-12.8	14.1	YES NO
2CV-5075-1	HPSI HDR #1 To 2P-32D	O		10.5-14.1	14.1	YES NO
2CV-5101-1	HPSI HDR #1 Thot injection	O		17.0-23.0	26.0	YES NO
2CV-5101-1	HPSI HDR #1 Thot injection	C		17.3-23.3	26.3	YES NO
2CV-5126-1	HPSI 2P-89A Recirc Isol	C		15.6-20.0	23.7	YES NO
2CV-5126-1	HPSI 2P-89A Recirc Isol	O		15.7-20.0	23.9	YES NO
2CV-5127-1	HPSI 2P-89C Recirc Isol	C		14.5-19.5	22.1	YES NO
2CV-5127-1	HPSI 2P-89C Recirc Isol	O		14.6-19.6	22.2	YES NO
2CV-5128-1	HPSI 2P-89B Recirc Isol	C		14.4-19.4	21.9	YES NO
2CV-5128-1	HPSI 2P-89B Recirc Isol	O		14.9-20.0	22.7	YES NO
2CV-5103-1	HPSI HDR #1 Orifice Bypass	C		18.7-25.3	28.6	YES NO
2CV-5103-1	HPSI HDR #1 Orifice Bypass	O		19.0-25.6	28.9	YES NO

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TABLE 2						
VALVE	DESCRIPTION	TEST DIR.	STROKE TIME (SEC)	ACCEPTABLE NORMAL RANGE TIME (SEC)	LIMITING VALUE	MEASURED TIME WITHIN ACCEPTABLE NORMAL RANGE?
2CV-5016-2	HPSI HDR #2 To 2P-32A	O		10.5-14.1	14.1	YES NO
2CV-5036-2	HPSI HDR #2 To 2P-32B	O		11.0-14.1	14.1	YES NO
2CV-5056-2	HPSI HDR #2 To 2P-32C	O		7.2-12.0	14.1	YES NO
2CV-5076-2	HPSI HDR #2 To 2P-32D	O		11.3-14.1	14.1	YES NO
2CV-5102-2	HPSI HDR #2 Thot injection	O		18.7-25.1	28.4	YES NO
2CV-5102-2	HPSI HDR #2 Thot injection	C		19.0-25.6	28.9	YES NO
2CV-5104-2	HPSI HDR #2 Orifice Bypass	C		19.1-25.7	29.1	YES NO
2CV-5104-2	HPSI HDR #2 Orifice Bypass	O		19.3-26.1	29.5	YES NO

5.2 IF stroke time greater than Limiting Value,
THEN perform the following:

- Notify Shift Manager. _____
- Declare valve inoperable. _____
- Refer to Tech Specs 3.5.2 and 3.5.3. _____
- Initiate WR/WO as applicable. _____

5.3 IF NO circled in Table 1 or 2
AND stroke time less than Limiting Value,
THEN immediately retest OR declare valve inoperable. _____

5.4 IF retest was performed
AND new stroke time outside Acceptable Normal Range,
THEN perform the following:

- Initiate Condition Report _____
- Initiate Operability Determination using 1015.047,
Condition Reporting Operability and Immediate
Reportability Determinations _____

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5.5 IF retest was performed
AND new stroke time within Acceptable Normal Range,
THEN perform ONE of the following:

5.5.1 IF cause of initial failure known,
THEN record new stroke time AND reason for failure
in section 5.0 comments. _____

5.5.2 IF cause of initial failure unknown,
THEN perform the following:

- Record new stroke time in section 5.0 Comments. _____
- Perform actions of step 5.4. _____

5.6 Record check valve ΔP AND compare with limiting value to
verify each Safety Injection check valve closed.

TABLE 3			
CHECK VALVE	DIFFERENTIAL PRESSURE	LIMITING VALUE	IS ΔP > LIMITING VALUE?
2SI-13A	psid	30 psid	YES NO
2SI-13B	psid	30 psid	YES NO
2SI-13C	psid	30 psid	YES NO
2SI-13D	psid	30 psid	YES NO

5.7 IF NO circled in Table 3,
THEN perform the following:

- Declare valve inoperable. _____
- Refer to Tech Spec 3.4.6.2. _____
- Notify Shift Manager. _____
- Initiate WR/WO as applicable. _____
- Refer to TS 3.6.3.1 (CR-ANO-2-2001-0403) _____

5.8 Valve Data recorded in database AND reviewed by SRO. _____

5.9 IF this surveillance performed as PMT,
THEN complete Unit 2 IST Data Collection (1015.0160). _____

Comments _____

Performed By _____ Date _____

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6.0 SUPERVISOR REVIEW AND ANALYSIS

- 6.1 Do all measured values recorded in Table 1 AND 2 fall within ACCEPTABLE NORMAL RANGE? YES NO
- 6.2 Do all measured values recorded in Table 3 fall within Limiting Values? YES NO
- 6.3 IF NO answered in 6.1,
THEN perform the following:
- 6.3.1 IF retest performed
AND new stroke time within Acceptable Normal Range with cause of initial failure known,
THEN review step 5.5 for concurrence. _____
- 6.3.2 IF retest stroke time outside Acceptable Normal Range OR retest stroke time within Acceptable Normal Range with cause of initial failure unknown,
THEN verify the following initiated:
- Condition Report _____
 - Operability Determination using 1015.047,
Condition Reporting Operability and Immediate
Reportability Determinations _____
- 6.3.3 IF stroke time exceeds Limiting Value,
THEN perform the following:
- Verify LCO Tracking Record initiated per
Conduct of Operations (1015.001). _____
 - Verify Condition Report initiated. _____
- 6.4 IF NO answered in 6.2,
THEN verify WR/WO initiated. _____

Comments _____

- 6.5 Are all administrative requirements of this test satisfied? YES NO

Supervisor _____ Date _____

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FULL FLOW HPSI TEST

This test demonstrates full open stroke of HPSI check valves 2SI-13A/B/C/D, 2SI-12, 2SI-10A/B/C, 2SI-26A/B, 2SI-27A/B, 2SI-28A/B AND 2SI-23A/B/C per IST Program. HPSI pump suction is aligned to RCS through LPSI pump suction valves and water returned to RCS through HPSI injection valves. HPSI pump data taken at full flow condition per GL 89-04. This test also confirms HPSI flow balance and capacity required by Tech Spec 4.5.2.h. **This Supplement satisfies NRC Commitments per Step 4.3.3.**

Individual Sections may be performed after Initial Conditions in Section 1.0 met. During Cold Shutdown outage other than refueling, 2P-89C required to be tested on one train only and Section 3.0 or 5.0 may be N/A'd. Sections not being performed may be N/A'd. All sections must be completed each refueling outage.

NOTE

If this surveillance performed with RCS boron concentration < 2500 ppm, then HPSI system will not be available as Tech Spec Boration source.

1.0 INITIAL CONDITIONS

- Shutdown Cooling in service. _____
 - Pressurizer bubble collapsed (PZR < 212°F). _____
 - RCS level greater than reduced inventory. _____
 - Following instruments in service AND calibration not overdue.
(Repetitive Tasks 017812-RED, 017811-GREEN) _____
- | | | |
|------------|------------|------------|
| 2FI-5101-1 | 2FI-5014-1 | 2FI-5054-2 |
| 2FI-5102-2 | 2FI-5034-1 | 2FI-5074-2 |
- This surveillance requires extensive local operations. RCS chemical cleaning results in elevated dose rates. Therefore this surveillance should not be conducted during RCS Chemical Cleaning and should be scheduled either before chemical cleaning has been performed or after elevated dose rates have subsided. Coordinate with Chemistry, System Engineering and Radiation Protection in order to prevent unnecessary radiation exposure due to elevated dose rates. _____

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- Notify System Engineering to measure flow on the respective HPSI pump recirc line being tested using ultrasonic flow-measuring device. Serial No. _____ Calibration Due Date _____
- Independently verify installation of ultrasonic flow-measuring device. _____
- IF HPSI pump suction source temperature greater than 86°F, THEN verify calibrated Digital Thermometer available to measure 2HCB-23-6" piping downstream of ESF Mini Recirc Header Isol (2CV-5628-2). Record M&TE # _____
- IF HPSI pump suction source temperature greater than 146°F, THEN verify calibrated Digital Thermometer available to measure 2DCB-2-4" piping downstream of Recirc Isol: 2CV-5126-1 (2P89A), 2CV-5127-1 (2P89C), OR 2CV-5128-1 (2P89B). Record M&TE # _____
- Predictive Maintenance OR SE available to take vibration readings. _____

NOTE

HPSI Header Flush (2103.002, Attachment G) will be required if RCS boron < 2500 ppm OR > 3000 ppm. If no RCS fills planned, then it may be preferable to raise RCS boron above 2500 ppm due to amount of water used for flush. If HPSI header boron concentration > 3000 ppm, then flush would be required to ensure that no slugs of boron would be sitting or left in injection headers.

- Record RCS boron concentration: _____ ppm _____
- Conduct crew brief using Conduct of Operations (1015.001). _____
- IF anytime during performance of this Supplement temporary test gauge needed in place of permanently installed gauge, THEN verify the following:
 - Test gauge calibration date current.
 - Accuracy of test gauge within ± 1% of full scale.
 - Range of test gauge less than three times normal process value.
 - Test gauge number recorded in TEST INST column of Section 7.0.

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2.0 2P-89A TEST

NOTE

Steps 2.1 through 2.6 may be performed in any order.

- | | | |
|-----|---|-------|
| 2.1 | Verify Initial Conditions (Section 1.0). | _____ |
| 2.2 | Verify Hot Leg Injection valve (2CV-5101-1) closed AND energized (2B52-L5). | _____ |
| 2.3 | Verify calibrated 3-D Model 2554x-32y (where x and y can be anything) test gauge with range of 0 to 2000 psig AND accuracy of 1/4% full scale installed on mini-recirc vent at 2SI-1093 and 2SI-1094. | _____ |
| 2.4 | Verify LPSI pump (2P-60A) suction valves aligned for SDC: | |
| | • 2P-60A Suction From RWT (2SI-2A) closed. | _____ |
| | • 2P-60A Suction From RCS (2SI-1A) open. | _____ |
| 2.5 | Verify the following valves closed: | |
| | • CNTMT Sump Isolation (2CV-5649-1 OR 2CV-5647-1) | _____ |
| | • RWT 2T-3 Outlet (2CV-5630-1) | _____ |
| | • 2P-89C Recirc (2CV-5127-1) | _____ |
| | • 2P-35A Recirc (2CV-5673-1) | _____ |
| | • RWT Recirc and Test Isolation (2BS-25) | _____ |
| 2.6 | Verify the following valves open: | |
| | • HPSI Recirc to Train A Suction (2BS-53) | _____ |
| | • 2P-89A Recirc Isol (2SI-64) | _____ |
| | • 2P-89A Suction Isol (2SI-8A) | _____ |
| | • 2P-89A Discharge Isol (2SI-10A) | _____ |
| | • RWT Recirc and Test Line Inlet to RWT (2BS-26) | _____ |
| | • HPSI 2P-89A Recirc Isol (2CV-5126-1) | _____ |
| | • ESF Mini Recirc Header Isol (2CV-5628-2) | _____ |
| | • SW ESF Header Isol (2CV-1400-1) | _____ |

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CAUTION

Opening 2SI-2A aligns flow path between RCS and RWT via HPSI recirc header. Flow could be in either direction depending on RCS pressure and RWT level. Action may be necessary to control RCS level.

- 2.7 Open 2P-60A Suction From RWT (2SI-2A). _____
- * 2.8 Monitor RCS level AND adjust as necessary during this test.
- 2.9 Align suction pressure gage (2PI-5090) by opening the following valves:
 - 2SI-5090A _____
 - 2SI-5090B _____

NOTE

2P-89A is operable if oil level visible in Oiler Glass bubbler.

- 2.10 Check 2P-89A pump AND motor oil levels. _____
- 2.11 Start 2P-89A. _____
- 2.12 Notify System Engineer to measure 2P-89A recirc flow upstream of HPSI Recirc Check valve (2SI-23A) to verify 2SI-23A open AND record in Table 15. _____
- * 2.13 Monitor temperature of applicable piping per Initial Conditions AND submit CR if piping downstream master mini recirc exceeds 140°F OR piping downstream applicable mini recirc isolation valve exceeds 200°F. (CR-2-2001-0032 determined piping operable to 255°F)
- 2.14 Align discharge pressure gage (2PI-5090) by opening the following valves:
 - 2SI-1042A _____
 - 2SI-1043A _____
- 2.15 Align mini-recirc pressure gage by opening the following valves:
 - 2SI-1093 _____
 - 2SI-1094 _____
- 2.16 Cycle HPSI Injection valves open AND closed one at a time AND record flow rate for each valve in Table 1:
 - 2CV-5015-1 _____
 - 2CV-5035-1 _____
 - 2CV-5055-1 _____
 - 2CV-5075-1 _____

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- 2.17 Throttle open Th Injection valve (2CV-5101-1) until _____
> 392 GPM indicated on 2FI-5101-1 AND record flow in Table 2.

CAUTION

HPSI pump flow > 852 GPM could cause pump runout and excessive motor amps.

- 2.18 Throttle open HPSI Injection valves as necessary to obtain _____
> 770 GPM on 2FI-5101-1 AND record 2P-89A flow in Table 3.
- 2.19 Throttle HPSI Injection valves to set total header flow _____
(F5084) between 770 and 780 GPM.
- 2.20 Record Header flow: _____ GPM _____
- 2.21 Isolate 2P-89A recirc by closing the following valves: _____
- 2CV-5126-1 _____
 - 2SI-64 _____
- 2.22 Record Header flow: _____ GPM _____
- 2.23 Close 2CV-5101-1. _____
- 2.24 Throttle HPSI Injection valves to set total header flow _____
(F5084) between 770 and 780 GPM.
- 2.25 Collect pump data listed in Table 4. _____
- 2.26 IF System Engineer desires data at various flow rates, _____
THEN throttle HPSI Injection valves as needed AND attach
results.
- 2.27 Restore 2P-89A recirc by opening the following valves: _____
- 2CV-5126-1 _____
 - 2SI-64 _____
- 2.28 Verify all Cold Leg Injection valves open to electrical limit: _____
- 2CV-5015-1 _____
 - 2CV-5035-1 _____
 - 2CV-5055-1 _____
 - 2CV-5075-1 _____
- 2.29 Record individual flows in Table 7. _____

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2.30 IF during refueling outage
OR any ECCS subsystem modifications have been performed that
may have altered flow characteristics,
THEN check flow balance between hot and cold leg as follows:

2.30.1 Close Orifice Bypass valve (2CV-5103-1). _____

2.30.2 Open Th Injection valve (2CV-5101-1) _____

2.30.3 Record Total Cold Leg Injection flow (F5084)
AND HPSI Header flow (2FI-5101-1) in Table 8. _____

2.30.4 Close 2CV-5101-1. _____

2.30.5 Open 2CV-5103-1. _____

2.31 Verify ALL Loop 1 HPSI Injection valves closed. _____

2.32 Stop 2P-89A AND place in PULL TO LOCK. _____

2.33 IF desired to stop EITHER of the following fans,
THEN place in NORMAL AFTER STOP:

- 2VUC-1A _____
- 2VUC-1B _____

{4.3.2}

2.34 **Isolate pressure gauges by closing the following valves:**
(outboard then inboard - will not overrange gage due to
piston affect - ER010827E201)

2.34.1 **2SI-5090B** _____

2.34.2 **2SI-5090A** _____

2.34.3 **2SI-1043A** _____

2.34.4 **2SI-1042A** _____

2.34.5 **2SI-1094** _____

2.34.6 **2SI-1093** _____

2.35 Close 2SI-2A as desired. _____

2.36 Restore 2CV-5630-1 to desired position. _____

2.37 Remove test gauge from mini-recirc vent AND replace cap. _____

2.38 Independently verify test gauge removed AND cap replaced. _____

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3.0 2P-89C (RED TRAIN) TEST

NOTE

Steps 3.1 through 3.6 may be performed in any order.

- 3.1 Verify Initial Conditions (Section 1.0). _____
- 3.2 Verify Hot Leg Injection valve (2CV-5101-1) closed AND _____
energized (2B52-L5).
- 3.3 Verify calibrated 3-D Model 2554x-32y (where x and y can be _____
anything) test gauge with range of 0 to 2000 psig and accuracy
of 1/4% full scale installed on mini-recirc vent at 2SI-1067 AND
2SI-1068. (N/A this step if already performed in section 5.0)
- 3.4 Verify LPSI pump (2P-60A) suction valves aligned for SDC.
 - 2P-60A Suction From RWT (2SI-2A) closed. _____
 - 2P-60A Suction From RCS (2SI-1A) open. _____
- 3.5 Verify the following valves open:
 - HPSI Recirc to Train A Suction (2BS-53) _____
 - 2P-89C Recirc to Train A Suction (2SI-66) _____
 - 2P-89C Recirc Isol (2SI-62) _____
 - 2P-89C Suction Isol (2SI-9A) _____
 - 2P-89C Discharge Isol (2SI-10C) _____
 - 2P-89C Discharge Cross Connect (2SI-11A) _____
 - RWT Recirc and Test Line Inlet to RWT (2BS-26) _____
 - HPSI 2P-89C Recirc Isol (2CV-5127-1) _____
 - ESF Mini Recirc Header Isol (2CV-5628-2) _____
 - SW ESF Header Isol (2CV-1400-1) _____
- 3.6 Verify the following valves closed:
 - CNTMT Sump Isolation (2CV-5649-1 OR 2CV-5647-1) _____
 - RWT 2T-3 Outlet (2CV-5630-1) _____
 - 2P-89A Recirc (2CV-5126-1) _____
 - 2P-35A Recirc (2CV-5673-1) _____
 - RWT Recirc and Test Isolation (2BS-25) _____
 - 2P-89C Suction X-Connect (2SI-9B) _____
 - 2P-89C Discharge X-Connect (2SI-11B) _____
 - 2P-89C Recirc to B Train Suction (2SI-67) _____

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CAUTION

Opening 2SI-2A aligns flow path between RCS and RWT via HPSI recirc header. Flow could be in either direction depending on RCS pressure and RWT level. Action may be necessary to control RCS level.

3.7 Open 2P-60A Suction From RWT (2SI-2A). _____

3.8 Monitor RCS level AND adjust as necessary during this test. _____

*

NOTE

If Section 5.0 of this Supplement has been completed during this outage, then steps 3.9 and 3.13 through 3.26 may be N/A'd.

3.9 Align suction pressure gage (2PI-5098) by opening the following valves:

- 2SI-5098A _____
- 2SI-5098B _____

NOTE

2P-89C is operable if the oil level in the sight glass is between the high and low level marks. The sight glass is located on the opposite side of the bearing housing from the oiler.

3.10 Check 2P-89C pump AND motor oil levels. _____

3.11 Start 2P-89C. _____

*

3.12 Monitor temperature of applicable piping per Initial Conditions AND submit CR if piping downstream master mini recirc exceeds 140°F OR piping downstream applicable mini recirc isolation valve exceeds 200°F. (CR-2-2001-0032 determined piping operable to 255°F)

3.13 Notify System Engineer to measure 2P-89C recirc flow upstream of HPSI Recirc Check valve (2SI-23C) to verify 2SI-23C open AND record in Table 15. _____

3.14 Align discharge pressure gage (2PI-5102) by opening the following valves:

- 2SI-1042C _____
- 2SI-1043C _____

3.15 Align mini-recirc pressure gage by opening the following valves:

- 2SI-1067 _____
- 2SI-1068 _____

3.16 Throttle open Th Injection valve (2CV-5101-1) until > 392 GPM indicated on 2FI-5101-1. _____

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CAUTION

HPSI pump flow > 852 GPM could cause pump runout and excessive motor amps.

- 3.17 Throttle open HPSI Injection valves as necessary to obtain _____
> 770 GPM on 2FI-5101-1 AND record 2P-89C flow in Table 3.
- 3.18 Throttle HPSI Injection valves to set total header flow (F5084) _____
between 770 and 780 GPM.
- 3.19 Record Header flow: _____ GPM. _____
- 3.20 Isolate 2P-89C recirc by closing the following valves:
 - 2SI-62 _____
 - 2CV-5127-1 _____
- 3.21 Record Header flow: _____ GPM. _____
- 3.22 Close 2CV-5101-1. _____
- 3.23 Throttle HPSI Injection valves to set total header flow (F5084) _____
between 770 and 780 GPM.
- 3.24 Collect pump data listed in Table 6. _____
- 3.25 IF System Engineer desires data at various flow rates, _____
THEN throttle HPSI Injection valves as needed AND attach _____
results.
- 3.26 Restore 2P-89C recirc by opening the following valves:
 - 2CV-5127-1 _____
 - 2SI-62 _____
- 3.27 Verify all Cold Leg Injection valves open to electrical limit:
 - 2CV-5015-1 _____
 - 2CV-5035-1 _____
 - 2CV-5055-1 _____
 - 2CV-5075-1 _____
- 3.28 Record individual flows in Table 9. _____

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- 3.29 IF during refueling outage
OR any ECCS subsystem modifications have been performed that
may have altered flow characteristics,
THEN check flow balance between hot and cold leg as follows:
- 3.29.1 Close Orifice Bypass valve (2CV-5103-1). _____
- 3.29.2 Open Th Injection valve (2CV-5101-1) _____
- 3.29.3 Record Total Cold Leg Injection flow (F5084)
AND HPSI Header flow (2FI-5101-1) in Table 10. _____
- 3.29.4 Close 2CV-5101-1. _____
- 3.29.5 Open 2CV-5103-1. _____
- 3.30 Verify all HPSI Injection valves closed. _____
- 3.31 Stop 2P-89C AND place in PULL TO LOCK. _____
- 3.32 IF desired to stop 2VUC-11A,
THEN place in NORMAL AFTER STOP. _____
- {4.3.2} 3.33 IF used to collect 2P-89C test data,
THEN isolate gauges by closing the following valves:
(outboard then inboard - will not overrange gage due to
piston affect - ER010827E201)
- 3.33.1 2SI-5098B _____
- 3.33.2 2SI-5098A _____
- 3.33.3 2SI-1043C _____
- 3.33.4 2SI-1042C _____
- 3.33.5 2SI-1068 _____
- 3.33.6 2SI-1067 _____
- 3.34 Close 2SI-2A as desired. _____
- 3.35 Restore 2CV-5630-1 to desired position. _____
- 3.36 IF 2P-89C test data collection (Table 6) complete,
THEN remove test gauge from mini-recirc vent
AND replace cap. _____
- 3.37 IF test gauge removed,
THEN independently verify test gauge removed AND cap replaced. _____

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4.0 2P-89B TEST

NOTE

Steps 4.1 through 4.6 may be performed in any order.

- 4.1 Verify Initial Conditions (Section 1.0). _____
- 4.2 Verify Hot Leg Injection valve (2CV-5102-2) closed AND energized (2B62-G2). _____
- 4.3 Verify calibrated 3-D Model 2554x-32y (where x and y can be anything) test gauge with range of 0 to 2000 psig AND accuracy of 1/4% full scale installed at 2P-89B Discharge 2SI-5001A and 2SI-5001B. _____
- 4.4 Verify LPSI pump (2P-60B) suction valves aligned for SDC:
 - 2P-60B Suction From RWT (2SI-2B) closed. _____
 - 2P-60B Suction From RCS (2SI-1B) open. _____
- 4.5 Verify the following valves closed:
 - CNTMT Sump Isolation (2CV-5650-2 OR 2CV-5648-2) _____
 - RWT 2T-3 Outlet (2CV-5631-2) _____
 - 2P-89C Recirc (2CV-5127-1) _____
 - 2P-35B Recirc (2CV-5672-1) _____
 - B HPSI pump Discharge Orifice Bypass Isolation (2SI-32) _____
 - B HPSI pump Discharge Orifice Bypass Throttling (2SI-33) _____
 - RWT Recirc and Test Isolation (2BS-25) _____
- 4.6 Verify the following valves open:
 - HPSI Recirc to Train B Suction (2BS-54) _____
 - 2P-89B Suction Isol (2SI-8B) _____
 - 2SI-65 _____
 - 2P-89B Discharge Isol (2SI-10B) _____
 - RWT Recirc and Test Line Inlet to RWT (2BS-26) _____
 - HPSI 2P-89B Recirc Isol (2CV-5128-1) _____
 - ESF Mini Recirc Header Isol (2CV-5628-2) _____
 - SW ESF Header Isol (2CV-1406-2) _____

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CAUTION

Opening 2SI-2B aligns flow path between RCS and RWT via HPSI recirc header. Flow could be in either direction depending on RCS pressure and RWT level. Action may be necessary to control RCS level.

- 4.7 Open 2P-60B Suction From RWT (2SI-2B). _____
- * 4.8 Monitor RCS level AND adjust as necessary during this test.
- 4.9 Align suction gage (2PI-5100) by opening the following valves:
 - 2SI-5100A _____
 - 2SI-5100B _____

NOTE

2P-89B is operable if oil level visible in Oiler Glass bubbler.

- 4.10 Check 2P-89B pump AND motor oil levels. _____
- 4.11 Start 2P-89B. _____
- 4.12 Notify System Engineer to measure 2P-89B recirc flow downstream of HPSI Recirc Check valve (2SI-23B) (but upstream of "T" for 2SI-65) to verify 2SI-23B open AND record in Table 15. _____
- * 4.13 Monitor temperature of applicable piping per Initial Conditions AND submit CR if piping downstream master mini recirc exceeds 140°F OR piping downstream applicable mini recirc isolation valve exceeds 200°F. (CR-2-2001-0032 determined piping operable to 255°F)
- 4.14 Align discharge gage (2PI-5101) by opening the following valves:
 - 2SI-1042B _____
 - 2SI-1043B _____
- 4.15 Align temporary discharge pressure gage by opening the following valves:
 - 2SI-5001A _____
 - 2SI-5001B _____
- 4.16 Cycle HPSI Injection valves open AND closed one at a time AND record flow rate for each valve in Table 1:
 - 2CV-5016-2 _____
 - 2CV-5036-2 _____
 - 2CV-5056-2 _____
 - 2CV-5076-2 _____

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- 4.17 Throttle open Th Injection valve (2CV-5102-2) until _____
> 392 GPM indicated on 2FI-5102-2 AND record flow in Table 2.

CAUTION

HPSI pump flow > 852 GPM could cause pump runout and excessive motor amps.

- 4.18 Throttle open HPSI Injection valves as necessary to obtain _____
> 770 GPM on 2FI-5102-2 AND record 2P-89B flow in Table 3.
- 4.19 Throttle HPSI Injection valves to set total header flow (F5084) _____
between 770 and 780 GPM.
- 4.20 Record header flow: _____ GPM. _____
- 4.21 Isolate 2P-89B recirc by closing the following valves:
- 2CV-5128-1 _____
 - 2SI-65 _____
- 4.22 Record header flow: _____ GPM. _____
- 4.23 Close 2CV-5102-2. _____
- 4.24 Throttle HPSI Injection valves to set total header flow (F5084) _____
between 770 and 780 GPM.
- 4.25 Collect pump data listed in Table 5. _____
- 4.26 IF System Engineer desires data at various flow rates,
THEN throttle HPSI Injection valves as needed AND attach
results. _____
- 4.27 Restore 2P-89B recirc by opening the following valves:
- 2CV-5128-1 _____
 - 2SI-65 _____
- 4.28 Verify all Cold Leg Injection valves open to electrical limit:
- 2CV-5016-2 _____
 - 2CV-5036-2 _____
 - 2CV-5056-2 _____
 - 2CV-5076-2 _____
- 4.29 Record individual flows in Table 11. _____

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- 4.30 IF during refueling outage
OR any ECCS subsystem modifications have been performed that
may have altered flow characteristics,
THEN check flow balance between hot and cold leg as follows:
- 4.30.1 Close Orifice Bypass valve (2CV-5104-2). _____
- 4.30.2 Open Th Injection valve (2CV-5102-2). _____
- 4.30.3 Record Total Cold Leg Injection flow (F5084)
AND HPSI Header flow (2FI-5102-2) in Table 12. _____
- 4.30.4 Close 2CV-5102-2. _____
- 4.30.5 Open 2CV-5104-2. _____
- 4.31 Verify ALL Loop 2 HPSI Injection valves closed. _____
- 4.32 Stop 2P-89B AND place in PULL TO LOCK. _____
- 4.33 IF desired to stop EITHER of the following fans,
THEN place in NORMAL AFTER STOP:
- 2VUC-1D _____
 - 2VUC-1E _____
- {4.3.2} 4.34 **Isolate gauges by closing the following valves:**
(outboard then inboard - will not overrange gage due to
piston affect - ER010827E201)
- 4.34.1 **2SI-5100B** _____
- 4.34.2 **2SI-5100A** _____
- 4.34.3 **2SI-1043B** _____
- 4.34.4 **2SI-1042B** _____
- 4.34.5 **2SI-5001B** _____
- 4.34.6 **2SI-5001A** _____
- 4.35 Close 2SI-2B as desired. _____
- 4.36 Restore 2CV-5631-2 to desired position. _____
- 4.37 Independently verify test gauge removed AND cap replaced. _____

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5.0 2P-89C (GREEN TRAIN) TEST

NOTE

Steps 5.1 through 5.6 may be performed in any order.

- | | | |
|-----|---|-------|
| 5.1 | Verify Initial Conditions (Section 1.0). | _____ |
| 5.2 | Verify Hot Leg Injection valve (2CV-5102-2) closed AND energized (2B62-G2). | _____ |
| 5.3 | Verify calibrated 3-D Model 2554x-32y (where x and y can be anything) test gauge with range of 0 to 2000 psig AND accuracy of 1/4% full scale installed on mini-recirc vent at 2SI-1067 AND 2SI-1068. (N/A this step if already performed in section 3.0) | _____ |
| 5.4 | Verify LPSI pump (2P-60B) suction valves aligned for SDC: | |
| | • 2P-60B Suction From RWT (2SI-2B) closed. | _____ |
| | • 2P-60B Suction From RCS (2SI-1B) open. | _____ |
| 5.5 | Verify the following valves open: | |
| | • HPSI Recirc to Train B Suction (2BS-54) | _____ |
| | • 2P-89C Recirc to Train B Suction (2SI-67) | _____ |
| | • 2P-89C Recirc Isol (2SI-62) | _____ |
| | • 2P-89C Suction Isol (2SI-9B) | _____ |
| | • 2P-89C Discharge Isol (2SI-10C) | _____ |
| | • 2P-89C Discharge Cross Connect (2SI-11B) | _____ |
| | • RWT Recirc and Test Line Inlet to RWT (2BS-26) | _____ |
| | • HPSI 2P-89C Recirc Isol (2CV-5127-1) | _____ |
| | • ESF Mini Recirc Header Isol (2CV-5628-2) | _____ |
| | • SW ESF Header Isol (2CV-1406-2) | _____ |
| 5.6 | Verify the following valves closed: | |
| | • CNTMT Sump Isolation (2CV-5650-2 OR 2CV-5648-2) | _____ |
| | • RWT 2T-3 Outlet (2CV-5631-2) | _____ |
| | • 2P-89B Recirc (2CV-5128-1) | _____ |
| | • 2P-35B Recirc (2CV-5672-1) | _____ |
| | • RWT Recirc and Test Isolation (2BS-25) | _____ |
| | • 2P-89C HPSI Suction X-Connect (2SI-9A) | _____ |
| | • 2P-89C Discharge X-Connect (2SI-11A) | _____ |
| | • 2P-89C Recirc to A Train Suction (2SI-66) | _____ |

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CAUTION

Opening 2SI-2B aligns flow path between RCS and RWT via HPSI recirc header. Flow could be in either direction depending on RCS pressure and RWT level. Action may be necessary to control RCS level.

5.7 Open 2P-60B Suction From RWT (2SI-2B). _____

* 5.8 Monitor RCS level AND adjust as necessary during this test.

NOTE

If Section 3.0 of this Supplement has been completed during this outage, then steps 5.9 and 5.13 through 5.26 may be N/A'd.

5.9 Align suction gage (2PI-5098) by opening the following valves:

- 2SI-5098A _____
- 2SI-5098B _____

NOTE

2P-89C HPSI pump is operable if the oil level in the sight glass is between the high and low level marks. The sight glass is located on the opposite side of the bearing housing from the oiler.

5.10 Check 2P-89C pump AND motor oil levels. _____

5.11 Start 2P-89C. _____

* 5.12 Monitor temperature of applicable piping per Initial Conditions AND submit CR if piping downstream master mini recirc exceeds 140°F OR piping downstream applicable mini recirc isolation valve exceeds 200°F. (CR-2-2001-0032 determined piping operable to 255°F)

5.13 Notify System Engineer to measure 2P-89C recirc flow upstream of HPSI Recirc Check valve (2SI-23C) to verify 2SI-23C open AND record in Table 15. _____

5.14 Align discharge gage (2PI-5102) by opening the following valves:

- 2SI-1042C _____
- 2SI-1043C _____

5.15 Align mini-recirc gauge by opening the following valves:

- 2SI-1067 _____
- 2SI-1068 _____

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- 5.16 Throttle open Th Injection valve (2CV-5102-2) until > 392 GPM _____
indicated on 2FI-5102-2.

CAUTION

HPSI pump flow > 852 GPM could cause pump runout and excessive motor amps.

- 5.17 Throttle open HPSI Injection valves as necessary to obtain _____
> 770 GPM on 2FI-5102-2 AND record 2P-89C flow in Table 3.
- 5.18 Throttle HPSI Injection valves to set total header flow (F5084) _____
between 770 and 780 GPM.
- 5.19 Record header flow: _____ GPM _____
- 5.20 Isolate 2P-89C recirc by closing the following valves:
- 2CV-5127-1 _____
 - 2SI-62 _____
- 5.21 Record header flow: _____ GPM. _____
- 5.22 Close 2CV-5102-2. _____
- 5.23 Throttle HPSI Injection valves to set total header flow (F5084) _____
between 770 and 780 GPM.
- 5.24 Collect pump data listed in Table 6. _____
- 5.25 IF System Engineer desires data at various flow rates,
THEN throttle HPSI Injection valves as needed AND attach
results. _____
- 5.26 Restore 2P-89C recirc by opening the following valves:
- 2CV-5127-1 _____
 - 2SI-62 _____
- 5.27 Verify the following valves open to electrical limit:
- 2CV-5016-2 _____
 - 2CV-5036-2 _____
 - 2CV-5056-2 _____
 - 2CV-5076-2 _____
- 5.28 Record individual flows in Table 13. _____

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- 5.29 IF during refueling outage
OR any ECCS subsystem modifications have been performed that
may have altered flow characteristics,
THEN check flow balance between hot and cold leg as follows:
- 5.29.1 Close Orifice Bypass valve (2CV-5104-2). _____
- 5.29.2 Open Th Injection valve (2CV-5102-2). _____
- 5.29.3 Record Total Cold Leg Injection flow (F5084) AND
HPSI Header flow (2FI-5102-2) in Table 14. _____
- 5.29.4 Close 2CV-5102-2. _____
- 5.29.5 Open 2CV-5104-2. _____
- 5.30 Close all four HPSI Injection valves. _____
- 5.31 Stop 2P-89C AND place in PULL TO LOCK. _____
- 5.32 IF desired to stop 2VUC-11B,
THEN place in NORMAL AFTER STOP. _____
- {4.3.2} 5.33 IF used to collect 2P-89C test data,
THEN isolate suction AND discharge pressure gauges by closing
the following valves: (outboard then inboard - will not
overrange gage due to piston affect - ER010827E201)
- 5.33.1 **2SI-5098B** _____
- 5.33.2 **2SI-5098A** _____
- 5.33.3 **2SI-1043C** _____
- 5.33.4 **2SI-1042C** _____
- 5.33.5 **2SI-1068** _____
- 5.33.6 **2SI-1067** _____
- 5.34 Close 2SI-2B as desired. _____
- 5.35 Restore 2CV-5631-2 to desired position. _____
- 5.36 IF 2P-89C test data collection (Table 6) complete,
THEN remove test gauge from mini-recirc vent AND replace cap. _____
- 5.37 IF test gauge removed,
THEN independently verify test gauge removed AND cap replaced. _____

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6.0 RESTORATION

6.1 IF Ultrasonic flow measuring device was installed,
THEN perform the following:

6.1.1 Remove ultrasonic flow measuring device. _____

6.1.2 Independently verify removal of ultrasonic flow
measuring device. _____

6.2 IF any temporary test gauge(s) were installed during this
test other than those used on mini-recirc vent,
THEN perform the following:

6.2.1 Verify all temporary test gauges removed. _____

6.2.2 Independently verify removal of temporary test
gauges. _____

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7.0 ACCEPTANCE CRITERIA

7.1 Record data AND compare with acceptance criteria.

TABLE 1				
INJECTION VALVE	VALVES TESTED	FLOW INDICATOR	FLOW RATE	IS FLOW RATE > 196 GPM?
2CV-5015-1	2CV-5015-1 2SI-13A	2FI-5014-1	GPM	YES NO
2CV-5035-1	2CV-5035-1 2SI-13B	2FI-5034-1	GPM	YES NO
2CV-5055-1	2CV-5055-1 2SI-13C	2FI-5054-2	GPM	YES NO
2CV-5075-1	2CV-5075-1 2SI-13D	2FI-5074-2	GPM	YES NO
2CV-5016-2	2CV-5016-2 2SI-13A	2FI-5014-1	GPM	YES NO
2CV-5036-2	2CV-5036-2 2SI-13B	2FI-5034-1	GPM	YES NO
2CV-5056-2	2CV-5056-2 2SI-13C	2FI-5054-2	GPM	YES NO
2CV-5076-2	2CV-5076-2 2SI-13D	2FI-5074-2	GPM	YES NO

TABLE 2				
INJECTION VALVE	VALVES TESTED	FLOW INDICATOR	FLOW RATE	IS FLOW RATE > 392 GPM?
2CV-5101-1	2SI-26A 2SI-27A 2SI-28A	2FI-5101-1	GPM	YES NO
2CV-5102-2	2SI-26B 2SI-27B 2SI-28B	2FI-5102-2	GPM	YES NO

TABLE 3				
PUMP	VALVES TESTED	FLOW INDICATOR	FLOW RATE	IS FLOW RATE > 770 GPM?
2P-89A	2SI-10A 2SI-12	2FI-5101-1	GPM	YES NO
2P-89B	2SI-10B	2FI-5102-2	GPM	YES NO
2P-89C	2SI-10C	2FI-5101-1/ 2FI-5102-2	GPM	YES NO

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TABLE 4					
2P-89A TEST QUANTITY	INSTRUMENT (INCLUDE TEST INST)	MEASURED VALUE	ACCEPTABLE NORMAL RANGE	LIMITING RANGE FOR OPERABILITY	IS DATA IN LIMITING RANGE?
Running Suction Pressure	2PI-5090 (local)	psig	≥ 8 psig	≥ 8 psig	YES NO
Pump Flow	F5084	GPM	770 to 780 GPM	N/A	N/A
Discharge Pressure	Mini-Recirc Test Gage	psig	N/A	N/A	N/A
	2PI-5091 (local)	psig	N/A	N/A	N/A
	2PI-5108 (2C17)	psig	N/A	N/A	N/A
Pump ΔP {4.3.1}	Mini Recirc Test Gage - 2PI-5090	psid	N/A	611.9 to 733.4 psid	YES NO
Inboard Brg Radial #1 Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Inboard Brg Radial #2 Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Inboard Brg Axial Vibes		in/sec	≤ 0.177 in/sec	≤ 0.426 in/sec	YES NO
Outboard Brg Radial #1 Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Outboard Brg Radial #2 Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Outboard Brg Axial Vibes		in/sec	≤ 0.282 in/sec	≤ 0.678 in/sec	YES NO

Vibration Instrument Cal Due Date _____

Vibration Data Collected By _____

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TABLE 5 (Pump Vib data = ER-2002-0844)					
2P-89B TEST QUANTITY	INSTRUMENT (INCLUDE TEST INST)	MEASURED VALUE	ACCEPTABLE NORMAL RANGE	LIMITING RANGE FOR OPERABILITY	IS DATA IN LIMITING RANGE?
Running Suction Pressure	2PI-5100 (local)	psig	≥ 8 psig	≥ 8 psig	YES NO
Pump Flow	F5084	GPM	770 to 780 GPM	N/A	N/A
Discharge Pressure	2PI-5101 (local)	psig	N/A	N/A	N/A
	2PI-5109 (2C16)	psig	N/A	N/A	N/A
	2PP-5001 Test Gage	psig	N/A	N/A	N/A
Pump ΔP {4.3.1}	2PI-5001 - 2PI-5100	psid	N/A	685 to 837 psid	YES NO
Inboard Brg Radial #1 Vibes		in/sec	≤ 0.237 in/sec	≤ 0.570 in/sec	YES NO
Inboard Brg Radial #2 Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Inboard Brg Axial Vibes		in/sec	≤ 0.227 in/sec	≤ 0.546 in/sec	YES NO
Outboard Brg Radial #1 Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Outboard Brg Radial #2 Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Outboard Brg Axial Vibes		in/sec	≤ 0.180 in/sec	≤ 0.432 in/sec	YES NO

Vibration Instrument Cal Due Date _____

Vibration Data Collected By _____

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TABLE 6					
2P-89C TEST QUANTITY	INSTRUMENT (INCLUDE TEST INST)	MEASURED VALUE	ACCEPTABLE NORMAL RANGE	LIMITING RANGE FOR OPERABILITY	IS DATA IN LIMITING RANGE?
Running Suction Pressure	2PI-5098 (local)	psig	≥ 8 psig	≥ 8 psig	YES NO
Pump Flow	F5084	GPM	770 to 780 GPM	N/A	N/A
Discharge Pressure	Mini-Recirc Test Gage	psig	N/A	N/A	N/A
	2PI-5102 (local)	psig	N/A	N/A	N/A
	2PI-5108 or 2PI-5109	psig	N/A	N/A	N/A
Pump ΔP {4.3.1}	Mini-Recirc Test Gage - 2PI-5098	psid	N/A	686.3 to 838.7 psid	YES NO
Inboard Brg Radial #1 Vibes		in/sec	≤ 0.195 in/sec	≤ 0.468 in/sec	YES NO
Inboard Brg Radial #2 Vibes		in/sec	≤ 0.320 in/sec	≤ 0.700 in/sec	YES NO
Inboard Brg Axial Vibes		in/sec	≤ 0.242 in/sec	≤ 0.582 in/sec	YES NO
Outboard Brg Radial #1 Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Outboard Brg Radial #2 Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO
Outboard Brg Axial Vibes		in/sec	≤ 0.325 in/sec	≤ 0.700 in/sec	YES NO

Vibration Instrument Cal Due Date _____

Vibration Data Collected By _____

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7.2 Record data AND compare to acceptance criteria.

TABLE 7		
HEADER #1 VALVE	FLOW INDICATOR	FLOW RATE
2CV-5015-1	F5014-1	GPM
2CV-5035-1	F5034-1	GPM
2CV-5055-1	F5054-2	GPM
2CV-5075-1	F5074-2	GPM

7.2.1 Add three lowest flows from Table 7:
_____ + _____ + _____ = _____ GPM

7.2.2 Is sum of three lowest flows \geq 594 GPM? YES NO

7.2.3 Is the total flow \leq 852 GPM? YES NO

7.3 Calculate ratio of cold leg flow to total header flow.

TABLE 8		
TOTAL COLD LEG INJECTION FLOW (F5084)	HPSI HEADER #1 FLOW (2FI-5101)	RATIO OF COLD LEG FLOW TO HEADER FLOW (F5084 \div 2FI-5101)
GPM	GPM	

7.4 IF required to test 2P-89C on Header #1,
THEN record data AND compare with acceptance criteria.

TABLE 9		
HEADER #1 VALVE	FLOW INDICATOR	FLOW RATE
2CV-5015-1	F5014-1	GPM
2CV-5035-1	F5034-1	GPM
2CV-5055-1	F5054-2	GPM
2CV-5075-1	F5074-2	GPM

7.4.1 Add three lowest flows from Table 9:
_____ + _____ + _____ = _____ GPM

7.4.2 Is sum of three lowest flows \geq 594 GPM? YES NO N/A

7.4.3 Is the total flow \leq 852 GPM? YES NO N/A

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- 7.5 Calculate ratio of cold leg flow to total header flow
(add to Table 10).

TABLE 10		
TOTAL COLD LEG INJECTION FLOW (F5084)	HPSI HEADER #1 FLOW (2FI-5101-1)	RATIO OF COLD LEG FLOW TO HEADER FLOW (F5084 ÷ 2FI-5101-1)
GPM	GPM	

- 7.6 Record data AND compare to acceptance criteria.

TABLE 11		
HEADER #2 VALVE	FLOW INDICATOR	FLOW RATE
2CV-5016-2	F5014-1	GPM
2CV-5036-2	F5034-1	GPM
2CV-5056-2	F5054-2	GPM
2CV-5076-2	F5074-2	GPM

- 7.6.1 Add three lowest flows from Table 11:
_____ + _____ + _____ = _____ GPM _____
- 7.6.2 Is sum of three lowest flows \geq 594 GPM? YES NO
- 7.6.3 Is the total flow \leq 852 GPM? YES NO

- 7.7 Calculate ratio of cold leg flow to total header flow.

TABLE 12		
TOTAL COLD LEG INJECTION FLOW (F5084)	HPSI HEADER #2 FLOW (2FI-5102)	RATIO OF COLD LEG FLOW TO HEADER FLOW (F5084 ÷ 2FI-5102)
GPM	GPM	

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- 7.8 IF required to test 2P-89C on Header #2,
THEN record data AND compare with acceptance criteria.

TABLE 13		
HEADER #2 VALVE	FLOW INDICATOR	FLOW RATE
2CV-5016-2	F5014-1	GPM
2CV-5036-2	F5034-1	GPM
2CV-5056-2	F5054-2	GPM
2CV-5076-2	F5074-2	GPM

- 7.8.1 Add three lowest flows from Table 13:
_____ + _____ + _____ = _____ GPM
- 7.8.2 Is sum of three lowest flows \geq 594 GPM? YES NO N/A
- 7.8.3 Is the total flow \leq 852 GPM? YES NO N/A

- 7.9 Calculate the ratio of cold leg to total header flow

TABLE 14		
TOTAL COLD LEG INJECTION FLOW (F5084)	HPSI HEADER #2 FLOW (2FI-5102)	RATIO OF COLD LEG FLOW TO HEADER FLOW (F5084 \div 2FI-5102)
GPM	GPM	

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7.10 Record data AND compare to acceptance criteria.

Table 15				
Valve	Instrument	Measured Value	Acceptance Criteria	Acceptance Criteria met?
2SI-23A		GPM	2SI-23A flow \geq 20 GPM	YES NO N/A
2SI-23B		GPM	2SI-23B flow \geq 20 GPM	YES NO N/A
2SI-23C		GPM	2SI-23C flow \geq 20 GPM	YES NO N/A

7.11 IF NO circled,
THEN perform the following:

- Declare applicable component inoperable.
- Refer to Tech Spec 3.5.2 and 3.5.3.
- Notify SM.
- Initiate Condition Report.

7.12 Send copy of completed supplement to System Engineer.

7.13 IF test performed with RCS boron concentration < 2500 ppm,
THEN perform the following:

- Initiate action to perform HPSI Header Flush (2103.002, Attachment G) during RCS fill OR prior to heatup.
- Notify SM/CRS HPSI system not available for Tech Spec Boration source.
- Make Status Board entries as required.

Comments _____

Performed By _____ Date _____

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8.0 SUPERVISOR REVIEW AND ANALYSIS

NOTE

Failure of HPSI pumps to meet specified flow or DP criteria of this test does NOT affect HPSI pump availability in Mode 5 or 6. Results outside acceptable normal range require resolution prior to heatup.

- 8.1 Do all measured values recorded in Acceptance Criteria section fall within specified Limiting Range for Operability? YES NO
- 8.2 Do all measured values recorded in Acceptance Criteria section fall within acceptable normal range? (Circle YES NO N/A N/A if only values outside Acceptable Normal Range are also outside Limiting Range for Operability).
- 8.3 IF NO circled in step 8.2, THEN perform the following corrective actions:
- 8.3.1 Notify IST Engineer to evaluate test results. _____
- 8.3.2 IF corrective maintenance required OR recommended, THEN initiate WR/WO indicating heatup restraint. _____
- 8.3.3 Make Control Room Log AND Status Board entries. _____

Comments _____

- 8.4 Are all administrative requirements of this test satisfied? YES NO

Supervisor _____ Date _____

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SUPPLEMENT 7A

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HPSI TRAIN A INTEGRITY TEST AND LEAK RATE DETERMINATION

This test assesses integrity of HPSI Train A by performing walkdown of system at pressure to satisfy Facility Operating License and NUREG 0578, Section 2.1.6.a.

1.0 INITIAL CONDITIONS

- Stopwatch, graduated cylinder, and containers for leak detection available. Stopwatch Serial Number _____
- IF available,
THEN obtain camera to capture photo of any boric acid leaks for the boric acid leak program (refer to 1032.047, Inspection and Evaluation of Boric Acid Leaks).

2.0 TEST PROCEDURE

- 2.1 Verify 2P-89A running on mini-recirc using Section 9.0 or Supplement 1 of this procedure. _____
- 2.2 After 5 minutes of pump operation, inspect portions of HPSI Train A outside Containment AND pressurized. Using P&ID M-2232 as guide, locate AND inspect each potential leakage source (valves, flanges, pump seals, etc.). _____
- 2.3 IF camera available,
THEN obtain photograph of any previously unidentified boric acid leak. _____
- 2.4 IF visible source of leakage identified,
THEN perform EITHER of the following (NA method NOT used):
 - Collect measured sample volume during timed interval to determine leak rate.
Record Initial Leak Rate on Leak Rate Data Sheet. _____
 - Count drops during timed interval (20 drops ~ 1 cc).
Record Initial Leak Rate on Leak Rate Data Sheet. _____
- 2.5 IF anything can be done during inspection to stop OR reduce leakage (i.e., adjust packing, tighten valves, etc.),
THEN take action to stop OR reduce leakage from each source. _____
- 2.6 IF anything was done to reduce leakage,
THEN record Final Leak Rate on Leak Rate Data Sheet. _____
- 2.7 Stop 2P-89A. _____

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SUPPLEMENT 7A

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3.0 ACCEPTANCE CRITERIA

3.1 Record total Final HPSI Train A leak rate: _____cc/min. _____

3.2 IF HPSI pump mechanical seal leak rate > 17 dpm
OR any other component final leak rate > 0 dpm,
THEN verify WR/WO submitted. _____

3.3 IF total HPSI Train A leakage > 6.5 cc/min (390 cc/hr),
THEN perform the following:

- Notify Shift Manager _____
- Refer to Calculation 97-R-2002-01 _____
- Notify System Engineering to evaluate leakage for impact
to ECCS SAR leakage criteria _____

3.4 IF any component final leak rate > 0 dpm,
THEN verify Condition Report initiated. _____

3.5 Forward copy of this test to System Engineering. _____

Performed By _____ Date _____

4.0 SUPERVISOR REVIEW AND ANALYSIS

4.1 IF any components have final leakrate > 0 cc/min,
THEN describe action taken below: _____

4.2 Are all administrative requirements of this test satisfied? YES NO

Supervisor _____ Date _____

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SUPPLEMENT 7A

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LEAK RATE DATA SHEET

Sheet ____ of ____

COMPONENT	INITIAL SAMPLE SIZE (3)	INITIAL TEST DURATION	INITIAL LEAK RATE (cc/min) (1)	CORRECTIVE ACTION TAKEN? (2)	FINAL SAMPLE SIZE (3)	FINAL TEST DURATION	FINAL LEAK RATE (cc/min) (1)
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			

(1) Leak Rate = Sample Volume ÷ Test Duration (20 drops = 1 cc)

(2) IF NO circled,
THEN N/A next two columns AND write initial leak rate for final leak rate.

(3) N/A if leak collection not performed.

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SUPPLEMENT 7B

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HPSI TRAIN B INTEGRITY TEST AND LEAK RATE DETERMINATION

This test assesses integrity of HPSI Train B by performing walkdown of system at pressure to satisfy Facility Operating License and NUREG 0578, Section 2.1.6.a.

1.0 INITIAL CONDITIONS

- Stopwatch, graduated cylinder, and containers for leak detection available. Stopwatch Serial Number _____
- IF available,
THEN obtain camera to capture photo of any boric acid leaks for the boric acid leak program (refer to 1032.047, Inspection and Evaluation of Boric Acid Leaks).

2.0 TEST PROCEDURE

- 2.1 Verify 2P-89B running on mini-recirc using Section 9.0 or Supplement 2 of this procedure. _____
- 2.2 After 5 minutes of pump operation, inspect portions of HPSI Train B outside Containment AND pressurized. Using P&ID M-2232 as guide, locate AND inspect each potential leakage source (valves, flanges, pump seals, etc.). _____
- 2.3 IF camera available,
THEN obtain photograph of any previously unidentified boric acid leak. _____
- 2.4 IF visible source of leakage identified,
THEN perform EITHER of the following (NA method NOT used):
 - Collect measured sample volume during timed interval to determine leak rate.
Record Initial Leak Rate on Leak Rate Data Sheet. _____
 - Count drops during timed interval (20 drops ~ 1 cc).
Record Initial Leak Rate on Leak Rate Data Sheet. _____
- 2.5 IF anything can be done during inspection to stop OR reduce leakage (i.e., adjust packing, tighten valves, etc.),
THEN take action to stop OR reduce leakage from each source. _____
- 2.6 IF anything was done to reduce leakage,
THEN record Final Leak Rate on Leak Rate Data Sheet. _____
- 2.7 Stop 2P-89B. _____

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SUPPLEMENT 7B

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3.0 ACCEPTANCE CRITERIA

3.1 Record total Final HPSI Train B leak rate: _____cc/min. _____

3.2 IF HPSI pump mechanical seal leak rate > 17 dpm
OR any other component final leak rate > 0 dpm,
THEN verify WR/WO submitted. _____

3.3 IF total HPSI Train B leakage > 6.5 cc/min (390 cc/hr),
THEN perform the following:

- Notify Shift Manager. _____
- Refer to Calculation 97-R-2002-01. _____
- Notify System Engineering to evaluate leakage for impact
to ECCS SAR leakage criteria. _____

3.4 IF ANY component final leak rate > 0 dpm,
THEN verify Condition Report initiated. _____

3.5 Forward copy of this test to System Engineering. _____

Performed By _____ Date _____

4.0 SUPERVISOR REVIEW AND ANALYSIS

4.1 IF any components have final leakrate > 0 cc/min,
THEN describe action taken below: _____

4.2 Are all administrative requirements of this test satisfied? YES NO

Supervisor _____ Date _____

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SUPPLEMENT 7B

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LEAK RATE DATA SHEET

Sheet ____ of ____

COMPONENT	INITIAL SAMPLE SIZE (3)	INITIAL TEST DURATION	INITIAL LEAK RATE (cc/min) (1)	CORRECTIVE ACTION TAKEN? (2)	FINAL SAMPLE Size (3)	FINAL TEST DURATION	FINAL LEAK RATE (cc/min) (1)
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			

(1) Leak Rate = Sample Volume ÷ Test Duration (20 drops = 1 cc)

(2) IF NO circled,
THEN N/A next two columns AND write initial leak rate for final leak rate.

(3) N/A if leak collection not performed.

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SUPPLEMENT 7C

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HPSI TRAIN C INTEGRITY TEST AND LEAK RATE DETERMINATION

This test assesses integrity of HPSI Train C (2P-89C suction AND discharge to Cross-Connect valves) by performing walkdown of system at pressure to satisfy Facility Operating License and NUREG 0578, Section 2.1.6.a.

1.0 INITIAL CONDITIONS

- Stopwatch, graduated cylinder, and containers for leak detection available. Stopwatch Serial Number _____
- IF available,
THEN obtain camera to capture photo of any boric acid leaks for the boric acid leak program (refer to 1032.047, Inspection and Evaluation of Boric Acid Leaks).

2.0 TEST PROCEDURE

- 2.1 Verify 2P-89C running on mini-recirc using Section 9.0 or Supplement 3 of this procedure. _____
- 2.2 After 5 minutes of pump operation, inspect portions of HPSI Train C which are pressurized AND not in Train A OR B. Using P&ID M-2232 as guide, locate AND inspect each potential leakage source (valves, flanges, pump seals, etc.). _____
- 2.3 IF camera available,
THEN obtain photograph of any previously unidentified boric acid leak. _____
- 2.4 IF visible source of leakage identified,
THEN perform EITHER of the following (NA method NOT used):
 - Collect measured sample volume during timed interval to determine leak rate.
Record Initial Leak Rate on Leak Rate Data Sheet. _____
 - Count drops during timed interval (20 drops ~ 1 cc).
Record Initial Leak Rate on Leak Rate Data Sheet. _____
- 2.5 IF anything can be done during inspection to stop OR reduce leakage (i.e., adjust packing, tighten valves, etc.),
THEN take action to stop OR reduce leakage from each source. _____
- 2.6 IF anything was done to reduce leakage,
THEN record Final Leak Rate on Leak Rate Data Sheet. _____
- 2.7 Stop 2P-89C. _____

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SUPPLEMENT 7C

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3.0 ACCEPTANCE CRITERIA

3.1 Record total Final HPSI Train C leak rate: _____cc/min. _____

3.2 IF HPSI pump mechanical seal leak rate > 17 dpm
OR any other component final leak rate > 0 dpm,
THEN verify WR/WO submitted. _____

3.3 IF total HPSI Train C leakage > 6.5 cc/min (390 cc/hr),
THEN perform the following:

- Notify Shift Manager. _____
- Refer to Calculation 97-R-2002-01. _____
- Notify System Engineering to evaluate leakage for impact to ECCS SAR leakage criteria. _____

3.4 IF any component final leak rate > 0 dpm,
THEN verify Condition Report initiated. _____

3.5 Forward copy of this test to System Engineering. _____

Performed By _____ Date _____

4.0 SUPERVISOR REVIEW AND ANALYSIS

4.1 IF any components have final leakrate > 0 cc/min,
THEN describe action taken below:

4.2 Are all administrative requirements of this test satisfied? YES NO

Supervisor _____ Date _____

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SUPPLEMENT 7C

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LEAK RATE DATA SHEET

Sheet ____ of ____

COMPONENT	INITIAL SAMPLE SIZE (3)	INITIAL TEST DURATION	INITIAL LEAK RATE (cc/min) (1)	CORRECTIVE ACTION TAKEN? (2)	FINAL SAMPLE SIZE (3)	FINAL TEST DURATION	FINAL LEAK RATE (cc/min) (1)
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			
				YES NO			

(1) Leak Rate = Sample Volume ÷ Test Duration (20 drops = 1 cc)

(2) IF NO circled,
THEN N/A next two columns AND write initial leak rate for final leak rate.

(3) N/A if leak collection not performed.

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SUPPLEMENT 8

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HPSI HEADER #1 HOT LEG INJECTION CHECK VALVE TEST

This test checks leakage for Hot Leg Injection check valves 2SI-26A, 2SI-27A and 2SI-28A per IST Program. For purpose of this test 2SI-27A and 2SI-28A considered one valve. All valves normally tested on refueling outage frequency.

Sections of this Supplement required as follows:

Section 2.0: 2SI-27A/2SI-28A Shutdown for Refueling Outage.

Section 3.0: 2SI-27A/2SI-28A leak rate determination OR PMT.

Section 4.0: 2SI-26A leakrate determination in Modes 1-3.

Section 5.0: 2SI-26A leakrate determination in Mode 5.

1.0 INITIAL CONDITIONS (May be performed in any order)

1.1 HPSI pumps aligned to Header #1 (2P-89A/C) secured. _____

1.2 IF performing Section 2.0,
THEN plant in Mode 3. _____

1.3 IF performing Section 3.0 only,
THEN plant in Mode 3, 4, or 5. _____

1.4 Obtain Tygon Tubing or hose. _____

1.5 IF performing Section 3.0 or 4.0,
THEN perform the following:

- Obtain Graduated cylinder or poly bottle to measure leakage. _____
- Verify Leak Collection Rig as described in Supplement 1 of 2104.004, Shutdown Cooling System available. _____

1.6 IF performing Section 5.0,
THEN verify the following:

- Plant in Mode 5. _____
- At least one SIT pressurized to > 250 psig. _____
- HPSI #1 Hot Leg Injection header filled AND vented. _____
- SIT Drain header not in use. _____
- All SIT outlet MOV's closed. _____
- HPSI #1 Hot Leg Injection not relied on for RCS Makeup per 1015.008 Att C. _____
- Obtain Graduated cylinder or poly bottle to measure leakage. _____
- WR/WO initiated for removal AND installation of restraint on 2SI-29A if required. WR/WO# _____

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2.0	2SI-27A AND 2SI-28A LEAK CHECK (N/A IF NOT REQUIRED)	
2.1	Verify Plant in Mode 3. Mode 3 required for duration of this test.	_____
2.2	Enter Tech Spec 3.5.2.	_____
{4.3.4}	2.3 Refer to Containment penetration administrative controls section of Conduct of Operations (1015.001) for 2CV-5101-1.	_____
2.4	Energize Th Injection valve (2CV-5101-1) by closing 2B52-L5.	_____
2.5	Monitor SIT level AND pressure while opening the following valves:	
	• SIT Drain to RDT (2CV-5081)	_____
	• CV Leakage (2CV-5105-1)	_____
2.6	Throttle open Th Injection (2CV-5101-1).	_____
2.7	<u>WHEN</u> pressure on 2PI-5105 has stabilized, <u>THEN</u> close the following valves:	
	• 2CV-5101-1	_____
	• 2CV-5105-1	_____
	• 2CV-5081	_____
2.8	Independently verify 2CV-5101-1 closed.	_____
2.9	Open 2CV-5101-1 breaker 2B52-L5.	_____
2.10	Exit Tech Spec 3.5.2.	_____
2.11	Verify RCS pressure ~ 2200 psia.	_____
2.12	Record initial pressure on 2PI-5105 in Table 1.	_____
2.13	<u>WHEN</u> 15 minutes have elapsed, <u>THEN</u> record final pressure on 2PI-5105 in Table 1.	_____
2.14	<u>IF</u> ΔP recorded in Table 1 greater than zero <u>AND</u> System Engineering determines need to quantify leakage, <u>THEN</u> perform the following:	
2.14.1	Complete Section 4.0 while preparing for CNTMT entry.	_____
2.14.2	<u>WHEN</u> CNTMT ready for entry, <u>THEN</u> perform Section 3.0.	_____

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NOTE

Leak test should be performed at ~ 250 psia RCS pressure in Mode 5. There is ~ 200 feet of pipe from 2SI-29A to 2CV-5101-1. This piping will have to be drained to quantify leakage from check valves. There may be 75 to 100 gallons of water in this line plus volume leaking into pipe.

3.0 2SI-27A AND 2SI-28A LEAK RATE DETERMINATION (N/A if not required)

3.1 Verify plant in Mode 3, 4, or 5. _____

3.2 IF this section being performed for PMT
THEN verify Supplement 6, of HPSI System Operations (2104.039)
has been performed after maintenance completed. _____

3.3 Verify HPSI Header #2 available for duration of test. _____

3.4 WHEN SITs removed from service,
THEN monitor RDT level/pressure AND open the following valves
to drain header as much as possible (L2200/P2200):

- 2CV-5105-1 _____
- 2CV-5081 _____

3.5 Connect hose to HPSI Header #1 Th Injection Drain (2SI-1061A)
AND route to floor drain. _____

3.6 Commence draining header by opening HPSI Header #1 Th
Injection Drains (2SI-1061A AND 2SI-1060A). _____

3.7 Continue draining header until slow, steady state
drain rate achieved. _____

3.8 Close the following valves:

- 2CV-5105-1 _____
- 2CV-5081 _____
- 2SI-1061A _____
- 2SI-1060A _____

3.9 Record RCS pressure in Table 2. _____

3.10 Attempt to maintain above pressure constant. _____

3.11 Open 2SI-1061A and 2SI-1060A AND continue draining header
until slow, steady state drain rate achieved. _____

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- 3.12 IF steam emitted from drain valves,
THEN perform the following:
- 3.12.1 Close the following valves:
- 2SI-1060A _____
 - 2SI-1061A _____
- 3.12.2 Obtain approximately 10 pounds of ice. _____
- 3.12.3 Connect Copper Cooling Coil as shown in Figure 1 of Supplement 1, 2104.004. _____
- 3.12.4 Connect Leak Collection Rig at 2SI-1061A. _____
- 3.12.5 Slowly open 2SI-1061A. _____
- 3.12.6 Slowly open 2SI-1060A while monitoring Leak Collection Rig pressure. _____
- 3.12.7 WHEN 2SI-1060A fully open,
THEN continue draining header until slow, steady state drain rate achieved. _____
- 3.13 Move hose from floor drain to measuring device
AND record initial time in Table 2. _____
- 3.14 WHEN five minutes have elapsed
OR at least two gallons collected,
THEN close the following valves:
- 2SI-1060A _____
 - 2SI-1061A _____
- 3.15 Record final time AND volume collected in Table 2. _____
- 3.16 IF Leak Collection Rig was used,
THEN remove AND store Leak Collection Rig. _____
- 3.17 Independently verify the following:
- 2SI-1060A closed. _____
 - 2SI-1061A closed AND capped. _____

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4.0 2SI-26A LEAK RATE DETERMINATION IN MODES 1-3 (N/A IF NOT REQUIRED)

4.1 Verify Plant in Mode 1, 2, or 3. _____

4.2 Connect hose to HPSI Header #1 Th Injection Vent (2SI-1059A) AND route to floor drain. _____

4.3 Open 2CV-5105-1. _____

4.4 Open any SIT Drain valve while monitoring SIT level AND pressure: _____

- 2SV-5001-1
- 2SV-5021-1
- 2SV-5041-2
- 2SV-5061-2

{4.3.4} 4.5 **Refer to Containment penetration administrative controls section of Conduct of Operations (1015.001) for 2SI-1058A AND 2SI-1059A.** _____

4.6 Open the following HPSI Header #1 Th Injection Vent valves: _____

- 2SI-1058A _____
- 2SI-1059A _____

4.7 Continue draining header until slow, steady state drain rate achieved. _____

4.8 IF steam emitted from vent valves,
THEN perform the following:

4.8.1 Close the following valves:

- 2SI-1058A _____
- 2SI-1059A _____

4.8.2 Obtain approximately 10 pounds of ice. _____

4.8.3 Connect Copper Cooling Coil per Figure 1 of Supplement 1, Shutdown Cooling System (2104.004). _____

4.8.4 Connect Leak Collection Rig at 2SI-1059A. _____

4.8.5 Open any SIT Drain valve while monitoring SIT level AND pressure. _____

4.8.6 Slowly open 2SI-1059A. _____

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- 4.8.7 Slowly open 2SI-1058A while monitoring Leak Collection Rig pressure. _____
- 4.8.8 WHEN 2SI-1058A fully open,
THEN continue draining header until slow, steady state drain rate achieved. _____
- 4.9 Move hose from floor drain to measuring device AND record initial time AND 2PI-5105 test pressure in Table 3. _____
- 4.10 WHEN five minutes have elapsed
OR at least two gallons collected,
THEN record final time AND volume collected in Table 3. _____
- 4.11 Perform the following:
- Lock close 2SI-1058A. _____
 - Lock close AND cap 2SI-1059A. _____
- 4.12 Close SIT Drain valve opened previously: _____
- 2SV-5001-1
 - 2SV-5021-1
 - 2SV-5041-2
 - 2SV-5061-2
- 4.13 Close 2CV-5105-1. _____
- 4.14 IF Leak Collection Rig was used,
THEN remove AND store Leak Collection Rig. _____
- 4.15 Independently verify the following:
- 2SI-1058A locked closed. _____
 - 2SI-1059A locked closed AND capped. _____

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5.0 2SI-26A LEAK RATE DETERMINATION IN MODE 5 (N/A IF NOT REQUIRED)

5.1 Verify Supplement 6, of HPSI System Operations (2104.039) _____
has been performed after maintenance completed.

5.2 Verify the following valves closed:

- 2CV-5081 _____
- 2CV-5082 _____
- 2CV-5101-1 _____
- 2SV-5001-1 _____
- 2SV-5021-1 _____
- 2SV-5041-2 _____
- 2SV-5061-2 _____

5.3 IF RCS pressure less than SIT pressure,
THEN close 2SI-29A (refer to 1015.008, SDC Control for
RCS Perturbation Determination). _____

5.4 Connect hose to HPSI Header #1 Th Injection Vent (2SI-1059A) _____
AND route to floor drain.

5.5 Open 2CV-5105-1. _____

NOTE

- Using highest available test pressure and maintaining constant pressure on 2SI-26A will ensure accurate test results.
- Monitor SIT pressure and level during test.

5.6 Open SIT Fill Bypass for desired SIT (Circle valve opened): _____

- A SIT 2SI-46
- B SIT 2SI-40
- C SIT 2SI-58
- D SIT 2SI-52

5.7 Refer to SDC Control, 1015.008 for Containment Closure control. _____

5.8 Unlock AND open the following HPSI Header #1 Th Injection Vent
valves:

- 2SI-1058A _____
- 2SI-1059A _____

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- 5.9 Continue draining header until slow, steady state drain rate achieved. _____
- 5.10 Move hose from floor drain to measuring device
AND record initial time AND 2PI-5105 test pressure
in Table 3. _____
- 5.11 WHEN five minutes have elapsed
OR at least two gallons collected,
THEN record final time AND volume collected in Table 3. _____
- 5.12 Perform the following:
- Lock close 2SI-1058A. _____
 - Lock close AND cap 2SI-1059A. _____
 - Close applicable SIT Fill Byp valve. _____
- 5.13 Cycle 2CV-5081 to depressurize Th injection header AND SIT
drain header as necessary. _____
- 5.14 Close 2CV-5105-1. _____
- 5.15 Open 2SI-29A _____
- 5.16 Independently verify the following:
- 2SI-1058A locked closed. _____
 - 2SI-1059A locked closed AND capped. _____
 - Applicable SIT Fill Byp valve closed. _____
 - 2SI-29A open. _____

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6.0 ACCEPTANCE CRITERIA

NOTE 2R17 leakage for 2SI-27A and 2SI-28A was 0.0 GPM. (WO#50966182)
--

6.1 IF Section 2.0 was performed, _____
THEN record data in Table 1 AND determine leak rate.

TABLE 1				
VALVES	2PI-5105 INITIAL PRESSURE	2PI-5105 FINAL PRESSURE	ΔP FINAL - INITIAL	IS $\Delta P > 0$?
2SI-27A 2SI-28A				YES NO N/A

6.2 IF Section 3.0 was performed, _____
THEN complete Table 2 AND determine leak rate.

TABLE 2						
VALVES	INITIAL TIME	FINAL TIME	ELAPSED TIME	VOLUME COLLECTED	LEAK RATE VOLUME \div TIME	ADJUSTED LEAK RATE (1)
2SI-27A 2SI-28A						

Note 1: Adjusted Leak Rate = Leak Rate x Extrapolation Constant (EC)

Extrapolation Constant = $\sqrt{2250 \div \text{test pressure}}$

Test Pressure = _____ psia

6.2.1 Is Adjusted Leak Rate in Table 2 > 1.0 GPM?

YES NO N/A

6.2.2 IF YES circled in 6.2.1,
THEN perform the following:

- Notify Shift Manager. _____
- Initiate WR/WO. _____
- Coordinate with System Engineering to determine operability AND source of leakage. _____
- Initiate Condition Report. _____

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<u>NOTE</u>
2R17 leakage adjusted to 2250 psia for 2SI-26A was 0.46 GPM. (WO#50966182)

6.3 IF Section 4.0 or 5.0 was performed,
 THEN record data in Table 3 AND determine leak rate. _____

TABLE 3						
VALVE	INITIAL TIME	FINAL TIME	ELAPSED TIME	VOLUME COLLECTED	LEAK RATE VOLUME ÷ TIME	ADJUSTED LEAK RATE (1)
2SI-26A						

Note 1: Adjusted Leak Rate = Leak Rate x Extrapolation Constant (EC)

Extrapolation Constant = $\sqrt{2250 \div \text{test pressure}}$

Test Pressure = _____ psia

6.3.1 Is Adjusted Leak Rate in Table 4 > 1.0 GPM? YES NO N/A

6.3.2 IF YES circled in 6.3.1,
 THEN perform the following:

- Notify Shift Manager. _____
- Initiate WR/WO. _____
- Coordinate with System Engineering to determine operability AND source of leakage. _____
- Initiate Condition Report. _____

6.3.3 IF 2SI-29A was closed for this test
 AND test results acceptable,
 THEN verify restraint installed with 2SI-29A open. _____

Performed By _____ Date _____

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7.0 SUPERVISOR REVIEW AND ANALYSIS

7.1 Is leakage for 2SI-27A AND 2SI-28A < 5.0 GPM? YES NO N/A

7.2 Is leakage for 2SI-26A < 5.0 GPM? YES NO N/A

7.3 IF NO answered to 7.1 AND 7.2,
THEN verify Condition Report initiated. _____

Comments _____

7.4 Are all administrative requirements of this test satisfied? YES NO

7.5 IF Section 2.0, 3.0, 4.0 or 5.0 performed,
THEN forward copy of completed test to Operations Standards
to revise procedure for data collected. _____

Supervisor _____ Date _____

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HPSI HEADER #2 HOT LEG INJECTION CHECK VALVE TEST

This test checks leakage for Hot Leg Injection check valves 2SI-26B, 2SI-27B and 2SI-28B per IST Program. For purpose of this test 2SI-27B and 2SI-28B considered one valve. All valves normally tested on refueling outage frequency.

Sections of this Supplement required as follows:

Section 2.0: 2SI-27B/2SI-28B Shutdown for Refueling Outage.

Section 3.0: 2SI-27B/2SI-28B leak rate determination OR PMT.

Section 4.0: 2SI-26B leakrate determination in Modes 1-3.

Section 5.0: 2SI-26B leakrate determination in Mode 5.

1.0 INITIAL CONDITIONS (May be performed in any order)

1.1 HPSI pumps aligned to Header #2 (2P-89B/C) secured. _____

1.2 IF performing Section 2.0,
THEN plant in Mode 3. _____

1.3 IF performing Section 3.0 only,
THEN plant in Mode 3, 4, OR 5. _____

1.4 Obtain Tygon Tubing or hose. _____

1.5 IF performing Section 3.0 or 4.0,
THEN perform the following:

- Obtain Graduated cylinder or poly bottle to measure leakage. _____
- Verify Leak Collection Rig as described in Supplement 1 of 2104.004, Shutdown Cooling System available. _____

1.6 IF performing Section 5.0,
THEN verify the following:

- Plant in Mode 5. _____
- At least one SIT pressurized to > 250 psig. _____
- HPSI #2 Hot Leg Injection header filled AND vented. _____
- SIT Drain header not in use. _____
- All SIT outlet MOV's closed. _____
- HPSI #2 Hot Leg Injection not relied on for RCS Makeup per 1015.008 Att C. _____
- Obtain Graduated cylinder or poly bottle to measure leakage. _____
- WR/WO initiated for removal AND installation of restraint on 2SI-29B if required. WR/WO# _____

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2.0 2SI-27B AND 2SI-28B LEAK CHECK (N/A IF NOT REQUIRED)

{4.3.4}

- | | | |
|--------|--|-----------------------------|
| 2.1 | Verify Plant in Mode 3. Mode 3 required for duration of this test. | _____ |
| 2.2 | Enter Tech Spec 3.5.2. | _____ |
| 2.3 | Refer to Containment penetration administrative controls section of Conduct of Operations (1015.001) for 2CV-5102-2. | _____ |
| 2.4 | Energize Th Injection valve (2CV-5102-2) by closing 2B62-G2. | _____ |
| 2.5 | Monitor SIT level AND pressure while opening the following valves: | |
| | <ul style="list-style-type: none"> • SIT Drain to RDT (2CV-5081) • CV Leakage (2CV-5106-2) |

_____ |
| 2.6 | Throttle open Th Injection (2CV-5102-2). | _____ |
| 2.7 | <u>WHEN</u> pressure on 2PI-5106 has stabilized,
<u>THEN</u> close the following valves: | |
| | <ul style="list-style-type: none"> • 2CV-5102-2 • 2CV-5106-2 • 2CV-5081 |

_____ |
| 2.8 | Independently verify 2CV-5102-2 closed. | _____ |
| 2.9 | Open 2CV-5102-2 breaker 2B62-G2. | _____ |
| 2.10 | Exit Tech Spec 3.5.2. | _____ |
| 2.11 | Verify RCS pressure ~ 2200 psia. | _____ |
| 2.12 | Record initial pressure on 2PI-5106 in Table 1. | _____ |
| 2.13 | <u>WHEN</u> 15 minutes have elapsed,
<u>THEN</u> record final pressure on 2PI-5106 in Table 1. | _____ |
| 2.14 | <u>IF</u> ΔP recorded in Table 1 greater than zero
<u>AND</u> System Engineering determines need to quantify leakage,
<u>THEN</u> perform the following: | |
| 2.14.1 | Complete Section 4.0 while preparing for CNTMT entry. | _____ |
| 2.14.2 | <u>WHEN</u> CNTMT ready for entry,
<u>THEN</u> perform Section 3.0. | _____ |

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NOTE

Leak test should be performed at ~ 250 psia RCS pressure in Mode 5. There is ~ 200 feet of pipe from 2SI-29B to 2CV-5102-2. This piping will have to be drained to quantify leakage from check valves. There may be 75 to 100 gallons of water in this line plus volume leaking into pipe.

3.0 2SI-27B AND 2SI-28B LEAK RATE DETERMINATION (N/A IF NOT REQUIRED)

- 3.1 Verify plant in Mode 3, 4, or 5. _____
- 3.2 IF this section being performed for PMT
THEN verify Supplement 6, of HPSI System Operations (2104.039)
has been performed after maintenance completed. _____
- 3.3 Verify HPSI Header #1 available for duration of test. _____
- 3.4 WHEN SITs removed from service,
THEN monitor RDT level/pressure AND open the following
valves to drain header as much as possible (L2200/P2200):
 - 2CV-5106-2 _____
 - 2CV-5081 _____
- 3.5 Connect hose to HPSI Header #2 Th Injection Drain (2SI-1061B)
AND route to floor drain. _____
- 3.6 Commence draining header by opening HPSI Header #2 Th
Injection Drains (2SI-1061B AND 2SI-1060B). _____
- 3.7 Continue draining header until slow, steady state
drain rate achieved. _____
- 3.8 Close the following valves:
 - 2CV-5106-2 _____
 - 2CV-5081 _____
 - 2SI-1061B _____
 - 2SI-1060B _____
- 3.9 Record RCS pressure in Table 2. _____
- 3.10 Attempt to maintain above pressure constant. _____
- 3.11 Open 2SI-1061B and 2SI-1060B AND continue draining header
until slow, steady state drain rate achieved. _____

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- 3.12 IF steam emitted from the drain valves,
THEN perform the following:
- 3.12.1 Close the following valves:
- 2SI-1060B _____
 - 2SI-1061B _____
- 3.12.2 Obtain approximately 10 pounds of ice. _____
- 3.12.3 Connect Copper Cooling Coil as shown in Figure 1 of Supplement 1, 2104.004. _____
- 3.12.4 Connect Leak Collection Rig at 2SI-1061B. _____
- 3.12.5 Slowly open 2SI-1061B. _____
- 3.12.6 Slowly open 2SI-1060B while monitoring Leak Collection Rig pressure. _____
- 3.12.7 WHEN 2SI-1060B fully open,
THEN Continue draining header until slow, steady state drain rate achieved. _____
- 3.13 Move hose from floor drain to measuring device
AND record initial time in Table 2. _____
- 3.14 WHEN five minutes have elapsed
OR at least two gallons collected,
THEN close the following valves:
- 2SI-1060B _____
 - 2SI-1061B _____
- 3.15 Record final time AND volume collected in Table 2. _____
- 3.16 IF Leak Collection Rig was used,
THEN remove AND store Leak Collection Rig. _____
- 3.17 Independently verify the following:
- 2SI-1060B closed. _____
 - 2SI-1061B closed AND capped. _____

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4.0 2SI-26B LEAK RATE DETERMINATION IN MODES 1-3 (N/A IF NOT REQUIRED)

4.1 Verify Plant in Mode 1, 2, or 3. _____

4.2 Connect hose to HPSI Header #2 Th Injection Vent (2SI-1059B) AND route to floor drain. _____

4.3 Open 2CV-5106-2. _____

4.4 Open any SIT Drain valve while monitoring SIT level AND pressure: _____

- 2SV-5001-1
- 2SV-5021-1
- 2SV-5041-2
- 2SV-5061-2

{4.3.4} 4.5 **Refer to Containment penetration administrative controls section of Conduct of Operations (1015.001) for 2SI-1058B AND 2SI-1059B.** _____

4.6 Open the following HPSI Header #2 Th Injection Vent valves:

- 2SI-1058B _____
- 2SI-1059B _____

4.7 Continue draining header until slow, steady state drain rate achieved. _____

4.8 IF steam emitted from the vent valves,
THEN perform the following:

4.8.1 Close the following valves:

- 2SI-1058B _____
- 2SI-1059B _____

4.8.2 Obtain approximately 10 pounds of ice. _____

4.8.3 Connect Copper Cooling Coil per Figure 1 of Supplement 1, Shutdown Cooling System (2104.004). _____

4.8.4 Connect Leak Collection Rig at 2SI-1059B. _____

4.8.5 Open any SIT Drain valve while monitoring SIT level AND pressure. _____

4.8.6 Slowly open 2SI-1059B. _____

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- 4.8.7 Slowly open 2SI-1058B while monitoring Leak Collection Rig pressure. _____
- 4.8.8 WHEN 2SI-1058B fully open,
THEN continue draining header until slow, steady state drain rate achieved. _____
- 4.9 Move hose from floor drain to measuring device AND record initial time AND 2PI-5106 test pressure in Table 3. _____
- 4.10 WHEN five minutes have elapsed
OR at least two gallons collected,
THEN record final time AND volume collected in Table 3. _____
- 4.11 Perform the following:
- Lock close 2SI-1058B. _____
 - Lock close AND cap 2SI-1059B. _____
- 4.12 Close SIT Drain valve opened previously: _____
- 2SV-5001-1
 - 2SV-5021-1
 - 2SV-5041-2
 - 2SV-5061-2
- 4.13 Close 2CV-5106-2. _____
- 4.14 IF Leak Collection Rig was used,
THEN remove AND store Leak Collection Rig. _____
- 4.15 Independently verify the following:
- 2SI-1058B locked closed. _____
 - 2SI-1059B locked closed AND capped. _____

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5.0 2SI-26B LEAK RATE DETERMINATION IN MODE 5 (N/A IF NOT REQUIRED)

5.1 Verify Supplement 6, of HPSI System Operations (2104.039) _____
has been performed after maintenance completed.

5.2 Verify the following valves closed:

- 2CV-5081 _____
- 2CV-5082 _____
- 2CV-5102-2 _____
- 2SV-5001-1 _____

- 2SV-5021-1 _____
- 2SV-5041-2 _____
- 2SV-5061-2 _____

5.3 IF RCS pressure less than SIT pressure, _____
THEN close 2SI-29B (refer to 1015.008, SDC Control for
RCS Perturbation Determination).

5.4 Connect hose to HPSI Header #2 Th Injection Vent (2SI-1059B) _____
AND route to floor drain.

5.5 Open 2CV-5106-2. _____

NOTE

- Using highest available test pressure and maintaining constant pressure on 2SI-26B will ensure accurate test results.
- Monitor SIT pressure and level during test.

5.6 Open SIT Fill Bypass for desired SIT (Circle valve opened): _____

- A SIT 2SI-46
- B SIT 2SI-40
- C SIT 2SI-58
- D SIT 2SI-52

5.7 Refer to SDC Control, 1015.008 for Containment Closure control. _____

5.8 Unlock AND open the following HPSI Header #2 Th Injection Vent valves:

- 2SI-1058B _____
- 2SI-1059B _____

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- 5.9 Continue draining header until slow, steady state drain rate achieved. _____
- 5.10 Move hose from floor drain to measuring device AND record initial time AND 2PI-5106 test pressure in Table 3. _____
- 5.11 WHEN five minutes have elapsed _____
OR at least two gallons collected,
THEN record final time AND volume collected in Table 3. _____
- 5.12 Perform the following:
- Lock close 2SI-1058B. _____
 - Lock close AND cap 2SI-1059B. _____
 - Close applicable SIT Fill Byp valve. _____
- 5.13 Cycle 2CV-5081 to depressurize Th injection header AND SIT drain header as necessary. _____
- 5.14 Close 2CV-5106-2. _____
- 5.15 Open 2SI-29B. _____
- 5.16 Independently verify the following:
- 2SI-1058B locked closed. _____
 - 2SI-1059B locked closed AND capped. _____
 - Applicable SIT Fill Byp valve closed. _____
 - 2SI-29B open. _____

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6.0 ACCEPTANCE CRITERIA

NOTE

2R17 leakage for 2SI-27B and 2SI-28B was 0.0 GPM. (WO#50966181)

6.1 IF Section 2.0 was performed,
THEN record data in Table 1 AND determine leak rate. _____

TABLE 1				
VALVES	2PI-5106 INITIAL PRESSURE	2PI-5106 FINAL PRESSURE	ΔP FINAL - INITIAL	IS $\Delta P > 0$?
2SI-27B 2SI-28B				YES NO N/A

6.2 IF Section 3.0 was performed,
THEN complete Table 2 AND determine leak rate. _____

TABLE 2						
VALVES	INITIAL TIME	FINAL TIME	ELAPSED TIME	VOLUME COLLECTED	LEAK RATE VOLUME \div TIME	ADJUSTED LEAK RATE (1)
2SI-27B 2SI-28B						

Note 1: Adjusted Leak Rate = Leak Rate x Extrapolation Constant (EC)

Extrapolation Constant = $\sqrt{2250 \div \text{test pressure}}$

Test Pressure = _____ psia

6.2.1 Is Adjusted Leak Rate in Table 2 > 1.0 GPM? YES NO N/A

6.2.2 IF YES circled in 6.2.1,
THEN perform the following:

- Notify Shift Manager. _____
- Initiate WR/WO. _____
- Coordinate with System Engineering to determine operability AND source of leakage. _____
- Initiate Condition Report. _____

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<u>NOTE</u>
2R17 leakage adjusted to 2250 psia for 2SI-26B was 0.0 GPM. (WO#50966181)

6.3 IF Section 4.0 or 5.0 was performed,
THEN record data in Table 3 AND determine leak rate. _____

TABLE 3						
VALVE	INITIAL TIME	FINAL TIME	ELAPSED TIME	VOLUME COLLECTED	LEAK RATE VOLUME ÷ TIME	ADJUSTED LEAK RATE (1)
2SI-26B						

Note 1: Adjusted Leak Rate = Leak Rate x Extrapolation Constant (EC)

Extrapolation Constant = $\sqrt{2250 \div \text{test pressure}}$

Test Pressure = _____ psia

6.3.1 Is Adjusted Leak Rate in Table 4 > 1.0 GPM? YES NO N/A

6.3.2 IF YES circled in 6.3.1,
THEN perform the following:

- Notify Shift Manager. _____
- Initiate WR/WO. _____
- Coordinate with System Engineering to
determine operability AND source of leakage. _____
- Initiate Condition Report. _____

6.3.3 IF 2SI-29B was closed for this test
AND test results acceptable,
THEN verify restraint reinstalled with 2SI-29B open. _____

Performed By _____ Date _____

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7.0 SUPERVISOR REVIEW AND ANALYSIS

7.1 Is leakage for 2SI-27B AND 2SI-28B < 5.0 GPM? YES NO N/A

7.2 Is leakage for 2SI-26B < 5.0 GPM? YES NO N/A

7.3 IF NO answered to 7.1 AND 7.2,
THEN verify Condition Report initiated. _____

Comments _____

7.4 Are all administrative requirements of this test satisfied? YES NO

7.5 IF Section 2.0, 3.0, 4.0 or 5.0 performed,
THEN forward copy of completed test to Operations Standards
to revise procedure for data collected. _____

Supervisor _____ Date _____

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HPSI PRESSURIZATION SYSTEM VALVE CLOSURE TEST

This test demonstrates the operability of HPSI Pressurization System (HPS) suction valves (2BS-13 and 2BS-14) and discharge check valves (2HPS-08 and 2HPS-09) that were installed by Temporary Alteration 04-02-002. The suction valves are required to be stroked quarterly to ensure they can be closed per the IST program. The check valves are required to be tested quarterly to ensure they will prevent reverse flow per the IST Program.

This test is normally performed when the HPS system is in service and is expected to be performed along with 2P-89B or 2P-89C (Green train) Quarterly test because a Green HPSI pump is required to be in operation. Once a Green HPSI pump is operating, the HPS discharge header will be isolated and vented to determine if 2HPS-08 and 2HPS-09 will close. This is not a leak rate determination test. If the HPS system is not in service, then this test is not required.

1.0 INITIAL CONDITIONS:

1.1 Verify the following valves open:

- HPSI Header #2 Drain (2SI-1056B) _____
- HPSI Header #2 Drain (2SI-1057B) _____

1.2 Verify HPSI pump in operation on Green Train
IAW ANY of the following methods: _____

- Supplement 2 of this procedure
- Supplement 3 of this procedure (aligned to Green train)
- Section 9.0 of this procedure

1.3 Check HPSI Header #2 Pressure > 1400 psig (2PI-5109). _____

2.0 TEST METHOD:

2.1 Close Drain Downstream of 2IA-5092 (2IA-1461). _____

2.2 Close HPS Pump Discharge Isolation (2HPS-05). _____

2.3 Open 2HPS-09 Check Bypass (2HPS-12). _____

2.4 Open HPS Discharge Header Drain (2HPS-07). _____

2.5 Determine if check valve 2HPS-08 closed by minimal
leakage (less than steady stream) out 2HPS-07 drain and
record in Table 1. _____

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|------|---|-------|
| 2.6 | Close 2HPS-07. | _____ |
| 2.7 | Close 2HPS-12. | _____ |
| 2.8 | Open HPS Check Valve Drain (2HPS-14). | _____ |
| 2.9 | Determine if check valve 2HPS-09 closed by minimal leakage (less than steady stream) out 2HPS-14 drain and record in Table 1. | _____ |
| 2.10 | Close 2HPS-14. | _____ |
| 2.11 | Open 2HPS-05. | _____ |
| 2.12 | Close the following valves: | |
| | • RWT Outlet Local Sample (2BS-13) | _____ |
| | • RWT Outlet Local Sample (2BS-14) | _____ |
| 2.13 | Record 2BS-13/2BS-14 closure in Table 2. | _____ |
| 2.14 | Open the following valves: | |
| | • 2BS-13 | _____ |
| | • 2BS-14 | _____ |
| 2.15 | Open 2IA-1461. | _____ |
| 2.16 | Return to associated supplement or section of this procedure to secure the running HPSI pump. | _____ |

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SUPPLEMENT 10

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3.0 ACCEPTANCE CRITERIA

3.1 Document observation of check valve closure in Table 1. _____

TABLE 1			
CHECK VALVE	TEST DIRECTION	TEST CRITERIA	IS PROPER VALVE CLOSURE INDICATED?
2HPS-08	Closed	Minimal leakage out 2HPS-07 drain	YES NO
2HPS-09	Closed	Minimal leakage out 2HPS-14 drain	YES NO

3.2 Document suction valve closure in Table 2. _____

TABLE 2			
VALVE	TEST DIRECTION	TEST CRITERIA	IS PROPER VALVE STROKE INDICATED?
2BS-13 OR 2BS-14	Closed	At least ONE valve closed	YES NO

3.3 IF NO circled in Table 1 or Table 2,
THEN perform the following:

- Declare affected valves inoperable. _____
- Secure the HPS IAW Attachment F of this procedure.
(This action isolates inoperable valves from
Green HPSI train.) _____
- Refer to Tech Spec 3.5.2 or 3.5.3. _____
- Notify Shift Manager. _____
- Initiate WR/WO as applicable. _____

Comments _____

Performed By _____ Date _____

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SUPPLEMENT 10

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4.0 SUPERVISOR REVIEW AND ANALYSIS

4.1 Was proper valve closure determined in Section 3.0? YES NO

4.2 IF NO answered to 4.1,
THEN perform the following corrective actions:

- Verify the HPSI Pressurization System isolated from the Green HPSI Header IAW Attachment F of this procedure. _____
- Verify Condition Report initiated. _____

Comments _____

4.3 Are all administrative requirements of this test satisfied? YES NO

Supervisor _____ Date _____

ADMINISTRATIVE JOB PERFORMANCE MEASUREUNIT: 2 REV #: 000 DATE: _____SYSTEM/DUTY AREA: A.3: Radiation ControlTASK: Review and approve Containment Purge Gaseous ReleaseJTA#: ANOSROADMINNORM189KA VALUE RO: 2.5 SRO: 3.4 KA REFERENCE: 2.3.9APPROVED FOR ADMINISTRATION TO: RO: _____ SRO: XTASK LOCATION: INSIDE CR: _____ OUTSIDE CR: _____ BOTH: X

SUGGESTED TESTING ENVIRONMENT AND METHOD (PERFORM OR SIMULATE):

PLANT SITE: _____ SIMULATOR: Perform CLASSROOM: Perform

POSITION EVALUATED: RO: _____ SRO: _____

ACTUAL TESTING ENVIRONMENT: SIMULATOR: _____ PLANT SITE: _____ LAB: _____

TESTING METHOD: SIMULATE: _____ PERFORM: _____

APPROXIMATE COMPLETION TIME IN MINUTES: 15 MinutesREFERENCE(S): OP 2104.033 Supplement 1 Rev. 043-02-0

EXAMINEE'S NAME: _____ SSN: _____

EVALUATOR'S NAME: _____

THE EXAMINEE'S PERFORMANCE WAS EVALUATED AGAINST THE STANDARDS CONTAINED IN THIS JPM AND IS DETERMINED TO BE:

SATISFACTORY: _____ UNSATISFACTORY: _____

PERFORMANCE CHECKLIST COMMENTS:

Start Time _____ Stop Time _____ Total Time _____

SIGNED: _____ DATE: _____

SIGNATURE INDICATES THIS JPM HAS BEEN COMPARED TO ITS APPLICABLE PROCEDURE BY A QUALIFIED INDIVIDUAL (NOT THE EXAMINEE) AND IS CURRENT WITH THAT REVISION.

ADMINISTRATIVE JOB PERFORMANCE MEASURE**INITIAL PLANT CONDITIONS**

Plant is in Mode 5.

Chemistry has completed Containment atmosphere radioactivity analysis.

Initial flow from 2RITS-8233, Containment Purge, is 8.5 SCFM.

Initial count rate on 2RITS-8233, Containment Purge, is 60cpm.

Initial CAM's Particulate reading is 1084 CPM and Gaseous is 928 CPM.

Current four hour average CAM's Particulate reading is 1532 CPM and Gaseous is 1204 CPM.

Last test reading run-time from engineering programs group is 7532.5 hrs.

Current run-time reading from 2B85-C7 is 8284.9 hrs.

A reactor Operator has completed the containment purge verification section of OP 2104.033 Supplement 1.

TASK STANDARD:

Four of the following Five errors must be identified:

- Since data recorded in step 4.1.2 was incorrect the filter run-time should have been given to Engineering programs for evaluation.
- Step 4.7 calculated count rate limits are wrong.
- Since current CAMS radiation readings are incorrect, the permit should have been resubmitted to chemistry.
- Step 4.12 2RITS-8233 set point is recorded incorrectly.
- Potentiometer dial set point circled is incorrect due to recording the set point incorrectly; this results in a non-conservative trip value for 2RITS-8233.

AND

The release permit must not be approved, but returned to chemistry for reanalysis.

TASK PERFORMANCE AIDS: A marked-up copy of Supplement 1 Containment Purge Gaseous Release Permit through section 4 and chemistry release data.

SIMULATOR SETUP: NA

ADMINISTRATIVE JOB PERFORMANCE MEASURE**Initiating CUE:**

The Shift Manager directs "Review and approve OP-2104.033 supplement 1, Containment Purge Gaseous Release Permit using the completed supplement and chemistry report. Identify all errors on the supplement."

CRITICAL STEPS: 2, 3

START TIME: _____

<u>PERFORMANCECHECKLIST</u>		<u>STANDARD</u>	<u>CIRCLE ONE</u>
EXAMINER'S NOTE: Provide a marked-up copy of OP 2104.033 Supplement 1.			
	1.	Perform supervisor review for approval of the Containment purge gaseous release permit and determine errors.	Reviews the containment purge gaseous release permit. N/A
EXAMINER'S NOTE: The following list identify errors in the supplement 1 provided. The acceptance criterion is given in the task standard.			
(C)	2.	<ul style="list-style-type: none"> Since data recorded in step 4.1.2 was incorrect the filter run-time should have been given to Engineering programs for evaluation. Step 4.7 calculated count rate limits are wrong. Step 4.8 since current CAMS radiation readings are incorrect, the permit should have been resubmitted to chemistry. Step 4.12 2RITS-8233 set point is recorded incorrectly. Potentiometer dial set point circled is incorrect due to recording the set point incorrectly; this results in a non-conservative trip value for 2RITS-8233. 	<ul style="list-style-type: none"> Filter run-time is beyond 720 hrs; this should be evaluated by engineering programs before proceeding with release. Calculated count rate limits were given to be particulate 2439 CPM and gaseous 2088 CPM but should have been Particulate1355 CPM and gaseous 1166 CPM. The Purge permit should be resubmitted to chemistry but the steps were marked as NA due to incorrect current readings recorded. Set point for 2SITS-8233 is recorded as 15000 CPM not 150 CPM as specified in Chemistry report. Potentiometer dial set point should be 3.84, but 5.68 is circled.
EXAMINER'S NOTE: The Examinee should discuss that the release will be resubmitted to chemistry and Engineering programs should evaluate the runtime on the exhaust filter.			
(C)	3.	The release should not be approved and should be resubmitted to chemistry.	Would not approve the release to begin. N/A SAT UNSAT
END			

STOP TIME: _____

ADMINISTRATIVE JOB PERFORMANCE MEASURE

EXAMINER's COPY

INITIAL PLANT CONDITIONS

- Plant is in Mode 5.
- Chemistry has completed Containment atmosphere radioactivity analysis.
- Initial flow from 2RITS-8233, Containment Purge, is 8.5 SCFM.
- Initial count rate on 2RITS-8233, Containment Purge, is 84cpm.
- Initial CAM's Particulate reading is 1084 CPM and Gaseous is 928 CPM.
- Current CAM's Particulate reading is 1532 CPM and Gaseous is 1204 CPM.
- Last test reading run-time from engineering programs group is 7532.5 hrs.
- Current run-time reading from 2B85-C7 is 8284.9 hrs.
- A reactor Operator has completed the containment purge verification section of OP 2104.033 Supplement 1.

Initiating CUE:

The Shift Manager directs "Review and approve OP-2104.033 supplement 1, Containment Purge Gaseous Release Permit using the completed supplement and chemistry report. Identify all errors on the supplement."

ADMINISTRATIVE JOB PERFORMANCE MEASURE

EXAMINEE's COPY

INITIAL PLANT CONDITIONS

- Plant is in Mode 5.
- Chemistry has completed Containment atmosphere radioactivity analysis.
- Initial flow from 2RITS-8233, Containment Purge, is 8.5 SCFM.
- Initial count rate on 2RITS-8233, Containment Purge, is 84cpm.
- Initial CAM's Particulate reading is 1084 CPM and Gaseous is 928 CPM.
- Current CAM's Particulate reading is 1532 CPM and Gaseous is 1204 CPM.
- Last test reading run-time from engineering programs group is 7532.5 hrs.
- Current run-time reading from 2B85-C7 is 8284.9 hrs.
- A reactor Operator has completed the containment purge verification section of OP 2104.033 Supplement 1.

Initiating CUE:

The Shift Manager directs "Review and approve OP-2104.033 supplement 1, Containment Purge Gaseous Release Permit using the completed supplement and chemistry report. Identify all errors on the supplement."

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SUPPLEMENT 1

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CONTAINMENT PURGE GASEOUS RELEASE PERMIT

This Supplement provides instructions for Containment Purge and satisfies Tech Spec 3.3.3.1, Table 4.3-3.2.a.i.a and ODCM App 2, L2.2.1, Table 2.2-2.2.A.

1.0 REQUEST (Operations)

- 1.1 Initiate WR/WO for I&C to perform Channel Functional Test of 2RX-9820 SPING 5 (2304.149). (D)
- 1.2 Verify valves aligned per Attachment A of this procedure, 2RE-8233 Shed on Top of Aux Bldg Roof section only. (D)
- 1.3 Start CNTMT Purge (2RITS-8233) Sample pump (2C-49) as follows:
 - 1.3.1 Place local handswitch 2HS-8233 in START. (D)
 - 1.3.2 Verify flow between 8.0 and 12.0 SCFM (2FIS-8233).
Flow = 8.5 SCFM (D)
 - 1.3.3 Record count rate on 2RE-8233: 60 cpm (D)
- 1.4 Record SPING 5, Channel 5 activity: 1.09E-6 μ ci/cc (D)
- 1.5 Record count rate on running CAMS:
CAMS 8271-2 Particulate 1084 Gaseous 928 (D)
- 1.6 Record CNTMT Building average pressure from PMS/PDS P5601-A or Supplement 4: 14.1 psia (D)
- 1.7 Submit to Chemistry for sampling and analysis. (D)

Performed By Brian Openden Date 3/9/05

2.0 ANALYSIS (Chemistry)

- 2.1 Verify plant in Mode 4, 5, or 6. (D)
- 2.2 Sample Containment Building atmosphere.
Date 3/9/05 Time 1000
Sample flowmeter M&TE number CNO-026 Cal due date 8/17/05 (D)
- 2.3 Performed Gamma spectroscopy. (D)
- 2.4 Review Gamma spectroscopy report. (D)
- 2.5 Generate Preliminary report. (D)

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SUPPLEMENT 1

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3.0 SPING 5 VALIDATION Prior to Purge (Chemistry)

- 3.1 Verify SPING 5 Channel Functional Test (2304.149) successfully ✓
performed AND sample pump restarted.
- 3.2 Perform the following using Eberline Radiation Monitoring System (1604.051):
- Verify SPING 5 operable by performing source check using Attachment 5. ✓
 - Verify SPING 5 channels 1, 3, 5, 7, 9, 10, 14, & 15 operable using Attachment 4. ✓
 - Set new SPING 5 channel 5 and/or channel 7 alarm setpoints using Form 1604.051E. ✓
 - Edit isotopic distribution using analysis data. ✓
- 3.3 Record activities in step 6.9, column 3 of this Supplement. ✓
- 3.4 Are doses from Gaseous Effluent release projected to exceed 25% of yearly design objectives on quarterly basis? (ODCM App. 2, L 2.4.4.A) YES NO
- 3.5 Return this Supplement and Permit to Unit 2 Control Room. ✓

Performed By Joe Chemistry Date 3/9/05

4.0 PURGE SYSTEM VERIFICATION (Operations)

- 4.1 Verify adequate Purge Exhaust filter run-time remaining for duration of purge as follows:
- 4.1.1 Record Last Test reading from last Air Purification System Surveillance (5120.420) or from Engineering Programs group: 7532.5 hrs ①
- 4.1.2 Record present run-time from 2B85-C7: 8284.9 hrs ②
- 4.1.3 Record estimated release duration: 1 hrs ③
- 4.1.4 Calculate projected filter run-time as follows: ④
- $$\frac{8284.9}{(4.1.2)} + \frac{1}{(4.1.3)} - \frac{7532.5}{(4.1.1)} = 753.4 \text{ hrs}$$
- 4.1.5 IF projected run-time since last test > 720 hours, NA
THEN notify Engineering Programs.

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SUPPLEMENT 1

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- 4.2 Verify Purge Exhaust Filter Unit doors closed AND dogged. ⓪
- 4.3 IF desired to align plant heating to 2VSF-2,
THEN verify plant heating aligned to 2VSF-2 per Attachment A
of Plant Heating Systems (2106.017). NA
- 4.4 Verify NO other Gaseous Release in progress. ⓪
- 4.5 Record Initial CAMS readings from Section 1.0:
Particulate 1084 Gaseous 928 ⓪
- 4.6 Record Current 4 hour averaged count rate on running CAMS:
Particulate 1532 Gaseous 1204 ⓪
- 4.7 Calculate allowable count rate Limits as follows:
Initial Particulate 1084 x 1.25 = 2439 CPM
Initial Gaseous 928 x 1.25 = 2088 CPM ⓪
- 4.8 IF Current Gaseous and Particulate averaged count rates greater
than allowable Limits,
THEN perform the following:
- 4.8.1 Notify Chemistry to obtain Containment Air
Sample and perform Gross Count. NA
- 4.8.2 Compare activity obtained in above step to previous
Containment Air Sample. NA
- 4.8.3 IF sample results indicate < 10% rise,
THEN continue with purge. NA
- 4.8.4 IF sample results indicate > 10% rise,
THEN resubmit Purge Permit. NA

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SUPPLEMENT 1

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4.9 Perform Source Check on Containment Purge Exhaust Rad Monitor (2RITS-8233) as follows:

4.9.1 Hold Selector switch in CHECK SOURCE. ①

4.9.2 IF meter does NOT move up scale,
THEN determine reason for no meter movement
AND obtain SM permission prior to starting release.
SM NA

4.9.3 Return Selector switch to OPERATE. ①

4.9.4 Check meter reading returns to initial background reading. ①

4.10 Verify plant in Mode 5 or 6. ①

4.11 Verify alarm and interlock functions of 2RITS-8233 as follows:

4.11.1 Open CNTMT Purge Supply Isolation (2CV-8283-1). ①

4.11.2 Open CNTMT Purge Exhaust Isolation (2CV-8285-1). ①

4.11.3 Place 2RITS-8233 to PULSE CAL. ①

4.11.4 IF 2RITS-8233 setpoint higher than Pulse Cal,
THEN release Potentiometer stop
AND lower setpoint. NA

4.11.5 Check the following:

- Alarm on 2RITS-8233 ①
- Alarm on 2C14 ①
- 2CV-8283-1 closes ①
- 2CV-8285-1 closes ①

4.11.6 Reset 2RITS-8233 AND place in OPERATE. ①

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SUPPLEMENT 1

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4.12 Release stop AND adjust 2RITS-8233 potentiometer to dial setpoint in Table below corresponding to setpoint from Preliminary Report.

RO

- Preliminary Report Setpoint: 15000 CPM
- IF setpoint from Preliminary Report < 1000 cpm, THEN 1E3 should be used as alarm setpoint value.

Alarm Stpt	Dial Stpt	Alarm Stpt	Dial Stpt	Alarm Stpt	Dial Stpt	Alarm Stpt	Dial Stpt	Alarm Stpt	Dial Stpt
10 = 0.00		120 = 2.04		4E2 = 3.10		6E3 = 5.28		8E4 = 7.39	
20 = 0.53		130 = 2.11		5E2 = 3.29		7E3 = 5.39		9E4 = 7.48	
30 = 0.86		140 = 2.18		6E2 = 3.44		8E3 = 5.51		1E5 = 7.55	
40 = 1.13		150 = 2.24		7E2 = 3.55		9E3 = 5.60		2E5 = 8.14	
50 = 1.32		160 = 2.30		8E2 = 3.67		1E4 = 5.68		3E5 = 8.46	
60 = 1.46		170 = 2.35		9E2 = 3.77		2E4 = 6.25		4E5 = 8.70	
70 = 1.61		180 = 2.40		1E3 = 3.84		3E4 = 6.56		5E5 = 8.86	
80 = 1.73		190 = 2.45		2E3 = 4.40		4E4 = 6.85		6E5 = 9.00	
90 = 1.82		200 = 2.50		3E3 = 4.72		5E4 = 7.03		7E5 = 9.14	
100 = 1.88		250 = 2.69		4E3 = 4.95		6E4 = 7.17		8E5 = 9.24	
110 = 1.96		300 = 2.85		5E3 = 5.13		7E4 = 7.29		9E5 = 9.35	
								1E6 = 9.39	

4.13 Perform Independent Verification of the following:

- Preliminary Report setpoint in step 4.12 correct.
- 2RITS-8233 dial setpoint correct per Table above.
- 2RITS-8233 in OPERATE.

RO
RO
RO

I/V Performed by: Robert D. Smith

4.14 Declare 2RITS-8233 operable.

RO

RELEASE APPROVAL (SM) _____

Entergy Operations Inc.
Arkansas Nuclear One Unit 2
Gaseous Radioactive Waste Release Permit
Post-Release Permit Update

26R2005-Test

PART III: ACTUAL RELEASE DATA

Release Point (44): 2RBPRG RX BUILDING PURGE
Discharge Point (12): DISC. PT. 12 - 2 CONT. PURGE

Permit Issued: 09-mar-2005 17:25:06 Release Type: Batch

Sample entry number: 28

Average Waste Flow:	4.0000E+04 CFM		
Total Waste Volume:	2.4000E+06 CF		
Actual Release Start:	10-mar-2005 05:41:00	Initial Pressure :	0.00
Actual Release End:	10-mar-2005 06:41:00	Final Pressure :	0.00
Release Duration:	60.0000 MIN		

Performed By:

Belant

Date

3/10/05

Approved By:

Sp. Supervisor

3/15/05

Entergy Operations Inc.
Arkansas Nuclear One Unit 2
Gaseous Radioactive Waste Release Permit
Post-Release Permit Update

261-205-544

RELEASE ACTIVITY - Unit 2

Isotope		: Pre-Disp. : Measured : uCi/cc	: Pre-Disp. : Measured : Conc/MPC	: Pre-Disp. : Measured : Conc/Total	: Conc/Total: : by : Type	: Release : Rate : uCi/sec	: Curies : Released
H-3	O:	4.37E-07	2.18E+00	3.33E-01	1.00E+00	8.24E+00	2.97E-02
XE-133	N:	8.75E-07	2.92E+00	6.67E-01	1.00E+00	1.65E+01	5.95E-02
Totals :		1.31E-06	5.10E+00	:	:	2.48E+01	8.92E-02

Intergrity Operations Inc.
Arkansas Nuclear One
Gaseous Radioactive Waste Release Permit
Pre-Release Supplementary Data

Unit 2

260205-Test

PART I: PRE-RELEASE DATA

Release Point (44): 2RBPRG RX BUILDING PURGE
Discharge Point (12): DISC. PT. 12 - 2 CONT. PURGE

Permit Issued: 09-mar-2005 17:25:06

Release Type: Batch

Rad Monitor: (8233) 2RE-8233 ✓
Rad Monitor Bckgrnd: 6.0000E+01 CPM

Estim. Waste Flow: 4.0000E+04 CFM
Estim. Waste Volume: 1.2000E+07 CF
Estim. Release Start: 09-mar-2005 17:24:29
Estim. Release End: 09-mar-2005 22:24:29 18:24
Estim. Duration: 300.0000 MIN
3-9-05 60 min

Initial Pressure : 0.00
Final Pressure : 0.00

PART II: PRE-RELEASE CALCULATIONS

Sample Entry # : 28
Gas sample time:

Sampled by:

Gas Monitor Response: 8.44E+01 CPM
Total Body Dose Rate: 2.25E-03 mrem/yr
Skin Dose Rate: ~~5.32E-03 mrem/yr~~
Max Organ Dose Rate: 1.65E-02 mrem/yr

% Limit = 0.0%
% Limit = 0.0%
% Limit = 0.0%

3.17E-2 3-9-05 Jbl

Max Monitor Setpoints: 2RE-8233
CPM

2RX-9820
uCi/cc

Noble Gas : 1.5E+02

5.0E-06

Flag:

Flags: A-Release Curies > Local Limit
S-Release Curies > Site Limit

N-Noble Gas Dose Rate > Limit
O-Organ Dose Rate > Limit

	Analysis Date	Measured Concen.	Est. Curies
Noble Gases		2.07E-07 uCi/cc	7.03E-02
Particulates	09-mar-2005 16:12:49	0.00E+00 uCi/cc	0.00E+00
Radioiodines	09-mar-2005 16:11:57	0.00E+00 uCi/cc	0.00E+00

Performed By:

Approved By:

Date

3/9/05
3/9/05

Energy Operations Inc.
 Arkansas Nuclear One Unit 2
 Gaseous Radioactive Waste Release Permit
 Pre-Release Supplementary Data

26R2005-Test

ISOTOPIC IDENTIFICATION - Unit 2

Isotope	Pre-Disp. : Measured : uCi/cc	Pre-Disp. : Measured : Conc/MPC	Pre-Disp. : Measured : Conc/Total	Conc/Total : by : Type	Release : Rate : uCi/sec	Estimated : Curies : Released
H-3	O: 1.03E-07	5.16E-01	3.33E-01	1.00E+00	1.95E+00	3.51E-02
XE-133	N: 2.07E-07	6.90E-01	6.67E-01	1.00E+00	3.91E+00	7.03E-02
Totals	3.10E-07	1.21E+00			5.86E+00	1.05E-01

Entergy Operations Inc.
Arkansas Nuclear One
Unit 2
Containment Purge Fan Run Time Report
Pre-Release Report

09-mar-2005

262005-test

Hour	Run Time	Start TOD	Stop TOD	Initialed By
1	1 hrs	<u>0541</u>	<u>0641</u>	<u>BS</u>

Purge considered complete after an additional 0 hours and 0 minutes.

Entergy Operations Inc.
Arkansas Nuclear One
Unit 2
09-mar-2005 17:34:00

26R2005-Test

1. The noble gases Total Body dose rate = $2.251\text{e-}03$ mRem/yr. It must be ≤ 500 mRem/yr per ODCM L-2.4.1.A.1. If exceeding this limit, without delay restore the release rate to comply with this limit. During periods of containment purging the dose rate may be averaged over a one hour interval.
 $3.17\text{E-}2$ 3-9-05 JD
2. The noble gases Skin dose rate = ~~$5.316\text{e-}03$~~ mRem/yr. It must be ≤ 3000 mRem/yr per ODCM L-2.4.1.A.1. If exceeding this limit, without delay restore the release rate to comply with this limit. During periods of containment purging the dose rate may be averaged over a one hour interval.
3. The ITP critical organ dose rate = $1.653\text{e-}02$ mRem/yr. It must be ≤ 1500 mRem/yr per ODCM L-2.4.1.A.2. If exceeding this limit, without delay restore the release rate to comply with this limit. During periods of containment purging the dose rate may be averaged over a one hour interval.
4. The quarterly Gamma Air dose = $2.203\text{e-}06$ mRad. If the dose exceeds 5 mRad per ODCM L-2.4.2.A.1 notify the NRC per ODCM L-2.4.2.A ACTION 1. The total dose limit is 10 mRad per ODCM L-2.5.1.A. The NRC must be notified if this value is exceeded per ODCM L-2.5.1.A ACTIONS 1 and 2.
5. The quarterly Beta Air dose = $6.554\text{e-}06$ mRad. If the dose exceeds 10 mRad per ODCM L-2.4.2.A.1 notify the NRC per ODCM L-2.4.2.A ACTION 1. The total dose limit is 20 mRad per ODCM L-2.5.1.A. The NRC must be notified if this value is exceeded per ODCM L-2.5.1.A ACTIONS 1 and 2.
6. The quarterly ITP dose = ~~$1.692\text{e-}03$~~ mRem. If the dose exceeds 7.5 mRem per ODCM L-2.4.3.A.1 notify the NRC per ODCM L-2.4.3.A ACTION 1. The total dose limit is 15 mRem per ODCM L-2.5.1.A. The NRC must be notified if this value is exceeded per ODCM L-2.5.1.A ACTIONS 1 and 2.
 $2.8149\text{E-}4$ 3-9-05 JD
7. The yearly Gamma Air dose = $2.203\text{e-}06$ mRad. If the dose exceeds 10 mRad per ODCM L-2.4.2.A.2 notify the NRC per ODCM L-2.4.2.A ACTION 1. The total dose limit is 20 mRad per ODCM L-2.5.1.A. The NRC must be notified if this value is exceeded per ODCM L-2.5.1.A ACTIONS 1 and 2.
8. The yearly Beta Air dose = $6.554\text{e-}06$ mRad. If the dose exceeds 20 mRad per ODCM L-2.4.2.A.2 notify the NRC per ODCM L-2.4.2.A ACTION 1. The total dose limit is 40 mRad per ODCM L-2.5.1.A. The NRC must be notified if this value is exceeded per ODCM L-2.5.1.A ACTIONS 1 and 2.
9. The yearly ITP dose = ~~$1.692\text{e-}03$~~ mRem. If the dose exceeds 15 mRad per ODCM L-2.4.3.A.2 notify the NRC per ODCM L-2.4.3.A ACTION 1. The total dose limit is 30 mRad per ODCM L-2.5.1.A. The NRC must be notified if this value is exceeded per ODCM L-2.5.1.A ACTIONS 1 and 2.
 $2.8149\text{E-}4$ 3-9-05 JD
10. The projected quarterly Gamma Air Dose = $2.984\text{e-}06$ mRad. If the dose exceeds 0.625 mRad ODCM L-2.4.4.A and ODCM L-2.4.4.B and releases being discharged without treatment notify NRC per ODCM L-2.4.4 ACTION 1. Contact Engineering Programs to verify Treatment System Operability if the projected quarterly dose exceeds 0.625 mRad.

Entergy Operations Inc.

Arkansas Nuclear One
Unit 2
09-mar-2005 17:34:0

2002005-test

11. The projected quarterly Beta Air Dose = $8.875e-06$ mRad. If the dose exceeds 1.25 mRad ODCM L-2.4.4.A and ODCM L-2.4.4.B and releases being discharged without treatment notify NRC per ODCM L-2.4.4 ACTIONS 1&2. Contact Engineering Programs to verify Treatment System Operability if the projected quarterly dose exceeds 1.25 mRad.
12. The projected quarterly ITP Dose = $2.292e-03$ mRem. If the dose exceeds 1.0 mRem ODCM L-2.4.4.A and releases are being discharged without treatment notify the NRC per ODCM L-2.4.4 ACTION 1. Contact Engineering Programs to verify Treatment System Operability if the projected quarterly dose exceeds 1.0 mRem.

13. Additional comments:

Gamma Air Dose for release = $2.203e-06$ mRad
Beta Air Dose for release = $6.554e-06$ mRad
ITP Dose for the release = ~~$2.160e-05$ mRem~~

$3.59E-6$ 3-9-05 JDD

ITP = I-131, H-3, and particulates with halflives > 8 days

Gaseous Release Number 2GR-2005-0028

Release time in minutes: 60

Nuclide	Total		Annual		Product	Gamma Dose Factor	Product
	Curies this release	Ground level conc pCi/m3	Factor	Skin Dose			
Kr-83m						1.93E-05	
Kr-85m			1.46E-03			1.23E-03	
Kr-85			1.34E-03			1.72E-05	
Kr-87			9.73E-03			6.17E-03	
Kr-88			2.37E-03			1.52E-02	
Kr-89			1.01E-02			1.73E-02	
Kr-90			7.29E-03			1.63E-02	
Xe-131m			4.76E-04			1.56E-04	
Xe-133m			9.94E-04			3.27E-04	
Xe-133	7.03E-02	5.47E+01	3.06E-04		1.67E-02	3.53E-04	1.93E-02
Xe-135m			7.11E-04			3.36E-03	
Xe-135			1.86E-03			1.92E-03	
Xe-137			1.22E-02			1.51E-03	
Xe-138			4.13E-03			9.21E-03	
Ar-41			2.69E-03			9.30E-03	
			Total		1.67E-02	Total	1.50E-02

1.72E-05
1.56E-04
3.27E-04
3.53E-04
1.92E-04

Update date 3/9/2005 18:24

3.17E-02 mRem/yr Skin Dose Rate
3.59E-06 mRem Dose for ITP

Unit 2 Quarterly & Yearly Dose Total

Last updated 03/09/05 18:24

3.8243E-04 mRem Quarterly ITP Dose
7.6613E-04 mRem Quarterly ITP Dose
9.5516E-04 mRem Quarterly ITP Dose
7.6583E-04 mRem Quarterly ITP Dose
2.8614E-03 mRem Yearly ITP Dose
7.2915E-04 mRem Quarterly ITP Dose
4.3032E-04 mRem Quarterly ITP Dose
5.6461E-04 mRem Quarterly ITP Dose
8.4791E-04 mRem Quarterly ITP Dose
2.5720E-03 mRem Yearly ITP Dose
5.9550E-04 mRem Quarterly ITP Dose
1.1152E-03 mRem Quarterly ITP Dose
9.6798E-04 mRem Quarterly ITP Dose
6.2090E-04 mRem Quarterly ITP Dose
3.2997E-03 mRem Yearly ITP Dose
2.8149E-04 mRem Quarterly ITP Dose
0.0000E+00 mRem Quarterly ITP Dose

Unit 1 Quarterly & Yearly Dose Total

Last updated 03/08/05 00:00

H-3	3.51E-02	Qtr. #1 2002	1.1372E-03 mRem Quarterly ITP Dose
C-14		Qtr. #2 2002	8.0344E-04 mRem Quarterly ITP Dose
Na-24		Qtr. #3 2002	3.5397E-04 mRem Quarterly ITP Dose
P-32		Qtr. #4 2002	1.2026E-03 mRem Quarterly ITP Dose
Cr-51		Yearly 2002	3.4017E-03 mRem Yearly ITP Dose
Mn-54		Qtr. #1 2003	1.0948E-03 mRem Quarterly ITP Dose
Mn-56		Qtr. #2 2003	1.0929E-03 mRem Quarterly ITP Dose
Fe-55		Qtr. #3 2003	9.7329E-04 mRem Quarterly ITP Dose
Fe-59		Qtr. #4 2003	7.6463E-04 mRem Quarterly ITP Dose
Co-58		Yearly 2003	3.9257E-03 mRem Yearly ITP Dose
Co-60		Qtr. #1 2004	9.2199E-04 mRem Quarterly ITP Dose
Ni-63		Qtr. #2 2004	1.8819E-03 mRem Quarterly ITP Dose
Ni-65		Qtr. #3 2004	1.1674E-03 mRem Quarterly ITP Dose
Cu-64		Qtr. #4 2004	1.0121E-03 mRem Quarterly ITP Dose
Zn-65		Yearly 2004	4.9230E-03 mRem Yearly ITP Dose
Zn-69		Qtr. #1 2005	6.4660E-04 mRem Quarterly ITP Dose
Br-83		Qtr. #2 2005	0.0000E+00 mRem Quarterly ITP Dose
Br-84			
Br-85			

Entergy Operations : ANO - Nuclear Chemistry Department - 9-MAR-2005 16:24

Main Spectra: 05-02588 Bkg Spectra : 05-02505

Sample date : 9-MAR-2005 15:14:00 Isolation date : 9-MAR-2005 15:14:00
Sample ID : 2REP Gas 2GR- Sample Quantity : 1.65000E+03 mls
Comments :
Geometry : TABLE 222 1L GAS MARINELLI CAVE 2 SHELF 1

Calib date : 8-MAR-2005 18:07:24 Acquisition date : 9-MAR-2005 16:09:35
keV/channel : 4.99636E-01 Elapsed live time: 0 00:15:00.00
offset : 6.10107E-02 Percent deadtime : 0.0%

Decay limit : 8.00000 Peak Sensitivity : 4.66000
Abundance : 30.00000 Energy tolerance : 1.50000
Library : Libark Nuclear Chemist : DMCENTY

Peak Search performed from channel : 100 to 4050

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
1	81.29	111	22	1.02	162.58	158	10	12.6	7.72E-01	XE-133

Nuclide Line Activity Report

Sample ID : 2RBP Gas 2GR- Acquisition date : 9-MAR-2005 16:09:35

Nuclide	Sbhr	Energy	Area	%Abn	Eff	uCi/unit	1 Sig Err
XE-133	FG	81.00	111.	37.10*	2.825E-03	1.934E-06	2.434E-07

Unidentified Energy Lines

None

Flags: "T" = Tentatively associated

Summary of Nuclide Activity

Total number of peaks in spectrum 1
Number of peaks identified by NID 1 100.00%

Nuclide	Sbhr	Halflife	Decay	uCi/unit	1 Sig Err
XE-133	FG	5.29D	1.006	1.934E-06	2.434E-07

Interference correction summary

Isotope uCi/cc Corrections applied BPS : below peak sensitivity

XE-133 = 1.934E-06

Xe-133eq= 2.027E-06

Interference report Completed

Monitor Bkg
cpm
2RE-8233 = 60 cpm / 3.9-05 @ 1730
Spring #5
chnl 5 - 2RX-9820 = 1.29E-6 uCi/cc

Entergy Operations : ANO - Nuclear Chemistry Department - 9-MAR-2005 16:27

Main Spectra: 05-02590

Bkg Spectra : 05-02508

Sample date : 9-MAR-2005 15:20:00 Isolation date : 9-MAR-2005 15:20:00
Sample ID : 2REP Part 2GR- Sample Quantity : 5.00000E+04 ml

Comments :
Geometry : TAELE 317 2 IN PART FLTR CAVE 3 SHELF 1

Calib date : 8-MAR-2005 19:19:26 Acquisition date : 9-MAR-2005 16:12:49
keV/channel : 4.99684E-01 Elapsed live time: 0 00:15:00.00
offset : -8.34717E-02 Percent deadtime : 0.2%

Decay limit : 8.00000 Peak Sensitivity : 4.66000
Abundance : 30.00000 Energy tolerance : 1.50000
Library : Libark Nuclear Chemist : DMCENTY

Peak Search performed from channel : 100 to 4050

Post-NID Peak Search Report
***** No peaks found *****

Nuclide Line Activity Report

Sample ID : 2RBP Part 2GR-

Acquisition date : 9-MAR-2005 16:12:49

Nuclide	Sbhr	Energy	Area	%Abn	Eff	uCi/unit	1 Sig Err
---------	------	--------	------	------	-----	----------	-----------

Unidentified Energy Lines

None

Flags: "T" = Tentatively associated

Summary of Nuclide Activity

Total number of peaks in spectrum	0
Number of peaks identified by NID	0 100.00%

Nuclide	Sbhr	Halflife	Decay	uCi/unit	1 Sig Err
---------	------	----------	-------	----------	-----------

Interference correction summary

Isotope	uCi/cc	Corrections applied BPS : below peak sensitivity
---------	--------	--

Cs-137eq= < 1.631E-10

Xe-133eq= < 1.560E-10

Interference report Completed

Entergy Operations : ANO - Nuclear Chemistry Department - 9-MAR-2005 16:27

Main Spectra: 05-02589

Bkg Spectra : 05-02510

Sample date : 9-MAR-2005 15:20:00 Isolation date : 9-MAR-2005 15:20:00

Sample ID : 2REP Char 2GR- Sample Quantity : 5.00000E+04 ml

Comments :

Geometry : TABLE 427 SPING CHAR CART CAVE 4 SHELF 1

Calib date : 8-MAR-2005 20:09:31 Acquisition date : 9-MAR-2005 16:11:57

keV/channel : 4.99521E-01 Elapsed live time: 0 00:15:00.00

offset : 1.04492E-02 Percent deadtime : 0.0%

Decay limit : 8.00000

Peak Sensitivity : 4.66000

Abundance : 30.00000

Energy tolerance : 1.50000

Library : Libark

Nuclear Chemist : DMCENTY

Peak Search performed from channel : 100 to 4050

```
#####  
#  
# No Peaks Identified #  
#  
#####
```

Interference correction summary

Isotope uCi/cc Corrections applied BPS : below peak sensitivity

Cs-137eq= < 2.628E-10 ✓

Interference report Completed

ANO - Nuclear Chemistry : Gross Beta & Tritium Report : 9-MAR-2005 16:57

Analysis Num: 05-02592

Sample date : 9-MAR-2005 15:26:00

Sample ID : 2RBP H3

Instrument : Packard 2300TR

Background Data

H-3 [cpm] : 13.90
Beta [cpm] : 23.60
Count time [min] : 10.00
QIP [glass bkg] : 380.00
H-3 MDA [uCi/ml] : 3.110E-09
Beta MDA [uCi/ml] : 4.986E-09

Sample Data

H-3 [cpm] : 2016.79
H-3 [dpm] : 5356.98
Count time [min] : 10.00
Beta [cpm] : 0.00
Beta [dpm] : 0.00
Equiv. Volume [ml] : 2500.00
Collected Volume [ml] : 50000.00
Total Dil Volume [ml] : 100.00
Aliquot Volume [ml] : 5.00

Activity

Beta < 4.986E-09

H-3 = 9.652E-07

Error

N/A uCi/ml

+/- 5.118E-09 uCi/ml

Calculated by : DMCENTY

Protocol #: 2 Name: 3 Cnts. 10 Min 09-Mar-2005 16:31

Region A: LL-UL= 0.0-18.6 Lcr= 0 Bkg=13.90 %2 Sigma=0.00

Region B: LL-UL=18.6-2000 Lcr= 0 Bkg=23.60 %2 Sigma=0.00

Region C: LL-UL= 0.0- 0.0 Lcr= 0 Bkg= 0.00 %2 Sigma=0.00

Time = 10.00 QIP = tSIE

ES Terminator = Count

Conventional DPM

Nuclide 1 = 220525

Nuclide 2 = 114953

2 Rx Oldg H-3

S#	TIME	CPMA	DPM1	CPMB	DPM2	tSIE	FLAG
1	10.00	2025.66	5380.06	8.44	8.45	387.	
1	10.00	2020.06	5378.08	7.54	7.54	385.	
1	10.00	2004.64	5312.80	9.56	9.58	388.	
	10.00	2016.79	5356.98	8.51	8.53	387.	A

RBP

Rx Bldg Purge - Completion Time Evaluation			RBP Flowrate*x/q	RB Vol	
✓ RBP cfm	4.00E+04 ✓		5.286E-05	✓ 1.820E+06	U1=1.81E+6 CF Unit 1
Isotope	uCi/cc	Air-ECLs		ECL-fraction	(U2=1.82E+6 CF) Unit 2
✓ H ³	✓ 9.652E-07	1.000E-07	bldg t-1/2, mins.	5.102E-04	Initial ECL Sum
Xe ^{131m}		2.000E-06	22.75	0.000E+00	
Xe ^{133m}		6.000E-07		0.000E+00	
✓ Xe ¹³³	✓ 1.934E-06	5.000E-07		2.045E-04	Time to Purge to 0.00
Xe ¹³⁵		7.000E-08		0.000E+00	After Initial 60 Minute
Kr ⁸⁵		7.000E-07		0.000E+00	Minutes
Kr ^{85m}		1.000E-07		0.000E+00	
Kr ⁸⁷		2.000E-08		0.000E+00	
Kr ⁸⁸		9.000E-09		0.000E+00	hours
Ar ⁴¹		1.000E-08		0.000E+00	minutes
Na24		7.000E-09		0.000E+00	
Cr51		3.000E-08		0.000E+00	
Mn54		1.000E-09		0.000E+00	
Fe59		5.000E-10		0.000E+00	
Co57		9.000E-10		0.000E+00	
Co58		1.000E-09		0.000E+00	
Co60		5.000E-11		0.000E+00	
Rb88		9.000E-08		0.000E+00	
Zr95		4.000E-10		0.000E+00	
Nb95		2.000E-09		0.000E+00	
Ag110m		1.000E-10		0.000E+00	
Sb122		2.000E-09		0.000E+00	
Sb124		3.000E-10		0.000E+00	
Sb125		7.000E-10		0.000E+00	
Te132		9.000E-10		0.000E+00	
I131		2.000E-10		0.000E+00	
I132		2.000E-08		0.000E+00	
I133		1.000E-09		0.000E+00	
I134		6.000E-08		0.000E+00	
I135		6.000E-09		0.000E+00	
Cs134		2.000E-10		0.000E+00	
Cs136		9.000E-10		0.000E+00	
Cs137		2.000E-10		0.000E+00	
Cs138		8.000E-08		0.000E+00	

✓ 3-9-05
JED

RBP

[illegible]

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ATTACHMENT 5

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NOBLE GAS MONITOR SOURCE CHECK

This test demonstrates operability of both Unit 1 and Unit 2 related SPING noble gas monitors by performing a source check of each detector channel and satisfies the source check requirements of ODCM Appendix 1 Surveillance Limitation S2.2.1 and Limitation L2.2.1 and ODCM Appendix 2 Surveillance Limitation S2.2.1 and Limitation L2.2.1. Particulate and iodine monitor channels are tested quarterly in accordance with I&C channel test procedures.

~~1.0~~ INITIAL CONDITIONS

~~1.1~~ Check the purpose of this test:

- ~~___~~ A) Regularly scheduled monthly test. It is not required to perform the surveillance on SPINGs that have been taken out of service for maintenance or calibration and gas channels that are inoperable. However, SPINGs that missed the monthly surveillance shall be source checked upon placing the SPING back in service.
- ~~___~~ B) Operability test following significant maintenance (describe maintenance performed in section 5.0).
Other (describe in section 5.0).

~~1.2~~ Complete the applicable portions of the Inoperable Equipment Checklist (computer generated form) and take the form to the Control Room. (N/A if already performed).

~~1.3~~ Notify Operations just prior to performing source check. Noble gas monitor will be inoperable during source check. It should be noted that a SPING may be taken out of service, with an operating vent, for source check without performing ODCM actions as long as the SPING is not out of service over four hour.

Performed By (Section 1.0) *Joe Chent*

~~2.0~~ TEST METHOD

~~2.1~~ IF SPING 1 and/or SPING 5 is to be source checked and SPING is in "STANDBY ON" mode,
THEN return SPING to "STANDBY OFF" mode and clear alarms.

~~2.2~~ Set Stack Flow rate to zero (off scan) as follows:

~~2.2.1~~ From the Main Menu, select option 8, "Data Acquisition Maintenance".

~~2.2.2~~ From the Data Acquisition Maintenance Menu, select option 1, "Substitute Value".

~~2.2.3~~ Press [F1] for a list of options.

~~2.2.4~~ Select option 1, "SPING Release Channel".

~~2.2.5~~ Select the affected SPING.

~~2.2.6~~ Select option 4, "Flow Rate".

~~2.2.7~~ Select option 1, "Two Minute" time period.

~~2.2.8~~ Enter the manual value of 0.0 for stack flow rate.

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NOBLE GAS MONITOR SOURCE CHECK

~~2.2.9~~ Press [F2] to update the file.

~~2.2.10~~ Press [F10] to exit OR [F8] to select another SPING (step 2.2.3).

~~2.2.11~~ Ensure manual values have been entered for stack flow on applicable SPINGS as follows:

~~A.~~ From the Main Menu, select option 8, "Data Acquisition Maintenance".

~~B.~~ From the Data Acquisition Maintenance Menu, select option 1, "Substitute Value".

~~C.~~ Press [F1] for a list of options.

~~D.~~ Select option 1, "SPING Release Channel".

~~E.~~ Select affected SPING.

~~F.~~ Select option 4, "Flow Rate".

~~G.~~ Select option 1, "Two Minute" time period.

~~H.~~ Verify the status of the SPING is "Off Scan".

~~I.~~ Press [F10] to exit.

~~2.3~~ Disable RDACS Annunciator Alarm function for applicable SPINGS as follows:

~~2.3.1~~ From the Main Menu, select option 8, "Data Acquisition Maintenance".

~~2.3.2~~ From the Data Acquisition Maintenance Menu, select option 1, "Substitute Value".

~~2.3.3~~ Enter "SPNGX_TBL" for Point ID, where X is the applicable SPING number.

~~2.3.4~~ Enter the manual value of 0.0.

~~2.3.5~~ Press [F2] to update the file.

~~2.3.6~~ Press [F10] to exit OR [F8] to select another SPING (step 2.3.3).

~~2.3.7~~ Verify "ANN OFF" is displayed in the Channel Offscan window of the affected SPING.

~~2.4~~ Perform status check and ensure channels to be tested are normal.

~~2.4.1~~ From the Gaseous Effluent Monitor main menu select option 3, "SPING Status". All data blocks with a normal status condition will appear dark green.

[F1] toggles between Unit 1 and Unit 2 SPINGS.

~~2.4.2~~ Ensure channels 5, 7 and 9 have a status of NORMAL for each SPING for which a source check will be performed. (SPING 11 does not have channel 9.)

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NOBLE GAS MONITOR SOURCE CHECK

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2.5 Record initial monitor readings in section 3.0.

NOTE

1. Section 2.6 can be performed in any order and on any channel that possesses a source provided the source is never invoked on channels 7 and 9 at the same time or when the channel is in maintenance.
2. Since channels 5 and 7 share the same source, they are source checked at the same time by invoking the source on channel 7.
3. More than one SPING can be source checked at a time provided Operations is notified prior to beginning.
4. Source will stay exposed to detector until 1530 counts in less than 10 minutes are observed.

2.6 Perform source check and record data in section 3.0.

2.6.1 From the Gaseous Effluent Monitor main menu, select option 2, "SPING Subsystem" followed by option 1, "SPING Control."

2.6.2 Select option 5, "Check Source".

2.6.3 Enter the appropriate SPING number.

2.6.4 Enter channel 7, "Medium Range Noble Gas (gamma)".

2.6.5 Press [F2] to send the command to the SPING. Respond appropriately to the prompts.

2.6.6 Press the up arrow until the cursor moves to the SPING channel window.

2.6.7 Enter channel 9, "High Range Noble Gas (gamma)".

2.6.8 Press [F2] to send the command to the SPING. Respond appropriately to the prompts.

2.6.9 Press [F10] to exit.

2.6.10 From the Gaseous Effluent Monitor Main Menu, select option 3, "SPING Status". The SPING channel data block selected will change to dark blue. Record a reading that reflects the count rate increase in section 3.0.

2.6.11 Repeat steps 2.6.1 through 2.6.10 for the remaining SPINGS that are in service as necessary.

2.6.12 IF this is a monthly surveillance,
THEN record out of service SPINGS in Section 5.0 and in the Work Order work exceptions.

2.6.13 IF a SPING is out of service when performing the monthly noble gas monitor source check,
THEN document that the source check must be done prior to returning the SPING to service on 1604.051A for Unit 1 or 1604.051B for Unit 2.

Performed By (Section 2.0) _____

Joe Chant

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NOBLE GAS MONITOR SOURCE CHECK

3.0 ACCEPTANCE CRITERIA

3.1 Compare measured values observed during SPING testing with "Limiting Range For Operability".

TEST QUANTITY (SPING MONITOR)	CHANNEL #	MEASURED VALUES $\mu\text{Ci/cc}$		LIMITING RANGE FOR OPERABILITY	IS DATA WITHIN LIMITING RANGE (CIRCLE YES OR NO)	
		INITIAL	SOURCE CHECK		YES	NO
001 RX-9820	5	NA	NA	count rate	YES	NO
	7			increases	YES	NO
	9				YES	NO
Contain. Purge	9				YES	NO
002 RX-9825	5			count rate	YES	NO
	7			increases	YES	NO
	9				YES	NO
Radwaste Area	9				YES	NO
003 RX-9830	5			count rate	YES	NO
	7			increases	YES	NO
	9				YES	NO
Fuel Hndlg Area	9				YES	NO
004 RX-9835	5			count rate	YES	NO
	7			increases	YES	NO
	9				YES	NO
Emerg. Pen. Rm	9				YES	NO
005 2RX-9820	5	1.31E-6	3.40E-4	count rate	YES	NO
	7	1.06E-3	7.39E-2	increases	YES	NO
	9	6.06E-1	1.33E+2		YES	NO
Contain. Purge	9				YES	NO
006 2RX-9825	5	NA	NA	count rate	YES	NO
	7			increases	YES	NO
	9				YES	NO
Radwaste Area	9				YES	NO
007 2RX-9830	5			count rate	YES	NO
	7			increases	YES	NO
	9				YES	NO
Fuel Hndlg Area	9				YES	NO
008 2RX-9835	5			count rate	YES	NO
	7			increases	YES	NO
	9				YES	NO
Emerg. Pen. Rm	9				YES	NO
009 2RX-9840	5			count rate	YES	NO
	7			increases	YES	NO
	9				YES	NO
PASS Bldg	9				YES	NO
010 2RX-9845	5			count rate	YES	NO
	7			increases	YES	NO
	9				YES	NO
Aux Bldg Ext	9				YES	NO
011 2RX-9850	5			count rate	YES	NO
	7			increases	YES	NO
Radwst Stg Bldg	7				YES	NO

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NOBLE GAS MONITOR SOURCE CHECK

3.1 IF "NO" is circled for any listed channel in the above table,
THEN perform the following:

- 3.2.1 Immediately notify the Shift Manager or Control Room Supervisor and a Chemistry Supervisor.
- 3.2.2 Declare the SPING noble gas monitor inoperable.
- 3.2.3 Write a Condition Report and a Work Request.
- 3.2.4 Implement action required in ODCM Appendix 1 Table 2.2-1 Action 3 or 5 and Table 2.4-1 OR ODCM Appendix 2 Table 2.2-1 Action 3 or 6 and Table 2.4-1.

3.3 IF the source fails to retract,
THEN leave the stack flow set to zero. Write a Work Request and Condition Report. The SPING noble gas channel is inoperable. Implement action required in ODCM Appendix 1 Table 2.2-1 Action 3 or 5 and Table 2.4-1 OR ODCM Appendix 2 Table 2.2-1 Action 3 or 6 and Table 2.4-1.

3.4 WHEN the channel status for all three detectors have returned to NORMAL,
THEN perform the following:

- 3.4.1 Restore stack flow rate to normal by performing steps 2.2.1 through 2.2.10 and typing "none" in step 2.2.8 instead of 0.0.
- 3.4.2 Enable RDACS Annunciator Alarm function by performing steps 2.3.1 through 2.3.6 and typing "none" instead of 0.0.
- 3.4.3 Verify that the Channel Offscan window on the RDACS terminal has been cleared of the "Chnl Off" and "Ann Off" indicators for the applicable SPING.

3.5 Verify live, 2 minute average, and 10 minute average stack flow are "Normal" and not in "Manual".

#1 1CP	<input type="checkbox"/>	#4 1EPR	<input type="checkbox"/>	#7 2FHA	<input type="checkbox"/>	#10 ABE	<input type="checkbox"/>
#2 1RWA	<input type="checkbox"/>	#5 2CP	<input checked="" type="checkbox"/>	#8 2EPR	<input type="checkbox"/>	#11 LLRW	<input type="checkbox"/>
#3 1FHA	<input type="checkbox"/>	#6 2RWA	<input type="checkbox"/>	#9 PASS	<input type="checkbox"/>		

3.6 IF SPING 1 and/or SPING 5 was source checked and containment purge ventilation is secured and no other maintenance is to be performed,
THEN return SPING 1 and/or SPING 5 to "STANDBY ON" mode

Performed By (Section 3.0) John Christ

Independent Verification (Section 3.0) John Christ

3.7 IF noble gas monitor source check was performed as a result of Step 2.5 of Attachment 10 of this procedure,
THEN N/A Steps 4.0 and 5.0 and proceed to Step 2.8 of Attachment 10.

4.0 Notify Operations that the SPING is back in service

Performed By (Section 4.0) John Christ

5.0 COMMENTS ① NGMSC prior to purge.

Supervisor: Kelly Sullivan

12/9/05 1940
(Date & Time)

For the duration of a waste gas tank release, Makeup Tank (MUT) gas space release, or Volume Control Tank (VCT) gas space release, SPING 2 channel 5 or SPING 6 channel 5 high alarm setpoint shall be changed to maintain its validity during the release. After the release, the high alarm setpoint will be changed and the total allocation fraction will be less than or equal to 1.

For the duration of a containment purge, SPING 1 channel 5 or SPING 5 channel 5 high alarm setpoint shall be changed to maintain its validity during these short, high activity releases. During the permit period of the purge, the total of the allocation fractions may be greater than 1, due to fractional hour releases in the early hours of the purge. After the purge, setpoints will be changed and the total allocation fraction will be less than or equal to 1.

☐ Unit 1 ☒ Unit 2
 SPING 5, 2 Containment Purge
 No. Name

PRE-RELEASE SETPOINT CHANGE

1.0 Alarm Setpoint for Channel 5 (from release permit): 5.0E-6 $\mu\text{Ci/cc}$

1.1 IF performing a waste gas decay tank, MUT, or VCT release
 THEN calculate the flow corrected Alarm setpoint as follows:

For Unit 1 releases:

$$\frac{\text{NA}}{\text{Step 1.0}} * \frac{11.5 \text{ cfm}}{11.5 \text{ cfm} + 47000 \text{ cfm}} = \text{NA} \mu\text{Ci/cc}$$

For Unit 2 releases:

$$\frac{\text{NA}}{\text{Step 1.0}} * \frac{20 \text{ cfm}}{20 \text{ cfm} + 49200 \text{ cfm}} = \text{NA} \mu\text{Ci/cc}$$

1.1.1 Line through the SPING Alarm Setpoint on page 1 of the preliminary release report and write in value calculated in Step 1.1 for the applicable unit.

2.0 Determine current Channel 5 and Channel 7 alarm setpoints by performing the following:

2.1 From Main Menu, select Option 2, "SPING Subsystem" followed by Option 2, "Channel Parameter Editor".

2.2 Select appropriate SPING.

2.3 Select appropriate channel and press [F3]. Log indicated values below.

Channel 5 High Alarm 4.4E-3 $\mu\text{Ci/cc}$

Channel 5 Alert Alarm 2.2E-3 $\mu\text{Ci/cc}$

Channel 7 High Alarm 2.23E-1 $\mu\text{Ci/cc}$

Channel 7 Alert Alarm 2.23E-2 $\mu\text{Ci/cc}$

2.4 WHEN alarm values have been logged,
 THEN press [F10] to exit to Main Menu.

FORM TITLE:

DETERMINING SETPOINTS FOR GASEOUS RELEASES

FORM NO.

1604.051E

CHANGE

011-00-0

3.0

IF alarm setpoint in Step 1.0 (for containment purges) or Step 1.1 (for waste gas decay tanks, MUT, & VCT) is less than OR equal to current Channel 5 High Alarm Setpoint listed in Step 2.3, THEN proceed to Line 6.0.

NOTE

The Alert Alarm Setpoint for Channel 5 represents 50% of the High Alarm Value. Should the release exceed the Alert Alarm Setpoint, an alarm will occur locally at the SPING.

- 4.0 IF alarm setpoint in Line 1.0 (for containment purges) or Step 1.1 (for waste gas decay tanks, MUT, & VCT) is greater than current Channel 5 High Alarm Setpoint listed in Step 2.3, THEN perform the following steps:

- 4.1 Complete Form 1604.051D using Line 1.0 alarm setpoint as highest expected activity value.
- 4.2 Enter new SPING setpoints from Form 1604.051D, Column 4 and Column 5 in the indicated channel(s) as follows:

A. AFFECTED SPING

1. IF current Channel 5 alert or high alarm setpoint recorded in Line 2.0 is less than the new Channel 5 setpoint, THEN raise the setpoint to equal the new Channel 5 setpoint.
 - a. From Main Menu, select Option 2, "SPING Subsystem" followed by Option 2, "Channel Parameter Editor".
 - b. Select appropriate SPING.
 - c. Select appropriate channel and press [F3].
 - d. Position cursor in the field to be changed and enter new value. Press [TAB] or [ENTER].
 - e. Press [F2] to update file.
 - f. WHEN all SPING channel parameters have been entered, THEN press [F10] to exit to Main Menu.
2. IF Channel 7 alert or high alarm setpoints recorded in Line 2.0 are less than the new Channel 5 setpoint, THEN raise the setpoint(s) to equal the Channel 5 setpoint in the same manner described in Steps 4.2.A.1.a-f.

B. UNAFFECTED SPINGS

1. Enter new Channel 5 high alarm setpoints from Form 1604.051D and new Channel 5 alert alarm setpoint as 50% of the high alarm setpoint from Form 1604.051D for the remaining SPINGS in the same manner described in Steps 4.2.A.1.a-f.

- 5.0 Ensure the setpoints are correct by generating a printout and comparing the values. DO NOT use the [F9] key to print the screen. Generate the printout by selecting option 2 from the Main Menu, followed by option 3, then select the SPING of interest. Attach the printout to this form.

6.0

Performed by Torchist
Independent Verification Jim Chung

Date 3-9-05
Date 3/8/05

FORM TITLE:

DETERMINING SETPOINTS FOR GASEOUS RELEASES

FORM NO.

1604.051E

CHANGE

011-00-0

POST-RELEASE SETPOINT RESTORATION

- 7.0 WHEN permit period of release is complete,
THEN record current Channel 5 activity.

2.5 E-6 $\mu\text{Ci/cc}$

- 7.1 IF the AFFECTED SPING's activity is greater than or equal to Channel 5 or Channel 7 setpoint recorded in 1604.051 Attachment 2,
THEN complete 1604.051D to determine new Channel 5 setpoints.

- 7.2 IF the AFFECTED SPING's activity is less than Channel 5 setpoint recorded in Line 2.0,
THEN return all SPING Channel 5 setpoints to 1604.051 Attachment 2 values in the same manner described in Line 4.0.

- 7.3 IF Channel 7 setpoints were changed,
THEN return them to 1604.051 Attachment 2 values in the same manner described in Line 4.0.

- 8.0 Ensure the setpoints are correct by generating a printout and comparing the values. DO NOT use the [F9] key to print the screen. Generate the printout by selecting option 2 from the Main Menu, followed by option 3, then select the SPING of interest. Attach the printout to this form.

- 9.0 Performed by Docent Date 3-10-05
 Independent Verification SonChen Date 3-10-05

FORM TITLE:

DETERMINING SETPOINTS FOR GASEOUS RELEASES

FORM NO.

1604.051E

CHANGE

011-00-0

ADMINISTRATIVE JOB PERFORMANCE MEASUREUNIT: 2 REV #: 000 DATE: _____SYSTEM/DUTY AREA: A4 Emergency PlanTASK: Determine Emergency Action Level and complete formJTA#: ANOSROEPLANEMERG278KA VALUE RO: 2.6 SRO: 4.0 KA REFERENCE: 2.4.29APPROVED FOR ADMINISTRATION TO: RO: _____ SRO: XTASK LOCATION: INSIDE CR: _____ OUTSIDE CR: _____ BOTH: X

SUGGESTED TESTING ENVIRONMENT AND METHOD (PERFORM OR SIMULATE):

PLANT SITE: _____ SIMULATOR: Perform LAB: _____

POSITION EVALUATED: RO: _____ SRO: _____

ACTUAL TESTING ENVIRONMENT: SIMULATOR: _____ PLANT SITE: _____ LAB: _____

TESTING METHOD: SIMULATE: _____ PERFORM: _____

APPROXIMATE COMPLETION TIME IN MINUTES: 15 MinutesREFERENCE(S): OP 1903.010 Rev. 037-00-0 and OP 1903.011 Rev. 032-00-0

EXAMINEE'S NAME: _____ SSN: _____

EVALUATOR'S NAME: _____

THE EXAMINEE'S PERFORMANCE WAS EVALUATED AGAINST THE STANDARDS CONTAINED IN THIS JPM AND IS DETERMINED TO BE:

SATISFACTORY: _____ UNSATISFACTORY: _____

PERFORMANCE CHECKLIST COMMENTS:

Start Time _____ Stop Time _____ Total Time _____

SIGNED: _____ DATE: _____

SIGNATURE INDICATES THIS JPM HAS BEEN COMPARED TO ITS APPLICABLE PROCEDURE BY A QUALIFIED INDIVIDUAL (NOT THE EXAMINEE) AND IS CURRENT WITH THAT REVISION.

ADMINISTRATIVE JOB PERFORMANCE MEASURE

JPM INITIAL TASK CONDITIONS:

- Plant had been operating for 375 days at 100% power.
- A reactor trip occurred one hour ago on 7/17/2006 at 1300.
- The reactor trip was due to a loss of circulating water to the main condenser.
- Both Main Steam Isolation Valves are closed.
- Ten minutes ago, a Steam Generator Tube Rupture on 'A' Steam Generator, SG, was diagnosed with a LKRT calculated to be 75 GPM.
- 'B' SG Upstream Atmospheric Dump Valve will not open (Estimated Time to Completion for repair is 5 hours).
- Chemistry sample of the reactor coolant system reports 34 $\mu\text{Ci/gm}$ I-131 activity on last two samples (~ 20 minutes apart).
- The RDACS projected dose rates at the site boundary is 0.005 mRem/hr TEDE and 0.010 mRem/hr Child Thyroid.
- The RDACS projected dose for the duration of the event is .0025 mRem TEDE and 0.05 mRem Child Thyroid. No PAR's or EAL's are identified by RDACS.
- RDACS reports wind speed of 10 MPH from 240°.
- The communicator's name will be 'Unit 1 STA'.
- No previous EAL has been declared.

TASK STANDARD:

Examinee correctly classifies this event as a SAE per EAL 3.4, LKRT greater than 44 gpm, with ongoing steam release and RCS activity $>1.0 \mu\text{Ci/gm}$ but $< 378 \mu\text{Ci/gm}$ with no protective actions and completes form 1903.010Y correctly.

TASK PERFORMANCE AIDS: OP 1903.010 and 1903.011

SIMULATOR SETUP: N/A.

ADMINISTRATIVE JOB PERFORMANCE MEASURE**INITIATING CUE:**

As Shift Manager, for the given plant conditions, determine the applicable EAL classification and complete form 1903.010Y as a drill.

Critical Steps: 2, 4, 5

PERFORMANCE CHECKLIST			STANDARDS	(Circle One)
	1.	Review E-Plan procedure 1903.010 to determine classification.	Review 1903.010 index and EAL classification tabs.	N/A SAT UNSAT
(C)	2.	Classify event as EAL Site Area Emergency.	Classify event as a SAE based on EAL 3.4, Steam Generator Tube Rupture > 44gpm with an ongoing steam release and RCS Activity >1.0 $\mu\text{Ci/gm}$ but < 378 $\mu\text{Ci/gm}$.	N/A SAT UNSAT
	3.	Begin completion of form 1903.010Y, Emergency Class initial Notification Message. <ul style="list-style-type: none"> • Message number 1. • Communicator's name is Unit 1 STA. • Check drill 	Complete basic information from initial conditions: <ul style="list-style-type: none"> • Message number 1. • Communicator's name is Unit 1 STA. • Check drill 	N/A SAT UNSAT
(C)	4.	Form 1903.010Y, Emergency Class initial Notification Message: <ul style="list-style-type: none"> • Check A SITE AREA EMERGENCY was DECLARED • Check Unit 2 on 7/17/2006 at 1410 • EAL No. 3.4 • Description: "Steam Generator Tube Rupture > 44gpm with an ongoing steam release and RCS Activity >1.0 $\mu\text{Ci/gm}$ but < 378 $\mu\text{Ci/gm}$." 	<ul style="list-style-type: none"> • Check A SITE AREA EMERGENCY was DECLARED • Check Unit 2 on 7/17/2006 at 1410 (NOTE: time written must be no later than 1425) • EAL No. 3.4 • Description: "Steam Generator Tube Rupture > 44gpm with an ongoing steam release and RCS Activity >1.0 $\mu\text{Ci/gm}$ but < 378 $\mu\text{Ci/gm}$." 	N/A SAT UNSAT

ADMINISTRATIVE JOB PERFORMANCE MEASURE

PERFORMANCE CHECKLIST			STANDARDS	(Circle One)
(C)	5.	Form 1903.010Y, Emergency Class initial Notification Message. <ul style="list-style-type: none">• Wind speed 10 mph from 240°• Check gaseous radioactive release due to event that does not exceed federally approved operating limits.• No PAR recommended at this time.• Approval signature and check Shift Manager.	<ul style="list-style-type: none">• Wind speed 10 mph from 240°• Check gaseous radioactive release due to event that does not exceed federally approved operating limits.• No PAR recommended at this time.• Approval signature and check Shift Manager.	N/A SAT UNSAT
END				

ADMINISTRATIVE JOB PERFORMANCE MEASURE

EXAMINER'S COPY

INITIAL PLANT CONDITIONS

- Plant had been operating for 375 days at 100% power.
- A reactor trip occurred one hour ago on 7/17/2006 at 1300.
- The reactor trip was due to a loss of circulating water to the main condenser.
- Both Main Steam Isolation Valves are closed.
- Ten minutes ago, a Steam Generator Tube Rupture on 'A' Steam Generator, SG, was diagnosed with a LKRT calculated to be 75 GPM.
- 'B' SG Upstream Atmospheric Dump Valve will not open (Estimated Time to Completion for repair is 5 hours).
- Chemistry sample of the reactor coolant system reports 34 $\mu\text{Ci/gm}$ I-131 activity on last two samples (~ 20 minutes apart).
- The RDACS projected dose rates at the site boundary is 0.005 mRem/hr TEDE and 0.010 mRem/hr Child Thyroid.
- The RDACS projected dose for the duration of the event is .0025 mRem TEDE and 0.05 mRem Child Thyroid. No PAR's or EAL's are identified by RDACS.
- RDACS reports wind speed of 10 MPH from 240°.
- The communicator's name will be 'Unit 1 STA'.
- No previous EAL has been declared.

INITIATING CUE:

As Shift Manager, for the given plant conditions, determine the applicable EAL classification and complete form 1903.010Y as a drill.

ADMINISTRATIVE JOB PERFORMANCE MEASURE

EXAMINEE'S COPY

INITIAL PLANT CONDITIONS

- Plant had been operating for 375 days at 100% power.
- A reactor trip occurred one hour ago on 7/17/2006 at 1300.
- The reactor trip was due to a loss of circulating water to the main condenser.
- Both Main Steam Isolation Valves are closed.
- Ten minutes ago, a Steam Generator Tube Rupture on 'A' Steam Generator, SG, was diagnosed with a LKRT calculated to be 75 GPM.
- 'B' SG Upstream Atmospheric Dump Valve will not open (Estimated Time to Completion for repair is 5 hours).
- Chemistry sample of the reactor coolant system reports 34 $\mu\text{Ci/gm}$ I-131 activity on last two samples (~ 20 minutes apart).
- The RDACS projected dose rates at the site boundary is 0.005 mRem/hr TEDE and 0.010 mRem/hr Child Thyroid.
- The RDACS projected dose for the duration of the event is .0025 mRem TEDE and 0.05 mRem Child Thyroid. No PAR's or EAL's are identified by RDACS.
- RDACS reports wind speed of 10 MPH from 240°.
- The communicator's name will be 'Unit 1 STA'.
- No previous EAL has been declared.

INITIATING CUE:

As Shift Manager, for the given plant conditions, determine the applicable EAL classification and complete form 1903.010Y as a drill.

E-DOC TITLE:
EMERGENCY CLASS INITIAL NOTIFICATION MESSAGE

E-DOC NO.
1903.011-Y

CHANGE NO.
032-00-0

INITIAL NOTIFICATION MESSAGE

Use this form for **Emergency Class Declarations, Changes (Upgrade or Downgrade), Protective Action Recommendations (PAR's) or Terminations.**

State and local officials must be notified of the Emergency Class or PAR within **15 minutes** of the emergency class declaration time or PAR Change.

1. **MESSAGE NUMBER:** _____

2. **MESSAGE:**

This is _____ at Arkansas Nuclear One. My
(Communicator's name)

phone number is (479) 858-_____.

This is ☐ **AN ACTUAL EVENT** ☐ **A DRILL**.

- ☐ **A NOTIFICATION OF UNUSUAL EVENT was DECLARED**
☐ **An ALERT was DECLARED**
☐ **A SITE AREA EMERGENCY was DECLARED**
☐ **A GENERAL EMERGENCY was DECLARED**
☐ **The Emergency was TERMINATED**

on ☐ **UNIT 1** ☐ **UNIT 2** on _____ at _____ based on
(Date) (Time)

EAL No. _____ **Description:** _____

The **wind** is **AT** _____ **miles per hour** and **FROM** _____ **degrees.**

(Degrees must be between 0 & 360)

☐ There is **NO GASEOUS RADIOACTIVE RELEASE** taking place at this time due to this event.

☐ There is **A GASEOUS RADIOACTIVE RELEASE** due to this event, which
☐ **does** ☐ **does not** exceed federally approved operating limits.

Recommended Protective Actions are:

- ☐ **NONE AT THIS TIME**
☐ **EVACUATE ZONES: G H I J K L M N O P Q R S T U**
☐ **SHELTER ZONES: G H I J K L M N O P Q R S T U**
☐ **Remainder of the EPZ to go indoors: G H I J K L M N O P Q R S T U**
☐ **Beyond 10 Mile EPZ.** ☐ **Evacuate** ☐ **Shelter sectors** _____ **out to** _____ **miles.**

Comments: _____

More information will follow shortly.

[3. **APPROVED:** _____
☐ **Shift Manager** ☐ **TSC Director** ☐ **EOF Director]**

E-DOC TITLE:
EMERGENCY CLASS INITIAL NOTIFICATION MESSAGE

E-DOC NO.
1903.011-Y

CHANGE NO.
032-00-0

ACTIONS FOR INITIAL NOTIFICATION

NOTE

- The material contained within the symbols (*) throughout this form is proprietary or private information.
- The Emergency Telephone Directory contains the emergency telephone numbers that you may need to complete this notification.
- Computer generated Form 1903.011-Y may be used for notifications. The computer generated form is not an identical copy to the hard copy form, but contains all necessary information.

The Arkansas Department of Health (ADH) **SHALL** be notified within **15 minutes** of an:

- Emergency Class Declaration
- Emergency Class Change (Upgrade or Downgrade)
- PAR Change
- Termination

INSTRUCTIONS

Complete Initial Notification Message

☐ 1 Computerized Notification Method

- Sign onto the computerized notification system computer using Entergy logon ID and Password.
- Ensure your computer is connected to a local or network printer.
- Double click (Select) the "EP Notification" icon or select [Start], [(All) Programs], [EP Notifications] to start notification program.
- Enter the appropriate data into the data fields for the Initial Notification Message. See Notification Instructions page 7 of this form.
- ED&C review and approval
Press the [Create PDF only] button and then print the form to a local printer for ED&C review and approval **OR** person with ED&C may sign electronically if computer supports electronic signature.
- Close the PDF file by pressing [X] in upper right hand corner of document.
- Send Fax
Plug the DEF/VS phone line into the computer (wireless computers only). Press the [Fax Message] button to send form.

Time: _____ Date: _____

h. Go to Step 3

CONTINGENCY ACTIONS

- ☐ 1. If at anytime the 'Computerized Notification Method' fails, Go to Step 2, and use the "DEF/VS Notification Method". If the "Computerized Notification Method" will allow you to fill out the Y form and print, you may use the computer generated forms for the "DEF/VS Notification Method".

E-DOC TITLE:
EMERGENCY CLASS INITIAL NOTIFICATION MESSAGE

E-DOC NO.
1903.011-Y

CHANGE NO.
032-00-0

INSTRUCTIONS

- ☐ 2. DEF/VS Notification Method
- Complete Initial Notification Message, page 1 of this form, for Message #__. Refer to Emergency Class Notification Instructions page 7 of this form.
 - Place the Initial Notification Message face down in DEF/VS fax document tray.
 - Press the **RED** [ANO Notification] button.
 - Press the **RED** [Start Fax] Button
- Time:_____ Date:_____
- ☐ 3. **IF** you are the EOF Notification Communicator and the ADH is collocated with ANO, **THEN** give the Initial Notifications Message to the State TOCD or the Local Government Liaison (LGL) if the TOCD is not available.
- Go to step 5
4. **[Verify the Computerized Notification System (CNS) has been activated for the appropriate emergency class (NUE OR Alert or higher classification) and that the ERO is responding in accordance with Attachment 9 Section 4 of Procedure 1903.011.]**

CONTINGENCY ACTIONS

- ☐ 2. Use non-dedicated fax to send Initial Notification Message to the ADH. If the ADH is collocated, then give the Initial Notification Message to the TOCD directly.
Fax number: *9-1-501-671-1406*
- Time:_____ Date:_____
- Use non-dedicated fax to send the Initial Message Form to the following facilities (do not send to your own facility):
- CR: *858-7414
TSC: *858-6622*
EOF: *858-6957*
- ☐ 3. None
- ☐ 4. **[Page the ERO using plant or commercial telephone in accordance with Attachment 9 section 7 of Procedure 1903.011.]**

E-DOC TITLE:
EMERGENCY CLASS INITIAL NOTIFICATION MESSAGE**E-DOC NO.**
1903.011-Y**CHANGE NO.**
032-00-0☐ 5. Confirm fax receipt.**NOTE**

DEF/VS will send you a return fax of the message you sent. Do NOT perform roll-call until you have received this fax.

☐ 5.1. Pick up DEF/VS phone handset.

Press **RED** button on DEF/VS phone.

Ask responding agencies to hold.

Read message to agencies:

**"I am calling from Arkansas Nuclear One.
Please confirm receipt of "Initial" fax,
message # ____."**

☐ 5.2 Perform roll-call:

- ☐ Conway County
- ☐ Johnson County
- ☐ Logan County
- ☐ Pope County
- ☐ Yell County
- ☐ Department of Emergency Management
- ☐ Arkansas Department of Health

Person Contacted _____ Time

☐ 5. Confirm fax receipt.**NOTE**

Use of DEM Emergency Action Authenticator may be required when contacting agencies by non-dedicated fax or telephone.

☐ 5.1 Call ADH at *9-1-501-661-2136* and confirm fax receipt. (Alternate number *9-1-800-633-1735*)

Person Contacted _____ Time

Request ADH to notify other agencies.

IF ADH cannot be reached by phone, **THEN** contact DEM at *9-1-501-730-9750* or radio (Channel 6 unscrambled) and request them to relay notification.

☐ 5.2 **IF** any agency does NOT confirm fax receipt, **THEN** request ADH to confirm receipt with those agencies.

IF ADH does not respond to roll-call, **THEN** Call ADH at *9-1-501-661-2136* and confirm fax receipt. (Alternate number *9-1-800-633-1735*)

Person Contacted _____ Time

IF ADH cannot be reached by phone, **THEN** contact DEM at *9-1-501-730-9750* or radio (Channel 6 unscrambled) and request them to relay notification.

E-DOC TITLE:
EMERGENCY CLASS INITIAL NOTIFICATION MESSAGE

E-DOC NO.
1903.011-Y

CHANGE NO.
032-00-0

INSTRUCTIONS**CONTINGENCY ACTIONS****NOTE**

[The Nuclear Regulatory Commission (NRC) SHALL be notified immediately following notification of the ADH and SHALL NOT exceed 1 hour following the declaration of an emergency class.]

- ☐ 6. [Using ENS telephone call the NRC, numbers located on telephone. Read Initial Notification Message to NRC Communicator.]

 Person Contacted

 Time

- ☐ 7. [Use non-dedicated fax to send Initial Notification Message to NRC Operations Center at *9-1-301-816-5151*.]

- ☐ 6. [Using commercial telephone, call the NRC, *9-1-301-816-5100*. Read the Initial Notification Message to NRC Communicator.]

 Person Contacted

 Time

7. None

NOTE

ERDS must be started within 1 hour of the declaration of an **ALERT or higher** emergency class.

- ☐ [8. Starting Emergency Response Data System (ERDS)
- ☐ 8.1 IF an ALERT or higher emergency class has been declared, THEN verify ERDS is operating for the affected unit by performing the following steps.
- ☐ 8.2 If a "1" for Unit 1 or "2" for Unit 2, highlighted in a red box is displayed at the top of the RDACS screen THEN ERDS is sending data to the NRC. Ensure the affected units' number is displayed and then go to step 9.
- ☐ 8.3 IF you are the EOF Notifications Communicator, THEN notify the TSC Notifications Communicator to perform steps 8.4 through 8.6.
- ☐ 8.4 Exit to the Main Menu screen on the RDACS terminal.
- ☐ 8.5 Select option 9 (ERDS Subsystem) on the Main Menu.
- ☐ 8.6 Start ERDS by selecting option 1 for Unit 1 OR option 3 for Unit 2.]

E-DOC TITLE:
EMERGENCY CLASS INITIAL NOTIFICATION MESSAGE

E-DOC NO.
1903.011-Y

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- ☐ 9. Verify an additional person has been called to perform ongoing ENS communications in the Control Room.

Priority as follows (Unit specific)

1. Operations Manager
2. Assistant Operations Manager
3. Off-duty Shift Manager
4. Off-duty Senior Reactor Operator

- ☐ 10. A follow-up notification using Form 1903.011-Z should be performed within approximately **30 minutes** of the time the state was notified (step 2 of this form).

9. None

10. None

Actions performed by: _____
(Name) (Date) (Time)

NOTE

Upon termination of event, copies of Notification Forms, Checklists and other related documentation should be forwarded to Emergency Planning. Originals should be submitted to ANO records.

E-DOC TITLE:**EMERGENCY CLASS INITIAL NOTIFICATION MESSAGE****E-DOC NO.****1903.011-Y****CHANGE NO.****032-00-0**

Emergency Class Notification Instructions

1.0 Authentication

If challenged by the Arkansas Department of Health (ADH) or the Department of Emergency Management (DEM) communicator to identify yourself, use the DEM Emergency Action Authenticator to provide the proper two-digit response.

2.0 Time Requirements

The ADH shall be notified within 15 minutes of an emergency class declaration, change (upgrade or downgrade), PAR change or termination.

A Follow-up Notification to the ADH is required within approximately 30 minutes after an Initial Notification to the State and local governments. The time stamp for the follow-up notification is from the time the fax [send] button is actuated.

A Follow-up Notification is required within one hour after the previous Follow-up Notification.

The Nuclear Regulatory Commission (NRC) shall be notified immediately after notification of the ADH and NOT later than one hour following the declaration of an emergency class.

3.0 Instructions For Completing Steps On The Initial Notification Message

Computerize notification method should be used as the primary notification method. If this system is inoperable then use the DEF/VS (handwritten) notification method. When using the DEF/VS (handwritten) notification method, use a medium or larger ball point pen and ensure that the print is dark enough that legibility is acceptable for faxing.

There are two types of computers that can be used to complete the computerized notification method. Typically a desktop unit will be used in the TSC or EOF and a wireless notebook or equivalent or a desktop will be used in the Control Room.

On the desktop units, the user can use the [Tab] button to move to the next field or can select each field using the mouse. The notebooks use a stylus pen to select the fields and to fill in the fields.

Message Type (Computerized Notification Method Only) – Select either “Initial”. When “Initial” is selected, then those portions of the form that are on the follow-up message will not be available for data entry.

Step 1 – Message Number - Number messages sequentially from the initial notification at the beginning of the event to the event termination message.

Step 2 – Communicator Name – Insert your name so that the agencies receiving the fax can have a contact.

Telephone Number – Insert a telephone number where you can be reached by the offsite agencies.

Type of Event – Check the appropriate box to inform the offsite agencies of whether this is a drill or actual event.

Type of Classification – Check the appropriate box to inform the offsite agencies of the type of emergency classification declaration.

Unit Affected – Check the appropriate box to inform the offsite agencies which unit is affected. If both units are in the same emergency classification, then check both boxes.

Date of event – Insert the date that the event occurred.

ARKANSAS NUCLEAR ONE			Page 8
E-DOC TITLE: EMERGENCY CLASS INITIAL NOTIFICATION MESSAGE	E-DOC NO. 1903.011-Y	CHANGE NO. 032-00-0	

Time of event – Insert the time of the last emergency class change.

EAL Number – Insert the EAL that the Emergency Class is based on.

EAL Description – Write in the condition corresponding to the EAL listed above.

Wind Speed – Insert the wind speed. The preferred data is obtained from the RDACS System Status screen, 57 Meter 10 Minute Average data. Wind speed data may also be obtained from the chart recorders in the Unit 1 Control Room, Russellville Airport (968-2360), or the Dardanelle Dam Lock (968-5008 Ext. 236).

Wind Direction – (*Wind Direction must be between 0 & 360 degrees. If RDACS shows greater than 360, then subtract 360 from reading before entering on notification form*) Insert the wind direction. The preferred data is obtained from the RDACS System Status screen, 57 METER 10 Minute Average data. Wind direction data may also be obtained from the chart recorders in the Unit 1 Control Room, Russellville Airport (968-2360), or the Dardanelle Dam Lock (968-5008 Ext. 236).

Gaseous Release – If there is no radioactive gaseous release occurring due to this event, check the first box.

If there is a gaseous radioactive release, check the second box. Then determine if the release exceeds federally approved operating limits and check the appropriate box.

Determining if federally approved operating limits are exceeded:

Obtain release information from the Initial Dose Assessor in the Control Room or the Dose Assessment Team in the EOF. If the release meets the criteria for an NUE or higher emergency class, then federally approved operating limits have been exceeded, otherwise they have not.

If the release is unmonitored or there is no data available at the time of notification, check the box “does not” exceed federally approved operating limits until the release can be quantified.

Recommended Protective Actions – Obtain this information from the person with Emergency Direction and Control (ED&C). Check the appropriate box for the PAR recommendations.

Check the box for “None at this time” if the Emergency Class is an NUE, Alert or SAE unless directed otherwise by the person with ED&C.

Check the boxes for “Evacuate Zones” and/or “Shelter Zones” and “Remainder of the EPZ to go indoors” if a GE emergency class has been declared. Obtain the zones to evacuate and/or shelter from the person with ED&C. Circle the appropriate zones for each action. IF ANY ZONES HAVE BEEN EVACUATED ON PREVIOUS PAR'S, INCLUDE THESE ZONES ON THE CURRENT PAR UNDER EVACUATED ZONES. **DO NOT** CHANGE THE PAR FOR ANY PREVIOUSLY EVACUATED ZONES TO SHELTER OR GO INDOORS.

IF Protective Actions are required beyond the 10 mile EPZ, **THEN** mark the “Beyond 10 Mile EPZ” box, the “Evacuate” or “Shelter” box and fill in the appropriate information in the blanks.

Comments – Insert any additional comments that may be useful to the offsite agencies (e.g. other EAL's that may apply, reactor sub-critical, offsite power restored).

Step 3 - Approved – Check the appropriate box which indicates the position with Emergency Direction and Control. Ensure the person with Emergency Direction and Controls approves and signs message before being sent to offsite agencies.

**ENTERGY OPERATIONS INCORPORATED
ARKANSAS NUCLEAR ONE**

**TITLE: EMERGENCY ACTION LEVEL
CLASSIFICATION**

DOCUMENT NO.
1903.010

CHANGE NO.
037-04-0

WORK PLAN EXP. DATE
N/A

TC EXP. DATE
N/A

SET #

SAFETY-RELATED
☒ YES ☐ NO

IPTE
☐ YES ☒ NO

TEMP ALT
☐ YES ☒ NO

PROGRAMMATIC EXCLUSION PER ENS-LI-101
☐ YES ☒ NO

When you see these TRAPS

Get these TOOLS

Time Pressure
Distraction/Interruption
Multiple Tasks
Overconfidence
Vague or Interpretive Guidance
First Shift/Last Shift
Peer Pressure
Change/Off Normal
Physical Environment
Mental Stress (Home or Work)

Effective Communication
Questioning Attitude
Placekeeping
Self Check
Peer Check
Knowledge
Procedures
Job Briefing
Coaching
Turnover

VERIFIED BY

DATE

TIME

_____	_____	_____
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FORM TITLE:

VERIFICATION COVER SHEET

FORM NO.
1000.006A

CHANGE NO.
051-00-0

**ENTERGY OPERATIONS INCORPORATED
ARKANSAS NUCLEAR ONE**

Page 1

TITLE: EMERGENCY ACTION LEVEL CLASSIFICATION

**DOCUMENT NO.
1903.010**

**CHANGE NO.
037-04-0**

AFFECTED UNIT:

☒ UNIT 1 ☒ UNIT 2

☒ **PROCEDURE**

☐ **ELECTRONIC DOCUMENT**

SAFETY-RELATED

☐ **WORK PLAN, EXP. DATE**

☒ **YES** ☐ **NO**

TYPE OF CHANGE:

☐ **NEW**

☒ **PC**

☐ **TC**

☐ **DELETION**

☒ **REVISION**

☐ **EZ**

EXP. DATE: _____

DOES THIS DOCUMENT:

- | | | |
|---|---|--|
| 1. Supersede or replace another procedure?
(If YES, complete 1000.006B for deleted procedure.) | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 2. Alter or delete an existing regulatory commitment?
(If YES, coordinate with Licensing before implementing.) | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 3. Require a 50.59 Review per Form 1000.006S?
(If No, attach completed Form 1000.006S) (If 50.59 Evaluation, OSRC review required.) | <input checked="" type="checkbox"/> YES | <input type="checkbox"/> NO |
| 4. Changes Surveillance Test Program (i.e. Technical Specifications, NRC Commitment, surveillance activity, see Step 7.5)? (If YES, complete 1000.009A) | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 5. Create an Intent Change?
(If YES, Standard Approval Process required.) | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 6. Implement or change IPTE requirements?
(If YES, complete 1000.143A. OSRC review required.) | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 7. Implement or change a Temporary Alteration?
(If YES, then OSRC review required.) | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |

Was the Master Electronic File used as the source document?

☒ **YES** ☐ **NO**

INTERIM APPROVAL PROCESS

STANDARD APPROVAL PROCESS

ORIGINATOR SIGNATURE: (Includes review of Att. 13) **DATE:**

ORIGINATOR SIGNATURE: (Includes review of Att. 13) **DATE:** 1/5/06

Print and Sign name: N/A

PHONE #:

Print and Sign name: William R. Gresham

PHONE #: 4998

SUPERVISOR APPROVAL: *

DATE:

INDEPENDENT REVIEWER:

DATE:

SRO UNIT ONE : **

DATE:

ENGINEERING:

DATE:

SRO UNIT TWO: **

DATE:

Code Programs - NDE:

DATE:

Interim approval allowed for non-intent changes requiring no 50.59 evaluation that are stopping work in progress.

UNIT SURVEILLANCE COORDINATOR:

DATE:

Standard Approval required for intent changes or changes requiring a 50.59 evaluation.

SECTION LEADER:

DATE:

*If change not required to support work in progress, Department Head must sign.

QUALITY ASSURANCE:

DATE:

**If both units are affected by change, both SRO signatures are required. (SRO signature required for safety related procedures only.)

OTHER SECTION LEADERS:

DATE:

OTHER SECTION LEADERS:

DATE:

OTHER SECTION LEADERS:

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OTHER SECTION LEADERS:

DATE:

OTHER SECTION LEADERS:

DATE:

OSRC CHAIRMAN/TECHNICAL REVIEWER:

DATE:

OTHER SECTION LEADERS:

DATE:

FINAL APPROVAL:

DATE:

OTHER SECTION LEADERS:

DATE:

REQUIRED EFFECTIVE DATE:

OTHER SECTION LEADERS:

DATE:

FORM TITLE:

PROCEDURE/WORK PLAN APPROVAL REQUEST

FORM NO.

1000.006B

CHANGE NO.

054-00-0

ENTERGY OPERATIONS INCORPORATED ARKANSAS NUCLEAR ONE

TITLE: EMERGENCY ACTION LEVEL CLASSIFICATION		DOCUMENT NO. 1903.010	CHANGE NO. 037-04-0
<input checked="" type="checkbox"/> PROCEDURE <input type="checkbox"/> WORK PLAN, EXP. DATE _____		PAGE <u>1</u> OF <u>2</u>	
<input type="checkbox"/> ELECTRONIC DOCUMENT			
TYPE OF CHANGE: <div style="display: flex; justify-content: space-between;"> <input type="checkbox"/> NEW <input checked="" type="checkbox"/> PC <input type="checkbox"/> TC <input type="checkbox"/> DELETION </div> <div style="display: flex; justify-content: space-between;"> <input checked="" type="checkbox"/> REVISION <input type="checkbox"/> EZ EXP. DATE: _____ </div>			
AFFECTED SECTION: (Include step # if applicable)	DESCRIPTION OF CHANGE: (For each change made, include sufficient detail to describe reason for the change.)		
Table of Contents	Changed referenced page numbers due to revisions in body of procedure		
Section 3.1	Added references to NEI Industry White Paper dated 11/18/05 and NRC Bulletin 2005-02 which were the documents used in revising procedure to new Security-based EALs		
Section 3.2	Added reference to Procedure 1203.048, "Security Event"		
Section 3.4	Added NRC commitments relating to NRC Bulletin 2005-02		
Section 4.3	Revised definitions for NUE, Alert, SAE and GE based upon 2005-02 NRC Bulletin and NEI White Paper.		
Sections 4.13 and 4.14	Added definitions for Hostile Action and Hostile Force, respectively		
Section 4.16	Added new definition for Loss of Physical Control of the Plant per NUREG-1022		
Section 4.21	Added new definition for Owner Controlled Area		
Sections 4.13 – 4.25	Re-numbered these sections due to addition of new 4.13, 4.14, 4.16 and 4.21		
Attachment 1- U-1 EAL Index	Revised index for section 7.0 EALs (7.1 thru 7.4) to include new security EALs as defined in NRC Bulletin 2005-02 and NEI White Paper dated 11/18/05		
Attachment 2 - U-2 EAL Index	Revised index for section 7.0 EALs (7.1 thru 7.4) to include new security EALs as defined in NRC Bulletin 2005-02 and NEI White Paper dated 11/18/05		
Attachment 3, EAL 7.1	New U-1 security-related EAL added to replace previous security-related NUE classification		
Attachment 3, EAL 7.2	New U-1 security-related EAL added to replace previous security-related Alert classification		
Attachment 3, EAL 7.3	New U-1 security-related EAL added to replace previous security-related SAE classification		
Attachment 3, EAL 7.4	New U-1 security-related EAL added to replace previous security-related GE classification		
Attachment 3, EAL 7.8	Added "Ongoing Security Compromise OR Airborne Threat" in Related EALs footnote section		
FORM TITLE: <div style="text-align: center; border: 1px solid black; padding: 5px;"> DESCRIPTION OF CHANGE </div>		FORM NO. 1000.006C	CHANGE NO. 050-00-0

**ENTERGY OPERATIONS INCORPORATED
ARKANSAS NUCLEAR ONE**

**TITLE: EMERGENCY ACTION LEVEL
CLASSIFICATION**

DOCUMENT NO.
1903.010

CHANGE NO.
037-04-0

☒ **PROCEDURE**

☐ **WORK PLAN, EXP. DATE** _____

PAGE 2 **OF** 2

☐ **ELECTRONIC DOCUMENT**

TYPE OF CHANGE:

☐ **NEW**

☒ **PC**

☐ **TC**

☐ **DELETION**

☒ **REVISION**

☐ **EZ**

EXP. DATE: _____

AFFECTED SECTION:
(Include step # if applicable)

DESCRIPTION OF CHANGE: (For each change made, include sufficient detail to describe reason for the change.)

Attachment 3, EAL 7.9

Added "Imminent Loss of Physical Control of the Plant" in Related EALs footnote section

Attachment 3, EAL 7.10

Added " Loss of Physical Control of the Plant" in Related EALs footnote section

Attachment 4, EAL 7.1

Added new U-2 security-related EAL 7.1 to replace previous security-related NUE classification

Attachment 4, EAL 7.2

Added new U-2 security-related EAL 7.2 to replace previous security-related Alert classification

Attachment 4, EAL 7.3

Added new U-2 security-related EAL 7.3 to replace previous security-related SAE classification

Attachment 4, EAL 7.4

Added new U-2 security-related EAL 7.4 to replace previous security-related GE classification

Attachment 4, EAL 7.8

Added "Ongoing Security Compromise OR Airborne Threat" in Related EALs footnote section

Attachment 4, EAL 7.9

Added "Imminent Loss of Physical Control of the Plant" in Related EALs footnote section

Attachment 4, EAL 7.10

Added "Loss of Physical Control of the Plant" in Related EALs footnote section

FORM TITLE:

DESCRIPTION OF CHANGE

FORM NO.
1000.006C

CHANGE NO.
050-00-0

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1.0 PURPOSE

This procedure establishes criteria for detection and classification of plant events into the four standard Emergency Classes.

2.0 SCOPE

This procedure is applicable to Units 1 and 2 in all modes; it does not include specific plant casualty procedures or systems operations requirements, but rather provides administrative processes only.

3.0 REFERENCES

3.1 REFERENCES USED IN PROCEDURE PREPARATION:

- 3.1.1 ANO Emergency Plan
- 3.1.2 ANO's EAL Bases Document
- 3.1.3 NUREG-0654/FEMA-REP-1, Rev. 1
- 3.1.4 10 CFR 50
- 3.1.5 NRC Branch Position on Acceptable Deviations to Appendix 1 to NUREG-0654/FEMA-REP-1, July 11, 1994
- 3.1.6 OCNA080005 - Allow for 1% fuel cladding failure to be determined by radiation dose readings. Step 4.10.1.A.2, 4.10.1.B.2, Attachment 3 EALs 1.2 and 1.3, Attachment 4 EALs 1.2 and 1.3, Attachment 7 and 8.
- 3.1.7 NEI 99-01 - Methodology for Development of Emergency Action Levels
- 3.1.8 NEI Industry White Paper - "Enhancements to Emergency Preparedness Programs for Hostile Action," dated November 18, 2005.
- 3.1.9 NRC Bulletin 2005-02, "Emergency Preparedness and Response Actions for Security-Based Events"

3.2 REFERENCES USED IN CONJUNCTION WITH THIS PROCEDURE:

- 3.2.1 EN-LI-102, "Corrective Action Process"
- 3.2.2 1903.011, "Emergency Response/Notifications"
- 3.2.3 1903.064, "Emergency Response Facility - Control Room"
- 3.2.4 1903.065, "Emergency Response Facility - Technical Support Center (TSC)"
- 3.2.5 1903.066, "Emergency Response Facility - Operational Support Center (OSC)"
- 3.2.6 1903.067, "Emergency Response Facility - Emergency Operations Facility (EOF)"
- 3.2.7 1203.025, "Natural Emergencies"

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- 3.2.8 2203.008, "Natural Emergencies"
- 3.2.9 1202.XXX, "Emergency Operating Procedures"
- 3.2.10 2202.XXX, "Emergency Operating Procedures"
- 3.2.11 1404.016, "Post Earthquake Data acquisition and Measurement"
- 3.2.12 1904.002, "Offsite Dose Projections-RDACS Method"
- 3.2.13 NRC Position Paper on "Timeliness of Classification of Emergency Conditions" dated August 17, 1995
- 3.2.14 1607.001, "Reactor Coolant System Sampling"
- 3.2.15 2607.001, "Unit 2 Reactor Coolant System Sampling"
- 3.2.16 1203.048, "Security Event"

3.3 RELATED ANO PROCEDURES:

- 3.3.1 1043.042, "Response to Security Contingencies"
- 3.3.2 1502.004, Attachment H
- 3.3.3 1903.023, "Personnel Emergency"
- 3.3.4 ANO Security Plan/Security Procedures
- 3.3.5 1015.007, "Fire Brigade Organization and Responsibilities"
- 3.3.6 1903.042, "Duties of the Emergency Medical Team"
- 3.3.7 1903.043, "Duties of the Emergency Radiation Team"
- 3.3.8 1302.022, "Core Damage Assessment"

3.4 REGULATORY CORRESPONDENCE CONTAINING NRC COMMITMENTS WHICH ARE IMPLEMENTED IN THIS PROCEDURE ARE DENOTED IN LEFT HAND MARGIN:

- 3.4.1 0CAN068320 (P-10766) - Section 4.3
- 3.4.2 CNRO-2005-044 (NRC Bulletin 2005-02) - Sections 4.3.1-4.3.4, 4.13. 4.14, U-1 EALs 7.1-7.4 and U-2 EALs 7.1-7.4

4.0 DEFINITIONS

- 4.1 Core Damage - A failure of fuel cladding integrity to the extent that any of the following happen:
 - 4.1.1 Fission product activity in the coolant exceeds the limits in the technical specifications.
 - 4.1.2 Fuel is no longer in the original geometry.

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4.1.3 A major portion of the core cannot be operated for its design cycle length.

4.2 Courtesy Call - A notification to the Arkansas Department of Health and follow-up notification to the NRC for conditions/events other than those constituting an Emergency Class as listed in procedure 1903.11, "Emergency Response/Notifications", Section 6.3.

4.3 Emergency Action Level - Alarms, instrument readings or visual sightings that have exceeded pre-determined limits which would categorize the situation into an initiating condition of one of the following four Emergency Classes:

Notification of Unusual Event
Alert
Site Area Emergency
General Emergency

{CNRO-2005-044} 4.3.1 Notification of Unusual Event -Events are in process or have occurred which indicate a potential degradation of the level of safety of the plant or indicate a security threat to facility protection has been initiated. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of safety systems occurs.

{CNRO-2005-044} 4.3.2 Alert - Events are in process or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant or a security event that involves probable life threatening risk to site personnel or damage to site equipment because of HOSTILE ACTION. Any releases are expected to be limited to small fractions of the EPA Protective Action Guideline exposure levels.

{CNRO-2005-044} 4.3.3 Site Area Emergency -Events are in process or have occurred which involve actual or likely major failures of plant functions needed for protection of the public or HOSTILE ACTION that results in intentional damage or malicious acts; (1) toward site personnel or equipment that could lead to the likely failure of or; (2) that prevent effective access to equipment needed for the protection of the public. Any releases are not expected to result in exposure levels which exceed EPA Protective Action Guideline exposure levels beyond the site boundary.

{CNRO-2005-044} 4.3.4 General Emergency -Events are in process or have occurred which involve actual or imminent substantial core degradation or melting with potential for loss of containment integrity or HOSTILE ACTION that result in an actual loss of physical control of the facility. Releases can be reasonably expected to exceed EPA Protective Action Guideline exposure levels offsite for more than the immediate site area.

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{OCAN068320} 4.4

Emergency Direction and Control - Overall direction of facility response which must include the non-delegable responsibilities for the decision to notify and to recommend protective actions to Arkansas Department of Health personnel and other authorities responsible for offsite emergency measures. With activation of the EOF, the EOF Director typically assumes the responsibility for Emergency Direction and Control. The management of on-site facility activities to mitigate accident consequences remains with the TSC Director in the Technical Support Center. The Shift Manager retains responsibility for the Control Room and plant systems operation.

- 4.5 Emergency Operations Facility (EOF) - A nearsite emergency response facility located approximately 0.65 miles northeast of the reactor buildings (the ANO Training Center).
- 4.6 Emergency Planning Zone (EPZ) - The EPZ considered by this procedure is the inhalation zone and is that area within approximately a 10 mile radius of ANO.
- 4.7 Emergency Response Organization (ERO) - The organization which is composed of the Initial Response Staff (IRS), the EOF staff, the TSC staff, the OSC staff, and the Emergency Team members. It has the capability to provide manpower and other resources necessary for immediate and long-term response to an emergency situation.
- 4.8 EPA Protective Action Guideline (PAG) Exposure Levels - The projected dose to reference man, or other defined individual, from an unplanned release of radioactive material at which a specific protective action to reduce or avoid that dose is recommended (i.e., 1 Rem TEDE or 5 Rem Child Thyroid (CDE)).
- 4.9 Exclusion Area: That area surrounding ANO within a minimum radius of 0.65 miles of the reactor buildings, but outside the protected area and controlled to the extent necessary by ANO during periods of emergency.
- 4.10 FISSION PRODUCT BARRIER FAILURE
- 4.10.1 Fuel Cladding Failure - Condition where the fuel rod cladding becomes defective and cannot contain the fission gases that have accumulated between the fuel pellet and the fuel rod cladding (commonly referred to as the gap).

A. Unit 1 - Greater than 1% fuel cladding failure as indicated by ANY of the following:

1. Nuclear Chemistry analysis of RCS sample yields > 400 uCi/gm specific I-131.
 2. Radiation levels that indicate >1% fuel cladding failure per Unit 1 Fuel Cladding Failure Radiation Plot (Att 7).
 3. Failed Fuel Iodine process monitor (RE 1237S) indicates > 8.2 x 10⁵ CPM.
- (4.10.1 cont.)

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4. Containment Radiation Levels correspond to a Site Area Emergency from Containment Radiation EAL Plot (Attachment 5).

5. Engineering assessment of core damage indicates >1% fuel cladding failure.

B. Unit 2 - Greater than 1% fuel cladding failure as indicated by ANY of the following:

1. Nuclear Chemistry analysis of RCS sample yields > 378 uCi/gm specific I-131.

2. Radiation levels that indicate >1% fuel cladding failure per Unit 2 Fuel Cladding Failure Radiation Plot (Att 8).]

3. Containment Radiation Levels correspond to a Site Area Emergency from Containment Radiation EAL Plot (Attachment 6).

4. Engineering assessment of core damage indicates > 1% fuel cladding failure.

4.10.2 RCS Boundary Failure

A. Unit 1 - RCS leakage greater than normal makeup capacity (50 gpm).

B. Unit 2 - RCS leakage greater than 44 gpm (capacity of a single Charging Pump).

4.10.3 Containment Integrity Failure

A. Abnormally high Containment High Range Radiation Monitor readings (RE-8060 or 8061 for Unit 1; 2RY-8925-1 or 2RY-8925-2 for Unit 2) and indications of radiological effluents outside of the Reactor Building that are not attributable to any other source.

B. In the judgement of the SM/TSC Director/EOF Director, a breach of the Reactor Building exists. The variety of possible Reactor Building integrity failure scenarios precludes the development of an all inclusive list. In the absence of the conditions described in 4.10.3.A above, the SM/TSC Director/EOF Director must judge the potential for an offsite release to occur based on a current status of Reactor Building isolation systems and structural integrity.

4.10.4 Inability to Monitor a Fission Product Barrier

A. Following the failure of two fission product barriers, the inability to monitor the third barrier is to be regarded as equivalent to a failure of that barrier.

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4.11 FISSION PRODUCT BARRIER CHALLENGE

4.11.1 **Challenge to Fuel Cladding:** any event or condition which in the judgement of the SM/TSC Director/EOF Director presents the potential for greater than 1% fuel cladding failure; for example:

- A. RCS temperature and pressure indicates superheated conditions.
- B. Indications of the core being uncovered.
- C. Exceeding safety limits (e.g. DNBR or Local Power Distribution)

4.11.2 **Challenge to RCS Boundary:** any event or condition which, in the judgement of the SM/TSC Director/EOF Director could result in RCS leakage in excess of normal makeup capacity (i.e., 50 gpm for Unit 1 or 44 gpm for Unit 2); for example:

- A. RCS pressure > 2450 psig and not decreasing.
- B. Two out of three seal stages failed on any RCP (U-1).
- C. Three out of four seal stages failed on any RCP (U-2).
- D. Failure of any component resulting in RCS leakage greater than Tech. Spec. limits and approaching normal make up capacity; (50 gpm) for Unit 1 or (44 gpm) for Unit 2.

4.11.3 **Challenge to Containment Building Integrity:** any event or condition which in the judgement of the SM/TSC Director/EOF Director significantly increases the potential for failure of containment integrity; for example:

- A. Containment pressure > Reactor Building spray actuation setpoint and increasing with no available RB spray or cooling.
- B. Hydrogen concentrations in containment > 3.5%.
- C. Occurrence of system or component failure which degrades the capability to maintain containment integrity as defined by Technical Specifications.

4.12 **Fuel Overheat** - Condition in which fission products trapped within the fuel pellet are released at an accelerated rate due to increasing temperature. Fuel overheating temperatures typically range from 1600 °F to 3600 °F cladding temperature.

{CNRO-2005-044}4.13 **Hostile Action** - An act toward a Nuclear Power Plant or its personnel that includes the use of violent force to destroy equipment, take hostages, and /or intimidates the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives,

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projectiles, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the Nuclear Power Plant. Non-terrorism-based EALs should be used to address such activities, (e.g., violent acts between individuals in the owner controlled area.)

- {CNRO-2005-044}4.14 Hostile Force - One or more individuals who are engaged in a determined assault, overtly or by stealth and deception, equipped with suitable weapons capable of killing, maiming, or causing destruction.
- 4.15 Initial Response Staff (IRS) - The emergency organization composed of plant personnel which must be able to respond to the site in accordance with Table B-1 of the Emergency Plan.
- 4.16 Loss of Physical Control of the Plant - Plant personnel are unable to operate equipment required to maintain safety functions to:
- Shutdown the reactor and maintain it in a safe shutdown condition
 - Remove residual heat
 - Control the release of radioactive material
 - Mitigate the consequences of an accident
- 4.17 Normal Makeup (MU) Capacity
- Unit 1: Normal makeup capacity is defined as 50 gpm. 50 gpm approximates a leak size for which the ability to make additions to the makeup tank is no longer adequate to maintain makeup tank level.
- Unit 2: Normal makeup capacity is defined as 44 gpm. 44 gpm is the capacity of a single charging pump.
- 4.18 Offsite - Those areas not covered by Section 4.16.
- 4.19 Onsite - The area within the Exclusion Area Boundary.
- 4.20 Operational Support Center (OSC) - Emergency response center within the ANO Maintenance Facility where support is coordinated for the following functions:
- Onsite Radiological Monitoring
Maintenance
Nuclear Chemistry
Emergency Medical Support
Fire Fighting Support
- The OSC also serves as the briefing area for repair and damage control teams and is located in the Maintenance Facility.
- 4.21 Owner Controlled Area (OCA) - The external area contiguous to the designated reactor site Protected Area over which site Security exercises control. The OCA extends outward to the Entergy site property lines.

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4.22 PLANT TRANSIENT

- 4.22.1 Any unplanned reactor trip from criticality.
- 4.22.2 A planned reactor trip in which the expected post-trip response did not occur.
- 4.22.3 Any event resulting in an automatic ESAS (Unit 1) or ESF (Unit 2) actuation or any event requiring manual initiation of these systems where automatic initiation would likely have occurred.
- 4.22.4 Any turbine-generator power change in excess of 100 MWe in less than one (1) minute other than a momentary spike due to a grid disturbance or a manually initiated runback.
- 4.22.5 Any unplanned main turbine or main feedwater pump turbine trip which results in a significant plant transient (change in excess of 100 MWe).

4.23 Protected Area: The area encompassed by physical barriers (i.e., the security fence) and to which access is controlled.

4.24 Reactor Coolant System (RCS) Leakage: Loss of RCS inventory due to a leak in the RCS or a supporting system that is not or cannot be isolated within 10 minutes.

4.25 Technical Support Center (TSC) - The location within the ANO Administration Building equipped with instrumentation and communication systems and facilities useful in monitoring the course of an accident; this center is located in the 3rd Floor of the ANO Administration Building.

5.0 RESPONSIBILITY AND AUTHORITY

- 5.1 The responsibility for event classification is assigned to the individual with responsibility for Emergency Direction and Control (i.e., The Shift Manager, TSC Director, or EOF Director).
- 5.2 The Control Room Supervisor (CRS) will assume Emergency Direction and Control responsibilities whenever the SM is not available to assume this responsibility (e.g. the SM becomes incapacitated and a replacement has not yet arrived).
- 5.3 Any individual who observes an initiating condition which warrants an emergency class declaration, as described in Attachments 3 and 4, shall immediately notify the person with current responsibility for Emergency Direction and Control (i.e. SM/TSC Director/EOF Director).

6.0 INSTRUCTIONS

NOTE

On emergencies that effect both units such as earthquakes, tornado's, etc., the unit with the highest Emergency Action Level Classification should be the one that is declaring the emergency.

6.1 CLASSIFYING EMERGENCIES:

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NOTE

NRC guidelines recommend that once indications are available to ANO staff that an EAL has been exceeded, a 15 minute goal is a reasonable period of time for assessing and classifying an emergency.

- 6.1.1 When indications of abnormal occurrences are received by the Control Room staff, the SM/TSC Director/EOF Director shall:
- A. Verify the indications of the off-normal event or reported sighting.
 - B. Ensure that the immediate actions (e.g., use of Emergency and Abnormal Operating Procedures) are taken for the safe and proper operation of the plant.
 - C. Compare the abnormal conditions with those listed in the "Index Of Emergency Action Levels" (Blue Tabs - Unit 1; Green Tabs - Unit 2).
 - D. Turn to the appropriate tab which corresponds to the condition picked from the Index Of EALs.

NOTE

Unit 1 EALs - Blue Tabs
Unit 2 EALs - Green Tabs

- E. Assess the information available from valid indications or reports, then:
 1. Compare information to criteria given for EAL,
 2. Review any Related EALs to determine if the abnormal conditions meet those criteria, and
 3. Declare the emergency classification that is indicated. If it appears that different classifications could be made for the current plant conditions, the highest classification indicated should be the one that is declared.

NOTE

The emergency action levels described in this procedure are not intended to be used during maintenance and/or testing situations where abnormal temperature, pressure, equipment status, etc., is expected. In addition, each EAL contains information on the mode(s) of operation during which it is applicable.

- F. If the indications or reports do not match the given EALs, then refer to the Miscellaneous Tab and using appropriate judgement, determine if the plant status warrants an emergency declaration.
- 6.1.2 Due to the speed in which events sometimes progress and the duty of the plant operators to take immediate corrective actions, an event may occur which was classifiable as an

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emergency, however, prior to offsite notifications the corrective actions taken may have removed the conditions that would have resulted in an emergency declaration. In this situation, it is not necessary to make an actual declaration of the emergency class, but an ENS notification to the NRC within one hour of the discovery of the undeclared event will provide an acceptable alternative. A courtesy call shall be made to ADH. Subsequent activation of response organization should be based upon the current plant conditions.

- 6.1.3 If no emergency declaration is required, then refer to procedure 1903.011, "Emergency Response/Notifications", Section 6.3 to determine if the event warrants a "For Information Only" notification to Entergy Management, NRC Resident Inspector and/or the Arkansas Department of Health.
- 6.1.4 Upon declaration of an emergency classification implement procedure, 1903.011, "Emergency Response Notifications", to ensure that immediate notification requirements are met and the proper Emergency Plan response is taken.
- 6.1.5 Upgrade the emergency classification if plant conditions degrade per steps 6.1.1.A through F.
- 6.1.6 Downgrade the emergency classification when plant conditions have improved and step 6.2 is applicable.

6.2 DOWNGRADING THE EMERGENCY CLASSIFICATION:

- 6.2.1 Assess the current plant conditions, then perform the following:
 - A. Compare the abnormal conditions with those listed in the "Index Of Emergency Action Levels" (Blue Tabs - Unit 1; Green Tabs - Unit 2).
 - B. Turn to the appropriate tab which corresponds to the condition picked from the Index Of EALs.

NOTE

Unit 1 EALs - Blue Tabs
Unit 2 EALs - Green Tabs

- C. Assess the information available from valid indications or reports, compare it to the given EALs. Obtain concurrence from NRC and State officials that downgrading is appropriate (if their emergency response organizations have been activated as a result of this event). Downgrade to the emergency classification that is indicated.
- D. If the indications or reports do not match the given EALs, then refer to the Miscellaneous Tab and using appropriate judgement, determine if the plant status warrants downgrading the emergency classification.

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- 6.2.2 Perform notifications to downgrade the emergency classification if appropriate per procedure 1903.011, "Emergency Response/Notifications".
- 6.2.3 If no emergency classification appears necessary, then terminate the emergency per step 6.3.
- 6.2.4 If the emergency classification is still required, repeat steps 6.2.1 through 6.2.3 whenever plant conditions again appear to have improved.

6.3 TERMINATING THE EMERGENCY:

- 6.3.1 Compare the existing plant conditions with the following:
 - A. Plant conditions no longer meet the emergency action level criteria AND it appears unlikely that current conditions will degrade further requiring reinstitution of an emergency classification.
 - B. Non-routine releases of radioactive material to the environment are under control or terminated.
 - C. Any fire, flood, earthquake, or similar emergency condition is controlled or has ceased.
 - D. All specified corrective actions have occurred OR the plant has been placed in the appropriate operational mode.
 - E. All required notifications have been completed.
 - F. NRC and State officials are in agreement that termination or transition to the recovery phase is appropriate (if their emergency response organizations have been activated as a result of this event).
- 6.3.2 If the conditions of 6.3.1 A-F are met, terminate the emergency or proceed to the recovery phase.

7.0 ATTACHMENTS AND FORMS

- 7.1 Attachment 1 - Unit 1 Index of EALs
- 7.2 Attachment 2 - Unit 2 Index of EALs
- 7.3 Attachment 3 - Unit 1 Emergency Action Levels
- 7.4 Attachment 4 - Unit 2 Emergency Action Levels
- 7.5 Attachment 5 - Unit 1 Containment Radiation EAL Plot
- 7.6 Attachment 6 - Unit 2 Containment Radiation EAL Plot
- 7.7 Attachment 7 - Unit 1 Fuel Cladding Failure Radiation Plot
- 7.8 Attachment 8 - Unit 2 Fuel Cladding Failure Radiation Plot

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ATTACHMENT 1
UNIT 1
INDEX OF EALS

NOTE

Once available plant parameters reach an Emergency Action Level (EAL), classifications should be made within **15** minutes.

1.0 PRIMARY SYSTEM EVENTS

1.1	RCS Activity Indicates >0.1% Fuel Cladding Failure	NUE
1.2	RCS Activity Indicates > 1% Fuel Cladding Failure	ALERT
1.3	Core Damage Indicated with an Inadequate Core Cooling Condition	SAE
1.4	Containment Radiation Reading which Indicates LOCA and >1% Fuel Cladding Failure	SAE
1.5	Containment Radiation Reading which Indicates LOCA and >50% Fuel Overheat	GE
1.6	Core Melt	GE
1.7	Loss of or challenge to all 3 Fission Product Barriers	GE

NOTE

RCS leakage is defined as a loss of RCS inventory due to a leak in the RCS or a supporting system that is not or cannot be isolated within 10 minutes.

2.0 RCS LEAKAGE

2.1	RCS Leakage	NUE
2.2	RCS Leakage > Normal Makeup Capacity (50 gpm)	ALERT
2.3	RCS Leakage > Normal Makeup Capacity (50 gpm) with >1.0% Fuel Cladding Failure Conditions	SAE
2.4	RCS Leakage > HPI Capacity	SAE

3.0 SECONDARY SYSTEM EVENTS

3.1	Uncontrolled OTSG Depressurization Resulting in MSLI Actuation	NUE
3.2	OTSG Tube Leak > Tech Spec limits	NUE
3.3	OTSG Tube Leak >10gpm Concurrent with an On-going Steam Release, or loss of offsite power	ALERT
3.4	OTSG Tube Rupture with Primary to Secondary Leakage > Normal Makeup Capacity (50 gpm) with ongoing steam release or loss of offsite power	SAE
3.5	OTSG Tube Leak >1 gpm with >1% Fuel Cladding Failure and on-going Steam Release	SAE

4.0 ELECTRICAL POWER FAILURES

4.1	Degraded Power	NUE
4.2	Station Blackout	ALERT
4.3	Blackout for more than 15 minutes	SAE
4.4	Loss of All Vital DC Power	ALERT
4.5	Loss of All Vital DC Power for more than 15 minutes	SAE

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ATTACHMENT 1
UNIT 1
INDEX OF EALS

NOTE

Once available plant parameters reach an Emergency Action Level (EAL), classifications should be made within **15** minutes.

5.0 RADIOLOGICAL EFFLUENTS

- 5.1 Radiological Effluents $\geq .05$ mRem/hr TEDE or .15 mRem/hr
Child Thyroid CDE at Site Boundary or Liquid Radiological
Effluents exceed ODCM LimitationsNUE
- 5.2 Radiological Effluents $\geq .5$ mRem/hr TEDE or 1.5 mRem/hr
Child Thyroid CDE at Site Boundary or Liquid Radiological
Effluents exceed 10 times ODCM LimitationsALERT
- 5.3 Radiological Effluents ≥ 50 mRem/hr TEDE or 150 mRem/hr
Child Thyroid CDE at the Site BoundarySAE
- 5.4 Radiological Effluents ≥ 250 mRem/hr TEDE or 500 mRem/hr
Child Thyroid CDE at the Site BoundaryGE
- 5.5 High Radiation/Airborne LevelsALERT
- 5.6 Spent Fuel AccidentSAE

6.0 SAFETY SYSTEM FUNCTION

- 6.1 Deviation from T.S. action statements when required to
shutdown or cooldown or deviations pursuant to
10CFR50.54(x)NUE
- 6.2 RPS Failure to Complete an Automatic TripALERT
- 6.3 RPS Failure to Complete a Manual TripSAE
- 6.4 Loss of Dose Assessment CapabilitiesNUE
- 6.5 Loss of CommunicationsNUE
- 6.6 Loss of Control Room AnnunciatorsALERT
- 6.7 Loss of Control Room Annunciators with Transient in
ProgressSAE
- 6.8 Control Room EvacuationALERT
- 6.9 Control Room Evacuation and control of shutdown systems
not established in 15 minutesSAE
- 6.10 Loss of Decay Heat Removal SystemsALERT
- 6.11 Degraded Hot Shutdown CapabilitySAE

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ATTACHMENT 1
UNIT 1
INDEX OF EALS

NOTE

Once available plant parameters reach an Emergency Action Level (EAL), classifications should be made within **15** minutes.

7.0 HAZARDS TO STATION OPERATION

7.1	Security Threat as Notified by Security	NUE
7.2	Ongoing Security Compromise as Notified by Security OR Airborne Threat	ALERT
7.3	Imminent Loss of Physical Control of the Plant	SAE
7.4	Loss of Physical Control of the Plant	GE
7.5	Fire or Explosion Onsite	NUE
7.6	Fire or Explosion Onsite Affecting One Train of <u>ANY</u> ES Systems	ALERT
7.7	Fire or Explosion Onsite Affecting Both Trains of <u>ANY</u> ES Systems	SAE
7.8	Aircraft Crash, Unusual Aircraft Activity, Train Derailment, Turbine Failure, Toxic or Flammable Gas Release	NUE
7.9	Aircraft Crash, Missiles, Toxic or Flammable Gas Affecting One Train of <u>ANY</u> ES Systems	ALERT
7.10	Aircraft Crash, Missiles, Toxic or Flammable Gas Affecting Both Trains of <u>ANY</u> ES Systems	SAE

8.0 NATURAL EVENTS

8.1	Tornado, Flood, Loss of Dardanelle Reservoir, Earthquake ...	NUE
8.2	Tornado, High Winds, Flood, Loss of Dardanelle Reservoir, Earthquake	ALERT
8.3	Tornado, High Winds, Flood, Loss of Dardanelle Reservoir, Earthquake	SAE

9.0 MISCELLANEOUS EVENTS

9.1	Plant Conditions Exist Which Require an Increased Awareness by Operations Staff and State and/or Local Authorities	NUE
9.2	Plant Conditions Exist that Warrant Activation of the TSC ..	ALERT
9.3	Plant Conditions Exist that Warrant Activation of the Emergency Response Facilities	SAE
9.4	Plant Conditions Exist That Make Release of Large Amount of Radioactivity Possible	GE

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ATTACHMENT 2
UNIT 2
INDEX OF EALS

NOTE

Once available plant parameters reach an Emergency Action Level (EAL), classifications should be made within **15** minutes.

1.0 PRIMARY SYSTEM EVENTS

- 1.1 RCS Activity Indicates >0.1% Fuel Cladding FailureNUE
- 1.2 RCS Activity Indicates >1.0% Fuel Cladding FailureALERT
- 1.3 Core Damage Indicated with an Inadequate Core Cooling
ConditionSAE
- 1.4 Containment Radiation Indicates LOCA and >1% Fuel Cladding
FailureSAE
- 1.5 Containment Radiation Indicates LOCA and >50% Fuel
OverheatGE
- 1.6 Core Melt with Containment Integrity Lost or ChallengedGE
- 1.7 Loss of or challenge to all 3 Fission Product BarriersGE

NOTE

RCS leakage is defined as a loss of RCS inventory due to a leak in the RCS or a supporting system that is not or cannot be isolated within 10 minutes.

2.0 RCS LEAKAGE

- 2.1 RCS LeakageNUE
- 2.2 RCS Leakage > 44 gpmALERT
- 2.3 RCS Leakage > 44 gpm with ICC ConditionsSAE

3.0 SECONDARY SYSTEM EVENTS

- 3.1 Uncontrolled S/G Depressurization Resulting in MSIS
ActuationNUE
- 3.2 S/G Tube Leak > Tech. Spec. LimitsNUE
- 3.3 S/G Tube Leak >10gpm with an Ongoing Steam ReleaseALERT
- 3.4 S/G Tube Rupture >44 gpm With an Ongoing Steam Release and
RCS Activity > 1.0 μ Ci/gm, but < 378 μ ci/gm (1% fuel
cladding failure)SAE

4.0 ELECTRICAL POWER FAILURES

- 4.1 Degraded PowerNUE
- 4.2 Station BlackoutALERT
- 4.3 Loss of All Vital DCALERT
- 4.4 Blackout > 15 minutesSAE
- 4.5 Loss of All Vital DC for > 15 minutesSAE

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ATTACHMENT 2
UNIT 2
INDEX OF EALS

NOTE

Once available plant parameters reach an Emergency Action Level (EAL), classifications should be made within **15** minutes.

5.0 RADIOLOGICAL EFFLUENTS

- 5.1 Radiological Effluents $\geq .05$ mrem/hr TEDE or .15 Child Thyroid CDE at Site Boundary or Liquid Radiological Effluents exceed ODCM LimitationsNUE
- 5.2 Radiological Effluents $\geq .5$ mrem/hr TEDE or 1.5 mrem/hr Child Thyroid CDE at Site Boundary or Liquid Radiological Effluents exceed 10 times ODCM LimitationsALERT
- 5.3 Radiological Effluents ≥ 50 mrem/hr TEDE or 150 mrem/hr Child Thyroid CDE at the Site BoundarySAE
- 5.4 Radiological Effluents ≥ 250 mrem/hr TEDE or 500 mrem/hr Child Thyroid CDE at the Site BoundaryGE
- 5.5 High Radiation/Airborne LevelsALERT
- 5.6 Spent Fuel AccidentSAE

6.0 SAFETY SYSTEM FUNCTION

- 6.1 Deviation from T.S. action statements when required to shutdown or cooldown or deviations pursuant to 10CFR50.54(X)NUE
- 6.2 RPS Failure to Complete an Automatic TripALERT
- 6.3 RPS Failure to Complete a Manual TripSAE
- 6.4 Loss of Dose Assessment CapabilitiesNUE
- 6.5 Loss of CommunicationsNUE
- 6.6 Control Room EvacuationALERT
- 6.7 Control Room Evacuation and control of shutdown systems not established in 15 minutesSAE
- 6.8 Loss of Decay Heat Removal SystemsALERT
- 6.9 Loss of Both S/Gs as a Heat Removal MethodSAE
- 6.10 Loss of Control Room AnnunciatorsALERT
- 6.11 Loss of Control Room Annunciators with a Transient in ProgressSAE

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ATTACHMENT 2
UNIT 2
INDEX OF EALS

NOTE

Once available plant parameters reach an Emergency Action Level (EAL), classifications should be made within **15** minutes.

7.0 HAZARDS TO STATION OPERATION

7.1	Security Threat as Notified by Security	NUE
7.2	Ongoing Security Compromise as Notified by Security OR Airborne Threat	SAE ALERT
7.3	Imminent Loss of Physical Control of the Plant	SAE
7.4	Loss of Physical Control of the Plant	GE
7.5	Fire or Explosion Onsite	NUE
7.6	Fire or Explosion Onsite Affecting One Train of ESF Systems	ALERT
7.7	Fire or Explosion Onsite Affecting Both Trains of ESF Systems	SAE
7.8	Aircraft Crash, Unusual Aircraft Activity, Train Derailment, Turbine Failure, Toxic or Flammable Gas	NUE
7.9	Aircraft Crash, Missiles, Toxic or Flammable Gas Affecting One Train of ESF Systems	ALERT
7.10	Aircraft Crash, Missiles, Toxic or Flammable Gas Affecting Both Trains of ESF Systems	SAE

8.0 NATURAL EVENTS

8.1	Tornado, Flood, Loss of Dardanelle Reservoir, Earthquake ...	NUE
8.2	Tornado, High Winds, Flood, Loss of Dardanelle Reservoir, Earthquake	ALERT
8.3	Tornado, High Winds, Flood, Loss of Dardanelle Reservoir, Earthquake	SAE

9.0 MISCELLANEOUS EVENTS

9.1	Plant Conditions Exist Which Require an Increased Awareness by Operations Staff and State and/or Local Authorities	NUE
9.2	Plant Conditions Exist that Warrant Activation of the TSC ..	ALERT
9.3	Plant Conditions Exist that Warrant Activation of the Emergency Response Facility	SAE
9.4	Plant Conditions Exist That Make Release of Large Amount of Radioactivity Possible	GE

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ATTACHMENT 3
UNIT 1
PRIMARY SYSTEM EVENTS

1.1

CONDITION:

RCS Activity indicates >0.1% fuel cladding failure
--

EMERGENCY CLASSIFICATION:

Notification of Unusual Event MODES <u>All</u>

CRITERIA:

1. Greater than 0.1% fuel cladding failure as indicated by <u>EITHER</u> of the following: A. Nuclear Chemistry analysis of RCS sample yields >40.0 μCi/gm specific I-131 <u>OR</u> B. Failed Fuel Iodine monitor (RE 1237S) indicates >3.3 x 10 ⁵ CPM

RELATED EALS:

	TAB
RCS Activity indicates >1% fuel cladding failure	<u>1</u>
High Radiation / Airborne Levels	<u>5</u>
Initiation of Plant S/D or C/D due to T.S. L.C.O.	<u>6</u>

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ATTACHMENT 3
UNIT 1
PRIMARY SYSTEM EVENTS

1.2

CONDITION:

RCS Activity indicates >1% fuel cladding failure

EMERGENCY CLASSIFICATION:

Alert

MODES All

CRITERIA:

1. Greater than 1% fuel cladding failure is indicated by Either of the following:

A. Nuclear Chemistry analysis of RCS sample yields:

1. >400 $\mu\text{Ci/gm}$ specific I-131

OR

2. Radiation levels that indicate >1% fuel cladding failure per Unit 1 Fuel Cladding Failure Radiation Plot (Att 7)

OR

B. Failed Fuel Iodine monitor (RE 1237S) indicates $>8.2 \times 10^5$ CPM.

RELATED EALS:

TAB

RCS Activity indicates >0.1% fuel cladding failure
Containment Radiation indicates LOCA and >1% fuel cladding failure
Loss of or Challenge to 3 Fission Product Barriers
Core Damage indicated with an ICC Condition
High Radiation/Airborne Levels
Initiation of Plant S/D or C/D due to T.S. L.C.O.

1
1
1
1
5
6

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ATTACHMENT 3
UNIT 1
PRIMARY SYSTEM EVENTS

1.3

CONDITION:

Core Damage Indicated with an Inadequate Core Cooling Condition

EMERGENCY CLASSIFICATION:

Site Area Emergency

MODES All

CRITERIA:

1. Inadequate core cooling capacity exists as evidenced by CETS indicating superheated conditions of Region 3 of Figure 4 of EOP 1202.013.

AND

2. Greater than 1% fuel cladding failure is indicated by EITHER of the following:

A. Nuclear Chemistry analysis of RCS sample yields:

1. >400 µCi/gm specific I-131

OR

2. Radiation levels that indicate >1% fuel cladding failure per Unit 1 Fuel Cladding Failure Radiation Plot (Att 7)

OR

B. Failed Fuel Iodine process monitor (RE 1237S) indicates >8.2 x 10⁵ CPM.
- RELATED EALS:
- TAB
- Containment Radiation High/Very High
Core Melt
Loss of or challenge to 3 Fission Product Barriers
RCS Leakage
- | |
|----------|
| <u>1</u> |
| <u>1</u> |
| <u>1</u> |
| <u>2</u> |

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ATTACHMENT 3
UNIT 1
PRIMARY SYSTEM EVENTS

1.4

CONDITION:

Containment Radiation reading which indicates LOCA and >1% fuel cladding failure

EMERGENCY CLASSIFICATION:

Site Area Emergency

MODES All

CRITERIA:

1. Containment Radiation Levels correspond to a Site Area Emergency as Determined from the Containment Radiation EAL Plot (Att 5)

AND

2. LOCA occurring within the containment building

RELATED EALS:

TAB

Containment Radiation indicates LOCA and > 50% fuel overheat
Loss of or Challenge to 3 Fission Product Barriers
Core Melt
Radiological Effluents

<u>1</u>
<u>1</u>
<u>1</u>
<u>5</u>

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ATTACHMENT 3
UNIT 1
PRIMARY SYSTEM EVENTS

1.5

CONDITION:

Containment Radiation readings which indicate LOCA and >50% fuel overheat

EMERGENCY CLASSIFICATION:

General Emergency

MODES All

CRITERIA:

1. Containment Radiation Levels correspond to a General Emergency as determined from the Containment Radiation EAL Plot (Att 5)

AND

2. LOCA occurring within the Containment Building

RELATED EALS:

TAB

Loss of or Challenge to 3 Fission Product Barriers
Radiological Effluents
Core Melt

1
5
1

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ATTACHMENT 3
UNIT 1
PRIMARY SYSTEM EVENTS

1.6

CONDITION:

Core Melt

EMERGENCY CLASSIFICATION:

General Emergency

MODES All

CRITERIA:

1. CETs indicate superheat conditions of Region 4 of Figure 4 of EOP 1202.013.

RELATED EALS:

TAB

Loss of or Challenge to 3 Fission Product Barriers
Containment Radiation High/Very High
Radiological Effluents

1
1
5

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ATTACHMENT 3
UNIT 1
PRIMARY SYSTEM EVENTS

1.7

CONDITION:

Loss of or challenge to all 3 Fission Product Barriers

EMERGENCY CLASSIFICATION:

General Emergency

MODES All

CRITERIA:

1. Either of the following conditions exist:
 - A. Fuel Cladding Failure (refer to section 4.10.1)
 - B. Challenge to Fuel Cladding (refer to section 4.11.1)

AND
2. Either of the following conditions exist:
 - A. RCS boundary failure (refer to section 4.10.2)
 - B. Challenge to RCS boundary (refer to section 4.11.2)

AND
3. Either of the following conditions exist:
 - A. Containment Integrity failure (refer to section 4.10.3)
 - B. Challenge to Containment Integrity (refer to section 4.11.3)

RELATED EALS:

TAB

Containment Radiation High/Very High	<u>1</u>
Core Melt	<u>1</u>
Radiological Effluents	<u>5</u>
Natural Events	<u>8</u>

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ATTACHMENT 3
UNIT 1
RCS LEAKAGE

2.1

CONDITION:

RCS Leakage

EMERGENCY CLASSIFICATION:

Notification of Unusual Event

MODES 1-4

CRITERIA:

NOTE

RCS leakage is defined as a loss of RCS inventory due to a leak in the RCS or a supporting system that is not or cannot be isolated within 10 minutes.

1. Unidentified or pressure boundary RCS leakage greater than 10 gpm.
- OR
2. Identified RCS leakage greater than 25 gpm.

RELATED EALS:

TAB

RCS Leakage > Normal Makeup Capacity (50 gpm)
TS LCO's
OTSG Tube Leak

2
6
3

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ATTACHMENT 3
UNIT 1
RCS LEAKAGE

2.2

CONDITION:

RCS Leakage > Normal Makeup Capacity (50 gpm)

EMERGENCY CLASSIFICATION:

Alert

MODES 1-4

CRITERIA:

NOTE

RCS leakage is defined as a loss of RCS inventory due to a leak in the RCS or a supporting system that is not or cannot be isolated within 10 minutes.

1. RCS Leakage is >50 gpm (Batch Controller capacity is exceeded).

RELATED EALS:

TAB

RCS Leakage > Normal M/U Capacity with Fuel Clad Failure Conditions
RCS Leakage > HPI Capacity
Containment Radiation High/Very High
Core Damage Indicated with an ICC Condition
Loss of or Challenge to 3 Fission Product Barriers
Radiological Effluents
Core Melt

2
2
1
1
1
5
1

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ATTACHMENT 3
UNIT 1
RCS LEAKAGE

2.3

CONDITION:

RCS Leakage > Normal Makeup Capacity (50 gpm) with >1.0% Fuel Cladding Failure Conditions

EMERGENCY CLASSIFICATION:

Site Area Emergency

MODES 1-4

CRITERIA:

NOTE

RCS leakage is defined as a loss of RCS inventory due to a leak in the RCS or a supporting system that is not or cannot be isolated within 10 minutes.

1. RCS Leakage is >50 gpm (Batch Controller capacity is exceeded) with $\geq 1.0\%$ Fuel Cladding Failure in the RCS (EAL 1.2)

NOTE

EAL 2.2 RCS Leakage > Normal Makeup Capacity (50 gpm)
EAL 1.2 RCS Activity Indicates >1% fuel cladding failure

RELATED EALS:

TAB

Containment Radiation indicates LOCA and fuel failure
Core Damage Indicated with an ICC Condition
Loss of or Challenge to 3 Fission Product Barriers
Radiological Effluents
Core Melt

<u>1</u>
<u>1</u>
<u>1</u>
<u>5</u>
<u>1</u>

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ATTACHMENT 3
UNIT 1
RCS LEAKAGE

2.4

CONDITION:

RCS Leakage > HPI Capacity

EMERGENCY CLASSIFICATION:

Site Area Emergency

MODES 1-4

CRITERIA:

NOTE

RCS leakage is defined as a loss of RCS inventory due to a leak in the RCS or a supporting system that is not or cannot be isolated within 10 minutes.

1. RCS Leakage > HPI Capacity as indicated by:
- A. Full available HPI being injected into the core

AND

B. Either of the following conditions exists:

1. RCS Pressure/Pressurizer Level continues to decrease

OR

2. RCS Subcooling margin remains inadequate with no indication of recovery.

RELATED EALS:

TAB

Containment Radiation High/Very High
Core Damage Indicated with an ICC Condition
Loss of or Challenge to 3 Fission Product Barriers
Radiological Effluents
Core Melt

1
1
1
5
1

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ATTACHMENT 3
UNIT 1
SECONDARY SYSTEM EVENTS

3.1

CONDITION:

Uncontrolled OTSG Depressurization Resulting in MSLI Actuation

EMERGENCY CLASSIFICATION:

Notification of Unusual Event

MODES 1-4

CRITERIA:

1. Any manual or automatic actuation of MSLI due to uncontrolled OTSG depressurization.

RELATED EALS:

TAB

OTSG Tube Leak
Radiological Effluents

3
5

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ATTACHMENT 3
UNIT 1
SECONDARY SYSTEM EVENTS

3.2

CONDITION:

OTSG Tube Leakage \geq Tech. Spec. Limits

EMERGENCY CLASSIFICATION:

Notification of Unusual Event

MODES 1-4

CRITERIA:

1. RCS Leak rate of \geq 150 gallons per day (.104 gpm), coincident with one or more of the following:
 - a) Main Steam line N-16 alarm(s)
 - b) Steam Line High Range RAD Monitors Increase (RI-2681 or 2682)
 - c) Condenser off gas process monitor count rate increase
 - d) Nuclear Chemistry sample indicating Primary-Secondary tube leak

RELATED EALS:

TAB

OTSG Tube Leak
RCS Leakage
Radiological Effluents

3
2
5

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ATTACHMENT 3
UNIT 1
SECONDARY SYSTEM EVENTS

3.3

CONDITION:

OTSG Tube Leakage > 10 gpm concurrent with ongoing steam release or loss of offsite power.

EMERGENCY CLASSIFICATION:

Alert

MODES 1-4

CRITERIA:

1. RCS Leakrate increase of >10 gpm, coincident with one of more of the following:

- a. Main Steam line N-16 alarms(s)
- b. Condenser Off Gas Process Monitor count rate increase
- c. Steam Line High Range Rad Monitors increase (RI-2681 or RI-2682)
- d. Nuclear Chemistry sample indicating primary-secondary tube leak

AND

2. ANY of the following occur:

- A. Loss of offsite power
- B. Steam release to the environment from either or both steam generator(s) indicated by:
 - 1. Main Steam Safety Valve(s) maintaining OTSG pressure (other than for normal post trip response)
 - 2. Use of ADV(s) to control OTSG pressure
 - 3. P7A is in use and continued operation required to maintain OTSG levels
 - 4. Steam line break outside containment

RELATED EALS:

TAB

OTSG Tube Rupture >50 gpm with ongoing steam release	<u>3</u>
OTSG Tube Leak with fuel cladding failure	<u>3</u>
RCS Leakage	<u>2</u>
Radiological Effluents	<u>5</u>
High Radiation/Airborne Levels	<u>5</u>
Electrical Power Failures	<u>4</u>
Loss of or Challenge to 3 Fission Product Barriers	<u>1</u>

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ATTACHMENT 3
UNIT 1
SECONDARY SYSTEM EVENTS

3.4

CONDITION:

OTSG Tube Rupture with primary to secondary leakage >normal makeup capacity (50 gpm) with ongoing steam release or loss of offsite power.

EMERGENCY CLASSIFICATION:

Site Area Emergency

MODES 1-4

CRITERIA:

1. OTSG Tube Rupture as indicated by BOTH of the following:
 - A. RCS Leakage > Normal Makeup Capacity (50 gpm)
 - B. Coincident with one or more of the following:
 - a) Main Steam line N-16 alarm(s)
 - b) Steam Line High Range RAD Monitors Increase (RI-2681 or 2682)
 - c) Condenser off gas process monitor count rate increase
 - d) Nuclear Chemistry sample indicating Primary-Secondary tube leak

AND
2. ANY of the following occur:
 - A. Loss of offsite power
 - B. Steam release to the environment from either or both steam generator(s) indicated by:
 1. Main Steam Safety Valve(s) maintaining OTSG pressure (other than for normal post trip response)
 2. Use of ADV(s) to control OTSG pressure
 3. P7A is in use and continued operation required to maintain OTSG levels
 4. Steam line break outside containment

RELATED EALS:

TAB

RCS Leakage
Radiological Effluents
Loss of or Challenge to 3 Fission Product Barriers
Electrical Power Failures

2
5
1
4

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ATTACHMENT 3
UNIT 1
SECONDARY SYSTEM EVENTS

3.5

CONDITION:

OTSG Tube Leak >1 gpm with >1% fuel cladding failure with ongoing steam release

EMERGENCY CLASSIFICATION:

Site Area Emergency

MODES 1-4

CRITERIA:

1. OTSG Leakrate increase of >1 gpm, coincident with one or more of the following:
 - a) Main Steam line N-16 alarm(s)
 - b) Steam Line High Range RAD Monitors Increase (RI-2681 or 2682)
 - c) Condenser off gas process monitor count rate increase
 - d) Nuclear Chemistry sample indicating Primary-Secondary tube leak

AND
2. Greater than 1% fuel cladding failure indicated in the RCS (EAL 1.2)

AND
3. ANY of the following occur:
 - A. Loss of offsite power
 - B. Steam release to the environment from either or both steam generator(s) indicated by:
 1. Main Steam Safety Valve(s) maintaining OTSG pressure (other than for normal post trip response)
 2. Use of ADV(s) to control OTSG pressure
 3. P7A is in use and continued operation required to maintain OTSG levels
 4. Steam line break outside containment

RELATED EALS:

CAUTION

If RCS leakage is ≥ 50 gpm, EAL 1.7 will apply. If RCS leakage is degrading and approaching 50 gpm **consider** EAL 1.7.

TAB

RCS Leakage	<u>2</u>
Radiological Effluents	<u>5</u>
Loss of or Challenge to 3 Fission Product Barriers	<u>1</u>
Electrical Power Failures	<u>4</u>

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ATTACHMENT 3
UNIT 1
ELECTRICAL POWER FAILURES

4.1

CONDITION:

Degraded Power

EMERGENCY CLASSIFICATION:

Notification of Unusual Event

MODES All

CRITERIA:

1. Only Diesel Generator (Station Blackout Diesel or Emergency Diesel) power is available to 4160V Buses (A3 and/or A4).

AND

2. No voltage indicated on 6.9 KV AND 4.16 KV nonvital buses (H1, H2, A1, and A2)

RELATED EALS:

TAB

Blackout
OTSG Tube Leak

4

3

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ATTACHMENT 3
UNIT 1
ELECTRICAL POWER FAILURES

4.2

CONDITION:

Station Blackout

EMERGENCY CLASSIFICATION:

Alert

MODES All

CRITERIA:

1. All 4160V buses de-energized.

RELATED EALS:

TAB

Blackout more than 15 minutes
Loss of Control Room Annunciators

4

6

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ATTACHMENT 3
UNIT 1
ELECTRICAL POWER FAILURES

4.3

CONDITION:

Blackout for more than 15 minutes.

EMERGENCY CLASSIFICATION:

Site Area Emergency

MODES All

CRITERIA:

1. All 4160V buses de-energized for greater than 15 minutes.

RELATED EALS:

TAB

Electrical Power Failures
Loss of Control Room Annunciators
Core Melt

4

6

1

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ATTACHMENT 3
UNIT 1
ELECTRICAL POWER FAILURES

4.4

CONDITION:

Loss of All Vital DC Power

EMERGENCY CLASSIFICATION:

Alert

MODES All

CRITERIA:

1. Loss of voltage on ALL of the following busses
 - A. D01 and D02
 - B. RA1 and RA2
 - C. D11 and D21

RELATED EALS:

TAB

Loss of All Vital DC Power for more than 15 minutes
Loss of Control Room Annunciators

4

6

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ATTACHMENT 3
UNIT 1
ELECTRICAL POWER FAILURES

4.5

CONDITION:

Loss of All Vital DC Power for more than 15 minutes

EMERGENCY CLASSIFICATION:

Site Area Emergency

MODES All

CRITERIA:

1. Loss of voltage on ALL of the following busses

- A. D01 and D02
- B. RA1 and RA2
- C. D11 and D21

AND

2. DC power is not restored within 15 minutes

RELATED EALS:

TAB

Electrical Power Failures
Loss of Control Room Annunciators

4
6

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ATTACHMENT 3
UNIT 1
RADIOLOGICAL EFFLUENTS

5.1

CONDITION:

Projected or measured activity at the Site Boundary, averaged over one hour, is greater than or equal to 0.05 mrem/hr TEDE or 0.15 mrem/hr Child Thyroid CDE or Liquid radiological effluents exceed ODCM Limitations.

EMERGENCY CLASSIFICATION:

Notification of Unusual Event

MODES All

CRITERIA:

1. Radiological Release which exceeds ANY of the following limits
 - A. Projected activity at the Site Boundary, as calculated by the RDACS method, indicate greater than or equal to 0.05 mrem/hr TEDE or 0.15 mrem/hr Child Thyroid CDE.
 - OR
 - B. Offsite monitoring teams report activity at the Site Boundary which, when averaged over the previous one hour, exceeds 0.05 mrem/hr TEDE or 0.15 mrem/hr Child Thyroid CDE.
 - OR
 - C. Liquid radiological effluents exceed ODCM Limitations.

RELATED EALS:

TAB

Radiological Effluents
High Radiation/Airborne Levels
OTSG Tube Leak

5
5
3

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ATTACHMENT 3
UNIT 1
RADIOLOGICAL EFFLUENTS

5.2

CONDITION:

Projected or measured activity at the Site Boundary, averaged over one hour, is greater than or equal to 0.5 mrem/hr TEDE or 1.5 mrem/hr Child Thyroid CDE or Liquid radiological effluents exceed 10 times ODCM Limitations.

EMERGENCY CLASSIFICATION:

Alert

MODES All

CRITERIA:

1. Radiological Release which exceeds ANY of the following limits
 - A. Projected activity at the Site Boundary, as calculated by the RDACS method, indicates greater than or equal to 0.5 mrem/hr TEDE or 1.5 mrem/hr Child Thyroid CDE.
 - OR
 - B. Offsite monitoring teams report activity at the Site Boundary which, when averaged over the previous one hour, exceeds 0.5 mrem/hr TEDE or 1.5 mrem/hr Child Thyroid CDE.
 - OR
 - C. Liquid radiological effluents exceed 10 times ODCM Limitations.

RELATED EALS:

TAB

Radiological Effluents
OTSG Tube Leak
Containment Radiation High

5

3

1

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ATTACHMENT 3
UNIT 1
RADIOLOGICAL EFFLUENTS

5.3

CONDITION:

Radiological Effluents are greater than or equal to 50 mrem/hr TEDE or 150 mrem/hr Child Thyroid CDE at the Site Boundary.

EMERGENCY CLASSIFICATION:

Site Area Emergency

MODES All —

CRITERIA:

1. Radiological Release which exceeds ANY of the following limits
 - A. Projected dose rates at the Site Boundary, as calculated by the RDACS method, indicate greater than or equal to 50 mrem/hr TEDE or 150 mrem/hr Child Thyroid CDE.
 - OR
 - B. Offsite monitoring teams report dose rates at the Site Boundary are greater than or equal to 50 mrem/hr TEDE or 150 mrem/hr Child Thyroid CDE.

RELATED EALS:

	TAB
Radiological Effluents	<u>5</u>
Containment Radiation High / Very High	<u>1</u>
Loss of or Challenge to 3 Fission Product Barriers	<u>1</u>
Core Melt	<u>1</u>

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ATTACHMENT 3
UNIT 1
RADIOLOGICAL EFFLUENTS

5.4

CONDITION:

Radiological Effluents are greater than or equal to 250 mrem/hr TEDE or 500 mrem/hr Child Thyroid CDE at the Site Boundary.

EMERGENCY CLASSIFICATION:

General Emergency

MODES All

CRITERIA:

1. Radiological Release which exceeds ANY of the following limits
 - A. Projected dose rates at the Site Boundary, as calculated by the RDACS method, indicate greater than or equal to 250 mrem/hr TEDE or 500 mrem/hr Child Thyroid CDE.
 - OR
 - B. Offsite monitoring teams report dose rates at the Site Boundary are greater than or equal to 250 mrem/hr TEDE or 500 mrem/hr Child Thyroid CDE.

RELATED EALS:

	TAB
Core Melt	<u>1</u>
Loss of or Challenge to 3 Fission Product Barriers	<u>1</u>
Containment Radiation High / Very High	<u>1</u>

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ATTACHMENT 3
UNIT 1
RADIOLOGICAL EFFLUENTS

5.5

CONDITION:

High Radiation/Airborne Levels

EMERGENCY CLASSIFICATION:

Alert

MODES All

CRITERIA:

1. The loss of control of radioactive material results in ANY of the following:
 - A. Containment radiation indicates >2R/hr
 - B. Area Radiation levels in controlled access (excluding containment) increase by 1 Rem/hr at 2 or more locations.
 - C. General area radiation levels outside of radiologically controlled areas increase by 10 mRem/hr.
 - D. Airborne levels as follows:
 - Auxiliary Building \geq 100 DAC (General Area)
 - Turbine Building \geq 10 DAC

NOTE: "Loss of Control" shall be defined as: ANY radioactive material outside its normal system boundaries. (For Example: spent resin spill, RCS liquid spill, spent fuel accident resulting in gaseous release, etc.)

RELATED EALS:

TAB

Radiological Effluents
Containment Radiation High
Spent Fuel Accident
RCS Leakage

5
1
5
2

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ATTACHMENT 3
UNIT 1
RADIOLOGICAL EFFLUENTS

5.6

CONDITION:

Spent Fuel Accident

EMERGENCY CLASSIFICATION:

Site Area Emergency

MODES All

CRITERIA:

1. The loss of water OR damage to a spent fuel assembly occurs in the Rx core (head removed), refueling canal, spent fuel pool, cask loading pit, fuel tilt pit or any plant area involved in the movement or storage of spent fuel.

AND

2. Radiation levels increase to 10 R/hr on Area Radiation Monitors or 10 Rem/hr HP Survey Report.

RELATED EALS:

TAB

Radiological Effluents
High Radiation/Airborne Levels
Miscellaneous Events

5

5

9

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ATTACHMENT 3
UNIT 1
SAFETY SYSTEM FUNCTION

6.1

CONDITION:

Deviation from T.S. action statements when required to shutdown or cooldown or deviations pursuant to 10CFR50.54(x)

EMERGENCY CLASSIFICATION:

Notification of Unusual Event

MODES 1-4

CRITERIA:

1. EITHER of the following conditions exist:
 - A. Inability to reach required mode within Tech. Spec. limits.
 - B. Deviation from Tech Specs authorized pursuant to 10CFR50.54(x)

RELATED EALS:

TAB

RCS Leakage
OTSG Tube Leak
RCS Activity High

<u>2</u>
<u>3</u>
<u>1</u>

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ATTACHMENT 3
UNIT 1
SAFETY SYSTEM FUNCTION

6.2

CONDITION:

Reactor Protection System Failure to Complete an Automatic Trip

EMERGENCY CLASSIFICATION:

Alert

MODES 1-2

CRITERIA:

1. A valid RPS trip setpoint is exceeded on ANY TWO RPS channels and the RPS fails to initiate and complete an automatic trip that brings the reactor subcritical.

AND

2. DSS trip or subsequent efforts to manually trip the Reactor from the Control Room and bring it subcritical are successful.

RELATED EALS:

TAB

RPS Failure to Complete a Manual Trip
Core Melt
Core Damage Indicated with an ICC Condition
Loss of or Challenge to 3 Fission Product Barriers

6

1

1

1

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ATTACHMENT 3
UNIT 1
SAFETY SYSTEM FUNCTION

6.3

CONDITION:

Reactor Protection System Failure to Complete an Manual Trip

EMERGENCY CLASSIFICATION:

Site Area Emergency

MODES 1-2

CRITERIA:

1. A valid RPS trip setpoint is exceeded on ANY TWO RPS channels and the RPS or DSS fails to initiate and complete an automatic trip that brings the reactor subcritical.

AND

2. Failure of manual trip function occurs. (Failure to trip the Reactor in the Control Room; i.e., must leave Control Room to trip the Reactor.)

RELATED EALS:

TAB

Loss of or Challenge to 3 Fission Product Boundaries
Core Melt
Core Damage Indicated with an ICC Condition

<u>1</u>
<u>1</u>
<u>1</u>

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ATTACHMENT 3
UNIT 1
SAFETY SYSTEM FUNCTION

6.4

CONDITION:

Loss of Dose Assessment Capabilities

EMERGENCY CLASSIFICATION:

Notification of Unusual Event

MODES All

CRITERIA:

1. The following conditions exist in the Low Level Radwaste Building:
 - A. SPING is inoperable AND
 - B. Compacting is in progress AND
 - C. Inability to obtain and analyze local grab samples every 2 hours.

OR
2. Reactor Building Purge System or Penetration Ventilation System is not isolable, and the applicable SPING is inoperable.

OR
3. All of the following conditions exist for any source of gaseous effluents in the Auxiliary Building or Spent Fuel Storage Building ventilation systems.
 - A. Applicable SPING is inoperable AND
 - B. Inability to obtain and analyze local grab samples every 2 hours

RELATED EALS:

TAB

None

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ATTACHMENT 3
UNIT 1
SAFETY SYSTEM FUNCTION

6.5

CONDITION:

Loss of Communications

EMERGENCY CLASSIFICATION:

Notification of Unusual Event

MODES All

CRITERIA:

1. Complete loss of ANY TWO of the following:
 - A. Plant telephone systems (Commercial Telephones and microwave)
 - B. Station Radio
 - C. Emergency Notification System

RELATED EALS:

TAB

None

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ATTACHMENT 3
UNIT 1
SAFETY SYSTEM FUNCTION

6.6

CONDITION:

Loss of Control Room Annunciators

EMERGENCY CLASSIFICATION:

Alert

MODES All

CRITERIA:

1. Loss of both AC and DC power to >50% of control room annunciators.

RELATED EALS:

TAB

Loss of Control Room Annunciators with Transient in Progress

6

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ATTACHMENT 3
UNIT 1
SAFETY SYSTEM FUNCTION

6.7

CONDITION:

Loss of Control Room Annunciators with Transient in Progress

EMERGENCY CLASSIFICATION:

Site Area Emergency

MODES All

CRITERIA:

1. Loss of both AC and DC power to >50% of control room annunciators.

AND

2. A plant transient is initiated or in progress. (See section 4.18 of this procedure for the definition of a Plant Transient.)

RELATED EALS:

TAB

None

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ATTACHMENT 3
UNIT 1
SAFETY SYSTEM FUNCTION

6.8

CONDITION:

Control Room Evacuation

EMERGENCY CLASSIFICATION:

Alert

MODES All

CRITERIA:

1. Control Room evacuation is expected to occur OR has already occurred.

RELATED EALS:

TAB

Control Room Evacuation and control of shutdown systems not established in 15 minutes
Fire or explosion onsite affecting both trains of any ES Systems

6

7

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ATTACHMENT 3
UNIT 1
SAFETY SYSTEM FUNCTION

6.9

CONDITION:

Control Room Evacuation and control of shutdown systems not established in 15 minutes.

EMERGENCY CLASSIFICATION:

Site Area Emergency

MODES All

CRITERIA:

- Control Room evacuation has occurred AND control of shutdown systems is not established from local stations within 15 minutes.

RELATED EALS:

TAB

Core Damage Indicated with an ICC Condition
Loss of Decay Heat Removal Systems
Core Melt

<u>1</u>
<u>6</u>
<u>1</u>

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ATTACHMENT 3
UNIT 1
SAFETY SYSTEM FUNCTION

6.10

CONDITION:

Loss of Decay Heat Removal Capabilities

EMERGENCY CLASSIFICATION:

Alert

MODES 5-6

CRITERIA:

1. Loss of Decay Heat Removal capabilities shall be identified as ANY of the following:
 - A. RCS indicates saturated conditions
 - B. Loss of both Decay Heat trains for >1 hr and OTSGs are not available for decay heat removal (NA if Fuel Transfer Canal is flooded)
 - C. HPI is required for cooling the reactor core.

RELATED EALS:

TAB

Core Damage Indicated with an ICC Condition
Radiological Effluents
Loss of or Challenge to 3 Fission Product Barriers
High Radiation/Airborne Levels
Core Melt

1
5
1
5
1

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ATTACHMENT 3
UNIT 1
SAFETY SYSTEM FUNCTION

6.11

CONDITION:

Degraded Hot Shutdown Capability

EMERGENCY CLASSIFICATION:

Site Area Emergency

MODES 1-4

CRITERIA:

1. Degraded HSD capability shall be identified as ANY of the following:
 - A. Loss of ALL steam removal capability on BOTH OTSGs. (e.g., Loss of ALL Turbine Bypass Valves, Atmospheric Dump Valves, and Main Steam Safety Valves)
 - B. Loss of ALL feedwater supply capability on BOTH OTSGs. (e.g., Loss of BOTH Main Feedwater Trains and BOTH EFW trains)
 - C. BOTH HPI Trains are inoperable and they are required for cooling the reactor core.

RELATED EALS:

TAB

Core Damage Indicated with an ICC Condition
Containment Radiation Very High
Core Melt
Loss of or Challenge to 3 Fission Product Barriers

1
1
1
1

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ATTACHMENT 3
UNIT 1
HAZARDS TO STATION OPERATION

7.1

CONDITION: {CNRO-2005-044}

Security Threat as Notified by Security.

EMERGENCY CLASSIFICATION:

Notification of Unusual Event

MODES All

CRITERIA:

1. Security threat or attempted entry or attempted sabotage.

OR

2. A credible site-specific security threat notification (i.e., credible per the ANO Safeguards Contingency Plan).

OR

3. A validated notification from the NRC providing information of an aircraft threat.

RELATED EALS:

TAB

Ongoing Security Compromise as Notified by Security OR Airborne Threat

7

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ATTACHMENT 3
UNIT 1
HAZARDS TO STATION OPERATION

7.2

CONDITION: {CNRO-2005-044}

Ongoing Security Compromise as Notified by Security OR Airborne Threat

EMERGENCY CLASSIFICATION:

Alert

MODES All

CRITERIA:

1. Ongoing security compromise

OR

2. A validated notification from the NRC of an airliner attack threat less than 30 minutes away

OR

3. A notification from the site Security force of an armed attack, explosive attack, airliner impact or other HOSTILE ACTION within the Owner Controlled Area (OCA) (refer to Hostile Action and OCA definitions in Section 4.0)

RELATED EALS:

TAB

Imminent Loss of Physical Control of the Plant

7

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ATTACHMENT 3
UNIT 1
HAZARDS TO STATION OPERATION

7.3

CONDITION: {CNRO-2005-044}

Imminent Loss of Physical Control of the Plant

EMERGENCY CLASSIFICATION:

Site Area Emergency

MODES All

CRITERIA:

1. Imminent loss of physical control of the plant

OR

2. A notification from the site Security force that an armed attack, explosive attack, airliner impact or other HOSTILE ACTION is occurring or has occurred within the Protected Area (refer to Hostile Action definition in Section 4.0)

RELATED EALS:

TAB

Loss of Physical Control of the Plant

7

PROC./WORK PLAN NO. 1903.010	PROCEDURE/WORK PLAN TITLE: EMERGENCY ACTION LEVEL CLASSIFICATION	PAGE:60 of 130 CHANGE: 037-04-0
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ATTACHMENT 3
UNIT 1
HAZARDS TO STATION OPERATION

7.4

CONDITION: {CNRO-2005-044}

Loss of Physical Control of the Plant

EMERGENCY CLASSIFICATION:

General Emergency

MODES All

CRITERIA:

A HOSTILE FORCE (see definition in Section 4.0) has taken control of the plant equipment such that plant personnel are unable to operate equipment required to maintain safety functions. Maintaining safety functions includes:

- 1) Shutdown the reactor and maintain it in a safe shutdown condition;
- 2) Remove residual heat;
- 3) Control the release of radioactive material; or
- 4) Mitigate the consequences of an accident

RELATED EALS:

TAB

None

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ATTACHMENT 3
UNIT 1
HAZARDS TO STATION OPERATION

7.5

CONDITION:

Fire or Explosion Onsite

EMERGENCY CLASSIFICATION:

Notification of Unusual Event

MODES All

CRITERIA:

1. Fire within the Protected Area Security Fence which is not extinguished within 10 minutes.

OR

2. Explosion causing facility damage.

RELATED EALS:

TAB

Fire or Explosion Onsite Affecting One Train of an ES System

7

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ATTACHMENT 3
UNIT 1
HAZARDS TO STATION OPERATION

7.6

CONDITION:

Fire or Explosion Onsite Affecting One Train of ANY ES Systems

EMERGENCY CLASSIFICATION:

Alert

MODES All

CRITERIA:

1. Fire or explosion onsite
- AND
2. A potential or actual loss of a single train of ANY ES system as a result of the fire or explosion

RELATED EALS:

TAB

Fire or Explosion Onsite Affecting Both Trains of ANY ES System
Control Room Evacuation

7
6

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ATTACHMENT 3
UNIT 1
HAZARDS TO STATION OPERATION

7.7

CONDITION:

Fire or Explosion Onsite Affecting Both Trains of ANY ES Systems

EMERGENCY CLASSIFICATION:

Site Area Emergency

MODES All

CRITERIA:

1. Fire or explosion onsite
- AND
2. A potential or actual loss of Both trains of ANY ES system as a result of the fire or explosion

RELATED EALS:

TAB

Control Room Evacuation and control of shutdown systems not established in 15 minutes

6

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ATTACHMENT 3
UNIT 1
HAZARDS TO STATION OPERATION

7.8

CONDITION:

Aircraft Crash, Unusual Aircraft Activity, Train Derailment, Turbine Failure, Toxic or Flammable Gas Release

EMERGENCY CLASSIFICATION:

Notification of Unusual Event

MODES All

CRITERIA:

1. ANY of the following:
 - A. Aircraft crash onsite.
 - B. Unusual Aircraft activity over the facility.
 - C. Train derailment onsite.
 - D. Turbine rotating component failure causing rapid plant shutdown.
 - E. Toxic or flammable gas release which limits or restricts access to areas required for security or safe operation of the plant.

RELATED EALS:

TAB

Fire or Explosion Onsite
Ongoing Security Compromise OR Airborne Threat
Aircraft Crash, Missiles, Toxic or Flammable Gas Affecting One Train
of ANY ES System

7

7

7

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ATTACHMENT 3
UNIT 1
HAZARDS TO STATION OPERATION

7.9

CONDITION:

Aircraft Crash, Missiles, Toxic or Flammable Gas Affecting One Train of ANY ES Systems

EMERGENCY CLASSIFICATION:

Alert

MODES All

CRITERIA:

1. ANY of the following:
 - A. Aircraft crash onsite.
 - B. Missiles/Projectiles from any source
 - C. Toxic or flammable gas release

AND

2. A potential OR actual loss of a single train of ANY ES system

RELATED EALS:

TAB

Fire or Explosion Onsite Affecting One Train of an ES System
Aircraft Crash, Missiles, Toxic or Flammable Gas Affecting Both
Trains of ANY ES System
Imminent Loss of Physical Control of the Plant

7
7
7

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ATTACHMENT 3
UNIT 1
HAZARDS TO STATION OPERATION

7.10

CONDITION:

Aircraft Crash, Missiles, Toxic or Flammable Gas Affecting Both Trains of ANY ES System

EMERGENCY CLASSIFICATION:

Site Area Emergency

MODES All —

CRITERIA:

1. ANY of the following:
 - A. Aircraft crash onsite.
 - B. Missiles/Projectiles from any source
 - C. Toxic or flammable gas release

AND
2. A potential OR actual loss of BOTH trains of ANY ES system

RELATED EALS:

TAB

Fire or Explosion Onsite Affecting Both Trains of an ES System
Loss of Physical Control of the Plant

7
7

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ATTACHMENT 3
UNIT 1
NATURAL EVENTS

8.1

CONDITION:

Tornado, Flood, Loss of Dardanelle Reservoir, Earthquake

EMERGENCY CLASSIFICATION:

Notification of Unusual Event

MODES All

CRITERIA:

1. ANY of the following:
 - A. Tornado observed on the ground within the Exclusion Area
 - B. Flood - Lake level $\geq 340'$ elev. and rising, with forecasted lake level $\geq 350'$ elev.
 - C. Low Level - Lake level $\leq 337'$ elev. AND forecasted by U.S. Army Corp of Engineers to reach 335' elev.
 - D. Earthquake - VERIFIED earthquake accompanied by .01g alarm.

RELATED EALS:

TAB

Tornado, High Winds, Flood, Loss of Dardanelle Reservoir, Earthquake

8

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ATTACHMENT 3
UNIT 1
NATURAL EVENTS

8.2

CONDITION:

Tornado, High Winds, Flood, Loss of Dardanelle Reservoir, Earthquake

EMERGENCY CLASSIFICATION:

Alert

MODES All

CRITERIA:

1. ANY of the following:
 - A. Tornado striking vital facility structures (e.g. housing ES related equipment)
 - B. High Winds - Sustained winds of >60 mph (10 minute average as reported by RDACS from either the 10 or 57 meter instruments).
 - C. Flood - Flood waters ≥350' elev. and are forecasted by U.S. Army Corp of Engineers to reach or exceed 354' elev.
 - D. Low Level - Lake level ≤335' elev
 - E. Earthquake - VERIFIED earthquake accompanied by .1g alarm.

or

Any natural event resulting in the potential or actual loss of ONE train of ANY ES system.

RELATED EALS:

TAB

Tornado, High Winds, Flood, Loss of Dardanelle Reservoir, Earthquake
Loss of or challenge to all 3 Fission Product Barriers

8

1

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ATTACHMENT 3
UNIT 1
NATURAL EVENTS

8.3

CONDITION:

Tornado, High Winds, Flood, Loss of Dardanelle Reservoir, Earthquake

EMERGENCY CLASSIFICATION:

Site Area Emergency

MODES 1-4

CRITERIA:

1. ANY of the following:

- A. High Winds - Sustained winds of ≥ 67 mph (10 minute average as reported by RDACS from either the 10 or 57 meter instruments).
- B. Flood - Flood Water Level is $> 361'$ elev.
- C. Low Level Lake level $\leq 335'$ elev. and Emergency Cooling Pond not available
- D. VERIFIED Earthquake $\geq 0.2g$
- E. Tornado, high wind, flood, low lake level or earthquake resulting in the potential or actual loss of BOTH trains of ANY ES system.

RELATED EALS:

TAB

Loss of or challenge to all 3 Fission Product Barriers

1

PROC./WORK PLAN NO. 1903.010	PROCEDURE/WORK PLAN TITLE: EMERGENCY ACTION LEVEL CLASSIFICATION	PAGE:70 of 130 CHANGE: 037-04-0
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ATTACHMENT 3
UNIT 1
MISCELLANEOUS EVENTS

9.1

CONDITION:

Other plant conditions exist that warrant increased awareness on the part of the operating staff and state and/or local offsite authorities or involve other than normal controlled shutdown.

EMERGENCY CLASSIFICATION:

Notification of Unusual Event

MODES All

CRITERIA:

An event has occurred and the following conditions exist:

1. This event is not covered by any other EAL

AND
2. This event does not challenge or cause the loss of a fission product barrier

AND
3. In the judgement of the SM/TSC Director/EOF Director this event requires an increased awareness by the ANO staff and offsite authorities.

RELATED EALS:

TAB

Plant Conditions Exist that Warrant Precautionary Activation of the TSC

9

PROC./WORK PLAN NO. 1903.010	PROCEDURE/WORK PLAN TITLE: EMERGENCY ACTION LEVEL CLASSIFICATION	PAGE:71 of 130 CHANGE: 037-04-0
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ATTACHMENT 3
UNIT 1
MISCELLANEOUS EVENTS

9.2

CONDITION:

Other plant conditions exist that warrant precautionary activation of the Technical Support Center and placing the near-site Emergency Operations Facility and other key emergency personnel on standby.

EMERGENCY CLASSIFICATION:

Alert

MODES All

CRITERIA:

The following conditions must exist

1. This event is not covered by any other EAL.

AND

2. This event must either challenge or cause the loss of a fission product barrier.

OR

Plant conditions exist that warrant activation of the Emergency Response Organization.

RELATED EALS:

TAB

Plant Conditions Exist that Warrant Activation of the Emergency Response Centers.

9

PROC./WORK PLAN NO. 1903.010	PROCEDURE/WORK PLAN TITLE: EMERGENCY ACTION LEVEL CLASSIFICATION	PAGE:72 of 130 CHANGE: 037-04-0
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ATTACHMENT 3
UNIT 1
MISCELLANEOUS EVENTS

9.3

CONDITION:

Other plant conditions exist that warrant activation of the emergency response facilities and monitoring teams or a precautionary notification to the public near the site.

EMERGENCY CLASSIFICATION:

Site Area Emergency

MODES All

CRITERIA:

The following conditions must exist

1. This event is not covered by any other EAL.

AND

2. The event must cause ANY of the following:

- A. Challenge two fission product barriers
- B. Failure of one fission product barrier and a challenge to another
- C. Failure of Two fission product barriers

RELATED EALS:

TAB

Plant Conditions Exist that Make Release of Large Amounts of Radioactivity Possible

9

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ATTACHMENT 3
UNIT 1
MISCELLANEOUS EVENTS

9.4

CONDITION:

Plant Conditions Exist That Make Release of Large Amounts of Radioactivity Possible

EMERGENCY CLASSIFICATION:

General Emergency

MODES All

CRITERIA:

The following conditions must exist:

1. This event is not covered by any other EAL

AND

2. Events have occurred that make a release of large amounts of radioactivity in a short period of time possible.

RELATED EALS:

TAB

None

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ATTACHMENT 4
UNIT 2
PRIMARY SYSTEM EVENTS

1.1

CONDITION:

RCS Activity indicates >0.1% fuel cladding failure

EMERGENCY CLASSIFICATION:

Notification of Unusual Event

MODES 1-5

CRITERIA:

1. Greater than 0.1% fuel cladding failure as indicated by EITHER of the following:
 - A. Selected isotope activity (I-131) >5.5E⁵ CPM (2RR4806 on 2C14 or 2RITS 4806B on 2C22)
 - B. Specific I-131 sample results >37.8 µCi/gm

RELATED EALS:

TAB

RCS Activity
T.S. L.C.O.'s
General Area Radiation/Airborne

<u>1</u>
<u>6</u>
<u>5</u>

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ATTACHMENT 4
UNIT 2
PRIMARY SYSTEM EVENTS

1.2

CONDITION:

RCS Activity indicates >1.0% fuel cladding failure

EMERGENCY CLASSIFICATION:

Alert

MODES 1-5

CRITERIA:

1. Greater than 1% fuel cladding failure as indicated by either of the following:
 - A. RCS Sample Analysis >378 μ Ci/gm specific I-131
 - OR
 - B. Radiation levels that indicate >1% fuel cladding failure per Unit 2 Fuel Cladding Failure Radiation Plot (Att 8)

RELATED EALS:

TAB

General Area Radiation/Airborne	5
Containment Radiation	1
Loss of or Challenge to 3 Fission Product Barriers	1
Core Damage/ICC	1

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ATTACHMENT 4
UNIT 2
PRIMARY SYSTEM EVENTS

1.3

CONDITION:

Core Damage Indicated with an Inadequate Core Cooling Condition

EMERGENCY CLASSIFICATION:

Site Area Emergency

MODES 1-5

CRITERIA:

1. Greater than 1% fuel cladding failure as indicated by either of the following:
 - A. RCS Sample Analysis >378 μ Ci/gm specific I-131
 - OR
 - B. Radiation levels that indicate >1% fuel cladding failure per Unit 2 Fuel Cladding Failure Radiation Plot (Att 8)
 - AND
2. Inadequate core cooling capacity exists as indicated by ANY of the following:
 - A. Th RTD and average CET temperature indicates >10°F superheat AND RVLMS LVL 7 or Lower indicates Dry.
 - B. Th RTD and average CET temperature indicates >10°F superheat with both RVLMS Channels inoperable AND RCS temperatures increasing.
 - C. CET Temperatures indicate greater than 700°F.

RELATED EALS:

TAB

Decay Heat Removal	<u>6</u>
Containment Radiation	<u>1</u>
Core Melt	<u>1</u>
RCS Leakage	<u>2</u>

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ATTACHMENT 4
UNIT 2
PRIMARY SYSTEM EVENTS

1.4

CONDITION:

Containment Radiation readings which indicate LOCA and >1% fuel cladding failure

EMERGENCY CLASSIFICATION:

Site Area Emergency

MODES All

CRITERIA:

1. Containment Radiation Levels correspond to a Site Area Emergency as determined from the containment radiation EAL plot (Att 6)

AND

2. LOCA occurring within the Containment Building

RELATED EALS:

TAB

Containment Radiation
Loss of or challenge to 3 Fission Product Barriers
Radiological Effluents
Core Melt

1
1
5
1

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ATTACHMENT 4
UNIT 2
PRIMARY SYSTEM EVENTS

1.5

CONDITION:

Containment Radiation readings which indicate LOCA and >50% fuel overheat

EMERGENCY CLASSIFICATION:

General Emergency

MODES All

CRITERIA:

1. Containment Radiation Levels correspond to a General Emergency as determined from the containment radiation EAL plot (Att 6)

AND

2. LOCA occurring within the Containment Building

RELATED EALS:

TAB

Loss of or challenge to 3 Fission Product Barriers
Radiological Effluents
Core Melt

<u>1</u>
<u>5</u>
<u>1</u>

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ATTACHMENT 4
UNIT 2
PRIMARY SYSTEM EVENTS

1.6

CONDITION:

Core Melt with Containment Integrity Lost or Challenged

EMERGENCY CLASSIFICATION:

General Emergency

MODES All

CRITERIA:

1. ANY of the following events occur
 - A. Small or Large LOCA and a complete failure of ALL ECCS systems occurs.
 - B. Loss of ALL feedwater AND S/G Level in both S/G's is ≤ 70 " (Wide Range) AND a complete failure of ALL ECCS Systems occurs.
 - C. Anticipated transient without a Rx trip

AND
2. Containment Integrity is lost OR challenged as defined by 4.10.3 or 4.11.3 (Definitions)

RELATED EALS:

TAB

Loss of or challenge to 3 Fission Product Barriers
Containment Radiation
Radiological Effluents

1
1
5

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ATTACHMENT 4
UNIT 2
PRIMARY SYSTEM EVENTS

1.7

CONDITION:

Loss of or challenge to all 3 Fission Product Barriers

EMERGENCY CLASSIFICATION:

General Emergency

MODES All

CRITERIA:

1. Either of the following conditions exist:
 - A. Fuel Cladding Failure (refer to section 4.10.1)
 - B. Challenge to Fuel Cladding (refer to section 4.11.1)

AND
2. Either of the following conditions exist:
 - A. RCS boundary failure (refer to section 4.10.2)
 - B. Challenge to RCS boundary (refer to section 4.11.2)

AND
3. Either of the following condition exist
 - A. Containment Integrity failure (refer to section 4.10.3)
 - B. Challenge to Containment Integrity (refer to section 4.11.3)

RELATED EALS:

TAB

Containment Radiation	<u>1</u>
Core Melt	<u>1</u>
Radiological Effluents	<u>5</u>
Natural Events	<u>8</u>

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ATTACHMENT 4
UNIT 2
RCS LEAKAGE

2.1

CONDITION:

RCS Leakage

EMERGENCY CLASSIFICATION:

Notification of Unusual Event

MODES 1-4

CRITERIA:

NOTE

RCS leakage is defined as a loss of RCS inventory due to a leak in the RCS or a supporting system that is not or cannot be isolated within 10 minutes.

1. Unidentified or pressure boundary RCS leakage greater than 10 gpm.

OR

2. Identified RCS leakage greater than 25 gpm.

RELATED EALS:

TAB

RCS Leakage
T.S. L.C.O.'s
Primary to Secondary Leakage
General Area Radiation/Airborne

2
6
3
5

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ATTACHMENT 4
UNIT 2
RCS LEAKAGE

2.2

CONDITION:

RCS Leakage > 44 gpm

EMERGENCY CLASSIFICATION:

Alert

MODES 1-4

CRITERIA:

NOTE

RCS leakage is defined as a loss of RCS inventory due to a leak in the RCS or a supporting system that is not or cannot be isolated within 10 minutes.

1. RCS Leakage is >44 gpm (Capacity of a single Charging Pump).

RELATED EALS:

TAB

RCS Leakage
General Area Radiation/Airborne
Containment Radiation
Decay Heat Removal
Primary to Secondary Leakage

<u>2</u>
<u>5</u>
<u>1</u>
<u>6</u>
<u>3</u>

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ATTACHMENT 4
UNIT 2
RCS LEAKAGE

2.3

CONDITION:

RCS Leakage > 44 gpm with ICC Conditions

EMERGENCY CLASSIFICATION:

Site Area Emergency

MODES 1-4

CRITERIA:

NOTE

RCS leakage is defined as a loss of RCS inventory due to a leak in the RCS or a supporting system that is not or cannot be isolated within 10 minutes.

1. RCS Leakage is >44 gpm (Capacity of a single Charging Pump).

AND

2. Inadequate Core Cooling conditions exist as indicated by ANY of the following:

- A. T_h RTD and average CET temperature indicates >10°F superheat AND RVLMS LVL 7 or Lower indicates Dry.
- B. T_h RTD and average CET temperature indicates >10°F superheat with both RVLMS Channels inoperable AND RCS temperature increasing.
- C. CET Temperatures indicate greater than 700°F.

RELATED EALS:

TAB

Core Damage/ICC
Radiological Effluents
Containment Radiation
Core Melt
Loss of or challenge to 3 Fission Product Barriers
Primary to Secondary Leakage

1
5
1
1
1
3

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ATTACHMENT 4
UNIT 2
SECONDARY SYSTEM EVENTS

3.1

CONDITION:

Uncontrolled S/G Depressurization Resulting in MSIS Actuation

EMERGENCY CLASSIFICATION:

Notification of Unusual Event

MODES 1-4

CRITERIA:

1. Any actuation of MSIS due to uncontrolled Steam Generator depressurization.

RELATED EALS:

TAB

Primary to Secondary Leakage
Radiological Effluents

3
5

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ATTACHMENT 4
UNIT 2
SECONDARY SYSTEM EVENTS

3.2

CONDITION:

S/G Tube Leak > Tech Spec Limits

EMERGENCY CLASSIFICATION:

Notification of Unusual Event

MODES 1-4

CRITERIA:

1. Primary to Secondary Leakage exceeds EITHER of the following limits
 - A. Total leakage through both S/G's is > 300 gallons per day (0.2083 gpm)
 - OR
 - B. Leakage to 1 S/G is > 150 gallons per day (0.1042 gpm)

RELATED EALS:

TAB

RCS Leakage
Primary to Secondary Leakage
Radiological Effluents

2
3
5

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ATTACHMENT 4
UNIT 2
SECONDARY SYSTEM EVENTS

3.3

CONDITION:

S/G Tube Leak >10 gpm with an Ongoing Steam Release

EMERGENCY CLASSIFICATION:

Alert

MODES 1-4

CRITERIA:

1. S/G tube leak >10 gpm with a Steam Release in Progress from either or both steam generator(s) as indicated by ANY of the following:
 - A. Main Steam Safety Valves maintaining S/G Pressure
 - B. SDBCS Atmospheric Dump Valves in Use
 - C. Steam Line Break Outside of Containment
 - D. 2P7A is in use and continued operation is required to maintain S/G levels.

RELATED EALS:

TAB

Primary to Secondary Leakage	<u>3</u>
RCS Leakage	<u>2</u>
General Area Radiation/Airborne	<u>5</u>
Radiological Effluents	<u>5</u>
Electrical Power	<u>4</u>

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ATTACHMENT 4
UNIT 2
SECONDARY SYSTEM EVENTS

3.4

CONDITION:

Steam Generator Tube Rupture >44 gpm With an Ongoing Steam Release and RCS Activity > 1.0 $\mu\text{Ci/gm}$, but < 378 $\mu\text{Ci/gm}$ (1% fuel cladding failure).

EMERGENCY CLASSIFICATION:

Site Area Emergency

MODES 1-4

CRITERIA:

1. S/G tube leak >44 gpm with a Steam Release in Progress from either or both steam generator(s) as indicated by ANY of the following:
 - A. Main Steam Safety Valve(s) maintaining S/G Pressure
 - B. SDBCS Atmospheric Dump Valve(s) in Use
 - C. Steam Line Break Outside of Containment
 - D. 2P7A is in use and continued operation is required to maintain S/G levels.

AND
2. RCS Activity > 1.0 $\mu\text{Ci/gm}$ (T.S. 3.4.8), but < 378 $\mu\text{Ci/gm}$ (1% fuel cladding failure).

RELATED EALS:

CAUTION

If fuel cladding failure is $\geq 1\%$ ($\geq 378 \mu\text{Ci/gm}$ I-131), EAL 1.7 will apply.
If fuel cladding is degrading and failure approaches 1% (378 $\mu\text{Ci/gm}$ I-131), **consider** EAL 1.7.

TAB

RCS Leakage	2
Radiological Effluents	5
Loss of or Challenge to 3 Fission Product Barriers	1
Core Melt	1
Electrical Power	4

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ATTACHMENT 4
UNIT 2
ELECTRICAL POWER FAILURES

4.1

CONDITION:

Degraded Power

EMERGENCY CLASSIFICATION:

Notification of Unusual Event

MODES All Modes

CRITERIA:

1. Temporary Loss of Normal Control Room Lighting

AND
2. No voltage indicated on Both 4.16 KV nonvital busses (2A1 & 2A2)

AND
3. At least one Emergency Diesel or Station Blackout Diesel started and supplying a vital bus (2A3 or 2A4)

RELATED EALS:

TAB

Electrical Power
MSIS
Primary to Secondary Leak

<u>4</u>
<u>3</u>
<u>3</u>

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ATTACHMENT 4
UNIT 2
ELECTRICAL POWER FAILURES

4.2

CONDITION:

Station Blackout

EMERGENCY CLASSIFICATION:

Alert

MODES All Modes

CRITERIA:

1. Loss of all Control Room Lighting except emergency DC Lights

AND
2. No voltage indicated on Both 4.16 KV nonvital busses. (2A1 and 2A2)

AND
3. No voltage indicated on Both 4.16 KV vital busses (2A3 and 2A4)

RELATED EALS:

TAB

Electrical Power
Communications, Dose Assessment
Primary to Secondary Leak
Decay Heat Removal
Core Melt

4
6
3
6
1

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ATTACHMENT 4
UNIT 2
ELECTRICAL POWER FAILURES

4.3

CONDITION:

Loss of All Vital DC

EMERGENCY CLASSIFICATION:

Alert

MODES 1-4

CRITERIA:

1. Loss of All of the following busses has occurred:
 - A. 2D01 and 2D02
 - B. 2RA1 and 2RA2
 - C. 2D21 and 2D23
 - D. 2D22 and 2D24

RELATED EALS:

TAB

Electrical Power
Communications, Dose Assessment

4
6

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ATTACHMENT 4
UNIT 2
ELECTRICAL POWER FAILURES

4.4

CONDITION:

Blackout >15 minutes.

EMERGENCY CLASSIFICATION:

Site Area Emergency

MODES All

CRITERIA:

1. Blackout has occurred as indicated by ALL of the following:
 - A. Loss of all Control Room lighting except emergency DC lights
 - B. No voltage indicated on Both 4.16 KV nonvital busses (2A1 and 2A2)
 - C. Neither Vital 4.16 KV Buss energized (2A3 or 2A4)

AND

2. The Blackout Condition exists for >15 minutes

RELATED EALS:

TAB

Decay Heat Removal
Electrical Power
Primary to Secondary Leakage
Core Melt
Radiological Effluents

6

4

3

1

5

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ATTACHMENT 4
UNIT 2
ELECTRICAL POWER FAILURES

4.5

CONDITION:

Loss of ALL Vital DC for >15 minutes

EMERGENCY CLASSIFICATION:

Site Area Emergency

MODES All

CRITERIA:

1. Loss of both of the following trains of DC Busses has occurred:

RED TRAIN

GREEN TRAIN

2D01

2D02

2RA1

2RA2

2D21

2D22

2D23

2D24

AND

2. Power is not restored to at least one train within 15 minutes

RELATED EALS:

TAB

Communications, Dose Assessment
Decay Heat Removal
Core Melt
Radiological Effluents

6

6

1

5

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ATTACHMENT 4
UNIT 2
RADIOLOGICAL EFFLUENTS

5.1

CONDITION:

Projected or measured activity at the Site Boundary, averaged over one hour, is greater than or equal to 0.05 mrem/hr TEDE or 0.15 mrem/hr Child Thyroid CDE or Liquid radiological effluents exceed ODCM Limitations.

EMERGENCY CLASSIFICATION:

Notification of Unusual Event

MODES All

CRITERIA:

1. Radiological Release which exceeds ANY of the following limits
 - A. Projected activity at the Site Boundary, as calculated by the RDACS method, indicate greater than or equal to 0.05 mrem/hr TEDE or 0.15 mrem/hr Child Thyroid CDE.
 - OR
 - B. Offsite monitoring teams report activity at the Site Boundary which, when averaged over the previous one hour, exceeds 0.05 mrem/hr TEDE or 0.15 mrem/hr Child Thyroid CDE.
 - OR
 - C. Liquid radiological effluents exceed ODCM Limitations.

RELATED EALS:

TAB

Radiological Effluents	<u>5</u>
General Area Radiation/Airborne	<u>5</u>
Primary to Secondary Leak	<u>3</u>

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ATTACHMENT 4
UNIT 2
RADIOLOGICAL EFFLUENTS

5.2

CONDITION:

Projected or measured activity at the Site Boundary, averaged over one hour, is greater than or equal to 0.5 mrem/hr TEDE or 1.5 mrem/hr Child Thyroid CDE or Liquid radiological effluents exceed 10 times ODCM Limitations.

EMERGENCY CLASSIFICATION:

Alert

MODES All

CRITERIA:

1. Radiological Release which exceeds ANY of the following limits
 - A. Projected activity at the Site Boundary, as calculated by the RDACS method, indicate greater than or equal to 0.5 mrem/hr TEDE or 1.5 mrem/hr Child Thyroid CDE.
 - OR
 - B. Offsite monitoring teams report activity at the Site Boundary which, when averaged over the previous one hour, exceeds 0.5 mrem/hr TEDE or 1.5 mrem/hr Child Thyroid CDE.
 - OR
 - C. Liquid radiological effluents exceed 10 times ODCM Limitations.

RELATED EALS:

TAB

Radiological Effluents
Primary to Secondary Leak
Containment Radiation

5

3

1

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ATTACHMENT 4
UNIT 2
RADIOLOGICAL EFFLUENTS

5.3

CONDITION:

Radiological Effluents are greater than or equal to 50 mrem/hr TEDE or 150 mrem/hr Child Thyroid CDE at the Site Boundary.

EMERGENCY CLASSIFICATION:

Site Area Emergency

MODES All

CRITERIA:

1. Radiological Release which exceeds ANY of the following limits
 - A. Projected dose rates at the Site Boundary, as calculated by the RDACS method, indicate greater than or equal to 50 mrem/hr TEDE or 150 mRem/hr Child Thyroid CDE.
 - OR
 - B. Offsite monitoring teams report dose rates at the Site Boundary are greater than or equal to 50 mrem/hr TEDE or 150 mrem/hr Child Thyroid CDE.

RELATED EALS:

TAB

Radiological Effluents
Containment Radiation
Loss of or Challenge to 3 Fission Product Barriers
Core Melt

5

1

1

1

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ATTACHMENT 4
UNIT 2
RADIOLOGICAL EFFLUENTS

5.4

CONDITION:

Radiological Effluents are greater than or equal to 250 mrem/hr TEDE or 500 mrem/hr Child Thyroid CDE at the Site Boundary.

EMERGENCY CLASSIFICATION:

General Emergency

MODES All

CRITERIA:

1. Radiological Release which exceeds ANY of the following limits
 - A. Projected dose rates at the Site Boundary, as calculated by the RDACS method, indicate greater than or equal to 250 mrem/hr TEDE or 500 mrem/hr Child Thyroid CDE.
 - OR
 - B. Offsite monitoring teams report dose rates at the Site Boundary are greater than or equal to 250 mrem/hr TEDE or 500 mrem/hr Child Thyroid CDE.

RELATED EALS:

	TAB
Core Melt	<u>1</u>
Loss of or Challenge to 3 Fission Product Barriers	<u>1</u>
Containment Radiation	<u>1</u>

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ATTACHMENT 4
UNIT 2
RADIOLOGICAL EFFLUENTS

5.5

CONDITION:

High Radiation/Airborne Levels

EMERGENCY CLASSIFICATION:

Alert

MODES All

CRITERIA:

1. The loss of control of radioactive material results in ANY of the following:
 - A. Containment radiation indicates >2R/hr
 - B. Area Radiation levels in controlled access (excluding containment) increase by 1 Rem/hr at 2 or more locations.
 - C. General area radiation levels outside of radiologically controlled areas increase by 10 mRem/hr.
 - D. Airborne levels as follows:
 - Auxiliary Building ≥ 100 DAC (General Area)
 - Turbine Building ≥ 10 DAC

NOTE: "Loss of Control" Shall be defined as: Any Radioactive material outside its normal system boundaries.
(For Example: Spent resin spill, RCS liquid spill, Spent fuel accident resulting in gaseous release, etc.)

RELATED EALS:

TAB

Radiological Effluents
Containment Radiation
Spent Fuel Damage
RCS Leakage

5
1
5
2

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ATTACHMENT 4
UNIT 2
RADIOLOGICAL EFFLUENTS

5.6

CONDITION:

Spent Fuel Accident

EMERGENCY CLASSIFICATION:

Site Area Emergency

MODES All

CRITERIA:

1. The loss of water OR damage to a spent fuel assembly occurs in the Rx core (head removed), refueling canal, spent fuel pool, cask loading pit, fuel tilt pit or any plant area involved in the movement or storage of spent fuel.

AND

2. Radiation levels increase to 10 R/hr by Area Radiation Monitors or 10 Rem/hr HP survey report.

RELATED EALS:

TAB

Radiological Effluents
General Area Radiation/Airborne
Miscellaneous

5
5
9

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ATTACHMENT 4
UNIT 2
SAFETY SYSTEM FUNCTION

6.1

CONDITION:

Deviation from T.S. action statements when required to shutdown or cooldown or deviations pursuant to 10CFR50.54(x)

EMERGENCY CLASSIFICATION:

Notification of Unusual Event

MODES 1-4

CRITERIA:

1. EITHER of the following conditions exist:
 - A. Inability to reach required mode within Tech. Spec. limits.
 - B. Deviation from Tech Specs authorized pursuant to 10CFR50.54(x)

RELATED EALS:

TAB

RCS Leakage
Primary to Secondary Leakage
RCS Activity

2
3
1

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ATTACHMENT 4
UNIT 2
SAFETY SYSTEM FUNCTION

6.2

CONDITION:

Reactor Protection System Failure to Complete an Automatic Trip

EMERGENCY CLASSIFICATION:

Alert

MODES 1-2

CRITERIA:

1. A valid RPS trip setpoint is exceeded

AND
2. Ten (10) or more CEAs fail to insert as result of the automatic trip

AND
3. CEAs are inserted either by manual trip or DSS.

RELATED EALS:

TAB

RPS Failure
Core Melt
Core Damage/ICC

<u>6</u>
<u>1</u>
<u>1</u>

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ATTACHMENT 4
UNIT 2
SAFETY SYSTEM FUNCTION

6.3

CONDITION:

Reactor Protection System Failure to Complete a Manual Trip

EMERGENCY CLASSIFICATION:

Site Area Emergency

MODES 1-2

CRITERIA:

1. A valid RPS trip setpoint is exceeded
- AND
2. Ten (10) or more CEAs fail to insert after the RPS, DSS and manual trip
(Example: 2B7 & 2B8 feeder breakers opened to insert CEAs due to a failure of automatic and manual RPS trips.)

RELATED EALS:

TAB

Loss of or Challenge to 3 Fission Product Barriers
Core Melt
Core Damage/ICC

<u>1</u>
<u>1</u>
<u>1</u>

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ATTACHMENT 4
UNIT 2
SAFETY SYSTEM FUNCTION

6.4

CONDITION:

Loss of Dose Assessment Capabilities

EMERGENCY CLASSIFICATION:

Notification of Unusual Event

MODES All

CRITERIA:

1. The following conditions exist in the Low Level Radwaste Building:
 - A. SPING is inoperable
 - B. Compacting is in progress
 - C. Inability to obtain and analyze local grab samples every 2 hours.

OR
2. Reactor Building Purge penetration is not isolable and both the applicable SPING and the Process Radiation Monitor are inoperable.

OR
3. All of the following conditions exist for any source of gaseous effluents in the Auxiliary Building, Auxiliary Extension Building, or Spent Fuel Storage Building ventilation systems.
 - A. Applicable SPING is inoperable
 - B. Applicable Process Radiation Monitor is inoperable
 - C. Inability to obtain and analyze local grab samples every 2 hours.

RELATED EALS:

TAB

Communications, Dose Assessment

6

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ATTACHMENT 4
UNIT 2
SAFETY SYSTEM FUNCTION

6.5

CONDITION:

Loss of Communications

EMERGENCY CLASSIFICATION:

Notification of Unusual Event

MODES All

CRITERIA:

1. Complete loss of ANY TWO of the following:
 - A. Plant telephone systems (Commercial telephones and microwave)
 - B. Station Radio
 - C. Emergency Notification System

RELATED EALS:

TAB

None

PROC./WORK PLAN NO. 1903.010	PROCEDURE/WORK PLAN TITLE: EMERGENCY ACTION LEVEL CLASSIFICATION	PAGE:104 of 130 CHANGE: 037-04-0
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ATTACHMENT 4
UNIT 2
SAFETY SYSTEM FUNCTION

6.6

CONDITION:

Control Room Evacuation

EMERGENCY CLASSIFICATION:

Alert

MODES All

CRITERIA:

1. Control Room evacuation is expected to occur OR has already occurred

RELATED EALS:

TAB

Control Room Evacuation

6

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ATTACHMENT 4
UNIT 2
SAFETY SYSTEM FUNCTION

6.7

CONDITION:

Control Room Evacuation and control of shutdown systems not established in 15 minutes.

EMERGENCY CLASSIFICATION:

Site Area Emergency

MODES 1-4

CRITERIA:

1. Control Room evacuation has occurred AND control of shutdown systems is not established from local stations within 15 minutes.

RELATED EALS:

TAB

Core Damage/ICC
Decay Heat Removal
Core Melt

<u>1</u>
<u>6</u>
<u>1</u>

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ATTACHMENT 4
UNIT 2
SAFETY SYSTEM FUNCTION

6.8

CONDITION:

Loss of Decay Heat Removal Capabilities

EMERGENCY CLASSIFICATION:

Alert

MODES 5-6

CRITERIA:

1. Loss of Decay Heat Removal capabilities shall be identified as ANY of the following:
 - A. RCS indicates saturated conditions
 - B. Loss of both shutdown cooling trains for >1 hr and S/G's not available for decay heat removal (NA if Fuel Transfer Canal >23 ft)
 - C. HPSI injection required for cooling the core

RELATED EALS:

TAB

Spent Fuel Accident
Core Damage/ICC
Radiological Effluents
Loss of or Challenge to 3 Fission Product Barriers
High Radiation/Airborne
Core Melt

5
1
5
1
5
1

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ATTACHMENT 4
UNIT 2
SAFETY SYSTEM FUNCTION

6.9

CONDITION:

Loss of Both S/Gs as a Heat Removal Method

EMERGENCY CLASSIFICATION:

Site Area Emergency

MODES 1-4

CRITERIA:

1. ALL of the following conditions exist:
 - A. S/G level in BOTH S/Gs is <70"
 - AND
 - B. ECCS Vent System is utilized

RELATED EALS:

TAB

Containment Radiation
RCS Leakage
Core Melt
Loss of or Challenge to 3 Fission Product Barriers

1
2
1
1

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ATTACHMENT 4
UNIT 2
SAFETY SYSTEM FUNCTION

6.10

CONDITION:

Loss of Control Room Annunciators

EMERGENCY CLASSIFICATION:

Alert

MODES ALL

CRITERIA:

1. Loss of BOTH AC and DC power to 9 or more of the Control Room Annunciator Panels.

RELATED EALS:

TAB

Loss of Control Room Annunciators with a Transient in progress
Electrical Power

6

4

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ATTACHMENT 4
UNIT 2
SAFETY SYSTEM FUNCTION

6.11

CONDITION:

Loss of Control Room Annunciators with a Transient in Progress

EMERGENCY CLASSIFICATION:

Site Area Emergency

MODES ALL

CRITERIA:

1. Loss of BOTH AC and DC power to 9 or more of the Control Room Annunciator Panels.

AND

2. A plant transient is initiated OR in progress. (See Section 4.18 of this procedure for the definition of a Plant Transient).

RELATED EALS:

TAB

Electrical Power

4

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ATTACHMENT 4
UNIT 2
HAZARDS TO STATION OPERATION

7.1

CONDITION: {CNRO-2005-044}

Security Threat as Notified by Security

EMERGENCY CLASSIFICATION:

Notification of Unusual Event

MODES All

CRITERIA:

1. Security threat or attempted entry or attempted sabotage
OR
2. A credible site-specific security threat notification (i.e., credible per the ANO Safeguards Contingency Plan).

OR
3. A validated notification from the NRC providing information of an aircraft threat.

RELATED EALS:

TAB

Ongoing Security Compromise as Notified by Security OR Airborne Threat

7

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ATTACHMENT 4
UNIT 2
HAZARDS TO STATION OPERATION

7.2

CONDITION: {CNRO-2005-044}

Ongoing Security Compromise as Notified by Security OR Airborne Threat

EMERGENCY CLASSIFICATION:

Alert

MODES All

CRITERIA:

1. Ongoing security compromise

OR

2. A validated notification from the NRC of an airliner attack threat less than 30 minutes away

OR

3. A notification from the site Security force of an armed attack, explosive attack, airliner impact or other HOSTILE ACTION within the Owner Controlled Area (OCA) (refer to Hostile Action and OCA definitions in Section 4.0)

RELATED EALS:

TAB

Imminent Loss of Physical Control of the Plant

7

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ATTACHMENT 4
UNIT 2
HAZARDS TO STATION OPERATION

7.3

CONDITION: {CNRO-2005-044}

Imminent Loss of Physical Control of the Plant

EMERGENCY CLASSIFICATION:

Site Area Emergency

MODES All

CRITERIA:

1. Imminent loss of physical control of the plant
- OR
2. A notification from the site Security force that an armed attack, explosive attack, airliner impact or other HOSTILE ACTION is occurring or has occurred within the Protected Area (refer to Hostile Action definition in Section 4.0)

RELATED EALS:

TAB

Loss of Physical Control of the Plant

7

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ATTACHMENT 4
UNIT 2
HAZARDS TO STATION OPERATION

7.4

CONDITION: {CNRO-2005-044}

Loss of Physical Control of the Plant

EMERGENCY CLASSIFICATION:

General Emergency

MODES All

CRITERIA:

A HOSTILE FORCE (see definition in Section 4.0) has taken control of the plant equipment such that plant personnel are unable to operate equipment required to maintain safety functions. Maintaining safety functions includes:

- 1) Shutdown the reactor and maintain it in a safe shutdown condition;
- 2) Remove residual heat;
- 3) Control the release of radioactive material; or
- 4) Mitigate the consequences of an accident

RELATED EALS:

TAB

None

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ATTACHMENT 4
UNIT 2
HAZARDS TO STATION OPERATION

7.5

CONDITION:

Fire or Explosion Onsite

EMERGENCY CLASSIFICATION:

Notification of Unusual Event

MODES All

CRITERIA:

1. Fire within the Protected Area Security Fence which is not extinguished within 10 minutes.
- OR
2. Explosion causing facility damage.

RELATED EALS:

TAB

Fire or Explosion
Security Threat

7
7

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ATTACHMENT 4
UNIT 2
HAZARDS TO STATION OPERATION

7.6

CONDITION:

Fire or Explosion Onsite affecting One Train of ESF Systems

EMERGENCY CLASSIFICATION:

Alert

MODES All

CRITERIA:

1. Fire or explosion onsite

AND
2. A potential or actual loss of a single train of ANY ESF system as a result of the fire or explosion.

RELATED EALS:

TAB

Fire or Explosion
Communications, Dose Assessment
Control Room Evacuation

7
6
6

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ATTACHMENT 4
UNIT 2
HAZARDS TO STATION OPERATION

7.7

CONDITION:

Fire or Explosion Onsite affecting Both Trains of ESF Systems

EMERGENCY CLASSIFICATION:

Site Area Emergency

MODES All

CRITERIA:

1. Fire or explosion onsite

AND
2. A potential or actual loss of Both trains of ANY ESF system as a result of the fire or explosion.

RELATED EALS:

TAB

Communications, Dose Assessment
Control Room Evacuation

6

6

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ATTACHMENT 4
UNIT 2
HAZARDS TO STATION OPERATION

7.8

CONDITION:

Aircraft Crash, Unusual Aircraft Activity, Train Derailment, Turbine failure, Toxic or Flammable Gas

EMERGENCY CLASSIFICATION:

Notification of Unusual Event

MODES All

CRITERIA:

1. ANY of the following
 - A. Aircraft crash onsite
 - B. Unusual Aircraft activity over the facility
 - C. Train derailment onsite
 - D. Turbine rotating component failure causing rapid plant shutdown
 - E. Toxic or flammable gas release which limits or restricts access to areas required for security or safe operation of the plant.

RELATED EALS:

	TAB
Fire or Explosion	<u>7</u>
Ongoing Security Compromise OR Airborne Threat	<u>7</u>
MSIS	<u>3</u>
Other Hazards	<u>7</u>

PROC./WORK PLAN NO. 1903.010	PROCEDURE/WORK PLAN TITLE: EMERGENCY ACTION LEVEL CLASSIFICATION	PAGE:118 of 130 CHANGE: 037-04-0
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ATTACHMENT 4
UNIT 2
HAZARDS TO STATION OPERATION

7.9

CONDITION:

Aircraft Crash, Missiles, Toxic or Flammable Gas Affecting One Train of ESF Systems

EMERGENCY CLASSIFICATION:

Alert

MODES All

CRITERIA:

1. ANY of the following
 - A. Aircraft crash onsite
 - B. Missiles/Projectiles from any source
 - C. Toxic or flammable gas release

AND
2. A potential OR actual loss of a single train of ANY ESF system

RELATED EALS:

TAB

Fire or Explosion
Other Hazards
Imminent Loss of Physical Control of the Plant

7
7
7

PROC./WORK PLAN NO. 1903.010	PROCEDURE/WORK PLAN TITLE: EMERGENCY ACTION LEVEL CLASSIFICATION	PAGE:119 of 130 CHANGE: 037-04-0
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ATTACHMENT 4
UNIT 2
HAZARDS TO STATION OPERATION

7.10

CONDITION:

Aircraft Crash, Missiles, Toxic or Flammable Gas Affecting Both Redundant ESF Trains

EMERGENCY CLASSIFICATION:

Site Area Emergency

MODES All

CRITERIA:

1. ANY of the following
 - A. Aircraft crash onsite
 - B. Missiles/Projectiles from any source
 - C. Toxic or flammable gas release

AND
2. A potential OR actual loss of BOTH trains of ANY ESF system

RELATED EALS:

TAB

Fire or Explosion
Loss of Physical Control of the Plant

7
7

PROC./WORK PLAN NO. 1903.010	PROCEDURE/WORK PLAN TITLE: EMERGENCY ACTION LEVEL CLASSIFICATION	PAGE:120 of 130 CHANGE: 037-04-0
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ATTACHMENT 4
UNIT 2
NATURAL EVENTS

8.1

CONDITION:

Tornado, Flood, Loss of Dardanelle Reservoir, Earthquake

EMERGENCY CLASSIFICATION:

Notification of Unusual Event

MODES All

CRITERIA:

1. ANY of the following
 - A. Tornado observed on the ground within the Exclusion Area
 - B. Flood - Lake level $\geq 340'$ elev. and rising with forecasted lake level $\geq 350'$ elev.
 - C. Low Level - Lake level $\leq 337'$ AND forecasted by U.S. Army Corp of Engineers to reach 335'
 - D. Earthquake - VERIFIED earthquake accompanied by .01g alarm.

RELATED EALS:

TAB

Natural Events

8

PROC./WORK PLAN NO. 1903.010	PROCEDURE/WORK PLAN TITLE: EMERGENCY ACTION LEVEL CLASSIFICATION	PAGE:121 of 130 CHANGE: 037-04-0
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ATTACHMENT 4
UNIT 2
NATURAL EVENTS

8.2

CONDITION:

Tornado, High Winds, Flood, Loss of Dardanelle Reservoir, Earthquake

EMERGENCY CLASSIFICATION:

Alert

MODES All

CRITERIA:

1. ANY of the following
 - A. Tornado striking vital facility structures (e.g. housing ES related equipment)
 - B. High Winds - Sustained winds of >72 mph (10 minute average as reported by RDACS from either the 10 or 57 meter instruments).
 - C. Flood - Flood waters $\geq 350'$ and are forecasted by U.S. Army Corp of Engineers to reach or exceed 354'
 - D. Low Level - Lake level $\leq 335'$ elevation
 - E. Earthquake - VERIFIED Earthquake accompanied by .1g alarm.

OR

Any natural event resulting in the potential or actual loss of ONE train of ANY ES system

RELATED EALS:

TAB

Natural Events
Loss of or challenge to all 3 Fission Product Barriers

8

1

PROC./WORK PLAN NO. 1903.010	PROCEDURE/WORK PLAN TITLE: EMERGENCY ACTION LEVEL CLASSIFICATION	PAGE:122 of 130 CHANGE: 037-04-0
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ATTACHMENT 4
UNIT 2
NATURAL EVENTS

8.3

CONDITION:

Tornado, High Winds, Flood, Loss of Dardanelle Reservoir, Earthquake

EMERGENCY CLASSIFICATION:

Site Area Emergency

MODES 1-4

CRITERIA:

1. ANY of the following
 - A. High Winds - Sustained winds of ≥ 80 mph (10 minute average as reported by RDACS from either the 10 or 57 meter instruments).
 - B. Flood - Flood Water Level is $>361'$ elev.
 - C. Low Level - Lake level $\leq 335'$ elev. and Emergency Cooling Pond not available.
 - D. VERIFIED Earthquake $\geq 0.2g$
 - E. Tornado, high wind, flood, low lake level or earthquake resulting in the potential or actual loss of BOTH trains of ANY ESF system.

RELATED EALS:

TAB

Loss of or challenge to all 3 Fission Product Barriers

1

PROC./WORK PLAN NO. 1903.010	PROCEDURE/WORK PLAN TITLE: EMERGENCY ACTION LEVEL CLASSIFICATION	PAGE:123 of 130 CHANGE: 037-04-0
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ATTACHMENT 4
UNIT 2
MISCELLANEOUS EVENTS

9.1

CONDITION:

Other plant conditions exist that warrant increased awareness on the part of the operating staff and state and/or local offsite authorities or involve other than normal controlled shutdown.

EMERGENCY CLASSIFICATION:

Notification of Unusual Event

MODES All

CRITERIA:

An event has occurred and the following conditions exist:

1. This event is not covered by any other EAL

AND
2. This event does not challenge or cause the loss of a fission product barrier

AND
3. In the judgement of the SM/TSC Director/EOF Director this event requires an increased awareness by the ANO Staff and offsite authorities.

RELATED EALS:

TAB

RCS Activity
RCS Leakage
Primary to Secondary Leak
Radiological Effluents
T.S. L.C.O.'s
Loss of Indications/Communications/Dose Assessment

1
2
3
5
6
6

PROC./WORK PLAN NO. 1903.010	PROCEDURE/WORK PLAN TITLE: EMERGENCY ACTION LEVEL CLASSIFICATION	PAGE:124 of 130 CHANGE: 037-04-0
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ATTACHMENT 4
UNIT 2
MISCELLANEOUS EVENTS

9.2

CONDITION:

Other plant conditions exist that warrant precautionary activation of the Technical Support Center and placing the near-site Emergency Operations Facility and other key emergency personnel on standby.

EMERGENCY CLASSIFICATION:

Alert

MODES All

CRITERIA:

The following conditions must exist

1. This event is not covered by any other EAL

AND

2. This event must either challenge or cause the loss of a fission product barrier.

RELATED EALS:

TAB

RCS Activity
RCS Leakage
Primary to Secondary Leak
Radiological Effluents
Decay Heat Removal

1
2
3
5
6

PROC./WORK PLAN NO. 1903.010	PROCEDURE/WORK PLAN TITLE: EMERGENCY ACTION LEVEL CLASSIFICATION	PAGE:125 of 130 CHANGE: 037-04-0
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ATTACHMENT 4
UNIT 2
MISCELLANEOUS EVENTS

9.3

CONDITION:

Other plant conditions exist that warrant activation of emergency response facilities and monitoring teams or a precautionary notification to the public near the site.

EMERGENCY CLASSIFICATION:

Site Area Emergency

MODES All

CRITERIA:

The following conditions must exist

1. This event is not covered by any other EAL

AND

2. This event may cause ANY of the following:

- A. Challenge to two fission product barriers
- B. Failure of one fission product barrier and a challenge to another
- C. Failure of 2 fission product barriers

RELATED EALS:

TAB

Core Damage/ICC
Containment Radiation
Decay Heat Removal
Radiological Effluents
RCS Leakage
Primary to Secondary Leak

1
1
6
5
2
3

PROC./WORK PLAN NO. 1903.010	PROCEDURE/WORK PLAN TITLE: EMERGENCY ACTION LEVEL CLASSIFICATION	PAGE:126 of 130 CHANGE: 037-04-0
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ATTACHMENT 4
UNIT 2
MISCELLANEOUS EVENTS

9.4

CONDITION:

Plant Conditions Exist That Make Release of Large Amounts of Radioactivity Possible

EMERGENCY CLASSIFICATION:

General Emergency

MODES All

CRITERIA:

The following conditions must exist

1. This event is not covered by any other EAL

AND

2. Events have occurred that make a release of large amounts of radioactivity in a short period of time possible.

RELATED EALS:

TAB

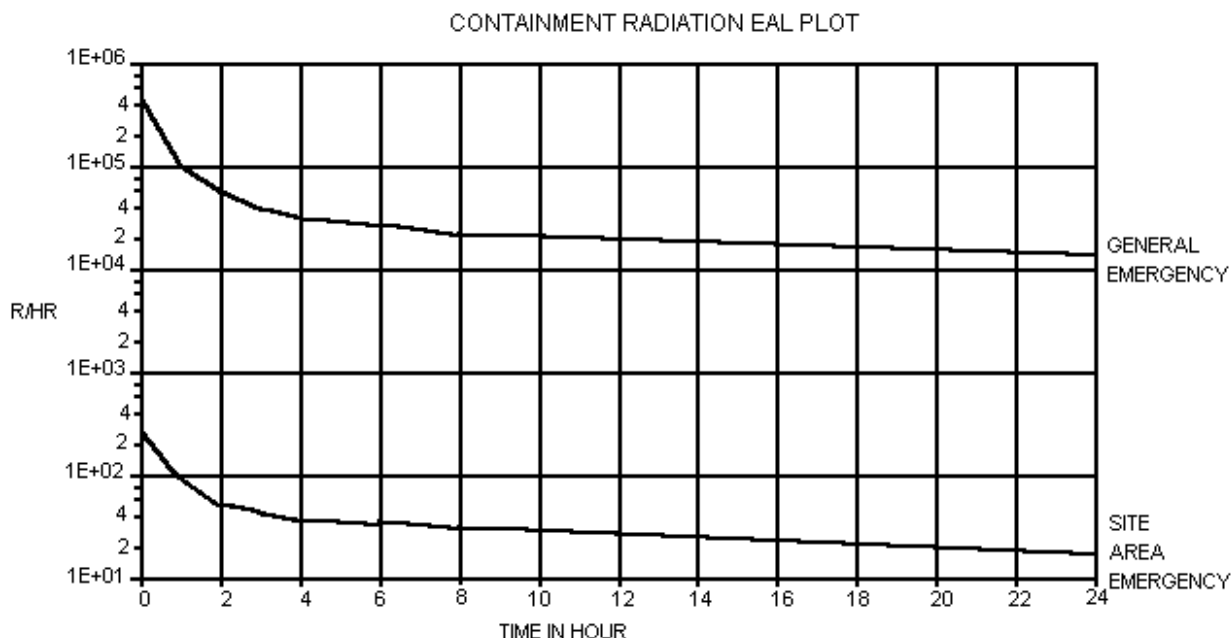
Core Melt
Loss of or Challenge to 3 Fission Product Barriers
Containment Radiation
Radiological Effluents

<u>1</u>
<u>1</u>
<u>1</u>
<u>5</u>

PROC./WORK PLAN NO. 1903.010	PROCEDURE/WORK PLAN TITLE: EMERGENCY ACTION LEVEL CLASSIFICATION	PAGE:127 of 130 CHANGE: 037-04-0
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ATTACHMENT 5

UNIT 1



INSTRUCTIONS

CAUTION

- * In the absence of a significant containment temperature transient, monitor readings should be considered valid.
- * In the event of a significant containment temperature transient, monitor readings may be erratic for a short duration (Ref.IN-97-45, Supplement 1)

A. Determine the containment radiation level.

1. If the plant has been operating at 100% for the past 30 days, use the reading from RE-8060 or RE-8061.
2. If the plant has been operating at less than 100% power for the past 30 days, determine the radiation level as follows:

$$\text{Rad level} = \text{Reading from RE-8060 or RE-8061} \times \frac{100\%}{\text{estimated ave. power for the past 30 days}}$$

B. Determine the time after shutdown (in hours).

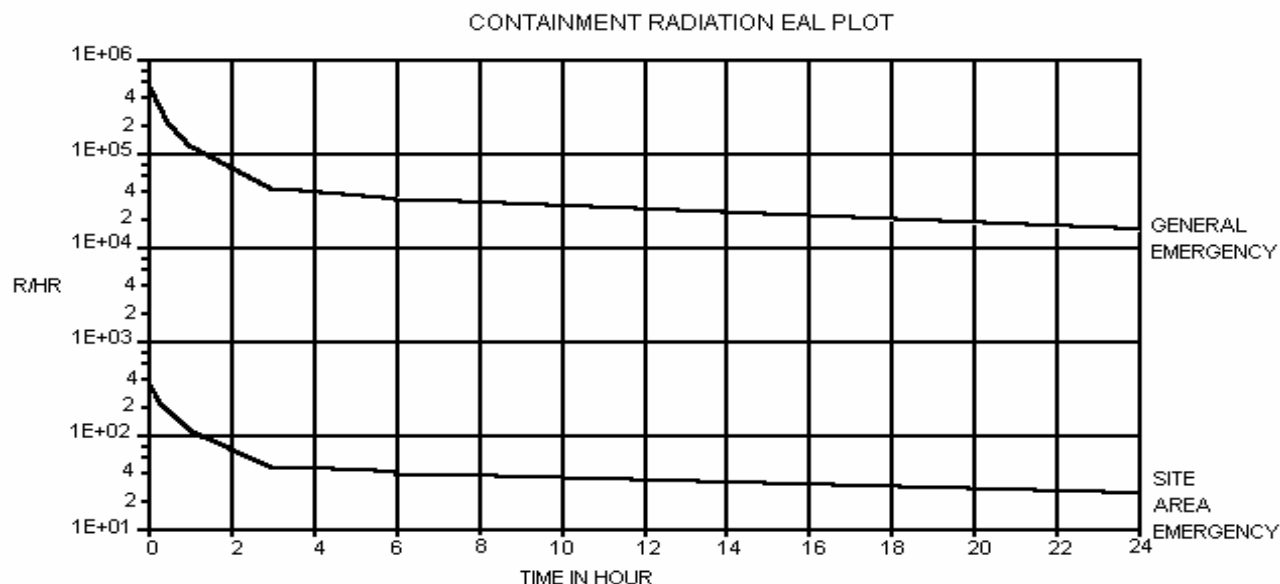
C. Find the intersection of the values from A and B on the graph.

D. Determine the emergency class.

1. SITE AREA EMERGENCY - intersection is between the two curves
2. GENERAL EMERGENCY - intersection is above the upper curve

PROC./WORK PLAN NO. 1903.010	PROCEDURE/WORK PLAN TITLE: EMERGENCY ACTION LEVEL CLASSIFICATION	PAGE:128 of 130 CHANGE: 037-04-0
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ATTACHMENT 6
UNIT 2



INSTRUCTIONS

CAUTION

- * In the absence of a significant containment temperature transient, monitor readings should be considered valid.
- * In the event of a significant containment temperature transient, monitor readings may be erratic for a short duration (Ref.IN-97-45, Supplement 1)

A. Determine the containment radiation level.

1. If the plant has been operating at 100% for the past 30 days, use the reading from 2RY-8925-1 or 2RY-8925-2.
2. If the plant has been operating at less than 100% power for the past 30 days, determine the radiation level as follows:

$$\text{Rad level} = \text{Reading from 2RY-8925-1 or 2RY-8925-2} \times \frac{100\%}{\text{estimated ave. power for the past 30 days}}$$

B. Determine the time after shutdown (in hours).

C. Find the intersection of the values from A and B on the graph.

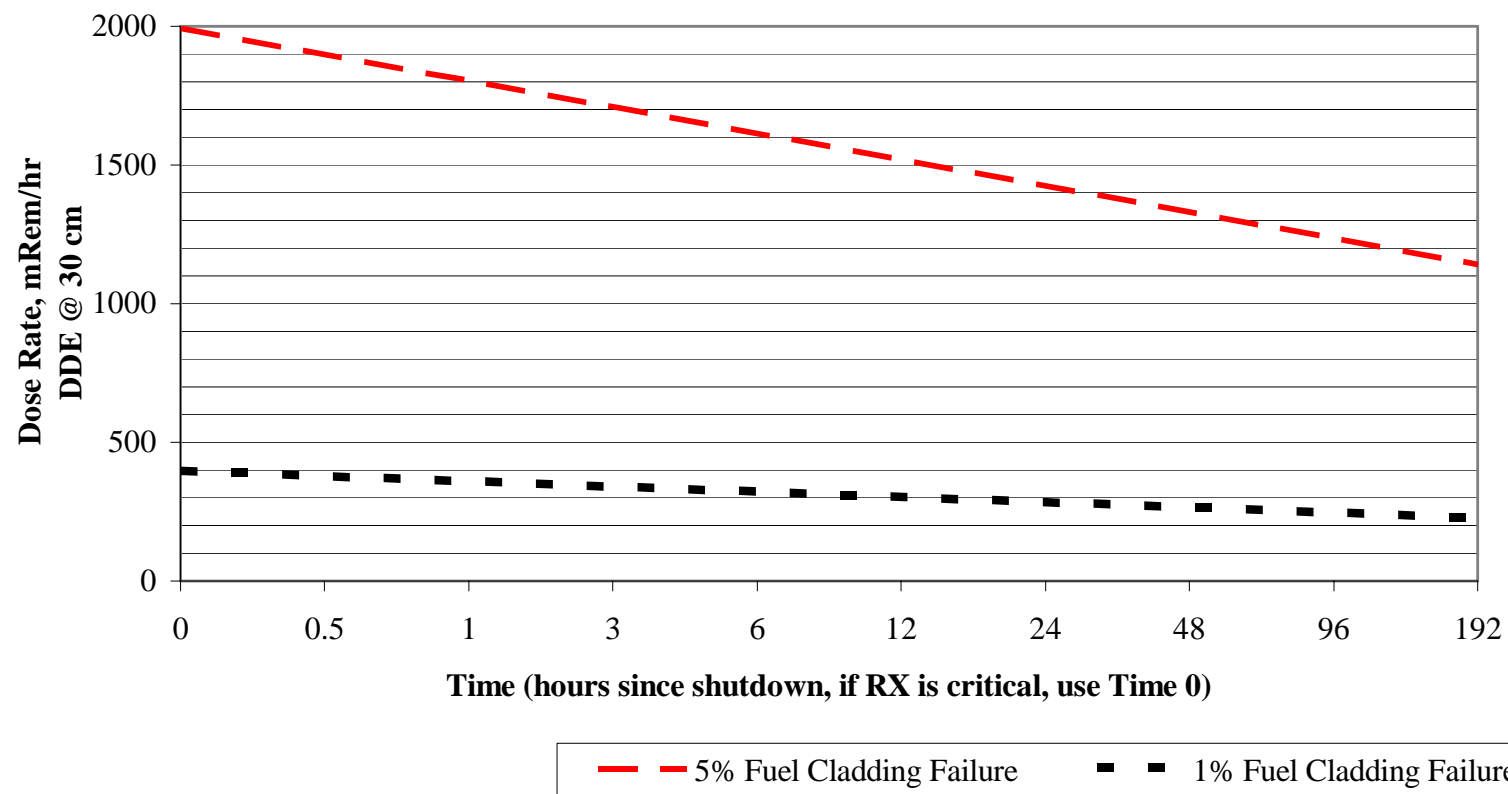
D. Determine the emergency class.

1. SITE AREA EMERGENCY - intersection is between the two curves
2. GENERAL EMERGENCY - intersection is above the upper curve

PROC./WORK PLAN NO. 1903.010	PROCEDURE/WORK PLAN TITLE: EMERGENCY ACTION LEVEL CLASSIFICATION	PAGE: 129 of 130 CHANGE: 037-04-0
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Attachment 7 (0CNA080005)
Unit 1 Fuel Cladding Failure Radiation Plot
 mRem/hr at SA-229

NOTE: If RX is critical, use Time 0



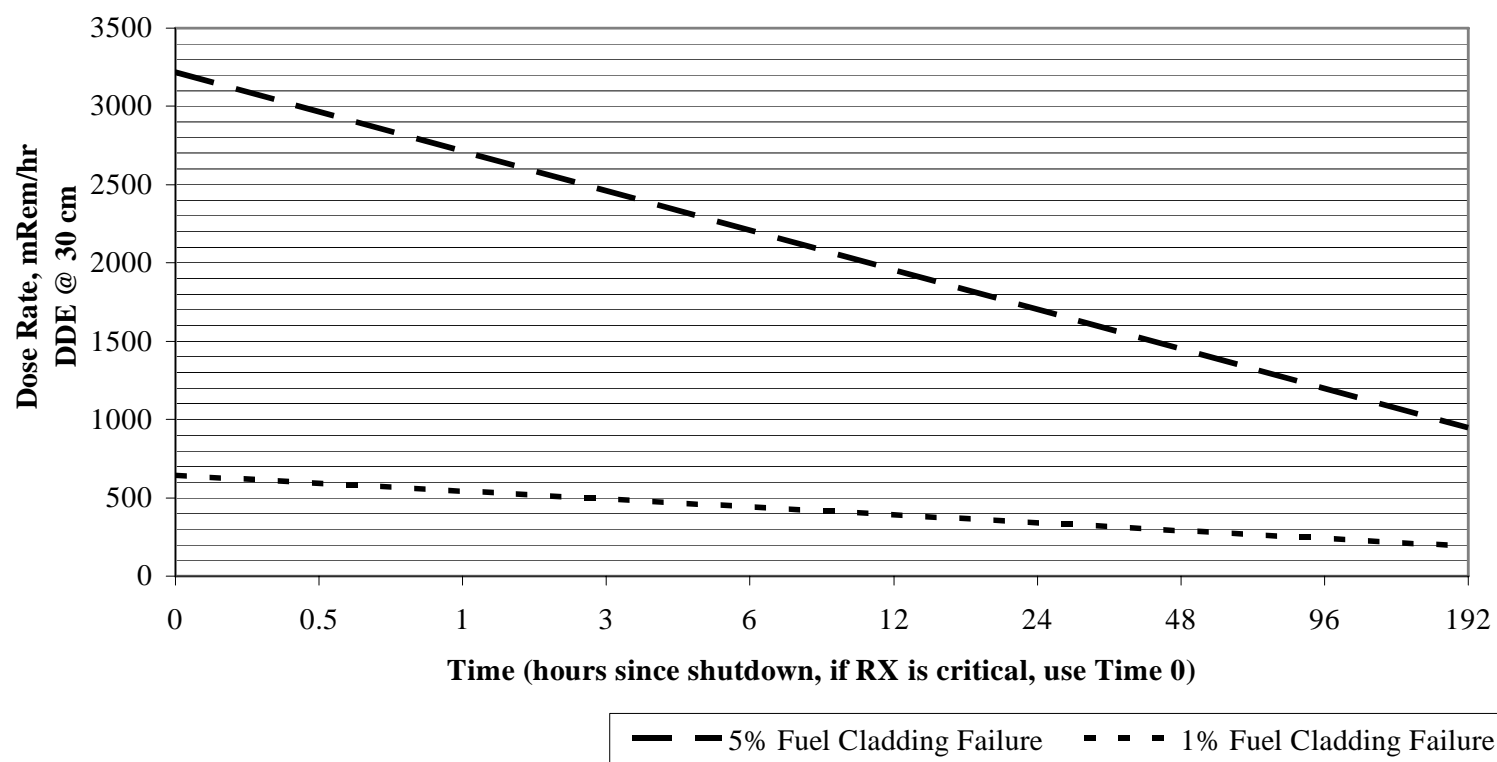
Instructions for obtaining the dose rates resides in the Chemistry sample procedure. This procedure partially fullfills T.S. 5.5.3

PROC./WORK PLAN NO. 1903.010	PROCEDURE/WORK PLAN TITLE: EMERGENCY ACTION LEVEL CLASSIFICATION	PAGE: 130 of 130 CHANGE: 037-04-0
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Attachment 8 (0CNA080005)
Unit 2 Fuel Cladding Failure Radiation Plot

mRem/hr at 2TCD-19

NOTE: If RX is critical, use Time 0



Instructions for obtaining the dose rate resides in the Chemistry sampling procedure

Facility: <u>ANO UNIT 2</u>	Date of Examination: <u>07/17/2006</u>
Exam Level (circle one): RO <input checked="" type="checkbox"/> SRO(I) <input type="checkbox"/> SRO(U) <input type="checkbox"/>	Operating Test No.: <u>1</u>

Control Room Systems [®] (8 for RO; 7 for SRO-I; 2 or 3 for SRO- U, including 1 ESF)		
System / JPM Title	Type Code*	Safety Function
a. ANO-2-JPM-NRC-ELEC EOP 2 062 A4.01 RO-3.3 SRO-3.1 Energize 2A2, non-vital 4160VAC bus following a Loss Of Offsite Power	A/L/N/S	6 Electrical
b. ANO-2-JPM-NRC-SIT006 006 A4.08 RO-4.2 SRO-4.3 Isolate Safety Injection Tank's with Safety Injection Actuation System actuated	A/L/D/S	2 Inventory
c. ANO-2-JPM-NRC-LTOP 010 K4.03 RO-3.8 SRO-4.1 Respond to Annunciator 2K10 C-4 and place low temperature overpressure relief valves inservice	L/N/S	3 Reactor Pressure Control
d. ANO-2-JPM-NRC-RCP03 008 A4.01 RO-3.3 SRO-3.1 Restore Component Cooling Water to Reactor Coolant Pumps	A/L/D/P/S	8 Plant Service Systems
e. ANO-2-JPM-NRC-CEA1 001 A4.03 RO-4.0 SRO-3.7 Exercise a Control Element Assembly	D/S	1 Reactivity
f. ANO-2-JPM-NRC-FWCS1 035 A4.01 RO-3.7 SRO- 3.6 Place Feed Water Control System in Automatic	D/S	4 Heat Removal
g. ANO-2-JPM-NRC-H2001 028 A4.01 RO-4.0 SRO-4.0 Manually start Hydrogen analyzer	C/D	5 Containment Integrity
h. ANO-2-JPM-NRC-ICI01 015 A2.02 RO-3.1 SRO-3.5 Remove Incore instrument from scan for Core Operating Limits Supervisory System	D/P/S	7 Instrumentation
In- Plant Systems [®] (3 for RO; 3 for SRO-I; 3 or 2 for SRO- U)		
i. ANO-2-JPM-NRC-AACGLS 064 A3.06 RO-3.3 SRO-3.4 Local start of Station Blackout Diesel	A/D	6 Electrical
j. ANO-2-JPM-NRC-P36ASD 004 A4.08 RO-3.8 SRO-3.4 Operate Charging Pump 2P36B Locally During Alternate Shutdown	D/E/R	2 Inventory
k. ANO-2-JPM-NRC-PRHTR 010 A2.01 RO-3.3 SRO-3.6 Locally control pressurizer proportional heaters	D/E	3 Reactor Pressure Control
@ All control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.		
Type Codes	Criteria for RO /SRO-I / SRO-U	
(A)lternate path (C)ontrol room (D)irect from bank (E)mergency or abnormal in-plant (L)ow-Power (N)ew or (M)odified from bank including 1(A) (P)revious 2 Exams (R)CA (S)imulator	4-6 / 4-6 / 2-3 ≤ 9 / ≤ 8 / ≤ 4 ≥ 1 / ≥ 1 / ≥ 1 ≥ 1 / ≥ 1 / ≥ 1 ≥ 2 / ≥ 2 / ≥ 1 ≤ 3 / ≤ 3 / ≤ 2 (randomly selected) ≥ 1 / ≥ 1 / ≥ 1	

Facility: <u>ANO UNIT 2</u>	Date of Examination: <u>07/17/2006</u>
Exam Level (circle one): RO <input type="checkbox"/> / SRO(I) <input checked="" type="checkbox"/> / SRO(U) <input type="checkbox"/>	Operating Test No.: <u>1</u>

Control Room Systems® (8 for RO; 7 for SRO-I; 2 or 3 for SRO- U, including 1 ESF)		
System / JPM Title	Type Code*	Safety Function
a. ANO-2-JPM-NRC-ELEC EOP 2 062 A4.01 RO-3.3 SRO-3.1 Energize 2A2, non-vital 4160VAC bus following a Loss Of Offsite Power	A/L/N/S	6 Electrical
b. ANO-2-JPM-NRC-SIT006 006 A4.08 RO-4.2 SRO-4.3 Isolate Safety Injection Tank's with Safety Injection Actuation System actuated	A/L/D/S	2 Inventory
c. ANO-2-JPM-NRC-LTOP 010 K4.03 RO-3.8 SRO-4.1 Respond to Annunciator 2K10 C-4 and place low temperature overpressure relief valves inservice	L/N/S	3 Reactor Pressure Control
d. ANO-2-JPM-NRC-RCP03 008 A4.01 RO-3.3 SRO-3.1 Restore Component Cooling Water to Reactor Coolant Pumps	A/L/D/P/S	8 Plant Service Systems
e. ANO-2-JPM-NRC-CEA1 001 A4.03 RO-4.0 SRO-3.7 Exercise a Control Element Assembly	D/S	1 Reactivity
f. ANO-2-JPM-NRC-FWCS1 035 A4.01 RO-3.7 SRO- 3.6 Place Feed Water Control System in Automatic	D/S	4 Heat Removal
g. ANO-2-JPM-NRC-H2001 028 A4.01 RO-4.0 SRO-4.0 Manually start Hydrogen analyzer	C/D	5 Containment Integrity
h.		

In- Plant Systems® (3 for RO; 3 for SRO-I; 3 or 2 for SRO- U)		
i. ANO-2-JPM-NRC-AACGLS 064 A3.06 RO-3.3 SRO-3.4 Local start of Station Blackout Diesel	A/D	6 Electrical
j. ANO-2-JPM-NRC-P36ASD 004 A4.08 RO-3.8 SRO-3.4 Operate Charging Pump 2P36B Locally During Alternate Shutdown	D/E/R	2 Inventory
k. ANO-2-JPM-NRC-PRHTR 010 A2.01 RO-3.3 SRO-3.6 Locally control pressurizer proportional heaters	D/E	3 Reactor Pressure Control

@ All control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.

Type Codes	Criteria for RO /SRO-I / SRO-U
(A)lternate path	4-6 / 4-6 / 2-3
(C)ontrol room	
(D)irect from bank	≤ 9 / ≤ 8 / ≤ 4
(E)mergency or abnormal in-plant	≥ 1 / ≥ 1 / ≥ 1
(L)ow-Power	≥ 1 / ≥ 1 / ≥ 1
(N)ew or (M)odified from bank including 1(A)	≥ 2 / ≥ 2 / ≥ 1
(P)revious 2 Exams	≤ 3 / ≤ 3 / ≤ 2 (randomly selected)
(R)CA	≥ 1 / ≥ 1 / ≥ 1
(S)imulator	

Facility: <u>ANO UNIT 2</u>	Date of Examination: <u>7/17/2006</u>
Exam Level : RO <input type="checkbox"/> / SRO(I) <input type="checkbox"/> / SRO(U) <input checked="" type="checkbox"/>	Operating Test No.: <u>1</u>

Control Room Systems® (8 for RO; 7 for SRO-I; 2 or 3 for SRO- U, including 1 ESF)		
System / JPM Title	Type Code*	Safety Function
a.		
b.		
c. ANO-2-JPM-NRC-LTOP 010 K4.03 RO-3.8 SRO-4.1 Respond to Annunciator 2K10 C-4 and place low temperature overpressure relief valves in service	L/N/S	3 Reactor Pressure Control
d. ANO-2-JPM-NRC-RCP03 008 A4.01 RO-3.3 SRO-3.1 Restore Component Cooling Water to Reactor Coolant Pumps	A/L/D/P/S	8 Plant Service Systems
e. ANO-2-JPM-NRC-CEA1 001 A4.03 RO-4.0 SRO-3.7 Exercise a Control Element Assembly	D/S	1 Reactivity
f.		
g.		
h.		

In- Plant Systems® (3 for RO; 3 for SRO-I; 3 or 2 for SRO- U)		
i. ANO-2-JPM-NRC-AACGLS 064 A3.06 RO-3.3 SRO-3.4 Local start of Station Blackout Diesel	A/D	6 Electrical
j. ANO-2-JPM-NRC-P36ASD 004 A4.08 RO-3.8 SRO-3.4 Operate Charging Pump 2P36B Locally During Alternate Shutdown	D/E/R	2 Inventory
k.		

@ All control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.

Type Codes	Criteria for RO /SRO-I / SRO-U
(A)lternate path	4-6 / 4-6 / 2-3
(C)ontrol room	
(D)irect from bank	≤ 9 / ≤ 8 / ≤ 4
(E)mergency or abnormal in-plant	≥ 1 / ≥ 1 / ≥ 1
(L)ow-Power	≥ 1 / ≥ 1 / ≥ 1
(N)ew or (M)odified from bank including 1(A)	≥ 2 / ≥ 2 / ≥ 1
(P)revious 2 Exams	≤ 3 / ≤ 3 / ≤ 2 (randomly selected)
(R)CA	≥ 1 / ≥ 1 / ≥ 1
(S)imulator	

ENTERGY OPERATIONS INCORPORATED ARKANSAS NUCLEAR ONE

TITLE: STANDARD ATTACHMENTS SET #	DOCUMENT NO. <div style="text-align: center;">2202.010</div>	CHANGE NO. <div style="text-align: center;">007-03-0</div>
	WORK PLAN EXP. DATE <div style="text-align: center;">N/A</div>	TC EXP. DATE <div style="text-align: center;">N/A</div>
	SAFETY-RELATED <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	IPTE <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
	TEMP ALT <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	
	PROGRAMMATIC EXCLUSION PER ENS-LI-101 <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	

When you see these **TRAPS**

Time Pressure

Distraction/Interruption

Multiple Tasks

Over Confidence

Vague or Interpretive Guidance

First Shift/Last Shift

Peer Pressure

Change/Off Normal

Physical Environment

Mental Stress (Home or Work)

Get these **TOOLS**

Effective Communication

Questioning Attitude

Placekeeping

Self Check

Peer Check

Knowledge

Procedures

Job Briefing

Coaching

Turnover

VERIFIED BY	DATE	TIME
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

FORM TITLE: <div style="text-align: center;">VERIFICATION COVER SHEET</div>	FORM NO. <div style="text-align: center;">1000.006A</div>	CHANGE NO. <div style="text-align: center;">051-00-0</div>
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ENTERGY OPERATIONS INCORPORATED ARKANSAS NUCLEAR ONE

Page 1

TITLE: STANDARD ATTACHMENTS

DOCUMENT NO.
2202.010

CHANGE NO.
007-03-0

AFFECTED UNIT:

☐ UNIT 1 ☒ UNIT 2

☒ PROCEDURE

☐ ELECTRONIC DOCUMENT

☐ WORK PLAN, EXP. DATE _____

SAFETY-RELATED

☒ YES ☐ NO

TYPE OF CHANGE:

☐ NEW

☒ PC

☐ TC

☐ DELETION

☐ REVISION

☐ EZ

EXP. DATE: N/A

DOES THIS DOCUMENT:

1. Supersede or replace another procedure?
(If YES, complete 1000.006B for deleted procedure.)

☐ YES ☒ NO

2. Alter or delete an existing regulatory commitment?
(If YES, coordinate with Licensing before implementing.)

☐ YES ☒ NO

3. Require a 50.59 Review per Form 1000.006S?
(If No, attach completed Form 1000.006S) (If 50.59 Evaluation, OSRC review required.)

☒ YES ☐ NO

4. Changes Surveillance Test Program (i.e. Technical Specifications, NRC Commitment, surveillance activity, see Step 7.5)? (If YES, complete 1000.009A)

☐ YES ☒ NO

5. Create an Intent Change?
(If YES, Standard Approval Process required.)

☐ YES ☒ NO

6. Implement or change IPTE requirements?
(If YES, complete 1000.143A. OSRC review required.)

☐ YES ☒ NO

7. Implement or change a Temporary Alteration?
(If YES, then OSRC review required.)

☐ YES ☒ NO

Was the Master Electronic File used as the source document?

☒ YES ☐ NO

INTERIM APPROVAL PROCESS

STANDARD APPROVAL PROCESS

ORIGINATOR SIGNATURE: (Includes review of Att. 13) DATE:

ORIGINATOR SIGNATURE: (Includes review of Att. 13) DATE: 2/23/2006

Print and Sign name: **NA** PHONE #:

Print and Sign name: **Roger Pierce** PHONE #: 3059

SUPERVISOR APPROVAL: * **N/A** DATE:

INDEPENDENT REVIEWER: **CHL** DATE: 3/1/06

SRO UNIT ONE ** **N/A** DATE:

ENGINEERING: **N/A** DATE:

SRO UNIT TWO: ** **N/A** DATE:

Code Programs - NDE: **N/A** DATE:

Interim approval allowed for non-intent changes requiring no 50.59 evaluation that are stopping work in progress.

UNIT SURVEILLANCE COORDINATOR: **N/A** DATE:

Standard Approval required for intent changes or changes requiring a 50.59 evaluation.

SECTION LEADER: **3/10/06** DATE:

*If change not required to support work in progress, Department Head must sign.

QUALITY ASSURANCE: **N/A** DATE:

**If both units are affected by change, both SRO signatures are required. (SRO signature required for safety related procedures only.)

OTHER SECTION LEADERS: **N/A** DATE: 3/9/06

OTHER SECTION LEADERS: **N/A** DATE:

OTHER SECTION LEADERS: **N/A** DATE:

OTHER SECTION LEADERS: **N/A** DATE:

OTHER SECTION LEADERS: **N/A** DATE:

OTHER SECTION LEADERS: **N/A** DATE:

OTHER SECTION LEADERS: **N/A** DATE:

OSRC CHAIRMAN/TECHNICAL REVIEWER: **3/16/06** DATE:

FINAL APPROVAL: **3/30/06** DATE:

REQUIRED EFFECTIVE DATE: **4/3/06**

FORM TITLE:

PROCEDURE/WORK PLAN APPROVAL REQUEST

FORM NO.
1000.006B

CHANGE NO.
054-00-0

ENTERGY OPERATIONS INCORPORATED ARKANSAS NUCLEAR ONE

TITLE: STANDARD ATTACHMENTS		DOCUMENT NO. 2202.010	CHANGE NO. 007-03-0
<input checked="" type="checkbox"/> PROCEDURE <input type="checkbox"/> WORK PLAN, EXP. DATE <u>N/A</u>		PAGE <u>1</u> OF <u>1</u>	
<input type="checkbox"/> ELECTRONIC DOCUMENT			
TYPE OF CHANGE: <input type="checkbox"/> NEW <input checked="" type="checkbox"/> PC <input type="checkbox"/> TC <input type="checkbox"/> DELETION <input type="checkbox"/> REVISION <input type="checkbox"/> EZ EXP. DATE: <u>N/A</u>			
AFFECTED SECTION: (Include step # if applicable)	DESCRIPTION OF CHANGE: (For each change made, include sufficient detail to describe reason for the change.) <p>This is a non-technical change (only operational issues addressed), therefore Nuclear Safety Analysis Engineer review NOT required.</p>		
Table Of Contents	Updated due to change in number of pages in Attachments 15 and 18 (1000.006S # 2).		
Attachment 13	Step 4.A.2.m, changed from "Meter Input Select" switch to "Bistable Input Select" switch to close configuration control loop (1000.006S # 6).		
Attachment 14	Steps 3.A.2.m & 3.B.2.m, changed from "Meter Input Select" switch to "Bistable Input Select" switch to close configuration control loop (1000.006S # 6).		
Attachment 15	Deleted second graph of this attachment. This graph showed volume versus percent indicated level for the 2T-41A/B CSTs. It was a straight line graph which indicated approximately 2000 gallons per percent. This was put in the form of a note on the first graph. An additional note was added concerning approximate gallons per foot for the "Q" CST (1000.006S # 3).		
Attachment 18	This attachment had a step (old Step 6) to shift the Regen Waste drains from the 2T92 sump to the LRW System on the premise that the CCW pump and HX skid drains are tied to this system. Testing (WO 53922) directed by CR-ANO-C-2005-0800 CA 82 verified that the CCW Room drains go to Turbine Building Sump Station #1. Swapping the position of 2ABS-28 and 2ABS-29 has no effect on the CCW pump room drains. Deleted this step, renumbered subsequent steps (1000.006S # 2 & 6).		
Attachment 19	Due to the last small "A" S/G tube leak, this attachment has been rewritten to provide trigger points, Chemistry Department judgment and Shift Manager judgment in the performance of these steps. This will help to minimize the possibility of overflowing Turbine Building sumps and unnecessary actions being taken.		
Attachment 29	As denoted below		
Substeps 1B and 2A	Deleted. This attachment is not used unless SU#2 is greater than 154 KV. Renumbered subsequent substeps (1000.006S # 3).		
Old Substep 1H	Split into two substeps (G and H) for proper procedure flow to allow both or either 4160V AC bus to be energized (1000.006S # 3).		
Old Substep 2E	Split into two substeps (D and E) for proper procedure flow to allow both or either 4160V AC bus to be energized (1000.006S # 3).		
Attachment 44	This data sheet is in various AOPs/EOPs. Will be deleted from those procedures as time allows (no 50 59 per 1000.006S # 3).		
Exhibit 1	Rewrote Step 6 to provide proper configuration control for VCT Outlet valve and RWT to Charging Pump Suction valve (1000.006S # 3).		
FORM TITLE:		FORM NO. 1000.006C	CHANGE NO. 050-00-0
DESCRIPTION OF CHANGE			

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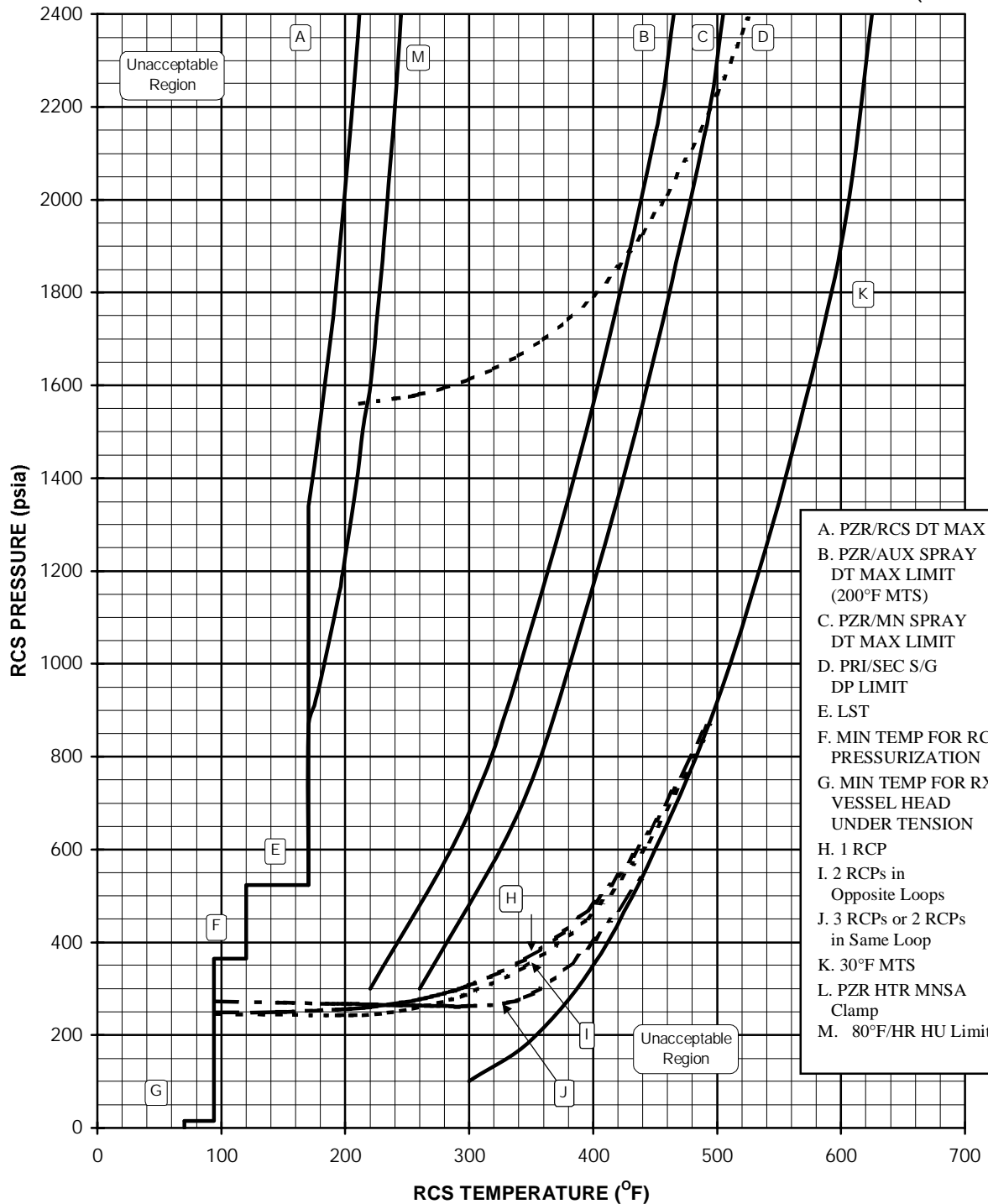
ATTACHMENT 1

P-T LIMITS

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- Use Control Board indication for RCP Operating Curves - Includes 12°F and 19 psi instrument errors.

(ER010861E201)

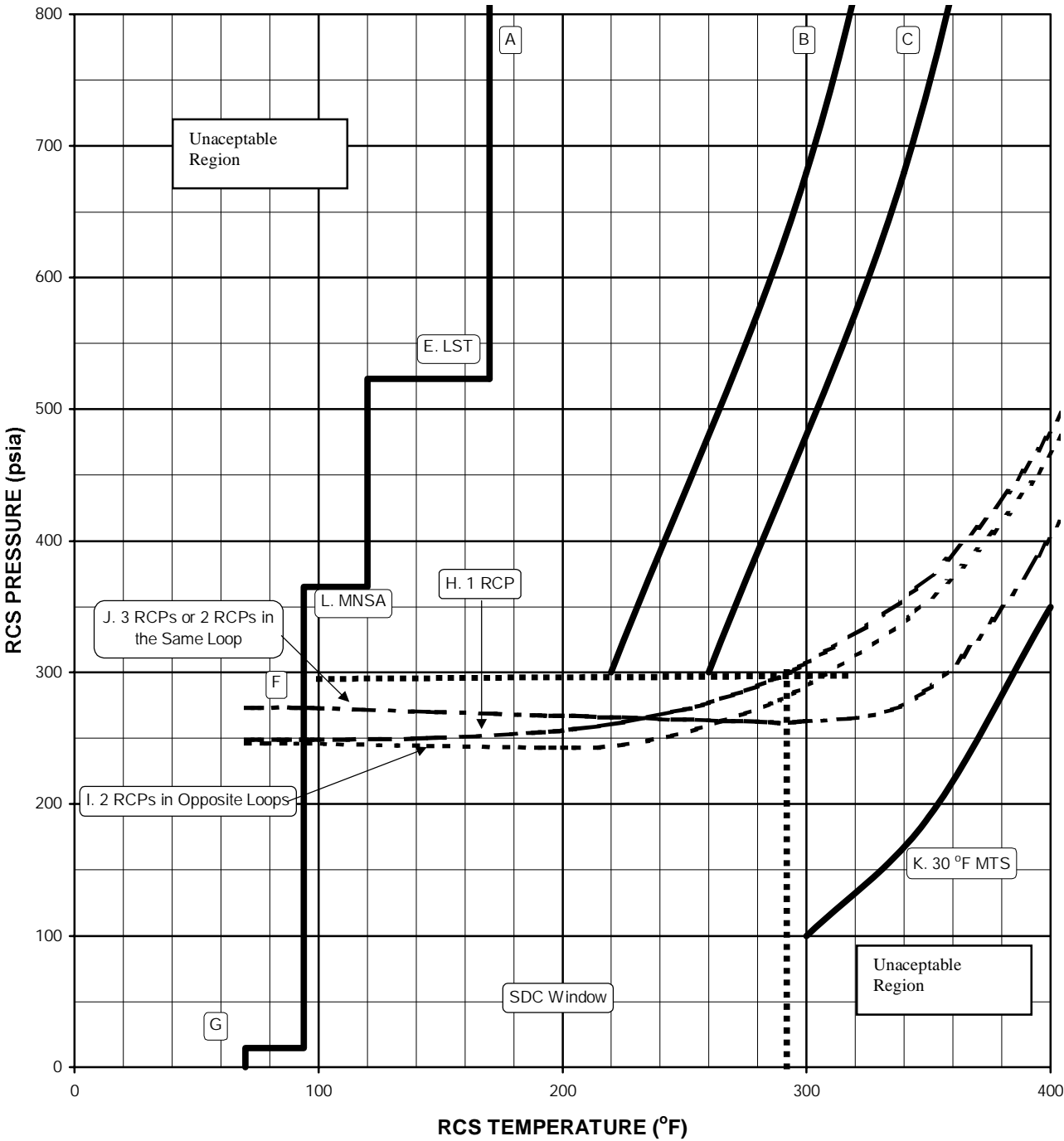


- Use 200°F MTS line for PTS limit for uncontrolled RCS cooldown below 500°F T_C.
- Use RCS TH in forced circulation to determine RCS MTS.
- Use average CETs in natural circulation to determine RCS MTS
- Stay to right of primary to secondary Δ P curve during controlled cooldown.

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ATTACHMENT 1

P-T LIMITS



- Use Control Board indication for RCP Operating Curves - Includes temperature error of 12°F and pressure error of 19 psi (ER010861E201).
- Use 200°F MTS line for PTS limit for uncontrolled RCS cooldown below 500°F T_C .
- Use RCS T_H in forced circulation to determine RCS MTS.
- Use average CETs in natural circulation to determine RCS MTS.

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ATTACHMENT 2

SIAS VERIFICATION

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Components found in a position other than specified are to be reported to the CRS.

COMPONENT DESCRIPTION	NUMBER	LOCATION	POSITION	√
TURNING GEAR OIL PUMP	2P76	2C01	OFF	
TURNING GEAR MOTOR	2M187	2C01	OFF	
HEATER DRAIN PUMP	2P8A	2C02	OFF	
MFWPT 2K2A TURNING GEAR	2K7A	2C02	OFF	
MFWPT MAIN OIL PUMP A	2P26	2C02	OFF	
MFWPT 2K2B TURNING GEAR	2K7B	2C02	OFF	
MFWPT MAIN OIL PUMP B	2P27	2C02	OFF	
HEATER DRAIN PUMP	2P8B	2C02	OFF	
BAM TANK GRAVITY FEED 2T6B	2CV-4921-1	2C09	OPEN	
BAM TANK GRAVITY FEED 2T6A	2CV-4920-1	2C09	OPEN	
BAM TANK HEATERS 2T6A HTR A	2M43A	2C09	OFF	
BAM TANK HEATERS 2T6A HTR C	2M43C	2C09	OFF	
VCT OUTLET	2CV-4873-1	2C09	CLOSED	
REGEN HX INLET	2CV-4821-1	2C09	CLOSED	
CHARGING PUMP	2P36A	2C09	ON	
CHARGING PUMP	2P36C	2C09	ON	
CHARGING PUMPS SUCTION SOURCE FROM BAM PUMPS	2CV-4916-2	2C09	OPEN	
BAM TANK HEATERS 2T6B HTR D	2M43D	2C09	OFF	
BAM TANK HEATERS 2T6B HTR B	2M43B	2C09	OFF	
LETDOWN ISOLATION	2CV-4820-2	2C09	CLOSED	
CHARGING PUMP	2P36B	2C09	ON	
BAM TANK RECIRC 2T6A	2CV-4903-2	2C09	CLOSED	
BAM TANK RECIRC 2T6B	2CV-4915-2	2C09	CLOSED	
VCT MAKEUP ISOL	2CV-4941-2	2C09	CLOSED	
BAM PUMP	2P39A	2C09	ON	
BAM PUMP	2P39B	2C09	ON	

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SIAS VERIFICATION

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COMPONENT DESCRIPTION	NUMBER	LOCATION	POSITION	√
EMERGENCY DIESEL GENERATOR 2	2DG2	2C33	ON	
2A4-2B6 FEEDER BKR	2A401	2C33	CLOSED	
LC 2B6 SUPPLY	2B612	2C33	CLOSED	
EMERGENCY DIESEL GENERATOR 1	2DG1	2C33	ON	
2A3-2B5 FEEDER BKR	2A301	2C33	CLOSED	
LC 2B5 SUPPLY	2B512	2C33	CLOSED	
CNTMT PURGE SUPPLY V1 INSIDE	2CV-8289-1	2C17	CLOSED	
CNTMT PURGE SUPPLY V1 OUTSIDE OUTSIDE	2CV-8283-1	2C17	CLOSED	
CNTMT PURGE EXHAUST V2 INSIDE	2CV-8291-1	2C17	CLOSED	
CNTMT PURGE EXHAUST V2 OUTSIDE OUTSIDE	2CV-8285-1	2C17	CLOSED	
SAMPLE ISOLATION VALVES QUENCH TANK LIQ	2SV-5878-1	2C17	CLOSED	
SAMPLE ISOLATION VALVES RCS	2SV-5833-1*	2C17	CLOSED	
RX DRAIN TANK DISCH ISOL	2CV-2202-1	2C17	CLOSED	
CNTMT VENT HEADER ISOL	2CV-2401-1	2C17	CLOSED(1)	
CNTMT SUMP DRAIN	2CV-2060-1	2C17	CLOSED	
RCP BLEEDOFF TO VCT	2CV-4846-1	2C17	CLOSED	
CNTMT AIR SAMPLE NORTH INSIDE SUPPLY	2SV-8265-1*	2C17	CLOSED	
CNTMT AIR SAMPLE NORTH INSIDE RETURN	2SV-8259-1*	2C17	CLOSED	
CNTMT AIR SAMPLE SOUTH INSIDE SUPPLY	2SV-8273-1*	2C17	CLOSED	
CNTMT AIR SAMPLE SOUTH INSIDE RETURN	2CV-8233-1*	2C17	CLOSED	
PASS SUMP SAMPLE SUPPLY ISOL	2SV-5634-1*	2C17	CLOSED	
PASS SUMP SAMPLE RETURN ISOL	2SV-5633-1*	2C17	CLOSED	
SI TANK 2T2B DRAIN	2SV-5021-1	2C17	CLOSED	
SI TANK 2T2B OUTLET	2CV-5023-1	2C17	OPEN	

NOTE #1: Heaters removed from breaker 2B51-L1. Penetration capped outside CNTMT.

* Denotes override capability.

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COMPONENT DESCRIPTION	NUMBER	LOCATION	POSITION	√
SI TANK 2T2A DRAIN	2SV-5001-1	2C17	CLOSED	
SI TANK 2T2A OUTLET	2CV-5003-1	2C17	OPEN	
LPSI TO 2P32A LOOP	2CV-5017-1*	2C17	OPEN	
LPSI PUMP	2P60A	2C17	ON	
LPSI TO 2P32B LOOP	2CV-5037-1*	2C17	OPEN	
HPSI TO 2P32A LOOP	2CV-5015-1*	2C17	OPEN	
HPSI TO 2P32B LOOP	2CV-5035-1*	2C17	OPEN	
HPSI TO 2P32C LOOP	2CV-5055-1*	2C17	OPEN	
HPSI TO 2P32D LOOP	2CV-5075-1*	2C17	OPEN	
HPSI PUMP	2P89C	2C17	ON (2)	
HPSI PUMP	2P89A	2C17	ON	
SDN HX ROOM AIR PURGE EXHAUST	2CV-8472-1	2C17	CLOSED	
SDN HX ROOM AIR PURGE SUPPLY	2CV-8471-1	2C17	CLOSED	
FUEL POOL HX SW INLET	2CV-1525-1	2C17	CLOSED	
ESF HEADER ISOL	2CV-1400-1	2C17	OPEN	
EMERG POND RTN	2CV-1541-1*	2C17	OPEN	
CCW /MAIN CHILLERS SUPPLY INLET	2CV-1530-1*	2C17	CLOSED	
ACW SUPPLY ISOL	2CV-1425-1*	2C17	CLOSED	
CCW/ACW RETURN ISOL	2CV-1543-1*	2C17	CLOSED	
SERVICE WATER INTAKE STRUC EXHAUST FAN	2VEF-25A	2C17	ON	
SERVICE WATER 2A3 SWGR ROOM	2VUC-2D	2C17	ON	
SERVICE WATER 2A3 SWGR ROOM	2VUC-2C	2C17	ON	
SERVICE WATER MCC 53 ROOM	2VUC-19B	2C17	ON	
SERVICE WATER MCC 53 ROOM	2VUC-19A	2C17	ON	

NOTE #2: IF powered from 2A3 AND 2P89A does NOT start, THEN start 2P89C.

* Denotes override capability.

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COMPONENT DESCRIPTION	NUMBER	LOCATION	POSITION	√
SERVICE WATER PUMP	2P4B	2C17	ON (3)	
SERVICE WATER PUMP	2P4A	2C17	ON	
RWT 2T3 OUTLET	2CV-5630-1	2C17	OPEN	
RWT RECIRCULATION ISOLATION	2CV-5637-1	2C17	CLOSED	
RWT RECIRCULATION ISOLATION	2CV-5638-2	2C16	CLOSED	
SI TANKS SAMPLE	2SV-5876-2	2C16	CLOSED	
CNTMT FIRE WTR ISOLATION	2CV-3200-2	2C16	CLOSED	
QUENCH TANK RMW SUPPLY	2CV-4690-2	2C16	CLOSED	
CNTMT PURGE SUPPLY V1 OUTSIDE INSIDE	2CV-8284-2	2C16	CLOSED	
CNTMT PURGE EXHAUST V2 OUTSIDE INSIDE	2CV-8286-2	2C16	CLOSED	
SAMPLE ISOLATION VALVE QUENCH TK LIQ	2SV-5871-2	2C16	CLOSED	
SAMPLE ISOLATION VALVE RCS	2SV-5843-2*	2C16	CLOSED	
RX DRAIN TANK DISCH ISOL	2CV-2201-2	2C16	CLOSED	
CNTMT SUMP DRAIN	2CV-2061-2	2C16	CLOSED	
RCP BLEEDOFF TO VCT	2CV-4847-2	2C16	CLOSED	
N2 SUPPLY SIT HI PRESS	2CV-6207-2	2C16	CLOSED	
N2 SUPPLY CNTMT LO PRESS	2CV-6213-2	2C16	CLOSED	
CNTMT AIR SAMPLE NORTH OUTSIDE SUPPLY	2SV-8263-2*	2C16	CLOSED	
CNTMT AIR SAMPLE NORTH OUTSIDE RETURN	2SV-8261-2*	2C16	CLOSED	
CNTMT AIR SAMPLE SOUTH OUTSIDE SUPPLY	2SV-8271-2*	2C16	CLOSED	
CNTMT AIR SAMPLE SOUTH OUTSIDE RETURN	2SV-8231-2*	2C16	CLOSED	
PASS SUMP SAMPLE SUPPLY ISOL	2SV-5634-2*	2C16	CLOSED	
PASS SUMP SAMPLE RETURN ISOL	2SV-5633-2*	2C16	CLOSED	

NOTE #3: IF powered from 2A3 AND 2P4A does NOT start, THEN 2P4B starts.

* Denotes override capability.

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COMPONENT DESCRIPTION	NUMBER	LOCATION	POSITION	√
SI TANKS 2T2D DRAIN	2SV-5061-2	2C16	CLOSED	
SI TANKS 2T2D OUTLET	2CV-5063-2	2C16	OPEN	
SI TANKS 2T2C DRAIN	2SV-5041-2	2C16	CLOSED	
SI TANKS 2T2C OUTLET	2CV-5043-2	2C16	OPEN	
LPSI TO 2P32C LOOP	2CV-5057-2*	2C16	OPEN	
LPSI PUMP	2P60B	2C16	ON	
LPSI TO 2P32D LOOP	2CV-5077-2*	2C16	OPEN	
HPSI TO 2P32A LOOP	2CV-5016-2*	2C16	OPEN	
HPSI TO 2P32B LOOP	2CV-5036-2*	2C16	OPEN	
HPSI TO 2P32C LOOP	2CV-5056-2*	2C16	OPEN	
HPSI TO 2P32D LOOP	2CV-5076-2*	2C16	OPEN	
HPSI PUMP	2P89C	2C16	ON (4)	
HPSI PUMP	2P89B	2C16	ON	
SDN HX ROOM AIR PURGE EXHAUST	2CV-8475-2	2C16	CLOSED	
SDN HX ROOM AIR PURGE SUPPLY	2CV-8474-2	2C16	CLOSED	
HPSI PUMP ROOM AIR PURGE SUPPLY	2CV-8498-2	2C16	CLOSED	
HPSI PUMP ROOM AIR PURGE EXHAUST	2CV-8497-2	2C16	CLOSED	
FUEL POOL HX SW INLET	2CV-1526-2	2C16	CLOSED	
ESF HEADER ISOL	2CV-1406-2	2C16	OPEN	
EMERG POND RTN	2CV-1560-2*	2C16	OPEN	
CCW /MAIN CHILLERS SUPPLY INLET	2CV-1531-2*	2C16	CLOSED	
ACW SUPPLY ISOL	2CV-1427-2*	2C16	CLOSED	
CCW/ACW RETURN ISOL	2CV-1542-2*	2C16	CLOSED	
SERVICE WATER INTAKE STRUC EXHAUST FAN	2VEF-25B	2C16	ON	

NOTE #4: IF powered from 2A4 AND 2P89B does NOT start, THEN start 2P89C.

* Denotes override capability.

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ATTACHMENT 2

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COMPONENT DESCRIPTION	NUMBER	LOCATION	POSITION	√
SERVICE WATER 2A4 SWGR ROOM	2VUC-2B	2C16	ON	
SERVICE WATER 2A4 SWGR ROOM	2VUC-2A	2C16	ON	
SERVICE WATER MCC 63 ROOM	2VUC-20B	2C16	ON	
SERVICE WATER MCC 63 ROOM	2VUC-20A	2C16	ON	
SERVICE WATER PUMP	2P4B	2C16	ON (5)	
SERVICE WATER PUMP	2P4C	2C16	ON	
RWT 2T3 OUTLET	2CV-5631-2	2C16	OPEN	
BEARING LIFT PUMP	2P90C	2C11	OFF	
BEARING LIFT PUMP	2P90F	2C11	OFF	
BEARING LIFT PUMP	2P90B	2C11	OFF	
BEARING LIFT PUMP	2P90D/E	2C11	OFF	
BEARING LIFT PUMP	2P90A	2C11	OFF	
MAIN CHILLER 2VCH-1A BKR INDICATION	2VCH-1A	2C22	OFF	
MAIN CHILLER 2VCH-1B BKR INDICATION	2VCH-1B	2C22	OFF	

NOTE #5: IF powered from 2A4 AND 2P4C does NOT start, THEN 2P4B starts.

* Denotes override capability

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ATTACHMENT 4

MSIS VERIFICATION

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Components found in a position other than specified are to be reported to the CRS.

COMPONENT DESCRIPTION	NUMBER	LOCATION	POSITION	✓
ADV UPSTRM ISOL	2CV-1002*	2C02	CLOSED	
CONDENSATE PUMP	2P2A**	2C02	OFF	
CONDENSATE PUMP	2P2C	2C02	OFF	
HEATER DRAIN PUMP	2P8A	2C02	OFF	
MFWPT 2K2A SPEED CONTROL	2SC-0321	2C02	TRIPPED	
MFWPT 2K2B SPEED CONTROL	2SC-0310	2C02	TRIPPED	
ADV UPSTRM ISOL	2CV-1052*	2C02	CLOSED	
HEATER DRAIN PUMP	2P8B	2C02	OFF	
CONDENSATE PUMP	2P2B	2C02	OFF	
CONDENSATE PUMP	2P2D**	2C02	OFF	
AUXILIARY FEEDWATER PUMP	2P75**	2C02	OFF	
2P7B DISCHARGE TO SG-A	2CV-1038-2*	2C17	CLOSED	
2P7B DISCHARGE TO SG-B	2CV-1036-2*	2C17	CLOSED	
2P7B DISCHARGE TO SG-A	2CV-1025-1*	2C17	CLOSED	
2P7B DISCHARGE TO SG-B	2CV-1075-1*	2C17	CLOSED	
FEEDWATER BLOCK VALVES TO SG-A	2CV-1024-1*	2C17	CLOSED	
FEEDWATER BLOCK VALVES TO SG-B	2CV-1074-1*	2C17	CLOSED	
MSIV HEADER #1	2SV-1010-1A	2C17	CLOSED	
STEAM GEN BLOWDOWN ISOLATION VALVE STEAM GEN A	2CV-1016-1	2C17	CLOSED	
STEAM GEN BLOWDOWN ISOLATION VALVE STEAM GEN B	2CV-1066-1	2C17	CLOSED	
2VSF-1A/B SW CLG OUTLET	2CV-1519-1*	2C17	OPEN	
2VSF-1A/B SW CLG INLET	2CV-1511-1*	2C17	OPEN	
FUEL POOL HX SW INLET	2CV-1525-1	2C17	CLOSED	
EMERG POND RTN	2CV-1541-1*	2C17	OPEN	

* Denotes override capability.

** Denotes override capability by opening DC control power breaker in breaker cubicles 2A106 (2P2C) and 2A205 (2P2B).

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ATTACHMENT 4

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COMPONENT DESCRIPTION	NUMBER	LOCATION	POSITION	√
CCW /MAIN CHILLERS SUPPLY INLET	2CV-1530-1*	2C17	CLOSED	
ACW SUPPLY ISOL	2CV-1425-1*	2C17	CLOSED	
CCW/ACW RETURN ISOL	2CV-1543-1*	2C17	CLOSED	
SERVICE WATER INTAKE STRUC EXHAUST FAN	2VEF-25A	2C17	ON	
SERVICE WATER PUMP	2P4B	2C17	ON (1)	
SERVICE WATER PUMP	2P4A	2C17	ON	
2P7A DISCHARGE TO SG-A	2CV-1026-2*	2C16	CLOSED	
2P7A DISCHARGE TO SG-B	2CV-1076-2*	2C16	CLOSED	
2P7A DISCHARGE TO SG-A	2CV-1037-1*	2C16	CLOSED	
2P7A DISCHARGE TO SG-B	2CV-1039-1*	2C16	CLOSED	
FEEDWATER BLOCK VALVE TO SG-A	2CV-1023-2*	2C16	CLOSED	
FEEDWATER BLOCK VALVE TO SG-B	2CV-1073-2*	2C16	CLOSED	
MSIV HEADER #2	2SV-1060-2A	2C16	CLOSED	
2VSF-1C/D SW CLG OUTLET	2CV-1513-2*	2C16	OPEN	
2VSF-1C/D SW CLG INLET	2CV-1510-2*	2C16	OPEN	
FUEL POOL HX SW INLET	2CV-1526-2	2C16	CLOSED	
EMERG POND RTN	2CV-1560-2*	2C16	OPEN	
CCW /MAIN CHILLERS SUPPLY INLET	2CV-1531-2*	2C16	CLOSED	
ACW SUPPLY ISOL	2CV-1427-2*	2C16	CLOSED	
CCW/ACW RETURN ISOL	2CV-1542-2*	2C16	CLOSED	
SERVICE WATER INTAKE STRUC EXHAUST FAN	2VEF-25B	2C16	ON	
SERVICE WATER PUMP	2P4B	2C16	ON (2)	
SERVICE WATER PUMP	2P4C	2C16	ON	

NOTE 1: IF powered from 2A3 AND 2P4A does NOT start, THEN 2P4B starts.

NOTE 2: IF powered from 2A4 AND 2P4C does NOT start, THEN 2P4B starts.

* Denotes override capability.

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ATTACHMENT 5

CIAS VERIFICATION

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Components found in a position other than specified are to be reported to the CRS.

COMPONENT DESCRIPTION	NUMBER	LOCATION	POSITION	√
REGEN HX INLET	2CV-4821-1	2C09	CLOSED	
REGEN HX OUTLET	2CV-4823-2	2C09	CLOSED	
CNTMT PURGE SUPPLY V1 INSIDE	2CV-8289-1	2C17	CLOSED	
CNTMT PURGE SUPPLY V1 OUTSIDE OUTSIDE	2CV-8283-1	2C17	CLOSED	
CNTMT PURGE EXHAUST V2 INSIDE	2CV-8291-1	2C17	CLOSED	
CNTMT PURGE EXHAUST V2 OUTSIDE OUTSIDE	2CV-8285-1	2C17	CLOSED	
SAMPLE ISOLATION VALVE QUENCH TANK LIQ	2SV-5878-1	2C17	CLOSED	
SAMPLE ISOLATION VALVE RCS	2SV-5833-1*	2C17	CLOSED	
RCP CCW SUPPLY	2CV-5236-1*	2C17	CLOSED	
RCP CCW RETURN	2CV-5255-1*	2C17	CLOSED	
CNTMT CHILL WATER SUPPLY	2CV-3852-1	2C17	CLOSED	
CNTMT CHILL WATER RETURN	2CV-3851-1	2C17	CLOSED	
RX DRAIN TANK DISCH ISOL	2CV-2202-1	2C17	CLOSED	
CNTMT VENT HEADER ISOL	2CV-2401-1	2C17	CLOSED (1)	
CNTMT SUMP DRAIN	2CV-2060-1	2C17	CLOSED	
RCP BLEEDOFF TO VCT	2CV-4846-1	2C17	CLOSED	
CNTMT AIR SAMPLE NORTH INSIDE SUPPLY	2SV-8265-1*	2C17	CLOSED	
CNTMT AIR SAMPLE NORTH INSIDE RETURN	2SV-8259-1*	2C17	CLOSED	
CNTMT AIR SAMPLE SOUTH INSIDE SUPPLY	2SV-8273-1*	2C17	CLOSED	
CNTMT AIR SAMPLE SOUTH INSIDE RETURN	2CV-8233-1*	2C17	CLOSED	
PASS SUMP SAMPLE SUPPLY ISOL	2SV-5634-1*	2C17	CLOSED	
PASS SUMP SAMPLE RETURN ISOL	2SV-5633-1*	2C17	CLOSED	

NOTE #1: Heaters removed from breaker 2B51-L1. Penetration capped outside CNTMT.

* Denotes override capability

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ATTACHMENT 5

CIAS VERIFICATION

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COMPONENT DESCRIPTION	NUMBER	LOCATION	POSITION	√
PENETRATION ROOM VENTILATION SOUTH SUPPLY DAMPER	2UCD-8863-1	2C17	CLOSED	
PENETRATION ROOM VENTILATION SOUTH RETURN DAMPER	2UCD-8865-1	2C17	CLOSED	
PENETRATION ROOM VENTILATION NORTH SUPPLY DAMPER	2UCD-8851-1	2C17	CLOSED	
PENETRATION ROOM VENTILATION NORTH RETURN DAMPER	2UCD-8853-1	2C17	CLOSED	
PENETRATION ROOM VENTILATION EXHAUST FAN	2VEF-38A	2C17	ON (2)	
SI TANKS SAMPLE	2SV-5876-2	2C16	CLOSED	
CNTMT FIRE WTR ISOLATION	2CV-3200-2	2C16	CLOSED	
QUENCH TANK RMW SUPPLY	2CV-4690-2	2C16	CLOSED	
CNTMT PURGE SUPPLY V1 OUTSIDE INSIDE	2CV-8284-2	2C16	CLOSED	
CNTMT PURGE EXHAUST V2 OUTSIDE INSIDE	2CV-8286-2	2C16	CLOSED	
SAMPLE ISOLATION VALVE STEAM GEN A	2CV-5852-2*	2C16	CLOSED	
SAMPLE ISOLATION VALVES STEAM GEN B	2CV-5859-2*	2C16	CLOSED	
SAMPLE ISOLATION VALVES QUENCH TK LIQ	2SV-5871-2	2C16	CLOSED	
SAMPLE ISOLATION VALVES RCS	2SV-5843-2*	2C16	CLOSED	
RCP CCW RETURN	2CV-5254-2*	2C16	CLOSED	
CNTMT CHILL WATER RETURN	2CV-3850-2	2C16	CLOSED	
RX DRAIN TANK DISCH ISOL	2CV-2201-2	2C16	CLOSED	
CNTMT SUMP DRAIN	2CV-2061-2	2C16	CLOSED	
RCP BLEEDOFF TO VCT	2CV-4847-2	2C16	CLOSED	
N2 SUPPLY SIT HI PRESS	2CV-6207-2	2C16	CLOSED	
N2 SUPPLY CNTMT LO PRESS	2CV-6213-2	2C16	CLOSED	

NOTE #2: IF BOTH Penetration Room Ventilation Fans running,
THEN place EITHER 2VEF-38A or 2VEF-38B handswitch in PTL
AND inform Chemistry to obtain grab samples.

* Denotes override capability

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ATTACHMENT 5

CIAS VERIFICATION

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COMPONENT DESCRIPTION	NUMBER	LOCATION	POSITION	√
CNTMT AIR SAMPLE NORTH OUTSIDE SUPPLY	2SV-8263-2*	2C16	CLOSED	
CNTMT AIR SAMPLE NORTH OUTSIDE RETURN	2SV-8261-2*	2C16	CLOSED	
CNTMT AIR SAMPLE SOUTH OUTSIDE SUPPLY	2SV-8271-2*	2C16	CLOSED	
CNTMT AIR SAMPLE SOUTH OUTSIDE RETURN	2SV-8231-2*	2C16	CLOSED	
PASS SUMP SAMPLE SUPPLY ISOL	2SV-5634-2*	2C16	CLOSED	
PASS SUMP SAMPLE RETURN ISOL	2SV-5633-2*	2C16	CLOSED	
PENETRATION ROOM VENTILATION SOUTH SUPPLY DAMPER	2UCD-8864-2	2C16	CLOSED	
PENETRATION ROOM VENTILATION SOUTH RETURN DAMPER	2UCD-8866-2	2C16	CLOSED	
PENETRATION ROOM VENTILATION NORTH SUPPLY DAMPER	2UCD-8852-2	2C16	CLOSED	
PENETRATION ROOM VENTILATION NORTH RETURN DAMPER	2UCD-8854-2	2C16	CLOSED	
PENETRATION ROOM VENTILATION EXHAUST FAN	2VEF-38B	2C16	ON (2)	
H2 PURGE/CTMT ATMOSPHERE	2RITS-8231-1	2C25	OFF	
H2 PURGE/CTMT ATMOSPHERE	2RITS-8271-2	2C25	OFF	

NOTE #2: IF BOTH Penetration Room Ventilation Fans running,
THEN place EITHER 2VEF-38A or 2VEF-38B handswitch in PTL
AND inform Chemistry to obtain grab samples.

* Denotes override capability.

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ATTACHMENT 6

SECURING CCW AND ACW

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1. Secure CCW System by performing the following:
 - A. Verify ALL RCPs stopped.
 - B. Verify BOTH PZR Spray valves in MANUAL and closed.
 - C. Verify ALL of the following valves closed:
 - RCP Bleedoff to VCT (2CV-4846-1)
 - RCP Bleedoff to VCT (2CV-4847-2)
 - RCP Bleedoff Relief to Quench Tank (2CV-4856)

NOTE

The remaining steps of this attachment should have a lower priority than implementation of the controlling procedure.

- D. Verify at least ONE Letdown Isolation valve closed:
 - 2CV-4820-2
 - 2CV-4821-1
 - 2CV-4823-2 (least preferred)
- E. Verify EFW suction aligned to CST.
- F. Locally close "SU/BD DI TO EFW PUMP SUCT" valve (2EFW-0706).
- G. Verify ALL Condensate Pump handswitches in PTL.
- H. Locally secure BOTH Waste Gas compressors by placing the following handswitches in OFF:
 - "2C75A CONTROL SWITCH" (2HS-2402A)
 - "2C75B CONTROL SWITCH" (2HS-2402B)
- I. Notify Chemistry to secure ALL unnecessary sample flows to the following sample panels:
 - 2C116 Sample System Control panel
 - 2C337 SG Secondary Sample panel
 - 2C145-I Secondary Sample panel
 - 2C145-II Secondary Sample panel

(Step 1 continued on next page)

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ATTACHMENT 6

SECURING CCW AND ACW

1. (continued)

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J. WHEN steps 1.A through 1.I complete,
THEN secure Loop 1 and 2 CCW by performing the following:

1) Verify closed ALL RCP CCW Isolation valves:

- 2CV-5255-1
- 2CV-5254-2
- 2CV-5236-1

2) Place ALL CCW Pump handswitches in PTL.

K. Secure BOTH MFW Pump Turning Gears by placing handswitches in PTL.

L. WHEN BOTH MFW pumps stopped, THEN place the following handswitches in PTL:

- MFW Pump Auxiliary Lube Oil pump 2P26
- MFW Pump Auxiliary Lube Oil pump 2P27
- MFW Pump Emergency Lube Oil pump 2P28

2. Secure ACW loads as follows:

A. Close BOTH SG Blowdown Isolation valves:

- 2CV-1016-1
- 2CV-1066-1

B. Break Condenser vacuum and secure Gland Seal steam using 2106.010, Condenser Vacuum System.

C. Secure EH System by placing BOTH EH Pump handswitches in PTL.

D. Secure Main Turbine Turning Gear by placing handswitch 2HS-9630 in PTL.

E. Start Emergency Control Room chiller 2VUC-27A or 2VUC-27B.

F. Commence Lube oil and Seal Oil system shutdown using 2106.020, Main Turbine Oil Operations.

G. WHEN Main Turbine stopped, THEN place the following handswitches in PTL:

- Motor Suction pump 2P19
- Turning Gear Oil pump 2P76

H. Verify Control Room chillers secured.

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ATTACHMENT 7

EFAS VERIFICATION

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Components found in a position other than specified are to be reported to the CRS.

COMPONENT DESCRIPTION	NUMBER	LOCATION	POSITION	√
2P7B DISCHARGE TO SG-A	2CV-1038-2*	2C17	OPEN (1)	
2P7B DISCHARGE TO SG-B	2CV-1036-2*	2C17	OPEN (1)	
FLOW CONTROL VALVE TO SG-A	2CV-1025-1*	2C17	OPEN (1)	
FLOW CONTROL VALVE TO SG-B	2CV-1075-1*	2C17	OPEN (1)	
PUMP SUCTION SOURCE FROM SW	2CV-0716-1	2C17	CLOSED (2)	
PUMP SUCTION SOURCE FROM CST	2CV-0789-1	2C17	OPEN (2)	
EFW PUMP	2P7B	2C17	ON	
PUMP FLUSH	2CV-0714-1	2C17	CLOSED	
PUMP FLUSH	2CV-0798-1	2C17	CLOSED	
SERVICE WATER PUMP	2P4B	2C17	ON (3)	
SERVICE WATER PUMP	2P4A	2C17	ON	

NOTES: #1. MSIS closes these valves.

#2. IF EFAS signal present AND suction pressure lowers to 5 psig, THEN EFW suction swaps to SW.

#3. IF powered from 4160v Vital bus 2A3 AND 2P4A pump fails to start, THEN 2P4B starts.

* Denotes override capability.

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ATTACHMENT 7

EFAS VERIFICATION

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COMPONENT DESCRIPTION	NUMBER	LOCATION	POSITION	√
2P7A DISCHARGE TO SG-A	2CV-1026-2*	2C16	OPEN (1)	
2P7A DISCHARGE TO SG-B	2CV-1076-2*	2C16	OPEN (1)	
2P7A DISCHARGE TO SG-A	2CV-1037-1*	2C16	OPEN (1)	
2P7A DISCHARGE TO SG-B	2CV-1039-1*	2C16	OPEN (1)	
EFW PUMP TURBINE 2K03 STEAM	2CV-0340-2*	2C16	OPEN	
PUMP SUCTION SOURCE FROM SW	2CV-0711-2	2C16	CLOSED (2)	
PUMP SUCTION SOURCE FROM CST	2CV-0795-2	2C16	OPEN (2)	
EFW PUMP	2P7A	2C16	RUNNING	
SERVICE WATER PUMP	2P4B	2C16	ON (3)	
SERVICE WATER PUMP	2P4C	2C16	ON	

NOTES: #1. MSIS closes these valves.

#2. IF EFAS signal present AND suction pressure lowers to 5 psig, THEN EFW suction swaps to SW.

#3. IF powered from 4160v Vital bus 2A4 AND 2P4C pump fails to start, THEN 2P4B starts.

* Denotes override capability.

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ATTACHMENT 8

RCS/PZR COOLDOWN TABLES

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1. Maintain RCS cooldown rate within the following limits:
 - 100°F per hour (constant) or 50°F in any half hour period (step) for RCS cold leg temperatures.
(TS 3.4.9.1 adjusted for instrument uncertainty)
2. Record RCS T_C every 15 minutes.
3. Calculate the change in T_C after the second reading is recorded.
4. Multiply the change in T_C by 4 and record cooldown rate.
5. Forward completed form to Operations Management.

TIME	RCS T_C	CHANGE IN T_C		COOLDOWN RATE °F/hr
			X 4	
			X 4	
			X 4	
			X 4	
			X 4	
			X 4	
			X 4	
			X 4	
			X 4	
			X 4	
			X 4	
			X 4	
			X 4	

Completed by _____ Date _____ .

Reviewed by _____ Date _____ .

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ATTACHMENT 8

RCS/PZR COOLDOWN TABLES

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1. Maintain PZR cooldown rate less than 200°F in ANY one hour period.
2. Record PZR temperature every 15 minutes.
3. Calculate the change in PZR temperature after the second reading is recorded.
4. Multiply the change in PZR temperature by 4 and record cooldown rate.
5. Forward completed form to Operations Management.

TIME	PZR TEMP	CHANGE IN PZR TEMP		COOLDOWN RATE °F/hr
			X 4	
			X 4	
			X 4	
			X 4	
			X 4	
			X 4	
			X 4	
			X 4	
			X 4	
			X 4	
			X 4	
			X 4	
			X 4	

Completed by _____ Date _____ .

Reviewed by _____ Date _____ .

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ATTACHMENT 9

VOID ELIMINATION

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1. Verify Letdown isolated.
2. Stop RCS depressurization.
3. Pressurize and depressurize RCS within P-T limits, refer to Attachment 1, P-T Limits.
4. Monitor PZR level and RVLMS for trending of RCS inventory.
5. IF voiding suspected in SG tubes,
THEN attempt to eliminate voids by using EITHER of the following:
 - Cooldown affected SG by steaming and feeding.
 - Cooldown affected SG using SG blowdown and feeding.
6. IF RVLMS indicates voiding, THEN vent Reactor Vessel as follows:
 - A. Open ONE Reactor Vessel Head Vent valve (2SV-4668-1 on 2C336-1) or (2SV-4668-2 on 2C336-2).
 - B. Open vent path to EITHER Quench Tank (2SV-4669-1) or CNTMT (2SV-4670-2) valve.
 - C. Monitor PZR level and RVLMS for trending of RCS inventory.
 - D. WHEN Reactor vessel head bubble collapsed, THEN verify vent path valves closed.
7. IF this attachment entered due to inability to depressurize AND depressurization of RCS still NOT possible, THEN vent PZR as follows:
 - A. Open ONE PZR vent valve (2SV-4636-1 on 2C336-1) or (2SV-4636-2 on 2C336-2).
 - B. Open vent path to EITHER Quench Tank (2SV-4669-1) or CNTMT (2SV-4670-2) valve.
 - C. Monitor PZR level and RVLMS for trending of RCS inventory.
 - D. WHEN RCS depressurization completed, THEN verify vent path valves closed.

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ATTACHMENT 10

SG ISOLATION

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STEAM GENERATOR A

NOTE

Goal is to isolate SG within 30 minutes of procedure entry to limit off-site release.

1. IF SG B to be isolated, THEN **GO TO** Step 4.
2. Verify each component in the following table in the indicated position:

COMPONENT DESCRIPTION	NUMBER	LOCATION	POSITION	√
MAIN STEAM TO EFWP TURB 2K03	2CV-1000-1	2C17	CLOSED	
2P7B DISCHARGE TO SG-A	2CV-1038-2*	2C17	CLOSED (1)	
FLOW CONTROL VALVE TO SG-A	2CV-1025-1*	2C17	CLOSED (1)	
FEEDWATER BLOCK VALVE TO SG-A	2CV-1024-1	2C17	CLOSED	
MSIV HEADER #1	2SV-1010-1A	2C17	CLOSED	
MSIV HEADER #1 BYP	2CV-1040-1	2C17	CLOSED (1)	
SAMPLE ISOLATION VALVE SG-A	2CV-5850	2C17	CLOSED (1)	
SG BLOWDOWN ISOLATION	2CV-1016-1	2C17	CLOSED (1)	
2P7A DISCHARGE TO SG-A	2CV-1026-2*	2C16	CLOSED (1)	
2P7A DISCHARGE TO SG-A	2CV-1037-1*	2C16	CLOSED (1)	
FEEDWATER BLOCK VALVE TO SG-A	2CV-1023-2	2C16	CLOSED	
MSIV HEADER #1	2SV-1010-2A	2C16	CLOSED	
SAMPLE ISOLATION VALVE STEAM GEN A	2CV-5852-2*	2C16	CLOSED (1)	
2CV-1001 PERMISSIVE	2CV-1001	2C02	OFF (1)	
ADV UPSTRM ISOL	2CV-1002*	2C02	CLOSED (1)	

* Denotes override capability.

NOTE #1: Valves may be open at SM/CRS discretion.

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ATTACHMENT 10

SG ISOLATION

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STEAM GENERATOR A

3. Locally close the following valves to isolate miscellaneous SG A Steam traps:

COMPONENT DESCRIPTION	NUMBER	LOCATION	√
"2F-310 ISOL (ABOVE SEAT DRN)"	2SGS-1042	West of 2CV-1010-1 four ft off floor Southeast of 2T91	
"2F-211 BYP"	2MS-43-1	South end of room eight ft off raised platform	
"EFWPT SUPPLY HDR DRAIN TRAP 2F-211 INLET"	2MS-43-2	South end of room eight ft off raised platform	
"ATMOS DUMP DRAIN TRAP 2F-197 ISOL"	2MS-74	East of 2CV-1002 one ft from east wall	
"COMBINED 2CV-1001 & 1051 DRAIN TRAP OUTLET ISOL"	2MS-2102	Southside of 2CV-1010-1 one ft off floor	

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ATTACHMENT 10

SG ISOLATION

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STEAM GENERATOR B

NOTE

Goal is to isolate SG within 30 minutes of procedure entry to limit off-site release.

4. Verify each component in the following table in the indicated position:

COMPONENT DESCRIPTION	NUMBER	LOCATION	POSITION	√
2P7B DISCHARGE TO SG-B	2CV-1036-2*	2C17	CLOSED (1)	
FLOW CONTROL VALVE TO SG-B	2CV-1075-1*	2C17	CLOSED (1)	
FEEDWATER BLOCK VALVE TO SG-B	2CV-1074-1	2C17	CLOSED	
MSIV HEADER #2	2SV-1060-1A	2C17	CLOSED	
SAMPLE ISOLATION VALVE SG-B	2CV-5858	2C17	CLOSED (1)	
SG BLOWDOWN ISOLATION	2CV-1066-1	2C17	CLOSED (1)	
MAIN STEAM TO EFWP TURB 2K03	2CV-1050-2	2C16	CLOSED	
2P7A DISCHARGE TO SG-B	2CV-1076-2*	2C16	CLOSED (1)	
2P7A DISCHARGE TO SG-B	2CV-1039-1*	2C16	CLOSED (1)	
FEEDWATER BLOCK VALVES TO SG-B	2CV-1073-2	2C16	CLOSED	
MSIV HEADER #2	2SV-1060-2A	2C16	CLOSED	
MSIV HEADER #2 BYP	2CV-1090-2	2C16	CLOSED (1)	
SAMPLE ISOLATION VALVE STEAM GEN B	2CV-5859-2*	2C16	CLOSED (1)	
2CV-1051 PERMISSIVE	2CV-1051	2C02	OFF (1)	
ADV UPSTRM ISOL	2CV-1052*	2C02	CLOSED (1)	

* Denotes override capability.

NOTE #1: Valves may be open at SM/CRS discretion.

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ATTACHMENT 10

SG ISOLATION

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STEAM GENERATOR B

5. Locally close the following valves to isolate miscellaneous SG B Steam traps:

COMPONENT DESCRIPTION	NUMBER	LOCATION	√
"TRAP 2F-311 ISOLATION ABOVE SEAT DRAIN)"	2SGS-1045	Northeast of 2T91 four ft off floor West of 2CV-1060-2	
"COMBINED 2CV-1001 & 1051 DRAIN TRAP OUTLET ISOL"	2MS-2102	Southside of 2CV-1010-1 one ft off floor	

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ATTACHMENT 11

DEGRADED POWER

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1. IF ANY Vital bus de-energized, THEN perform the following:
 - A. Initiate Annunciator Corrective Actions for any associated alarms.
 - B. IF 4160v Vital bus 2A3 or 2A4 bus lockout exists, THEN notify Electrical Maintenance to determine cause and correct.
 - C. Attempt to manually start DG, refer to 2104.036, Emergency Diesel Generator Operations.
 - D. IF SU XFMRs NOT available, THEN energize 4160v Vital buses using 2104.037, Alternate AC Diesel Generator Operations, Attachment E.
 - E. IF ESF equipment on energized train fails AND ESF equipment on de-energized train needed to satisfy a safety function, THEN crosstie 4160v Vital buses using 2107.002, ESF Electrical System Operation.
 - F. IF desired to restore Control Room indication and controls, THEN crosstie 480v Vital buses 2B5 and 2B6 using 2107.002, ESF Electrical System Operation or 120v Instrument AC buses 2Y1 and 2Y2 using 2107.003, Inverter and 120 VAC Electrical System Operation.
 - G. IF desired to restore AC power to battery charger from redundant bus, THEN refer to 2107.004, DC Electrical System Operations.

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ATTACHMENT 11

DEGRADED POWER

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CAUTION

IA operated components may reposition as IA pressure restores.

2. IF IA pressure less than 65 psig, THEN perform the following:
 - A. Inform Unit 1 of IA cross-connect status.

Note

Loss of 120v Instrument AC Bus 2Y1 will cause 2CV-3004 to fail open.

- B. Verify Instrument Air Cross-connect valves open:
 - 2CV-3004
 - 2CV-3015
 - C. IF Unit 1 Instrument Air pressure lowers to less than 60 psig, THEN perform the following:
 - 1) Close Instrument Air Cross-connect valves:
 - 2CV-3004
 - 2CV-3015
 - 2) Locally verify the following valves closed:
 - MANUAL X-CONNECT TO UNIT 1 (2IA-47)
 - MANUAL X-CONNECT TO UNIT 1 (2IA-48)
 - 2F-37 INLET FROM DRY HDR (2IA-192)
3. IF Loss of Offsite Power did NOT occur AND ANY bus de-energized, THEN perform the following:
 - A. WHEN cause of bus failure determined and corrected, THEN energize affected bus.
 - B. **RETURN TO** procedure in effect.

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ATTACHMENT 11

DEGRADED POWER

NOTE

Voltage indication for SU XFMRs may indicate SU XFMRs available with associated disconnect or breaker open.

4. Determine availability of ANY SU XFMR to energize 4160v and 6900v buses as follows:

- Check SU XFMR #3 voltage greater than 21.7 KV using the following:

Regulated Voltage	Unregulated Voltage
SPDS E2ST3R PMS E9664	SPDS E22AT

- Check SU XFMR #2 voltage greater than 154 KV using the following:

Regulated Voltage	Unregulated Voltage
SPDS EST2R PMS E4013	SPDS E161ST2

5. IF SU XFMR #3 available,
THEN perform the following as required:

A. IF Loop 2 CCW NOT in service,
THEN perform the following:

1) Close at least ONE RCP CCW Isolation valve:

- 2CV-5255-1
- 2CV-5254-2
- 2CV-5236-1

2) IF CCW CNTMT Isolation valves will NOT close from Control Room,
THEN locally close RCP CCW return valve "RCP RETURN ISOL" (2CV-5255-1).

(Step 5 continued on next page)

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ATTACHMENT 11

DEGRADED POWER

5. (continued)

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- B. IF 2A1 is de-energized,
THEN place the following breakers in PTL:

BREAKER	DESCRIPTION
2B324	2C-5A
2B123	2P-33A
2B721	2P-33C

- C. IF 2A2 is de-energized,
THEN place the following breakers in PTL:

BREAKER	DESCRIPTION
2B424	2C-5B
2B223	2P-33B

- D. Re-energize buses as necessary by closing the following SU XFMR #3 Feeder breakers:

BUS	BREAKER
2A1	2A113
2A2	2A213
2H1	2H15
2H2	2H25

- E. **GO TO** Step 8.

6. IF SU XFMR #2 available,
THEN **GO TO** Attachment 29, Startup XFMR #2 Usage to energize buses.

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7. IF SU XFMR #2 and #3 NOT available, THEN perform the following:

A. Verify ALL XFMR Feeder breaker switches in PTL and breakers open:

- 2H13, SU #2 Feeder to 2H1
- 2H14, Unit Aux Feeder to 2H1
- 2H15, SU #3 Feeder to 2H1
- 2H23, SU #2 Feeder to 2H2
- 2H24, Unit Aux Feeder to 2H2
- 2H25, SU #3 Feeder to 2H2
- 2A111, SU #2 Feeder to 2A1
- 2A112, Unit Aux Feeder to 2A1
- 2A113, SU #3 Feeder to 2A1
- 2A211, SU #2 Feeder to 2A2
- 2A212, Unit Aux Feeder to 2A2
- 2A213, SU #3 Feeder to 2A2

B. Place the following Load Center Supply breakers in PTL:

BREAKER	DESCRIPTION
2A102	2A1 to 2B1
2A104	2A1 to 2B7
2A202	2A2 to 2B2

C. **GO TO** Step 17.

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8. IF Instrument Air NOT in service,
THEN perform the following to restore Instrument Air:
- A. Locally verify at least ONE IA compressor running.
 - B. Verify Instrument Air Cross-Connect valves closed as desired:
 - 2CV-3004
 - 2CV-3015
9. IF SW to ACW isolated,
THEN restore SW to ACW as follows:
- A. Verify SW suctions aligned to Lake.
 - B. IF SW suctions can NOT be aligned to Lake, THEN **GO TO** Step 16.
 - C. Restore SW to ACW, refer to Exhibit 5, CCW/ACW/SW Alignment.

CAUTION

Minimum 480v Vital bus voltage is 436v.

10. IF Loop 2 CCW NOT in service,
THEN restore Loop 2 CCW to service as follows:
- A. IF "2P9A/B DISCH PRESS HI/LO" annunciator (2K11-J7) in alarm,
THEN locally start a Condensate Transfer pump at ONE of the following breakers:
 - 2B12-B2 "CONDENSATE TRANSFER PUMP 2P-9A"
 - 2B21-G3 "CONDENSATE TRANSFER PUMP 2P-9B"

NOTE

Low IA pressure may prevent operation of CCW Cross Connect valves.

- B. Verify ONE CCW pump running AND aligned to provide flow to Loop 2 CCW.
- C. Verify at least ONE CCW/ACW Return valve open:
 - 2CV-1543-1
 - 2CV-1542-2

(Step 10 continued on next page)

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DEGRADED POWER

10. (continued)

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- D. Verify at least ONE SW to CCW /Main Chillers Supply valve open.
- 2CV-1530-1
 - 2CV-1531-2
- E. IF SIAS or MSIS actuated, THEN maintain SW header pressure greater than 85 psig.
- F. IF Loop 2 CCW Surge Tank level lowers in an uncontrolled manner, THEN perform the following:
- 1) Place BOTH Loop 2 CCW pumps in PTL.
 - 2) **GO TO** Step 13.
11. IF CCW isolated to RCPs, THEN restore CCW flow to RCPs using Attachment 21, Restoration of CCW to RCPs.
12. IF Condenser Vacuum pumps NOT in service THEN restore Condenser Vacuum pumps, refer to 2106.010, Condenser Vacuum System.
13. Transfer ANY 4160v Vital buses previously supplied from DGs to associated 4160v Non-vital bus using 2104.036, Emergency Diesel Generator Operations.
14. IF unable to transfer 4160v Vital Buses, THEN **RETURN TO** procedure in effect.
15. Shutdown Diesel Generators using 2104.036, Emergency Diesel Generator Operations.
16. **RETURN TO** procedure in effect.
17. IF AACG available AND 2A1 NOT energized, THEN perform the following:
- A. Energize 4160v Non-vital bus 2A1 using 2104.037, Alternate AC Diesel Generator Operations, Attachment E.
 - B. WHEN 4160v Non-vital bus 2A1 energized, THEN **GO TO** Step 28.

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DEGRADED POWER

CAUTION

With only ONE DG operating, backfeeding power may result in overloading DG and loss of Vital bus.

18. IF ANY of the following conditions exist AND AACG NOT available, THEN **GO TO** Step 28.

- Only ONE DG running and the other DG can NOT be started.
- SIAS actuated.
- Offsite power will be restored in a short period of time.

19. IF 2A1 or 2A2 NOT energized,
THEN perform the following to energize 4160v Non-vital bus 2A1 or 2A2 by backfeeding from a DG:

- IF 2A1 to be energized, THEN **GO TO** Step 20.
- IF 2A2 to be energized, THEN **GO TO** Step 21.

20. IF 2A1 de-energized, THEN align breakers on 2A1 as follows:

A. Place the following handswitches in PTL and verify breakers open:

BREAKER	DESCRIPTION
2A111	SU # 2 to 2A1
2A112	Unit Aux to 2A1
2A113	SU # 3 to 2A1
2A103	LC2B3 Feeder
2A109	LC2B9 Feeder

B. Place the following handswitches in PTL and verify breakers open:

PUMP	DESCRIPTION
2P2A	Condensate pump
2P2C	Condensate pump
2P8A	Heater Drain pump
2P75	Auxiliary Feed pump

(Step 20 continued on next page)

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DEGRADED POWER

20. (continued)

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- C. Place Main Chiller 2VCH-1A handswitch (2HS-3810) in PTL on 2C22 and verify breaker open.
- D. Locally align Load Center 2B1, 2B7, and 2B12 using Attachment 24, Local Breaker Alignment.
- E. Verify the following breakers closed:

BREAKER	DESCRIPTION
2A102	2A1 to 2B1
2A104	2A1 to 2B7

- F. **GO TO** Caution before Step 22.

21. IF 2A2 de-energized, THEN align breakers on 2A2 as follows:

- A. Place the following handswitches in PTL and verify breakers open:

BREAKER	DESCRIPTION
2A211	SU # 2 to 2A2
2A212	Unit Aux to 2A2
2A213	SU # 3 to 2A2
2A203	LC2B4 Feeder
2A204	LC2B8 Feeder
2A209	LC2B10 Feeder

- B. Place the following handswitches in PTL and verify breakers open:

PUMP	DESCRIPTION
2P2B	Condensate pump
2P2D	Condensate pump
2P8B	Heater Drain pump

- C. Place Main Chiller 2VCH-1B handswitch (2HS-3812) in PTL on 2C22 and verify breaker open.
- D. Locally align Load Center 2B2 and 2B21 using Attachment 24, Local Breaker Alignment.
- E. Verify 480v Non-vital bus 2B2 feeder breaker (2A202) closed.

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DEGRADED POWER

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CAUTION

- **The DG will be connected to a bus with load capability in excess of capacity. Starting additional loads could cause undervoltage or overload to occur resulting in loss of the Vital bus.**
- **Closure of EITHER breaker 2A309 or 2A409 to energize bus 2A1 or 2A2 with SIAS present, will result in associated DG output breaker 2A308 or 2A408 tripping open.**

22. Re-energize 4160v bus 2A1 or 2A2 by EITHER of the following:

- Close breaker 2A309 to energize 4160v bus 2A1.
- Close breaker 2A409 to energize 4160v bus 2A2.

23. IF DG load exceeds 2850 KW, THEN perform the following:

- A. Trip breaker used to energize bus (2A309 or 2A409).
- B. Investigate cause of excessive load.
- C. Verify problem corrected before trying to re-energize bus.

24. Perform the following to restore Instrument Air:

- A. Locally verify at least ONE IA compressor running.
- B. Verify Instrument Air Cross-Connect valves closed as desired:
 - 2CV-3004
 - 2CV-3015

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ATTACHMENT 11

DEGRADED POWER

25. Restore SW to ACW as follows:
- A. Verify SW suction aligned to Lake.
 - B. IF SW suction can NOT be aligned to Lake, THEN **GO TO** Step 28.
 - C. Restore SW to ACW, refer to Exhibit 5, CCW/ACW/SW Alignment.
26. Restore Loop 2 CCW to service as follows:
- A. IF "2P9A/B DISCH PRESS HI/LO" annunciator (2K11-J7) in alarm, THEN locally start a Condensate Transfer pump at ONE of the following breakers:
 - 2B12-B2 "CONDENSATE TRANSFER PUMP 2P-9A"
 - 2B21-G3 "CONDENSATE TRANSFER PUMP 2P-9B"

NOTE

Low IA pressure may prevent operation of CCW Cross Connect valves.

- B. Verify ONE CCW pump running AND aligned to provide flow to Loop 2 CCW.
- C. Verify at least ONE CCW/ACW return valve open:
 - 2CV-1543-1
 - 2CV-1542-2
- D. Verify at least ONE SW to CCW /Main Chillers Supply valve open:
 - 2CV-1530-1
 - 2CV-1531-2
- E. IF SIAS or MSIS actuated, THEN maintain SW header pressure greater than 85 psig.
- F. IF Loop 2 CCW Surge Tank level lowers in an uncontrolled manner, THEN perform the following:
 - 1) Place BOTH Loop 2 CCW pumps in PTL.
 - 2) **GO TO** Step 28.

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DEGRADED POWER

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27. Restore CCW flow to RCPs using Attachment 21, Restoration of CCW to RCPs.
28. IF offsite power will be unavailable for an extended period of time,
THEN perform the following:
- A. Monitor DG fuel oil inventory to ensure adequate supply available for long term operation of DGs.
 - B. Break condenser vacuum AND secure Gland Seal steam using 2106.010, Condenser Vacuum System.
 - C. Minimize load on batteries or chargers by the following:
 - Commence Lube Oil and Seal Oil system shutdown using 2106.020, Main Turbine Oil Operations.
 - Transfer Turbine Generator and MFW pump lube oil pumps to AC powered pumps (if available).
29. **RETURN TO** procedure in effect.

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ATTACHMENT 12

HOT LEG INJECTION

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1. Locally clear danger tags AND close the following breakers:

- 2B52-L5 "2CV-5101-1, HOT LEG INJ VALVE"
- 2B62-G2 "2CV-5102-2, HOT LEG INJ VALVE"

2. Close HPSI Header Orifice Bypass valves:

- 2CV-5103-1
- 2CV-5104-2

CAUTION

HPSI pump flow greater than 800 gpm indicates pump flow in excess of NPSH requirements. (ER-ANO-2002-0528-000)

3. Open both Hot Leg Injection valves:

- 2CV-5101-1
- 2CV-5102-2

4. Record HPSI Header flows AND add values to calculate Total HPSI Header flow:

- 2FI-5101 "HEADER 1" _____.
- 2FI-5102 "HEADER 2" _____.

Total HPSI Header flow = _____.

5. Perform the following calculation to determine acceptable band for Total HPSI Cold Leg Injection flow:

A. [Total HPSI Header flow (Step 4)] X 0.60 = MAX FLOW

[_____] X 0.60 = _____.

B. [Total HPSI Header flow (Step 4)] X 0.40 = MIN FLOW

[_____] X 0.40 = _____.

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ATTACHMENT 12

HOT LEG INJECTION

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6. Record HPSI Cold Leg Injection flows AND add values to calculate Total HPSI Cold Leg Injection flow:

- 2FI-5014-1 _____.
- 2FI-5034-1 _____.
- 2FI-5054-2 _____.
- 2FI-5074-2 _____.

Total HPSI Cold Leg Injection flow = _____.

7. IF Total HPSI Cold Leg Injection flow in Step 6 NOT within acceptable band calculated in Step 5, THEN perform ONE of the following:

NOTE

Affected HPSI train is ANY train where HPSI Header Orifice Bypass valve or Hot Leg Injection valve does NOT move to its required position.

- A. IF EITHER HPSI train affected, THEN perform the following:

- 1) IF Total HPSI Cold Leg Injection flow greater than MAX FLOW value calculated in Step 5.A, THEN throttle associated Cold Leg Injection valves equally on affected train.
- 2) IF Total HPSI Cold Leg Injection flow less than MIN FLOW value calculated in Step 5.B, THEN throttle Hot Leg Injection valve on affected train.
- 3) IF only ONE HPSI train operating, AND Cold Leg Injection valves throttled, THEN check total HPSI flow acceptable using Exhibit 2, HPSI Flow Curve.

- B. Throttle both Hot Leg Injection valves to establish Total HPSI Cold Leg Injection flow within acceptable band.

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ATTACHMENT 13

SIAS RESET

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NOTE

Following actuation CNTMT pressure must be 17.5 psia or less to reset CIAS and SIAS.

1. Verify CIAS reset.

NOTE

Resetting the SIAS signal will realign CCP Suction valves to their pre-SIAS positions (no flyback protection).

2. Verify CCP Suction source will be available after SIAS reset.
3. IF RCS pressure greater than variable setpoint AND CNTMT pressure less than 17.5 psia, THEN GO TO Step 5.
4. Reset SIAS Trip on ALL unbypassed PPS channels bistables as follows:
 - A. Reset SIAS Trip Bistables as follows:

NOTE

- **Reset of a bypassed channel is unnecessary.**

- 1) Perform the following to power up reset circuitry:
 - a) Place Test Power Supply Channel Test switch (located bottom 2C23-A) to channel being reset (A, B, C, or D).
 - b) IF reset circuitry NOT powered up, THEN press "ON" pushbutton (located to right of Test Power Supply Channel Test switch). "ON" light will illuminate and white light for selected channel will illuminate.

(Step 4 continued on next page)

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ATTACHMENT 13

SIAS RESET

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4. (continued)

- 2) On Bistable Control Panel Channel drawer being reset, perform the following:
 - a) Place Bistable Select switch to position 6.
 - b) Place Meter Input Select switch to TRIP SP.
 - c) Depress and hold red Test pushbutton.
 - d) Turn Coarse potentiometer clockwise.
WHEN the six PPS Bistable Relay Indicating Lights beneath channel 6 are off, THEN stop turning Coarse potentiometer.

NOTE

There is a 10 second time delay between reset of Low PZR Pressure setpoint reset.

- e) Depress Low PZR Pressure Setpoint Reset pushbutton
(This lowers variable setpoint by less than 200 psi increments).
- f) Depress Pretrip/Trip Status Indicator Reset pushbutton to clear Pretrip/Trip Indicator lights.
- g) Turn Coarse potentiometer counter clockwise.
WHEN channel 6 Pretrip Indicator light turns on,
THEN stop turning Coarse potentiometer.
- h) Depress Low PZR Press Setpoint Reset pushbutton.
- i) Depress Pretrip/Trip Status Indicator Reset pushbutton to clear Pretrip Indicator light.
- j) Repeat Steps 4.A.2.g through 4.A.2.i.
WHEN variable setpoint voltage on Digital voltmeter does NOT lower,
THEN continue with Step 4.A.2.k.
- k) Release red Test pushbutton.
- l) Place Meter Input Select switch to INPUT.
- m) Place Bistable Select switch to OFF.

(Step 4 continued on next page)

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ATTACHMENT 13

SIAS RESET

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4. (continued)

B. Repeat Step 4.A for remaining PPS channels.

C. Perform the following to power down reset circuitry:

1) Place Test Power Supply Channel Test switch in OFF.

2) Press "ON" pushbutton (located to right of Test Power Supply Channel Test switch). "ON" light will extinguish.

5. Reset PPS SIAS Actuation Trip Paths (1, 2, 3, or 4) as follows:

A. Place LK/UNLK switch to UNLK (key No. 15).

B. Depress SIAS pushbutton on 2C23.

C. Verify Trip Path lights reset on local PPS Status panels.

D. Place LK/UNLK switch to LK AND remove key.

E. Repeat Steps 5.A through 5.D to reset remaining Actuation Trip Paths.

6. Reset ESF SIAS Actuation as follows:

A. Depress EITHER SIAS Lockout Reset pushbutton on 2C40 AND verify BOTH Reset lights ON.

B. Depress EITHER SIAS Lockout Reset pushbutton on 2C39 AND verify BOTH Reset lights ON.

7. Reset Main Turbine Lift pumps at 2C11.

8. Verify RCP Bleedoff to VCT Isolation valves open:

- 2CV-4846-1
- 2CV-4847-2

9. Place Main Turbine on turning gear.

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ATTACHMENT 14

MSIS RESET

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1. IF BOTH SG pressures greater than variable setpoints,
THEN **GO TO** Step 4 of this attachment.
2. IF EITHER SG has an unisolable rupture,
THEN verify affected SG EFW Discharge Isolation valves de-energized and closed:

EFW PUMP	SG A	SG B
2P7A	2CV-1026-2/2D26-A4	2CV-1076-2/2D26-C1
	2CV-1037-1/2D27-B1	2CV-1039-1/2D27-B2
2P7B	2CV-1038-2/2B63-H3	2CV-1036-2/2B63-H1
	2CV-1025-1/2B51-N2	2CV-1075-1/2B53-J2

3. Reset SG A and B Low Pressure Trip Bistables:

A. Reset SG A Low Pressure Trip bistables on ALL unbypassed PPS channels as follows:

- | |
|--|
| <p style="text-align: center;"><u>NOTE</u></p> <ul style="list-style-type: none">• Reset of a bypassed channel is unnecessary. |
|--|

- 1) Perform the following to power up reset circuitry:
 - a) Place Test Power Supply Channel Test switch (located bottom 2C23-A) to channel being reset (A, B, C, or D).
 - b) IF reset circuitry NOT powered up, THEN press "ON" pushbutton (located to right of Test Power Supply Channel Test switch). "ON" light will illuminate and white light for selected channel will illuminate.
- 2) Perform the following on Bistable Control Panel Channel drawer being reset:
 - a) Place Bistable Select switch to position 11.
 - b) Place Meter Input Select switch to TRIP SP.
 - c) Depress and hold red Test pushbutton.
 - d) Turn Coarse potentiometer clockwise.
WHEN the six PPS Bistable Relay Indicating Lights beneath channel 11 are off,
THEN stop turning Coarse potentiometer.

(Step 3 continued on next page)

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ATTACHMENT 14

MSIS RESET

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3. (continued)

NOTE

There is a 10 second time delay between resets of Low SG Pressure setpoint reset.

- e) Depress SG Low Press Setpoint Reset pushbutton to lower variable setpoint by less than 200 psi increments.
- f) Depress Pretrip/Trip Status Indicator Reset pushbutton to clear Pretrip/Trip Indicator lights.
- g) Turn Coarse potentiometer counter clockwise.
WHEN Channel 11 Pretrip Indicator light turns on,
THEN stop turning Coarse potentiometer.
- h) Depress Low SG Press Setpoint Reset pushbutton.
- i) Depress Pretrip/Trip Status Indicator Reset pushbutton to clear Pretrip Indicator light.
- j) Repeat Steps 3.A.2.g through 3.A.2.i.
WHEN variable setpoint on Digital voltmeter does NOT lower,
THEN continue with Step 3.A.2.k.
- k) Release red Test pushbutton.
- l) Place Meter Input Select switch to INPUT.
- m) Place Bistable Select switch to OFF.

(Step 3 continued on next page)

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ATTACHMENT 14

MSIS RESET

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3. (continued)

B. Reset B SG Low Pressure Trip bistables on ALL unbypassed PPS channels as follows:

- 1) Place Test Power Supply Channel Test switch (located bottom 2C23-A) to channel being reset (A, B, C, or D). The white light above selected channel will turn on.

NOTE

Reset of a bypassed channel is unnecessary.

2) Perform the following on Bistable Control Panel Channel drawer being reset:

- a) Place Bistable Select switch to position 12.
- b) Place Meter Input Select switch in TRIP SP.
- c) Depress and hold red Test pushbutton.
- d) Turn Coarse potentiometer clockwise.
WHEN the six PPS Bistable Relay Indicating lights beneath channel 12 go out,
THEN stop turning Coarse potentiometer.

NOTE

There is a 10 second time delay between resets of Low SG Pressure setpoint reset.

- e) Depress SG Low Press Setpoint Reset pushbutton to lower variable setpoint by 200 psi increments.
- f) Depress Pretrip/Trip Status Indicator Reset pushbutton to clear Pretrip/Trip Indicator lights.
- g) Turn Coarse potentiometer counter clockwise.
WHEN Channel 12 Pretrip Indicator Light turns on,
THEN stop turning Coarse potentiometer.
- h) Depress Low SG Pressure Setpoint Reset pushbutton.
- i) Depress Pretrip/Trip Status Indicator Reset pushbutton to clear Pretrip Indicator light.

(Step 3 continued on next page)

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ATTACHMENT 14

MSIS RESET

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3. (continued)

j) Repeat steps 3.B.2.g through 3.B.2.i.
WHEN variable setpoint voltage does NOT lower,
THEN continue with Step 3.B.2.k.

k) Release red Test pushbutton.

l) Place Meter Input Select switch to INPUT.

m) Place Bistable Select switch to OFF.

C. Repeat Steps 3.A.1 through 3.B.2.k for remaining PPS channels.

D. Perform the following to power down reset circuitry:

1) Place Test Power Supply Channel Test switch in OFF.

2) Press "ON" pushbutton (located to right of Test Power Supply Channel Test switch). "ON" light will extinguish.

4. Reset PPS MSIS Actuation Trip Paths (1, 2, 3 or 4):

A. Place LK/UNLK switch to UNLK (key No. 15).

B. Depress MSIS pushbutton on 2C23.

C. Verify trip path lights reset on local PPS status panels.

D. Place LK/UNLK switch to LK and remove key.

E. Repeat steps 4.A through 4.D to reset remaining Actuation Trip Paths.

5. Reset ESF MSIS Actuation:

A. Depress EITHER MSIS Lockout Reset pushbutton on 2C40 AND verify BOTH Reset lights ON.

B. Depress EITHER MSIS Lockout Reset pushbutton on 2C39 AND verify BOTH Reset lights ON.

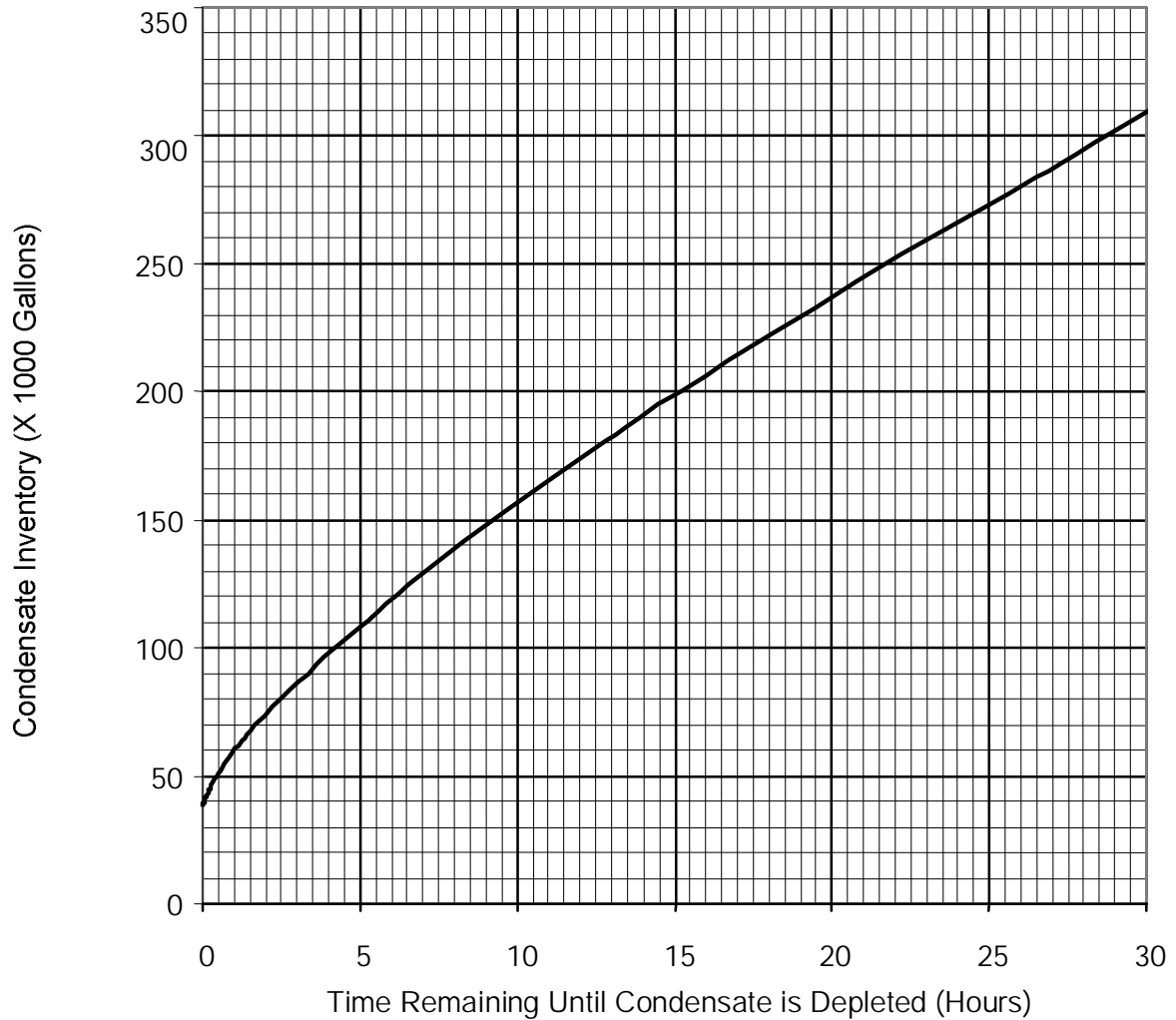
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ATTACHMENT 15

CONDENSATE USAGE

NOTE

This curve can be used to determine time available before SDC required based on available condensate inventory.



Notes: 2T-41A/B volume is approximately 2000 gallons per percent.

"Q" CST volume is approximately 9800 gallons per foot.

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ATTACHMENT 16

RAS VERIFICATION

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Components found in a position other than specified are to be reported to the CRS.

COMPONENT DESCRIPTION	NUMBER	LOCATION	POSITION	√
LPSI PUMP	2P60A	2C17	OFF	
RWT 2T3 OUTLET	2CV-5630-1	2C17	CLOSED	
MINI RECIRC LPSI 2P60A ISOL	2CV-5123-1	2C17	CLOSED	
MINI RECIRC LPSI 2P60B ISOL	2CV-5124-1	2C17	CLOSED	
MINI RECIRC CNTMT SPRAY 2P35A ISOL	2CV-5673-1	2C17	CLOSED	
MINI RECIRC CNTMT SPRAY 2P35B ISOL	2CV-5672-1	2C17	CLOSED	
MINI RECIRC HPSI 2P89A ISOL	2CV-5126-1	2C17	CLOSED	
MINI RECIRC HPSI 2P89B ISOL	2CV-5128-1	2C17	CLOSED	
MINI RECIRC HPSI 2P89C ISOL	2CV-5127-1	2C17	CLOSED	
SW INLET SDN CLG HX 2E35A	2CV-1453-1*	2C17	OPEN	
CNTMT SUMP SUCTION ISOL	2CV-5647-1*	2C17	OPEN	
CNTMT SUMP SUCTION ISOL	2CV-5649-1*	2C17	OPEN	
LPSI PUMP	2P60B	2C16	OFF	
ESF RECIRC HEADER ISOL	2CV-5628-2	2C16	CLOSED	
RWT 2T3 OUTLET	2CV-5631-2	2C16	CLOSED	
SW INLET SDN CLG HX 2E35B	2CV-1456-2*	2C16	OPEN	
CNTMT SUMP SUCTION ISOL	2CV-5648-2*	2C16	OPEN	
CNTMT SUMP SUCTION ISOL	2CV-5650-2*	2C16	OPEN	

* Denotes override capability

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ATTACHMENT 17

LOCA ISOLATION

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Components found in a position other than specified are to be reported to the CRS.

COMPONENT DESCRIPTION	NUMBER	LOCATION	POSITION	√
LTOP RELIEF/ECCS ISOL	2CV-4740-2	2C09	CLOSED (1)	
LTOP RELIEF ISOL	2CV-4731-2	2C09	CLOSED (1)	
LTOP RELIEF ISOL	2CV-4741-1	2C09	CLOSED (1)	
LTOP RELIEF ISOL	2CV-4730-1	2C09	CLOSED (1)	
ECCS PZR VENT VLV	2CV-4698-1	2C09	CLOSED (1)	
SIT DRAIN HEADER TO RWT	2CV-5082	2C33	CLOSED	
SIT DRAIN HEADER TO RDT	2CV-5081	2C33	CLOSED	
SHUTDOWN COOLING RC ISOLATION	2CV-5084-1	2C17	CLOSED	
SHUTDOWN COOLING RC ISOLATION	2CV-5038-1	2C17	CLOSED	
HPSI CV LEAKAGE	2CV-5105-1	2C17	CLOSED	
SHUTDOWN COOLING RC ISOLATION	2CV-5086-2	2C16	CLOSED	
HPSI CV LEAKAGE	2CV-5106-2	2C16	CLOSED	
RX HEAD VENT	2SV-4668-1	2C336-1	CLOSED	
PRESSURIZER VENT	2SV-4636-1	2C336-1	CLOSED	
VENT TO QUENCH TANK	2SV-4669-1	2C336-1	CLOSED	
RX HEAD VENT	2SV-4668-2	2C336-2	CLOSED	
PRESSURIZER VENT	2SV-4636-2	2C336-2	CLOSED	
VENT TO RX BLDG ATMOSPHERE	2SV-4670-2	2C336-2	CLOSED	

NOTE #1: IF LTOP Isolations or ECCS vent open AND Quench Tank parameters normal, THEN maintain valves open at the discretion of the SM/CRS.

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ATTACHMENT 18

RCS TO CCW LEAK ISOLATION

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1. Isolate Letdown by closing Letdown Isolation valve (2CV-4820-2).
2. Cycle Charging pumps as needed to maintain PZR level within 5% of setpoint.
3. Align Loop 2 CCW Surge Tank Vent valve (2CV-5218) to GCH.
4. IF Loop 2 CCW Surge Tank level stops rising OR RCS leak isolated, THEN isolate CCW to Letdown Heat Exchanger as follows:
 - A. Place VCT Bypass to BMS valve (2CV-4826) to BMS.
 - B. Locally close inlet isolation, "2E-29 SUPP ISOL" valve (2CCW-43) located near door to Lower South Piping Penetration room.
 - C. Close Letdown Temperature Control valve (2CV-5261).
 - D. Close Letdown Backpressure Control valves:
 - 2CV-4810
 - 2CV-4811

NOTE

Maximum CCW Surge tank drain rate through 2CCW-5030 is approximately 80 gpm.

5. Locally maintain Loop 2 CCW Surge Tank level 40 to 50% as follows:
 - A. Open "B SURGE TANK DRN" valve (2CCW-1023).
 - B. Throttle "2T-37A/B DRN TO LRW" valve (2CCW-5030).
6. Verify ANY CCW feed and bleed/side-stream filter operation for chemistry control secured.
7. IF RCS leak to CCW still exists, THEN verify RCS Sample Isolation valves closed:
 - 2SV-5833-1
 - 2SV-5843-2

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ATTACHMENT 18

RCS TO CCW LEAK ISOLATION

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8. IF RCS leak to CCW from RCPs, THEN perform the following:
 - A. Verify ALL RCPs stopped.
 - B. Verify BOTH PZR Spray valves in MANUAL and closed.
 - C. Close RCP CCW Supply valve (2CV-5236-1).
 - D. Close RCP CCW Return Isolation valves:
 - 2CV-5254-2
 - 2CV-5255-1
 - E. Close RCP Bleedoff to VCT Isolation valve (2CV-4847-2).
 - F. Close RCP Bleedoff Relief to Quench Tank Isolation valve (2CV-4856).
9. IF RCS leak to CCW from Sample cooler, THEN locally isolate CCW to affected cooler as follows:
 - A. Isolate CCW to RCS Sample Cooler as follows:
 - 1) Close "RCS SAMP CLR O/L ISOL" valve (2CCW-155).
 - 2) Close "RCS SAMP CLR SUPP ISOL" valve (2CCW-52).
 - B. Isolate CCW to Safety Injection and SDC Sample Cooler as follows:
 - 1) Close "SDC HEAT EXCHANGER DISCHARGE SAMPLE ISOLATION" valve (2SV-5655) on 2C116.
 - 2) Close "SDC SUCTION FROM RCS SAMPLE ISOLATION" valve (2SV-5125) on 2C116.
 - 3) Close "2E-51 RTN ISOL" valve (2CCW-59).
 - 4) Close "2E-51 SUPP ISOL" valve (2CCW-58).
10. Notify Chemistry to sample CCW system for activity.
11. Notify Radiation Protection to survey CCW system and post as needed.

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ATTACHMENT 19

CONTROL OF SECONDARY CONTAMINATION

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1. Contact Chemistry to commence sampling Turbine Building Sump for activity.
2. IF directed by Chemistry,
THEN perform the following:

CAUTION

Regen Waste Tank Dumps, Turbine Building Sump Dumps or hotwell rejects to the Flume are considered radioactive liquid releases in this situation.

- A. Isolate uncontrolled Turbine Building Sump release by verifying the following Turbine Building Sump Pump Control switches in OFF:
 - 2P42A (2HS-4300)
 - 2P42B (2HS-4301)
 - 2P42C (2HS-4302)
 - 2P42D (2HS-4303)
 - 2P96 (2HS-4304)
- B. Isolate Corrosion Product Sampling (CPS) system drains to Sump Station No. 1 by closing the following valves: (valves located in 2T-21 Tank Room)
 - 2E-24A Blowdown Line Drain/Corrosion Product Sample (2SGS-1010)
 - 2E-24B Blowdown Line Drain/Corrosion Product Sample (2SGS-1038A)
- C. Initiate action to have SG sample panel drains aligned to Neutralizing tank (2T87) using Neutralizing Tank Operations (2106.027).
- D. At SG Secondary Sample panel (2C377), place the following handswitches in OFF:
 - "2HS-5933"
 - "2HS-5935"
- E. Complete 2104.023 Attachment B, Turbine Building Sump Release Permit for any Turbine Building sump releases.

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ATTACHMENT 19

CONTROL OF SECONDARY CONTAMINATION

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3. Verify Condensate Inlet filter (2F-807) and SG BD filter (2F-808) bypassed and isolated using 2106.024, SU & Blowdown Demineralizer Ops.
4. Coordinate with Chemistry to determine need to place SU/BD DI 2T94A in Normal Flow Service Alignment using 2106.024, SU & Blowdown Demineralizer Ops.
5. Notify Radiation Protection to perform the following:
 - A. Monitor the following areas:
 - Startup and Blowdown Demin area
 - MSIV Room
 - 2T92 Tank Room
 - Secondary System to SG Sample panel (2C377)
 - FW Corrosion Products samplers (near FW heaters 2E1A/2E1B)
 - Unit 2 Turbine Building
 - B. Establish radiologically controlled areas as needed.
6. Maintain Hotwell level by EITHER of the following:
 - Reject to 2T92 Tanks via Startup and Blowdown Demin Service Rinse using 2106.024, SU and Blowdown Demineralizer Ops.
 - Pumping Hotwell to the flume using 2106.016, Condensate and Feedwater Operations.

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ATTACHMENT 19

CONTROL OF SECONDARY CONTAMINATION

Page 3 of 5

7. Locally check the following systems for radioactive release paths and report ANY leaking components to SM:
 - Main Steam
 - Auxiliary Steam
 - Condensate
 - Feedwater

 - Startup and Blowdown Demin
 - Emergency Feedwater
 - Auxiliary Feedwater
8. IF releasing steam from ADVs, MSSVs, or EFW Pump Turbine (2K3),
THEN perform the following:
 - A. Notify Radiation Protection of potential for contaminating ventilation intake filters.
 - B. Notify Radiation Protection to monitor for airborne contamination at CA-2.

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ATTACHMENT 19

CONTROL OF SECONDARY CONTAMINATION

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9. IF determined necessary by Shift Manager, THEN verify the following valves closed and breakers open. Issue Caution Tags to SM with the following statement: "Operation of this component may result in system cross-contamination or an uncontrolled radioactive release. Verify contained fluids activity levels and appropriate release permits completed before repositioning."

COMPONENT DESCRIPTION	NUMBER	LOCATION	√
EXTRACTION STEAM TO PLANT HEATING HX	2AS-3401-A	Plant Heating HX Room	
EXTRACTION STEAM TO PLANT HEATING HX	2AS-3401-C	Plant Heating HX Room	
2CV-2163 ISOLATION	2AS-95	By WCO Desk	
2P7A/B FLUSH TO FLUME	2BD-30	By WCO Desk Near 2CV-1460	
EFW PUMPS CST SUCTION CHECK VALVE BYPASS	2EFW-18	EFW Pump 2P7B Rm	
MAINTENANCE FACILITY STEAM SUPPLY	2AS-117	North End #2 FW Heaters	
UNIT 1 MAIN STEAM TO UNIT 2	2AS-78	Rm off Train Bay Unit 2 side	
2P42A BREAKER	2B32-B3	MCC 2B32	
2P42B BREAKER	2B42-B3	MCC 2B42	
2P42C BREAKER	2B12-C3	MCC 2B12	
2P42D BREAKER	2B22-C3	MCC 2B22	
2P96 BREAKER	2B21-E4	MCC 2B21	
CST A HEATING STEAM	2AS-146	CST Valve Pit	
CST B HEATING STEAM	2AS-140	CST Valve Pit	
CST CROSS-CONNECT TO UNIT 1	2CT-113	CST Valve Pit	

(Step 9 continued on next page)

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ATTACHMENT 19

CONTROL OF SECONDARY CONTAMINATION

9. (continued)

COMPONENT DESCRIPTION	NUMBER	LOCATION	√
SAMP ISOL 2T-41A	2PMU-200	CST VALVE PIT	
CST 2T-41A O/L TO RECYCLE PUMP 2P-195A/B ISOL	2PMU-201	CST VALVE PIT	
2T-41B O2 SAMP O/L ISOL	2PMU-202	CST VALVE PIT	
CST 2T-41B O/L TO RECYCLE PUMP 2P-195A/B ISOL	2PMU-203	CST VALVE PIT	
2T-41A DEGAS TIE-IN ISOL	2PMU-204	CST VALVE PIT	
CST 2T-41A SUPP TO VAC DEGAS 2T-141	2PMU-205	CST VALVE PIT	
CST 2T-41B SUPP TO VAC DEGAS 2T-141	2PMU-206	CST VALVE PIT	
VAC DEGAS 2T-141 RTN TO CST 2T-41B ISOL	2PMU-207	CST VALVE PIT	
SUPP TO CST 2T-41A/B FROM MWTF	2PMU-208	CST VALVE PIT	
MU WATER TO RMWT	2PMU-70	CST VALVE PIT	
MU PLANT TO COND	2PMU-71	CST VALVE PIT	
RMWT HEATING STEAM	2AS-155	RMWT Valve Pit	

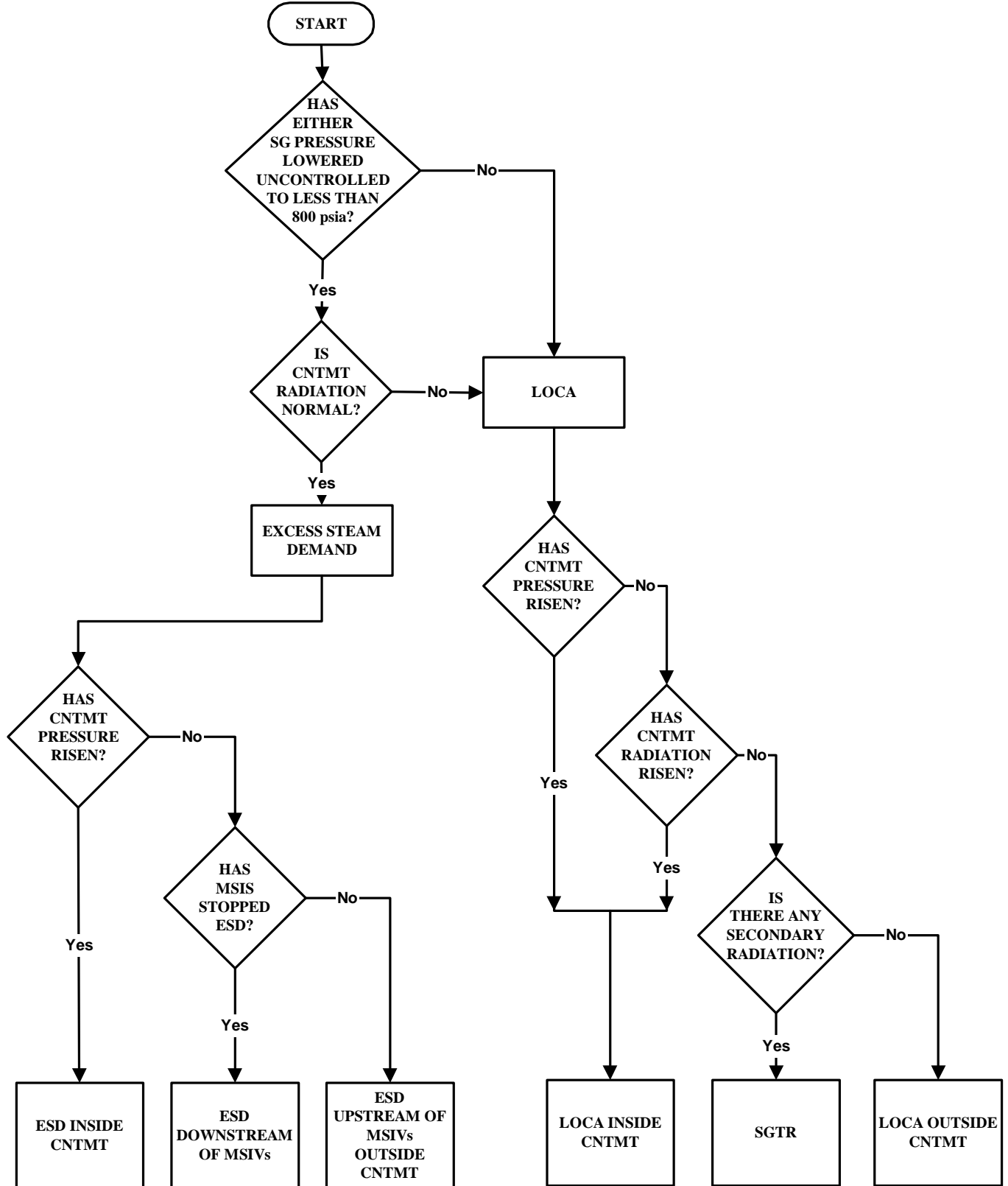
10. Ensure SG sample flows maintained as follows:

- A. Issue Caution Tags to SM with the following statement: "Operation of this component may result in loss of SG sample flow. Unit 2 SM/CRS approval required for component operation."
- B. Locally install Caution Tags at SG Secondary Sample Panel (2C377) handswitches "2HS-5933" and "2HS-5935".

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ATTACHMENT 20

BREAK IDENTIFICATION CHART



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ATTACHMENT 21

RESTORATION OF CCW TO RCPs

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1. Align Controlled Bleedoff as follows:
 - A. IF SIAS OR CIAS NOT actuated, THEN verify RCP Bleedoff to VCT valves open:
 - 2CV-4846-1
 - 2CV-4847-2
 - B. Verify RCP Bleedoff Relief Isolation to Quench Tank valve (2CV-4856) open.
2. IF RCP seal temperatures less than 180°F, THEN restore CCW to RCPs by performing the following:
 - A. Open RCP CCW Supply valve (2CV-5236-1).
 - B. Open RCP CCW Return valve (2CV-5254-2).
 - C. Open RCP CCW Return valve (2CV-5255-1).
 - D. IF unexplained Loop 2 CCW Surge Tank level change observed, THEN perform the following:
 - 1) Verify ALL RCPs stopped.
 - 2) Isolate CCW to RCPs.
 - 3) Verify RCP Bleedoff to VCT valves closed:
 - 2CV-4846-1
 - 2CV-4847-2
 - 4) Verify RCP Bleedoff Relief Isolation to Quench Tank valve (2CV-4856) closed.
3. IF RCP seal temperatures 180°F or greater, THEN restore CCW to RCPs as follows:
 - A. Verify RCP CCW Return valve (2CV-5255-1) closed.
 - B. Verify RCP CCW Supply valve (2CV-5236-1) open.
 - C. Verify RCP CCW Return valve (2CV-5254-2) open.
 - D. Throttle open RCP CCW Return valve (2CV-5255-1) with a single 1 second modulation.

(Step 3 continued on next page)

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ATTACHMENT 21

RESTORATION OF CCW TO RCPs

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3. (continued)

E. IF unexplained Loop 2 CCW Surge Tank level change observed,
THEN perform the following:

- 1) Verify ALL RCPs stopped.
- 2) Isolate CCW to RCPs.
- 3) Verify RCP Bleedoff to VCT valves closed:
 - 2CV-4846-1
 - 2CV-4847-2
- 4) Verify RCP Bleedoff Relief Isolation to Quench Tank valve (2CV-4856) closed.

F. IF RCP seal temperatures greater than 300°F,
THEN use PMS to monitor seal cooldown rate:

RCP	CONTROLLED BLEEDOFF	LOWER SEAL CAVITY
A	T6008	T6009
B	T6018	T6019
C	T6028	T6029
D	T6038	T6039

CAUTION

Cooldown rates greater than 100°F/hr with seal temperatures 180°F or greater may result in RCP Seal failure.

NOTE

Each 1 second modulation equals 80 to 100 gpm.

G. Maintain RCP seal cooldown rate less than 100°F/hr by throttling 2CV-5255-1 with one second modulations.

H. WHEN RCP Seal temperature stable for 15 minutes, THEN fully open 2CV-5255-1.

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ATTACHMENT 21

RESTORATION OF CCW TO RCPs

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4. IF CCW to RCPs can NOT be restored OR Loop 2 CCW Surge Tank level (2LIS-5214) lowers to 13% following restoration, THEN perform the following:
- A. Verify ALL RCPs stopped.
- B. Isolate CCW to RCPs by closing the following valves:
- 2CV-5254-2
 - 2CV-5236-1
 - 2CV-5255-1
- C. Isolate Controlled Bleedoff as follows:
- 1) Verify RCP Bleedoff to VCT valves closed:
- 2CV-4846-1
 - 2CV-4847-2
- 2) Close RCP Bleedoff Relief Isolation to Quench Tank valve (2CV-4856).

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ATTACHMENT 22

LOCA OUTSIDE CNTMT ISOLATION

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1. Check Aux Building Radiation monitors to determine break location.
2. IF Charging pumps running AND "HEADER FLOW LO" annunciator (2K12-B3) in alarm, THEN perform the following:
 - A. Stop ALL Charging pumps.
 - B. Close Charging Header Isolation valve (2CV-4840-2).

NOTE

The following step addresses LPSI header check valve leakage which causes LPSI Header Relief valve (2PSV-5089) to lift.

3. IF in service BMS Holdup Tank level rising, THEN perform the following to isolate leaking check valve:
 - A. Close ONE LPSI Injection MOV.
 - B. IF RCS pressure rising, THEN **RETURN TO** procedure in effect.
 - C. Open LPSI Injection MOV closed in Step 3.A.
 - D. Repeat Steps 3.A through 3.C for remaining injection headers.
4. IF LOCA outside CNTMT can NOT be isolated, THEN perform the following:
 - A. Reset SIAS using Attachment 13, SIAS Reset.
 - B. Verify Emergency Borate valve (2CV-4916-2) closed.
 - C. Attempt to maintain RWT level greater than 6% using 2104.003, Chemical Addition.
 - D. Verify a maximum of ONE HPSI pump running.
 - E. Verify a maximum of ONE LPSI pump running.
 - F. IF CNTMT pressure less than 22.5 psia, THEN stop BOTH CNTMT Spray pumps.

(Step 4 continued on next page)

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ATTACHMENT 22

LOCA OUTSIDE CNTMT ISOLATION

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4. (continued)

G. IF CNTMT pressure 22.5 psia or greater,
THEN verify maximum of ONE CNTMT Spray pump running.

H. Locally open the following breakers:

- 2B51-K1 "2CV-5647-1 CNTMT SUMP ISOLATION"
- 2B52-E4 "2CV-5630-1 RWT OUTLET VALVE"
- 2B52-G3 "2CV-5649-1 CNTMT SUMP ISOLATION"
- 2B61-F3 "2CV-5631-2 RWT OUTLET VALVE"
- 2B61-H2 "2CV-5648-2 CNTMT SUMP ISOLATION"
- 2B62-G3 "2CV-5650-2 CNTMT SUMP ISOLATION"

5. IF RWT level lowers to 6%, THEN perform the following:

A. Stop ALL HPSI pumps.

B. Stop ALL LPSI pumps.

C. Stop ALL CNTMT Spray pumps.

D. Restore RWT level to greater than 6%.

E. WHEN RWT level greater than 6%,
THEN start HPSI, LPSI, and CNTMT Spray pumps as needed.

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ATTACHMENT 23

RCP OPERATING LIMITS

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1. Verify RCS pressure above minimum NPSH requirements per Attachment 1, P-T Limits.
2. Verify PZR level greater than 60% AND stable or rising.
3. Verify MTS 30°F or greater.
4. Verify electrical power available to at least ONE 6900v Non-vital bus.
5. Verify associated SG level 10 to 90% with FW available.
6. Verify selected RCP operating limits satisfied as follows:
 - A. Verify RCP starting interlocks satisfied as follows:
 - 1) "HP OIL LIFT PRESS LO" annunciator (2K11-D2/D4/D6/D8) clear.
 - 2) IF HP Oil Lift pump discharge pressure alarm will NOT clear, THEN defeat alarm using 2103.006, Reactor Coolant Pump Operations, Attachment C.
 - 3) Verify Loop 2 CCW in service.
 - 4) Verify RCP CCW Supply/Return valves open:
 - 2CV-5236-1
 - 2CV-5254-2
 - 2CV-5255-1

NOTE

Opening RCP Bleed-off valves before RCS pressure greater than 100 psia may cause seal damage.

B. WHEN RCS pressure greater than 100 psia, THEN perform the following:

- 1) Verify RCP Bleedoff to VCT valves open:
 - 2CV-4846-1
 - 2CV-4847-2
- 2) IF "CONTROLLED BLEED OFF MANUAL ISOL" valve (2RCP-5) closed, THEN verify 2RCP-5 open.

(Step 6 continued on next page)

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ATTACHMENT 23

RCP OPERATING LIMITS

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6. (continued)

C. Verify the following indications for selected RCP:

- 1) Upper Oil Reservoir greater than 73%.
- 2) Lower Oil Reservoir greater than 73%.
- 3) Bearing temperature less than 194°F.
- 4) Motor Stator Temperature less than 260°F.
- 5) Controlled bleedoff flow indicated.
- 6) Controlled bleedoff temperature less than 180°F.
- 7) "INNER GASKET LEAK" annunciator (2K11-D1/D3/D5/D7) clear.
- 8) "REVERSE ROTATION" annunciator (2K11-C2/C4/C6/C8) clear.

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ATTACHMENT 24

LOCAL BREAKER ALIGNMENT

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1. IF aligning 4160v Non-vital bus 2A1, THEN perform the following:

A. Locally verify the following breakers closed AND open ALL remaining breakers on Load Center 2B1:

BREAKER	DESCRIPTION
2B112	"LC 2B1 SUPPLY"
2B114	"MCC 2B12 SUPPLY"
2B133	"INSTRUMENT AIR COMPRESSOR 2C27A"

B. Locally verify the following breakers closed AND open ALL remaining breakers on Load Center 2B7:

BREAKER	DESCRIPTION
2B712	"LC 2B7 SUPPLY"
2B721	"CCW PUMP 2P33C"

C. Locally verify the following breaker closed AND open ALL remaining breakers on MCC 2B12:

BREAKER	DESCRIPTION
2B12-B2	"CONDENSATE TRANSFER PUMP 2P-9A"

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ATTACHMENT 24

LOCAL BREAKER ALIGNMENT

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2. IF aligning 4160v Non-vital bus 2A2, THEN perform the following:

A. Locally verify the following breakers closed AND open ALL remaining breakers on Load Center 2B2:

BREAKER	DESCRIPTION
2B212	"LC 2B2 SUPPLY"
2B221	"MCC 2B21 SUPPLY"
2B223	"CCW PUMP 2P33B"
2B233	"INSTRUMENT AIR COMPRESSOR 2C27B"

B. Locally verify the following breaker closed and open ALL remaining breakers on MCC 2B21:

BREAKER	DESCRIPTION
2B21-G3	"CONDENSATE TRANSFER PUMP 2P-9B"

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ATTACHMENT 25

LOAD SHEDDING OF VITAL BATTERY LOADS

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1. Locally open RAS Sump and RWT Valve breakers:
 - 2B52-G3 "CNTMT SUMP SUCTION ISOL 2CV-5649-1"
 - 2B52-E4 "RWT 2T3 OUTLET 2CV-5630-1"
 - 2B62-G3 "CNTMT SUMP SUCTION ISOL 2CV-5650-2"
 - 2B61-F3 "RWT 2T3 OUTLET 2CV-5631-2"
2. Place the following pump handswitches in PTL:
 - A. ALL HPSI pumps.
 - B. BOTH LPSI pumps.
 - C. BOTH CNTMT Spray pumps.

CAUTION

Performance of this step will cause full ESFAS actuation.

3. Secure Inverter supplying 120v Vital AC buses 2RS3 (2Y13 or 2Y1113) and 2RS4 (2Y24 or 2Y2224) using 2107.003, Inverter and 120 VAC Electrical System Operation.
4. Establish control of EFW pump (2P7A) as follows:
 - A. IF 2P7A tripped on overspeed, THEN establish local control using 2106.006, Emergency Feedwater Operations.
 - B. IF 2P7A running, THEN use Speed controller (2HIC-0336-2) to control SG levels.

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ATTACHMENT 26

RESTORATION OF VITAL BATTERY LOADS

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1. Verify 120v Vital AC buses 2RS3 and 2RS4 energized from inverter using 2107.003, Inverter and 120 VAC Electrical System Operation.
2. Reset PPS actuation paths that are above setpoint.
3. Locally close RAS RWT Valve breakers:
 - 2B52-E4 "RWT 2T3 OUTLET 2CV-5630-1"
 - 2B61-F3 "RWT 2T3 OUTLET 2CV-5631-2"
4. Place the following pump handswitches in NORMAL:
 - A. TWO HPSI pumps.
 - B. BOTH LPSI pumps.
 - C. BOTH CNTMT Spray pumps.
5. Locally close RAS Sump Valve breakers:
 - 2B52-G3 "CNTMT SUMP SUCTION ISOL 2CV-5649-1"
 - 2B62-G3 "CNTMT SUMP SUCTION ISOL 2CV-5650-2"

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ATTACHMENT 27

PZR SPRAY OPERATION

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1. IF Normal spray operated AND RCS MTS greater than 160°F, THEN complete Table 1 of this attachment.
2. IF RCS pressure can NOT be controlled with Normal spray, THEN manually initiate Aux spray as follows:
 - A. Verify at least ONE Charging pump running.
 - B. IF Regen HX to RCS temperature (2TI-4825) greater than 275°F, THEN isolate letdown to reduce temperature.
 - C. IF Regen HX to RCS temperature (2TI-4825) can NOT be reduced to less than 275°F, THEN complete Table 1 of this attachment.
 - D. IF Regen HX to RCS (2TI-4825) AND PZR water phase (2TI-4627) differential temperature greater than 200°F, THEN complete Table 1 of this attachment.
 - E. Close Regen HX to RCP B/C valves:
 - 2CV-4827-2
 - 2CV-4831-2
 - F. Verify PZR Spray (2CV-4651/2CV-4652) or PZR Spray Isolation valves (2HS-4655/2HS-4653) closed.
 - G. Throttle Aux Spray valve (2CV-4824-2) as necessary.

TABLE 1

TIME		TEMPERATURE		
SPRAY VALVE OPENED	SPRAY VALVE CLOSED	(PZR WATER PHASE) 2TI-4627	2TIS-4607 2TIS-4608 2TI-4825	DIFFERENCE

3. Forward completed form to Unit 2 Systems Engineering, NSSS.

Completed by _____ Date _____.

Reviewed by _____ Date _____.

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ATTACHMENT 28

BORIC ACID REQUIRED FOR SHUTDOWN MARGIN

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1. Determine minimum boron concentration necessary to maintain shutdown margin using 2103.015, Reactivity Balance Calculation for each of the following conditions:

<u>RCS TEMP</u>	<u>MODE</u>	<u>REQUIRED BORON, ppm</u>
525°F	3	_____.
300°F	3	_____.
200°F	4	_____.
80°F	5	_____.

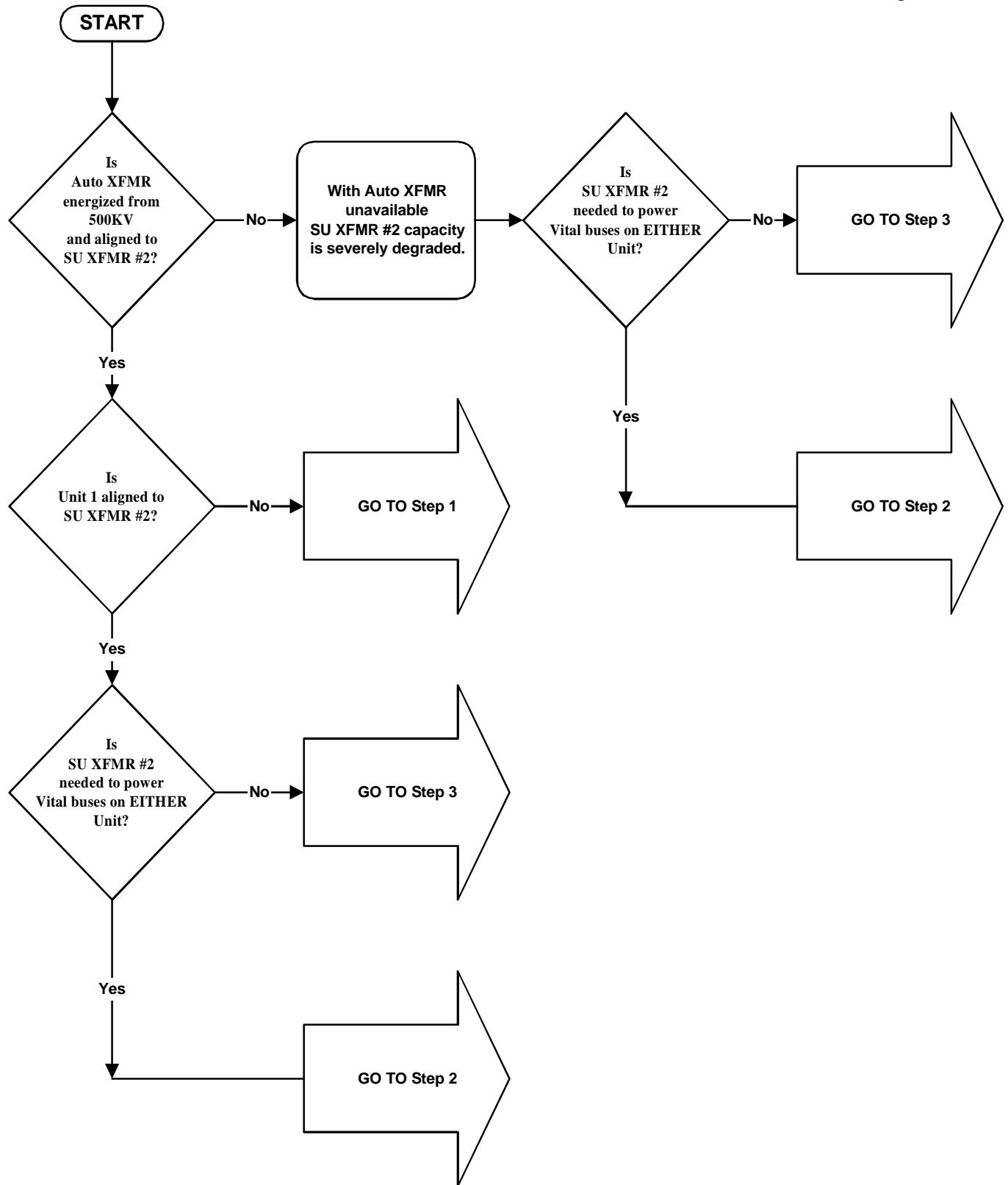
2. Record current boron concentration: _____ ppm
3. Calculate amount of boric acid which must be added using BORON 2 program or 2103.004, Soluble Poison Concentration Control, Attachment A.
 - A. IF RCS cooldown NOT required AND current RCS boron less than concentration of Step 1 for existing plant conditions, THEN **GO TO** Exhibit 1, Emergency Boration.
 - B. IF RCS cooldown required, THEN use maximum concentration of Step 1 and current RCS boron sample to calculate volume of boric acid addition required.
 - C. Determine amount of BAMT volume, in units of percent level, using 2104.003, Chemical Addition, Attachment H.
 _____ % of 2T6 _____ (A or B)
4. IF required boric acid volume has NOT been added, THEN verify Boric Acid aligned from selected BAM tank as follows:
 - A. Associated BAM pump running.
 - B. Emergency Borate valve (2CV-4916-2) open.
 - C. Associated Gravity Feed valve open:
 - 2CV-4920-1
 - 2CV-4921-1
 - D. VCT Outlet valve (2CV-4873-1) closed.
5. WHEN required boric acid volume added, THEN align Boric Acid system as directed by SM.
6. WHEN addition of boric acid calculated in Step 3 complete, THEN notify chemistry to sample RCS for boron.

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STARTUP XFMR #2 USAGE

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STARTUP XFMR #2 USAGE

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1. IF ONLY Unit 2 energizing buses from SU XFMR #2 AND Auto XFMR energized from 500 KV, THEN perform the following:
 - A. Verify Unit 1 NOT energizing ANY buses from SU XFMR #2.
 - B. IF AFW pump 2P75 in service to satisfy Heat Removal safety function, THEN exit this attachment AND restore electrical busses to SU XFMR #2 as directed by Operations Management and Design Engineering.
 - C. Locally verify SU XFMR #2 load shed circuit enabled:
 - Key Lock Switch (143-2H09) at 2H-13 in NORMAL.
 - Key Lock Switch (143-2A16) at 2A-111 in NORMAL.
 - D. IF 2A1 to be energized, THEN place the following breakers in PTL:

BREAKER	DESCRIPTION
2A102	2A1 to 2B1
2A104	2A1 to 2B7
2B324	2C-5A
2B123	2P-33A
2B721	2P-33C

(Step 1 continued on next page)

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STARTUP XFMR #2 USAGE

1. (continued)

- E. IF 2A2 to be energized,
THEN place the following breakers in PTL::

BREAKER	DESCRIPTION
2A202	2A2 to 2B2
2B424	2C-5B
2B223	2P-33B

- F. Energize required Non-vital buses 2A1, 2A2, 2H1, and 2H2 from SU XFMR #2 as follows:

- 1) Monitor and coordinate SU XFMR #2 loading to ensure XFMR MVA limits are NOT exceeded:
 - The following table lists SU XFMR #2 MVA limits based on available cooling method:

XFMR COOLING METHODS	XFMR Winding MVA Limit		
	161 KV	4160v	6900v
Forced air and oil cooling	45 MVA	21 MVA	25 MVA
Forced air cooling only	36 MVA	16.8 MVA	20 MVA
Natural Circ cooling only	27 MVA	12.6 MVA	15 MVA

- 2) Close the following as necessary to energize 4160v non-vital buses:

BREAKER	DESCRIPTION
2A111	SU2 to 2A1
2A211	SU2 to 2A2

- 3) Place synch switch for 2H1 Feeder breaker in ON AND close SU XFMR Feeder breaker 2H13 to energize bus 2H1.
- 4) Place synch switch for 2H2 Feeder breaker in ON AND close SU XFMR Feeder breakers 2H23 to energize bus 2H2.

(Step 1 continued on next page)

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STARTUP XFMR #2 USAGE

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1. (continued)

CAUTION

- **Minimum Non-vital bus voltage during SU XFMR #2 loading is 3640v on 4160v Non-vital buses.**
- **Minimum Non-vital bus voltage during SU XFMR #2 loading is 6010v on 6900v buses.**
- **Minimum 480v Vital bus voltage is 436v when 4160v Vital buses energized.**

G. IF desired to energize 4160v Vital bus 2A3,
THEN perform the following:

- 1) Place synch switch for 2A3 Normal Feeder breaker in ON.
- 2) Hold Normal Feeder breaker (2A309) in closed position for 3 seconds.
- 3) Check voltage indicated on 2A3.

H. IF desired to energize 4160v Vital bus 2A4,
THEN perform the following:

- 1) Place synch switch for 2A4 Normal Feeder breaker in ON.
- 2) Hold Normal Feeder breaker (2A409) in closed position for 3 seconds.
- 3) Check voltage indicated on 2A4.

(Step 1 continued on next page)

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ATTACHMENT 29

STARTUP XFMR #2 USAGE

1. (continued)

- I. IF Loop 2 CCW System NOT in service,
THEN perform the following:

1) Close at least ONE CCW CNTMT Isolation valve:

- 2CV-5255-1
- 2CV-5254-2
- 2CV-5236-1

2) IF CCW CNTMT isolation valves can NOT be closed from Control Room,
THEN locally close "RCP RETURN ISOL" valve (2CV-5255-1).

- J. Verify 480v Non-vital buses 2B1, 2B2, and 2B7 energized by closing as necessary the following breakers:

BREAKER	DESCRIPTION
2A102	2A1 to 2B1
2A104	2A1 to 2B7
2A202	2A2 to 2B2

- K. Locally verify at least ONE IA compressor running.

- L. IF ACW System NOT in service,
THEN restore SW to ACW as follows:

- 1) Verify SW suctions aligned to Lake.
- 2) IF SW suctions can NOT be aligned to Lake, THEN **GO TO** Step 1.O (ONE.OSCAR).
- 3) Restore SW to ACW, refer to Exhibit 5, CCW/ACW/SW Alignment.

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STARTUP XFMR #2 USAGE

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1. (continued)

M. IF necessary,
THEN restore Loop 2 CCW to service as follows:

- 1) IF "2P9A/B DISCH PRESS HI/LO" (2K11-J7) annunciator in alarm,
THEN locally start a Condensate Transfer pump at ONE of the following breakers:
 - 2B12-B2 "CONDENSATE TRANSFER PUMP 2P-9A"
 - 2B21-G3 "CONDENSATE TRANSFER PUMP 2P-9B"

NOTE

Low IA pressure may prevent opening of CCW Cross-Connect valves to Loop 2.

- 2) Verify ONE CCW pump running AND aligned to provide flow to Loop 2 CCW.
- 3) Verify at least ONE CCW/ACW Return valve open:
 - 2CV-1543-1
 - 2CV-1542-2
- 4) Verify at least ONE SW to CCW /Main Chillers Supply valve open:
 - 2CV-1530-1
 - 2CV-1531-2
- 5) IF MSIS or SIAS actuated, THEN maintain SW header pressure greater than 85 psig.
- 6) IF Loop 2 CCW Surge Tank level lowers in an uncontrolled manner,
THEN perform the following:
 - a) Place BOTH Loop 2 CCW pumps in PTL.
 - b) **GO TO** Step 1.O (ONE.OSCAR).
- 7) Restore CCW flow to RCPs using Attachment 21, Restoration of CCW to RCPs.
- 8) Restore letdown using 2102.004, Chemical and Volume Control, if desired.

N. IF necessary,
THEN restore Condenser Vacuum as per 2106.010, Condenser Vacuum System.

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STARTUP XFMR #2 USAGE

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1. (continued)

- O. Verify SU XFMR #2 cooling systems in service by checking "XFMR TROUBLE" annunciator (2K01-C4) clear.

NOTE

Due to SU XFMR #2 limitations it may be desirable to maintain 4160v Vital buses on DGs.

- P. IF SM desires, THEN transfer 4160v Vital buses from DGs to SU XFMR #2 using 2104.036, Emergency Diesel Generator Operations ("Manual Shutdown of 2DG1" OR "Manual Shutdown of 2DG2" section).

NOTE

The following table of thumb rules may be helpful in determining SU XFMR #2 161 KV winding loading limit (current readings are located on Unit 1 panel C10):

INPUT VOLTAGE	45 MVA AMP LIMIT	36 MVA AMP LIMIT	27 MVA AMP LIMIT
169 KV	154 A	123 A	92 A
165 KV	157 A	126 A	94 A
161 KV	161 A	129 A	97 A
157 KV	165 A	132 A	99 A
154 KV	169 A	135 A	101 A
INPUT VOLTAGE	AMPS PER RCP	AMPS PER CW PUMP	AMPS PER COND PUMP
169 KV	23.0 A	20.5 A	13.6 A
165 KV	23.6 A	21.0 A	14.0 A
161 KV	24.2 A	21.5 A	14.3 A
157 KV	24.8 A	22.1 A	14.7 A
154 KV	25.3 A	22.5 A	15.0 A

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STARTUP XFMR #2 USAGE

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1. (continued)

- Q. Additional Non-safety loads may be energized from SU XFMR #2 within limits of the load shed feature at the discretion of the SM, refer to 2107.001, Electrical System Operation.
- R. IF this attachment entered from 2202.008, Station Blackout,
THEN **RETURN TO** Section 2, SU XFMR #2.
- S. **RETURN TO** procedure in effect.

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STARTUP XFMR #2 USAGE

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CAUTION

NO Non-vital loads may be energized if BOTH units aligned to SU XFMR #2 and EITHER Unit energizing Vital buses from SU XFMR #2.

2. IF aligning Vital buses to SU XFMR #2, THEN energize 4160v Vital buses 2A3 and/or 2A4 from SU XFMR #2 by performing the following:

- A. Verify NO Unit 1 Non-vital loads energized from SU XFMR #2.
- B. Perform the following as necessary for any de-energized 4160v non-vital bus:
- 1) Verify the following Feeder Breaker switches in PTL and breakers open:

Energizing 2A1

- 2H13, SU #2 Feeder to 2H1
- 2H14, Unit Aux Feeder to 2H1
- 2H15, SU #3 Feeder to 2H1
- 2H23, SU #2 Feeder to 2H2
- 2H24, Unit Aux Feeder to 2H2
- 2H25, SU #3 Feeder to 2H2
- 2A111, SU #2 Feeder to 2A1
- 2A112, Unit Aux Feeder to 2A1
- 2A113, SU #3 Feeder to 2A1
- 2A212, Unit Aux Feeder to 2A2
- 2A213, SU #3 Feeder to 2A2

Energizing 2A2

- 2H13, SU #2 Feeder to 2H1
- 2H14, Unit Aux Feeder to 2H1
- 2H15, SU #3 Feeder to 2H1
- 2H23, SU #2 Feeder to 2H2
- 2H24, Unit Aux Feeder to 2H2
- 2H25, SU #3 Feeder to 2H2
- 2A112, Unit Aux Feeder to 2A1
- 2A113, SU #3 Feeder to 2A1
- 2A211, SU #2 Feeder to 2A2
- 2A212, Unit Aux Feeder to 2A2
- 2A213, SU #3 Feeder to 2A2

(Step 2 continued on next page)

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STARTUP XFMR #2 USAGE

2. (continued)

2) Verify the following handswitches in PTL and breakers open:

Energizing 2A1		Energizing 2A2	
BREAKER	DESCRIPTION	BREAKER	DESCRIPTION
2A102	2A1 to 2B1	2A202	2A2 to 2B2
2A103	2A1 to 2B3	2A203	2A2 to 2B2
2A104	2A1 to 2B7	2A204	2A2 to 2B4
2A109	2A1 to 2B9	2A209	2A2 to 2B8 2A2 to 2B10

3) Verify the following pump handswitches in PTL and breakers open:

Energizing 2A1		Energizing 2A2	
BREAKER	DESCRIPTION	BREAKER	DESCRIPTION
2P2A	Condensate pump	2P2B	Condensate pump
2P2C	Condensate pump	2P2D	Condensate pump
2P8A	Heater Drain pump	2P8B	Heater Drain pump
2P75	Auxiliary Feed pump		

4) Verify associated Main Chiller handswitch in PTL and breaker open:

Energizing 2A1	Energizing 2A2
2HS-3810	2HS-3812

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STARTUP XFMR #2 USAGE

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2. (continued)

CAUTION

Forced circulation cooling for SU XFMR #2 will NOT be available.

- C. Verify 4160v Non-vital buses 2A1 and/or 2A2 energized by verifying closed the following Feeder breakers:
- 2A111, SU XFMR #2 to 2A1
 - 2A211, SU XFMR #2 to 2A2
- D. IF desired to energize 4160v Vital bus 2A3, THEN perform the following:
- 1) Place synch switch for 2A3 Normal Feeder breaker in ON.
 - 2) Hold Normal Feeder breaker (2A309) in closed position for 3 seconds.
 - 3) Check voltage indicated on 2A3.
- E. IF desired to energize 4160v Vital bus 2A4, THEN perform the following:
- 1) IF 2A3 was energized by previous step, THEN wait for two minutes prior to energizing 2A4.
 - 2) Place synch switch for 2A4 Normal Feeder breaker in ON.
 - 3) Hold Normal Feeder breaker (2A409) in closed position for 3 seconds.
 - 4) Check voltage indicated on 2A4.
- F. IF DG energizing associated bus and SM desires, THEN transfer 4160v Vital bus from DG to SU XFMR #2 using 2104.036, Emergency Diesel Generator Operations ("Manual Shutdown of 2DG1" OR "Manual Shutdown of 2DG2" section).

(Step 2 continued on next page)

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STARTUP XFMR #2 USAGE

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2. (continued)

G. Coordinate SU XFMR #2 loading with Unit 1 to ensure the following:

- 480v Vital buses 2B5 and 2B6 voltage maintained greater than 436v.
- XFMR MVA limits NOT exceeded.
- The following table lists SU XFMR #2 MVA limits:

XFMR COOLING METHODS	XFMR Winding MVA Limit	
	161 KV	4160v
Natural Circ cooling only	27 MVA	12.6 MVA

- The following table of thumb rules may be helpful in determining SU XFMR #2 161 KV winding loading limit (current readings are located on Unit 1 panel C10):

INPUT VOLTAGE	27 MVA AMP LIMIT
169 KV	92 A
165 KV	94 A
161 KV	97 A
157 KV	99 A
154 KV	101 A

H. IF this attachment entered from 2202.008, Station Blackout, THEN **RETURN TO** Section 2, SU XFMR #2.

I. **RETURN TO** procedure in effect.

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STARTUP XFMR #2 USAGE

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CAUTION

Non-vital buses from BOTH Units can only be energized under the following conditions.

- 1. SU XFMR #2 MVA limits NOT exceeded.**
- 2. Load shed NOT bypassed.**
- 3. 4160v Non-vital bus maintained greater than 3640v.**
- 4. 6900v Non-vital bus maintained greater than 6010v.**

3. Energize ONLY Non-vital buses from SU XFMR #2 by performing the following:
 - A. Verify Unit 1 NOT energizing ANY Vital buses from SU XFMR #2.
 - B. IF AFW pump 2P75 in service to satisfy Heat Removal safety function,
THEN exit this attachment AND restore electrical busses to SU XFMR #2 as directed by Operations Management and Design Engineering.
 - C. IF 2A1 to be energized,
THEN place the following breakers in PTL:

BREAKER	DESCRIPTION
2A102	2A1 to 2B1
2A104	2A1 to 2B7
2B324	2C-5A
2B123	2P-33A
2B721	2P-33C

- D. IF 2A2 to be energized,
THEN place the following breakers in PTL:

BREAKER	DESCRIPTION
2A202	2A2 to 2B2
2B424	2C-5B
2B223	2P-33B

(Step 3 continued on next page)

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STARTUP XFMR #2 USAGE

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3. (continued)

E. Energize required Non-vital buses 2A1, 2A2, 2H1, and 2H2 from SU XFMR #2 as follows:

1) Monitor SU XFMR #2 loading to ensure XFMR MVA limits NOT exceeded.

• The following table lists SU XFMR #2 MVA limits:

XFMR COOLING METHODS	XFMR Winding MVA Limit		
	161 KV	4160v	6900v
Forced air and oil cooling	45 MVA	21 MVA	25 MVA
Forced air cooling only	36 MVA	16.8 MVA	20 MVA
Natural Circ cooling only	27 MVA	12.6 MVA	15 MVA

2) Close the following SU XFMR Feeder breakers as necessary to energize the following buses:

BUS	BREAKER
2A1	2A111
2A2	2A211
2H1	2H13
2H2	2H23

F. IF Loop 2 CCW System NOT in service,
THEN perform the following:

1) Close at least ONE RCP CCW Isolation valve:

- 2CV-5255-1
- 2CV-5254-2
- 2CV-5236-1

2) IF CCW CNTMT isolation valves can NOT be closed from Control Room,
THEN locally close "RCP RETURN ISOL" valve (2CV-5255-1).

(Step 3 continued on next page)

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STARTUP XFMR #2 USAGE

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3. (continued)

- G. Verify 480v Non-vital buses 2B1, 2B2, and 2B7 energized by closing as necessary the following breakers:

BREAKER	DESCRIPTION
2A102	2A1 to 2B1
2A104	2A1 to 2B7
2A202	2A2 to 2B2

- H. Locally verify at least ONE IA compressor running.

- I. IF ACW NOT in service,
THEN restore SW to ACW as follows:

- 1) Verify SW suctions aligned to Lake.
- 2) IF SW suctions can NOT be aligned to Lake, THEN **GO TO** Step 3.L.
- 3) Restore SW to ACW, refer to Exhibit 5, CCW/ACW/SW Alignment.

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STARTUP XFMR #2 USAGE

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3. (continued)

J. IF necessary,
THEN restore Loop 2 CCW to service as follows:

- 1) IF "2P9A/B DISCH PRESS HI/LO" (2K11-J7) annunciator in alarm,
THEN locally start a Condensate Transfer pump at ONE of the following breakers:
 - 2B12-B2 "CONDENSATE TRANSFER PUMP 2P-9A"
 - 2B21-G3 "CONDENSATE TRANSFER PUMP 2P-9B"

NOTE

Low IA pressure may prevent opening of CCW Cross-Connect valves to Loop 2.

- 2) Verify ONE CCW pump running AND aligned to provide flow to Loop 2 CCW.
- 3) Verify at least ONE CCW/ACW return valve open:
 - 2CV-1543-1
 - 2CV-1542-2
- 4) Verify at least ONE SW to CCW /Main Chillers supply valve open:
 - 2CV-1530-1
 - 2CV-1531-2
- 5) IF MSIS or SIAS actuated, THEN maintain SW header pressure greater than 85 psig.
- 6) IF Loop 2 CCW Surge Tank level lowers in an uncontrolled manner,
THEN perform the following:
 - a) Place BOTH Loop 2 CCW pumps in PTL.
 - b) **GO TO** Step 3.L.
- 7) Restore CCW flow to RCPs using Attachment 21, Restoration of CCW to RCPs.
- 8) Restore letdown using 2102.004, Chemical and Volume Control, if desired.

(Step 3 continued on next page)

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STARTUP XFMR #2 USAGE

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3. (continued)

K. IF necessary,
THEN restore Condenser Vacuum as per 2106.010, Condenser Vacuum System.

L. IF the following conditions satisfied AND SM desires,

- 4160v Vital buses 2A3/2A4 NOT energized from SU XFMR #2
- Auto XFMR energized from 500 KV
- Unit 1 NOT supplied from SU XFMR #2

THEN locally place SU XFMR #2 load shed Key Lock switches in BYPASS
(bypass key located in SM key cabinet).

- Key Lock switch (143-2H09) at 2H-13
- Key Lock switch (143-2A16) at 2A-111

M. Verify SU XFMR #2 cooling systems in service by checking
"XFMR TROUBLE" annunciator (2K01-C4) clear.

(Step 3 continued on next page)

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STARTUP XFMR #2 USAGE

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3. (continued)

CAUTION

- Minimum Non-vital bus voltage during SU XFMR #2 loading is 3640v on 4160v Non-vital buses.
- Minimum Non-vital bus voltage during SU XFMR #2 loading is 6010v on 6900v buses.

NOTE

The following table of thumb rules may be helpful in determining SU XFMR #2 161 KV winding loading limit (current readings are located on Unit 1 panel C10):

INPUT VOLTAGE	45 MVA AMP LIMIT	36 MVA AMP LIMIT	27 MVA AMP LIMIT
169 KV	154 A	123 A	92 A
165 KV	157 A	126 A	94 A
161 KV	161 A	129 A	97 A
157 KV	165 A	132 A	99 A
154 KV	169 A	135 A	101 A
INPUT VOLTAGE	AMPS PER RCP	AMPS PER CW PUMP	AMPS PER COND PUMP
169 KV	23.0 A	20.5 A	13.6 A
165 KV	23.6 A	21.0 A	14.0 A
161 KV	24.2 A	21.5 A	14.3 A
157 KV	24.8 A	22.1 A	14.7 A
154 KV	25.3 A	22.5 A	15.0 A

N. Start additional loads as desired by SM within primary and secondary winding MVA limits of SU XFMR #2, refer to 2107.001, Electrical System Operation.

O. IF this attachment entered from 2202.008, Station Blackout, THEN RETURN TO Section 2, SU XFMR #2.

P. **RETURN TO** procedure in effect.

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ATTACHMENT 30

BLACKOUT INSTRUMENTATION CABINETS

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1. IF room temperature where cabinet located is greater than outside temperature, THEN consider opening room door.
2. Open the following Control Room cabinet doors:

COMPONENT DESCRIPTION	NUMBER	LOCATION	√
PMS Panels	2C100 A/B/C	Control Room	
SPDS Panel	2C69A	Control Room	
Feed and Condensate Panel	2C02	Control Room	
Reactivity Control Panel	2C03	Control Room	
RCS Control Panel	2C04	Control Room	
Auxiliary Systems Panel	2C14	Control Room	
DG Control Panels	2C33-1,2	Control Room	
ESF Control Panel	2C17	Control Room	
ESF Control Panel	2C16	Control Room	
Electric Plant Panel	2C10	Control Room	
PPS Cabinets	2C23-1,2,3,4	Control Room	
Rad Monitor Cabinet	2C25	Control Room	
Aux Relay Cabinets	2C18-1,2	Control Room	
RVLMS Cabinets	2C388-1,2	Control Room	
Steam Line and PZR Safety Instrumentation Cabinets	2C336-1,2	Control Room	
MTS Cabinets	2C336-3,4	Control Room	
Aux Relay Cabinets	2C21-1,2	Control Room	

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BLACKOUT INSTRUMENTATION CABINETS

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3. Locally open the following cabinet doors:

COMPONENT DESCRIPTION	NUMBER	LOCATION	√
PMS Cabinet	2C92 A/B	Cmptr Rm, 404 EL.	
PMS Cabinet	2C93	Cmptr Rm, 404 EL.	
PMS Cabinet	2C94 A to E	Cmptr Rm, 404 EL.	
PMS Cabinet	2C95	Cmptr Rm, 404 EL.	
Computer Cabinet	2C67	Cmptr Rm, 404 EL.	
Computer Cabinet	2C66	Cmptr Rm, 404 EL.	
SPDS Computer Cabinet	2C35	SPDS Room, 386 EL.	
SPDS Computer Cabinet	2C34	SPDS Room, 386 EL.	
SPDS Computer Cabinet	2C79	SPDS Room, 386 EL.	
SPDS Computer Cabinet	2C78	SPDS Room, 386 EL.	
SPDS Computer Cabinet	2C77	SPDS Room, 386 EL.	
SPDS Computer Cabinet	2C76	SPDS Room, 386 EL.	
SPDS Computer Cabinet	2C43	SPDS Room, 386 EL.	
SPDS Computer Cabinet	2C42	SPDS Room, 386 EL.	
SPDS Computer Cabinet	2C44	SPDS Room, 386 EL.	
SPDS Computer Cabinet	2C41	SPDS Room, 386 EL.	

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BLACKOUT INSTRUMENTATION CABINETS

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3. (continued)

COMPONENT DESCRIPTION	NUMBER	LOCATION	√
Alternate Shutdown Cabinet	2C384	UNEP Room, 386 EL.	
Vital Instrument Inverter	2Y22	MCC 53 Rm, 372 EL.	
Vital Instrument Inverter	2Y24	MCC 53 Rm, 372 EL.	
Vital Instrument Inverter	2Y2224	MCC 53 Rm, 372 EL.	
SPDS Computer Inverter	2Y26	MCC 53 Rm, 372 EL.	
Vital Instrument Inverter	2Y11	DC Equip Rm, 372 EL	
Vital Instrument Inverter	2Y13	DC Equip Rm, 372 EL	
Vital Instrument Inverter	2Y1113	DC Equip Rm, 372 EL	
Plant Computer Inverter	2Y25	2B9, 10 Rm, 372 EL.	
CPC Computer Cabinet	2C398	CPC Room, 372 EL.	
CPC Computer Cabinet	2C399	CPC Room, 372 EL.	
CPC Computer Cabinet	2C400	CPC Room, 372 EL.	
CPC Computer Cabinet	2C401	CPC Room, 372 EL.	
CPC Computer Cabinet	2C395	CPC Room, 372 EL.	
CPC Computer Cabinet	2C396	CPC Room, 372 EL.	
CPC Computer Cabinet	2C397	CPC Room, 372 EL.	

4. Locally open the following cabinet doors in controlled access:

COMPONENT DESCRIPTION	NUMBER	LOCATION	√
CPC Cabinets	2C15-1,2,3,4	CPC Room, 404 EL.	

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ATTACHMENT 31

SDC PUMP VENTING

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1. IF venting SDC pump 2P60B or 2P35B, THEN **GO TO** Step 3 of this Attachment.
2. Vent 2P60A or 2P35A as follows:
 - A. Locally close "LPSI 2P60A SUCT FROM RCS" valve (2SI-1A).
 - B. IF LPSI aligned for SDC,
THEN locally throttle "LPSI 2P60A NORM SUCT" valve (2SI-2A) open.
 - C. Verify RWT Outlet valve (2CV-5630-1) open.
 - D. Locally vent LPSI or CNTMT Spray pump with Pump Discharge Line vents and drains.

2P60A	2SI-1034A	OR	2P35A	2BS-1029A
	2SI-1035A			2BS-1030A
	2SI-1067A			2BS-1006A
	2SI-1068A			2BS-1007A

- E. Locally vent SDC system with SDC Suction Line vents:
 - 2SI-1028
 - 2SI-1029
- F. IF steam binding present in SDC piping, THEN perform the following:
 - 1) Locally open "LPSI 2P60A NORM SUCT" valve (2SI-2A).
 - 2) Open LPSI 2P60A Recirc Isolation valve (2CV-5123-1).
 - 3) Locally open "RWT RECIRC AND TEST LINE RTN ISO" valve (2BS-25).
 - 4) Verify ESF Mini Recirc Header Isolation valve (2CV-5628-2) open.
 - 5) Locally verify "RWT RECIRC AND TEST LINE I/N ISOL" valve (2BS-26) open.
 - 6) Locally open "CONT SPRAY AND LPSI TO RWT RECIRC AND TEST" valve (2SI-18) 10 turns.
 - 7) Start LPSI pump 2P60A.

(Step 2 continued on next page)

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ATTACHMENT 31

SDC PUMP VENTING

2. (continued)

8) WHEN 2P60A has run for 5 minutes, THEN stop 2P60A.

9) Locally close "RWT RECIRC AND TEST LINE RTN ISOL" valve (2BS-25).

10) Locally close "CONT SPRAY AND LPSI TO RWT RECIRC AND TEST" valve (2SI-18).

G. Close LPSI 2P60A Recirc Isolation valve (2CV-5123-1).

H. IF CNTMT Spray aligned for SDC, THEN close RWT Outlet valve (2CV-5630-1).

I. IF LPSI aligned for SDC, THEN locally close "LPSI 2P60A NORM SUCT" valve (2SI-2A).

J. Locally open "LPSI 2P60A SUCT FROM RCS" valve (2SI-1A).

K. **RETURN TO** procedure to restore SDC.

3. Vent 2P60B or 2P35B as follows:

A. Locally close "LPSI 2P60B SUCT FROM RCS" valve (2SI-1B).

B. IF LPSI aligned for SDC, THEN locally throttle "LPSI 2P60B NORM SUCT" valve (2SI-2B) open.

C. Verify RWT Outlet valve (2CV-5631-2) open.

D. Locally vent LPSI or CNTMT Spray pump with Pump Discharge Line vents and drains:

2P60B	2SI-1034B	OR	2P35B	2BS-1029B
	2SI-1035B			2BS-1030B
	2SI-1067B			2BS-1006B
	2SI-1068B			2BS-1007B

E. Locally vent SDC system with SDC Suction Line vents:

- 2SI-1028
- 2SI-1029

(Step 3 continued on next page)

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ATTACHMENT 31

SDC PUMP VENTING

3. (continued)

F. IF steam binding is present in SDC piping, THEN perform the following:

- 1) Locally open "LPSI 2P60B NORM SUCT" valve (2SI-2B).
- 2) Open LPSI 2P60B Recirc Isolation valve (2CV-5124-1).
- 3) Locally open "RWT RECIRC AND TEST LINE RTN ISO" valve (2BS-25).
- 4) Verify ESF Mini Recirc Header Isolation valve (2CV-5628-2) open.
- 5) Locally verify "RWT RECIRC AND TEST LINE I/N ISOL" valve (2BS-26) open.
- 6) Locally open "CONT SPRAY AND LPSI TO RWT RECIRC AND TEST" valve (2SI-18) 10 turns.
- 7) Start LPSI pump 2P60B.
- 8) WHEN 2P60B has run for 5 minutes, THEN stop 2P60B.
- 9) Locally close "RWT RECIRC AND TEST LINE RTN ISOL" valve (2BS-25).
- 10) Locally close "CONT SPRAY AND LPSI TO RWT RECIRC AND TEST" valve (2SI-18).
- 11) Close LPSI 2P60B Recirc Isolation valve (2CV-5124-1).

G. IF CNTMT Spray aligned for SDC, THEN close RWT Outlet valve (2CV-5631-2).

I. IF LPSI aligned for SDC, THEN locally close "LPSI 2P60B NORM SUCT" valve (2SI-2B).

J. Locally open "LPSI 2P60B SUCT FROM RCS" valve (2SI-1B).

4. **RETURN TO** procedure to restore SDC.

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ATTACHMENT 32

CNTMT EVACUATION CHECKLIST

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1. IF Outage Desk manned, THEN notify Shift Outage Manager of the condition.
2. Determine time to start CNTMT evacuation and closure as follows:

NOTE

CETs and ATS will NOT be operable with Reactor Vessel Head removed.

- A. IF RCS in reduced inventory AND CETs NOT available, THEN perform the following:
 - 1) Verify CNTMT purge secured using 2104.033, Containment Atmosphere Control.
 - 2) **GO TO** Step 5.B of this Attachment AND initiate CNTMT evacuation and closure.
- B. IF CETs or RVLMS ATS operable, THEN determine time to boiling as follows:

- 1) Determine and record RCS heatup rate.

_____ F/min
heatup rate

- 2) Determine and record saturation temperature using steam tables and present RCS pressure.

_____ F
saturation temperature (T_{SAT})

- 3) Solve for time to boiling:

$$\frac{\{T_{SAT}\} - \{RCS \text{ temp}\}}{\{\text{heatup rate}\}} = \text{time to boiling } \{t3\}$$

$$\frac{\{ \quad F \} - \{ \quad F \}}{\{ \quad F/min \}} = \quad \text{minutes}$$

- 4) Record time to boil (t3) in step 2.E.

(Step 2 continued on next page)

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ATTACHMENT 32

CNTMT EVACUATION CHECKLIST

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2. (continued)

C. Record time SDC was lost {t1} (From 2203.029, Loss of Shutdown Cooling Step 1).

D. IF time to boiling can NOT be calculated,
THEN record time to boiling from Control Room logs in Step 2.E.

E. Calculate time to start CNTMT evacuation and closure as follows:

$$\{ \underline{t1} \} + [\{ \underline{t3} \} - 30 \text{ minutes}] = \{ \underline{\text{time to start Step 5}} \}$$

$$\underline{\hspace{1cm}} + [\underline{\hspace{1cm}} - 30 \text{ minutes}] = \underline{\hspace{1cm}}.$$

3. Verify CNTMT purge secured using 2104.033, Containment Atmosphere Control.

4. WHEN RCS temperature greater than 180°F, THEN perform the following:

A. Locally verify "RWT RECIRC AND TEST LINE" valve (2BS-26) open.

B. Place ONE HPSI pump handswitch in NORMAL AFTER STOP.

C. WHEN RCS temperature greater than 195°F, THEN verify the following on PPS inserts:

1) HI/LO SG Level Bypass Permissive lights extinguished.

2) IF HI/LO SG Bypass Permissive lights do NOT extinguish,
THEN place associated handswitch in NORMAL.

3) Verify NORMAL lights are ON.

4) Verify at least 3 channels operable.

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ATTACHMENT 32

CNTMT EVACUATION CHECKLIST

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NOTE

The following are examples of events where SDC may NOT be able to be restored.

- A rupture exists in the SDC system that would prevent SDC from being returned to service.
- No SDC pumps available due to equipment or electrical failure.
- SDC suction line valves can NOT be opened by any means.
- SW flow can NOT be established to at least ONE SDC HX.

5. IF time to start CNTMT evacuation and closure reached OR SDC can NOT be restored, THEN perform the following:
- A. Obtain SM concurrence for CNTMT evacuation and closure.
- B. Perform 1015.008, Attachment F, Containment Closure Checklist.
- C. IF Refueling Canal empty OR RCS level lowering, THEN locally perform the following:
- 1) Verify Traveling Sheave Assembly retrieved, refer to 2503.003, Operation of Fuel Handling Equipment.
 - 2) Verify "FUEL TRANSFER TUBE" valve (2CV-5432) closed.
- D. Notify Radiation Protection to evacuate CNTMT of all personnel NOT involved with CNTMT closure.
- E. Make the following announcement on Plant Page system:
- Attention all personnel. Attention all personnel. A Unit 2 CNTMT evacuation is required. All personnel except those performing CNTMT closure evacuate CNTMT.
- F. Actuate CNTMT Evacuation alarm on 2C22.
- G. Repeat Steps 5.E and F one time.
- H. Attempt to establish CNTMT cooling using 2104.033, Containment Atmosphere Control.
- I. IF CNTMT coolers operating, THEN verify chilled water or Service Water aligned to CNTMT coolers.

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ATTACHMENT 33

RCS LEVEL

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1. IF bubble in PZR, THEN maintain PZR level 29 to 82%.
2. IF bubble NOT in PZR, THEN maintain RCS Level per Table 1.
3. Verify indicated PZR or RCS level greater than minimum level for SDC, prior to starting SDC pump.

TABLE 1

2LI-4791/ 2LI-4792 (INCHES)	RCS CONDITION	RCS LOCAL LEVEL INDICATION
388	REFUELING	401 Ft 5 1/2 Inches
286	40 % PZR LEVEL	392 Ft 11 1/2 Inches
239	23 FEET ABOVE FUEL	389 Ft 1/2 Inches
200	10% PZR LEVEL	385 Ft 9 1/4 Inches
120	PZR HEATER	379 Ft 1 1/2 Inches
90	HEAD REMOVAL	376 Ft 7 1/2 Inches
70	SAFETY INJECTION CHECK VALVE	374 Ft 11 1/2 Inches
42	SEAL REPLACEMENT/HOT LEG FULL	372 Ft 7 1/2 Inches
32	NITROGEN PURGE	371 Ft 9 1/2 Inches
25	SG TUBE PLUGGING	371 Ft 2 1/2 Inches
19	MINIMUM LEVEL FOR SDC	370 Ft 8 1/2 Inches
0	BOTTOM OF HOT LEG	369 Ft 1 1/2 Inches

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ATTACHMENT 34

RCS WATER SOLID OPERATIONS

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CAUTION

- RCS pressure is sensitive to inventory and temperature changes during water solid conditions.
- Pressure excursions during water solid conditions may result in RCS over pressurization, challenging PZR safety valves, or RCS pressurized thermal shock.

NOTE

Parameters in brackets [] reflect normal values corrected for harsh CNTMT environment with CNTMT temperature greater than 200°F or CNTMT radiation greater than 10^5 R/hr.

1. WHEN changing RCS temperature, pressure, and inventory, THEN make controlled changes AND allow time to monitor effect.
2. Minimize void formation in SG U-tubes by maintaining BOTH SGs pressure less than RCS pressure.
3. IF establishing PZR or RCS bubble NOT desired, THEN **RETURN TO** procedure in effect.

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RCS WATER SOLID OPERATIONS

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4. IF desired to establish PZR or RCS bubble, THEN perform the following:
- A. Check at least ONE intact SG available for Heat Removal by EITHER of the following:
- SG level 10 to 90% [20 to 90%] with FW available.
 - SG level being restored with total FW flow greater than 485 gpm.
- B. IF intact SG NOT available for Heat Removal, THEN **RETURN TO** procedure in effect.
- C. Determine PZR and RCS temperature by the following:
- PZR temperature
 - SPDS point CV2DOMEA
 - SPDS point CV2DOME B
- D. Check PZR and RCS temperature within P-T limits for current RCS pressure, refer to Attachment 1, P-T Limits.
- E. Energize ALL available PZR heaters.
- F. Commence RCS cooldown as follows:
- 1) Monitor cooldown rate as follows:
 - a) Record RCS T_C and PZR temperature using Attachment 8, RCS Cooldown Table.
 - b) Plot RCS pressure versus RCS T_C using Attachment 1, P-T Limits every 15 minutes.
 - 2) Initiate RCS cooldown using SDBCS Bypass valves or ADVs.
- G. Maintain RCS pressure within P-T limits, refer to Attachment 1, P-T Limits.

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ATTACHMENT 34

RCS WATER SOLID OPERATIONS

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CAUTION

Throttling HPSI flow without meeting HPSI termination criteria may result in fuel damage.

NOTE

During RCS cooldown, a steam bubble may form in the PZR or Reactor Vessel head.

5. WHEN RCS cooldown commenced, THEN perform the following:
- A. IF HPSI termination criteria satisfied, THEN maintain PZR level 29 to 80% [50 to 70%] using Charging and HPSI.
 - B. IF head bubble established as indicated by RVLMS LVL 01 DRY, THEN maintain RVLMS LVL 03 WET using Charging and HPSI.
 - C. Place Letdown in service as follows:
 - 1) Check Letdown should be established.
 - 2) IF Letdown will NOT be re-established, THEN **RETURN TO** procedure in effect.
 - 3) IF SIAS actuated, THEN perform the following:
 - a) Perform Attachment 35, Boric Acid Alignment for Cooldown.
 - b) Reset SIAS using Attachment 13, SIAS Reset.
 - c) IF SIAS can NOT be reset, THEN **RETURN TO** procedure in effect.
 - 4) Establish Letdown using 2104.002, Chemical and Volume Control.
 - D. **RETURN TO** procedure in effect.

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ATTACHMENT 35

BORIC ACID ALIGNMENT FOR COOLDOWN

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NOTE

The following alignment prevents re-position of valves upon reset of SIAS.

1. Verify BAM pumps running.
2. Place Emergency Borate valve (2CV-4916-2) handswitch in OPEN.
3. Place Gravity Feed Valve handswitches in OPEN:
 - 2CV-4920-1
 - 2CV-4921-1
4. Place VCT Outlet valve (2CV-4873-1) handswitch in CLOSE.
5. Charging Pump Suction Source from RWT Valve (2CV-4950-2) handswitch in CLOSE.

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ATTACHMENT 36

SIT ISOLATION

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1. IF SIAS actuated, THEN perform the following:
 - A. IF adequate shutdown margin NOT established using Attachment 28, Boric Acid Required for Shutdown Margin, THEN perform Attachment 35, Boric Acid Alignment for Cooldown.
 - B. Reset SIAS using Attachment 13, SIAS Reset.
2. Locally remove danger tags, unlock, and close the following breakers:

			√		√		√
"SIT 2T2A OUTLET"	2CV-5003-1 (2B51-F2)	Danger Tag removed	—	Lock removed	—	Bkr closed	—
"SIT 2T2B OUTLET"	2CV-5023-1 (2B51-H1)	Danger Tag removed	—	Lock removed	—	Bkr closed	—
"SIT 2T2C OUTLET"	2CV-5043-2 (2B61-F2)	Danger Tag removed	—	Lock removed	—	Bkr closed	—
"SIT 2T2D OUTLET"	2CV-5063-2 (2B61-H1)	Danger Tag removed	—	Lock removed	—	Bkr closed	—

3. Close SIT Outlet valves.
4. IF ANY SIT can NOT be isolated, THEN vent or drain affected SIT using 2104.001, Safety Injection Tank Operation.

CAUTION

Gloves and face shield are required personnel protection to work inside breaker cubicles.

5. IF affected SIT can NOT be vented or drained, THEN locally close SIT Outlet valve by depressing contactor on right side of valve controller inside breaker cubicle:
 - 2B51-F2 "SIT 2T2A OUTLET", 2CV-5003-1
 - 2B51-H1 "SIT 2T2B OUTLET", 2CV-5023-1
 - 2B61-F2 "SIT 2T2C OUTLET", 2CV-5043-2
 - 2B61-H1 "SIT 2T2D OUTLET", 2CV-5063-2
6. IF affected SIT can NOT be isolated, vented, or drained, THEN notify CRS.

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SIT ISOLATION

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7. Locally open the following breakers:

- 2B51-F2 "SIT 2T2A OUTLET", 2CV-5003-1
- 2B51-H1 "SIT 2T2B OUTLET", 2CV-5023-1
- 2B61-F2 "SIT 2T2C OUTLET", 2CV-5043-2
- 2B61-H1 "SIT 2T2D OUTLET", 2CV-5063-2

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ATTACHMENT 37

NON-VITAL AUXILIARY RESTORATION FROM SU XFMR #3

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1. Energize 480v Non-vital buses 2B1, 2B2, and 2B7 by closing the following breakers.

BREAKER	DESCRIPTION
2A102	2A1 to 2B1
2A104	2A1 to 2B7
2A202	2A2 to 2B2

CAUTION

IA operated components may reposition as IA pressure is restored.

2. Locally verify at least ONE IA compressor running.

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ATTACHMENT 37

NON-VITAL AUXILIARY RESTORATION FROM SU XFMR #3

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3. Restore Loop 2 CCW to service as follows:
- A. Verify SW suction aligned to Lake.
- B. IF SW suction can NOT be aligned to Lake, THEN perform the following:
- 1) Verify SW to CCW and ACW isolated.
 - 2) Verify CCW/ACW Return valves closed:
 - 2CV-1543-1
 - 2CV-1542-2
 - 3) **RETURN TO** procedure in effect.
- C. IF "2P9A/B DISCH PRESS HI/LO" annunciator (2K11-J7) in alarm, THEN locally start ONE Condensate Transfer pump:
- 2B12-B2 "CONDENSATE TRANSFER PUMP 2P-9A"
 - 2B21-G3 "CONDENSATE TRANSFER PUMP 2P-9B"

NOTE

Low IA pressure may prevent operation of CCW Cross-Connect valves.

- D. Verify ONE CCW pump running AND aligned to provide flow to Loop 2 CCW:
- 2P33B
 - 2P33C
- E. Verify at least ONE CCW/ACW Return valve open:
- 2CV-1543-1
 - 2CV-1542-2

(Step 3 continued on next page)

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NON-VITAL AUXILIARY RESTORATION FROM SU XFMR #3

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3. (continued)

F. Verify at least ONE SW to CCW /Main Chillers Supply valve open:

- 2CV-1530-1
- 2CV-1531-2

G. Verify SW aligned to ACW.

H. IF unexplained Loop 2 CCW Surge Tank level change observed,
THEN perform the following:

- 1) Place BOTH Loop 2 CCW pumps in PTL.
- 2) **GO TO** Step 10.

4. Notify Chemistry to sample RCS for:

- Iodine 2 to 6 hours following Reactor trip from greater than 15% power.
- Boron

5. Restore CCW flow to RCPs using Attachment 21, Restoration of CCW to RCPs.

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ATTACHMENT 37

NON-VITAL AUXILIARY RESTORATION FROM SU XFMR #3

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6. Check RCP restart criteria satisfied as follows:
 - A. Electrical power available to at least ONE 6900v bus.
 - B. CCW established to RCPs.
 - C. RCP Controlled Bleedoff temperatures less than 180°F.
 - D. High temperature alarms clear on desired RCPs.
 - E. PZR level at setpoint and controlled.
 - F. IF LTOPs in service,
THEN verify PZR level less than 67%.
 - G. At least ONE SG available for Heat Removal by EITHER of the following:
 - Level 10 to 90% with FW available.
 - Level being restored with total FW flow of 485 gpm or greater.
 - H. RCP NPSH satisfied, refer to Attachment 1, P-T Limits.
 - I. RCP Bleedoff to VCT Isolation valves open:
 - 2CV-4846-1
 - 2CV-4847-2
 - J. RCP operating limits satisfied using 2103.006, Reactor Coolant Pump Operations.
7. IF RCP restart criteria NOT satisfied, THEN **GO TO** Step 9.

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NON-VITAL AUXILIARY RESTORATION FROM SU XFMR #3

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8. Perform the following to restart RCPs:
 - A. Start ONE RCP in EACH loop using 2103.006, Reactor Coolant Pump Operations.
 - B. IF at least ONE RCP can NOT be started, THEN **GO TO** Step 9.
 - C. Check proper RCP NPSH using Attachment 1, P-T Limits.
 - D. IF RCP NPSH NOT satisfied, THEN perform the following:
 - 1) Stop ALL RCPs.
 - 2) Verify BOTH PZR Spray valves in MANUAL and closed.
 - E. IF PZR level less than 29%, THEN verify PZR heaters OFF.
 - F. Operate Charging pumps or HPSI pumps as needed to maintain PZR level 29 to 80%.
 - G. Verify PZR Spray valve handswitch for running RCP in AUTO.
9. WHEN PZR level greater than 29%,
THEN place Letdown in service using 2104.002, Chemical and Volume Control.
10. Verify Control Room chiller running.
11. IF Control Room chiller NOT available, THEN verify Emergency Control Room chiller running, refer to 2104.007, Emergency Control Room Air Conditioning and Ventilation.
12. Verify Main Chiller running, refer to 2104.026, Main Chilled Water System.

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ATTACHMENT 37

NON-VITAL AUXILIARY RESTORATION FROM SU XFMR #3

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13. Verify MSR Steam Supply valves from SGs closed:
 - 2CV-0400
 - 2CV-0460
14. IF MSIVs closed, THEN perform the following:
 - A. IF MSIS OR CSAS actuated, THEN reset MSIS using Attachment 14, MSIS Reset AND reset CSAS.
 - B. Open MSIV Bypass valves.
 - C. WHEN SG and Main Steam pressure within 50 psi, THEN open MSIVs.
15. Establish RCS temperature control as follows:
 - A. Verify SDBCS reset using 2105.008, Steam Dump and Bypass Control System Operation.
 - B. Maintain RCS temperatures using SDBCS Bypass valves or ADVs.
16. Restore Circulating Water System to service using 2104.008, Circulating Water System Operation.
17. Establish Condenser vacuum using 2106.010, Condenser Vacuum System.
18. IF Loop 2 CCW in service, THEN restore MFW and Condensate system to service on short path recirculation through demineralizer using 2106.016, Condensate and Feedwater Operation.
19. WHEN at least ONE Condensate pump running AND SU/BD DI in service, THEN locally unlock and open "SU/BD DI TO EFWP SUCT" valve (2EFW-0706).
20. **RETURN TO** procedure in effect.

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ATTACHMENT 38

NON-VITAL AUXILIARY RESTORATION FROM SU XFMR #2

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1. Verify Control Room chiller running.
2. IF Control Room chiller NOT available, THEN verify Emergency Control Room chiller running, refer to 2104.007, Emergency Control Room Air Conditioning and Ventilation.
3. IF CNTMT temperature and pressure rising, THEN perform the following:
 - A. Verify ALL available CNTMT coolers running and SW aligned.
 - B. IF SU XFMR #2 load shed bypassed AND 4160v load limit allows, THEN start ONE Main chiller, refer to 2104.026, Main Chilled Water System.
4. IF Loop 2 CCW NOT restored, THEN **GO TO** Step 9.

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ATTACHMENT 38

NON-VITAL AUXILIARY RESTORATION FROM SU XFMR #2

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5. Check RCP restart criteria satisfied as follows:
 - A. Electrical power available to at least ONE 6900v bus.
 - B. CCW established to RCPs.
 - C. RCP Controlled Bleedoff temperatures less than 180°F.
 - D. High temperature alarms clear on desired RCPs.
 - E. PZR level at setpoint and controlled.
 - F. IF LTOPs in service,
THEN verify PZR level less than 67%.
 - G. At least ONE SG available for Heat Removal by EITHER of the following:
 - Level 10 to 90% with FW available.
 - Level being restored with total FW flow of 485 gpm or greater.
 - H. RCP NPSH satisfied, refer to Attachment 1, P-T Limits.
 - I. RCP Bleedoff to VCT Isolation valves open:
 - 2CV-4846-1
 - 2CV-4847-2
 - J. RCP operating limits satisfied using 2103.006, Reactor Coolant Pump Operations.
6. IF RCP restart criteria NOT satisfied, THEN **GO TO** Step 8.

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NON-VITAL AUXILIARY RESTORATION FROM SU XFMR #2

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7. Perform the following to restart RCPs:
 - A. Start ONE RCP in EACH loop using 2103.006, Reactor Coolant Pump Operations.
 - B. IF at least ONE RCP can NOT be started, THEN **GO TO** Step 8.
 - C. Check proper RCP NPSH using Attachment 1, P-T Limits.
 - D. IF RCP NPSH NOT satisfied, THEN perform the following:
 - 1) Stop ALL RCPs.
 - 2) Verify BOTH PZR Spray valves in MANUAL and closed.
 - E. IF PZR level less than 29%, THEN verify PZR heaters OFF.
 - F. Operate Charging pumps or HPSI pumps as needed to maintain PZR level 29 to 80%.
 - G. Verify PZR Spray valve handswitch for running RCP in AUTO.
8. WHEN PZR level greater than 29%,
THEN place Letdown in service using 2104.002, Chemical and Volume Control.

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NON-VITAL AUXILIARY RESTORATION FROM SU XFMR #2

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9. Verify MSR Steam Supply valves from SGs closed:
 - 2CV-0400
 - 2CV-0460
10. IF MSIVs closed, THEN perform the following:
 - A. IF MSIS OR CSAS actuated, THEN reset MSIS using Attachment 14, MSIS Reset AND reset CSAS.
 - B. Open MSIV Bypass valves.
 - C. WHEN SG and Main Steam pressure within 50 psi, THEN open MSIVs.
11. Establish RCS temperature control as follows:
 - A. Verify SDBCS reset using 2105.008, Steam Dump and Bypass Control System Operation.
 - B. Maintain RCS temperatures using SDBCS Bypass valves or ADVs.
12. Restore ONE Circulating Water pump to service using 2104.008, Circulating Water System Operation.
13. Establish Condenser vacuum using 2106.010, Condenser Vacuum System.
14. IF Loop 2 CCW in service, THEN restore MFW and Condensate system to service on short path recirculation through demineralizer using 2106.016, Condensate and Feedwater Operation.
15. WHEN at least ONE Condensate pump running AND SU/BD DI in service, THEN locally unlock and open "SU/BD DI TO EFWP SUCT" valve (2EFW-0706).
16. **RETURN TO** procedure in effect.

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ATTACHMENT 39

SG BACKFLOW LOG

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1. Calculate Projected Final RCS Boron as follows:
 - A. $\text{SG Level Initial} - \text{SG Level Final} = \text{Projected SG Volume}$
 - B. $(\text{Projected SG Volume} \div 2) \times .01 = \text{Boron Reduction Factor}$
 - C. $\text{RCS Boron Initial} \times \text{Boron Reduction Factor} = \text{Boron Reduction}$
 - D. $\text{RCS Boron Initial} - \text{Boron Reduction} = \text{Projected Final RCS Boron}$
2. IF Projected Final RCS Boron less than required shutdown margin using Attachment 28, Boric Acid Required for Shutdown Margin, THEN verify emergency boration in progress using Exhibit 1, Emergency Boration.
3. Calculate Projected Final RCS Boron for EACH SG backflow evolution.

SG BACKFLOW		SG LEVEL		RCS BORON	
START TIME	STOP TIME	INITIAL	FINAL	INITIAL	PROJECTED FINAL

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ATTACHMENT 40

INVERTER SHUTDOWN AND DC BREAKER ALIGNMENT

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1. Locally verify Inverters 2Y11, 2Y13, 2Y1113, 2Y22, 2Y24 and 2Y2224 shutdown as follows:

<u>Action:</u>	2Y11 (√)	2Y13 (√)	2Y1113 (√)	2Y22 (√)	2Y24 (√)	2Y2224 (√)
A. Place "MANUAL BYPASS SWITCH" to ALTERNATE SOURCE position.	_____	_____	_____	_____	_____	_____
B. Open "120 VAC INVERTER OUTPUT" (B-2) breaker.	_____	_____	_____	_____	_____	_____
C. Open "125 VDC INPUT" (B-1) breaker.	_____	_____	_____	_____	_____	_____

2. Locally shutdown Inverter 2Y25 using 2107.003, Inverter and 120 VAC Electrical System Operation.

3. Locally open the following breakers:

- 2D21-01 "6900V SWITCHGEAR 2H1"
- 2D21-03 "4160v SWITCHGEAR 2A101"
- 2D23-04 "4160v SWITCHGEAR 2A3"
- 2D22-01 "6900V SWITCHGEAR 2H2"
- 2D22-03 "4160v SWITCHGEAR 2A201"
- 2D24-04 "4160v SWITCHGEAR 2A4"

4. Locally open the following breakers:

- 2D27-B1 "2CV-1037-1 2P7A DISCHARGE TO SG-A"
- 2D27-B2 "2CV-1039-1 2P7A DISCHARGE TO SG-B"
- 2D26-A4 "2CV-1026-2 2P7A DISCHARGE TO SG-A"
- 2D26-C1 "2CV-1076-2 2P7A DISCHARGE TO SG-B"
- 2D26-B1 "EFW 2P-7A STM ISOL 2CV-0340-2"

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ATTACHMENT 41

CSAS VERIFICATION

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Components found in a position other than specified are to be reported to the CRS.

COMPONENT DESCRIPTION	NUMBER	LOCATION	POSITION	✓
CONDENSATE PUMP	2P2A**	2C02	OFF	
CONDENSATE PUMP	2P2C	2C02	OFF	
HEATER DRAIN PUMP	2P8A	2C02	OFF	
MFWPT 2K2A SPEED CONTROL	2SC-0321	2C02	TRIPPED	
MFWPT 2K2B SPEED CONTROL	2SC-0310	2C02	TRIPPED	
HEATER DRAIN PUMP	2P8B	2C02	OFF	
CONDENSATE PUMP	2P2B	2C02	OFF	
CONDENSATE PUMP	2P2D**	2C02	OFF	
AUXILIARY FEEDWATER PUMP	2P75**	2C02	OFF	
FEEDWATER BLOCK VALVES TO SG-A	2CV-1024-1*	2C17	CLOSED	
FEEDWATER BLOCK VALVES TO SG-B	2CV-1074-1*	2C17	CLOSED	
MSIV HEADER #1	2SV-1010-1A	2C17	CLOSED	
CNTMT SPRAY PUMP	2P35A	2C17	ON	
CNTMT SPRAY HEADER ISOLATION VALVE	2CV-5612-1	2C17	OPEN	
FEEDWATER BLOCK VALVES TO SG-A	2CV-1023-2*	2C16	CLOSED	
FEEDWATER BLOCK VALVES TO SG-B	2CV-1073-2*	2C16	CLOSED	
MSIV HEADER #2	2SV-1060-2A	2C16	CLOSED	
CNTMT SPRAY PUMP	2P35B	2C16	ON	
CNTMT SPRAY HEADER ISOLATION VALVE	2CV-5613-2	2C16	OPEN	

* Denotes override capability.

** Denotes override capability by opening DC control power breaker in breaker cubicles 2A106 (2P2C) and 2A205 (2P2B).

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ATTACHMENT 42

COOLDOWN/DEPRESSURIZE ISOLATED SG

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1. Cooldown and depressurize isolated SG by performing ANY ONE of the following methods:

CAUTION

- **Allowing backflow of 2% SG level to RCS will reduce boron concentration about 1%.**
- **SG Backflow to RCS may be ineffective for small SG tube leakage.**

A. SG Backflow to RCS:

- 1) IF ANY RCP running, THEN maintain isolated SG level 10 to 38% as follows:
 - a) Determine RCS boron reduction using Attachment 39, SG Backflow Log.
 - b) Maintain RCS pressure within 50 psi of isolated SG as RCP NPSH requirements allow.
 - c) Lower RCS pressure below isolated SG pressure to allow SG inventory to flow into RCS.
 - d) Control RCS pressure within 50 psi of isolated SG to maintain SG level 10 to 38%.
 - e) Verify isolated SG EFW Discharge Isolation valves de-energized and closed:

EFW PUMP	SG A	SG B
2P7A	2CV-1026-2/2D26-A4	2CV-1076-2/2D26-C1
	2CV-1037-1/2D27-B1	2CV-1039-1/2D27-B2
2P7B	2CV-1038-2/2B63-H3	2CV-1036-2/2B63-H1
	2CV-1025-1/2B51-N2	2CV-1075-1/2B53-J2

- e) Sample RCS boron concentration every 30 minutes.

B. Steaming to Condenser:

- 1) IF ALL RCPs secured AND Condenser available, THEN perform the following:
 - a) Open MSIV Bypass valve on isolated SG.
 - b) Use SDBCS Bypass valves.

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ATTACHMENT 42

COOLDOWN/DEPRESSURIZE ISOLATED SG

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NOTE

Draining SG to 10% will expose approximately 58 inches of tubes.

C. Uncovering SG tubes:

- 1) IF ANY RCP running AND SG Backflow to RCS ineffective, THEN maintain isolated SG level 10 to 38% as follows:
 - a) Align SG Blowdown to 2T92s using 2106.008, Steam Generator Operations.
 - b) Drain SG to 10 to 38% to allow steam bubble exposure to colder SG tubes.
 - c) Verify isolated SG EFW Discharge Isolation valves de-energized and closed:

EFW PUMP	SG A	SG B
2P7A	2CV-1026-2/2D26-A4 2CV-1037-1/2D27-B1	2CV-1076-2/2D26-C1 2CV-1039-1/2D27-B2
2P7B	2CV-1038-2/2B63-H3 2CV-1025-1/2B51-N2	2CV-1036-2/2B63-H1 2CV-1075-1/2B53-J2

D. Feed and bleed:

- 1) IF ALL RCPs secured AND Condenser NOT available, THEN maintain isolated SG level 45 to 90% by performing the following:
 - a) Align SG Blowdown to 2T92s using 2106.008, Steam Generator Operations.
 - b) Feed isolated SG using EFW.
 - c) Throttle SG Blowdown rate on isolated SG to maintain level.

E. Ambient cooling:

- 1) IF steaming isolated SG NOT desired, THEN allow ruptured SG to cooldown by ambient cooling.

F. Steaming to atmosphere:

- 1) IF Condenser NOT available AND steaming isolated SG desired, THEN use SDBCS Upstream ADV or Upstream ADV Isolation MOV on isolated SG.

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ATTACHMENT 43

ECCS/CSS PUMP MONITORING

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Monitor all available indications for signs of a loss of ECCS pump suction, i.e. CNTMT Sump blockage, as indicated by any of the following (listed in order of likely occurrence):

- a) Unstable or lower than expected HPSI or CS flow
- b) Unstable or lower than expected HPSI or CS pump discharge pressure
- c) Lower than expected HPSI or CS pump suction pressure, low suction pressure alarm
- d) Unstable or lower than expected HPSI or CS pump motor current
- e) Raised HPSI or CS pump noise

If there are indications of a reduction in NPSH or pump performance, operator should review parameter trends and attempt to diagnose what is happening. For example: an individual pump in distress, a valve or system component failure or sump screen blockage. Accurate diagnosis of these occurrences under accident conditions is difficult and will require the operator to rely heavily on knowledge, experience and training. None of the available indications will provide a 100% conclusive diagnosis.

1. Circle ECCS/CSS pump(s) in service.

HPSI 2P-89A HPSI 2P-89B HPSI 2P-89C CSS 2P-35A CSS 2P-35B

2. Monitor respective ECCS/CSS pump for signs of sump blockage from Control Room using available indications:

Amperage

- 2DG1 amperage A-2DG1
- 2DG2 amperage A-2DG2

Suction Pressure

- Suction pressure alarm 2K07-D7 "SDC SUCTION PRESS HI" and 2PI-5039A on 2C04 if enabled/aligned

Discharge Pressure

- 2PI-5108/P5108 HPSI HDR1 Pressure
- 2PI-5109/P5109 HPSI HDR2 Pressure
- 2PI-5622/P5622 CSS pump 2P-35A Discharge Pressure
- 2PI-5625/P5625 CSS pump 2P-35B Discharge Pressure

Flow

- 2FI-5101-1/F5101-1 HPSI HDR1 Flow
- 2FI-5102-2/F5102-2 HPSI HDR2 Flow
- 2FIS-5610/F5610 CSS pump 2P-35A Flow
- 2FIS-5616/F5616 CSS pump 2P-35B Flow
- CSS HDR 1 flow low alarm 2K06-E1 "SPRAY HDR FLOW LO"
- CSS HDR 2 flow low alarm 2K05-E1 "SPRAY HDR FLOW LO"

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ATTACHMENT 43

ECCS/CSS PUMP MONITORING

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3. **IF Rooms accessible (dose considerations) AND CNTMT less than 53 psia, THEN valve in LPSI Pump Suction Pressure transmitters (2PT-5039 and 2PT-5058) as follows:**
 - 3.1 Verify 2PI-5039 Isol (2SI-5039A) open.
 - 3.2 Open 2PT-5039 Isol (2SI-5039).
 - 3.3 Verify 2PI-5058 Isol (2SI-5058B) open.
 - 3.4 Open 2PT-5058 Isol (2SI-5058).
 - 3.5 Verify suction pressure alarm enabled on 2PI-5039A.
4. **IF Room accessible (dose considerations) AND manpower available, THEN monitor the following:**
 - 2P-35A Suction Pressure – align 2P-35A Suction Pressure Gauge (2PI-5677)
 - 2P-35B Suction Pressure – align 2P-35B Suction Pressure Gauge (2PI-5687)
 - 2P-89A Suction Pressure – align 2P-89A Suction Pressure Gauge (2PI-5090)
 - 2P-89B Suction Pressure – align 2P-89B Suction Pressure Gauge (2PI-5100)
 - 2P-89C Suction Pressure – align 2P-89C Suction Pressure Gauge (2PI-5098)
5. **IF manpower available, THEN monitor amperage at the respective pump breaker:**
 - 2P-35A Local Ammeter at 2A-304
 - 2P-35B Local Ammeter at 2A-404
 - 2P-89A Local Ammeter at 2A-306
 - 2P-89B Local Ammeter at 2A-406
 - 2P-89C Local Ammeter at 2A-307/407
6. **IF Room accessible (dose considerations), THEN monitor for cavitation noise at suction of respective pump(s).**
7. **IF CNTMT Sump Blockage observed, THEN notify CRS.**

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ATTACHMENT 44

CHARGING HEADER DATA

1. IF PMS computer available,
THEN perform the following:
 - A) Select Tabular Log screen and set CHARGE tabular log to ACTIVATE.
 - B) Complete table using Step 2.A. and 2.B. instructions after event.
2. IF PMS computer NOT available,
THEN perform the following:
 - A) WHEN starting first Charging pump,
THEN record pump start time, minimum temperature observed on 2TI-4825 during pump operation, and RCS T_c in table.
 - B) WHEN ALL Charging pumps secured,
THEN record stop time in table.
3. Send charging data to Unit 2 Systems Engineering.

CHARGING PUMP RUN TIMES		REGEN HX TEMP TO RCS	RCS T _c	RCS T _c
START	STOP	2TI-4825	2TI-4616	2TI-4716

Completed By _____ Date/Time ____/____/____

Reviewed By _____ Date/Time ____/____/____

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EXHIBIT 1

EMERGENCY BORATION

1. Select ONE of the following Emergency Boration flowpaths:

FLOWPATH	ACTIONS REQUIRED
A. Gravity Feed	<p>A. Verify at least ONE BAM Tank Gravity Feed valve open:</p> <ul style="list-style-type: none"> • 2CV-4920-1 • 2CV-4921-1
B. BAM pumps	<p>B. 1) Start at least ONE BAM pump.</p> <p>2) Open Emergency Borate valve (2CV-4916-2).</p> <p>3) Verify Boric Acid Makeup Flow Control valve (2CV-4926) closed.</p>
C. RWT to Charging pumps	<p>C. Open Charging Pump Suction Source From RWT valve (2CV-4950-2).</p>

2. Close VCT Outlet valve (2CV-4873-1).
3. IF VCT Outlet valve does NOT close,
THEN verify BAM Pumps Emergency Boration flowpath selected.
4. Verify Reactor Makeup Water Flow Control valve (2CV-4927) closed.
5. Verify at least ONE Charging pump running and charging header flow greater than 40 gpm.

(Restoration steps on next page)

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EXHIBIT 1

EMERGENCY BORATION

NOTE

Reactor Engineering assistance may be required to determine shutdown margin.

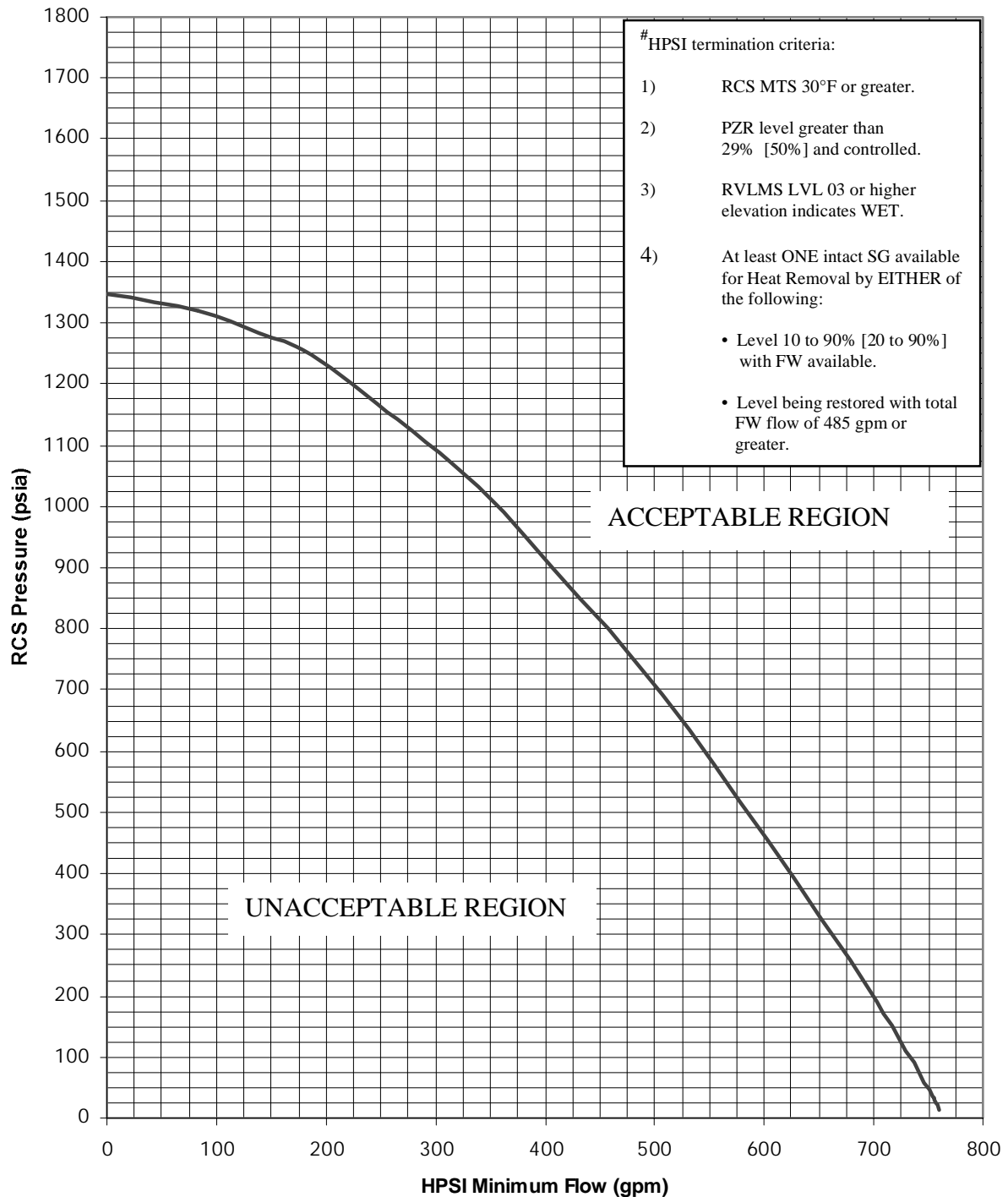
6. WHEN boron concentration greater than minimum required for shutdown margin, THEN perform the following:
- A. Verify VCT level $\geq 20\%$.
 - B. Place VCT Outlet valve (2CV-4873-1) in AUTOMATIC.
 - C. WHEN 2CV-4873-1 open, THEN perform the following:
 - 1) Verify BOTH BAM pumps secured.
 - 2) Verify the following valves closed:
 - 2CV-4920-1
 - 2CV-4921-1
 - 2CV-4916-2
 - 3) IF 2CV-4950-2 was opened, THEN place handswitch in AUTOMATIC and check that valve closes.

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EXHIBIT 2

HPSI FLOW CURVE

1. IF HPSI NOT throttled, THEN verify at least ONE HPSI pump running, ALL associated Injection MOVs open and flow curve requirements met.
2. IF HPSI throttled, THEN verify HPSI termination criteria[#] satisfied.

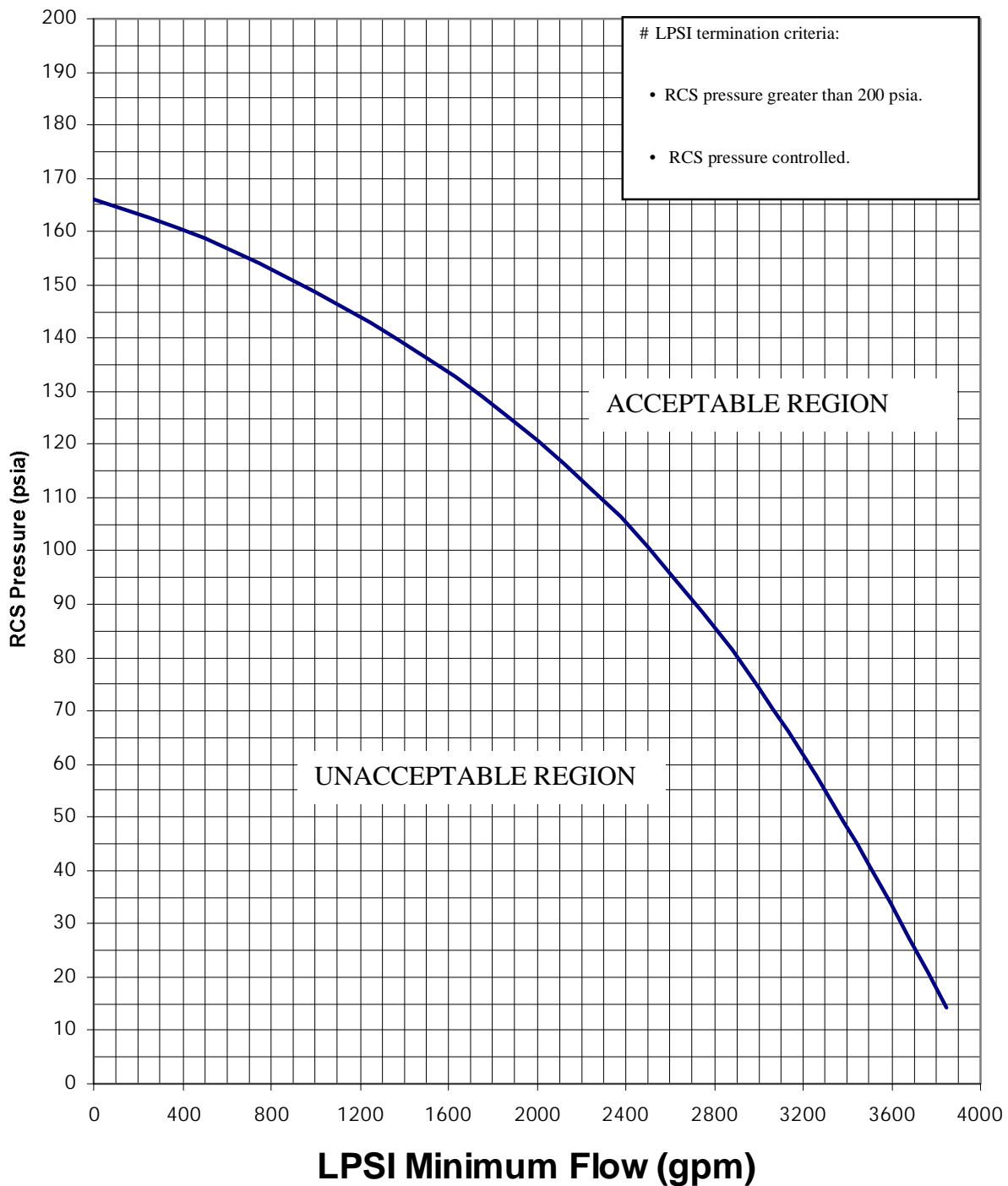


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EXHIBIT 3

LPSI FLOW CURVE

1. Verify at least ONE LPSI pump running and ALL associated Injection MOVs open.
2. IF LPSI throttled, THEN verify LPSI termination criteria[#] satisfied.



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EXHIBIT 4

LOCAL DG RESET

NOTE

The overspeed trip mechanism is reset if overspeed reset lever does NOT encounter resistance while operating.

1. Verify this action directed by EOP/AOP. (CR-ANO-2-2003-01328)
2. Verify DG Normal Start handswitch at 2C33 in PTL for DG being reset:
 - 2DG1 Engine Start switch (2HS-2809-1)
 - 2DG2 Engine Start switch (2HS-2829-2)
3. Locally reset overspeed trip mechanism at associated DG as follows:
 - A) Place Overspeed Reset lever to far left to engage reset:
 - 2DG1 "OVERSPEED RESET LEVER"
 - 2DG2 "OVERSPEED RESET LEVER"
 - B) Verify Overspeed Reset lever returns to an upright position.
 - C) Repeat steps 2.A and 2.B once.
4. Locally depress Shutdown Relay Reset button at associated DG local control panel:
 - 2E12 "PB5 ENGINE SHUTDOWN RELAY RESET"
 - 2E22 "PB3 ENGINE SHUTDOWN RELAY RESET"
5. Locally verify associated 4160v Vital bus 2A3/2A4 Normal Feeder breaker open:
 - "2A309 2A3 SUPPLY BKR"
 - "2A409 2A4 SUPPLY BKR"
6. Locally verify associated 4160v Vital bus 2A3/2A4 Lockout relays reset:
 - "186 - 2A3 LOCKOUT"
 - "186 - 2A4 LOCKOUT"
7. Locally verify associated DG lockout relays on DG Output breakers (2A308/2A408) reset:
 - "186 - 2DG1 LOCKOUT"
 - "186 - 2DG2 LOCKOUT"
8. Locally depress Exciter Reset pushbutton at associated DG local control panel:
 - 2E12, "PB1 EXCITER RESET"
 - 2E22, "PB1 EXCITER RESET"
9. Notify Control Room DG reset and ready for start.

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EXHIBIT 5

CCW/ACW/SW ALIGNMENT

1. IF SW suction NOT aligned to lake, THEN **RETURN TO** procedure in effect.
2. IF CCW flow NOT aligned to RCPs AND offsite power available, THEN perform the following:
 - A. IF RCP seal temperatures less than 180°F,
THEN restore CCW to RCPs by performing the following:
 - 1). Open RCP CCW Supply valve (2CV-5236-1).
 - 2). Open RCP CCW Return valve (2CV-5254-2).
 - 3). Open RCP CCW Return valve (2CV-5255-1).
 - 4). IF unexplained Loop 2 CCW Surge Tank level change observed,
THEN perform the following:
 - a) Verify ALL RCPs stopped.
 - b) Isolate CCW to RCPs.
 - c) Verify RCP Bleedoff to VCT valves closed:
 - 2CV-4846-1
 - 2CV-4847-2
 - d) Verify RCP Bleedoff Relief Isolation to Quench Tank valve (2CV-4856) closed.
 - B. IF RCP seal temperatures 180°F or greater, THEN restore CCW to RCPs as follows:
 - 1). Verify RCP CCW Return valve (2CV-5255-1) closed.
 - 2). Verify RCP CCW Supply valve (2CV-5236-1) open.
 - 3). Verify RCP CCW Return valve (2CV-5254-2) open.
 - 4). Throttle open RCP CCW Return valve (2CV-5255-1) with a single 1 second modulation.

(Step 2 continued on next page)

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EXHIBIT 5

CCW/ACW/SW ALIGNMENT

2. (continued)

- 5). IF unexplained Loop 2 CCW Surge Tank level change observed, THEN perform the following:
- a) Verify ALL RCPs stopped.
 - b) Isolate CCW to RCPs.
 - c) Verify RCP Bleedoff to VCT valves closed:
 - 2CV-4846-1
 - 2CV-4847-2
 - d) Verify RCP Bleedoff Relief Isolation to Quench Tank valve (2CV-4856) closed.
- 6). IF RCP seal temperatures greater than 300°F, THEN use PMS to monitor seal cooldown rate:

RCP	CONTROLLED BLEEDOFF	LOWER SEAL CAVITY
A	T6008	T6009
B	T6018	T6019
C	T6028	T6029
D	T6038	T6039

CAUTION

RCP Seal cooldown rates greater than 100°F/hr with seal temperatures 180°F or greater may result in RCP Seal failure.

NOTE

Each 1 second modulation equals 80 to 100 gpm.

- 7) Maintain RCP seal cooldown rate less than 100°F/hr by throttling 2CV-5255-1 with one second modulations.
- 8). WHEN RCP Seal temperature stable for 15 minutes, THEN fully open 2CV-5255-1.

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EXHIBIT 5

CCW/ACW/SW ALIGNMENT

3. IF SW NOT aligned to CCW AND Loop 2 CCW available, THEN perform the following:

A. Override and open at least ONE SW to CCW/ACW Return valve:

- 2CV-1543-1
- 2CV-1542-2

CAUTION

Supplying ACW and CCW from a single SW pump may result in low SW header pressure.

B. Override and throttle at least ONE SW to CCW /Main Chillers Supply valve:

- 2CV-1530-1
- 2CV-1531-2

C. Maintain SW header pressure greater than 85 psig.

4. IF SW NOT aligned to ACW, THEN perform the following:

A. Verify at least ONE SW to CCW/ACW Return valve open:

- 2CV-1543-1
- 2CV-1542-2

B. Override and throttle open ACW Supply valves:

- 2CV-1425-1
- 2CV-1427-2

C. Maintain SW header pressure greater than 85 psig.

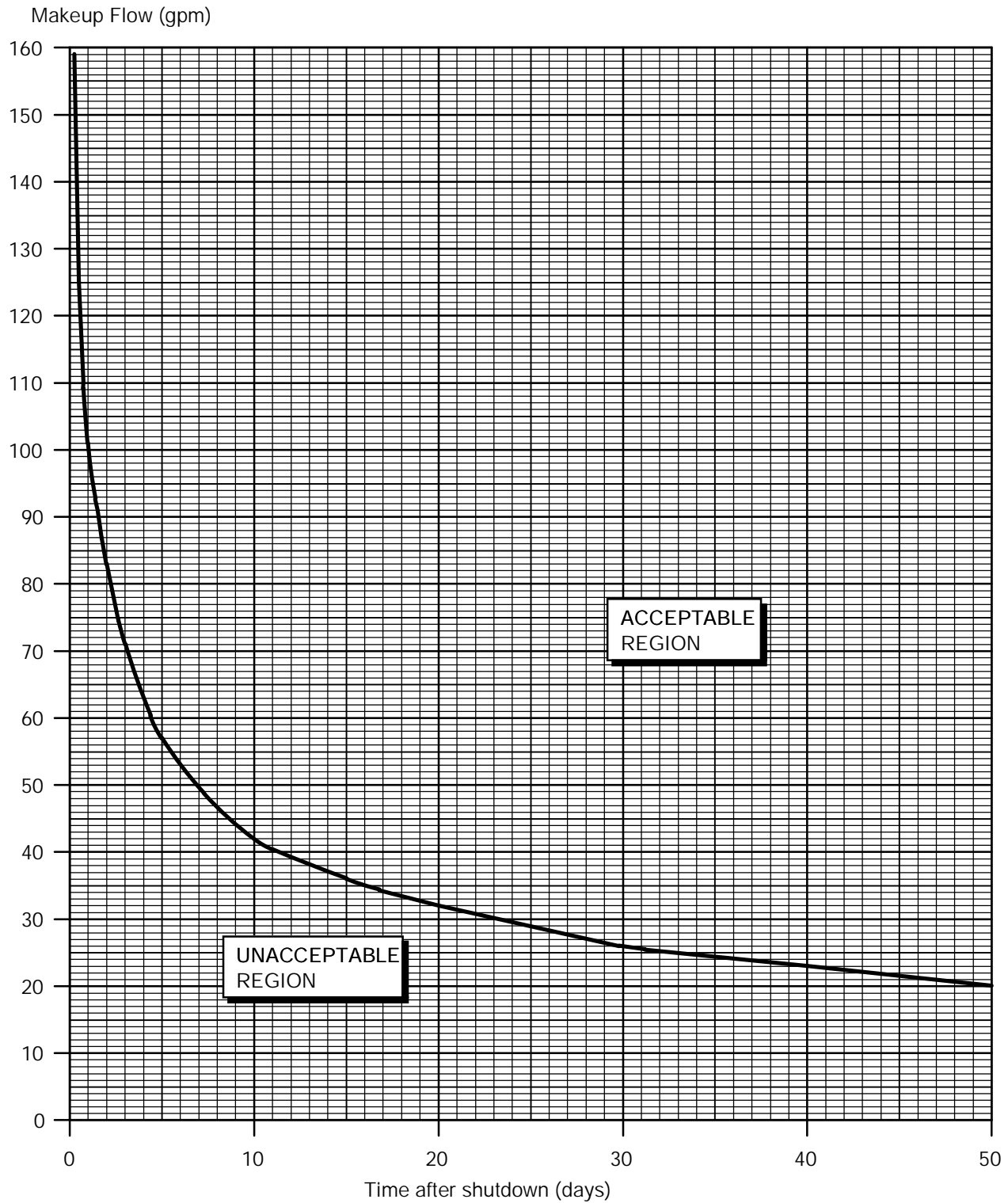
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EXHIBIT 6

RCS MAKEUP FLOW CURVE

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EXHIBIT 7

CBO REACTOR TRIP CHECKLIST

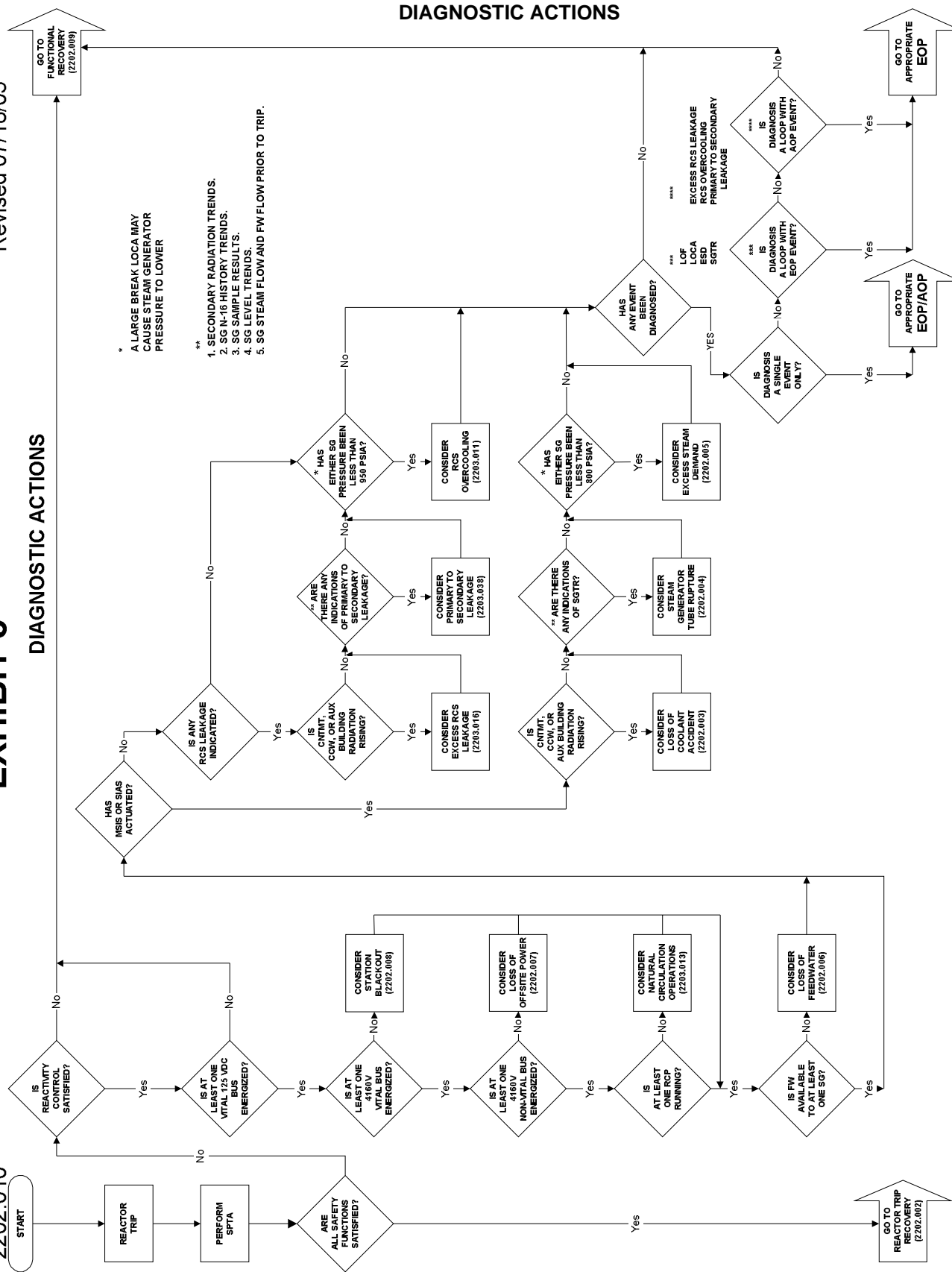
REACTIVITY CONTROL	(C) Reactor power lowering (C) ALL CEAs fully inserted
VITAL AUXILIARIES	(C) Main Turbine tripped (C) Generator Output Breakers open Exciter Field breaker open At least ONE 6900v bus energized At least ONE 4160v Non-vital bus energized (C) Both DGs secured At least ONE 4160v AND 480v Vital bus energized At least ONE 125v Vital DC bus energized
RCS INVENTORY CONTROL	(C) PZR level 10 to 80% AND Trending to setpoint RCS MTS 30°F or greater
RCS PRESSURE CONTROL	(C) 1800 to 2250 psia AND Trending to setpoint
CORE HEAT REMOVAL	(C) At least ONE RCP running (If not, go to RCS Heat Removal) (C) CCW to RCPs Loop ΔT less than 10°F RCS MTS 30°F or greater (C) SW to CCW <u>IF</u> SIAS/MSIS actuated, <u>THEN</u> SW press > 85 psig
RCS HEAT REMOVAL	(C) At least ONE SG level 10 to 90% (C) FW maintaining SG level (C) MFW in RTO (C) Feedwater line intact (C) SG pressure 950 to 1050 psia (C) RCS T _C 540 to 555°F
CNTMT CONTROL	(C) CNTMT temperature less than 140°F (C) CNTMT pressure less than 16 psia (C) CNTMT Spray pumps secured 2K10-B6 "CNTMT PART/GAS RAD HI/LO" clear 2K11-B10 "AREA RADIATION HI/LO" clear 2K11-C10 "PROC LIQUID RADIATION HI/LO" clear Area and Process Monitor trends stable 2K11-A10 "SEC SYS RADIATION HI" clear Secondary System Radiation Monitor trends stable

(C) = Contingency Actions

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JOB PERFORMANCE MEASUREUNIT: 2 REV #: 000 DATE: _____SYSTEM/DUTY AREA: A. C. Electrical DistributionTASK: Energize 2A2 (ALTERNATE SUCCESS PATH)JTA#: ANO2ROEOPAOPEMERG32KA VALUE RO: 3.3 SRO: 3.1 KA REFERENCE: 062 A4.01APPROVED FOR ADMINISTRATION TO: RO: X SRO: XTASK LOCATION: INSIDE CR: X OUTSIDE CR: _____ BOTH: _____

SUGGESTED TESTING ENVIRONMENT AND METHOD (PERFORM OR SIMULATE):

PLANT SITE: _____ SIMULATOR: Perform LAB: _____

POSITION EVALUATED: RO: _____ SRO: _____

ACTUAL TESTING ENVIRONMENT: SIMULATOR: _____ PLANT SITE: _____ LAB: _____

TESTING METHOD: SIMULATE: _____ PERFORM: _____

APPROXIMATE COMPLETION TIME IN MINUTES: 20 MinutesREFERENCE(S): OP 2202.010 Rev. 007-03-0

EXAMINEE'S NAME: _____ SSN: _____

EVALUATOR'S NAME: _____

THE EXAMINEE'S PERFORMANCE WAS EVALUATED AGAINST THE STANDARDS CONTAINED IN THIS JPM AND IS DETERMINED TO BE:

SATISFACTORY: _____ UNSATISFACTORY: _____

PERFORMANCE CHECKLIST COMMENTS:

Start Time _____ Stop Time _____ Total Time _____

SIGNED: _____ DATE: _____

SIGNATURE INDICATES THIS JPM HAS BEEN COMPARED TO ITS APPLICABLE PROCEDURE BY A QUALIFIED INDIVIDUAL (NOT THE EXAMINEE) AND IS CURRENT WITH THAT REVISION.

JOB PERFORMANCE MEASURE

THE EXAMINER SHALL REVIEW THE FOLLOWING WITH THE EXAMINEE:

The examiner shall review the "Briefing Checklist - System Walkthrough" portion of OP 1064.023

Attachment 6 with the examinee.

JPM INITIAL TASK CONDITIONS: This is an alternate success path JPM.

A Reactor Trip has occurred.

A loss of off-site power has occurred.

Vital 4160VAC buses 2A3/2A4 are energized from respective EDG's.

Non-Vital bus 2A1 energized from AACG.

SU XFMR #3 and SU XFMR #2 have been energized from 500KV and 161 ring Busses

TASK STANDARD:

Energize 2A2 from Startup transformer #2.

TASK PERFORMANCE AIDS:

OP 2102.010 Attachment 11 and attachment 29.

SIMULATOR SETUP:

Mode 3.

Loss of Offsite Power but now restored.

2A3 and 2A4 energized from respective EDG.

The AACG is powering 2A1.

SU XFMR#3 voltage is ~22 KV.

SU XFMR#2 voltage is ~160 KV.

Insert remote malfunction:

A113; value = LCK_OP, 2A113, Startup #3 feeder breaker to 2A2 fails to close.

JOB PERFORMANCE MEASURE

INITIATING CUE:

The SM/CRS directs, "Energize 2A2 from SU XFMR #3 using attachment 11.CRITICAL ELEMENTS (C): 9, 10, 13, 17

PERFORMANCE CHECKLIST			STANDARDS	(Circle One)
	1. (Proc step 1)	Verify both vital busses energized.	On 2C33, verified both EDG's are supplying respective vital busses, 2A3, 2B5, 2A4, and 2B6.	N/A SAT UNSAT
	2. (Proc step 2)	Verify instrument air > 65psig.	On 2C14, verified instrument air pressure > 65psig.	N/A SAT UNSAT
	3. (Proc step 3)	Verify Loss of Off Site power occurred from initial conditions.	From initial conditions determined that step should be NA'd.	N/A SAT UNSAT
	4. (Proc step 4)	Verify that SU XFMR #3 voltage is greater than 21.7 KV.	Verified that SU XFMR #3 voltage is greater than 21.7KV using: SPDS E2ST3R PMS E9664	N/A SAT UNSAT
	5. (Proc step 4)	Verify that SU XFMR #2 voltage is greater than 154 KV.	Verified that SU XFMR #2 voltage is greater than 154KV using: SPDS EST2R PMS E4013	N/A SAT UNSAT
	6. (Proc step 5a)	Verify CCW is in service.	On 2C33, verified 'C' CCW pump is running and step should be NA'd.	N/A SAT UNSAT
	7. (Proc step 5b)	Verify that 2A1 is energized.	On 2C10, verified 2A1 is energized and step should be NA'd.	N/A SAT UNSAT
	8. (Proc step 5c)	Verify that 2A2 is not energized.	On 2C10, verified 2A2 is not energized and place hand switches 2B424, 2C5B (on 2C01) and 2B223, 2P33B (on 2C14) in PTL.	N/A SAT UNSAT
Examiner's note: Examinee will attempt to energize 2A2 from SU XFMR #3. The feeder breaker will fail to close.				

JOB PERFORMANCE MEASURE

PERFORMANCE CHECKLIST			STANDARDS	(Circle One)
(C)	9. (Proc step 5d)	Attempt to energize Non-vital bus 2A2 by closing 2A213, SU XFMR #3 Feeder to 2A2. (Note the examinee may place SYNC switch in socket and attempt to close the breaker that way when 2A213 does not close automatically. The breaker will not close)	<p>Took 2A213 out of PTL position and observed that breaker did not close by observing that the Green light remains ON and the Red light remains OFF above the hand switch and no voltage is indicated on the bus.</p> <p>Recognize that 2A213 will not close.</p> <p>Contact CRS or AO to investigate breaker.</p>	N/A SAT UNSAT
<p>Examiner cues:</p> <p>Report that AO/Electricians have checked out the feeder breaker 2A213 and will need to repair the breaker with an ETA of 8 hours.</p> <p>Report as CRS to continue with EOP 2202.010 attachment 11 and energize 2A2.</p>				
<p>Examiner's note:</p> <p>Step 6 in attachment 11 tells the examinee to go to attachment 29 to energize 2A2. Hand examinee Attachment 29.</p>				
(C)	10. (Proc. Step Att. 29 flow chart)	<p>Determine that auto-transformer is in service and start at step 1 in attachment 29.</p> <p>Examiner's cue: If contacted as dispatcher, report that the Auto-transformer is in service.</p>	Either call the dispatcher or look at ring bus mimic on 2C10 to determine that the 500KV and 161KV ring busses are intact and the auto-transformer is in service.	N/A SAT UNSAT
	11. (Proc step 1.a)	<p>Verify Unit 1 NOT energizing ANY buses from SU XFMR #2.</p> <p>Examiner's Cue: report as Unit 1 Shift Manager that Unit 1 is not using SU XFMR #2.</p>	Contacted Unit 1 to determine if they are using SU XFMR #2.	N/A SAT UNSAT
	12. (Proc step 1.b)	Verify that 2P75, Auxiliary Feed Water pump is not running.	On Panel 2C02, observed that 2P75 was not running by the Green light ON and Red light OFF above the hand switch.	N/A SAT UNSAT

JOB PERFORMANCE MEASURE

PERFORMANCE CHECKLIST			STANDARDS	(Circle One)
(C)	13. (Proc step 1.c)	Locally verify SU XFMR #2 load shed circuit enabled. Examiner's cue: Key Lock Switch (143-2H09) at 2H-13 is in NORMAL and Key Lock Switch (143-2A16) at 2A-111 is in NORMAL.	Contact AO to verify that the load shed circuit is enabled.	N/A SAT UNSAT
	14. (Proc step 1.d)	N/A step for 2A1 to be energized.	Determined that 2A1 was already energized and N/A step.	N/A SAT UNSAT
	15. (Proc step 1.e)	Place the following hand switches to PTL position: 2A202 2A2 to 2B2 (on 2C10) 2C-5B (on 2C02) 2P-33B (on 2C14)	On 2C10 placed breaker 2A202 to the PTL position by rotating and pulling hand switch to the left. On 2C01, placed breaker 2A202 to PTL. On 2C02, placed 2C5B to PTL. On 2C14, placed 2P33B to PTL.	N/A SAT UNSAT
	16. (Proc step 1.f.1)	Monitor and coordinate SU XFMR #2 loading to ensure XFMR MVA limits are NOT Exceeded.	Make preparations to monitor SU XFMR #2 loading limits by determining Voltage and Current (from Unit 1 on C10) as loads are started using SU XFMR # 2.	N/A SAT UNSAT
Examiner's note: Startup Transformer loading is manually determined by using voltage (Points SPDS E2ST3R and PMS E9664) and current from Unit 1 C10. $MVA = (Voltage * Current * \sqrt{3})$				
(C)	17. (Proc step 1.f.2)	Close breaker 2A211, SU XFMR #2 to 2A2.	On 2C10, energize 2A2 from SU XFMR #2 by taking hand switch for 2A211 out of PTL and observing the Green light OFF and Red light ON and voltage indicated on 2A2.	N/A SAT UNSAT
END				

JOB PERFORMANCE MEASURE

EXAMINER'S COPY

JPM INITIAL TASK CONDITIONS:

A Reactor Trip has occurred.

A loss of off-site power has occurred.

Vital 4160VAC buses 2A3/2A4 are energized from respective EDG's.

Non-Vital bus 2A1 energized from AACG.

SU XFMR #3 and SU XFMR #2 have been energized from 500KV and 161 ring Busses

INITIATING CUE:

The SM/CRS directs, "Energize 2A2 from SU XFMR #3 using attachment 11.

JOB PERFORMANCE MEASURE

EXAMINEE'S COPY

JPM INITIAL TASK CONDITIONS:

A Reactor Trip has occurred.

A loss of off-site power has occurred.

Vital 4160VAC buses 2A3/2A4 are energized from respective EDG's.

Non-Vital bus 2A1 energized from AACG.

SU XFMR #3 and SU XFMR #2 have been energized from 500KV and 161 ring Busses

INITIATING CUE:

The SM/CRS directs, "Energize 2A2 from SU XFMR #3 using attachment 11.

ENTERGY OPERATIONS INCORPORATED
ARKANSAS NUCLEAR ONE

TITLE: **SAFETY INJECTION TANK OPERATIONS**

DOCUMENT NO.

2104.001

CHANGE NO.

027-02-0

WORK PLAN EXP. DATE

N/A

TC EXP. DATE

N/A

SET #

SAFETY-RELATED

☒ YES

☐ NO

IPTE

☐ YES

☒ NO

TEMP ALT

☐ YES

☒ NO

PROGRAMMATIC EXCLUSION PER ENS-LI-101

☐ YES

☒ NO

When you see these **TRAPS**

Time Pressure

Distraction/Interruption

Multiple Tasks

Over Confidence

Vague or Interpretive Guidance

First Shift/Last Shift

Peer Pressure

Change/Off Normal

Physical Environment

Mental Stress (Home or Work)

Get these **TOOLS**

Effective Communication

Questioning Attitude

Placekeeping

Self Check

Peer Check

Knowledge

Procedures

Job Briefing

Coaching

Turnover

VERIFIED BY

DATE

TIME

FORM TITLE:

VERIFICATION COVER SHEET

FORM NO.

1000.006A

CHANGE NO.

051-00-0

**ENTERGY OPERATIONS INCORPORATED
ARKANSAS NUCLEAR ONE**

TITLE: SAFETY INJECTION TANK OPERATIONS		DOCUMENT NO. 2104.001	CHANGE NO. 027-02-0
<input checked="" type="checkbox"/> PROCEDURE <input type="checkbox"/> WORK PLAN, EXP. DATE <u>N/A</u>		PAGE <u>1</u> OF <u>1</u>	
<input type="checkbox"/> ELECTRONIC DOCUMENT			
TYPE OF CHANGE: <input type="checkbox"/> NEW <input checked="" type="checkbox"/> PC <input type="checkbox"/> TC <input type="checkbox"/> DELETION <input type="checkbox"/> REVISION <input type="checkbox"/> EZ EXP. DATE: <u>N/A</u>			
AFFECTED SECTION: (Include step # if applicable) Supp 4	DESCRIPTION OF CHANGE: (For each change made, include sufficient detail to describe reason for the change.) Added additional detail and guidance to steps 3.8 and 3.11 for maintaining RDT level and pressure while draining SIT. 1000.006S #3		
FORM TITLE: DESCRIPTION OF CHANGE		FORM NO. 1000.006C	CHANGE NO. 050-00-0

PROC./WORK PLAN NO. 2104.001	PROCEDURE/WORK PLAN TITLE: SAFETY INJECTION TANK OPERATIONS	PAGE: 1 of 80 CHANGE: 027-02-0
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1.0 PURPOSE

To provide instructions for operating, sampling and testing the Safety Injection tanks (SITs) and their associated valves.

2.0 SCOPE

This procedure provides a description of the Safety Injection tanks (SITs). It also provides instructions for operation of the SITs including filling, draining, pressurizing, sampling and venting. This procedure also provides surveillances for the SITs and associated valves.

This procedure contains requirements for assessing conformance with the Unit 2 Technical Specifications Limiting Conditions for Operation (LCO). This Procedure satisfies the requirements of Technical Specifications 4.5.1.c, 4.5.1.d.1 and partially satisfies IST Program requirements.

3.0 DESCRIPTION

The four Safety Injection tanks (2T-2A/B/C/D) form a passive sub-system of the Emergency Core Cooling System. Each tank is connected to a safety injection header, which in turn is connected to the cold legs of the Reactor Coolant System (RCS).

The tanks are filled with borated water and pressurized with nitrogen. Check valves between the RCS and the safety injection headers are seated at normal operating pressures. At normal operating pressures, these maintain the Safety Injection tanks in a passive mode. In the unlikely event of a Loss of Coolant Accident, RCS pressure will lower below SIT pressure and the tanks will dump into the RCS.

Each SIT has a motor operated outlet valve. The feeder breaker for each of these valves is normally locked open. The only time these breakers should be shut is during valve repositioning.

Each Safety Injection tank is supplied with the following connections:

- Fill line
- Nitrogen supply
- Vent connections
- Drain line

These connections are equipped with solenoid operated isolation valves. A manual bypass is installed around these solenoid valves for use should solenoid valve failures occur.

Indication and alarms for tank level and pressure are provided in the Control Room. Line pressure indicators and alarms for detecting RCS leakage past the safety injection header check valves also are provided.

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4.0 REFERENCES

4.1 References Used in Procedure Preparation:

- NRC Generic Letter 89-04 (OCNA048916)
- IST Program, ASME Code Section, 1989 Edition with no Addenda
- ANO-2 Tech Specs 3.5.1, 3.6.1.1, 4.5.1.c, and 4.5.1.d.1
- LCP 90-6032, Safety Injection Tank Nitrogen Valves
- CR-2-91-517, SIT Containment Isolation Valves
- LIR-L91-0261, Monitoring Valve Safety Functions
- CR 2-95-0542 Containment Penetration Valves found Un-Locked
- ANO Calculation 92-0075-01, "Determination of maximum SIT N₂ pressure required for Non Intrusive Outlet Check Valve Test."
- CR-ANO-2-2000-1037, 2SV-5061-2 Inoperable
- CR-ANO-2-2001-1303, Revised 50.59 for PC 025-05-0
- CR-ANO-2-2001-0296, 2CV-5082 Breaker Locked Open and Handwheel Locked Closed Above Mode 5 due to Hot Short Concerns

4.2 References Used in Conjunction with this Procedure:

- ANO-2 Technical Specification 3.5.1, 4.5.1. 3.6.1.1.
- HPSI System Operation (2104.039)
- Chemical and Volume Control (2104.002)
- Conduct of Operations (1015.001)

4.3 NRC Commitments

- 4.3.1 P2249 - Individually leakrate test 2SI-16A, B, C, and D each refueling outage. (Supplement 6)
- 4.3.2 P2250 - Check SIT Sample Valves safety function at least every two years. (Supplement 5)
- 4.3.3 P5070 - Prohibit cross-connecting SITs via non-seismic piping. (Sections 5.0, 11.0, 12.0, and 14.0)
- 4.3.4 P14711 - Operation of Containment Penetration Valves above Mode 5. (Sections 7.0, 10.0, 13.0, Supplement 6)

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5.0 LIMITS AND PRECAUTIONS

5.1 During operations in Mode 1, 2 or 3 (with RCS pressure \geq 700 psia), maintain following Safety Injection tank conditions:

5.1.1 Pressure 600-624 psig

5.1.2 Level 80.1-87.9 %

5.1.3 Boron Concentration 2200-3000 ppm

5.1.4 The following SIT Outlet valves open and de-energized:

- SIT A Outlet valve (2CV-5003-1)
- SIT B Outlet valve (2CV-5023-1)
- SIT C Outlet valve (2CV-5043-2)
- SIT D Outlet valve (2CV-5063-2)

{4.3.3}

5.1.5 No more than one of the following pairs of SIT Nitrogen Supply valves open at a time:

- SIT A Nitrogen Supply valves (2SV-5005A/B)
- SIT B Nitrogen Supply valves (2SV-5025A/B)
- SIT C Nitrogen Supply valves (2SV-5045A/B)
- SIT D Nitrogen Supply valves (2SV-5065A/B)

5.2 Design temperature of piping downstream of SIT Drain valves is 140°F. If backleakage is indicated with pressure greater than 650 psig, then associated SIT Drain valves should NOT be opened more than two times for 10-second duration each time.

5.3 A SIT boron sample must be verified to be between 2200-3000 ppm within six hours after level rise of \geq 5% since previous sample (not including any of the level rise due to addition from RWT).

5.4 If inleakage to SIT $>$ 0.1% per day is indicated, then trending program or method should be established to ensure accountability of reasons for each change in affected SIT levels using SIT Level Change (OPS-B37). This log is triggered by 2203.012G SIT High Level and SIT High Pressure alarms. Inleakage \leq 0.1% per day does not require tracking by OPS-B37 due to inability to exceed TS 4.5.1.b sampling requirement limit at 5% inleakage.

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6.0 SETPOINTS

6.1 SIT Outlet valves receive an open signal from the following:

- Reactor Coolant System pressure 675 ± 8 psia
- Safety Injection Actuation Signal

6.2 SIT Drain valves (2SV-5001-1, 2SV-5021-1, 2SV-5041-2, and 2SV-5061-2) are interlocked closed upon SIAS signal. Valves may be opened after SIAS reset by rotating appropriate handswitches to CLOSE, then returning to OPEN.

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7.0 LOWERING SAFETY INJECTION TANK LEVEL

7.1 Draining SITs to RDT in Mode 1, 2, 3, or 4 with SIT Outlet valves Open

7.1.1 IF source of SIT in leakage unknown,
THEN initiate SIT Level Change (OPS-B37) as desired.

7.1.2 IF OPS-B37 being maintained for SIT to be drained,
THEN record pre-drain level on OPS-B37.

*7.1.3 Monitor all SIT levels and pressures during this operation.

7.1.4 Open SIT Drain to RDT (2CV-5081).

7.1.5 IF desired level drop is < 1/2%,
THEN close 2CV-5081.

*7.1.6 IF > 650 psig on SIT injection header to be drained,
THEN do NOT open associated SIT drain valve more than two times for 10 second duration each time.

- SIS Injection to Loop 2P-32A (2PIS-5000)
- SIS Injection to Loop 2P-32B (2PIS-5020)
- SIS Injection to Loop 2P-32C (2PIS-5040)
- SIS Injection to Loop 2P-32D (2PIS-5060)

7.1.7 Open desired SIT Drain valve:

- 2T-2A - SIT A Drain valve (2SV-5001-1)
- 2T-2B - SIT B Drain valve (2SV-5021-1)
- 2T-2C - SIT C Drain valve (2SV-5041-2)
- 2T-2D - SIT D Drain valve (2SV-5061-2)

7.1.8 WHEN desired SIT level or pressure reached,
THEN close SIT Drain valve opened:

- 2SV-5001-1
- 2SV-5021-1
- 2SV-5041-2
- 2SV-5061-2

7.1.9 IF desired to raise SIT pressure,
THEN add nitrogen to associated SIT using Raising Safety Injection Tank Pressure section of this procedure.

7.1.10 IF drain was stopped based on SIT pressure,
AND continued draining is desired,
THEN repeat steps 7.1.4 through 7.1.9 as necessary.

7.1.11 Verify 2CV-5081 closed.

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- 7.1.12 IF SIT drained with 2CV-5081 open,
THEN perform the following:
- A. Open associated SIT Drain valve to repressurize SIT Drain header:
- 2T-2A - SIT A Drain valve (2SV-5001-1)
 - 2T-2B - SIT B Drain valve (2SV-5021-1)
 - 2T-2C - SIT C Drain valve (2SV-5041-2)
 - 2T-2D - SIT D Drain valve (2SV-5061-2)
- B. WHEN SIT Drain header pressurized,
THEN close SIT Drain valve opened in previous step:
- 2SV-5001-1
 - 2SV-5021-1
 - 2SV-5041-2
 - 2SV-5061-2

- 7.1.13 IF desired to raise SIT pressure,
THEN add nitrogen to associated SIT using Raising Safety Injection Tank Pressure section of this procedure.

- 7.1.14 IF OPS-B37 being maintained for SIT drained,
THEN record post-drain level on OPS-B37.

- 7.2 Draining SITs to Hold Up tanks (2T-12s) in Mode 3 with RCS Pressure < 700 psia OR in Mode 4, 5, or 6 with SIT Outlet valves Closed

- 7.2.1 IF 18-Month Remote Position Indication (Supplement 4 of Cold Shutdown Valve Testing, 2305.006) required,
THEN perform in conjunction with this activity.

- 7.2.2 Verify the following valves closed:
- CNTMT Spray to LPSI to RWT Recirc and Test valve (2SI-18)
 - RWT Recirc and Test Line Return Isolation valve (2BS-25)

{4.3.4}

- 7.2.3 **IF plant in Mode 3 or 4,**
THEN establish Containment Penetration Administrative Controls using 1015.001, Conduct of Operations prior to opening 2SI-17 or 2CV-5082.

- 7.2.4 IF Category E is in effect,
THEN log status in Category E log for the following valves:
- SIT Drain Header Outside Containment Isolation valve (2SI-17)
 - RWT Recirc and Test Line to Hold Up tanks (2BS-28)

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- 7.2.5 Open 2SI -17.
- 7.2.6 Open 2BS-28.
- 7.2.7 Open associated valves to drain desired SITs.
- 2T-2A - 2SV-5004 Bypass (2SI -46)
 - 2T-2B - 2SV-5024 Bypass (2SI -40)
 - 2T-2C - 2SV-5044 Bypass (2SI -58)
 - 2T-2D - 2SV-5064 Bypass (2SI -52)
- 7.2.8 Open SIT Drain Header to RWT (2CV-5082).
- 7.2.9 Monitor on line 2T-12 tank pressure (2C14) to ensure relief valve does not lift (relieves at 7 psig).
- 7.2.10 IF drain rate more than desired,
THEN reduce or secure SIT drain as necessary.
- 7.2.11 IF Containment ventilation available,
THEN verify Containment ventilation in service per Containment Atmosphere Control (2103.033).

CAUTION

Draining a SIT below indicated range while SIT is pressurized may cause gas intrusion into the RCS.

- * 7.2.12 WHEN SIT Wide Range Level is between 10 and 12% for any SIT being drained,
THEN perform the following for the affected SIT:
- A. Close associated SIT drain valve:
- 2T-2A - 2SV-5004 Bypass (2SI -46)
 - 2T-2B - 2SV-5024 Bypass (2SI -40)
 - 2T-2C - 2SV-5044 Bypass (2SI -58)
 - 2T-2D - 2SV-5064 Bypass (2SI -52)
- B. IF personnel in Containment Building,
THEN announce venting operation over plant page.
- C. Open associated SIT vent valves:
- 2T-2A - Vent valve (2SV-5006) or Bypass (2SI -44)
 - 2T-2B - Vent valve (2SV-5026) or Bypass (2SI -38)
 - 2T-2C - Vent valve (2SV-5046) or Bypass (2SI -56)
 - 2T-2D - Vent valve (2SV-5066) or Bypass (2SI -50)

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NOTE

SIT may be considered vented when Wide Range SIT pressure is approximately equal to CNTMT pressure and stable.

- D. WHEN affected SIT venting is complete,
THEN open associated SIT drain valve:
- 2T-2A - 2SV-5004 Bypass (2SI -46)
 - 2T-2B - 2SV-5024 Bypass (2SI -40)
 - 2T-2C - 2SV-5044 Bypass (2SI -58)
 - 2T-2D - 2SV-5064 Bypass (2SI -52)
- 7.2.13 WHEN SIT draining complete,
THEN perform the following:
- A. Close 2CV-5082.
- B. Remove key from 2CV-5082 handswitch.
- C. Close Manual Drain valves opened:
- 2T-2A - 2SV-5004 Bypass (2SI -46)
 - 2T-2B - 2SV-5024 Bypass (2SI -40)
 - 2T-2C - 2SV-5044 Bypass (2SI -58)
 - 2T-2D - 2SV-5064 Bypass (2SI -52)
- D. Verify vent valves closed as desired:
- 2T-2A - Vent valve (2SV-5006) AND Bypass (2SI -44)
 - 2T-2B - Vent valve (2SV-5026) AND Bypass (2SI -38)
 - 2T-2C - Vent valve (2SV-5046) AND Bypass (2SI -56)
 - 2T-2D - Vent valve (2SV-5066) AND Bypass (2SI -50)
- E. Lock closed 2SI -17.
- F. Lock closed 2BS-28.
- G. IF Category E in effect,
THEN log status in Category E log:
- 2SI -17
 - 2BS-28
- H. IF Containment controls in effect,
THEN complete Containment Penetration Valve log (1015.001D) for 2SI -17.
- I. WHEN SIT drain alignment no longer desired,
AND in Modes 1, 2, 3 or 4,
THEN complete Containment Penetration Administrative Controls in 1015.001, Conduct of Operations for 2CV-5082.

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7.3 Draining SITs to RWT (2T-3) in Mode 4, 5, or 6 with SIT Outlet valves closed

7.3.1 IF 18-Month Remote Position Indication (Supplement 4 of Cold Shutdown Valve Testing, 2305.006) required, THEN perform in conjunction with this activity.

7.3.2 Ensure addition of SIT Volume into RWT will NOT reduce RWT Boron to < 2500 ppm.

7.3.3 Verify following valves closed:

- RWT Recirc and Test Line to Hold Up Tanks valve (2BS-28)
- CNTMT Spray & LPSI to RWT Recirc & Test valve (2SI-18)

NOTE

If HPSI pump starts with 2SI-17 and 2CV-5082 open and SIT drain valve open, then HPSI mini-recirc flowpath would be aligned to SIT drain line.

*7.3.4 IF at any time during this evolution HPSI pump is started, THEN immediately close the following valves:

- 2SI-17
- 2CV-5082

{4.3.4}

7.3.5 **IF plant in Mode 4, THEN establish Containment Penetration Administrative Controls using 1015.001, Conduct of Operations prior to opening 2SI-17 or 2CV-5082.**

7.3.6 IF Category E in effect, THEN log status in Category E log for following valves:

- SIT Drain Header Outside Containment Isolation valve (2SI-17)
- RWT Recirc and Test Line Return Isolation valve (2BS-25)

7.3.7 Open 2SI-17.

7.3.8 Open 2BS-25.

7.3.9 Verify open RWT Recirc/Test Line Inlet to RWT (2BS-26).

7.3.10 Open associated manual valves to drain desired SITs:

- 2T-2A - 2SV-5004 Bypass (2SI-46)
- 2T-2B - 2SV-5024 Bypass (2SI-40)
- 2T-2C - 2SV-5044 Bypass (2SI-58)
- 2T-2D - 2SV-5064 Bypass (2SI-52)

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7.3.11 Open SIT Drain Header to RWT (2CV-5082).

7.3.12 IF desired to completely drain SIT,
THEN perform the following:

A. IF Containment ventilation available,
THEN verify Containment ventilation in service per
Containment Atmosphere Control (2103.033).

CAUTION

Draining a SIT below indicated range while SIT is pressurized may cause gas intrusion into the RCS.

* B. WHEN SIT Wide Range Level is between 10 and 12%
for any SIT being drained,
THEN perform the following for the affected SIT:

1. Close associated SIT drain valve:

- 2T-2A - 2SV-5004 Bypass (2SI-46)
- 2T-2B - 2SV-5024 Bypass (2SI-40)
- 2T-2C - 2SV-5044 Bypass (2SI-58)
- 2T-2D - 2SV-5064 Bypass (2SI-52)

2. IF personnel in Containment Building,
THEN announce venting operation over plant page.

3. Open associated SIT vent valves:

- 2T-2A - Vent valve (2SV-5006) or Bypass (2SI-44)
- 2T-2B - Vent valve (2SV-5026) or Bypass (2SI-38)
- 2T-2C - Vent valve (2SV-5046) or Bypass (2SI-56)
- 2T-2D - Vent valve (2SV-5066) or Bypass (2SI-50)

NOTE

SIT may be considered vented when Wide Range SIT pressure is approximately equal to CNTMT pressure AND stable.

4. WHEN affected SIT venting is complete,
THEN open associated SIT drain valve:

- 2T-2A - 2SV-5004 Bypass (2SI-46)
- 2T-2B - 2SV-5024 Bypass (2SI-40)
- 2T-2C - 2SV-5044 Bypass (2SI-58)
- 2T-2D - 2SV-5064 Bypass (2SI-52)

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- 7.3.13 WHEN SIT draining complete,
 THEN perform the following:
- A. Close 2CV-5082.
 - B. Remove key from 2CV-5082 handswitch.
 - C. Close Manual Drain valves opened:
 - 2T-2A - 2SV-5004 Bypass (2SI -46)
 - 2T-2B - 2SV-5024 Bypass (2SI -40)
 - 2T-2C - 2SV-5044 Bypass (2SI -58)
 - 2T-2D - 2SV-5064 Bypass (2SI -52)
 - D. Verify Vent valves closed as desired:
 - 2T-2A - Vent valve (2SV-5006) AND Bypass (2SI -44)
 - 2T-2B - Vent valve (2SV-5026) AND Bypass (2SI -38)
 - 2T-2C - Vent valve (2SV-5046) AND Bypass (2SI -56)
 - 2T-2D - Vent valve (2SV-5066) AND Bypass (2SI -50)
 - E. Lock closed 2SI -17.
 - F. Lock closed 2BS-25.
 - G. IF Category E in effect,
 THEN log status in Category E log:
 - 2SI -17
 - 2BS-25
 - H. IF Containment controls in effect,
 THEN complete Containment Penetration Valve log
 (1015.001D) for 2SI -17.
 - I. WHEN SIT drain alignment no longer desired,
 AND in Modes 1, 2, 3 or 4,
 THEN complete Containment Penetration Administrative
 Controls in 1015.001, Conduct of Operations for
 2CV-5082.

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8.0 FILLING SITS (RCS PRESSURE \geq 1500 PSIA)

8.1 IF pressure > 650 psig indicated on any of the following:

- SIS Injection to Loop 2P-32A (2PIS-5000)
- SIS Injection to Loop 2P-32B (2PIS-5020)
- SIS Injection to Loop 2P-32C (2PIS-5040)
- SIS Injection to Loop 2P-32D (2PIS-5060)

AND injection header flush desired,

THEN GO TO Attachment C of this procedure to fill SITs.

8.2 Place HPSI pump (2P-89A/B/C) in service on minimum recirculation mode using applicable section of HPSI System Operation (2104.039).

* 8.3 Monitor SIT levels and pressures as SIT pressure will rise rapidly during fill operations.

NOTE

SIT pressure will rapidly drop 2-5 psi when opening drain valve if SIT drain header has been depressurized.

8.4 IF filling A SIT,
THEN perform the following:

8.4.1 Verify open:

- SIT A Drain valve (2SV-5001-1)
- SIT A Check Valve Bypass (2SV-5004)

8.4.2 Throttle open selected HPSI Pump Injection MOV:

- HPSI Header 1 Injection to RCP A Discharge (2CV-5015-1)
- HPSI Header 2 Injection to RCP A Discharge (2CV-5016-2)

8.4.3 WHEN desired level reached,
THEN close the following:

- A. HPSI valve opened in step 8.4.2
(maintain handswitch in close position for \geq 2 seconds after red light out).
- B. 2SV-5001-1
- C. 2SV-5004

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- 8.5 IF filling B SIT,
 THEN perform the following:
- 8.5.1 Verify open:
- SIT B Drain valve (2SV-5021-1)
 - SIT B Check Valve Bypass (2SV-5024)
- 8.5.2 Throttle open selected HPSI Pump Injection MOV:
- HPSI Header 1 Injection to RCP B Discharge (2CV-5035-1)
 - HPSI Header 2 Injection to RCP B Discharge (2CV-5036-2)
- 8.5.3 WHEN desired level reached,
 THEN close the following:
- A. HPSI valve opened in step [8.5.2](#)
 (maintain handswitch in close position
 for ≥ 2 seconds after red light out).
 - B. 2SV-5021-1
 - C. 2SV-5024
- 8.6 IF filling C SIT,
 THEN perform the following:
- 8.6.1 Verify open:
- SIT C Drain valve (2SV-5041-2)
 - SIT C Check Valve Bypass (2SV-5044)
- 8.6.2 Throttle open selected HPSI Pump Injection MOV:
- HPSI Header 1 Injection to RCP C Discharge (2CV-5055-1)
 - HPSI Header 2 Injection to RCP C Discharge (2CV-5056-2)
- 8.6.3 WHEN desired level reached,
 THEN close the following:
- A. HPSI valve opened in step [8.6.2](#)
 (maintain handswitch in close position
 for ≥ 2 seconds after red light out).
 - B. 2SV-5041-2
 - C. 2SV-5044

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- 8.7 IF filling D SIT,
THEN perform the following:
- 8.7.1 Verify open:
- SIT D Drain valve (2SV-5061-2)
 - SIT D Check Valve Bypass (2SV-5064)
- 8.7.2 Throttle open selected HPSI Pump Injection MOV:
- HPSI Header 1 Injection to RCP D Discharge (2CV-5075-1)
 - HPSI Header 2 Injection to RCP D Discharge (2CV-5076-2)
- 8.7.3 WHEN desired level reached,
THEN close the following:
- A. HPSI valve opened in step [8.7.2](#)
(maintain handswitch in close position
for ≥ 2 seconds after red light out).
 - B. 2SV-5061-2
 - C. 2SV-5064
- 8.8 WHEN all SIT filling operations are complete,
THEN secure HPSI pump using HPSI System Operation (2104.039).

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9.0 FILLING SITS THROUGH ALTERNATE INJECTION HEADER (RCS PRESSURE \geq 1500 PSIA)

9.1 IF pressure > 650 psig indicated on any of the following:

- SIS Injection to Loop 2P-32A (2PIS-5000)
- SIS Injection to Loop 2P-32B (2PIS-5020)
- SIS Injection to Loop 2P-32C (2PIS-5040)
- SIS Injection to Loop 2P-32D (2PIS-5060)

AND injection header flush desired,

THEN GO TO Attachment C of this procedure to fill SITs.

9.2 Place HPSI pump (2P-89A/B/C) in service on minimum recirculation mode using applicable section of HPSI System Operation (2104.039).

* 9.3 Monitor SIT levels and pressures as SIT pressure will rise rapidly during fill operations.

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NOTE

SIT pressure will rapidly drop 2-5 psi when opening drain valve if SIT drain header has been depressurized.

- 9.4 IF filling A SIT,
 THEN perform the following:
- 9.4.1 Verify one of the following open:
- SIT B Drain valve (2SV-5021-1)
 - SIT C Drain valve (2SV-5041-2)
 - SIT D Drain valve (2SV-5061-2)
- 9.4.2 Open SIT A Check Valve Bypass (2SV-5004).
- 9.4.3 Throttle open selected HPSI Pump Injection MOV to SIT Drain header being used for fill:
- HPSI Header 1 Injection to RCP B Discharge (2CV-5035-1)
 - HPSI Header 2 Injection to RCP B Discharge (2CV-5036-2)
 - HPSI Header 1 Injection to RCP C Discharge (2CV-5055-1)
 - HPSI Header 2 Injection to RCP C Discharge (2CV-5056-2)
 - HPSI Header 1 Injection to RCP D Discharge (2CV-5075-1)
 - HPSI Header 2 Injection to RCP D Discharge (2CV-5076-2)
- 9.4.4 WHEN desired level reached,
 THEN close the following:
- A. HPSI valve opened in step [9.4.3](#)
 (maintain handswitch in close position
 for ≥ 2 seconds after red light out).
- B. SIT Drain valve opened in previous step:
- 2SV-5021-1
 - 2SV-5041-2
 - 2SV-5061-2
- C. 2SV-5004

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NOTE

SIT pressure will rapidly drop 2-5 psi when opening drain valve if SIT drain header has been depressurized.

- 9.5 IF filling B SIT,
 THEN perform the following:
- 9.5.1 Verify one of the following open:
- SIT A Drain valve (2SV-5001-1)
 - SIT C Drain valve (2SV-5041-2)
 - SIT D Drain valve (2SV-5061-2)
- 9.5.2 Open SIT B Check Valve Bypass (2SV-5024).
- 9.5.3 Throttle open selected HPSI Pump Injection MOV to SIT Drain header being used for fill:
- HPSI Header 1 Injection to RCP A Discharge (2CV-5015-1)
 - HPSI Header 2 Injection to RCP A Discharge (2CV-5016-2)
 - HPSI Header 1 Injection to RCP C Discharge (2CV-5055-1)
 - HPSI Header 2 Injection to RCP C Discharge (2CV-5056-2)
 - HPSI Header 1 Injection to RCP D Discharge (2CV-5075-1)
 - HPSI Header 2 Injection to RCP D Discharge (2CV-5076-2)
- 9.5.4 WHEN desired level reached,
 THEN close the following:
- A. HPSI valve opened in step [9.5.3](#)
 (maintain handswitch in close position
 for ≥ 2 seconds after red light out).
- B. SIT Drain valve opened in previous step:
- 2SV-5001-1
 - 2SV-5041-2
 - 2SV-5061-2
- C. 2SV-5024

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NOTE

SIT pressure will rapidly drop 2-5 psi when opening drain valve if SIT drain header has been depressurized.

- 9.6 IF filling C SIT,
 THEN perform the following:
- 9.6.1 Verify one of the following open:
- SIT A Drain valve (2SV-5001-1)
 - SIT B Drain valve (2SV-5021-1)
 - SIT D Drain valve (2SV-5061-2)
- 9.6.2 Open SIT C Check Valve Bypass (2SV-5044).
- 9.6.3 Throttle open selected HPSI Pump Injection MOV to SIT Drain header being used for fill:
- HPSI Header 1 Injection to RCP A Discharge (2CV-5015-1)
 - HPSI Header 2 Injection to RCP A Discharge (2CV-5016-2)
 - HPSI Header 1 Injection to RCP B Discharge (2CV-5035-1)
 - HPSI Header 2 Injection to RCP B Discharge (2CV-5036-2)
 - HPSI Header 1 Injection to RCP D Discharge (2CV-5075-1)
 - HPSI Header 2 Injection to RCP D Discharge (2CV-5076-2)
- 9.6.4 WHEN desired level reached,
 THEN close the following:
- A. HPSI valve opened in step [9.6.3](#)
 (maintain handswitch in close position
 for ≥ 2 seconds after red light out).
- B. SIT Drain valve opened in previous step:
- 2SV-5001-1
 - 2SV-5021-1
 - 2SV-5061-2
- C. 2SV-5044

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<u>NOTE</u>
SIT pressure will rapidly drop 2-5 psi when opening drain valve if SIT drain header has been depressurized.

- 9.7 IF filling D SIT,
 THEN perform the following:
- 9.7.1 Verify one of the following open:
- SIT A Drain valve (2SV-5001-1)
 - SIT B Drain valve (2SV-5021-1)
 - SIT C Drain valve (2SV-5041-2)
- 9.7.2 Open SIT D Check Valve Bypass (2SV-5064).
- 9.7.3 Throttle open selected HPSI Pump Injection MOV to SIT Drain header being used for fill:
- HPSI Header 1 Injection to RCP A Discharge (2CV-5015-1)
 - HPSI Header 2 Injection to RCP A Discharge (2CV-5016-2)
 - HPSI Header 1 Injection to RCP B Discharge (2CV-5035-1)
 - HPSI Header 2 Injection to RCP B Discharge (2CV-5036-2)
 - HPSI Header 1 Injection to RCP C Discharge (2CV-5055-1)
 - HPSI Header 2 Injection to RCP C Discharge (2CV-5056-2)
- 9.7.4 WHEN desired level reached,
 THEN close the following:
- A. HPSI valve opened in step [9.7.3](#)
 (maintain handswitch in close position
 for ≥ 2 seconds after red light out).
- B. SIT Drain valve opened in previous step:
- 2SV-5001-1
 - 2SV-5021-1
 - 2SV-5041-2
- C. 2SV-5064
- 9.8 WHEN all SIT filling operations are complete,
 THEN secure HPSI pump using HPSI System Operation (2104.039).

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10.0 FILLING SITS IN MODE 3, 4, 5, or 6 (RCS PRESSURE < 1500 PSIA)

10.1 Verify HPSI system aligned using HPSI System Operation (2104.039), Normal ESFAS System Alignment or Aligning 2P-89C for B Standby.

10.2 Verify closed HPSI Header 1 Th Injection (2CV-5101-1).

10.3 Verify closed HPSI Header 2 Th Injection (2CV-5102-2).

10.4 Verify closed the following HPSI Injection MOVs:

- HPSI Header 1 Injection to RCP A Discharge (2CV-5015-1)
- HPSI Header 1 Injection to RCP B Discharge (2CV-5035-1)
- HPSI Header 1 Injection to RCP C Discharge (2CV-5055-1)
- HPSI Header 1 Injection to RCP D Discharge (2CV-5075-1)

- HPSI Header 2 Injection to RCP A Discharge (2CV-5016-2)
- HPSI Header 2 Injection to RCP B Discharge (2CV-5036-2)
- HPSI Header 2 Injection to RCP C Discharge (2CV-5056-2)
- HPSI Header 2 Injection to RCP D Discharge (2CV-5076-2)

{4.3.4}

10.5 **IF required to fill SITs in Mode 3 or 4, THEN establish Containment Penetration Administrative Controls using 1015.001, Conduct of Operations prior to opening 2SI-5115A or 2CV-5082.**

10.6 Perform the following to align HPSI to SIT Cross Connect valves:

10.6.1 IF Category E in effect,
THEN log status in Category E log.

10.6.2 Open HPSI to SIT Cross Connect valves:

- HPSI LP Fill to SIT Drain Header (2SI-1024B)
- HPSI LP Fill to SIT Drain Header (2SI-1025B)
- HPSI LP Fill to SIT Drain Header Auxiliary HPSI Fill Isolation (2SI-5115A)
- HPSI LP Fill to SIT Drain Header Auxiliary HPSI Fill Isolation (2SI-5115B)

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- 10.7 Open SIT Drain Header Isolation (2CV-5082).
- 10.8 Verify closed the following SIT Check Valve Bypasses:
- SIT A Check Valve Bypass (2SV-5004)
 - SIT B Check Valve Bypass (2SV-5024)
 - SIT C Check Valve Bypass (2SV-5044)
 - SIT D Check Valve Bypass (2SV-5064)
- 10.9 Verify closed the Drain valve for SIT being filled:
- SIT A Drain valve (2SV-5001-1)
 - SIT B Drain valve (2SV-5021-1)
 - SIT C Drain valve (2SV-5041-2)
 - SIT D Drain valve (2SV-5061-2)

CAUTION

If injection valves leak through to RCS, then PZR pressure and level may rise.

- *10.10 WHEN filling SIT,
THEN monitor PZR pressure and level.
- 10.11 IF using HPSI Train B,
THEN start HPSI pump aligned to HPSI Header 2 (2P-89B/C)
using HPSI System Operation (2104.039).
- 10.12 IF using HPSI Train A,
THEN perform the following:
- 10.12.1 Verify plant NOT in Mode 3 or 4.
- 10.12.2 Verify HPSI Pumps Discharge X-Conn (2SI-11A) open.
- 10.12.3 Verify HPSI Pumps Discharge X-Conn (2SI-11B) open.
- 10.12.4 Start HPSI pump aligned to HPSI Header 1 (2P-89A/C)
using HPSI System Operation (2104.039).
- 10.13 Open SIT Check Valve Bypass for SIT to be filled:
- SIT A Check Valve Bypass (2SV-5004)
 - SIT B Check Valve Bypass (2SV-5024)
 - SIT C Check Valve Bypass (2SV-5044)
 - SIT D Check Valve Bypass (2SV-5064)
- 10.14 WHEN desired level reached,
THEN close SIT Check Valve Bypass opened.
- 10.15 Stop running HPSI pump (2P-89A/B/C) using HPSI System Operation (2104.039).

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- 10.16 IF HPSI Train A was used,
THEN perform the following:
- IF 2P-89C aligned to Train A,
THEN lock closed 2SI-11B.
 - IF 2P-89C aligned to Train B,
THEN lock closed 2SI-11A.
- 10.17 Lock closed HPSI to SIT Cross Connect valves:
- 2SI-1024B
 - 2SI-1025B
 - 2SI-5115A
 - 2SI-5115B
- 10.18 Close 2CV-5082.
- 10.19 Remove key from 2CV-5082 handswitch.
- 10.20 IF Containment Penetration Controls in effect,
THEN update Containment Penetration Valve Log (1015.001D) for 2SI-5115A.
- 10.21 IF Category E in effect,
THEN log status in Category E log.
- 10.22 Depressurize SIT Drain Header by cycling SIT Drain to RDT (2CV-5081) open and closed.
- 10.23 WHEN LP fill alignment no longer desired,
AND in Modes 1, 2, 3 or 4,
THEN complete Containment Penetration Administrative Controls in 1015.001, Conduct of Operations for 2CV-5082.

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11.0 RAISING SAFETY INJECTION TANK PRESSURE

11.1 Verify HP Nitrogen Supply aligned with N₂ regulator set at desired pressure using N2 System Operations (2104.009), Exhibit 7, Nitrogen Manifold Operations.

11.2 Open Supply Header to Containment Isolation (2CV-6207-2).
{4.3.3}

CAUTION

Cross-connecting SITs via nitrogen supply valves in Modes 1, 2 and 3 (with RCS pressure ≥700 psia) will cause associated SITs to be inoperable.

11.3 IF plant in Mode 3, 4 or 5 with RCS pressure < 700 psia,
THEN SIT pressures may be equalized by opening N₂ fill valves on more than one SIT at a time.

11.4 IF desired to raise pressure in 2T-2A,
THEN perform the following:

11.4.1 Open N₂ Supply valves (2SV-5005A/B).

11.4.2 WHEN 2T-2A at desired pressure
THEN close N₂ Supply valves (2SV-5005A/B).

11.5 IF desired to raise pressure in 2T-2B,
THEN perform the following:

11.5.1 Open N₂ Supply valves (2SV-5025A/B).

11.5.2 WHEN 2T-2B at desired pressure
THEN close N₂ Supply valves (2SV-5025A/B).

11.6 IF desired to raise pressure in 2T-2C,
THEN perform the following:

11.6.1 Open N₂ Supply valves (2SV-5045A/B).

11.6.2 WHEN 2T-2C at desired pressure
THEN close N₂ Supply valves (2SV-5045A/B).

11.7 IF desired to raise pressure in 2T-2D,
THEN perform the following:

11.7.1 Open N₂ Supply valves (2SV-5065A/B).

11.7.2 WHEN 2T-2D at desired pressure
THEN close N₂ Supply valves (2SV-5065A/B).

11.8 Close Supply Header to Containment Isolation (2CV-6207-2).

11.9 Verify HP N₂ from Unit 1 secured using N2 System Operations (2104.009), Exhibit 7, Nitrogen Manifold Operations.

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12.0 LOWERING SAFETY INJECTION TANK PRESSURE

- 12.1 IF 18-Month Remote Position Indication (Supplement 4 of Cold Shutdown Valve Testing, 2305.006) required, THEN perform in conjunction with this activity.
- 12.2 Venting SITs Through Normal Vent Line
- 12.2.1 IF Containment ventilation available, THEN verify Containment ventilation in service per Containment Atmosphere Control (2104.033).
- 12.2.2 IF personnel in CNTMT Building, THEN announce venting operation over plant page.
- 12.2.3 IF Equipment Hatch or Temporary Equipment Hatch open, THEN verify air flow into Containment Building.
- 12.2.4 IF venting SIT (2T-2A), THEN open ONE of the following:
- SIT A Vent (2SV-5006)
 - SIT A Vent Bypass (2SI-44)
- 12.2.5 IF venting SIT (2T-2B), THEN open ONE of the following:
- SIT B Vent (2SV-5026)
 - SIT B Vent Bypass (2SI-38)
- 12.2.6 IF venting SIT (2T-2C), THEN open ONE of the following:
- SIT C Vent (2SV-5046)
 - SIT C Vent Bypass (2SI-56)
- 12.2.7 IF venting SIT (2T-2D), THEN open ONE of the following:
- SIT D Vent (2SV-5066)
 - SIT D Vent Bypass (2SI-50)
- 12.2.8 IF desired to fill SIT that is being vented, THEN commence raising level using Raising SIT Level section of this procedure.
- 12.2.9 WHEN desired pressure achieved, THEN close Vent valves opened.

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- 12.3 Venting SIT through Nitrogen Supply Line Header Drain
- 12.3.1 IF Containment ventilation available,
THEN verify Containment ventilation in service per Containment Atmosphere Control (2104.033).
- 12.3.2 Verify closed Supply Header to Containment Isolation (2CV-6207-2).
- 12.3.3 IF Equipment Hatch or Temporary Equipment Hatch open,
THEN verify air flow into Containment Building.
- 12.3.4 Verify closed SIT Nitrogen Supply valves:
- SIT A Nitrogen Supply valves (2SV-5005A/B)
 - SIT B Nitrogen Supply valves (2SV-5025A/B)
 - SIT C Nitrogen Supply valves (2SV-5045A/B)
 - SIT D Nitrogen Supply valves (2SV-5065A/B)
- 12.3.5 Open Supply Header Drain After 2N₂-18 (2N₂-1043).

{4.3.3}

<u>CAUTION</u>
Venting more than one SIT at a time may cause SITs to be inoperable

- 12.3.6 Vent SITs as follows:
- IF venting SIT A,
THEN open 2SV-5005A/B.
 - IF venting SIT B,
THEN open 2SV-5025A/B.
 - IF venting SIT C,
THEN open 2SV-5045A/B.
 - IF venting SIT D,
THEN open 2SV-5065A/B.
- 12.3.7 IF desired to fill SIT that is being vented,
THEN commence raising SIT level using appropriate section of this procedure.
- 12.3.8 WHEN desired pressure reached,
THEN close SIT N₂ Supply valves opened.
- 12.3.9 Close Supply Header Drain After 2N₂-18 (2N₂-1043).
- 12.4 IF desired to lower SIT Pressure by Draining to RDT,
THEN use appropriate section of this procedure.

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13.0 SIT SAMPLING

{4.3.4}

- 13.1 IF in Mode 1, 2, 3, or 4,
THEN establish Containment Penetration Administrative Controls per 1015.001, Conduct of Operations for SIT Penetration Sample Isolation valves (2SV-5872, 2SV-5873, 2SV-5874 and 2SV-5875).
- 13.2 WHEN requested by Chemistry,
THEN open SIT Penetration Sample Isolation (2SV-5876-2).
- 13.3 WHEN sampling complete,
THEN close 2SV-5876-2.
- 13.4 Complete Containment penetration administrative controls for valves opened in step 13.1.

14.0 RAISING SIT PRESSURE USING TEMPORARY N₂ BOTTLES

NOTE

A temporary alteration package will be needed to perform this section.

- 14.1 Check temporary nitrogen bottles connected at 2N₂-5003.
- 14.2 Verify Supply Hdr to Ctmt Isol Before 2CV-6207-2 (2N₂-17) closed.
- 14.3 Verify Temporary N₂ Bottle Header Pressure regulator backed off.
- 14.4 Open Isolation valves on the four in service N₂ bottles.
 - 14.4.1 IF combined header pressure < 700 psig,
THEN perform the following:
 - A. Isolate in service N₂ bottles.
 - B. Unisolate four Standby bottles in rack and place in service signs on them.
 - C. WHEN time permits,
THEN change out empty bottles with full ones staged in hallway.
- 14.5 Open 2N₂-5003.
- 14.6 Slowly raise N₂ pressure to 700 to 750 psig using Temporary N₂ Pressure regulator.
- 14.7 Open Supply Header to Containment Isolation (2CV-6207-2).

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{4.3.3}

CAUTION

**Cross-connecting SITs via nitrogen supply valves in Mode 1, 2 and 3
(with RCS pressure \geq 700 psia) will cause associated SITs to be inoperable.**

- 14.8 IF plant in Mode 3, 4 or 5 with RCS pressure < 700 psia,
THEN SIT pressures may be equalized by opening N₂ Fill valves on more than one SIT at a time.
- 11.9 IF desired to raise pressure in 2T-2A,
THEN perform the following:
 - 11.9.1 Open N₂ Supply valves (2SV-5005A/B).
 - 11.9.2 WHEN 2T-2A at desired pressure
THEN close N₂ Supply valves (2SV-5005A/B).
- 11.10 IF desired to raise pressure in 2T-2B,
THEN perform the following:
 - 11.10.1 Open N₂ Supply valves (2SV-5025A/B).
 - 11.10.2 WHEN 2T-2B at desired pressure
THEN close N₂ Supply valves (2SV-5025A/B).
- 11.11 IF desired to raise pressure in 2T-2C,
THEN perform the following:
 - 11.11.1 Open N₂ Supply valves (2SV-5045A/B).
 - 11.11.2 WHEN 2T-2C at desired pressure
THEN close N₂ Supply valves (2SV-5045A/B).
- 11.12 IF desired to raise pressure in 2T-2D,
THEN perform the following:
 - 11.12.1 Open N₂ Supply valves (2SV-5065A/B).
 - 11.12.2 WHEN 2T-2D at desired pressure
THEN close N₂ Supply valves (2SV-5065A/B).
- 14.13 Close Supply Header to Containment Isolation (2CV-6207-2).
- 14.14 Back off Temporary N₂ Regulator.
- 14.15 Close 2N₂-5003.
- 14.16 Open 2N₂-17.
- 14.17 Close all bottle isolations for in service bottles.
- 14.18 IF combined header pressure < 700 psig,
THEN change out in service bottles.

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
INSIDE CONTAINMENT RX BLDG 426'							
2SI-44	SIT A Vent Bypass	M2232 F7 SH 1	SOUTH OF ELEVATOR, ON THE FLOOR BY ELEVATOR & 2T-2A TANK	CLOSED			
2SI-38	SIT B Vent Bypass	M2232 H7 SH 1	2 FT OFF GRATE, UNDER MS LINE A ABOVE 2T-2B	CLOSED			
2SI-56	SIT C Vent Bypass	M2232 B7 SH 1	NW SIDE 2M-55B (H ₂ RECOMBINER)	CLOSED			
2SI-50	SIT D Vent Bypass	M2232 D7 SH 1	ABOVE 2T-2D BY MS LINE B SNUBBER AT HANDRAIL	CLOSED			
RX BLDG 404' AT 2T-2A							
2SI-5009B	SIT A Level Transmitters Isolation	M2232 E7 SH 1	SOUTH SIDE OF 2T-2A 5 FT UP	OPEN			
2SI-5009A	SIT A Level Transmitters Isolation	M2232 E7 SH 1	SOUTH SIDE OF 2T-2A, 15 FT OFF GRATING	OPEN			INACCESSIBLE VALVE
2SI-45	SIT A N ₂ Supply Bypass	M2232 F7 SH 1	SOUTH SIDE OF 2T-2A, 1 FT OFF GRATING	CLOSED			
2SI-1075A	SIT A Nitrogen Supply Line Vent	M2232 F6 SH 1	NE SIDE OF 2T-2A, BELOW 426 FT FLOOR GRATING	CLOSED			
2SI-1076A	SIT A Nitrogen Supply Line Vent	M2232 F6 SH 1	NE SIDE OF 2T-2A, BELOW 426 FT FLOOR GRATING	CLOSED			
2SI-5010A	SIT A Level Transmitter Isolation	M2232 F6 SH 1	SOUTH OF ELEVATOR AT 2T-2A	OPEN			
2SI-5011	SIT A Pressure Transmitters Isolation	M2232 F6 SH 1	BETWEEN 2T-2A TANK AND ELEVATOR, 20 FT UP FROM FLOOR	OPEN			INACCESSIBLE VALVE
RX BLDG 404' AT 2T-2B							
2SI-5029A	SIT B Level Transmitters Isolation	M2232 G6 SH 1	ON EAST SIDE OF 2T-2B, 12 FT UP	OPEN			
2SI-5029B	SIT B Level Transmitters Isolation	M2232 G6 SH 1	SOUTHEAST SIDE OF 2T-2B, 8 FT UP	OPEN			
2SI-39	SIT B N ₂ Supply Bypass	M2232 H7 SH 1	SOUTH EAST OF 2T-2B, 1 FT OFF GRATING	CLOSED			
2SI-1075B	SIT B Nitrogen Supply Line Vent	M2232 H7 SH 1	ABOVE N ₂ SOLENOID, 1 FT FROM CEILING	CLOSED			

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
2SI-1076B	SIT B Nitrogen Supply Line Vent	M2232 H7 SH 1	ABOVE N ₂ SOLENOID, 1 FT FROM CEILING	CLOSED			
2SI-5030A	SIT B Level Transmitters Isolation	M2232 H6 SH 1	ON 2T-2B, WEST SIDE OF TK, 10 FT UP	OPEN			INACCESSIBLE VALVE
2SI-5031	SIT B Pressure Transmitters Isolation	M2232 H6 SH 1	TOP OF 2T-2B, TAP OFF PIPING FOR RELIEF	OPEN			
RX BLDG 404' AT 2T-2D							
2SI-5069A	SIT D Level Transmitter Isolation	M2232 D6 SH 1	EAST SIDE OF 2T-2D, 15 FEET UP	OPEN			
2SI-5069B	SIT D Level Transmitter Isolation	M2232 C6 SH 1	EAST SIDE OF 2T-2D, 7 FEET UP	OPEN			
2SI-51	SIT D N ₂ Supply Bypass	M2232 D8 SH 1	NORTH SIDE OF 2T-2D TANK AT GRATING	CLOSED			
2SI-1075D	SIT D Nitrogen Supply Line Vent	M2232 D7 SH S1	ON TOP OF 2T-2D, NORTH WEST SIDE OF TANK, 30 FT UP	CLOSED			
2SI-1076D	SIT D Nitrogen Supply Line Vent	M2232 D7 SH 1	ON TOP OF 2T-2D, NORTH WEST SIDE OF TANK, 30 FT UP	CLOSED			
2SI-5070A	SIT D Level Transmitter Isolation	M2232 D7 SH 1	15 FT OFF GRATING, NORTH SIDE OF 2T-2D	OPEN			
2SI-5071	SIT D Pressure Transmitter Isolation	M2232 D6 SH 1	ON TOP OF 2T-2D, TAP OFF PIPING FOR RELIEF	OPEN			
RX BLDG 404' AT 2T-2C							
2SI-5049A	SIT C Level Transmitters Isolation	M2232 B7 SH 1	SIDE OF 2T-2C BETWEEN TANK AND WALL	OPEN			
2SI-5049B	SIT C Level Transmitters Isolation	M2232 B7 SH 1	8 FT UP, SOUTHEAST SIDE OF 2T-2C	OPEN			
2SI-57	SIT C N ₂ Supply Bypass	M2232 B8 SH 1	EAST SIDE 2T-2C AT GRATING	CLOSED			
2SI-1075C	SIT C Nitrogen Supply Line Vent	M2232 B7 SH 1	ABOVE N ₂ SUPPLY SV TO 2T-2C, 20 FT OFF GRATING	CLOSED			
2SI-1076C	SIT C Nitrogen Supply Line Vent	M2232 B7 SH 1	ABOVE N ₂ SUPPLY SV TO 2T-2C, 20 FT OFF GRATING	CLOSED			

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
2SI-5050A	SIT C Level Transmitter Isolation	M2232 B6 SH 1	SOUTH SIDE OF 2T-2C, 20 FT UP	OPEN			
2SI-5051	SIT C Pressure Transmitter Isolation	M2232 B6 SH 1	TOP OF 2T-2C, TAP OFF PIPING TO RELIEF	OPEN			
RX BLDG 386' AT 2T-2A							
2SI-46	2SV-5004 Bypass	M2232 E7 SH 1	SOUTHWEST SIDE OF 2T-2A AT GRATING	CLOSED			
2SI-25A	SIT A Sample Isolation	M2232 E6 SH 1	SOUTH OF ELEVATOR UNDER 2T-2A, 2 FT OFF GRATING	OPEN			
2SI-47	SIT A Drain Valve Bypass 2SV-5001-1	M2232 E7 SH 1	SOUTHWEST SIDE OF 2T-2A	LOCKED CLOSED			
2SI-5010B	SIT A Level Transmitter Isolation	M2232 E6 SH 1	ON SOUTH SIDE OF 2T-2A, 15 FT OFF GRATING	OPEN			
2SI-5000A	Safety Inj. Header A 2PT-5000 Isolation	M2232 E7 SH 1	WEST SIDE OF 2T-2A	OPEN			
2SI-5000B	Safety Inj. Header A 2PT-5000 Isolation	M2232 E7 SH 1	WEST SIDE OF 2T-2A	OPEN			
2SI-5113A	SIT A Outlet 2PP-5113 Isolation	M2232 E7 SH 1	UNDER 2T-2A, SOUTH OF ELEVATOR, 3 FT OFF GRATING	CLOSED			
2SI-5113B	SIT A Outlet 2PP-5113 Isolation	M2232 E7 SH 1	SOUTH OF ELEVATOR, UNDER 2T-2A, ABOVE 2SI-5113A	CLOSED			
RX BLDG 386' AT 2T-2B							
2SI-41	SIT B Drain Valve Bypass 2SV-5021-1	M2232 G7 SH 1	AT FLOOR TO LEFT OF LADDER TO 2T-2B	LOCKED CLOSED			
2SI-40	2SV-5024 Bypass	M2232 G7 SH 1	UNDER 2T-2B, 1 FT OFF GRATING	CLOSED			
2SI-5133A	SIT B Outlet 2PP-5133 Isolation	M2232 G7 SH 1	UNDER 2T-2B, BETWEEN OUTLET AND CHECK VALVES	CLOSED			
2SI-5133B	SIT B Outlet 2PP-5133 Isolation	M2232 G7 SH 1	UNDER 2T-2B, BETWEEN OUTLET AND CHECK VALVES	CLOSED			
2SI-25B	SIT B Sample Isolation	M2232 G6 SH 1	EAST SIDE OF 2T-2B, 6 FT UP	OPEN			

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL COMMENTS
2SI-5020A	Safety Inj. Header B 2PT-5020 Isolation	M2232 G7 SH 1	UNDER 2T-2B, 3 FT OFF GRATING	OPEN		
2SI-5020B	Safety Inj. Header B 2PT-5020 Isolation	M2232 G7 SH 1	UNDER 2T-2B, 3 FT OFF GRATING, NEXT TO 2SI-5020A	OPEN		
2SI-5030B	SIT B Level Transmitter Isolation	M2232 G6 SH 1	WEST SIDE OF 2T-2B, 12 FT UP	OPEN		
RX BLDG 386' AT 2T-2C						
2SI-5153A	SIT C Outlet 2PP-5153 Isolation	M2232 A7 SH 1	UNDER 2T-2C, BETWEEN OUTLET AND CHECK VALVES	CLOSED		
2SI-5153B	SIT C Outlet 2PP-5153 Isolation	M2232 A7 SH 1	UNDER 2T-2C, BETWEEN OUTLET AND CHECK VALVES	CLOSED		
2SI-5040A	Safety Inj. Header C 2PT-5040 Isolation	M2232 A7 SH 1	UNDER 2T-2C TANK	OPEN		
2SI-5040B	Safety Inj. Header C 2PT-5040 Isolation	M2232 A7 SH 1	UNDER 2T-2C TANK	OPEN		
2SI-58	2SV-5044 Bypass	M2232 B7 SH 1	SOUTHWEST SIDE OF 2T-2C AT GRATING	CLOSED		
2SI-59	SIT C Drain Valve Bypass	M2232 B7 SH 1	UNDER 2T-2C, 1 FT OFF GRATING	LOCKED CLOSED		
2SI-25C	SIT C Sample Isolation	M2232 A6 SH 1	UNDER 2T-2C, 2 FT OFF GRATING	OPEN		
2SI-5050B	SIT C Level Transmitters Isolation	M2232 A6 SH 1	SIDE OF 2T-2C	OPEN		
RX BLDG 386' AT 2T-2D						
2SI-25D	SIT D Sample Isolation	M2232 C6 SH 1	UNDER 2T-2D TANK	OPEN		
2SI-5070B	SIT D Level Transmitters Isolation	M2232 C7 SH 1	10 FT OFF GRATING ON NORTH SIDE OF 2T-2D	OPEN		
2SI-52	2SV-5064 Bypass	M2232 D7 SH 1	NORTHEAST OF 2T-2D TANK	CLOSED		
2SI-5060A	Safety Inj. Header D 2PT-5060 Isolation	M2232 C7 SH 1	UNDER 2T-2D BETWEEN OUTLET AND CHECK VALVES	OPEN		

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS		
2SI-5060B	Safety Inj. Header D 2PT-5060 Isolation	M2232 C7 SH 1	UNDER 2T-2D BETWEEN OUTLET AND CHECK VALVES	OPEN					
2SI-53	SIT D Drain Valve Bypass 2SV-5061-2	M2232 C7 SH 1	UNDER 2T-2D AT GRATING	LOCKED CLOSED					
2SI-5173A	SIT D Outlet 2PP-5173 Isolation	M2232 C7 SH 1	UNDER 2T-2D, BETWEEN OUTLET AND CHECK VALVES	CLOSED					
2SI-5173B	SIT D Outlet 2PP-5173 Isolation	M2232 C7 SH 1	UNDER 2T-2D, BETWEEN OUTLET AND CHECK VALVES	CLOSED					
RX BLDG 357" USPP AREA									
2SI-5119	SIT Drain Header Drain	M2232 B8 SH 1	PENTRATION 2P33 BY 2CV-5082	CLOSED					
2SI-5120	SIT Drain Header Drain	M2232 B8 SH 1	PENETRATION 2P33, DOWNSTREAM OF 2CV-5082	CLOSED					
2PS-7956	Sample Line Drain Valves Inside Containment	M2237 A3 SH 1	3 FT WEST OF PENETRATION 2P26 1 FT ABOVE GRATING	LOCKED CLOSED					
2PS-7957	Sample Line Drain Valves Inside Containment	M2237 A3 SH 1	3 FT WEST OF PENETRATION 2P26 1 FT ABOVE GRATING	LOCKED CLOSED					

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
AUX BLDG 360' USPP ROOM							
2PS-5877A	2PP-5877 Isolation	M2237 B3 SH 1	PENETRATION 2P37	LOCKED CLOSED			
2PS-5877B	2PP-5877 Isolation	M2237 B3 SH 1	PENETRATION 2P37	LOCKED CLOSED CAPPED			
2PS-97	Manual Penetration Isolation	M2237 B3 SH 1	PENETRATION 2P37	OPEN			
2PS-1010A	Penetration Vent	M2237 A3 SH 1	PENETRATION 2P37	LOCKED CLOSED			
2PS-1010B	Penetration Vent	M2237 A3 SH 1	PENETRATION 2P37	LOCKED CLOSED CAPPED			
2SI-5115A	HPSI LP Fill to SIT Drain Hdr Aux HPSI Fill Isol	M2232 A8 SH 1	PENETRATION 2P33, 1 FT FROM WALL, 4 FT UP	LOCKED CLOSED			
2SI-5115B	HPSI LP Fill to SIT Drain Hdr Aux HPSI Fill Isol	M2232 A8 SH 1	PENETRATION 2P33, 1.5 FT FROM WALL, 4 FT UP	LOCKED CLOSED			
2SI-5115C	2PP-5115 Isolation	M2232 A8 SH 1	BETWEEN 2CV-5035 & 5036, ON LINE FROM 2CV-5101, 4.5 FT UP	CLOSED			
2SI-5115D	2PP-5115 Isolation	M2232 A8 SH 1	BETWEEN 2CV-5035 & 5036, 5 FT UP	CLOSED			
2SI-17	SIT Drain Header Outside Containment Isolation	M2232 A8 SH 1	PENETRATION 2P33, 1 FT FROM WALL, 6 FT UP	LOCKED CLOSED			

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ATTACHMENT C

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INJECTION HEADER FLUSH

This attachment is used to raise boron concentration in the SIT Injection Header by flushing system piping to the RDT.

1.0 INITIAL CONDITIONS (May be performed in any order)

- 1.1 Circle affected SIT Injection Header: _____

2T-2A
2T-2B
2T-2C
2T-2D
- 1.2 Coordinate with System Engineering to determine required flush volume. _____ gallons _____
- 1.3 Calculate required change in RDT level to obtain flush volume recorded above: _____
_____ gal ÷ 17.6 gal /% = _____ %
- 1.4 Record initial Reactor Drain Tank level. _____ % _____
- 1.5 Record pressure for SIT injection header to be flushed: _____ psig _____
 - SIS Injection to Loop 2P-32A (2PIS-5000)
 - SIS Injection to Loop 2P-32B (2PIS-5020)
 - SIS Injection to Loop 2P-32C (2PIS-5040)
 - SIS Injection to Loop 2P-32D (2PIS-5060)

2.0 INJECTION HEADER FLUSH

- 2.1 Place HPSI pump (2P-89A/B/C) on minimum recirculation mode using applicable section of HPSI System Operation (2104.039). _____
- 2.2 Open SIT Drain to RDT (2CV-5081). _____
- 2.3 Throttle open HPSI MOV for SIT Header to be flushed: _____
 - HPSI Header 1 Injection to RCP A Discharge (2CV-5015-1)
 - HPSI Header 2 Injection to RCP A Discharge (2CV-5016-2)
 - HPSI Header 1 Injection to RCP B Discharge (2CV-5035-1)
 - HPSI Header 2 Injection to RCP B Discharge (2CV-5036-2)
 - HPSI Header 1 Injection to RCP C Discharge (2CV-5055-1)
 - HPSI Header 2 Injection to RCP C Discharge (2CV-5056-2)
 - HPSI Header 1 Injection to RCP D Discharge (2CV-5075-1)
 - HPSI Header 2 Injection to RCP D Discharge (2CV-5076-2)

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ATTACHMENT C

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- 2.4 Check indicated pressure for SIT injection header to be flushed is at HPSI pump discharge pressure: _____
- SIS Injection to Loop 2P-32A (2PIS-5000)
 - SIS Injection to Loop 2P-32B (2PIS-5020)
 - SIS Injection to Loop 2P-32C (2PIS-5040)
 - SIS Injection to Loop 2P-32D (2PIS-5060)
- *2.5 Monitor all SIT levels and pressures during this operation.
- *2.6 Pump the Reactor Drain Tank as necessary using 2103.007, Quench Tank and Reactor Drain Tank Ops.
- 2.7 IF pressure for SIT injection header to be flushed > 650 psig in Section 1.0, _____
THEN open desired SIT Drain valve no more than two times for 10 second duration each time to flush injection header:
- SIT A Drain valve (2SV-5001-1)
 - SIT B Drain valve (2SV-5021-1)
 - SIT C Drain valve (2SV-5041-2)
 - SIT C Drain valve (2SV-5061-2)
- 2.8 IF pressure in Section 1.0 < 650 psig, _____
THEN open desired SIT Drain valve and flush injection header:
- SIT A Drain valve (2SV-5001-1)
 - SIT B Drain valve (2SV-5021-1)
 - SIT C Drain valve (2SV-5041-2)
 - SIT C Drain valve (2SV-5061-2)
- 2.9 WHEN flush is complete based on change in RDT level, _____
THEN close the following valves:
- 2.9.1 SIT Drain to RDT (2CV-5081) _____
- 2.9.2 SIT Drain valve opened in step 2.7 or 2.8. _____
- 2.9.3 HPSI Injection MOV opened in step 2.3 _____
- 3.0 GO TO appropriate section of this procedure to fill selected SIT. _____

Performed By _____ Date _____

Reviewed By _____ Date _____

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SUPPLEMENT 1

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SIT ISOLATION VALVE BREAKER CHECK

(Monthly when RCS Pressure Greater than 2000 PSIA)

The purpose of this check is to verify that power to SIT isolation valve operator is removed by verifying motor circuit breaker open, tagged, and locked as required by Technical Specification 4.5.1.c.

1.0 INITIAL CONDITIONS

INITIAL

1.1 RCS pressure > 2000 PSIA.

2.0 TEST METHOD

2.1 Verify that power is removed from valves listed below by verifying the following circuit breakers are Danger Tagged open AND locks installed.

SIT	VALVE	DESCRIPTION	BREAKER	INITIAL	
				DANGER TAGGED OPEN	LOCK INSTALLED
2T-2A	2CV-5003-1	SIT A Outlet valve	2B51-F2		
2T-2B	2CV-5023-1	SIT B Outlet valve	2B51-H1		
2T-2C	2CV-5043-2	SIT C Outlet valve	2B61-F2		
2T-2D	2CV-5063-2	SIT D Outlet valve	2B61-H1		

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SUPPLEMENT 1

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3.0 ACCEPTANCE CRITERIA

3.1 Are breakers listed in Section 2.0 Locked open? YES NO

3.2 Are breakers listed in Section 2.0 Danger Tagged? YES NO

3.3 IF NO is circled above,
THEN perform the following:

- Declare tank inoperable.
- Notify Shift Manager.
- Refer to Tech Spec 3.5.1.

3.4 Comments:

Performed By _____ Date _____

4.0 SUPERVISOR REVIEW AND ANALYSIS

4.1 Has this equipment been proven operable per ACCEPTANCE CRITERIA? YES NO

4.2 IF NO is answered to 4.1,
THEN perform the following corrective actions:

- Verify LCO Tracking Record completed per Conduct of Operations (1015.001).
- Verify Condition Report initiated.

4.3 Comments:

4.4 Are all administrative requirements of this test satisfied? YES NO

SUPERVISOR _____ Date _____

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QUARTERLY SIT VALVE STROKE AND POSITION VERIFICATION

The Quarterly SIT Valve Stroke and Position Verification is required by IST Program. The purposes of this test are to 1) verify operation of SIT Drain valves and SIT Discharge Check valves and 2) verify SIT Fill Check valves are closed. Allowing SIT pressure to lower at least 5 psig when stroking SIT Drain valves will ensure SIT Discharge Check valves are partially stroked as required by ASME Code Section XI (IST Program). Monitoring for maximum 5 psig drop in one minute while aligned to fill header will ensure SIT Fill Check valves are closed as required by ASME Code Section XI (IST Program).

1.0 INITIAL CONDITIONS

- 1.1 Safety Injection tanks aligned using Attachment A of this procedure. _____
- 1.2 Safety Injection Tank Discharge Outlet MOVs open. _____
- 1.3 Currently calibrated stopwatch available. _____
Stopwatch serial no. _____

2.0 TEST METHOD

- 2.1 Record initial SIT pressure for each SIT in test Table B. _____
- * 2.2 Verify ALL SIT levels and pressures are adequately above Tech Spec 3.5.1 limits to allow testing (initial in block indicates that TS conditions satisfied to start test; continuous action step verifies that TS compliance is met during performance of test). _____
- 2.3 Open SIT Drain to RDT (2CV-5081). _____
- 2.4 IF 2SV-5001-1 operable,
THEN perform the following (ref CR-ANO-2-2000-1037):
 - 2.4.1 Open SIT A Drain valve (2SV-5001-1). _____
 - Check open indication on 2SV-5001-1. _____
 - Check SIT A Level lowering. _____

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- 2.4.2 WHEN SIT A pressure lowers 5 psig,
 THEN perform the following:
- A. Close AND time SIT A Drain valve (2SV-5001-1). _____
- B. Record closing time (nearest 1/10 second) in Table A. _____
- C. Record final SIT A pressure in Table B. _____
- D. Check closed indication on 2SV-5001-1. _____
- E. Check SIT A Level stabilized. _____
- 2.5 IF 2SV-5021-1 operable,
 THEN perform the following (ref CR-ANO-2-2000-1037):
- 2.5.1 Open SIT B Drain valve (2SV-5021-1). _____
- Check open indication on 2SV-5021-1. _____
- Check SIT B Level lowering. _____
- 2.5.2 WHEN SIT B pressure lowers 5 psig,
 THEN perform the following:
- A. Close AND time SIT B Drain valve (2SV-5021-1). _____
- B. Record closing time (nearest 1/10 second) in Table A. _____
- C. Record final SIT B pressure in Table B. _____
- D. Check closed indication on 2SV-5021-1. _____
- E. Check SIT B Level stabilized. _____
- 2.6 IF 2SV-5041-2 operable,
 THEN perform the following (ref CR-ANO-2-2000-1037):
- 2.6.1 Open SIT C Drain valve (2SV-5041-2). _____
- Check open indication on 2SV-5041-2. _____
- Check SIT C Level lowering. _____

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- 2.6.2 WHEN SIT C pressure lowers 5 psig,
 THEN perform the following:
- A. Close AND time SIT C Drain valve (2SV-5041-2). _____
- B. Record closing time (nearest 1/10 second) in Table A. _____
- C. Record final SIT C pressure in Table B. _____
- D. Check closed indication on 2SV-5041-2. _____
- E. Check SIT C Level stabilized. _____
- 2.7 IF 2SV-5061-2 operable,
 THEN perform the following (ref CR-ANO-2-2000-1037):
- 2.7.1 Open SIT D Drain valve (2SV-5061-2). _____
- Check open indication on 2SV-5061-2. _____
- Check SIT D Level lowering. _____
- 2.7.2 WHEN SIT D pressure lowers 5 psig,
 THEN perform the following:
- A. Close AND time SIT D Drain valve (2SV-5061-2). _____
- B. Record closing time (nearest 1/10 second) in Table A. _____
- C. Record final SIT D pressure in Table B. _____
- D. Check closed indication on 2SV-5061-2. _____
- E. Check SIT D Level stabilized. _____
- 2.8 2T-2A SIT Fill Check valve (2SI-48).
- 2.8.1 Record initial 2T-2A pressure in Table C. _____
- 2.8.2 Open SIT 2T-2A Fill valve (2SV-5004). _____
- 2.8.3 Wait one minute. _____
- 2.8.4 Close 2SV-5004. _____
- 2.8.5 Record final 2T-2A pressure in Table C. _____

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2. 9 2T-2B SIT Fill Check valve (2SI-42).
2. 9. 1 Record initial 2T-2B pressure in Table C. _____
2. 9. 2 Open SIT 2T-2B Fill valve (2SV-5024). _____
2. 9. 3 Wait one minute. _____
2. 9. 4 Close 2SV-5024. _____
2. 9. 5 Record final 2T-2B pressure in Table C. _____
2. 10 2T-2C SIT Fill Check valve (2SI-60).
2. 10. 1 Record initial 2T-2C pressure in Table C. _____
2. 10. 2 Open SIT 2T-2C Fill valve (2SV-5044). _____
2. 10. 3 Wait one minute. _____
2. 10. 4 Close 2SV-5044. _____
2. 10. 5 Record final 2T-2C pressure in Table C. _____
2. 11 2T-2D SIT Fill Check valve (2SI-54).
2. 11. 1 Record initial 2T-2D pressure in Table C. _____
2. 11. 2 Open SIT 2T-2D Fill valve (2SV-5064). _____
2. 11. 3 Wait one minute. _____
2. 11. 4 Close 2SV-5064. _____
2. 11. 5 Record final 2T-2D pressure in Table C. _____
2. 12 Close SIT Drain to RDT (2CV-5081).
2. 13 Open associated SIT Drain valve to repressurize
SIT Drain header: _____
- For 2T-2A, SIT A Drain valve (2SV-5001-1)
 - For 2T-2B, SIT B Drain valve (2SV-5021-1)
 - For 2T-2C, SIT C Drain valve (2SV-5041-2)
 - For 2T-2D, SIT D Drain valve (2SV-5061-2)
2. 14 WHEN SIT Drain header pressurized,
THEN close SIT Drain valve opened in previous step: _____
- For 2T-2A, SIT A Drain valve (2SV-5001-1)
 - For 2T-2B, SIT B Drain valve (2SV-5021-1)
 - For 2T-2C, SIT C Drain valve (2SV-5041-2)
 - For 2T-2D, SIT D Drain valve (2SV-5061-2)

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3.0 ACCEPTANCE CRITERIA

TABLE A

VALVE	DESCRIPTION	TEST DIR.	MEASURED STROKE TIME (SEC)	ACCEPT-ABLE NORMAL RANGE	LIMITING VALUE OF STROKE TIME	WITHIN ACCEPTABLE NORMAL RANGE?	OPERATOR INITIAL
2SV-5001-1 (NOTE 1)	SIT A Drain Valve	CLOSED		≤ 2	2	YES NO NA (2)	
2SV-5021-1 (NOTE 1)	SIT B Drain Valve	CLOSED		≤ 2	2	YES NO NA (2)	
2SV-5041-2 (NOTE 1)	SIT C Drain Valve	CLOSED		≤ 2	2	YES NO NA (2)	
2SV-5061-2 (NOTE 1)	SIT D Drain Valve	CLOSED		≤ 2	2	YES NO NA (2)	

NOTE 1: Stroke testing of this valve also tests its Fail Safe Function.

NOTE 2: NA if associated drain valve inoperable. (Ref CR-AN0-2-2000-1037)

TABLE B

VALVE	INSTRUMENT	INITIAL PRESSURE	FINAL PRESSURE	PRESSURE CHANGE	MINIMUM ACCEPT. PRESSURE CHANGE	IS PRESS CHANGE \geq MINIMUM ACCEPT. ?	OPERATOR INITIAL
2SI -16A	2PIS-5012				≥ 5 PSIG	YES NO NA (1)	
2SI -16B	2PIS-5032				≥ 5 PSIG	YES NO NA (1)	
2SI -16C	2PIS-5051				≥ 5 PSIG	YES NO NA (1)	
2SI -16D	2PIS-5071				≥ 5 PSIG	YES NO NA (1)	

NOTE 1: NA if associated drain valve inoperable. (Ref CR-AN0-2-2000-1037)

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TABLE C

VALVE	INSTRUMENT (CIRCLE ONE)	INITIAL PRESSURE	FINAL PRESSURE	PRESSURE CHANGE	MAXIMUM ACCEPT. PRESSURE CHANGE	IS PRESS CHANGE ≤ MAXIMUM ACCEPT. ?	OPERATOR INITIAL
2SI -48	2PIS-5012 OR P5012				≤ 5 PSIG in one minute	YES NO	
2SI -42	2PIS-5032 OR P5032				≤ 5 PSIG in one minute	YES NO	
2SI -60	2PIS-5051 OR P5051				≤ 5 PSIG in one minute	YES NO	
2SI -54	2PIS-5071 OR P5071				≤ 5 PSIG in one minute	YES NO	

- 3.1 Is stroke time within acceptable normal range for each valve in Table A? YES NO
- 3.2 Was 2SV-5001-1 position indication verified correct by SIT A Level lowering when valve indicated open AND SIT A Level stabilized when valve indicated closed? NA if 2SV-5001-1 inoperable. (Ref CR-ANO-2-2000-1037) YES NO NA
- 3.3 Was 2SV-5021-1 position indication verified correct by SIT B Level lowering when valve indicated open AND SIT B Level stabilized when valve indicated closed? NA if 2SV-5021-1 inoperable. (Ref CR-ANO-2-2000-1037) YES NO NA
- 3.4 Was 2SV-5041-2 position indication verified correct by SIT C Level lowering when valve indicated open AND SIT C Level stabilized when valve indicated closed? NA if 2SV-5041-2 inoperable. (Ref CR-ANO-2-2000-1037) YES NO NA
- 3.5 Was 2SV-5061-2 position indication verified correct by SIT D Level lowering when valve indicated open AND SIT D Level stabilized when valve indicated closed? NA if 2SV-5061-2 inoperable. (Ref CR-ANO-2-2000-1037) YES NO NA
- 3.6 Was 2SI -16A/B/C/D partial stroke tested by SIT pressure change ≥ 5 psig in Table B? YES NO

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3.7 Was 2SI -48/42/60/54 closed status tested by SIT pressure change \leq 5 psig in one minute in Table C? YES NO

3.8 IF NO is circled in step 3.1, 3.6, or 3.7, THEN perform the following:

- Decl are affected valve inoperable.
- Noti fy Shift Manager.
- Refer to Tech Spec 3.5.1.
- Ini ti ate WR/WO as applicabl e.

3.9 IF any NO is circled in step 3.2, 3.3, 3.4, 3.5 or 3.7, THEN submit WR/WO.

3.10 IF this surveillance performed as PMT, THEN complete Unit 2 IST Data Collection (1015.0160).

3.11 Comments:

Performed By _____ Date _____

4.0 SUPERVISOR REVIEW AND ANALYSIS

4.1 Do all measured values recorded in Acceptance Criteria section fall within specified LIMITING RANGE/VALUE FOR OPERABILITY? YES NO

4.2 IF NO is answered to 4.1, THEN perform the following corrective actions:

- Veri fy LCO Tracking Record completed per Conduct of Operations (1015.001).
- Veri fy Condi tion Report ini ti ated.

4.3 Did remote position indication and actual valve position agree for SIT valves cycled in this supplement? YES NO

4.4 IF the answer to 4.3 is NO, THEN verifi y WR/WO has been submitted.

4.5 Comments:

4.6 Are all administrative requirements of this test satisfied? YES NO

SUPERVISOR _____ Date _____

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18 MONTH VERIFICATION OF PRESSURE INTERLOCK

The purpose of this test is to verify operation of pressure interlock that opens Safety Injection Tank Outlet motor operated valves. This test is provided to document surveillance requirements of Technical Specification 4.5.1.d.1.

1.0	INITIAL CONDITIONS	INITIAL
1.1	Safety Injection Tank level between 80.1% and 87.9%	_____
1.2	Safety Injection Tank pressure between 600 and 624 psig	_____
1.3	RCS pressure between 650 psia and 660 psia	_____
1.4	Verify the following breakers closed:	
	• 2CV-5003-1 Series breaker (2B51-H8)	_____
	• 2CV-5023-1 Series breaker (2B51-L3)	_____
	• 2CV-5043-2 Series breaker (2B61-H6)	_____
	• 2CV-5063-2 Series breaker (2B61-K3)	_____

2.0 TEST METHOD

2.1 Close the following breakers for SIT Outlet valves:

Valve	Breaker	
2CV-5003-1	2B51-F2	_____
2CV-5023-1	2B51-H1	_____
2CV-5043-2	2B61-F2	_____
2CV-5063-2	2B61-H1	_____

NOTE

- RCS pressure indication can be obtained from RCS Pressurizer Low Range Pressure Indicator (2PI-4623-1 or 2PI-4623-2 on 2C04) or from P4623-1 or P4623-2 on plant computer.
- The SIT Outlet valve opening setpoint is 675 ± 8 psia.

2.2	Record number of instrument used in Table 1.	_____
2.3	Slowly begin raising RCS pressure to 700 psia.	_____
2.4	In Table 1, record RCS pressure as each SIT Outlet valve <u>begins</u> to stroke open:	
	• SIT A Outlet valve (2CV-5003-1)	_____
	• SIT B Outlet valve (2CV-5023-1)	_____
	• SIT C Outlet valve (2CV-5043-2)	_____
	• SIT D Outlet valve (2CV-5063-2)	_____

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2.5 Before RCS pressure exceeds 700 psi a, check the following open:

- SIT A Outlet valve (2CV-5003-1)
- SIT B Outlet valve (2CV-5023-1)
- SIT C Outlet valve (2CV-5043-2)
- SIT D Outlet valve (2CV-5063-2)

3.0 ACCEPTANCE CRITERIA

TABLE 1

VALVE	INSTRUMENT	RCS PRESSURE	NORMAL SETPOINT RANGE PSI A	MAX PRESSURE PSI A	IN LIMITING RANGE?	OPERATOR INITIAL
2CV-5003-1	(1)	psi a	660-690	≤ 700	YES NO	
2CV-5023-1	(1)	psi a	660-690	≤ 700	YES NO	
2CV-5043-2	(2)	psi a	660-690	≤ 700	YES NO	
2CV-5063-2	(2)	psi a	660-690	≤ 700	YES NO	

- (1) For 2CV-5003-1 and 2CV-5023-1, indicate 2PI-4623-1 or P4623-1.
(2) For 2CV-5043-2 and 2CV-5063-2, indicate 2PI-4623-2 or P4623-2.

3.1 IF any NO is circled in Table 1,
THEN perform the following:

- Declare affected valve inoperable.
- Refer to Tech Spec 3.5.1.
- Notify Shift Manager.
- Initiate WR/WO.

3.2 Comments: _____

Performed By _____ Date _____

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4.0 SUPERVISOR REVIEW AND ANALYSIS

4.1 Do all values in Acceptance Criteria section fall within specified LIMITING RANGE/VALUE FOR OPERABILITY? YES NO

4.2 IF NO is answered to 4.1,
THEN perform the following corrective actions:

- Verify LCO Tracking Record completed per Conduct of Operations (1015.001). _____
- Verify Condition Report initiated. _____

4.3 Comments: _____

4.4 Are all administrative requirements of this test satisfied? YES NO

SUPERVISOR _____ Date _____

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RAISING SIT BORON CONCENTRATION WITH RCS PRESSURE > 1500 PSIA

The purpose of this supplement is to provide means of raising SIT boron concentration due to RCS inleakage. Each time Tech Spec limits are exceeded, SIT shall be declared inoperable. SIT level and pressure will be monitored closely and restored to limits of Tech Spec 3.5.1.

1.0 LIMITS AND PRECAUTIONS

- 1.1 When performing this supplement, then entry into Tech Spec 3.5.1 will be required. Do NOT exceed Tech Spec time limit on SIT level and pressure.
- 1.2 If at any time during this evolution another SIT becomes inoperable for any reason, then immediately suspend this evolution and refer to Tech Spec 3.5.1 or Tech Spec 3.0.3 as applicable.

2.0 INITIAL CONDITIONS (May be performed in any order)

- 2.1 Notify Chemistry to ensure support available to obtain SIT boron sample. _____
- 2.2 Perform crew brief. _____
- 2.3 Operator in communications with Control Room available to lineup high pressure nitrogen. _____
- 2.4 Verify ≥ 700 psig N_2 supply pressure is available. _____
- 2.5 Station Operator to monitor HPSI pump starts. _____
- 2.6 Station Operator to perform the following: _____
 - Monitor Reactor Drain tank pressure and level.
 - Perform venting or draining operations as necessary.
- 2.7 Obtain permission from Operations Manager to enter Tech Spec 3.5.1 Action Statement. _____
- 2.8 SPDS or Plant Computer available to monitor SIT levels and pressures. _____
- 2.9 Coordinate with Chemistry and System Engineering to determine required level change for desired boron concentration. _____
- 2.10 Evaluate Plant Risk using COPD-024, Risk Assessment Guidelines. _____

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3.0 DRAIN AND FILL OF AFFECTED SIT

- 3.1 Circle affected SIT: _____
- 2T-2A 2T-2B 2T-2C 2T-2D
- *3.2 Monitor SIT levels and pressures as pressure will change rapidly during drain and fill operations.
- 3.3 IF desired to raise SIT levels,
THEN adjust SIT levels to maximum allowable level using appropriate section of this procedure. _____
- 3.4 Verify boron sample of affected SIT current. _____
- 3.5 Record the following for affected SIT: _____
- Initial Level _____ %
- Initial Pressure _____ psi g
- Initial Boron _____ ppm
- *3.6 Monitor all SITs during the following evolutions.
- *3.7 IF non-affected SIT pressure alarm received
OR non-affected SIT level alarm received,
THEN perform the following:
- 3.7.1 Suspend draining.
- 3.7.2 Fill or pressurize SIT that is in alarm using appropriate section of this procedure.
- *3.8 Pump the Reactor Drain Tank as necessary to maintain level < 80% and pressure < 7 psi g using 2103.007, Quench Tank and Reactor Drain Tank Ops.
- 3.9 Open SIT Drain to RDT (2CV-5081). _____

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*3.10 IF > 650 psig on SIT injection header to be drained,
THEN do NOT open associated SIT drain valve more than two
times for 10 second duration each time.

- SIS Injection to Loop 2P-32A (2PIS-5000)
- SIS Injection to Loop 2P-32B (2PIS-5020)
- SIS Injection to Loop 2P-32C (2PIS-5040)
- SIS Injection to Loop 2P-32D (2PIS-5060)

*3.11 Cycle desired SIT Drain valve open and closed as needed to
drain SIT while maintaining RDT level 10 to 80% and
pressure 1 to 7 psig:

- 2T-2A - SIT A Drain valve (2SV-5001-1)
- 2T-2B - SIT B Drain valve (2SV-5021-1)
- 2T-2C - SIT C Drain valve (2SV-5041-2)
- 2T-2D - SIT D Drain valve (2SV-5061-2)

3.12 Record entry time into Tech Spec 3.5.1. Time _____

3.13 WHEN draining operations complete,
THEN perform the following:

3.13.1 Verify SIT Drain valve closed: _____

- 2SV-5001-1
- 2SV-5021-1
- 2SV-5041-2
- 2SV-5061-2

3.13.2 Close SIT Drain to RDT (2CV-5081). _____

3.14 Record the following for affected SIT: _____

Level _____ %

Pressure _____ psig

Time _____

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- 3.15 Commence filling affected SIT to desired level, but within Tech Spec limits as follows:

- 3.15.1 Place HPSI pump (2P-89A/B/C) in service on minimum recirculation mode using applicable section of HPSI System Operation (2104.039). _____

NOTE

SIT pressure will rapidly drop 2-5 psi when opening drain valve if SIT drain header has been depressurized.

- *3.15.2 Monitor SIT parameters as SIT pressure will rise rapidly during fill operations.

- 3.15.3 IF filling 2T-2A,
THEN perform the following:

- A. Verify open:

- SIT A Drain Valve (2SV-5001-1) _____
- SIT A Check Valve Bypass (2SV-5004) _____

- B. Throttle open selected HPSI Injection Pump MOV to establish fill rate ≤ 120 gpm (2FI-5014-1, F5014-1): _____

- 2CV-5015-1
- 2CV-5016-2

- C. WHEN Tech Spec 3.5.1 exited,
THEN record time: _____

- D. WHEN desired level reached,
THEN close the following:

1. HPSI valve opened in previous step (maintain handswitch in close position for ≥ 2 seconds after red light out). _____
2. 2SV-5001-1 _____
3. 2SV-5004 _____

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- 3.15.4 IF filling 2T-2B,
THEN perform the following:
- A. Verify open:
 - SIT B Drain Valve (2SV-5021-1) _____
 - SIT B Check Valve Bypass (2SV-5024) _____
 - B. Throttle open selected HPSI Injection Pump MOV _____
to establish fill rate ≤ 120 gpm
(2FI-5034-1, F5034-1):
 - 2CV-5035-1
 - 2CV-5036-2
 - C. WHEN Tech Spec 3.5.1 exited,
THEN record time: _____
 - D. WHEN desired level reached,
THEN close the following:
 1. HPSI valve opened in previous step
(maintain handswitch in close position
for ≥ 2 seconds after red light out). _____
 2. 2SV-5021-1 _____
 3. 2SV-5024 _____
- 3.15.5 IF filling 2T-2C,
THEN perform the following:
- A. Verify open:
 - SIT C Drain Valve (2SV-5041-2) _____
 - SIT C Check Valve Bypass (2SV-5044) _____
 - B. Throttle open selected HPSI Injection Pump MOV _____
to establish fill rate ≤ 120 gpm
(2FI-5054-2, F5054-2):
 - 2CV-5055-1
 - 2CV-5056-2
 - C. WHEN Tech Spec 3.5.1 exited,
THEN record time: _____
 - D. WHEN desired level reached,
THEN close the following:
 1. HPSI valve opened in previous step
(maintain handswitch in close position
for ≥ 2 seconds after red light out). _____
 2. 2SV-5041-2 _____
 3. 2SV-5044 _____

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- 3.15.6 IF filling 2T-2D,
THEN perform the following:
- A. Verify open:
 - SIT D Drain Valve (2SV-5061-2) _____
 - SIT D Check Valve Bypass (2SV-5064) _____
 - B. Throttle open selected HPSI Injection Pump MOV _____
to establish fill rate ≤ 120 gpm
(2FI-5074-2, F5074-2):
 - 2CV-5075-1
 - 2CV-5076-2
 - C. WHEN Tech Spec 3.5.1 exited,
THEN record time: _____
 - D. WHEN desired level reached,
THEN close the following:
 1. HPSI valve opened in previous step _____
(maintain handswitch in close position
for ≥ 2 seconds after red light out).
 2. 2SV-5061-2 _____
 3. 2SV-5064 _____
- 3.16 IF Tech Spec 3.5.1 time limit was exceeded,
THEN perform the following:
- Refer to Tech Spec 3.5.1. _____
 - Notify Shift Manager. _____
 - Initiate Condition Report. _____
- 3.17 IF HPSI pump NOT required to fill other SITs,
THEN secure HPSI pump (2P-89A/B/C) using HPSI System Operation _____
(2104.039).
- 3.18 Record the following for affected SIT: _____
- Level _____ %
- Pressure _____ psi g

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NOTE

When SIT fill complete, pressure will continue to drop as liquid solution becomes saturated with Nitrogen and Nitrogen cools down.

- *3.19 Monitor affected SIT pressure to ensure Tech Spec limits are maintained.
- 3.20 IF required to raise affected SIT pressure,
THEN perform the following:
- 3.20.1 Verify HP Nitrogen Supply aligned with N₂ regulator set at desired pressure using N2 System Operations (2104.009), Exhibit 7, Nitrogen Manifold Operations. _____
- 3.20.2 Open Supply Header to Containment Isolation (2CV-6207-2). _____
- 3.20.3 Open the following valves for selected SIT: _____
- For 2T-2A - N2 Supply valves (2SV-5005A/B)
 - For 2T-2B - N2 Supply valves (2SV-5025A/B)
 - For 2T-2C - N2 Supply valves (2SV-5045A/B)
 - For 2T-2D - N2 Supply valves (2SV-5065A/B)
- 3.20.4 WHEN desired SIT pressure reached,
THEN close Nitrogen Supply valves. _____
- 3.20.5 Close 2CV-6207-2. _____
- 3.20.6 Verify HP N₂ from Unit 1 secured using N2 System Operations (2104.009), Exhibit 7, Nitrogen Manifold Operations. _____
- 3.21 Contact Chemistry to sample affected SIT. _____
- 3.22 Record final Boron concentration for affected SIT. _____
- Boron _____ ppm

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4.0 ACCEPTANCE CRITERIA

4.1 Are requirements of TS 3.5.1 satisfied for all SITs? YES NO

4.2 IF NO circled above,
THEN perform the following:

- Declare SITs inoperable. _____
- Refer to Technical Specification 3.5.1. _____
- Notify Shift Manager. _____

Performed By _____ Date _____

5.0 SUPERVISOR REVIEW AND ANALYSIS

5.1 Are all SITs operable IAW ACCEPTANCE CRITERIA? YES NO

5.2 IF NO answered to 5.1,
THEN perform the following corrective actions:

- Verify LCO Tracking Record completed per Conduct of Operations (1015.001). _____
- Verify Condition Report initiated. _____

5.3 Comments: _____

5.4 Are all administrative requirements of this test satisfied? YES NO

SUPERVISOR _____ Date _____

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{4.3.2}

SIT SAMPLE VALVES 24 MONTH REMOTE POSITION INDICATION CHECK

This test is performed to verify remote position indication agrees with actual valve position at least once every 24 months to satisfy IST Program and ASME code IWV-3300 requirements. The leak tightness of valves is not tested as part of this test, only valve position. If valve position does not agree with remote indication, Work Request/Work Order (WR/WO) shall be submitted and condition corrected. A Condition Report is not required. The values for SIT level and pressure were chosen to ensure adequate pressure and level are available to cycle valves and have flow at sample sink. This test may be performed in conjunction with monthly SIT samples taken by chemists or as desired.

When checking the following valves closed, minimal flow may be observed at sample sink, however, steady stream should not be observed. A steady stream would indicate valve did not close properly.

- | | | |
|-------|--|----------------|
| 1.0 | INITIAL CONDITIONS | <u>INITIAL</u> |
| 1.1 | Check SIT level \geq 50% for each SIT. | _____ |
| 1.2 | Check SIT pressure \geq 50 psig for each SIT. | _____ |
| 1.3 | Refer to Containment Penetration Administrative Controls in 1015.001, Conduct of Operations as necessary. | _____ |
| 2.0 | TEST METHOD | |
| 2.1 | Verify the following valves closed at 2C116: | |
| | • 2T-2C Sample (2SV-5872) | _____ |
| | • 2T-2D Sample (2SV-5873) | _____ |
| | • 2T-2A Sample (2SV-5874) | _____ |
| | • 2T-2B Sample (2SV-5875) | _____ |
| 2.2 | IF Containment controls in effect,
THEN complete Containment Penetration Valve Log (1015.001D)
for the following valves: | |
| | • 2T-2C Sample (2SV-5872) | _____ |
| | • 2T-2D Sample (2SV-5873) | _____ |
| | • 2T-2A Sample (2SV-5874) | _____ |
| | • 2T-2B Sample (2SV-5875) | _____ |
| 2.3 | Verify 2FIC-5928 (at 2C116) Inlet Isolation Needle valve open. | _____ |
| 2.3.1 | Verify Safety Injection Tank Isol (2PS-78) open. | _____ |

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- 2.4 Open SIT Master Sample valve (2SV-5876-2). _____
- 2.5 Check minimal flow (less than steady stream) at PSS SIT Flow Indication (2FIC-5928). (This checks individual SIT sample valves are closed.) _____
- 2.6 Check remote position indication on the following closed:
 - 2T-2C Sample (2SV-5872) _____
 - 2T-2D Sample (2SV-5873) _____
 - 2T-2A Sample (2SV-5874) _____
 - 2T-2B Sample (2SV-5875) _____
- 2.7 Open 2T-2C Sample (2SV-5872). _____
- 2.8 Check steady flow indicated at 2FIC-5928. _____
- 2.9 Check remote position indication for 2SV-5872 open. _____
- 2.10 Close 2SV-5872. _____
- 2.11 Check minimal flow (less than steady stream) at 2FIC-5928. _____
- 2.12 Open 2T-2D Sample (2SV-5873). _____
- 2.13 Check steady flow indicated at 2FIC-5928. _____
- 2.14 Check remote position indication for 2SV-5873 open. _____
- 2.15 Close 2SV-5873. _____
- 2.16 Check minimal flow (less than steady stream) at 2FIC-5928. _____
- 2.17 Open 2T-2A Sample (2SV-5874). _____
- 2.18 Check steady flow indicated at 2FIC-5928. _____
- 2.19 Check remote position indication for 2SV-5874 open. _____
- 2.20 Close 2SV-5874. _____
- 2.21 Check minimal flow (less than steady stream) at 2FIC-5928. _____
- 2.22 Open 2T-2B Sample (2SV-5875). _____
- 2.23 Check steady flow indicated at 2FIC-5928. _____
- 2.24 Check remote position indication for 2SV-5875 open. _____

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- 2.25 Check 2SV-5876-2 indicates open:
- On 2C16 _____
 - On 2C116 _____
- 2.26 Close 2SV-5876-2. _____
- 2.27 Check minimal flow (less than steady stream) at 2FIC-5928. _____
- 2.28 Check 2SV-5876-2 indicates closed:
- On 2C16 _____
 - On 2C116 _____
- 2.29 Close 2SV-5875. _____
- 2.30 Close 2PS-78. _____
- 2.31 IF Containment controls in effect,
THEN complete Containment Penetration Valve Log (1015.001D)
for SIT Sample valves. _____

3.0 ACCEPTANCE CRITERIA

- 3.1 Do all remote and actual valve positions agree? YES NO
- 3.2 IF answer to 3.1 is NO,
THEN submit WR/WO and record in Comments section. _____
- 3.3 Comments:

Performed By: _____ Date _____

4.0 SUPERVISOR REVIEW AND ANALYSIS

- 4.1 Do all remote and actual valve positions agree? YES NO
- 4.2 Comments:
- _____
- 4.3 Are all administrative requirements of this test satisfied? YES NO

SUPERVISOR _____ Date _____

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{4.3.1}

SIT DISCHARGE CHECK VALVE LEAK TEST

The purpose of this test is to measure leakage past Safety Injection Tank Discharge Check valves 2SI-16A/B/C/D. Test method 1, 2 or 3 may be used. Test Method 1 is used if plant is in Mode 5 or 6 and depressurized. Test Method 2 or 3 is used if plant is in Mode 1, 2 or 3 and RCS pressure is > 1700 psig. This test is performed at least once every two years and satisfies IST Program test requirements.

1.0 INITIAL CONDITIONS

INITIAL

1.1 IF Test Method 1 is to be used,
THEN verify the following:

- Plant is in Mode 5 or 6. _____
- RCS pressure at atmospheric. _____
- SIT Discharge valves Closed. _____
- SIT indicated level between 50% and 89%. _____
- SIT at atmospheric pressure and vented to Containment. _____
- Hydro pump available with the following: _____
- Calibrated 0-2500 psig discharge pressure gauge. _____
- M&TE Number _____
- Calibrated discharge relief valve set and tested to 1700 psig. _____
- Hydro pump DI water source available. _____
- Temporary vent valve to facilitate depressurization. _____
- Sufficient length of 3/8 stainless steel tubing tested to at least 2000 psig. _____
- Appropriate fittings for connection of Hydro pump to SI piping. _____
- WR/WO issued to support connection of Hydro pump. _____
- IF computer data not available,
THEN record data using associated indicator,
AND indicate instrument used in remarks section. _____

1.2 IF Test Method 2 or 3 is to be used,
THEN verify the following:

- Plant is in Mode 1, 2 or 3. _____
- RCS pressure is > 1700 psig. _____
- HPSI system aligned for ESFAS Standby. _____
- Verify SIS DRN From SI TK To RDT (2CV-5081) is closed. _____
- Recirc line to RWT NOT being used by any other system. _____

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- IF Test Method 3 is being used,
THEN verify currently calibrated 0 - 2000 psig test
gage, with drain connection, installed at 2PP-5115
Isolation valve 2SI-5115D. _____

Test gage number _____

- IF computer data is not available, _____
THEN record data using associated indicator,
AND indicate instrument used in remarks section.

1.3 N/A Test methods not used. _____

2.0 TEST METHOD 1 (Leakrate Test Using Hydro Pump)

NOTE

- When performing this method, all activities should be completed for SIT
being tested prior to beginning test on next SIT.
- This section may be repeated as needed for each SIT to be tested.

		<u>2T2A</u>	<u>2T2B</u>	<u>2T2C</u>	<u>2T2D</u>
2.1	Verify selected SIT Discharge valve closed:	_____	_____	_____	_____
	<ul style="list-style-type: none"> • 2T2A - 2CV-5003-1 • 2T2B - 2CV-5023-1 • 2T2C - 2CV-5043-2 • 2T2D - 2CV-5063-2 				
2.2	Verify selected SIT Vent valve open and vented to atmosphere:	_____	_____	_____	_____
	<ul style="list-style-type: none"> • 2T2A - 2SV-5006 • 2T2B - 2SV-5026 • 2T2C - 2SV-5046 • 2T2D - 2SV-5066 				
2.3	Connect DI water source to Hydro pump.	_____	_____	_____	_____
2.4	Connect Hydro pump to selected SIT test connection:	_____	_____	_____	_____
	<ul style="list-style-type: none"> • 2T2A - 2SI-5113B • 2T2B - 2SI-5133B • 2T2C - 2SI-5153B • 2T2D - 2SI-5173B 				
2.5	Independently verify DI water source connection to Hydro pump.	_____	_____	_____	_____
2.6	Open Hydro pump DI supply valve.	_____	_____	_____	_____

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2.7	Open selected SIT test connection isolation valves (NA valves not repositioned):	<u>2T2A</u>	<u>2T2B</u>	<u>2T2C</u>	<u>2T2D</u>
	• 2SI -5113A (2T-2A)	_____			
	• 2SI -5113B (2T-2A)	_____			
	• 2SI -5133A (2T-2B)		_____		
	• 2SI -5133B (2T-2B)		_____		
	• 2SI -5153A (2T-2C)			_____	
	• 2SI -5153B (2T-2C)			_____	
	• 2SI -5173A (2T-2D)				_____
	• 2SI -5173B (2T-2D)				_____
2.8	Start Hydro pump AND slowly pressurize to 1635 psig (1625 min, 1645 max).	_____	_____	_____	_____
2.9	Record initial levels and start time in Test Table.	_____	_____	_____	_____
2.10	WHEN 30 minutes have elapsed OR SIT level rises 0.3%, THEN record final SIT levels and stop time in Test Table.	_____	_____	_____	_____
2.11	Stop Hydro pump.	_____	_____	_____	_____
2.12	Close Hydro pump DI Supply valve.	_____	_____	_____	_____
2.13	Slowly depressurize Hydro pump.	_____	_____	_____	_____
2.14	Close selected SIT test connection isolation valves (NA valves not repositioned):				
	• 2SI -5113A (2T-2A)	_____			
	• 2SI -5113B (2T-2A)	_____			
	• 2SI -5133A (2T-2B)		_____		
	• 2SI -5133B (2T-2B)		_____		
	• 2SI -5153A (2T-2C)			_____	
	• 2SI -5153B (2T-2C)			_____	
	• 2SI -5173A (2T-2D)				_____
	• 2SI -5173B (2T-2D)				_____

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		<u>2T2A</u>	<u>2T2B</u>	<u>2T2C</u>	<u>2T2D</u>
2.15	Disconnect Hydro pump.	_____	_____	_____	_____
2.16	Independently verify Hydro pump disconnected.	_____	_____	_____	_____
2.17	Install pipe caps on valves previously manipulated (NA pipe caps not previously pulled):				
	• 2SI -5113A (2T-2A)	_____			
	• 2SI -5113B (2T-2A)	_____			
	• 2SI -5133A (2T-2B)		_____		
	• 2SI -5133B (2T-2B)		_____		
	• 2SI -5153A (2T-2C)			_____	
	• 2SI -5153B (2T-2C)			_____	
	• 2SI -5173A (2T-2D)				_____
	• 2SI -5173B (2T-2D)				_____
2.18	Independently verify pipe caps reinstalled on valves previously manipulated: (NA pipe caps not previously pulled)				
	• 2SI -5113A (2T-2A)	_____			
	• 2SI -5113B (2T-2A)	_____			
	• 2SI -5133A (2T-2B)		_____		
	• 2SI -5133B (2T-2B)		_____		
	• 2SI -5153A (2T-2C)			_____	
	• 2SI -5153B (2T-2C)			_____	
	• 2SI -5173A (2T-2D)				_____
	• 2SI -5173B (2T-2D)				_____
2.19	Complete Test Table to determine selected SIT Outlet Check valve leakrate.	_____	_____	_____	_____

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3.0 TEST METHOD 2 (Leakrate Test Using HPSI Pumps - Drain Header Pressurized)

3.1 Verify initial conditions Section 1.0 are satisfied. _____

3.2 IF available,
THEN use PMS computer points for the following data:

3.2.1 2T2A

- 2T-2A SIT Pressure (P5011 or P5012) _____
- SIT 2T-2A Level (L5008 and L5009) _____
- SIS Injection to Loop 2P-32A Pressure (P5000) _____

3.2.2 2T2B

- SIT 2T-2B Pressure (P5031 or P5032) _____
- SIT 2T-2B Level (L5028 and L5029) _____
- SIS Injection to Loop 2P-32B Pressure (P5020) _____

3.2.3 2T2C

- SIT 2T-2C Pressure (P5051 or P5052) _____
- SIT 2T-2C Level (L5048 and L5049) _____
- SIS Injection to Loop 2P-32C Pressure (P5040) _____

3.2.4 2T2D

- SIT 2T-2D Pressure (P5071 or P5072) _____
- SIT 2T-2D Level (L5068 and L5069) _____
- SIS Injection to Loop 2P-32D Pressure (P5060) _____

3.3 Verify the following valves are closed:

- SIS Drn From SI Tanks To RWT (2CV-5082) _____
- SIS Drn From SI Tanks To RDT (2CV-5081) _____

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NOTE

The following step assures SIT Drain Header pressurized to SIT pressure and prevents leakage past SIT Fill valves from SITs to drain header. Monitor SIT pressure and level during pressurization.

- 3.4 Open one of the following valves to pressurize SIT drain hdr: _____
- SIT A Drain valve (2SV-5001-1)
 - SIT B Drain valve (2SV-5021-1)
 - SIT C Drain valve (2SV-5041-2)
 - SIT D Drain valve (2SV-5061-2)
- 3.5 WHEN SIT Drain Header is pressurized indicated by stable _____
SIT levels,
THEN close SIT Drain valve opened.
- 3.6 Start HPSI pump 2P-89A, 2P-89B or 2P-89C on recirc using _____
HPSI System Operation (2104.039).
- *3.7 Monitor all affected SIT levels and pressures.

NOTE

- SIT Discharge Check Valve Leak Tests may be performed concurrently when using Test Method 2.
- This section may be repeated as needed for each SIT to be tested.

- | | <u>2T2A</u> | <u>2T2B</u> | <u>2T2C</u> | <u>2T2D</u> |
|--|-------------|-------------|-------------|-------------|
| 3.8 Open appropriate HPSI Injection MOV: | _____ | _____ | _____ | _____ |
| <ul style="list-style-type: none"> • 2T2A - 2CV-5015-1 or 2CV-5016-2 • 2T2B - 2CV-5035-1 or 2CV-5036-2 • 2T2C - 2CV-5055-1 or 2CV-5056-2 • 2T2D - 2CV-5075-1 or 2CV-5076-2 | | | | |
| 3.9 Record initial levels, pressures, and start time in Test Table. | _____ | _____ | _____ | _____ |
| 3.10 <u>WHEN</u> 30 minutes have elapsed,
<u>OR</u> SIT High Pressure Alarm setpoint reached,
<u>THEN</u> record final test data
and stop time in Test Table. | _____ | _____ | _____ | _____ |

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		<u>2T2A</u>	<u>2T2B</u>	<u>2T2C</u>	<u>2T2D</u>
3.11	Close HPSI Injection MOV previously opened.	_____	_____	_____	_____
3.12	Complete Test Table to determine selected SIT Outlet Check valve leakrate.	_____	_____	_____	_____
3.13	<u>IF</u> Check valve leakrate <u>NOT</u> acceptable <u>OR</u> Test Method 3 leak test desired, <u>THEN</u> perform leak test using Section 4.0.	_____	_____	_____	_____
3.14	<u>IF</u> desired to stop HPSI pump started in step 3.6, <u>THEN</u> secure pump using HPSI System Operation (2104.039).	_____	_____	_____	_____

4.0 TEST METHOD 3 (Leakrate Test Using HPSI PUMPS - Drain Header pressurized > SIT Pressure)

<u>NOTE</u>	
If unable to throttle temporary drain valve at 2PP-5115 sufficiently to maintain drain header pressure > SIT pressure, then Section 3.0 must be used to determine 2SI-16 leak rate.	

4.1	Verify initial conditions Section 1.0 are satisfied.	_____
4.2	Notify Radiation Protection of evolution and obtain their assistance as required.	_____
4.3	Verify the following valves locked closed:	
	• SIT Drain (2SI-17)	_____
	• HPSI to SIT Fill (2SI-1024B)	_____
	• HPSI to SIT Fill (2SI-1025B)	_____
4.4	Connect poly-sleeving or tygon tubing to drain valve at pressure gauge at 2PP-5115 Isolation valve 2SI-5115D and route to floor drain.	_____

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4.5 IF PMS computer available,
THEN use PMS computer points for the following data:

4.5.1 For 2T2A:

- 2T-2A SIT Pressure (P5011 or P5012) _____
- SIT 2T-2A Level (L5008 and L5009) _____
- SIS Injection to Loop 2P-32A Pressure (P5000) _____

4.5.2 For 2T2B:

- SIT 2T-2B Pressure (P5031 or P5032) _____
- SIT 2T-2B Level (L5028 and L5029) _____
- SIS Injection to Loop 2P-32B Pressure (P5020) _____

4.5.3 For 2T2C:

- SIT 2T-2C Pressure (P5051 or P5052) _____
- SIT 2T-2C Level (L5048 and L5049) _____
- SIS Injection to Loop 2P-32C Pressure (P5040) _____

4.5.4 For 2T2D:

- SIT 2T-2D Pressure (P5071 or P5072) _____
- SIT 2T-2D Level (L5068 and L5069) _____
- SIS Injection to Loop 2P-32D Pressure (P5060) _____

4.6 Start HPSI pump 2P-89A, 2P-89B or 2P-89C using
HPSI System Operation (2104.039). _____

{4.3.4}

4.7 **Establish Containment Administrative Controls per 1015.001,
Conduct of Operations prior to opening 2SI-5115A or 2CV-5082.** _____

*4.8 Monitor all affected SIT levels and pressures.

4.9 Open SI Drain Header to RWT (2CV-5082). _____

NOTE

- SIT Discharge Check Valve Leak Tests may be performed concurrently when using Test Method 3.
- This section may be repeated as needed for each SIT to be tested.

4.10 Open appropriate HPSI Injection MOV: 2T2A 2T2B 2T2C 2T2D

- 2T2A - 2CV-5015-1 or 2CV-5016-2
- 2T2B - 2CV-5035-1 or 2CV-5036-2
- 2T2C - 2CV-5055-1 or 2CV-5056-2
- 2T2D - 2CV-5075-1 or 2CV-5076-2

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|------|---|-------------|-------------|-------------|-------------|
| | | <u>2T2A</u> | <u>2T2B</u> | <u>2T2C</u> | <u>2T2D</u> |
| 4.11 | Verify Temporary Drain valve at gage installed at 2PP-5115 is closed. | _____ | _____ | _____ | _____ |

NOTE

Persons must remain in vicinity of 2PP-5115 during this portion of test until 2PP-5115 isolated (1000.028, Control of Temporary Alterations).

- | | | |
|------|---|-------|
| 4.12 | IF Category E in effect,
<u>THEN</u> log status in Category E log. | _____ |
| 4.13 | Open the following HPSI to SIT Fill valves: | |
| | • 2SI -5115A | _____ |
| | • 2SI -5115B | _____ |
| | • 2SI -5115C | _____ |
| | • 2SI -5115D | _____ |

NOTE

The following step is used to reduce leakage past SIT fill valve and into SIT. Maintaining drain header pressure slightly greater than SIT pressure reduces D/P across SIT fill valve and allows an accurate measurement of 2SI-16 leakage.

- | | | |
|------|--|-------|
| 4.14 | Slowly throttle open temporary drain valve at 2PP-5115. | _____ |
| 4.15 | Maintain drain header pressure on local pressure indicator (2SI-5115D) 10 to 50 pounds greater than SIT indicated pressure. | _____ |
| 4.16 | Record initial level, pressures, and start time in Test Table. | _____ |
| 4.17 | <u>WHEN</u> 30 minutes have elapsed,
<u>OR</u> SIT High Pressure Alarm received,
<u>THEN</u> record final test data and stop time in Test Table. | _____ |
| 4.18 | Close HPSI Injection MOV previously opened. | _____ |
| 4.19 | <u>IF</u> desired to stop HPSI pump started in step 4.6,
<u>THEN</u> secure pump using HPSI System Operation (2104.039). | _____ |

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- | | | <u>2T2A</u> | <u>2T2B</u> | <u>2T2C</u> | <u>2T2D</u> |
|--------|---|-------------|-------------|-------------|-------------|
| 4.20 | Close the following valves: | | | | |
| | • 2SI -5115A | _____ | _____ | _____ | _____ |
| | • 2SI -5115B | _____ | _____ | _____ | _____ |
| | • 2SI -5115C | _____ | _____ | _____ | _____ |
| | • 2SI -5115D | _____ | _____ | _____ | _____ |
| 4.21 | <u>WHEN</u> all leak testing using Method 3 complete,
<u>OR</u> desired to secure leak testing,
<u>THEN</u> perform the following: | | | | |
| 4.21.1 | Close 2CV-5082. | | | | _____ |
| 4.21.2 | Remove key from 2CV-5082 handswitch. | | | | _____ |
| 4.21.3 | <u>IF</u> Containment controls in effect,
<u>THEN</u> complete applicable sections of Conduct of
Operations (1015.001) for 2CV-5082 and 2SI -5115A. | | | | _____ |
| 4.21.4 | <u>IF</u> Category E in effect,
<u>THEN</u> complete Category E log. | | | | _____ |
| 4.21.5 | Verify currently calibrated 0 - 2000 psig test
gage, with drain connection, removed from
2PP-5115 Isolation valve 2SI -5115D. | | | | _____ |
| 4.22 | <u>WHEN</u> ALL leak testing using Method 3 complete,
<u>THEN</u> independently verify the following valves closed: | | | | |
| | • 2SI -5115A | | | | _____ |
| | • 2SI -5115B | | | | _____ |
| | • 2SI -5115C | | | | _____ |
| | • 2SI -5115D | | | | _____ |

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5.0 ACCEPTANCE CRITERIA

TEST TABLE

<u>2T2A</u> (This Table may be copied as many times as necessary)	
STOP Time _____ (-) _____ START Time _____ (=) _____ Total Time _____ (minutes)	<div style="text-align: center;">(Not required for Test Method #1)</div> Initial SIS to 2P-32A Pressure (P5000) _____ (-) _____ Initial SIT Pressure (P5011) or (P5012) (Circle One Used) _____ (=) _____ TEST DIFFERENTIAL PRESSURE (TDP) _____
<div style="text-align: center;">(Not required for Test Method #1)</div> EXTRAPOLATION RATIO COEFFICIENT (ERC) $(1635 / \text{_____ TDP})^{1/2} = \text{_____ ERC}$	
LEVEL DEVIATION	
Final LEVEL $[L5008(\text{_____}) + L5009(\text{_____})] / 2 = \text{_____} \%$ Average	Initial LEVEL $[L5008(\text{_____}) + L5009(\text{_____})] / 2 = \text{_____} \%$ Average
Final Average _____% - Initial Average _____% = _____% Level Deviation	
LEAK RATE CALCULATION	
Total Leakage $(\text{_____} \% \text{Level Deviation}) \times (120.84 \text{ gal} / \%) = \text{_____} \text{ gallons total Leakage}$	
Uncorrected Leakrate for 2SI-16A $(\text{_____} \text{ gal Total Leakage}) / (\text{_____} \text{ min Total Time}) = \text{_____} \text{ gpm Uncorrected Leakrate}$ <div style="text-align: right;">(Test Method #1 Leakrate)</div>	
<div style="text-align: center;">(Not required for Test Method #1)</div> Corrected Leakrate for 2SI-16A $(\text{_____} \text{ gpm Uncorrected Leakrate}) \times (\text{_____} \text{ ERC}) = \text{_____} \text{ gpm Corrected Leakrate}$ <div style="text-align: right;">(Test Method #2 and #3 Leakrate)</div>	

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TEST TABLE

<u>2T2B</u> (This Table may be copied as many times as necessary)	
STOP Time _____ (-) _____ START Time _____ (=) _____ Total Time _____ (minutes)	<div style="text-align: center;">(Not required for Test Method #1)</div> Initial SIS to 2P-32B Pressure (P5020) _____ (-) _____ Initial SIT Pressure (P5031) or (P5032) (Circle One Used) _____ (=) _____ TEST DIFFERENTIAL PRESSURE (TDP) _____
<div style="text-align: center;">(Not required for Test Method #1)</div> EXTRAPOLATION RATIO COEFFICIENT (ERC) $(1635 / \text{_____ TDP})^{1/2} = \text{_____ ERC}$	
LEVEL DEVIATION	
Final LEVEL $[L5028(\text{_____}) + L5029(\text{_____})] / 2 = \text{_____} \%$ Average	Initial LEVEL $[L5028(\text{_____}) + L5029(\text{_____})] / 2 = \text{_____} \%$ Average
Final Average _____ %- Initial Average _____ % = _____ % Level Deviation	
LEAK RATE CALCULATION	
Total Leakage $(\text{_____} \% \text{Level Deviation}) \times (120.84 \text{ gal} / \%) = \text{_____} \text{ gallons total Leakage}$	
Uncorrected Leakrate for 2SI-16B $(\text{_____} \text{ gal Total Leakage}) / (\text{_____} \text{ min Total Time}) = \text{_____} \text{ gpm Uncorrected Leakrate}$ <div style="text-align: right;">(Test Method #1 Leakrate)</div>	
<div style="text-align: center;">(Not required for Test Method #1)</div> Corrected Leakrate for 2SI-16B $(\text{_____} \text{ gpm Uncorrected Leakrate}) \times (\text{_____} \text{ ERC}) = \text{_____} \text{ gpm Corrected Leakrate}$ <div style="text-align: right;">(Test Method #2 and #3 Leakrate)</div>	

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TEST TABLE

<u>2T2C</u> (This Table may be copied as many times as necessary)	
STOP Time _____ (-) _____ START Time _____ (=) _____ Total Time _____ (minutes)	<div style="text-align: center;">(Not required for Test Method #1)</div> Initial SIS to 2P-32C Pressure (P5040) _____ (-) _____ Initial SIT Pressure (P5051) or (P5052) (Circle One Used) _____ (=) _____ TEST DIFFERENTIAL PRESSURE (TDP) _____
<div style="text-align: center;">(Not required for Test Method #1)</div> EXTRAPOLATION RATIO COEFFICIENT (ERC) $(1635 / \text{_____ TDP})^{1/2} = \text{_____ ERC}$	
LEVEL DEVIATION	
Final LEVEL $[L5048(\text{_____}) + L5049(\text{_____})] / 2 = \text{_____} \%$ Average	Initial LEVEL $[L5048(\text{_____}) + L5049(\text{_____})] / 2 = \text{_____} \%$ Average
Final Average _____ %- Initial Average _____ % = _____ % Level Deviation	
LEAK RATE CALCULATION	
Total Leakage $(\text{_____} \% \text{Level Deviation}) \times (120.84 \text{ gal} / \%) = \text{_____} \text{ gallons total Leakage}$	
Uncorrected Leakrate for 2SI-16C $(\text{_____} \text{ gal Total Leakage}) / (\text{_____} \text{ min Total Time}) = \text{_____} \text{ gpm Uncorrected Leakrate}$ <div style="text-align: right;">(Test Method #1 Leakrate)</div>	
<div style="text-align: center;">(Not required for Test Method #1)</div> Corrected Leakrate for 2SI-16C $(\text{_____} \text{ gpm Uncorrected Leakrate}) \times (\text{_____} \text{ ERC}) = \text{_____} \text{ gpm Corrected Leakrate}$ <div style="text-align: right;">(Test Method #2 and #3 Leakrate)</div>	

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TEST TABLE

<u>2T2D</u> (This Table may be copied as many times as necessary)	
STOP Time _____ (-) _____ START Time _____ (=) _____ Total Time _____ (minutes)	<div style="text-align: center;">(Not required for Test Method #1)</div> Initial SIS to 2P-32D Pressure (P5060) _____ (-) _____ Initial SIT Pressure (P5071) or (P5072) (Circle One Used) _____ (=) _____ TEST DIFFERENTIAL PRESSURE (TDP) _____
<div style="text-align: center;">(Not required for Test Method #1)</div> EXTRAPOLATION RATIO COEFFICIENT (ERC) $(1635 / \text{_____ TDP})^{1/2} = \text{_____ ERC}$	
LEVEL DEVIATION	
Final LEVEL $[L5068(\text{_____}) + L5069(\text{_____})] / 2 = \text{_____} \%$ Average	Initial LEVEL $[L5068(\text{_____}) + L5069(\text{_____})] / 2 = \text{_____} \%$ Average
Final Average _____ %- Initial Average _____ % = _____ % Level Deviation	
LEAK RATE CALCULATION	
Total Leakage $(\text{_____} \% \text{Level Deviation}) \times (120.84 \text{ gal} / \%) = \text{_____} \text{ gallons total Leakage}$	
Uncorrected Leakrate for 2SI-16D $(\text{_____} \text{ gal Total Leakage}) / (\text{_____} \text{ min Total Time}) = \text{_____} \text{ gpm Uncorrected Leakrate}$ <div style="text-align: right;">(Test Method #1 Leakrate)</div>	
<div style="text-align: center;">(Not required for Test Method #1)</div> Corrected Leakrate for 2SI-16D $(\text{_____} \text{ gpm Uncorrected Leakrate}) \times (\text{_____} \text{ ERC}) = \text{_____} \text{ gpm Corrected Leakrate}$ <div style="text-align: right;">(Test Method #2 and #3 Leakrate)</div>	

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NOTE	
Previous leakrates recorded in 2R17 are as follows:	
2SI -16A = 0.000 gpm	
2SI -16C = 0.000 gpm	
2SI -16B = 0.000 gpm	
2SI -16D = 0.252 gpm	

- 5.1 Are all leakrates logged in Test Table < 5 gpm? YES NO
- 5.2 Are all leakrates logged in Test Table < 1 gpm? YES NO
- 5.3 IF NO is circled in step 5.2,
THEN determine Maximum Allowable Leakrate as follows:
(N/A if leakrate is > 5 gpm) _____
- $[(5.0 \text{ gpm} - X) \div 2] + X = \text{Maximum Allowable Leakrate}$
- (X is adjusted measured leakrate from last surveillance)
- 5.4 IF NO circled in step 5.2,
THEN is adjusted Measured Leakrate less than
Maximum Allowable Leakrate calculated above? YES NO NA

NOTE	
Test results sent to Nuclear Engineering Design must be analyzed before ACCEPTANCE CRITERIA can be completed.	

- 5.5 Has Nuclear Engineering Design analyzed 2SI -16 leakrates and determined that they are acceptable? YES NO

Nuclear Engineering Design

- 5.6 IF NO circled in step 5.5,
THEN perform the following:
- Notify Shift Manager. _____
 - Declare applicable valve inoperable. _____
 - Refer to Tech Spec 3.4.6.2. _____
 - Initiate WR/WO. _____

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5.7 Comments:

Performed By _____ DATE _____

_____ DATE _____

(CIRCLE ONE)

6.0 SUPERVISOR REVIEW AND ANALYSIS

6.1 Do all measured Leakrates recorded in Test Table satisfy Acceptance Criteria steps 5.1, 5.2, and 5.4 if applicable? YES NO

6.2 IF NO answered to 6.1,
THEN perform the following corrective actions:

- Verify LCO Tracking Record completed per Conduct of Operations (1015.001). _____
- Verify Condition Report initiated. _____

6.3 Comments:

6.4 Are all administrative requirements of this test satisfied? YES NO

6.5 Forward copy of completed test to Operations Standards to revise procedure for data collected. _____

SUPERVISOR _____ Date _____

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QUARTERLY RCS PRESSURE ISOLATION CHECK VALVE CLOSURE TEST

The Quarterly RCS Pressure Isolation Check Valve Closure Check is required by IST Program. The purpose of this test is to verify 2SI-15A/B/C/D and 2SI-16A/B/C/D check valves are closed. Performance of this test is required Quarterly during Mode 1 and 2 Operation.

This test is not required to be completed prior to entering Mode 3 or 4. However, completion is required prior to entering Mode 2 if not completed within past 92 days.

1.0 INITIAL CONDITIONS

- 1.1 Safety Injection tanks aligned using Attachment A of this procedure. _____
- 1.2 Record and verify RCS pressure > 2000 PSIA _____ PSIA. _____

2.0 TEST METHOD

- *2.1 Monitor all SIT levels and pressures during performance of this test.
- *2.2 IF ANY SIT level or pressure trends up unexpectedly
THEN close associated HPSI Injection MOV
AND perform the following to restore SIT parameters:
 - 2.2.1 IF SIT level < 80.1% or > 87.9%,
OR pressure < 600 psig or > 624 psig,
THEN refer to Tech Spec 3.5.1.
 - 2.2.2 Drain affected SIT using appropriate section of this procedure.

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- 2.3 2SI -15A/B/C/D Leak check:
- 2.3.1 Record indicated pressure on SIS to RCP 2P-32
Pressure indicators in Table 1. _____
- 2.4 2SI -16 Leak check using HPSI pump (2P-89A/B/C):
- 2.4.1 Record initial SIT pressure for each SIT in
Table 2. _____
- 2.4.2 Place HPSI pump (2P-89A/B/C) in service on
minimum recirculation mode using applicable
section of HPSI System Operation (2104.039). _____
- 2.4.3 Pressurize Loop A Injection Header as follows:
- A. Open associated HPSI Hdr. Injection to RCP
Discharge (2CV-5015-1 or 2CV-5016-2) until
2PIS-5000 or P5000 reads > 800 psig. _____
- B. Close HPSI valve opened in step [2.4.3.A](#)
(maintain handswitch in close position
for \geq 2 seconds after red light out). _____
- C. Record final 2T-2A pressure in Table 2. _____
- 2.4.4 Pressurize Loop B Injection Header as follows:
- A. Open associated HPSI Hdr. Injection to RCP
Discharge (2CV-5035-1 or 2CV-5036-2) until
2PIS-5020 or P5020 reads > 800 psig _____
- B. Close HPSI valve opened in step [2.4.4.A](#)
(maintain handswitch in close position
for \geq 2 seconds after red light out). _____
- C. Record final 2T-2B pressure in Table 2. _____

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- 2.4.5 Pressurize Loop C Injection Header as follows:
- A. Open associated HPSI Hdr. Injection to RCP Discharge (2CV-5055-1 or 2CV-5056-2) until 2PIS-5040 or P5040 reads > 800 psig. _____
 - B. Close HPSI valve opened in step 2.4.5.A (maintain handswitch in close position for ≥ 2 seconds after red light out). _____
 - C. Record final 2T-2C pressure in Table 2. _____
- 2.4.6 Pressurize Loop D Injection Header as follows:
- A. Open associated HPSI Hdr. Injection to RCP Discharge (2CV-5075-1 or 2CV-5076-2) until 2PIS-5060 or P5060 reads > 800 psig _____
 - B. Close HPSI valve opened in step 2.4.6.A (maintain handswitch in close position for ≥ 2 seconds after red light out). _____
 - C. Record final 2T-2D pressure in Table 2. _____
- 2.4.7 IF any inventory addition to SITs desired, THEN add using section 8.0 of this procedure. _____
- 2.4.8 Verify HPSI pump (2P-89A/B/C) secured using HPSI System Operation (2104.039). _____

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3.0 ACCEPTANCE CRITERIA

TABLE 1					
VALVE	INSTRUMENT (CIRCLE ONE)	INDICATED PRESSURE	LIMITING RANGE FOR OPERABILITY	IS DATA WITHIN LIMITING RANGE (CIRCLE ONE)	OPERATOR INITIALS
2SI -15A	2PIS-5000 OR P5000		< 1900 psi g	YES NO	
2SI -15B	2PIS-5020 OR P5020		< 1900 psi g	YES NO	
2SI -15C	2PIS-5040 OR P5040		< 1900 psi g	YES NO	
2SI -15D	2PIS-5060 OR P5060		< 1900 psi g	YES NO	

TABLE 2							
VALVE	INSTRUMENT (CIRCLE ONE)	SIT INITIAL PRESSURE	SIT FINAL PRESSURE	PRESS RISE	MAX. PRESS RISE	IS PRESS. RISE ≤ MAXIMUM ACCEPTABLE (CIRCLE ONE)	OPER. INIT.
2SI -16A	2PIS-5012 OR P5012				5 PSIG	YES NO	
2SI -16B	2PIS-5032 OR P5032				5 PSIG	YES NO	
2SI -16C	2PIS-5051 OR P5051				5 PSIG	YES NO	
2SI -16D	2PIS-5071 OR P5071				5 PSIG	YES NO	

- 3.1 Are 2SI -15A/B/C/D recorded closed by all pressures in Table 1 < Limiting Range for Operability? YES NO
- 3.2 Are 2SI -16A/B/C/D recorded closed by each pressure rise in Table 2 ≤ Maximum Acceptable Pressure Rise? YES NO

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3.3 IF NO circled in Test Table, step 3.1 or 3.2,
THEN perform the following:

- Decl are affected valve inoperable.
- Noti fy Shi ft Manager.
- Refer to Tech Spec 3.5.1.
- Ini ti ate WR/WO as appli cable.

Performed By _____ Date _____

4.0 SUPERVI SOR REVI EW AND ANALYSI S

4.1 Do all measured values recorded in Acceptance Criteria section fall within specified LIMITING RANGE/VALUE FOR OPERABI LITY? YES NO

4.2 Has this equipment been proven operable using ACCEPTANCE CRITERIA? YES NO

4.3 IF NO answered to 4.1 or 4.2,
THEN perform the following corrective actions:

- Veri fy LCO Tracking Record completed per Conduct of Operations (1015.001).
- Veri fy Condi tion Report ini ti ated.

4.4 Comments: _____

4.5 Are all administrative requirements of this test satisfied? YES NO

SUPERVI SOR _____ Date _____

JOB PERFORMANCE MEASUREUNIT: 2 REV #: 005 DATE: _____SYSTEM/DUTY AREA: Safety Injection TanksTASK: Isolate SITs with SIAS Actuated ALTERNATE SUCCESS PATHJTA#: ANO2ROEOPAOPEMERG13KA VALUE RO: 4.2 SRO: 4.3 KA REFERENCE: 006 A4.08APPROVED FOR ADMINISTRATION TO: RO: X SRO: XTASK LOCATION: INSIDE CR: X OUTSIDE CR: _____ BOTH: _____

SUGGESTED TESTING ENVIRONMENT AND METHOD (PERFORM OR SIMULATE):

PLANT SITE: _____ SIMULATOR: Perform LAB: _____

POSITION EVALUATED: RO: _____ SRO: _____

ACTUAL TESTING ENVIRONMENT: SIMULATOR: _____ PLANT SITE: _____ LAB: _____

TESTING METHOD: SIMULATE: _____ PERFORM: _____

APPROXIMATE COMPLETION TIME IN MINUTES: 20 MinutesREFERENCE(S): OP 2202.010 Rev 007-03-0 and OP 2104.001 Rev 27-02-0

EXAMINEE'S NAME: _____ SSN: _____

EVALUATOR'S NAME: _____

THE EXAMINEE'S PERFORMANCE WAS EVALUATED AGAINST THE STANDARDS CONTAINED IN THIS JPM AND IS DETERMINED TO BE:

SATISFACTORY: _____ UNSATISFACTORY: _____

PERFORMANCE CHECKLIST COMMENTS:

Start Time _____ Stop Time _____ Total Time _____

SIGNED: _____ DATE: _____

SIGNATURE INDICATES THIS JPM HAS BEEN COMPARED TO ITS APPLICABLE PROCEDURE BY A QUALIFIED INDIVIDUAL (NOT THE EXAMINEE) AND IS CURRENT WITH THAT REVISION.

JOB PERFORMANCE MEASURE

THE EXAMINER SHALL REVIEW THE FOLLOWING WITH THE EXAMINEE:

The examiner shall review the "Briefing Checklist - System Walkthrough" portion of OP 1064.023

Attachment 6 with the examinee.

JPM INITIAL TASK CONDITIONS:

A LOCA is in progress.

TASK STANDARD:

SIT A, B, and C outlet valves are closed AND the ability to drain the affected SIT (D) is demonstrated.

This is an alternate success path JPM.

TASK PERFORMANCE AIDS:

OP 2202.010 Attachment 36, Attachment 13 and OP 2104.001 section 7.0

SIMULATOR SETUP:

Mode 3.

LOCA in progress.

RCS pressure is ~ 700 psia and controlled.

Verify RCS pressure is above SIAS set point.

1. SIT outlet valves have had breakers closed.

2. CIAS has been RESET.

3. Safety Injection Tank (2T2D) isolation valve (2CV-5063-2) will not close when required to be closed.

RUN CAE file JPM08. This will accomplish the following:

Attach trigger file 'sitisold' to T4 (this will trigger T4 when 2CV5063-2 is started closed (T4=NE4G0632).

T4=CV50632 =1.0

T4=DO_HS_5063_R OFF (red light off)

T4=DO_HS_5063_G OFF (green light off)

JOB PERFORMANCE MEASURE

INITIATING CUE:

The CRS directs, "Isolate the SIT's using Standard Attachment 36, SIT isolation. Adequate SDM has been established."

CRITICAL ELEMENTS (C): 6, 7, 8, 10, 19, 22, 23, 24

PERFORMANCE CHECKLIST			STANDARDS	(Circle One)
EXAMINER'S NOTE:				
Hand Examinee Attachment 36, SIT Isolation.				
	1. (Proc step 1.a)	Determine from initial conditions that Attachment 35, Boric Acid Alignment is not required to be performed.	Determine from initial conditions that adequate SDM exists.	N/A SAT UNSAT
	2. (Proc step 1.b)	Verify SIAS is NOT reset.	Look on 2C03 PPS inserts and see that RED ESFAS SIAS actuation lights OFF. OR Verify SIAS alarms are IN on 2K04 and 2K06.	N/A SAT UNSAT
EXAMINER'S NOTE:				
Hand Examinee Attachment 13, SIAS reset.				
	3. (Proc step 1)	Verify CIAS is reset.	Obtain ATTACHMENT 13 AND look on 2C03 PPS inserts and see that RED ESFAS CIAS actuation lights on. OR Verify CIAS alarms are clear on 2K04 and 2K06.	N/A SAT UNSAT
	4. (Proc step 2)	Verify that CCP suction source will be available after SIAS reset. EXAMINERS CUE: CRS directs placing Hand switch for 2CV 4920-1 to OPEN.	Determine that either a CCP suction source needs to be taken to OPEN so that the valve will not close when SIAS is reset. Request preference from CRS. Place Hand Switch on 2C09 for 2CV4920-1 to the OPEN position by rotating switch to the clockwise direction.	N/A SAT UNSAT
	5. (Proc step 3)	Verify RCS pressure is greater than variable set point and CNTMT pressure is less than 17.5psia. Examinee transitions to step 5.	On 2C04, verified RCS pressure is greater than SIAS variable set point on all four channels. Using SPDS, PMS or on 2C33, verified containment pressure is less than 17.5 psia. GO to step 5 in Att. 13.	N/A SAT UNSAT

JOB PERFORMANCE MEASURE

PERFORMANCE CHECKLIST			STANDARDS	(Circle One)
(C)	6. (Proc step 5.A)	Place LK/UNLK switch to UNLK	On panel 2C23-B at the actuation reset panel, inserted key number 15 and rotated key switch Clockwise to UNLK.	N/A SAT UNSAT
(C)	7. (Proc step 5.B)	Depress SIAS pushbutton.	On panel 2C23-B at the actuation reset panel, depressed the SIAS pushbutton.	N/A SAT UNSAT
(C)	8. (Proc step 5.C)	Verify trip path lights reset on local PPS status panel.	On panel above 2C23, observed all four white trip path lights for SIAS illuminated.	N/A SAT UNSAT
EXAMINERS NOTE: Only "B" channel on 2C23 is simulated.				
	9. (Proc step 5.D)	Place LK/UNLK switch to LK and remove key.	On panel 2C23-B at the actuation reset panel, rotated key switch CCW to LK. Removed key number 15.	N/A SAT UNSAT
EXAMINERS NOTE: Only "2C40" is simulated.				
(C)	10. (Proc step 6)	Reset ESF SIAS actuation.	On panel 2C40-7, depressed the SIAS Lockout Reset pushbutton. Observed the "SIAS ON" light ON.	N/A SAT UNSAT
	11. (Proc step 7)	Reset main turbine lift oil pumps.	On panel 2C11, placed the Low Suction Press Reset hand switch to RESET. Over the hand switch for each bearing lift pump, observed amber and green lights OFF; and red light ON.	N/A SAT UNSAT
	12. (Proc step 8)	Verify RCP Bleedoff to VCT Isolation valves open. <u>POSITIVE CUE:</u> Green light OFF; Red light ON.	On panel 2C16, took hand switch for 2CV-4847-2, RCP Bleedoff to VCT to CLOSE then to OPEN and Observed GREEN light OFF and RED light ON. On panel 2C17, took hand switch for 2CV-4846-1, RCP Bleedoff to VCT to CLOSE then to OPEN and Observed GREEN light OFF and RED light ON.	N/A SAT UNSAT
	13. (Proc step 9)	Place Main Turbine on turning gear.	On panel 2C01, observed that Green light OFF; Red light ON for turning gear engaged and Green light OFF; Red light ON for turning gear motor on.	N/A SAT UNSAT

JOB PERFORMANCE MEASURE

PERFORMANCE CHECKLIST			STANDARDS	(Circle One)
Examiner's Note: Examinee will transition to Attachment 36.				
	14. (Proc step 2)	Contact AO/WCO to remove tags and close breakers for the following: 2B51-F2 - 2CV5003-1 2B51-H1 - 2CV5023-1 2B61-F2 - 2CV5043-2 2B61-H1 - 2CV5063-2 EXAMINER'S CUE: When contacted state that the above tags are removed and breakers are closed.	Contact AO/WCO to remove tags and close breakers for the following: 2B51-F2 - 2CV5003-1 2B51-H1 - 2CV5023-1 2B61-F2 - 2CV5043-2 2B61-H1 - 2CV5063-2	N/A SAT UNSAT
	15. (Proc step 3)	Close SIT 2T2A Outlet valve (2CV-5003-1).	On panel 2C17, placed hand switch for 2CV-5003-1 in "CLOSE". Observed green light ON; red light OFF above hand switch.	N/A SAT UNSAT
	16. (Proc step 3)	Close SIT 2T2B outlet valve (2CV-5023-1).	On panel 2C17, placed hand switch for 2CV-5023-1 in "CLOSE". Observed green light ON; red light OFF above hand switch.	N/A SAT UNSAT
	17. (Proc step 3)	Close SIT 2T2C outlet valve (2CV-5043-2).	On panel 2C16, closed 2CV-5043-2. Observed green light ON; red light OFF above hand switch.	N/A SAT UNSAT
Examiner's Note: The following step is the faulted part of the JPM. The 'D' SIT will not close.				
	18. (Proc step 3)	Close SIT 2T2D outlet valve (2CV-5063-2).	On panel 2C16, placed hand switch for 2CV-5063-2 in "CLOSE". Observed green light OFF; red light OFF above hand switch. Reported to the SM/CRS that SIT 2T2D outlet valve did NOT close and appears to have tripped the breaker.	N/A SAT UNSAT

JOB PERFORMANCE MEASURE

PERFORMANCE CHECKLIST		STANDARDS		(Circle One)
<p><u>EXAMINER'S CUE:</u> Provide the following cue upon receiving the report that 2T2D outlet valve will NOT close.</p> <p>EXAMINER'S NOTE: Step 4 directs using OP 2104.001. Give Examinee procedure OP 2104.001 section 7.0 and provide the following cue:</p> <p><u>EXAMINER'S CUE:</u> The CRS directs, "Drain SIT 2T2D to the RDT using OP 2104.001 section 7.1."</p> <p>EXAMINER'S NOTE: Steps 1 and 2 will be marked as Not Applicable.</p>				
	19. (Proc step 7.1.3)	Monitor SIT levels during draining.	Use PMS, SPDS or Control Board indications on 2C16 and 2C17 to monitor SIT levels.	N/A SAT UNSAT
(C)	19. (Proc step 7.1.4)	Open SIT Drain Header To RDT valve (2CV-5081).	<p>On panel 2C33, opened 2CV-5081.</p> <p>Observed green light OFF; red light ON above handswitch.</p> <p>On panel 2C14, monitored RDT 2T68 Level (2LIS-2200A) while draining 2T2C.</p> <p>Using control board mounted indications OR PMS or SPDS computer points, monitored 2T2D level and pressure while draining.</p>	N/A SAT UNSAT
	20. (Proc step 7.1.5)	N/A step for lowering level < 1/2 %.	N/A step for lowering level < 1/2 %.	N/A SAT UNSAT
	21. (Proc step 7.1.6)	Verified SIT drain header pressure less than 650psig.	On panel 2C16, verified 2PS-5060 is less than 650psig.	N/A SAT UNSAT
(C)	22. (Proc step 7.1.7)	Open 2T2D Drain valve (2SV-5061-2).	<p>On panel 2C16, opened 2SV-5061-2.</p> <p>Observed green light OFF; red light ON above hand switch.</p>	N/A SAT UNSAT
<p><u>EXAMINER'S NOTE:</u> After a ~ 10% increase in 2LIS-2200A level indication, provide the following cue:</p> <p><u>EXAMINER'S CUE:</u> 2T2D has been drained adequately for this JPM. The CRS directs, "Secure draining 2T2D."</p>				

JOB PERFORMANCE MEASURE

PERFORMANCE CHECKLIST			STANDARDS	(Circle One)
(C)	23. (Proc step 7.1.8)	Close 2T2D Drain valve (2SV-5061-2). <u>POSITIVE CUE:</u> Green light ON; red light OFF.	On panel 2C16, closed 2SV-5061-2. Observed green light ON; red light OFF above hand switch.	N/A SAT UNSAT
EXAMINER'S NOTE: Steps 7.1.9 and 7.1.10 are not applicable.				
(C)	24. (Proc step 7.1.11)	Close SIT Drain Header To RDT valve (2CV-5081). <u>POSITIVE CUE:</u> Green light ON; red light OFF.	On panel 2C33, closed 2CV-5081. Observed green light ON; red light OFF above handswitch.	N/A SAT UNSAT
EXAMINER'S CUE: This ends the JPM.				
END				

JOB PERFORMANCE MEASURE

EXAMINER'S COPY

JPM INITIAL TASK CONDITIONS:

A LOCA is in progress.

INITIATING CUE:

The CRS directs, "Isolate the SIT's using Standard Attachment 36, SIT isolation. Adequate SDM has been established."

JOB PERFORMANCE MEASURE

EXAMINEE'S COPY

JPM INITIAL TASK CONDITIONS:

A LOCA is in progress.

INITIATING CUE:

The CRS directs, "Isolate the SIT's using Standard Attachment 36, SIT isolation. Adequate SDM has been established."

ENTERGY OPERATIONS INCORPORATED ARKANSAS NUCLEAR ONE

TITLE: ANNUNCIATOR 2K10 CORRECTIVE ACTION

DOCUMENT NO.
2203.012J

CHANGE NO.
031-00-0

SET #

WORK PLAN EXP. DATE
N/A

TC EXP. DATE
N/A

SAFETY-RELATED
☒ **YES** ☐ **NO**

IPTE
☐ **YES** ☒ **NO**

TEMP ALT
☐ **YES** ☒ **NO**

When you see these TRAPS

Time Pressure
Distraction/Interruption
Multiple Tasks
Over Confidence
Vague or Interpretive Guidance
First Shift/Last Shift
Peer Pressure
Change/Off Normal
Physical Environment
Mental Stress (Home or Work)

Get these TOOLS

Effective Communication
Questioning Attitude
Placekeeping
Self Check
Peer Check
Knowledge
Procedures
Job Briefing
Coaching
Turnover

VERIFIED BY

DATE

TIME

FORM TITLE:

VERIFICATION COVER SHEET

FORM NO.
1000.006A

CHANGE NO.
050-00-0

**ENTERGY OPERATIONS INCORPORATED
ARKANSAS NUCLEAR ONE**

Page 1

TITLE: ANNUNCIATOR 2K10 CORRECTIVE ACTION

**DOCUMENT NO.
2203.012J**

**CHANGE NO.
031-00-0**

AFFECTED UNIT:

☐ UNIT 1 ☒ UNIT 2

☒ **PROCEDURE**

☐ **ELECTRONIC DOCUMENT**

☐ **WORK PLAN,**

EXP. DATE _____

SAFETY-RELATED

☒ **YES** ☐ **NO**

TYPE OF CHANGE:

☐ **NEW**

☐ **PC**

☐ **TC**

☐ **DELETION**

☒ **REVISION**

☐ **EZ**

EXP. DATE: N/A

DOES THIS DOCUMENT:

- | | | |
|---|------------------------------|--|
| 1. Supersede or replace another procedure?
(If YES, complete 1000.006B for deleted procedure.) | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 2. Alter or delete an existing regulatory commitment?
(If YES, coordinate with Licensing before implementing.) | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 3. Require a 50.59 Review per Form 1000.006S?
(If No, attach completed Form 1000.006S) (If 50.59 Evaluation, OSRC review required.) | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 4. Changes Surveillance Test Program (i.e. Technical Specifications, NRC Commitment, surveillance activity, see Step 7.5)? (If YES, complete 1000.009A) | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 5. Create an Intent Change?
(If YES, Standard Approval Process required.) | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 6. Implement or change IPTE requirements?
(If YES, complete 1000.143A. OSRC review required.) | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 7. Implement or change a Temporary Alteration?
(If YES, then OSRC review required.) | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |

Was the Master Electronic File used as the source document?

☒ **YES** ☐ **NO**

INTERIM APPROVAL PROCESS

ORIGINATOR SIGNATURE: (Includes review of Att. 13) **DATE:**

Print and Sign name:

NA

PHONE #:

SUPERVISOR APPROVAL: *

N/A

DATE:

SRO UNIT ONE : **

N/A

DATE:

SRO UNIT TWO: **

N/A

DATE:

Interim approval allowed for non-intent changes requiring no 50.59 evaluation that are stopping work in progress.

Standard Approval required for intent changes or changes requiring a 50.59 evaluation.

*If change not required to support work in progress, Department Head must sign.

**If both units are affected by change, both SRO signatures are required. (SRO signature required for safety related procedures only.)

STANDARD APPROVAL PROCESS

ORIGINATOR SIGNATURE: (Includes review of Att. 13) **DATE:** 6/2/2005

Print and Sign name:

Rich Swanson

PHONE #: 5478

INDEPENDENT REVIEWER:

DATE:

ENGINEERING:

N/A

DATE:

Code Programs - NDE:

N/A

DATE:

UNIT SURVEILLANCE COORDINATOR:

N/A

DATE:

SECTION LEADER:

SMG

DATE:

6-3-05

QUALITY ASSURANCE:

N/A

DATE:

OTHER SECTION LEADERS:

N/A

DATE:

OTHER SECTION LEADERS:

N/A

DATE:

OTHER SECTION LEADERS:

N/A

DATE:

OTHER SECTION LEADERS:

N/A

DATE:

OTHER SECTION LEADERS:

N/A

DATE:

OTHER SECTION LEADERS:

N/A

DATE:

OTHER SECTION LEADERS:

N/A

DATE:

OSRC CHAIRMAN/TECHNICAL REVIEWER:

SMG

DATE:

FINAL APPROVAL:

6-9-2005

DATE:

REQUIRED EFFECTIVE DATE:

6/14/05

FORM TITLE:

PROCEDURE/WORK PLAN APPROVAL REQUEST

FORM NO.

1000.006B

CHANGE NO.

054-00-0

**ENTERGY OPERATIONS INCORPORATED
ARKANSAS NUCLEAR ONE**

**TITLE: ANNUNCIATOR 2K10 CORRECTIVE
ACTION**

**DOCUMENT NO.
2203.012J**

**CHANGE NO.
031-00-0**

☒ PROCEDURE

☐ WORK PLAN, EXP. DATE N/A

PAGE 1 OF 1

☐ ELECTRONIC DOCUMENT

TYPE OF CHANGE:

☐ NEW

☐ PC

☐ TC

☐ DELETION

☒ REVISION

☐ EZ

EXP. DATE: N/A

AFFECTED SECTION:
(Include step # if applicable)

DESCRIPTION OF CHANGE: (For each change made, include sufficient detail to describe reason for the change.)

Reviewed and upgraded procedure to improve level of detail.
Added references to various procedures.
Added instrument numbers.
Converted notes to steps, simplified others.

J2 & J3

Action for CSAS Actuated changed to secure pump if other train Spray pump and Cntmt Cooling running to prevent motor damage.

K2

Added specific components to check to verify adequate ventilation in Intake Structure.

B4

Specified which adjustment screw to turn to adjust VSP.

J4 & J5

Added note and step 2.4 per CR-ANO-2-2005-992.

A5

Corrected TS Surveillance number.

FORM TITLE:

DESCRIPTION OF CHANGE

**FORM NO.
1000.006C**

**CHANGE NO.
050-00-0**

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	CEDMCS	COLSS	QCST	
A	CEDMCS BUS UNDERVOLT Page 4	COLSS POWER MARGIN EXCEEDED Page 16	T41B LEVEL LO LO Page 28	A
B	CEA WITHDRAWAL PROHIBIT Page 5	TECH SPEC AZ TILT EXCEEDED Page 19	T41B LEVEL LO Page 29	B
C	MAJOR CEA DEVIATION Page 7	CPC AZ TILT EXCEEDED Page 20	T41B TROUBLE Page 30	C
D	MINOR CEA DEVIATION Page 8	RCS TEMPERATURE		D
E	REG GROUP OUT OF SEQUENCE Page 9	CHANNEL 1 MARG TO SAT LO Page 21	CHANNEL 2 MARG TO SAT LO Page 31	E
F	REG GROUP CEA PDIL Page 11	REACTOR TAVE-TREF HI Page 23	REACTOR TAVE-TREF LO Page 33	F
G	REG GROUP CEA PPDIL Page 12	HOT LEG TEMP HI Page 24	COLD LEG TEMP HI Page 34	G
H	CEDMCS COIL VOLTAGE HI Page 13	RRS TROUBLE Page 25	SPARE	H
J	CEDMCS CABINETS TROUBLE Page 14	CSAS PUMP 2P35A WDG TEMP HI Page 26	CSAS PUMP 2P35B WDG TEMP HI Page 35	J
K	ANNUNCIATOR POWER FAILURE Page 15	SW PUMPS BRG/WDG TEMP HI Page 27	VLPMS RCS VIBRATION Page 36	K
	1	2	3	

- Denotes reflash capability

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RCS RELIEF			CONTAINMENT		
A	PRESSURIZER RELIEF VALVE OPEN Page 37	RV HEAD LEAK OFF TEMP HI Page 47	CNTMT RADIATION HI Page 53	A	
B	PZR RELIEF TAILPIPE TEMP HI Page 39	SPARE	CNTMT PART/GAS RAD HI/LO Page 55	B	
C	LOOP 1 LTOP VALVE ALIGN INCORRECT Page 40	LOOP 2 LTOP VALVE ALIGN INCORRECT Page 48	PNL 2C128A TROUBLE/ H2 HI Page 57	C	
D	QUENCH TANK PRESSURE HI Page 41	SPARE	PRESSURIZER CONTROL	D	
E	QUENCH TANK LEVEL HI/LO Page 42	SURGE LINE TEMP HI/LO Page 49	CNTRL CH 1 PRESSURE HI/LO Page 59	E	
F	QUENCH TANK TEMP HI Page 43	SPARE	CNTRL CH 1 LEVEL LO LO Page 60	F	
G	A SPRAY LINE TEMP HI/LO Page 44	B SPRAY LINE TEMP HI/LO Page 50	CNTRL CH 1 LEVEL LO Page 61	G	
H	STARTUP CHANNELS		CNTRL CH 1 LEVEL HI HI Page 62	H	
J	BORON DILUTE CHANNEL 1 EVENT Page 45	BORON DILUTE CHANNEL 2 EVENT Page 51	CNTRL CH 1 LEVEL HI Page 63	J	
K	STARTUP CHANNEL 1 TROUBLE Page 46	STARTUP CHANNEL 2 TROUBLE Page 52	LOW RANGE CH 1 PRESS LO Page 64	K	
4			5		
			6		

- Denotes reflash capability

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	CONTAINMENT
A	CNTMT TEMP/ HUMIDITY HI Page 65
B	CNTMT SUMP LEVEL HI Page 66
C	PNL 2C128B TROUBLE H2 HI Page 67
D	PRESSURIZER CONTROL
E	CNTRL CH 2 PRESSURE HI/LO Page 68
F	CNTRL CH 2 LEVEL LO LO Page 70
G	CNTRL CH 2 LEVEL LO Page 71
H	CNTRL CH 2 LEVEL HI HI Page 72
J	CNTRL CH 2 LEVEL HI Page 73
K	LOW RANGE CH 2 PRESS LO Page 74
	7

- Denotes reflash capability

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ANNUNCIATOR 2K10

A-1

CEDMCS BUS UNDERVOLT

1.0 CAUSES

1.1 Trip undervoltage coil (1 of 4) on CEDMCS Cabinet Bus (2C70 or 2C71).

2.0 ACTION REQUIRED

2.1 IF Reactor tripped,
THEN GO TO 2202.001, Standard Post Trip Actions.

2.2 IF Reactor NOT tripped,
THEN verify proper CEDM MG voltage adjustment using CEDM Control System Operation (2105.009).

3.0 TO CLEAR ALARM

3.1 Restore Bus voltage.

4.0 REFERENCES

4.1 E-2456-3

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ANNUNCIATOR 2K10

B-1

CEA WITHDRAWAL PROHIBIT

1.0 CAUSES

- 1.1 CPC channels (2 of 4) calculating or receiving any of the following when $> 10^{-3}\%$ power:
- DNBR pretrip.
 - LPD pretrip.
 - Either CEAC detects a CEA deviation of 5.0 inches.
 - CPC subgroup deviation of 4.95 inches.
 - Reg group out of sequence (sequential groups get within 7.5 inches of each other).
- 1.2 RPS senses (2 of 4) High Pzr Pressure pretrips.

2.0 ACTION REQUIRED

- 2.1 IF Reactor trips,
THEN GO TO 2202.001, Standard Post Trip Actions.

NOTE

Inserting CEAs may cause local flux suppression and result in LPD trip.

- 2.2 IF DNBR or LPD pretrip,
THEN borate to lower Reactor power using 2104.003, Chemical Addition.
- 2.3 IF High pressure pretrip,
THEN perform the following:
- 2.3.1 Verify both Pressurizer Spray valves open:
- 2CV-4651
 - 2CV-4652
- 2.3.2 IF high pressure due to turbine setback or trip,
THEN verify SDBCS responding.
- 2.3.3 IF high pressure NOT due to secondary system upset,
THEN refer to 2203.028, PZR Systems Malfunction.

(B-1 Continued on next page)

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ANNUNCIATOR 2K10

B-1

CEA WITHDRAWAL PROHIBIT (Continued)

2.4 IF due to CEA deviation,
THEN perform the following:

- Refer to 2203.003, CEA Malfunction.
- Align CEAs using 2105.009, CEDM Control System Operation.

3.0 TO CLEAR ALARM

NOTE

If either CEAC is placed in CEAC INOP with alarm locked in, then the CEAC must be removed from INOP in 3 CPC Channels to clear alarm.

3.1 Clear pretrips.

3.2 Reset RPS.

4.0 REFERENCES

4.1 E-2456-3

4.2 CNPSD-335 Rev. 0, CPC Functional Design Requirements

4.3 NPSD-815P Rev. 1P, ANO-2 Cycle Independent Reload Data Block Constants

4.4 ER 010204N201, added CWP to Group P

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ANNUNCIATOR 2K10

C-1

MAJOR CEA DEVIATION

1.0 CAUSES

NOTE

When CEA deviation within a reg group exceeds 6 inches, then all rod motion in Manual Sequential is inhibited (PMS points DEV2R1, DEV2R2, DEV2R3, DEV2R4, and DEV2R5).

1.1 Difference between highest and lowest CEA within a group > 6.0 inches. This annunciator is driven by PMS and will occur when any of the following points are in alarm: DEV2A, DEV2B, DEV2P, DEV2R1, DEV2R2, DEV2R3, DEV2R4, DEV2R5, and DEV2R6.

1.2 Watchdog Timer due to computer failure.

2.0 ACTION REQUIRED

2.1 Obtain CEA position printout to determine affected CEAs.

2.2 Verify PMS Pulse counter updating.

2.3 Refer to Tech Specs 3.1.3.1 and 3.1.3.2.

2.4 Refer to 2203.003, CEA Malfunction.

2.5 Align CEAs using 2105.009, CEDM Control System Operation.

3.0 TO CLEAR ALARM

3.1 Alarm will clear when deviation < 6.0 inches.

4.0 REFERENCES

4.1 E-2456-3

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ANNUNCIATOR 2K10

D-1

MINOR CEA DEVIATION

1.0 CAUSES

- 1.1 Difference between highest and lowest CEA within a group > 3.0 inches. This annunciator is driven by PMS and will occur when any of the following points are in alarm: DEV1A, DEV1B, DEV1P, DEV1R1, DEV1R2, DEV1R3, DEV1R4, DEV1R5, and DEV1R6.
- 1.2 Watchdog Timer due to computer failure.

2.0 ACTION REQUIRED

- 2.1 Obtain CEA position printout to determine affected CEAs.
- 2.2 Verify PMS Pulse counter updating.
- 2.3 Refer to Tech Spec 3.1.3.2.
- 2.4 IF deviation is OUTWARD,
THEN refer to 2203.003, CEA Malfunction.
- 2.5 Align CEAs using 2105.009, CEDM Control System Operation

3.0 TO CLEAR ALARM

- 3.1 Alarm will clear once deviation < 3.0 inches.

4.0 REFERENCES

- 4.1 E-2456-3
- 4.2 TS 3.1.3.2

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ANNUNCIATOR 2K10

E-1

REG GROUP OUT OF SEQUENCE

1.0 CAUSES

NOTE

PMS drives this window. This condition inhibits CEA motion while in the Manual Sequential mode only. It does NOT affect the ability to move CEAs in either Manual Individual or Manual group.

- 1.1 Shutdown group inserted below the exercise limit. This condition can be diagnosed by checking PMS alarm screen for BV6006 or BV6007.
 - The lowest CEA in shutdown group A (SDMINA) < 145 inches.
 - The lowest CEA in shutdown group B (SDMINB) < 145 inches.
- 1.2 Adjacent Reg group overlap NOT being properly maintained.
 - PMS alarms (BV6001 - BV6004) will indicate maximum overlap requirement (60") being violated. This overlap requirement is enforced for all adjacent reg groups above lower group stop (LGS) and below upper group stop (UGS).
- 1.3 PMS alarm (BV6009) indicates CEA Sequencing program logic error exists and program has calculated group motion permissives for more than two Reg groups.
- 1.4 Major Reg group deviation exceeded.
 - PMS alarms (DEV2R1, DEV2R2, DEV2R3, DEV2R4, DEV2R5) indicate reg group deviations > 6.0 inches (K6012).
- 1.5 CEA Sequencing Program NOT running (CEA INOP QUALITY=ALM)

2.0 ACTION REQUIRED

- 2.1 Consult PMS CEA Sequencing Diagnostic Screen for problem.
- 2.2 Verify PMS CEA positions correct by comparison with CEAC positions and update PMS positions as necessary.
- 2.3 IF EITHER Shutdown group inserted below exercise limit,
THEN withdraw CEAs to clear condition using 2105.009, CEDM Control System Operation.

(E-1 Continued on next page)

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ANNUNCIATOR 2K10

E-1

REG GROUP OUT OF SEQUENCE (Continued)

NOTE

- When Upper Sequential Permissive (USP) for any Reg group reached (highest CEA > 98.7"), then next sequential Reg group will receive a withdrawal permissive, and group deviation must be > 90" (< 60" overlap).
- When Lower Sequential Permissive (LSP) for any Reg group reached (lowest CEA < 52.5 "), then next sequential Reg group will receive an insertion permissive, and group deviation must be > 90" (< 60" overlap).
- Adjacent Group Deviation (CRD1-2 through CRD4-5) is arithmetic difference between lowest CEA in any Reg group and highest CEA in next sequential Reg group (i.e. CRD1-2 = CRMIN1 minus CRMAX2).

2.4 IF due to improper Reg group overlap (BV6001 - BV6004),
THEN reposition group or individual CEA to clear alarm using 2105.009,
CEDM Control System Operation.

2.5 IF due to major CEA deviation within any Reg group (DEV2R1 - DEV2R5),
THEN realign CEAs within group using 2105.009, CEDM Control System
Operation.

3.0 TO CLEAR ALARM

3.1 Adjust and correct any erroneous PMS CEA positions.

3.2 Realign any mispositioned CEAs using EITHER Manual Individual or
Manual Group mode.

4.0 REFERENCES

4.1 E-2456-3

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ANNUNCIATOR 2K10

F-1

REG GROUP CEA PDIL

1.0 CAUSES

- 1.1 Lowest CEA in any reg group inserted below Power Dependent Insertion Limit (PDIL) for that group. This annunciator is driven by PMS and will occur when any of the following points are in alarm: PDILR1, PDILR2, PDILR3, PDILR4, PDILR5, PDILR6, and PDILRP.
- 1.2 Watchdog Timer due to computer failure.
- 1.3 Group 5 less than fully withdrawn.

2.0 ACTION REQUIRED

- 2.1 IF during Reactor startup,
THEN verify alarm clears when Group 5 fully withdrawn.
- 2.2 Refer to 2203.032, Emergency Boration.
- 2.3 Refer to Tech Spec 3.1.3.6.
- 2.4 IF PDIL Alarm inoperable,
THEN verify CEA positions every 4 hours per Tech Spec 4.1.3.6.
- 2.5 WHEN desired to declare PDIL Alarm operable,
THEN perform the following: (CR-ANO-2-2003-00919)
 - Verify PDS/PMS "COLSS STATUS DISP." indicates COLSS operating normally.
 - Verify COLSS operable per Attachment F, COLSS Return to Service Checks of 2105.013, COLSS Operations.

3.0 TO CLEAR ALARM

- 3.1 Ensure reg groups position in conjunction with power level per Tech Spec 3.1.3.6.

4.0 REFERENCES

- 4.1 E-2456-3

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ANNUNCIATOR 2K10

G-1

REG GROUP CEA PPDIL

1.0 CAUSES

<p style="text-align: center;"><u>NOTE</u> PPDIL alarm setpoints are ~ 5" above the PDIL setpoints.</p>
--

- 1.1 Lowest CEA in any Reg group inserted below the Pre-Power Dependent Insertion Limit (PPDIL) for that group. This annunciator is driven by PMS and will occur when any of the following points are in alarm: PPDILR1, PPDILR2, PPDILR3, PPDILR4, PPDILR5, PPDILR6, and PPDILRP.
- 1.2 Watchdog Timer due to computer failure.
- 1.3 Group 6 less than 10 inches withdrawn.

2.0 ACTION REQUIRED

- 2.1 IF during Reactor startup,
THEN verify alarm clears when Group 6 ~ 10 inches withdrawn.
- 2.2 Withdraw appropriate reg CEA group for power level per Tech Spec 3.1.3.6. This limit can also be determined by observing PMS points PPDIL1 - PPDIL6, PPDILRP.
- 2.3 Reduce power to level that will prevent violation with reg groups in their present positions per Tech Spec 3.1.3.6.

3.0 TO CLEAR ALARM

- 3.1 Ensure reg groups position in conjunction with power level per Tech Spec 3.1.3.6.

4.0 REFERENCES

- 4.1 E-2456-3

PROC./WORK PLAN NO. 2203.012J	PROCEDURE/WORK PLAN TITLE: ANNUNCIATOR 2K10 CORRECTIVE ACTION	PAGE: 13 of 74 CHANGE: 031-00-0
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ANNUNCIATOR 2K10

H-1

CEDMCS COIL VOLTAGE HI

1.0 CAUSES

CAUTION

If continuous high voltage applied for more than 5 minutes, then damage to CEDM coil may result.

1.1 High voltage to CEDM coil.

2.0 ACTION REQUIRED

2.1 Refer to Exhibit 1, CEDMCS Timer Failure Alarm Response of CEDM Control System Operation (2105.009).

3.0 TO CLEAR ALARM

3.1 Correct high voltage.

4.0 REFERENCES

4.1 E-2456-3

4.2 DCP-88-2111

4.3 DCP-85-2150

4.4 LCP-95-6003

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ANNUNCIATOR 2K10

J-1

CEDMCS CABINETS TROUBLE

<p style="text-align: center;"><u>NOTE</u> This alarm will reflash.</p>
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1.0 CAUSES

1.1 Any signal from Annunciator 2K20 (windows B3 through H3).

2.0 ACTION REQUIRED

2.1 Refer to 2203.012T, Annunciator 2K20 Corrective Action.

3.0 TO CLEAR ALARM

3.1 Correct problem indicated on 2K20 (B3 through H3).

4.0 REFERENCES

4.1 E-2456-3

4.2 DCP-88-2111

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ANNUNCIATOR 2K10

K-1

ANNUNCIATOR POWER FAILURE

1.0 CAUSES

NOTE

2K08, 2K09, and 2K10 have the same AC power source (2Y1-17). If AC is lost, then annunciators will remain functional using DC power source (2D21-36).

1.1 Loss of AC power to Annunciator 2K10.

1.2 Loss of DC power to Annunciator 2K10.

2.0 ACTION REQUIRED

2.1 IF 2Y1-17 tripped,
THEN refer to Tripped Breakers and Thermal Overloads section of Electrical System Operations (2107.001).

2.2 IF 2D21-36 tripped,
THEN refer to Tripped Breakers and Thermal Overloads section of Electrical System Operations (2107.001).

3.0 TO CLEAR ALARM

3.1 Restore AC and DC power to Annunciator 2K10.

4.0 REFERENCES

4.1 E-2456-3

4.2 DCP-88-2111

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ANNUNCIATOR 2K10

A-2

COLSS POWER MARGIN EXCEEDED

1.0 CAUSES

NOTE

- If BSCAL good, then Licensed Power (CV5001) is BSCAL (CV9005 Secondary Calorimetric Power). If BSCAL quality NCAL, then Licensed Power is CV5993 (Smoothed Plant Power).
- Information to aid in determining COLSS operability is located in Setpoints section of 2105.013.

- 1.1 Licensed Power Limit (BV9002) exceeded (driven by PMS PID CV9002 < 0).
 - Smoothed Licensed Power > Licensed Power Limit with a 3 minute time delay.
 - Smoothed Licensed Power > Licensed Power Limit + 1%.
 - Smoothed Licensed Power rolling 4 hour average Licensed Power Limit.
- 1.2 DNBR Power Limit (BV9000) exceeded driven by Smoothed Plant Power (CV5993) > Smoothed DNBR POL (CV5996).
- 1.3 KW/FT Power Limit (BV9001) exceeded driven by Smoothed Plant Power (CV5993) > Smoothed KW/FT POL (CV5997).
- 1.4 Instantaneous DNBR Power Limit (BV9203) exceeded driven by Plant Power (CV9000) > biased DNBR POL (CV5994) + 2%.
- 1.5 Instantaneous KW/FT Power Limit (BV9204) exceeded driven by Plant Power (CV9000) > biased KW/FT POL (CV5995) + 2%.
- 1.6 PMS Display Tc (CV1201) $\geq 554.7^{\circ}\text{F}$.
- 1.7 PMS Display Tc (CV1201) $\leq 542.0^{\circ}\text{F}$.
- 1.8 Any of the following COLSS failures:
 - Smoothed Plant Power (CV5993) quality = NCAL.
 - Smoothed DNBR (CV5996) quality = NCAL.
 - Smoothed KW/FT (CV5997) quality = NCAL.

(A-2 Continued on next page)

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ANNUNCIATOR 2K10

A-2

COLSS POWER MARGIN EXCEEDED
(Continued)

2.0 ACTION REQUIRED

2.1 Check PMS to determine cause of alarm.

2.2 IF Licensed Power Limit (BV9002) exceeded with COLSS operable,
THEN perform the following per 2102.004, Power Operations:

NOTE

Normal steady state variations may cause Heat Balance Power briefly to exceed 100% and are NOT considered License Violations or beyond design basis. There are no limits on the number of times these normal fluctuations may occur, or the time interval that must separate such excursions, except that:

- The average heat balance power level over any eight hour period (i.e. CV9005H8) SHALL NOT exceed rated thermal power, and
- 102% should not be exceeded at any time.

2.2.1 IF Smoothed Licensed Power (CV5001) greater than licensed power limit but less than licensed power limit + 1%,
THEN reduce power below licensed power limit within the next 10 minutes.

2.2.2 IF Smoothed Licensed Power (CV5001) greater than licensed power limit + 1%,
THEN reduce power below licensed power limit IMMEDIATELY.

2.2.3 IF Secondary steam leak causing License Power rise,
THEN perform the following:

- Reduce MTG load as required to clear alarm.
- IF MTG load lowered more than 50 MWe,
THEN trip reactor and GO TO 2202.001, Standard Post Trip Actions.

2.2.4 IF Smoothed Licensed Power rolling 4 hour average greater than Licensed Power Limit,
THEN reduce power to prevent 8-hour average from exceeding Licensed Power Limit.

NOTE

The 4-Hour Alarm will automatically re-enable after either 30 minutes have elapsed or the 4-hour average drops below 100%.

2.2.5 IF desired to temporarily disable the 4-Hour alarm,
THEN depress DISABLE Button on the PMS 4-Hour Alarm Screen.

(A-2 Continued on next page)

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ANNUNCIATOR 2K10

A-2

COLSS POWER MARGIN EXCEEDED (Continued)

- 2.3 IF DNBR or KW/FT power limits (BV9000, BV9001, BV9203, and BV9204) exceeded with COLSS operable,
THEN perform the following:
 - 2.3.1 IF power (CV9000 or CV5993) > POL based on DNBR or KW/FT,
THEN commence plant power reduction within 15 minutes to reduce plant power below limits. Refer to 2102.004 Power Operations.
 - 2.3.2 IF DNBR POL exceeded due to excessive difference between Secondary Cal Power and Turbine Power,
THEN refer to COLSS Operations (2105.013) to recalibrate.
 - 2.3.3 Refer to Tech Specs 3.2.1 and 3.2.4.
- 2.4 IF PMS Display Tc (CV1201) $\leq 542.0^{\circ}\text{F}$ or $\geq 554.7^{\circ}\text{F}$,
THEN perform the following:
 - 2.4.1 Adjust Tave to restore Tc to between 542.0 and 554.7°F.
 - 2.4.2 Refer to TS 3.2.6.
- 2.5 IF COLSS inoperable,
THEN refer to Loss of COLSS (2203.043).
- 2.6 IF COLSS Power Margin Alarm inoperable,
THEN station Operator at PMS Terminal to constantly monitor alarms.

3.0 TO CLEAR ALARM

- 3.1 Raise margin to operating limit (CV9002) to ≥ 0.01 .
- 3.2 Restore Tc to between 542.0 and 554.7°F.

4.0 REFERENCES

- 4.1 E-2456-3

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ANNUNCIATOR 2K10

B-2

TECH SPEC AZ TILT EXCEEDED

1.0 CAUSES

1.1 COLSS Az Tilt (CV9008) greater than Tech Spec Az Tilt Limit (K9039).

2.0 ACTION REQUIRED

2.1 IF > 20% power and COLSS inoperable,
THEN refer to Loss of COLSS (2203.043).

2.2 Compare COLSS Az Tilt (CV9008) with TS Az Tilt Limit (K9039).

2.3 Perform COLSS Az Tilt Calculation using 2102.004, Power Operation.

2.4 IF any unresolved problems,
THEN contact Reactor Engineering.

3.0 TO CLEAR ALARM

3.1 Reduce Az Tilt below Tech Spec Az Tilt Limit.

4.0 REFERENCES

4.1 E-2456-3

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ANNUNCIATOR 2K10

C-2

CPC AZ TILT EXCEEDED

1.0 CAUSES

- 1.1 COLSS calculated azimuthal tilt (CV9008) exceeds CPC azimuthal tilt allowance.

2.0 ACTION REQUIRED

- 2.1 IF > 20% power and COLSS inoperable,
THEN refer to Loss of COLSS (2203.043).
- 2.2 Refer to Tech Spec 3.2.3.
- 2.3 Compare COLSS Az Tilt (CV9008) with Vector Tilt (CV9767) and Arithmetic Tilt (CV9766).
- 2.4 IF COLSS Az Tilt (CV9008) and Arithmetic Tilt (CV9766) agree,
THEN check status of COLSS Vector Tilt Calculation by observing Vector Tilt > 5% (BV9013) and Vector Tilt Calc Failed (BV9011).
- 2.5 Check ASI (CV9198) for possible Incore Detector spikes.
- 2.6 IF faulty Incore indicated,
THEN perform the following:
 - 2.6.1 Run CHECK program using N9 Function on PMS to determine faulty detector.
 - 2.6.2 Remove from scan using 2105.013, COLSS Operations.
- 2.7 IF necessary to adjust CPC Az Tilt Allowance,
THEN perform Attachment I of 2102.004, Power Operation.
- 2.8 IF any unresolved problems,
THEN contact Reactor Engineering.

3.0 TO CLEAR ALARM

- 3.1 Reduce COLSS Az Tilt (CV9008) below CPC Az Tilt Allowance (K9038).

4.0 REFERENCES

- 4.1 E-2456-3

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ANNUNCIATOR 2K10

E-2

CHANNEL 1 MARG TO SAT LO

1.0 CAUSES

- 1.1 Plant in Mode 1 with Margin to Saturation temperature $\leq 20^{\circ}\text{F}$.
- 1.2 Plant NOT in Mode 1 with Margin to Saturation temperature $< 30^{\circ}\text{F}$.
- 1.3 Power lost to Computer Digital Output card/system (Y0550 closed) and Margin to Saturation temperature $< 30^{\circ}\text{F}$.

2.0 ACTION REQUIRED

- 2.1 IF alarm occurs during EOP implementation,
THEN GO TO EOP in use.
- 2.2 Check Channel 1 and Channel 2 Margin to Sat calculators:
- 2.3 IF Margin to Sat indication flashing or channel inoperable,
THEN perform the following:
 - 2.3.1 Do NOT use for safety related function.
 - 2.3.2 Refer to 2105.012, RCS Saturation Margin Calculator Operations.
 - 2.3.3 Refer to TS 3.3.3.6, Post-Accident Instrumentation.
- 2.4 Check SPDS Margin to Saturation point TSMRGN2.
- 2.5 Refer to Steam Tables as necessary to determine actual Margin to Saturation using the following parameters:
 - Highest valid Th temperature
 - Lowest valid RCS pressure
- 2.6 IF actual Margin to Sat verified $< 30^{\circ}\text{F}$ and reactor NOT tripped,
THEN perform the following:
 - *2.6.1 IF RCS Pressure < 2000 psia,
THEN perform the following:
 - A. Manually trip reactor.
 - B. GO TO 2202.001, Standard Post Trip Actions.
 - 2.6.2 IF Margin to Sat $> 20^{\circ}\text{F}$,
THEN no further action required.
 - 2.6.3 Verify Margin to Sat $> 20^{\circ}\text{F}$.

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ANNUNCIATOR 2K10

E-2

CHANNEL 1 MARG TO SAT LO
(Continued)

3.0 TO CLEAR ALARM

3.1 IF in Mode 1,
THEN raise Margin to saturation > 20°F.

3.2 IF NOT in Mode 1,
THEN raise Margin to saturation > 35°F.

4.0 REFERENCES

4.1 E-2456-3

4.2 DCP-88-2111

4.3 DCP-94-2008

4.4 ER-ANO-2-2002-0630-000, MTS 20°F

4.5 ER-ANO-2-2002-0630-001, MTS 20°F or 30°F

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ANNUNCIATOR 2K10

F-2

REACTOR TAVE-TREF HI

1.0 CAUSES

1.1 RRS Selected Tave - Tref > 6.8°F.

2.0 ACTION REQUIRED

2.1 Check RRS Tave - Tref using PMS Points T4617-A and T4617-B.

2.2 IF High Tave - Tref condition verified,
THEN add boric acid to the RCS or raise turbine load as necessary to reduce temperature difference. Refer to 2104.003, Chemical Addition and 2106.009, Turbine Generator Operations.

2.3 IF RCS Tc > 554.7°F,
THEN refer to Tech Spec 3.2.6.

2.4 IF RRS failure affects pressurizer level control system,
THEN refer to 2203.028, PZR Systems Malfunction.

3.0 TO CLEAR ALARM

3.1 Reset Tave signal validation logic on FWCS EWS.

3.2 Return Tave to within 5°F of Tref.

4.0 REFERENCES

4.1 E-2456-3

4.2 DCP-94-2008

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ANNUNCIATOR 2K10

G-2

HOT LEG TEMP HI

1.0 CAUSES

1.1 Loop A Th > 622°F (2TS-4614-IN in 2C21).

1.2 Loop B Th > 622°F (2TS-4714-2N in 2C21).

2.0 ACTION REQUIRED

2.1 Verify alarm using Th indications on 2C04.

2.2 IF alarm valid,
THEN perform the following:

2.2.1 IF RCS Tc > 554.7°F,
THEN refer to Tech Spec 3.2.6.

2.2.2 Perform the following as necessary to reduce temperature:

- Add boric acid to the RCS per 2104.003, Chemical Addition.
- Raise turbine load per 2106.009, Turbine Generator Operations.

2.3 IF RRS Tave affected,
THEN verify unaffected loop Tave selected on FWCS Engineering Work Station using 2106.007, Main Feedwater Pump and FWCS Operations.

2.4 IF RRS failure affects pressurizer level control system,
THEN refer to 2203.028, PZR Systems Malfunction.

3.0 TO CLEAR ALARM

3.1 Lower Loop A and B Th to < 620°F.

4.0 REFERENCES

4.1 E-2456-3

4.2 DCP-88-2111

4.3 DCP-94-2008

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ANNUNCIATOR 2K10

H-2

RRS TROUBLE

NOTE

This alarm will reflash.

1.0 CAUSES

- 1.1 Any of the following RRS trouble alarms on FWCS Engineering Work Station:
- Turbine First Stage Pressure Failure (TUPR1FA, TUPR2FA, TUPRFAIL)
 - Tave Failure (TAVGLPA, TAVGLPB)
 - Internal Card Failure
 - DPU Drops Status

2.0 ACTION REQUIRED

- 2.1 Check FWCS EWS for cause.
- 2.2 IF any Tave or Turbine First Stage Pressure channel failed,
THEN verify good channel selected using Main Feedwater Pump and FWCS Operations (2106.007).

NOTE

Swapping RRS Tc input may make 2C80 indication inoperable per TS 3.3.3.5.

- 2.3 IF RRS Normal Tc input failed (2TI-4616 or 2TI-4716),
AND SM desires,
THEN select Alternate Tc input (2TE-4615 or 2TE-4715) as follows:
- 2.3.1 Place appropriate RCP Loop Selector Switch in 2C21 to ALT:
- 2HS-4618 for Loop 1.
 - 2HS-4718 for Loop 2.
- 2.3.2 Check Tc indications on 2C80 and refer to TS 3.3.3.5.
- 2.4 Notify System Engineer.

3.0 TO CLEAR ALARM

- 3.1 WHEN alarming condition clears,
THEN reset FWCS EWS.

4.0 REFERENCES

- 4.1 E-2456-3
- 4.2 DCP-94-2008

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ANNUNCIATOR 2K10

J-2

CSAS PUMP 2P35A WDG TEMP HI

1.0 CAUSES

- 1.1 Containment Spray pump (2P-35A) winding temperature > 275°F (2TS-5680).

2.0 ACTION REQUIRED

- 2.1 Check temperature on Spray Pump Temperature recorder (2TR-5682).

- 2.2 Verify ESF Pump Room coolers running:

- 2VUC-1A
- 2VUC-1B
- 2VUC-1C

- 2.3 IF CSAS actuated,
AND 2P-35B in service,
AND Green Train Containment Cooling running in Emergency Mode,
THEN consider securing 2P-35A.

- 2.4 IF CSAS NOT actuated,
THEN perform the following:

- 2.4.1 Stop 2P-35A.

- 2.4.2 Refer to Tech Spec 3.6.2.1.

3.0 TO CLEAR ALARM

- 3.1 Reduce temperature to < 275°F.

4.0 REFERENCES

- 4.1 E-2456-3
- 4.2 DCP-88-2111

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ANNUNCIATOR 2K10

K-2

SW PUMPS BRG/WDG TEMP HI

1.0 CAUSES

1.1 Alarm setpoint exceeded on SW Pump Temperature recorder (2TR-1428):

- 190° F on any Service Water Pump bearing.
- 295° F on any Service Water Pump Motor winding.

SW Pump	2P-4A	2P-4B	2P-4C
Motor Winding	2TT-1428	2TT-1434	2TT-1440
Upper Bearing	2TT-1429	2TT-1435	2TT-1441
Lower Bearing	2TT-1471	2TT-1458	2TT-1466

2.0 ACTION REQUIRED

2.1 Check 2TR-1428 to determine affected pump.

2.2 Press ACK ALM1 2TRS-1428 to acknowledge alarm and allow reflash.

2.3 Verify the following as necessary to ensure adequate Intake Structure Ventilation:

- Both Intake Structure Exhaust Fans running:
 - 2VEF-25A
 - 2VEF-25B
- Door louvers open.
- Space heaters secured.
- Intake Heater (2VEH-1) ON/OFF toggle switch in OFF (down).
- Sheet metal plates above SW pump motors removed.

2.4 IF unable to reduce temperature,
THEN shift to standby Service Water pump.

3.0 TO CLEAR ALARM

3.1 Reduce temperature below alarm setpoint.

3.2 Press RESET ALM2 on 2TR-1428.

4.0 REFERENCES

4.1 E-2456-3

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ANNUNCIATOR 2K10

A-3

T41B LEVEL LO LO

1.0 CAUSES

1.1 Q CST (T-41B) level < 17% (5.1 feet) (2LIS-0727-2A or 2LSX-0727-1C).

2.0 ACTION REQUIRED

2.1 Notify Unit 1 Control Room.

2.2 Fill T-41B from Vacuum Degas System or Mobile Water Treatment Facility using 2106.031, Makeup Water Degasification System Operations.

3.0 TO CLEAR ALARM

3.1 Raise level > 17% (5.1 feet).

4.0 REFERENCES

4.1 E-2456-3

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ANNUNCIATOR 2K10

B-3

T41B LEVEL LO

1.0 CAUSES

1.1 Q CST (T-41B) level < 92.3% (27'9") (2LIS-0727-2A or 2LSX-0727-1C).

2.0 ACTION REQUIRED

2.1 Notify Unit 1 Control Room.

2.2 Fill T-41B from Vacuum Degas System or Mobile Water Treatment Facility using 2106.031, Makeup Water Degasification System Operations.

3.0 TO CLEAR ALARM

3.1 Raise T-41B level > 92.3% (27'9")

4.0 REFERENCES

4.1 E-2456-3

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ANNUNCIATOR 2K10

C-3

T41B TROUBLE

1.0 CAUSES

1.1 Any of the following alarms from local annunciator 2KC165:

- Q CST (T-41B) temperature < 77°F (2TS-0727).
- HCC-23-12" heat tracing < 40°F (P-7A and B suction).
- 2HCD-937-6" heat tracing < 40°F (2P-7A and B recirc).
- 2HCC-282-12" heat tracing < 40°F (2P-7A and B suction).
- Loss of AC power to local annunciator panel (2KC-165).

2.0 ACTION REQUIRED

2.1 Inform Unit 1 Control Room.

2.2 Check power to heat trace circuits from Unit 1 as follows:

- T-41B tank heaters fed from 52-8141 to PP64 breaker 1.
- HCC-23-12" fed from 52-8141 to PP64 breaker 2 to 6LC breaker 7.
- 2HCD-937-6" fed from 52-8141 to PP64 breaker 2 to 6LC breaker 9.
- 2HCC-282-12" fed from 52-8141 to PP64 breaker 2 to 6LC breaker 8.
- Loss of AC power to annunciator fed from B-8141 to PP64-2 to 6LC-10.

3.0 TO CLEAR ALARM

3.1 Alarm will clear automatically when above conditions clear.

4.0 REFERENCES

4.1 E-2456-3

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ANNUNCIATOR 2K10

E-3

CHANNEL 2 MARG TO SAT LO

1.0 CAUSES

- 1.1 Plant in Mode 1 with Margin to Saturation temperature $\leq 20^{\circ}\text{F}$.
- 1.2 Plant NOT in Mode 1 with Margin to Saturation temperature $< 30^{\circ}\text{F}$.
- 1.3 Power lost to Computer Digital Output card/system (Y0550 closed) and Margin to Saturation temperature $< 30^{\circ}\text{F}$.

2.0 ACTION REQUIRED

- 2.1 IF alarm occurs during EOP implementation,
THEN GO TO EOP in use.
- 2.2 Check Channel 1 and Channel 2 Margin to Sat calculators:
- 2.3 IF Margin to Sat indication flashing or channel inoperable,
THEN perform the following:
 - 2.3.1 Do NOT use for safety related function.
 - 2.3.2 Refer to 2105.012, RCS Saturation Margin Calculator Operations.
 - 2.3.3 Refer to TS 3.3.3.6, Post-Accident Instrumentation.
- 2.4 Check SPDS Margin to Saturation point TSMRGN2.
- 2.5 Refer to Steam Tables as necessary to determine actual Margin to Saturation using the following parameters:
 - Highest valid Th temperature
 - Lowest valid RCS pressure
- 2.6 IF actual Margin to Sat verified $< 30^{\circ}\text{F}$ and reactor NOT tripped,
THEN perform the following:
 - *2.6.1 IF RCS Pressure < 2000 psia,
THEN perform the following:
 - A. Manually trip reactor.
 - B. GO TO 2202.001, Standard Post Trip Actions.
 - 2.6.2 IF Margin to Sat $> 20^{\circ}\text{F}$,
THEN no further action required.
 - 2.6.3 Verify Margin to Sat $> 20^{\circ}\text{F}$.

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ANNUNCIATOR 2K10

E-3

CHANNEL 2 MARG TO SAT LO (Continued)

3.0 TO CLEAR ALARM

3.1 IF in Mode 1,
THEN raise Margin to saturation > 20°F.

3.2 IF NOT in Mode 1,
THEN raise Margin to saturation > 35°F.

4.0 REFERENCES

4.1 E-2456-3

4.2 DCP-88-2111

4.3 DCP-94-2008

4.4 ER-ANO-2-2002-0630-000, MTS 20°F

4.5 ER-ANO-2-2002-0630-001, MTS 20°F or 30°F

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ANNUNCIATOR 2K10

F-3

REACTOR TAVE-TREF LO

1.0 CAUSES

1.1 Selected RRS Tave - Tref < -6.8°F.

2.0 ACTION REQUIRED

2.1 Check RRS Tave - Tref using PMS Points T4617-A and T4617-B.

2.2 IF Low Tave - Tref condition verified,
THEN perform the following as necessary to reduce ΔT :

- Add water to the RCS per 2104.003, Chemical Addition.
- Reduce turbine load per 2106.009, Turbine Generator Operations.

2.3 IF RCS TC < 542°F,
THEN refer to Tech Spec 3.2.6.

2.4 IF RRS failure affects pressurizer level control system,
THEN refer to 2203.028, PZR Systems Malfunction.

3.0 TO CLEAR ALARM

3.1 Reset Tave signal validation logic on FWCS EWS.

3.2 Return Tave to within 5°F of Tref.

4.0 REFERENCES

4.1 E-2456-3

4.2 DCP-94-2008

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ANNUNCIATOR 2K10

G-3

COLD LEG TEMP HI

1.0 CAUSES

1.1 Loop A Tc > 563°F (2TC-4616).

1.2 Loop B Tc > 563°F (2TC-4716).

2.0 ACTION REQUIRED

2.1 Verify alarm using Tc indications on 2C04.

2.2 IF alarm valid,
THEN perform the following:

2.2.1 Perform the following as necessary to reduce temperature:

- Add boric acid to the RCS per 2104.003, Chemical Addition.
- Raise turbine load per 2106.009, Turbine Generator Operations.

2.2.2 Refer to Tech Spec 3.2.6.

2.3 IF RRS Tave affected,
THEN verify unaffected loop Tave selected on FWCS Engineering Work Station using Main Feedwater Pump and FWCS Operations (2106.007).

2.4 IF RRS failure affects pressurizer level control system,
THEN refer to 2203.028, PZR Systems Malfunction.

3.0 TO CLEAR ALARM

3.1 Reduce Loop A and B Tc to < 562.4°F.

4.0 REFERENCES

4.1 E-2456-3

4.2 DCP-88-2111

4.3 DCP-94-2008

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ANNUNCIATOR 2K10

J-3

CSAS PUMP 2P35B WDG TEMP HI

1.0 CAUSES

- 1.1 Containment Spray Pump (2P-35B) Winding temperature > 275°F (2TS-5681).

2.0 ACTION REQUIRED

- 2.1 Check temperature on Spray Pump Temperature recorder (2TR-5682).
- 2.2 Verify ESF Pump Room coolers running:
 - 2VUC-1D
 - 2VUC-1E
 - 2VUC-1F
- 2.3 IF CSAS actuated,
AND 2P-35A in service,
AND Red Train Containment Cooling running in Emergency Mode,
THEN consider securing 2P-35B.
- 2.4 IF CSAS NOT actuated,
THEN perform the following:
 - 2.4.1 Stop 2P-35B.
 - 2.4.2 Refer to Tech Spec 3.6.2.1.

3.0 TO CLEAR ALARM

- 3.1 Reduce temperature to < 275°F.

4.0 REFERENCES

- 4.1 E-2456-3
- 4.2 DCP-88-2111

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ANNUNCIATOR 2K10

K-3

VLPMS RCS VIBRATION

NOTE

- This alarm is generated from PMS.
- The first Channel to Alarm will have a red border on mimic screen.

1.0 CAUSES

- 1.1 Fixed and Floating setpoints exceeded in Vibration Loose Parts Monitoring System (2C19).

2.0 ACTION REQUIRED

- 2.1 IF testing or maintenance in progress,
THEN no action required.
- 2.2 Determine affected channel on 2C19 by either of the following:
- Select Mimic Screen (F8).
 - View channel select window of Master Control Module.
- 2.3 Turn audio monitor to alarmed channel.
- 2.4 Monitor for noise.
- 2.5 IF any abnormal noises (thumping, grinding or clanking) heard,
AND required by Shift Manager,
THEN complete Attachment A of 2105.002, Vibration and Loose Parts Monitor System.

3.0 TO CLEAR ALARM

- 3.1 Depress Reset on Master Control module.

4.0 REFERENCES

- 4.1 E-2456-3
- 4.2 DCP-93-2006

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ANNUNCIATOR 2K10

A-4

PRESSURIZER RELIEF VALVE OPEN

1.0 CAUSES

- 1.1 One or both Pressurizer Relief valves open as indicated by HI-ALARM condition on PZR Relief Valve monitor (2VYI-4633-1 or 2VYI-4634-1).

2.0 ACTION REQUIRED

- 2.1 Identify open Relief valves by checking individual module HI-ALARM lights and meter indication on 2C336-1.

- 2.2 Determine if valve actually lifting as follows:

- 2.2.1 Check for lowering RCS pressure.

NOTE

- Alarm variable setpoints adjusted to 160°F if relief not leaking or 240°F if relief leaking per 2K10-B4.
- 2TIS-4630 and 2TIS-4631 may be at different setpoints.

- 2.2.2 Check for high temperature downstream of relief:

- 2TIS-4630
- 2TIS-4631
- Alarm 2K10-B4

- 2.2.3 Monitor Quench Tank pressure, temperature and level:

- 2PIS-4694
- 2TIS-4694
- 2LIS-4694

- 2.2.4 Interpret source of noise using 2105.011, PZR Relief Valve Monitoring System Operation.

- 2.3 Refer to 2203.016, Excess RCS Leakage.

- 2.4 Refer to Tech Spec 3.4.3.

- 2.5 IF desired to reduce RCS pressure to attempt to seat valve, THEN refer to 2103.005, Pressurizer Operations.

- 2.6 IF alarm due to channel failure, THEN restore monitoring capability using 2105.011, PZR Relief Valve Monitoring System Operation.

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ANNUNCIATOR 2K10

A-4

PRESSURIZER RELIEF VALVE OPEN
(Continued)

3.0 TO CLEAR ALARM

3.1 Alarm will clear when valve is reseated.

4.0 REFERENCES

4.1 E-2456-3

4.2 ER010542E201, CR-2-2000-0262, Pressurizer Tailpipe Temperature Alarm

4.3 2105.011, Pzr Relief Valve Monitoring System Operation
Supplement 1 - Pressurizer Relief Valve Monitor Monthly Test

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ANNUNCIATOR 2K10

B-4

PZR RELIEF TAILPIPE TEMP HI

1.0 CAUSES

- 1.1 Temp > VSP on relief line downstream of 2PSV-4633 (2TIS-4630).
- 1.2 Temp > VSP on relief line downstream of 2PSV-4634 (2TIS-4631).

2.0 ACTION REQUIRED

NOTE

- Alarm variable setpoint (VSP) adjusted to 160°F if relief not leaking or 240°F if relief leaking (2TIS-4630 or 2TIS-4631 > 160°F).
- 2TIS-4630 and 2TIS-4631 may be at different VSPs.

- 2.1 Perform RCS LKRT per 2305.002, Reactor Coolant System Leak Detection to determine leakage from 2PSV-4633 and 2PSV-4634.
- 2.2 IF leakage determined,
THEN perform the following:
 - 2.2.1 Refer to 2203.016, Excess RCS Leakage.
 - 2.2.2 Adjust 2TIS-4630 or 2TIS-4631 VSP to 240°F using upper right adjustment screw to maintain alarm function.
 - 2.2.3 IF wrong adjustment screw turned,
THEN submit WR/WO for calibration.
- 2.3 Vent and drain Quench tank as necessary using 2103.007, Quench Tank and Reactor Drain Tank Ops.
- 2.4 IF desired to reduce RCS pressure to attempt to seat valve,
THEN refer to 2103.005, Pressurizer Operations.
- 2.5 WHEN tailpipe temperature returns to no leakage condition (< 140°F),
THEN restore VSP to 160°F.

3.0 TO CLEAR ALARM

- 3.1 Reduce tail pipe temperature (2TIS-4630 and 2TIS-4631) to < VSP.

4.0 REFERENCES

- 4.1 E-2456-3
- 4.2 DCP-88-2111
- 4.3 ER010542E201, CR-2-2000-0262, Pressurizer Tailpipe Temperature Alarm

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ANNUNCIATOR 2K10

C-4

LOOP 1 LTOP VALVE ALIGN INCORRECT

1.0 CAUSES

- 1.1 Any LTOP Relief Isolation valve (2CV-4730-1, 2CV-4731-2, 2CV-4740-2 or 2CV-4741-1) in condition listed below:
 - Open with RCS Thot (2TIS-4614-1) > 280°F.
 - Closed with RCS Thot (2TIS-4614-1) < 270°F.

2.0 ACTION REQUIRED

- 2.1 IF due to isolating or aligning LTOPs at reduced RCS temperature as directed by Plant Heatup (2102.002) or Plant Cooldown (2102.010), THEN no further action required.
- 2.2 IF actual Hot Leg Temp > 280°F, THEN close LTOP Isolation valves.
- 2.3 IF actual Hot Leg Temp < 270°F, THEN open LTOP Isolation valves.

3.0 TO CLEAR ALARM

- 3.1 Position valve to required position for operating conditions.

4.0 REFERENCES

- 4.1 E-2456-3

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ANNUNCIATOR 2K10

D-4

QUENCH TANK PRESSURE HI

1.0 CAUSES

1.1 Quench tank (2T-42) pressure > 40 psig (2PIS-4694).

2.0 ACTION REQUIRED

NOTE

Pressure Relief Valve (2PSV-4696) relieves pressure to CNTMT sump at 70 psig. Rupture Disc (2PSV-4695) opens at 90 psig.

2.1 Vent Quench tank using 2103.007, Quench Tank and Reactor Drain Tank Ops.

2.2 Verify CNTMT LP N2 valve (2CV-6213-2) closed.

2.3 IF Quench tank pressure > 60 psig,
THEN submit WR to replace rupture disc (ANIN-900724-011).

3.0 TO CLEAR ALARM

3.1 Reduce pressure < 40 psig.

4.0 REFERENCES

4.1 E-2456-3

4.2 ANIN-900724-011

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ANNUNCIATOR 2K10

E-4

QUENCH TANK LEVEL HI/LO

1.0 CAUSES

1.1 High - Level > 87% (2LIS-4694).

1.2 Low - Level < 73% (2LIS-4694).

2.0 ACTION REQUIRED

2.1 IF High,
THEN perform the following:

2.1.1 Drain Quench tank to RDT using 2103.007, Quench Tank and Reactor Drain Tank Ops.

2.1.2 Verify Quench Tank Makeup valve (2CV-4685) closed.

2.2 IF Low,
THEN perform the following:

2.2.1 Verify Quench Tank Drain to RDT valve (2CV-4692) closed.

2.2.2 Fill Quench tank using 2103.007, Quench Tank and Reactor Drain Tank Ops.

3.0 TO CLEAR ALARM

3.1 Adjust Quench Tank level to between 74% and 86%.

4.0 REFERENCES

4.1 E-2456-3

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ANNUNCIATOR 2K10

F-4

QUENCH TANK TEMP HI

1.0 CAUSES

1.1 Quench Tank temperature (2TIS-4694) > 125°F.

2.0 ACTION REQUIRED

2.1 Attempt to determine leaking Pressurizer relief by monitoring individual downstream temperatures (2TIS-4630 and 2TIS-4631).

2.2 IF during Heatup or Hot Standby,
THEN check locally at relief valves and ECCS vents for leakage.

2.3 Reduce Quench Tank temperature using 2103.007, Quench Tank and Reactor Drain Tank Ops.

3.0 TO CLEAR ALARM

3.1 Lower Quench Tank temperature to < 125°F.

4.0 REFERENCES

4.1 E-2456-3

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ANNUNCIATOR 2K10

G-4

A SPRAY LINE TEMP HI/LO

1.0 CAUSES

1.1 Spray Line temperature upstream of Pressurizer Spray valve (2CV-4651) < 525°F (2TIS-4607).

1.2 RTD open circuit (> 695°F).

2.0 ACTION REQUIRED

2.1 Check Spray Line temperature (2TIS-4607) to determine cause.

2.2 IF low temperature condition confirmed,
THEN perform the following:

2.2.1 Monitor temperature and manually initiate spray flow as required to maintain temperature above alarm setpoint. Refer to 2103.005, Pressurizer Operations.

2.2.2 Report condition to System Engineering for evaluation.

2.3 IF instrument failure,
THEN submit WR/WO.

3.0 TO CLEAR ALARM

3.1 Raise temperature > 525°F (2TIS-4607).

3.2 Repair RTD circuit.

4.0 REFERENCES

4.1 E-2456-3

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ANNUNCIATOR 2K10

J-4

BORON DILUTE CHANNEL 1 EVENT

1.0 CAUSES

NOTES

- During a down power, setpoint is automatically maintained 1.5 times neutron count rate. During an up power, raise setpoint by depressing ALARM SETPOINT RESET pushbutton.
- During extended periods of extremely low count rates, monitor may enter a Lo E state causing unpredictable response when counts first register again. I&C can restore monitor operability by filling the count registers with 12 cps from the test circuit. (CR-ANO-2-2005-992)

- 1.1 Reactor neutron count rate greater than setpoint generated by Boron Dilution monitor (2JC-9000-1).

2.0 ACTION REQUIRED

- 2.1 Check count rate using Boron Dilution Event Channel 1 and Channel 2 indicators (2JIS-9000 and 2JIS-9003).
- 2.2 IF rising count rate unexpected or uncontrolled,
THEN GO TO 2203.017, Moderator Dilution.
- 2.3 IF rising count rate expected and controlled,
THEN depress ALARM SETPOINT RESET pushbutton.
- 2.4 IF monitor failed high,
THEN contact I&C to insert a test signal to override indicated count rate.
- 2.5 IF in Mode 3, 4 or 5,
THEN verify one the following for protection against dilution event:
- At least one Boron Dilution Monitor and alarm operable.
 - Cocked CEA protection established.
 - Dilution Flowpath tagout hung per Refueling Shuffle (2502.001).

3.0 TO CLEAR ALARM

- 3.1 Reduce count rate below existing setpoint.
- 3.2 Depress alarm setpoint reset pushbutton to generate new setpoint, 1.5 times present count rate.
- 3.3 Raise count rate above 10^4 counts/sec.

4.0 REFERENCES

- 4.1 E-2456-3

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ANNUNCIATOR 2K10

K-4

STARTUP CHANNEL 1 TROUBLE

1.0 CAUSES

- 1.1 Startup Channel 1 Trouble as indicated by NON-OPERATE light on 2JITS-9000-1 (2C336-1), due to any of the following conditions:
- 15-volt power supply voltage low.
 - Magnitude of High Voltage Power Supply voltage low.
 - Magnitude of current from guarded fission chamber low, indicating cable or detector integrity lost.
 - Test switch (S3) on the Test Generator Board (A9) in the signal conditioner depressed.

2.0 ACTION REQUIRED

- 2.1 IF in Modes 1, 2 or 3,
THEN refer to Tech Spec 3.3.3.5.
- 2.2 IF in Mode 6 and EITHER of the following occur:
- Either Startup Channel inoperable
 - Both Audible Count Rate indications inoperable
- THEN perform the following:
- Suspend all core alterations.
 - Suspend all positive reactivity additions.
 - Refer to Tech Spec 3.9.2.
- 2.3 Notify I&C to troubleshoot as required.

3.0 TO CLEAR ALARM

- 3.1 Place test switches to OPERATE or OFF.
- 3.2 Replace printed circuit board.
- 3.3 Adjust power supply voltage.

4.0 REFERENCES

- 4.1 E-2456-3
- 4.2 DCP-88-2111

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ANNUNCIATOR 2K10

A-5

RV HEAD LEAK OFF TEMP HI

1.0 CAUSES

1.1 Temperature > 150°F on Leakoff Drain to RDT (2TIS-4662).

2.0 ACTION REQUIRED

2.1 Perform RCS leak rate calculation per 2305.002, Reactor Coolant System Leak Detection.

2.2 Refer to 2203.016, Excess RCS Leakage.

2.3 Evaluate all potential sources into RDT for potential leakage. Refer to 2103.007, Quench Tank and Reactor Drain Tank Ops.

2.4 IF 2TIS-4662 failed,
THEN refer to Tech Spec 3.4.6.2, Surveillance Requirement 4.4.6.2.1.b.

3.0 TO CLEAR ALARM

3.1 Reduce Drain Line temperature < 150°F.

4.0 REFERENCES

4.1 E-2456-4

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ANNUNCIATOR 2K10

C-5

LOOP 2 LTOP VALVE ALIGN INCORRECT

1.0 CAUSES

- 1.1 Any LTOP Relief Isolation valve (2CV-4730-1, 2CV-4731-2, 2CV-4740-2 or 2CV-4741-1) in condition listed below:
 - Open with RCS Thot (2TIS-4714-2) > 280°F.
 - Closed with RCS Thot (2TIS-4714-2) < 270°F.

2.0 ACTION REQUIRED

- 2.1 IF due to isolating or aligning LTOPs at reduced RCS temperature as directed by Plant Heatup (2102.002) or Plant Cooldown (2102.010), THEN no further action required.
- 2.2 IF actual Hot Leg temperature > 280°F, THEN close LTOP Isolation valves.
- 2.3 IF actual Hot Leg temperature < 270°F, THEN open LTOP Isolation valves.

3.0 TO CLEAR ALARM

- 3.1 Position valve to required position for operating conditions.

4.0 REFERENCES

- 4.1 E-2456-4

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ANNUNCIATOR 2K10

E-5

SURGE LINE TEMP HI/LO

1.0 CAUSES

1.1 High - > 695°F (2TIS-4609).

1.2 Low - < 605°F (2TIS-4609).

2.0 ACTION REQUIRED

2.1 IF High,
THEN perform the following:

2.1.1 Compare PZR temperature and pressure using steam tables.

2.1.2 IF RCS pressure ≤ 2300 psia,
THEN High Alarm invalid.

2.2 IF Low,
THEN perform the following:

2.2.1 IF RCS pressure < 1600 psia,
THEN disregard alarm.

2.2.2 Check Pressurizer level for evidence of insurge.

2.2.3 IF alarm will not clear by equalizing PZR Boron,
THEN alarm NOT due to inadequate spray flow.

3.0 TO CLEAR ALARM

3.1 Restore Surge Line temperature > 605°F and < 695°F.

4.0 REFERENCES

4.1 E-2456-4

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ANNUNCIATOR 2K10

G-5

B SPRAY LINE TEMP HI/LO

1.0 CAUSES

1.1 Spray Line temperature upstream of Pressurizer Spray valve (2CV-4652) < 525°F (2TIS-4608).

1.2 RTD open circuit (> 695°F).

2.0 ACTION REQUIRED

2.1 Check Spray Line Temperature (2TIS-4608) to determine cause.

2.2 IF low temperature condition confirmed,
THEN perform the following:

2.2.1 Monitor temperature and manually initiate spray flow as required to maintain temperature above alarm setpoint. Refer to 2103.005, Pressurizer Operations.

2.2.2 Report condition to System Engineering for evaluation.

2.3 IF instrument failure,
THEN submit WR/WO.

3.0 TO CLEAR ALARM

3.1 Raise temperature to > 525°F (2TIS-4608).

3.2 Repair RTD circuit.

4.0 REFERENCES

4.1 E-2456-4

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ANNUNCIATOR 2K10

J-5

BORON DILUTE CHANNEL 2 EVENT

1.0 CAUSES

NOTES

- During a down power, setpoint is automatically maintained 1.5 times neutron count rate. During an up power, raise setpoint by depressing ALARM SETPOINT RESET pushbutton.
- During extended periods of extremely low count rates, monitor may enter a Lo E state causing unpredictable response when counts first register again. I&C can restore monitor operability by filling the count registers with 12 cps from the test circuit. (CR-ANO-2-2005-992)

- 1.1 Reactor neutron count rate greater than setpoint generated by Boron Dilution Monitor (2JC-9003-2).

2.0 ACTION REQUIRED

- 2.1 Check count rate using Boron Dilution Event Channel 1 and Channel 2 indicators (2JIS-9000 and 2JIS-9003).
- 2.2 IF rising count rate unexpected or uncontrolled,
THEN GO TO 2203.017, Moderator Dilution.
- 2.3 IF rising count rate expected and controlled,
THEN depress the ALARM SETPOINT RESET pushbutton.
- 2.4 IF monitor failed high,
THEN contact I&C to insert a test signal to override indicated count rate.
- 2.5 IF in Mode 3, 4 or 5,
THEN verify one the following for protection against dilution event:
- At least one Boron Dilution Monitor and alarm operable.
 - Cocked CEA protection established.
 - Dilution Flowpath tagout hung per Refueling Shuffle (2502.001).

3.0 TO CLEAR ALARM

- 3.1 Reduce count rate below existing setpoint.
- 3.2 Depress alarm setpoint reset pushbutton to generate new setpoint, 1.5 times present count rate.
- 3.3 Raise count rate above 10^4 counts/sec.

4.0 REFERENCES

- 4.1 E-2456-4

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ANNUNCIATOR 2K10

K-5

STARTUP CHANNEL 2 TROUBLE

1.0 CAUSES

- 1.1 Startup Channel 2 Trouble as indicated by NON-OPERATE light on 2JIT-9003-2 (2C336-2), due to any of the following:
- 15-volt power supply voltage low.
 - Magnitude of High Voltage Power Supply voltage low.
 - Magnitude of current from guarded fission chamber low, indicating cable or detector integrity lost.
 - Test switch (S3) on the Test Generator Board (A9) in the signal conditioner is depressed.

2.0 ACTION REQUIRED

- 2.1 IF in Mode 6 and EITHER of the following occur,
- Either Startup Channel inoperable
 - Both Audible Count Rate indications inoperable
- THEN perform the following:
- Suspend all core alterations.
 - Suspend all positive reactivity additions.
 - Refer to Tech Spec 3.9.2.

2.2 Notify I&C to troubleshoot as required.

3.0 TO CLEAR ALARM

- 3.1 Place test switches to OPERATE or OFF.
- 3.2 Replace printed circuit board.
- 3.3 Adjust power supply voltage.

4.0 REFERENCES

- 4.1 E-2456-4
- 4.2 DCP-88-2111

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ANNUNCIATOR 2K10

A-6

CNTMT RADIATION HI

1.0 CAUSES

- 1.1 Containment High Range Radiation monitor (2RITS-8925-1 or 2RITS-8925-2) greater than alarm setpoint of 1000 R/hr.

2.0 ACTION REQUIRED

NOTE

Rising or lowering CNTMT High Range Radiation may be due to rising and then lowering CNTMT Temperature causing thermally induced current (TIC) that leads to false positive and then negative indication/trend. Trends should be validated against Containment Area Radiation Low Range monitors (2RITS-8905/8909/8912). (CR-ANO-C-1998-0054)

- 2.1 Check CNTMT High Range Radiation monitors on 2C336-1 and 2C336-2.
- 2.2 Check CNTMT High Range Rad recorder (2RR-8925) on 2C363.
- 2.3 Check CAMS (2RITS-8231-1 and 2RITS-8271-2).
- 2.4 IF CNTMT Area Radiation High Range monitor > 1000 R/hr,
AND any Containment Area Radiation Low Range monitor
(2RITS-8905/8909/8912) available,
THEN perform the following:
 - 2.4.1 Verify Valid Containment Hi Radiation by comparing High Range response to Low Range response.
 - 2.4.2 IF Containment Hi Radiation alarm NOT valid,
THEN GO TO step 2.6.
 - 2.4.3 Obtain SM concurrence.
 - 2.4.4 Verify CIAS actuated.
- 2.5 IF CNTMT Area Radiation High Range monitor > 1000 R/hr,
AND Containment Area Radiation Low Range monitor
(2RITS-8905/8909/8912) NOT available,
THEN perform the following:
 - 2.5.1 Obtain SM concurrence.
 - 2.5.2 Verify CIAS actuated.
- 2.6 Refer to Emergency Action Level Classification (1903.010).
- 2.7 Refer to Tech Spec 3.3.3.1.

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A-6

CNTMT RADIATION HI
(Continued)

3.0 TO CLEAR ALARM

3.1 BOTH of the following conditions met:

- CNTMT radiation below setpoint.
- TRIP 1 Pushbutton on associated monitor depressed.

4.0 REFERENCES

4.1 E-2456-4

4.2 DCP-88-2111

4.3 E-2433

4.4 TM 6063-0020

4.5 2304.148, High Range Containment Radmonitor Test

4.6 CR-ANO-C-1998-0054, HRRM TIC response

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ANNUNCIATOR 2K10

B-6

CNTMT PART/GAS RAD HI/LO

1.0 CAUSES

1.1 CAMS Air Particulate detector greater than alarm setpoint:

- $2RITS-8231-1A \geq 2 \times 10^5$ CPM
- $2RITS-8271-2A \geq 3 \times 10^5$ CPM

1.2 CAMS Gaseous monitor greater than alarm setpoint:

- $2RITS-8231-1B \geq 2 \times 10^4$ CPM
- $2RITS-8271-2B \geq 2 \times 10^4$ CPM

1.3 Any of the above Radiation monitors out of range low (< 10 CPM).

NOTE

If on-line CAMS found tripped/secured, operability of remaining idle CAMS is assured for 15 minutes. This allowance for operability begins at the time of discovery that neither CAMS unit in operation and assumes at least one other TS required method of RCS leakage detection operable and in service (i.e., containment sump level indication). Entry into TS 3.4.6.1 is not required during this 15 minutes period. If neither CAMS can be started within 15 minutes of discovery or Containment Sump level indication inoperable, then TS 3.4.6.1 must be entered immediately. (LIC-02-050)

2.0 ACTION REQUIRED

2.1 Check CAMS to determine alarming condition.

2.2 Place standby CAMS in service.

2.3 IF significant rise in CNTMT airborne radioactivity, THEN perform the following:

- Determine RCS leak rate per 2305.002, Reactor Coolant System Leak Detection.
- Verify BOTH CAMS returning to CNTMT using Containment Atmosphere Control (2104.033).
- Refer to 2203.016, Excess RCS Leakage.

2.4 Notify Radiation Protection or Chemistry to sample CNTMT atmosphere.

2.5 Refer to Tech Spec 3.4.6.1.

(B-6 Continued on next page)

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ANNUNCIATOR 2K10

B-6

CNTMT PART/GAS RAD HI/LO
(Continued)

3.0 TO CLEAR ALARM

3.1 Reset CAMS when radiation lowered below alarm setpoint.

3.2 Low alarm will automatically clear.

3.3 IF monitor failed or out of service,
THEN perform the following:

3.3.1 Place monitor in Level Cal.

3.3.2 Verify WR/WO submitted.

4.0 REFERENCES

4.1 E-2456-4

4.2 DCP-88-2111

4.3 ER002399N201, Rx Bldg Pressure & O2 Control Minor Modification

4.4 LIC-01-018, TS Amend 231, TS 3.4.6.1

4.5 LIC-02-050, CAMS Inoperability

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ANNUNCIATOR 2K10

C-6

PNL 2C128A TROUBLE/H2 HI

<p style="text-align: center;"><u>NOTE</u> This alarm will reflash.</p>
--

1.0 CAUSES

1.1 Any of the following alarms on H2 analyzer (2C128A):

- 1.1.1 High H2 concentration - $\geq 3.0\%$ H2 (2AITS-8371-1).
- 1.1.2 Low Sample Air flow - ≤ 0.236 SCFM (2FS-8375).
- 1.1.3 Loss of AC Power to 2C128A Annunciator.
- 1.1.4 Containment H2 Sampling Disabled - either of the following handswitches in OVERRIDE.
 - CNTMT Air Sample (2HS-8345-1) on 2C33
 - 2C128A Isolation valves (2HS-8276-1) on 2C182

2.0 ACTION REQUIRED

2.1 Check Annunciator 2K424 in 2C33 for cause of alarm.

<p style="text-align: center;"><u>NOTE</u> 2C128A minimum flow is 0.220 SCFM on CNTMT Air Sample Return (2FI-8375).</p>
--

2.2 IF Low Sample Air flow,
THEN perform the following:

- 2.2.1 Verify system aligned for operation per 2104.044, Containment Hydrogen Control Operations.
- 2.2.2 Verify H2 Analyzer Sample pump (2P-162) in operation.
- 2.2.3 Check sample flow indicated on 2C128A CNTMT Air Sample Return (2FI-8375) greater than 0.236 SCFM.

(C-6 Continued on next page)

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ANNUNCIATOR 2K10

C-6

PNL 2C128A TROUBLE/H2 HI
(Continued)

NOTE

The automatic functions of the H2 analyzer are defeated with either 2HS-8345-1 or 2HS-8276-1 in OVERRIDE.

- 2.3 IF 2HS-8345-1 in OVERRIDE,
THEN verify 2SV-8351-1 open to align suction to CNTMT Building dome.
- 2.4 IF 2HS-8276-1 in OVERRIDE,
THEN verify H2 Analyzer Sample pump (2P-162) secured.
- 2.5 Refer to Containment Hydrogen Control (2104.044).
- 2.6 IF Loss of AC Power to 2C128A,
THEN check breaker 2Y1-33.
- 2.7 IF 2Y1-33 tripped,
THEN refer to Tripped Breakers and Thermal Overloads section of Electrical System Operations (2107.001).

3.0 TO CLEAR ALARM

- 3.1 Restore AC Power to annunciator on 2C128A.
- 3.2 Reduce H2 concentration < 3.0%.
- 3.3 Raise Sample airflow > 0.236 SCFM.
- 3.4 Remove 2HS-8345-1 and 2HS-8276-1 from OVERRIDE.

4.0 REFERENCES

- 4.1 E-2456-4
- 4.2 DCP-91-2003

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ANNUNCIATOR 2K10

E-6

CNTRL CH 1 PRESSURE HI/LO

1.0 CAUSES

1.1 High - \geq 2340 psia RCS pressure (2PS-4626A).

1.2 Low - \leq 2100 psia RCS pressure (2PS-4626A).

2.0 ACTION REQUIRED

2.1 Refer to Tech Spec 3.2.8.

2.2 IF reducing pressure due to Safety valve leakage,
THEN no further action required.

2.3 Refer to 2203.028, PZR Systems Malfunction.

3.0 TO CLEAR ALARM

3.1 Restore RCS pressure to between 2100 psia and 2340 psia.

4.0 REFERENCES

4.1 E-2456-4

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ANNUNCIATOR 2K10

F-6

CNTRL CH 1 LEVEL LO LO

1.0 CAUSES

- 1.1 Pressurizer level < 29% (2LC-4627-1N).
- 1.2 Control circuit power supply breaker (2Y1-7) open.

2.0 ACTION REQUIRED

- 2.1 IF Pressurizer level < 29%,
THEN verify all PZR heaters OFF.

NOTE

An uncomplicated Full Power trip may cause pressurizer heater cutoff for approximately 2 minutes before restoration with charging/letdown. This response does NOT uncover pressurizer heaters and AOP entry not required.

- 2.2 IF NOT expected (e.g. no Full Power trip),
THEN refer to 2203.028, PZR Systems Malfunction.
- 2.3 IF 2Y1-7 tripped,
THEN refer to Tripped Breakers and Thermal Overloads section of Electrical System Operations (2107.001).

3.0 TO CLEAR ALARM

- 3.1 Raise Pressurizer level > 29%.
- 3.2 Close control circuit power supply breakers.

4.0 REFERENCES

- 4.1 E-2456-4

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ANNUNCIATOR 2K10

G-6

CNTRL CH 1 LEVEL LO

1.0 CAUSES

1.1 Pressurizer level > 5.2% deviation below programmed level (2LC-4627-1AN).

1.2 Control circuit power supply breaker (2Y1-7) open.

2.0 ACTION REQUIRED

2.1 IF losing RCS inventory,
THEN GO TO 2203.016, Excess RCS Leakage.

2.2 Refer to 2203.028, PZR Systems Malfunction.

2.3 IF 2Y1-7 tripped,
THEN refer to Tripped Breakers and Thermal Overloads section of Electrical System Operations (2107.001).

3.0 TO CLEAR ALARM

3.1 Raise level to < 5.2% below programmed level.

3.2 Close control circuit power supply breaker.

4.0 REFERENCES

4.1 E-2456-4

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ANNUNCIATOR 2K10

H-6

CNTRL CH 1 LEVEL HI HI

1.0 CAUSES

1.1 Pressurizer level > 13.2% deviation above programmed level (2LS-4627-1N).

2.0 ACTION REQUIRED

2.1 Refer to 2203.028, PZR Systems Malfunction.

2.2 Refer to Tech Spec 3.4.4.

3.0 TO CLEAR ALARM

3.1 Reduce Pressurizer level deviation < 12.5%.

4.0 REFERENCES

4.1 E-2456-4

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ANNUNCIATOR 2K10

J-6

CNTRL CH 1 LEVEL HI

1.0 CAUSES

1.1 Pressurizer level > 4.5% deviation above programmed level (2LC-4627-1BN).

1.2 Control circuit power supply breaker (2Y1-7) open.

2.0 ACTION REQUIRED

2.1 Refer to 2203.028, PZR Systems Malfunction.

2.2 IF 2Y1-7 tripped,
THEN refer to Tripped Breakers and Thermal Overloads section of Electrical System Operations (2107.001).

3.0 TO CLEAR ALARM

3.1 Lower level to < 4.5% above programmed level.

3.2 Close control circuit power supply breaker.

4.0 REFERENCES

4.1 E-2456-4

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ANNUNCIATOR 2K10

K-6

LOW RANGE CH 1 PRESS LO

1.0 CAUSES

1.1 RCS pressure < 675 psia (2PC-4623-1).

2.0 ACTION REQUIRED

2.1 Verify SIT Outlet valves closed.

- SIT A Discharge (2CV-5003-1)
- SIT B Discharge (2CV-5023-1)
- SIT C Discharge (2CV-5043-2)
- SIT D Discharge (2CV-5063-2)

3.0 TO CLEAR ALARM

3.1 Raise pressure > 675 psia.

4.0 REFERENCES

4.1 E-2456-4

4.2 CR-ANO-2-1999-0736, SIT O/L MOV Stroke Setpoint

4.3 ER980274P201

4.4 2304.200, Pressurizer Pressure Red Channel Instrumentation Calibration

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ANNUNCIATOR 2K10

A-7

CNTMT TEMP/HUMIDITY HI

<p style="text-align: center;"><u>NOTE</u> This alarm will reflash.</p>
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1.0 CAUSES

- 1.1 > 92°F dewpoint temperature on any of 5 detectors located in Containment (2MS-5661, 2MS-5662, 2MS-5663, 2MS-5664, or 2MS-5665).
- 1.2 > 135°F on any of 4 temperature detectors located in Containment (2TS-5661, 2TS-5662, 2TS-5663, 2TS-5664).
- 1.3 Breaker 43LA-12 manipulation - possible spike of 2MS-5664/5665 on 2MR-5660.

2.0 ACTION REQUIRED

- 2.1 Check Annunciator 2K423 in 2C32 for initiating alarm.
- 2.2 Check CNTMT Temperature and Humidity recorders (2TR-5660 and 2MR-5660).
- 2.3 Verify proper containment ventilation using 2104.033, Containment Atmosphere Control.
- 2.4 Verify Main chiller (2VCH-1A or 2VCH-1B) in service.
- 2.5 Refer to Tech Spec 3.6.1.4.
- 2.6 Initiate Primary Leak Rate calculation per 2305.002, Reactor Coolant System Leak Detection.
 - 2.6.1 IF primary leakage has risen,
THEN GO TO 2203.016, Excess RCS Leakage.
 - 2.6.2 IF primary leakage has NOT risen,
THEN check for feedwater or steam leak inside containment.

3.0 TO CLEAR ALARM

- 3.1 Reduce Containment Dewpoint temperature to < 90.5°F.
- 3.2 Reduce Containment temperature to < 131.5°F.

4.0 REFERENCES

- 4.1 E-2456-4
- 4.2 DCP-88-2111

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ANNUNCIATOR 2K10

B-7

CNTMT SUMP LEVEL HI

1.0 CAUSES

1.1 CNTMT Sump level > 85% (2LIS-5641-2).

2.0 ACTION REQUIRED

2.1 IF LOCA NOT in progress,
THEN drain CNTMT Sump using 2104.014, LRW and BMS Operations.

2.2 Perform RCS LKRT using 2305.002, Reactor Coolant System Leak Detection.

2.3 IF containment activity NOT rising on CAMS,
THEN check the following:

2.3.1 CNTMT Sump Suction valves closed:

- 2CV-5647-1
- 2CV-5648-2

2.3.2 CCW Expansion tank (2T-37B) level NOT lowering.

2.3.3 SW Header Pressure (2PIS-1417-1 and 2PIS-1423-2) normal (55 to 118 psig).

2.3.4 CNTMT Bldg Chilled Water Press Low (2K13-A4) NOT in alarm.

2.3.5 Fire Water Flow (2K11-B9) NOT in alarm.

2.3.6 No unexplained trends in Steam Flow, Feed Flow, or Steam Generator Levels.

2.4 IF sump level > 100%,
THEN refer to Tech Spec 3.4.6.1.

2.5 IF abnormal leakage into CNTMT,
THEN refer to Tech Spec 3.6.2.2.

3.0 TO CLEAR ALARM

3.1 Drain Containment sump < 85%.

4.0 REFERENCES

4.1 E-2456-2

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ANNUNCIATOR 2K10

C-7

PNL 2C128B TROUBLE/H2 HI

NOTE

This alarm will reflash.

1.0 CAUSES

1.1 Any of the following alarms on H2 Analyzer (2C128B):

- 1.1.1 High H2 concentration - \geq 3.0% H2 (2AITS-8387-2).
- 1.1.2 Low Sample Air flow - \leq 0.297 SCFM (2FS-8385).
- 1.1.3 Loss of AC Power to 2C128B Annunciator.
- 1.1.4 Containment H2 Sampling Disabled - EITHER of the following handswitches in OVERRIDE:
 - CNTMT Air Sample (2HS-8346-2) on 2C33.
 - 2C128B Isolation valves (2HS-8266-2) on 2C184.

2.0 ACTION REQUIRED

2.1 Check Annunciator 2K424 in 2C33 for initiating alarm.

NOTE

Minimum flow for 2C128B is 0.282 SCFM on CNTMT Air Sample Return (2FI-8385).

2.2 IF Low Sample Air flow,
THEN perform the following:

- 2.2.1 Verify system aligned for operation per 2104.044, Containment Hydrogen Control Operations.
- 2.2.2 Verify H2 Analyzer Sample pump (2P-163) in operation.
- 2.2.3 Check sample flow indicated on 2C128B CNTMT Air Sample Return (2FI-8385) greater than 0.297 SCFM.

(C-7 Continued on next page)

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ANNUNCIATOR 2K10

C-7

PNL 2C128B TROUBLE/H2 HI
(Continued)

NOTE

The automatic functions of the H2 Analyzer are defeated with either 2HS-8346-2 or 2HS-8266-2 in OVERRIDE.

- 2.3 IF 2HS-8346-2 in OVERRIDE,
THEN verify 2SV-8341-2 open to align suction to CNTMT Building dome.
- 2.4 IF 2HS-8266-2 in OVERRIDE,
THEN verify H2 Analyzer Sample pump (2P-163) secured.
- 2.5 Refer to 2104.044, Containment Hydrogen Control Operations.
- 2.6 IF Loss of AC Power,
THEN check breaker 2Y2-35.
- 2.7 IF 2Y2-35 tripped,
THEN refer to Tripped Breakers and Thermal Overloads section of Electrical System Operations (2107.001).

3.0 TO CLEAR ALARM

- 3.1 Reduce H2 concentration < 3.0%.
- 3.2 Raise Sample Air flow > 0.297 SCFM.
- 3.3 Restore AC Power to annunciator on 2C128B.
- 3.4 Remove 2HS-8346-2 and 2HS-8266-2 from OVERRIDE.

4.0 REFERENCES

- 4.1 E-2456-4
- 4.2 DCP-91-2003

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ANNUNCIATOR 2K10

E-7

CNTRL CH 2 PRESSURE HI/LO

1.0 CAUSES

1.1 High - \geq 2340 psia RCS pressure (2PS-4626B).

1.2 Low - \leq 2100 psia RCS pressure (2PS-4626B).

2.0 ACTION REQUIRED

2.1 Refer to Tech Spec 3.2.8.

2.2 IF reducing pressure due to Safety valve leakage,
THEN no further action required.

2.3 Refer to 2203.028, PZR Systems Malfunction.

3.0 TO CLEAR ALARM

3.1 Restore RCS pressure to > 2100 psia and < 2340 psia.

4.0 REFERENCES

4.1 E-2456-4

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ANNUNCIATOR 2K10

F-7

CNTRL CH 2 LEVEL LO LO

1.0 CAUSES

- 1.1 PZR level < 29% (2LC-4627-2N).
- 1.2 Control circuit power supply breaker (2Y2-7) open.

2.0 ACTION REQUIRED

- 2.1 IF Pressurizer level < 29%,
THEN verify ALL PZR heaters OFF.

NOTE

An uncomplicated Full Power trip may cause pressurizer heater cutoff for approximately 2 minutes before restoration with charging/letdown. This response does NOT uncover pressurizer heaters and AOP entry is not required.

- 2.2 IF NOT expected (e.g. no Full Power trip),
THEN refer to 2203.028, PZR Systems Malfunction.
- 2.3 IF 2Y2-7 tripped,
THEN refer to Tripped Breakers and Thermal Overloads section of Electrical System Operations (2107.001).

3.0 TO CLEAR ALARM

- 3.1 Raise Pressurizer level > 29%.
- 3.2 Close control circuit power supply breaker.

4.0 REFERENCES

- 4.1 E-2456-4

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ANNUNCIATOR 2K10

G-7

CNTRL CH 2 LEVEL LO

1.0 CAUSES

1.1 PZR level > 5.2% deviation below programmed level (2LC-4627-2AN).

1.2 Control circuit power supply breaker (2Y2-7) open.

2.0 ACTION REQUIRED

2.1 IF losing RCS inventory,
THEN GO TO 2203.016, Excess RCS Leakage.

2.2 Refer to 2203.028, PZR Systems Malfunction.

2.3 IF 2Y2-7 tripped,
THEN refer to Tripped Breakers and Thermal Overloads section of
Electrical System Operations (2107.001).

3.0 TO CLEAR ALARM

3.1 Raise level to < 5.2% below programmed level.

3.2 Close control circuit power supply breaker.

4.0 REFERENCES

4.1 E-2456-4

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ANNUNCIATOR 2K10

H-7

CNTRL CH 2 LEVEL HI HI

1.0 CAUSES

1.1 PZR level > 13.2% deviation above programmed PZR level (2LS-4627-2N).

2.0 ACTION REQUIRED

2.1 Refer to 2203.028, PZR Systems Malfunction.

2.2 Refer to Tech Spec 3.4.4.

3.0 TO CLEAR ALARM

3.1 Reduce Pressurizer level deviation < 12.5%.

4.0 REFERENCES

4.1 E-2456-4

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ANNUNCIATOR 2K10

J-7

CNTRL CH 2 LEVEL HI

1.0 CAUSES

- 1.1 PZR level > 4.5% deviation above programmed level (2LC-4627-2BN).
- 1.2 Control circuit power supply breaker (2Y2-7) open.

2.0 ACTION REQUIRED

- 2.1 Refer to 2203.028, PZR Systems Malfunction.
- 2.2 IF 2Y2-7 tripped,
THEN refer to Tripped Breakers and Thermal Overloads section of Electrical System Operations (2107.001).

3.0 TO CLEAR ALARM

- 3.1 Lower level to < 4.5% above programmed level.
- 3.2 Close control circuit power supply breaker.

4.0 REFERENCES

- 4.1 E-2456-4

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ANNUNCIATOR 2K10

K-7

LOW RANGE CH 2 PRESS LO

1.0 CAUSES

1.1 RCS pressure < 675 psia (2PC-4623-2).

2.0 ACTION REQUIRED

2.1 Verify SIT Outlet valves closed.

- SIT A Discharge (2CV-5003-1)
- SIT B Discharge (2CV-5023-1)
- SIT C Discharge (2CV-5043-2)
- SIT D Discharge (2CV-5063-2)

3.0 TO CLEAR ALARM

3.1 Raise pressure > 675 psia.

4.0 REFERENCES

4.1 E-2456-4

4.2 CR-ANO-2-1999-0736, SIT O/L MOV Stroke Setpoint

4.3 ER980274P201

4.4 2304.201, Pressurizer Pressure Green Channel Instrumentation Calibration

JOB PERFORMANCE MEASUREUNIT: 2 REV #: 000 DATE: _____SYSTEM/DUTY AREA: Pressurizer Pressure Control SystemTASK: Respond to Annunciator for LTOP valve misalignmentJTA#: ANO2-RO-PZR-OFFNORM-11KA VALUE RO: 3.8 SRO: 4.1 KA REFERENCE: 010 K4.03APPROVED FOR ADMINISTRATION TO: RO: X SRO: XTASK LOCATION: INSIDE CR: X OUTSIDE CR: _____ BOTH: _____

SUGGESTED TESTING ENVIRONMENT AND METHOD (PERFORM OR SIMULATE):

PLANT SITE: _____ SIMULATOR: Perform LAB: _____

POSITION EVALUATED: RO: _____ SRO: _____

ACTUAL TESTING ENVIRONMENT: SIMULATOR: _____ PLANT SITE: _____ LAB: _____

TESTING METHOD: SIMULATE: _____ PERFORM: XAPPROXIMATE COMPLETION TIME IN MINUTES: 10 MinutesREFERENCE(S): OP 2203.012J Rev 31-00-0

EXAMINEE'S NAME: _____ SSN: _____

EVALUATOR'S NAME: _____

THE EXAMINEE'S PERFORMANCE WAS EVALUATED AGAINST THE STANDARDS
CONTAINED IN THIS JPM AND IS DETERMINED TO BE:

SATISFACTORY: _____ UNSATISFACTORY: _____

PERFORMANCE CHECKLIST COMMENTS:

Start Time _____ Stop Time _____ Total Time _____

SIGNED: _____ DATE: _____

SIGNATURE INDICATES THIS JPM HAS BEEN COMPARED TO ITS APPLICABLE PROCEDURE
BY A QUALIFIED INDIVIDUAL (NOT THE EXAMINEE) AND IS CURRENT WITH THAT REVISION.

JOB PERFORMANCE MEASURE

THE EXAMINER SHALL REVIEW THE FOLLOWING WITH THE EXAMINEE:

The examiner shall review the "Briefing Checklist - System Walkthrough" portion of OP 1064.023

Attachment 6 with the examinee.

JPM INITIAL TASK CONDITIONS:

Reactor Coolant System and Pressurizer cool down in progress.

**2K10-C4, Loop 1 LTOP Valve Align Incorrect and 2 K10-C5, Loop 2 LTOP Valve Align Incorrect
are in alarm.**

TASK STANDARD:

Place both loop 1 and loop 2 LTOP's in service.

TASK PERFORMANCE AIDS:

OP 2203.012J, Annunciator 2K10 Corrective Action

SIMULATOR SETUP:

RCS and PZR cool down in progress.

RCS pressure less than 400 psia.

Power available to LTOP Isolation valves.

RCS Thot (both 2TIS4614-1 and 2TIS4714-2) indicate < 280°F

Annunciators 2K10 C4 and C5 are in alarm.

JOB PERFORMANCE MEASURE

INITIATING CUE:

The Control Room Supervisor directs you respond to annunciators 2K10-C4 and 2K10-C5 using OP 2203.012J.

CRITICAL ELEMENTS (C): 4, 5, 6, 7

PERFORMANCE CHECKLIST			STANDARDS	(Circle One)
Examiner note: Valves may be opened in any order and either alarm window may be mitigated first.				
	1. (Step 2.1)	Determined misalignment not directed by a procedure step. Examiner's cue: CRS reports that alarms are not due to a procedural step in the Cool down procedure.	Determined that the LTOP's should be in service for given conditions.	N/A SAT UNSAT
	2. (Step 2.2)	Determine RCS T-Hot temperature is less than 280°F.	Using PMS, SPDS or 2C04 control board indications determined that 2TIS-4614-1 is less than 280°F and N/A'd step to isolate LTOP's.	N/A SAT UNSAT
	3. (Step 2.3)	Determine RCS T-Hot temperature is less than 280°F.	Using PMS, SPDS or 2C04 control board indications determined that 2TIS-4614-1 is less than 280°F and implemented step.	N/A SAT UNSAT
(C)	4. (Step 2.3)	Opened 2CV-4730-1, LTOP isolation valve.	On 2C09, took hand switch for 2CV-4730-1 to clockwise direction and observed that Green light OFF and Red light ON.	N/A SAT UNSAT
(C)	5. (Step 2.3)	Opened 2CV-4741-1, LTOP isolation valve.	On 2C09, took hand switch for 2CV-4741-1 to clockwise direction and observed that Green light OFF and Red light ON.	N/A SAT UNSAT
(C)	6. (Step 2.3)	Opened 2CV-4731-2, LTOP isolation valve.	On 2C09, took hand switch for 2CV-4731-2 to clockwise direction and observed that Green light OFF and Red light ON.	N/A SAT UNSAT
(C)	7. (Step 2.3)	Opened 2CV-4740-2, LTOP isolation valve.	On 2C09, took hand switch for 2CV-4741-1 to clockwise direction and observed that Green light OFF and Red light ON.	N/A SAT UNSAT

JOB PERFORMANCE MEASURE

PERFORMANCE CHECKLIST			STANDARDS	(Circle One)
	8. (Step 2.3)	Verified Alarm 2K10-C4 and 2K10-C5 alarms cleared.	On 2K10, verified that alarm window C4 and C5 light are in 'slow flash' and acknowledged alarm lights to verify that alarm windows clear.	N/A SAT UNSAT
END				

JOB PERFORMANCE MEASURE

EXAMINERS COPY:

INITIAL CONDITIONS:

Reactor Coolant System and Pressurizer cool down are in progress.

2K10-C4, Loop 1 LTOP Valve Align Incorrect, and 2 K10-C5, Loop 2 LTOP Valve Align Incorrect, are in alarm.

INITIATING CUE:

The Control Room Supervisor directs you respond to annunciators 2K10-C4 and 2K10-C5 using OP 2203.012J.

JOB PERFORMANCE MEASURE

EXAMINEES COPY:

INITIAL CONDITIONS:

Reactor Coolant System and Pressurizer cool down are in progress.

2K10-C4, Loop 1 LTOP Valve Align Incorrect, and 2 K10-C5, Loop 2 LTOP Valve Align Incorrect, are in alarm.

INITIATING CUE:

The Control Room Supervisor directs you respond to annunciators 2K10-C4 and 2K10-C5 using OP 2203.012J.

JOB PERFORMANCE MEASUREUNIT: 2 REV #: 006 DATE: _____SYSTEM/DUTY AREA: Abnormal/Emergency OperationsTASK: Restore component cooling water to reactor coolant pumps (Alternate Success Path)JTA#: ANO2-RO-EOPAOP-EMERG-32KA VALUE RO: 3.3 SRO: 3.1 KA REFERENCE: 008 A4.01APPROVED FOR ADMINISTRATION TO: RO: X SRO: XTASK LOCATION: INSIDE CR: X OUTSIDE CR: _____ BOTH: _____

SUGGESTED TESTING ENVIRONMENT AND METHOD (PERFORM OR SIMULATE):

PLANT SITE: _____ SIMULATOR: Perform LAB: _____

POSITION EVALUATED: RO: _____ SRO: _____

ACTUAL TESTING ENVIRONMENT: SIMULATOR: _____ PLANT SITE: _____ LAB: _____

TESTING METHOD: SIMULATE: _____ PERFORM: _____

APPROXIMATE COMPLETION TIME IN MINUTES: 20 MinutesREFERENCE(S): EOP 2202.010 Attachment 21 Rev. 007-03-0

EXAMINEE'S NAME: _____ SSN: _____

EVALUATOR'S NAME: _____

THE EXAMINEE'S PERFORMANCE WAS EVALUATED AGAINST THE STANDARDS CONTAINED IN THIS JPM AND IS DETERMINED TO BE:

SATISFACTORY: _____ UNSATISFACTORY: _____

PERFORMANCE CHECKLIST COMMENTS:

Start Time	Stop Time	Total Time
_____	_____	_____

SIGNED: _____ DATE: _____

SIGNATURE INDICATES THIS JPM HAS BEEN COMPARED TO ITS APPLICABLE PROCEDURE BY A QUALIFIED INDIVIDUAL (NOT THE EXAMINEE) AND IS CURRENT WITH THAT REVISION.

JOB PERFORMANCE MEASURE**THE EXAMINER SHALL REVIEW THE FOLLOWING WITH THE EXAMINEE:**

The examiner shall review the "Briefing Checklist - System Walkthrough" portion of OP 1064.023 Attachment 6 with the examinee.

JPM INITIAL TASK CONDITIONS: 2A1, 2A2, are re-energized from SU#2 following a degraded power situation. 2202.010 ATT. 29 steps up to 1.m.7 have been completed.

-

TASK STANDARD: Controlled bleed off isolated to VCT and CBO relief valve isolated.

TASK PERFORMANCE AIDS: Copy of EOP 2202.010 Attachment 21

SIMULATOR SETUP: Set up CCW valves per EOP 2202.010 Attachment 29 "STARTUP XFM# 2 USAGE" perform actions through step 1.m.7. Close RCP CCW RETURN valves, 2CV-5255-1, 2CV-5254-2 and 2CV-5236-1. No CCW pumps running. SW to CCW/ACW supply and returns closed. NO SIAS actuation.

Run CAE file JPM07 This will do the following:

Set T4 = ccwrcp (this will trigger T4 when 2CV 5255 red light is energized).

When 2CV 5255-1 is taken to open position, it will trip the breaker

T4=DO HS 5255 R off (override)

T4=DO HS 5255 G off (override)

T4=CV52551 = 0.0% (component malfunction)

JOB PERFORMANCE MEASURE**INITIATING CUE:**

The CRS directs, "Restore CCW to the RCP's using EOP 2202.010 Attachment 21.

CRITICAL ELEMENTS (C): 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

START TIME: _____

PERFORMANCE CHECKLIST			STANDARDS	(Circle One)
Examiner's note: Give Examinee Attachment 21.				
	1. (Step 1.A)	Verify RCP Bleedoff to VCT valves open.	On panel 2C16 verified 2CV-4847-2 red light on; control switch in OPEN. On panel 2C17, verified 2CV-4846-1 red light on; control switch in OPEN.	N/A SAT UNSAT
	2. (Step 1.B)	Verify RCP Bleedoff Relief Isolation to Quench Tank open.	On panel 2C09, verified 2CV-4856 red light on; key switch in LOCKED OPEN.	N/A SAT UNSAT
(C)	3. (Step 2)	Determine RCP Seal temperature and status of Loop II CCW pump.	On panel 2C14 or on PMS computer determined RCP seal temperatures greater than 180°F. On 2C14, observed running indication for one Loop II CCW pump and Loop II flow. NA'd step 2.	N/A SAT UNSAT
(C)	4. (Step 3.A)	Verify RCP CCW Return valve (2CV-5255-1) CLOSED.	On panel 2C17, verified 2CV-5255-1 closed. Observed green light ON; red light OFF above handswitch.	N/A SAT UNSAT
(C)	5. (Step 3.B)	Open RCP CCW Supply valve (2CV-5236-1).	On panel 2C17, placed handswitch for 2CV-5236-1 in "OPEN". Observed green light OFF; red light ON.	N/A SAT UNSAT

JOB PERFORMANCE MEASURE

PERFORMANCE CHECKLIST			STANDARDS	(Circle One)
(C)	6. (Step 3.C)	Open RCP CCW Return valve (2CV-5254-2).	On panel 2C16, placed handswitch for 2CV-5254-2 in "OPEN". Observed green light OFF; red light ON.	N/A SAT UNSAT
EXAMINER'S NOTE: When 2CV-5255-1 is taken to OPEN, the breaker will trip and cannot be reset.				
(C)	7 (Step 3.D)	Modulate RCP CCW Return valve (2CV-5255-1) OPEN.	On panel 2C17, took handswitch for 2CV-5255-1 to "OPEN" for one (1) second then released. Observed red and green lights OFF. EXAMINEE may ask to dispatch a NLO to the valve and or breaker.	N/A SAT UNSAT
EXAMINER'S NOTE: The examinee may elect to monitor RCP seal cool down before making the decision that CCW cannot be restored. This monitoring of RCP seal cool down may take several minutes to validate that 2CV-5255-1 did not open. The examinee should go to step 4 of Attachment 21.				
(C)	8. (Step 4.A)	Verify ALL RCP's secured. <u>POSITIVE CUE:</u> Green light ON and Red light OFF for 2P32 A, B, C, D.	On panel 2C04, observed 2P32A, B, C, and D RCP handswitches in STOP or PTL. Observed handswitch is green flagged; green light ON and red light OFF.	N/A SAT UNSAT
(C)	9. (Step 4.B)	Close 2CV-5254-2. <u>POSITIVE CUE:</u> Green light ON.	On panel 2C16, placed handswitch for 2CV-5254-2 to "CLOSE" Observed green light ON; red light OFF.	N/A SAT UNSAT

JOB PERFORMANCE MEASURE

PERFORMANCE CHECKLIST			STANDARDS	(Circle One)
(C)	10. (Step 4.B)	Close 2CV-5236-1. <u>POSITIVE CUE:</u> Green light ON.	On panel 2C17, placed handswitch for 2CV-5236-1 to "CLOSE" Observed green light ON; red light OFF.	N/A SAT UNSAT
(C)	11. (Step 4.C.1)	Close RCP bleedoff to VCT valves. <u>POSITIVE CUE:</u> For 2CV-4846-1 green light ON and For 2CV-4847-2 green light ON.	On panel 2C17, placed handswitch for 2CV-4846-1 to "CLOSE." On panel 2C16, placed handswitch for 2CV-4847-2 to "CLOSE." For each valve, observed green light ON; red light OFF.	N/A SAT UNSAT
(C)	12. (Step 4.C.2)	Close RCP bleedoff relief isolation to quench tank valve (2CV-4856). <u>POSITIVE CUE:</u> Green light ON.	On panel 2C09, placed handswitch for 2CV-4856 to "CLOSE" Observed green light ON; red light OFF.	N/A SAT UNSAT
END				

JOB PERFORMANCE MEASURE

EXAMINER'S COPY

JPM INITIAL TASK CONDITIONS:

2A1, 2A2, are re-energized from SU#2 following a degraded power situation. 2202.010 ATT. 29 steps up to 1.m.7 have been completed.

INITIATING CUE:

The CRS directs, "Restore CCW to the RCP's using EOP 2202.010 Attachment 21.

JOB PERFORMANCE MEASURE

EXAMINEE'S COPY

JPM INITIAL TASK CONDITIONS:

2A1, 2A2, are re-energized from SU#2 following a degraded power situation. 2202.010 ATT. 29 steps up to 1.m.7 have been completed.

INITIATING CUE:

The CRS directs, "Restore CCW to the RCP's using EOP 2202.010 Attachment 21.

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SUPPLEMENT 2

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CEA EXERCISE TEST

This test verifies operability of each CEA per TS surveillance requirement 4.1.3.1.2. It is normally performed quarterly with Reactor in Mode 1 or 2, but can be performed in conjunction with Reactor Startup or trip. CEA traces performed concurrent with exercise to trend coil performance (may be NA'd with I&C concurrence). If troubleshooting or maintenance required, then CEAs will be placed on Hold Bus.

1.0 INITIAL CONDITIONS

- 1.1 IF Reactor Trip has occurred,
THEN perform the following:

- | | | |
|-------|---|-----------|
| 1.1.1 | Verify all CEAs withdrawn > 5 inches prior to trip. | <u>NA</u> |
| 1.1.2 | Verify all CEAs at or below lower electrical limit. | <u>NA</u> |
| 1.1.3 | Complete section 3.0 Acceptance Criteria. | <u>NA</u> |
| 1.1.4 | N/A remaining portions of this supplement. | <u>NA</u> |

- 1.2 IF Reactor Startup has occurred
THEN perform the following:

- | | | |
|-------|---|-----------|
| 1.2.1 | Verify all CEAs withdrawn or inserted > 5 inches. | <u>NA</u> |
| 1.2.2 | Complete section 3.0 Acceptance Criteria. | <u>NA</u> |
| 1.2.3 | N/A remaining portions of this supplement. | <u>NA</u> |

- 1.3 Verify voltage trace status as follows:

- 1.3.1 IF voltage traces desired,
THEN verify the following:

- I&C support available to analyze CEA visicorder traces.
- Visicorder available to record CEA voltage traces.

- 1.3.2 IF voltage traces NOT desired,
THEN I&C concurrence obtained:

Not Inserted I&C contact

- 1.4 Review Limits and Precautions section of this procedure.

- 1.5 Verify Group 6 NOT inserted beyond the Programmed Insertion Limit. (CR-ANO-2-2005-2193)

NA

NA

NA

NA

NA

NA

NA

NA

NA

NA

NA

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2.0 TEST METHOD

NOTE

- CEA Malfunction (2203.003) is applicable during this test if any CEA fails to exercise successfully, drops or appears stuck.
- 2K10-D1, 2K10-E1 and 2K10-G1 will alarm during CEA exercise.
- If I&C concurs, Voltage Traces need NOT be performed.
- If CEA has a known problems (e.g., coil with missing phase), it should be bumped one step and then stopped to allow I&C Maintenance to evaluate for additional problems on coil traces for that CEA. If additional problems are found, then coordinate with I&C Maintenance and System Engineering for additional actions. (CR-ANO-2-2001-0611)

- * 2.1 NA IF required to place CEAs on Hold Bus,
THEN enter Tech Spec 3.1.3.1, Action C
(CEAs inoperable but trippable; no SDM penalty).
- * 2.2 NA IF CEAs placed on Hold Bus for any reason,
THEN perform the following:
- 2.2.1 Verify CEAs removed from Hold Bus
- 2.2.2 Exit TS 3.1.3.1.C.
- 2.3 IF voltage traces desired,
THEN coordinate with I&C to perform voltage traces
concurrent with CEA exercises.

NA

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CAUTION

- Both PMS and COLSS receive pulse counter input. If CEA pulsed inward too far, the excessive peaking factors generated will render COLSS inoperable. When pulsing CEA in groups 1 through 5, with group out of sequence, this occurs at $\leq 142.5"$. For CEA in any group, this occurs at $\geq 10"$ deviation from its group.
- If CEA that is providing position indication for another CEA drops, then associated CEAC will see two dropped CEAs instead of one. Placing associated CEAC in INOP will prevent unnecessary trip if this happens.
- Do not simultaneously insert CEAs from Groups 5 and 6 below 146.25 inches. Large Planar Radial Peaking Factors will be applied to CPC calculations, likely resulting in channel trips.

2.4 IF a CEA RSPT is providing position indication to another CEA by installation of a T-ALT,
THEN perform the following prior to exercising CEA that is providing position indication:

NA

- Using CPC/CEAC Operations (2105.001), place associated CEAC in INOP in all four CPC channels.

(Example: (If CEA 46 RSPT 2 is providing position indication for CEA 1, then place CEAC 2 in INOP prior to exercising CEA 46).)

NOTE

Table 1 may be used as placekeeping guide while performing CEA exercises.

2.5 Exercise all CEAs in Table 1 as follows:

- * 2.5.1 IF CEA movement delayed for extended period,
THEN verify Mode Select switch in OFF.
- * 2.5.2 Using operable CEA Position indicators, verify CEA within 7 inches of the other CEAs in the group while exercising CEAs. (TS 3.1.3.1)
- 2.5.3 On all available CEAC Operator Module digital displays, select position indication for CEA to be exercised.
- 2.5.4 Place Individual CEA Selection switches to CEA to be exercised.
- 2.5.5 Place Mode Select switch to MANUAL INDIVIDUAL.
- 2.5.6 Verify CEA to be exercised is at UEL.

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NOTE

- CEA insertion is verified to be ≥ 5 " by observation of RSPTs. Observing 5.25" change in pulse counter position does NOT mean CEA has moved ≥ 5 ".
- If all CEAs in the subgroup of CEA being inserted are above upper alarm deadband of 140.83 inches, the CEAC 1 or 2 CEA Deviation annunciators (2K04 J-5/2K04 J-6) will NOT actuate
- Use of CEAC #1 and CEAC #2 standard OM Module to monitor raw input signal is recommended to ensure CEA movement of 5 inches. CEAC group display uses process CEA positions that are rounded off to nearest inch.
- Due to scheduling or component malfunction it is acceptable for CEAs to be inserted to other than Power Operations (2102.004) Attachment D Programmed Insertion Limit.

- 2.5.7 Insert CEA seven steps (≥ 5 inches by RSPT).
- 2.5.8 Return CEA to UEL.
- 2.5.9 Verify CEA returned to position required by Power Operation (2102.004), Programmed CEA Insertion to Minimize CEA Finger Wear (ATTACHMENT D).
- 2.5.10 Record results on Table 1.
- 2.5.11 WHEN all required CEA movements complete,
THEN verify Mode Select switch in OFF.
- 2.6 IF either CEAC was placed in INOP for this exercise,
THEN use CPC/CEAC Operations (2105.001) to remove from INOP in all four CPC channels. NA
- 2.7 IF any CEA or CEDMCS circuits require maintenance,
THEN perform the following: _____
- 2.7.1 Complete repairs
- 2.7.2 List affected CEAs in step 3.3.

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3.0 ACCEPTANCE CRITERIA

3.1 Has each CEA been determined operable by movement of > 5 inches in any one direction by RSPT indication? YES NO

3.2 IF NO is circled above,
THEN perform the following:

- Declare affected CEAs inoperable.
- Refer to Tech Spec 3.1.3.1.
- Notify S/M.
- Complete Condition Report.

3.3 Comments: _____

Performed By  Date _____

4.0 SUPERVISOR REVIEW AND ANALYSIS

4.1 Are CEAs operable as required by Acceptance Criteria? YES NO

4.2 IF answer to 4.1 is NO,
THEN describe action taken below: _____

4.3 Are all administrative requirements of this test satisfied? YES NO

Supervisor _____ Date _____

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SUPPLEMENT 2

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TABLE 1

CEA#	CEA position indication selected.	CEA select switch correctly positioned	Mode Select switch in MANUAL INDIVIDUAL.	Verify CEA at UEL.	Insert CEA ≥ 5 inches by RSPT indication.	Return CEA to UEL.	Return CEA to Program Insertion Limit as required.	Voltage Trace (1)	CEA Exercise Satisfactory?	
									YES	NO
1-39	✓	✓	✓	✓	✓	✓	✓	NA	✓	
1-41	✓	✓	✓	✓	✓	✓	✓	NA	✓	
1-43	✓	✓	✓	✓	✓	✓	✓	NA	✓	
1-45	✓	✓	✓	✓	✓	✓	✓	NA	✓	
6-1	✓	✓	✓	✓	✓	✓	✓	NA	✓	
6-46										
6-47	✓	✓	✓	✓	✓	✓	✓	NA	✓	
6-48	✓	✓	✓	✓	✓	✓	✓	NA	✓	
6-49	✓	✓	✓	✓	✓	✓	✓	NA	✓	
A-50	✓	✓	✓	✓	✓	✓	✓	NA	✓	
A-52	✓	✓	✓	✓	✓	✓	✓	NA	✓	
A-54	✓	✓	✓	✓	✓	✓	✓	NA	✓	
A-56	✓	✓	✓	✓	✓	✓	✓	NA	✓	
A-51	✓	✓	✓	✓	✓	✓	✓	NA	✓	
A-53	✓	✓	✓	✓	✓	✓	✓	NA	✓	
A-55	✓	✓	✓	✓	✓	✓	✓	NA	✓	
A-57	✓	✓	✓	✓	✓	✓	✓	NA	✓	
5-58	✓	✓	✓	✓	✓	✓	✓	NA	✓	
5-59	✓	✓	✓	✓	✓	✓	✓	NA	✓	
5-60	✓	✓	✓	✓	✓	✓	✓	NA	✓	
5-61	✓	✓	✓	✓	✓	✓	✓	NA	✓	
3-62	✓	✓	✓	✓	✓	✓	✓	NA	✓	
3-64	✓	✓	✓	✓	✓	✓	✓	NA	✓	
3-66	✓	✓	✓	✓	✓	✓	✓	NA	✓	
3-68	✓	✓	✓	✓	✓	✓	✓	NA	✓	
3-63	✓	✓	✓	✓	✓	✓	✓	NA	✓	
3-65	✓	✓	✓	✓	✓	✓	✓	NA	✓	
3-67	✓	✓	✓	✓	✓	✓	✓	NA	✓	
3-69	✓	✓	✓	✓	✓	✓	✓	NA	✓	
A-70	✓	✓	✓	✓	✓	✓	✓	NA	✓	
A-73	✓	✓	✓	✓	✓	✓	✓	NA	✓	
A-76	✓	✓	✓	✓	✓	✓	✓	NA	✓	
A-79	✓	✓	✓	✓	✓	✓	✓	NA	✓	
2-71	✓	✓	✓	✓	✓	✓	✓	NA	✓	
2-74	✓	✓	✓	✓	✓	✓	✓	NA	✓	
2-77	✓	✓	✓	✓	✓	✓	✓	NA	✓	
2-80	✓	✓	✓	✓	✓	✓	✓	NA	✓	
A-72	✓	✓	✓	✓	✓	✓	✓	NA	✓	
A-75	✓	✓	✓	✓	✓	✓	✓	NA	✓	
A-78	✓	✓	✓	✓	✓	✓	✓	NA	✓	
A-81	✓	✓	✓	✓	✓	✓	✓	NA	✓	

(1) Voltage Traces are not mandatory; NA if voltage traces not obtained.

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TABLE 1

CEA#	CEA position indication selected.	CEA select switch correctly positioned	Mode Select switch in MANUAL INDIVIDUAL.	Verify CEA at UEL.	Insert CEA ≥ 5 inches by RSPT indication.	Return CEA to UEL.	Return CEA to Program Insertion Limit as required.	Voltage Trace (1)	CEA Exercise Satisfactory?	
									YES	NO
B-2	✓	✓	✓	✓	✓	✓	✓	NA	✓	
B-3	✓	✓	✓	✓	✓	✓	✓	NA	✓	
B-4	✓	✓	✓	✓	✓	✓	✓	NA	✓	
B-5	✓	✓	✓	✓	✓	✓	✓	NA	✓	
2-6	✓	✓	✓	✓	✓	✓	✓	NA	✓	
2-7	✓	✓	✓	✓	✓	✓	✓	NA	✓	
2-8	✓	✓	✓	✓	✓	✓	✓	NA	✓	
2-9	✓	✓	✓	✓	✓	✓	✓	NA	✓	
4-10	✓	✓	✓	✓	✓	✓	✓	NA	✓	
4-11	✓	✓	✓	✓	✓	✓	✓	NA	✓	
4-12	✓	✓	✓	✓	✓	✓	✓	NA	✓	
4-13	✓	✓	✓	✓	✓	✓	✓	NA	✓	
B-14	✓	✓	✓	✓	✓	✓	✓	NA	✓	
B-16	✓	✓	✓	✓	✓	✓	✓	NA	✓	
B-18	✓	✓	✓	✓	✓	✓	✓	NA	✓	
B-20	✓	✓	✓	✓	✓	✓	✓	NA	✓	
B-15	✓	✓	✓	✓	✓	✓	✓	NA	✓	
B-17	✓	✓	✓	✓	✓	✓	✓	NA	✓	
B-19	✓	✓	✓	✓	✓	✓	✓	NA	✓	
B-21	✓	✓	✓	✓	✓	✓	✓	NA	✓	
P-22	✓	✓	✓	✓	✓	✓	✓	NA	✓	
P-23	✓	✓	✓	✓	✓	✓	✓	NA	✓	
P-24	✓	✓	✓	✓	✓	✓	✓	NA	✓	
P-25	✓	✓	✓	✓	✓	✓	✓	NA	✓	
P-26	✓	✓	✓	✓	✓	✓	✓	NA	✓	
P-27	✓	✓	✓	✓	✓	✓	✓	NA	✓	
P-28	✓	✓	✓	✓	✓	✓	✓	NA	✓	
P-29	✓	✓	✓	✓	✓	✓	✓	NA	✓	
B-30	✓	✓	✓	✓	✓	✓	✓	NA	✓	
B-32	✓	✓	✓	✓	✓	✓	✓	NA	✓	
B-34	✓	✓	✓	✓	✓	✓	✓	NA	✓	
B-36	✓	✓	✓	✓	✓	✓	✓	NA	✓	
B-31	✓	✓	✓	✓	✓	✓	✓	NA	✓	
B-33	✓	✓	✓	✓	✓	✓	✓	NA	✓	
B-35	✓	✓	✓	✓	✓	✓	✓	NA	✓	
B-37	✓	✓	✓	✓	✓	✓	✓	NA	✓	
1-38	✓	✓	✓	✓	✓	✓	✓	NA	✓	
1-40	✓	✓	✓	✓	✓	✓	✓	NA	✓	
1-42	✓	✓	✓	✓	✓	✓	✓	NA	✓	
1-44	✓	✓	✓	✓	✓	✓	✓	NA	✓	

(1) Voltage Traces are not mandatory; NA if voltage traces not obtained.

ENTERGY OPERATIONS INCORPORATED ARKANSAS NUCLEAR ONE

TITLE: CEDM CONTROL SYSTEM OPERATION

DOCUMENT NO.
2105.009

CHANGE NO.
022-01-0

SET #

WORK PLAN EXP. DATE
N/A

TC EXP. DATE
N/A

SAFETY-RELATED
☒ **YES** ☐ **NO**

IPTE
☐ **YES** ☒ **NO**

TEMP ALT
☐ **YES** ☒ **NO**

PROGRAMMATIC EXCLUSION PER ENS-LI-101
☐ **YES** ☒ **NO**

When you see these TRAPS

Get these TOOLS

Time Pressure
Distraction/Interruption
Multiple Tasks
Over Confidence
Vague or Interpretive Guidance
First Shift/Last Shift
Peer Pressure
Change/Off Normal
Physical Environment
Mental Stress (Home or Work)

Effective Communication
Questioning Attitude
Placekeeping
Self Check
Peer Check
Knowledge
Procedures
Job Briefing
Coaching
Turnover

VERIFIED BY

DATE

TIME

FORM TITLE:

VERIFICATION COVER SHEET

FORM NO.
1000.006A

CHANGE NO.
051-00-0

Page 1

TITLE: CEDM CONTROL SYSTEM OPERATION		DOCUMENT NO. 2105.009	CHANGE NO. 022-01-0
AFFECTED UNIT: <input type="checkbox"/> UNIT 1 <input checked="" type="checkbox"/> UNIT 2		<input checked="" type="checkbox"/> PROCEDURE <input type="checkbox"/> ELECTRONIC DOCUMENT <input type="checkbox"/> WORK PLAN, EXP. DATE _____	SAFETY-RELATED <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
TYPE OF CHANGE: <input type="checkbox"/> NEW <input checked="" type="checkbox"/> PC <input type="checkbox"/> TC <input type="checkbox"/> DELETION <input type="checkbox"/> REVISION <input type="checkbox"/> EZ EXP. DATE: <u>N/A</u>			
DOES THIS DOCUMENT:			
1. Supersede or replace another procedure? (If YES, complete 1000.006B for deleted procedure.)		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
2. Alter or delete an existing regulatory commitment? (If YES, coordinate with Licensing before implementing.)		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
3. Require a 50.59 Review per Form 1000.006S? (If No, attach completed Form 1000.006S) (If 50.59 Evaluation, OSRC review required.)		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
4. Changes Surveillance Test Program (i.e. Technical Specifications, NRC Commitment, surveillance activity, see Step 7.5)? (If YES, complete 1000.009A)		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
5. Create an Intent Change? (If YES, Standard Approval Process required.)		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
6. Implement or change IPTE requirements? (If YES, complete 1000.143A. OSRC review required.)		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
7. Implement or change a Temporary Alteration? (If YES, then OSRC review required.)		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
Was the Master Electronic File used as the source document?		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
INTERIM APPROVAL PROCESS		STANDARD APPROVAL PROCESS	
ORIGINATOR SIGNATURE: (Includes review of Att. 13) DATE:		ORIGINATOR SIGNATURE: (Includes review of Att. 13) DATE: 3/2/2006	
Print and Sign name: NA PHONE #:		Print and Sign name: Greg Burghardt PHONE #: 3202	
SUPERVISOR APPROVAL: * N/A DATE:		INDEPENDENT REVIEWER: DATE: 3/2/06	
SRO UNIT ONE :** N/A DATE:		ENGINEERING: N/A DATE:	
SRO UNIT TWO:** N/A DATE:		Code Programs - NDE: N/A DATE:	
Interim approval allowed for non-intent changes requiring no 50.59 evaluation that are stopping work in progress.		UNIT SURVEILLANCE COORDINATOR: DATE:	
Standard Approval required for intent changes or changes requiring a 50.59 evaluation.		SECTION LEADER: DATE: 3/3/06	
*If change not required to support work in progress, Department Head must sign.		QUALITY ASSURANCE: N/A DATE:	
**If both units are affected by change, both SRO signatures are required. (SRO signature required for safety related procedures only.)		OTHER SECTION LEADERS: N/A DATE:	
		OTHER SECTION LEADERS: N/A DATE:	
		OTHER SECTION LEADERS: N/A DATE:	
		OTHER SECTION LEADERS: N/A DATE:	
OSRC CHAIRMAN/TECHNICAL REVIEWER: DATE: 3-5-06		OTHER SECTION LEADERS: N/A DATE:	
FINAL APPROVAL: DATE: 3-16-06		OTHER SECTION LEADERS: N/A DATE:	
REQUIRED EFFECTIVE DATE:		OTHER SECTION LEADERS: N/A DATE:	
FORM TITLE: PROCEDURE/WORK PLAN APPROVAL REQUEST		FORM NO. 1000.006B	CHANGE NO. 054-00-0

**ENTERGY OPERATIONS INCORPORATED
ARKANSAS NUCLEAR ONE**

TITLE: CEDM CONTROL SYSTEM OPERATION		DOCUMENT NO. 2105.009	CHANGE NO. 022-01-0
<input checked="" type="checkbox"/> PROCEDURE <input type="checkbox"/> WORK PLAN, EXP. DATE <u>N/A</u>		PAGE <u>1</u> OF <u>1</u>	
<input type="checkbox"/> ELECTRONIC DOCUMENT			
TYPE OF CHANGE:			
<input type="checkbox"/> NEW <input checked="" type="checkbox"/> PC <input type="checkbox"/> TC <input type="checkbox"/> DELETION			
<input type="checkbox"/> REVISION <input type="checkbox"/> EZ EXP. DATE: <u>N/A</u>			
AFFECTED SECTION: (Include step # if applicable)	DESCRIPTION OF CHANGE: (For each change made, include sufficient detail to describe reason for the change.)		
Exhibit 1	Step 2.6 modified per SYE. Check Hold bus voltages dropped at least 10 VDC. 1000.006S #3		
Step 6.5	Modified per SYE. MG set output breaker trips on HI / LO Exciter field amps. 1000.006S #3		
FORM TITLE: DESCRIPTION OF CHANGE		FORM NO. 1000.006C	CHANGE NO. 050-00-0

<p>ḐĪ NYŋÉ NĪ Ō ĐÓBÒ ÒNŋ</p> <p>ī ī ðēððç</p>	<p>ḐĪ NYŋŪÉT ŪŋÉ NĪ Ō ĐÓBÒ ĩ ĩ ŌŪ</p> <p>YŪŪÓ YŊŌĪ Ī NŌ Ī ÇĪ Ī ŪÓ NĐŪĪ BĪ xNŌ</p>	<p>ĐBŪŪ Ī ±° Ī ð</p> <p>YĐBĐŪŪ ḐĪ Ī ḐĪ ḐĪ</p>
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èòð ŌxŌxĪ Ī BŌŪ ḐĪ ŪYBĒĪ xNŌĪ

- èòĭ Đ®. ±® ¬± ½'±¬. 21 ħ²Ş Ī»ħ½¬±® Ī®. ° Y. ®½«¬. ¬ ¾®»ħµ»®Ō Ē²¼»®ª±'¬ħ¹» Ī®. ° Ū»ª. ½» B®³ħ¬«®» ¬ħħ' ¾» ª. -«ħ'Ş ª»®. °. »¼. . 2 ½±²¬ħ½¬. ®. ¬. B. ® Ūħ° B¼ŋ«¬³»²¬ Ī½®»® «¬. 21 Ū' . ¾. ¬ ĩ ±° Đ'ħ²¬ Ø»ħ¬«° øĪ ī ḐĪ ððḐĪ ÷ð
- èòĭ x° Ī YP Ē²¼»®ª±'¬ħ¹» Ī®. ° Ū»ª. ½» B®³ħ¬«®» ŌNĪ . 2 ½±²¬ħ½¬. ®. ¬. B. ® Ūħ° B¼ŋ«¬³»²¬ Ī½®»®Ō ¬. »² Ī YP ³ħŞ 2±¬ ±°»² ®. »² ®»¬«®. ®»¼ð
- èòĭ Ē. ¬. -«¾¹®±«° ±² Ø±'¼ P«-ð ĐŌĪ ħ²¼ YŊŌĪĪ ®»½». ª» °«'¬» ½±«²¬»®. 2°«¬Ō x° YŪB . - °«'¬»¼. . 2®ħ¼ ¬±± °ħ®Ō »'½»¬¬. ª» °»ħµ. 21 °ħ½¬±®- ½ħ² ¾» ¹»²»®ħ¬»¼ð Ī. - ®. ' ½ħ«¬» YŊŌĪĪ ¬± ¾Ş°ħ¬- ŪŌPĪ -«¾®±«¬. 2» ®»²¼»®. 21 YŊŌĪĪ . 2±°»®ħ'»ð Ē. »² °«'¬. 21 YŪB . 2 1®±«°- ĩ ¬. ®±«¹. è ħ²¼ 1®±«° . - ±«¬ ±° -»¬«²½»ð ¬. - ®. ' ±½ħ«® ħ. â ĩ ī Ḑēpŋ Ū±® YŪB . 2 ħ²Ş 1®±«° ¬. - ®. ' ±½ħ«® ħ. â ĩ Ḑp ¼»ª. ħ. ¬. ±² ®±³ . ¬- 1®±«°ð øYĪ ōĪ ḐçĪ ḐĪ ēè÷
- èòĭ Ē. »² YŪB- °ħ½»¼ ±² ±'¼ ¾«-ð ½±²¬®±' ®±±³ '±¬»- ħ¾. ' . -Ş ¬± ³±ª ¬. ±¬» YŪB- ħ²¼ ¬. »®»®±®» ħ¬-±½. ħ¬»¼ YŪB- ħ» ¼»½'ħ»¼ . 2±°»®ħ'»ð Ī. - ®»¬«®. ®»- »²¬®Ş . 2¬± ĪĪ ī ḐĪ ḐĪ ḐĪ B½¬. ±² Yð YŪB- ±² ±'¼ ¾«- ħ®» ½±²¬. ¼»®»¼ . 2±°»®ħ'» ¾«¬. -¬. ½±²¬. ¼»®»¼ ħ. -®. °°ħ¾'ð Ī. - - ¾»½ħ«¬» ±'¼ ¾«¬»- ħ®» ħ'¬± ¼»»²»¹. Ī»¼ ®. »² Ī YP- ±°»²»¼ ħ²¼ ¬. »®»®±®» ħ' YŪB- ±² ±'¼ ¾«- ®. ' ¾» . 2¬»®¬¼ ±² ®ħħ½¬±® ¬®. °ð Ī. 2½» YŪB- ±² ±'¼ ¾«- ħ®» -¬. ' -®. °°ħ¾'»ð ¬. »Ş ħ®» ½±²¬. ¼»®»¼ ħ. - ħªħ. 'ħ¾' °±® . 2¬»®¬. ±² °±® ¬. «¬¼±®² ³ħ¹. 2ð YŪB- ±² ±'¼ ¾«- ħ®» -¬. ' ½±²¬. ¼»®»¼ ħ. - ħª. 21 ¬. »® °«' 2»¹ħ¬. ª» ®ħħ½¬. ª. -Ş . 2¬»®¬. ±² °±¬»²¬. ħ' ħ²¼ 2± ĪŪŌ °»²ħ¬. »- ¬. ±«'¼ ¾» ħ°° . »¼ «²'»- YŪB . - µ²±®² ¬± ¾» «²¬®. °°ħ¾'»ð
- èòè ŪĪĪ °ħ²»' - øĪ Yī Ḑēnī Yī Ḑē÷ ħ®» °±®»®»¼ ®®±³ ĩ ÇĪ ē ĩ ī ḐĒ ĪŞ¬¬³ N«¬°«¬ ¾®»ħµ»® øYpé÷ð Ī»³±ª. 21 ĩ ÇĪ ē ®®±³ -»®ª. ½» ±® ±°»². 21 Ypé ®. ' °®»ª»²¬ -¬ħ® ±° ŌŪ Ī»¬ðøYĪ ḐBŊŊĪ ḐĪ ḐḐēḐĪ ī ēé÷

èòð Ī ŪĪ ĐN×ŌĪ Ī

- èòĭ YŪB Ōħŋ® Ū»ª. ħ¬. ±² ħ'ħ³ . - â èòð . 2½. »-ð Ī. - ħ'ħ³ . 2. . ¾. ¬- Ōħ²«ħ' Ī»¬«²¬. ħ' YŪŪŌYĪ ±°»®ħ¬. ±²ð
- èòĭ YŪB Ō. 2±® Ū»ª. ħ¬. ±² ħ'ħ³ . - â ī ðð . 2½. »-ð
- èòĭ Ī. » °±'±®. 21 ½±²¼. ¬. ±²- ħ'ħ³ ±² ŌŪ Ī»¬ ½±²¬®±' °ħ²»ª
- Ō±® x²°«¬ ª±'¬ħ¹» øâ ĩ ī ī ª±'¬-÷
 - Ō±® N«¬°«¬ °®»¬«²½Ş øâ èé ØĪ÷
 - Ø. 1. ³±¬±® ¬³°»®ħ¬«®»
- èòĭ YĐYŋYŪBÝ B'ħ³ñĐ»²ħ'¬Ş Ī»¬°±. 2¬-ª
- Ī. 21' YŪB Ū»ª. ħ¬. ±² øŌ è . 2½. »-÷
 - Ī®± ±® ³±®» YŪB- ¼»ª. ħ¬. 21 ®. ¬. 2 ±² Ī«¾¹®±«° øŌ è . 2½. »-÷
 - YŪB Ī«¾¹®±«° Ū»ª. ħ¬. ±² øâ çòç . 2½. »-÷
 - YŪB Ū®±«° N«¬ ±° Ī»¬«²½» øâ ð . 2½. »-÷
 - Ī. 3«'¬ħ²»±«- . 2¬»®¬. ±² ±° Ū®±«° è ú è YŪB- ¾»'±® ī ī èòĭ è . 2½. »-
 - Ī. «¬¼±®² Pħ²µ YŪB . 2¬»®¬¼ ¾»'±® ī ī èòè . 2½. »-
- èòè Ī. » ŌŪ -»¬ ±«¬°«¬ ¾®»ħµ»® ®. ' -®. ° . ° Ū'½. ¬»® Ū. »¼ B³°- ħ®» ŪxĪ ØŪĪ ±° ¬. » °±'±®. 21ª
- â Ḑòè ħ³°-
 - â çòè ħ³°-

ÐĬ ÑŸŋÉ ĬĬ Ő ÐŎÐŎ ŐŬŎ ĭĭ ðĕðððç	ÐĬ ÑŸŮŮĖĬ ŮŋÉ ĬĬ Ő ÐŎÐŎ ĭ ĭ ŐŮŋ ŸŮŮŎ ŸŬŎĬ Ĭ ŬŎ Ĭ çĬ Ĭ ŮŎ ŬŮĬ ßĬ ×ŬŎ	ÐßŮŮŋ ĕ ±° ĭ ð ŸðßðŮŮŋ ðĭ ĭ ðŏĭ ðŏ
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éòð ŐŬĬ ĬĬ ŮŮŮŮĬ ßĬ ĬĬ Ĭ ŮĬ Ĭ Ĭ ßĬ Ĭ Ėð

ŮĬ Ĭ °ç²»´ - øĭ Ÿĭ ðĕŋĭ Ÿĭ ðĕ÷ ç® » ±©»®»¼ Ő®±³ ĭ çĭ ĕ ĭ ĭ ðĖ Ĭ Ÿ-ŋ»³ Ŭ«ŋ°«ŋ ¼®»çµ»® øŸðĕ÷ð øŸĬ óßŎŬŏĭ óĭ ððĕŏĭ ĭ ĕĕ÷	ŐŬĬ Ů
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- éòĭ Ê»®. °Ÿ ŋ, » ±´´±©. 21 . 2. ŋ. ç´ ½±²¼. ŋ. ±²- °±® -»´½ŋ»¼ ŐŮ Ĭ »æ
- éòĭ òĭ ŮĬ Ĭ Ÿ±²-ç½ŋ»® ŬĬ ŮĬ Ĭ þŸ°ç-- þ®»çµ»® ½´±-»¼ð
- ĭ çŏĭ ŋŮĬ Ĭ ŬĬ ĕĭ ŏĭ ŋŮĬ Ĭ °±® ŐŮ Ĭ »ŋ Ÿĭ
 - ĭ çŏĭ ŋŮĬ Ĭ ŬĬ ĕĭ ŏĭ ŋŮĬ Ĭ °±® ŐŮ Ĭ »ŋ Ÿĭ
- éòĭ òĭ Ð±©»® -«°°´Ÿ ¼®»çµ»® ½´±-»¼ °±® -»´½ŋ»¼ ŐŮ -»æ
- ĭ þŏĕĭ ĭ °±® ŐŮ -»ŋ Ÿĭ
 - ĭ þŏĕĭ ĭ °±® ŐŮ -»ŋ Ÿĭ
- éòĭ òĭ Ő±ŋ»® ×²°«ŋ ½. ®½«ŋ ŋ ¼®»çµ»® ±°»² ø, ç²¼-©. ŋ½, . 2 ŬŮŮ÷ð
- éòĭ òĭ ð»«ŋç´ ×²ŋ»®«°ŋ»® ±°»² ø, ç²¼-©. ŋ½, . 2 ŬŮŮ÷ð
- éòĭ òĕ Ů»²»®çŋ»® Ŭ«ŋ°«ŋ ½. ®½«ŋ ŋ ¼®»çµ»® °±® -»´½ŋ»¼ ŐŮ -»ŋ ±°»²
ø. 2-.. ¼ŋ ´±©»® ®. 1, ŋ -»½ŋ. ±²±° ½ç¼. 2»ŋ÷æ
- ĭ Ÿĭ ĕĭ ĭ Ÿþ °±® ŐŮ -»ŋ Ÿĭ
 - ĭ Ÿĭ ĕĭ ĭ Ÿþ °±® ŐŮ -»ŋ Ÿĭ
- éòĭ òĕ Ő±ŋ»® Ÿ±²ŋ»® Ő±½ç´ŋĬ »³ŋ» -»´½ŋ»® . 2 ŐŬŸßŎð
- éòĭ ×Ů -ŋç®ŋ. 21 °. ®ŋ ŐŮ -»ŋð
ŤŦŮŮ °»®±®³ ŋ, » ±´´±©. 21æ
- éòĭ òĭ Ê»®. °Ÿ -ŋ»° éòĭ ½±³°´»ŋðð
- éòĭ òĭ Ê»®. °Ÿ Ĭ »ç½ŋ»® Ĭ ®. ° ½. ®½«ŋ ŋ ¼®»çµ»®- ĭ ŋ, ®±«¹, ĕ ±°»²ð
- éòĭ òĭ Őç²«ç´´Ÿ ½´±-» Ő±ŋ»® ×²°«ŋ ½. ®½«ŋ ŋ ¼®»çµ»® ¼Ÿ ŋçµ. 21
ç²¼-©. ŋ½, ŋŋ ŬŎð
- éòĭ òĭ Ÿ´±-» ð»«ŋç´ ×²ŋ»®«°ŋ»® ¼Ÿ ŋçµ. 21 ç²¼-©. ŋ½, ŋŋ ŬŎð
- éòĭ òĕ Ÿ, »½µ Ő±ç¼ Ŭ°° ´. 1, ŋ. ´´«³. 2çŋ»¼ð
- éòĭ òĕ Ů»°®»-- Ő±ŋ»® Ŭ² °«ŋ, ¼«ŋŋ±² ŋŋ -ŋç®ŋ ³ŋŋ»®ð
- éòĭ òĕ ÉŦŮŮ Ð«ŋ, Ê±´ŋç¹» þ«ŋ. ´¼«° . ´´«³. 2çŋ»-ð
ßŮŮ çŋ ´»çŋŋ Ĭ ð -»½±²¼- çŋ -»´ç°-»¼ð
ŤŦŮŮ °«ŋ, ŋŋ ¼«ŋ. ´¼«° ¹»²»®çŋ»® Ŭ«ŋ°«ŋ Ê±´ŋç¹» «²ŋ. ´ ĭ Ĭ ð ŋŋ
ĭĭĭ ÊßŸ . - ®»ç½ŋ»¼ð
- éòĭ òĕ ×Ů º±´ŋç¹» ŐŬĬ ¼ŋŋ»»² ĭ Ĭ ð ç²¼ ĭ Ĭ ĭ ÊßŸð
ŤŦŮŮ ç¼ŋŋ«ŋŋ ŋŋ ¼ŋŋ»»² ĭ Ĭ ð ç²¼ ĭ Ĭ ĭ ÊßŸ «ŋ. 21
Ů»²»®çŋ»® Ê±´ŋç¹» ß¼ŋŋ«ŋ³²ŋ °ŋŋ»²ŋ. ±³ŋŋ»®ð
- éòĭ òç Ð«ŋ. Ĭ »ŋŋ °«ŋ, ¼«ŋŋ±² ŋŋ ½´ç® ç²Ÿ ®»³ç. 2. 21 ç´ç®³-ð
- éòĭ òĭ ð Ÿ´±-» Ů»²»®çŋ»® Ŭ«ŋ°«ŋ ¼®»çµ»® °±® -»´½ŋ»¼ ŐŮ -»ŋ ¼Ÿ
°«ŋ. 21 Ő±ç¼ Ŭ² °«ŋ, ¼«ŋŋ±²æ
- ĭ Ÿĭ ĕĭ ĭ Ÿþ °±® ŐŮ -»ŋ Ÿĭ
 - ĭ Ÿĭ ĕĭ ĭ Ÿþ °±® ŐŮ -»ŋ Ÿĭ

<p>ḐĬ NŸḡÉ NĬ Ō ḐŌBŌ ŌNŋ</p> <p>ĭ ĭ ḐèḐḐḐç</p>	<p>ḐĬ NŸŮŮĖĬ ŮḡÉ NĬ Ō ḐŌBŌ ĭ ĭ ŌŮḡ</p> <p>ŸŮŮŌ ŸNŌĬ Ĭ NŌ Ĭ çĬ Ĭ ŮŌ NḐŮĬ BĬ xNŌ</p>	<p>ḐBŮŮḡ ê ±° ĭ Ḑ</p> <p>ŸḐBḐŮŮḡ ḐĬ ĭ ḐḐĭ ḐḐ</p>
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éòí	<p>xŮ ° ç½· 2¹ -»½±²¼ ŌŮ -»· . 2 ±°»®ç· ±²Ḑ</p> <p><u>ṮŮŮŮ</u> °»®±³ ç·» °±´´±©· 2¹ḡ</p>
éòí òĭ	Ê»®· °S -»° éòĭ ½±³°´»»Ḑ
éòí òĭ	Ê»®· °S Ĭ®· ° ½· ®½«· ĩ ¾®»çµ»® ýç ½´±-»¼Ḑ
éòí òĭ	Ōç²«ç´´S ½´±-» Ō±ĥ±® x²°«ĥ ½· ®½«· ĩ ¾®»çµ»® ¾S ĩµ· 2¹ · ç²¼-©· ĩ½· ĩ± NŌḐ
éòí òĭ	Ÿ´±-» Ō»«®ç´ x²ĥ»®®«°ĥ»® ¾S ĩµ· 2¹ · ç²¼-©· ĩ½· ĩ± NŌḐ
éòí òè	Ÿ·»½µ Ō±ç¼ N°° ´· 1·ĥ· . ´´«³· 2çĥ»¼Ḑ
éòí òè	Ů°®»-- ŌNĬ NĬ NŌ °«-¾«ĥ±² ĩ± -ĥ® ĩ³±ĥ®Ḑ
éòí òé	<p>ÉŮŮŮ Ḑ«-· Ê±´ĥ¹» Þ«· ´¼«° ´· 1·ĥ· . . ´´«³· 2çĥ»¼Ḑ</p> <p><u>BŮŮ</u> çĥ· ´çĥ-ĥ ĭ Ḑ -»½±²¼- çĥ· »´ç°-»¼Ḑ</p> <p><u>ṮŮŮŮ</u> °«-· Ḑ«-· ĩ± Þ«· ´¼«° Ů»² Ê±´ĥ¹» ¾«ĥ±² «²· ´ ĭ ĭ Ḑ ĩ±</p> <p>ĭ ĭ ĭ ÊBŸ · - ®»ç½·»¼Ḑ</p>
éòí òè	Ḑ«-· Ĭ»-»ĥ °«-¾«ĥ±² ĩ± ½´»ç® ç²S ®»³ç· 2· 2¹ ç´ç®³-Ḑ
éòí òç	Ḑç®ç´´»´ ŌŮ -»ĥ- ç- °±´´±©-ḡ
BḐ	<p>Ḑ´ç½» ĬS²½·®±-½±°» Ĭ»´½ĥ±® Ĭ©· ĩ½· ±² ĭ Ÿĭ èĭ ĩ±</p> <p>°±-· ĩ· ±² ½±®®»-°±²¼· 2¹ ĩ± ŌŮ -»ĥ ḡ«ĥ- ĩçĥ»¼Ḑ</p>
BḐ	<p>B¼ḡ«ĥ¹»²»®çĥ±® a±´ĥ¹» BŮŮ °®»-«²½S ç- 2½»--ç®S ĩ±</p> <p>-S²½·®±2· Ĭ» ®«²2· 2¹ ç²¼· 2½±³· 2¹ 1»²»®çĥ±®- «-· 2¹</p> <p>Ů»²»®çĥ±® Ê±´ĥ¹» B¼ḡ«ĥ³»² °±ĥ²ĥ· ±³»ĥ®Ḑ</p>
ŸḐ	<p>Ê»®· °S ç·» °±´´±©· 2¹ °ç®ç³»»® ½±²¼· ĩ· ±²-ḡ</p> <ul style="list-style-type: none"> Ů»²»®çĥ±® N«ĥ«ĥ a±´ĥ¹»- ³çĥ½·»¼Ḑ ĬS²½·®±-½±°» ®±ĥĥ· 2¹ -´±©´S · 2 ŮBĬ Ĭ ¼· ®»½· ĩ±²Ḑ

<p>ĬS²½·®±2· Ĭ· 2¹ · 2ĥ»®´±½µ °®»a²ĥ- °ç®ç´´»´· 2¹ ŌŮ -»ĥ- ±«ĥ ±° °çĥ-»Ḑ</p>
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ŮḐ	<p>xŮ -S²½·®±-½±°» · 2¼· ½çĥ- ½±²ĥ· 2«±«- ±«ĥ ±° °çĥ-»</p> <p>½±²¼· ĩ· ±² ©· ç· ĬŸÞ- ±°»²Ḑ</p> <p><u>ṮŮŮŮ</u> ½±²-· ¼»® ç¼¼· 2¹ ´±ç¼ ¾S ½´±-· 2¹ ĬŸÞ-Ḑ</p>
ŮḐ	<p>ÉŮŮŮ ĬS²½·®±-½±°» ®»ç½·»- ´ĭ Nù½´½µḐ</p> <p><u>ṮŮŮŮ</u> °´ç½» Ḑç®ç´´»´· 2¹ Ĭ©· ĩ½· ĩ± °±-· ĩ· ±²</p> <p>½±®®»-°±²¼· 2¹ ĩ± ŌŮ -»ĥ ḡ«ĥ- ĩçĥ»¼Ḑ</p>
ŮḐ	<p>ÉŮŮŮ N«ĥ«ĥ ¾®»çµ»® ½´±-»-Ḑ ç- · 2¼· ½çĥ»¼ ¾S Ō±ç¼ N²</p> <p>´· 1·ĥ· . . ´´«³· 2çĥ»¼Ḑ</p> <p><u>ṮŮŮŮ</u> ®»´çĥ-» -©· ĩ½·Ḑ</p>
ŮḐ	Ḑ´ç½» ĬS²½·®±-½±°» Ĭ»´½ĥ±® Ĭ©· ĩ½· ĩ± NŮŮḐ
éòí òĭ Ḑ	<p>Þç´ç²½» ®»ç´´´±ç¼ ¾»ĥ»² ŌŮ -»ĥ- «-· 2¹ -»½· ĩ±² èḐḐ ±°</p> <p>ç· - °®±½»¼«®»Ḑ</p>

<p>ĐI NYONÉ NĬ Ò ĐỒBÒ Ò NỎ</p> <p>ỈỈ ÒỀỒỒỒ</p>	<p>ĐI NYOUÉI UNÉ NĬ Ò ĐỒBÒ I Ỉ ÒU</p> <p>YUÚÓ YNÒI Ỉ NỎ Í ÇÍ I ÚÓ NĐUÍ BỈ XNÒ</p>	<p>ĐBÚU Ề ±° Í Ò</p> <p>YĐBĐÚU ỒỈỈ ỒỒỈ ỒỒ</p>
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ềồồ ỒNỈ NĬ UUÚUÍ BỈ NĬ Í UỈ ỀNỎI BUÚ BUỒỀỈ I ÚÚÚỈ ỀXỈ Ø P NỈ Ø ÚÚ Í UỈ Í XÒ Í UỈ ỀX YÚ

<p>ỒÚ Í »Ỉ Ồ. ÍÍ Ỉ®. ° . ° ÛỈỈ Ỉ»® ỈỈ«®®»2Ỉ. - ä òềề Ỉ^{3°}- ±® ä ồềề Ỉ^{3°}-ò</p>
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ềôi xÚ Ỉ²§ ±° Ỉ» ° ±ÍÍ ±Ồ. 2Ỉ Ỉ±2ỈỈ Ỉ. ±2- »Ỉ. -ỈỒ

- ÛỈỈ Ỉ»® Û. »ỈỈ B^{3°}- »ỈỈ»ỈỈ Ỉ» Í. 3. Ỉ. 2 x2-. ỈỈ B NỈ Í±1 ØNĐỈ ỒỈỈỈ ÷
- Ò±ỈỈ 2»»ỈỈ- ỈỈỈỈỈỈ 2Ỉ Ỉ± Ỉ®»a»2Ỉ »ỈỈ»ỈỈ ỈỈ. 2Ỉ Í. 3. Ỉ- ±° NĐỈ ỒỈỈỈ
- Ò±ỈỈ 2»»ỈỈ- ỈỈỈỈỈỈ 2Ỉ Ỉ°Ỉ»® Ỉ-Ỉ®Ỉ. 2Ỉ -»Ỉ±2ỈỈ ỒÚ -»Ỉ

Ỉ ØÚỒ °»®°±®3 Ỉ» ° ±ÍÍ ±Ồ. 2Ỉæ

ềôi òỉ Ò±1 Ỉ» ° ±ÍÍ ±Ồ. 2Ỉ . 2 Í Ỉ-Ỉ. ±2 Í±1 Ỉ±® Ỉ±Ỉ ỒÚ -»Ỉ-æ

- ÛỈỈ Ỉ»® Û. »ỈỈ B^{3°}-
- Û»2»®Ỉ-±® N«Ỉ°«Ỉ Ề±Í Ỉ1»
- Û»2»®Ỉ-±® N«Ỉ°«Ỉ B^{3°}-

<p>B ỈỈ±ỈỈµỒ. -» ỈỈỈ«-Ỉ3»2Ỉ ±2 Ỉ» Û»2 Ề±Í Ỉ1» BỈỈ«-Ỉ ° ±Ỉ Ồ. ÍÍ ®Ỉ. -» N«Ỉ°«Ỉ Ề±Í Ỉ1» Ỉ2Ỉ ÛỈỈ Ỉ»® Û. »ỈỈ B^{3°}- ±2 Ỉ» Ỉ-±±Ỉ Ỉ»ỈỈ ỒÚ -»Ỉ Ỉ2Ỉ Í±Ồ»® ÛỈỈ Ỉ»® Û. »ỈỈ B^{3°}- ±2 Ỉ» ±°±±-Ỉ ỒÚ Í Ỉ-ò</p>

ềôi òỉ Ò±2. Ỉ±® ÛỈỈ Ỉ»® Û. »ỈỈ B^{3°}- ±2 Ỉ±Ỉ ỒÚ -»Ỉ- Ồ. ÍÍ ỈỈỈ«-Ỉ. 2Ỉ 1»2»®Ỉ-±® a±Í Ỉ1»ò

ềôi òỉ xÚ Û»2»®Ỉ-±® N«Ỉ°«Ỉ Ề±Í Ỉ1» ≤ ỈỈ Ò ỀBÝỒ

Ỉ ØÚỒ °»®°±®3 Ỉ» ° ±ÍÍ ±Ồ. 2Ỉ Ỉ± Ỉ®Ỉ. -» ÛỈỈ Ỉ»® Û. »ỈỈ B^{3°}- Ỉ±®

ỒU T»Ỉ Ồ. Ỉ. Í±Ồ»-Ỉ ÛỈỈ Ỉ»® Û. »ỈỈ B^{3°}-æ

Bò Ề-. 2Ỉ -Ỉ®»ỒỈ®. a»®Ồ Í±±-»2 ° ±Ỉ»2Ỉ. ±3»Ỉ»® -»Ỉ -Ỉ®»Ồò

Bò BỈỈỈ«-Ỉ Û»2 Ề±Í Ỉ1» BỈỈỈ«-Ỉ ° ±Ỉ»2Ỉ. ±3»Ỉ»® YÓNÝỒỀXỈ Ûò

ềôi òề xÚ Û»2»®Ỉ-±® N«Ỉ°«Ỉ Ề±Í Ỉ1» ä ỈỈ Ò ỀBÝỒ

Ỉ ØÚỒ °»®°±®3 Ỉ» ° ±ÍÍ ±Ồ. 2Ỉ Ỉ± Í±Ồ»® ÛỈỈ Ỉ»® Û. »ỈỈ B^{3°}- Ỉ±®

ỒU T»Ỉ Ồ. Ỉ. Ỉ. 1»»-Ỉ ÛỈỈ Ỉ»® Û. »ỈỈ B^{3°}-æ

Bò Ề-. 2Ỉ -Ỉ®»ỒỈ®. a»®Ồ Í±±-»2 ° ±Ỉ»2Ỉ. ±3»Ỉ»® -»Ỉ -Ỉ®»Ồò

Bò BỈỈỈ«-Ỉ Û»2 Ề±Í Ỉ1» BỈỈỈ«-Ỉ ° ±Ỉ»2Ỉ. ±3»Ỉ»® YNÉOỈ UÍ ỒYÓNÝỒỀXỈ Ûò

ềôi òề Í»° Ỉ-Ỉ ỈỈ±a» -Ỉ»°- «2Ỉ. Í ÛỈỈ Ỉ»® Û. »ỈỈ B^{3°}- Ồ. Ỉ. 2 òềề Ỉ^{3°}- ±° »ỈỈ Ỉ±Ỉ»®ò

ềôi òề Ề-. 2Ỉ -Ỉ®»ỒỈ®. a»®Ồ Ỉ. 1»»2 ° ±Ỉ»2Ỉ. ±3»Ỉ»® -»Ỉ -Ỉ®»Ồò

ềôi òề Ò±1 Ỉ» ° ±ÍÍ ±Ồ. 2Ỉ . 2 Í Ỉ-Ỉ. ±2 Í±1 Ỉ±® Ỉ±Ỉ ỒÚ -»Ỉ-æ

- ÛỈỈ Ỉ»® Û. »ỈỈ B^{3°}-
- Û»2»®Ỉ-±® N«Ỉ°«Ỉ Ề±Í Ỉ1»
- Û»2»®Ỉ-±® N«Ỉ°«Ỉ B^{3°}-

ềôi òç Ò±Ỉ. ° § Í §-Ỉ»3 Û2Ỉ. 2»»® ỒÚ Í Ỉ» 1»2»®Ỉ-±® a±Í Ỉ1» ỈỈỈ«-Ỉ»Ỉò

ÐĬ ÑŸŋÉ ÑĬ Ō ÐŌBŌ ŌÑŋ ĭĭ ðëððç	ÐĬ ÑŸŮŮĖĬ ŮŋÉ ÑĬ Ō ÐŌBŌ ĭ ĭ ŌŮŋ ŸŮŮŌ ŸÑŌĬ Ĭ ÑŌ Ĭ ÇĬ Ĭ ŮŌ ÑÐŮĬ BĬ ×ÑŌ	ÐBŮŮŋ ŸÐBŮŮŮŋ	Ĭ ð ±° Ĭ ð ðĬ Ĭ ōđĬ ōđ
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ĭĭ ðëððç
 ŮĖŌ×p×Ĭ ĭ
Ĭ »^a. - »¼ ðçĥĭ ĭ ĥðë
 ŸŮB Ÿđĭ ĖÐÐŮĬ ŮĬ ×ÐÐŮĬ ŸÑ×Ō Ĭ ŮŌÐŮĬ BĬ ĖĬ Ů ŌŮBĬ ĖĬ ŮŌŮŮĬ
 ÐBŮŮ ĭ ÑŮ ĭ

Ĭ . - »^ˆ. ¾. ĩ °®±^a. ¼»- Ñ°»®ĭ ĩ. ±²- ĩ. » ĭ¾. ´. ĩŒ ĩ± 3»ĭ-«®» ĭ²¼ ĩ®»²¼ ŸŮBŌđĭ «°°»®
 1®. °°»® ½±. ´ ĩ»³»®ĭ ĩ-«®»ð Ñĭ. »® . ĩ- ĩ±®. ½ĭ´ŒŒ Œ ĩ± ŸŮB- đĬ Ō Ĭ Ō èŌ Ĭ Ĭ Ō Ĭ èŌ Ĭ èŌ èèŌ ĖĬ Ō
 ĭ²¼ ĖĬ ÷ ½ĭ² ĭ´-± ¾» 3»ĭ-«®»¼ ¾Œ ®°®®. 2¹ ĩ± ĖŸŸ èðëĭ èëë ŸĬ ōBŌÑŋĬ đĬ çççŌđĬ Ĭ Ĭ ōđđĬ Ō
 ĭ òð Ñ¾ĭ-ĭ. 2 ½«®»²-´Œ ½ĭ´. ¾®ĭĭ-¾ Ōĭ²¼. »´¼ Ů. 1. ĩĭ´ Ė±´-3»-»® ŌŮĖŌ ÷ ±® »-«^aĭ´²-
 3«´-ĭ. 3»-»® đĬ »°»® ĩ± ĭ ÑÐŮŌđĭ ĭ ±® ŮĖŌ «-ĭ¹»÷ð

ŌÑĬ Ů
<ul style="list-style-type: none"> Ō±´¼ ¾«- ^a±´-ĭ¹» °®»^a»²- ĩ±¾ĭ-ĭ. 2. 2¹ °®±°»® ĩ»³»®ĭ ĩ-«®» ®»ĭ¼. 2¹-ð Ĭ »½±®¼ ĭ¾ĭ-±´«ĭ- ^aĭ´«ĭ- ±° ^a±´-ĭ¹» ®»ĭ¼. 2¹- ĩ±¾ĭ-ĭ. 2»¼ð

ĭ òð Ÿ. »½µ ŸŮB Ÿđĭ ŌÑĬ ±² Ō±´¼ p«-ð
 ĭ òð Ñ¾ĭ-ĭ. 2 ŸŮB Ÿđĭ Ė°°»® Ů®. °°»® ½±. ´ ^a±´-ĭ¹» đĖ«¹÷ ĭ- °±´´±©-æ
 ĭ òĭ Ō±½ĭ-» ŸŮB Ÿđĭ ±°®»® ½ĭ¾´»- . 2 °ĭ²»´ ±² Ĭ pŸĬ Ÿèð đ¾. ». 2¼ ĭ½½»-- °ĭ²»´ ĩ±
 ´»° ĩ± Ů ĭ ŸĖĭ ¼±±®÷ð
 ĭ òĭ Ė. ĩ. ŮĖŌ -½ĭ´» -» ĩ±² ĭ ððð ĩ-µ» ^a±´-ĭ¹» ®»ĭ¼. 2¹ ĭ½®±-- •p´ĭ½µĖ ĭ²¼
 •Ė. ĩ-»Ė ½ĭ¾´»- ´±½ĭ-»¼ ±² Ĭ pŸĬ Ÿèð ĩ»³. 2ĭ´- Ÿĭ ĭ²¼ Ÿèð đB ĩŒ. ½ĭ´
 ®»ĭ¼. 2¹ . - ĬĬ ĖŮŸ÷ð
 đĖ«¹÷ ā ÁÁÁÁÁÁ Ė
 ĭ òð Ñ¾ĭ-ĭ. 2 ŸŮB Ÿđĭ Ė°°»® Ů®. °°»® - »«²-ĭ ^a±´-ĭ¹» đĖ- »«²-÷ ĭ- °±´´±©-æ
 ĭ òĭ Ō±½ĭ-» ŸŮB Ÿđĭ ½±. ´ 3±². ĩ±® ½±²²»½ĭ-±® ±² °®±²-ĭ . ¼» ±° ĭ ŸĖĭ ð đĭ . - . -
 ĭ ®±«²¼Ō ½ĭ°°»¼ ½±²²»½ĭ-±® ®. ĩ. đŸĭ ÷ ´±½ĭ-»¼ ¼. ®»½ĭ-Œ ĭ¾±^a» . ĩð
 ĭ òĭ Ĭ »³±^a» ½±²²»½ĭ-±® ½ĭ° ¾Œ «²-½®»®. 2¹ð
 ĭ òĭ Ė. ĩ. ŮĖŌ -½ĭ´» -» ĩ±² ĭ ðð³ĖŌ ĩ-µ» ^a±´-ĭ¹» ®»ĭ¼. 2¹ ĭ½®±-- °. 2- •ŸĖ ĭ²¼
 •ŮĖŌ đB ĩŒ. ½ĭ´®»ĭ¼. 2¹ . - è ³. ´´. ^a±´-ĭ- ŮŸŌ÷
 ĭ òĭ òĭ Ĭ »½±®¼ ŮĖŌ ®»ĭ¼. 2¹ ā ÁÁÁÁÁÁ³Ė
 Ÿ±^{2a}»® ĩ± Ė±´-ĭ-æÁÁÁÁÁÁ³Ė Ė ĭ ĭ Ė ĭ ā ÁÁÁÁÁÁ³Ė
 Ĭ »½±®¼ đĖ- »«²-÷ ā ÁÁÁÁÁÁ Ė
 ĭ òĭ Ĭ ½®»® ½±²²»½ĭ-±® ½ĭ° ¾ĭ½µ ±² ŸŮB Ÿđĭ ½±. ´ 3±². ĩ±® ½±²²»½ĭ-±®ð

ÐĬ ÑŸŋÉ ÑĬ Ō ÐŌÐŌ ŌÑŋ ĬĬ Ðēðððç	ÐĬ ÑŸŮŮĬĬ ŮŋÉ ÑĬ Ō ÐŌÐŌ Ĭ Ĭ ŮŮ ŸŮŮŌ ŸÑŌĬĬ ÑŌ Ĭ çĬ Ĭ ŮŌ ÑÐŮĬ ßĬ ×ÑŌ	ÐßŮŮ ŸÐßŌŮŮ	ĬĬ ±° Ĭ Ð ÐĬ Ĭ ŌĬĬ ŌÐ
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ĬĬ Ðēðððç
 ŮĬØ×Þ×Ĭ Ĭ
Ĭ»^a. -»¼ ðçĥĬ Ĭ ĥðē
 ŸŮß Ÿðĭ ĒÐÐŮĬ ŮĬ ×ÐÐŮĬ ŸÑ×Ō Ĭ ŮŌÐŮĬ ßĬ ĒĬ Ů ŮŮßĬ ĒĬ ŮŌŮŮĬ
 ÐßŮŮ Ĭ ÑŮ Ĭ

èðð Ē- Ĭ Ĭ» ±₃- Ĭ[©] Ĭ± ½Ĭ ½« Ĭ-» ½± Ĭ ½«^{®®}»²- Ø×½± Ĭ÷ Ĭ- °±'±[©]-ð
 èðĭ Ø×½± Ĭ÷ ā ØĒ-«²-÷ AAAAAAĒ) ðððĬ ±₃-ð
 èðĬ Ø×½± Ĭ÷ ā ÁÁÁÁÁÁ Ĭ^{3°}-
 èðð ŸĬ ½« Ĭ-» ½± Ĭ[®]»- -Ĭ²½» ØĬ ½± Ĭ÷ Ĭ- °±'±[©]-æ
 èðĭ ØĬ ½± Ĭ÷ ā ØĒ«¹-ÁÁÁÁÁÁĒ) Ø×½± Ĭ÷ ÁÁÁÁÁÁ Ĭ^{3°}-
 ØĬ ½± Ĭ÷ ā ÁÁÁÁÁÁ ±₃-

ŌÑĬ Ů	
Ō»Ĭ¼ [®] »- -Ĭ ² ½» ³ «- Ĭ ¾» -«¾-Ĭ [®] Ĭ ² -»¼ Ĭ± ±¾-Ĭ ² Ĭ½½« [®] Ĭ-» [®] »Ĭ¼ ² Ō Ō»Ĭ¼ [®] »- -Ĭ ² ½» ^{°±®}	ŸŮß Ÿĭ Ĭ- °± ^a . ¼»¼ Ĭ ² Ĭ- Ĭ½ Ĭ½« Ĭ- ± ² Ō Ø± [©] » ^a » [®] Ō Ĭ Ĭ±±μ« [°] Ĭ¾Ĭ» ^{°±®} Ĭ»Ĭ¼ [®] »- -Ĭ ² ½» ^{°±®} ¼»¼ [®] » ² «- ² 1 ĒŸý ēðēēī ēēē Ĭ± ½Ĭ ½« Ĭ-» ± ₃ » [®] ŸŮß ½± Ĭ- Ĭ» ^{3°} » [®] Ĭ-« [®] -Ō

èðĬ ØĬ ½± Ĭ÷ ā ÁÁÁÁÁÁØĬ ½± Ĭ÷ Ō ðēĬ ē ±₃-ØŸŮß Ÿðĭ Ĭ»Ĭ¼[®]»- -Ĭ²½»÷ð
 èðĬ ØĬ ½± Ĭ÷ ā ÁÁÁÁÁÁ ±₃-
 èðð Ñ¾-Ĭ² ŸŮß Ÿðĭ ½± Ĭ- Ĭ»^{3°}»[®]Ĭ-«[®] Ĭ- °±'±[©]-æ
 èðĭ Ē-» Ĭ₃»^{°±'±[©].²1} Ĭ± ±¾-Ĭ² ŸŮß Ÿðĭ ½± Ĭ- Ĭ»^{3°}»[®]Ĭ-«[®]æ

- Ÿ± Ĭ[®]»- -Ĭ²½» ØĬ ½± Ĭ÷ ½Ĭ ½« Ĭ-»¼ Ĭ² -»[°] èðð
- Ĭ Ĭ¾Ĭ» ¾» Ĭ±[©]

Ĭ»- -Ĭ ² ½»	Ĭ» ^{3°} ð	Ĭ»- -Ĭ ² ½»	Ĭ» ^{3°} ð	Ĭ»- -Ĭ ² ½»	Ĭ» ^{3°} ð	Ĭ»- -Ĭ ² ½»	Ĭ» ^{3°} ð
ēðē	ðððĬ Ĭ	éðē	ĬĬ ēðēçē	çðì	Ĭ ēĭ ðĭ ēē	ĬĬ ðĭ	Ĭ ēðððĬ Ĭ
ēðē	ēðēēç	éðē	ĬĬ ĬĬ ðĭ ēĬ	çðē	Ĭ ēðððĬ ē	ĬĬ ðĭ	Ĭ ēēðēðē
ēðē	ĬĬ ðĭ ēē	éðē	ĬĬ ðððĬ ç	çðē	Ĭ ēēðēðĬ	ĬĬ ðē	Ĭ çĬ ðĭ ēē
ēðç	Ĭ ðððĬ Ĭ	éðē	ĬĬ ēðēçē	çðē	Ĭ ēĭ ðĭ ēç	ĬĬ ðē	Ĭ ððððĬ Ĭ
ē	Ĭ ēðēç	éðç	Ĭ ēĭ ðĭ ēĬ	çðē	Ĭ ēðððĬ ē	ĬĬ ðē	Ĭ ðēðēðç
ēðĭ	ĬĬ ðĭ ēē	ē	Ĭ ēðððĬ	çðç	Ĭ ēēðēðĬ	ĬĬ ðē	ĬĬ ĬĬ ðĭ ēē
ēðĬ	Ĭ ðððĬ Ĭ	ēðĭ	Ĭ ēēðēçē	Ĭ ð	Ĭ çĬ ðĭ ē	ĬĬ ðç	Ĭ Ĭ ðððĬ Ĭ
ēðĬ	Ĭ ēðēçĬ	ēðĬ	Ĭ ēĭ ðĭ ēĭ	Ĭ ððĭ	Ĭ ððððĬ ē	ĬĬ	ĬĬ ēðēĬ
ēðĬ	ēĭ ðĭ ēē	ēðĬ	Ĭ ēðððĬ Ĭ	Ĭ ððĬ	Ĭ ðēðēðĬ	ĬĬ ðĭ	ĬĬ ĬĬ ðĭ ēē
ēðē	ēðððĬ ē	ēðĭ	Ĭ ēēðēçē	Ĭ ððĬ	ĬĬ ĬĬ ðĭ ēĬ	ĬĬ ðĬ	Ĭ Ĭ ðððĬ Ĭ
ēðē	ēēðēçĬ	ēðē	Ĭ çĬ ðĭ ēē	Ĭ ððĭ	ĬĬ ðððĬ ē	ĬĬ ðĬ	Ĭ Ĭ ēðēĬ Ĭ
ēðē	ēĭ ðĭ ēç	ēðē	Ĭ ððððĬ Ĭ	Ĭ ððē	ĬĬ ēðēðē	ĬĬ ðĭ	Ĭ ēĭ ðĭ ēē
ēðē	ēðððĬ ē	ēðē	Ĭ ðēðēçç	Ĭ ððē	ĬĬ ĬĬ ðĭ ēĬ	ĬĬ ðē	Ĭ ēðððĬ ē
ēðç	ēēðēçĬ	ēðē	ĬĬ ĬĬ ðĭ ēē	Ĭ ððē	ĬĬ ðððĬ ç	ĬĬ ðē	Ĭ ēēðēðē
ē	çĬ ðĭ ē	ēðç	ĬĬ ððððĬ Ĭ	Ĭ ððē	Ĭ Ĭ ēðēðē	ĬĬ ðē	Ĭ ēĭ ðĭ ēē
ēðĭ	Ĭ ððððĬ ē	ç	ĬĬ ēðē	Ĭ ððç	Ĭ ēĭ ðĭ ēĬ	ĬĬ ðē	Ĭ ēðððĬ ē
ēðĬ	Ĭ ðēðēçĬ	çðĭ	ĬĬ ĬĬ ðĭ ēē	ĬĬ	Ĭ ēðððĬ	ĬĬ ðç	Ĭ çĬ ðĭ ē
ēðĬ	ĬĬ ĬĬ ðĭ ēĬ	çðĭ	Ĭ Ĭ ðððĬ Ĭ	ĬĬ ðĭ	Ĭ ēēðēðē	ĬĬ	ēððððēð
ēðĭ	ĬĬ ððððĬ ē	çðĭ	Ĭ Ĭ ēðēðĬ	ĬĬ ðĬ	Ĭ ēĭ ðĭ ēĬ	ĬĬ ðĭ	ēðēðēēē

ΘΙ ΝΥ _α Ε ΝΙ Θ ΘΟΒΟ ΟΝ _ο ι ι ðēðððç	ΘΙ ΝΥΟΥΕΙ ΟηΕ ΝΙ Θ ΘΟΒΟ Ι Χ ΟΥ _æ ΥΟΥΟ ΥΝΟΙ Ι ΝΘ Ι Ç Ι ΟΟ ΝΘΟΥ Β Ι ΧΝΘ	ΘΒΟΥ _æ ι ι ±° ι ð ΥΘΒΟΥ _æ ðι ι όðι όð
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Ι ΕΘΘΟΥΟΥΟΙ Ι

ΘΒΟΥ Ι ΝÚ ē

ι οι Ι »-ι Ι ΥΠΟΙ ΒΟΥ Ι ΥΠΟê Ç- °±´´±©-æ øÝ±³°´»» Ç´´ -ι»°- . 2 ±®¼»®
 ©®, -ι»² °±® »Ç½, Ι ΥΠ ¾»°±®» °®±½»¾, 2¹ -ι 2»´´ Ι ΥΠò÷

$x^2 - \neg^{\circ} \ll \frac{1}{2} \neg \neg \pm^2 \neg^{\circ}$	Ι ΥΠΟι ι θι ηι υι ι	Ι ΥΠΟê êθι ηι υι ι
Ð»®°±®³ ¬½» °±´´±©. 2¹ -ι -ι»-ι Ι «²ι Ι®. °æ	ðñβ	ðñβ
Ê»®. °§ Ι ΥΠ ½´±-¾ °»® -ι»° ι ðι		
Ø±´¼ Èθι ηι υι ι . 2 ÈÈ Þ§°Ç-- °±¬. ¬. ±²ò øÈ . - Ι ΥΠ ý÷		
Ó±³»²¬Ç®. ´§ ¼»°®»-- Ι »Ç½¬±® Ι®. ° °«¬¼«¬ι±² øι θι όçðé´οι ÷ ±² ι Υθι ò		
Ê»®. °§ Ι ΥΠ ±°»²-ò		
Ý»¾μ ι ðι ι όβι ð Ç´Ç®³ ½±³»- . 2 ±® ®»°´Ç¬½»-ò		
Ι »´Ç¬» Èθι ηι υι ι ò øÈ . - Ι ΥΠ ý÷		
Ê»®. °§ Ι »°´Ç¬. È². ¬ ι ðι ι ê . 2 ι Υι ι ®»-»-ò		
Ð»®°±®³ ¬½» °±´´±©. 2¹ -ι -ι»-ι ÈÈ Ι®. °æ	ðñβ	ðñβ
Ê»®. °§ Ι ΥΠ ½´±-¾ °»® -ι»° ι ðι		
Ø±´¼ Èθι ηι υι ι . 2 Ι «²ι Þ§°Ç-- °±¬. ¬. ±²ò øÈ . - Ι ΥΠ ý÷		
Ó±³»²¬Ç®. ´§ ¼»°®»-- Ι »Ç½¬±® Ι®. ° °«¬¼«¬ι±² øι θι όçðé´οι ÷ ±² ι Υθι ò		
Ê»®. °§ Ι ΥΠ ±°»²-ò		
Ý»¾μ ι ðι ι όβι ð Ç´Ç®³ ½±³»- . 2 ±® ®»°´Ç¬½»-ò		
Ι »´Ç¬» Èθι ηι υι ι ò øÈ . - Ι ΥΠ ý÷		
Ê»®. °§ Ι »°´Ç¬. È². ¬ ι ðι ι ê . 2 ι Υι ι ®»-»-ò		

ι οι οι xÚ ¼»-¬ ®»¼ ¬± ½´±-» Ι ΥΠΟι ΒΟΥ Ι ΥΠΟêò
 ΙΘΥΟ ®»°® ¬± -ι»° ι ðι ò

ΘΙ ΝΥ _α Ε ΝΙ Θ ΘΟΒΟ ΟΝ _ο ι ι̇ ðēðððç	ΘΙ ΝΥΟΥΕΙ ΟηΕ ΝΙ Θ ΘΟΒΟ Ι Χ ΟΥ _æ ΥΟΥΟ ΥΝΟΙ Ι ΝΘ Ι Ç Ι ΟΟ ΝΘΟΥ Β Ι ΧΝΘ	ΘΒΟΥ _æ ι̇ ē ±° ι̇ ð ΥΘΒΟΥ _æ ðι̇ ι̇ óðι̇ óð
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Ι ΕΘΘΟΥΟΥΟΙ Ι

ΘΒΟΥ ι̇ ΝÚ ē

ι̇ οι̇ Ι »-ι̇ Ι ΥΠοι̇ ΒΟΥ Ι ΥΠοέ̇ Ç- °±´´±©-æ øÝ±³°´»» Ç´´ -ι̇»°- . 2 ±®¼»® ©®, -ι̇»²
 °±® »Ç½,̇ Ι ΥΠ ¾»°±®» °®±½»¾. 2¹ -ι̇ 2»´´- Ι ΥΠò÷

$x^2 - \text{ι̇}^® \ll \frac{1}{2} \text{ι̇} \cdot \pm^2 \text{ ι̇} - \text{ι̇}^°$	Ι ΥΠοι̇ ι̇ θι̇ η̇ι̇ υ̇ι̇ι̇	Ι ΥΠοέ̇ εθι̇ η̇ι̇ υ̇ι̇ι̇
Ð»®°±®³ -ι̇,̇ » °±´´±©. 2¹ -ι̇ -ι̇»-ι̇ Ι,̇«²-ι̇ Ι®, °æ	ðñβ	ðñβ
Ê»®. °§ Ι ΥΠ ½´±-¾ °»® -ι̇»° ι̇ ðι̇		
Ø±´¼ ΕΘι̇ η̇ι̇ υ̇ι̇ι̇ . 2 ÊÊ Þ§°Ç-- °±-- ι̇ ±²ò øË . - Ι ΥΠ ý÷		
Ó±³»²-Ç®. ´§ ¼»°®»-- Ι »Ç½-ι̇® Ι®, ° °«-¾«-ι̇±² øι̇ θι̇ óçðéðóι̇ ÷ ±² ι̇ Ýðι̇ ð		
Ê»®. °§ Ι ΥΠ ±°»²-ò		
Ý,̇»½μ ι̇ ðι̇ ι̇ óβι̇ ð Ç´Ç®³ ½±³»- . 2 ±® ®»°´Ç-,̇»-ò		
Ι »´Ç-» ΕΘι̇ η̇ι̇ υ̇ι̇ι̇ ð øË . - Ι ΥΠ ý÷		
Ê»®. °§ Ι »°´Ç-,̇ Ê². - ι̇ ðι̇ ι̇ ê . 2 ι̇ Ýι̇ι̇ ®»-»-ò		
Ð»®°±®³ -ι̇,̇ » °±´´±©. 2¹ -ι̇ -ι̇»-ι̇ ÊÊ Ι®, °æ	ðñβ	ðñβ
Ê»®. °§ Ι ΥΠ ½´±-¾ °»® -ι̇»° ι̇ ðι̇		
Ø±´¼ ΕΘι̇ η̇ι̇ υ̇ι̇ι̇ . 2 Ι,̇«²-ι̇ Þ§°Ç-- °±-- ι̇ ±²ò øË . - Ι ΥΠ ý÷		
Ó±³»²-Ç®. ´§ ¼»°®»-- Ι »Ç½-ι̇® Ι®, ° °«-¾«-ι̇±² øι̇ θι̇ óçðéðóι̇ ÷ ±² ι̇ Ýðι̇ ð		
Ê»®. °§ Ι ΥΠ ±°»²-ò		
Ý,̇»½μ ι̇ ðι̇ ι̇ óβι̇ ð Ç´Ç®³ ½±³»- . 2 ±® ®»°´Ç-,̇»-ò		
Ι »´Ç-» ΕΘι̇ η̇ι̇ υ̇ι̇ι̇ ð øË . - Ι ΥΠ ý÷		
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ι̇ οι̇ ðι̇ xÚ ¼»-· ®»¼ -ι̇ ½´±-» Ι ΥΠοι̇ ΒΟΥ Ι ΥΠοέ̇
 ΙΟΥΟ ®»°® -ι̇ -ι̇»° ι̇ ðι̇ ð

ÐĬ ÑŸṁÉ ÑĬ Ō ÐŌΒŌ ŌÑŌ ĭĭ ðēðððç	ÐĬ ÑŸŮŮĖĬ ŮñÉ ÑĬ Ō ÐŌΒŌ ĭḿ ŌŮḂ ḂŮŮŌ ḂÑŌĬ Ĭ ÑŌ Ĭ ÇĬ Ĭ ŮŌ ÑÐŮĬ ΒĬ ×ÑŌ	ÐΒŮŮḂ ḂÉ ±° Ĭ ð ḂÐΒŌŮŮḂ ðĬ Ĭ ðĭ Ĭ ð
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Ĭ ĖÐÐŌŮŮŮŮŮ Ĭ

ÐΒŮŮ è ÑŮ è

ĭ ðē Ĭ»- Ĭ ḂŮŮĬ ΒŮŮ Ḃ ḂŮḂè Ç- °±´´±©-æ øŸ±³°´»» Ç´´ -»°- . 2 ±®¼® ©®, -»²
 °±® »Ç½, Ḃ ḂŮ ¾»°±®» °®±½»¾, 2¹ -± 2»'' Ḃ ḂŮð÷

$x^2 - \neg^{\circ} \ll \frac{1}{2} \neg \neg \pm^2 \neg \neg^{\circ}$	Ḃ ḂŮŮĬ ĭ øĬ ñĬ ŮĬ Ĭ	Ḃ ḂŮḂè è øĬ ñĬ ŮĬ Ĭ
Ð»®°±®³ ¬,» °±´´±©. 2¹ ¬± ¬»- Ĭ,«²¬ Ĭ®, °æ	ÒñΒ	ÒñΒ
Ê»®, °§ Ḃ ḂŮ ½´±-¾ °»® -»° ĭ ðĭ		
Ø±¼ ÈŮĬ ñĬ ŮĬ Ĭ . 2 ĖĖ Þ§°Ç-- °±-- ¬ ±²ð øĖ . - Ḃ ḂŮ Ḃ÷		
Ó±³»²¬Ç®, ´§ ¼»°®»-- Ĭ»Ç½¬±® Ĭ®, ° °«-¾«¬±² øĭ øĬ óçðéèøĭ ÷ ±² ĭ Ḃĭ Ĭ ð		
Ê»®, °§ Ḃ ḂŮ ±°»²-ð		
Ḃ,»½µ ĭ ðĭ ĭ óβĭ ð Ç´Ç®³ ½±³»- . 2 ±® ®»°´Ç-,»-ð		
Ĭ»´Ç-» ÈŮĬ ñĬ ŮĬ Ĭ ð øĖ . - Ḃ ḂŮ Ḃ÷		
Ê»®, °§ Ĭ»°´Ç-, Ė². ¬ ĭ ðĭ ĭ è . 2 ĭ Ḃĭ Ĭ ®»-»-ð		
Ð»®°±®³ ¬,» °±´´±©. 2¹ ¬± ¬»- ĖĖ Ĭ®, °æ	ÒñΒ	ÒñΒ
Ê»®, °§ Ḃ ḂŮ ½´±-¾ °»® -»° ĭ ðĭ		
Ø±¼ ÈŮĬ ñĬ ŮĬ Ĭ . 2 Ĭ,«²¬ Þ§°Ç-- °±-- ¬ ±²ð øĖ . - Ḃ ḂŮ Ḃ÷		
Ó±³»²¬Ç®, ´§ ¼»°®»-- Ĭ»Ç½¬±® Ĭ®, ° °«-¾«¬±² øĭ øĬ óçðéèøĭ ÷ ±² ĭ Ḃĭ Ĭ ð		
Ê»®, °§ Ḃ ḂŮ ±°»²-ð		
Ḃ,»½µ ĭ ðĭ ĭ óβĭ ð Ç´Ç®³ ½±³»- . 2 ±® ®»°´Ç-,»-ð		
Ĭ»´Ç-» ÈŮĬ ñĬ ŮĬ Ĭ ð øĖ . - Ḃ ḂŮ Ḃ÷		
Ê»®, °§ Ĭ»°´Ç-, Ė². ¬ ĭ ðĭ ĭ è . 2 ĭ Ḃĭ Ĭ ®»-»-ð		

ĭ ðēøĭ $\frac{x \dot{U}}{T \emptyset U \emptyset}$ ¼»- . ®»¼ ¬± ½´±-» Ḃ ḂŮŮĬ ΒŮŮ Ḃ ḂŮḂèð
 ®»°®® ¬± -»° ĭ ðĭ ð

ĭ ðē $\frac{x \dot{U}}{T \emptyset U \emptyset}$ ¼»- . ®»¼ ¬± ½´±-» Ḃ ḂŮ-ð
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Ĭ ĖĐĐĐŪŌŪŌĬ Ĭ
YŪB ŪĖŪĬ YxĬ Ū Ĭ ŪĬ

ĐBŪ Ū Ĭ NŪ é

Ĭ . - -»- -^a»[®]. Ō. »- ±°»[®]½. ' - S ±° »½. YŪB °»[®] Ĭ Ĭ -«^{®a}». ' '½»[®]«[®]»³»²-
 Ĭ òĬ òĬ òĬ òĬ ò x - . - 2±^{®3}½ ' S °»[®]±^{®3}½ - «½»[®] S ©. - Ĭ »½-±[®] . 2 Ō±½» Ĭ ±[®] Ĭ ò
 ¾«- ½½² ¾» °»[®]±^{®3}½ . 2 ½±²½»²½- ±² ©. - Ĭ »½-±[®] Ĭ -½»[®] ±[®] -[®]. ò YŪB -½»[®]-
 °»[®]±^{®3}½ ½±²½»[®]»²- ©. - »[®]½. - - ± -[®]»²½ ½±. ' °»[®]±^{®3}½»²½ Ø³½ S ¾» ÒBZ½ ©. - xúY
 ½±²½»[®]»²½÷ ò x⁰ -[®]±«¾» - , ±±- . 21 ±[®] 3½. 2-»²½»[®]«[®]»⁴ - , »² YŪB- ©. ' ¾» ° ½»½
 ±² Ø± ¾ p«- ò

Ĭ òð xŌxĬ xBŌ YNŌŪxĬ xNŌĬ

Ĭ òĬ	xŪ Ĭ »½-± [®] Ĭ [®] . ° ½- ±½½» [®] ½ ò TØŪŌ °» [®] ± ^{®3} - , » [®] ± [®] ± [®] . 21æ	
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Ĭ òĬ òĬ	Ê» [®] . ŌS ½ ' ' YŪB- ½- ± [®] ¾»' ± [®] ' ± [®] » [®] »' »½- [®] . ½½ ' ' . 3. - ò	_____
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Ĭ òĬ òĬ	Ê» [®] . ŌS ½ ' ' YŪB- ©. - ¼½» ² ± [®] . 2-» [®] -½ â è . 2½»- ò	_____
Ĭ òĬ òĬ	Y± ³ ° ' »-» - »½- . ± ² Ĭ òð B½½»° -½» ² Y [®] . -» [®] . ½	_____
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Ĭ òĬ òĬ	xŪ ^a ± ' -½ ¹ » -½½»- ¼»- . » [®] ½ ò TØŪŌ ^a » [®] . ŌS - , » [®] ± [®] ± [®] . 21æ	_____
	<ul style="list-style-type: none"> xúY -«°° ±[®]- ½½. ' ¾» - ± ½½ S Ĭ » YŪB^a. - . ½±[®]½»[®] -½½»- ò Ê. - . ½±[®]½»[®] ½½. ' ¾» - ± »½±[®]½ YŪB^a ± ' -½¹» -½½»- ò 	
Ĭ òĬ òĬ	xŪ ^a ± ' -½ ¹ » -½½»- ÒNĬ ¼»- . » [®] ½ ò TØŪŌ xúY ½± ² ½» [®] » ² ½ ±½-½. 2½æ	_____
	AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA xúY ½± ² -½½-	
Ĭ òĬ	Ĭ ^a . » [®] Ō. 3. - ½½ Đ [®] ½½½«- . ± ² - - »½- . ± ² ± ⁰ - . - ° ±½½» [®] » [®] ò	_____
Ĭ òè	Ê» [®] . ŌS Ū [®] ±«° è ÒNĬ . 2-» [®] -½ ¾»S ± ² ½ - , » Đ [®] ± ¹ ½ ³ » [®] ½ x ² -» [®] - . ± ² Ō. 3. - ò øYĬ óBŌNŌĬ óĬ ððēóĬ Ĭ çĬ ÷	_____

ΘΙ ΝΥΘΕ ΝΙ Θ ΘΟΒΟ ΟΝΘ ι ι ðèððç	ΘΙ ΝΥΘΕΙΘ ΘΗΕ ΝΙ Θ ΘΟΒΟ Ι Χ ΘΥΘ ΥΘΥΘ ΥΝΘΙ Ι ΝΘ Ι Ç Ι ΥΘ ΝΘΥΙ ΒΙ ΧΝΘ	ΘΒΥΘΘ ΥΘΒΘΥΘΘ	Ι Θ ±° Ι Θ ΘΙ Ι ΘΘΙ ΘΘ
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Ι ΕΘΘΟΥΟΥΘΙ Ι

ΘΒΥΘ Ι ΝΥ ε

ι ðð Ι ΥΙ Ι ΟΥΙ ΘΝΥ

ΘΝΙ Θ
<ul style="list-style-type: none"> ΥΥΒ Οζ °«²½¬. ±² θι ι ðι ðððι ÷ . - ζ °°´. ½ζ¾´» ¼«®. 21 ¬. - ¬»¬. ° ζ²S ΥΥΒ °ζ. ´ - ¬± »´»®½. -» -«½½»--°«´´SΘ ¼®±°- ±® ζ °°»ζ®- -¬«½µð ι Θι ðóΥι ð ι Θι ðóΥι ζ²¼ ι Θι ðóΥι ®. ´´ ζ´ζ³ ¼«®. 21 ΥΥΒ »´»®½. -»ð ×° ×ύΥ ½±²½«®-ð Ê±´¬ζ¹» Ι®ζ½»- 2»»¼ ΘΝΙ ¾» °»®±®³»¼ð ×° ΥΥΒ ζ- ζ µ²±²² °®±¾´»³- θ»ð¹ðð ½±. ´ ®. ¬. 3. --. 21 ° ζ-»÷ð. . ¬ -±«´¼ ¾» ¾«³°»¼ ±²» -¬»° ζ²¼ ¬»² -¬±°°»¼ ¬± ζ´´±® ×ύΥ Οζ. 2¬²ζ²½» ¬± »ζ´«ζ¬» °±® ζ¼¼. ¬. ±²ζ´ °®±¾´»³- ±² ½±. ´ ¬®ζ½»- °±® ¬ζ¬ ΥΥΒ ×° ζ¼¼. ¬. ±²ζ´ °®±¾´»³- ζ®» °±«²¼ð ¬»² ½±±®¼. 2ζ¬®. ®. ¬. ×ύΥ Οζ. 2¬²ζ²½» ζ²¼ ΙS-¬³ Û²¹. 2»»®. 21 °±® ζ¼¼. ¬. ±²ζ´ ζ½¬. ±²-ð θΥΙ όΒΘΝόι όι ððι όðει ι ÷

ö ι ðι	×Ú ®»´«· ®»¼ ¬± °´ζ½» ΥΥΒ- ±² θ±´¼ Þ«-ð ΙΘΥΘ »²¬»® Ι»½. Ι°»½ ι ðι ðι ðι ð Β½¬. ±² Υ θΥΥΒ- . 2±°»®ζ¾´» ¾«¬ ¬®. °°ζ¾´»ä 2± ΙΥΘ °»²ζ´¬S÷ð
ö ι ðι	×Ú ΥΥΒ- °´ζ½»¼ ±² θ±´¼ Þ«- °±® ζ²S ®»ζ-±²ð ΙΘΥΘ °»®±®³ ¬.» °±´´±®. 21æ ι ðι ðι Ê»®. °S ΥΥΒ- ®»³±ª»¼ °®±³ θ±´¼ Þ«- ι ðι ðι Û´. ¬ ΙΙ ι ðι ðι ðι ðΥð
ι ðι	×Ú ª±´¬ζ¹» ¬®ζ½»- ¼»¬· ®»¼ð ΙΘΥΘ ½±±®¼. 2ζ¬®. ®. ¬. ×ύΥ ¬± °»®±®³ ª±´¬ζ¹» ¬®ζ½»- ½±²½«®»²¬ ®. ¬. ΥΥΒ »´»®½. -»-ð

ENTERGY OPERATIONS INCORPORATED ARKANSAS NUCLEAR ONE

TITLE: POWER OPERATIONS

DOCUMENT NO.
2102.004

CHANGE NO.
031-01-0

SET #

WORK PLAN EXP. DATE
N/A

TC EXP. DATE
N/A

SAFETY-RELATED
☒ YES ☐ NO

IPTE
☐ YES ☒ NO

TEMP ALT
☐ YES ☒ NO

PROGRAMMATIC EXCLUSION PER ENS-LI-101
☐ YES ☒ NO

When you see these TRAPS

Get these TOOLS

Time Pressure
Distraction/Interruption
Multiple Tasks
Over Confidence
Vague or Interpretive Guidance
First Shift/Last Shift
Peer Pressure
Change/Off Normal
Physical Environment
Mental Stress (Home or Work)

Effective Communication
Questioning Attitude
Placekeeping
Self Check
Peer Check
Knowledge
Procedures
Job Briefing
Coaching
Turnover

VERIFIED BY

DATE

TIME

FORM TITLE:

VERIFICATION COVER SHEET

FORM NO.
1000.006A

CHANGE NO.
051-00-0

ENTERGY OPERATIONS INCORPORATED ARKANSAS NUCLEAR ONE

Page 1

TITLE: POWER OPERATIONS		DOCUMENT NO. 2102.004	CHANGE NO. 031-01-0
AFFECTED UNIT: <input type="checkbox"/> UNIT 1 <input checked="" type="checkbox"/> UNIT 2		<input checked="" type="checkbox"/> PROCEDURE <input type="checkbox"/> ELECTRONIC DOCUMENT <input type="checkbox"/> WORK PLAN, EXP. DATE _____	SAFETY-RELATED <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
TYPE OF CHANGE: <input type="checkbox"/> NEW <input checked="" type="checkbox"/> PC <input type="checkbox"/> TC <input type="checkbox"/> DELETION <input type="checkbox"/> REVISION <input type="checkbox"/> EZ EXP. DATE: N/A			
DOES THIS DOCUMENT:			
1. Supersede or replace another procedure? (If YES, complete 1000.006B for deleted procedure.)		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
2. Alter or delete an existing regulatory commitment? (If YES, coordinate with Licensing before implementing.)		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
3. Require a 50.59 Review per Form 1000.006S? (If No, attach completed Form 1000.006S) (If 50.59 Evaluation, OSRC review required.)		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
4. Changes Surveillance Test Program (i.e. Technical Specifications, NRC Commitment, surveillance activity, see Step 7.5)? (If YES, complete 1000.009A)		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
5. Create an Intent Change? (If YES, Standard Approval Process required.)		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
6. Implement or change IPTE requirements? (If YES, complete 1000.143A. OSRC review required.)		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
7. Implement or change a Temporary Alteration? (If YES, then OSRC review required.)		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
Was the Master Electronic File used as the source document?		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
INTERIM APPROVAL PROCESS		STANDARD APPROVAL PROCESS	
ORIGINATOR SIGNATURE: (Includes review of Att. 13) DATE: _____ Print and Sign name: NA PHONE #: _____		ORIGINATOR SIGNATURE: (Includes review of Att. 13) DATE: 3/27/2006 Print and Sign name: DVICK <i>D. Vick</i> PHONE #: 5474	
SUPERVISOR APPROVAL: * N/A DATE: _____		INDEPENDENT REVIEWER: _____ DATE: 3/24/06	
SRO UNIT ONE : ** N/A DATE: _____		ENGINEERING: N/A DATE: _____	
SRO UNIT TWO: ** N/A DATE: _____		Code Programs - NDE: N/A DATE: _____	
Interim approval allowed for non-intent changes requiring no 50.59 evaluation that are stopping work in progress. Standard Approval required for intent changes or changes requiring a 50.59 evaluation. *If change not required to support work in progress, Department Head must sign. **If both units are affected by change, both SRO signatures are required. (SRO signature required for safety related procedures only.)		UNIT SURVEILLANCE COORDINATOR: N/A DATE: _____	
		SECTION LEADER: <i>Roger K. Pueri</i> DATE: 3-30-06	
		QUALITY ASSURANCE: N/A DATE: _____	
		OTHER SECTION LEADERS: N/A DATE: _____	
		OTHER SECTION LEADERS: N/A DATE: _____	
		OTHER SECTION LEADERS: N/A DATE: _____	
OSRC CHAIRMAN/TECHNICAL REVIEWER: <i>Roger K. Pueri</i> DATE: 3-30-06		OTHER SECTION LEADERS: N/A DATE: _____	
FINAL APPROVAL: <i>SMS</i> DATE: 3/31/06		OTHER SECTION LEADERS: N/A DATE: _____	
REQUIRED EFFECTIVE DATE: 4/4/06		OTHER SECTION LEADERS: N/A DATE: _____	
FORM TITLE: PROCEDURE/WORK PLAN APPROVAL REQUEST		FORM NO. 1000.006B	CHANGE NO. 054-00-0

ENTERGY OPERATIONS INCORPORATED
ARKANSAS NUCLEAR ONE

TITLE: **POWER OPERATIONS**

DOCUMENT NO.
2102.004

CHANGE NO.
031-01-0

☒ PROCEDURE

☐ WORK PLAN, EXP. DATE N/A

PAGE 1 OF 1

☐ ELECTRONIC DOCUMENT

TYPE OF CHANGE:

☐ NEW

☒ PC

☐ TC

☐ DELETION

☐ REVISION

☐ EZ

EXP. DATE: N/A

AFFECTED SECTION:
(Include step # if applicable)

Pg 4

DESCRIPTION OF CHANGE: (For each change made, include sufficient detail to describe reason for the change.)

Added CR-ANO-2005-1527-CA8 to references.

Step 9.25

Removed directions for starting Squirt pumps and referred starting of these pumps to Secondary System Chemical Addition (2106.028) which now contains section for starting and priming these pumps.

Att F

Added step 2.0 to verify Main Generator Potential Transformer Space Heater breaker (45LA-12) is closed when MTG is offline for >24 hours or Freeze Protection is in effect.

FORM TITLE:

DESCRIPTION OF CHANGE

FORM NO.
1000.006C

CHANGE NO.
050-00-0

ĐT NÝMÉ NT Ò ĐÒBÒ ÒÑò İİ ĐT òĐòİ	ĐT NÝÜÜÉİ ÜİÉ NT Ò ĐÒBÒ İ İ ÖÜæ ĐÑÉ Üİ NĐÜİ Bİ XÑÒ	ĐBÜÜæ İ ±° èİ ÝĐBÜÜÜæ Đİ İ òĐİ òĐ
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İ òĐ ĐÉİ ĐÑİ Ü

İ ½ - °®±½¼«®» °®±ª. ¼»- . 2-¬®½¬. ±2- °±® ±°»®¬¬. ±2 ±° Ė². ¬ İ ½±ª»
İ Ü °±©»®Ò Ò±²¹Ó¬»®³ Í¬»½¼\$ Í¬¬» x²-»®¬. ±2 Ò. 3. ¬¬ ½²¼ İ®½²¬. »²¬ x²-»®¬. ±2
Ò. 3. ¬¬ °±® Ü®±«°- è ½²¼ Đ YÜB- ¬®» ¬®½µ¼¼ ¬± »²-«®» ½±³°´. ½²½» ©. ¬,
İ İ İ òİ òİ òèò

İ òĐ İ YÑĐÜ

İ ½ - °®±½¼¼«®» °®±ª. ¼»- . 2-¬®½¬. ±2- °±® ®½. -. 2¹ °±©»® °®±³ ¢ İ Ü ¬± İ òĐÜ ½²¼
°±® ®»¼¼½. 2¹ °±©»® °®±³ İ òĐÜ ¬± Ó±¼» Í ò Í¬»½¼\$ -¬¬» ±°»®¬¬. ±2 ½²² ¼»
»-¬½¼´. -¼¼ ½¬ ½²\$ °±©»® ´ªª´ ¼»-®»¼Ò B´. ½´ Í ½²° x²¼»´. ØBÍ x÷ ½±²¬®±´ ½²¼
°«ª´ °®»½±²¼¼. ¬. ±2. 2¹ 1«¼»´. 2»- ¬®» °®±ª. ¼»¼Ò Ó»¬±¼- °±® ½²½²¹. 2¹ ¬¼»
½. 3«¬½´ ´°±©»® ¬. ¬ ½±²¬¬½²¬ -«¼. 2 YĐY- ½²¼ YÑÓİ İ ¬®» ½´-±. 2½´«¼»¼Ò

Ü«» ¬± ¬¼» İ İ ®»-«. ®»³²¬¬ -½¬. -°. »¼ ½²¼ ½±³°´»´. ¬\$ ±° °´½²¬ 3½²»ª»®. 2¹
©. ½² ±½½²«® ©. ´» ®½. -. 2¹ °±©»® ¬± İ òÜ ½²¼ ®»¼¼½. 2¹ °±©»® °®±³ İ òÜÒ ¬¼»-»
-»½¬. ±2- ®»-«. ®» . 2. ¬. ½´. 2¹ ©¼² ½±³°´¬»¼Ò Í¬»°- 1ªª»®2. 2¹ °±©»® 3½²»ª»®-
½±ª» İ òÜ ±® -¬»½¼\$ -¬¬» ±°»®¬¬. ±2- ¼± 2±¬ ®»-«. ®» . 2. ¬. ½´. 2¹Ò

İ òĐ ÜÜİ Yİ XĐİ XÑÒ

İ ½ - 2¹ ®»½¬¬® °±©»® . - 2±®³½´´\$ °»®°±®³»¼ ¼\$ ¼. ´«¬. ±2 ©. ¬. YÜB- 3½. 2¬½. 2. 2¹
B´. ½´ Í ½²° x²¼»´. ØBÍ x÷ 2»½ Ü¬«´. ¼®. «³ Í ½²° x²¼»´. ØÜİ x÷ ½- ½ °«²½¬. ±2 ±°
°±©»®Ò YÜB Ü®±«° è ±® Ü®±«° Đ 3½\$ ¼» °½¬¬. ½´´\$. 2-»®¬¼¼ °±® BÍ x ½±²¬®±´Ò
YÜB- ¬®» ©. ¬¼¼½² ½- BÍ x ¼¼½±³- 3±®» °±¬. ¬ªª» Ø±® ´»- 2»¹½¬ªª»÷ ¼¼«» ¬±
2»«¬®±² °´«´. -¼. Ö. 2 ¬¼» ½±®» ½- °±©»® ´ªª´ . - ®½. -»¼Ò İ ¼» ¬³°»®½¬«®»
¼. °°®»²½² ±° ©½¬® . 2 ¬¼» ½±®» ®. -»- ½²«- 2¹ °±©»® ¬± -¼. Ö ¬±©½¼¼ ¬¼» ½±®»
¼¼¬¬±³ ®»-«´. 2¹ . 2 BÍ x ¼¼½±³. 2¹ 3±®» °±¬. ¬ªª» Ø±® ´»- 2»¹½¬ªª»÷Ò

İ ¼¼½¬. ±2 . 2 ®»½¬¬® °±©»® -¼«´¼ ¼¼ . 2. ¬. ½¬¼¼ ¼\$ ¼±®½¬. ±2 2±®³½´´\$Ò ¼«¬ YÜB-
3½\$ ¼¼ «-»¼ ¬± . 2. ¬. ½¬» °±©»® ®»¼¼½¬. ±2Ò x²-»®¬. ±2 ±° YÜB Ü®±«° è -¼«´¼ ¼¼
«-»¼ . 2. ¬. ½´´\$ ¬± 3½. 2¬½. 2 BÍ x 2»½ Üİ xÒ YÜB Ü®±«° Đ 3½\$ ¼¼ «-»¼ °±® BÍ x
½±²¬®±´ ½- ±«¬´. 2»¼ ½±ª»Ò Í «¼-»«²¬¼¼. ´«¬. ±2 3½\$ ¼¼ ®»-«. ®»¼¼ ½- Ė²±²
°»½µ- ±® ¬± ½±³°»²¬¬» °±® YÜB Ü®±«° è ±® Đ 3±¬. ±2Ò

YÜB Ü®±«° è ±® Đ -¼«´¼ ÒÑİ ¼¼ . 2-»®¬¼¼ ¼¼\$±²¼ ¬¼» Ò±²¹ İ»®³ Í¬»½¼\$ Í¬¬»
x²-»®¬. ±2 Ò. 3. ¬¬ ØÒİ İ İ xÒ÷ °»® YÑÓİ ½²¼ İ İ İ òİ òİ òèò Ø±«ªª»®Ò . °®½°. ¼¼ °±©»®
®»¼¼½¬. ±2 ©. ¬. YÜB- . - 2»½²--½²Ò ¬¼»² . 2-»®¬. ±2 ¼¼\$±²¼ ¬¼» Òİ İ İ xÒ . - ½´´±©»®¼¼
°±® -¼±®¬ °»®. ±¼- . 2 ½½½²¼½²½² ©. ¬ İ ½² İ °½²Ò x²-»®¬. ±2 ¼¼\$±²¼ ¬¼» Òİ İ İ xÒ
-¼±«´¼ ¼¼ 3. 2. 3. İ¼¼ ½²¼BÍ x ½±²¬®±´ -¼±«´¼ ¼¼» ®»-¬±®»¼½ ½- «. ½µ\$ ½-
°®½¬. ½²´Ò

İ ¼» ¬. 3» YÜB- ¬®» ¼¼´±© ¬¼» Ò±²¹ İ»®³ ½²¼ İ ¼±®¬ İ»®³ Í¬»½¼\$ Í¬¬» x²-»®¬. ±2
Ò. 3. ¬¬ -¼½´´ ¼¼» ®»½±¼¼¼¼ ±2 °±®³ İ İ òİ òĐòİ BÒ Ė². ¬ İ YÜB x²-»®¬. ±2 Ò±¹Ò
İ ¼» °±®³- ¬®» ¬¼»² °±®©½¼¼¼ ¬± İ »½¬¬® Ü²¹. 2»»®. 2¹Ò

<p>ĐT NÝmÉ NŦ Õ ĐÔBÒ ÒÑø</p> <p>İİ Đİ òĐĐİ</p>	<p>ĐT NÝYUUEİ ŨÉ NŦ Õ ĐÔBÒ İı ŐŬ</p> <p>ĐNÉ Ũİ NĐŨİ Bİ xNŬ</p>	<p>ĐBŬŬĐ İ ±° Èİ</p> <p>ÝĐBĐŬŬĐ Đİİ òĐİ òĐ</p>
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- YÍ óBĐŬŬŬÍ óİ ĐĐİ òĐÈİİ Ò Ŭ®±°»¼ YŬB ú Đ®±¹®¿³ x²-»®- ±² Ő. 3. -
- YÍ óBĐŬŬŬÍ óİ ĐĐĐŬÍ ĐÈÈĐ ŐÍŦ İ²¼ Í¬¿¹» İ«¼» Đ«²¼´ Ŭ¹®¿¼¿¬. ±²
- Ũİ ĐĐİ İİİ Ò ĐÈİ Ŧ±´´«° Ũİ
- Ũİ ÇÇİ ĐÈĐŨİ Đİ NÝ¿ ½òĐĐŬŬòĐĐĐĐİ òĐİ Ò Í»½±²¼¿®\$ È°®¿¬» °±® Đ±©»® È°®¿¬»
- YÍ óBĐŬŬŬÍ óİ ĐĐİ òĐÇİ È Ő±-- ±° YNŐÍŦ
- Ŭ½¿´±² ´»¬¬»® YŬNİ ĐĐİ òĐĐİ Èİ ĐBĐŬŬŬÍ Ý\$½´ İ È YŬB Đ±¬¬. ¬. ±²- ¬± B½¿. »ª» ¿ İ¿®¹»¬ BÍ xĐ
- YÍ óBĐŬŬŬÍ óİ ĐĐİ óİ İİ Ç Ő. ½»²-»¼ Đ±©»® Ő. 3. - »½»»¼. 2¹ ¹«¼¿²½»
- YÍ óBĐŬŬŬÍ óİ ĐĐÈŬÍ Èİ È YBÈĐ Ŭ²»®¹. İ. 2¹ -®¿²-°±®³»® -°¿½» ¿¿¬»®- ©¿² -®¿²-°±®³»® ½±±´. 2¹ ¹®±«° - »½«®¼

İ Òİ Ŧ»°»®»²½»- È-»¼ . 2 Y±²¶«²½¬. ±² ©. ¬. ¬. - Đ®±½»¼«®»

- Đ´¿²¬ Y±±´¼±©² Đİİ Đİ òĐİ Đ÷
- Í¬¿³ Ŭ²»®¿¬¬® È¿¬»® Y¿»³. -¬®\$ Ő±². ¬±®. 2¹ È². ¬ x x Đİ ĐĐĐĐĐİ Í÷
- YNŐÍŦ N°»®¿¬. ±²- Đİİ ĐÈĐĐİ Í÷
- Ő¿. 2 Ŭ»¼®¿¬»® Đ«³° ¿²¼ ŬÉYÍ N°»®¿¬. ±²- Đİİ ĐÈĐĐĐÈ÷
- İ«¼. 2» Ŭ²»®¿¬¬® N°»®¿¬. ±²- Đİİ ĐÈĐĐĐÇ÷
- Bİ. 3«¬¿´ Đ±©»® İ. ´¬ Y¿½«¿¬. ±² È¬. 2¹ İ¿» YĐY Í\$¬»³ Đİİ Đİ òĐİ È÷
- YŬŬŐ Y±²¬®±´ Í\$¬»³ N°»®¿¬. ±² Đİİ ĐÈĐĐĐÇ÷
- YNŐÍŦ Ő±²¬¿\$ N°»®¿¼. ´¬ \$ İ»¬ Đİİ İ òĐĐİ ÷
- È². ¬ İ®± N°»®¿¬. ±²- Ő±¹- Đİİ ĐÈĐĐĐİ Đ÷
- YĐYñYŬBY N°»®¿¬. ±²- Đİİ ĐÈĐĐĐİ ÷
- Đ´¿²¬ Đ®»óĐ»¿¬«° B²¼ Đ®»óY®. ¬. ½¿´ Y¿»½µ´. -¬ Đİİ Đİ òĐĐİ ÷
- Ő¿. 2 İ«¼. 2» N. ´ N°»®¿¬. ±²- Đİİ ĐÈĐĐĐİ Đ÷
- Ŧ¿½¬. ª. -\$ Đ¿´¿²½» Y¿½«¿¬. ±² Đİİ Đİ òĐĐİ È÷
- Ŭ¹¿¬. °. »® Í\$¬»³ N°»®¿¬. ±²- Đİİ Đİ òĐĐİ È÷
- Í¬¿²¼¿¼ Đ±¬ İ®. ° B½¬. ±²- Đİİ Đİ òĐĐİ ÷
- Đ´¿²¬ Đ¿¿¬«° Đİİ Đİ òĐĐĐİ ÷
- Ŭ³»®¹»²½\$ Ŭ»¼®¿¬»® Í\$¬»³ N°»®¿¬. ±²- Đİİ ĐÈĐĐĐÈ÷
- Í¬¿³ Ŭ«³° B²¼ Đ\$¿¬- Y±²¬®±´ Í\$¬»³ N°»®¿¬. ±²- Đİİ ĐÈĐĐĐÈ÷
- Y±²¼»²-¿¬» ¿²¼ Ŭ»¼®¿¬»® N°»®¿¬. ±²- Đİİ ĐÈĐĐĐİ È÷
- Í¬¿¬«° Y¿¿²»´ İ ¿²¼ İ İ»¬ Đİİ Đİ òİ İ È÷
- Ŭ´½¬®. ½¿´ Í\$¬»³ N°»®¿¬. ±²- Đİİ ĐÈĐĐĐĐİ ÷
- Y±®±®¿¬» Ŭ«»´ Ŧ»´. ¿¼. ´¬ \$ ĐŬŬÍ Đİ ÷
- Ŭ´¿²¼ Í»¿´ Í¬¿³ Í\$¬»³ Đİİ ĐÈĐĐĐİ Í÷
- Í»½±²¼¿®\$ Í\$¬»³ Y¿»³. ½¿´ B¼¼. ¬. ±² Đİİ ĐÈĐĐĐİ È÷
- Í¬¿³ Ŭ²»®¿¬¬® N°»®¿¬. ±²- Đİİ ĐÈĐĐĐÈ÷
- ŬÍŦ B²¼ ŬŬŬBÍ N°»®¿¬. ±²- Đİİ ĐÈĐĐĐİ È÷
- Y¿»³. ½¿´ B¼¼. ¬. ±² Đİİ Đİ òĐĐĐİ ÷
- Ŧ¿¼. ¿¬. ±² Ő±². ¬±®. 2¹ B²¼ Ŭª¿¿¿¬. ±² B´¿³ Í\$¬»³ Đİİ ĐÈĐĐĐİ È÷
- Đ®. 3¿®\$ ¬± Í»½±²¼¿®\$ Ő¿µ¿¹» Đİİ Đİ òĐĐİ È÷
- È². ¬ İ®± N°»®¿¬. ±²- Ő. 2¿® Đ±©»® B¼¶«¬³»²¬ Đİİ ĐÈĐĐÈİ ÷
- Í¿°¬\$ x²¶»½¬. ±² İ¿²µ N°»®¿¬. ±²- Đİİ Đİ òĐĐĐİ ÷

İ Òİ ŐİY Y±³³. -³»²¬-

İ Òİ Òİ ĐÇĐÇÈĐ Ŧ¿½¬¬® İ®. ° ¼«» ¬± »½»»¼. 2¹ YĐY BÍ x ®¿²¹»
Đİİ òĐĐİ ÈĐ ¿²¼ B¬¬¿½¿³»²¬ B÷

İ Òİ Őİ Đİİ Èİ ÇŐ İĐŬ ¿±´¼ °±. 2¬ °±® ´±© °±©»® BÍ x İ®. ° ½±²½»®²-
Đİİ òĐĐİ ÈĐ

ĐĤ ÑŸmÉ ÑĤ Ő ĐÔBÔ ÒÑŋ ĤĤ ĐĤ ĐĐĐĤ	ĐĤ ÑŸŮŮÉĤ ŮñÉ ÑĤ Ő ĐÔBÔ Ĩ Ĩ ŐŮŋ ĐÑÉ ŮĤ ÑĐŮĤ BĤ ×ÑŎ	ĐBŮŮŋ ě ±° ěĤ ŸĐBÔŮŮŋ ĐĤĤ ĐĐĤ ĐĐ
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èòð Ő×Ő×ĤĤ BÔŮ ĐĤ ŮŸBĤĤ ×ÑŎĤ

èòĭ ŐĤ. 2-Ĥ. 2 ŮĤ±®» Ĥ. 2»Ĥ® °±©»®Đ ŸĐŸ 2»«-®±2 °±©»® Ĥ2¼ ŸĐŸ ¼»Ĥ-ĤŎĤ °±©»®
©. Ĥ. 2 ĤĤ ĤĤ¼» ĤŎĤŎĤ 2±-» Ĥ Ĥ. 3. Ĥ- ©. 2 Ĥ¼±ª» ĤĤŮ °±©»®Đ

èòĤ BĤ. ĤĤ ĤĤ°» ×2¼» ĤĐĤ ×÷. 2¼. ½Ĥ-»¼ ¼Ÿ ŸÑŎĤĤ ĐŸĖçĤ çè÷ ĤĤĤ ¼»
3Ĥ. 2-Ĥ. 2¼ ©. Ĥ. 2 ĤĤ ĤŎĤĐÉ Ĥ. 3. Ĥ-Đ

èòĤ ×Ŏ ŸÑŎĤĤ Ĥ. 2±°»®Ĥ¼»®Đ Ĥ. 2 ŸĐŸ Đ×Ů ĤĤè ĤĤĤ ŐÑĤ »Ĥ¼»¼ ĤĤ ĤŎĤĐÉ
Ĥ. 3. Ĥ- ©. Ĥ. Ĥ Ĥ¼±ª» ĤĐŮ °±©»®Đ

èòĤ ŸĐŸ BĤ. 3«ĤĤĤ Ĥ. Ĥ BĤĤ±©Ĥ2½ ĤĤĤ ¼» 3Ĥ. 2-Ĥ. 2¼ 1®ĤĤ-® ĤĤĤ ĤĤ«ĤĤ
ĤĤ. 3«ĤĤĤ Ĥ. Ĥ °»® ĤĤ ĤŎĤŎĤ ×Ŏ ŸÑŎĤĤ ±°»®Ĥ¼»®Đ Ĥ. 2 BĤ. 3«ĤĤĤ Ĥ. Ĥ
ŐĤ12. Ĥ¼» ĐŸĖçĐĐè÷ «-»¼Đ ×Ŏ ŸÑŎĤĤ Ĥ. 2±°»®Ĥ¼»®Đ Ĥ. 2 Ĥ. - -
¼»-»®3. 2¼ ¼Ÿ «- 21 BĤ. 3«ĤĤĤ Đ±©»® Ĥ. Ĥ ŸĤĤĤĤĤ±2 Ė- 21 Ĥ. ŸĐŸ
ĤŸ-»3 ĐĤĤĐĤĐĤĤé÷Đ

èòĖ ×2¼. ½Ĥ- Ĥ2- â ĤŮè ŸĐĤ ±2 ĤĤ-«° ŸĤĤ22»Ĥ- Ĥ±«¼ 2±- ¼» ®»1Ĥ¼¼ Ĥ-
Ĥ½Ĥ«Ĥ-» Ĥ2¼ 2± ½®¼¼ Ĥ- Ĥ±«¼ ¼» ĤĤµ»2 °±® Ĥ±«®½» ®Ĥ21» Ĥ¼. ½Ĥ-¼
½±«2- ®Ĥ-» ©. 2 ®»Ĥ½-® °±©»® Ĥ. 2 °±©»® ®Ĥ21»Đ

èòĖ BĤĤ Ĥ«-¼±©2 ŸŮB- ĤĤĤ ¼» ©. Ĥ. ¼®Ĥ©2 Ĥ± Ů«ĤĤ Ñ«- °±- Ĥ. 2Đ
ĐĤĤ ĤŎĤŎĤè÷

èòĖ ŸŮB Ů®±«°- Ĥ Ĥ. ®±«1 Ĥ- ĤĤĤ ¼» Ő«ĤĤ ±«- Ĥ2¼ ŸŮB Ů®±«°- Ė Ĥ2¼ Đ
Ĥ. 3. Ĥ¼ Ĥ- Ĥ. 2-»®Ĥ. 2 Ĥ. 3. Ĥ-Đ ĐĤĤ ĤŎĤŎĤĐè÷

èòĖ ×Ŏ Ĥ¼±ª» ĤĐŮ °±©»®Đ Ĥ. 2 Ĥ±. ¼ ŸŮB ©. Ĥ. ¼®Ĥ©ĤĤ ±Ŏ 3±®» ĤĤĤ ĤĐ. 2½»-
Ĥ Ĥ2Ÿ ĤĤ 3. 2«-» °»®. ±¼Đ Ĥ. - ®¼¼½»- Ĥ. µ»Ĥ±¼ ±Ŏ Ő«ĤĤĤĤ-
¼«» Ĥ ĤĤ1» Ĥ½ĤĤ °±©»® ¼»2- ĤŸ ½ĤĤ21»- 2»® ŸŮB Ő. 21»®Ĥ. Ő-Đ ŸŮB
3±- Ĥ2 Ĥ±«¼ ±2Ÿ ¼» «-¼ Ĥ Ĥ22-®ĤĤ BĤ × ©. Ĥ. 2 ŮĤ × ½22-®ĤĤ ¼Ĥ2¼ Ĥ2¼
Ĥ±«¼ ¼» ĤĤ© Ĥ2¼ -3±-Ĥ. Đ

èòç Ė. 2 °±©»® ≥ ĤŎĤ Ů Ĥ2¼ ŸŮB- â ĤĤèèè. 2½»- ©. Ĥ. ¼®Ĥ©2Đ 3. -°±- Ĥ. 2¼
ŸŮB- 3ĤŸ ½Ĥ«-» ĤĤ1» ŸĐŸñŸŮBŸ Đ2ĤĤ-Ÿ ŮĤ½-®- Ĥ ¼» ĤŎĤ. ¼» ĤĤ- ©. ĤĤ
1»2»®Ĥ-» ĤĤĤ Ĥ½-®- ®. Đ

èòĤĐ Ė. 2 ±2» ŸŮBŸ Ĥ. ×ŐÑĐŐ ŸĐŸ- «-» °2ĤĤ-Ÿ ŐĤ½-®- ®®±3 ±°»®Ĥ¼» ŸŮBŸ
Ĥ3¼ Ĥ-»ŸĐ Ő±®3ĤĤ ĤĐ -»½2¼ Ĥ. 3» ¼»ĤŸ 2±- ĤªĤ. Ĥ¼»Đ

èòĤĤ Bª»®Ĥ1» ĐĤĤ °®»--«® ĤĤĤ ¼» ¼»-»»2 ĤĤĤ Ĥ2¼ ĤĤĤ °. Ĥ ĐĤĤ ĤŎĤĐè÷Đ
Ő. 3. Ĥ ½22- 2«±«- ±°»®ĤĤ ±2 Ĥ- â ĤĤĤĐ °. Ĥ Ĥ±Ĥ»-- ĤĤ2 ĤĤ±«®-Đ

èòĤĤ ĤĤ½-® ½±±ĤĤ Ĥ½¼ Ĥ1 Ĥ3°»®Ĥ-«® ĐĤ½ ĤĤĤ ¼»
¼»-®»2 ĤĤ Ĥ2¼ ĤĤĐéplŮ ©. 2 ±°»®ĤĤ. 21 Ĥ¼±ª» ĤĐŮ °±©»® ĐĤĤ ĤŎĤĐè÷Đ

èòĤĤ Ĥª» Ĥ±«¼ ¼» 3Ĥ. 2-Ĥ. 2¼ Ĥ- Ĥ®° Ő ĤplŮ «- 21 B-Ĥ½. 32- ŸĐ
ĤŸĤ Ĥ3°»®Ĥ-«® Ė-Đ ĤĤ½-® Đ±©»®Đ

èòĤĤ Đ®»--«®. Ĥ® Ĥª» Ĥ±«¼ ¼» ĤŎ®®±Ĥ. 3Ĥ-»Ÿ Ő®±1®Ĥ33¼ª ĤĤĤ «- 21
B-Ĥ½. 32- ŮŐ Đ®»--«®. Ĥ® Őª» Đ®±1®Ĥ3Đ

ĐT ÑYmÉ NT Ñ ĐÔBÒ ÒÑñ İİ Đİ òĐİ	ĐT ÑYUUÉİ UñÉ NT Ñ ĐÔBÒ İ İ ÖÜñ ĐÑÉ Uİ ÑĐUİ Bİ XÑÖ	ĐBÜÜñ YĐBÖÜÜñ	ê ±° êİ Đİ İ òĐİ òĐ
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èòİ è É»² İ»¿¬±® ½®. ¬. ½¿ ¿²¼ İYÍ İ¿ª» ä ëİ ëpÚò ¬»² İYÍ İ¿ª» - ¿¿´ ¾»
ª»®. °. »¼ ≥ ëİ ëpÚ ¿´ »¿¬ª»®Ş İĐ 3. 2«¬- òİ İ òİ òİ òè÷÷

èòİ è Ü± ÒÑİ ¬¿¿²-°»® 3±®» ¬¿¿² İİ òè ÓÊB ¬± İİ èĐ ©. 2¼. 2¹ ±° ÍÊİ ¬± °®ªª²¬
´±© ª±´¿¿¹»- ±² İPè ¿²¼ İPèò

èòİ è Ó¿. 3«³ ¬ª¿¼Ş ¬¿¿¬ª´±¿¼ ±² ÍÊİ ¿²¼ Ê². ¬ B«· ÈUÓİ . - èèòè ÓÊB ±®
¢ İëİ é ¿³-ò Ó. 2. 3. İ ¿³±«²¬ ±° ¬. 3» ¬. - ¿³°»®¿¹» »½»¼»¼ò

èòİ è Ü±® ¿²Ş . 3. ¬- ¿--±½ ¿¬¼ ©. ¬. °±©»® ´ªª´ . 2¼. ½¿¬ ±²- «-» ¬.»
°±´´±©. 2¹ñ

èòİ èòİ xÜ YÑÓİ İ ¿ª¿. ´¿¾´» ¼«®. 2¹ ¬ª¿¼Ş ¬¿¿¬ª ±°»®¿¬ ±²-ò
İØÜÖ «-» ĐxÜ YÊèĐİ ò

èòİ èòİ xÜ YÑÓİ İ ÒÑİ ¿ª¿. ´¿¾´» ¼«®. 2¹ ¬ª¿¼Ş ¬¿¿¬ª ±°»®¿¬ ±²-ò
İØÜÖ «-» ´¿¹»¬¬ ±° ¬.» °±´´±©. 2¹ °±® °±©»® . 2¼. ½¿¬ ±²ñ

- ĐxÜ İëİ ±® ĐxÜ İéé ±² ¿²Ş ±°»®¿¾´ YĐY Ý¿¿²»´
- Ü½±® Ó. 2»¿® Đ±©»®
- Ó¿²«¿´ ½¿´½«¿¬ ±² ±° Í»½±²¼¿Ş Ý¿´±®. 3»¬®. ½ Đ±©»®

èòİ èòİ Ü«®. 2¹ °±©»® 3¿²»ªª®- «-» YĐY ĐxÜ İééò

èòİ ¸ Ø. 1. Ö±¹ Đ±©»® İ®. ° pŞ° ¿--»- ®»-«®¼ ¬± ¾» ®»³±ª¼ ¿¬ ≤ İĐİ Ü °±©»®
òİ İ İ¿¾´» İĐİ Öİ ÷÷

èòİ ð YĐY İ®. ° pŞ° ¿--»- ®»-«®¼ ¬± ¾» ®»³±ª¼ ¿¬ ≥ İĐİ Ü °±©»®
òİ İ İ¿¾´» İĐİ Öİ ÷÷

èòİ İ Ø¿¿ ¾¿¿¿²½» °±©»® - ¿±«´¼ ¾» ½±²¬®±´´¼ ≤ İĐÜÜò Ö±³¿¿-¬ª¿¼Ş ¬¿¿¬ª^a¿®. ¿¬ ±²- 3¿Ş ¾®. »°´Ş »½»¼ İĐÜÜ ¿²¼ ¿®» ÒÑİ ½±²-¼¼»®¼ . ½²-»
ª. ±´¿¬ ±²- ±® ¾»Ş±²¼ ¬.» ¼»- 12 ¾¿-ò İ.»®» ¿®» 2± . 3. ¬- ±² ¬.»
2«¾¼® ±° ¬. 3»- ¬.»-» 2±³¿´ °«½¬«¿¬ ±²- 3¿Ş ±½½«®Ö ±® ¬.» ¬. 3»
. 2¬»ªª¿´ ¬¿¿¬ 3«¬- »°¿®¿¬- «½.» »½«®- ±²-ò »½»°¬ ¬¿¿¬ñ

- İ.» ¿ª»®¿¹» ¿¿¬ ¾¿¿¿²½» °±©»® ´ªª´ ±ª»® ¿²Ş ». 1. ¬ ±«® °»®. ±¼
ø òò YÊçĐĐèĐè÷ İØBÖÖ ÒÑİ »½»¼ ®¿¬¼ ¬.»³¿´ °±©»®Ö ¿²¼
- İĐİ Ü - ¿±«´¼ 2±¬ ¾» »½»¼¼¼ ¿¬ ¿²Ş ¬. 3»ò

èòĐ ÍÜİ ĐÑxÖİ İ

èòİ İBİ x øĐxÜ İéé÷ B«· ¬®. ° ±° o Đòİ è »²¿¾´¼¼ ©.»² ¿ª»®¿¹» ±°
YĐY ®¿² 2«¬¬±² °´«· . 2°«¬- øĐxÜ- İĐÖ İİ Ö ¿²¼ İİ ÷ »½»¼¼- İéÜ °±©»®ò

ĐT ÑÝmÉ ÑT Ñ ĐÒBÒ ÒÑò İİ ĐT òĐİ	ĐT ÑÝÜÜÉİ ÜñÉ ÑT Ñ ĐÒBÒ İıİ ÖÜæ ĐÑÉ Üİ ÑĐÜİ Bİ ×ÑÖ	ĐBÜÜæ İ é ±° èİ ÝĐBÖÜÜæ Đİİ òĐİ òĐ
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çòð İ B×İ ×ÖÜ ĐÑÉÜİ BÞÑÉÜ İ ðÜ

<p>• Đ'ç²¬ °ç®ç³»¬»®- ³ç§ ¼» ³±². ¬±®¼¼ «¬ ²¹ Ü' . ¼¬ ¬ İ Ñ Êç®. ±«- Đç®ç³»¬»®- Ê- İ »ç½¬±® Đ±®»®ò</p> <p>• Þ±®±² ç¼¶«¬³»²¬ ¼ç¬ç °±® °±®»® ½çç²¹» ³ç§ ¼» ±¼¬ç. ²¼¼ °®±³ İ »ç½¬. a. ¬§ ½«®a»- '±½ç¬¼ . ² Đ'ç²¬ Üç¬ç ¼±±µò</p>	<p>ÖNİ U</p>
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- ö çòİ xÜ ç²§ Ü®±«° è ±® Đ ÝÜB İİĐİ . ²±°»®ç¼' » ¼«» ¬± -°. µ. ²¹ò
İ òB'¬ò »¬½òò
İ ØÜÖ ®»®»® ¬± ÝĐÝñÝÜBÝ Ñ°»®ç¬. ±²- òİİ ðèððĐİ ÷ ¬± °»®±³
¬» » °±'±®. ²¹æ
- xÜ Ü®±«° è ±® Đ ³«¬ ¼» . ²¬»®¬¼ ¼»'±® İİèðèè . ²½»-
BÖÜ ç' . ²±°»®ç¼' İİĐİ - . ² ¹®±«° . ²°«¬ ¬± -ç³» ÝÜBÝò
İ ØÜÖ °'ç½» ç°»½¬¼ ÝÜBÝ . ² ×ÖÑĐ . ² ç' ±°»®ç¼' ÝĐÝ-ò
 - xÜ Ü®±«° è ±® Đ ³«¬ ¼» . ²¬»®¬¼ ¼»'±® İİèðèè . ²½»-
BÖÜ . ²±°»®ç¼' İİĐİ - . ² ¹®±«° . ²°«¬ ¬± ¼±¬, ÝÜBÝ-ò
İ ØÜÖ °'ç½» ¼±¬, ÝÜBÝ- . ² ×ÖÑĐ . ² ç' ±°»®ç¼' ÝĐÝ-
ç²¼ ®»¬®. ½¬ «¬¹» ¬± Ü®±«° è . ² ½½½¼¼ç²½» ©. ¬, İİ İ òİ òİ òèò
 - xÜ Ü®±«° è ±® Đ . ²¬»®¬. ±² ®»¬«®¼ ¼«» ¬± ç ¬ç²¬. »²¬
½±²¼. ¬. ±² ¼»°±®» ÝÜBÝ- ½ç² ¼» °'ç½¼¼ . ² ×ÖÑĐò
İ ØÜÖ ¼»½'ç® ç°»½¬¼ ÝÜBÝ- . ²±°»®ç¼' ®. ² ¹®±«°
. ²¬»®¬¼ ¼»'±® İİèðèè . ²½»-ò

- çòİ Ò±¬. °§ İ »ç½¬±® Ü²¹. ²»»®. ²¹ ±° . ²¬²¬ ¬± ®ç. -» °±®»®ò
- ö çòİ Ê-» B¬¬ç½. ³»²¬ B °±® Bİ × ½±²¬®±' ¼«®. ²¹ °±®»® »-½ç'ç¬. ±²ò
- ö çòİ Ò±². ¬±® Bİ × BÖÜ Bİ İ. ¬ ç- ½ç'½ç'ç¬¼ ¼§ ÝÑÓİİ ç²¼ ½±³°ç®»
¬± ÝĐÝ-ò
- xÜ ¼»¬. ®¼¼ ¬± ç¼¶«¬ ÝĐÝ Bİ İ. ¬ B'±®ç²½» ðĐxÜ ðêİ ÷ ç²¼
ÝÑÓİİ Bİ İ. ¬ øÝÊçððè÷ ¼«®. ²¹ °±®»® »-½ç'ç¬. ±²ò
İ ØÜÖ «¬» B¬¬ç½. ³»²¬ × ±° ¬. - °®±½¼¼«®ò

- ö çòè xÜ Ì »½»¼- èðpÜò
İ ØÜÖ -¬±° °±®»® »-½ç'ç¬. ±² ç²¼ ½±²¬ç½¬ İ §¬»³ Ü²¹. ²»»®ò
- Óİİ İ Üóİİ Þ İİ ¬± ÒĐİ Þ İ»³° ðİ ðèðð÷ Ñİ İİİİ òĐİİİ ò °±. ²¬ İ ç
 - Óİİ İ Üóİİ Þ İİ ¬± ÒĐİ B İ»³° ðİ ðİ İ é÷ Ñİ İİİİ òĐİİİ ò °±. ²¬ İ ð
 - Óİİ İ Üóİİ Þ İİ ¬± ÒĐİ B İ»³° ðİ ðİ İ ð÷ Ñİ İİİİ òĐİİİ ò °±. ²¬ İ İ
 - Óİİ İ Üóİİ Þ İİ ¬± ÒĐİ Þ İ»³° ðİ ðİ èð÷ Ñİ İİİİ òĐİİİ ò °±. ²¬ İ İ

öçòèòİ xÜ Ì »½»¼- èðpÜò
İ ØÜÖ -¬±° °±®»® »-½ç'ç¬. ±² ç²¼ ½±²¬ç½¬ İ §¬»³ Ü²¹. ²»»®ò

çòè xÜ ÝÑÓİİ ±«¬ ±° -»®a. ½»ò
İ ØÜÖ ®»®»® ¬± Ò±-- ±° ÝÑÓİİ òİİ ðİ òĐİ İ ÷ò

- çòé Ü»¬»®³. ²» ³±¬¬ ®»¬®. ½¬. a» ³ç''. ³«³ ®ç¬» °±® °±®»® »-½ç'ç¬. ±² °®±³
»¬»® ±° ¬» » °±'±®. ²¹æ
- Đ±®»® Ü-½ç'ç¬. ±² Ò. ³. ¬- Þç-¼¼ ±² Ü«»' Đ®½±²¼. ¬. ±². ²¹
Ü«¼¼. ²»- øB¬¬ç½. ³»²¬ Bò İ ç¼' Bóİ ÷
 - İ »½±³³»²¼ç¬. ±²- °®±³ İ »ç½¬±® Ü²¹. ²»»®. ²¹

ĐT ÑYmÉ NT Ñ ĐÓBÒ ÒÑ	ĐT ÑYUUÉI ÚnÉ NT Ñ ĐÓBÒ Ì Ì ÓÚ	ĐBÚÚ	İ Ñ ±° èİ
İ İ Đİ òĐİ	ĐÑÉ Úİ ÑĐÚİ BÌ ×ÑÒ	YĐBÒÚÚ	Đİ İ òĐİ òĐ

Çòİ İ Đ®. ±® ¬± ®¿. --. 21 °±©»® ¿½±ª» èðúò ¿¿. 2¬¿. 2 BÍ × ©. ¬¿. 2 o ðòĐİ ±° ÚÍ × ¿¬ ¿ °«2½¬. ±2 ±° °±©»® ´ª»´ «¬. 21 B¬¬¿½. 3»2¬ B ±° ¬¿. - °®±½»¼«®»ò «2´»-- -°»½. °. »¼ ±¬¿»®©. -» ¾§ Í»¿½¬® Ú21. 2»»®. 21ò

Çòİ İ Đ®. ±® ¬± »½»»¼. 21 Ó¿. 2 Y±2¼»2-»® ´. 3. ¬- øèĐİ . 2½¿-ª¿½««3÷ò ª»®. °§ -»½±2¼ Y. ®½«´¿¬. 21 É¿¬»® °«3° øİ ĐÓİ B ±® İ ĐÓİ B÷ ®«22. 21ò

Çòİ è ÉØÚÒ ¢ èðú °±©»®ò
 ÍØÚÒ °¿¿½» Í-«. ®¬ °«3°- . 2 -»®ª. ½» «¬. 21 ¿°°´. ½¿¾´» -»½¬. ±2 ±°
 Í»½±2¼¿®§ Í§¬»»3 Y¿. 3. ½¿´ B¼¼. ¬. ±2 øİ İ ðèòĐİ è÷ò

Çòİ è ÉØÚÒ ¢ èðóèèú °±©»®ò
 ÍØÚÒ ¬¬¿¬ -»½±2¼ Ø¿¿¬»® Ú®¿. 2 °«3° øİ ĐÓèB ±® İ ĐÓèB÷ «¬. 21
 Y±2¼»2-¿¬» ¿2¼ Ú»»¼©¿¬»® Ñ°»®¿¬. ±2- øİ İ ðèòĐİ è÷ò

Çòİ é ÉØÚÒ »¬¿»® ±° ¬¿. » °±´´±©. 21 ½±2¼. ¬. ±2- 3»¬æ

- Í±¬¿´ Ó¿. 2 Ú»»¼©¿¬»® °´±© à İ èòðòð 1°3 øİ ÚÍ Óðéçè÷
- Y±2¼»2-¿¬» Ø¿¿¼»® °®»--«®» à èèò °-. 1 ø¢ èðóèèú °±©»®÷

ÌØÚÒ ¬¬¿¬ ¬¿. ®¼ Y±2¼»2-¿¬» °«3° «¬. 21 Y±2¼»2-¿¬» ¿2¼ Ú»»¼©¿¬»® Ñ°»®¿¬. ±2- øİ İ ðèòĐİ è÷ò

Çòİ è ÉØÚÒ Y±2¼»2-¿¬» Í½. ®½- øİ YÉóðèèİ ¿2¼ İ YÉóðèèİ ÷ °«´´§ ½´±-»¼ò
 BÓÚ . 2¼. ½¿¬»¼ °´±© ¿½±ª» -»¬°±. 2¬ò
 ÍØÚÒ °¿¿½» Y±2¼»2-¿¬» Í½. ®½ ½±2¬®±´´»®- . 2 BÈÌ Ñæ

- İ Ú×Yóðèèİ
- İ Ú×Yóðèèİ

Çòİ Ç xÚ 2»½»--¿®§ ¬± ®»1¿. 2 ¿¼¼. ¬. ±2¿´ ÚÒBÍ ¿¿®1. 2ò
 ÍØÚÒ ¿¼¶«¬¬¿. » °±´´±©. 21 YĐY ½±2¬¿¿2¬- ¿- ¼»--®»¼æ

- Đ±©»®ó»´¿¬¼ ½±2¬¿¿2¬- øĐYBÓ×BÓ ÌÍÚÚò ÑYBÓò ÌĐY÷ «¬. 21 Đ±©»® Í¿21» Ò. 2»¿® B3°´. °. »® Y¿´. ¾®¿¬. ±2 ¿¬ Đ±©»® øİ İ ðèòĐİ İ ÷ò
- Ó¿-- Ú´±© Í¿¬» Y±2¬¿¿2¬- øÚYİ ÷ «¬. 21 B¬¬¿½. 3»2¬ Òò YĐYñYÚBY Ñ°»®¿¬. ±2- øİ İ ðèòĐİ ÷ò
- BÍ Ì. ´¬ ½±2¬¿¿2¬- øĐ×Ú ðèİ ÷ «¬. 21 B¬¬¿½. 3»2¬ × ±° ¬¿. - °®±½»¼«®»ò

Çòİ ð Đ®. ±® ¬± ®¿. --. 21 °±©»® ¿½±ª» éðúò ª»®. °§ YÑÓÍÍ Ú´±© øYÉççİ èY÷ 1°»¿¬»® ¬¿¿2 YĐY °´±© øĐ×Ú İ èè÷ °±® ¿´´ ±°»®¿¾´» YĐY ½¿¿22»´-ò

- xÚ YÉççİ èY ´»-- ¬¿¿2 Đ×Ú İ èè ±2 ¿2§ YĐYò
 ÍØÚÒ ¿¼¶«¬¬ YĐY °´±© «¬. 21 YĐYñYÚBY Ñ°»®¿¬. ±2- øİ İ ðèòĐİ ÷ò

Çòİ İ ÉØÚÒ Í¬¿¿ Ú´±© à éðú ø¢ İ íèè µ¾³ñ¿÷ò
 ÍØÚÒ ª»®. °§ ÚÉ B§°¿--ª¿´ª»- ®¿3° ½´±-»¼æ

- İ Ø×Yóðèèİ ó B ÓÚÉ Í»1 B§°¿--ª¿´ª» øİ YÉóðèèİ ÷
- İ Ø×Yóðèèİ ó B ÓÚÉ Í»1 B§°¿--ª¿´ª» øİ YÉóðèèİ ÷

ĐT ÑÝmÉ ÑT Ò ĐÒBÒ ÒÑò	ĐT ÑÝÙÙÉT ÙnÉ ÑT Ò ĐÒBÒ Ì Ì ÒÙæ	ĐBÙÙæ	Î Ç ±° èÌ
Î Î ÒT òĐĐÌ	ĐÑÉ ÙÎ ÑĐÙÎ BÌ ×ÑÒ	ÝØBÒÙÙæ	ĐT Ì òĐĐÌ òĐ

Î Î ÒT Ì xÚ ÎÝÍ ©. ´´ ¼» ±°»²¼ô
ÎØÙÒ ²±¬. °§ Ý»³. -¬®§ ¬± -¿³°´» ÎÝÍ °±® Ì±¬¿ Ù¿- ¿²¼ Øìæ _____
 Ì±¬¿ ´¿-æ ÁÁÁÁÁÁÁ ½½ñµ¹ Øì æ ÁÁÁÁÁÁÁ Ù ¬±¬¿ ´¿-

Î Î ÒT è xÚ ®»¬«· ®¼ ¬± ½±³³»²½» ¼»¹¿¬. °. ½¿¬. ±²ò
ÎØÙÒ «-» Ù»¹¿¬. °. »® Í§-¬»³ Ñ°»®¿¬. ±²- øT Ì òĐĐÌ è÷ò _____

Î Î ÒT è Í¬¿®¬ ¬»» °±´´±©. ²¹ °«³°-æ
 • Ó±¬±® Í«½¬. ±² °«³° øT ĐĐÌ Ç÷ _____
 • Í¬¿®¬ Ì«®². ²¹ Ù»¿® Ñ. ´ °«³° øT ĐĐéè÷ _____

Î Î ÒT é Ê»®. °§ Ù¿¿²¼ Í»¿´ Í¬¿¿³ °®»--«®» ²±®³¿´ «-. ²¹ Ù¿¿²¼ Í»¿´
 Í¬¿¿³ Í§-¬»³ øT Ì òèòĐĐÌ Ì÷ò _____

ÒNÌ Ù

x° Ù»²»®¿¬±® Ó±¬±® Ñ°»®¿¬¼ Ù. -½±²²½¬ øÒNÙ÷ ½´±-»¼ô ¬»² p®»¿µ»®- èT Ì ò ¿²¼
 èT Ì Ì ¬»±«´¼ ÒNÌ ¼» ±°»² ³±®» ¬¿¿² ±²» ¬»±«® ø³¿´. ³«³ ±° Î ¬»±«®÷ ¬± ³. ². ³. |»
 °±--. ¼. ´. ¬§ ±° °¿¬¬»±ª® ±° ½¿°¿½. ¬±®-ò

Î Î ÒT è xÚ ¼»¬. ®¼ ¬± ¬¿µ» Ó¿. ² Ì«®¼. ²» Ù»²»®¿¬±® ±°°´. ²»
BØÙ ³¿. ²¬¿. ² Î»¿½¬±® ½®. ¬. ½¿´ò
ÎØÙÒ °»®±®³ ¬»» °±´´±©. ²¹æ

Î Î ÒT èÒÌ Í»¼«½» Í»¿½¬±® °±©»® ¿²¼ ¬«®¼. ²» ´±¿¼ ¬± ¼»¬. ®¼
 °±©»® ´ª»´-ò Í»°»® ¬± Ì«®¼. ²» Ù»²»®¿¬±®
 Ñ°»®¿¬. ±²- øT Ì òèòĐĐÇ÷ò _____

Î Î ÒT èÒÎ ÉØÙÒ ¿¬ Î ÒÙ Ì«®¼. ²» ´±¿¼ô
ÎØÙÒ ª»®. °§ Í Ù ´ª»´ -»¬±. ²¬ ®¿³°- °®±³ éĐ ¬± èĐùò _____

Î Î ÒT èÒÌ ÉØÙÒ Î»¿½¬±® °±©»® ©. ¬». ² ¿ª¿. ´¿¼´» ½¿°¿½. ¬§ ±° ÍÙpÝÍ ô
BØÙ ¼»¬. ®¼ °±©»® ´ª»´ ®»¿½»¼ô
ÎØÙÒ °»®±®³ ¬»» °±´´±©. ²¹æ

Bò Ó¿²«¿´§ ¬®. ° Ì«®¼. ²»ò _____

Pò Ê»®. °§ Ù»²»®¿¬±® Ñ«¬°«¬ ¼®»¿µ»®- ±°»²æ
 • è´ÍĐ _____
 • è´ÍÌ _____

Ýò Ê»®. °§ ¬»» °±´´±©. ²¹ ª¿´ª»- ½´±-»¼æ
 • Í¬±° _____
 • Ý±²¬®±´ _____
 • x²¬»®½°¬ Í¬±° _____

Ùò Ê»®. °§ Ù»²»®¿¬±® Ù´½. ¬»® Ù. »¼ ¼®»¿µ»® ±°»²ò _____

Ùò Ê»®. °§ ÍÙpÝÍ p§°¿-- ª¿´ª»- ½±²¬®±´´. ²¹
 ÍñÙ °®»--«®» ¿¬ ±® ²»¿® -»¬±. ²¬ò _____

Đĩ ÑÝmÉ Ñĩ Õ ĐÔBÒ ÒÑø ĩĩ ðĩ òðĩ	Đĩ ÑÝÙÙÉĩ ÒĩÉ Ñĩ Õ ĐÔBÒ ĩ ĩ ÒÙæ ĐÑÉ Ûĩ ÑĐÛĩ Bĩ ×ÑÒ	ĐBÙÙæ ĩ ð ±° èĩ ÝĐBÒÙÙæ ðĩ ĩ òðĩ òð
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<p>ÝBÉĩ ×ÑÒ</p> <ul style="list-style-type: none"> • ĩ Bĩ × B« ĩ Ò. ° øĐ×Û ĩ èé÷ »² ĩ¼´»¼ ¼S © ĩ² »«¬±² °´« ĩª» ĩ¹» °±©»® ±° ĩ éÙ ĩ- ½ ĩ´½« ĩ¬»¼ ¼Sæ ÅøĐ×Û ĩ ð ò Đ×Û ĩĩ ò Đ×Û ĩĩ ÷ ÷ ĩ Åð • Ñ¬¼»® °±©»® . ²¼. ½ ĩ¬. ±²- ³ ĩS ©» ĩ¼ ĩ ¬± èÙ ´±©»® ¬¼ ĩ² © ĩ² °±©»® ò ×° ĩ Bĩ × â ò ðò ĩ è ©¼² © ĩ² °±©»® âĩ éÙò ÝĐÝ ½ ĩ²²»´ ©. ´´ ¬. ° ò

ö ĩĩ òĩ èðĩ	Ó±². ¬±® ÝĐÝ ĩ ĩ² Đ±©»®- «¬. ²¹ Đĩ Bĩ × -½»»² ±² ĐÓĩ ò
ö ĩĩ òĩ èðè	×Û ÝĐÝ ĩ ĩ² Đ±©»® âĩ ù ø ĩª» ĩ¹» ±° Đ×Û ĩ ðò ĩĩ ú ĩĩ ÷ ò <u>İØÙÒ</u> «¬» Đĩ Bĩ × øĐ×Û ĩ èé÷ °±® Bĩ × ½±²¬±´ ò
ö ĩĩ òĩ èðê	Ó±². ¬±® ĩ Bĩ × øĐ×Û ĩ èé÷ BÒÙ Đĩ Bĩ × øĐ×Û ĩ èé÷ ±² ĩ´´ ±° » ĩ¼´» ÝĐÝ-ò
ö ĩĩ òĩ èðé	Ý±²¬. ²«» ĩ » ĩ½¬±® °±©»® ®»¼«½¬. ±² ¬± Çĩ ðÙ «¬. ²¹ ¼±® ĩ¬. ±²ò ÝÛB- ĩ²¼ ĩ ÛpÝĩ ĩ- ²»½»-- ĩ®S ©. ´ ³ ĩ. ²¬ ĩ. ². ²¹ ĩ ĩª» ©. ¬¼. ² ò ĩ pĩ ±° °®±¹® ĩ³ ĩ ĩª» °® Û¼. ¼ ¬ ĩ ò
ĩĩ òĩ èðè	ÉØÙÒ ĩ » ĩ½¬±® °±©»® ´»-- ¬¼ ĩ² ĩ éÙò <u>İØÙÒ</u> ½´±-» Óİ ĩ ĩ¬ ĩ³ ĩ«°°´Sª ĩª»-æ <ul style="list-style-type: none"> • ĩ ÝÉóðĩ ðð • ĩ ÝÉóðĩ èð

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JOB PERFORMANCE MEASUREUNIT: 2 REV #: 011 DATE: _____SYSTEM/DUTY AREA: Abnormal/Emergency OperationsTASK: Perform control element assembly exercise.JTA#: ANO2-RO-CEDM-SURV-13KA VALUE RO: 4.0 SRO: 3.7 KA REFERENCE: 001 A4.03APPROVED FOR ADMINISTRATION TO: RO: X SRO: XTASK LOCATION: INSIDE CR: X OUTSIDE CR: _____ BOTH: _____

SUGGESTED TESTING ENVIRONMENT AND METHOD (PERFORM OR SIMULATE):

PLANT SITE: _____ SIMULATOR: Perform LAB: _____

POSITION EVALUATED: RO: _____ SRO: _____

ACTUAL TESTING ENVIRONMENT: SIMULATOR: _____ PLANT SITE: _____ LAB: _____

TESTING METHOD: SIMULATE: _____ PERFORM: _____

APPROXIMATE COMPLETION TIME IN MINUTES: 10 MinutesREFERENCE(S): OP 2105.009 Rev. 22-01-0

EXAMINEE'S NAME: _____ SSN: _____

EVALUATOR'S NAME: _____

THE EXAMINEE'S PERFORMANCE WAS EVALUATED AGAINST THE STANDARDS CONTAINED IN THIS JPM AND IS DETERMINED TO BE:

SATISFACTORY: _____ UNSATISFACTORY: _____

PERFORMANCE CHECKLIST COMMENTS:

Start Time	Stop Time	Total Time
_____	_____	_____

SIGNED: _____ DATE: _____

SIGNATURE INDICATES THIS JPM HAS BEEN COMPARED TO ITS APPLICABLE PROCEDURE BY A QUALIFIED INDIVIDUAL (NOT THE EXAMINEE) AND IS CURRENT WITH THAT REVISION.

JOB PERFORMANCE MEASURE

THE EXAMINER SHALL REVIEW THE FOLLOWING WITH THE EXAMINEE:

The examiner shall review the "Briefing Checklist - System Walkthrough" portion of OP 1064.023 Attachment 6 with the examinee.

JPM INITIAL TASK CONDITIONS: OP 2105.009 Supplement 2, "CEA Exercise Test" is

completed successfully through step 2.5 for all CEA's except CEA #46. No T-alt is installed on either RSPT
for CEA #46.

TASK STANDARD: CEA #46 has been inserted seven (7) steps (5.25 inches) and withdrawn to the
Proper programmed insertion limit (148.5" withdrawn)

TASK PERFORMANCE AIDS: Copy of partially completed OP 2105.009 Supplement 2.

SIMULATOR SETUP: All CEA's withdrawn to programmed insertion limit (148.5").

JOB PERFORMANCE MEASURE**INITIATING CUE:**

The CRS directs, "Complete the CEA Exercise Test for CEA #46 using OP 2105.009 Supplement 2, Step 2.5."

CRITICAL ELEMENTS (C): 1, 3, 4, 5, 6, 7, 8

START TIME: _____

PERFORMANCE CHECKLIST			STANDARDS	(Circle One)
(C)	1. (Step 2.5.2)	Verify CEA #46 is within 7" of other CEA's in Group 6 throughout exercise.	Using RSPT1, RSPT2 or Pulse counter readings on PMS verify that CEA 46 remains within 7" of all Group 6 CEA's throughout exercise.	N/A SAT UNSAT
	2. (Step 2.5.3)	Select position indication for CEA # 46.	On panel 2C03, CEA #46 displayed on all available CEAC module displays by one of the following methods: - Standard OM, - CEA group plot (Group 6 selected) - CEA values Page 2 - CEA subgroup plot (Group 6 selected)	N/A SAT UNSAT
(C)	3. (Step 2.5.4)	Place the individual CEA selection switches to CEA #46.	On panel 2C03, selected CEA #46. Observed the TENS in "4" and the UNITS in "6". <u>OR</u> Observed CEA #46 individual light ON.	N/A SAT UNSAT
(C)	4. (Step 2.5.5)	Place the mode select switch to MANUAL INDIVIDUAL.	On panel 2C03, placed mode select switch to MI. Observed MI (MANUAL INDIVIDUAL) light ON.	N/A SAT UNSAT
(C)	5. (Step 2.5.6)	Verify CEA #46 at upper electrical limit (UEL).	On insert 2JC-9058, moved CEA 46 to UEL by going to WITHDRAW on CEA insert until #46 upper electrical limit (UEL) red light on. Observed UEL red light ON.	N/A SAT UNSAT

JOB PERFORMANCE MEASURE

PERFORMANCE CHECKLIST			STANDARDS	(Circle One)
(C)	1. (Step 2.5.7)	Insert CEA #46 seven steps (>5").	Inserted CEA seven steps (>5"). Observed insertion of 5.0 inches or greater on CEAC's #1 and #2 displays.	N/A SAT UNSAT
(C)	7. (Step 2.5.8)	Return CEA #46 at upper electrical limit (UEL).	On insert 2JC-9058, moved CEA 46 to UEL by going to WITHDRAW on CEA insert until #46 upper electrical limit (UEL) red light on. Observed UEL red light ON.	N/A SAT UNSAT
(C)	2. (Step 2.5.9)	Insert CEA #46 to Programmed insertion limit.	CEA #46 inserted to programmed insertion limit (UEL + 2 steps). Observed CEA #46 at 148.5" on Pulse counter (149" on CEAC's)	N/A SAT UNSAT
	9. (Step 2.5.10)	Record results.	Using OP 2105.009 Supplement 2 Table 1, recorded the results of CEA #46 exercise.	N/A SAT UNSAT
	10. (Step 2.5.11)	Restore CEDMCS control panel to OFF.	On insert 2JC-9058, selected OFF mode of operation.	N/A SAT UNSAT
END				

JOB PERFORMANCE MEASURE

EXAMINER'S COPY

JPM INITIAL TASK CONDITIONS:

OP 2105.009 Supplement 2, "CEA Exercise Test" is completed successfully through step 2.5 for all CEA's except CEA # 46.

No T-alt is installed on either RSPT for CEA #46.

INITIATING CUE:

The CRS directs, "Complete the CEA Exercise Test for CEA #46 using OP 2105.009 Supplement 2, Step 2.5."

JOB PERFORMANCE MEASURE

EXAMINEE'S COPY

JPM INITIAL TASK CONDITIONS:

OP 2105.009 Supplement 2, "CEA Exercise Test" is completed successfully through step 2.5 for all CEA's except CEA # 46.
No T-alt is installed on either RSPT for CEA #46.

INITIATING CUE:

The CRS directs, "Complete the CEA Exercise Test for CEA #46 using OP 2105.009 Supplement 2, Step 2.5."

ENTERGY OPERATIONS INCORPORATED ARKANSAS NUCLEAR ONE

**TITLE: MAIN FEEDWATER PUMP AND FWCS
OPERATION**

SET #

**DOCUMENT NO.
2106.007**

**CHANGE NO.
023-01-0**

**WORK PLAN EXP. DATE
N/A**

**TC EXP. DATE
N/A**

**SAFETY-RELATED
☒ YES ☐ NO**

**IPTE
☒ YES ☐ NO**

**TEMP ALT
☐ YES ☒ NO**

**PROGRAMMATIC EXCLUSION PER ENS-LI-101
☐ YES ☒ NO**

When you see these TRAPS

Time Pressure
Distraction/Interruption
Multiple Tasks
Over Confidence
Vague or Interpretive Guidance
First Shift/Last Shift
Peer Pressure
Change/Off Normal
Physical Environment
Mental Stress (Home or Work)

Get these TOOLS

Effective Communication
Questioning Attitude
Placekeeping
Self Check
Peer Check
Knowledge
Procedures
Job Briefing
Coaching
Turnover

VERIFIED BY

DATE

TIME

FORM TITLE:

VERIFICATION COVER SHEET

**FORM NO.
1000.006A**

**CHANGE NO.
051-00-0**

**ENTERGY OPERATIONS INCORPORATED
ARKANSAS NUCLEAR ONE**

Page 1

TITLE: MAIN FEEDWATER PUMP AND FWCS OPERATION

**DOCUMENT NO.
2106.007**

**CHANGE NO.
023-01-0**

AFFECTED UNIT:

☐ UNIT 1 ☒ UNIT 2

☒ PROCEDURE

☐ ELECTRONIC DOCUMENT

☐ WORK PLAN, EXP. DATE _____

SAFETY-RELATED

☒ YES ☐ NO

TYPE OF CHANGE:

☐ NEW

☒ PC

☐ TC

☐ DELETION

☐ REVISION

☐ EZ

EXP. DATE: N/A

DOES THIS DOCUMENT:

- | | | |
|---|------------------------------|--|
| 1. Supersede or replace another procedure?
(If YES, complete 1000.006B for deleted procedure.) | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 2. Alter or delete an existing regulatory commitment?
(If YES, coordinate with Licensing before implementing.) | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 3. Require a 50.59 Review per Form 1000.006S?
(If No, attach completed Form 1000.006S) (If 50.59 Evaluation, OSRC review required.) | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 4. Changes Surveillance Test Program (i.e. Technical Specifications, NRC Commitment, surveillance activity, see Step 7.5)? (If YES, complete 1000.009A) | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 5. Create an Intent Change?
(If YES, Standard Approval Process required.) | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 6. Implement or change IPTE requirements?
(If YES, complete 1000.143A. OSRC review required.) | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 7. Implement or change a Temporary Alteration?
(If YES, then OSRC review required.) | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |

Was the Master Electronic File used as the source document?

☒ YES ☐ NO

INTERIM APPROVAL PROCESS

STANDARD APPROVAL PROCESS

ORIGINATOR SIGNATURE: (Includes review of Att. 13) DATE:

Print and Sign name: **NA** PHONE #:

SUPERVISOR APPROVAL: * **N/A** DATE:

SRO UNIT ONE **: **N/A** DATE:

SRO UNIT TWO **: **N/A** DATE:

Interim approval allowed for non-intent changes requiring no 50.59 evaluation that are stopping work in progress.

Standard Approval required for intent changes or changes requiring a 50.59 evaluation.

*If change not required to support work in progress, Department Head must sign.

**If both units are affected by change, both SRO signatures are required. (SRO signature required for safety related procedures only.)

ORIGINATOR SIGNATURE: (Includes review of Att. 13) DATE: 11/11/2005

Print and Sign name: **Nick Ledbetter** PHONE #: **5888**

INDEPENDENT REVIEWER: DATE: **11-14-05**

ENGINEERING: **N/A** DATE:

Code Programs - NDE: **N/A** DATE:

UNIT SURVEILLANCE COORDINATOR: **N/A** DATE:

SECTION LEADER: **Roger K. Pierce** DATE: **11-14-05**

QUALITY ASSURANCE: **N/A** DATE:

OTHER SECTION LEADERS: **N/A** DATE:

OTHER SECTION LEADERS: **N/A** DATE:

OTHER SECTION LEADERS: **N/A** DATE:

OTHER SECTION LEADERS: **N/A** DATE:

OTHER SECTION LEADERS: **N/A** DATE:

OTHER SECTION LEADERS: **N/A** DATE:

OTHER SECTION LEADERS: **N/A** DATE:

OSRC CHAIRMAN/TECHNICAL REVIEWER: **Roger K. Pierce** DATE: **11-14-05**

FINAL APPROVAL: **SM/BA** DATE: **11-14-05**

REQUIRED EFFECTIVE DATE: **11-21-05**

FORM TITLE:

PROCEDURE/WORK PLAN APPROVAL REQUEST

**FORM NO.
1000.006B**

**CHANGE NO.
054-00-0**

**ENTERGY OPERATIONS INCORPORATED
ARKANSAS NUCLEAR ONE**

**TITLE: MAIN FEEDWATER PUMP AND FWCS
OPERATION**

**DOCUMENT NO.
2106.007**

**CHANGE NO.
023-01-0**

☒ **PROCEDURE** ☐ **WORK PLAN, EXP. DATE** N/A

PAGE 1 **OF** 1

☐ **ELECTRONIC DOCUMENT**

TYPE OF CHANGE:

☐ **NEW**

☒ **PC**

☐ **TC**

☐ **DELETION**

☐ **REVISION**

☐ **EZ**

EXP. DATE: N/A

AFFECTED SECTION:
(Include step # if applicable)

DESCRIPTION OF CHANGE: (For each change made, include sufficient detail to describe reason for the change.)

6.4

Changed >20% FEED FLOW LO to HI PWR MODE to say >17% FEED FLOW LO to HI PWR MODE. (1000.006S, # 3) PIF-2-05-851

10.8

Modified text to delete reference to other procedure section. This section did not provide any guidance. Only one button manipulation is required, so no additional detail is needed. Step now reads: Place HIC for affected MFWP Recircs in AUTO as desired. (1000.006S, # 3) PIF-2-05-862

FORM TITLE:

DESCRIPTION OF CHANGE

**FORM NO.
1000.006C**

**CHANGE NO.
050-00-0**

PROC./WORK PLAN NO. 2106.007	PROCEDURE/WORK PLAN TITLE: MAIN FEEDWATER PUMP AND FWCS OPERATION	PAGE: 1 of 63 CHANGE: 023-01-0
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1.0 PURPOSE

Provide description and instructions for operation of Main Feedwater pumps (MFWP), MFWP Lube Oil and Turning Gear systems, and Feedwater Control System (FWCS).

2.0 SCOPE

This procedure provides instructions for normal operations of the Main Feedwater pumps (2P-1A and 2P-1B) and Turbines (2K-2A and 2K-2B), including lube oil and turning gear operations. Instructions for operating the Feedwater Control System are also included.

3.0 DESCRIPTION

Main Feedwater Pumps

The Main Feedwater Pump unit consists of a turbine driver and a centrifugal pump. Both pumps are required for 100% power. One MFW pump can supply > 94% full power flow with 3 condensate pumps and 2 heater drain pumps running. One MFW pump can supply > 95% full power flow with 4 condensate pumps and 2 heater drain pumps running. The procedural limit of $\leq 90\%$ full power for single MFW pump operations provides margin to these limits.

The Main Feedwater pump is a single stage, double suction centrifugal pump with a rated discharge pressure of 1117 psig. The Main Feedwater Pump Lube Oil System lubricates pump bearings. To prevent shaft leakage, pump is supplied with a temperature controlled Shaft Seal Injection System. Source of seal injection water is the Condensate System. A seal bushing and a serrated shaft sleeve control leakage of water along the shaft. Condensate is used to prevent escape of high temperature Main Feedwater from within the pump by forming this seal.

The Main Feedwater Pump Turbine is a six stage, variable speed, condensing turbine that operates under two sets of steam conditions. High pressure steam is supplied to the turbine from the Main Steam System and low pressure steam is supplied from Moisture Separator Reheater (2E-12A) Outlet. High pressure steam is used during initial startup, periods of low HP turbine exhaust flow, and if necessary, during high load requirements. Low pressure steam is used during normal power operations. Gland seal steam and gland exhaust for the Turbines is supplied from Main Turbine Gland Steam and Gland Exhaust Systems.

Turbine Speed Control is accomplished by an Electro Hydraulic Control System (EHC). During startup or manual operations, the Operator electronically controls turbine speed. During automatic operation, the Feedwater Control System controls speed of the turbine. High pressure hydraulic fluid is supplied to the Main Feed Pump Turbines from the main turbine EHC System.

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Feedwater Pump Lube Oil System

Both Main Feedwater pumps and Turbines are serviced by a common Lube Oil System. This system consists of a Lube Oil Reservoir, two AC powered Main Oil pumps (2P-26/27), a DC powered Emergency Oil pump (2P-28), two Lube Oil Filters, two Lube Oil coolers, and Lube Oil Vapor Extractor (2C-17).

The Lube Oil Reservoir provides sufficient storage capacity of lube oil for both Main Feedwater Pump Units. Mounted on the reservoir are three oil pump motors. Inside the reservoir is a selector valve for porting oil through the coolers. The two Main Oil pumps are constant pressure centrifugal pumps. Either oil pump can supply full pressure to the Main Feedwater pumps. During normal operations, one oil pump is operating and the other pump is in standby. Should oil pressure lower to 65 psig, standby pump will auto start. The Emergency Oil pump is identical to other oil pumps with the exception of its driver. The Emergency Oil pump will automatically start if oil supply pressure drops to 47 psig.

The Main Feedwater Pump Lube Oil coolers (2E-22A and 2E-22B) are tube and shell design with lube oil on the shell side and Component Cooling Water on the tube side. During normal operations, only one cooler is in service. Located on the common cooling water outlet line is a Control valve (2CV-5283) which controls CCW flow through the coolers to maintain lube oil temperature.

The Lube Oil Filters (2F-297A and 2F-297B) are stacked disc construction. Each disc is made of a fine screen material. Three way selector valves on the filter inlet and outlet line determine which filter is in service. Lube Oil Vapor Extractor (2C-17) maintains a slight negative pressure in the Lube Oil Reservoir to remove moisture and air. An Oil Separator on the suction of the Vapor Extractor removes any oil present in the vapor. A bypass valve (2LO-47) around the Vapor Extractor is provided to adjust reservoir vacuum.

Feedwater Control System

The Feedwater Control System (FWCS) maintains Steam Generator downcomer water level by controlling feedwater flow rate. This is achieved through simultaneous adjustment of Main Feed Reg valve (MFRV), MFRV Bypass valve and Feedwater Pump speed. This can be performed in either automatic or manual mode. Normal Automatic Mode allows three element control system and digital programs to automatically control level. When in this mode, the individual manual/auto stations and the Master controller are in automatic. This mode is used when automatic S/G level control is desired.

There are three modes of manual operation. In Preferred Manual, the Master controller is in manual and the individual manual/auto stations are in automatic. In this mode, the Operator manually adjusts the Master controller to provide simultaneous manual control of MFRV position, MFRV Bypass valve position, and Feedwater Pump speed. This mode is used when the manual control of valves and pump speed is desired from one station.

In Partial Manual mode, the Master controller is in automatic with one or more individual manual/auto stations in manual. In this mode, the Operator manually adjusts the individual manual/auto stations in manual to control S/G level.

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The Master controller (2FIC-1029/2FIC-1129) for each FWCS is on 2C02. The compensated level signal from the FWCS is the process variable input to the Master controller. The controller has a Manual/Automatic Transfer Button for mode selection. During automatic operation, the DPU compares level input signal to level setpoint signal and generates a flow demand output signal. In manual, push buttons are used to control the output.

Flow demand output signal from each Master controller is supplied to both FWCSs. The higher of the two flow demand signals is supplied to the pump speed program. The flow demand output signal is also supplied to the valve position programs of the MFRV and Bypass valve controlled by that FWCS.

Each FWCS is equipped with a Reactor Trip Override (RTO) feature. The purpose of RTO is to prevent abnormal Pressurizer level drops due to overcooling of the RCS by limiting the feedwater flow rates after a reactor trip thus limiting the amount of cold water added to the Steam Generators.

CEDMCS undervoltage coils 1 and 2 supply the reactor trip signal to FWCS 1 and undervoltage coils 3 and 4 supply the signal to FWCS 2. Each FWCS also supplies the signals that it receives to the other FWCS and to the SDBCS.

The RTO signal causes the Feedwater Pump speeds to be reduced to the minimum automatic setpoint (3150 rpm) and the Main Feed Reg valves to ramp closed at 1.4% per second. The MFRV Bypass valves will cycle based on RCS Tave. Tave of 548.24°F will result in 2.24% flow demand and 19% valve position. Tave of 552°F will result in 6% flow demand and 50.7% valve position. The FWCS will slowly return the Steam Generators to their normal level. When S/G level > 55% and > 60 sec from TRIP, the RTO signals are automatically removed.

If the FWCSs are being operated with Master controllers in manual, the RTO signals will still perform their functions, but when RTO clears the flow demand will return to the Master controller value. If individual manual/auto stations are in manual, the RTO signals can NOT perform their function and the operator must manually control pump speed and valve position to minimize RCS cooldown.

A High Level Override (HLO) feature is provided in each FWCS to aid in preventing moisture carryover from the S/G to the Main Turbine. HLO actuates $\geq 82\%$ and clears $\leq 80\%$. This HLO signal causes the affected MFRV and Bypass valve to close. Both MFWPs will still be controlled by the higher flow demand signal from the two FWCS. If the individual manual/auto stations are in manual, the HLO signals can NOT perform their function and the operator must manually control pump speed and valve position to minimize moisture carryover.

Main Feedwater Regulating valves (MFRV)

The MFRVs are air operated valves that, in conjunction with other components, maintain S/G level within the proper band. These valves receive a close signal on RTO and HLO. They can be operated in auto by the FWCS, in manual with the controller, or by insertion of the locking pin to allow valve operation with the handwheel.

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Main Feedwater pump (MFWP) Recirc valve and Condensate Recirc valve

A MFWP trip results in lower flow through the pump, causing the associated recirc valve to open in an attempt to maintain flow. The opening recirc valve may result in MFWP suction pressure lowering enough to autostart the standby condensate pump. Additionally, the idle MFW pump will NOT go on the turning gear with its recirc valve open, due to the wind milling action of recirc flow through the pump.

ERCN1 to ER-ANO-2001-0212 was implemented to maximize feedwater flow to steam generators, allowing more time for operator response to prevent a plant trip. Upon a MFWP trip, the recirc valve controller will close the valve and send a digital trip signal to the associated condensate recirc valve controller, thereby closing both recirc valves. The MFWP trip signal is taken from the MFWP discharge pressure transmitters (2PT-0747 and 2PT-0739, respectively). This trip signal is operator adjustable and is intended to be set at ~ 850 PSIG with the MFWP in service and ~ 500 PSIG with MFWP NOT in service. This analog current signal is fed to the associated MFWP recirc valve controller and also provides MFWP discharge pressure indication on the recirc valve controller display.

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4.0 REFERENCES

4.1 References Used in Procedure Preparation:

- MFWP Tech Manuals D055.0040, G080.3240, G080.3740
- NCP 980547N203, SG Replacement Changes for FWCS/RRS
- NCP 975122N201, High High Cntmt Pressure Isolation of MFW
- ER 992050E201 & Calc 00-E-0002-02 CS-FW Evaluation and Analysis
- CR-ANO-2-2000-1052, CCW alignment to MFWPLO coolers
- ER980547N207, ANO2 PUR PPS/CPC Setpoint Mods
- ER980547N208, ANO2 Condensate and FW System Setpoint Mods.
- ER-ANO-2001-0212-000, FW/Cond Recirc Controller Upgrades
- Calculation Revision Notice 02-151
- ER-ANO-2005-0248, MFP suction strainer installation
- CR-ANO-2-2005-1336, Water Hammer While Admitting Steam to MFWP
- CR-ANO-2-2005-1339, Resetting Relays in MFWP Turbine EHC Cabinets

4.2 References Used in Conjunction with this Procedure:

- Condensate And Feedwater Operations (2106.016)
- Electrohydraulic Oil System Operation (2106.012)
- Component Cooling Water System Operations (2104.028)
- Lube Oil Transfer and Purification (2106.001)
- Control of Infrequently Performed Tests or Evolutions (1000.143)

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5.0 LIMITS AND PRECAUTIONS

- 5.1 Maximum oil temperature rise across bearing should NOT exceed 50°F.
- 5.2 Oil temperature returning from bearing should not exceed 180°F.
- 5.3 Bearing metal temperatures should NOT exceed 200°F.
- 5.4 When MFWP to be uncoupled, then pump and turbine shall be isolated to prevent rotation except with turning gear or an approved test procedure.
- 5.5 Main Feedwater pump design maximum speed is 5050 rpm.
- 5.6 If MFWP Turbine EHC Trouble Alarm locked in or meter relays not reset, then MFWP may not rise in speed above LSS.
- 5.7 Rapid transients should be avoided with FWCS in manual.
- 5.8 When FWCS testing or troubleshooting in progress, consideration should be given to the following:
 - Place appropriate controllers in manual.
 - Remove appropriate analog inputs from service.
- 5.9 When controllers for valves and pumps are in manual, respective component will not respond to High Level Override or Reactor Trip Override.
- 5.10 If either regulating valve or bypass valve isolated when FWCS in service, consideration should be given to the following:
 - Respective controller should be left in manual with demand at system value for present flow demand.
 - Isolated valve should not be stroked with Fischer Porter controller unless associated regulating valve or bypass valve first placed in manual. This will prevent valve tracking function causing valve that is in service to stroke.
- 5.11 Automatic setpoint for MFWP Recirc controllers (2FIC-0735 and 2FIC-0742) should be set for ≥ 3000 gpm to protect MFWPs from low flow.
- 5.12 Wait at least 90 seconds between resetting of both Digital Process Units.
- 5.14 For normal two pump operation, the Δp limit for Main Feed Pump suction strainers is 7 psid. Design differential pressure is 28 psid.
- 5.15 With Main Feed Pump suction strainers installed, avoid continuous operation with pump speed in the following ranges:
 - 2167 to 2200 rpm
 - 4033 to 4067 rpm
- 5.16 IF unexplained rise noted in oil reservoir,
THEN investigation should include possible leak
(Lube Oil cooler, MFWP seal leak or improper valve lineup).
- 5.17 MFPT Lube Oil filter Δp limit is 10 psid.

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6.0 SETPOINTS

6.1 Main Feedwater Pump Turbine Trips:

- MSIS 1 or 2
- CSAS 1 or 2
- Main Turbine Trip (Selected pump only)
- Low Flow < 4000 gpm (30 second time delay)
- Manual Trip (2C02, Turbine Front Standard)
- Overspeed 110%
- Thrust Bearing Wear (Active) > 13 psig (2 out of 2)
- Thrust Bearing Wear (Inactive) > 13 psig (2 out of 2)
- High Exhaust Pressure (Low Vacuum) > 13.4 HgA (2 out of 2)
- Low-Low Suction Pressure < 325 psig with 30 second time delay (2 out of 3)
- High Discharge Pressure > 1250 psig at pump discharge, AND > 1300 psig at EITHER 2E-1A or 2E-1B outlet
- Low Turbine Lube Oil Pressure (permissive < 8 psig, trip < 4 psig)
- Low Pump Lube Oil Pressure (permissive < 8 psig, trip < 4 psig)

6.2 The following conditions must exist to latch MFWP Turbine:

- EH supply pressure > 1500 psig
- MSIS AND CSAS clear
- Pump Casing differential temperature < 25°F.
- HP stop valve closed
- LP stop valve closed
- Control Valve Operating Assembly in full closed position.
- The other MFWT LP stop valve closed or 2 Cond. pumps running.
- BOTH Instrument AC Panels 2Y1 AND 2Y2 energized.

6.3 Main Feed Pump Lube Oil System Interlocks

- The Standby Main Oil pump (2P-26 or 2P-27) starts at < 65 psig.
- The Emergency Oil pump (2P-28) starts at < 47 psig.
- MFWP Turning gear trips on low bearing oil pressure.
- MFWP Turning gear will NOT engage Casing Δ Temp \geq 25°F.

6.4 Steam Generator level setpoints

- Steam Generator High Level Trip > 85.8%
- Steam Generator Low Level Trip < 22.2%
- High Level Override > 82.0%
- S/G Level deviation-Selected Level > 5% from Setpoint
- > 17% FEED FLOW LO to HI PWR MODE
- S/G level Setpoint ramps 60-70% at Turbine FSP ~ 25%

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7.0 MAIN FEEDWATER PUMP LUBE OIL SYSTEM OPERATIONS

7.1 Lube Oil System Startup

7.1.1 Initial Conditions

- A. Valves aligned using Attachment A of this procedure.
- B. CCW available to Lube Oil coolers using Startup section of Component Cooling Water System Operations (2104.028).
- C. MFWP Lube Oil Reservoir (2T-34) level (2LIS-0396) greater than +2 inches in the level band.
- D. Lube Oil Temperature controller (2TIC-5283) aligned as follows:
 - In AUTO.
 - Set to maintain bearing inlet temperature ~ 120°F.

7.1.2 Verify Vapor Extractor (2HS-0330 for 2C-17) running.

7.1.3 Adjust Vapor Extractor Bypass valve (2LO-47) to maintain ~ 1/2 inch of H₂O vacuum in 2T-34 on 2PI-9800.

7.1.4 Start selected MFWP Lube Oil pump:

- 2P-26
- 2P-27

7.1.5 Verify oil pressure > 70 psig at LO MFPT Filters Inlet (2PI-2604).

7.1.6 Verify Δp between LO MFPT Filters Inlet (2PI-2604) and LO MFPT Filters Outlet (2PI-2606) \leq 8 PSID.

7.1.7 Check oil flow at bearings:

- 2K-2A Active Thrust Brg Wear (2FO-0372)
- 2K-2A Inactive Thrust Brg Wear (2FO-0374)
- 2K-2B Active Thrust Brg Wear (2FO-0370)
- 2K-2B Inactive Thrust Brg Wear (2FO-0371)

7.1.8 Verify the following:

- Non-running MFWP Lube Oil pump (2P-26 or 2P-27) in NORMAL AFTER STOP
- Emergency Oil pump (2P-28) in NORMAL AFTER STOP

7.1.9 Test Auto Start of MFWP Oil pumps using Supplement 6.

7.1.10 IF desired to place MFWP LO Reservoir Side Stream Filtration Unit (2F-498) in service, THEN use Lube Oil Transfer and Purification (2106.001).

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7.2 Shifting MFWP Lube Oil Filters:

7.2.1 IF placing Lube Oil Filter (2F-297A) on line,
THEN perform the following:

- * A. Monitor filter outlet pressure at all times during this operation using LO MFPT Filters Outlet (2PI-2606).
- * B. IF lube oil pressure lowers,
THEN place original filter on line.
- C. Unlock and open Lube Oil Filters 2F-297A/B Inlet Selector valve (2LO-51) until indicator moves ~ 90° toward 2F-297A.
- D. Vent 2F-297A by throttling open Lube Oil Filter 2F-297A Vent (2LO-1014) until solid stream issues.
- E. WHEN 2F-297A is filled and vented,
THEN close 2LO-1014.
- F. Fully position 2LO-51 to 2F-297A.
- G. Lock 2LO-51.
- H. Submit WR/WO to replace 2F-297B.

7.2.2 WHEN new 2F-297B installed,
THEN perform the following:

- A. Unlock and open 2LO-51 until indicator moves ~ 90° toward 2F-297B.
- B. Fill and vent 2F-297B by throttling open Lube Oil Filter 2F-297B Vent (2LO-1016) until solid stream issues.
- C. Close 2LO-1016.
- D. Check 2F-297B for leaks.
- E. Fully position 2LO-51 to 2F-297A.
- F. Lock 2LO-51.

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7.2.3 IF placing Lube Oil Filter (2F-297B) on line,
THEN perform the following:

- * A. Monitor filter outlet pressure at all times during this operation LO MFPT Filters Outlet (2PI-2606).
- * B. IF lube oil pressure lowers,
THEN place original filter on line.
- C. Unlock and open Lube Oil Filters 2F-297A/B Inlet Selector valve (2LO-51) until indicator moves ~ 90° toward 2F-297B.
- D. Vent 2F-297B by throttling open Lube Oil Filter 2F-297B Vent (2LO-1016) until solid stream issues.
- E. WHEN 2F-297B filled and vented,
THEN close 2LO-1016.
- F. Fully position 2LO-51 to 2F-297B.
- G. Lock 2LO-51.
- H. Submit WR/WO to replace 2F-297A.

7.2.4 WHEN new 2F-297A has been installed,
THEN perform the following:

- A. Unlock and open 2LO-51 until indicator moves ~ 90° toward 2F-297A.
- B. Fill and vent 2F-297A by throttling open Lube Oil Filter 2F-297A Vent (2LO-1014) until solid stream issues.
- C. Close 2LO-1014.
- D. Check 2F-297A for leaks.
- E. Fully position 2LO-51 to 2F-297B.
- F. Lock 2LO-51.

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7.3 Shifting MFWP Lube Oil coolers

7.3.1 Start Standby MFWP Oil pump (2P-26 OR 2P-27) as follows:

- Place 2P-26 handswitch (2HS-0331) in NORMAL AFTER START.
- Place 2P-27 handswitch (2HS-0332) in NORMAL AFTER START.

*7.3.2 Monitor MFWP Lube Oil temperature on PMS points T0374 and T0371 while shifting coolers.

7.3.3 Verify the following valves open to align CCW to BOTH MFWP Lube Oil coolers:

- 2E-22A MFWP LO HX Supply (2CCW-46)
- 2E-22A MFWP LO HX Return (2CCW-47)
- 2E-22B MFWP LO HX Supply (2CCW-44)
- 2E-22B MFWP LO HX Return (2CCW-45)

7.3.4 Verify FME Zone 1 controls implemented for accessing lube oil sump per Foreign Material Exclusion Program (1000.060).

7.3.5 Slowly open Lube Oil Cooler X-Connect (2LO-67) until oil issues out of Standby Lube Oil Cooler Constant Vent.

7.3.6 Slowly shift Lube Oil Cooler Inlet Selector (2LO-49) to Standby cooler. (Arrow aligned to pumps = 2E-22A aligned/arrow aligned to control panel = 2E-22B aligned. Refer to Exhibit 8, CCW to MFWPLO Cooler Alignment).

7.3.7 Isolate CCW to off-line cooler as follows:

- IF 2E-22A off-line cooler (refer to previous step),
THEN close 2CCW-46.
- IF 2E-22B off-line cooler (refer to previous step),
THEN close 2CCW-44.

7.3.8 Close 2LO-67.

7.3.9 Secure Standby MFWP Oil pump started at first step of this section (2P-26 OR 2P-27) as follows:

- Place 2P-26 handswitch (2HS-0331) in NORMAL AFTER STOP.
- Place 2P-27 handswitch (2HS-0332) in NORMAL AFTER STOP.

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7.4 Lube Oil System Shutdown

7.4.1 Verify BOTH MFWP Turbines have been on turning gear at least two hours to ensure rotors have cooled.

7.4.2 IF vacuum to be maintained
AND exhaust trunk can NOT be isolated,
THEN isolate lube oil as follows:

- A. Stop Vapor Extractor 2C-17 (2HS-0330).
- B. Place BOTH MFWP Turning gears in PULL TO LOCK:
 - 2HS-0353 for 2K-7A
 - 2HS-0333 for 2K-7B
- C. Install Danger Tags to isolate Lube Oil to Pump/Turbine as desired.
- *D. Monitor bearing temperatures on 2TR-0325 OR PMS.
Do NOT exceed 220°F bearing temperature.

7.4.3 IF vacuum to be maintained on main condenser,
THEN install Danger Tags to isolate the following components:

- MFWP Turbines gland seal
- Gland exhaust
- Exhaust trunk

7.4.4 Isolate gland seal steam to MFWP Turbines by closing the following valves:

- Gland Seal Supply to 2K-2A (2GS-2)
- Gland Seal Supply to 2K-2B (2GS-4)

7.4.5 Place BOTH MFWP Turning gears in PULL TO LOCK:

- 2HS-0353 for 2K-7A
- 2HS-0333 for 2K-7B

7.4.6 Place the following pumps in PULL TO LOCK:

- Standby Main Oil pump (2P-26 OR 2P-27):
 - 2HS-0331 for 2P-26
 - 2HS-0332 for 2P-27
- Emergency Oil pump 2HS-0351 (2P-28).

7.4.7 Place operating Main Oil pump in PULL TO LOCK:

- 2HS-0331 for 2P-26
- 2HS-0332 for 2P-27

7.4.8 Stop Vapor Extractor 2C-17 (2HS-0330) as desired.

7.4.9 Secure MFWP LO Reservoir Side Stream Filtration Unit (2F-498) as desired using Lube Oil Transfer and Purification (2106.001).

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8.0 MFWP TURNING GEAR OPERATIONS

8.1 Placing MFWP on Turning gear

- 8.1.1 Verify MFWP Lube Oil System in operation per Main Feedwater Pump Lube Oil System Operations section of this procedure.
- 8.1.2 Verify seal water supplied to MFWP per Attachment C of Condensate and Feedwater Operations (2106.016).
- 8.1.3 Check turbine at low speed (Low Speed Switch amber light on).
- 8.1.4 Reset turning gear lockout relay:
 - 2W032 for 2K-7A
 - 2W033 for 2K-7B

NOTE

MFWT rotor is considered bowed if it sits idle with Gland Steam admitted for more than one hour.

- 8.1.5 IF rotor considered bowed,
THEN perform the following:
 - A. Engage turning gear locally.
 - B. Rotate shaft ~ 90° every 15 minutes until one complete revolution achieved.
 - * C. Monitor for abnormal noise during performance of following steps to place rotor on turning gear.
- 8.1.6 Verify selected MFWP Turning gear motor running:
 - 2K-7A
 - 2K-7B
- 8.1.7 Place selected MFWP Turning gear handswitch in NORMAL AFTER START:
 - 2HS-0353 for 2K-7A
 - 2HS-0333 for 2K-7B
- 8.1.8 IF turning gear fails to engage,
THEN perform the following:
 - Manually engage turning gear using manual lever.
 - Verify WR/WO submitted.

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8.2 Securing MFWP Turning gear

8.2.1 Place selected MFWP Turning gear handswitch in PULL TO LOCK:

- 2HS-0353 for 2K-7A
- 2HS-0333 for 2K-7B

8.2.2 Verify selected MFWP Turning gear disengages:

- 2K-7A
- 2K-7B

9.0 MAIN FEEDWATER PUMP STARTUP

9.1 Initial Conditions

- Selected MFWP on turning gear.
- MFWP Low Flow Bypass switches in BYPASS.
- Bias indication on both MFWP speed controllers ≥ 0.0 .
- MFWP Lube Oil Temperature controller (2TIC-5283) in AUTO at $\sim 120^{\circ}\text{F}$.
- Valves aligned using Condensate And Feedwater Operations (2106.016).
- Two Condensate pumps in operation per 2106.016.
- EHC System in operation using Electrohydraulic Oil System Operation (2106.012).
- All MFWP Turbine reset permissives clear per Section 6.0.
- Gland Seal aligned using Gland Seal Steam System (2106.013).
- IF starting first MFWP,
THEN Preferred Trip Selector switch (2HS-0352) selected to pump NOT being started.
- MFWP recirc valve controllers (2FIC-0742 and 2FIC-0735) MFWP/CNDP Recirc Auto Close setpoint (pg 3 of controller) set to ~ 500 psig.

9.2 IF selected MFWP discharge to casing differential temperature $\geq 25^{\circ}\text{F}$, THEN perform the following:

9.2.1 Verify selected MFWP Turning gear NOT engaged:

- 2K-7A
- 2K-7B

9.2.2 Establish recirc flow through selected MFWP by opening manual recirc warm-up valve:

- For A MFWP: 2FW-6C
- For B MFWP: 2FW-6D

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CAUTION

The following step will bypass interlocks that prevent rolling MFWP when casing differential temperature $\geq 25^{\circ}\text{F}$. Do NOT roll MFWP.

9.2.3 IF above step NOT desired or NOT adequate,
THEN establish flow through selected MFWP by cracking open MFWP Recirc valve to maintain minimum pump flow:

- For A MFWP: 2CV-0741 with 2FIC-0735
- For B MFWP: 2CV-0749 with 2FIC-0742

9.2.4 WHEN selected MFWP casing differential temperature $< 25^{\circ}\text{F}$,
THEN the following may continue:

- Turning gear operation
- Pump startup

9.3 Verify the following at Main Feedwater Pump Control insert on 2CO2:

- Power lamp on
 - AT LSS lamp on
- | | <u>2K-2A</u> | <u>2K-2B</u> |
|------------------------|--------------|--------------|
| • HP stop valve closed | 2CV-0321A | 2CV-0316A |
| • LP stop valve closed | 2CV-0350 | 2CV-0330 |
| • Control valve closed | 2CV-0351 | 2CV-0331 |

9.4 Check Main Steam to MFWP valve open for pump being started:

- For A MFWP: 2CV-0320
- For B MFWP: 2CV-0315

9.4.1 IF valve closed with Main Steam Header pressurized,
THEN manually throttle open to equalize pressure and prevent water hammer using Conduct of Operations (1015.001).

9.4.2 WHEN pressure across valve equalized,
THEN open selected valve.

9.5 Open the following valves on 2C12:

	<u>A pump</u>	<u>B pump</u>
• HPSV Above Seat Drain	2CV-0321	2CV-0316
• HPSV Below Seat Drain	2CV-0317	2CV-0314
• LPSV Below Seat Drain	2CV-0327	2CV-0312
• LPSV Above Seat Drain	2CV-0326	2CV-0311
• First Stage Shell Drain	2CV-0322	2CV-0307
• LP Steam Drain	2CV-0328	2CV-0328

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- 9.6 Verify selected MFWT Speed controller (2HIC-0321 or 2HIC-0310) aligned as follows:
- In MANUAL
 - Output demand at zero
- 9.7 Verify selected MFWP Recirc (2CV-0741 or 2CV-0749) throttled open.
- 9.8 IF manual recirc warm-up valves 2FW-6C and 2FW-6D opened in Step 9.2, THEN close the following valves:
- 2FW-6C
 - 2FW-6D
- 9.9 Latch selected MFWP turbine by momentarily depressing Reset pushbutton AND check the following:
- Associated Feed Pump Trip annunciator (2K03-A8 or A11) clears.
- | | | |
|-----------------------|--------------|--------------|
| | <u>2K-2A</u> | <u>2K-2B</u> |
| • HP stop valve opens | 2CV-0321A | 2CV-0316A |
| • LP stop valve opens | 2CV-0350 | 2CV-0330 |
- 9.10 IF selected MFWP Turbine does NOT latch, THEN refer to EXHIBIT 1.
- 9.11 Reset all meter relays in MFWP Turbine EHC cabinets 2C36 and 2C37 by depressing push buttons above respective meters.
- 9.12 Depress RAISE pushbutton on selected MFWP Turbine until turning gear disengages at ~ 200 rpm or until speed reaches 500 rpm.
- 9.13 Secure MFP Turning Gear as follows:
- 9.13.1 Verify Low Speed Switch amber light off.
- 9.13.2 Verify Turning Gear stopped. (Auto stops 5 seconds after disengaging.)
- 9.13.3 IF securing A MFP, THEN locally check engaging solenoid core exposed ~2 inches.
- IF engaging solenoid NOT exposed ~2 inches, THEN disengage turning gear by pulling engaging handle DOWN.
- 9.13.4 IF securing B MFP, THEN locally check engaging solenoid core exposed ~1 inch.
- IF engaging solenoid NOT exposed ~1 inch, THEN disengage turning gear by pulling engaging handle UP.

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9.14 Trip selected MFWP and check the following:

- Associated Feed Pump Trip annunciator (2K03-A8 or A11) alarms.
- HP stop valve closes

<u>2K-2A</u>	<u>2K-2B</u>
2CV-0321A	2CV-0316A
- LP stop valve closes

2CV-0350	2CV-0330
----------	----------
- Control valve closes

2CV-0351	2CV-0331
----------	----------
- AT LSS lamp on

9.15 Latch selected MFWP turbine by momentarily depressing Reset pushbutton AND check the following:

- Associated Feed Pump Trip annunciator (2K03-A8 or A11) clears
- HP stop valve opens

<u>2K-2A</u>	<u>2K-2B</u>
2CV-0321A	2CV-0316A
- LP stop valve opens

2CV-0350	2CV-0330
----------	----------

9.16 Raise selected turbine speed by depressing RAISE pushbutton until AT HSS lamp is illuminated and verify the following:

CAUTION

Avoid continuous operation of MFPs between 2167 and 2200 rpm.

- Selected Turbine speed is between 800 and 2500 rpm.
- Adequate pump recirculation flow (1 gpm/1 rpm) for selected turbine.
- Condensate Pump discharge pressures between 680 and 700 psig.
- AUTO lamp is on for selected Turbine.

9.17 Close valves opened in Step 9.5 for running MFWP:

- | | <u>A</u> pump | <u>B</u> pump |
|---------------------------|---------------|---------------|
| • HPSV Above Seat Drain | 2CV-0321 | 2CV-0316 |
| • HPSV Below Seat Drain | 2CV-0317 | 2CV-0314 |
| • LPSV Below Seat Drain | 2CV-0327 | 2CV-0312 |
| • LPSV Above Seat Drain | 2CV-0326 | 2CV-0311 |
| • First Stage Shell Drain | 2CV-0322 | 2CV-0307 |
| • LP Steam Drain | 2CV-0328 | 2CV-0328 |

9.18 IF placing second MFWP in service,
THEN GO TO Placing the Second MFWP in Service.

9.19 WHEN ready to feed Steam Generators with MFW,
THEN GO TO FWCS Controller Operations (Transfer from Manual to Auto).

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10.0 PLACING THE SECOND MFWP IN SERVICE

- 10.1 Verify Main Feedwater Pump Startup section completed through step 9.17.
- 10.2 Verify Condensate header pressure 650 to 750 psig.
- 10.3 Verify S/G levels and flows stable enough to place second MFWP on line.
- 10.4 Verify selected MFWP flow maintained ~ 1 gal/1 rpm at all times.
- 10.5 Slowly raise incoming pump speed until pump speed controller demand matches Speed tracking Demand for respective FWCS.
 - WHEN automatic operation desired,
THEN place speed controller for this pump in Automatic.
- 10.6 WHEN flow and S/G levels stabilized,
THEN bump selected MFWP Recirc closed while performing the following:
 - 10.6.1 Between bumps allow flows and S/G levels to stabilize.
 - 10.6.2 Continue bumping selected MFWP Recirc until closed.
- 10.7 Adjust MFWP/CNDP Recirc Auto Close setpoint for both MFWP recirc valve controllers (pg 3 of controller) to ~ 850 psig:
 - 2FIC-0742
 - 2FIC-0735

CAUTION

Avoid continuous operation of MFPs in the following speed ranges:

- 2167 to 2200 rpm
- 4033 to 4067 rpm

- 10.8 Place HIC for affected MFWP Recircs in AUTO as desired.

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11.0 MAIN FEEDWATER PUMP SHUTDOWN

CAUTION

Removing a MFP from service will result in the suction strainer Δp on the in service MFP rising by a factor of four. Refer to Attachment I.

- 11.1 Verify power within capacity of feed pump to remain in service:
- MFW \leq 90%
 - AFW \sim 4%
 - EFW \sim 3%
- 11.2 Adjust MFWP/CNDP Recirc Auto Close setpoint for BOTH MFWP recirc valve controllers (pg 3 of controllers) to \sim 500 psig:
- 2FIC-0742
 - 2FIC-0735
- 11.3 Verify MFWP Turbine Preferred Trip Select switch (2HS-0352) selected to pump being shutdown.
- 11.4 Take manual control of MFWP Speed controller (2HIC-0321 or 2HIC-0310) to be removed from service and slowly lower pump speed.
- 11.5 Verify the following:
- S/G levels maintained between 40 and 80%.
 - Selected MFWP minimum flow maintained (\sim 1 gal/1 rpm).
 - Condensate header pressure maintained 650 to 750 psig by manually controlling 2FIC-0663 OR 2FIC-0662.
- 11.6 IF desired to minimize O₂ ingress into condenser
OR raise system reliability,
THEN idle selected MFWP at minimum speed.
- 11.7 WHEN selected MFWP at minimum speed
AND desired to secure pump,
THEN trip selected MFWP and check the following:
- Associated Feed Pump Trip annunciator (2K03-A8 or A11) alarms.
- | | | |
|------------------------|--------------|--------------|
| | <u>2K-2A</u> | <u>2K-2B</u> |
| • HP stop valve closes | 2CV-0321A | 2CV-0316A |
| • LP stop valve closes | 2CV-0350 | 2CV-0330 |
| • Control valve closes | 2CV-0351 | 2CV-0331 |
| • AT LSS lamp on | | |
- 11.8 Close MFWP Recirc valve for pump being secured:
- For A MFWP: 2CV-0741 with 2FIC-0735
 - For B MFWP: 2CV-0749 with 2FIC-0742
- 11.9 Verify Condensate pump discharge pressure between 650 and 750 psig.
- 11.10 Check proper performance of Feedwater Control System.
- 11.11 WHEN selected MFWP speed lowers to \sim 0 rpm,
THEN verify MFWP Turning gear engages per Section 8.0 of this procedure

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12.0 FWCS CONTROLLER OPERATIONS (TRANSFER FROM AUTO TO MANUAL)

NOTE

Manual always tracks automatic in Feedwater Control System to provide bumpless transfer from Automatic to Manual at any time.

12.1 IF desired to transfer Master controller to MANUAL,
THEN perform the following:

12.1.1 Depress M/A button.

12.1.2 Depress RAISE or LOWER as necessary to change demand.

12.2 IF desired to transfer Individual controller to MANUAL,
THEN perform the following:

12.2.1 Depress M/A pushbutton.

12.2.2 Depress RAISE or LOWER as necessary to change demand.

13.0 FWCS CONTROLLER OPERATIONS (TRANSFER FROM MANUAL TO AUTO)

13.1 Verify S/G NR level within 2% of setpoint.

13.2 Verify Steam Generator NR Level stable.

NOTE

If a signal is reset, then Signal RESET will be WHITE and selector box will indicate NORMAL. Signal RESET will be BLUE with Point ID RED if signal needs to be reset. (CR-ANO-2-2004-0008)

13.3 On EWS, verify the following:

- All Signal RESETs, on all Signal Validation Screens Reset per appropriate Attachment, OR reason known AND desired to continue.
- NO unexplained alarms present
- KEY in OPERATE AND Removed.

13.4 IF using MFWP
AND SDBCS operating with any valves in automatic
AND Master Setpoint > 1000 psia,
THEN perform the following:

13.4.1 Place SDBCS Master setpoint in local.

13.4.2 Slowly adjust SDBCS Master setpoint to 1000 psia or less.

13.4.3 Slowly raise Feed Pump speed to ~ 3150 rpm.

13.4.4 Verify Feed Pump discharge pressure greater than SG pressure.

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13.5 IF FWCS valves in manual,
THEN perform the following:

13.5.1 Display FW flow demand tracking for 'A' and 'B' FWCS at either of the following locations:

- On page 2 of MFWP Speed Fisher Porter controllers
- On PMS point (FWFDMDT1 or FWFDMDT2)

13.5.2 Match Flow Demand on Master controller to within 1% of Flow Demand Tracking value.

13.5.3 Place controller for selected valve in automatic.

13.5.4 Check selected valve position remains constant from manual to automatic.

13.5.5 Place Master controller in automatic.

13.5.6 Verify Flow Demand on Master output responding to control S/G level.

13.5.7 WHEN desired to place second valve in automatic,
THEN perform the following:

A. Verify both valve positions close to respective positions desired by FWCS.

B. Place controller for second valve in automatic.

CAUTION

Avoid continuous operation of MFPs in the following speed ranges:

- 2167 to 2200 rpm
- 4033 to 4067 rpm

13.6 WHEN desired to place first MFWP speed controller in automatic,
THEN perform the following:

13.6.1 Display Speed Demand Tracking on page 2 of respective MFRV controller OR on PMS (PMPDMDTA or PMPDMDTB).

13.6.2 Slowly adjust demand on Feed Pump speed controller to match Speed Demand Tracking value.

13.6.3 Place Feed Pump Speed controller in automatic.

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14.0 MAIN FEED REGULATING VALVE OPERATIONS

14.1 To establish local control, perform the following:

- 14.1.1 Establish radio communications with Control Room.
- 14.1.2 Align hole in operating sleeve with hole in MFRV stem by adjusting handwheel.
- 14.1.3 Insert locking pin.
- 14.1.4 Open Instrument Air Actuator Equalizing valve.
- 14.1.5 Position MFRV as directed by Control Room.
- 14.1.6 IF desired to isolate Instrument Air to MFRV positioner, THEN close local isolation valve next to positioner, ~ 6 inches above floor.

14.2 To restore remote control, perform the following:

- 14.2.1 Establish radio communications with Control Room.
- 14.2.2 Verify IA aligned to selected MFRV positioner.
- 14.2.3 Close Instrument Air Actuator Equalizing valve.
- 14.2.4 Inform Control Room that pin will be removed for selected MFRV.
- 14.2.5 Remove pin.
- 14.2.6 Manually jack sleeve fully upward.

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15.0 MAIN FEEDWATER PUMP RECIRC VALVE MANUAL OPERATION

- 15.1 To establish local control of Main Feedwater Pump Recirc valves, perform the following:
 - 15.1.1 Establish radio communications with Control Room.
 - 15.1.2 Unscrew and remove coupling at top of manual override shaft.
 - 15.1.3 Place HIC for affected MFWP Recirc in MANUAL.
 - 15.1.4 Turn handwheel clockwise to expose actuator shaft
 - Align and slide coupling onto shaft.
 - 15.1.5 Close Instrument Air supply valve to valve operator.
 - 15.1.6 Open Instrument Air Equalizing valve around valve operator.
 - 15.1.7 Turn handwheel to position valve as desired.
- 15.2 To restore remote control of Main Feedwater Pump Recirc valves, perform the following.
 - 15.2.1 Establish radio communications with Control Room.
 - 15.2.2 Verify the following for associated MFWP Recirc:
 - HIC in MANUAL with 0 output
 - MFWP Recirc closed
 - 15.2.3 Close Instrument Air Equalizing valve around valve operator.
 - 15.2.4 Open Instrument Air Supply to valve operator.
 - 15.2.5 Attempt to relieve coupling tension by applying small air signal to valve.
 - 15.2.6 IF unable to relieve coupling tension in previous step, THEN slowly rotate handwheel for selected MFWP Recirc until coupling tension relieved.
 - 15.2.7 Remove coupling from actuator shaft and inform Control Room valve no longer pinned.
 - 15.2.8 Turn handwheel counterclockwise to fully extend manual override shaft.
 - Reinstall coupling at top of shaft.

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16.0 OPERATION OF MFWP SEAL WATER CONTROLLERS

16.1 Verify MFWP Seal Water aligned per Attachment C of Condensate and Feedwater Operations (2106.016).

16.2 IF verifying operation of 2P-1A Seal Water controllers,
THEN perform the following:

16.2.1 Verify IA aligned to the following MFWP Seal Water controllers:

- 2P-1A Seal Water Supply Pressure controller (2PC-0737)
- 2P-1A Inboard Seal Supply Temperature controller (2TIC-0733)
- 2P-1A Outboard Seal Supply Temperature controller (2TIC-0755)

16.2.2 Verify 2PC-0737 maintaining seal water pressure (2PI-0737) slightly greater than MFWP suction pressure (2PI-0735/P0735).

16.2.3 Verify the following temperature controllers maintaining seal water outlet temperature ~170°F:

- 2TIC-0733 (inboard)
- 2TIC-0755 (outboard)

16.3 IF verifying operation of 2P-1B Seal Water controllers,
THEN perform the following:

16.3.1 Verify IA aligned to the following MFWP Seal Water controllers:

- 2P-1B Seal Water Supply Pressure controller (2PC-0745)
- 2P-1B Inboard Seal Supply Temperature controller (2TIC-0773)
- 2P-1B Outboard Seal Supply Temperature controller (2TIC-0775)

16.3.2 Verify 2PC-0745 maintaining seal water pressure (2PI-0745) slightly greater than MFWP suction pressure (2PI-0742/P0742).

16.3.3 Verify the following temperature controllers maintaining seal water outlet temperature ~170°F:

- 2TIC-0773 (inboard)
- 2TIC-0775 (outboard)

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ATTACHMENT A

MFWP LUBE OIL LINEUP

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
MAIN FEEDWATER PUMP LO RESERVOIR 2T-34							
2LO-49	Lube Oil Coolers 2E-22A/B Inlet Selector Valve	M2216 C6 SH 2	MFWP LUBE OIL SKID, W SIDE OF 2T-34, UNDER LID ON TOP	(2)			
2LO-67	Lube Oil Coolers 2E-22A/B X-Connect	M2216 C6 SH 2	MFWP LUBE OIL SKID, W SIDE OF 2T-34, UNDER LID ON TOP	CLOSED			
2LO-1014	Lube Oil Filters 2F-297A Vent	M2216 D7 SH 2	MFWP LUBE OIL SKID, S SIDE OF 2T-34, ON TOP OF FILTER 2F-297A, 4 FT FROM FLOOR	CLOSED			
2LO-51	Lube Oil Filters 2F-297A/B Inlet Selector Valve	M2216 D7 SH 2	MFWP LUBE OIL SKID, 1 FT S OF 2T-34, BETWEEN FILTERS 2F-297A/B, 5 FT UP	(3)			
2LO-1016	Lube Oil Filter 2F-297B Vent	M2216 D7 SH 2	MFWP LUBE OIL SKID, S SIDE OF 2T-34, ON TOP OF FILTER 2F-297B, 4 FT FROM FLOOR	CLOSED			
2LO-1013	Lube Oil Filter 2F-297A Drain	M2216 D7 SH 2	MFWP LUBE OIL SKID, S SIDE OF 2T-34, 1 FT N AND 1 FT BELOW LO COOLER 2E-22A	CLOSED			
2LO-1019	Lube Oil Filters 2F-297A/B Inlet Selector Drain	M2216 D7 SH 2	MFWP LUBE OIL SKID, S SIDE OF 2T-34, 1 FT BELOW LO COOLER 2E-22A, 3 FT FROM FLOOR	CLOSED			
2LO-1015	Lube Oil Filter 2F-297B Drain	M2216 D7 SH 2	MFWP LUBE OIL SKID, S SIDE OF 2T-34, 1 FT N AND 1 FT BELOW LO COOLER 2E-22A	CLOSED			
2LO-1011	Lube Oil Cooler 2E-22A Drain	M2216 C7 SH 2	MFWP LUBE OIL SKID, S SIDE OF 2T-34, 1 FT BELOW LO COOLER 2E-22A, 2.5 FT FROM FLOOR	CLOSED			
2LO-1012	Lube Oil Cooler 2E-22B Drain	M2216 C7 SH 2	MFWP LUBE OIL SKID, S SIDE OF 2T-34, E END OF LO COOLER 2E-22B, 2 IN FROM FLOOR	CLOSED			
2LO-2604	Lube Oil Filters Inlet 2PI-2604 Isol	M2216 D7 SH 2	MFWP LUBE OIL SKID, INSIDE CABINET ON TOP OF 2T-34, BEHIND 2PI-2604	OPEN			
2LO-2606	Lube Oil Filters Outlet 2PI-2606 Isol	M2216 D7 SH 2	MFWP LUBE OIL SKID, INSIDE CABINET ON TOP OF 2T-34, BEHIND 2PI-2606	OPEN			
PLATFORM ABOVE AUX FW PUMP 2P-75							
2LO-47	Vapor Extractor 2C-17 Bypass	M2216 E3 SH 2	PLATFORM ABOVE AUX FW PUMP 2P-75, 2 FT ABOVE GRATING	(1)			
MAIN FEEDWATER PUMP A FRONT STANDARD							
2LO-53A	MFV A Pump/Turbine Supply Isol	M2216 F5 SH 2	MFWP A FRONT STANDARD, SE CORNER UNDER PLATE	OPEN			
2LO-2609A	MFWP A LO Press Trip 2PI-2609A Isol	M2216 F5 SH 2	MFWP A FRONT STANDARD, IN LOWER CABINET AT SE CORNER OF 2K2A GAUGE BOARD 2C103	OPEN			
2LO-2607A	MFWP A Oil Press Control 2PI-2607A Isol	M2216 H6 SH 2	MFWP A FRONT STANDARD, IN LOWER CABINET AT SE CORNER OF 2K2A GAUGE BOARD 2C103	OPEN			
2LO-2603A	MFWPT A LO Supply 2PI-2603A Isol	M2216 G7 SH 2	MFWP A FRONT STANDARD, IN N SIDE OF 2K2A GAUGE BOARD 2C103, 3 FT UP	OPEN			

(1) Adjust 2LO-47 to maintain ~ 0.5" H₂O in 2T-34.

(2) Aligned to desired cooler. 2LO-49 arrow pointing toward pumps = 2E-22A aligned. 2LO-49 arrow pointing toward control panel = 2E-22B aligned. (Refer to EXHIBIT 3, CCW TO MFWPLO COOLER ALIGNMENT)

(3) Aligned to desired filter.

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MFWP LUBE OIL LINEUP

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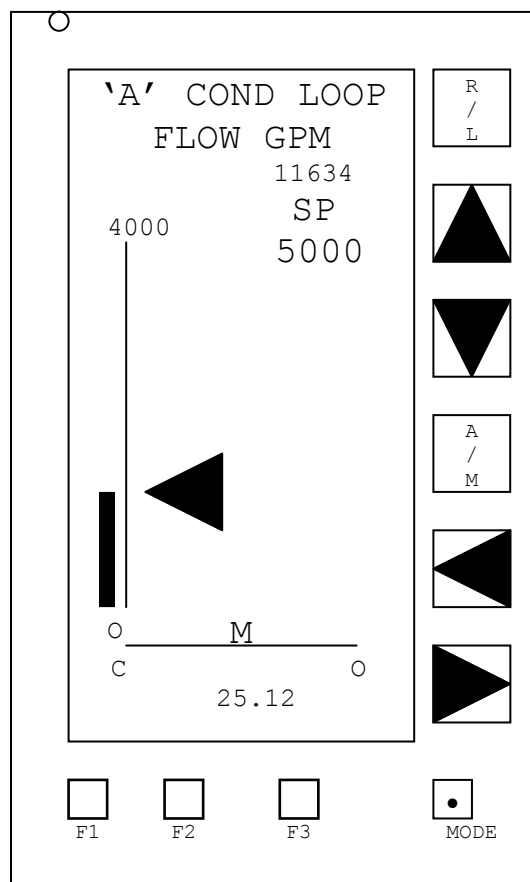
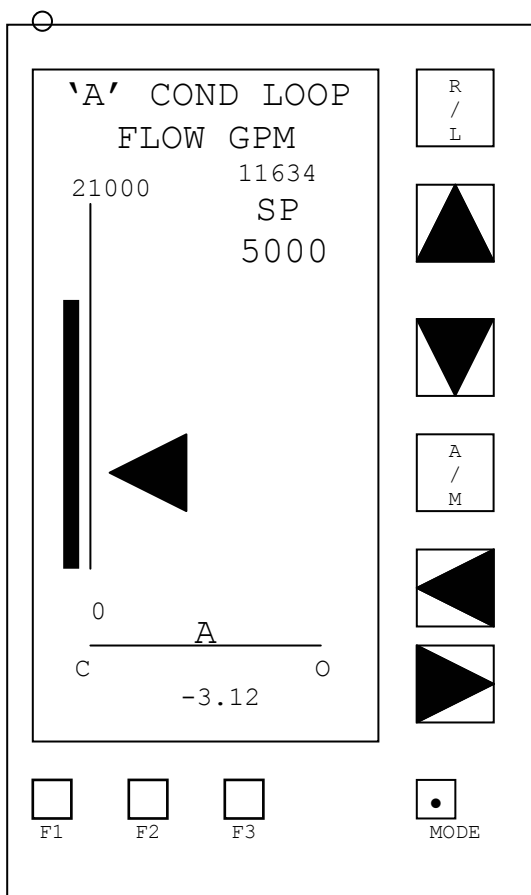
COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
2LO-2608A	MFWP A LO Press to Bearings 2PI-2608A Isol	M2216 F7 SH 2	MFWP A FRONT STANDARD, IN N SIDE OF 2K2A GAUGE BOARD 2C103, 6 FT UP	OPEN			
2LO-2603B	MFWPT A LO Supply 2PT-2603A Isol	M2216 G7 SH 2	MFWP A FRONT STANDARD, IN N SIDE OF 2K2A GAUGE BOARD 2C103, 3 FT UP	OPEN			
2LO-3005	MFWPT A LO Supply 2PI-2603A Test Conn	M2216 F7 SH 2	MFWP A FRONT STANDARD, IN N SIDE OF 2K2A GAUGE BOARD 2C103, 2 FT UP	CLOSED			
2LO-3006	MFWP A LO Press to Bearings 2PI-2608A Test Conn	M2216 F7 SH 2	MFWP A FRONT STANDARD, IN N SIDE OF 2K2A GAUGE BOARD 2C103, 2 FT UP	CLOSED			
2LO-2603E	MFWPT A LO Supply Press 2PT/PI-2603A Isol	M2216 G7 SH 2	MFWP A FRONT STANDARD, IN N SIDE OF 2K2A GAUGE BOARD 2C103, 2 FT UP	OPEN			
MAIN FEEDWATER PUMP B FRONT STANDARD							
2LO-53B	MFW B Pump/Turbine Supply Isol	M2216 F4 SH 2	MFWP B FRONT STANDARD, SE CORNER UNDER PLATE	OPEN			
2LO-2609B	MFWP B LO Press Trip 2PI-2609B Isol	M2216 G4 SH 2	MFWP B FRONT STANDARD, IN LOWER CABINET AT SE CORNER OF 2K2B GAUGE BOARD 2C104	OPEN			
2LO-2607B	MFWP B Oil Press Control 2PI-2607B Isol	M2216 H4 SH 2	MFWP B FRONT STANDARD, IN LOWER CABINET AT SE CORNER OF 2K2B GAUGE BOARD 2C104	OPEN			
2LO-2608B	MFWP B LO Press to Bearings 2PI-2608B Isol	M2216 F3 SH 2	MFWP B FRONT STANDARD, IN N SIDE OF 2K2B GAUGE BOARD 2C104, 6 FT UP	OPEN			
2LO-2603C	MFWPT B LO Supply 2PT-2603B Isol	M2216 G2 SH 2	MFWP B FRONT STANDARD, IN LOWER CABINET AT SE CORNER OF 2K2B GAUGE BOARD 2C104	OPEN			
2LO-2603D	MFWPT B LO Supply 2PI-2603B Isol	M2216 G2 SH 2	MFWP B FRONT STANDARD, IN N SIDE OF 2K2B GAUGE BOARD 2C104, 2 FT UP	OPEN			
2LO-3003	MFWPT B LO Supply 2PT-2603B Test Conn	M2216 F3 SH 2	MFWP B FRONT STANDARD, IN N SIDE OF 2K2B GAUGE BOARD 2C104, 2 FT UP	CLOSED			
2LO-3004	MFWP B LO Press to Bearings 2PI-2608B Test Conn	M2216 F3 SH 2	MFWP B FRONT STANDARD, IN N SIDE OF 2K2B GAUGE BOARD 2C104, 2 FT UP	CLOSED			
2LO-2603F	MFWPT B LO Supply Press 2PT/PI-2603B Isol	M2216 G3 SH 2	MFWP B FRONT STANDARD, IN N SIDE OF 2K2B GAUGE BOARD 2C104, 2 FT UP	OPEN			
2LO-1026	MFWP LO Return Line Sample	M2216 F6 SH2	20 FT N MFWP B FRONT STANDARD, UNDER CATWALK NEAR WEST WALL, 6 FT UP FROM FLOOR	CLOSED			

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ATTACHMENT B

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CONDENSATE RECIRC CONTROLLER



F1: Disables and enables same train MFP LO DISCH Pressure condition.
F2: Scrolls through displays.
F3: Used to clear any reverse video alarm conditions indicated on controller.
Remote/Local: No effect.
Setpoint Keys: Adjusts controller setpoint.
A/M: Selects automatic or manual operating modes.
Output Keys: Adjusts controller output when in manual.
Heartbeat Pulse: (Upper Left Hand Corner) - Flashing light indicates controller functioning. If NOT flashing, controller may be locked up.

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Condensate pumps 2P-2A and 2P-2C have common recirculation line back to High Pressure Condenser 2E-11A through Condensate pump Recirculation valve 2CV-0663. This valve is air operated valve whose solenoid is powered from 2Y1-40. Condensate pumps 2P-2B and 2P-2D recirculate flow back to 2E-11A through Condensate pump Recirculation valve 2CV-0662 that is powered from 2Y2-25. Each valve is controlled from its own flow indicating controller (FIC) located on 2C02 in Control Room. These controllers are designated 2FIC-0662 and 2FIC-0663.

During normal operation with respective FIC in AUTO, valves will modulate from full closed to full open as Condensate header flow deviates below setpoint of 5000 gpm. These flow devices determine actual Condensate header flow for train by subtracting Heater Drain pump discharge flow from Main Feedwater pump suction flow and adding Condensate Recirc flow. This derived Condensate pump flow will then be used by controller as its process variable to be controlled at controller's adjustable setpoint value. Condensate flow calculation does NOT consider flow to Startup & Blowdown DI or Condensate filter.

When controller is in automatic and any of Condensate pump discharge pressures rise to > 753 psig, controller's output will go to full recirc flow condition. Reverse video "DSCH PRESS HI" will flash at bottom of display. Auto indication will flash reverse video "A". Once high pressure condition clears, flashing will stop and "DSCH PRESS HI" will be displayed in reverse video. Auto indication will return to normal. Pushing F3 button at bottom of screen will clear reverse video "DSCH PRESS HI" indication on screen.

When controller is in manual and high discharge pressure input is received, controller's output will NOT change. Reverse video "DSCH PRESS HI" will flash at bottom of display. Auto indication will flash reverse video "M". Once condition clears, flashing will stop and "DSCH PRESS HI" will be displayed in reverse video. Manual indication will return to normal. Pushing F3 button at bottom of screen will clear reverse video "DSCH PRESS HI" indication on screen. When this condition is active controller can transfer between auto and manual via A/M button but when placed in auto controller output will go to maximum recirc flow condition.

When controller is in automatic and low MFP discharge pressure input is received, controller's output will go to no recirc flow condition. Pressure at which this occurs is determined by manual input to respective side MFP Recirc valve Fisher Porter controller. A "T" will be displayed at bottom of screen when actual MFP discharge pressure drops below setpoint on respective MFP Recirc Valve controller. Once condition clears, "T" indication will clear. Auto control function will return to normal. If in manual and low discharge pressure input is received, controller's output will NOT change. A "T" will be displayed at bottom of screen. Once condition clears, "T" indication will clear.

When this condition is active controller can transfer between auto and manual via A/M button but when placed in auto controller output will go to no recirc flow condition. MFP low discharge pressure function can be bypassed by pressing F1 button when condition is active.

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If bypassed, flashing reverse video "T" will be displayed at bottom of screen. While bypassed, controller will function normally with only high discharge pressure input having ability to override controller. If function is bypassed, pressing F1 button again will take controller out of bypass.

When controller is in automatic and total loop flow drops below 2000 GPM, controller's output will go to full recirc flow condition. Auto indication will flash reverse video "A". Once condition clears, auto indication will return to normal. If in manual and total loop flow drops below 2000 GPM, controller's output will NOT change. Manual indication will flash reverse video "M". Once condition clears, manual indication will return to normal. When this condition is active controller can transfer between auto and manual via A/M button but when placed in auto controller output will go to full recirc flow condition.

When in automatic and any condition occurs Operator can take controller to manual and override any automatic actuation with exception of all Condensate pumps tripped.

Condensate Pump Recirc Valves

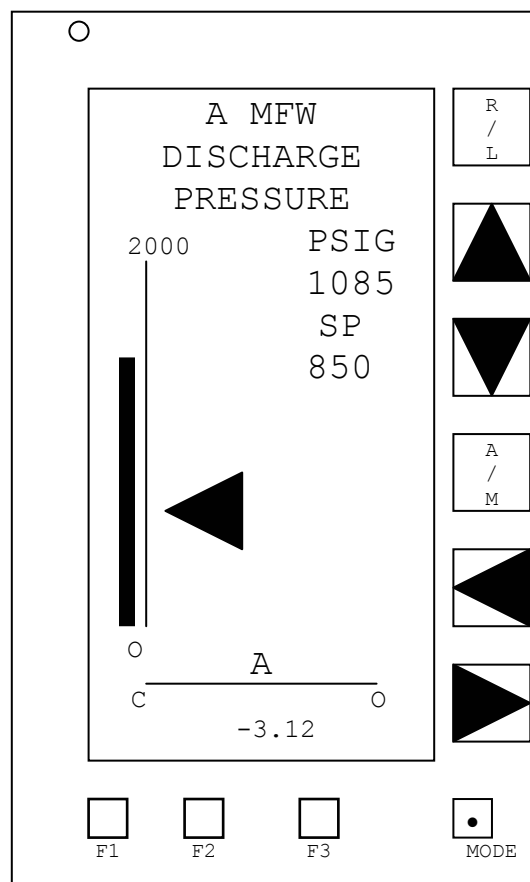
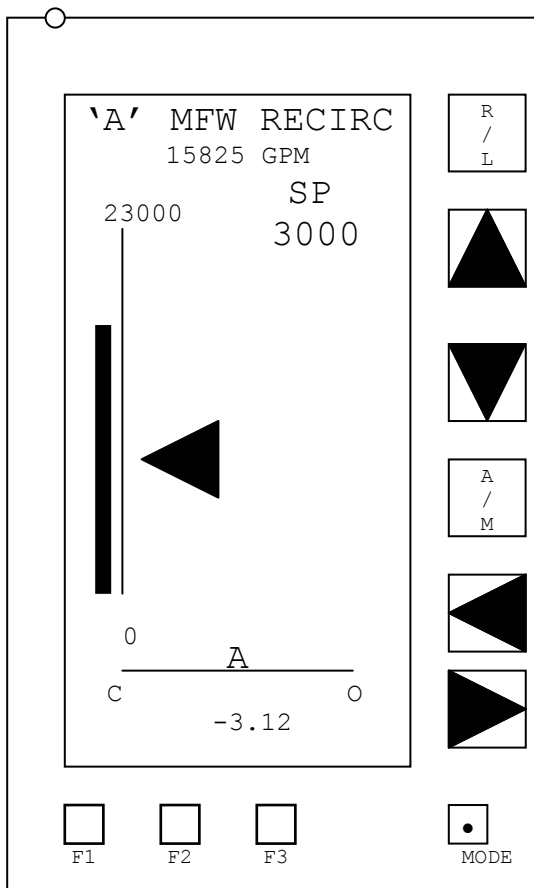
ACTUATION	SETPOINT	EFFECT ON VALVE	EFFECTS FOR MANUAL / AUTO	ABILIATY TO OVERRIDE	INDICATION
All Condensate pumps secured	All breakers open	Closes both Condensate Pump Recirc valves	Will actuate valves whether in automatic or manual	Can't be overridden from controller	No controller indication
High Discharge Pressure	>753 psig at discharge of any Condensate pump	Opens both Condensate Pump Recirc valves to 100%	Will actuate valve when in automatic only	Can be overridden by placing controller in manual	Indicated by reverse video "DISCH PRESS HI" on controller
Main Feedwater pump Tripped	MFP discharge pressure drops below an Operator adjusted setpoint	Closes Condensate Pump Recirc valve on affected side only	Will actuate valve when in automatic only	Can be overridden by placing controller in manual or by depressing F1 pushbutton	Indicated by "T" on controller
Loop Flow less than 2000 GPM	Loop Flow less than 2000 GPM	Opens affected Condensate Pump Recirc valves to 100%	Will actuate valve when in automatic only	Can be overridden by placing controller in manual	Automatic indication will flash in reverse video
Automatic flow control	Loop flow drops below setpoint (5000 GPM)	Modulates affected side valve	Will actuate valve when in automatic only	Can be overridden by placing controller in manual	Indicated by an "A" on controller screen

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ATTACHMENT C

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MFWP RECIRC CONTROLLER



- F1: Removes "OVERRIDE DISABLED" initiated by R/L pushbutton.
F2: Scrolls through displays.
F3: Used to clear any reverse video alarm conditions indicated on controller.
- Remote/Local: Overrides all controller functions.
Setpoint Keys: Adjusts controller setpoint (Page 1 and 3).
A/M: Selects automatic or manual operating modes.
Output Keys: Adjusts controller output when in manual.
Heartbeat Pulse: (Upper Left Hand Corner) - Flashing light indicates controller functioning. If NOT flashing, controller may be locked up.

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Valves are normally operated with respective Flow Indicating controllers in automatic. 2FIC-0735 for "A" train is powered from 2Y1-41. 2FIC-0742 for "B" train is powered from 2Y2-19. Normally both Recirculation valve flow controllers are set at ~3000 gpm. Controllers provide for bumpless transfer between automatic and manual. If power is lost and restored, controller will come back in manual with its output set to zero.

F2 button can toggle between three displays available on this controller.

Display #1 - Normally selected for display. Displays MFP suction flow both digitally and with bargraph. Bargraph has range of 0-23,000 GPM. Recirc valve flowrate setpoint is adjustable and is displayed digitally and on bargraph. Controller output is displayed at bottom of screen both digitally and with bargraph. The status, whether in manual or automatic, is displayed via an "A" or "M" near bottom of screen and is selected via this A/M button. Up and down arrows are used to adjust setpoint. When in manual, right and left arrows adjust controller output.

Display #2 - Difference between display #1 and display #2 is range of MFP suction flow bargraph. When display #2 is selected range changes from 0-23,000 GPM to 0-6,000 GPM.

Display #3 - Provides indication of MFP discharge pressure via numeric and vertical bargraph. This display also shows low discharge pressure setpoint, which is adjustable via setpoint raise/lower buttons.

When controller is in automatic or manual and MFP discharge pressure falls below operator adjustable setpoint on display #3, control function is overridden and recirc valve is closed. At same time closed signal is sent to condensate recirc valve controller. Controller displays flashing "DISCH LO" when pressure falls below setpoint. Controllers, both main feed pump recirc and condensate pump recirc, are released back to control if discharge pressure goes above setpoint or setpoint is lowered below actual discharge pressure. R/L button will disable this function and "OVERRIDE DISABLED" will be indicated on display screen.

F1 pushbutton will release R/L override condition.

When controller is in automatic or manual, full open signal will be sent to Recirculation valves if respective Main Feedwater pump's discharge pressure is greater than 1250 psig as sensed by two-out-of-three discharge pressure switches. This will occur whether flow controller is in manual or automatic. Controller displays flashing "DISCH HI" when this condition is present. R/L button will disable this function and "OVERRIDE DISABLED" will be indicated on display screen. F1 pushbutton will release R/L override condition.

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Feedwater Pump Recirc Valves

ACTUATION	SETPOINT	EFFECT ON VALVE	EFFECTS FOR MANUAL / AUTO	ABILIATY TO OVERRIDE	INDICATION
High Discharge Pressure	1250 psig 2 out of 3	Opens affected side MFP Recirc valves to 100%	Will actuate valve when in manual or automatic	Can be over ridden by use of controller R/L pushbutton and will be indicated by "OVERRIDE DISABLED" reverse video	Indicated by reverse video "DISCH HI" on controller
Main Feedwater pump Tripped	MFP discharge pressure drops below an Operator adjusted setpoint	Closes MFP Recirc valve on affected side only	Will actuate valve when in manual or automatic	Can be over ridden by use of controller R/L pushbutton and will be indicated by "OVERRIDE DISABLED" reverse video	Indicated by "DISCH LO" on controller
Automatic flow control	MFP Recirc flow drops below setpoint (3000 GPM)	Modulates affected side valve	Will actuate valve when in automatic only	Can be over ridden by placing controller in manual	Indicated by an "A" on controller screen

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ATTACHMENT D

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SELECTING NARROW RANGE LEVEL TRANSMITTER FOR 2LR-1034/2LR-1134

- 1.0 Place FWCS mode switch at EWS to CONFIG.
- 2.0 Check SDS login icon appears (~ 15 second time delay).
- 3.0 Press custom button for NRLVL select screen.
- 4.0 Select desired transmitter to be displayed by clicking mouse with cursor in the select box.
- 5.0 Check box for selected transmitter highlighted in red.
- 6.0 Reduce screens as desired.
- 7.0 Place FWCS mode switch to OPERATE.
- 8.0 Verify SDS Login Icon extinguished.

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ADDING/REMOVING WIDE RANGE LEVEL, FEEDWATER FLOW OR STEAM FLOW POINTS ON EWS

NOTE

An alternate transmitter must be selected to control the process when a transmitter will be taken off Scan or out of service.

- 1.0 Perform the following to remove any Wide Range Level, Feedwater Flow, or Steam Flow point from service:
 - 1.1 Place FWCS mode switch at EWS to CONFIG.
 - 1.2 Check SDS login icon appears (~ 15 second time delay).
 - 1.3 Press custom button for Signal Validation screen for appropriate parameter.
 - 1.4 Check input value for transmitter to be placed in control is satisfactory for plant conditions.
 - 1.5 Press custom SELECT button for appropriate Control/Reset Status Screen.
 - 1.6 Select the desired transmitter to control the process by clicking mouse with cursor in Control box for that transmitter.
 - 1.7 Check border on box for selected transmitter highlighted in red.
 - 1.8 Check on Signal Validation screen that selected controlling transmitter value being fed through selector box.
 - 1.9 Reduce screens as desired.
 - 1.10 Place FWCS mode switch to OPERATE.
 - 1.11 Verify SDS Login Icon extinguished.

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2.0 Perform the following to place any Wide Range Level, Feedwater Flow, or Steam Flow point in service:

- 2.1 Place FWCS mode switch at EWS to CONFIG.
- 2.2 Check SDS login icon appears (~ 15 second time delay).
- 2.3 Press custom button for Signal Validation screen for appropriate parameter.
- 2.4 Display point information screen for point to be returned to service by performing either of the following:
 - 2.4.1 Double click on POINT INFO Icon.
 - 2.4.2 Click right hand mouse button on desired transmitter value.
 - A. With left hand button, click on INFORMATION.
 - B. IF point to be placed in service is Wide Range level, THEN change point ID on Point Information screen from IN***** to LY***** (i.e. IN11791C to LY11791C).
- 2.5 Click on CHANGE DATA to display Change Data screen.
- 2.6 IF point NOT on scan, THEN perform the following:
 - 2.6.1 Verify point to be returned to scan NOT selected on appropriate Control/Reset Status screen.
 - 2.6.2 Click mouse with cursor in ON scan field.
 - 2.6.3 Check ON box shaded.
 - 2.6.4 Click mouse with cursor in UNLATCH field.
 - 2.6.5 Check UNLATCH box shaded.
 - 2.6.6 Click mouse with cursor in APPLY field.
 - 2.6.7 Reduce screens as necessary.
- 2.7 Check on Signal Validation screen that input value for transmitter to be returned to service appropriate for current conditions.

(Section 2.0 continued next page)

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- 2.8 IF point to be returned to service Wide Range Level or Feed Flow,
THEN perform the following:
 - 2.8.1 Click mouse with cursor in RESET box for affected input.
 - 2.8.2 Check RESET box white in color.
 - 2.8.3 Check selector box label NORMAL.
- 2.9 Press custom SELECT button for appropriate Control/Reset Status Screen.
- 2.10 Click mouse with cursor in RESET box on controlling transmitter.
- 2.11 Check neither transmitter box highlighted in a red border.
- 2.12 Check on Signal Validation screen that selector output value for parameter appropriate for current conditions.
- 2.13 Acknowledge alarms on Alarm screen.
- 2.14 Reduce screens as desired.
- 2.15 Place FWCS mode switch to OPERATE.
- 2.16 Verify SDS Login Icon extinguished.

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ATTACHMENT F

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ADDING/REMOVING NARROW RANGE LEVEL, FEEDWATER TEMPERATURE OR
STEAM PRESSURE POINTS ON EWS

NOTE

An alternate transmitter must be selected to control the process when a transmitter will be taken off Scan or out of service.

- 1.0 Perform the following remove any Narrow Range Level, Feedwater Temperature, or Steam Pressure point from service:
 - 1.1 Place FWCS mode switch at EWS to CONFIG.
 - 1.2 Check SDS login icon appears (~ 15 second time delay).
 - 1.3 Press custom SELECT button for Signal Validation screen for appropriate parameter.
 - 1.4 Check input values for other inputs that will be left in control appropriate for current conditions.
 - 1.5 Display Point Information screen for point to be removed from service by performing either of the following:
 - 1.5.1 Double click on POINT INFO Icon.
 - 1.5.2 Click right hand mouse button on desired transmitter value.
 - A. With left hand button, click on INFORMATION.
 - 1.6 Display the Change Data screen.
 - 1.7 Click mouse with cursor in "B" field to select bad quality for point.
 - 1.8 Check "B" field shaded.
 - 1.9 Click mouse with cursor in APPLY field.
 - 1.10 Reduce screens as needed.
 - 1.11 Check on Signal Validation screen that point quality on appropriate point indicated as bad.
 - 1.12 Acknowledge alarms on Alarm screen
 - 1.13 Reduce screens as desired.
 - 1.14 Place FWCS mode switch to OPERATE.
 - 1.15 Verify SDS Login Icon extinguished.

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- 2.0 Perform the following to place any Narrow Range Level, Feedwater Temperature, or Steam Pressure point in service:
 - 2.1 Place FWCS mode switch at EWS to CONFIG.
 - 2.2 Check SDS login icon appears (~ 15 second time delay).
 - 2.3 Display Point Information screen for point to be returned to service by performing either of the following:
 - 2.3.1 Double click on POINT INFO Icon.
 - 2.3.2 Click right hand mouse button on desired transmitter value.
 - A. With left hand button, click on INFORMATION.
 - 2.4 Click on CHANGE DATA to display Change Data screen.
 - 2.5 IF point NOT on scan,
THEN perform the following:
 - 2.5.1 Click mouse with cursor in ON scan field.
 - 2.5.2 Check "ON" box shaded.
 - 2.5.3 Click mouse with cursor in APPLY field.
 - 2.5.4 Reduce screen as needed.
 - 2.6 Verify Signal Validation screen for appropriate parameter displayed.
 - 2.7 Check input value for point to be returned to service appropriate for current conditions.
 - 2.8 Display Point Information and Change Data screens for point to be returned to service.
 - 2.9 Click mouse with cursor in UNLATCH field.
 - 2.10 Check UNLATCH field shaded.
 - 2.11 Click mouse with cursor in APPLY field.
 - 2.12 Check on Signal Validation screen that point quality for affected point good.
 - 2.13 Check selector output appropriate for current conditions.

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ATTACHMENT F

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- 2.14 Check label on selector box indicates NORMAL.
- 2.15 Acknowledge alarms on Alarm screen.
- 2.16 Reduce screens as desired.
- 2.17 Place FWCS mode switch to OPERATE.
- 2.18 Verify SDS Login Icon extinguished.

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ATTACHMENT G

PAGE 1 OF 2

REMOVING/ADDING POINT FROM/TO SCAN

- 1.0 Perform the following to remove a point from scan:
 - 1.1 Verify point NOT selected for Control.
 - 1.2 Place FWCS mode switch at EWS to CONFIG.
 - 1.3 Check SDS login icon appears (~ 15 second time delay).
 - 1.4 Double click on POINT INFO Icon.
 - 1.5 On Point Information screen perform the following:
 - 1.5.1 Double click POINT ID to highlight field.
 - 1.5.2 Enter point ID.
 - 1.5.3 Click APPLY.
 - 1.5.4 Click CHANGE DATA.
 - 1.6 On Change Data screen perform the following:
 - 1.6.1 Click mouse with cursor in OFF scan field.
 - 1.6.2 Check OFF box shaded.
 - 1.6.3 Click APPLY.
 - 1.6.4 Verify Scan OFF in upper left hand corner of Change Data screen.
 - 1.6.5 IF desired to escape and minimize screen,
THEN click on upper left hand arrow.
 - 1.7 Place FWCS mode switch to OPERATE.

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ATTACHMENT G

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- 2.0 Perform the following to add point to scan:
 - 2.1 Verify point NOT selected for Control.
 - 2.2 Place FWCS mode switch at EWS to CONFIG.
 - 2.3 Check SDS login icon appears (~ 15 second time delay).
 - 2.4 Double click on POINT INFO Icon.
 - 2.5 On Point Information screen perform the following:
 - 2.5.1 Double click POINT ID to highlight field.
 - 2.5.2 Enter point ID.
 - 2.5.3 Click APPLY.
 - 2.5.4 Click CHANGE DATA.
 - 2.6 On Change Data screen perform the following:
 - 2.6.1 Click mouse with cursor in ON scan field.
 - 2.6.2 Check ON box shaded.
 - 2.6.3 Click mouse with cursor in UNLATCH field.
 - 2.6.4 Check UNLATCH box shaded.
 - 2.6.5 Click APPLY.
 - 2.6.6 Verify Scan ON in upper left hand corner of Change Data screen.
 - 2.6.7 IF desired to escape and minimize screen,
THEN click on upper left hand arrow.
 - 2.7 Check on Signal Validation screen that input value for transmitter to be returned to service appropriate for current conditions.
 - 2.7.1 Click mouse with cursor in RESET box for affected input.
 - 2.7.2 Check RESET box white in color.
 - 2.7.3 Check selector box label NORMAL.
 - 2.8 Place FWCS mode switch to OPERATE.

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ATTACHMENT H

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FORCING POINT QUALITY

- 1.0 IF point desired to be changed a process control input,
THEN select an alternate transmitter using appropriate Attachment.
- 2.0 Perform the following to force quality of a point:
 - 2.1 Place FWCS mode switch at EWS to CONFIG.
 - 2.2 Check SDS login icon appears (~ 15 second time delay).
 - 2.3 Double click on POINT INFO icon.
 - 2.4 On Point Information screen perform the following:
 - 2.4.1 Double click on POINT ID to highlight field.
 - 2.4.2 Enter point ID.
 - 2.4.3 Click APPLY.
 - 2.4.4 Click CHANGE DATA.
 - 2.5 On Change Data screen perform the following:
 - 2.5.1 Click mouse with cursor on desired quality in EXT CALIBR field.
 - 2.5.2 Verify desired quality box shaded.
 - 2.5.3 Click APPLY.
 - 2.5.4 Verify desired quality displayed in EXT CALIBR field.
 - 2.5.5 IF desired to escape and minimize screen,
THEN click on upper left hand arrow.
 - 2.6 Place FWCS mode switch to OPERATE.

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ATTACHMENT H

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3.0 Perform the following to restore quality of point:

3.1 Place FWCS mode switch at EWS to CONFIG.

3.2 Check SDS login icon appears (~ 15 second time delay).

3.3 Double click on POINT INFO icon.

3.4 On Point Information screen perform the following:

3.4.1 Double click POINT ID to highlight field.

3.4.2 Enter point ID.

3.4.3 Click APPLY.

3.4.4 Verify input value for affected point appropriate for current conditions.

3.4.5 Click on CHANGE DATA.

3.5 On Change Data screen perform the following:

3.5.1 Click mouse with cursor on UNLATCH in EXT CALIBR field.

3.5.2 Verify UNLATCH shaded.

3.5.3 Click APPLY.

3.5.4 Verify UNLATCH displayed in EXT CALIBR field.

3.5.5 IF desired to escape and minimize screen,
THEN click on upper left hand arrow.

3.6 On Signal Validation screen check input value for transmitter being returned to service appropriate for current conditions:

3.6.1 Click mouse with cursor in RESET box for affected input.

3.6.2 Check RESET box white in color.

3.7 IF alternate transmitter was selected for process control input,
THEN restore primary transmitter as process control input using appropriate Attachment.

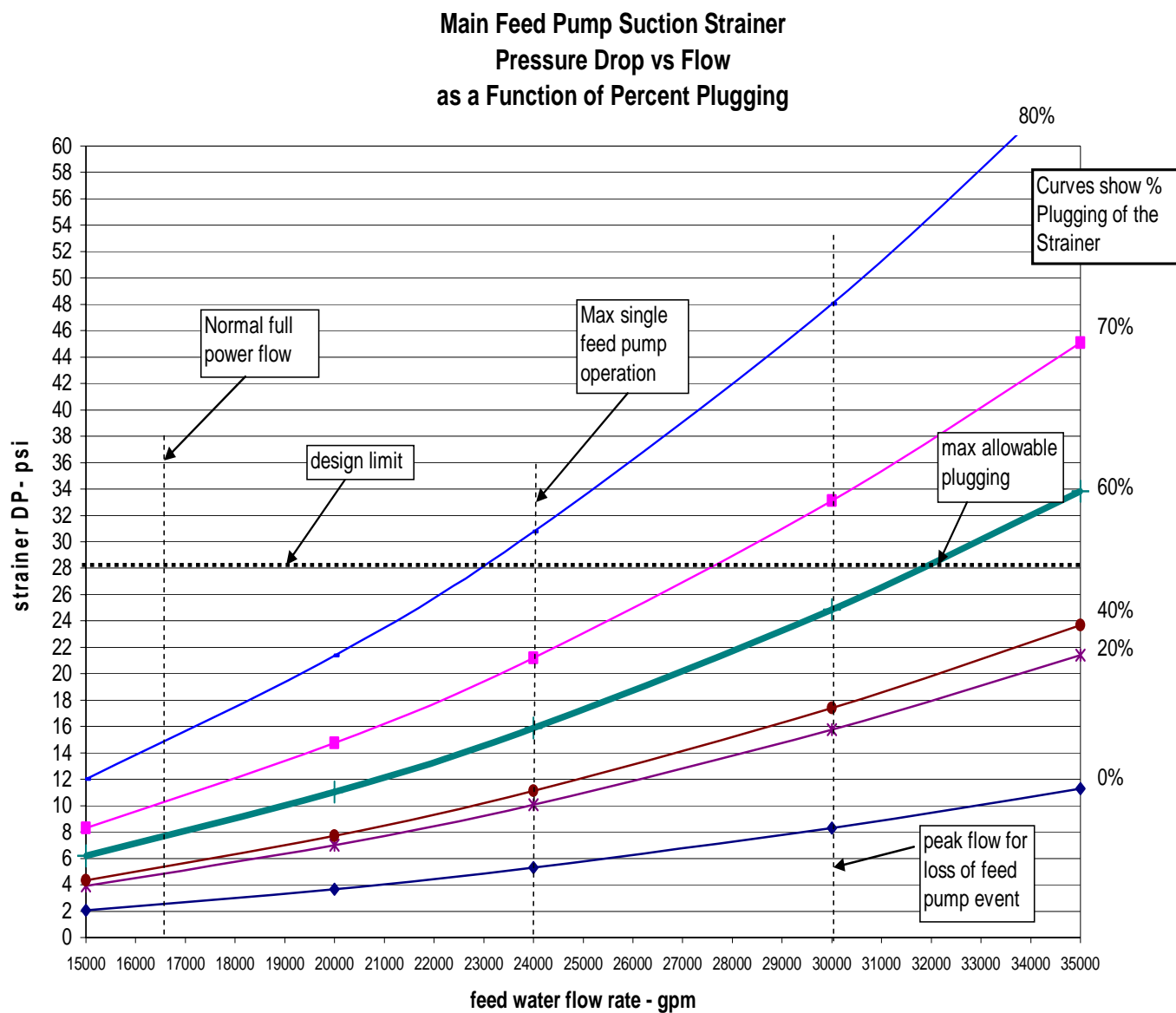
3.8 Place FWCS mode switch to OPERATE.

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ATTACHMENT I

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MFWP SUCTION STRAINER PERCENT PLUGGING CURVES



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2106.007

EXHIBIT 1
MAIN FEEDWATER TURBINE TRIP RESET

Revised 09/22/98

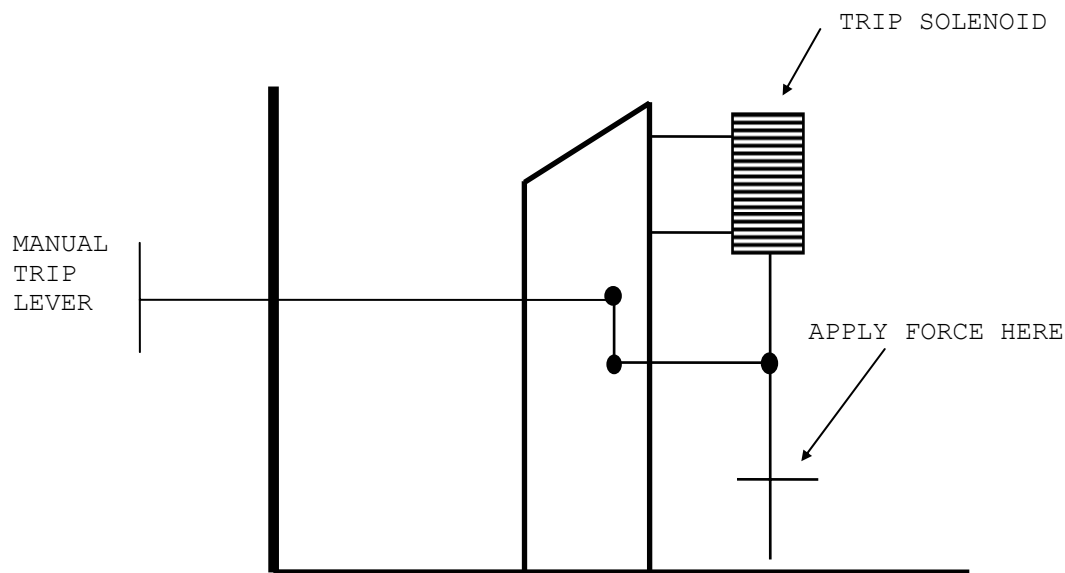
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1.0 DISCUSSION

The purpose of this Exhibit is to provide instructions to manually reset the Main Feedwater Turbine if it will not reset from the Control Room. If the spring that resets the trip solenoid is weak or the trip linkage is out of adjustment, then manual assistance is required to reset the trip mechanism. Manually resetting the turbine in this manner does not affect the ability of the trip mechanism to trip the turbine.

2.0 INSTRUCTIONS

- 2.1 Apply downward force to the shaft of the trip solenoid while depressing the Reset button in the Control Room.
- 2.2 Verify WR/WO submitted.



View is looking south from inside middle cabinet of front standard.

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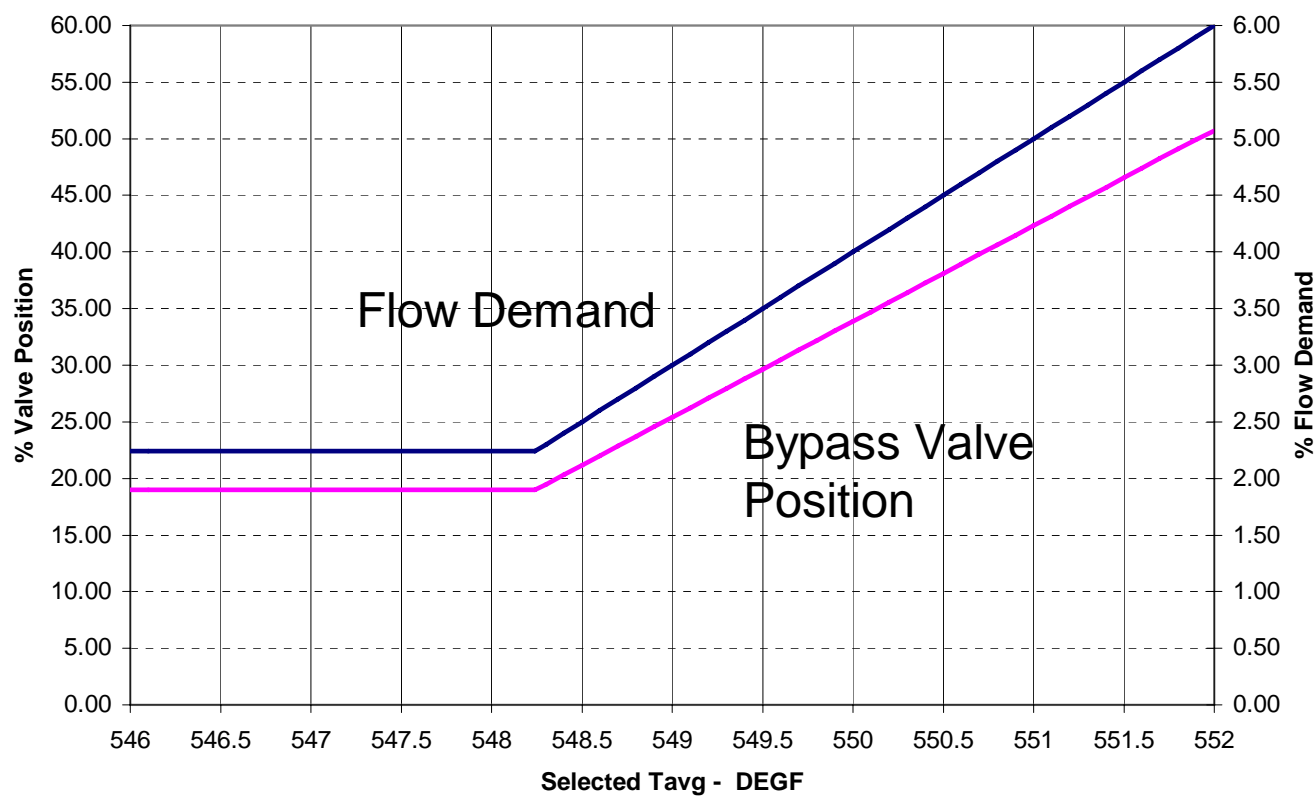
EXHIBIT 7

Revised 7/17/00

Main Feed Reg Bypass Valve Position vs. Tave during RTO

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Main Feed Reg Bypass Valve Position vs. Tavg During RTO



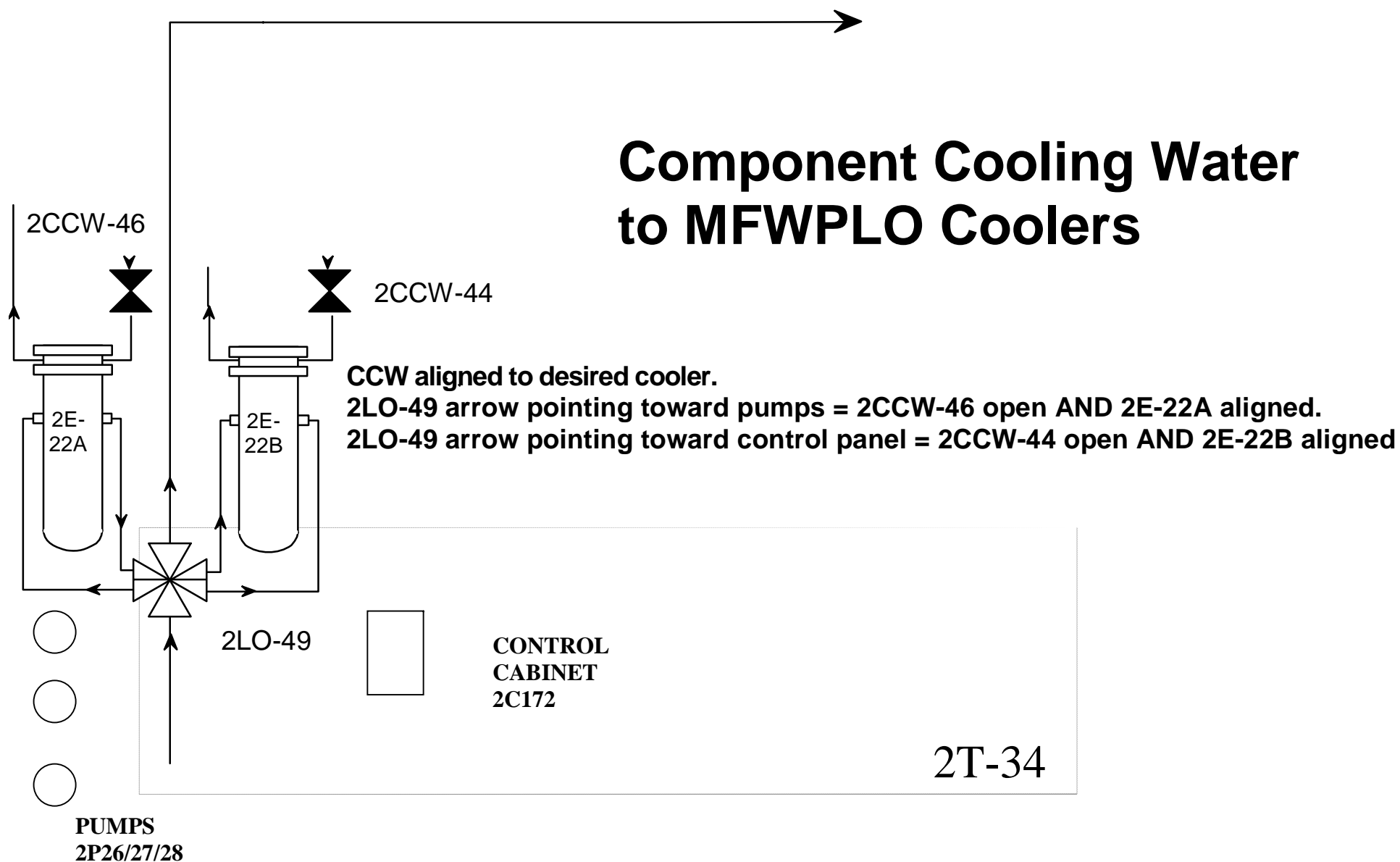
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EXHIBIT 8
CCW TO MFWPLO COOLER ALIGNMENT

Revised 05/15/02

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SUPPLEMENT 2

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EMERGENCY GOVERNOR AND TRIP LOCKOUT EXERCISE TEST

This test is performed as prerequisite to Overspeed Trip Test. Section for pump NOT being tested may be N/A'd.

1.0 INITIAL CONDITIONS

- MFWP Speed between 3535 and 5050 rpm. _____
2K-2A Speed _____ rpm 2K-2B Speed _____ rpm
- Communications established between 2C178 and Control Room. _____

2.0 TEST METHOD FOR MFWP A

- 2.1 Place Lockout handswitch (2HS-0348) in 2C178 in LOCKOUT. _____
- 2.2 Check lockout relay energized by red light above 2HS-0348 ON. _____
- 2.3 IF lockout relay NOT energized,
THEN stop test and notify S/M. _____
- 2.4 Check Oil Test pump (2P-121A) starts.
- 2.5 Depress AND hold Overspeed Test pushbutton (2HS-0361). _____
- 2.6 Check trip mechanism tripped by green light above
Mech/Reset pushbutton (2HS-0342) ON. _____
- 2.7 Release Overspeed Test pushbutton. _____
- 2.8 Depress Overspeed Reset pushbutton (2HS-0344). _____
- 2.9 Check trip mechanism reset by white light above Overspeed
Reset pushbutton ON. _____
- 2.10 Place Lockout handswitch to NORMAL. _____
- 2.11 Check 2P-121A stops. _____
- 2.12 Check lockout relay de-energized by green light above
2HS-0348 ON. _____

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SUPPLEMENT 2

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3.0 TEST METHOD FOR MFWP B

- 3.1 Place Lockout handswitch (2HS-0349) in 2C178 in LOCKOUT. _____
- 3.2 Check lockout relay energized by red light above 2HS-0349 ON. _____
- 3.3 IF lockout relay NOT energized,
THEN stop test and notify S/M. _____
- 3.4 Check Oil Test pump (2P-121B) starts. _____
- 3.5 Depress AND hold Overspeed Test pushbutton (2HS-0362). _____
- 3.6 Check trip mechanism tripped by green light above
Mech/Reset pushbutton (2HS-0343) ON. _____
- 3.7 Release Overspeed Test pushbutton. _____
- 3.8 Depress Overspeed Reset pushbutton (2HS-0347). _____
- 3.9 Check trip mechanism reset by white light above Overspeed
Reset pushbutton ON. _____
- 3.10 Place Lockout handswitch to NORMAL. _____
- 3.11 Check 2P-121B stops. _____
- 3.12 Check Lockout Relay de-energized by green light above
2HS-0349 ON. _____

4.0 ACCEPTANCE CRITERIA

- 4.1 Did lockout relay energize? YES NO
- 4.2 Did trip mechanism trip and reset? YES NO
- 4.3 IF NO circled above,
THEN write WR/WO for repairs prior to mechanical
overspeed trip test of pump. _____

Performed By _____ Date _____

Supervisor _____ Date _____

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SUPPLEMENT 3

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THRUST BEARING WEAR TEST

This Supplement is performed to test operability of Main Feed Water Pump Thrust Bearing Wear Trip. Section for pump NOT being tested may be N/A'd.

1.0 INITIAL CONDITIONS

- Communications established between 2C178 and Control Room. _____

2.0 TEST METHOD FOR MFWP A

2.1 Obtain key for Thrust Bearing Wear Test switch (2HS-0350). _____

2.2 Check the following test switches in NORMAL:

- Active Thrust Bearing Test switch (2HS-0356) _____
- Inactive Thrust Bearing Test switch (2HS-0354) _____

2.3 Momentarily depress 2K2A Thrust Brg Wear Circuit Status light (2PB-0350). _____

- Check White light illuminates. _____

2.4 Place Thrust Bearing Wear Test switch (2HS-0350) in TEST. _____

2.4.1 Check the following lights lit:

- Active (right) _____
- Inactive (left) _____

2.5 Momentarily depress 2PB-0350. _____

- Check White light does NOT illuminate. _____

2.6 Place Active Thrust Bearing Test switch (2HS-0356) in TEST. _____

- Check Active light goes out. _____
- Check 2K2A Thrust Brg Wear Trip Circuit Test light lit. _____

2.7 Place Active Thrust Bearing Test switch (2HS-0356) to NORMAL. _____

- Check Active light lit. _____
- Check 2K2A Thrust Brg Wear Trip Circuit Test light off. _____

2.8 Place Inactive Thrust Bearing Test switch (2HS-0354) to TEST. _____

- Check Inactive light goes out. _____
- Check 2K2A Thrust Brg Wear Trip Circuit Test light lit. _____

2.9 Place Inactive Thrust Bearing Test switch (2HS-0354) to NORMAL. _____

- Check Inactive light lit. _____
- Check 2K2A Thrust Brg Wear Trip Circuit Test light off. _____

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SUPPLEMENT 3

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- 2.10 Place Thrust Bearing Wear Test switch (2HS-0350) to NORMAL. _____
- 2.10.1 Check the following lights out: _____
- Active (right) _____
 - Inactive (left) _____
- 2.11 Momentarily depress 2K2A Thrust Brg Wear Circuit Status light (2PB-0350). _____
- Check White light illuminates. _____
- 3.0 TEST METHOD FOR MFWP B
- 3.1 Obtain key for Thrust Bearing Wear Test switch (2HS-0370). _____
- 3.2 Check the following test switches in NORMAL: _____
- Active Thrust Bearing Test switch (2HS-0357) _____
 - Inactive Thrust Bearing Test switch (2HS-0355) _____
- 3.3 Momentarily depress 2K2B Thrust Brg Wear Circuit Status light (2PB-0370). _____
- Check White light illuminates. _____
- 3.4 Place Thrust Bearing Wear Test switch (2HS-0370) in TEST. _____
- 3.4.1 Check the following lights lit: _____
- Active (right) _____
 - Inactive (left) _____
- 3.5 Momentarily depress 2PB-0370. _____
- Check White light does NOT illuminate. _____
- 3.6 Place Active Thrust Bearing Test switch (2HS-0357) in TEST. _____
- Check Active light goes out. _____
 - Check 2K2B Thrust Brg Wear Trip Circuit Test light lit. _____
- 3.7 Place Active Thrust Bearing Test switch (2HS-0357) to NORMAL. _____
- Check Active light is lit. _____
 - Check 2K2B Thrust Brg Wear Trip Circuit Test light off. _____
- 3.8 Place Inactive Thrust Bearing Test switch (2HS-0355) to TEST. _____
- Check Inactive light goes out. _____
 - Check 2K2B Thrust Brg Wear Trip Circuit Test light lit. _____

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3.9 Place Inactive Thrust Bearing Test switch (2HS-0355) to NORMAL. _____

- Check Inactive light is lit. _____
- Check 2K2B Thrust Brg Wear Trip Circuit Test light off. _____

3.10 Place Thrust Bearing Wear Test switch (2HS-0370) to NORMAL. _____

3.10.1 Check the following lights out: _____

- Active (right) _____
- Inactive (left) _____

3.11 Momentarily depress 2K2B Thrust Brg Wear Circuit Status light (2PB-0370). _____

- Check White light illuminates. _____

4.0 ACCEPTANCE CRITERIA

4.1 Did lights illuminate as required by this procedure? YES NO

4.2 Did lights go out as required by this procedure? YES NO

4.3 IF NO circled above,
THEN write WR/WO to repair to pump test circuitry. _____

Performed By _____ Date _____

Supervisor _____ Date _____

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SUPPLEMENT 4

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MECHANICAL OVERSPEED TRIP TEST OF 2K-2A

The purpose of this Supplement is to test overspeed trip of "A" Main Feedwater Pump Turbine and document setpoint at which trip occurs.

1.0 INITIAL CONDITIONS

- Feedwater pump uncoupled from turbine. _____
- Lube Oil System in service and tested using Lube Oil System Startup section of this procedure. _____
- Thrust Bearing Wear Test has been performed using Supplement 3 of this procedure. _____
- Turbine has been on turning gear at least 2 hours. _____
- EHC System in service using Electrohydraulic Oil System Operation (2106.012). _____
- IF desired to use hand held tachometer or digital multimeter, THEN verify calibration current. _____

Serial number _____

NOTE

The following has been determined to be an IPTE.

- Operations Manager or his designee in Control Room. _____
- Perform Crew Brief using Crew Brief Checklist (Form 1015.001A). _____

2.0 TEST METHOD

- 2.1 Verify Main Steam to A MFWP (2CV-0320) closed. _____
- 2.2 Verify LP Supply Line Isol (2RS-27) closed. _____
- 2.3 Verify steam line between 2CV-0320 and MFWT A depressurized (2PI-0321). _____
- 2.4 Vent steam line between 2CV-0320 and MFWT A as necessary by cycling MFWT 2K-2A Supply Line Vents (2MS-2000A AND 2MS-2000B). _____
- 2.5 Verify steam line between 2RS-27 and MFWT A depressurized (2PI-0328). _____
- 2.6 Vent steam line between 2RS-27 and MFWT A as necessary by cycling LP Supply Line Atmos Vent (2RS-3000). _____
- 2.7 Latch 2K-2A by depressing Reset pushbutton. _____

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SUPPLEMENT 4

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- 2.8 Check the following:
- MFWP Turbine Trip annunciator (2K03-A8) clears. _____
 - HP stop valve (2CV-0321A) opens. _____
 - LP stop valve (2CV-0350) opens. _____
- 2.9 Trip 2K-2A by depressing Trip pushbutton. _____
- 2.10 Check the following:
- MFWP Turbine Trip annunciator (2K03-A8) in alarm. _____
 - HP stop valve (2CV-0321A) closed. _____
 - LP stop valve (2CV-0350) closed. _____
 - Control valve (2CV-0351) closed. _____
 - Power lamp on. _____
 - AT LSS lamp on. _____
- 2.11 Open the following valves on 2C12:
- HPSV Above Seat Drain (2CV-0321) _____
 - HPSV Below Seat Drain (2CV-0317) _____
 - LPSV Below Seat Drain (2CV-0327) _____
 - LPSV Above Seat Drain (2CV-0326) _____
 - First Stage Shell Drain (2CV-0322) _____
 - LP Steam Drain (2CV-0328) _____
- 2.12 Verify MFWT Speed controller (2HIC-0321) aligned as follows:
- In MANUAL _____
 - Output demand at zero _____

CAUTION

MFWT is uncoupled and subject to rapid speed changes.

- 2.13 Monitor MFWT speed while performing the following:
- 2.13.1 Manually throttle open 2CV-0320 until downstream piping pressurized. _____
- 2.13.2 Verify 2CV-0320 full open. _____
- 2.14 Latch turbine by depressing Reset pushbutton. _____

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- 2.15 Check the following:
- MFWP Turbine Trip annunciator (2K03-A8) clears. _____
 - HP stop valve (2CV-0321A) opens. _____
 - LP stop valve (2CV-0350) opens. _____
- 2.16 Dispatch an Operator to A MFWP to verify the following:
- All personnel are standing clear. _____
 - Debris clear of MFWT shaft. _____
 - Jacking gear engagement lever NOT obstructed. _____
- 2.17 Depress RAISE pushbutton until turning gear disengages at ~200 rpm. _____
- 2.18 Trip 2K-2A. _____
- 2.19 Check the following:
- MFWP Turbine Trip annunciator (2K03-A8) in alarm. _____
 - HP stop valve (2CV-0321A) closed. _____
 - LP stop valve (2CV-0350) closed. _____
 - AT LSS lamp illuminated. _____
- 2.20 Latch turbine by depressing Reset pushbutton. _____
- 2.21 Check the following:
- MFWP Turbine Trip annunciator (2K03-A8) clears. _____
 - HP stop valve (2CV-0321A) opens. _____
 - LP stop valve (2CV-0350) opens. _____
- 2.22 Raise turbine speed using RAISE pushbutton until AT HSS and AUTO lamps are lit. _____
- 2.23 Using 2HIC-0321, slowly raise turbine speed to ~ 4040 rpm. _____
- 2.24 Perform Emergency Governor and Trip Lockout Exercise Test using Supplement 2 of this procedure. _____
- 2.25 Establish communications between MFWT front standard and Control Room. _____
- 2.26 Slowly raise MFWT speed to High Speed Stop \leq 5420 (NOT to exceed 5450 rpm) using MFWP speed controller. _____

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CAUTION

- Do NOT exceed 5620 rpm during this test.
- Do NOT reset turbine until speed is < 4000 rpm.

2.27 Depress AND hold Overspeed Test Pushbutton (2HS-0387) at 2K-2A front standard. _____

- Monitor MFWT speed rise. _____
- Record overspeed trip setpoint from the following: _____
(N/A indications NOT available)
Control Room _____ rpm Front Standard _____ rpm
Hand Held Tachometer or Digital Multimeter _____ rpm

2.28 IF overspeed trip setpoint between 5350 and 5610 rpm,
THEN perform the following:

2.28.1 Place Turbine on MFWP Turning gear 2K-7A for 30 minutes. _____

2.28.2 Danger tag 2K-2A for coupling pump to turbine. _____

2.28.3 Fill and vent pump as necessary to ensure alignment
of pump to turbine. _____

2.28.4 Inform Maintenance 2K-2A ready to be aligned and coupled. _____

3.0 ACCEPTANCE CRITERIA

3.1 Is MFWT A overspeed trip setpoint using Front Standard, YES NO
Hand Held Tachometer or Digital Multimeter indication between
5350 and 5610 rpm?

3.2 IF NO circled in step 3.1,
THEN describe action taken below: _____

Performed By _____ Date _____

Supervisor _____ Date _____

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SUPPLEMENT 5

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MECHANICAL OVERSPEED TRIP TEST OF 2K-2B

The purpose of this Supplement is to test overspeed trip of "B" Main Feedwater Pump Turbine and document setpoint at which trip occurs.

1.0 INITIAL CONDITIONS

- Feedwater Pump uncoupled from turbine. _____
- Lube Oil System in service and tested using Lube Oil System Startup section of this procedure. _____
- Thrust Bearing Wear Test has been performed using Supplement 3 of this procedure. _____
- Turbine has been on turning gear for at least 2 hours. _____
- EHC System in service using Electrohydraulic Oil System Operation (2106.012). _____
- IF desired to use hand held tachometer or digital multimeter, THEN verify calibration current. _____

Serial number _____

NOTE

The following has been determined to be an IPTE.

- Operations Manager or his designee in Control Room. _____
- Perform Crew Brief using Crew Brief Checklist (Form 1015.00A). _____

2.0 TEST METHOD

- 2.1 Verify Main Steam to B MFWP (2CV-0315) closed. _____
- 2.2 Verify LP Supply Line Isol (2RS-32) closed. _____
- 2.3 Verify steam line between 2CV-0315 and MFWT B depressurized (2PI-0316). _____
- 2.4 Vent steam line between 2CV-0315 and MFWT B as necessary by cycling MFWT 2K-2B Supply Line Vents (2MS-2001A AND 2MS-2001B). _____
- 2.5 Verify steam line between 2RS-32 and MFWT B depressurized (2PI-0313). _____
- 2.6 Vent steam line between 2RS-32 and MFWT B as necessary by cycling LP Supply Line Atmos Vent (2RS-3002). _____
- 2.7 Latch 2K-2B by depressing Reset pushbutton. _____

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- 2.8 Check the following:
- MFWP Turbine Trip annunciator (2K03-A11) clears. _____
 - HP stop valve (2CV-0316A) opens. _____
 - LP stop valve (2CV-0330) opens. _____
- 2.9 Trip 2K-2B by depressing Trip pushbutton. _____
- 2.10 Check the following:
- MFWP Turbine Trip annunciator (2K03-A11) in alarm. _____
 - HP stop valve (2CV-0316A) closes. _____
 - LP stop valve (2CV-0330) closes. _____
 - Control valve (2CV-0331) closed. _____
 - Power lamp on. _____
 - AT LSS lamp on. _____
- 2.11 Open the following valves on 2C12:
- HPSV Above Seat Drain (2CV-0316). _____
 - HPSV Below Seat Drain (2CV-0314). _____
 - LPSV Below Seat Drain (2CV-0312). _____
 - LPSV Above Seat Drain (2CV-0311). _____
 - First Stage Shell Drain (2CV-0307). _____
 - LP Steam Drain (2CV-0328). _____
- 2.12 Verify MFWT Speed controller (2HIC-0310) aligned as follows:
- In MANUAL. _____
 - Output demand at zero. _____

CAUTION

MFWT is uncoupled and subject to rapid speed changes.

- 2.13 Monitor MFWT speed while performing the following:
- 2.13.1 Manually throttle open 2CV-0315 until downstream piping pressurized. _____
- 2.13.2 Verify 2CV-0315 full open. _____
- 2.14 Latch turbine by depressing Reset pushbutton. _____

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SUPPLEMENT 5

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- 2.15 Check the following:
- MFWP Turbine Trip annunciator (2K03-A11) clears. _____
 - HP stop valve (2CV-0316A) opens. _____
 - LP stop valve (2CV-0330) opens. _____
- 2.16 Dispatch an Operator to MFWP to verify the following:
- All personnel are standing clear. _____
 - Debris clear of MFWT shaft. _____
 - Jacking gear engagement lever NOT obstructed. _____
- 2.17 Depress RAISE pushbutton until turning gear disengages at ~200 rpm. _____
- 2.18 Trip 2K-2B. _____
- 2.19 Check the following:
- MFWP Turbine Trip annunciator (2K03-A11) in alarm. _____
 - HP stop valve (2CV-0316A) closes. _____
 - LP stop valve (2CV-0330) closes. _____
 - AT LSS lamp illuminated. _____
- 2.20 Latch turbine by depressing Reset pushbutton. _____
- 2.21 Check the following:
- MFWP Turbine Trip annunciator (2K03-A11) clears. _____
 - HP stop valve (2CV-0316A) opens. _____
 - LP stop valve (2CV-0330) opens. _____
- 2.22 Raise turbine speed using RAISE pushbutton until AT HSS and AUTO lamps are lit. _____
- 2.23 Using 2HIC-0310, slowly raise turbine speed to ~ 4040 rpm. _____
- 2.24 Perform Emergency Governor and Trip Lockout Exercise Test using Supplement 2 of this procedure. _____
- 2.25 Establish communications between MFWT front standard and the Control Room. _____
- 2.26 Slowly raise MFWT speed to High Speed Stop \leq 5420 (NOT to exceed 5450 rpm) using MFWP speed controller. _____

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SUPPLEMENT 5

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CAUTION

- Do NOT exceed 5620 rpm during this test.
- Do NOT reset turbine until speed is < 4000 rpm.

- 2.27 Depress AND hold Overspeed Test Pushbutton (2HS-0386) at 2K-2B front standard. _____
- Monitor MFWT speed rise. _____
 - Record overspeed trip setpoint from the following: _____
(N/A indications NOT available) _____
- Control Room _____ rpm Front Standard _____ rpm
- Hand Held Tachometer or Digital Multimeter _____ rpm

- 2.28 IF overspeed trip setpoint between 5350 and 5610 rpm,
THEN perform the following:

- 2.28.1 Place Turbine on MFWP Turning gear 2K-7B for 30 minutes. _____
- 2.28.2 Danger tag 2K-2B for coupling pump to turbine. _____
- 2.28.3 Fill and vent pump as necessary to ensure
alignment of pump to turbine. _____
- 2.28.4 Inform Maintenance 2K-2B ready to be aligned and coupled. _____

3.0 ACCEPTANCE CRITERIA

- 3.1 Is MFWT B overspeed trip setpoint using Front Standard, Hand Held Tachometer or Digital Multimeter indication between 5350 and 5610 rpm? YES NO
- 3.2 IF NO circled in step 3.1,
THEN describe action taken below: _____

Performed By _____ Date _____

Supervisor _____ Date _____

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SUPPLEMENT 6

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AUTO START TEST OF MFWP OIL PUMP

The purpose of this Supplement is to test auto start feature of MFWP Oil pumps (2P-26, 2P-27, and 2P-28).

1.0 INITIAL CONDITIONS

- MFWP Oil System in operation. _____
- Circle running MFWP oil pump. 2P-26 2P-27 _____

2.0 TEST METHOD

2.1 IF 2P-27 circled in Section 1.0,
THEN perform Auto Start Test of 2P-26 as follows:

- * 2.1.1 Monitor 2K-2A and 2K-2B Bearing Oil Pressures
(2PI-2603AA AND 2PI-2603BB) on 2CO2.
- 2.1.2 Momentarily depress Local Test pushbutton (2HS-0384)
to start 2P-26. _____
- 2.1.3 Verify 2P-26 running. _____
- 2.1.4 Place 2P-26 handswitch (2HS-0331) in NORMAL AFTER START. _____
- 2.1.5 Place 2P-27 handswitch (2HS-0332) in NORMAL AFTER STOP. _____

2.2 IF 2P-26 circled in Section 1.0,
THEN perform Auto Start test of 2P-27 as follows:

- * 2.2.1 Monitor 2K-2A and 2K-2B Bearing Oil Pressures
(2PI-2603AA AND 2PI-2603BB) on 2CO2.
- 2.2.2 Momentarily depress Local Test pushbutton (2HS-0384)
to start 2P-27. _____
- 2.2.3 Verify 2P-27 running. _____
- 2.2.4 Place 2P-27 handswitch (2HS-0332) in NORMAL AFTER START. _____
- 2.2.5 Place 2P-26 handswitch (2HS-0331) in NORMAL AFTER STOP. _____

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SUPPLEMENT 6

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2.3 Perform Auto Start Test of 2P-28 as follows:

NOTE

- Starting 2P-28 will bring in 2K03-D10 (ELOP 2P-28 Running) alarm.
- Low Float Voltage may cause the following alarms to annunciate:
 - 2K01-E12 (2D03 Charger Trouble)
 - 2D33 (RIS) 2K-9302

2.3.1 Momentarily depress Local Test pushbutton (2HS-0385) for 2P-28. _____

2.3.2 Check 2P-28 running. _____

2.3.3 Place 2P-28 handswitch (2HS-0351) in NORMAL AFTER STOP. _____

2.4 MFWP Oil Tank Level Gauge Test

2.4.1 Open Lube Oil Reservoir cabinet door. _____

2.4.2 Lower float rod until Lube Oil Reservoir Level Lo (2K03-A10) alarms. _____

2.4.3 Release level float rod and verify 2K03-A10 clears. _____

2.4.4 Raise float rod until Lube Oil Reservoir Level Hi (2K03-B10) alarms. _____

2.4.5 Release level float rod and verify 2K03-B10 clears. _____

2.4.6 Close Lube Oil Reservoir cabinet door. _____

3.0 ACCEPTANCE CRITERIA

3.1 Did Standby Oil pump (2P-26 or 2P-27) and Emergency Oil pump (2P-28) start when tested in Section 2.0? YES NO

3.2 IF NO circled in step 3.1,
THEN describe action taken below: _____

Performed By _____ Date _____

Supervisor _____ Date _____

(Record retention of this form is NOT required)

ENTERGY OPERATIONS INCORPORATED ARKANSAS NUCLEAR ONE

**TITLE: MAIN FEEDWATER PUMP AND FWCS
OPERATION**

SET #

**DOCUMENT NO.
2106.007**

**CHANGE NO.
023-01-0**

**WORK PLAN EXP. DATE
N/A**

**TC EXP. DATE
N/A**

**SAFETY-RELATED
☒ YES ☐ NO**

**IPTE
☒ YES ☐ NO**

**TEMP ALT
☐ YES ☒ NO**

**PROGRAMMATIC EXCLUSION PER ENS-LI-101
☐ YES ☒ NO**

When you see these TRAPS

Time Pressure
Distraction/Interruption
Multiple Tasks
Over Confidence
Vague or Interpretive Guidance
First Shift/Last Shift
Peer Pressure
Change/Off Normal
Physical Environment
Mental Stress (Home or Work)

Get these TOOLS

Effective Communication
Questioning Attitude
Placekeeping
Self Check
Peer Check
Knowledge
Procedures
Job Briefing
Coaching
Turnover

VERIFIED BY

DATE

TIME

FORM TITLE:

VERIFICATION COVER SHEET

**FORM NO.
1000.006A**

**CHANGE NO.
051-00-0**

**ENTERGY OPERATIONS INCORPORATED
ARKANSAS NUCLEAR ONE**

Page 1

TITLE: MAIN FEEDWATER PUMP AND FWCS OPERATION

**DOCUMENT NO.
2106.007**

**CHANGE NO.
023-01-0**

AFFECTED UNIT:

☐ UNIT 1 ☒ UNIT 2

☒ PROCEDURE

☐ ELECTRONIC DOCUMENT

☐ WORK PLAN, EXP. DATE _____

SAFETY-RELATED

☒ YES ☐ NO

TYPE OF CHANGE:

☐ NEW

☒ PC

☐ TC

☐ DELETION

☐ REVISION

☐ EZ

EXP. DATE: N/A

DOES THIS DOCUMENT:

- | | | |
|---|------------------------------|--|
| 1. Supersede or replace another procedure?
(If YES, complete 1000.006B for deleted procedure.) | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 2. Alter or delete an existing regulatory commitment?
(If YES, coordinate with Licensing before implementing.) | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 3. Require a 50.59 Review per Form 1000.006S?
(If No, attach completed Form 1000.006S) (If 50.59 Evaluation, OSRC review required.) | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 4. Changes Surveillance Test Program (i.e. Technical Specifications, NRC Commitment, surveillance activity, see Step 7.5)? (If YES, complete 1000.009A) | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 5. Create an Intent Change?
(If YES, Standard Approval Process required.) | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 6. Implement or change IPTE requirements?
(If YES, complete 1000.143A. OSRC review required.) | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 7. Implement or change a Temporary Alteration?
(If YES, then OSRC review required.) | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |

Was the Master Electronic File used as the source document?

☒ YES ☐ NO

INTERIM APPROVAL PROCESS

STANDARD APPROVAL PROCESS

ORIGINATOR SIGNATURE: (Includes review of Att. 13) DATE:

Print and Sign name: **NA** PHONE #:

SUPERVISOR APPROVAL: * **N/A** DATE:

SRO UNIT ONE **: **N/A** DATE:

SRO UNIT TWO **: **N/A** DATE:

Interim approval allowed for non-intent changes requiring no 50.59 evaluation that are stopping work in progress.

Standard Approval required for intent changes or changes requiring a 50.59 evaluation.

*If change not required to support work in progress, Department Head must sign.

**If both units are affected by change, both SRO signatures are required. (SRO signature required for safety related procedures only.)

ORIGINATOR SIGNATURE: (Includes review of Att. 13) DATE: 11/11/2005

Print and Sign name: **Nick Ledbetter** PHONE #: **5888**

INDEPENDENT REVIEWER: DATE: **11-14-05**

ENGINEERING: **N/A** DATE:

Code Programs - NDE: **N/A** DATE:

UNIT SURVEILLANCE COORDINATOR: **N/A** DATE:

SECTION LEADER: **Roger K. Pierce** DATE: **11-14-05**

QUALITY ASSURANCE: **N/A** DATE:

OTHER SECTION LEADERS: **N/A** DATE:

OTHER SECTION LEADERS: **N/A** DATE:

OTHER SECTION LEADERS: **N/A** DATE:

OTHER SECTION LEADERS: **N/A** DATE:

OTHER SECTION LEADERS: **N/A** DATE:

OTHER SECTION LEADERS: **N/A** DATE:

OTHER SECTION LEADERS: **N/A** DATE:

OSRC CHAIRMAN/TECHNICAL REVIEWER: **Roger K. Pierce** DATE: **11-14-05**

FINAL APPROVAL: **SM/BA** DATE: **11-14-05**

REQUIRED EFFECTIVE DATE: **11-21-05**

FORM TITLE:

PROCEDURE/WORK PLAN APPROVAL REQUEST

**FORM NO.
1000.006B**

**CHANGE NO.
054-00-0**

**ENTERGY OPERATIONS INCORPORATED
ARKANSAS NUCLEAR ONE**

**TITLE: MAIN FEEDWATER PUMP AND FWCS
OPERATION**

**DOCUMENT NO.
2106.007**

**CHANGE NO.
023-01-0**

☒ **PROCEDURE** ☐ **WORK PLAN, EXP. DATE** N/A

PAGE 1 **OF** 1

☐ **ELECTRONIC DOCUMENT**

TYPE OF CHANGE:

☐ **NEW**

☒ **PC**

☐ **TC**

☐ **DELETION**

☐ **REVISION**

☐ **EZ**

EXP. DATE: N/A

AFFECTED SECTION:
(Include step # if applicable)

DESCRIPTION OF CHANGE: (For each change made, include sufficient detail to describe reason for the change.)

6.4 Changed >20% FEED FLOW LO to HI PWR MODE to say >17% FEED FLOW LO to HI PWR MODE. (1000.006S, # 3) PIF-2-05-851

10.8 Modified text to delete reference to other procedure section. This section did not provide any guidance. Only one button manipulation is required, so no additional detail is needed. Step now reads: Place HIC for affected MFWP Recircs in AUTO as desired. (1000.006S, # 3) PIF-2-05-862

FORM TITLE:

DESCRIPTION OF CHANGE

**FORM NO.
1000.006C**

**CHANGE NO.
050-00-0**

PROC./WORK PLAN NO. 2106.007	PROCEDURE/WORK PLAN TITLE: MAIN FEEDWATER PUMP AND FWCS OPERATION	PAGE: 1 of 63 CHANGE: 023-01-0
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1.0 PURPOSE

Provide description and instructions for operation of Main Feedwater pumps (MFWP), MFWP Lube Oil and Turning Gear systems, and Feedwater Control System (FWCS).

2.0 SCOPE

This procedure provides instructions for normal operations of the Main Feedwater pumps (2P-1A and 2P-1B) and Turbines (2K-2A and 2K-2B), including lube oil and turning gear operations. Instructions for operating the Feedwater Control System are also included.

3.0 DESCRIPTION

Main Feedwater Pumps

The Main Feedwater Pump unit consists of a turbine driver and a centrifugal pump. Both pumps are required for 100% power. One MFW pump can supply > 94% full power flow with 3 condensate pumps and 2 heater drain pumps running. One MFW pump can supply > 95% full power flow with 4 condensate pumps and 2 heater drain pumps running. The procedural limit of $\leq 90\%$ full power for single MFW pump operations provides margin to these limits.

The Main Feedwater pump is a single stage, double suction centrifugal pump with a rated discharge pressure of 1117 psig. The Main Feedwater Pump Lube Oil System lubricates pump bearings. To prevent shaft leakage, pump is supplied with a temperature controlled Shaft Seal Injection System. Source of seal injection water is the Condensate System. A seal bushing and a serrated shaft sleeve control leakage of water along the shaft. Condensate is used to prevent escape of high temperature Main Feedwater from within the pump by forming this seal.

The Main Feedwater Pump Turbine is a six stage, variable speed, condensing turbine that operates under two sets of steam conditions. High pressure steam is supplied to the turbine from the Main Steam System and low pressure steam is supplied from Moisture Separator Reheater (2E-12A) Outlet. High pressure steam is used during initial startup, periods of low HP turbine exhaust flow, and if necessary, during high load requirements. Low pressure steam is used during normal power operations. Gland seal steam and gland exhaust for the Turbines is supplied from Main Turbine Gland Steam and Gland Exhaust Systems.

Turbine Speed Control is accomplished by an Electro Hydraulic Control System (EHC). During startup or manual operations, the Operator electronically controls turbine speed. During automatic operation, the Feedwater Control System controls speed of the turbine. High pressure hydraulic fluid is supplied to the Main Feed Pump Turbines from the main turbine EHC System.

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Feedwater Pump Lube Oil System

Both Main Feedwater pumps and Turbines are serviced by a common Lube Oil System. This system consists of a Lube Oil Reservoir, two AC powered Main Oil pumps (2P-26/27), a DC powered Emergency Oil pump (2P-28), two Lube Oil Filters, two Lube Oil coolers, and Lube Oil Vapor Extractor (2C-17).

The Lube Oil Reservoir provides sufficient storage capacity of lube oil for both Main Feedwater Pump Units. Mounted on the reservoir are three oil pump motors. Inside the reservoir is a selector valve for porting oil through the coolers. The two Main Oil pumps are constant pressure centrifugal pumps. Either oil pump can supply full pressure to the Main Feedwater pumps. During normal operations, one oil pump is operating and the other pump is in standby. Should oil pressure lower to 65 psig, standby pump will auto start. The Emergency Oil pump is identical to other oil pumps with the exception of its driver. The Emergency Oil pump will automatically start if oil supply pressure drops to 47 psig.

The Main Feedwater Pump Lube Oil coolers (2E-22A and 2E-22B) are tube and shell design with lube oil on the shell side and Component Cooling Water on the tube side. During normal operations, only one cooler is in service. Located on the common cooling water outlet line is a Control valve (2CV-5283) which controls CCW flow through the coolers to maintain lube oil temperature.

The Lube Oil Filters (2F-297A and 2F-297B) are stacked disc construction. Each disc is made of a fine screen material. Three way selector valves on the filter inlet and outlet line determine which filter is in service. Lube Oil Vapor Extractor (2C-17) maintains a slight negative pressure in the Lube Oil Reservoir to remove moisture and air. An Oil Separator on the suction of the Vapor Extractor removes any oil present in the vapor. A bypass valve (2LO-47) around the Vapor Extractor is provided to adjust reservoir vacuum.

Feedwater Control System

The Feedwater Control System (FWCS) maintains Steam Generator downcomer water level by controlling feedwater flow rate. This is achieved through simultaneous adjustment of Main Feed Reg valve (MFRV), MFRV Bypass valve and Feedwater Pump speed. This can be performed in either automatic or manual mode. Normal Automatic Mode allows three element control system and digital programs to automatically control level. When in this mode, the individual manual/auto stations and the Master controller are in automatic. This mode is used when automatic S/G level control is desired.

There are three modes of manual operation. In Preferred Manual, the Master controller is in manual and the individual manual/auto stations are in automatic. In this mode, the Operator manually adjusts the Master controller to provide simultaneous manual control of MFRV position, MFRV Bypass valve position, and Feedwater Pump speed. This mode is used when the manual control of valves and pump speed is desired from one station.

In Partial Manual mode, the Master controller is in automatic with one or more individual manual/auto stations in manual. In this mode, the Operator manually adjusts the individual manual/auto stations in manual to control S/G level.

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The Master controller (2FIC-1029/2FIC-1129) for each FWCS is on 2C02. The compensated level signal from the FWCS is the process variable input to the Master controller. The controller has a Manual/Automatic Transfer Button for mode selection. During automatic operation, the DPU compares level input signal to level setpoint signal and generates a flow demand output signal. In manual, push buttons are used to control the output.

Flow demand output signal from each Master controller is supplied to both FWCSs. The higher of the two flow demand signals is supplied to the pump speed program. The flow demand output signal is also supplied to the valve position programs of the MFRV and Bypass valve controlled by that FWCS.

Each FWCS is equipped with a Reactor Trip Override (RTO) feature. The purpose of RTO is to prevent abnormal Pressurizer level drops due to overcooling of the RCS by limiting the feedwater flow rates after a reactor trip thus limiting the amount of cold water added to the Steam Generators.

CEDMCS undervoltage coils 1 and 2 supply the reactor trip signal to FWCS 1 and undervoltage coils 3 and 4 supply the signal to FWCS 2. Each FWCS also supplies the signals that it receives to the other FWCS and to the SDBCS.

The RTO signal causes the Feedwater Pump speeds to be reduced to the minimum automatic setpoint (3150 rpm) and the Main Feed Reg valves to ramp closed at 1.4% per second. The MFRV Bypass valves will cycle based on RCS Tave. Tave of 548.24°F will result in 2.24% flow demand and 19% valve position. Tave of 552°F will result in 6% flow demand and 50.7% valve position. The FWCS will slowly return the Steam Generators to their normal level. When S/G level > 55% and > 60 sec from TRIP, the RTO signals are automatically removed.

If the FWCSs are being operated with Master controllers in manual, the RTO signals will still perform their functions, but when RTO clears the flow demand will return to the Master controller value. If individual manual/auto stations are in manual, the RTO signals can NOT perform their function and the operator must manually control pump speed and valve position to minimize RCS cooldown.

A High Level Override (HLO) feature is provided in each FWCS to aid in preventing moisture carryover from the S/G to the Main Turbine. HLO actuates $\geq 82\%$ and clears $\leq 80\%$. This HLO signal causes the affected MFRV and Bypass valve to close. Both MFWPs will still be controlled by the higher flow demand signal from the two FWCS. If the individual manual/auto stations are in manual, the HLO signals can NOT perform their function and the operator must manually control pump speed and valve position to minimize moisture carryover.

Main Feedwater Regulating valves (MFRV)

The MFRVs are air operated valves that, in conjunction with other components, maintain S/G level within the proper band. These valves receive a close signal on RTO and HLO. They can be operated in auto by the FWCS, in manual with the controller, or by insertion of the locking pin to allow valve operation with the handwheel.

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Main Feedwater pump (MFWP) Recirc valve and Condensate Recirc valve

A MFWP trip results in lower flow through the pump, causing the associated recirc valve to open in an attempt to maintain flow. The opening recirc valve may result in MFWP suction pressure lowering enough to autostart the standby condensate pump. Additionally, the idle MFW pump will NOT go on the turning gear with its recirc valve open, due to the wind milling action of recirc flow through the pump.

ERCN1 to ER-ANO-2001-0212 was implemented to maximize feedwater flow to steam generators, allowing more time for operator response to prevent a plant trip. Upon a MFWP trip, the recirc valve controller will close the valve and send a digital trip signal to the associated condensate recirc valve controller, thereby closing both recirc valves. The MFWP trip signal is taken from the MFWP discharge pressure transmitters (2PT-0747 and 2PT-0739, respectively). This trip signal is operator adjustable and is intended to be set at ~ 850 PSIG with the MFWP in service and ~ 500 PSIG with MFWP NOT in service. This analog current signal is fed to the associated MFWP recirc valve controller and also provides MFWP discharge pressure indication on the recirc valve controller display.

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4.0 REFERENCES

4.1 References Used in Procedure Preparation:

- MFWP Tech Manuals D055.0040, G080.3240, G080.3740
- NCP 980547N203, SG Replacement Changes for FWCS/RRS
- NCP 975122N201, High High Cntmt Pressure Isolation of MFW
- ER 992050E201 & Calc 00-E-0002-02 CS-FW Evaluation and Analysis
- CR-ANO-2-2000-1052, CCW alignment to MFWPLO coolers
- ER980547N207, ANO2 PUR PPS/CPC Setpoint Mods
- ER980547N208, ANO2 Condensate and FW System Setpoint Mods.
- ER-ANO-2001-0212-000, FW/Cond Recirc Controller Upgrades
- Calculation Revision Notice 02-151
- ER-ANO-2005-0248, MFP suction strainer installation
- CR-ANO-2-2005-1336, Water Hammer While Admitting Steam to MFWP
- CR-ANO-2-2005-1339, Resetting Relays in MFWP Turbine EHC Cabinets

4.2 References Used in Conjunction with this Procedure:

- Condensate And Feedwater Operations (2106.016)
- Electrohydraulic Oil System Operation (2106.012)
- Component Cooling Water System Operations (2104.028)
- Lube Oil Transfer and Purification (2106.001)
- Control of Infrequently Performed Tests or Evolutions (1000.143)

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5.0 LIMITS AND PRECAUTIONS

- 5.1 Maximum oil temperature rise across bearing should NOT exceed 50°F.
- 5.2 Oil temperature returning from bearing should not exceed 180°F.
- 5.3 Bearing metal temperatures should NOT exceed 200°F.
- 5.4 When MFWP to be uncoupled, then pump and turbine shall be isolated to prevent rotation except with turning gear or an approved test procedure.
- 5.5 Main Feedwater pump design maximum speed is 5050 rpm.
- 5.6 If MFWP Turbine EHC Trouble Alarm locked in or meter relays not reset, then MFWP may not rise in speed above LSS.
- 5.7 Rapid transients should be avoided with FWCS in manual.
- 5.8 When FWCS testing or troubleshooting in progress, consideration should be given to the following:
 - Place appropriate controllers in manual.
 - Remove appropriate analog inputs from service.
- 5.9 When controllers for valves and pumps are in manual, respective component will not respond to High Level Override or Reactor Trip Override.
- 5.10 If either regulating valve or bypass valve isolated when FWCS in service, consideration should be given to the following:
 - Respective controller should be left in manual with demand at system value for present flow demand.
 - Isolated valve should not be stroked with Fischer Porter controller unless associated regulating valve or bypass valve first placed in manual. This will prevent valve tracking function causing valve that is in service to stroke.
- 5.11 Automatic setpoint for MFWP Recirc controllers (2FIC-0735 and 2FIC-0742) should be set for ≥ 3000 gpm to protect MFWPs from low flow.
- 5.12 Wait at least 90 seconds between resetting of both Digital Process Units.
- 5.14 For normal two pump operation, the Δp limit for Main Feed Pump suction strainers is 7 psid. Design differential pressure is 28 psid.
- 5.15 With Main Feed Pump suction strainers installed, avoid continuous operation with pump speed in the following ranges:
 - 2167 to 2200 rpm
 - 4033 to 4067 rpm
- 5.16 IF unexplained rise noted in oil reservoir,
THEN investigation should include possible leak
(Lube Oil cooler, MFWP seal leak or improper valve lineup).
- 5.17 MFPT Lube Oil filter Δp limit is 10 psid.

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6.0 SETPOINTS

6.1 Main Feedwater Pump Turbine Trips:

- MSIS 1 or 2
- CSAS 1 or 2
- Main Turbine Trip (Selected pump only)
- Low Flow < 4000 gpm (30 second time delay)
- Manual Trip (2C02, Turbine Front Standard)
- Overspeed 110%
- Thrust Bearing Wear (Active) > 13 psig (2 out of 2)
- Thrust Bearing Wear (Inactive) > 13 psig (2 out of 2)
- High Exhaust Pressure (Low Vacuum) > 13.4 HgA (2 out of 2)
- Low-Low Suction Pressure < 325 psig with 30 second time delay (2 out of 3)
- High Discharge Pressure > 1250 psig at pump discharge, AND > 1300 psig at EITHER 2E-1A or 2E-1B outlet
- Low Turbine Lube Oil Pressure (permissive < 8 psig, trip < 4 psig)
- Low Pump Lube Oil Pressure (permissive < 8 psig, trip < 4 psig)

6.2 The following conditions must exist to latch MFWP Turbine:

- EH supply pressure > 1500 psig
- MSIS AND CSAS clear
- Pump Casing differential temperature < 25°F.
- HP stop valve closed
- LP stop valve closed
- Control Valve Operating Assembly in full closed position.
- The other MFWT LP stop valve closed or 2 Cond. pumps running.
- BOTH Instrument AC Panels 2Y1 AND 2Y2 energized.

6.3 Main Feed Pump Lube Oil System Interlocks

- The Standby Main Oil pump (2P-26 or 2P-27) starts at < 65 psig.
- The Emergency Oil pump (2P-28) starts at < 47 psig.
- MFWP Turning gear trips on low bearing oil pressure.
- MFWP Turning gear will NOT engage Casing Δ Temp \geq 25°F.

6.4 Steam Generator level setpoints

- Steam Generator High Level Trip > 85.8%
- Steam Generator Low Level Trip < 22.2%
- High Level Override > 82.0%
- S/G Level deviation-Selected Level > 5% from Setpoint
- > 17% FEED FLOW LO to HI PWR MODE
- S/G level Setpoint ramps 60-70% at Turbine FSP ~ 25%

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7.0 MAIN FEEDWATER PUMP LUBE OIL SYSTEM OPERATIONS

7.1 Lube Oil System Startup

7.1.1 Initial Conditions

- A. Valves aligned using Attachment A of this procedure.
- B. CCW available to Lube Oil coolers using Startup section of Component Cooling Water System Operations (2104.028).
- C. MFWP Lube Oil Reservoir (2T-34) level (2LIS-0396) greater than +2 inches in the level band.
- D. Lube Oil Temperature controller (2TIC-5283) aligned as follows:
 - In AUTO.
 - Set to maintain bearing inlet temperature ~ 120°F.

7.1.2 Verify Vapor Extractor (2HS-0330 for 2C-17) running.

7.1.3 Adjust Vapor Extractor Bypass valve (2LO-47) to maintain ~ 1/2 inch of H₂O vacuum in 2T-34 on 2PI-9800.

7.1.4 Start selected MFWP Lube Oil pump:

- 2P-26
- 2P-27

7.1.5 Verify oil pressure > 70 psig at LO MFPT Filters Inlet (2PI-2604).

7.1.6 Verify Δp between LO MFPT Filters Inlet (2PI-2604) and LO MFPT Filters Outlet (2PI-2606) \leq 8 PSID.

7.1.7 Check oil flow at bearings:

- 2K-2A Active Thrust Brg Wear (2FO-0372)
- 2K-2A Inactive Thrust Brg Wear (2FO-0374)
- 2K-2B Active Thrust Brg Wear (2FO-0370)
- 2K-2B Inactive Thrust Brg Wear (2FO-0371)

7.1.8 Verify the following:

- Non-running MFWP Lube Oil pump (2P-26 or 2P-27) in NORMAL AFTER STOP
- Emergency Oil pump (2P-28) in NORMAL AFTER STOP

7.1.9 Test Auto Start of MFWP Oil pumps using Supplement 6.

7.1.10 IF desired to place MFWP LO Reservoir Side Stream Filtration Unit (2F-498) in service, THEN use Lube Oil Transfer and Purification (2106.001).

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7.2 Shifting MFWP Lube Oil Filters:

7.2.1 IF placing Lube Oil Filter (2F-297A) on line,
THEN perform the following:

- * A. Monitor filter outlet pressure at all times during this operation using LO MFPT Filters Outlet (2PI-2606).
- * B. IF lube oil pressure lowers,
THEN place original filter on line.
- C. Unlock and open Lube Oil Filters 2F-297A/B Inlet Selector valve (2LO-51) until indicator moves ~ 90° toward 2F-297A.
- D. Vent 2F-297A by throttling open Lube Oil Filter 2F-297A Vent (2LO-1014) until solid stream issues.
- E. WHEN 2F-297A is filled and vented,
THEN close 2LO-1014.
- F. Fully position 2LO-51 to 2F-297A.
- G. Lock 2LO-51.
- H. Submit WR/WO to replace 2F-297B.

7.2.2 WHEN new 2F-297B installed,
THEN perform the following:

- A. Unlock and open 2LO-51 until indicator moves ~ 90° toward 2F-297B.
- B. Fill and vent 2F-297B by throttling open Lube Oil Filter 2F-297B Vent (2LO-1016) until solid stream issues.
- C. Close 2LO-1016.
- D. Check 2F-297B for leaks.
- E. Fully position 2LO-51 to 2F-297A.
- F. Lock 2LO-51.

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7.2.3 IF placing Lube Oil Filter (2F-297B) on line,
THEN perform the following:

- * A. Monitor filter outlet pressure at all times during this operation LO MFPT Filters Outlet (2PI-2606).
- * B. IF lube oil pressure lowers,
THEN place original filter on line.
- C. Unlock and open Lube Oil Filters 2F-297A/B Inlet Selector valve (2LO-51) until indicator moves ~ 90° toward 2F-297B.
- D. Vent 2F-297B by throttling open Lube Oil Filter 2F-297B Vent (2LO-1016) until solid stream issues.
- E. WHEN 2F-297B filled and vented,
THEN close 2LO-1016.
- F. Fully position 2LO-51 to 2F-297B.
- G. Lock 2LO-51.
- H. Submit WR/WO to replace 2F-297A.

7.2.4 WHEN new 2F-297A has been installed,
THEN perform the following:

- A. Unlock and open 2LO-51 until indicator moves ~ 90° toward 2F-297A.
- B. Fill and vent 2F-297A by throttling open Lube Oil Filter 2F-297A Vent (2LO-1014) until solid stream issues.
- C. Close 2LO-1014.
- D. Check 2F-297A for leaks.
- E. Fully position 2LO-51 to 2F-297B.
- F. Lock 2LO-51.

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7.3 Shifting MFWP Lube Oil coolers

7.3.1 Start Standby MFWP Oil pump (2P-26 OR 2P-27) as follows:

- Place 2P-26 handswitch (2HS-0331) in NORMAL AFTER START.
- Place 2P-27 handswitch (2HS-0332) in NORMAL AFTER START.

*7.3.2 Monitor MFWP Lube Oil temperature on PMS points T0374 and T0371 while shifting coolers.

7.3.3 Verify the following valves open to align CCW to BOTH MFWP Lube Oil coolers:

- 2E-22A MFWP LO HX Supply (2CCW-46)
- 2E-22A MFWP LO HX Return (2CCW-47)
- 2E-22B MFWP LO HX Supply (2CCW-44)
- 2E-22B MFWP LO HX Return (2CCW-45)

7.3.4 Verify FME Zone 1 controls implemented for accessing lube oil sump per Foreign Material Exclusion Program (1000.060).

7.3.5 Slowly open Lube Oil Cooler X-Connect (2LO-67) until oil issues out of Standby Lube Oil Cooler Constant Vent.

7.3.6 Slowly shift Lube Oil Cooler Inlet Selector (2LO-49) to Standby cooler. (Arrow aligned to pumps = 2E-22A aligned/arrow aligned to control panel = 2E-22B aligned. Refer to Exhibit 8, CCW to MFWPLO Cooler Alignment).

7.3.7 Isolate CCW to off-line cooler as follows:

- IF 2E-22A off-line cooler (refer to previous step),
THEN close 2CCW-46.
- IF 2E-22B off-line cooler (refer to previous step),
THEN close 2CCW-44.

7.3.8 Close 2LO-67.

7.3.9 Secure Standby MFWP Oil pump started at first step of this section (2P-26 OR 2P-27) as follows:

- Place 2P-26 handswitch (2HS-0331) in NORMAL AFTER STOP.
- Place 2P-27 handswitch (2HS-0332) in NORMAL AFTER STOP.

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7.4 Lube Oil System Shutdown

7.4.1 Verify BOTH MFWP Turbines have been on turning gear at least two hours to ensure rotors have cooled.

7.4.2 IF vacuum to be maintained
AND exhaust trunk can NOT be isolated,
THEN isolate lube oil as follows:

- A. Stop Vapor Extractor 2C-17 (2HS-0330).
- B. Place BOTH MFWP Turning gears in PULL TO LOCK:
 - 2HS-0353 for 2K-7A
 - 2HS-0333 for 2K-7B
- C. Install Danger Tags to isolate Lube Oil to Pump/Turbine as desired.
- *D. Monitor bearing temperatures on 2TR-0325 OR PMS.
Do NOT exceed 220°F bearing temperature.

7.4.3 IF vacuum to be maintained on main condenser,
THEN install Danger Tags to isolate the following components:

- MFWP Turbines gland seal
- Gland exhaust
- Exhaust trunk

7.4.4 Isolate gland seal steam to MFWP Turbines by closing the following valves:

- Gland Seal Supply to 2K-2A (2GS-2)
- Gland Seal Supply to 2K-2B (2GS-4)

7.4.5 Place BOTH MFWP Turning gears in PULL TO LOCK:

- 2HS-0353 for 2K-7A
- 2HS-0333 for 2K-7B

7.4.6 Place the following pumps in PULL TO LOCK:

- Standby Main Oil pump (2P-26 OR 2P-27):
 - 2HS-0331 for 2P-26
 - 2HS-0332 for 2P-27
- Emergency Oil pump 2HS-0351 (2P-28).

7.4.7 Place operating Main Oil pump in PULL TO LOCK:

- 2HS-0331 for 2P-26
- 2HS-0332 for 2P-27

7.4.8 Stop Vapor Extractor 2C-17 (2HS-0330) as desired.

7.4.9 Secure MFWP LO Reservoir Side Stream Filtration Unit (2F-498) as desired using Lube Oil Transfer and Purification (2106.001).

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8.0 MFWP TURNING GEAR OPERATIONS

8.1 Placing MFWP on Turning gear

- 8.1.1 Verify MFWP Lube Oil System in operation per Main Feedwater Pump Lube Oil System Operations section of this procedure.
- 8.1.2 Verify seal water supplied to MFWP per Attachment C of Condensate and Feedwater Operations (2106.016).
- 8.1.3 Check turbine at low speed (Low Speed Switch amber light on).
- 8.1.4 Reset turning gear lockout relay:
 - 2W032 for 2K-7A
 - 2W033 for 2K-7B

NOTE

MFWT rotor is considered bowed if it sits idle with Gland Steam admitted for more than one hour.

- 8.1.5 IF rotor considered bowed,
THEN perform the following:
 - A. Engage turning gear locally.
 - B. Rotate shaft ~ 90° every 15 minutes until one complete revolution achieved.
 - * C. Monitor for abnormal noise during performance of following steps to place rotor on turning gear.
- 8.1.6 Verify selected MFWP Turning gear motor running:
 - 2K-7A
 - 2K-7B
- 8.1.7 Place selected MFWP Turning gear handswitch in NORMAL AFTER START:
 - 2HS-0353 for 2K-7A
 - 2HS-0333 for 2K-7B
- 8.1.8 IF turning gear fails to engage,
THEN perform the following:
 - Manually engage turning gear using manual lever.
 - Verify WR/WO submitted.

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8.2 Securing MFWP Turning gear

8.2.1 Place selected MFWP Turning gear handswitch in PULL TO LOCK:

- 2HS-0353 for 2K-7A
- 2HS-0333 for 2K-7B

8.2.2 Verify selected MFWP Turning gear disengages:

- 2K-7A
- 2K-7B

9.0 MAIN FEEDWATER PUMP STARTUP

9.1 Initial Conditions

- Selected MFWP on turning gear.
- MFWP Low Flow Bypass switches in BYPASS.
- Bias indication on both MFWP speed controllers ≥ 0.0 .
- MFWP Lube Oil Temperature controller (2TIC-5283) in AUTO at $\sim 120^{\circ}\text{F}$.
- Valves aligned using Condensate And Feedwater Operations (2106.016).
- Two Condensate pumps in operation per 2106.016.
- EHC System in operation using Electrohydraulic Oil System Operation (2106.012).
- All MFWP Turbine reset permissives clear per Section 6.0.
- Gland Seal aligned using Gland Seal Steam System (2106.013).
- IF starting first MFWP,
THEN Preferred Trip Selector switch (2HS-0352) selected to pump NOT being started.
- MFWP recirc valve controllers (2FIC-0742 and 2FIC-0735) MFWP/CNDP Recirc Auto Close setpoint (pg 3 of controller) set to ~ 500 psig.

9.2 IF selected MFWP discharge to casing differential temperature $\geq 25^{\circ}\text{F}$, THEN perform the following:

9.2.1 Verify selected MFWP Turning gear NOT engaged:

- 2K-7A
- 2K-7B

9.2.2 Establish recirc flow through selected MFWP by opening manual recirc warm-up valve:

- For A MFWP: 2FW-6C
- For B MFWP: 2FW-6D

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CAUTION

The following step will bypass interlocks that prevent rolling MFWP when casing differential temperature $\geq 25^{\circ}\text{F}$. Do NOT roll MFWP.

9.2.3 IF above step NOT desired or NOT adequate,
THEN establish flow through selected MFWP by cracking open MFWP Recirc valve to maintain minimum pump flow:

- For A MFWP: 2CV-0741 with 2FIC-0735
- For B MFWP: 2CV-0749 with 2FIC-0742

9.2.4 WHEN selected MFWP casing differential temperature $< 25^{\circ}\text{F}$,
THEN the following may continue:

- Turning gear operation
- Pump startup

9.3 Verify the following at Main Feedwater Pump Control insert on 2CO2:

- Power lamp on
 - AT LSS lamp on
- | | <u>2K-2A</u> | <u>2K-2B</u> |
|------------------------|--------------|--------------|
| • HP stop valve closed | 2CV-0321A | 2CV-0316A |
| • LP stop valve closed | 2CV-0350 | 2CV-0330 |
| • Control valve closed | 2CV-0351 | 2CV-0331 |

9.4 Check Main Steam to MFWP valve open for pump being started:

- For A MFWP: 2CV-0320
- For B MFWP: 2CV-0315

9.4.1 IF valve closed with Main Steam Header pressurized,
THEN manually throttle open to equalize pressure and prevent water hammer using Conduct of Operations (1015.001).

9.4.2 WHEN pressure across valve equalized,
THEN open selected valve.

9.5 Open the following valves on 2C12:

	<u>A pump</u>	<u>B pump</u>
• HPSV Above Seat Drain	2CV-0321	2CV-0316
• HPSV Below Seat Drain	2CV-0317	2CV-0314
• LPSV Below Seat Drain	2CV-0327	2CV-0312
• LPSV Above Seat Drain	2CV-0326	2CV-0311
• First Stage Shell Drain	2CV-0322	2CV-0307
• LP Steam Drain	2CV-0328	2CV-0328

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- 9.6 Verify selected MFWT Speed controller (2HIC-0321 or 2HIC-0310) aligned as follows:
- In MANUAL
 - Output demand at zero
- 9.7 Verify selected MFWP Recirc (2CV-0741 or 2CV-0749) throttled open.
- 9.8 IF manual recirc warm-up valves 2FW-6C and 2FW-6D opened in Step 9.2, THEN close the following valves:
- 2FW-6C
 - 2FW-6D
- 9.9 Latch selected MFWP turbine by momentarily depressing Reset pushbutton AND check the following:
- Associated Feed Pump Trip annunciator (2K03-A8 or A11) clears.
- | | | |
|-----------------------|--------------|--------------|
| | <u>2K-2A</u> | <u>2K-2B</u> |
| • HP stop valve opens | 2CV-0321A | 2CV-0316A |
| • LP stop valve opens | 2CV-0350 | 2CV-0330 |
- 9.10 IF selected MFWP Turbine does NOT latch, THEN refer to EXHIBIT 1.
- 9.11 Reset all meter relays in MFWP Turbine EHC cabinets 2C36 and 2C37 by depressing push buttons above respective meters.
- 9.12 Depress RAISE pushbutton on selected MFWP Turbine until turning gear disengages at ~ 200 rpm or until speed reaches 500 rpm.
- 9.13 Secure MFP Turning Gear as follows:
- 9.13.1 Verify Low Speed Switch amber light off.
- 9.13.2 Verify Turning Gear stopped. (Auto stops 5 seconds after disengaging.)
- 9.13.3 IF securing A MFP, THEN locally check engaging solenoid core exposed ~2 inches.
- IF engaging solenoid NOT exposed ~2 inches, THEN disengage turning gear by pulling engaging handle DOWN.
- 9.13.4 IF securing B MFP, THEN locally check engaging solenoid core exposed ~1 inch.
- IF engaging solenoid NOT exposed ~1 inch, THEN disengage turning gear by pulling engaging handle UP.

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10.0 PLACING THE SECOND MFWP IN SERVICE

- 10.1 Verify Main Feedwater Pump Startup section completed through step 9.17.
- 10.2 Verify Condensate header pressure 650 to 750 psig.
- 10.3 Verify S/G levels and flows stable enough to place second MFWP on line.
- 10.4 Verify selected MFWP flow maintained ~ 1 gal/1 rpm at all times.
- 10.5 Slowly raise incoming pump speed until pump speed controller demand matches Speed tracking Demand for respective FWCS.
 - WHEN automatic operation desired,
THEN place speed controller for this pump in Automatic.
- 10.6 WHEN flow and S/G levels stabilized,
THEN bump selected MFWP Recirc closed while performing the following:
 - 10.6.1 Between bumps allow flows and S/G levels to stabilize.
 - 10.6.2 Continue bumping selected MFWP Recirc until closed.
- 10.7 Adjust MFWP/CNDP Recirc Auto Close setpoint for both MFWP recirc valve controllers (pg 3 of controller) to ~ 850 psig:
 - 2FIC-0742
 - 2FIC-0735

CAUTION

Avoid continuous operation of MFPs in the following speed ranges:

- 2167 to 2200 rpm
- 4033 to 4067 rpm

- 10.8 Place HIC for affected MFWP Recircs in AUTO as desired.

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11.0 MAIN FEEDWATER PUMP SHUTDOWN

CAUTION

Removing a MFP from service will result in the suction strainer Δp on the in service MFP rising by a factor of four. Refer to Attachment I.

- 11.1 Verify power within capacity of feed pump to remain in service:
- MFW \leq 90%
 - AFW \sim 4%
 - EFW \sim 3%
- 11.2 Adjust MFWP/CNDP Recirc Auto Close setpoint for BOTH MFWP recirc valve controllers (pg 3 of controllers) to \sim 500 psig:
- 2FIC-0742
 - 2FIC-0735
- 11.3 Verify MFWP Turbine Preferred Trip Select switch (2HS-0352) selected to pump being shutdown.
- 11.4 Take manual control of MFWP Speed controller (2HIC-0321 or 2HIC-0310) to be removed from service and slowly lower pump speed.
- 11.5 Verify the following:
- S/G levels maintained between 40 and 80%.
 - Selected MFWP minimum flow maintained (\sim 1 gal/1 rpm).
 - Condensate header pressure maintained 650 to 750 psig by manually controlling 2FIC-0663 OR 2FIC-0662.
- 11.6 IF desired to minimize O₂ ingress into condenser
OR raise system reliability,
THEN idle selected MFWP at minimum speed.
- 11.7 WHEN selected MFWP at minimum speed
AND desired to secure pump,
THEN trip selected MFWP and check the following:
- Associated Feed Pump Trip annunciator (2K03-A8 or A11) alarms.
- | | | |
|------------------------|--------------|--------------|
| | <u>2K-2A</u> | <u>2K-2B</u> |
| • HP stop valve closes | 2CV-0321A | 2CV-0316A |
| • LP stop valve closes | 2CV-0350 | 2CV-0330 |
| • Control valve closes | 2CV-0351 | 2CV-0331 |
| • AT LSS lamp on | | |
- 11.8 Close MFWP Recirc valve for pump being secured:
- For A MFWP: 2CV-0741 with 2FIC-0735
 - For B MFWP: 2CV-0749 with 2FIC-0742
- 11.9 Verify Condensate pump discharge pressure between 650 and 750 psig.
- 11.10 Check proper performance of Feedwater Control System.
- 11.11 WHEN selected MFWP speed lowers to \sim 0 rpm,
THEN verify MFWP Turning gear engages per Section 8.0 of this procedure

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12.0 FWCS CONTROLLER OPERATIONS (TRANSFER FROM AUTO TO MANUAL)

NOTE

Manual always tracks automatic in Feedwater Control System to provide bumpless transfer from Automatic to Manual at any time.

12.1 IF desired to transfer Master controller to MANUAL,
THEN perform the following:

12.1.1 Depress M/A button.

12.1.2 Depress RAISE or LOWER as necessary to change demand.

12.2 IF desired to transfer Individual controller to MANUAL,
THEN perform the following:

12.2.1 Depress M/A pushbutton.

12.2.2 Depress RAISE or LOWER as necessary to change demand.

13.0 FWCS CONTROLLER OPERATIONS (TRANSFER FROM MANUAL TO AUTO)

13.1 Verify S/G NR level within 2% of setpoint.

13.2 Verify Steam Generator NR Level stable.

NOTE

If a signal is reset, then Signal RESET will be WHITE and selector box will indicate NORMAL. Signal RESET will be BLUE with Point ID RED if signal needs to be reset. (CR-ANO-2-2004-0008)

13.3 On EWS, verify the following:

- All Signal RESETs, on all Signal Validation Screens Reset per appropriate Attachment, OR reason known AND desired to continue.
- NO unexplained alarms present
- KEY in OPERATE AND Removed.

13.4 IF using MFWP
AND SDBCS operating with any valves in automatic
AND Master Setpoint > 1000 psia,
THEN perform the following:

13.4.1 Place SDBCS Master setpoint in local.

13.4.2 Slowly adjust SDBCS Master setpoint to 1000 psia or less.

13.4.3 Slowly raise Feed Pump speed to ~ 3150 rpm.

13.4.4 Verify Feed Pump discharge pressure greater than SG pressure.

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13.5 IF FWCS valves in manual,
THEN perform the following:

13.5.1 Display FW flow demand tracking for 'A' and 'B' FWCS at either of the following locations:

- On page 2 of MFWP Speed Fisher Porter controllers
- On PMS point (FWFDMDT1 or FWFDMDT2)

13.5.2 Match Flow Demand on Master controller to within 1% of Flow Demand Tracking value.

13.5.3 Place controller for selected valve in automatic.

13.5.4 Check selected valve position remains constant from manual to automatic.

13.5.5 Place Master controller in automatic.

13.5.6 Verify Flow Demand on Master output responding to control S/G level.

13.5.7 WHEN desired to place second valve in automatic,
THEN perform the following:

A. Verify both valve positions close to respective positions desired by FWCS.

B. Place controller for second valve in automatic.

CAUTION

Avoid continuous operation of MFPs in the following speed ranges:

- 2167 to 2200 rpm
- 4033 to 4067 rpm

13.6 WHEN desired to place first MFWP speed controller in automatic,
THEN perform the following:

13.6.1 Display Speed Demand Tracking on page 2 of respective MFRV controller OR on PMS (PMPDMDTA or PMPDMDTB).

13.6.2 Slowly adjust demand on Feed Pump speed controller to match Speed Demand Tracking value.

13.6.3 Place Feed Pump Speed controller in automatic.

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14.0 MAIN FEED REGULATING VALVE OPERATIONS

14.1 To establish local control, perform the following:

- 14.1.1 Establish radio communications with Control Room.
- 14.1.2 Align hole in operating sleeve with hole in MFRV stem by adjusting handwheel.
- 14.1.3 Insert locking pin.
- 14.1.4 Open Instrument Air Actuator Equalizing valve.
- 14.1.5 Position MFRV as directed by Control Room.
- 14.1.6 IF desired to isolate Instrument Air to MFRV positioner, THEN close local isolation valve next to positioner, ~ 6 inches above floor.

14.2 To restore remote control, perform the following:

- 14.2.1 Establish radio communications with Control Room.
- 14.2.2 Verify IA aligned to selected MFRV positioner.
- 14.2.3 Close Instrument Air Actuator Equalizing valve.
- 14.2.4 Inform Control Room that pin will be removed for selected MFRV.
- 14.2.5 Remove pin.
- 14.2.6 Manually jack sleeve fully upward.

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15.0 MAIN FEEDWATER PUMP RECIRC VALVE MANUAL OPERATION

- 15.1 To establish local control of Main Feedwater Pump Recirc valves, perform the following:
 - 15.1.1 Establish radio communications with Control Room.
 - 15.1.2 Unscrew and remove coupling at top of manual override shaft.
 - 15.1.3 Place HIC for affected MFWP Recirc in MANUAL.
 - 15.1.4 Turn handwheel clockwise to expose actuator shaft
 - Align and slide coupling onto shaft.
 - 15.1.5 Close Instrument Air supply valve to valve operator.
 - 15.1.6 Open Instrument Air Equalizing valve around valve operator.
 - 15.1.7 Turn handwheel to position valve as desired.
- 15.2 To restore remote control of Main Feedwater Pump Recirc valves, perform the following.
 - 15.2.1 Establish radio communications with Control Room.
 - 15.2.2 Verify the following for associated MFWP Recirc:
 - HIC in MANUAL with 0 output
 - MFWP Recirc closed
 - 15.2.3 Close Instrument Air Equalizing valve around valve operator.
 - 15.2.4 Open Instrument Air Supply to valve operator.
 - 15.2.5 Attempt to relieve coupling tension by applying small air signal to valve.
 - 15.2.6 IF unable to relieve coupling tension in previous step, THEN slowly rotate handwheel for selected MFWP Recirc until coupling tension relieved.
 - 15.2.7 Remove coupling from actuator shaft and inform Control Room valve no longer pinned.
 - 15.2.8 Turn handwheel counterclockwise to fully extend manual override shaft.
 - Reinstall coupling at top of shaft.

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16.0 OPERATION OF MFWP SEAL WATER CONTROLLERS

16.1 Verify MFWP Seal Water aligned per Attachment C of Condensate and Feedwater Operations (2106.016).

16.2 IF verifying operation of 2P-1A Seal Water controllers,
THEN perform the following:

16.2.1 Verify IA aligned to the following MFWP Seal Water controllers:

- 2P-1A Seal Water Supply Pressure controller (2PC-0737)
- 2P-1A Inboard Seal Supply Temperature controller (2TIC-0733)
- 2P-1A Outboard Seal Supply Temperature controller (2TIC-0755)

16.2.2 Verify 2PC-0737 maintaining seal water pressure (2PI-0737) slightly greater than MFWP suction pressure (2PI-0735/P0735).

16.2.3 Verify the following temperature controllers maintaining seal water outlet temperature ~170°F:

- 2TIC-0733 (inboard)
- 2TIC-0755 (outboard)

16.3 IF verifying operation of 2P-1B Seal Water controllers,
THEN perform the following:

16.3.1 Verify IA aligned to the following MFWP Seal Water controllers:

- 2P-1B Seal Water Supply Pressure controller (2PC-0745)
- 2P-1B Inboard Seal Supply Temperature controller (2TIC-0773)
- 2P-1B Outboard Seal Supply Temperature controller (2TIC-0775)

16.3.2 Verify 2PC-0745 maintaining seal water pressure (2PI-0745) slightly greater than MFWP suction pressure (2PI-0742/P0742).

16.3.3 Verify the following temperature controllers maintaining seal water outlet temperature ~170°F:

- 2TIC-0773 (inboard)
- 2TIC-0775 (outboard)

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ATTACHMENT A

MFWP LUBE OIL LINEUP

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
MAIN FEEDWATER PUMP LO RESERVOIR 2T-34							
2LO-49	Lube Oil Coolers 2E-22A/B Inlet Selector Valve	M2216 C6 SH 2	MFWP LUBE OIL SKID, W SIDE OF 2T-34, UNDER LID ON TOP	(2)			
2LO-67	Lube Oil Coolers 2E-22A/B X-Connect	M2216 C6 SH 2	MFWP LUBE OIL SKID, W SIDE OF 2T-34, UNDER LID ON TOP	CLOSED			
2LO-1014	Lube Oil Filters 2F-297A Vent	M2216 D7 SH 2	MFWP LUBE OIL SKID, S SIDE OF 2T-34, ON TOP OF FILTER 2F-297A, 4 FT FROM FLOOR	CLOSED			
2LO-51	Lube Oil Filters 2F-297A/B Inlet Selector Valve	M2216 D7 SH 2	MFWP LUBE OIL SKID, 1 FT S OF 2T-34, BETWEEN FILTERS 2F-297A/B, 5 FT UP	(3)			
2LO-1016	Lube Oil Filter 2F-297B Vent	M2216 D7 SH 2	MFWP LUBE OIL SKID, S SIDE OF 2T-34, ON TOP OF FILTER 2F-297B, 4 FT FROM FLOOR	CLOSED			
2LO-1013	Lube Oil Filter 2F-297A Drain	M2216 D7 SH 2	MFWP LUBE OIL SKID, S SIDE OF 2T-34, 1 FT N AND 1 FT BELOW LO COOLER 2E-22A	CLOSED			
2LO-1019	Lube Oil Filters 2F-297A/B Inlet Selector Drain	M2216 D7 SH 2	MFWP LUBE OIL SKID, S SIDE OF 2T-34, 1 FT BELOW LO COOLER 2E-22A, 3 FT FROM FLOOR	CLOSED			
2LO-1015	Lube Oil Filter 2F-297B Drain	M2216 D7 SH 2	MFWP LUBE OIL SKID, S SIDE OF 2T-34, 1 FT N AND 1 FT BELOW LO COOLER 2E-22A	CLOSED			
2LO-1011	Lube Oil Cooler 2E-22A Drain	M2216 C7 SH 2	MFWP LUBE OIL SKID, S SIDE OF 2T-34, 1 FT BELOW LO COOLER 2E-22A, 2.5 FT FROM FLOOR	CLOSED			
2LO-1012	Lube Oil Cooler 2E-22B Drain	M2216 C7 SH 2	MFWP LUBE OIL SKID, S SIDE OF 2T-34, E END OF LO COOLER 2E-22B, 2 IN FROM FLOOR	CLOSED			
2LO-2604	Lube Oil Filters Inlet 2PI-2604 Isol	M2216 D7 SH 2	MFWP LUBE OIL SKID, INSIDE CABINET ON TOP OF 2T-34, BEHIND 2PI-2604	OPEN			
2LO-2606	Lube Oil Filters Outlet 2PI-2606 Isol	M2216 D7 SH 2	MFWP LUBE OIL SKID, INSIDE CABINET ON TOP OF 2T-34, BEHIND 2PI-2606	OPEN			
PLATFORM ABOVE AUX FW PUMP 2P-75							
2LO-47	Vapor Extractor 2C-17 Bypass	M2216 E3 SH 2	PLATFORM ABOVE AUX FW PUMP 2P-75, 2 FT ABOVE GRATING	(1)			
MAIN FEEDWATER PUMP A FRONT STANDARD							
2LO-53A	MFV A Pump/Turbine Supply Isol	M2216 F5 SH 2	MFWP A FRONT STANDARD, SE CORNER UNDER PLATE	OPEN			
2LO-2609A	MFWP A LO Press Trip 2PI-2609A Isol	M2216 F5 SH 2	MFWP A FRONT STANDARD, IN LOWER CABINET AT SE CORNER OF 2K2A GAUGE BOARD 2C103	OPEN			
2LO-2607A	MFWP A Oil Press Control 2PI-2607A Isol	M2216 H6 SH 2	MFWP A FRONT STANDARD, IN LOWER CABINET AT SE CORNER OF 2K2A GAUGE BOARD 2C103	OPEN			
2LO-2603A	MFWPT A LO Supply 2PI-2603A Isol	M2216 G7 SH 2	MFWP A FRONT STANDARD, IN N SIDE OF 2K2A GAUGE BOARD 2C103, 3 FT UP	OPEN			

(1) Adjust 2LO-47 to maintain ~ 0.5" H₂O in 2T-34.

(2) Aligned to desired cooler. 2LO-49 arrow pointing toward pumps = 2E-22A aligned. 2LO-49 arrow pointing toward control panel = 2E-22B aligned. (Refer to EXHIBIT 3, CCW TO MFWPLO COOLER ALIGNMENT)

(3) Aligned to desired filter.

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MFWP LUBE OIL LINEUP

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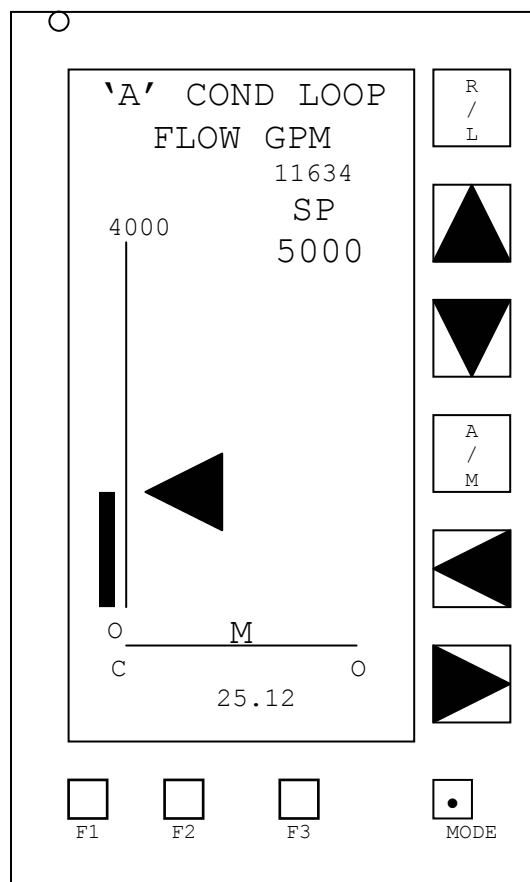
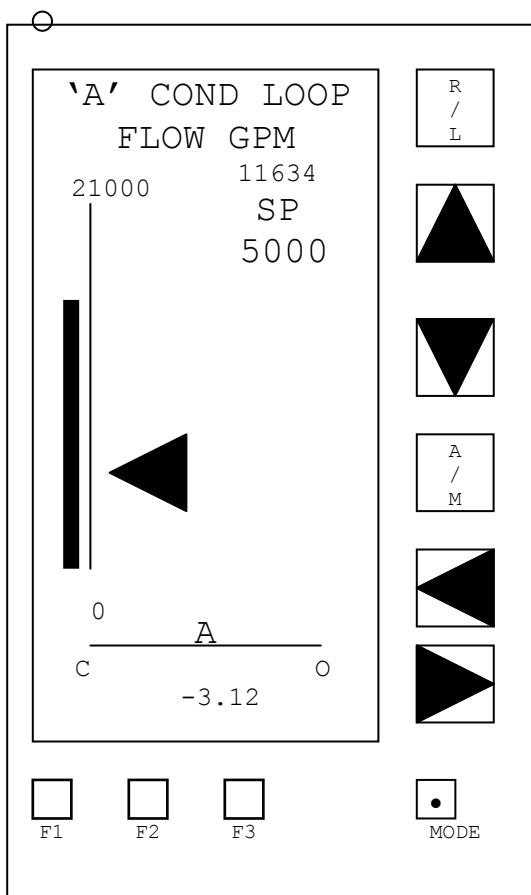
COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
2LO-2608A	MFWP A LO Press to Bearings 2PI-2608A Isol	M2216 F7 SH 2	MFWP A FRONT STANDARD, IN N SIDE OF 2K2A GAUGE BOARD 2C103, 6 FT UP	OPEN			
2LO-2603B	MFWPT A LO Supply 2PT-2603A Isol	M2216 G7 SH 2	MFWP A FRONT STANDARD, IN N SIDE OF 2K2A GAUGE BOARD 2C103, 3 FT UP	OPEN			
2LO-3005	MFWPT A LO Supply 2PI-2603A Test Conn	M2216 F7 SH 2	MFWP A FRONT STANDARD, IN N SIDE OF 2K2A GAUGE BOARD 2C103, 2 FT UP	CLOSED			
2LO-3006	MFWP A LO Press to Bearings 2PI-2608A Test Conn	M2216 F7 SH 2	MFWP A FRONT STANDARD, IN N SIDE OF 2K2A GAUGE BOARD 2C103, 2 FT UP	CLOSED			
2LO-2603E	MFWPT A LO Supply Press 2PT/PI-2603A Isol	M2216 G7 SH 2	MFWP A FRONT STANDARD, IN N SIDE OF 2K2A GAUGE BOARD 2C103, 2 FT UP	OPEN			
MAIN FEEDWATER PUMP B FRONT STANDARD							
2LO-53B	MFW B Pump/Turbine Supply Isol	M2216 F4 SH 2	MFWP B FRONT STANDARD, SE CORNER UNDER PLATE	OPEN			
2LO-2609B	MFWP B LO Press Trip 2PI-2609B Isol	M2216 G4 SH 2	MFWP B FRONT STANDARD, IN LOWER CABINET AT SE CORNER OF 2K2B GAUGE BOARD 2C104	OPEN			
2LO-2607B	MFWP B Oil Press Control 2PI-2607B Isol	M2216 H4 SH 2	MFWP B FRONT STANDARD, IN LOWER CABINET AT SE CORNER OF 2K2B GAUGE BOARD 2C104	OPEN			
2LO-2608B	MFWP B LO Press to Bearings 2PI-2608B Isol	M2216 F3 SH 2	MFWP B FRONT STANDARD, IN N SIDE OF 2K2B GAUGE BOARD 2C104, 6 FT UP	OPEN			
2LO-2603C	MFWPT B LO Supply 2PT-2603B Isol	M2216 G2 SH 2	MFWP B FRONT STANDARD, IN LOWER CABINET AT SE CORNER OF 2K2B GAUGE BOARD 2C104	OPEN			
2LO-2603D	MFWPT B LO Supply 2PI-2603B Isol	M2216 G2 SH 2	MFWP B FRONT STANDARD, IN N SIDE OF 2K2B GAUGE BOARD 2C104, 2 FT UP	OPEN			
2LO-3003	MFWPT B LO Supply 2PT-2603B Test Conn	M2216 F3 SH 2	MFWP B FRONT STANDARD, IN N SIDE OF 2K2B GAUGE BOARD 2C104, 2 FT UP	CLOSED			
2LO-3004	MFWP B LO Press to Bearings 2PI-2608B Test Conn	M2216 F3 SH 2	MFWP B FRONT STANDARD, IN N SIDE OF 2K2B GAUGE BOARD 2C104, 2 FT UP	CLOSED			
2LO-2603F	MFWPT B LO Supply Press 2PT/PI-2603B Isol	M2216 G3 SH 2	MFWP B FRONT STANDARD, IN N SIDE OF 2K2B GAUGE BOARD 2C104, 2 FT UP	OPEN			
2LO-1026	MFWP LO Return Line Sample	M2216 F6 SH2	20 FT N MFWP B FRONT STANDARD, UNDER CATWALK NEAR WEST WALL, 6 FT UP FROM FLOOR	CLOSED			

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ATTACHMENT B

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CONDENSATE RECIRC CONTROLLER



F1: Disables and enables same train MFP LO DISCH Pressure condition.
F2: Scrolls through displays.
F3: Used to clear any reverse video alarm conditions indicated on controller.
Remote/Local: No effect.
Setpoint Keys: Adjusts controller setpoint.
A/M: Selects automatic or manual operating modes.
Output Keys: Adjusts controller output when in manual.
Heartbeat Pulse: (Upper Left Hand Corner) - Flashing light indicates controller functioning. If NOT flashing, controller may be locked up.

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Condensate pumps 2P-2A and 2P-2C have common recirculation line back to High Pressure Condenser 2E-11A through Condensate pump Recirculation valve 2CV-0663. This valve is air operated valve whose solenoid is powered from 2Y1-40. Condensate pumps 2P-2B and 2P-2D recirculate flow back to 2E-11A through Condensate pump Recirculation valve 2CV-0662 that is powered from 2Y2-25. Each valve is controlled from its own flow indicating controller (FIC) located on 2C02 in Control Room. These controllers are designated 2FIC-0662 and 2FIC-0663.

During normal operation with respective FIC in AUTO, valves will modulate from full closed to full open as Condensate header flow deviates below setpoint of 5000 gpm. These flow devices determine actual Condensate header flow for train by subtracting Heater Drain pump discharge flow from Main Feedwater pump suction flow and adding Condensate Recirc flow. This derived Condensate pump flow will then be used by controller as its process variable to be controlled at controller's adjustable setpoint value. Condensate flow calculation does NOT consider flow to Startup & Blowdown DI or Condensate filter.

When controller is in automatic and any of Condensate pump discharge pressures rise to > 753 psig, controller's output will go to full recirc flow condition. Reverse video "DSCH PRESS HI" will flash at bottom of display. Auto indication will flash reverse video "A". Once high pressure condition clears, flashing will stop and "DSCH PRESS HI" will be displayed in reverse video. Auto indication will return to normal. Pushing F3 button at bottom of screen will clear reverse video "DSCH PRESS HI" indication on screen.

When controller is in manual and high discharge pressure input is received, controller's output will NOT change. Reverse video "DSCH PRESS HI" will flash at bottom of display. Auto indication will flash reverse video "M". Once condition clears, flashing will stop and "DSCH PRESS HI" will be displayed in reverse video. Manual indication will return to normal. Pushing F3 button at bottom of screen will clear reverse video "DSCH PRESS HI" indication on screen. When this condition is active controller can transfer between auto and manual via A/M button but when placed in auto controller output will go to maximum recirc flow condition.

When controller is in automatic and low MFP discharge pressure input is received, controller's output will go to no recirc flow condition. Pressure at which this occurs is determined by manual input to respective side MFP Recirc valve Fisher Porter controller. A "T" will be displayed at bottom of screen when actual MFP discharge pressure drops below setpoint on respective MFP Recirc Valve controller. Once condition clears, "T" indication will clear. Auto control function will return to normal. If in manual and low discharge pressure input is received, controller's output will NOT change. A "T" will be displayed at bottom of screen. Once condition clears, "T" indication will clear.

When this condition is active controller can transfer between auto and manual via A/M button but when placed in auto controller output will go to no recirc flow condition. MFP low discharge pressure function can be bypassed by pressing F1 button when condition is active.

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If bypassed, flashing reverse video "T" will be displayed at bottom of screen. While bypassed, controller will function normally with only high discharge pressure input having ability to override controller. If function is bypassed, pressing F1 button again will take controller out of bypass.

When controller is in automatic and total loop flow drops below 2000 GPM, controller's output will go to full recirc flow condition. Auto indication will flash reverse video "A". Once condition clears, auto indication will return to normal. If in manual and total loop flow drops below 2000 GPM, controller's output will NOT change. Manual indication will flash reverse video "M". Once condition clears, manual indication will return to normal. When this condition is active controller can transfer between auto and manual via A/M button but when placed in auto controller output will go to full recirc flow condition.

When in automatic and any condition occurs Operator can take controller to manual and override any automatic actuation with exception of all Condensate pumps tripped.

Condensate Pump Recirc Valves

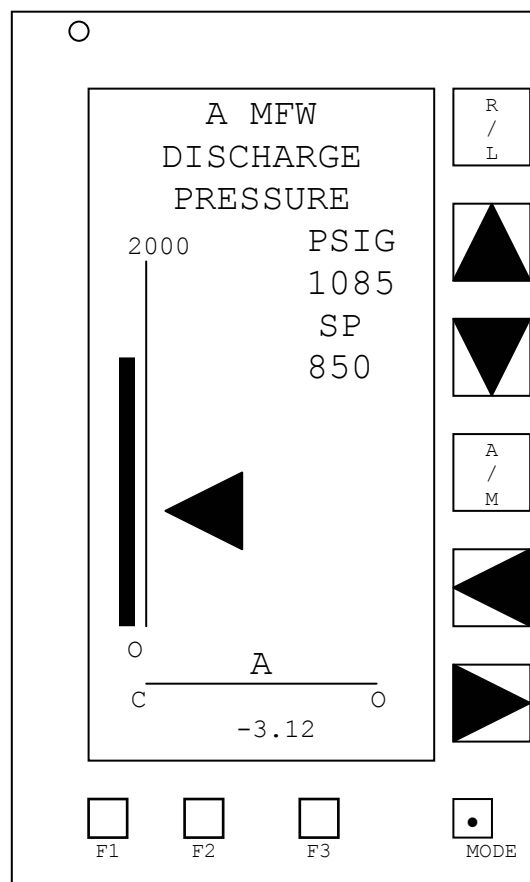
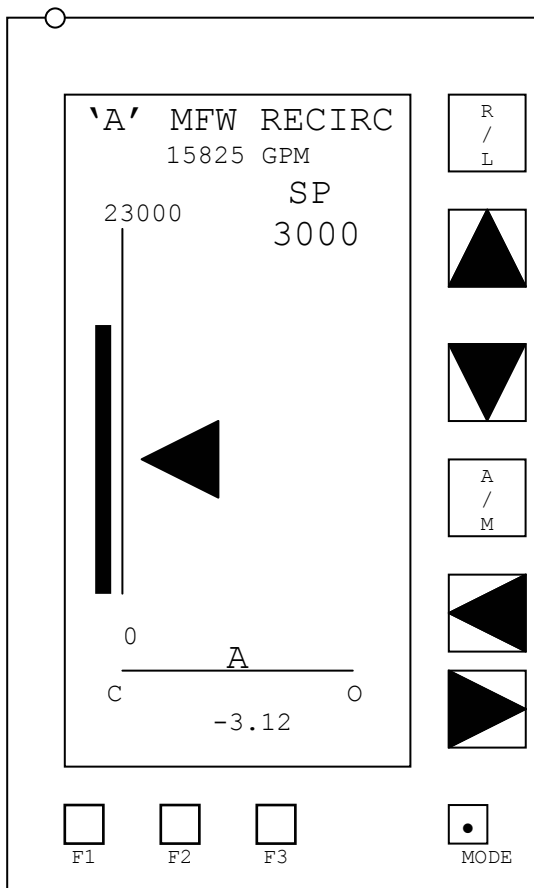
ACTUATION	SETPOINT	EFFECT ON VALVE	EFFECTS FOR MANUAL / AUTO	ABILIATY TO OVERRIDE	INDICATION
All Condensate pumps secured	All breakers open	Closes both Condensate Pump Recirc valves	Will actuate valves whether in automatic or manual	Can't be overridden from controller	No controller indication
High Discharge Pressure	>753 psig at discharge of any Condensate pump	Opens both Condensate Pump Recirc valves to 100%	Will actuate valve when in automatic only	Can be overridden by placing controller in manual	Indicated by reverse video "DISCH PRESS HI" on controller
Main Feedwater pump Tripped	MFP discharge pressure drops below an Operator adjusted setpoint	Closes Condensate Pump Recirc valve on affected side only	Will actuate valve when in automatic only	Can be overridden by placing controller in manual or by depressing F1 pushbutton	Indicated by "T" on controller
Loop Flow less than 2000 GPM	Loop Flow less than 2000 GPM	Opens affected Condensate Pump Recirc valves to 100%	Will actuate valve when in automatic only	Can be overridden by placing controller in manual	Automatic indication will flash in reverse video
Automatic flow control	Loop flow drops below setpoint (5000 GPM)	Modulates affected side valve	Will actuate valve when in automatic only	Can be overridden by placing controller in manual	Indicated by an "A" on controller screen

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MFWP RECIRC CONTROLLER



- F1: Removes "OVERRIDE DISABLED" initiated by R/L pushbutton.
F2: Scrolls through displays.
F3: Used to clear any reverse video alarm conditions indicated on controller.
- Remote/Local: Overrides all controller functions.
Setpoint Keys: Adjusts controller setpoint (Page 1 and 3).
A/M: Selects automatic or manual operating modes.
Output Keys: Adjusts controller output when in manual.
Heartbeat Pulse: (Upper Left Hand Corner) - Flashing light indicates controller functioning. If NOT flashing, controller may be locked up.

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Valves are normally operated with respective Flow Indicating controllers in automatic. 2FIC-0735 for "A" train is powered from 2Y1-41. 2FIC-0742 for "B" train is powered from 2Y2-19. Normally both Recirculation valve flow controllers are set at ~3000 gpm. Controllers provide for bumpless transfer between automatic and manual. If power is lost and restored, controller will come back in manual with its output set to zero.

F2 button can toggle between three displays available on this controller.

Display #1 - Normally selected for display. Displays MFP suction flow both digitally and with bargraph. Bargraph has range of 0-23,000 GPM. Recirc valve flowrate setpoint is adjustable and is displayed digitally and on bargraph. Controller output is displayed at bottom of screen both digitally and with bargraph. The status, whether in manual or automatic, is displayed via an "A" or "M" near bottom of screen and is selected via this A/M button. Up and down arrows are used to adjust setpoint. When in manual, right and left arrows adjust controller output.

Display #2 - Difference between display #1 and display #2 is range of MFP suction flow bargraph. When display #2 is selected range changes from 0-23,000 GPM to 0-6,000 GPM.

Display #3 - Provides indication of MFP discharge pressure via numeric and vertical bargraph. This display also shows low discharge pressure setpoint, which is adjustable via setpoint raise/lower buttons.

When controller is in automatic or manual and MFP discharge pressure falls below operator adjustable setpoint on display #3, control function is overridden and recirc valve is closed. At same time closed signal is sent to condensate recirc valve controller. Controller displays flashing "DISCH LO" when pressure falls below setpoint. Controllers, both main feed pump recirc and condensate pump recirc, are released back to control if discharge pressure goes above setpoint or setpoint is lowered below actual discharge pressure. R/L button will disable this function and "OVERRIDE DISABLED" will be indicated on display screen.

F1 pushbutton will release R/L override condition.

When controller is in automatic or manual, full open signal will be sent to Recirculation valves if respective Main Feedwater pump's discharge pressure is greater than 1250 psig as sensed by two-out-of-three discharge pressure switches. This will occur whether flow controller is in manual or automatic. Controller displays flashing "DISCH HI" when this condition is present. R/L button will disable this function and "OVERRIDE DISABLED" will be indicated on display screen. F1 pushbutton will release R/L override condition.

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Feedwater Pump Recirc Valves

ACTUATION	SETPOINT	EFFECT ON VALVE	EFFECTS FOR MANUAL / AUTO	ABILIATY TO OVERRIDE	INDICATION
High Discharge Pressure	1250 psig 2 out of 3	Opens affected side MFP Recirc valves to 100%	Will actuate valve when in manual or automatic	Can be over ridden by use of controller R/L pushbutton and will be indicated by "OVERRIDE DISABLED" reverse video	Indicated by reverse video "DISCH HI" on controller
Main Feedwater pump Tripped	MFP discharge pressure drops below an Operator adjusted setpoint	Closes MFP Recirc valve on affected side only	Will actuate valve when in manual or automatic	Can be over ridden by use of controller R/L pushbutton and will be indicated by "OVERRIDE DISABLED" reverse video	Indicated by "DISCH LO" on controller
Automatic flow control	MFP Recirc flow drops below setpoint (3000 GPM)	Modulates affected side valve	Will actuate valve when in automatic only	Can be over ridden by placing controller in manual	Indicated by an "A" on controller screen

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ATTACHMENT D

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SELECTING NARROW RANGE LEVEL TRANSMITTER FOR 2LR-1034/2LR-1134

- 1.0 Place FWCS mode switch at EWS to CONFIG.
- 2.0 Check SDS login icon appears (~ 15 second time delay).
- 3.0 Press custom button for NRLVL select screen.
- 4.0 Select desired transmitter to be displayed by clicking mouse with cursor in the select box.
- 5.0 Check box for selected transmitter highlighted in red.
- 6.0 Reduce screens as desired.
- 7.0 Place FWCS mode switch to OPERATE.
- 8.0 Verify SDS Login Icon extinguished.

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ADDING/REMOVING WIDE RANGE LEVEL, FEEDWATER FLOW OR STEAM FLOW POINTS ON EWS

NOTE

An alternate transmitter must be selected to control the process when a transmitter will be taken off Scan or out of service.

- 1.0 Perform the following to remove any Wide Range Level, Feedwater Flow, or Steam Flow point from service:
 - 1.1 Place FWCS mode switch at EWS to CONFIG.
 - 1.2 Check SDS login icon appears (~ 15 second time delay).
 - 1.3 Press custom button for Signal Validation screen for appropriate parameter.
 - 1.4 Check input value for transmitter to be placed in control is satisfactory for plant conditions.
 - 1.5 Press custom SELECT button for appropriate Control/Reset Status Screen.
 - 1.6 Select the desired transmitter to control the process by clicking mouse with cursor in Control box for that transmitter.
 - 1.7 Check border on box for selected transmitter highlighted in red.
 - 1.8 Check on Signal Validation screen that selected controlling transmitter value being fed through selector box.
 - 1.9 Reduce screens as desired.
 - 1.10 Place FWCS mode switch to OPERATE.
 - 1.11 Verify SDS Login Icon extinguished.

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2.0 Perform the following to place any Wide Range Level, Feedwater Flow, or Steam Flow point in service:

- 2.1 Place FWCS mode switch at EWS to CONFIG.
- 2.2 Check SDS login icon appears (~ 15 second time delay).
- 2.3 Press custom button for Signal Validation screen for appropriate parameter.
- 2.4 Display point information screen for point to be returned to service by performing either of the following:
 - 2.4.1 Double click on POINT INFO Icon.
 - 2.4.2 Click right hand mouse button on desired transmitter value.
 - A. With left hand button, click on INFORMATION.
 - B. IF point to be placed in service is Wide Range level, THEN change point ID on Point Information screen from IN***** to LY***** (i.e. IN11791C to LY11791C).
- 2.5 Click on CHANGE DATA to display Change Data screen.
- 2.6 IF point NOT on scan, THEN perform the following:
 - 2.6.1 Verify point to be returned to scan NOT selected on appropriate Control/Reset Status screen.
 - 2.6.2 Click mouse with cursor in ON scan field.
 - 2.6.3 Check ON box shaded.
 - 2.6.4 Click mouse with cursor in UNLATCH field.
 - 2.6.5 Check UNLATCH box shaded.
 - 2.6.6 Click mouse with cursor in APPLY field.
 - 2.6.7 Reduce screens as necessary.
- 2.7 Check on Signal Validation screen that input value for transmitter to be returned to service appropriate for current conditions.

(Section 2.0 continued next page)

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- 2.8 IF point to be returned to service Wide Range Level or Feed Flow,
THEN perform the following:
 - 2.8.1 Click mouse with cursor in RESET box for affected input.
 - 2.8.2 Check RESET box white in color.
 - 2.8.3 Check selector box label NORMAL.
- 2.9 Press custom SELECT button for appropriate Control/Reset Status Screen.
- 2.10 Click mouse with cursor in RESET box on controlling transmitter.
- 2.11 Check neither transmitter box highlighted in a red border.
- 2.12 Check on Signal Validation screen that selector output value for parameter appropriate for current conditions.
- 2.13 Acknowledge alarms on Alarm screen.
- 2.14 Reduce screens as desired.
- 2.15 Place FWCS mode switch to OPERATE.
- 2.16 Verify SDS Login Icon extinguished.

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ATTACHMENT F

PAGE 1 OF 3

ADDING/REMOVING NARROW RANGE LEVEL, FEEDWATER TEMPERATURE OR
STEAM PRESSURE POINTS ON EWS

NOTE

An alternate transmitter must be selected to control the process when a transmitter will be taken off Scan or out of service.

- 1.0 Perform the following remove any Narrow Range Level, Feedwater Temperature, or Steam Pressure point from service:
 - 1.1 Place FWCS mode switch at EWS to CONFIG.
 - 1.2 Check SDS login icon appears (~ 15 second time delay).
 - 1.3 Press custom SELECT button for Signal Validation screen for appropriate parameter.
 - 1.4 Check input values for other inputs that will be left in control appropriate for current conditions.
 - 1.5 Display Point Information screen for point to be removed from service by performing either of the following:
 - 1.5.1 Double click on POINT INFO Icon.
 - 1.5.2 Click right hand mouse button on desired transmitter value.
 - A. With left hand button, click on INFORMATION.
 - 1.6 Display the Change Data screen.
 - 1.7 Click mouse with cursor in "B" field to select bad quality for point.
 - 1.8 Check "B" field shaded.
 - 1.9 Click mouse with cursor in APPLY field.
 - 1.10 Reduce screens as needed.
 - 1.11 Check on Signal Validation screen that point quality on appropriate point indicated as bad.
 - 1.12 Acknowledge alarms on Alarm screen
 - 1.13 Reduce screens as desired.
 - 1.14 Place FWCS mode switch to OPERATE.
 - 1.15 Verify SDS Login Icon extinguished.

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ATTACHMENT F

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- 2.0 Perform the following to place any Narrow Range Level, Feedwater Temperature, or Steam Pressure point in service:
 - 2.1 Place FWCS mode switch at EWS to CONFIG.
 - 2.2 Check SDS login icon appears (~ 15 second time delay).
 - 2.3 Display Point Information screen for point to be returned to service by performing either of the following:
 - 2.3.1 Double click on POINT INFO Icon.
 - 2.3.2 Click right hand mouse button on desired transmitter value.
 - A. With left hand button, click on INFORMATION.
 - 2.4 Click on CHANGE DATA to display Change Data screen.
 - 2.5 IF point NOT on scan,
THEN perform the following:
 - 2.5.1 Click mouse with cursor in ON scan field.
 - 2.5.2 Check "ON" box shaded.
 - 2.5.3 Click mouse with cursor in APPLY field.
 - 2.5.4 Reduce screen as needed.
 - 2.6 Verify Signal Validation screen for appropriate parameter displayed.
 - 2.7 Check input value for point to be returned to service appropriate for current conditions.
 - 2.8 Display Point Information and Change Data screens for point to be returned to service.
 - 2.9 Click mouse with cursor in UNLATCH field.
 - 2.10 Check UNLATCH field shaded.
 - 2.11 Click mouse with cursor in APPLY field.
 - 2.12 Check on Signal Validation screen that point quality for affected point good.
 - 2.13 Check selector output appropriate for current conditions.

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ATTACHMENT F

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- 2.14 Check label on selector box indicates NORMAL.
- 2.15 Acknowledge alarms on Alarm screen.
- 2.16 Reduce screens as desired.
- 2.17 Place FWCS mode switch to OPERATE.
- 2.18 Verify SDS Login Icon extinguished.

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ATTACHMENT G

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REMOVING/ADDING POINT FROM/TO SCAN

- 1.0 Perform the following to remove a point from scan:
 - 1.1 Verify point NOT selected for Control.
 - 1.2 Place FWCS mode switch at EWS to CONFIG.
 - 1.3 Check SDS login icon appears (~ 15 second time delay).
 - 1.4 Double click on POINT INFO Icon.
 - 1.5 On Point Information screen perform the following:
 - 1.5.1 Double click POINT ID to highlight field.
 - 1.5.2 Enter point ID.
 - 1.5.3 Click APPLY.
 - 1.5.4 Click CHANGE DATA.
 - 1.6 On Change Data screen perform the following:
 - 1.6.1 Click mouse with cursor in OFF scan field.
 - 1.6.2 Check OFF box shaded.
 - 1.6.3 Click APPLY.
 - 1.6.4 Verify Scan OFF in upper left hand corner of Change Data screen.
 - 1.6.5 IF desired to escape and minimize screen,
THEN click on upper left hand arrow.
 - 1.7 Place FWCS mode switch to OPERATE.

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ATTACHMENT G

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2.0 Perform the following to add point to scan:

2.1 Verify point NOT selected for Control.

2.2 Place FWCS mode switch at EWS to CONFIG.

2.3 Check SDS login icon appears (~ 15 second time delay).

2.4 Double click on POINT INFO Icon.

2.5 On Point Information screen perform the following:

2.5.1 Double click POINT ID to highlight field.

2.5.2 Enter point ID.

2.5.3 Click APPLY.

2.5.4 Click CHANGE DATA.

2.6 On Change Data screen perform the following:

2.6.1 Click mouse with cursor in ON scan field.

2.6.2 Check ON box shaded.

2.6.3 Click mouse with cursor in UNLATCH field.

2.6.4 Check UNLATCH box shaded.

2.6.5 Click APPLY.

2.6.6 Verify Scan ON in upper left hand corner of Change Data screen.

2.6.7 IF desired to escape and minimize screen,
THEN click on upper left hand arrow.

2.7 Check on Signal Validation screen that input value for transmitter to be returned to service appropriate for current conditions.

2.7.1 Click mouse with cursor in RESET box for affected input.

2.7.2 Check RESET box white in color.

2.7.3 Check selector box label NORMAL.

2.8 Place FWCS mode switch to OPERATE.

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ATTACHMENT H

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FORCING POINT QUALITY

- 1.0 IF point desired to be changed a process control input,
THEN select an alternate transmitter using appropriate Attachment.
- 2.0 Perform the following to force quality of a point:
 - 2.1 Place FWCS mode switch at EWS to CONFIG.
 - 2.2 Check SDS login icon appears (~ 15 second time delay).
 - 2.3 Double click on POINT INFO icon.
 - 2.4 On Point Information screen perform the following:
 - 2.4.1 Double click on POINT ID to highlight field.
 - 2.4.2 Enter point ID.
 - 2.4.3 Click APPLY.
 - 2.4.4 Click CHANGE DATA.
 - 2.5 On Change Data screen perform the following:
 - 2.5.1 Click mouse with cursor on desired quality in EXT CALIBR field.
 - 2.5.2 Verify desired quality box shaded.
 - 2.5.3 Click APPLY.
 - 2.5.4 Verify desired quality displayed in EXT CALIBR field.
 - 2.5.5 IF desired to escape and minimize screen,
THEN click on upper left hand arrow.
 - 2.6 Place FWCS mode switch to OPERATE.

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ATTACHMENT H

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3.0 Perform the following to restore quality of point:

3.1 Place FWCS mode switch at EWS to CONFIG.

3.2 Check SDS login icon appears (~ 15 second time delay).

3.3 Double click on POINT INFO icon.

3.4 On Point Information screen perform the following:

3.4.1 Double click POINT ID to highlight field.

3.4.2 Enter point ID.

3.4.3 Click APPLY.

3.4.4 Verify input value for affected point appropriate for current conditions.

3.4.5 Click on CHANGE DATA.

3.5 On Change Data screen perform the following:

3.5.1 Click mouse with cursor on UNLATCH in EXT CALIBR field.

3.5.2 Verify UNLATCH shaded.

3.5.3 Click APPLY.

3.5.4 Verify UNLATCH displayed in EXT CALIBR field.

3.5.5 IF desired to escape and minimize screen,
THEN click on upper left hand arrow.

3.6 On Signal Validation screen check input value for transmitter being returned to service appropriate for current conditions:

3.6.1 Click mouse with cursor in RESET box for affected input.

3.6.2 Check RESET box white in color.

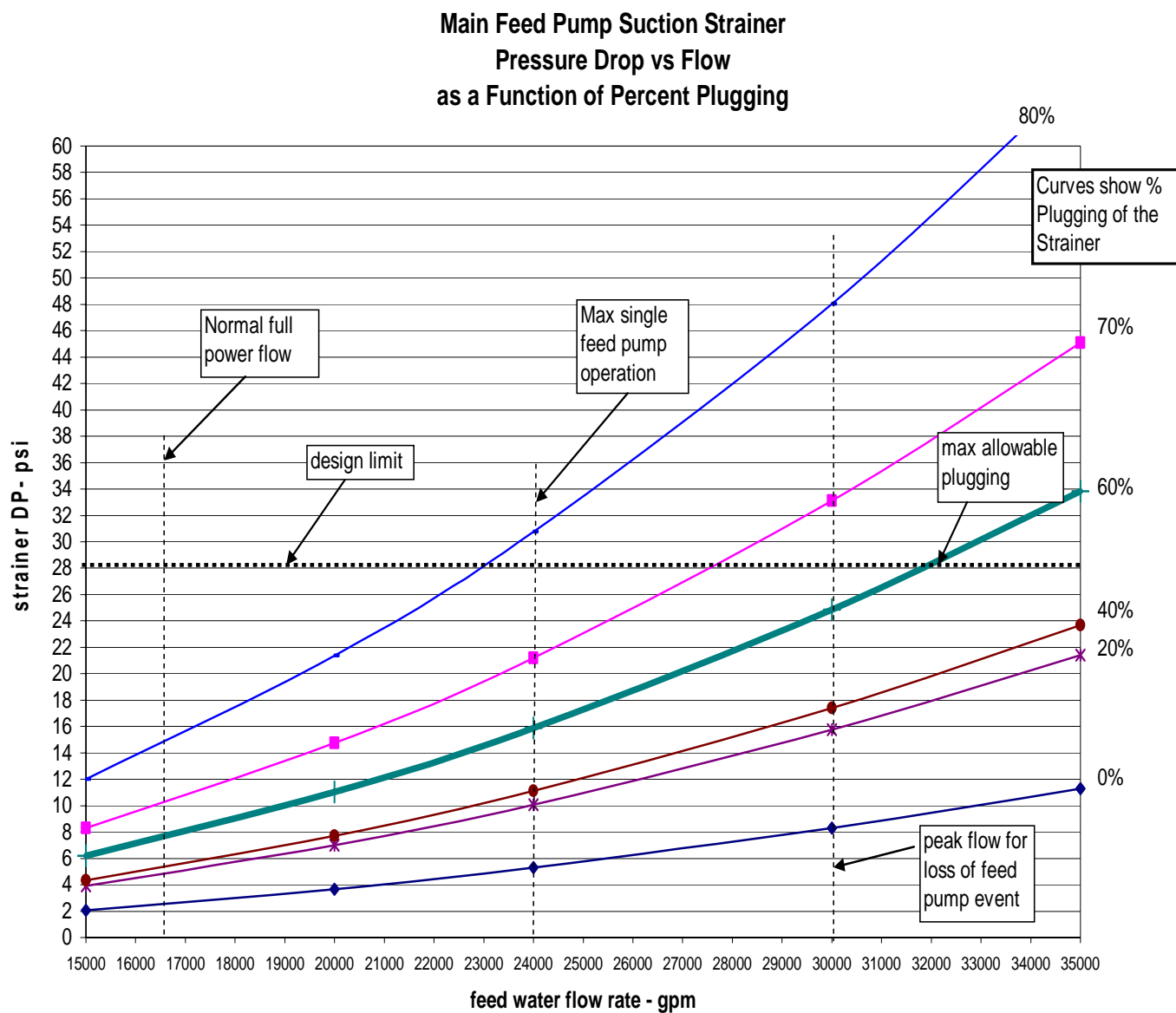
3.7 IF alternate transmitter was selected for process control input,
THEN restore primary transmitter as process control input using appropriate Attachment.

3.8 Place FWCS mode switch to OPERATE.

ATTACHMENT I

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MFWP SUCTION STRAINER PERCENT PLUGGING CURVES



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EXHIBIT 1
MAIN FEEDWATER TURBINE TRIP RESET

Revised 09/22/98

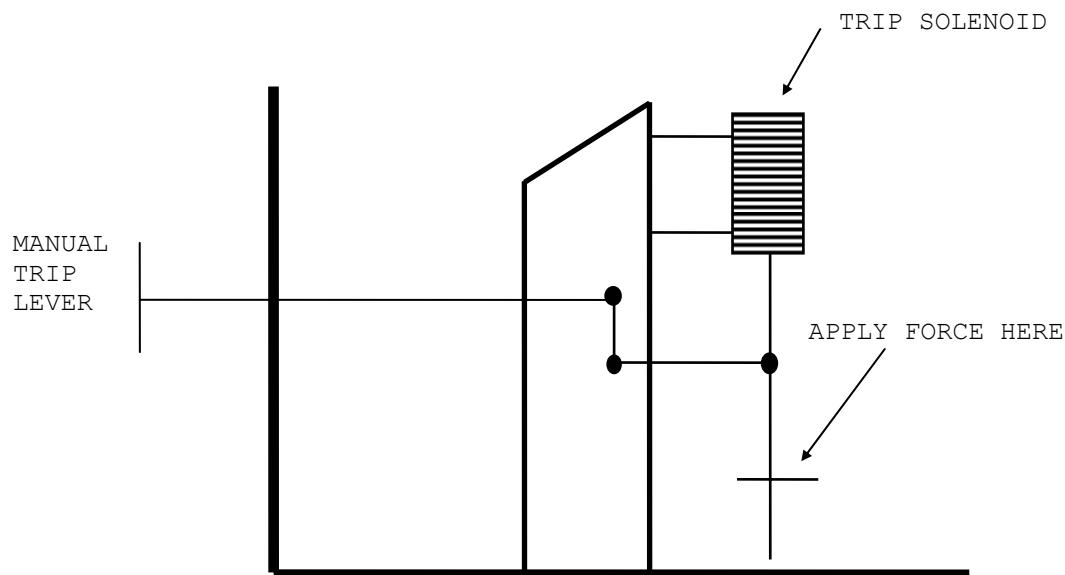
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1.0 DISCUSSION

The purpose of this Exhibit is to provide instructions to manually reset the Main Feedwater Turbine if it will not reset from the Control Room. If the spring that resets the trip solenoid is weak or the trip linkage is out of adjustment, then manual assistance is required to reset the trip mechanism. Manually resetting the turbine in this manner does not affect the ability of the trip mechanism to trip the turbine.

2.0 INSTRUCTIONS

- 2.1 Apply downward force to the shaft of the trip solenoid while depressing the Reset button in the Control Room.
- 2.2 Verify WR/WO submitted.



View is looking south from inside middle cabinet of front standard.

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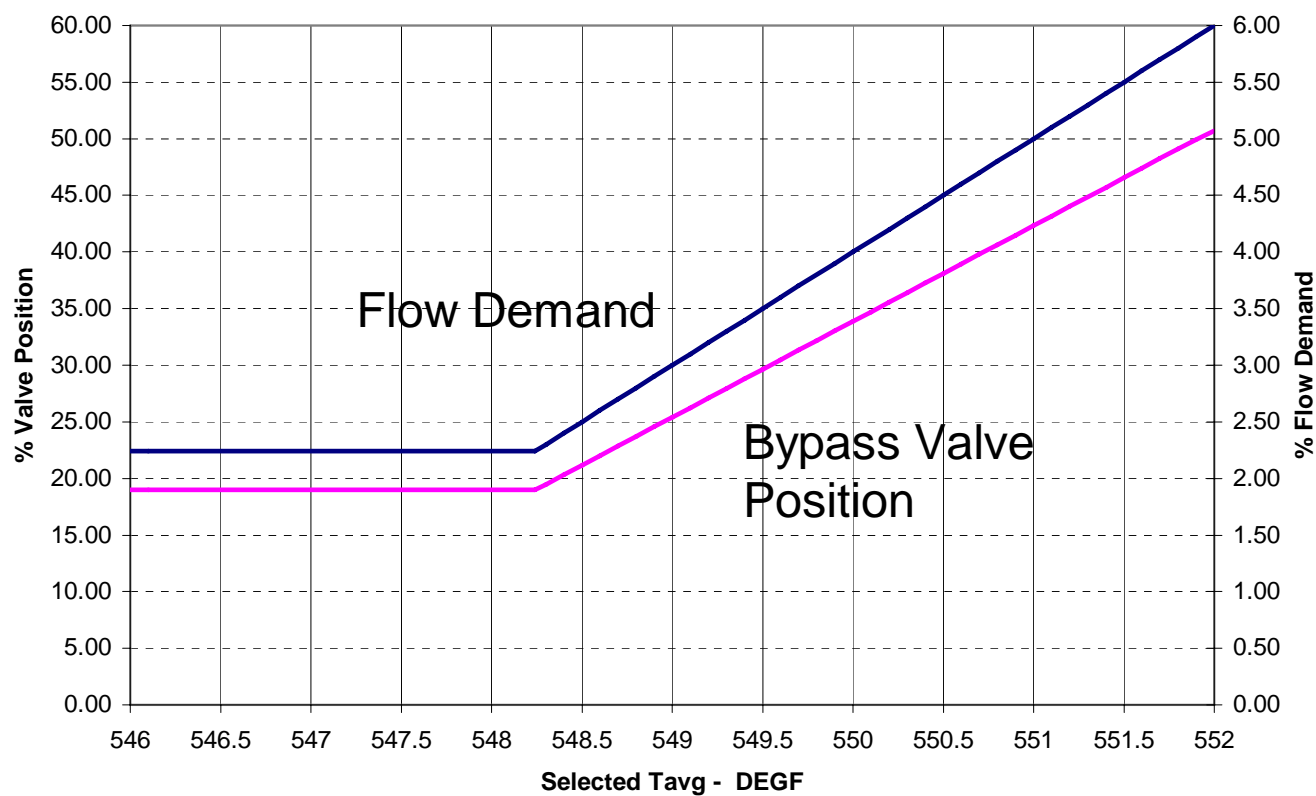
EXHIBIT 7

Revised 7/17/00

Main Feed Reg Bypass Valve Position vs. Tavg during RTO

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Main Feed Reg Bypass Valve Position vs. Tavg During RTO



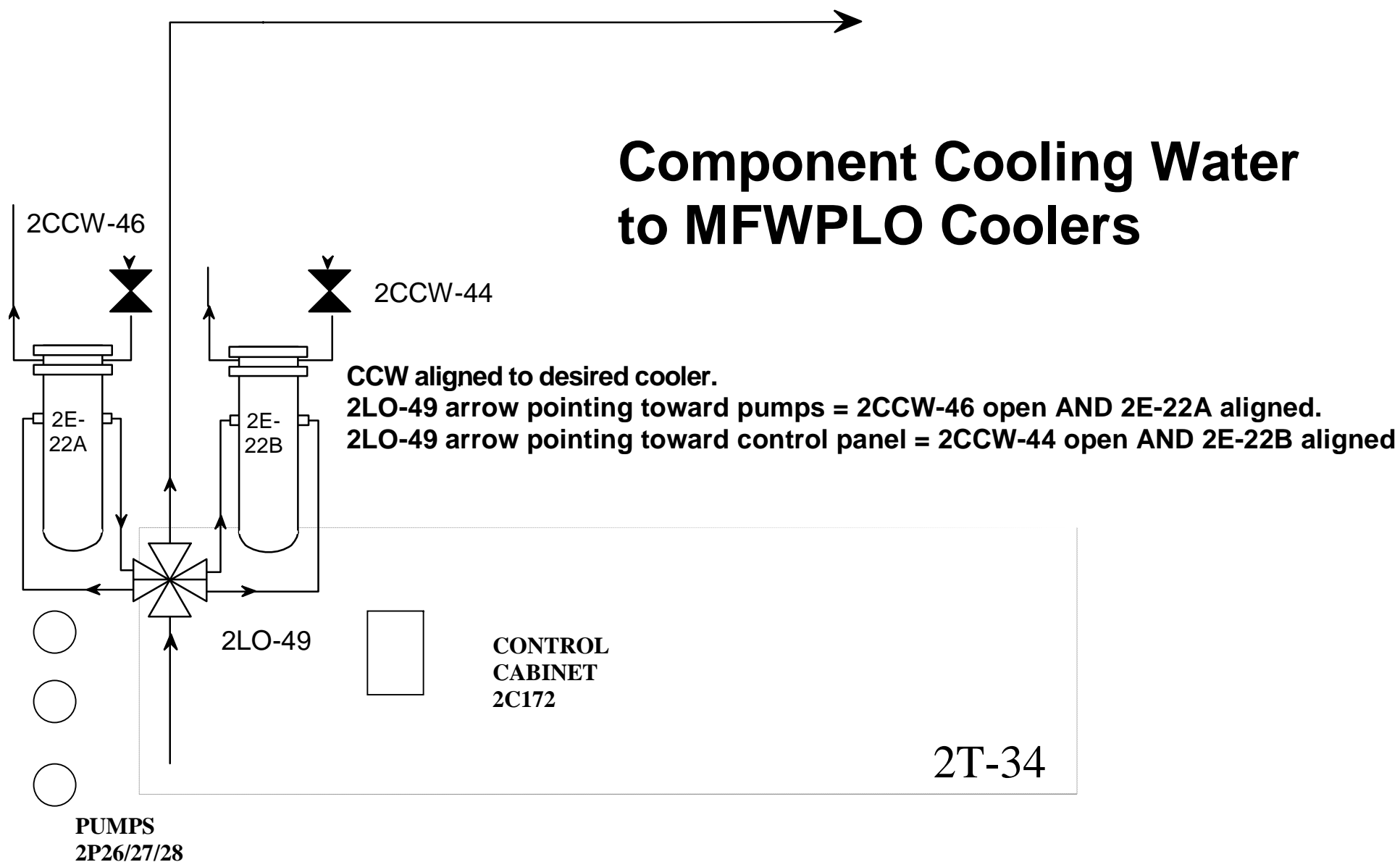
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EXHIBIT 8
CCW TO MFWPLO COOLER ALIGNMENT

Revised 05/15/02

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SUPPLEMENT 2

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EMERGENCY GOVERNOR AND TRIP LOCKOUT EXERCISE TEST

This test is performed as prerequisite to Overspeed Trip Test. Section for pump NOT being tested may be N/A'd.

1.0 INITIAL CONDITIONS

- MFWP Speed between 3535 and 5050 rpm. _____
2K-2A Speed _____ rpm 2K-2B Speed _____ rpm
- Communications established between 2C178 and Control Room. _____

2.0 TEST METHOD FOR MFWP A

- 2.1 Place Lockout handswitch (2HS-0348) in 2C178 in LOCKOUT. _____
- 2.2 Check lockout relay energized by red light above 2HS-0348 ON. _____
- 2.3 IF lockout relay NOT energized,
THEN stop test and notify S/M. _____
- 2.4 Check Oil Test pump (2P-121A) starts.
- 2.5 Depress AND hold Overspeed Test pushbutton (2HS-0361). _____
- 2.6 Check trip mechanism tripped by green light above
Mech/Reset pushbutton (2HS-0342) ON. _____
- 2.7 Release Overspeed Test pushbutton. _____
- 2.8 Depress Overspeed Reset pushbutton (2HS-0344). _____
- 2.9 Check trip mechanism reset by white light above Overspeed
Reset pushbutton ON. _____
- 2.10 Place Lockout handswitch to NORMAL. _____
- 2.11 Check 2P-121A stops. _____
- 2.12 Check lockout relay de-energized by green light above
2HS-0348 ON. _____

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SUPPLEMENT 2

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3.0 TEST METHOD FOR MFWP B

- 3.1 Place Lockout handswitch (2HS-0349) in 2C178 in LOCKOUT. _____
- 3.2 Check lockout relay energized by red light above 2HS-0349 ON. _____
- 3.3 IF lockout relay NOT energized,
THEN stop test and notify S/M. _____
- 3.4 Check Oil Test pump (2P-121B) starts. _____
- 3.5 Depress AND hold Overspeed Test pushbutton (2HS-0362). _____
- 3.6 Check trip mechanism tripped by green light above
Mech/Reset pushbutton (2HS-0343) ON. _____
- 3.7 Release Overspeed Test pushbutton. _____
- 3.8 Depress Overspeed Reset pushbutton (2HS-0347). _____
- 3.9 Check trip mechanism reset by white light above Overspeed
Reset pushbutton ON. _____
- 3.10 Place Lockout handswitch to NORMAL. _____
- 3.11 Check 2P-121B stops. _____
- 3.12 Check Lockout Relay de-energized by green light above
2HS-0349 ON. _____

4.0 ACCEPTANCE CRITERIA

- 4.1 Did lockout relay energize? YES NO
- 4.2 Did trip mechanism trip and reset? YES NO
- 4.3 IF NO circled above,
THEN write WR/WO for repairs prior to mechanical
overspeed trip test of pump. _____

Performed By _____ Date _____

Supervisor _____ Date _____

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SUPPLEMENT 3

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THRUST BEARING WEAR TEST

This Supplement is performed to test operability of Main Feed Water Pump Thrust Bearing Wear Trip. Section for pump NOT being tested may be N/A'd.

1.0 INITIAL CONDITIONS

- Communications established between 2C178 and Control Room. _____

2.0 TEST METHOD FOR MFWP A

2.1 Obtain key for Thrust Bearing Wear Test switch (2HS-0350). _____

2.2 Check the following test switches in NORMAL:

- Active Thrust Bearing Test switch (2HS-0356) _____
- Inactive Thrust Bearing Test switch (2HS-0354) _____

2.3 Momentarily depress 2K2A Thrust Brg Wear Circuit Status light (2PB-0350). _____

- Check White light illuminates. _____

2.4 Place Thrust Bearing Wear Test switch (2HS-0350) in TEST. _____

2.4.1 Check the following lights lit:

- Active (right) _____
- Inactive (left) _____

2.5 Momentarily depress 2PB-0350. _____

- Check White light does NOT illuminate. _____

2.6 Place Active Thrust Bearing Test switch (2HS-0356) in TEST. _____

- Check Active light goes out. _____
- Check 2K2A Thrust Brg Wear Trip Circuit Test light lit. _____

2.7 Place Active Thrust Bearing Test switch (2HS-0356) to NORMAL. _____

- Check Active light lit. _____
- Check 2K2A Thrust Brg Wear Trip Circuit Test light off. _____

2.8 Place Inactive Thrust Bearing Test switch (2HS-0354) to TEST. _____

- Check Inactive light goes out. _____
- Check 2K2A Thrust Brg Wear Trip Circuit Test light lit. _____

2.9 Place Inactive Thrust Bearing Test switch (2HS-0354) to NORMAL. _____

- Check Inactive light lit. _____
- Check 2K2A Thrust Brg Wear Trip Circuit Test light off. _____

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SUPPLEMENT 3

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- 2.10 Place Thrust Bearing Wear Test switch (2HS-0350) to NORMAL. _____
- 2.10.1 Check the following lights out: _____
- Active (right) _____
 - Inactive (left) _____
- 2.11 Momentarily depress 2K2A Thrust Brg Wear Circuit Status light (2PB-0350). _____
- Check White light illuminates. _____
- 3.0 TEST METHOD FOR MFWP B
- 3.1 Obtain key for Thrust Bearing Wear Test switch (2HS-0370). _____
- 3.2 Check the following test switches in NORMAL: _____
- Active Thrust Bearing Test switch (2HS-0357) _____
 - Inactive Thrust Bearing Test switch (2HS-0355) _____
- 3.3 Momentarily depress 2K2B Thrust Brg Wear Circuit Status light (2PB-0370). _____
- Check White light illuminates. _____
- 3.4 Place Thrust Bearing Wear Test switch (2HS-0370) in TEST. _____
- 3.4.1 Check the following lights lit: _____
- Active (right) _____
 - Inactive (left) _____
- 3.5 Momentarily depress 2PB-0370. _____
- Check White light does NOT illuminate. _____
- 3.6 Place Active Thrust Bearing Test switch (2HS-0357) in TEST. _____
- Check Active light goes out. _____
 - Check 2K2B Thrust Brg Wear Trip Circuit Test light lit. _____
- 3.7 Place Active Thrust Bearing Test switch (2HS-0357) to NORMAL. _____
- Check Active light is lit. _____
 - Check 2K2B Thrust Brg Wear Trip Circuit Test light off. _____
- 3.8 Place Inactive Thrust Bearing Test switch (2HS-0355) to TEST. _____
- Check Inactive light goes out. _____
 - Check 2K2B Thrust Brg Wear Trip Circuit Test light lit. _____

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3.9	Place Inactive Thrust Bearing Test switch (2HS-0355) to NORMAL.	_____
	• Check Inactive light is lit.	_____
	• Check 2K2B Thrust Brg Wear Trip Circuit Test light off.	_____
3.10	Place Thrust Bearing Wear Test switch (2HS-0370) to NORMAL.	_____
	3.10.1 Check the following lights out:	
	• Active (right)	_____
	• Inactive (left)	_____
3.11	Momentarily depress 2K2B Thrust Brg Wear Circuit Status light (2PB-0370).	_____
	• Check White light illuminates.	_____
4.0 ACCEPTANCE CRITERIA		
4.1	Did lights illuminate as required by this procedure?	YES NO
4.2	Did lights go out as required by this procedure?	YES NO
4.3	<u>IF</u> NO circled above, <u>THEN</u> write WR/WO to repair to pump test circuitry.	_____
Performed By _____ Date _____		
Supervisor _____ Date _____		

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SUPPLEMENT 4

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MECHANICAL OVERSPEED TRIP TEST OF 2K-2A

The purpose of this Supplement is to test overspeed trip of "A" Main Feedwater Pump Turbine and document setpoint at which trip occurs.

1.0 INITIAL CONDITIONS

- Feedwater pump uncoupled from turbine. _____
- Lube Oil System in service and tested using Lube Oil System Startup section of this procedure. _____
- Thrust Bearing Wear Test has been performed using Supplement 3 of this procedure. _____
- Turbine has been on turning gear at least 2 hours. _____
- EHC System in service using Electrohydraulic Oil System Operation (2106.012). _____
- IF desired to use hand held tachometer or digital multimeter, THEN verify calibration current. _____

Serial number _____

NOTE

The following has been determined to be an IPTE.

- Operations Manager or his designee in Control Room. _____
- Perform Crew Brief using Crew Brief Checklist (Form 1015.001A). _____

2.0 TEST METHOD

- 2.1 Verify Main Steam to A MFWP (2CV-0320) closed. _____
- 2.2 Verify LP Supply Line Isol (2RS-27) closed. _____
- 2.3 Verify steam line between 2CV-0320 and MFWT A depressurized (2PI-0321). _____
- 2.4 Vent steam line between 2CV-0320 and MFWT A as necessary by cycling MFWT 2K-2A Supply Line Vents (2MS-2000A AND 2MS-2000B). _____
- 2.5 Verify steam line between 2RS-27 and MFWT A depressurized (2PI-0328). _____
- 2.6 Vent steam line between 2RS-27 and MFWT A as necessary by cycling LP Supply Line Atmos Vent (2RS-3000). _____
- 2.7 Latch 2K-2A by depressing Reset pushbutton. _____

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SUPPLEMENT 4

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- 2.8 Check the following:
- MFWP Turbine Trip annunciator (2K03-A8) clears. _____
 - HP stop valve (2CV-0321A) opens. _____
 - LP stop valve (2CV-0350) opens. _____
- 2.9 Trip 2K-2A by depressing Trip pushbutton. _____
- 2.10 Check the following:
- MFWP Turbine Trip annunciator (2K03-A8) in alarm. _____
 - HP stop valve (2CV-0321A) closed. _____
 - LP stop valve (2CV-0350) closed. _____
 - Control valve (2CV-0351) closed. _____
 - Power lamp on. _____
 - AT LSS lamp on. _____
- 2.11 Open the following valves on 2C12:
- HPSV Above Seat Drain (2CV-0321) _____
 - HPSV Below Seat Drain (2CV-0317) _____
 - LPSV Below Seat Drain (2CV-0327) _____
 - LPSV Above Seat Drain (2CV-0326) _____
 - First Stage Shell Drain (2CV-0322) _____
 - LP Steam Drain (2CV-0328) _____
- 2.12 Verify MFWT Speed controller (2HIC-0321) aligned as follows:
- In MANUAL _____
 - Output demand at zero _____

CAUTION

MFWT is uncoupled and subject to rapid speed changes.

- 2.13 Monitor MFWT speed while performing the following:
- 2.13.1 Manually throttle open 2CV-0320 until downstream piping pressurized. _____
- 2.13.2 Verify 2CV-0320 full open. _____
- 2.14 Latch turbine by depressing Reset pushbutton. _____

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SUPPLEMENT 4

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- 2.15 Check the following:
- MFWP Turbine Trip annunciator (2K03-A8) clears. _____
 - HP stop valve (2CV-0321A) opens. _____
 - LP stop valve (2CV-0350) opens. _____
- 2.16 Dispatch an Operator to A MFWP to verify the following:
- All personnel are standing clear. _____
 - Debris clear of MFWT shaft. _____
 - Jacking gear engagement lever NOT obstructed. _____
- 2.17 Depress RAISE pushbutton until turning gear disengages at ~200 rpm. _____
- 2.18 Trip 2K-2A. _____
- 2.19 Check the following:
- MFWP Turbine Trip annunciator (2K03-A8) in alarm. _____
 - HP stop valve (2CV-0321A) closed. _____
 - LP stop valve (2CV-0350) closed. _____
 - AT LSS lamp illuminated. _____
- 2.20 Latch turbine by depressing Reset pushbutton. _____
- 2.21 Check the following:
- MFWP Turbine Trip annunciator (2K03-A8) clears. _____
 - HP stop valve (2CV-0321A) opens. _____
 - LP stop valve (2CV-0350) opens. _____
- 2.22 Raise turbine speed using RAISE pushbutton until AT HSS and AUTO lamps are lit. _____
- 2.23 Using 2HIC-0321, slowly raise turbine speed to ~ 4040 rpm. _____
- 2.24 Perform Emergency Governor and Trip Lockout Exercise Test using Supplement 2 of this procedure. _____
- 2.25 Establish communications between MFWT front standard and Control Room. _____
- 2.26 Slowly raise MFWT speed to High Speed Stop \leq 5420 (NOT to exceed 5450 rpm) using MFWP speed controller. _____

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CAUTION

- Do NOT exceed 5620 rpm during this test.
- Do NOT reset turbine until speed is < 4000 rpm.

2.27 Depress AND hold Overspeed Test Pushbutton (2HS-0387) at 2K-2A front standard. _____

- Monitor MFWT speed rise. _____
- Record overspeed trip setpoint from the following:
(N/A indications NOT available) _____
Control Room _____ rpm Front Standard _____ rpm
Hand Held Tachometer or Digital Multimeter _____ rpm

2.28 IF overspeed trip setpoint between 5350 and 5610 rpm,
THEN perform the following:

2.28.1 Place Turbine on MFWP Turning gear 2K-7A for 30 minutes. _____

2.28.2 Danger tag 2K-2A for coupling pump to turbine. _____

2.28.3 Fill and vent pump as necessary to ensure alignment
of pump to turbine. _____

2.28.4 Inform Maintenance 2K-2A ready to be aligned and coupled. _____

3.0 ACCEPTANCE CRITERIA

3.1 Is MFWT A overspeed trip setpoint using Front Standard, YES NO
Hand Held Tachometer or Digital Multimeter indication between
5350 and 5610 rpm?

3.2 IF NO circled in step 3.1,
THEN describe action taken below: _____

Performed By _____ Date _____

Supervisor _____ Date _____

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SUPPLEMENT 5

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MECHANICAL OVERSPEED TRIP TEST OF 2K-2B

The purpose of this Supplement is to test overspeed trip of "B" Main Feedwater Pump Turbine and document setpoint at which trip occurs.

1.0 INITIAL CONDITIONS

- Feedwater Pump uncoupled from turbine. _____
- Lube Oil System in service and tested using Lube Oil System Startup section of this procedure. _____
- Thrust Bearing Wear Test has been performed using Supplement 3 of this procedure. _____
- Turbine has been on turning gear for at least 2 hours. _____
- EHC System in service using Electrohydraulic Oil System Operation (2106.012). _____
- IF desired to use hand held tachometer or digital multimeter, THEN verify calibration current. _____

Serial number _____

NOTE

The following has been determined to be an IPTE.

- Operations Manager or his designee in Control Room. _____
- Perform Crew Brief using Crew Brief Checklist (Form 1015.00A). _____

2.0 TEST METHOD

- 2.1 Verify Main Steam to B MFWP (2CV-0315) closed. _____
- 2.2 Verify LP Supply Line Isol (2RS-32) closed. _____
- 2.3 Verify steam line between 2CV-0315 and MFWT B depressurized (2PI-0316). _____
- 2.4 Vent steam line between 2CV-0315 and MFWT B as necessary by cycling MFWT 2K-2B Supply Line Vents (2MS-2001A AND 2MS-2001B). _____
- 2.5 Verify steam line between 2RS-32 and MFWT B depressurized (2PI-0313). _____
- 2.6 Vent steam line between 2RS-32 and MFWT B as necessary by cycling LP Supply Line Atmos Vent (2RS-3002). _____
- 2.7 Latch 2K-2B by depressing Reset pushbutton. _____

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--	---	--

SUPPLEMENT 5

PAGE 2 OF 4

2.8 Check the following:

- MFWP Turbine Trip annunciator (2K03-A11) clears. _____
- HP stop valve (2CV-0316A) opens. _____
- LP stop valve (2CV-0330) opens. _____

2.9 Trip 2K-2B by depressing Trip pushbutton. _____

2.10 Check the following:

- MFWP Turbine Trip annunciator (2K03-A11) in alarm. _____
- HP stop valve (2CV-0316A) closes. _____
- LP stop valve (2CV-0330) closes. _____
- Control valve (2CV-0331) closed. _____
- Power lamp on. _____
- AT LSS lamp on. _____

2.11 Open the following valves on 2C12:

- HPSV Above Seat Drain (2CV-0316). _____
- HPSV Below Seat Drain (2CV-0314). _____
- LPSV Below Seat Drain (2CV-0312). _____
- LPSV Above Seat Drain (2CV-0311). _____
- First Stage Shell Drain (2CV-0307). _____
- LP Steam Drain (2CV-0328). _____

2.12 Verify MFWT Speed controller (2HIC-0310) aligned as follows:

- In MANUAL. _____
- Output demand at zero. _____

CAUTION

MFWT is uncoupled and subject to rapid speed changes.

2.13 Monitor MFWT speed while performing the following:

- 2.13.1 Manually throttle open 2CV-0315 until downstream piping pressurized. _____
- 2.13.2 Verify 2CV-0315 full open. _____

2.14 Latch turbine by depressing Reset pushbutton. _____

PROC./WORK PLAN NO. 2106.007	PROCEDURE/WORK PLAN TITLE: MAIN FEEDWATER PUMP AND FWCS OPERATION	PAGE: 60 of 63 CHANGE: 023-01-0
--	---	--

SUPPLEMENT 5

PAGE 3 OF 4

- 2.15 Check the following:
- MFWP Turbine Trip annunciator (2K03-A11) clears. _____
 - HP stop valve (2CV-0316A) opens. _____
 - LP stop valve (2CV-0330) opens. _____
- 2.16 Dispatch an Operator to MFWP to verify the following:
- All personnel are standing clear. _____
 - Debris clear of MFWT shaft. _____
 - Jacking gear engagement lever NOT obstructed. _____
- 2.17 Depress RAISE pushbutton until turning gear disengages at ~200 rpm. _____
- 2.18 Trip 2K-2B. _____
- 2.19 Check the following:
- MFWP Turbine Trip annunciator (2K03-A11) in alarm. _____
 - HP stop valve (2CV-0316A) closes. _____
 - LP stop valve (2CV-0330) closes. _____
 - AT LSS lamp illuminated. _____
- 2.20 Latch turbine by depressing Reset pushbutton. _____
- 2.21 Check the following:
- MFWP Turbine Trip annunciator (2K03-A11) clears. _____
 - HP stop valve (2CV-0316A) opens. _____
 - LP stop valve (2CV-0330) opens. _____
- 2.22 Raise turbine speed using RAISE pushbutton until AT HSS and AUTO lamps are lit. _____
- 2.23 Using 2HIC-0310, slowly raise turbine speed to ~ 4040 rpm. _____
- 2.24 Perform Emergency Governor and Trip Lockout Exercise Test using Supplement 2 of this procedure. _____
- 2.25 Establish communications between MFWT front standard and the Control Room. _____
- 2.26 Slowly raise MFWT speed to High Speed Stop \leq 5420 (NOT to exceed 5450 rpm) using MFWP speed controller. _____

PROC./WORK PLAN NO. 2106.007	PROCEDURE/WORK PLAN TITLE: MAIN FEEDWATER PUMP AND FWCS OPERATION	PAGE: 61 of 63 CHANGE: 023-01-0
--	---	--

SUPPLEMENT 5

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CAUTION

- Do NOT exceed 5620 rpm during this test.
- Do NOT reset turbine until speed is < 4000 rpm.

- 2.27 Depress AND hold Overspeed Test Pushbutton (2HS-0386) at 2K-2B front standard. _____
- Monitor MFWT speed rise. _____
 - Record overspeed trip setpoint from the following: _____
(N/A indications NOT available) _____
- Control Room _____ rpm Front Standard _____ rpm
- Hand Held Tachometer or Digital Multimeter _____ rpm

- 2.28 IF overspeed trip setpoint between 5350 and 5610 rpm,
THEN perform the following:

- 2.28.1 Place Turbine on MFWP Turning gear 2K-7B for 30 minutes. _____
- 2.28.2 Danger tag 2K-2B for coupling pump to turbine. _____
- 2.28.3 Fill and vent pump as necessary to ensure
alignment of pump to turbine. _____
- 2.28.4 Inform Maintenance 2K-2B ready to be aligned and coupled. _____

3.0 ACCEPTANCE CRITERIA

- 3.1 Is MFWT B overspeed trip setpoint using Front Standard, Hand Held Tachometer or Digital Multimeter indication between 5350 and 5610 rpm? YES NO
- 3.2 IF NO circled in step 3.1,
THEN describe action taken below: _____

Performed By _____ Date _____

Supervisor _____ Date _____

PROC./WORK PLAN NO. 2106.007	PROCEDURE/WORK PLAN TITLE: MAIN FEEDWATER PUMP AND FWCS OPERATION	PAGE: 62 of 63 CHANGE: 023-01-0
--	---	--

SUPPLEMENT 6

PAGE 1 OF 2

AUTO START TEST OF MFWP OIL PUMP

The purpose of this Supplement is to test auto start feature of MFWP Oil pumps (2P-26, 2P-27, and 2P-28).

1.0 INITIAL CONDITIONS

- MFWP Oil System in operation. _____
- Circle running MFWP oil pump. 2P-26 2P-27 _____

2.0 TEST METHOD

2.1 IF 2P-27 circled in Section 1.0,
THEN perform Auto Start Test of 2P-26 as follows:

- * 2.1.1 Monitor 2K-2A and 2K-2B Bearing Oil Pressures
(2PI-2603AA AND 2PI-2603BB) on 2CO2.
- 2.1.2 Momentarily depress Local Test pushbutton (2HS-0384)
to start 2P-26. _____
- 2.1.3 Verify 2P-26 running. _____
- 2.1.4 Place 2P-26 handswitch (2HS-0331) in NORMAL AFTER START. _____
- 2.1.5 Place 2P-27 handswitch (2HS-0332) in NORMAL AFTER STOP. _____

2.2 IF 2P-26 circled in Section 1.0,
THEN perform Auto Start test of 2P-27 as follows:

- * 2.2.1 Monitor 2K-2A and 2K-2B Bearing Oil Pressures
(2PI-2603AA AND 2PI-2603BB) on 2CO2.
- 2.2.2 Momentarily depress Local Test pushbutton (2HS-0384)
to start 2P-27. _____
- 2.2.3 Verify 2P-27 running. _____
- 2.2.4 Place 2P-27 handswitch (2HS-0332) in NORMAL AFTER START. _____
- 2.2.5 Place 2P-26 handswitch (2HS-0331) in NORMAL AFTER STOP. _____

PROC./WORK PLAN NO. 2106.007	PROCEDURE/WORK PLAN TITLE: MAIN FEEDWATER PUMP AND FWCS OPERATION	PAGE: 63 of 63 CHANGE: 023-01-0
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SUPPLEMENT 6

PAGE 2 OF 2

2.3 Perform Auto Start Test of 2P-28 as follows:

NOTE

- Starting 2P-28 will bring in 2K03-D10 (ELOP 2P-28 Running) alarm.
- Low Float Voltage may cause the following alarms to annunciate:
 - 2K01-E12 (2D03 Charger Trouble)
 - 2D33 (RIS) 2K-9302

2.3.1 Momentarily depress Local Test pushbutton (2HS-0385) for 2P-28. _____

2.3.2 Check 2P-28 running. _____

2.3.3 Place 2P-28 handswitch (2HS-0351) in NORMAL AFTER STOP. _____

2.4 MFWP Oil Tank Level Gauge Test

2.4.1 Open Lube Oil Reservoir cabinet door. _____

2.4.2 Lower float rod until Lube Oil Reservoir Level Lo (2K03-A10) alarms. _____

2.4.3 Release level float rod and verify 2K03-A10 clears. _____

2.4.4 Raise float rod until Lube Oil Reservoir Level Hi (2K03-B10) alarms. _____

2.4.5 Release level float rod and verify 2K03-B10 clears. _____

2.4.6 Close Lube Oil Reservoir cabinet door. _____

3.0 ACCEPTANCE CRITERIA

3.1 Did Standby Oil pump (2P-26 or 2P-27) and Emergency Oil pump (2P-28) start when tested in Section 2.0? YES NO

3.2 IF NO circled in step 3.1,
THEN describe action taken below: _____

Performed By _____ Date _____

Supervisor _____ Date _____

(Record retention of this form is NOT required)

JOB PERFORMANCE MEASUREUNIT: 2 REV #: 009 DATE: _____SYSTEM/DUTY AREA: Feed water Control SystemTASK: Place the Feed water Control System in AutomaticJTA#: ANO2ROFWCSNORM5KA VALUE RO: 3.7 SRO: 3.6 KA REFERENCE: 035 A4.01APPROVED FOR ADMINISTRATION TO: RO: X SRO: XTASK LOCATION: INSIDE CR: X OUTSIDE CR: _____ BOTH: _____

SUGGESTED TESTING ENVIRONMENT AND METHOD (PERFORM OR SIMULATE):

PLANT SITE: _____ SIMULATOR: Perform LAB: _____

POSITION EVALUATED: RO: _____ SRO: _____

ACTUAL TESTING ENVIRONMENT: SIMULATOR: _____ PLANT SITE: _____ LAB: _____

TESTING METHOD: SIMULATE: _____ PERFORM: _____

APPROXIMATE COMPLETION TIME IN MINUTES: 15 MinutesREFERENCE(S): OP-2106.007 Rev. 23-01-0

EXAMINEE'S NAME: _____ SSN: _____

EVALUATOR'S NAME: _____

THE EXAMINEE'S PERFORMANCE WAS EVALUATED AGAINST THE STANDARDS CONTAINED IN THIS JPM AND IS DETERMINED TO BE:

SATISFACTORY: _____ UNSATISFACTORY: _____

PERFORMANCE CHECKLIST COMMENTS:

Start Time	Stop Time	Total Time
_____	_____	_____

SIGNED: _____ DATE: _____

SIGNATURE INDICATES THIS JPM HAS BEEN COMPARED TO ITS APPLICABLE PROCEDURE BY A QUALIFIED INDIVIDUAL (NOT THE EXAMINEE) AND IS CURRENT WITH THAT REVISION.

JOB PERFORMANCE MEASURE**THE EXAMINER SHALL REVIEW THE FOLLOWING WITH THE EXAMINEE:**

The examiner shall review the "Briefing Checklist - System Walkthrough" portion of 1064.023 Attachment 6 with the examinee.

JPM INITIAL TASK CONDITIONS:

I&C has completed testing on "A" FWCS.

The FW Master Controller is in MANUAL.

Both "A" FWCS individual valve controllers are in MANUAL.

TASK STANDARD:

'A' FWCS in AUTOMATIC

Neither a Low SG level alarm (50%) was received nor has the HLO, High Level Override (82%) actuated.

TASK PERFORMANCE AIDS:

OP 2106.007 Section 13.0

SIMULATOR SETUP:

'A' FWCS master controller is in manual, 'A' Main Feed regulating valve HIC is in manual

'A' Main Feed regulating valve bypass HIC is in manual.

'A' MFP HIC is in AUTO.

EXAMINER'S NOTES:**INITIATING CUE:**

JOB PERFORMANCE MEASURE

The CRS directs, "Place the 'A' FWCS Master and individual Manual/Auto stations in AUTOMATIC from MANUAL mode using OP 2106.007 Section 13.0."

CRITICAL ELEMENTS (C): 5, 6, 8, 11, 12

START TIME: _____

PERFORMANCE CHECKLIST			STANDARDS	(Circle One)
	1. (Step 13.1)	Verify S/G levels are within 2% of level set point.	On panel 2C02, observed S/G levels within 2% of level set point and/or adjusted Main Feed Regulating Valve position until S/G levels were within 2% of set point.	N/A SAT UNSAT
	2. (Step 13.2)	Verify Steam Generator level is stable.	On panel 2C02, adjusted Main Feed Regulating Valve position until S/G levels were stable.	N/A SAT UNSAT
	3. (Step 13.3)	<p>On EWS, verify the following:</p> <p>All Signal RESET's, on all Signal Validation Screens, have been Reset, or reason known and it is desired to continue. NO unexplained alarms are present KEY in OPERATE and Removed.</p> <p>Examiner CUE:</p> <p>All Signal RESET's, on all Signal Validation Screens, have been Reset, or reason known and it is desired to continue. NO unexplained alarms are present KEY in OPERATE and Removed.</p>	<p>On EWS, verify the following:</p> <p>All Signal RESET's, on all Signal Validation Screens, have been Reset, or reason known and it is desired to continue. NO unexplained alarms are present KEY in OPERATE and Removed.</p>	N/A SAT UNSAT
<p>Examiner's Note (Step 13.4):</p> <p>SDBCS is NOT operating with any of the valves in automatic, so the entire step should be N/A'd. Indications are on 2C02.</p>				

JOB PERFORMANCE MEASURE

PERFORMANCE CHECKLIST			STANDARDS	(Circle One)
	4. (Step 13.5.1)	Display FW flow demand tracking for 'A' FWCS at either: <ul style="list-style-type: none"> On page 2 of MFP Speed Fisher Porter Controllers. On PMS point (FWFDMDT1) 	On 2C02, Displayed FW flow demand tracking for 'A' FWCS on page 2 of associated MFP Speed Fisher Porter Controller. OR On PMS, On 2C02, Displayed FW flow demand tracking for 'A' FWCS on PMS using point (FWFDMDT1)	N/A SAT UNSAT
(C)	5. (Step 13.5.2)	Match the Flow Demand on the Master controller to within 2% of the flow demand tracking value.	On 2C02, using the FWCS associated master controller, depressed the raise or lower manual pushbutton(s) to match the output signal to the Flow demand tracking value.	N/A SAT UNSAT
<p align="center">Examiner's Note:</p> <p>Either the main feed regulating valve controller or the main feed regulating valve bypass may be placed in automatic first. Also, the FWCS HIC's are not typical fisher-porter controllers; they simply relay the signal to the FWCS cabinet. If the M/A pushbutton is not pushed and released then the controller could swap from MANUAL to AUTO back to MANUAL again. This is the design of the controller-FWCS interface.</p>				
(C)	6. (Step 13.5.3)	Transfer the first FWCS Valve controller to AUTOMATIC.	On panel 2C02, using the FW Reg Valve Controller (2HIC-0748), depressed the M/A pushbutton. Observed that an 'A' is displayed on the HIC. OR On panel 2C02, using the FW Reg Valve Bypass Controller 2HIC-0753, depressed the M/A pushbutton. Observed the "M" changed to an "A" the selected HIC, indicating the controller is in automatic.	N/A SAT UNSAT
	7. (Step 13.5.4)	Verify the first valve position remains in a satisfactory position.	On panel 2C02 observed that the valve selected to be placed in automatic first, remains in a satisfactory position.	N/A SAT UNSAT

JOB PERFORMANCE MEASURE

PERFORMANCE CHECKLIST			STANDARDS	(Circle One)
(C)	8. (Step 13.5.5)	Transfer the "A" FWCS Master controller to AUTO.	On panel 2C02, placed Master Controller (2FIC-1029) in AUTO by depressing the M/A pushbutton. Observed the "M" changed to an "A" on 2FIC-1029 indicating the controller is in AUTOMATIC.	N/A SAT UNSAT
	9. (Step 13.5.6)	Verify Flow Demand on the Master controller output is responding as desired.	On 2C02, using the Master Controller, verified Flow Demand on the Master controller output is responding as desired.	N/A SAT UNSAT
	10. (Step 13.5.7.a)	Verify both valve positions are close to the respective positions required by the FWCS.	On 2C02, observed that both valve positions, the valve in automatic and the valve desired to place in automatic are close to the respective positions required by the FWCS by comparing the FWCS demanded position to the actual valve position.	N/A SAT UNSAT
(C)	11. (Step 13.5.7.b)	Transfer the controller for the second valve to AUTOMATIC.	On panel 2C02, using the FW Reg Valve Controller (2HIC-0748), depressed the M/A pushbutton. Observed that an 'A' is displayed on the HIC. OR On panel 2C02, using the FW Reg Valve Bypass Controller 2HIC-0753, depressed the M/A pushbutton. Observed the "M" changed to an "A" the selected HIC, indicating the controller is in automatic.	N/A SAT UNSAT
(C)	12.	Verify neither the SG low level alarm @ 50% narrow range is received nor the High Level Override (HLO) @ 82% Narrow range throughout the performance of this JPM.	The Low SG level alarm pretrip clear (2K04 A4 or A5 or A6 or A7) and HLO alarm clear (2K03-J3 or J4)	N/A SAT UNSAT
END				

STOP TIME: _____

JOB PERFORMANCE MEASURE

EXAMINER'S COPY

JPM INITIAL TASK CONDITIONS:

I&C has completed testing on "A" FWCS.
The FW Master Controller is in MANUAL.
Both "A" FWCS individual valve controllers are in MANUAL.

INITIATING CUE:

The CRS directs, "Place the 'A' FWCS Master and individual Manual/Auto stations in AUTOMATIC from MANUAL mode using OP 2106.007 Section 13.0."

JOB PERFORMANCE MEASURE

EXAMINEE'S COPY

JPM INITIAL TASK CONDITIONS:

I&C has completed testing on "A" FWCS.
The FW Master Controller is in MANUAL.
Both "A" FWCS individual valve controllers are in MANUAL.

INITIATING CUE:

The CRS directs, "Place the 'A' FWCS Master and individual Manual/Auto stations in AUTOMATIC from MANUAL mode using OP 2106.007 Section 13.0."

ENTERGY OPERATIONS INCORPORATED ARKANSAS NUCLEAR ONE

**TITLE: CONTAINMENT HYDROGEN CONTROL
OPERATIONS**

DOCUMENT NO.
2104.044

CHANGE NO.
029-00-0

SET #

WORK PLAN EXP. DATE
N/A

TC EXP. DATE
N/A

SAFETY-RELATED
☒ YES ☐ NO

IPTE
☐ YES ☒ NO

TEMP ALT
☐ YES ☒ NO

When you see these **TRAPS**

Time Pressure
Distraction/Interruption
Multiple Tasks
Over Confidence
Vague or Interpretive Guidance
First Shift/Last Shift
Peer Pressure
Change/Off Normal
Physical Environment
Mental Stress (Home or Work)

Get these **TOOLS**

Effective Communication
Questioning Attitude
Placekeeping
Self Check
Peer Check
Knowledge
Procedures
Job Briefing
Coaching
Turnover

VERIFIED BY

DATE

TIME

FORM TITLE:

VERIFICATION COVER SHEET

FORM NO.
1000.006A

CHANGE NO.
050-00-0

**ENTERGY OPERATIONS INCORPORATED
ARKANSAS NUCLEAR ONE**

Page 1

TITLE: CONTAINMENT HYDROGEN CONTROL OPERATIONS

**DOCUMENT NO.
2104.044**

**CHANGE NO.
029-00-0**

AFFECTED UNIT:

☐ UNIT 1 ☒ UNIT 2

☒ PROCEDURE
☐ WORK PLAN

☐ ELECTRONIC DOCUMENT
EXP. DATE

SAFETY-RELATED
☒ YES ☐ NO

TYPE OF CHANGE:

☐ NEW

☒ REVISION

☐ PC

☐ EZ

☐ TC

☐ DELETION

EXP. DATE: N/A

DOES THIS DOCUMENT:

- | | | |
|---|---|---|
| 1. Supersede or replace another procedure?
(If YES, complete 1000.006B for deleted procedure.) | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 2. Alter or delete an existing regulatory commitment?
(If YES, coordinate with Licensing before implementing.) | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 3. Require a 50.59 Review per Form 1000.006S?
(If No, attach completed Form 1000.006S) (If 50.59 Evaluation, OSRC review required.) | <input checked="" type="checkbox"/> YES | <input type="checkbox"/> NO |
| 4. Changes Surveillance Test Program (i.e. Technical Specifications, NRC Commitment, surveillance activity, see Step 7.5)? (If YES, complete 1000.009A) | <input checked="" type="checkbox"/> YES | <input checked="" type="checkbox"/> NO <i>5/23/05 Euf</i> |
| 5. Create an Intent Change?
(If YES, Standard Approval Process required.) | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 6. Implement or change IPTE requirements?
(If YES, complete 1000.143A. OSRC review required.) | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 7. Implement or change a Temporary Alteration?
(If YES, then OSRC review required.) | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |

Was the Master Electronic File used as the source document?

☒ YES ☐ NO

INTERIM APPROVAL PROCESS

STANDARD APPROVAL PROCESS

ORIGINATOR SIGNATURE: (Includes review of Att. 13) DATE:

Print and Sign name: NA PHONE #:

SUPERVISOR APPROVAL: * N/A DATE:

SRO UNIT ONE **: N/A DATE:

SRO UNIT TWO **: N/A DATE:

Interim approval allowed for non-intent changes requiring no 50.59 evaluation that are stopping work in progress.

Standard Approval required for intent changes or changes requiring a 50.59 evaluation.

*If change not required to support work in progress, Department Head must sign.

**If both units are affected by change, both SRO signatures are required. (SRO signature required for safety related procedures only.)

ORIGINATOR SIGNATURE: (Includes review of Att. 13) DATE: 5/9/2005

Print and Sign name: Mark Self *SM Self* PHONE #: 3164

INDEPENDENT REVIEWER: Roger P. Allen DATE: 5-10-05

ENGINEERING: N/A DATE:

Code Programs - NDE: N/A DATE:

UNIT SURVEILLANCE COORDINATOR: Earnest Williams Jr. DATE: 5/23/05

SECTION LEADER: W. Allen DATE: 5/26/05

QUALITY ASSURANCE: N/A DATE:

OTHER SECTION LEADERS: NA Licensing DATE:

OTHER SECTION LEADERS: N/A DATE:

OTHER SECTION LEADERS: N/A DATE:

OTHER SECTION LEADERS: N/A DATE:

OTHER SECTION LEADERS: N/A DATE:

OTHER SECTION LEADERS: N/A DATE:

OTHER SECTION LEADERS: N/A DATE:

OSRC CHAIRMAN/TECHNICAL REVIEWER: Roger P. Allen DATE: 5-10-05

FINAL APPROVAL: M. Allen DATE: 6-1-05

REQUIRED EFFECTIVE DATE: 6-2-05

FORM TITLE:

PROCEDURE/WORK PLAN APPROVAL REQUEST

**FORM NO.
1000.006B**

**CHANGE NO.
054-00-0**

ENTERGY OPERATIONS INCORPORATED

ARKANSAS NUCLEAR ONE

TITLE: CONTAINMENT HYDROGEN CONTROL OPERATIONS		DOCUMENT NO. 2104.044	CHANGE NO. 029-00-0
<input checked="" type="checkbox"/> PROCEDURE <input type="checkbox"/> WORK PLAN, EXP. DATE <u> N/A </u>		PAGE <u> 1 </u> OF <u> 2 </u>	
<input type="checkbox"/> ELECTRONIC DOCUMENT			
TYPE OF CHANGE: <input type="checkbox"/> NEW <input type="checkbox"/> PC <input type="checkbox"/> TC <input type="checkbox"/> DELETION <input checked="" type="checkbox"/> REVISION <input type="checkbox"/> EZ EXP. DATE: <u> N/A </u>			
AFFECTED SECTION: (Include step # if applicable)	DESCRIPTION OF CHANGE: (For each change made, include sufficient detail to describe reason for the change.)		
Throughout	Reviewed and updated for level of detail. PIF 2-05-378 Changed "Inoperable Equipment Checklist" to "LCO Tracking Record".		
7.2.4, 7.3.13, 7.4.4, 7.5.13, Exhibit 1 steps 1.4 and 2.4	Changed "system flow" to "Containment Air Sample Return flow" as this agrees with the labels on 2C182A. PIF 2-05-182		
Throughout	Added instrument numbers and locations for additional detail.		
7.3.3, 7.5.3	Broke actions in these steps into 2 bullets. PIF 2-05-182		
7.3.13, 7.5.13	Changed "WCO Log" to "CBOT Log". The WCO no longer takes logs in the control room PIF 2-05-182		
7.3.16, 7.5.16	Changed "Place" to "Verify". This valve should already be in its normal position. PIF 2-05-182		
7.3.18, 7.5.18	Made these steps continuous actions. PIF 2-05-182		
9.0	Split section into individual sub-steps specific for the H2 recombiner being operated. 9.1 for start of 2M-55A, and 9.2 for start of 2M-55B. Added instrument numbers throughout this section for additional detail and clarity. PIF 2-05-117		
10.0	Split section into individual sub-steps specific for the H2 recombiner being operated. 10.1 for shutdown of 2M-55A, and 10.2 for shutdown of 2M-55B. Added instrument numbers throughout this section for additional detail and clarity. PIF 2-05-117		
Att C	Added instrument numbers to table on page 3 of 3 for clarity. PIF 2-05-117		
Att D	Deleted. All requirements of this Heatup Test are captured within Supps 3 and 4. Att D is no longer required.		
FORM TITLE:		FORM NO.	CHANGE NO.
DESCRIPTION OF CHANGE		1000.006C	050-00-0

**ENTERGY OPERATIONS INCORPORATED
ARKANSAS NUCLEAR ONE**

TITLE: CONTAINMENT HYDROGEN CONTROL OPERATIONS		DOCUMENT NO. 2104.044	CHANGE NO. 029-00-0
<input checked="" type="checkbox"/> PROCEDURE <input type="checkbox"/> WORK PLAN, EXP. DATE <u>N/A</u>		PAGE <u>2</u> OF <u>2</u>	
<input type="checkbox"/> ELECTRONIC DOCUMENT			
TYPE OF CHANGE: <input type="checkbox"/> NEW <input type="checkbox"/> PC <input type="checkbox"/> TC <input type="checkbox"/> DELETION <input checked="" type="checkbox"/> REVISION <input type="checkbox"/> EZ EXP. DATE: <u>N/A</u>			
AFFECTED SECTION: (Include step # if applicable)	DESCRIPTION OF CHANGE: (For each change made, include sufficient detail to describe reason for the change.)		
Supp 1, Supp 2	Deleted these supplements. Hydrogen Recombiners are not required by Tech Specs or TRM, but are operated per EOPs. Supp 1 and 2 consist of the Semi-annual (twice yearly) test. Supp 3 and 4 remain in the procedure for testing these units on an 18 month frequency per MTCL and EOP requirements. Supps 3 and 4 contain all the requirements and testing that existed in Supps 1, 2 and Att D.		
Supp 3, Supp 4	Added instrument numbers throughout this supplement for additional detail and clarity. PIF 2-05-117 New step 2.8 to maintain ~48 KW until beginning of step to maintain corrected temperature > 1200°F to 1350°F. PIF 2-05-117 Added arithmetic aid in "Total Time" tables on page 3 of 4. PIF 2-05-117		
Supp 6, Supp 7	Added steps for securing CAMs paper drive in 2.3 and 2.4. PIF 2-05-104 Added note on page 2 of 6 to clarify Containment Penetration controls. PIF 2-05-103 Added note on page 3 of 6 to clarify 2HPA-40/41 operation. PIF 2-05-104 2.12.6 Changed "independent concurrent" to "concurrent" as "independent concurrent" is not defined in 1015.001 or COPD-001. PIF 2-04-104 2.14.1 Added step to independently verify 2SV-8273-1/8263-2 open. PIF 2-04-103 2.17 Added substeps to re-align CAMs isolations (2.17.1 and 2.17.2) and to align for CNTMT oxygen control if desired (2.17.4).		
FORM TITLE: DESCRIPTION OF CHANGE		FORM NO. 1000.006C	CHANGE NO. 050-00-0

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1.0 PURPOSE

Provide instructions for the Hydrogen Analyzer and Hydrogen Recombiner Systems including portions of the abandoned in place Hydrogen Purge system.

2.0 SCOPE

This procedure provides a description for the Hydrogen Analyzer and Hydrogen Recombiner Systems. It also provides instructions for startup, operation and shutdown of the Containment Hydrogen Control Systems. Instructions are provided for periodic testing of the Hydrogen Recombiner and Hydrogen Analyzer Systems.

This procedure includes boundary isolation valves for the abandoned in place Hydrogen Purge system.

3.0 DESCRIPTION

The Hydrogen Analyzer and Recombiner systems are designed to control hydrogen gas in the Containment Building. Proper mixing of containment atmosphere is provided by the Containment Atmosphere Control System. The systems in this procedure are designed to limit hydrogen concentration to a maximum of 3.9% following a Loss of Coolant Accident (LOCA).

Each Hydrogen Analyzer System panel (2C128) includes a sample cooler, solenoid operated inlet and outlet valves, Delphi pressure regulator, dual pump driven by one motor, thermal conductivity cell, and pressure control valve. Power supplies for each unit are as follows:

PANEL	480V	REGULATOR	INSTRUMENT	DC	120 VAC
2C128A	2B52-B2	2RS1-14	2Y1-33	2D21-25	31LA-31
2C128B	2B62-B1	2RS2-14	2Y2-35	2D22-35	30LA-12

Sample gas is drawn in through a sample cooler supplied with Service Water. Moisture is condensed and removed by a trap that drains to the Liquid Radwaste system. A Delphi regulator controls inlet pressure allowing operation over a wide range of containment pressures. The inlet pump draws air and delivers it to the conductivity cell.

Each analyzer has two local flow meters, flow control valves, three toggle valves and an ON/OFF switch behind meter door. One flow meter (2FIS-8365 or 2FIS-8381) provides indication of detector sample flow. Gas Supply Throttle valves (2HPA-46 or 2HPA-47) should be full open providing > 0.3 SCFH during analyzer operation. The other flow meter (2FI-8366 or 2FI-8382) provides Nitrogen flow indication to reference side of detector if Nitrogen is used as a reference gas. At present, reference gas is room atmosphere. Each cabinet is connected to a separate Penetration Room Ventilation System so that any release of activity from leaks in cabinet will be minimized.

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Remote equipment in Unit 2 Control Room allows monitoring and operation of analyzers. Each analyzer is provided with an Auto Start Sequence capability that allows Control Room to place either system in service. Auto Start Sequence is initiated by using OVERRIDE function of CNTMT Air Sample Supply valve handswitch (2HS-8273-1 for Train A and 2HS-8263-2 for Train B). System flow indication is provided on 2C182 in Control Room. Alarm panel 2K424 provides annunciation for 2C128A or 2C128B when H₂ concentration is high, sample flow is low or Analyzer Auto start sequence is defeated. An alarm on 2K424 initiates a common alarm for each analyzer on 2K10.

Two independent Hydrogen Recombiner Systems (2M-55A and 2M-55B) are available to reduce hydrogen concentration in Containment following a LOCA. Each system is composed of a Recombiner unit located in Containment, a power supply panel in Upper South or Upper North Electrical Penetration Rooms respectively and a Control Panel (2C182 and 2C184) in Unit 2 Control Room.

The Recombiner is completely enclosed and the internals protected from containment spray. Air entering louvers is drawn through unit by natural convection. In preheater, a shroud placed around control heaters takes advantage of heat conduction through walls to warm incoming air. This raises system efficiency and evaporates any moisture droplets that may be entrained in air. The warmed air enters heater section through an orifice plate that regulates airflow to approximately 100 scfm. Five banks of vertically stacked heaters heat air to 1150 to 1400°F. Flameless recombination of hydrogen and oxygen occurs.

The Hydrogen Purge System is abandoned in place. Only those portions of system shared by H₂ Analyzers, CAMS Units and PASS System will be used. If desired to use Hydrogen Purge System, then system will require new procedures and testing to verify system performance including removal of blind flange installed in purge supply piping per PC-92-8070.

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4.0 REFERENCES

4.1 References Used in Procedure Preparation

- Electric Hydrogen Recombiner Tech Manual, TM-W120.2190
- Hydrogen Analyzer (Delphi) Tech Manual, C539.0050
- CR-2-89-667
- DCP-91-2003, Hydrogen Analyzer Modification
- PC-92-8070, Hydrogen Purge System Blind Flange installation
- Calc No. 89-E-D105-01, Use of Hydrogen Purge System
- Calc No. 90-E-0116-01, ANO-2 EOP Setpoint Document
- ER002239N201, Rx Bldg Pressure & O2 Control Minor Modification
- CR-2-99-787, Use of Lead Seals to Lock Hydrogen Analyzer Doors
- CR-ANO-2-2001-1164, 2M-55B Channel 3 Temperature Detector failed
- ER-ANO-2003-0221-000, Isolation of PASS
- CR-ANO-2003-0054, 2HPA-47 Mis-positioned
- TS Amendment 254, Deletion of H2 Recombiners and Relocation of H2 Analyzers from TS to TRM

4.2 References Used in Conjunction with this Procedure

None

4.3 NRC Commitments

- 4.3.1 P16180, Indication of Hydrogen Concentration in Containment required within 90 minutes (Section 5.0, Supplements 6 & 7)

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5.0 LIMITS AND PRECAUTIONS
{4.3.1}

- 5.1 **Hydrogen Analyzer System should be placed in operation within 70 minutes after a LOCA.**
- 5.2 Hydrogen Recombiner System should be placed in operation when hydrogen concentration is $\geq 2\%$ after a LOCA.
- 5.3 Hydrogen Recombiner corrected temperature should NOT exceed 1400°F. Do not exceed 1400°F on any operable thermocouple to ensure corrected temperature does not exceed 1400°F.
- 5.4 Do NOT exceed a maximum Hydrogen Recombiner power of 75 KW.
- 5.5 Hydrogen Analyzers are inoperable when range selector in OFF OR until 3 hour warm-up period is complete.
- 5.6 Operability of CNTMT Air Supply AND Return valves is not affected by overriding automatic closure function as long as LLRT of Closed Loop portion of system outside CNTMT is current AND associated CAMS Isolation valves are closed.

6.0 SETPOINTS

6.1 Hydrogen Analyzer Alarms

- H2 CONCENTRATION HI $\geq 3.0\%$
- H2 ANALYZER SAMPLE AIR LOW FLOW A: ≤ 0.236 SCFM
(60 second time delay) B: ≤ 0.297 SCFM
- CONTAINMENT H2 SAMPLING DISABLED
 - For Hydrogen Analyzer 2C128A - Auto Start defeated by EITHER of the following:
 - ◆ Placing Primary Sampling valve 2SV-8345-1 (2HS-8345-1) in OVERRIDE
 - ◆ Placing Inlet/Outlet valves 2SV-8234-1/2SV-8230-1 (2HS-8276-1) in OVERRIDE
 - For Hydrogen Analyzer 2C128B - Auto Start defeated by EITHER of the following:
 - ◆ Placing Primary Sampling valve 2SV-8346-2 (2HS-8346-2) in OVERRIDE
 - ◆ Placing Inlet/Outlet valves 2SV-8266-2/2SV-8264-2 (2HS-8266-2) in OVERRIDE

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7.0 HYDROGEN ANALYZER (2C128A/B) START

7.1 Initial Conditions

- Hydrogen Analyzer System aligned using Attachment A
- Hydrogen Purge System aligned using Attachment B
- Associated Loop of Service Water in operation
 - Loop 1 SW for 2C128A
 - Loop 2 SW for 2C128B
- Containment Building Recirculation fans in operation per Containment Atmosphere Control (2104.033)
- Power available to Analyzers

7.2 Hydrogen Analyzer (2C128A) Auto Start

- 7.2.1 Verify CAMS Isolation Supply AND Return valves (2SV-8278-1/8280-1) closed on 2C17.
- 7.2.2 Verify open the following valves:
- CNTMT Air Sample Supply (2SV-8271-2) on 2C16
 - CNTMT Air Sample Return (2SV-8231-2) on 2C16
 - CNTMT Air Sample Return (2CV-8233-1) on 2C17
- 7.2.3 Initiate Auto Start Sequence by placing CNTMT Air Sample Supply (2SV-8273-1) on 2C17 in OVERRIDE.
- 7.2.4 Check Hydrogen Analyzer (2C128A) Containment Air Sample Return flow ≥ 0.220 SCFM on 2FI-8375 on 2C182A.
- 7.2.5 IF desired to check proper 2C128A Auto start, THEN perform the following:
- Check CTMT H2 PURGE OVERRIDDEN (2K06-D7) alarms.
 - Check CNTMT Air Sample Supply (2SV-8273-1) on 2C17 open.
 - Verify 2C128A Primary Sample (2SV-8345-1) on 2C33 open.
 - Verify 2C128A Isolations (2SV-8234-1/8230-1) on 2C182 energized to open by red light above 2HS-8276-1.
 - Verify 2C128A Sample pump (2P-162) starts on 2C182.
- 7.2.6 IF desired to align Hydrogen Analyzer sample through 2C128A Backup Sample (2SV-8351-1), THEN perform the following:
- A. Place 2C128A Backup Sample handswitch (2HS-8351-1) on 2C182 in OVERRIDE to open 2SV-8351-1.
 - B. Place 2C128A Primary Sample handswitch (2HS-8345-1) on 2C33 in OVERRIDE to close 2SV-8345-1.

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- 7.3 Hydrogen Analyzer (2C128A) Manual Start
- 7.3.1 IF CIAS OR SIAS present,
THEN use Step 7.2 of this procedure to start 2C128A.
- 7.3.2 IF CAMS unit 2RE-8231-1 aligned for CNTMT oxygen control,
THEN perform the following:
- A. Open CAMS Pump Disch/CNTMT Bldg M/U Isol (2HPA-74).
 - B. Close 2RE-8231-1 Discharge to ABHV (2HPA-1010).
 - C. Close CNTMT Bldg M/U Isol (2HPA-76).
- 7.3.3 IF plant in Mode 1 through 4,
THEN verify the following on 2C25:
- CAMS unit 2RE-8271-2 operable
 - CAMS unit 2RE-8271-2 in operation
- 7.3.4 Verify 2RE-8231-1 Sample pump (2C-47) on 2C25 stopped.
- 7.3.5 Close CAMS Isolation Supply & Return valves (2SV-8278-1/8280-1) on 2C17.
- 7.3.6 Verify the following valves open:
- CNTMT Air Sample Supply (2SV-8271-2) on 2C16
 - CNTMT Air Sample Return (2SV-8231-2) on 2C16
 - CNTMT Air Sample Supply (2SV-8273-1) on 2C17
 - CNTMT Air Sample Return (2CV-8233-1) on 2C17
- 7.3.7 Open 2C128A Primary Sample (2SV-8345-1) on 2C33.
- 7.3.8 Place Hydrogen Purge Manifold Position switch (2HS-8337) on 2C25 to POSITION 6 (all valves closed).
- 7.3.9 Verify 2C128A Backup Sample (2SV-8351-1) on 2C182 closed.
- 7.3.10 Verify 2C128A Isolations (2SV-8234-1/8230-1) on 2C182 open as indicated by 2HS-8276-1 (2C182) red light energized.
- 7.3.11 Place AND hold 2C128A Sample Pump (2P-162) handswitch (2HS-8232-1) on 2C182 to START for >5 seconds.
- 7.3.12 Verify 2C128A Sample pump (2P-162) on 2C182 running.
- 7.3.13 Check Hydrogen Analyzer 2C128A Containment Air Sample Return flow > 0.220 SCFM on 2FI-8375 at 2C182A at least daily.
- Add 2FI-8375 to CBOT Log.
- 7.3.14 Check detector sample flow > 0.3 SCFH on 2FIS-8365 (behind 2C128A H2 meter door) at least daily.
- Add 2FIS-8365 to WCO Log.
- 7.3.15 IF sample flow < 0.3 SCFH,
THEN notify Shift Manager.

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CAUTION

Placing range switch to OFF will turn off all power to instrument AND will render analyzer inoperable.

7.3.16 Verify Range switch behind sealed door on 2C128A in any operating position.

7.3.17 IF Range switch was in OFF,
THEN allow analyzer to warm up for three hours before considering H2 reading reliable.

- * 7.3.18 IF Analyzer operating for extended period (> 1 week),
THEN submit WR/WO for I&C to perform the following:
- Zero check weekly
 - Span check monthly

7.4 Hydrogen Analyzer (2C128B) Auto Start

7.4.1 Verify CAMS Isolation Supply AND Return valves (2SV-8262-2/8260-2) closed.

7.4.2 Verify open the following valves:

- CNTMT Air Sample Return (2SV-8261-2) 2C16
- CNTMT Air Sample Supply (2SV-8265-1) 2C17
- CNTMT Air Sample Return (2SV-8259-1) 2C17

7.4.3 Initiate Auto Start Sequence by placing CNTMT Air Sample Supply valve (2SV-8263-2) on 2C16 in OVERRIDE.

7.4.4 Check Hydrogen Analyzer (2C128B) Containment Air Sample Return flow \geq 0.282 SCFM on 2FI-8385 on 2C182A.

7.4.5 IF desired to check proper 2C128B Auto start,
THEN perform the following:

- Check CTMT H2 PURGE OVERRIDDEN (2K05-D7) alarms.
- Check CNTMT Air Sample Supply (2SV-8263-2) on 2C16 open.
- Verify 2C128B Primary Sample (2SV-8346-2) on 2C33 open.
- Verify 2C128B Isolations (2SV-8266-2/8264-2) on 2C184 energized to open by red light above 2HS-8266-2.
- Verify 2C128B Sample pump (2P-163) starts on 2C184.

7.4.6 IF desired to align Hydrogen Analyzer sample through 2C128B Backup Sample (2SV-8341-2),
THEN perform the following:

- A. Place 2C128B Backup Sample handswitch (2HS-8341-2) on 2C184 in OVERRIDE to open 2SV-8341-2.
- B. Place 2C128B Primary Sample handswitch (2HS-8346-2) on 2C33 in OVERRIDE to close 2SV-8346-2.

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- 7.5 Hydrogen Analyzer (2C128B) Manual Start
- 7.5.1 IF CIAS OR SIAS is present,
THEN use Step 7.4 of this procedure to start 2C128B.
- 7.5.2 IF CAMS unit 2RE-8271-2 aligned for CNTMT oxygen control,
THEN perform the following:
- A. Open CAMS Pump Disch/CNTMT Bldg M/U Isol (2HPA-77).
 - B. Close 2RE-8271-2 Discharge to ABHV (2HPA-1011).
 - C. Close CNTMT Bldg M/U Isol (2HPA-79).
- 7.5.3 IF plant in Mode 1 through 4,
THEN verify the following on 2C25:
- CAMS unit 2RE-8231-1 operable
 - CAMS unit 2RE-8231-1 in operation
- 7.5.4 Verify 2RE-8271-2 Sample pump (2C-48) on 2C25 stopped.
- 7.5.5 Close CAMS Isolation Supply & Return valves (2SV-8262-2/8260-2).
- 7.5.6 Open the following valves:
- CNTMT Air Sample Return (2SV-8261-2) 2C16
 - CNTMT Air Sample Supply (2SV-8263-2) 2C16
 - CNTMT Air Sample Return (2SV-8259-1) 2C17
 - CNTMT Air Sample Supply (2SV-8265-1) 2C17
- 7.5.7 Open 2C128B Primary Sample (2SV-8346-2) on 2C33.
- 7.5.8 Place Hydrogen Purge Manifold Position switch (2HS-8337) on 2C25 to POSITION 6 (all valves closed).
- 7.5.9 Verify 2C128B Backup Sample (2SV-8341-2) on 2C184 closed.
- 7.5.10 Verify 2C128B Isolations (2SV-8266-2/8264-2) on 2C184 open as indicated by 2HS-8266-2 (2C184) red light energized.
- 7.5.11 Place AND hold 2C128B Sample pump (2P-163) Handswitch (2HS-8272-2) on 2C184 to START for >5 seconds.
- 7.5.12 Verify 2C128B Sample pump (2P-163) on 2C184 running.
- 7.5.13 Check Hydrogen Analyzer (2C128B) Containment Air Sample Return flow > 0.282 SCFM on 2FI-8385 at 2C182A at least daily.
- Add 2FI-8385 to CBOT Log.
- 7.5.14 Check detector sample flow > 0.3 SCFH on 2FIS-8381 (behind 2C128B H2 meter door) at least daily.
- Add 2FIS-8381 to WCO Log.
- 7.5.15 IF sample flow < 0.3 SCFH,
THEN notify Shift Manager.

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CAUTION

Placing range switch to OFF will turn off all power to instrument AND will render analyzer inoperable.

- 7.5.16 Verify Range switch behind sealed door on 2C128B in any operating position.
- 7.5.17 IF Range switch in OFF,
 THEN allow analyzer to warm up for three hours before considering H2 reading reliable.
- * 7.5.18 IF Analyzer operating for extended period (> 1 week),
 THEN submit WR/WO for I&C to perform the following:
 - Zero check weekly
 - Span check monthly

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8.0 HYDROGEN ANALYZER (2C128A/B) SHUTDOWN

8.1 Securing Hydrogen Analyzer (2C128A) following Auto Start

8.1.1 Place CNTMT Air Sample Supply (2SV-8273-1) on 2C17 in OPEN.

8.1.2 Perform the following:

- Check CTMT H2 PURGE OVERRIDDEN (2K06-D7) alarm clear.
- Verify 2C128A Sample pump (2P-162) on 2C182 stopped.
- Verify 2C128A Isolations (2SV-8234-1/8230-1) on 2C182 closed as indicated by 2HS-8276-1 red light NOT lit.
- Verify 2C128A Primary Sample (2SV-8345-1) on 2C33 closed.
- Verify 2C128A Backup Sample (2SV-8351-1) on 2C182 closed.

8.1.3 Select Range switch behind sealed door on 2C128A to one of the following:

- IF analyzer to be left in standby,
THEN select any of the range positions.
- IF analyzer to be completely secured,
THEN select OFF position AND refer to TRM 3.6.4.1.

8.1.4 Verify the following valves NOT in OVERRIDE:

- CNTMT Air Sample Supply (2SV-8271-2) on 2C16
- CNTMT Air Sample Return (2SV-8231-2) on 2C16
- CNTMT Air Sample Return (2CV-8233-1) on 2C17

8.2 Securing Hydrogen Analyzer (2C128A) following Manual Start

8.2.1 Select Range switch behind sealed door on 2C128A to one of the following:

- IF analyzer to be left in standby,
THEN select any of the range positions.
- IF analyzer to be completely secured,
THEN select OFF position AND refer to TRM 3.6.4.1.

8.2.2 Place 2C128A Sample pump (2P-162) on 2C182 in OFF.

8.2.3 Close 2C128A Isolations (2SV-8234-1/8230-1) on 2C182.

8.2.4 Select desired sample point for CAMS Unit 2RE-8231-1 using Hydrogen Purge Manifold Position switch (2HS-8337).

8.2.5 Verify the following valves closed:

- 2C128A Backup Sample (2SV-8351-1) on 2C182
- 2C128A Primary Sample (2SV-8345-1) on 2C33-1

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- 8.3 Securing Hydrogen Analyzer (2C128B) following Auto Start
- 8.3.1 Place CNTMT Air Sample Supply (2SV-8263-2) on 2C16 in OPEN.
- 8.3.2 Perform the following:
- Check CTMT H2 PURGE OVERRIDDEN (2K05-D7) alarm clear.
 - Verify 2C128B Sample pump (2P-163) on 2C184 stopped.
 - Verify 2C128B Isolations (2SV-8266-2/8264-2) on 2C184 closed as indicated by 2HS-8266-2 red light NOT lit.
 - Verify 2C128B Primary Sample (2SV-8346-2) closed.
 - Verify 2C128B Backup Sample (2SV-8341-2) closed.
- 8.3.3 Select Range switch behind sealed door on 2C128B to one of the following:
- IF analyzer to be left in standby,
THEN select any of the range positions.
 - IF analyzer to be completely secured,
THEN select OFF position AND refer to TRM 3.6.4.1.
- 8.3.4 Verify the following valves NOT in OVERRIDE:
- CNTMT Air Sample Return (2SV-8261-2) on 2C16
 - CNTMT Air Sample Supply (2SV-8265-1) on 2C17
 - CNTMT Air Sample Return (2SV-8259-1) on 2C17
- 8.4 Securing Hydrogen Analyzer (2C128B) following Manual Start
- 8.4.1 Select Range switch behind sealed door on 2C128B to one of the following:
- IF analyzer to be left in standby,
THEN select any of the range positions.
 - IF analyzer to be completely secured,
THEN select OFF position AND refer to TRM 3.6.4.1.
- 8.4.2 Place 2C128B Sample pump (2P-163) on 2C184 in OFF.
- 8.4.3 Close 2C128B Isolations (2SV-8266-2/8264-2) on 2C184.
- 8.4.4 Select desired sample point for CAMS Unit 2RE-8271-2 using Hydrogen Purge Manifold Position switch (2HS-8337).
- 8.4.5 Verify the following valves closed:
- 2C128B Backup Sample valve (2SV-8341-2) on 2C184
 - 2C128B Primary Sample valve (2SV-8346-2) on 2C33-2

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9.0 HYDROGEN RECOMBINER (2M-55A/B) START

- 9.1 Perform the following to start Hydrogen recombiner (2M-55A):
 - 9.1.1 Verify Power Out switch in OFF.
 - 9.1.2 Verify Power Adjust potentiometer (2POTR-6890) set to zero (000):
 - 9.1.3 Verify H2 Recombiner #1 supply breaker (2B-533) closed.
 - 9.1.4 Check white Power Available light illuminated.
 - 9.1.5 Place Power Out switch to ON.
 - 9.1.6 Turn Power Adjust potentiometer (2POTR-6890) clockwise to raise power to 5 KW as indicated on power meter (2WI-6892).
 - 9.1.7 Maintain power at 5 KW for 10 minutes using 2POTR-6890.
 - 9.1.8 Raise power to 10 KW using 2POTR-6890.
 - 9.1.9 Maintain power at 10 KW on 2WI-6892 for 10 minutes using 2POTR-6890.
 - 9.1.10 Determine Recombiner Temperature Correction Factor using Attachment C.
 - 9.1.11 Raise power to 20 KW on 2WI-6892 using 2POTR-6890.
 - 9.1.12 Maintain power at 20 KW on 2WI-6892 for 5 minutes.
 - 9.1.13 Determine required Recombiner power from Attachment F based on Pre-LOCA CNTMT temperature and Post-LOCA CNTMT pressure.
 - 9.1.14 Raise power on 2WI-6892 using 2POTR-6890 to value determined in above step.

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CAUTION

- Do NOT exceed maximum Recombiner output power of 75 KW OR operable thermocouple temperature of 1400°F.
- If temperature difference between any two temperature readings exceeds 50°F during steady state operation, then temperatures should NOT be used as an indication of proper operation.

9.1.15 Monitor operable thermocouple temperatures (2TI-6888) every 30 minutes AND record on Attachment C of this procedure.

NOTE

A power change of 1 KW will change temperature approximately 18°F.

9.1.16 WHEN 2M-55A has operated for ≥ 2 hours,
THEN verify proper operation of 2M-55A as follows:

- H2 concentration being reduced OR maintained at low concentration
- Recombiner maintaining power at required value
- Recombiner power ≤ 75 KW
- Average corrected temperature per Attachment C between 1225°F and 1400°F

9.1.17 IF H2 concentration has risen by greater than 0.5% in 24 hours
OR H2 concentration exceeds 3.0%,
THEN raise Recombiner power 4 KW above previous setting.

9.2 Perform the following to start Hydrogen recombinder (2M-55B):

9.2.1 Verify Power Out switch in OFF.

9.2.2 Verify Power Adjust potentiometer (2POTR-6891) set to zero (000):

9.2.3 Verify H2 Recombiner #2 supply breaker (2B-633) closed:

9.2.4 Check white Power Available light illuminated.

9.2.5 Place Power Out switch to ON.

9.2.6 Turn Power Adjust potentiometer (2POTR-6891) clockwise to raise power to 5 KW as indicated on power meter (2WI-6893).

9.2.7 Maintain power at 5 KW for 10 minutes using 2POTR-6891.

9.2.8 Raise power to 10 KW using 2POTR-6891.

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- 9.2.9 Maintain power at 10 KW on 2WI-6893 for 10 minutes using 2POTR-6891.
- 9.2.10 Determine Recombiner Temperature Correction Factor using Attachment C.
- 9.2.11 Raise power to 20 KW on 2WI-6893 using 2POTR-6891.
- 9.2.12 Maintain power at 20 KW on 2WI-6893 for 5 minutes.
- 9.2.13 Determine required Recombiner power from Attachment F based on Pre-LOCA CNTMT temperature and Post-LOCA CNTMT pressure.
- 9.2.14 Raise power on 2WI-6893 using 2POTR-6891 to value determined in above step.

CAUTION

- Do NOT exceed maximum Recombiner output power of 75 KW OR operable thermocouple temperature of 1400°F.
- If temperature difference between any two temperature readings exceeds 50°F during steady state operation, then temperatures should NOT be used as an indication of proper operation.

- 9.2.15 Monitor operable thermocouple temperatures (2TI-6889) every 30 minutes AND record on Attachment C of this procedure.

NOTE

A power change of 1 KW will change temperature approximately 18°F.

- 9.2.16 WHEN 2M-55B has operated for ≥ 2 hours,
THEN verify proper operation of 2M-55B as follows:
- H2 concentration being reduced OR maintained at low concentration
 - Recombiner maintaining power at required value
 - Recombiner power ≤ 75 KW
 - Average corrected temperature per Attachment C between 1225°F and 1400°F
- 9.2.17 IF H2 concentration has risen by greater than 0.5% in 24 hours
OR H2 concentration exceeds 3.0%,
THEN raise Recombiner power 4 KW above previous setting.

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10.0 HYDROGEN RECOMBINER (2M-55A/B) SHUTDOWN

10.1 Perform the following to shut down Hydrogen Recombiner (2M-55A):

- 10.1.1 Lower power to zero (000) on power meter (2WI-6892) using Power Adjust potentiometer (2POTR-6890).
- 10.1.2 Place Power Out switch to OFF.
- 10.1.3 WHEN average corrected temperature per Attachment C has lowered to near CNTMT ambient,
THEN open H2 Recombiner #1 supply breaker (2B-533).

10.2 Perform the following to shut down Hydrogen Recombiner (2M-55B):

- 10.2.1 Lower power to zero (000) on power meter (2WI-6893) using Power Adjust potentiometer (2POTR-6891).
- 10.2.2 Place Power Out switch to OFF.
- 10.2.3 WHEN average corrected temperature per Attachment C has lowered to near CNTMT ambient,
THEN open H2 Recombiner #2 supply breaker (2B-633).

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ATTACHMENT A

HYDROGEN ANALYZER SYSTEM VALVE LINEUP

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
U2 HOT LAB - RAB 354'- 2C128A HYDROGEN ANALYZER							
2HPA-66	2C128A CNTMT Air Sample Rtn 2FE-8375 Outlet	M2261 G2 SH 3	U2 HOT LAB, ABOVE H2 ANALYZER 2C128A, 8 FT FROM FLOOR	LOCKED OPEN			
2HPA-51	2C128A CNTMT Air Sample Rtn 2FE-8375 Bypass	M2261 H2 SH 3	U2 HOT LAB, ABOVE H2 ANALYZER 2C128A, 8 FT FROM FLOOR	CLOSED			
2HPA-69	2C128A CNTMT Air Sample Rtn 2FE-8375 Inlet	M2261 B2 SH 3	U2 HOT LAB, ABOVE H2 ANALYZER 2C128A, 8 FT FROM FLOOR	LOCKED OPEN			
2HPA-68	2C128A CNTMT Air Sample Rtn 2FE-8375 Test Conn	M2261 F1 SH 3	U2 HOT LAB, 3 FT W OF H2 ANALYZER 2C128A, 7 FT FROM FLOOR	CLOSED CAPPED			
2HPA-67	2C128A CNTMT Air Sample Rtn 2FE-8375 Test Conn	M2261 F1 SH 3	U2 HOT LAB, 3 FT W OF H2 ANALYZER 2C128A, 7 FT FROM FLOOR	CLOSED CAPPED			
2HPA-25	2C128A Span Gas Supply Hdr Isol	M2261 G5 SH 3	U2 HOT LAB AREA, INSIDE H2 ANALYZER 2C128A, 6 FT UP	CLOSED			
2HPA-26	2C128A Zero Gas Supply Hdr Isol	M2261 G6 SH 3	U2 HOT LAB AREA, INSIDE H2 ANALYZER 2C128A, 6 FT UP	CLOSED			
2HPA-1008	2C128A Detector Test/Vent Valve	M2261 D6 SH 3	U2 HOT LAB AREA, INSIDE H2 ANALYZER 2C128A, 4.5 FT UP	CLOSED CAPPED			
2HPA-48	2C128A Zero Gas to Reference Vent	M2261 E5 SH 3	U2 HOT LAB AREA, INSIDE H2 ANALYZER 2C128A, 3 FT UP	THROTTLED 2 TURNS OPEN			
2HPA-40	2C128A Sample Supply to Detector	M2261 E6 SH 3	U2 HOT LAB AREA, INSIDE H2 ANALYZER 2C128A, 3 FT UP	OPEN			
2HPA-46	2C128A Detector Inlet	M2261 E6 SH 3	U2 HOT LAB AREA, INSIDE H2 ANALYZER 2C128A, 3 FT UP	OPEN			
2HPA-44	2C128A Span Gas Supply to Detector	M2261 F4 SH 3	U2 HOT LAB AREA, INSIDE H2 ANALYZER 2C128A, 3 FT UP	CLOSED			
2HPA-42	2C128A Zero Gas Supply to Detector	M2261 E6 SH 3	U2 HOT LAB AREA, INSIDE H2 ANALYZER 2C128A, 3 FT UP	CLOSED			
2C128A Front Cabinet Door	2C128A Front Cabinet Door	M2261 D4	U2 HOT LAB	LC (1)			

(1) Locked closed with lead seal AND Range Select switch NOT in OFF (CR-2-99-787).

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ATTACHMENT A

HYDROGEN ANALYZER SYSTEM VALVE LINEUP

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
UNPP - 2C128B HYDROGEN ANALYZER							
2HPA-18	2C128B Span Gas Supply Hdr Isol	M2261 G4 SH 3	UNPP, TOP OF STAIRS, INSIDE H2 ANALYZER 2C128B, 6 FT UP	CLOSED			
2HPA-17	2C128B Zero Gas Supply Hdr Isol	M2261 G4 SH 3	UNPP, TOP OF STAIRS, INSIDE H2 ANALYZER 2C128B, 5.5 FT UP	CLOSED			
2HPA-1009	2C1288 Detector Test/Vent Valve	M2261 D4 SH 3	UNPP, TOP OF STAIRS, INSIDE H2 ANALYZER 2C1288, 4.5 FT UP	CLOSED CAPPED			
2HPA-49	2C128B Zero Gas to Reference Vent	M2261 E4 SH 3	UNPP, TOP OF STAIRS, INSIDE H2 ANALYZER 2C128B, 3 FT UP	THROTTLED ~ 2 TURNS OPEN			
2HPA-41	2C128B Sample Supply to Detector	M2261 E4 SH 3	UNPP, TOP OF STAIRS, INSIDE H2 ANALYZER 2C128B, 3 FT UP	OPEN			
2HPA-47	2C128B Detector Inlet	M2261 E4 SH 3	UNPP, TOP OF STAIRS, INSIDE H2 ANALYZER 2C128B, 3 FT UP	OPEN			
2HPA-45	2C128B Span Gas Supply to Detector	M2261 E4 SH 3	UNPP, TOP OF STAIRS, INSIDE H2 ANALYZER 2C128B, 3 FT UP	CLOSED			
2HPA-43	2C128B Zero Gas Supply to Detector	M2261 E4 SH 3	UNPP, TOP OF STAIRS, INSIDE H2 ANALYZER 2C128B, 3 FT UP	CLOSED			
2HPA-73	2C128B CNTMT Air Sample Rtn 2FE-8385 Inlet	M2261 H2 SH 3	UNPP, TOP OF STAIRS, ABOVE H2 ANALYZER 2C128B, 8 FT FROM FLOOR	LOCKED OPEN			
2HPA-52	2C128B CNTMT Air Sample Rtn 2FE-8385 Bypass	M2261 H2 SH 3	UNPP, TOP OF STAIRS, ABOVE H2 ANALYZER 2C128B, 8 FT FROM FLOOR	CLOSED			
2HPA-70	2C128B CNTMT Air Sample Rtn 2FE-8385 Outlet	M2261 H2 SH 3	UNPP, TOP OF STAIRS, ABOVE H2 ANALYZER 2C128B, 8 FT FROM FLOOR	LOCKED OPEN			
2HPA-71	2C128B CNTMT Air Sample Rtn 2FE-8385 Test Conn	M2261 H2 SH 3	UNPP, 2 FT W OF H2 ANALYZER 2C128B, 7 FT UP	CLOSED CAPPED			
2HPA-72	2C128B CNTMT Air Sample Rtn 2FE-8385 Test Conn	M2261 H2 SH 3	UNPP, 2 FT W OF H2 ANALYZER 2C128B, 7 FT UP	CLOSED CAPPED			
2C128B Front Cabinet Door	2C128B Front Cabinet Door	M2261 H2	UNPP	LC (1)			

(1) Locked closed with lead seal AND Range Select switch NOT in OFF (CR-2-99-787).

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ATTACHMENT B

HYDROGEN PURGE SYSTEM VALVE LINEUP

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
NORTH END OF 2VEF-38A/B ROOM							
2SW-5031	2VP-5 Discharge to SW System	M2261 B2 SH 2	2VEF-38A/B ROOM, N END, ABOVE 2T-93, 8.5 FT FROM FLOOR	CLOSED			
2SW-41	2VSF-30 Seal Water Supply	M2261 B7 SH 2	2VEF-38A/B RM, N END, ABOVE 2T-93, 8.5 FT FROM FLOOR	CLOSED			
2SW-40	2VEF-37 Seal Water Supply	M2261 D4 SH 2	2VEF-38A/B RM, N END, ABOVE 2T-93, 8.5 FT FROM FLOOR	CLOSED			
ENTRANCE TO LNPP							
2SW-5020	2VEF-37/2VSF-30 Inlet Line Vent	M2210 H3 SH 3	AB 335' HALL, N END, AT ENTRANCE TO LNPP RM, 2 FT W OF 2CV-1530-1, 10 FT UP	CLOSED CAPPED			
LNPP							
2SW-1054	2VEF-37 Seal Water Supply Vent	M2261 D2 SH 2	LNPP, HALFWAY UP STAIRCASE, 3 FT N OF EMERGENCY LIGHT BOX 2EL-14	CLOSED CAPPED			
2SW-1055	2VP-5 Discharge Header Vent	M2261 B2 SH 2	LNPP, HALFWAY UP STAIRCASE, 3 FT N OF EMERGENCY LIGHT BOX 2EL-14	CLOSED CAPPED			
UNPP, H2 ANALYZER 2C128B AREA							
2HPA-31	2C128B Sample Supply Hdr Isol	M2261 G3 SH 3	UNPP, AT TOP OF STAIRS, INSIDE H2 ANALYZER 2C128B, 3 FT UP	LOCKED OPEN			
2HPA-39	2C128B Sample Return Hdr Isol	M2261 G2 SH 3	UNPP, AT TOP OF STAIRS, INSIDE H2 ANALYZER PANEL 2C128B, 3 FT UP	LOCKED OPEN			
UNPP							
2HPA-4	2C128B Sample Return CNTMT Isol	M2261 F7 SH 1	UNPP, AT TOP OF STAIRS, 3 FT NW OF H2 ANALYZER 2C128B, 6.5 FT UP	LOCKED OPEN			
2HPA-64	2RE-8271-2B Inlet	M2261 G2 SH 2	UNPP, AT TOP OF STAIRS, INSIDE 2RE-8271-2 CABINET, N SIDE, 3 FT UP	OPEN			
2HPA-3	2C128B Sample Supply CNTMT Isol	M2261 E7 SH 1	UNPP, AT TOP OF STAIRS, 3 FT NW OF H2 ANALYZER 2C128B, 6.5 FT UP	LOCKED OPEN			
2HPA-10	2RE-8271-2A/2B Bypass	M2261 G2 SH 2	UNPP, AT TOP OF STAIRS, INSIDE 2RE-8271-1 CABINET, 2 FT UP	THROTTLED (2)			
2HPA-65	2RE-8271-2B Outlet	M2261 G2 SH 2	UNPP, AT TOP OF STAIRS, INSIDE 2RE-8271-2 CABINET, 6 INCHES UP	OPEN			
2HPA-12	2FIS-8271-2 Inlet	M2261 G2 SH 2	UNPP, AT TOP OF STAIRS, INSIDE 2RE-8271-2 CABINET, 6 INCHES UP	OPEN			
2HPA-1003	2RE-8271-2 Outlet Drain	M2261 F7 SH 1	UNPP, AT TOP OF STAIRS, 1 FT NE OF 2RE-8271-2 CABINET, 1.5 FT UP	CLOSED CAPPED			

(2) Throttled to control sample flow between 8 and 12 SCFM on 2FIS-8271-2 when 2RITS-8271-2 in service.

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ATTACHMENT B

HYDROGEN PURGE SYSTEM VALVE LINEUP

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
2HPA-1011	2RE-8271-2 Discharge to ABHV	M2261 F7 SH 1	UNPP, AT TOP OF STAIRS, NEAR 2RE-8271-2 CABINET.	OPEN			
2HPA-77	CAMS Pump Disch/CNTMT Bldg M/U Isol	M2261 F4 SH 4	UNPP, AT TOP OF STAIRS, NEAR 2RE-8271-2 CABINET.	CLOSED			
2HPA-78	CNTMT Bldg M/U Throttle Valve	M2261 F4 SH 4	UNPP, AT TOP OF STAIRS, NEAR 2RE-8271-2 CABINET.	THROTTLED (4)			
2HPA-79	CNTMT Bldg M/U Isol	M2261 F4 SH 4	UNPP, AT TOP OF STAIRS, NEAR 2RE-8271-2 CABINET.	OPEN			
2HPA-54	2RE-8271-2 Outlet Test Conn.	M2261 F7 SH 1	UNPP, AT TOP OF STAIRS, 1 FT N OF 2RE-8271-2 CABINET, 3 FT UP	CLOSED CAPPED			
2HPA-8271A	2RE-8271-2 Outlet Master Isol.	M2261 F7 SH 1	UNPP, AT TOP OF STAIRS, 1.5 FT N OF 2RE-8271-1 CABINET, 2.5 FT UP	OPEN			
2HPA-8261A	2C128B Sample Rtn to CNTMT PP Isol	M2261 F7 SH 1	UNPP, AT TOP OF STAIRS, 2 FT N OF 2RE-8271-2 CABINET, 3.5 FT UP	LC			
2HPA-8261B	2C128B Sample Rtn to CNTMT PP Isol	M2261 F7 SH 1	UNPP, AT TOP OF STAIRS, 2 FT N OF 2RE-8271-2 CABINET, 4 FT UP	LC CAPPED			
2HPA-8263A	CNTMT Air Sample Supply to 2C128B PP Isol	M2261 E6 SH 1	UNPP, AT TOP OF STAIRS, 2 FT N OF 2RE-8271-2 CABINET, 2.5 FT UP	LC			
2HPA-8263B	CNTMT Air Sample Supply to 2C128B PP Isol	M2261 E6 SH 1	UNPP, AT TOP OF STAIRS, 2 FT N OF 2RE-8271-2 CABINET, 3 FT UP	LC CAPPED			
2HPA-56	2RE-8271-2 Inlet Test Conn	M2261 E7 SH 1	UNPP, AT TOP OF STAIRS, 3 FT NW OF 2RE-8271-2 CABINET, 5 FT UP	CLOSED CAPPED			
2HPA-8271B	2RE-8271-2 Inlet Master Isol	M2261 E7 SH 1	UNPP, AT TOP OF STAIRS, 4 FT NW OF 2RE-8271-2 CABINET, 4.5 FT UP	OPEN			
2HPA-1006	CNTMT Air Sample Supply to 2C128B Drain	M2261 E7 SH 1	UNPP, AT TOP OF STAIRS, 5 FT N OF 2RE-8271-2, CABINET, 2 FT UP	CLOSED CAPPED			
2HPA-8265	CNTMT Air Sample Supply to 2C128B PP Isol	M2261 E7 SH 1	UNPP, AT TOP OF STAIRS, 6 FT NW OF 2RE-8271-2 CABINET, EVEN WITH PLATFORM, 7 FT UP	CLOSED CAPPED			
WASTE GAS PANEL ROOM							
2HPA-8231B	2RE-8231-1 Inlet Master Isol	M2261 F7 SH 1	WASTE GAS PANEL ROOM, NE CORNER, ABOVE 2RE-2429, 6.5 FT FROM FLOOR	OPEN			
2HPA-53	2RE-8231-1 Inlet Test Conn	M2261 F7 SH 1	WASTE GAS PANEL ROOM, NE CORNER, ABOVE 2RE-2429, 5 FT FROM FLOOR	CLOSED CAPPED			
2HPA-50	2RE-8231-1 Outlet Test Conn	M2261 G7 SH 1	WASTE GAS PANEL ROOM, ABOVE SW CORNER OF 2RE-8231-1 CABINET, 6 FT FROM FLOOR	CLOSED CAPPED			
2HPA-1004	2RE-8231-1 O/L Test Conn	M2261 G7 SH 1	WASTE GAS PANEL ROOM, 2 FT SE OF 2RE-8231-1 CABINET, 1 FT UP	CLOSED CAPPED			

(4) Throttled to maintain desired Containment building pressure per SM/CRS direction.

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ATTACHMENT B

HYDROGEN PURGE SYSTEM VALVE LINEUP

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
2HPA-1010	2RE-8231-1 Discharge to ABHV	M2261 G7 SH 1	WASTE GAS PANEL ROOM, NEAR 2RE-8231-1 CABINET.	OPEN			
2HPA-8231A	2RE-8231-1 Outlet Master Isol	M2261 G7 SH 1	WASTE GAS PANEL ROOM, ABOVE SW CORNER OF 2RE-8231-1 CABINET, .5 FT FROM FLOOR	OPEN			
2HPA-62	2RE-8231-1B Inlet	M2261 G5 SH 2	WASTE GAS PANEL ROOM, INSIDE 2RE-8231-1 CABINET, SE CORNER, 2.5 FT UP	OPEN			
2HPA-9	2RE-8231-1A/1B Bypass	M2261 G4 SH 2	WASTE GAS PANEL ROOM, INSIDE 2RE-8231-1 CABINET, 1.5 FT UP	THROTTLED (3)			
2HPA-76	CNTMT Bldg M/U Isol	M2261 F7 SH 4	WASTE GAS PANEL ROOM, NEAR 2RE-8231-1 CABINET.	OPEN			
2HPA-74	CAMS Pump Disch/CNTMT Bldg M/U Isol	M2261 F7 SH 4	WASTE GAS PANEL ROOM, NEAR 2RE-8231-1 CABINET.	CLOSED			
2HPA-75	CNTMT Bldg M/U Throttle Valve	M2261 F7 SH 4	WASTE GAS PANEL ROOM, NEAR 2RE-8231-1 CABINET.	THROTTLED (4)			
2HPA-63	2RE-8231-1B Outlet	M2261 G5 SH 2	WASTE GAS PANEL ROOM, INSIDE 2RE-8231-1 CABINET, 6 INCHES UP	OPEN			
2HPA-11	2FIS-8231-1 Inlet	M2261 G4 SH 2	WASTE GAS PANEL ROOM, INSIDE 2RE-8231-1 CABINET, 6 INCHES UP	OPEN			
2HPA-1002	CNTMT Air Sample Supply to 2C128A Drain	M2261 F7 SH 1	WASTE GAS PANEL ROOM, SE CORNER ABOVE 2P-110, 6 FT FROM FLOOR	CLOSED CAPPED			
2HPA-1001	2C128A Sample Rtn to CNTMT Drain	M2261 G7 SH 1	WASTE GAS PANEL ROOM, SE CORNER, ABOVE 2P-110, 6 FT FROM FLOOR	CLOSED CAPPED			
SAMPLE COOLER HALLWAY BEHIND HOT LAB							
2HPA-1005	PASS CNTMT Air Sample Rtn Drain	M2261 H7 SH 3	SAMPLE COOLER HALLWAY, ABOVE 2SW-24A, 7 FT UP	CLOSED CAPPED			
2HPA-1007	PASS CNTMT Air Sample Supply Drain	M2261 G7 SH 3	SAMPLE COOLER HALLWAY, ABOVE 2SW-24A, 7 FT UP	CLOSED CAPPED			
2HPA-60	PASS CNTMT Air Sample Supply	M2261 H7 SH 3	SAMPLE COOLER HALLWAY, ABOVE 2CV-1503, 8 FT UP	CLOSED			
2HPA-61	PASS CNTMT Air Sample Return	M2261 H7 SH 3	SAMPLE COOLER HALLWAY, ABOVE 2CV-1503, 7 FT UP	CLOSED			
UNIT 2 HOT LAB -H2 ANALYZER 2C128A AREA							
2HPA-30	2C128A Sample Supply Hdr Isol	M2261 G7 SH 3	UNIT 2 HOT LAB, INSIDE H2 ANALYZER 2C128A, 3 FT UP	LOCKED OPEN			
2HPA-38	2C128A Sample Return Hdr Isol	M2261 G7 SH 3	UNIT 2 HOT LAB, INSIDE H2 ANALYZER 2C128A, 3 FT UP	LOCKED OPEN			

(3) Throttled to control sample flow between 8 and 12 SCFM on 2FIS-8231-1 when 2RITS-8231-1 in service.

(4) Throttled to maintain desired Containment building pressure per SM/CRS direction.

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HYDROGEN PURGE SYSTEM VALVE LINEUP

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
USPP							
2HPA-1	2C128A Sample Supply CNTMT Isol	M2261 F7 SH 1	USPP, SW CORNER, S WALL 6 FT UP	LOCKED OPEN			
2HPA-2	2C128A Sample Return CNTMT Isol	M2261 G7 SH 1	USPP, SW CORNER, S WALL, 4.5 FT UP	LOCKED OPEN			
2HPA-8240A	H2 Purge Return Hdr PP Isol	M2261 G6 SH 1	USPP, 3 FT NE OF CNTMT SPRAY HDR A ISOL 2CV-5612-1, 7 FT UP	LOCKED CLOSED			
2HPA-8240B	H2 Purge Return Hdr PP Isol	M2261 G6 SH 1	USPP, 3 FT NE OF CNTMT SPRAY HDR A ISOL 2CV-5612-1, 7 FT UP	LC CAPPED			
2HPA-8271C	H2 Purge Supply Hdr PP Isol	M2261 F6 SH 1	USPP, 2 FT NE OF CNTMT SPRAY HDR A ISOL 2CV-5612-1, 8.5 FT UP	LOCKED CLOSED			
2HPA-8271D	H2 Purge Supply Hdr PP Isol	M2261 F7 SH 1	USPP, 2 FT NE OF CNTMT SPRAY HDR A ISOL 2CV-5612-1, 8.5 FT UP	LC CAPPED			
2HPA-8275	H2 Purge Supply Hdr PP Isol	M2261 F7 SH 1	USPP, 1 FT W OF 2CV-5057, 8 FT UP	CLOSED CAPPED			

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ATTACHMENT C

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HYDROGEN RECOMBINER TEMPERATURE DATA SHEET

The purpose of this attachment is to provide steps to calculate a Recombiner Temperature Correction Factor AND to record Recombiner parameters during operation.

1.0 PERFORM THE FOLLOWING TO DETERMINE RECOMBINER TEMPERATURE CORRECTION FACTOR.

1.1 Calculate average CNTMT temperature by either of the following:

1.1.1 Calculate average CNTMT temperature using data from PMS OR SPDS.

$$\text{Avg CNTMT Temp} = \frac{T5605-5 + T5606-6}{2} = \frac{(\quad) + (\quad)}{2} = \quad \text{°F}$$

1.1.2 Calculate average CNTMT temperature using data obtained near each hydrogen recombinder from currently calibrated Thermistor Digital Thermometer (TDT).

Instrument Number _____

$$\text{Avg CNTMT Temp} = \frac{T @ 2M-55A + T @ 2M-55B}{2} = \frac{(\quad) + (\quad)}{2} = \quad \text{°F}$$

1.2 Determine Control Room temperature using currently calibrated Thermistor digital thermometer (TDT).

Instrument Number _____ Control Room Temp = _____ °F

1.3 Determine Recombiner Temperature Correction Factor as follows:

$$\text{Temp Corr Factor} = [\text{Avg CNTMT Temp} - \text{Control Rm Temp}] \times 0.6$$

$$\text{Temp Corr Factor} = [(\quad) - (\quad)] \times 0.6 = \quad \text{°F}$$

1.4 IF average Containment temperature _____
OR Control Room temperature varies by $\geq 10^{\circ}\text{F}$ during test,
THEN recalculate temperature correction factor.

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ATTACHMENT C

PAGE 2 OF 3

HYDROGEN RECOMBINER TEMPERATURE DATA SHEET

* 2.0 COMPLETE PAGE 3 OF THIS ATTACHMENT AS FOLLOWS:

<p style="text-align: center;"><u>NOTE</u></p> <p>2M-55B Channel 3 Temperature Detector failed. Do not use for temperature indication. (CR-ANO-2-2001-1164)</p>
--

- 2.1 IF any temperature indication is failed,
THEN N/A that column.
- 2.2 Calculate average of valid temperature indications (1, 2 OR 3 thermocouples may be used) AND record in Ave Temp column.
- 2.3 Record Temperature Correction Factor in Corr Factor column.
- 2.4 Subtract correction factor from average temperature to determine average corrected temperature.
- 2.5 Use additional copies of data sheet as necessary.

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ATTACHMENT E

HYDROGEN PURGE SYSTEM CONTAINMENT VALVE LINEUP

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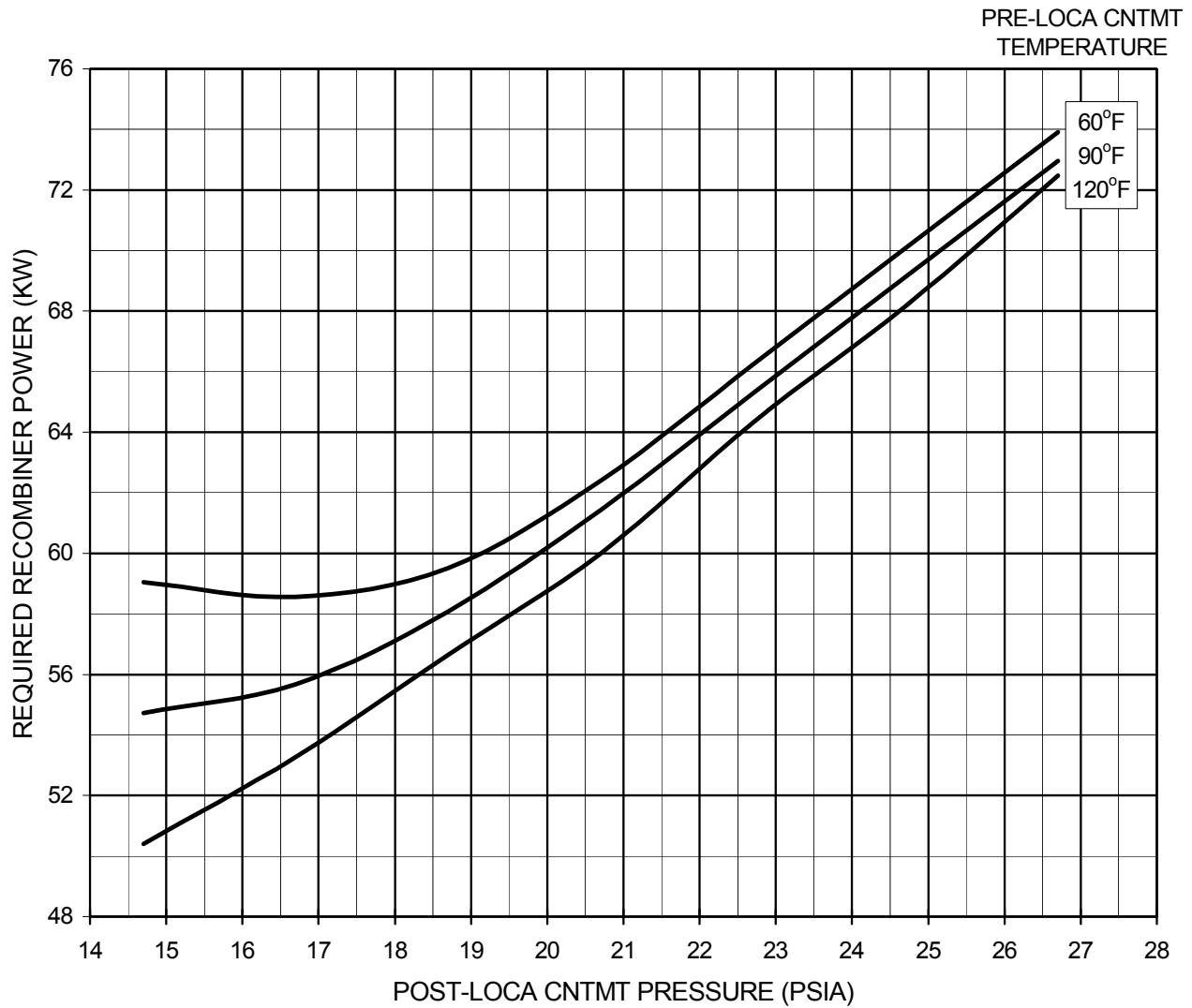
COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
CNTMT BUILDING, S PIPING PENET RM							
2HPA-8233	H2 Purge Rtn Hdr PP Isol	M2261 G6 SH 1	RB 357', S PIPING PENET AREA, BETWEEN 2P-26 & 2P-27	CLOSED			
2HPA-36	H2 Purge Supply Hdr Isol	M2261 F6 SH 1	RB 357', S PIPING PENET AREA, COMING OUT OF 2P-6, UP 25 FT	LOCKED OPEN			
2HPA-8251	H2 Purge Supply PP Isol	M2261 F6 SH 1	RB 357', S PIPING PENET AREA, COMING OUT OF 2P-6, UP 25 FT	CLOSED			
CNTMT BUILDING, N PIPING PENET RM							
2HPA-37	2C1288 Sample Supply Hdr Isol	M2261 E6 SH 1	RB 357', N PIPING PENET AREA, 4 FT OUT ON LINE OUT OF 2P-58 1 FT UP	LOCKED OPEN			
2HPA-8241	2C1288 Sample Supply Hdr PP Isol	M2261 E6 SH 1	RB 357', N PIPING PENET AREA, 3-1/2 FT OUT OF LINE FROM 2P-58, 1 FT UP	CLOSED			
2HPA-8259	2C1288 Sample Return Hdr PP Isol	M2261 F6 SH 1	RB 357', N PIPING PENET AREA, OUT FROM GUARD RAIL NEAR 2P-58	CLOSED			

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ATTACHMENT F

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RECOMBINER POWER REQUIREMENT



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EXHIBIT 1

Revised 5/9/05

2104.044

HYDROGEN ANALYZER AUTO START

PAGE 1 OF 1

1.0 IF desired to Auto Start Hydrogen Analyzer (2C128A),
THEN perform the following:

1.1 Verify CAMS Isolation valves (2SV-8278-1/8280-1) on 2C17 closed.

1.2 Open the following valves by placing in OVERRIDE:

- CNTMT Air Sample Supply (2SV-8271-2) on 2C16
- CNTMT Air Sample Return (2SV-8231-2) on 2C16
- CNTMT Air Sample Return (2CV-8233-1) on 2C17

1.3 Initiate Auto Start by placing CNTMT Air Sample Supply (2SV-8273-1) on 2C17 in OVERRIDE.

1.4 Check 2C128A Containment Air Sample Return flow \geq 0.220 SCFM on 2FI-8375 (2C182A).

2.0 IF desired to Auto Start Hydrogen Analyzer (2C128B),
THEN perform the following:

2.1 Verify CAMS Isolation valves (2SV-8262-2/8260-2) on 2C16 closed.

2.2 Open the following valves by placing in OVERRIDE:

- CNTMT Air Sample Return (2SV-8261-2) on 2C16
- CNTMT Air Sample Supply (2SV-8265-1) on 2C17
- CNTMT Air Sample Return (2SV-8259-1) on 2C17

2.3 Initiate Auto Start by placing CNTMT Air Sample Supply (2SV-8263-2) on 2C16 in OVERRIDE.

2.4 Check 2C128B Containment Air Sample Return flow \geq 0.282 SCFM on 2FI-8385 (2C182A).

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SUPPLEMENT 3

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HYDROGEN RECOMBINER 2M-55A OPERATIONAL TEST

This supplement is performed to verify operability of Hydrogen Recombiner (2M-55A).

1.0 INITIAL CONDITIONS

1.1 IF test performed during reactor shutdown conditions,
THEN perform the following:

- Inspect power supply cabinet for structural integrity. _____
- Inspect heater unit for structural integrity. _____
- Verify no flammable materials located near heater unit. _____
- Verify heater unit airflow louvers NOT obstructed. _____
- Take precautions to prevent personnel injury around heater unit (warning signs, rope barrier, etc.). _____

2.0 TEST METHOD

2.1 Verify 2M-55A Main Circuit breaker (2B-533) closed. _____

2.2 Check Power Available light (2B533) on Control Panel (2C182) illuminated. _____

2.3 Verify Power Adjust potentiometer (2POTR-6890) on Control Panel (2C182) set at zero (000). _____

2.4 Close Power Out switch on control panel (2C182). _____

2.5 Determine Recombiner temperature correction factor using Attachment C of this procedure. _____

NOTE

Start time is from moment potentiometer is manipulated.

2.6 Perform the following:

2.6.1 Record start time in Step 3.1 and 3.3. _____

2.6.2 Turn 2POTR-6890 clockwise until 48 KW indicated on wattmeter 2WI-6892. _____

* 2.6.3 Maintain 47 to 49 KW on 2WI-6892 using 2POTR-6890 on 2C182 until commencement of step 2.10.

2.7 Commence recording data on Attachment C every 15 minutes. _____

* 2.8 IF 1400°F is exceeded on any operable thermocouple (2TI-6888) on 2C182,
THEN stop test AND investigate cause.

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SUPPLEMENT 3

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- 2.9 Record time corrected average temperature $\geq 700^{\circ}\text{F}$ in steps 3.1 and 3.2. _____
- 2.10 WHEN corrected average temperature is $\geq 1200^{\circ}\text{F}$,
THEN perform the following:
- 2.10.1 Record time in Steps 3.3 and 3.4. _____
- 2.10.2 Adjust 2POTR-6890 to maintain temperature between 1200°F to 1350°F (2TI-6888). _____
- 2.11 WHEN Recombiner corrected average temperature has been maintained $\geq 700^{\circ}\text{F}$ for at least 2 hours,
THEN record time in step 3.2. _____
- 2.12 WHEN Recombiner corrected average temperature has been maintained $\geq 1200^{\circ}\text{F}$ for at least 4 hours,
THEN record time in step 3.4. _____
- 2.13 WHEN Recombiner temperature has stabilized $\geq 1200^{\circ}\text{F}$,
THEN check temperature variations between channels $\leq 50^{\circ}\text{F}$ (2TI-6888). _____
- 2.14 IF temperature variation between channels greater than 50°F (2TI-6888),
THEN submit WR/VO. _____
- 2.15 Turn 2POTR-6890 to obtain Recombiner power $\geq 60\text{ KW}$ (2WI-6892). _____
- 2.16 Return 2POTR-6890 to zero (ØØØ). _____
- 2.17 Place Power Out switch to OFF. _____
- 2.18 Open Main Power Circuit breaker (2B-533) on load center. _____
- 2.19 Attach Attachment C to this supplement. _____

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SUPPLEMENT 3

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3.0 TEST ACCEPTANCE CRITERIA

3.1 Hydrogen Recombiner 2M-55A obtains a corrected average sheath temperature $\geq 700^{\circ}\text{F}$ within 90 minutes.

Start Time (step 2.6)	Time $\geq 700^{\circ}\text{F}$ (step 2.9)	Total Time to Obtain $\geq 700^{\circ}\text{F}$ (step 2.9-step 2.6.1) minutes	LIMITING RANGE FOR OPERABILITY $\geq 700^{\circ}\text{F}$ within 90 minutes	IS DATA WITHIN LIMITING RANGE? YES NO

3.2 Hydrogen Recombiner 2M-55A maintains $\geq 700^{\circ}\text{F}$ for at least 2 hours.

Time $\geq 700^{\circ}\text{F}$ (step 2.9)	End Time $\geq 700^{\circ}\text{F}$ (step 2.11)	Total Time $\geq 700^{\circ}\text{F}$ (step 2.11-step 2.9) minutes	LIMITING RANGE FOR OPERABILITY $> 700^{\circ}\text{F}$ for at least 2 hours	IS DATA WITHIN LIMITING RANGE? YES NO

3.3 Hydrogen Recombiner 2M-55A obtains a corrected average sheath temperature $\geq 1200^{\circ}\text{F}$ within 5 hours.

Start Time (step 2.6)	Time $\geq 1200^{\circ}\text{F}$ (step 2.10.1)	Total Time to Obtain $\geq 1200^{\circ}\text{F}$ (step 2.10.1-step 2.6.1) minutes	LIMITING RANGE FOR OPERABILITY $\geq 1200^{\circ}\text{F}$ within 5 hours	IS DATA WITHIN LIMITING RANGE? YES NO

3.4 Hydrogen Recombiner 2M-55A maintains $\geq 1200^{\circ}\text{F}$ for at least 4 hours.

Time $\geq 1200^{\circ}\text{F}$ (step 2.10.1)	End Time $\geq 1200^{\circ}\text{F}$ (step 2.12)	Total Time $\geq 1200^{\circ}\text{F}$ (step 2.12-step 2.10.1) minutes	LIMITING RANGE FOR OPERABILITY $> 1200^{\circ}\text{F}$ for at least 4 hours	IS DATA WITHIN LIMITING RANGE? YES NO

3.5 Is maximum power output ≥ 60 KW? _____

3.6 IF NO is circled above,
THEN perform following:

- Notify Shift Manager. _____
- Declare Hydrogen Recombiner (2M-55A) inoperable. _____
- Initiate Condition Report. _____
- Initiate WR/WO as applicable. _____

Comments _____

Performed By _____ Date _____

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SUPPLEMENT 3

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4.0 SUPERVISOR REVIEW AND ANALYSIS

- | | | | |
|-----|--|-------|----|
| 4.1 | Do all measured values recorded in Section 3.0 fall within specified LIMITING RANGE FOR OPERABILITY? | YES | NO |
| 4.2 | Has this equipment been proven operable per ACCEPTANCE CRITERIA? | YES | NO |
| 4.3 | <u>IF</u> NO is answered to 4.1 or 4.2,
<u>THEN</u> verify Condition Report initiated. | _____ | |

Comments _____

- | | | | |
|-----|---|-----|----|
| 4.4 | Are all administrative requirements of this test satisfied? | YES | NO |
|-----|---|-----|----|

Supervisor _____ Date _____

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SUPPLEMENT 4

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HYDROGEN RECOMBINER 2M-55B OPERATIONAL TEST

This supplement is performed to verify operability of Hydrogen Recombiner (2M-55B).

1.0 INITIAL CONDITIONS

1.1 IF test performed during reactor shutdown conditions,
THEN perform the following:

- Inspect power supply cabinet for structural integrity. _____
- Inspect heater unit for structural integrity. _____
- Verify no flammable materials located near heater unit. _____
- Verify heater unit airflow louvers NOT obstructed. _____
- Take precautions to prevent personnel injury around heater unit (warning signs, rope barrier, etc.). _____

2.0 TEST METHOD

2.1 Verify 2M-55B Main Circuit breaker (2B-633) closed. _____

2.2 Check Power Available light (2B633) on Control Panel (2C184) illuminated. _____

2.3 Verify Power Adjust potentiometer (2POTR-6891) on Control Panel (2C184) set at zero (000). _____

2.4 Close Power Out switch on control panel (2C184). _____

2.5 Determine Recombiner temperature correction factor using Attachment C of this procedure. _____

NOTE

Start time is from moment potentiometer is manipulated.

2.6 Perform the following: _____

2.6.1 Record start time in Step 3.1 and 3.3. _____

2.6.2 Turn 2POTR-6891 clockwise until 48 KW indicated on wattmeter 2WI-6893. _____

* 2.6.3 Maintain 47 to 49 KW on 2WI-6893 using 2POTR-6890 on 2C184 until commencement of step 2.10. _____

2.7 Commence recording data on Attachment C every 15 minutes. _____

* 2.8 IF 1400°F is exceeded on any operable thermocouple (2TI-6889) on 2C184,
THEN stop test AND investigate cause.

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SUPPLEMENT 4

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- 2.9 Record time corrected average temperature $\geq 700^{\circ}\text{F}$ in steps 3.1 AND 3.2. _____
- 2.10 WHEN corrected average temperature is $\geq 1200^{\circ}\text{F}$,
THEN perform the following: _____
- 2.10.1 Record time in Steps 3.3 AND 3.4. _____
- 2.10.2 Adjust 2POTR-6891 to maintain temperature
between 1200°F to 1350°F (2TI-6889). _____
- 2.11 WHEN Recombiner corrected average temperature has been
maintained $\geq 700^{\circ}\text{F}$ for at least 2 hours,
THEN record time in step 3.2. _____
- 2.12 WHEN Recombiner corrected average temperature has been
maintained $\geq 1200^{\circ}\text{F}$ for at least 4 hours,
THEN record time in step 3.4. _____
- 2.13 WHEN Recombiner temperature has stabilized $\geq 1200^{\circ}\text{F}$,
THEN check temperature variations between channels
 $\leq 50^{\circ}\text{F}$ (2TI-6889). _____
- 2.14 IF temperature variation between channels greater
than 50°F (2TI-6889),
THEN submit WR/VO. _____
- 2.15 Turn 2POTR-6891 to obtain Recombiner power
 $\geq 60\text{ KW}$ (2WI-6893). _____
- 2.16 Return 2POTR-6891 to zero (ØØØ). _____
- 2.17 Place Power Out switch to OFF. _____
- 2.18 Open Main Power Circuit breaker (2B-633) on load center. _____
- 2.19 Attach Attachment C to this supplement. _____

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SUPPLEMENT 4

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3.0 TEST ACCEPTANCE CRITERIA

3.1 Hydrogen Recombiner 2M-55B obtains a corrected average sheath temperature $\geq 700^{\circ}\text{F}$ within 90 minutes.

Start Time (step 2.6)	Time $\geq 700^{\circ}\text{F}$ (step 2.9)	Total Time to Obtain $\geq 700^{\circ}\text{F}$ (step 2.9-step 2.6.1) minutes	LIMITING RANGE FOR OPERABILITY $\geq 700^{\circ}\text{F}$ within 90 minutes	IS DATA WITHIN LIMITING RANGE? YES NO

3.2 Hydrogen Recombiner 2M-55B maintains $\geq 700^{\circ}\text{F}$ for at least 2 hours.

Time $\geq 700^{\circ}\text{F}$ (step 2.9)	End Time $\geq 700^{\circ}\text{F}$ (step 2.11)	Total Time $\geq 700^{\circ}\text{F}$ (step 2.11-step 2.9) minutes	LIMITING RANGE FOR OPERABILITY > 700°F for at least 2 hours	IS DATA WITHIN LIMITING RANGE? YES NO

3.3 Hydrogen Recombiner 2M-55B obtains a corrected average sheath temperature $\geq 1200^{\circ}\text{F}$ within 5 hours.

Start Time (step 2.6)	Time $\geq 1200^{\circ}\text{F}$ (step 2.10.1)	Total Time to Obtain $\geq 1200^{\circ}\text{F}$ (step 2.10.1-step 2.6.1) minutes	LIMITING RANGE FOR OPERABILITY $\geq 1200^{\circ}\text{F}$ within 5 hours	IS DATA WITHIN LIMITING RANGE? YES NO

3.4 Hydrogen Recombiner 2M-55B maintains $\geq 1200^{\circ}\text{F}$ for at least 4 hours.

Time $\geq 1200^{\circ}\text{F}$ (step 2.10.1)	End Time $\geq 1200^{\circ}\text{F}$ (step 2.12)	Total Time $\geq 1200^{\circ}\text{F}$ (step 2.12-step 2.10.1) minutes	LIMITING RANGE FOR OPERABILITY > 1200°F for at least 4 hours	IS DATA WITHIN LIMITING RANGE? YES NO

3.5 Is maximum power output ≥ 60 KW? YES NO

3.6 IF NO is circled above,
THEN perform following:

- Notify Shift Manager.
- Declare Hydrogen Recombiner (2M-55B) inoperable.
- Initiate Condition Report.
- Initiate WR/WO as applicable.

Comments

Performed By _____ Date _____

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4.0 SUPERVISOR REVIEW AND ANALYSIS

- | | | | |
|-----|--|-----|-------|
| 4.1 | Do all measured values recorded in Section 3.0 fall within specified LIMITING RANGE FOR OPERABILITY? | YES | NO |
| 4.2 | Has this equipment been proven operable per ACCEPTANCE CRITERIA? | YES | NO |
| 4.3 | <u>IF</u> NO is answered to 4.1 or 4.2,
<u>THEN</u> verify Condition Report initiated. | | _____ |

Comments _____

- | | | | |
|-----|---|-----|----|
| 4.4 | Are all administrative requirements of this test satisfied? | YES | NO |
|-----|---|-----|----|

Supervisor _____ Date _____

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SUPPLEMENT 6

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HYDROGEN ANALYZER 2C128A FUNCTIONAL TEST

The purpose of this Supplement is to perform a functional test of Hydrogen Analyzer 2C128A. This test verifies that Analyzer will start AND obtain required flow rate to assure a representative sample of Containment Hydrogen within time requirements stated in NUREG 0737 (90 minutes). **NRC Commitment P16180.**

1.0 INITIAL CONDITIONS

- Verify CNTMT Sump Level Monitor 2LIS-5641-2 operable. _____
- Hydrogen Analyzer System aligned per Attachment A of this procedure. _____
- Hydrogen Purge System aligned per Attachment B of this procedure. _____
- Hydrogen Purge System aligned per Attachment E of this procedure. _____
- Hydrogen Analyzer (2C128B) NOT in operation. _____
- Loop 1 Service Water in operation. _____

2.0 TEST METHOD

2.1 Perform the following TS/TRM entries:

- IF in modes 1-4,
THEN enter TS 3.4.6.1, Leakage Detection Systems. _____
- IF in modes 1-2,
THEN enter TRM 3.6.4.1, Hydrogen Analyzers. _____

2.2 IF CAMS unit 2RE-8231-1 aligned for CNTMT oxygen control,
THEN perform the following:

- 2.2.1 Open CAMS Pump Disch/CNTMT Bldg M/U Isol (2HPA-74). _____
- 2.2.2 Close 2RE-8231-1 Discharge to ABHV (2HPA-1010). _____
- 2.2.3 Close CNTMT Bldg M/U Isol (2HPA-76). _____

2.3 Verify the following on 2C25 for Radiation Monitor 2RE-8231-1:

- Sample pump (2C-47) in STOP. _____
- CAMs Paper Drive switch in OFF. _____

2.4 Verify the following on 2C25 for Radiation Monitor 2RE-8271-2:

- Sample pump (2C-48) in STOP. _____
- CAMs Paper Drive switch in OFF. _____

2.5 Verify 2RE-8231-1 Isolations (2SV-8278-1/8280-1) closed on 2C17. _____

2.6 Verify 2RE-8271-2 Isolations (2SV-8262-2/8260-2) closed on 2C16. _____

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SUPPLEMENT 6

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2.7 Verify the following valves open:

- CNTMT Air Sample Supply (2SV-8271-2) on 2C16 _____
- CNTMT Air Sample Return (2SV-8231-2) on 2C16 _____
- CNTMT Air Sample Supply (2SV-8273-1) on 2C17 _____
- CNTMT Air Sample Return (2SV-8233-1) on 2C17 _____

NOTE

2C128A Inlet AND Outlet valve indication is provided on 2C182 by a single red light. This light indicates circuit is energized to open these valves. Actual valve position does NOT provide this indication.

2.8 Verify the following prior to Auto Start:

- 2C128A Isolations (2SV-8234-1/8230-1) closed on 2C182 as indicated by 2HS-8276-1 red light NOT lit. _____
- 2C128A Sample pump (2P-162) on 2C182 in OFF. _____
- 2C128A Primary Sample valve (2SV-8345-1) on 2C33 closed. _____
- PASS Gas Sample Supply Line (2HS-5953-1) on 2C17 in CLOSE. _____

NOTE

In Modes 1-4, 2SV-8273-1 may be placed in OVERRIDE under Administrative Control. A dedicated Operator must be designated to be available to remove this handswitch from OVERRIDE. No TS entry is required. Refer to Conduct of Operations (1015.001).

2.9 Auto Start 2C128A by performing the following:

- 2.9.1 Verify Containment Penetration Administrative Controls in effect. _____
- 2.9.2 Place CNTMT Air Sample Supply valve (2SV-8273-1) on 2C17 in OVERRIDE. _____

2.10 Perform the following:

- Check CTMT H2 PURGE OVERRIDDEN (2K06-D7) alarms. _____
- Verify 2C128A Primary Sample (2SV-8345-1) open on 2C33. _____
- Verify 2C128A Sample pump (2P-162) starts on 2C182. _____
- Verify 2C128A Isolations (2SV-8234-1/8230-1) open as indicated by 2HS-8276-1 (2C182) red light energized. _____

2.11 WHEN Hydrogen Analyzer has been in operation \geq 5 minutes, THEN record system flow on 2FI-8375 at 2C182A in Section 3.0. _____

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2.12 Perform the following locally at 2C128A:

- | | | |
|--------|---|-------|
| 2.12.1 | Remove lead seal from front cabinet door. | _____ |
| 2.12.2 | Record detector sample flow on 2FIS-8365.
_____ SCFH | _____ |
| 2.12.3 | <u>IF</u> sample flow < 0.3 SCFH,
<u>THEN</u> Notify SM. | _____ |
| 2.12.4 | Record as left sample flow on 2FIS-8365 in
Section 3.0. | _____ |
| 2.12.5 | Record sample pressure on 2PI-8372 in Section 3.0. | _____ |

NOTE

2HPA-40 is open when its toggle handle is perpendicular to the panel on which it is operated. 2HPA-40 is closed when its toggle handle is parallel to the panel on which it is operated.

- | | | | |
|--------|---|-------|-------|
| 2.12.6 | Perform verification AND concurrent
verification of the following: | Verif | CV |
| | • 2HPA-40 open | _____ | _____ |
| | • 2HPA-46 open | _____ | _____ |
| | • 2C128A range selector switch NOT OFF | _____ | _____ |
| | • 2C128A door locked closed with seal | _____ | _____ |

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- 2.13 Perform the following to test low flow alarm:
- 2.13.1 Open 2C128A CNTMT Air Sample Return 2FE-8375 Bypass (2HPA-51) to cause 2K424 (in 2C33) AND 2K10-C6 to alarm. _____
- 2.13.2 IF 2K424 and 2K10-C6 do NOT alarm,
THEN perform the following:
- A. Unlock AND throttle closed 2C128A CNTMT Air Sample Return 2FE-8375 Outlet (2HPA-66) until alarms annunciate. _____
- B. Lock open 2HPA-66. _____
- C. Independently verify 2HPA-66 locked open. _____
- 2.13.3 Close 2HPA-51. _____
- 2.14 WHEN desired to secure 2C128A,
THEN place CNTMT Air Sample Supply (2SV-8273-1) to OPEN. _____
- 2.14.1 Independently verify 2SV-8273-1 in OPEN. _____
- 2.15 Perform the following:
- Check CTMT H2 PURGE OVERRIDDEN (2K06-D7) alarm clear. _____
 - Verify 2C128A Sample pump (2P-162) stopped. _____
 - Verify 2C128A Primary Sample (2SV-8345-1) closed. _____
 - Verify 2C128A Isolations (2SV-8234-1/8230-1) closed as indicated by 2HS-8276-1 red light NOT lit. _____
- 2.16 Verify desired sample point selected on Hydrogen Purge Manifold Position switch (2HS-8337). _____

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SUPPLEMENT 6

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2.17 Re-align CAMS unit for normal operation as follows:

2.17.1 Open 2RE-8231-1 Isolations (2SV-8278-1/8280-1). _____

2.17.2 Open 2RE-8271-2 Isolations (2SV-8262-2/8260-2). _____

2.17.3 IF in modes 1-4,
THEN perform the following:

A. Place CAMS 2RE-8231-1 OR 2RE-8271-2
in service using
Containment Atmosphere Control (2104.033). _____

B. Exit TS/TRM entered previously. _____

2.17.4 Perform EITHER of the following: _____

- Align 2RE-8231-1 for CNTMT Oxygen Control using Aligning Either CAMS for Oxygen Control in Containment section of 2104.033, Containment Atmosphere Control.
- Update Status Board to present alignment.

3.0 TEST ACCEPTANCE CRITERIA

3.1 Record values AND compare with Limiting Range for operability. _____

TEST QUANTITY	INSTRUMENT	MEASURED VALUE	NORMAL RANGE	LIMITING RANGE FOR OPERABILITY	IS DATA IN LIMITING RANGE?
System Flow	2FI-8375	scfm	> 0.220 scfm	> 0.220 scfm	YES NO
Sample Flow	2FIS-8365	scfh	≥ 0.3 scfh	≥ 0.3 scfh	YES NO
Sample Pressure	2PI-8372	psig	1 to 5 psig	< 10 psig	YES NO

3.2 IF NO is circled above,
THEN perform the following:

- Notify Shift Manager. _____
- Declare 2C128A inoperable. _____
- Refer to TRM 3.6.4.1. _____
- Initiate WR/WO as applicable. _____

Comments _____

Performed By _____ Date _____

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SUPPLEMENT 6

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4.0 SUPERVISOR REVIEW AND ANALYSIS

- | | | | |
|-----|--|-------|-------|
| 4.1 | Do all values recorded in Section 3.0 fall in specified LIMITING RANGE FOR OPERABILITY? | YES | NO |
| 4.2 | Do all values recorded in Section 3.0 fall in NORMAL RANGE? | YES | NO |
| 4.3 | <u>IF</u> NO is answered to 4.1,
<u>THEN</u> perform the following corrective actions: <ul style="list-style-type: none"> • Verify LCO Tracking Record completed per Conduct of Operations (1015.001). • Verify Condition Report initiated. | _____ | _____ |
| 4.4 | <u>IF</u> NO is answered to 4.2,
<u>THEN</u> verify WR/WO has been initiated. | _____ | _____ |

Comments

- | | | | |
|-----|---|-----|----|
| 4.5 | Are all administrative requirements of this test satisfied? | YES | NO |
|-----|---|-----|----|

Supervisor _____ Date _____

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SUPPLEMENT 7

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HYDROGEN ANALYZER 2C128B FUNCTIONAL TEST

The purpose of this Supplement is to perform a functional test of Hydrogen Analyzer 2C128B. This test verifies that Analyzer will start AND obtain required flow rate to assure a representative sample of Containment Hydrogen within time requirements stated in NUREG 0737 (90 minutes). **NRC Commitment P16180.**

1.0 INITIAL CONDITIONS

- Verify CNTMT Sump Level Monitor 2LIS-5641-2 operable. _____
- Hydrogen Analyzer System aligned per Attachment A of this procedure. _____
- Hydrogen Purge System aligned per Attachment B of this procedure. _____
- Hydrogen Purge System aligned per Attachment E of this procedure. _____
- Hydrogen Analyzer (2C128A) NOT in operation. _____
- Loop 2 Service Water in operation. _____

2.0 TEST METHOD

2.1 Perform the following TS/TRM entries:

- IF in modes 1-4,
THEN enter TS 3.4.6.1, Leakage Detection Systems. _____
- IF in modes 1-2,
THEN enter TRM 3.6.4.1, Hydrogen Analyzers. _____

2.2 IF CAMS unit 2RE-8271-2 aligned for CNTMT oxygen control,
THEN perform the following:

- 2.2.1 Open CAMS Pump Disch/CNTMT Bldg M/U Isol (2HPA-77). _____
- 2.2.2 Close 2RE-8271-2 Discharge to ABHV (2HPA-1011). _____
- 2.2.3 Close CNTMT Bldg M/U Isol (2HPA-79). _____

2.3 Verify the following on 2C25 for Radiation Monitor 2RE-8231-1:

- Sample pump (2C-47) in STOP. _____
- CAMs Paper Drive switch in OFF. _____

2.4 Verify the following on 2C25 for Radiation Monitor 2RE-8271-2:

- Sample pump (2C-48) in STOP. _____
- CAMs Paper Drive switch in OFF. _____

2.5 Verify 2RE-8231-1 Isolations (2SV-8278-1/8280-1) closed on 2C17. _____

2.6 Verify 2RE-8271-2 Isolations (2SV-8262-2/8260-2) closed on 2C16. _____

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2.7 Verify the following valves open:

- CNTMT Air Sample Return (2SV-8261-2) _____
- CNTMT Air Sample Supply (2SV-8263-2) _____
- CNTMT Air Sample Supply (2SV-8265-1) _____
- CNTMT Air Sample Return (2SV-8259-1) _____

NOTE

2C128B Inlet AND Outlet valve indication is provided on 2C184 by a single red light. This light indicates circuit is energized to open these valves. Actual valve position does NOT provide this indication.

2.8 Verify the following prior to Auto Start:

- 2C128B Isolations (2SV-8266-2/8264-2) closed on 2C184 closed as indicated by 2HS-8266-2 red light NOT lit. _____
- 2C128B Sample pump (2P-163) on 2C184 in OFF. _____
- 2C128B Primary Sample valve (2SV-8346-2) on 2C33 closed. _____

NOTE

In Modes 1-4, 2SV-8263-2 may be placed in OVERRIDE under Administrative Control. A dedicated Operator must be designated to be available to remove this handswitch from OVERRIDE. No TS entry is required. Refer to Conduct of Operations (1015.001).

2.9 Auto Start 2C128B by performing the following:

- 2.9.1 Verify Containment Penetration Administrative Controls in effect. _____
- 2.9.2 Place CNTMT Air Sample Supply valve (2SV-8263-2) on 2C17 in OVERRIDE. _____

2.10 Perform the following:

- Check CTMT H2 PURGE OVERRIDDEN (2K05-D7) alarms. _____
- Verify 2C128B Primary Sample (2SV-8346-2) open on 2C33. _____
- Verify 2C128B Sample pump (2P-163) starts on 2C184. _____
- Verify 2C128B Isolations (2SV-8266-2/8264-2) open as indicated by 2HS-8266-2 (2C184) red light energized. _____

2.11 WHEN Hydrogen Analyzer has been in operation \geq 5 minutes, THEN record system flow on 2FI-8385 at 2C182A in Section 3.0. _____

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2.12 Perform the following locally at 2C128B:

- | | | |
|--------|---|-------|
| 2.12.1 | Remove lead seal from front cabinet door. | _____ |
| 2.12.2 | Record detector sample flow on 2FIS-8381.
_____ SCFH | _____ |
| 2.12.3 | <u>IF</u> sample flow < 0.3 SCFH,
<u>THEN</u> Notify SM. | _____ |
| 2.12.4 | Record as left sample flow on 2FIS-8381 in
Section 3.0. | _____ |
| 2.12.5 | Record sample pressure on 2PI-8388 in Section 3.0. | _____ |

NOTE

2HPA-41 is open when its toggle handle is perpendicular to the panel on which it is operated. 2HPA-41 is closed when its toggle handle is parallel to the panel on which it is operated.

- | | | | |
|--------|---|-------|-------|
| 2.12.6 | Perform verification AND concurrent
verification of the following: | Verif | CV |
| | • 2HPA-41 open | _____ | _____ |
| | • 2HPA-47 open | _____ | _____ |
| | • 2C128B range selector switch NOT OFF | _____ | _____ |
| | • 2C128B door locked closed with seal | _____ | _____ |

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SUPPLEMENT 7

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- 2.13 Perform the following to test low flow alarm:
- 2.13.1 Open 2C128B CNTMT Air Sample Return 2FE-8385 Bypass (2HPA-52) to cause 2K424 (in 2C33) AND 2K10-C7 to alarm. _____
- 2.13.2 IF 2K424 AND 2K10-C7 do NOT alarm,
THEN perform the following:
- A. Unlock AND throttle closed 2C128B CNTMT Air Sample Return 2FE-8385 Outlet (2HPA-70) until alarms annunciate. _____
- B. Lock open 2HPA-70. _____
- C. Independently verify 2HPA-70 locked open. _____
- 2.13.3 Close 2HPA-52. _____
- 2.14 WHEN desired to secure 2C128B,
THEN place CNTMT Air Sample Supply (2SV-8263-2) to OPEN. _____
- 2.14.1 Independently verify 2SV-8263-2 in OPEN. _____
- 2.15 Perform the following:
- Check CTMT H2 PURGE OVERRIDDEN (2K05-D7) alarm clear. _____
 - Verify 2C128B Sample pump (2P-163) stopped. _____
 - Verify 2C128B Primary Sample (2SV-8346-2) closed. _____
 - Verify 2C128B Isolations (2SV-8266-2/8264-2) closed as indicated by 2HS-8266-2 red light NOT lit. _____
- 2.16 Verify desired sample point selected on Hydrogen Purge Manifold Position switch (2HS-8337). _____

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2.17 Re-align CAMS unit for normal operation as follows:

2.17.1 Open 2RE-8231-1 Isolations (2SV-8278-1/8280-1). _____

2.17.2 Open 2RE-8271-2 Isolations (2SV-8262-2/8260-2). _____

2.17.3 IF in modes 1-4,
THEN perform the following:

A. Place CAMS 2RE-8231-1 OR 2RE-8271-2
in service using
Containment Atmosphere Control (2104.033). _____

B. Exit TS/TRM entered previously. _____

2.17.4 Perform EITHER of the following: _____

- Align 2RE-8271-2 for CNTMT Oxygen Control using Aligning Either CAMS for Oxygen Control in Containment section of 2104.033, Containment Atmosphere Control.
- Update Status Board to present alignment.

3.0 TEST ACCEPTANCE CRITERIA

3.1 Record values AND compare with Limiting Range for operability. _____

TEST QUANTITY	INSTRUMENT	MEASURED VALUE	NORMAL RANGE	LIMITING RANGE FOR OPERABILITY	IS DATA IN LIMITING RANGE?
System Flow	2FI-8385	scfm	> 0.282 scfm	> 0.282 scfm	YES NO
Sample Flow	2FIS-8381	scfh	≥ 0.3 scfh	≥ 0.3 scfh	YES NO
Sample Pressure	2PI-8388	psig	1 to 5 psig	< 10 psig	YES NO

3.2 IF NO is circled above,
THEN perform the following:

- Notify Shift Manager. _____
- Declare 2C128B inoperable. _____
- Refer to TRM 3.6.4.1. _____
- Initiate WR/WO as applicable. _____

Comments _____

Performed By _____ Date _____

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4.0 SUPERVISOR REVIEW AND ANALYSIS

- | | | | |
|-----|--|-------|-------|
| 4.1 | Do all values recorded in Section 3.0 fall in specified LIMITING RANGE FOR OPERABILITY? | YES | NO |
| 4.2 | Do all values recorded in Section 3.0 fall in NORMAL RANGE? | YES | NO |
| 4.3 | <p><u>IF</u> NO is answered to 4.1,
<u>THEN</u> perform the following corrective actions:</p> <ul style="list-style-type: none"> • Verify LCO Tracking Record completed per Conduct of Operations (1015.001). • Verify Condition Report initiated. | _____ | _____ |
| 4.4 | <u>IF</u> NO is answered to 4.2,
<u>THEN</u> verify WR/WO has been initiated. | _____ | _____ |

Comments

- 4.5 Are all administrative requirements of this test satisfied? YES NO

Supervisor _____ Date _____

JOB PERFORMANCE MEASUREUNIT: 2 REV #: 009 DATE: _____SYSTEM/DUTY AREA: Hydrogen Recombiner and Purge SystemTASK: Start Up a Hydrogen Analyzer (2C128B manual start).JTA#: ANO2ROCONH2NORM3KA VALUE RO: 3.1 SRO: 3.3 KA REFERENCE: 028 A4.03APPROVED FOR ADMINISTRATION TO: RO: X SRO: XTASK LOCATION: INSIDE CR: X OUTSIDE CR: _____ BOTH: _____

SUGGESTED TESTING ENVIRONMENT AND METHOD (PERFORM OR SIMULATE):

PLANT SITE: _____ SIMULATOR: Perform LAB: _____

POSITION EVALUATED: RO: _____ SRO: _____

ACTUAL TESTING ENVIRONMENT: SIMULATOR: _____ PLANT SITE: _____ LAB: _____

TESTING METHOD: SIMULATE: _____ PERFORM: _____

APPROXIMATE COMPLETION TIME IN MINUTES: 15 MinutesREFERENCE(S): OP-2104.044 Rev. 29-00-0

EXAMINEE'S NAME: _____ SSN: _____

EVALUATOR'S NAME: _____

THE EXAMINEE'S PERFORMANCE WAS EVALUATED AGAINST THE STANDARDS CONTAINED IN THIS JPM AND IS DETERMINED TO BE:

SATISFACTORY: _____ UNSATISFACTORY: _____

PERFORMANCE CHECKLIST COMMENTS:

Start Time	Stop Time	Total Time
_____	_____	_____

SIGNED: _____ DATE: _____

SIGNATURE INDICATES THIS JPM HAS BEEN COMPARED TO ITS APPLICABLE PROCEDURE BY A QUALIFIED INDIVIDUAL (NOT THE EXAMINEE) AND IS CURRENT WITH THAT REVISION.

JOB PERFORMANCE MEASURE**THE EXAMINER SHALL REVIEW THE FOLLOWING WITH THE EXAMINEE:**

The examiner shall review the "Briefing Checklist - System Walkthrough" portion of 1064.023 Attachment 6 with the examinee.

JPM INITIAL TASK CONDITIONS:

The hydrogen analyzer system is aligned using OP 2104.044 Attachment "A".

Service water is available.

Containment building recirculation fans are in operation.

Power is available to the analyzers.

CAMS unit 2RE-8271-2 is NOT aligned for containment building oxygen control.

CIAS or SIAS is not present.

TASK STANDARD:

Hydrogen Analyzer (2C128B) is in service.

TASK PERFORMANCE AIDS:

OP 2104.044 Section 7.5

SIMULATOR SETUP:

Ensure that 2RE8231 is in service and in modes 1-4.

EXAMINER'S NOTES:

JOB PERFORMANCE MEASURE**INITIATING CUE:**

The CRS directs, Place Hydrogen Analyzer (2C128B) in service manually per OP 2104.044 section 7.5.

CRITICAL ELEMENTS (C): 5, 6, 7, 8, 9, 10, 12, 13, 14, 15, 16

START TIME: _____

PERFORMANCE CHECKLIST			STANDARDS	(Circle One)
<u>Examiner's note:</u> This JPM can be given in the simulator or in the control room. If given in the control room then provide the component position cues as required.				
	1. (Step 7.5.1)	Verify CIAS and SIAS not actuated.	Verified per initial conditions that CIAS and SIAS are not actuated.	N/A SAT UNSAT
	2. (Step 7.5.2)	Verify 2RE8271-2 Not aligned for containment oxygen control.	Verified per initial conditions that 2RE8271-2 is NOT aligned for containment oxygen control.	N/A SAT UNSAT
	3. (Step 7.5.3)	Verify CAMS Unit 2RE-8231-1 in service. Examiner's cue: "pump on" alarm light OFF. "low flow" alarm light OFF. "filter not in motion" alarm light OFF.	On panel 2C25, observed "pump on", "low flow" and "filter not in motion" alarm lights OFF for 2RE8231-1.	N/A SAT UNSAT
	4. (Step 7.5.4)	Stop Radiation Monitor 2RE-8271-2 Sample Pump (2C-48). Examiner's Cue: "Pump On" light OFF "Low Flow" light ON	On panel 2C25, placed handswitch for 2RE-8271-2 sample pump in STOP. Observed "Pump On" light OFF; "Low Flow" light ON.	N/A SAT UNSAT
(C)	5. (Step 7.5.5)	Close CAMS Isolation Supply and Return valves. Examiner's Cue: 2SV-8262-2/8260-2 has green light ON; red light OFF	On panel 2C16, placed handswitch for CAMS Isolation 2SV-8262-2/8260-2 in CLOSE. Observed green light ON; red light OFF over handswitch for 2SV-8262-2/8260-2.	N/A SAT UNSAT

JOB PERFORMANCE MEASURE

PERFORMANCE CHECKLIST			STANDARDS	(Circle One)
(C)	6. (Step 7.5.6)	Open CNTMT Air Sample Supply valve (2SV-8261-2). Examiner's Cue: 2SV-8261-2 has green light OFF and red light ON	On panel 2C16, placed key operated handswitch for 2SV-8261-2 in OPEN <u>OR</u> Verified 2SV-8261-2 open. Observed green light OFF; red light ON over handswitch for 2SV-8261-2.	N/A SAT UNSAT
(C)	7. (Step 7.5.6)	Open CNTMT Air Sample Supply valve (2SV-8263-2). Examiner's Cue: 2SV-8263-2 has green light OFF and red light ON	On panel 2C16, placed key operated handswitch for 2SV-8263-2 in OPEN <u>OR</u> Verified 2SV-8263-2 open. Observed green light OFF; red light ON over handswitch for 2SV-8263-2.	N/A SAT UNSAT
(C)	8. (Step 7.5.6)	Open CNTMT Air Sample Return valve (2SV-8259-1). Examiner's Cue: 2SV-8259-1 has green light OFF and red light ON	On panel 2C17, placed key operated handswitch for 2SV-8259-1 in OPEN <u>OR</u> Verified 2SV-8259-1 open. Observed green light OFF; red light ON over handswitch for 2SV-8259-1.	N/A SAT UNSAT
(C)	9. (Step 7.5.6)	Open CNTMT Air Sample Return valve (2SV-8265-1). Examiner's Cue: 2SV-8265-1 has green light OFF and red light ON	On panel 2C17, placed key operated handswitch for 2SV-8265-1 in OPEN <u>OR</u> Verified 2SV-8265-1 open. Observed green light OFF; red light ON over handswitch for 2SV-8265-1.	N/A SAT UNSAT
(C)	10. (Step 7.5.7)	Open CNTMT Air Sample Valve (2SV-8346-2). Examiner's Cue: 2SV-8246-2 has green light OFF and red light ON	On panel 2C33, placed handswitch for 2SV-8346-2 in OPEN. Observed green light OFF; red light ON over handswitch for 2SV-8346-2.	N/A SAT UNSAT

JOB PERFORMANCE MEASURE

PERFORMANCE CHECKLIST			STANDARDS	(Circle One)
(C)	11. (Step 7.5.8)	Place Hydrogen Purge Manifold Position switch (2HS-8337) in 6 - ALL VALVES CLOSED. Examiner's Cue: 2HS-8337 is in position 6 - ALL VALVES CLOSED.	On panel 2C25, rotated hand switch until 2HS-8337 is in position 6 - ALL VALVES CLOSED.	N/A SAT UNSAT
(C)	12. (Step 7.5.9)	Verify 2C128B Backup Sample Valve (2SV-8341-2) closed. Examiner's Cue: 2SV-8241-2 has green light ON and red light OFF	On panel 2C184, verified 2SV-8341-2 closed. Observed green light ON; red light OFF above handswitch for 2SV-8341-2.	N/A SAT UNSAT
<u>EXAMINER'S NOTE:</u> In the following step, placing handswitch to open will cause red light to come on. Verification of solenoid open will occur when flow is verified.				
(C)	13. (Step 7.5.10)	Open 2C128B Isolation valves (2SV-8266-2/8264-2). Examiner's Cue: 2SV-8266-2/8264-2 have red light ON	On panel 2C184, placed handswitch 2HS-8266-2 for 2SV-8266-2/8264-2 in OPEN. Observed red light ON above 2HS-8266-2.	N/A SAT UNSAT
(C)	14. (Step 7.5.11)	Start 2C128B Sample Pump (2P-163). Examiner's Cue: Hand switch for 2C128B is in Start. <u>When hand Switch released:</u> Examiner's Cue: Hand switch for 2C128B has returned to center position.	On panel 2C184, placed and held 2HS-8272-2 in START. After approximately 5 seconds, released 2HS-8272-2.	N/A SAT UNSAT
(C)	15. (Step 7.5.12)	Verify 2C128B Sample Pump (2P-163) running.	On panel 2C184, observed green light OFF and red light ON above handswitch for 2P-163.	N/A SAT UNSAT

JOB PERFORMANCE MEASURE

PERFORMANCE CHECKLIST			STANDARDS	(Circle One)
(C)	16. (Step 7.5.13)	Check analyzer flow (on panel 2C182A) Examiner's Cue: Sample flow on 2FI-8385 is reading 0.35 SCFM and CRS will take care of adding reading to CBOT log.	On panel 2C182A, observed flow on 2FI-8385 > 0.282 SCFM. Stated need to add to CBOT log.	N/A SAT UNSAT
<u>Examiner's note:</u> The rest of the steps in this section are directed to the WCO in the auxiliary building to verify local operation of the Hydrogen Analyzer, these steps are not required to be completed for this JPM.				
END				

STOP TIME: _____

JOB PERFORMANCE MEASURE**EXAMINER'S COPY****JPM INITIAL TASK CONDITIONS:**

The hydrogen analyzer system is aligned using OP 2104.044 Attachment "A".
Service water is available.
Containment building recirculation fans are in operation.
Power is available to the analyzers.
CAMS unit 2RE-8271-2 is NOT aligned for containment building oxygen control.
CIAS or SIAS is not present.

INITIATING CUE:

The CRS directs, Place Hydrogen Analyzer (2C128B) in service manually per OP 2104.044 section 7.5.

JOB PERFORMANCE MEASURE**EXAMINEE'S COPY****JPM INITIAL TASK CONDITIONS:**

The hydrogen analyzer system is aligned using OP 2104.044 Attachment "A".
Service water is available.
Containment building recirculation fans are in operation.
Power is available to the analyzers.
CAMS unit 2RE-8271-2 is NOT aligned for containment building oxygen control.
CIAS or SIAS is not present.

INITIATING CUE:

The CRS directs, Place Hydrogen Analyzer (2C128B) in service manually per OP 2104.044 section 7.5.

ENTERGY OPERATIONS
ARKANSAS NUCLEAR ONE

DATE: 07/14/03 TIME: 11:13:33

REACTOR POWER : 98.02 %FP CORE ASI : 0.026
CORE BURNUP : 33.1 EFPD CORE BURNUP : 0.00000E+00 MWD/MTU
CEA POSITIONS(IN.WD): GRP5 0.0 GRP6 0.0 P-GRP 0.0

AZIMUTHAL TILT = 0.00

SURVEILLANCES ... REFERENCE COLSS OPERATIONS (2105.013)

- 1.** 193 OF 220 INCORE DETECTORS ARE OPERABLE
WHICH MEETS THE REQUIREMENT OF AT LEAST 75% OF ALL INCORE
DETECTORS OPERABLE (165 DETECTORS) WITH AT LEAST ONE INCORE DETECTOR
IN EACH QUADRANT AT EACH LEVEL.
- 2.** 40 INCORE DETECTOR LOCATIONS ARE OPERABLE WHICH MEETS THE REQUIREMENT
OF AT LEAST 75% OF ALL INCORE DETECTOR LOCATIONS OPERABLE
(33 LOCATIONS).
- 3.** THERE ARE 36 GOOD TILT ESTIMATES AT 5 OUT OF 5 LEVELS.
WHICH MEETS THE REQUIREMENTS FOR AT LEAST 6 GOOD TILT
ESTIMATES, WITH AT LEAST 1 TILT ESTIMATE AT EACH OF 3 LEVELS.

DEPLETION/BACKGROUND CORRECTED SYMMETRIC SPND SIGNALS BY SYMMETRIC
DETECTOR SETS AND PAIRS

ADDITIONAL COLSS VECTOR TILT SETS NOT INDICATED HERE:

SET 5: STRINGS 12,8,33,37
SET 6: STRINGS 7,17,38,28
SET 7: STRINGS 13,15,32,30
SET 8: STRINGS 14,16,31,29

DETECTOR	STRG	ASSM	LEVEL 1 % DEV	LEVEL 2 % DEV	LEVEL 3 % DEV	LEVEL 4 % DEV	LEVEL 5 % DEV
SYMMETRIC SPND SET 1 (COLSS VECTOR TILT)							
SE02	1	7	0.1%	0.2%	-0.1%	0.2%	0.3%
SL02	4	13	-0.1%	0.2%	0.0%	0.0%	0.0%
SL14	44	171	0.1%	0.1%	-0.2%	0.4%	0.2%
SE14	41	165	0.0%	-0.5%	0.2%	-0.6%	-0.5%
AVG			330.8	340.2	386.9	321.8	308.8
SYMMETRIC SPND SET 2 (COLSS VECTOR TILT)							
SG02	2	9	-0.2%	0.2%	-0.3%	0.4%	0.3%
SP07	19	80	0.1%	0.0% +	0.1%	0.6%	0.3%
SJ14	43	169	-0.2%	0.7%	-0.1%	0.1%	0.0%
SB09	26	98	0.3%	-0.9%	0.2%	-1.2%	-0.5%
AVG			572.1	593.8	672.9	556.4	521.1
SYMMETRIC SPND SET 3 (COLSS VECTOR TILT)							
SC04	5	27	0.2%	-0.5%	0.4%	-0.4%	-0.6%
SN04	10	37	-0.4%	0.8%	0.0%	0.6%	0.7%
SN12	40	151	-0.3%	0.3%	-0.1%	0.3%	0.2%
SC12	35	141	0.5%	-0.6%	-0.3%	-0.6%	-0.3%
AVG			476.6	489.1	558.2	462.0	437.9
SYMMETRIC SPND SET 4 (COLSS VECTOR TILT)							
SE04	6	29	0.3%	0.2%	0.0%	0.4%	0.0% +
SL04	9	35	-0.5%	0.1%	-0.6%	0.2%	0.2%
SL12	39	149	0.2%	0.2%	0.1%	-0.3%	0.5%
SE12	36	143	0.0% +	-0.5%	0.5%	-0.4%	-0.7%
AVG			678.7	700.0	797.2	660.8	628.4

CON9CHKZ

ENTERGY OPERATIONS
ARKANSAS NUCLEAR ONE

DATE: 07/14/03 TIME: 11:13:33

REACTOR POWER : 98.02 %FP CORE ASI : 0.026
CORE BURNUP : 33.1 EFPD CORE BURNUP : 0.00000E+00 MWD/MTU
CEA POSITIONS(IN.WD): GRP5 0.0 GRP6 0.0 P-GRP 0.0

AZIMUTHAL TILT = 0.00

DEPLETION/BACKGROUND CORRECTED SYMMETRIC SPND SIGNALS BY SYMMETRIC
DETECTOR SETS AND PAIRS

ADDITIONAL COLSS VECTOR TILT SETS NOT INDICATED HERE:

SET 5: STRINGS 12,8,33,37
SET 6: STRINGS 7,17,38,28
SET 7: STRINGS 13,15,32,30
SET 8: STRINGS 14,16,31,29

DETECTOR	STRG ASSM	LEVEL 1 % DEV	LEVEL 2 % DEV	LEVEL 3 % DEV	LEVEL 4 % DEV	LEVEL 5 % DEV
SYMMETRIC SPND SET 5						
SC06	12 54	0.4%	0.0% +	0.1%	0.6%	-0.5%
SN06	17 64	0.2%	0.8%	-0.1%	0.3%	0.5%
SN10	33 124	-0.5%	0.5%	-0.4%	0.2%	0.3%
SC10	28 114	0.0%	-1.3%	0.3%	-1.1%	-0.2%
	AVG	662.3	691.0	783.7	645.9	601.4
SYMMETRIC SPND SET 6						
SG04	7 31	-0.5%	0.7%	0.0%	-0.1%	2.8%
SJ04	8 33	-0.6%	0.2%	0.0%	0.5%	-6.0%
SJ12	38 147	1.2%	0.1%	-0.1%	0.3%	1.8%
SG12	37 145	-0.1%	-1.0%	0.1%	-0.7%	1.4%
	AVG	680.3	708.1	810.2	674.1	629.5
SYMMETRIC SPND SET 7						
SE06	13 56	0.4%	-0.2%	0.3%	-1.3%	-0.8%
SL06	16 62	-0.3%	0.6%	-0.4%	0.6%	0.4%
SL10	32 122	-0.1%	-0.3%	-0.4%	1.2%	0.7%
SE10	29 116	0.1%	-0.1%	0.5%	-0.5%	-0.4%
	AVG	699.1	722.8	824.6	684.0	641.2
SYMMETRIC SPND SET 8						
SG06	14 58	-0.1%	0.2%	0.6%	-0.7%	0.4%
SJ06	15 60	-0.6%	0.6%	-0.3%	0.9%	0.5%
SJ10	31 120	0.2%	0.1%	0.1%	0.8%	0.2%
SG10	30 118	0.4%	-0.9%	-0.4%	-1.0%	-1.1%
	AVG	668.7	689.7	789.1	658.3	632.7
SYMMETRIC SPND SET 9 (COLSS VECTOR TILT)						
SB07	18 68	0.1%	0.0% +	-0.3%	-0.5%	-0.2%
SJ02	3 11	0.0%	0.5%	0.1%	0.6%	0.2%
SP09	27 110	0.0% +	0.0% +	0.0% +	0.0% +	0.0% +
SG14	42 167	-0.1%	-0.5%	0.1%	-0.1%	-0.1%
	AVG	571.7	591.1	672.8	555.1	517.8

CON9CHKZ

ENTERGY OPERATIONS
ARKANSAS NUCLEAR ONE

DATE: 07/14/03 TIME: 11:13:33

REACTOR POWER : 98.02 %FP CORE ASI : 0.026
CORE BURNUP : 33.1 EFPD CORE BURNUP : 0.00000E+00 MWD/MTU
CEA POSITIONS(IN.WD): GRP5 0.0 GRP6 0.0 P-GRP 0.0

AZIMUTHAL TILT = 0.00

DEPLETION/BACKGROUND CORRECTED SYMMETRIC SPND SIGNALS BY SYMMETRIC
DETECTOR SETS AND PAIRS

ADDITIONAL COLSS VECTOR TILT SETS NOT INDICATED HERE:

SET 5: STRINGS 12,8,33,37
SET 6: STRINGS 7,17,38,28
SET 7: STRINGS 13,15,32,30
SET 8: STRINGS 14,16,31,29

DETECTOR	STRG ASSM	LEVEL 1 % DEV	LEVEL 2 % DEV	LEVEL 3 % DEV	LEVEL 4 % DEV	LEVEL 5 % DEV
SYMMETRIC PAIR 1						
SA06	11 52	0.0% +	-0.3%	-0.1%	-0.4%	-0.5%
SR10	34 126	0.0% +	0.3%	0.1%	0.4%	0.5%
	AVG	0.0	189.1	215.5	179.2	174.8
SYMMETRIC PAIR 2						
SC08	20 84	0.0%	0.0%	0.0%	0.0%	0.0%
SN08	25 94	*** REPLACED BY RAD CAL ***				
	AVG	646.9	664.3	755.4	624.9	581.2
SYMMETRIC PAIR 3						
SE08	21 86	*** REPLACED BY RAD CAL ***				
SL08	24 92	0.0% +	0.0% +	0.0% +	0.0% +	0.0% +
	AVG	0.0	0.0	0.0	0.0	0.0
SYMMETRIC PAIR 4						
SG08	22 88	0.0%	-0.4%	0.4%	-0.2%	-0.4%
SJ08	23 90	0.0%	0.4%	-0.4%	0.2%	0.4%
	AVG	587.1	603.1	695.6	578.9	557.5

? DENOTES A QUESTIONABLE SPND SIGNAL

+ DENOTES SPND THAT IS BAD, SUSPECT, OR MANUALLY SUBSTITUTED
AND IS NOT USED TO COMPUTE AVG FOR THE LEVEL

CON9CHKZ

ENTERGY OPERATIONS
ARKANSAS NUCLEAR ONE

DATE: 07/14/03 TIME: 11:13:33

REACTOR POWER : 98.02 %FP CORE ASI : 0.026
CORE BURNUP : 33.1 EFPD CORE BURNUP : 0.000000E+00 MWD/MTU
CEA POSITIONS(IN.WD): GRP5 0.0 GRP6 0.0 P-GRP 0.0

AZIMUTHAL TILT = 0.00

DEPLETION/BACKGROUND CORRECTED SYMMETRIC SPND SIGNALS BY SYMMETRIC
DETECTOR SETS AND PAIRS

ADDITIONAL COLSS VECTOR TILT SETS NOT INDICATED HERE:

SET 5: STRINGS 12,8,33,37
SET 6: STRINGS 7,17,38,28
SET 7: STRINGS 13,15,32,30
SET 8: STRINGS 14,16,31,29

DETECTOR	STRG	ASSM	LEVEL 1 SIG	LEVEL 2 SIG	LEVEL 3 SIG	LEVEL 4 SIG	LEVEL 5 SIG
SYMMETRIC SPND SET 1 (COLSS VECTOR TILT)							
SE02	1	7	331.0	340.7	386.6	322.3	309.8
SL02	4	13	330.4	340.9	387.0	321.9	308.6
SL14	44	171	331.1	340.5	386.1	322.9	309.4
SE14	41	165	330.7	338.5	387.6	320.0	307.2
	AVG		330.8	340.2	386.9	321.8	308.8
SYMMETRIC SPND SET 2 (COLSS VECTOR TILT)							
SG02	2	9	570.7	595.3	670.7	558.8	522.5
SP07	19	80	572.4	0.0 +	673.8	559.8	522.4
SJ14	43	169	571.1	597.7	672.5	557.0	521.1
SB09	26	98	574.0	588.5	674.5	549.9	518.6
	AVG		572.1	593.8	672.9	556.4	521.1
SYMMETRIC SPND SET 3 (COLSS VECTOR TILT)							
SC04	5	27	477.7	486.6	560.4	460.3	435.3
SN04	10	37	474.6	492.9	558.1	465.0	440.8
SN12	40	151	475.1	490.4	557.4	463.4	438.7
SC12	35	141	479.1	486.2	556.7	459.3	436.7
	AVG		476.6	489.1	558.2	462.0	437.9
SYMMETRIC SPND SET 4 (COLSS VECTOR TILT)							
SE04	6	29	680.9	701.4	797.4	663.4	0.0 +
SL04	9	35	675.4	700.6	792.7	662.3	629.7
SL12	39	149	679.8	701.2	797.8	659.0	631.2
SE12	36	143	0.0 +	696.7	800.8	658.5	624.2
	AVG		678.7	700.0	797.2	660.8	628.4
SYMMETRIC SPND SET 5							
SC06	12	54	665.0	0.0 +	784.8	649.9	598.3
SN06	17	64	663.6	696.3	783.2	647.9	604.4
SN10	33	124	658.7	694.8	780.7	647.1	603.2
SC10	28	114	662.0	682.0	786.2	638.6	600.0
	AVG		662.3	691.0	783.7	645.9	601.4

CON9CHKZ

ENTERGY OPERATIONS

ARKANSAS NUCLEAR ONE

DATE: 07/14/03 TIME: 11:13:33

REACTOR POWER : 98.02 %FP CORE ASI : 0.026
 CORE BURNUP : 33.1 EFPD CORE BURNUP : 0.00000E+00 MWD/MTU
 CEA POSITIONS(IN.WD): GRP5 0.0 GRP6 0.0 P-GRP 0.0

AZIMUTHAL TILT = 0.00

DEPLETION/BACKGROUND CORRECTED SYMMETRIC SPND SIGNALS BY SYMMETRIC
 DETECTOR SETS AND PAIRS

ADDITIONAL COLSS VECTOR TILT SETS NOT INDICATED HERE:

SET 5: STRINGS 12,8,33,37
 SET 6: STRINGS 7,17,38,28
 SET 7: STRINGS 13,15,32,30
 SET 8: STRINGS 14,16,31,29

DETECTOR	STRG	ASSM	LEVEL 1 SIG	LEVEL 2 SIG	LEVEL 3 SIG	LEVEL 4 SIG	LEVEL 5 SIG
SYMMETRIC SPND SET 6							
SG04	7	31	677.2	712.9	810.4	673.7	647.1
SJ04	8	33	676.2	709.3	809.9	677.6	591.6
SJ12	38	147	688.6	709.1	809.6	675.9	640.8
SG12	37	145	679.4	701.0	810.8	669.2	638.4
	AVG		680.3	708.1	810.2	674.1	629.5
SYMMETRIC SPND SET 7							
SE06	13	56	701.7	721.4	827.2	675.2	636.3
SL06	16	62	696.7	727.0	820.9	688.4	644.1
SL10	32	122	698.2	721.0	821.3	691.9	645.7
SE10	29	116	699.7	721.9	828.8	680.5	638.7
	AVG		699.1	722.8	824.6	684.0	641.2
SYMMETRIC SPND SET 8							
SG06	14	58	667.9	691.2	793.9	653.6	635.1
SJ06	15	60	665.0	693.5	786.9	664.4	636.0
SJ10	31	120	670.2	690.6	789.6	663.6	634.0
SG10	30	118	671.6	683.4	786.1	651.7	625.6
	AVG		668.7	689.7	789.1	658.3	632.7
SYMMETRIC SPND SET 9 (COLSS VECTOR TILT)							
SB07	18	68	572.1	0.0 +	671.1	552.3	517.0
SJ02	3	11	571.6	594.3	673.7	558.4	519.1
SP09	27	110	0.0 +	0.0 +	0.0 +	0.0 +	0.0 +
SG14	42	167	571.4	587.9	673.5	554.6	517.4
	AVG		571.7	591.1	672.8	555.1	517.8

CON9CHKZ

ENTERGY OPERATIONS
ARKANSAS NUCLEAR ONE
DATE: 07/14/03 TIME: 11:13:33

REACTOR POWER : 98.02 %FP CORE ASI : 0.026
CORE BURNUP : 33.1 EFPD CORE BURNUP : 0.00000E+00 MWD/MTU
CEA POSITIONS(IN.WD): GRP5 0.0 GRP6 0.0 P-GRP 0.0

AZIMUTHAL TILT = 0.00

DEPLETION/BACKGROUND CORRECTED SYMMETRIC SPND SIGNALS BY SYMMETRIC
DETECTOR SETS AND PAIRS

ADDITIONAL COLSS VECTOR TILT SETS NOT INDICATED HERE:

SET 5: STRINGS 12,8,33,37
SET 6: STRINGS 7,17,38,28
SET 7: STRINGS 13,15,32,30
SET 8: STRINGS 14,16,31,29

DETECTOR	STRG ASSM	LEVEL 1 SIG	LEVEL 2 SIG	LEVEL 3 SIG	LEVEL 4 SIG	LEVEL 5 SIG
SYMMETRIC PAIR 1						
SA06	11 52	0.0 +	188.5	215.3	178.4	174.0
SR10	34 126	0.0 +	189.6	215.6	180.0	175.6
	AVG	0.0	189.1	215.5	179.2	174.8
SYMMETRIC PAIR 2						
SC08	20 84	646.9	664.3	755.4	624.9	581.2
SN08	25 94	*** REPLACED BY RAD CAL ***				
	AVG	646.9	664.3	755.4	624.9	581.2
SYMMETRIC PAIR 3						
SE08	21 86	*** REPLACED BY RAD CAL ***				
SL08	24 92	0.0 +	0.0 +	0.0 +	0.0 +	0.0 +
	AVG	0.0	0.0	0.0	0.0	0.0
SYMMETRIC PAIR 4						
SG08	22 88	587.0	600.8	698.6	577.6	555.3
SJ08	23 90	587.2	605.4	692.6	580.2	559.7
	AVG	587.1	603.1	695.6	578.9	557.5

? DENOTES A QUESTIONABLE SPND SIGNAL

+ DENOTES SPND THAT IS BAD, SUSPECT, OR MANUALLY SUBSTITUTED
AND IS NOT USED TO COMPUTE AVG FOR THE LEVEL

ENTERGY OPERATIONS
ARKANSAS NUCLEAR ONE

DATE: 07/14/03 TIME: 11:45:36

REACTOR POWER : 98.03 %FP CORE ASI : 0.027
CORE BURNUP : 33.1 EFPD CORE BURNUP : 0.00000E+00 MWD/MTU
CEA POSITIONS(IN.WD): GRP5 0.0 GRP6 0.0 P-GRP 0.0

AZIMUTHAL TILT = 0.00

SURVEILLANCES ... REFERENCE COLSS OPERATIONS (2105.013)

- 1.** 192 OF 220 INCORE DETECTORS ARE OPERABLE
WHICH MEETS THE REQUIREMENT OF AT LEAST 75% OF ALL INCORE
DETECTORS OPERABLE (165 DETECTORS) WITH AT LEAST ONE INCORE DETECTOR
IN EACH QUADRANT AT EACH LEVEL.
- 2.** 40 INCORE DETECTOR LOCATIONS ARE OPERABLE WHICH MEETS THE REQUIREMENT
OF AT LEAST 75% OF ALL INCORE DETECTOR LOCATIONS OPERABLE
(33 LOCATIONS).
- 3.** THERE ARE 35 GOOD TILT ESTIMATES AT 5 OUT OF 5 LEVELS.
WHICH MEETS THE REQUIREMENTS FOR AT LEAST 6 GOOD TILT
ESTIMATES, WITH AT LEAST 1 TILT ESTIMATE AT EACH OF 3 LEVELS.

DEPLETION/BACKGROUND CORRECTED SYMMETRIC SPND SIGNALS BY SYMMETRIC
DETECTOR SETS AND PAIRS

ADDITIONAL COLSS VECTOR TILT SETS NOT INDICATED HERE:

SET 5: STRINGS 12,8,33,37
SET 6: STRINGS 7,17,38,28
SET 7: STRINGS 13,15,32,30
SET 8: STRINGS 14,16,31,29

DETECTOR	STRG	ASSM	LEVEL 1 % DEV	LEVEL 2 % DEV	LEVEL 3 % DEV	LEVEL 4 % DEV	LEVEL 5 % DEV
SYMMETRIC SPND SET 1 (COLSS VECTOR TILT)							
SE02	1	7	0.0% +	0.2%	-0.1%	0.2%	0.3%
SL02	4	13	-0.1%	0.2%	0.0%	0.0%	0.0%
SL14	44	171	0.1%	0.1%	-0.2%	0.4%	0.2%
SE14	41	165	0.0%	-0.5%	0.2%	-0.6%	-0.5%
AVG			330.7	340.1	386.8	321.7	308.7
SYMMETRIC SPND SET 2 (COLSS VECTOR TILT)							
SG02	2	9	-0.2%	0.2%	-0.3%	0.4%	0.3%
SP07	19	80	0.1%	0.0% +	0.1%	0.6%	0.2%
SJ14	43	169	-0.2%	0.7%	-0.1%	0.1%	0.0%
SB09	26	98	0.3%	-0.9%	0.2%	-1.2%	-0.5%
AVG			572.0	593.7	672.8	556.3	521.1
SYMMETRIC SPND SET 3 (COLSS VECTOR TILT)							
SC04	5	27	0.2%	-0.5%	0.4%	-0.4%	-0.6%
SN04	10	37	-0.4%	0.8%	0.0%	0.7%	0.7%
SN12	40	151	-0.3%	0.3%	-0.1%	0.3%	0.2%
SC12	35	141	0.5%	-0.6%	-0.3%	-0.6%	-0.3%
AVG			476.5	489.0	558.1	462.0	437.8
SYMMETRIC SPND SET 4 (COLSS VECTOR TILT)							
SE04	6	29	0.3%	0.2%	0.0%	0.4%	0.0% +
SL04	9	35	-0.5%	0.1%	-0.6%	0.2%	0.2%
SL12	39	149	0.2%	0.2%	0.1%	-0.3%	0.5%
SE12	36	143	0.0% +	-0.5%	0.5%	-0.4%	-0.7%
AVG			678.6	699.8	797.1	660.7	628.3

CON9CHKZ

ENTERGY OPERATIONS
ARKANSAS NUCLEAR ONE

DATE: 07/14/03 TIME: 11:45:36

REACTOR POWER : 98.03 %FP CORE ASI : 0.027
CORE BURNUP : 33.1 EFPD CORE BURNUP : 0.00000E+00 MWD/MTU
CEA POSITIONS(IN.WD): GRP5 0.0 GRP6 0.0 P-GRP 0.0

AZIMUTHAL TILT = 0.00

DEPLETION/BACKGROUND CORRECTED SYMMETRIC SPND SIGNALS BY SYMMETRIC
DETECTOR SETS AND PAIRS

ADDITIONAL COLSS VECTOR TILT SETS NOT INDICATED HERE:

SET 5: STRINGS 12,8,33,37
SET 6: STRINGS 7,17,38,28
SET 7: STRINGS 13,15,32,30
SET 8: STRINGS 14,16,31,29

DETECTOR	STRG ASSM	LEVEL 1 % DEV	LEVEL 2 % DEV	LEVEL 3 % DEV	LEVEL 4 % DEV	LEVEL 5 % DEV
SYMMETRIC SPND SET 5						
SC06	12 54	0.4%	0.0% +	0.1%	0.6%	-0.5%
SN06	17 64	0.2%	0.8%	-0.1%	0.3%	0.5%
SN10	33 124	-0.5%	0.5%	-0.4%	0.2%	0.3%
SC10	28 114	0.0%	-1.3%	0.3%	-1.1%	-0.2%
	AVG	662.2	690.9	783.7	645.8	601.4
SYMMETRIC SPND SET 6						
SG04	7 31	-0.5%	0.7%	0.0%	-0.1%	2.8%
SJ04	8 33	-0.6%	0.2%	0.0%	0.5%	-6.0%
SJ12	38 147	1.2%	0.1%	-0.1%	0.3%	1.8%
SG12	37 145	-0.1%	-1.0%	0.1%	-0.7%	1.4%
	AVG	680.2	708.0	810.1	674.0	629.4
SYMMETRIC SPND SET 7						
SE06	13 56	0.4%	-0.2%	0.3%	-1.3%	-0.8%
SL06	16 62	-0.3%	0.6%	-0.4%	0.6%	0.4%
SL10	32 122	-0.1%	-0.3%	-0.4%	1.2%	0.7%
SE10	29 116	0.1%	-0.1%	0.5%	-0.5%	-0.4%
	AVG	698.9	722.7	824.5	683.9	641.1
SYMMETRIC SPND SET 8						
SG06	14 58	-0.1%	0.2%	0.6%	-0.7%	0.4%
SJ06	15 60	-0.6%	0.6%	-0.3%	0.9%	0.5%
SJ10	31 120	0.2%	0.1%	0.1%	0.8%	0.2%
SG10	30 118	0.4%	-0.9%	-0.4%	-1.0%	-1.1%
	AVG	668.5	689.6	789.1	658.2	632.6
SYMMETRIC SPND SET 9 (COLSS VECTOR TILT)						
SB07	18 68	0.1%	0.0% +	-0.3%	-0.5%	-0.2%
SJ02	3 11	0.0%	0.5%	0.1%	0.6%	0.2%
SP09	27 110	0.0% +	0.0% +	0.0% +	0.0% +	0.0% +
SG14	42 167	-0.1%	-0.5%	0.1%	-0.1%	-0.1%
	AVG	571.6	591.0	672.7	555.1	517.8

CON9CHKZ

ENTERGY OPERATIONS
ARKANSAS NUCLEAR ONE
DATE: 07/14/03 TIME: 11:45:36

REACTOR POWER : 98.03 %FP CORE ASI : 0.027
CORE BURNUP : 33.1 EFPD CORE BURNUP : 0.00000E+00 MWD/MTU
CEA POSITIONS(IN.WD): GRP5 0.0 GRP6 0.0 P-GRP 0.0

AZIMUTHAL TILT = 0.00

DEPLETION/BACKGROUND CORRECTED SYMMETRIC SPND SIGNALS BY SYMMETRIC
DETECTOR SETS AND PAIRS

ADDITIONAL COLSS VECTOR TILT SETS NOT INDICATED HERE:

SET 5: STRINGS 12,8,33,37
SET 6: STRINGS 7,17,38,28
SET 7: STRINGS 13,15,32,30
SET 8: STRINGS 14,16,31,29

DETECTOR	STRG	ASSM	LEVEL 1 % DEV	LEVEL 2 % DEV	LEVEL 3 % DEV	LEVEL 4 % DEV	LEVEL 5 % DEV
SYMMETRIC PAIR 1							
SA06	11	52	0.0% +	-0.3%	-0.1%	-0.4%	-0.5%
SR10	34	126	0.0% +	0.3%	0.1%	0.4%	0.5%
	AVG		0.0	189.0	215.4	179.2	174.8
SYMMETRIC PAIR 2							
SC08	20	84	0.0%	0.0%	0.0%	0.0%	0.0%
SN08	25	94	*** REPLACED BY RAD CAL ***				
	AVG		646.8	664.2	755.4	624.8	581.1
SYMMETRIC PAIR 3							
SE08	21	86	*** REPLACED BY RAD CAL ***				
SL08	24	92	0.0% +	0.0% +	0.0% +	0.0% +	0.0% +
	AVG		0.0	0.0	0.0	0.0	0.0
SYMMETRIC PAIR 4							
SG08	22	88	0.0%	-0.4%	0.4%	-0.2%	-0.4%
SJ08	23	90	0.0%	0.4%	-0.4%	0.2%	0.4%
	AVG		587.0	603.0	695.6	578.8	557.4

? DENOTES A QUESTIONABLE SPND SIGNAL

+ DENOTES SPND THAT IS BAD, SUSPECT, OR MANUALLY SUBSTITUTED
AND IS NOT USED TO COMPUTE AVG FOR THE LEVEL

CON9CHKZ

ENTERGY OPERATIONS
 ARKANSAS NUCLEAR ONE
 DATE: 07/14/03 TIME: 11:45:36

REACTOR POWER : 98.03 %FP CORE ASI : 0.027
 CORE BURNUP : 33.1 EFPD CORE BURNUP : 0.00000E+00 MWD/MTU
 CEA POSITIONS(IN.WD): GRP5 0.0 GRP6 0.0 P-GRP 0.0

AZIMUTHAL TILT = 0.00

DEPLETION/BACKGROUND CORRECTED SYMMETRIC SPND SIGNALS BY SYMMETRIC
 DETECTOR SETS AND PAIRS

ADDITIONAL COLSS VECTOR TILT SETS NOT INDICATED HERE:

SET 5: STRINGS 12,8,33,37
 SET 6: STRINGS 7,17,38,28
 SET 7: STRINGS 13,15,32,30
 SET 8: STRINGS 14,16,31,29

DETECTOR	STRG	ASSM	LEVEL 1 SIG	LEVEL 2 SIG	LEVEL 3 SIG	LEVEL 4 SIG	LEVEL 5 SIG
SYMMETRIC SPND SET 1 (COLSS VECTOR TILT)							
SE02	1	7	0.0 +	340.7	386.6	322.2	309.8
SL02	4	13	330.3	340.9	387.0	321.9	308.6
SL14	44	171	331.0	340.4	386.1	322.9	309.3
SE14	41	165	330.7	338.5	387.6	320.0	307.2
	AVG		330.7	340.1	386.8	321.7	308.7
SYMMETRIC SPND SET 2 (COLSS VECTOR TILT)							
SG02	2	9	570.6	595.2	670.7	558.7	522.4
SP07	19	80	572.3	0.0 +	673.8	559.7	522.4
SJ14	43	169	571.0	597.6	672.5	556.9	521.0
SB09	26	98	573.9	588.4	674.4	549.8	518.5
	AVG		572.0	593.7	672.8	556.3	521.1
SYMMETRIC SPND SET 3 (COLSS VECTOR TILT)							
SC04	5	27	477.6	486.6	560.4	460.3	435.2
SN04	10	37	474.6	492.9	558.1	465.0	440.7
SN12	40	151	475.0	490.3	557.4	463.3	438.7
SC12	35	141	479.0	486.1	556.7	459.3	436.6
	AVG		476.5	489.0	558.1	462.0	437.8
SYMMETRIC SPND SET 4 (COLSS VECTOR TILT)							
SE04	6	29	680.8	701.3	797.4	663.3	0.0 +
SL04	9	35	675.3	700.4	792.7	662.2	629.6
SL12	39	149	679.7	701.0	797.7	658.9	631.1
SE12	36	143	0.0 +	696.6	800.7	658.4	624.1
	AVG		678.6	699.8	797.1	660.7	628.3
SYMMETRIC SPND SET 5							
SC06	12	54	664.9	0.0 +	784.8	649.9	598.2
SN06	17	64	663.4	696.2	783.1	647.8	604.3
SN10	33	124	658.6	694.6	780.7	647.1	603.1
SC10	28	114	661.9	681.9	786.2	638.5	599.9
	AVG		662.2	690.9	783.7	645.8	601.4

CON9CHKZ

ENTERGY OPERATIONS
ARKANSAS NUCLEAR ONE

DATE: 07/14/03 TIME: 11:45:36

REACTOR POWER : 98.03 %FP CORE ASI : 0.027
CORE BURNUP : 33.1 EFPD CORE BURNUP : 0.00000E+00 MWD/MTU
CEA POSITIONS(IN.WD): GRP5 0.0 GRP6 0.0 P-GRP 0.0

AZIMUTHAL TILT = 0.00

DEPLETION/BACKGROUND CORRECTED SYMMETRIC SPND SIGNALS BY SYMMETRIC
DETECTOR SETS AND PAIRS

ADDITIONAL COLSS VECTOR TILT SETS NOT INDICATED HERE:

SET 5: STRINGS 12,8,33,37
SET 6: STRINGS 7,17,38,28
SET 7: STRINGS 13,15,32,30
SET 8: STRINGS 14,16,31,29

DETECTOR	STRG	ASSM	LEVEL 1 SIG	LEVEL 2 SIG	LEVEL 3 SIG	LEVEL 4 SIG	LEVEL 5 SIG
SYMMETRIC SPND SET 6							
SG04	7	31	677.1	712.8	810.3	673.6	647.0
SJ04	8	33	676.0	709.1	809.9	677.5	591.5
SJ12	38	147	688.5	709.0	809.5	675.8	640.7
SG12	37	145	679.3	700.9	810.7	669.1	638.3
	AVG		680.2	708.0	810.1	674.0	629.4
SYMMETRIC SPND SET 7							
SE06	13	56	701.6	721.3	827.2	675.1	636.3
SL06	16	62	696.5	726.8	820.9	688.3	644.0
SL10	32	122	698.1	720.8	821.2	691.8	645.7
SE10	29	116	699.6	721.8	828.8	680.4	638.6
	AVG		698.9	722.7	824.5	683.9	641.1
SYMMETRIC SPND SET 8							
SG06	14	58	667.8	691.1	793.9	653.5	635.0
SJ06	15	60	664.8	693.4	786.9	664.3	635.9
SJ10	31	120	670.1	690.5	789.6	663.5	633.9
SG10	30	118	671.5	683.3	786.0	651.6	625.6
	AVG		668.5	689.6	789.1	658.2	632.6
SYMMETRIC SPND SET 9 (COLSS VECTOR TILT)							
SB07	18	68	572.0	0.0 +	671.0	552.3	517.0
SJ02	3	11	571.5	594.2	673.7	558.3	519.0
SP09	27	110	0.0 +	0.0 +	0.0 +	0.0 +	0.0 +
SG14	42	167	571.3	587.8	673.5	554.6	517.4
	AVG		571.6	591.0	672.7	555.1	517.8

CON9CHKZ

ENTERGY OPERATIONS
ARKANSAS NUCLEAR ONE

DATE: 07/14/03 TIME: 11:45:36

REACTOR POWER : 98.03 %FP CORE ASI : 0.027
CORE BURNUP : 33.1 EFPD CORE BURNUP : 0.00000E+00 MWD/MTU
CEA POSITIONS(IN.WD): GRP5 0.0 GRP6 0.0 P-GRP 0.0

AZIMUTHAL TILT = 0.00

DEPLETION/BACKGROUND CORRECTED SYMMETRIC SPND SIGNALS BY SYMMETRIC
DETECTOR SETS AND PAIRS

ADDITIONAL COLSS VECTOR TILT SETS NOT INDICATED HERE:

SET 5: STRINGS 12,8,33,37
SET 6: STRINGS 7,17,38,28
SET 7: STRINGS 13,15,32,30
SET 8: STRINGS 14,16,31,29

DETECTOR	STRG ASSM	LEVEL 1 SIG	LEVEL 2 SIG	LEVEL 3 SIG	LEVEL 4 SIG	LEVEL 5 SIG
SYMMETRIC PAIR 1						
SA06	11 52	0.0 +	188.5	215.3	178.4	174.0
SR10	34 126	0.0 +	189.6	215.6	180.0	175.6
	AVG	0.0	189.0	215.4	179.2	174.8
SYMMETRIC PAIR 2						
SC08	20 84	646.8	664.2	755.4	624.8	581.1
SN08	25 94	*** REPLACED BY RAD CAL ***				
	AVG	646.8	664.2	755.4	624.8	581.1
SYMMETRIC PAIR 3						
SE08	21 86	*** REPLACED BY RAD CAL ***				
SL08	24 92	0.0 +	0.0 +	0.0 +	0.0 +	0.0 +
	AVG	0.0	0.0	0.0	0.0	0.0
SYMMETRIC PAIR 4						
SG08	22 88	586.9	600.7	698.6	577.5	555.2
SJ08	23 90	587.1	605.3	692.5	580.1	559.7
	AVG	587.0	603.0	695.6	578.8	557.4

? DENOTES A QUESTIONABLE SPND SIGNAL

+ DENOTES SPND THAT IS BAD, SUSPECT, OR MANUALLY SUBSTITUTED
AND IS NOT USED TO COMPUTE AVG FOR THE LEVEL

ENTERGY OPERATIONS INCORPORATED ARKANSAS NUCLEAR ONE

TITLE: COLSS OPERATIONS

**DOCUMENT NO.
2105.013**

**CHANGE NO.
023-00-0**

**WORK PLAN EXP. DATE
N/A**

**TC EXP. DATE
N/A**

SET #

**SAFETY-RELATED
☒ YES ☐ NO**

**IPTE
☐ YES ☒ NO**

**TEMP ALT
☐ YES ☒ NO**

When you see these **TRAPS**

Time Pressure
Distraction/Interruption
Multiple Tasks
Over Confidence
Vague or Interpretive Guidance
First Shift/Last Shift
Peer Pressure
Change/Off Normal
Physical Environment
Mental Stress (Home or Work)

Get these **TOOLS**

Effective Communication
Questioning Attitude
Placekeeping
Self Check
Peer Check
Knowledge
Procedures
Job Briefing
Coaching
Turnover

VERIFIED BY

DATE

TIME

FORM TITLE:

VERIFICATION COVER SHEET

**FORM NO.
1000.006A**

**CHANGE NO.
050-00-0**

Page 1

TITLE: COLSS OPERATIONS		DOCUMENT NO. 2105.013	CHANGE NO. 023-00-0
AFFECTED UNIT: <input type="checkbox"/> UNIT 1 <input checked="" type="checkbox"/> UNIT 2		<input checked="" type="checkbox"/> PROCEDURE <input type="checkbox"/> ELECTRONIC DOCUMENT <input type="checkbox"/> WORK PLAN, EXP. DATE _____	SAFETY-RELATED <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
TYPE OF CHANGE: <input type="checkbox"/> NEW <input type="checkbox"/> PC <input type="checkbox"/> TC <input type="checkbox"/> DELETION <input checked="" type="checkbox"/> REVISION <input type="checkbox"/> EZ EXP. DATE: <u>N/A</u>			
DOES THIS DOCUMENT:			
1. Supersede or replace another procedure? (If YES, complete 1000.006B for deleted procedure.)		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
2. Alter or delete an existing regulatory commitment? (If YES, coordinate with Licensing before implementing.)		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
3. Require a 50.59 Review per Form 1000.006S? (If No, attach completed Form 1000.006S) (If 50.59 Evaluation, OSRC review required.)		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
4. Changes Surveillance Test Program (i.e. Technical Specifications, NRC Commitment, surveillance activity, see Step 7.5)? (If YES, complete 1000.009A)		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
5. Create an Intent Change? (If YES, Standard Approval Process required.)		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
6. Implement or change IPTE requirements? (If YES, complete 1000.143A. OSRC review required.)		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
7. Implement or change a Temporary Alteration? (If YES, then OSRC review required.)		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
Was the Master Electronic File used as the source document?		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
INTERIM APPROVAL PROCESS		STANDARD APPROVAL PROCESS	
ORIGINATOR SIGNATURE: (Includes review of Att. 13) DATE:		ORIGINATOR SIGNATURE: (Includes review of Att. 13) DATE: 6/10/2005	
Print and Sign name: NA PHONE #:		Print and Sign name: <u>Kent Fancher</u> PHONE #: <u>5476</u>	
SUPERVISOR APPROVAL: * N/A DATE:		INDEPENDENT REVIEWER: <u>SM Seb</u> DATE: <u>6-14-05</u>	
SRO UNIT ONE:** N/A DATE:		ENGINEERING: <u>Charles Garb Jr.</u> DATE: <u>6/17/05</u>	
SRO UNIT TWO:** N/A DATE:		Code Programs - NDE: N/A DATE:	
Interim approval allowed for non-intent changes requiring no 50.59 evaluation that are stopping work in progress.		UNIT SURVEILLANCE COORDINATOR: DATE:	
Standard Approval required for intent changes or changes requiring a 50.59 evaluation.		SECTION LEADER: <u>Roger K. Priein</u> DATE: <u>6-20-05</u>	
*If change not required to support work in progress, Department Head must sign.		QUALITY ASSURANCE: N/A DATE:	
**If both units are affected by change, both SRO signatures are required. (SRO signature required for safety related procedures only.)		OTHER SECTION LEADERS: N/A DATE:	
		OTHER SECTION LEADERS: N/A DATE:	
		OTHER SECTION LEADERS: N/A DATE:	
		OTHER SECTION LEADERS: N/A DATE:	
OSRC CHAIRMAN/TECHNICAL REVIEWER: <u>SM Seb</u> DATE: <u>6-14-05</u>		OTHER SECTION LEADERS: N/A DATE:	
FINAL APPROVAL: <u>[Signature]</u> DATE: <u>6-20-05</u>		OTHER SECTION LEADERS: N/A DATE:	
REQUIRED EFFECTIVE DATE: <u>7/18/05</u>		OTHER SECTION LEADERS: N/A DATE:	
FORM TITLE: PROCEDURE/WORK PLAN APPROVAL REQUEST		FORM NO. 1000.006B	CHANGE NO. 054-00-0

**ENTERGY OPERATIONS INCORPORATED
ARKANSAS NUCLEAR ONE**

TITLE: COLSS Operations		DOCUMENT NO. 2105.013	CHANGE NO. 023-00-0
<input checked="" type="checkbox"/> PROCEDURE <input type="checkbox"/> WORK PLAN, EXP. DATE <u>N/A</u>		PAGE <u>1</u> OF <u>1</u>	
<input type="checkbox"/> ELECTRONIC DOCUMENT			
TYPE OF CHANGE: <input type="checkbox"/> NEW <input type="checkbox"/> PC <input type="checkbox"/> TC <input type="checkbox"/> DELETION <input checked="" type="checkbox"/> REVISION <input type="checkbox"/> EZ EXP. DATE: <u>N/A</u>			
AFFECTED SECTION: (Include step # if applicable)	DESCRIPTION OF CHANGE: (For each change made, include sufficient detail to describe reason for the change.) <p style="text-align: center;">Reviewed and upgraded procedure to improve level of detail.</p> <p>Throughout procedure Removed or reworded ambiguous terminology. Added or modified text for clarity. Made minor enhancements per Procedure Writers Guide (1015.030). Renumbered steps where appropriate. Modified document descriptions for consistency. Split out steps that contained multiple actions. Corrected references to procedure titles. PIF 2-05-400 No 50.59 per 1000.006-S #2, #3, #4, #5, and #8.</p> <p>Attachment D Attachment D, contains 8 COLSS constants that require at least weekly verification. The intent is that those addressable constants that are likely to change during the cycle are unsecured on the plant computer and are desired to be verified on a weekly basis. This change updates the constants in Attachment D with those that are most likely to be changed during the cycle. COLSS addressable constant K9697 will be removed from Attachment D and K9693 and AB1(1) will be added. PIF 2-05-489 50.59 Review is attached.</p> <p>2105.013C Modified step 3.3 and added step 3.5 to improve clarity. PIF 2-04-524 No 50.59 per 1000.006-S #2 and #3.</p> <p>2105.013D Added steps 1.1 and 1.5 and modified steps 1.3 and 1.4 to improve clarity. PIF 2-04-524 No 50.59 per 1000.006-S #2 and #3.</p> <p> Added an initial blank on step 3.0. PIFs 2-04-524 and 2-04-672 No 50.59 per 1000.006-S #8.</p>		
FORM TITLE: DESCRIPTION OF CHANGE		FORM NO. 1000.006C	CHANGE NO. 050-00-0

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1.0 PURPOSE

To provide a description and instructions for Core Operating Limits Supervisory System (COLSS).

2.0 SCOPE

This procedure provides instructions for COLSS operation. Instructions are provided for computer interface. COLSS Impact Assessment (2105.013B) is provided to evaluate COLSS operability prior to removal of any computer point from scan. Form 2105.013C, Point Substitution Or Removal From Scan, is used to remove points from scan or change to a manual value. Form 2105.013D, Restoring COLSS Points To Service, is used to return points to service that were removed using Form 2105.013C.

3.0 DESCRIPTION

The Plant Monitoring System provides a means for initiating programs for performing COLSS and CEA tasks and reporting malfunctions within the computer system. Trend recorders and CRTs are used to display messages, alarms and logs. 2C03 contains dedicated displays for DNBR Power Limit and LPD Limit. COLSS monitors various parameters that affect operation of the core and provides indication and alarm functions for core parameters.

The following are inputs into COLSS:

- Reactor Coolant System Parameters:
 - Hot Leg temperatures
 - Cold Leg temperatures
 - Pressurizer pressure
 - Reactor Coolant Pump speed
 - Reactor Coolant Pump Differential pressure
- Secondary System Parameters:
 - Feedwater flow
 - Feedwater temperature
 - Feedwater pressure
 - Steam pressure
 - Steam flow
 - Turbine First Stage pressure
 - Steam Generator Blowdown flow rate
- Core Parameters:
 - Flux level from Fixed Incore Detectors
 - CEA positions from CEDMCS Pulse Counter

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COLSS outputs include the following:

- COLSS Indications:
 - Core Power Operating Limit based on DNBR (meter on 2C03)
 - Core Power Operating Limit based on LPD (meter on 2C03)
 - Chart Recorder 2JR-9002 on 2C04)
 - Digital Point Display on Control Room CRTs
 - Digital indication of COLSS Licensed Power (meter on 2C100)
- COLSS Alarms
 - COLSS Power Margin Exceeded
 - CPC Az Tilt Exceeded
 - Tech Spec Az Tilt Exceeded
 - COLSS Input Parameter Processing
- Sensor Validity Check

The purpose of this portion of COLSS is to check for out of range sensors and perform a cross check of like sensors. The program is designed so that if an invalid sensor is detected, corrective action can be taken, either automatic or manual. This check is performed every 1 second. An alarm message is displayed if a failure is detected.

The following options are available for COLSS input variables:

- Automatic replacement of a failed process input by an alternate process input.
- Automatic algorithm alteration for certain functions when no alternate inputs are available. This automatic alteration functions to set the sensor and all calculations in which the sensor is inputted to NCAL.
- Manual Substitution of LIKE sensor inputs. LIKE sensors are those measuring the same parameter at or near the same location.
- Manual Substitution of constants for selected COLSS inputs.
- Analog Measurement Error Adjustment
 - COLSS Power and Flow Calculations
- RCS Volumetric Flow Rate

The flow rate through each Reactor Coolant Pump is determined from the pump differential pressure and the pump speed. The pump flow rates are then determined from factory measured pump characteristic curves. The four pump flow rates are summed to obtain total volumetric flow rate. This calculation is performed every one second.

- Primary Calorimetric Power

Core Delta T power is calculated based on pressurizer pressure, hot leg and cold leg temperatures and reactor coolant mass flowrate. This calculation is performed every one second.

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- Secondary Calorimetric Power (SCAL)

This power represents an energy balance across the Secondary side of the Steam Generators. This calculation is performed every 10 seconds above 15% Delta T power using 30 sampling points of smoothed data. SCAL can be calculated using feedwater flow (FWBSCAL) or steam flow (MSBSCAL). The COLSS PMS Screen is used to select between these two power calculations.

- Turbine Power Calculation

This calculation is based upon the fact that turbine load is directly proportional to turbine first stage pressure. It is performed every one second.

- Power Calibration
 - COLSS automatically calibrates Delta T power and Turbine power to Secondary Calorimetric power. This calibration is performed incrementally every one second when the Secondary Calorimetric power level is being calculated such that the calibration will occur over a period of time.
 - Delta-T and Turbine power can also be calibrated to Secondary Cal by using the Calibration Turb and Delta-T Powers program. This is accessed off the COLSS2 Menu on the PMS.

- Plant Power Selection

Below 15% Delta T power, Plant Power (CV9000) and Smoothed Plant Power (CV5993) are uncalibrated Delta T power. From 15% (ΔT) to 80% (Sec Cal) COLSS selects the maximum of either calibrated Delta T power or Calibrated Turbine power. Above 80% (Sec Cal), COLSS selects the maximum of either Secondary Calorimetric power or Calibrated Turbine power. If the Secondary Calorimetric Power Calculation is bad above 15% power, Plant Power reverts to the higher of uncalibrated ΔT power or uncalibrated Turbine power.

- Licensed Power Selection (used for comparison with Licensed Power limit)
 - Licensed Power (CV5001) is the value displayed on 2QI-9529 (on 2C100). This value is logged to satisfy compliance with the licensed power limit.
 - Above 15% (ΔT) with Sec Cal good, CV5001 will indicate the value from CV9005M2 (2 min rolling avg of Sec Cal.)
 - Below 15% (ΔT) AND anytime Sec Cal is NOT good (NCAL), CV5001 will indicate the value from CV5993 (2 minute rolling avg of Plant Power).

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COLSS Flux and Power Distribution Calculations

- Incore Detector Inputs

The core contains 42 incore detector assemblies. Each assembly contains five detectors equally spaced along the vertical axis of the core and located in a symmetrical pattern. The incore detectors are read by the computer every 10 seconds. The signals are corrected for leakage, background and rhodium depletion (sensitivity correction) before further processing.

- Conversion of Flux to Power

COLSS determines the actual power from a given incore flux detector signal and integrates the relative power for an incore detector region for the purpose of updating fuel burnup factors. Pre-calculated correction factors for region burnup, power level, and CEA insertion are used in the flux to power conversion.

- Planar Radial Peaking Factor and Rod Shadowing Factor Selection

Pre-calculated planar radial peaking factors and rod shadowing factors are determined based on CEA group positions and plant power. This calculation is performed every 10 seconds above 15% (CV9000) ΔT power.

Planar radial peaking factor is the ratio of the power in the hottest fuel pin in a core plane (a radial slice) to the power in the average fuel pin in that plane. This ratio is affected by CEA insertion, plant power level and fuel burnup.

Penalty factors are calculated for regulating group out of sequence and excessive deviation within a group. These values are used to modify the planar radial peaking factors. Both planar radial peaking factors and rod shadowing factors are determined by table lookup schemes. The proper table entry is selected based on CEA configuration.

- Axial Flux Distribution Calculation

ASI is calculated using the corrected incore detector signals. The signal from all detectors at a particular level is averaged to give power indications at that level. This operation is repeated to give power indications from the detectors at all five axial locations. The detector power signals are corrected for rod shadowing and shape annealing and a curve is generated. The curve that is generated is broken into forty nodes (points) and is supplied to the LPD Limit Calculation. This same curve is broken down into twenty nodes and is supplied to the DNBR Calculation. This calculation is performed every 10 seconds above 15%.

The basic equation for Axial Shape Index (ASI) is:

$$\frac{\text{Power in Lower 20 Nodes} - \text{Power in Upper 20 Nodes}}{\text{Power in all 40 Nodes}}$$

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- Azimuthal Tilt

Azimuthal Power Tilt (Az Tilt) is the power asymmetry between azimuthally symmetric fuel assemblies (located directly across and at the same distance from the center of the core). Ideally, all signals from azimuthally symmetric detectors should be equal. Since this seldom occurs, a power tilt exists.

Az Tilt is described by an amplitude and an angle. The tilt amplitude is equivalent to the maximum power that any fuel pin will see due to radial power asymmetries observed by the incore detectors. It is obtained by vector addition of the individual tilts from all azimuthally symmetric detector sets after assigning greater importance to those located farthest from the center. The tilt angle is the angle in which this resultant vector tilt amplitude occurs. COLSS continuously runs an on-line program for tilt calculations; Vector tilt (CV9767) and Arithmetic tilt (CV9766). The vector tilt is normally preferred since its calculation results in a smaller tilt value, which provides more operating margin to calculated thermal power limits.

The Az Tilt calculation compares COLSS tilt to CPC Az Tilt limit and actuates an annunciator if the CPC limit is exceeded. This calculation is performed every 10 seconds above 15%.

Calculation of Power Operating Limits

- LPD (Kw/ft) Power Operating Limit Calculation
The power in the average node in the core is multiplied by a three dimensional peaking factor to determine the maximum Local Power Density (LPD). This calculated value is compared to cold leg temperature dependent Kw/ft values to determine the Core Operating Limit. The power limit based on LPD is displayed on 2C03. This calculation is performed every 10 seconds above 15%.
- DNBR Power Operating Limit Calculation

This portion of COLSS evaluates the core power operating limit based on the limiting thermal margin determined from DNBR. The power limit based on DNBR is displayed on 2C03. This calculation is performed every 30 seconds above 15% and tuned every second based on changes in RCS flow rate, coolant inlet temperature or PZR pressure.
- Core Power Margin and Alarm Annunciation

COLSS performs continuous monitoring of plant power with respect to the licensed power limit and the calculated core power operating limits. The condition is alarmed whenever plant power exceeds a power operating limit or when licensed power exceeds the licensed power limit.
- COLSS Addressable Constant Changes

COLSS uses addressable constants that are changeable in the calculations for power limits. It is necessary to verify these constants twice weekly when in Mode 1 or 2, after maintenance, and if PMS is reloaded from tape storage unit. The constants are verified using the Periodic Addressable Constant log (2105.013, Attachment D).

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4.0 REFERENCES

4.1 References Used in Procedure Preparation:

- ANO Unit 2 Tech Spec Section 3/4.2 and Table 3.3-1
- CR-2-90-0221-02 (addressable constant channel check)
- LPD/DNBR Tech Spec Change
- PIE-90-0148-B, Nuclear Instrumentation Miscalibration
- System 32/77 Computer System
- NRC Memo SSINS #200/AITS.F14580H2 dated 8-22-80, Discussion of "Licensed Power Level"
- CR-2-2003-00919-02 (TS 4.1.3.6 with PDIL alarm inoperable)

4.2 References Used In Conjunction With This Procedure:

- CEDM Control System Operation (2105.009)
- CPC/CEAC Operations (2105.001)
- Power Operation (2102.004)
- Core Protection Calculator Change Control (1022.002)
- RTD Response Time Penalty Calculation (2302.006)
- ANO Unit 2 Tech Spec Section 3/4.2 and Table 3.3-1
- Azimuthal Power Tilt Calculation (2103.017)
- Heat Balance Calculation (2103.016)
- RCS Flow Rate Calculation (2103.018)
- COLSS Monthly Op Test (2312.001)
- Periodic Core Power Distribution (2302.005)
- Plant Computer Operation (2105.010)
- Computer Support Trending Program (1082.005)
- Unit Two Operations Logs (1015.003B)
- CR-ANO-1-1999-0038-005, COLSS Out of Service and EFPD update

5.0 LIMITS AND PRECAUTIONS

5.1 When COLSS is required to be operable by Tech Specs, then for the following conditions, as a minimum, any computer point shall have evaluation performed using COLSS Impact Assessment (2105.013B).

- Prior to removal of incore detector from scan.
- Prior to removal of CEA Pulse counter from scan.
- Prior to deleting from processing of any other COLSS computer point.
- Prior to substituting any COLSS computer point.
- Failure of transmitter which provides input to COLSS.

5.2 BEFORE exceeding 20% power, verify COLSS in service.

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6.0 SETPOINTS

- 6.1 Refer to Annunciator 2K10 Corrective Actions (2203.012J) for COLSS PMS generated alarms.
- 6.2 If COLSS INOP (PID) in alarm, then this is to be considered definite indication of loss of COLSS operability.
- 6.3 The following are possible indications of loss of COLSS operability:
- 6.3.1 No change in the following indications for several minutes:
- ASI
 - Plant Power/Licensed Power
 - Azimuthal Tilt
- 6.3.2 LPD or DNBR Power Operating Limit indicates zero on 2C03.
- 6.3.3 One or more of the following alarms are received:
- COLSS Power Margin Exceeded (2K10-A2)
 - CPC Az Tilt Exceeded (2K10-C2)
 - Minor CEA Deviation (2K10-D1)
 - Major CEA Deviation (2K10-C1)
 - Reg Group CEA PPDIL (2K10-G1)
 - Reg Group CEA PDIL (2K10-F1)
 - Reg Group Out of Sequence (2K10-E1)

NOTE

BV9013 will display current tilt calculation that is being used whether it is vector or arithmetic.

- 6.4 IF any of the following occur,
THEN Azimuthal Tilt (CV9008) will automatically shift from vector tilt (CV9767) to arithmetic tilt (CV9766):
- Vector tilt value > 0.05 (BV9013)
 - Vector tilt calculation failed (BV9011)

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6.5 PMS Computer generates the following alarms on alarm screen (DAD):

6.5.1 COLSS INOP - COLSS inoperable due to software or hardware failure.

6.5.2 CEA INOP - Control Element Sequencer inoperable due to software or hardware failure.

6.5.3 CEA Position Related alarms:

- Two CEA position indications NOT available
(BV2000 = NO)
- Individual CEA position deviation > 5 inches
(BV2001 = YES)
- CEA deviation within group > 7 inches
(BV2002 = YES)
- Shutdown Bank CEAs NOT fully withdrawn
(BV2003 = NO)

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7.0 COLSS OPERATION

NOTE

A failover can only occur when system in Primary with Backup Mode.
Manual requests via FAIL Turn on Code will be denied for any other mode.

7.1 Operability testing requirements.

- BEFORE declaring COLSS operable during unit startup, verify incore detectors checked using Power Operation (2102.004).
- Verify COLSS Alarms operable using Supplement 1, COLSS Monthly Operability Test, of this procedure every 31 days
- Verify COLSS Tilt Calculation Validity Check performed every 31 days using Azimuthal Power Tilt Verification (2302.056).

7.2 IF Power Dependent Insertion Limit (PDIL) alarm fails, THEN verify CEA position every 4 hours. (Refer to TS 4.1.3.6)

7.3 Use COLSS Impact Assessment (2105.013B) and Point Substitution or Removal from Scan (2105.013C) to perform any of the following:

- Removal of failed Incore detector from scan.
- Removal of failed CEA pulse counter indication from scan.
- Removal of any COLSS computer point or transmitter from scan.
- Placement of COLSS computer point to sub value.

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- 7.4 IF desired to change COLSS Addressable Constants,
THEN perform the following:
- 7.4.1 Verify change directed by another written procedure.
- 7.4.2 At PMS enter CONST to access COLSS Display/Update Constants.
- A. Select desired point to be changed.
- B. Type in new value, depress ENTER.
- C. Depress F3 (Update).
- 7.4.3 Log changes in COLSS Addressable Constant Change Log (Attachment A).
- 7.4.4 Perform COLSS Periodic Addressable Constant Log (Attachment D or PMS printout).
- 7.5 Verify COLSS Addressable Constant values are same as latest entry in COLSS Addressable Constant Change log using Periodic Addressable Constant log (Attachment D) or PMS generated form for the following instances:
- At least weekly in Modes 1 and 2
 - Prior to placing COLSS/PMS in service following maintenance
 - Prior to placing COLSS/PMS in service following reload from tape storage unit (CSG or Reactor Engineering confirmation)
- 8.0 OPERATION WITH COLSS OUT OF SERVICE
- 8.1 IF COLSS inoperable during power operation,
THEN perform the following:
- 8.1.1 Refer to Loss of COLSS (2203.043).
- 8.1.2 Due to Power Dependent Insertion Limit (PDIL) alarm inoperable, verify CEA position every 4 hours.
(Refer to TS 4.1.3.6)

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9.0 CHECK OF COMPUTER POINTS REMOVED FROM SCAN AND SUBSTITUTED VALUES

- 9.1 Perform check of COLSS computer points removed from scan under the following conditions:
- Weekly in Modes 1 and 2.
 - IF maintenance performed on PMS computer,
THEN as soon as PMS computer is returned to service.
 - IF PMS computer reloaded from tape storage unit
(CSG or Reactor Engineering confirmation),
THEN as soon as PMS computer is returned to service.
- 9.2 Check COLSS computer points removed from scan agree with Control Room computer printout as follows:
- 9.2.1 Obtain COLSS Deleted From Processing/Substituted Points printout (R3 function).
- 9.2.2 Compare printout obtained in above step with copy of printout maintained in Control Room.
- 9.2.3 IF additional points have been deleted or substituted,
THEN verify COLSS Impact Assessment (2105.013B) has been completed for each deleted or substituted point.
- 9.2.4 Review restoration dates on 2105.013B for deleted or substituted points.
- 9.2.5 IF deleted or substituted points have exceeded date,
THEN perform the following:
- A. Investigate cause for delay in restoration.
 - B. Evaluate placing deleted or substituted points back in service.
 - C. IF point NOT returned to service,
THEN revise date and record reason for delay in comments section of 2105.013B.
- 9.2.6 IF PMS computer reloaded from tape,
AND printouts differ,
THEN verify correct disk storage unit was used to reload PMS (CSG or Reactor Engineering confirmation).
- 9.2.7 Maintain current copy of COLSS Deleted From Processing/Substituted Points printout (R3 function) and 2105.013B in Control Room.

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10.0 PLACING POINTS REMOVED FROM SCAN AND SUBSTITUTED BACK IN SERVICE

- 10.1 Place points back in service using Restoring COLSS Points to Service (2105.013D).
- 10.2 Maintain current copy of COLSS Deleted From Processing/Substituted Points printout (R3 function) in Control Room.
- 10.3 Discard COLSS Impact Assessment (2105.013B) associated with point returned to service.

11.0 SECONDARY CALORIMETRIC POWER SELECTION

- 11.1 On PMS COLSS screen Page 2, select Operator Select Switch For BSCAL.

CAUTION

Indicated power could rise as much as 1.5% when shifting from MSBSCAL to FWBSCAL.

- 11.2 IF secondary calorimetric power based on feedwater flow (FWBSCAL) will be used,
THEN select FWBSCAL SELECTED.
- 11.3 IF secondary calorimetric power based on steam flow (MSBSCAL) will be used,
THEN perform the following:
 - 11.3.1 Verify MSBSCAL indicates > 95%.
 - 11.3.2 Select MSBSCAL SELECTED.
- 11.4 Verify selected power changes from green to red.
- 11.5 Select CONTINUE on PMS Screen to complete power selection.

12.0 TURBINE AND DELTA-T POWER CALIBRATION

- 12.1 Access COLSS2 Menu on PMS.
- 12.2 Depress CALIBRATION TURB AND DELTA-T POWERS button on PMS screen to select Calib-Calibrate Delta-T and Turbine Power to Sec Cal Pwr screen.
- 12.3 IF desired to calibrate Turbine Power,
THEN depress Calibrate Turbine button on PMS screen.
- 12.4 IF desired to calibrate Delta-T Power,
THEN depress Calibrate Delta-T button on PMS screen.
- 12.5 WHEN desired to exit Calibration screen,
THEN depress COLSS2 menu button.

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ATTACHMENT B

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COLSS ADDRESSABLE CONSTANTS

<u>PID</u>	<u>DESCRIPTION</u>	<u>PID</u>	<u>DESCRIPTION</u>
K9000	FW Temp Crosscheck Limit	K9038	CPC Tilt LIMIT
K9001	STM Press Crosscheck Limit	K9039	Tech Spec Tilt Limit
K9002	FW Flow Crosscheck Limit	K9041	Licensed Power Limit
K9003	STM Flow Crosscheck Limit	K9042	Min RPM(I) Speed
K9004	S/G 1 Press Correction	K9043	RCP Speed Crosscheck Limit
K9005	S/G 2 Press Correction	K9044	RCP DP Cross Check Limit
K9006	S/G 1 Press Correction	K9045	TCOLD Cross Check Limit
K9007	S/G 2 Press Correction	K9046	THOT Cross Check Limit
K9008	S/G 1 BD Specific Volume	K9047	RCS Press Crosscheck Limit
K9009	S/G 2 BD Specific Volume	K9048	TFSP Crosscheck Limit
K9010	S/G 1 Steam Quality	K9080	Core AVG Linear Heat Rate
K9011	S/G 2 Steam Quality	K9081	Failed IC Correction Factor
K9012	S/G 1 BD Fluid Quality	K9100	Min Prim Cal PWR (BDELT)
K9013	S/G 2 BD Fluid Quality	K9650	Adjust For Model Uncertainty
K9014	Letdown Mass Flow Rate	K9655	Min Plant PWR To Do Block L
K9015	Letdown Fluid Enthalpy	K9656	Min Plant PWR To Do Block U
K9016	RCP Seal Coolant Loss	K9657	BDYN Derivative Gain
K9017	RCP Seal Coolant Enthalpy	K9660	S/G 1 FW Venturi Coefficient
K9018	Cooling Water Mass Flow	K9661	S/G 2 FW Venturi Coefficient
K9019	Cooling Water Enthalpy Rise	K9662	S/G 1 FW Venturi Temp Coeff
K9020	Cooling Water Losses	K9663	S/G 2 FW Venturi Temp Coeff
K9021	Cooling Water Enthalpy	K9664	Axial Shape Index High Limit
K9022	Energy Pressurizer Loss	K9665	Axial Shape Index Low Limit
K9023	RCP Piping Energy Loss	K9670-73	Forward Flow Gain
K9024	Energy Loss From Both S/G	K9674-77	Forward Flow Bias
K9025	Other NSSS Energy Losses	K9678-81	Reverse Flow Gain
K9026	Charging Pump Mass Flow	K9682-85	Reverse Flow Bias
K9027	Charging Pump Enthalpy	K9688	Rated Vessel Flow
K9028	Total RCP Energy Input	K9689	Dynamic Power Gain
K9029	Energy Input Pzr Heaters	K9690	Delta T Power Gain
K9030	Other Elect Energy Inputs	K9691	Static Power Bias
K9031	Other Energy Inputs	K9692	Dynamic Power Limit
K9032	Full Rated Calorimetric PWR	K9693-96	Turbine Power Coefficients
K9033	S/G 1 FW Press Corr Factor	K9697	Peaking Factor Adjustment
K9034	S/G 2 FW Press Corr Factor		
K9035	S/G 1 FW Press Corr Factor		
K9036	S/G 2 FW Press Corr Factor		

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ATTACHMENT C

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COLSS INPUT PARAMETERS

INST NO	POINT ID	INST NO.	POINT ID
2TT-4616	T4616	2SY-6131A	S6131A
2TE-4615	T4615-A	2SY-6131B	S6131B
2TE-4715	T4715-A	2SY-6121A	S6121A
2TT-4716	T4716	2SY-6121B	S6121B
2TT-4614-1	T4614	2SY-6141A	S6141A
2TT-4714-2	T4714	2SY-6141B	S6141B
2PY-4626-A	P4626-A	2SY-6151A	S6151A
2PY-4626-B	P4626-B	2SY-6151B	S6151B
2FT-1029	PD1029	2PDT-6176A	PD6176A
2FT-1129	PD1129	2PDT-6176B	PD6176B
2FT-1030	PD1030		
2FT-1130	PD1130		
2FT-1030A	PD1030A		
2FT-1130A	PD1130A		
2TE-1023	T1023	2PDT-6166A	PD6166A
2TE-1073	T1073	2PDT-6166B	PD6166B
2PT-0222	PO222	2PDT-6186A	PD6186A
2PT-1020	P1023	2PDT-6186B	PD6186B
2PT-1070	P1073	2PDT-6196A	PD6196A
2SQT-1017	F1017	2PDT-6196B	PD6196B
2SQT-1067	F1067		
2PY-1141-1B	P1141-1	2PY-1041-1B	P1041-1
2PY-1141-2B	P1141-2	2PY-1041-2B	P1041-2
2PY-1141-3B	P1141-3	2PY-1041-3B	P1041-3
2PY-1141-4B	P1141-4	2PY-1041-4B	P1041-4
CALCULATED	P1141	CALCULATED	P1041
CALCULATED	CV1201*		
2FT-1029A	PD1029A		
2FT-1129A	PD1129A		
2TE-1023A	T1023A		
2TE-1073A	T1073A		

* CV1201 is Center Weighted Average of T4615, T4615-A, T4715, and T4715-A. It is calculated by COLSS. CV1201 calculated in COLSS but NOT used in COLSS except for "COLSS Power Marg" = Alarm.

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ATTACHMENT C

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COLSS INPUT PARAMETERS

<u>POINT ID</u>	<u>POINT ID</u>
CEA01	CEA22
CEA02	CEA23
CEA03	CEA24
CEA04	CEA25
CEA05	CEA26
CEA06	CEA27
CEA07	CEA28
CEA08	CEA29
CEA09	CEA30
CEA10	CEA31
CEA11	CEA32
CEA12	CEA33
CEA13	CEA34
CEA14	CEA35
CEA15	CEA36
CEA16	CEA37
CEA17	CEA38
CEA18	CEA39
CEA19	CEA40
CEA20	CEA41
CEA21	CEA42
CEA43	CEA64
CEA44	CEA65
CEA45	CEA66
CEA46	CEA67
CEA47	CEA68
CEA48	CEA69
CEA49	CEA70
CEA50	CEA71
CEA51	CEA72
CEA52	CEA73
CEA53	CEA74
CEA54	CEA75
CEA55	CEA76
CEA56	CEA77
CEA57	CEA78
CEA58	CEA79
CEA59	CEA80
CEA60	CEA81
CEA61	CRMIN1-6*
CEA62	SDMINA-B*
CEA63	PLMIN1-2*
	CRDEV1-6*
	SDDEVA-B*
	PLDEV1-2*

* These points are generated by COLSS.

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COLSS INPUT PARAMETERS

<u>POINT ID</u>	<u>POINT ID</u>
NA06-1/5*	NJ02-1/5*
NB07-1/5*	NJ04-1/5*
NB09-1/5*	NJ06-1/5*
NC04-1/5*	NJ08-1/5*
NC06-1/5*	NJ10-1/5*
NC08-1/5*	NJ12-1/5*
NC10-1/5*	NJ14-1/5*
NC12-1/5*	NL02-1/5*
NE02-1/5*	NL04-1/5*
NE04-1/5*	NL06-1/5*
NE06-1/5*	NL08-1/5*
NE10-1/5*	NL10-1/5*
NE12-1/5*	NL12-1/5*
NE14-1/5*	NL14-1/5*
NG02-1/5*	NN04-1/5*
NG04-1/5*	NN06-1/5*
NG06-1/5*	NN10-1/5*
NG08-1/5*	NN12-1/5*
NG10-1/5*	NP07-1/5*
NG12-1/5*	NP09-1/5*
NG14-1/5*	NR10-1/5*

* 1/5 indicates 5 levels of detectors 1 through 5.

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ATTACHMENT D

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PERIODIC ADDRESSABLE CONSTANT LOG

POINT ID (Note 1)	PMS
K9038	
K9039	
K9690	
K9693	
K9674	
K9675	
K9676	
K9677	
AB1 (1)	

(Note 1) Verify all values agree with latest value entered in Addressable Constant Change log.

POINT ID	NORMAL INDICATION	PMS
BV2005	NO (Note 2)	

(Note 2) IF BV2005 Normal indication is YES,
THEN refer to Inoperable CEA Position Indication section of CPC/CEAC Operations (2105.001).

(Note 3) IF performed for other than normal scheduled check per OPS-B38,
THEN annotate below.

COMMENTS:

PERFORMED BY _____ Date _____

SUPERVISOR _____ Date _____

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ATTACHMENT F

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COLSS RETURN TO SERVICE CHECKS

NOTE

- 1, 4 and 8 hour average power calculations will be the same value (history buffer emptied - no data available for averaging) following a COLSS failover or computer restart until the associated times have expired for each calculation.
- After a loss of COLSS, RCS Leak Mass Program (LKMS) must be re-initialized by CSG (it does not restart automatically).

1.0 Prior to declaring COLSS operable following any out-of-service event or failover, verify the following: (CR-ANO-1-1999-0038-005)

- Value of EFPD (CV6011) is within 1.0 of actual EFPD. Contact Reactor Engineering for assistance if found out-of-tolerance.
- CEA positions are correct or updated as required.
- COLSS Addressable Constants are correct or updated as required.
- Any failed Incore detectors removed from scan (refer to Check of Computer Points Removed from Scan and Substituted Values section of this procedure).

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SUPPLEMENT 1

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COLSS MONTHLY OPERABILITY TEST

This supplement verifies proper functioning of the following alarms when above 20% rated thermal power:

- COLSS Azimuthal Tilt, as required by Technical Specification 3/4.2.3.C.
- COLSS DNBR Margin, as required by Technical Specification 3/4.2.4.3.
- COLSS KW/FT Margin, as required by Technical Specification 3/4.2.1.3.

This surveillance requires that COLSS indicated plant power be maintained above 15% of rated thermal power. In situations where plant is either shut down or at power level below 15%, COLSS input simulation test case may be invoked to support completion of this surveillance.

1.0 INITIAL CONDITIONS

NOTE

COLSS inputs may be simulated allowing COLSS to execute when less than 20% thermal power. Simulation of COLSS inputs will require assistance of Computer Support personnel to execute COLSS input simulation test case.

1.1 IF unit below 20% of Rated Thermal Power,
THEN perform the following:

- | | | |
|-------|---|-------|
| 1.1.1 | Notify Shift Manager that COLSS inputs will be substituted and NOT available to Operations for duration of this test. | _____ |
| 1.1.2 | Request COLSS Deleted From Processing/Substituted Points printout (R3 function) at an on-line PMS console. | _____ |
| 1.1.3 | Attach printout to this supplement. | _____ |
| 1.1.4 | Contact CSG personnel to simulate COLSS inputs. | _____ |

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SUPPLEMENT 1

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NOTE

For convenience in alarm value verification operator may call up or create Group Displays (GD CMOT) that contain appropriate points.

2.0 INSTRUCTIONS

2.1 Verify the following at an on-line PMS console:

2.1.1 COLSS operating in scheduled (normal) mode. _____

2.1.2 Verify GD COLSSOP1 group display screen selected as desired. _____

2.1.3 The following parameters have good quality: _____

<u>PT. ID</u>	<u>DESCRIPTION</u>	<u>√</u>
CV9000	Plant Power {I}	___
CV9005	Secondary Cal Power {F}	___
CV5994	Biased DNBR Pol {X}	___
CV5995	Biased KW/FT Pol {X}	___
CV5996	Smoothed DNBR Pol {X}	___
CV5997	Smoothed KW/FT Pol {X}	___
CV9008	Azimuthal Tilt Magnitude {R}	___

2.1.4 The following alarms status is present: _____

<u>PT. ID</u>	<u>DESCRIPTION</u>	<u>VALUE</u>	<u>√</u>
BV9000	DNBR Power Limit {X}	IN RANG	___
BV9001	KW/FT Power Limit {X}	IN RANG	___
BV9002	Licensed Power Limit {X}	IN RANG	___
BV9203	Instantaneous DNBR Power Lim {X}	IN RANG	___
BV9204	Instantaneous KWFT Power Lim {X}	IN RANG	___
BV6047	COLSS-CPC Azimuthal Tilt Lim {R}	NORMAL	___
BV9500	T/C Less Than 542.5°F	FALSE	___

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SUPPLEMENT 1

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2.2 Test COLSS CPC Tilt Limit Annunciation (2K10, C-2).

2.2.1 Select SDS COLSS Monthly Operability Test (CMOT) screen at an on-line PMS console. _____

2.2.2 Verify GD COLSSOP2 group display screen selected on second PMS console as desired. _____

2.2.3 Perform the following:

A. Select AZIMUTHAL TILT ALARM (Option 1). _____

B. Depress ENTER key. _____

C. Depress F3 (SAVE) key. _____

D. Check COLSS CPC AZ TILT (2K10, C-2) alarms within 10 seconds. _____

2.2.4 Check COLSS Azimuthal Tilt alarm functional per the following computer point values: _____

<u>PT. ID</u>	<u>DESCRIPTION</u>	<u>VALUE</u>	<u>✓</u>
BV6047	COLSS-CPC Azimuthal Tilt Lim {R}	EXCEED	—
JA9045#	COLSS CPC Azimuthal Tilt Alm	CPC TLT	—
JA9045\$	COLSS CPC Azimuthal Tilt Alm	CPC TLT	—

2.2.5 Acknowledge 2K10, C-2 AND check the following: _____

<u>PT. ID</u>	<u>DESCRIPTION</u>	<u>VALUE</u>	<u>✓</u>
BV6047	COLSS-CPC Azimuthal Tilt Lim {R}	Normal	—
JA9045#	COLSS CPC Azimuthal Tilt Alm	Normal	—
JA9045\$	COLSS CPC Azimuthal Tilt Alm	Normal	—

2.2.6 Check 2K10, C-2 clears ~30 seconds after alarm is acknowledged. _____

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SUPPLEMENT 1

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2.3 Test COLSS DNBR Margin Annunciation (2K10, A-2)

2.3.1 Verify SDS COLSS Monthly Operability Test (CMOT) screen selected at an on-line PMS console. _____

2.3.2 Verify GD COLSSOP2 group display screen selected on second PMS console as desired. _____

2.3.3 Perform the following:

A. Select DNBR MARGIN ALARM (option 2). _____

B. Depress ENTER key. _____

C. Depress F3 (SAVE) key. _____

D. Check COLSS Power Margin Exceeded (2K10, A-2) alarms within 10 seconds. _____

2.3.4 Check COLSS DNBR Margin alarm functional per the following computer point values: _____

<u>PT. ID</u>	<u>DESCRIPTION</u>	<u>VALUE</u>	<u>√</u>
BV9000	DNBR Power Limit {X}	EXCEED	___
BV9203	Instantaneous DNBR Power Lim {X}	EXCEED	___
JA9044#	COLSS Power Margin Alarm	MARGIN	___
JA9044\$	COLSS Power Margin Alarm	MARGIN	___

2.3.5 Acknowledge 2K10, A-2 AND check the following: _____

<u>PT. ID</u>	<u>DESCRIPTION</u>	<u>VALUE</u>	<u>√</u>
BV9000	DNBR Power Limit {X}	IN RANG	___
BV9203	Instantaneous DNBR Power Lim {X}	IN RANG	___
JA9044#	COLSS Power Margin Alarm	NORMAL	___
JA9044\$	COLSS Power Margin Alarm	NORMAL	___

2.3.6 Check 2K10, A-2 clears ~30 seconds after alarm is acknowledged. _____

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SUPPLEMENT 1

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- 2.4 Test COLSS KW/FT Margin Annunciation (2K10, A-2)
- 2.4.1 Verify SDS COLSS Monthly Operability Test (CMOT) screen selected at an on-line PMS console. _____
- 2.4.2 Verify GD COLSSOP2 group display screen selected on second PMS console as desired. _____
- 2.4.3 Perform the following:
- A. Select "Linear Heat Rate Alarm" (option 3). _____
- B. Depress ENTER key. _____
- C. Depress F3 (SAVE) key. _____
- D. Check COLSS Power Margin Exceeded (2K10, A-2) alarms within 10 seconds. _____
- 2.4.4 Check COLSS Linear Heat Rate Margin alarm functional per the following computer point values: _____
- | <u>PT. ID</u> | <u>DESCRIPTION</u> | <u>VALUE</u> | <u>✓</u> |
|---------------|-----------------------------------|--------------|----------|
| BV9001 | KW/FT Power Limit {X} | EXCEED | — |
| BV9204 | Instantaneous KW/FT Power Lim {X} | EXCEED | — |
| JA9044# | COLSS Power Margin Alarm | MARGIN | — |
| JA9044\$ | COLSS Power Margin Alarm | MARGIN | — |
- 2.4.5 Acknowledge 2K10, A-2 AND check the following: _____
- | <u>PT. ID</u> | <u>DESCRIPTION</u> | <u>VALUE</u> | <u>✓</u> |
|---------------|----------------------------------|--------------|----------|
| BV9001 | KW/FT Power Limit {X} | IN RANG | — |
| BV9204 | Instantaneous KWFT Power Lim {X} | IN RANG | — |
| JA9044# | COLSS Power Margin Alarm | NORMAL | — |
| JA9044\$ | COLSS Power Margin Alarm | NORMAL | — |
- 2.4.6 Check 2K10, A-2 clears ~30 seconds after alarm is acknowledged. _____

PROC./WORK PLAN NO. 2105.013	PROCEDURE/WORK PLAN TITLE: COLSS OPERATIONS	PAGE: 27 of 33 CHANGE: 023-00-0
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SUPPLEMENT 1

PAGE 6 OF 7

- 2.5 IF COLSS inputs simulated,
 THEN perform the following:
- 2.5.1 Have CSG terminate COLSS Input Test Case Simulation. _____
 - 2.5.2 Use SDS function (DFP-Delete From Processing) to delete all database points contained on COLSS Deleted Point Review obtained during step 1.1.2. _____
 - 2.5.3 Request another COLSS Deleted From Processing/Substituted Points printout (R3 function). _____
 - 2.5.4 Verify all required database points identified in step 1.1.2 have been deleted. _____

PROC./WORK PLAN NO. 2105.013	PROCEDURE/WORK PLAN TITLE: COLSS OPERATIONS	PAGE: 28 of 33 CHANGE: 023-00-0
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SUPPLEMENT 1

PAGE 7 OF 7

3.0 ACCEPTANCE CRITERIA

3.1 Did COLSS Power Margin alarm annunciate during performance of this test as required? YES NO

3.2 Did COLSS CPC Azimuthal Tilt alarm annunciate during performance of this test as required? YES NO

3.3 IF NO circled in step 3.1 or step 3.2, THEN perform the following:

3.3.1 Notify S/M. _____

3.3.2 Enter the following Tech Specs:

- COLSS KW/FT Margin Tech Spec 3.2.1 Action b _____
- COLSS Azimuthal Tilt Tech Spec 3.2.3 Action a _____
- COLSS DNBR Margin Tech Spec 3.2.4 Action b _____

3.3.3 Contact Computer Support Group for assistance. _____

3.3.4 Initiate WR/WO as applicable. _____

Comments: _____

Performed by _____ Date _____

4.0 SUPERVISOR REVIEW AND ANALYSIS

4.1 Have conditions of Acceptance Criteria been satisfied? YES NO

NOTE

Tech Spec Action may be exited when continuous monitoring of failed parameter has been established on PMS or alarm restored.

4.2 IF NO answered to step 4.1, THEN perform the following corrective actions:

- Verify LCO Tracking Record complete per Conduct of Operations (1015.001). _____
- Verify Condition Report initiated. _____

Comments: _____

Supervisor _____ Date _____

COLSS IMPACT ASSESSMENT

PAGE 1 OF 2

This form performed under the following conditions, as a minimum, anytime COLSS is required to be operable by Technical Specifications: (This does not apply when resetting CEA pulse counter. This only applies to COLSS computer points that input into COLSS calculations.)

- Prior to removal of incore detector from scan
- Prior to removal of CEA Pulse Counter from scan
- Prior to removal of any other COLSS computer point from scan
- Prior to placing any other COLSS computer point to manual value
- Failure of transmitter which provides input to COLSS

1.0 COLSS IMPACT ASSESSMENT (Licensed Operator)

1.1 Enter the following data:

- Affected computer point _____
- Anticipated restoration date: _____
- Reason for removing or substituting point: _____

1.2 IF an Incore Detector affected,
THEN perform the following (N9 function, CHECK program):

- 1.2.1 Identify core location - level _____ - _____
Nxxx y
- 1.2.2 IF detector will be removed from scan,
THEN verify compliance with SAR Section 7.7.1.1.7.
- 1.2.3 IF SAR Section 7.7.1.1.7 will be satisfied,
THEN complete Point Substitution or Removal
from Scan (2105.013C).

1.3 IF a CEA Pulse Counter affected,
THEN perform the following:

- 1.3.1 Check both Reed Switches are operable for CEA. _____
- 1.3.2 IF TS 3.1.3.2 (Mode 1 or 2) will be satisfied,
THEN complete Point Substitution or Removal
from Scan (2105.013C). _____

FORM TITLE:

COLSS IMPACT ASSESSMENT

FORM NO.

2105.013B

REV.

023-00-0

COLSS IMPACT ASSESSMENT

PAGE 2 OF 2

- 1.4 IF computer point other than an Incore Detector or CEA Pulse Counter affected,
THEN perform the following:
- 1.4.1 Identify impact of altering status of input on COLSS calculations. _____
-
- 1.4.2 Will altering status of affected computer point render any COLSS calculation ineffective (COLSS inoperable)? YES NO
- Obtain assistance from Reactor Engineering or Computer Support as necessary.
- 1.4.3 IF NO circled in step 1.4.2,
THEN initiate 2105.013C. _____
- 1.4.4 IF YES circled in step 1.4.2,
THEN perform the following:
- A. Does current status of affected computer point render COLSS inoperable? YES NO
- B. IF COLSS inoperable,
THEN refer to Operation With COLSS Out Of Service section of this procedure. _____

Comments: _____

Performed By: _____ Date: _____

Licensed Operator

S/M Review: _____ Date: _____

Forward copy to Reactor Engineering.

FORM TITLE:	COLSS IMPACT ASSESSMENT	FORM NO.	2105.013B	REV.	023-00-0
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POINT SUBSTITUTION OR REMOVAL FROM SCAN

PAGE 1 OF 2

- 1.0 IF removing an Incore Detector from service,
THEN perform the following:
- 1.1 IF SAR Section 7.7.1.1.7 will NOT be satisfied,
THEN enter TS action statement. _____
(Refer to TS 3.2.2, 3.2.3, and 3.10.2)
 - 1.2 Go to RIS1 or RIS2 computer function. _____
 - 1.3 To delete, use RID (type PID as xxx-y). _____
 - 1.4 Perform CHECK program using N9 to verify incore was removed
from scan. _____
 - 1.5 Perform Independent Verification of incore removed from
scan. _____
 - 1.6 Submit WR/WO for deleted Incore. WR/WO # _____
- 2.0 IF removing any CEA Pulse Counter from service,
THEN perform the following:
- 2.1 IF in Mode 1 or 2
AND TS 3.1.3.2 will NOT be satisfied,
THEN enter TS action statement. _____
 - 2.2 Make Status Board entry for CEA Pulse Counter removed from
scan. _____
 - 2.3 Make Station log entry for CEA Pulse Counter removed from
scan. _____
 - 2.4 Enter DFP (Deleted From Processing function) at an on-line
PMS console. _____
 - 2.5 Type in CEA to be removed from scan. _____
 - 2.6 Perform Independent Verification of CEA to be removed from
scan. _____
 - 2.7 Depress ENTER to remove CEA from scan. _____

FORM TITLE:

POINT SUBSTITUTION OR REMOVAL FROM SCAN

FORM NO.

2105.013C

REV.

023-00-0

POINT SUBSTITUTION OR REMOVAL FROM SCAN

PAGE 2 OF 2

NOTE

Do not substitute values into # or \$ points unless requested by CSG.

3.0 IF removing any computer point other than Incore Detector or CEA Pulse Counter from service,
THEN perform the following:

- 3.1 Contact CSG to remove security level protection for DFP (Deleted From Processing function). _____
- 3.2 Enter DFP function at an on-line PMS console. _____
- 3.3 Type in affected point to be removed from scan. _____
- 3.4 Perform Independent Verification of point to be removed from scan. _____
- 3.5 Depress ENTER to remove point from scan. _____

4.0 If desired to enter manual substitution for any computer point other than Incore Detectors or CEA Pulse Counters,
THEN perform the following:

- 4.1 Contact CSG to remove security level protection for SV (Substitute Value function). _____
- 4.2 Enter SV function. _____
- 4.3 Type in affected point to be substituted. _____
- 4.4 Type in substituted value. _____
- 4.5 Perform Independent Verification of point and value to be substituted. _____
- 4.6 Depress ENTER to substitute value. _____

5.0 Place current COLSS Deleted From Processing/Substituted Points printout (R3 function) and copies of completed 2105.013B and 2105.013C in Control Room book (Unit 2 Incore Detector Log). _____

Performed By _____ Date _____

Independent Verification _____ Date _____

Supervisor _____ Date _____

Forward copy to Reactor Engineering for review.

FORM TITLE:

POINT SUBSTITUTION OR REMOVAL FROM SCAN

FORM NO.

2105.013C

REV.

023-00-0

RESTORING COLSS POINTS TO SERVICE

PAGE 1 OF 1

This form used in conjunction with COLSS Impact Assessment (2105.013B) to restore points that have been either removed from scan, or have manually substituted values.

1.0 IF point NOT an incore,
THEN perform the following:

- 1.1 Perform channel check to verify point to be returned is good. _____
- 1.2 Enter RPTP Turn On Code at an on-line PMS console. _____
- 1.3 Type in point desired to return to active scan. _____
- 1.4 Perform Independent Verification of point to be returned to active scan. _____
- 1.5 Depress ENTER to return point to active scan. _____
- 1.6 Contact CSG to restore security level protected to DFP function. _____

2.0 IF point is an incore,
THEN perform the following:

- 2.1 Enter COLSS Turn On Code at an on-line PMS console. _____
- 2.2 Select RIS function. _____
- 2.3 Restore using RIR function. _____
- 2.4 Perform Independent Verification of incore returned to active scan. _____

3.0 Place current COLSS Deleted From Processing/Substituted Points printout (R3 function) in Control Room book (Unit 2 Incore Detector Log). _____

Performed By _____ Date _____

Independent Verification _____ Date _____

Supervisor _____ Date _____

Forward copy to Reactor Engineering.

FORM TITLE: RESTORING COLSS POINTS TO SERVICE	FORM NO. 2105.013D	REV. 023-00-0
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ARKANSAS NUCLEAR ONE
UNIT 2

In the event of failure of both sets of valves, reactor decay heat will be removed through the main steam safety valves and the RCS will remain at hot shutdown. Cooldown can be accomplished through manual operation of the atmospheric dump valves. Each valve has a handwheel which can be operated locally.

7.7.1.1.6 Boron Control System

Boron concentration control is normally accomplished by manual dilution and boration as described in Section 9.3.4. During normal operation, boron concentration is measured by radiochemistry analysis.

7.7.1.1.7 In-Core Instrumentation System

The in-core instrumentation system is used to evaluate core power and temperature distributions, perform periodic calibrations of the out-of-core flux measurement system, and provide inputs to the Core Operating Limit Supervisory System (COLSS). This system is used for confirmation and calibration of neutron flux measurements.

There are 42 in-core monitoring assemblies spaced radially and axially to permit flux mapping of the core. (See Figure 7.7-5) At each of the selected locations, an instrument assembly is inserted into the center of the fuel assembly. Each instrument assembly contains five rhodium self-powered detectors placed at selected axial locations and an outlet thermocouple. The assemblies contain background detectors to provide a means of determining signal noise. The rhodium detectors produce a current proportional to the beta emission from a central rhodium wire following activation by neutron capture.

The plant computer system corrects the in-core detector signals for background pickup and changes in sensitivity with burnup. Chromel-Alumel thermocouples are positioned to read coolant exit temperatures from the fuel assemblies.

Detector assemblies are routed into the reactor vessel through eight in-core instrumentation nozzles in the reactor vessel head. An instrumentation support plate assembly within the reactor vessel guides the detector assemblies into selected fuel assemblies.

The fixed in-core instrumentation system is designed to perform the following functions:

- A. To determine the gross power distribution in the core at different operating conditions over the range from 10 to 125 percent average reactor power;
- B. To provide data to estimate the fuel burnup in each fuel assembly;
- C. To provide data for the evaluation of thermal margins in the core;
- D. To provide data which will be used to check that the core power distribution is consistent with calculated values;
- E. To provide information to calibrate and to assure correct operation of the reactor protection and control systems; and,
- F. To provide signals for use in the COLSS.

ARKANSAS NUCLEAR ONE
UNIT 2

When the incore instrumentation system is used to perform the functions listed above, it must consist of:

1. At least 75% of all incore detectors operable (165 detectors) with at least one incore detector in each quadrant at each level, and
2. At least 75% of all incore detector locations operable (33 locations), and
3. Sufficient operable incore detectors to perform at least six tilt estimates with at least one tilt estimate at each of three levels.

Section 15.1.15 describes the Fuel Misloading event and the analysis of record (AOR) for this event. The AOR allows for only one random failed incore instrument string (in addition to locations E8 and N8) during startup testing (Section 4.5.3.2) for each cycle. With additional strings of ICI failures, the results of the AOR could be invalidated. Specifically, if multiple failed ICI strings were located near a misloaded assembly, then some misloads that could result in fuel damage may not be detected prior to full power operation. To prevent fuel damage, either the required overpower margin (ROPM) must be substantially increased or alternate requirements on ICI operability must be imposed.

If less than 41 incore detector strings were operable during the 30% power distribution measurements at initial startup during each cycle, then the following additional requirements ({i, ii} and/or {A,B}) must be satisfied at all times during the cycle, including during the power distribution measurement:

- i. Sufficient operable incore detectors to perform at least six tilt estimates on each of at least three levels.
- ii. All fuel assemblies except those with one or more full faces to the core shroud must satisfy one of the following criteria:
 - ii.a Be within one assembly of at least one operable ICI detector string (see Figure 7.7-7 for acceptable configurations).
 - ii.b Be within two assemblies of two operable ICI detector strings (see Figure 7.7-8 for acceptable configurations).

If {i} was not satisfied during the 30% power distribution measurement, then one of the following actions must be completed prior to exceeding 50% power:

- A. Perform CEA symmetry checks for at least one CEA group having a CEA within two assemblies of the assembly not in compliance with {ii} above.
- B. Perform an evaluation to determine the ability of the incore detector system to detect average power asymmetry of at least 10% between quadrant 4 x 4 groups of assemblies with the actual operable incore detector pattern and make suitable adjustments to COLSS and CPCs to assure conservative indications of the DNBR and LHR margins.

If {i} is satisfied, but not {ii} during the power distribution measurement, then power ascension can proceed to 70% power before completing one of the above actions. If the non-compliance with {i} and/or {ii} occurs after the power distribution measurement, then one of the above actions must be completed within 14 EFPD upon discovery.

ARKANSAS NUCLEAR ONE UNIT 2

If these minimum conditions are not met, the incore instrumentation system is not used for the above listed applicable monitoring or calibration functions.

For a portion of Fuel Cycle 10 the incore instrumentation system was allowed to be used to perform the functions listed above with $< 75\%$ and $\geq 50\%$ of all incore detectors (< 165 and ≥ 110 detectors) and detector locations (< 33 and ≥ 22 locations) provided appropriate penalties were applied to the COLSS and CPCs.

For Cycle 17, one incore location was inoperable and replaced with a simulated incore detector assembly. The assembly was inserted to provide structural integrity to the incore support structure and provided no input to the incore monitoring system.

The penalties were based on a full 1.0% increase in overall uncertainty on the CECOR F_{xy} measurement.

An operable incore detector location consists of a fuel assembly containing a fixed detector string with a minimum of three operable rhodium detectors.

A tilt estimate can be made from two sets of symmetric pairs of incore detectors. Two sets of symmetric pairs of incore detectors are formed by two pairs of diagonally opposite symmetric detectors, one incore detector per quadrant.

Operability of the incore instrumentation is demonstrated by the performance of a channel check within 24 hours prior to use and at least once per 7 days thereafter when required for monitoring the azimuthal power tilt, radial peaking factors, local power density or DNB margin. In addition, operability is demonstrated at least once per 18 months by the performance of a channel calibration operation which exempts the neutron detectors, but includes all electronic components. The neutron detectors are calibrated prior to installation in the reactor core.

Core power distribution information is available at 210 locations, and temperature distribution information is available at 42 locations throughout the core. The full system has more capability than is needed to verify power and temperature distributions and to calibrate the out-of-core neutron detectors.

The confirmation of power and temperature distribution and calibration of the out-of-core detectors are done on a periodic basis as specified in the Technical Specifications. The frequency is chosen to assure that all protective and control system settings, that depend on core burnup and thermal and hydraulic properties, are maintained at conservative values.

7.7.1.1.8 Megawatt Demand Setter

This section has been intentionally deleted since the Megawatt Demand Setter System has been removed.

7.7.1.1.9 Shutdown Cooling System

The Shutdown Cooling (SDC) System is discussed in Section 9.3.6. The system instrumentation and controls necessary to bring the plant to a cold shutdown condition are discussed in the following sections.

JOB PERFORMANCE MEASUREUNIT: 2 REV #: 001 DATE: _____SYSTEM/DUTY AREA: Incore Instrumentation SystemTASK: Remove An Incore Detector From ScanJTA#: ANO2ROPMSNORM4KA VALUE RO: 3.1 SRO: 3.5 KA REFERENCE: 015 A2.02APPROVED FOR ADMINISTRATION TO: RO: X SRO: XTASK LOCATION: INSIDE CR: X OUTSIDE CR: _____ BOTH: _____

SUGGESTED TESTING ENVIRONMENT AND METHOD (PERFORM OR SIMULATE):

PLANT SITE: _____ SIMULATOR: Perform LAB: _____

POSITION EVALUATED: RO: _____ SRO: _____

ACTUAL TESTING ENVIRONMENT: SIMULATOR: _____ PLANT SITE: _____ LAB: _____

TESTING METHOD: SIMULATE: _____ PERFORM: XAPPROXIMATE COMPLETION TIME IN MINUTES: 15 MinutesREFERENCE(S): OP 2105.013 Rev. 23-00-0

EXAMINEE'S NAME: _____ SSN: _____

EVALUATOR'S NAME: _____

THE EXAMINEE'S PERFORMANCE WAS EVALUATED AGAINST THE STANDARDS
CONTAINED IN THIS JPM AND IS DETERMINED TO BE:

SATISFACTORY: _____ UNSATISFACTORY: _____

PERFORMANCE CHECKLIST COMMENTS:

Start Time _____ Stop Time _____ Total Time _____

SIGNED: _____ DATE: _____

SIGNATURE INDICATES THIS JPM HAS BEEN COMPARED TO ITS APPLICABLE PROCEDURE
BY A QUALIFIED INDIVIDUAL (NOT THE EXAMINEE) AND IS CURRENT WITH THAT REVISION.

JOB PERFORMANCE MEASURE

THE EXAMINER SHALL REVIEW THE FOLLOWING WITH THE EXAMINEE:

The examiner shall review the "Briefing Checklist - System Walkthrough" portion of OP 1064.023

Attachment 6 with the examinee.

JPM INITIAL TASK CONDITIONS:

The board operator has noticed that ASI has been spiking and has determined the Incore detector

E02-1 needs to be removed from service.

TASK STANDARD:

Remove incore detector E02-1 from scan and verified compliance with SAR requirements.

TASK PERFORMANCE AIDS:

PMS terminal, OP 2105.013B with Section 1 completed, OP 2105.013C, Incore Printouts from COLSS

and SAR 7.7.1.1.7.

SIMULATOR SETUP:

100% Power, steady state. Disconnect PMS printer so printouts will not be printed outside security envelope.

JOB PERFORMANCE MEASURE

INITIATING CUE:

The Control Room Supervisor directs you to remove spiking Incore Detector E02-1 from scan using forms 2105.013B and 2105.013C.

CRITICAL ELEMENTS (C): 3, 5, 6, 8

PERFORMANCE CHECKLIST			STANDARDS	(Circle One)
NOTES: 1. If keyboard used, an <ENTER> must follow the Turn-On-Code (TOC) entry 2. Examinee may elect to go directly to step by typing the appropriate TOC (Turn-On-Code) in from PMS screen, bypassing Main Menu(s). 3. Form 2105.013B section 1.1 already filled out by CRS. 4. JPM steps 1-3 are for form 2105.013.				
	1. (Step 1.2.1)	Identify Incore location to be removed from scan on form 2105.013B.	Entered Incore location NE02-1 into space provided on form 2105.013B and initialed step.	N/A SAT UNSAT
	2. (Step 1.2.2)	Perform CHECK program using N9 function. Examiner's Note: When examinee gets to the point of selecting the printer, give N9 report printed on "Salmon" colored paper to examinee. DO NOT ALLOW EXAMINEE TO PRINT REPORT!	At PMS screen/keyboard on 2C03 examinee performed the following evolutions to obtain CHECK program printout using COLSS N9 function: Touched "COLSS" button on PMS touch screen OR typed "COLSS" <Enter> on keyboard on 2C04. Touched "N9" button on PMS touch screen OR typed "N9" <Enter> on keyboard on 2C04. Selected "F4(Run/Prt)" on keyboard on Panel 2C04. Examinee could also select F3(Run Dis) or F5 (Run/Dis/Prt) Enter Job Number "1" (CHECK) <ENTER> from keyboard on Panel 2C04. Obtained CHECK program printout and initialed Step 1.2.2 of 2105.013B.	N/A SAT UNSAT

JOB PERFORMANCE MEASURE

PERFORMANCE CHECKLIST		STANDARDS		(Circle One)
EXAMINER'S NOTE				
Examinee may discuss the COLSS Operability requirements of SAR Section 7.7.1.1.7 such as:				
<div>1. 193 of 220 Incore detectors are operable which meets the requirement of at least 75% of all incore detectors operable (165 detectors) with at least one incore detector in each quadrant at each level.</div> <div>2. 40 Incore detector locations are operable which meets the requirement of at least 75% of all incore detector locations operable (33 locations).</div> <div>3. There are 36 good tilt estimates at 5 out of 5 levels which meets the requirements for at least 6 good tilt estimates, with at least 1 tilt estimate at each of 3 levels.</div>				
Examinee should use this information to determine that if detector E02-1 is removed from service that the Operability of the COLSS system is not affected and that the requirements of SAR Section 7.7.1.1.7 are still meet.				
(C)	3. (Step 1.2.3)	Using N9 report, verify compliance with SAR section 7.7.1.1.7 assuming the detector will be removed from scan. EXAMINERS NOTE: If examinee requests to look at SAR Section 7.7.1.1.7, give SAR handout to examinee.	Examinee used the N9 report and from the heading and analysis of the report determined that the loss of detector E02-1 for Symmetric SPND Set #1 at level 1 results in the loss of one detector from the total number of detectors and the loss of one tilt estimate. Examinee initialed 2105.013B Step 1.2.3 to signify that SAR Section 7.7.1.1.7 will be satisfied and proceeded to 2105.013C.	N/A SAT UNSAT
	4. (Step 1.1)	Place NA in 2105.013C Step 1.1.	Placed NA in initial block of 2105.013C Step 1.1	N/A SAT UNSAT
(C)	5. (Step 1.2)	Use RIS function to select E02-1 for removal from scan	At PMS terminal/screen examinee performed the following evolution using touch-screen on Panel 2C03 AND/OR typing in TOCs using keyboard on PMS terminal: COLSS (Ensure page 1) ↓ RIS1 (Raw Incore Signal (1/2) Initialed Step 1.2 of 2105.013C.	N/A SAT UNSAT

JOB PERFORMANCE MEASURE

PERFORMANCE CHECKLIST			STANDARDS	(Circle One)
(C)	6. (Step 1.3)	Use RID function to remove E02-1 from scan	<p>At PMS terminal/screen examinee performed the following evolution using touch screen on 2C03 AND/OR typing in TOCs at keyboard on Panel 2C04.</p> <p>RID (Delete)</p> <p>↓</p> <p>E02-1 (Enter Grid Loc-Level)</p> <p><ENTER></p> <p>↓</p> <p>Yes (Are you sure DEL is REQ'D (Y/N))</p> <p><ENTER></p> <p>Initialed Step 1.3 of 2105.013C.</p>	N/A SAT UNSAT
	7. (Step 1.4)	<p>Perform CHECK program using N9 function</p> <p>Examiner's Note:</p> <p>When examinee gets to N9 screen, give N9 report printed on "Yellow" paper to examinee. The steps to obtain N9 CHECK report were performed in Step 2.</p> <p>DO NOT ALLOW EXAMINEE TO PRINT REPORT!</p>	<p>At PMS terminal/screen/keyboard on 2C03 examinee performed the following evolutions to obtain CHECK program printout using COLSS N9 function:</p> <p>Touched COLSS button on PMS touch screen OR typed COLSS <Enter> on keyboard rom PMS terminal.</p> <p>Touched N9 button on PMS touch screen OR typed N9 <Enter> on keyboard for PMS terminal.</p> <p>Obtained CHECK program printout and initialed Step 1.4 of 2105.013C.</p>	N/A SAT UNSAT
(C)	8. (Step 1.4)	Using N9 report verify detector E02-1 has been removed from scan and compliance with SAR section 7.7.1.1.7 is still being met.	<p>Examinee used the N9 report to determine that:</p> <p>Incore detector E02-1 has been removed from scan</p> <p><u>AND</u></p> <p>The requirements of SAR 7.7.1.1.7 are still being met.</p> <p>Examinee initialed 2105.013C Step 1.4.</p>	N/A SAT UNSAT

JOB PERFORMANCE MEASURE

PERFORMANCE CHECKLIST			STANDARDS	(Circle One)
9. (Step 1.5)	Perform Independent Verification that Incore detector E02-1 is removed from scan. Examiner's CUE: Inform Examinee that Independent Verification of deleted incore point has been completed.	Notified CRS/SM that Independent Verification of deleted incore point is required by procedure. Examinee initialed 2105.013C Step 1.5.	N/A SAT UNSAT	
10. (Step 1.6)	Submit WR/WO for deleted incore and entered Work request number. Examiner's CUE: Inform examinee that the P&S liason has submitted Work Request WR 12345 on Incore detector E02-1.	Discussed need to submit WR/WO (Work Request) for deleted incore instrument. Examinee will write Work Request Number at Step 1.6 of 2105.013C and initial step.	N/A SAT UNSAT	
END				

JOB PERFORMANCE MEASURE**EXAMINERS COPY:****INITIAL CONDITIONS:**

The board operator has noticed that ASI has been spiking and has determined that Incore Detector E02-1 needs to be removed from service.

INITIATING CUE:

The Control Room Supervisor directs you to remove spiking Incore Detector E02-1 from scan using forms 2105.013B and 2105.013C.

JOB PERFORMANCE MEASURE

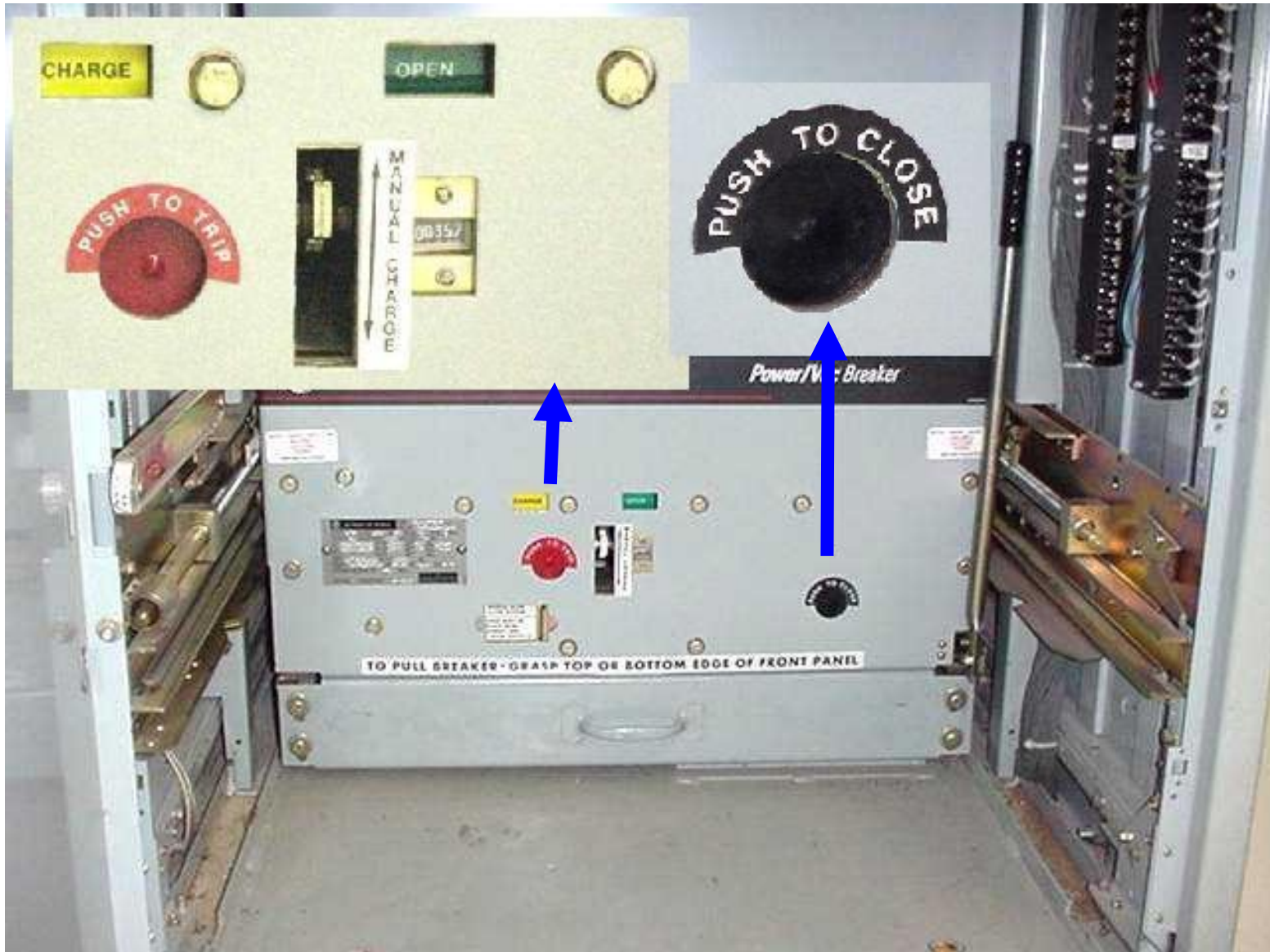
EXAMINEES COPY:

INITIAL CONDITIONS:

The board operator has noticed that ASI has been spiking and has determined that Incore Detector E02-1 needs to be removed from service.

INITIATING CUE:

The Control Room Supervisor directs you to remove spiking Incore Detector E02-1 from scan using forms 2105.013B and 2105.013C.



**ENTERGY OPERATIONS INCORPORATED
ARKANSAS NUCLEAR ONE**

**TITLE: ALTERNATE AC DIESEL GENERATOR
OPERATIONS**

**DOCUMENT NO.
2104.037**

**CHANGE NO.
008-00-0**

**WORK PLAN EXP. DATE
N/A**

**TC EXP. DATE
N/A**

**SAFETY-RELATED
☒ YES ☐ NO**

**IPTE
☐ YES ☒ NO**

**TEMP ALT
☐ YES ☒ NO**

**PROGRAMMATIC EXCLUSION PER ENS-LI-101
☐ YES ☒ NO**

SET #

When you see these TRAPS

Time Pressure
Distraction/Interruption
Multiple Tasks
Over Confidence
Vague or Interpretive Guidance
First Shift/Last Shift
Peer Pressure
Change/Off Normal
Physical Environment
Mental Stress (Home or Work)

Get these TOOLS

Effective Communication
Questioning Attitude
Placekeeping
Self Check
Peer Check
Knowledge
Procedures
Job Briefing
Coaching
Turnover

VERIFIED BY

DATE

TIME

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

FORM TITLE:

VERIFICATION COVER SHEET

**FORM NO.
1000.006A**

**CHANGE NO.
051-00-0**

**ENTERGY OPERATIONS INCORPORATED
ARKANSAS NUCLEAR ONE**

Page 1

TITLE: ALTERNATE AC DIESEL GENERATOR OPERATIONS		DOCUMENT NO. 2104.037	CHANGE NO. 008-00-0
AFFECTED UNIT: <input checked="" type="checkbox"/> UNIT 1 <input checked="" type="checkbox"/> UNIT 2		<input checked="" type="checkbox"/> PROCEDURE <input type="checkbox"/> ELECTRONIC DOCUMENT <input type="checkbox"/> WORK PLAN EXP. DATE _____	
SAFETY-RELATED <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO			
TYPE OF CHANGE: <input type="checkbox"/> NEW <input type="checkbox"/> PC <input type="checkbox"/> TC <input type="checkbox"/> DELETION <input checked="" type="checkbox"/> REVISION <input type="checkbox"/> EZ EXP. DATE: N/A			
DOES THIS DOCUMENT:			
1. Supersede or replace another procedure? (If YES, complete 1000.006B for deleted procedure.)		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
2. Alter or delete an existing regulatory commitment? (If YES, coordinate with Licensing before implementing.)		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
3. Require a 50.59 Review per Form 1000.006S? (If No, attach completed Form 1000.006S) (If 50.59 Evaluation, OSRC review required.)		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
4. Changes Surveillance Test Program (i.e. Technical Specifications, NRC Commitment, surveillance activity, see Step 7.5)? (If YES, complete 1000.009A)		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
5. Create an Intent Change? (If YES, Standard Approval Process required.)		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
6. Implement or change IPTE requirements? (If YES, complete 1000.143A. OSRC review required.)		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
7. Implement or change a Temporary Alteration? (If YES, then OSRC review required.)		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
Was the Master Electronic File used as the source document?		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
INTERIM APPROVAL PROCESS		STANDARD APPROVAL PROCESS	
ORIGINATOR SIGNATURE: (Includes review of Att. 13) DATE: _____ Print and Sign name: NA PHONE #: _____		ORIGINATOR SIGNATURE: (Includes review of Att. 13) DATE: 10/21/2005 Print and Sign name: Chuck Olson PHONE #: 5932	
SUPERVISOR APPROVAL: * N/A DATE: _____		INDEPENDENT REVIEWER: _____ DATE: 11-8-05	
SRO UNIT ONE : ** N/A DATE: _____		ENGINEERING: NA DATE: _____	
SRO UNIT TWO: ** N/A DATE: _____		Code Programs - NDE: N/A DATE: _____	
Interim approval allowed for non-intent changes requiring no 50.59 evaluation that are stopping work in progress. Standard Approval required for intent changes or changes requiring a 50.59 evaluation. *If change not required to support work in progress, Department Head must sign. **If both units are affected by change, both SRO signatures are required. (SRO signature required for safety related procedures only.)		UNIT SURVEILLANCE COORDINATOR: N/A DATE: _____	
		SECTION LEADER: Roger X. Pierri DATE: 11-14-05	
		QUALITY ASSURANCE: N/A DATE: _____	
		OTHER SECTION LEADERS: UT OPS DATE: 11-9-05	
		OTHER SECTION LEADERS: N/A DATE: _____	
		OTHER SECTION LEADERS: N/A DATE: _____	
		OTHER SECTION LEADERS: N/A DATE: _____	
OSRC CHAIRMAN/TECHNICAL REVIEWER: _____ DATE: 11-8-05		OTHER SECTION LEADERS: N/A DATE: _____	
FINAL APPROVAL: _____ DATE: 11-15-2005		OTHER SECTION LEADERS: N/A DATE: _____	
REQUIRED EFFECTIVE DATE: _____ 11-22-05		OTHER SECTION LEADERS: N/A DATE: _____	
FORM TITLE:		FORM NO.	CHANGE NO.
PROCEDURE/WORK PLAN APPROVAL REQUEST		1000.006B	054-00-0

ENTERGY OPERATIONS INCORPORATED ARKANSAS NUCLEAR ONE

**TITLE: ALTERNATE AC DIESEL GENERATOR
OPERATIONS**

**DOCUMENT NO.
2104.037**

**CHANGE NO.
008-00-0**

☒ PROCEDURE

☐ WORK PLAN, EXP. DATE N/A

PAGE 1 OF 1

☐ ELECTRONIC DOCUMENT

TYPE OF CHANGE:

☐ NEW

☐ PC

☐ TC

☐ DELETION

☒ REVISION

☐ EZ

EXP. DATE: N/A

AFFECTED SECTION:
(Include step # if applicable)

DESCRIPTION OF CHANGE: (For each change made, include sufficient detail to describe reason for the change.)

Throughout

Reviewed and updated procedure to improve level of detail. 1000.006S #3
Added references to other procedures. 1000.006S #10
Added instrument/component names and numbers. 1000.006S #3 **PIF-2-05-314**

Step 4.1 pg 4

Added references
• Calc-85-S-00002-01, Emergency Diesel Generator Loading
• Unit 2 Emergency Diesel Generator Reliability Program (1032.033)
No 50.59 determination required as per 1000.006S #10

Various

Step as previously written checked for PRE-LUBE Level OK clear, and if alarm not clear, operator directed to determine verify pump 2P-244 operable with adequate level. This action not possible as alarm is driven from Pressure switch that equates a column of oil to 1#. Modified step to have operator check power to 2P-238 and to use Att E to start AACG if not available.
No 50.59 determination required as per 1000.006S #3

Various

When referencing a section of procedure by #, changed this to reference by section title.
No 50.59 determination required as per 1000.006S #3

Various

Step throughout procedure was reworded to operate AACG for at least 10 minutes and until temperature <190 after engine unloaded.
No 50.59 determination required as per 1000.006S #3

Steps 12.1.1/12.2.1

Added capacity of 2T-9A & B (350 gallons).
No 50.59 determination required as per 1000.006S #3

Attachment E step 8.0

Updated KW load values of various loads on AACG to Calc-85-S-00002-01 and worst case LBLOCA (SBLOCA for Pzr Prop Htrs) **PIF-2-05-624/720**
No 50.59 determination required as per 1000.006S #10

Section 13

Deleted old section 13 and incorporated into sections 8 and 11. Only 2 steps were different and these were rewritten as IF...THEN steps. 1000.006S #4

FORM TITLE:

DESCRIPTION OF CHANGE

**FORM NO.
1000.006C**

**CHANGE NO.
050-00-0**

PROC./WORK PLAN NO. 2104.037	PROCEDURE/WORK PLAN TITLE: ALTERNATE AC DIESEL GENERATOR OPERATIONS	PAGE: 1 of 70 CHANGE: 008-00-0
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1.0 PURPOSE

To provide a basic description and the necessary guidance for the proper operation of the Alternate AC (AAC) Diesel Generator and auxiliary systems.

2.0 SCOPE

This procedure includes a description of the AAC Generator and instructions for normal and abnormal operations. It also provides the required surveillances for the AAC Generator and its auxiliary systems.

3.0 DESCRIPTION

The engine is a Caterpillar 16-cylinder four-stroke turbocharged diesel with a rated output of 4400 KW continuous and 5320 KW overload (30 minutes). The crankshaft drives a front and a rear gear train. The front gear train drives the lube oil pump, the jacket water and aftercooler/oil cooler (AC/OC) water pumps and the fuel transfer pump.

Intake air goes through the turbocharger where it is compressed before entering the cylinders. The turbocharger outlet has a spring-loaded shutoff valve to shut down the engine during an emergency stop. Once the shutoff valve has tripped it must be manually reset before the engine can be started.

The engine is cooled by two separate cooling loops. The high temperature loop cools the cylinder block, cylinder heads and turbochargers using the engine driven jacket water pump. The low temperature loop cools the aftercooler cores and the oil coolers using the engine driven AC/OC pump. Both loops reject heat to a radiator outside the building.

The gear type lube oil pump circulates oil through coolers and duplex filters to the priority valve. The priority valve directs oil to the engine bearings, the piston cooling jets, and bypasses excess flow to the oil filters. While the engine is secured, a lube oil heating system provides continuous oil circulation to the cylinder block and maintains lube oil temperature above 80°F. Prelubrication is required before starting the engine to protect against bearing and crankshaft damage. The engine is equipped with an air driven intermittent prelube pump that is energized when the start switch is actuated.

Engine starting is accomplished by three-vane type air starting motors. Starting air is controlled by three air actuated relay valves that are controlled by two electrically actuated solenoid valves plumbed in parallel. Starting air is stored at ~ 415 psig in two receivers and is regulated down to 200 - 220 psig at the engine connection. Starting air is also used for the intermittent prelube pump, turbocharger air impingement system and the trip mechanism for the emergency air shutoff valve.

A barring device is provided to manually rotate the engine for maintenance. A mechanical interlock prevents starting the engine if the barring device is engaged.

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The Kato generator is an eight pole, 900 rpm, 4160 VAC machine rated at 4400 KW continuous and a 0.8 power factor (rated). The generator is equipped with a KATO KCR760 voltage regulator that operates in either an isochronous mode or a load-sharing mode depending on whether the AAC DG is paralleled with another power source. When in the load sharing mode, the voltage regulator has been set to automatically adjust generator VAR loading to maintain a constant 0.98 power factor. When in the isochronous mode, the voltage regulator will maintain generator output voltage at a nominal 4160V (operator adjustable setpoint). Power to the voltage regulator is provided by a permanent magnet generator mounted to the main rotor shaft so field flashing is not required.

The engine starting function is controlled by the Local/Remote Switch and the Programmable Logic Controller (PLC). When the switch is in the Maintenance position, the engine may not be started. In the Local position, the engine can be started and stopped only at the local engine controls handswitch. When in the Standby position, the engine can be started and stopped locally or from the control room. The PLC checks sufficient lubricating oil is present before the engine starts. If an Emergency Start is initiated and the PLC does not sense pre-lube oil level within 30 seconds and the start has been continuously requested the engine will start cranking under the assumption that the oil level-sensing device has failed. The PLC also provides a limited time (5 seconds) duration cranking cycle to prevent excessive use of starting air if engine does not start. In the event of a PLC failure, the engine can be started without a check for pre-lubricating oil. This allows the flexibility to risk engine damage in exchange for the need in an emergency situation to have the engine running.

The Load Sharing Governor is an electronic governor using a magnetic pick-up to sense engine speed. The fuel rack actuator controls the amount of fuel supplied to the engine based on the signal from the Load Sharing Governor. A back-up mechanical governor set at 105% of rated speed allows the engine to run if the electronic governor fails. When the unit senses a rapid rise in load and if sufficient air inlet manifold pressure is not present, a solenoid valve opens to supply compressed air into the compressor side of each turbocharger to provide a boost. A signal is also sent to the governor to send more fuel to the engine before a speed loss. This improves transient response, particularly in lower load conditions.

All AAC Generator Building and AAC DG auxiliary loads are supplied by 480V MCC 2B161 that is fed from 2B16. 2B16 is supplied by the 13.8 KV London Line or from the output of the AAC DG. A stand-alone PLC installed inside 2B16 monitors generator output and controls the operation of load center supply breakers 2B16-A1 (London Line) and 2B16-B1 (AAC DG Output). The PLC/LC supply breaker control logic acts like a normal-seeking ABT with the output of the AAC DG as the normal source.

125 VDC house power is supplied from 2D-55 via DC panel 2D-40. 2D-55 is a combination battery charger and 200 amp-hr battery bank located on the lower level of the switchgear room. The battery charger is supplied by building lighting panel 53LA and normally supplies 2D-40 while floating the battery bank to maintain the batteries fully charged. 2D-40 supplies DC breaker control power for the AAC DG output breaker and 2B16 supply breakers, DC fuel pump 2P-243, 2UY-7000 (AAC DG PLC) and other miscellaneous DC house loads.

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2Y-27 is a computer-grade uninterruptible power supply designed to supply regulated 120VAC to 20C-7000 (switchgear room PC control station) and the PLC in 2B16. 2Y-27 is supplied by 53LA or from an internal battery bank if house AC power is lost. The capacity of the battery bank inside 2Y-27 is the limiting component for maintaining remote operation capability of the AAC DG during a loss of the London Line. Testing has demonstrated that 2Y-27 will maintain acceptable output voltage for at least 5 1/2 hours on a loss of building 120VAC.

The AAC DG control system is based on an Ethernet type fiber optic network which links two Programmable Logic Controllers and two PC control stations. The AAC DG network has a link with the Site network that allows monitoring of AAC DG operation via the PMS. During periods of high PMS network traffic, the link between the AAC DG and Site networks will be automatically interrupted in order to protect the AAC DG network from locking up. PLC-A (2UY-7000) is inside 2C-435 in the AAC DG building and controls all AAC DG soft touch starts and stops and automatic shutdowns. PLC-C (2UY-7001) is inside 2C-436 in the TB 372' switchgear area. PLC-C controls breaker operations, breaker logic and interlocks for the 4160V breaker in 2A-9. Both PLCs are required for remote operation of the AAC DG and associated breakers. If both PLCs are lost, the AAC DG may be started and stopped locally using the engine control handswitches and all breakers may be manually operated. If only PLC-C is lost, the AACG could be operated from the Control Room, but local breaker operation would be required.

4.0 REFERENCES

4.1 References used in Procedure Preparation:

- Caterpillar 4616 Technical Manual
- General Electric Power/VAC Metal Clad Switchgear Tech Manual
- Best Power Technology Micro-Ferrups Ups User Manual
- Regulatory Guide (1.108) Periodic Testing of Diesel Generator Units Used as Onsite Electrical Power Systems at Nuclear Power Plants.
- ANO Unit 2 Technical Specifications.
- ANO Unit 2 SAR
- NUMARC 87-00 REV. 1
- CR-ANO-C-2000-0026 & CR-ANO-C-1999-0018, T-25 Level requirement
- ER010061N201, SBO Computer Corrections
- CR-ANO-2-2001-1320, 2D-55 Battery Operability
- CR-ANO-2-2002-0181 Identification of 2A-905 (spare) in procedure
- 1053.011, Electrical Safety
- CR-ANO-C-2003-0222, Configuration Control of Drain valves
- CALC-85-S-00002-01, Emergency Diesel Generator Loading

4.2 References used in Conjunction with this Procedure:

- Electrical System Operation (2107.001)
- ESF Electrical System Operation (2107.002)
- Unit 2 Emergency Diesel Generator Reliability Program (1032.033)

4.3 NRC Commitments

- 4.3.1 P1851, Perform quarterly surveillance of the AAC power source (Supplements 1 and 2).

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5.0 LIMITS AND PRECAUTIONS

- 5.1 All AAC Diesel Generator starts shall be logged in the station log.
- 5.2 AAC shall not be paralleled with EDG. EDG governor would be operating in speed control and may overload or underload attempting to control speed.
- 5.3 AAC Diesel Generator load limits are as follows:
 - 5320 KW for 30 minutes
 - 4600 KW for 500 hours
 - < 4400 KW continuous with ambient air temperature < 100°F.
- 5.4 Any visible tubing vibration or fluid leaks should be promptly reported to System Engineering.
- 5.5 If PLC-A (2UY-7000) fails, then the local engine control switch must be held in the STOP position until the engine has stopped turning.
- 5.6 The engine will not start when the Local/Remote switch is in Maintenance position.
- 5.7 Emergency Stop switch should not be used for normal engine shutdown because the shut off of air to the cylinders causes unnecessary backpressure on the cylinder air inlet valves.
- 5.8 Personnel should stand clear of the air start motors during engine starts because air and oil are rapidly discharged when engine cranks.
- 5.9 If power is lost to the AACG Building for an extended period of time (> 5 hours), 2Y-27 may shut down and interrupt power to the 2B16 PLC. Manual operation of 2B16 supply breakers would then be required when starting the AACG. If the Low AC Out alarm is received on 2Y-27, then consideration should be given to starting the AACG or backfeeding to 2B16 via 2A9 to ensure remote operating capability of the AACG.
- 5.10 Engine room lighting may be lost for ~ 6 minutes when 2B16 transfers during engine starts and stops. Engine room emergency lighting will remain energized for 10 minutes following 2B16 power supply transfers.
- 5.11 If engine lube oil temperature < 50°F, then the AAC Generator is inoperable. (Ref CR C-97-0165)
- 5.12 The guidance and criteria for AACG failures is contained within Unit 2 Emergency Diesel Generator Reliability Program (1032.033). Ensure System Engineering notified to verify all requirements of 1032.033 are met for valid AACG failures. (CR C-99-0039)
- 5.13 During periods of offsite grid disturbance, the AACG should not be tied to the grid. System Dispatcher should be contacted to determine any potential grid disturbances before starting the diesel.
- 5.14 If AACG can not be started and loaded from the Control Room, then AACG is inoperable and a Condition Report is required. If DC is lost to 2Y-26, then the AACG will not start from the Control Room during a blackout, and the AACG is inoperable.

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- 5.15 Generator Lockout relay may actuate during a loss of offsite power. The lockout should be reset immediately to ensure the diesel could be started within 10 minutes of declaring a station blackout.
- 5.16 Admin Low Level Limit in Bulk Fuel Oil Storage Tank (T-25) for AACG is 19.3 feet (Lower Limit for Fuel Oil Reorder). Absolute minimum level to maintain AAC operable for gravity feed is 14.1 feet and 11.4 feet with transfer pump 2P-235 operable. (CR-ANO-C-1999-0018, CA-03)
- 5.17 If room temperature in area of AACG battery (2D-55) falls below 60 deg Fahrenheit, declare AACG inoperable. (CR-ANO-2-2001-1320).
- 5.18 If Loss of 480v AC to 2B16 (127-2B16 relay) occurs, then AACG Fire detection pane 2C437 is de-energized. Refer to Fire Protection System Annunciator Corrective Action (2203.009).

6.0 SETPOINTS AND INTERLOCKS

- 6.1 PLC-based Automatic Engine Shutdowns
 - 6.1.1 AC/OC Water Temperature High - Inlet temperature > 152°F for 5 seconds.
 - 6.1.2 Crankcase Pressure High - >4" H2O for 5 seconds.
 - 6.1.3 Jacket Water Temperature High High - Outlet temperature > 223°F for 5 seconds. (This trip blocked if engine started with Emergency Start pushbutton on touch screen.)
 - 6.1.4 Low Lube Oil pressure
 - Oil pressure < 16 psig for 5 seconds with engine speed > 170 RPM for 9 seconds.
 - Oil pressure < 39 psig for 5 seconds with engine speed > 650 RPM for 9 seconds.
 - 6.1.5 Emergency Stop - Emergency Stop switch depressed.
 - 6.1.6 Engine Overspeed - Engine speed > 1017 RPM.
 - 6.1.7 Engine Failed to Start - Engine cranks for 5 seconds without PLC engine speed detecting 170 RPM.
 - 6.1.8 Generator Lockout.

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- 6.2 Redundant (PLC failure) Protection Features - The following Non-PLC engine shutdowns are enabled if PLC fails to produce a heartbeat pulse for 10 seconds:
- Generator Differential Current
 - Crankcase Pressure High
 - Low Lube Oil pressure
 - Engine Overspeed
 - Emergency Stop
- 6.3 AAC Generator Lockouts
- Generator Negative Sequence Overcurrent
 - Generator Overcurrent
 - Generator Differential Current
 - Generator Reverse Power (Anti-motoring)
 - Loss of Generator Field
- 6.4 Breaker Interlocks
- 6.4.1 2A-1001 will NOT close if 2A-901, 2A-902, 2A-903 or 2A-904 is closed. 2A-1001 opens on Generator or Engine Lockout.
- 6.4.2 2A-310 and 2A-410 trip circuits are equipped with train separation interlocks. If 2A3 is energized from 2A-309 or 2A-308 and 2A4 is energized from 2A-408 or 2A-409, then 2A-310 and 2A-410 will automatically trip when the second crosstie breaker (2A-310/410) is closed. These interlocks can be bypassed using bypass switches 69-310 and 69-410.
- 6.4.3 Bypass switch (2HS-7105) on 2C436 is provided to bypass PLC closing logic for breakers 2A-310 and 2A-410 for energized bus crosstie.
- 6.4.4 When AAC Generator starts and 2A9 is energized, if Automatic Transfer Mode Selector switch above 2B16-B1 is in AUTO then PLC opens London Feed to 2B16 (2B16-A1) and AAC Generator Output to 2B161 (2B16-B1) closes to supply 2B161 from AAC Generator output. When Generator is secured, if Automatic Transfer Mode Selector switch above 2B16-B1 is in AUTO then 2B16-B1 opens and 2B16-A1 closes to supply 2B161 from London Feed. If London Feed is lost or 2B16-A1 will not close and AAC Generator is not running, then 2A-903 or 2A-904 may be closed to backfeed power to 2B161.
- 6.4.5 If 2A-902 is closed, then 2A-310 OR 2A-410 can only be closed when both associated feeders to 2A3 OR 2A4 are open. (Example: If 2A-902 is closed, then 2A-308 and 2A-309 must be open to close 2A-310.)

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7.0 ALIGNING AAC GENERATOR FOR STANDBY

- 7.1 Verify system aligned using Attachments A through D.
- 7.2 Verify the following control switch positions at 2C440:
- Voltage Raise/Lower switch (2HS-7116) OFF
 - Speed Raise/Lower switch (2HS-7115) OFF
 - Emergency Stop switch (2HS-7104B) RELEASED
 - Engine Control switch (2HS-7117) MIDDLE
 - Local/Remote switch (2HS-7118) STANDBY
 - Generator Heater switch (2HS-7119) AUTO
 - Lube Oil Heater switch (2HS-7120) AUTO
 - Jacket Water Heater switch (2HS-7121) AUTO
 - Current Limiter Circuit breaker (in 2C440) CLOSED (forward)
 - Idle/Rated switch (in 2C440) RATED
- 7.3 Verify Jacket Water Outlet temperature (2TI-7156) > 90°F.
- 7.4 Verify Lube Oil From Cooler temperature (2TI-7122) > 70°F.

8.0 STARTING AAC DIESEL

- 8.1 Contact System Dispatcher to determine if any potential grid disturbances exist that prevent tying Diesel to grid.
- * 8.2 IF grid disturbances reported while AAC Diesel tied to the grid,
THEN secure AACG.
- * 8.3 IF loss of offsite power occurs
AND Generator L.O. Relay Trip (2K12-H3) in alarm,
THEN dispatch operator to reset lockout.
- 8.4 Notify Unit 1 of intent to start AAC Diesel.
- 8.5 Perform the following pre-start checks:
- AAC Generator aligned per Section 7.0.
 - Sump oil level between ADD and FULL on KEEP WARM side of dipstick.
 - Jacket Water Expansion Tank Level (2LI-7176) 1/4 to 3/4 in sight glass.
 - Fuel Oil Day Tank Level (2LI-7201A or 2LI-7201B) 40 - 84%.
 - Manual jacking gear eccentric disengaged (Hex nut protruding from housing).
 - Generator inboard and outboard bearing oil levels 1/4 to 3/4 in sight glass.
 - Overspeed air damper open (Air Manifold Inlet on top of engine).
 - Air Start Lubricators (2M-21A/B/C) oil levels in sight glass.
 - Governor hydraulic fluid level \geq 1/2 in sight glass.
- 8.6 IF AACG will be run in No Load Condition,
THEN place Automatic Transfer Mode Selector switch above 2B16-B1 in MANUAL.

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8.7 Perform the following to start AAC Generator:

8.7.1 Touch ELECTRICAL BUS CONTROL.

8.7.2 Touch 4160 V BREAKERS.

8.7.3 Verify the following breakers open:

- 2A-901, AAC to 4.16KV Switchgear A3
- 2A-902, AAC to 4.16KV Switchgear 2A4
- 2A-903, AAC to 4.16KV Switchgear A1
- 2A-904, AAC to 4.16KV Switchgear 2A1

8.7.4 Touch ENGINE START/STOP.

8.7.5 Touch START SCREEN.

NOTE

Start Constraints are reset by clearing the condition and resetting PLC. PLC is reset using the Annunciator Screen or the handswitch on 2C435.

8.7.6 Verify Start Constraints clear: (Green indicates clear)

- KEY SWITCH IN STANDBY
- FUEL SOLENOID OPEN

8.7.7 Check Start Constraint PRE-LUBE LEVEL OK clear.

8.7.8 IF PRE-LUBE LEVEL OK NOT clear,
THEN perform the following:

- A. Verify Automatic Transfer Mode Selector switch above 2B16-B1 in AUTO to ensure power available to 2B-161.
- B. Verify 2B161-B4 closed to supply power to Keep Warm and Continuous Lube pump (2P-238).
- C. Verify 2P-238 handswitch (2HS-7240) on 2C457 in ON.
- D. IF PRE-LUBE LEVEL OK will NOT clear,
THEN GO TO Attachment E to start AACG.

8.7.9 Touch START button.

8.7.10 WHEN generator reaches ~ 900 RPM and 4160 volts,
THEN perform the following:

- A. Touch ELECTRICAL BUS CONTROL.
- B. Touch 480 V BREAKERS.
- C. Verify AAC Generator Output breaker (2A-1001) closed.
- D. Verify AAC Generator Output to 2B161 (2B16-B1) closed.
- E. Verify London Feed to 2B161 (2B16-A1) open.

8.8 IF desired to load AACG for peak loading,
THEN GO TO Loading and Unloading 2A1 section (do not load A1).

8.9 IF desired to load AACG for other than peak loading,
THEN GO TO appropriate section to load desired bus.

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9.0 LOADING AND UNLOADING 2A1

9.1 Verify AAC DG running per Starting AAC Diesel section.

9.2 Touch GENERATOR CONTROL.

9.3 Verify Load Control Selection set to desired PC:

- AAC Building
- Control Room

9.4 Touch ENTER USER DEMAND.

9.5 Enter desired KW on keypad. (If peak loading, then 4400 or as directed by dispatcher.)

9.6 Touch OK.

9.7 Touch RAMP RATE INCREASE or DECREASE to set desired ramp rate. (Normally 5 KW/sec)

9.8 Synchronize and close AAC Generator to 2A1 (2A-904) as follows:

9.8.1 Touch ELECTRICAL BUS CONTROL.

9.8.2 Touch 4160 V BREAKERS.

9.8.3 Touch breaker 2A-904.

9.8.4 Touch 2A-904 on SELECT BREAKER TO SYNC module.

9.8.5 Verify 2A-904 touch pad highlighted and red light on.

9.8.6 Verify PERM light illuminated on SPM-A MODULE MODE.

9.8.7 Touch Voltage touch pads to match generator and bus voltage.

9.8.8 Touch Speed touch pads to cause synchroscope to rotate slowly in the FAST direction.

9.8.9 WHEN synchroscope passes through -90°, THEN perform either of the following until the synchroscope passes through 0° to close 2A-904.

- Touch and hold TOUCH TO CLOSE SYNC BREAKER.
- Hold 2A-904 Control switch (2HS-7103) in close.

9.8.10 Verify 2A-904 closed (2A-904 Status red light energized).

*9.9 Touch GENERATOR CONTROL and monitor load.

*9.10 Repeat steps 9.2 through 9.6 as needed to adjust load.

9.11 Commence taking AAC Diesel Generator Log (OPS-B39).

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- 9.12 WHEN desired to unload 2A1 from the AAC Generator,
 THEN perform the following:
- 9.12.1 Touch GENERATOR CONTROL.
- 9.12.2 Verify LOAD CONTROL SELECTION selected to desired PC:
- AAC Building
 - Control Room
- 9.12.3 Touch ENTER USER DEMAND.
- 9.12.4 Enter 200 KW on keypad.
- 9.12.5 Touch OK.
- 9.12.6 WHEN AAC Generator load stabilized between 200 and 400 KW,
 THEN perform the following:
- A. Touch ELECTRICAL BUS CONTROL.
- B. Touch 4160 V BREAKERS.
- C. Touch 2A-904.
- D. Perform the following as needed to open 2A-904:
- Touch TRIP
 - Use 2A-904 Control switch (2HS-7103).

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10.0 LOADING AND UNLOADING A1

10.1 Verify AAC DG running per Starting AAC Diesel section.

10.2 Verify U-1 ready to tie AAC DG to A1.

10.3 Touch GENERATOR CONTROL.

10.4 Verify Load Control Selection set to desired PC:

- AAC Building
- Control Room

10.5 Touch ENTER USER DEMAND.

10.6 Enter desired KW on keypad.

10.7 Touch OK.

10.8 Touch RAMP RATE INCREASE or DECREASE to set desired ramp rate.
(Normally 5 KW/sec)

10.9 Synchronize and close AAC Generator to A1 (2A-903) as follows:

10.9.1 Touch ELECTRICAL BUS CONTROL.

10.9.2 Touch 4160 V BREAKERS.

10.9.3 Touch breaker 2A-903.

10.9.4 Touch 2A-903 on SELECT BREAKER TO SYNC module.

10.9.5 Verify 2A-903 touch pad highlighted and red light on.

10.9.6 Verify PERM light illuminated on the SPM-A MODULE MODE.

10.9.7 Touch Voltage touch pads to match generator and bus voltage.

10.9.8 Touch Speed touch pads to cause synchroscope to rotate slowly in FAST direction.

10.9.9 WHEN synchroscope passes through -90°,
THEN perform either of the following until synchroscope passes through 0° to close 2A-903.

- Touch and hold TOUCH TO CLOSE SYNC BREAKER.
- Hold 2A-903 Control switch (2HS-7102) in close.

10.9.10 Verify 2A-903 closed (2A-903 Status red light energized).

*10.10 Touch GENERATOR CONTROL and monitor load.

*10.11 Repeat steps 10.3 through 10.7 as needed to adjust load.

10.12 Commence taking AAC Diesel Generator Log (OPS-B39).

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- 10.13 WHEN desired to unload A1 from AAC Generator
THEN coordinate with Unit 1 Control Room and perform the following:
- 10.13.1 Touch GENERATOR CONTROL.
- 10.13.2 Verify LOAD CONTROL SELECTION selected to desired PC:
- AAC Building
 - Control Room
- 10.13.3 Touch ENTER USER DEMAND.
- 10.13.4 Enter 200 KW on keypad.
- 10.13.5 Touch OK.
- 10.13.6 WHEN AAC Generator load stabilized between 200 and 400 KW,
THEN perform the following:
- A. Touch ELECTRICAL BUS CONTROL.
- B. Touch 4160 V BREAKERS.
- C. Touch 2A-903.
- D. Perform the following as needed to open 2A-903.
- Touch TRIP.
 - Use 2A-903 Control switch (2HS-7102).

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11.0 SECURING AAC DIESEL

- 11.1 Touch GENERATOR CONTROL.
- 11.2 Verify Load Control Selection set to desired PC:
 - AAC Building
 - Control Room
- 11.3 IF AACG was loaded,
THEN verify load stable between 200 and 400 KW.
- 11.4 Touch ELECTRICAL BUS CONTROL.
- 11.5 Touch 4160 V BREAKER
- 11.6 Verify the following breakers open:
 - 2A-901, AAC to 4.16KV Switchgear A3
 - 2A-902, AAC to 4.16KV Switchgear 2A4
 - 2A-903, AAC to 4.16KV Switchgear A1
 - 2A-904, AAC to 4.16KV Switchgear 2A1
- 11.7 Touch SWITCH TO SYNC screen.
- 11.8 Adjust voltage to 4160 volts using VOLTAGE RAISE/LOWER touch pads.
- 11.9 Adjust frequency to 60 Hz using SPEED RAISE/LOWER touch pads.
- 11.10 Operate engine unloaded until the following conditions met:
 - At least 10 minutes elapsed
 - Jacket Water Out temperature (2TI-7156) < 190° F
- 11.11 Touch ENGINE START/STOP.
- 11.12 Touch STOP SCREEN.
- 11.13 Touch STOP.
- 11.14 Touch ELECTRICAL BUS CONTROL.
- 11.15 Touch 480 V BREAKERS.
- 11.16 Verify 2A-1001 open.
- 11.17 Verify 2B16-A1 closed.
- 11.18 Verify 2B16-B1 open.
- 11.19 Verify all AAC Generator alarms reset or concerns resolved. Refer to 2203.012Z, Annunciator 2C435 Corrective Action.
- 11.20 Verify Automatic Transfer Mode Selector switch above 2B16-B1 in AUTO.

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12.0 DRAINING AND FILLING COOLING WATER EXPANSION TANK (2T-9B)

12.1 To drain 2T-9B perform the following:

12.1.1 Verify adequate volume available in ECW Drain/Fill Tank (2T-9A) to receive drainage from 2T-9B. (Both tanks have a capacity of 350 gallons).

12.1.2 IF ECW Expansion Tank to be drained below sightglass, AND NOT desired to drain cooling loops, THEN isolate desired loops as follows:

- A. Declare AACG inoperable.
- B. For AAC DG Cylinder Head, close the following:
 - 2P-237 Jacket Water Pump/Engine Suction (2AAC-2)
 - Jacket Water Engine Outlet Header Isol (2AAC-3)
 - 2T-9B ECW Expansion Tank to JW Suction Hdr (2AAC-14)
- C. For AAC DG Lube Oil and After Cooler, close the following:
 - 2P-240 AC/OC Pump suction (2AAC-6)
 - AC/OC Engine Outlet Header Isol (2AAC-7)
- D. For Jacket Cooling Water in JW Radiator, close the following:
 - JW Radiator Outlet Header (2AAC-1)
 - JW Radiator Inlet Isol (2AAC-4)
- E. For AC/OC Radiator, close the following:
 - AC/OC Radiator Outlet Header Isol (2AAC-5)
 - AC/OC Radiator Inlet Isol (2AAC-8)

12.1.3 Verify the following valves closed:

- Jacket Water Header Isol (2AAC-12)
- 2P-236 ECW Fill Pump Suction (2AAC-9)
- 2P-236 ECW Fill Discharge (2AAC-10)

12.1.4 Open 2P-236 ECW Fill Pump Bypass (2AAC-11).

12.1.5 Throttle open AC/OC Header Isol (2AAC-13) to desired flow rate while monitoring the following:

- 2T-9A Level (2LI-7177)
- 2T-9B Level (2LI-7176)

12.1.6 WHEN desired level reached, THEN close the following valves:

- 2AAC-13
- 2AAC-11

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- 12.2 To fill 2T-9B perform the following:
- 12.2.1 Verify sufficient volume available in ECW Drain/Fill Tank (2T-9A). (Both tanks have a capacity of 350 gallons).
- 12.2.2 IF necessary to add coolant to 2T-9A, THEN coordinate with Chemistry to add proper Glycol /Water mixture to tank.
- 12.2.3 Verify the following valves open:
- 2P-236 ECW Fill Pump Suction (2AAC-9)
 - 2P-236 ECW Fill Discharge (2AAC-10)
 - AC/OC Header Isol (2AAC-13)
 - 2T-9B ECW Expansion Tank to AC/OC Suction Header (2AAC-34)
 - 2PI -7178 (2P-236 Discharge Press) Isol (2AAC-7178)
- 12.2.4 Start ECW Fill pump (2P-236) using 2PB-7102 while monitoring the following:
- 2T-9A Level (2LI -7177)
 - 2T-9B Level (2LI -7176)
- 12.2.5 WHEN desired level reached, THEN secure 2P-236 using 2PB-7102.
- 12.2.6 Close the following valves:
- 2AAC-10
 - 2AAC-9
 - 2AAC-13
 - 2AAC-7178

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- 12.2.7 IF step 12.1.2 performed,
THEN verify the following valves open:
- 2P-237 Jacket Water Pump/Engine Suction (2AAC-2)
 - Jacket Water Engine Outlet Header Isol (2AAC-3)
 - 2T-9B ECW Expansion Tank to JW Suction Hdr (2AAC-14)
 - 2P-240 AC/OC Pump suction (2AAC-6)
 - AC/OC Engine Outlet Header Isol (2AAC-7)
 - JW Radiator Outlet Header (2AAC-1)
 - JW Radiator Inlet Isol (2AAC-4)
 - AC/OC Radiator Outlet Header Isol (2AAC-5)
 - AC/OC Radiator Inlet Isol (2AAC-8)
- 12.2.8 Vent air from system as follows:
- A. Open 2M-13A Jacket Water Vent (2AAC-1044A).
 - B. WHEN solid stream of water issues from vent,
THEN close 2AAC-1044A.
 - C. Open 2M-13B Jacket Water Vent (2AAC-1044B).
 - D. WHEN solid stream of water issues from vent,
THEN close 2AAC-1044B.
 - E. Open Jack Water Engine Outlet Header Vent (2AAC-1002).
 - F. WHEN solid stream of water issues from vent,
THEN close 2AAC-1002.
- 12.2.9 IF AACG declared inoperable for this evolution,
THEN AACG may be declared operable.

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13.0 OPERATION OF AACG STARTING AIR AND SERVICE AIR SYSTEMS

13.1 Operation of Starting Air Dryer (2M-10)

13.1.1 To align 2M-10 for normal operation, perform the following:

- A. Verify the following valves open:
 - 2C-7 to 2M-10 Dry Isol (2AAC-20)
 - 2M-10 Air Dry Unit Outlet (2AAC-21)
- B. Verify 2M-10 Air Dry Unit Bypass (2AAC-22) closed.
- C. Place 2M-10 Handswitch (2HS-7001) to ON.

13.1.2 To secure 2M-10, place 2M-10 Handswitch (2HS-7001) to OFF.

13.1.3 To bypass 2M-10, perform the following:

- A. Verify 2M-10 Air Dry Unit Bypass (2AAC-22) open.
- B. Verify the following valves closed:
 - 2C-7 to 2M-10 Dry Isol (2AAC-20)
 - 2M-10 Air Dry Unit Outlet (2AAC-21)

NOTE

Starting Air Compressor (2C-7) cycles between 395 and 415 psig in the Starting Air Receivers.

13.2 Operation of Starting Air Compressor (2C-7)

13.2.1 To start 2C-7, perform the following:

- A. Verify Starting Air Dryer (2M-10) aligned per step [13.1](#).
- B. Place 2C-7 Handswitch (2HS-7100A) to AUTO.

13.2.2 To secure 2C-7, place 2HS-7100A to OFF/RESET.

13.3 Blowdown of Starting Air Receivers (2T-16A and 2T-16B)

13.3.1 To blowdown 2T-16A, perform the following:

- A. Open 2T-16A Starting Air Receiver Drain (2AAC-1016A).
- B. WHEN moisture removed,
THEN close 2AAC-1016A.

13.3.2 To blowdown 2T-16B, perform the following:

- A. Open 2T-16B Starting Air Receiver Drain (2AAC-1016B).
- B. WHEN moisture removed,
THEN close 2AAC-1016B.

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- 13.4 Operation of Service Air Compressor (2C-11)
 - 13.4.1 To start 2C-11, perform the following:
 - A. Close 2C-11 Breaker 2B161-E6.
 - B. Place 2C-11 Handswitch (2HS-7123) on 2B161-E6 to AUTO.
 - 13.4.2 To secure 2C-11, perform the following:
 - A. Place 2C-11 Handswitch (2HS-7123) on 2B161-E6 to OFF.
 - B. Open 2C-11 Breaker 2B161-E6.
 - 13.4.3 To blowdown Service Air Receiver (2T-19), perform the following:
 - A. Open 2T-19 Service Air Receiver Drain (2SA-1000).
 - B. WHEN moisture removed,
THEN close 2SA-1000.

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AAC GENERATOR VALVE LINEUP

COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
ACC GENERATOR BLDG DOMESTIC WATER							
2DW-35	Domestic Water Supply to ACC Bldg.	M2212 D6 SH 5		OPEN			
2DW-36	Hose Conn.	M2212 D6 SH 5		CLOSED			
2DW-39	Hose Conn.	M2212 D5 SH 5		CLOSED			
2DW-1025	Domestic Water Hdr Vent	M2212 D6 SH 5		CLOSED			
AAC FUEL OIL ENG RM SW CORNER							
2AAC-1005	AAC Bldg Fuel Oil Supply Hdr Drain	M2241 D7 SH 3		CLOSED			
2AAC-7192A	2PDIT-7192 Inlet FO Strainer 2F-7191	M2241 D7 SH 3		OPEN			
2AAC-7192B	2PDIT-7192 Outlet FO Strainer 2F-7191	M2241 D7 SH 3		OPEN			
2AAC-15	2P-235 FO Transfer Pump Suction	M2241 D7 SH 3		OPEN			
2AAC-7193	2PT-7193 2P-235 Outlet Pressure	M2241 D6 SH 3		OPEN			
2AAC-59	2P-235 FO Transfer Pump Discharge	M2241 D6 SH 3		OPEN			
2AAC-1010	2P-235 Discharge Hdr Drain	M2241 D6 SH 3		CLOSED			
2AAC-16	2T-11 Day Tank Fill Isol	M2241 D6 SH3		OPEN			
2AAC-17	Fuel Oil Hdr 2T-11 Bypass	M2241 C6 SH 3		CLOSED			
2AAC-1015	Fuel Oil Hdr 2T-11 Bypass Drain	M2241 C6 SH 3	UNDER DECKPLATE	CLOSED			
2AAC-1009	2T-11 Day Tank Drain/Sample	M2241 D6 SH 3		CLOSED			
2AAC-1006	2T-11 Day Tank Outlet Line Sample	M2241 D5 SH 3		CLOSED			
2AAC-18	2T-11 Day Tank to 2K-9 Supply	M2241 D5 SH 3		LOCKED OPEN			

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
2AAC-1008	2T-11 Day Tank Sample Point	M2241 D5 SH 3		CLOSED			
2AAC-1007	2T-11 Day Tank Sample Point	M2241 D5 SH 3		CLOSED			
2AAC-7201	2LT-7201 (2T-11 Day Tk)	M2241 D5 SH 3		OPEN			
2AAC-1029A	2F-7216A Secondary Filter Drain	M2241 E3 SH 3		CLOSED			
2AAC-1029B	2F-7216B Secondary Filter Drain	M2241 E3 SH 3		CLOSED			
2AAC-1025	2E-76 FO Cooler Vent	M2241 F5 SH 3		CLOSED			
2AAC-1026	2E-76 FO Cooler Drain	M2241 E5 SH 3		CLOSED			
2AAC-35	2F-7205A/B Primary Filters	M2241 D4 SH 3		BOTH IN SERVICE			
2AAC-36	2F-7216A/B Secondary Filters	M2241 E3 SH 3		BOTH IN SERVICE			
AAC LUBE OIL SYSTEM							
2AAC-7131	2LS-7131 (Eng Lo Sump)	M2241 C7 SH 5		OPEN			
2AAC-57	Lube Oil Sump Drain	M2241 C7 SH 5		CLOSED			
2AAC-1031	Lube Oil Sump Drain	M2241 C7 SH 5		CLOSED			
2AAC-7127	2P-238/2M-12 Inlet	M2241 B7 SH 5		OPEN			
2AAC-1028	2P-238/2M-12 Inlet Drain	M2241 A7 SH 5		CLOSED			
2AAC-1027	2P-238/2M-12 Outlet Drain	M2241 A5 SH 5		CLOSED			
2AAC-7135	2P-238/2M-12 Outlet	M2241 B5 SH 5		OPEN			
2AAC-52	2F-7119A/B/C Inlet	M2241 D6 SH 5		OPEN			

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
2AAC-53	2F-7123A/B Filter Change	M2241 E6 SH 5		RUN			
2AAC-1033A	2F-7123A LO Filter Drain	M2241 E6 SH 5		CLOSED			
2AAC-1033B	2F-7123B LO Filter Drain	M2241 D6 SH 5		CLOSED			
AAC BLDG SERVICE AIR SYSTEM							
2SA-1000	2T-19 Service Air Receiver Drain	M2241 G7 SH 4		CLOSED			
2SA-153	2T-19 Outlet	M2241 G7 SH 4		OPEN			
2SA-154	Service Air Hdr Portable Connection	M2241 G6 SH 4		CLOSED			
2SA-155	Service Air Hose Conn.	M2241 H6 SH 4		CLOSED			
2SA-156	Service Air Hose Conn.	M2241 H5 SH 4		CLOSED			
2SA-157	Service Air Hose Conn.	M2241 G6 SH 4		CLOSED			
2SA-158	Service Air Hose Conn.	M2241 G5 SH 4		CLOSED			
AAC 2K-9 STARTING AIR SYSTEM							
2AAC-7227	2PI-7227 (2C-7 Disch Press)	M2241 E7 SH 4		OPEN			
2AAC-22	2M-10 Air Dry Unit Bypass	M2241 E6 SH 4		CLOSED			
2AAC-20	2C-7 to 2M-10 Dry Isol	M2241 E6 SH 4		OPEN			
2AAC-54	2M-10 Air Dry to 2ME-7100	M2241 B6 SH 4		THROTTLED (I)			
2AAC-58	2F-21/22 and 2ME-7100 Inlet	M2241 B6 SH 4		OPEN			
2AAC-1036	2F-21 (2ME-7100 Inlet Filter) Drain	M2241 B7 SH 4		CLOSED			
2AAC-1037	2F-22 (2ME-7100 Outlet Filter) Drain	M2241 B7 SH 4		CLOSED			

Note 1: Throttle to obtain ~160 psig on 2PI-7001 with compressor loaded

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
2AAC-1038	2F-21/22 and 2ME-7/100 Outlet	M2241 B7 SH 4		THROTTLED			~1/16 of a turn open
2AAC-21	2M-10 Air Dry Unit Outlet	M2241 E5 SH 4		OPEN			
2AAC-7234	2PI-7234 (2M-10 Dry Outlet Press) Isol	M2241 E5 SH 4		OPEN			
2AAC-27	2C-7/2M-10 Outlet Hdr Isol	M2241 E5 SH 4		OPEN			
2AAC-29	2T-16A Starting Air Receiver Inlet	M2241 E4 SH 4		OPEN			
2AAC-7236A	2PI-7236A (2T-16A Press) Isol	M2241 D4 SH 4		OPEN			
2AAC-1016A	2T-16A Starting Air Receiver Drain	M2241 E4 SH 4		CLOSED			
2AAC-7237A	2PS-7221A/2PT-7238A Isol	M2241 E4 SH 4		OPEN			
2AAC-7221A	2PS-7221A (2T-16A Press) Isol	M2241 E4 SH 4		OPEN			
2AAC-1045A	2PS-7221A/2PT-7238A Hdr Drain	M2241 E4 SH 4		CLOSED			
2AAC-7238A	2PT-7238A (2T-16A Press) Isol	M2241 E4 SH 4		OPEN			
2AAC-30	2T-16B Starting Air Receiver Inlet	M2241 D4 SH 4		OPEN			
2AAC-7236B	2PI-7236B (2T-16B Press) Isol	M2241 C4 SH 4		OPEN			
2AAC-1016B	2T-16B Starting Air Receiver Drain	M2241 C4 SH 4		CLOSED			
2AAC-7237B	2PS-7221B/2PT-7238B Isol	M2241 D4 SH 4		OPEN			
2AAC-7221B	2PS-7221B (2T-16B Press) Isol	M2241 D4 SH 4		OPEN			
2AAC-1045B	2PS-7221B/2PT-7238B Hdr Drain	M2241 D4 SH 4		CLOSED			
2AAC-7238B	2PT-7238B (2T-16B Press) Isol	M2241 C4 SH 4		OPEN			

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
2AAC-23	2T-16A/B Outlet Hdr Cross Conn.	M2241 E3 SH 4		OPEN			
2AAC-24A	2PCV-7239A Inlet	M2241 E3 SH 4		OPEN			
2AAC-25A	2PCV-7239A Outlet	M2241 E3 SH 4		OPEN			
2AAC-24B	2PCV-7239B Inlet	M2241 D3 SH 4		OPEN			
2AAC-25B	2PCV-7239B Outlet	M2241 D3 SH 4		OPEN			
2AAC-7247A	2PCV-7239A Outlet Hdr Test Conn.	M2241 E3 SH 4		CLOSED			
2AAC-1018A	2PCV-7239A Pilot Sensing Line & Test Conn Isol	M2241 E3 SH 4		OPEN			
2AAC-1019A	2PCV-7239A Outlet Hdr Drain	M2241 E3 SH 4	UNDER DECKPLATE	CLOSED			
2AAC-1019B	2PCV-7239B Outlet Hdr Drain	M2241 D3 SH 4	UNDER DECKPLATE	CLOSED			
2AAC-7247B	2PCV-7239B Outlet Hdr Drain	M2241 D3 SH 4		CLOSED			
2AAC-1018B	2PCV-7239B Pilot Sensing Line & Test Conn Isol	M2241 D3 SH 4		OPEN			
2AAC-42	2KMC-1/3Overspeed Trip/2P-244	M2241 E2 SH 4		OPEN			
2AAC-43	2KMC-2 Air Start Motor Isol	M2241 E2 SH 4		OPEN			
2AAC-44	2M-13A/B Turbo Chargers Isol	M2241 D2 SH 4		OPEN			
2AAC-7254	2PI-7254 (2T-33 Air Accumulator) Isol	M2241 C2 SH 4		OPEN			
2AAC-1033	2T-33 Air Accumulator Drain	M2241 B2 SH 4		CLOSED			
2AAC-56	Manual Air Trip to Fuel Rack Air Cylinders	M2241 B2 SH 4		PULLED OUT			

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
CVCS MAKEUP WATER TO 2T-9A							
2CVC-1020	CVCS Supply Hdr Vent	M2241 C3 SH 1		CLOSED			
2CVC-152	CVCS Supply Hdr Isol	M2241 C3 SH 1		CLOSED			
2CVC-1019	CVCS Supply Hdr Drain	M2241 C3 SH 1		CLOSED			
ECW DRAIN AND FILL SYSTEM							
2AAC-11	2P-236 ECW Fill Pump Bypass	M2241 C3 SH 1		CLOSED			
2AAC-9	2P-236 ECW Fill Pump Suction	M2241 B3 SH 1		CLOSED			
2AAC-19	AAC DG ECW Header Pumpdown Isol	M2241 B3 SH 1		CLOSED			
2AAC-7178	2P-7178 (2P-236 Discharge Press) Isol	M2241 B3 SH 1		CLOSED			
2AAC-1001	2P-236 Discharge Outlet Vent	M2241 B3 SH 1		CLOSED			
2AAC-10	2P-236 ECW Fill Discharge	M2241 B4 SH 1		CLOSED			
2AAC-12	Jacket Water Hdr Isol.	M2241 D6 SH 1		CLOSED			
2AAC-13	AC/OC Hdr Isol	M2241 D6 SH 1		CLOSED			
JACKET WATER SYSTEM							
2AAC-1004	Jacket Water Hdr Drain	M2241 E6 SH 1	UNDER DECKPLATE	CLOSED			
2AAC-2	2P-237 Jacket Water Pump/Engine Suction	M2241 E6 SH 1		OPEN			
2AAC-7152	2P-237 Jacket Water Test Conn.	M2241 E5 SH 1		CLOSED			
2AAC-1041	2P-237 Discharge Hdr Test Conn.	M2241 E5 SH 1		CLOSED			
2AAC-7190	2P-239 JW Heater Pump Suction	M2241 E5 SH 1		OPEN			

ATTACHMENT A

AAC GENERATOR VALVE LINEUP

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
2AAC-1034	2P-239 JW Heater Pump Suction Drain	M2241 E5 SH 1		CLOSED			
2AAC-1035	2P-239 JW Heater Pump Discharge Drain	M2241 E4 SH 1		CLOSED			
2AAC-7196	2P-239 JW Heater Pump Discharge	M2241 E4 SH 1		OPEN			
2AAC-1044A	2M-13A Jacket Water Vent	M2241 F5 SH 1		CLOSED			
2AAC-1044B	2M-13B Jacket Water Vent	M2241 F5 SH 1		CLOSED			
2AAC-3	Jack Water Eng Outlet Hdr Isol	M2241 E3 SH 1		OPEN			
2AAC-1002	Jack Water Eng Outlet Hdr Vent	M2241 E3 SH 1		CLOSED			
2AAC-1011	Jack Water Eng Outlet Hdr Drain	M2241 F6 SH 1	UNDER DECKPLATE	CLOSED			
2AAC-14	2T-9B ECW Expansion Tk to JW Suction Hdr	M2241 G6 SH 1		OPEN			
2AAC-4	JW Radiator Inlet Isol	M2241 F6 SH 1		OPEN			
2AAC-1042	JW Radiator Outlet Hdr Vent	M2241 F7 SH 1		CLOSED			
2AAC-1	JW Radiator Outlet Hdr.	M2241 E6 SH 1		OPEN			
AC/OC RADIATOR INSIDE BLDG							
2AAC-1043	AC/OC Radiator Outlet Hdr Vent	M2241 E7 SH 1		CLOSED			
2AAC-5	AC/OC Radiator Outlet Hdr Isol	M2241 D7 SH 1		OPEN			
2AAC-34	2T-9B ECW Expansion Tk to AC/OC Suction Hdr	M2241 D7 SH 1		OPEN			
2AAC-1012	AC/OC Suction Hdr Drain	M2241 C6 SH 1	UNDER DECKPLATE	CLOSED			
2AAC-6	2P-240 AC/OC Pump Suction	M2241 D6 SH 1		OPEN			

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
2AAC-7164	2P-240 AC/OC Pump Suction Test Conn.	M2241 D6 SH 1		CLOSED			
2AAC-1003	AC/OC Eng Outlet Hdr Vent	M2241 D3 SH 1		CLOSED			
2AAC-7	AC/OC Eng Outlet Hdr Isol	M2241 D3 SH 1		OPEN			
2AAC-1013	AC/OC Eng Outlet Hdr Drain	M2241 C6 SH 1	UNDER DECKPLATE	CLOSED			
2AAC-8	AC/OC Radiator Inlet Isol.	M2241 C6 SH 1		OPEN			
2T-9B ECW EXPANSION TK							
2AAC-7176A	2LI-7176 Upper Level Isol	M2241 H5 SH 1		OPEN			INACCESSIBLE
2AAC-7176B	2LI-7176 Lower Level Isol	M2241 G5 SH 1		OPEN			INACCESSIBLE
INSTRUMENT ROOT VALVE RACK							
2AAC-7133A	2PSH-7133 (Eng Trip LO to Eng) Isol	M2241 F5 SH 5		OPEN			
2AAC-7134A	2PSL-7134 (Eng Trip LO to Eng) Isol	M2241 F5 SH 5		OPEN			
2AAC-7258	2PS-7258 (2T-33 Outlet Hdr) Isol	M2241 B2 SH 4		OPEN			
2AAC-7263	2PS-7263 (Eng Trip Crankcase Press)	M2241 C3 SH 2		OPEN			
2AAC-7257	Crankcase Press to 2PS-7263/2PT-7257	M2241 C4 SH 2		OPEN			
2AAC-7253	2PS-7253 (2M-9 Fuel Pack Linkage/Isol)	M2241 B1 SH 4		OPEN			
2AAC-7208A	2PDT-7208 (Inlet 2F-7216A/B Secondary Filter)	M2241 F3 SH 3		OPEN			
2AAC-7214B	2PDT-7214 (Outlet 2F-7205A/B Primary Filters)	M2241 D4 SH 3		OPEN			
2AAC-7125A	2PDT-7125 (2F-7123A/B LO Filter) Inlet	M2241 F7 SH 5		OPEN			
2AAC-7125B	2PDT-7125 (2F-7123A/B LO Filters) Outlet	M2241 F6 SH 5		OPEN			

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
2AAC-7126	2PT-7126/2PSL-7134/2PSH-7133 Isol	M2241 F5 SH 5		OPEN			
2AAC-7214A	2PDT-7214 (Inlet 2F-7205A/B Primary Filters)	M2241 D4 SH 3		OPEN			
2AAC-7208B	2PDT-7208 (Outlet 2F-7216A/B Secondary Filters)	M2241 F4 SH 3		OPEN			
2AAC-7212A	2PT-7212 (FO Hdr to Eng Press)	M2241 F4 SH 3		OPEN			
2AAC-7154A	2PT-7154 (2P-237 Disch Hdr Press) Isol	M2241 F5 SH 1		OPEN			
2AAC-7166	2PT-7166 (2P-240 Discharge Press) Isol	M2241 D5 SH 1		OPEN			
2AAC-7255A	2PT-7255 (2E-132 Aftercooler Press)	M2241 C6 SH 2		OPEN			
INSTRUMENT RACK							
2AAC-7253A	2PS-7253 Test Port	M2241 B1 SH 4		CLOSED			
2AAC-7258A	2PS-7258 Test Port	M2241 B2 SH 4		CLOSED			
2AAC-7134B	2PSL-7134 Test Port	M2241 F5 SH 5		CLOSED			
2AAC-7133B	2PSH-7133 Test Port	M2241 F4 SH 5		CLOSED			
2AAC-7263A	2PS-7263 Test Port	M2241 C3 SH 2		CLOSED			
2AAC-7255B	2PT-7255 Test Port	M2241 C6 SH 2		CLOSED			
2AAC-7166A	2PT-7166 Test Port	M2241 D6 SH 1		CLOSED			
2AAC-7154B	2PT-7154 Test Port	M2241 F5 SH 1		CLOSED			
2AAC-7214C	2PDT-7214 Test Port	M2241 E4 SH 3		CLOSED			
2AAC-7214D	2PDT-7214 Test Port	M2241 E4 SH 3		CLOSED			

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
2AAC-1030	2PT-7126 Test Port	M2241 F5 SH 5		CLOSED			
2AAC-7212B	2PT-7212 Test Port	M2241 F4 SH 3		CLOSED			
2AAC-7125C	2PDT-7125 Test Port	M2241 D6 SH 5		CLOSED			
2AAC-7125D	2PDT-7125 Test Port	M2241 F6 SH 5 F6		CLOSED			
2AAC-7257A	2PT-7257 Test Port	M2241 C3 SH 2		CLOSED			
2AAC-7208C	2PDT-7208 Test Port	M2241 E3 SH 3		CLOSED			
2AAC-7208D	2PDT-7208 Test Port	M2241 E4 SH 3		CLOSED			
OUTSIDE JW COOLING VALVES							
2AAC-1023	JW Radiator Inlet Hdr Vent	M2241 G7 SH 1		CLOSED			
2AAC-1039	JW Radiator Inlet Drain	M2241 G8 SH 1		CLOSED			
2AAC-1022	JW Radiator Outlet Vent	M2241 D8 SH 1		CLOSED			
LONDON X-FORMER PAD							
2AAC-1032	2X-120 Pad Drain			CLOSED			
AC/OC RADIATOR OUTSIDE							
2AAC-1021	AC/OC Radiator Vent	M2241 E8 SH 1		CLOSED			
2AAC-1040	AC/OC Radiator Drain	M2241 D8 SH 1		CLOSED			
2AAC-1024	AC/OC Radiator Inlet Hdr Vent	M2241 E8 SH 1		CLOSED			

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COMPONENT NUMBER	COMPONENT DESCRIPTION	PRINT # GRID #	ADDITIONAL COMPONENT INFORMATION	REQUIRED POSITION	TAG	INITIAL	COMMENTS
OUTSIDE							
2AAC-1000	2T-9A Outlet Hdr Drain	M2241 B2 SH 1	OUTSIDE WEST OF AAC BLDG, SOUTH SIDE OF 2T-94	CLOSED			
2CVC-153	CVCS to 2T-9A Isol	M2241 C3 SH 1	OUTSIDE WEST OF AAC BLDG, SOUTH EAST SIDE OF 2T-94	CLOSED			
2AAC-7250A	2PT-7250A (2VFP-18A Air Inlet Filter)	M2241 F8 SH 2	ON ROOF	OPEN			
2AAC-7250B	2PT-7250B (2VFP-18B Air Inlet Filter)	M2241 F5 SH 2	ON ROOF	OPEN			
2AAC-1020	2M-12 Exhaust Silencer Drain	M2241 G6 SH 2	ON ROOF	CLOSED			
2AAC-61	AAC FO Supply Isol	M2241 D8 SH 3	T-25 VALVE PIT	OPEN			
2AAC-1017	2T-11 Day Tk Overflow to T-25 Hdr Drain	M2241 D8 SH 3	T-25 VALVE PIT	CLOSED			
2AAC-1014	AAC Bldg Fuel Oil Supply Hdr Drain	M2241 B8 SH 3	T-25 VALVE PIT	CLOSED			

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ATTACHMENT B

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AACG 4160V SWITCHGEAR BREAKER CHECKLIST

BREAKER NUMBER	DESCRIPTION	PRINT #	REQUIRED POSITION	TAG	INITIAL	COMMENTS
2A9						
2A-901	AAC to 4.16KV Switchgear A3		Racked In			
2A-902	AAC to 4.16KV Switchgear 2A4		Racked In			
2A-903	AAC to 4.16KV Switchgear A1		Racked In			
2A-904	AAC to 4.16KV Switchgear 2A1		Racked In			
2A-905	Spare		Racked In			
2A10						
2A-1001	AAC Generator Breaker 2A10		Racked In			

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AACG 480V LOAD CENTER BREAKER CHECKLIST

BREAKER NUMBER	DESCRIPTION	PRINT #	REQUIRED POSITION	TAG	INITIAL	COMMENTS
2B16						
2B16-A1	London Feed to MCC 2B161		Closed			
2B16-B1	AAC Generator Output to MCC 2B161		Open			
2B16-B1	Transfer Mode Selector Switch		AUTO			

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AACG 480V MCC BREAKER CHECKLIST

BREAKER NUMBER	DESCRIPTION	PRINT #	REQUIRED POSITION	TAG	INITIAL	COMMENTS
MCC 2B161						
2B161-A1	Spare		Open			
2B161-A2	2VUE-81 Swgr Room Heater 1	E2126 SH 8	Closed			
2B161-A3	2VUE-82 Swgr Room Heater 2	E2126 SH 8	Closed			
2B161-A4	Spare		Open			
2B161-A5	2VUE-77 Engine Room Heater 1	E2126 SH 8	Closed			
2B161-A6	2VUE-78 Engine Room Heater 2	E2126 SH 8	Closed			
2B161-A7	2VUE-79 Engine Room Heater 3	E2126 SH 8	Closed			
2B161-A8	2VUE-80 Engine Room Heater 4	E2126 SH 8	Closed			
2B161-A9	Spare		Open			
2B161-A10	Spare		Open			
2B161-A11	Spare		Open			
2B161-B1	2VEF-18 Engine Room Exhaust Fan	E2126 SH 6	Closed			
2B161-B2	2VEF-17 Engine Room Exhaust Fan	E2126 SH 13	Closed			
2B161-B3	2VEF-16 Engine Room Exhaust Fan	E2126 SH 11	Closed			
2B161-B4	AAC Gen Auxiliaries	E2126 SH 12	Closed			
2B161-B5	2VSF-32 Swgr Room Air Handling Unit	E2126 SH 11	Closed			
2B161-B6	Spare		Open			
2B161-B7	2VEF-19 Swgr Room Backup Exhaust Fan	E2126 SH 1	Closed			
2B161-C1	2M-15A AAC Gen Radiator Fan 1	E2126 SH 10	Closed			
2B161-C2	2M-15B AAC Gen Radiator Fan 2	E2126 SH 9	Closed			
2B161-C3	Spare		Open			
2B161-D1	Spare		Open			

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BREAKER NUMBER	DESCRIPTION	PRINT #	REQUIRED POSITION	TAG	INITIAL	COMMENTS
2B161-D2	2C-7 AAC Gen Starting Air Compr Skid	E2126 SH 4	Closed			
2B161-D3	Spare		Open			
2B161-D4	DR 620 Rolling Door	E2126 SH 12	Closed			
2B161-D5	2P-235 AAC Gen Fuel Oil Transfer Pump	E2126 SH 2	Closed			
2B161-D6	2E-76 AAC Gen Fuel Oil Cooler	E2126 SH 3	Closed			
2B161-D7	Spare		Open			
2B161-E2	2X-47 Dist Transformer 480/120-108V	E2126 SH 12	Closed			
2B161-E3	2L-65 AAC Gen Bldg Crane	E2126 SH 12	Open			
2B161-E4	2W-91/2W-92 AAC Gen Bldg Welding Receptacles	E2126 SH 12	Closed			
2B161-E5	2P-234 AAC Gen Bldg Drain Sump Pump	E2126 SH 5	Closed			
2B161-E6	2C-11 AAC Gen Bldg Service Air Comp	E2126 SH 7	Open			

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ATTACHMENT E

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AAC GENERATOR EMERGENCY START

- 1.0 IF PLC available,
THEN reset PLC.
- 2.0 IF AACG network PLC fails,
OR both PCs have failed,
THEN perform local start using Exhibit 1 of this procedure.
- 3.0 Start AAC Generator as follows:
 - 3.1 Touch ENGINE START/STOP.
 - 3.2 Touch START Screen.
 - 3.3 Touch START button.
 - 3.4 IF engine does not start in ~ 35 seconds due to pre-lube interlock,
THEN touch and hold EMERGENCY START until engine speed reaches 180 RPM.
 - 3.5 Verify Generator frequency ~ 60 Hz (900 RPM) and voltage ~ 4160 volts.
- 4.0 Touch ELECTRICAL BUS CONTROL.
- 5.0 Touch 4160 v BREAKERS.
- 6.0 Verify AAC Generator Output breaker (2A-1001) closed.
- 7.0 Coordinate with Unit 1 to determine electrical power status.
- 8.0 Use the appropriate sections of this Attachment to load the AACG as desired within the following limits:
 - Any combination of Unit 1 and Unit 2 vital and non-vital buses may be energized as long as total load remains < 4400 KW. (4600 KW for 500 hours, 5320 KW for 30 minutes)
 - 2A3 and 2A4 should NOT be supplied at the same time except to satisfy a safety function.
IF 2A3 and 2A4 are supplied at the same time in Modes 1-4,
THEN enter Tech Spec 3.0.3.
 - Potential Unit 1 and Unit 2 loads are as follows:

COMPONENT	UNIT 1 LOAD	UNIT 2 LOAD
CHARGING PUMP	N/A	50 KW
SERVICE WATER PUMP	261 KW	640 KW
HPI /HPSI PUMP	522 KW	420 KW
LPI /LPSI PUMP	261 KW	340 KW
SPRAY PUMP	186 KW	340 KW
EFW PUMP	522 KW	500 KW
PZR PROPORTIONAL HTRS	N/A	0-180 KW
ESF BUS	800 KW	N/A

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- 9.0 Energizing 2A3 from the AAC Generator (Dead-bus transfer only)
 - 9.1 Review step 8.0 of this Attachment.
 - 9.2 Verify 2A3 - 2A4 Tie breaker (2A-310) open.
 - 9.3 IF 2A4 NOT energized from AAC Generator,
THEN verify 2A3 - 2A4 Tie breaker (2A-410) open.
 - 9.4 Verify 2A3 Supply breaker (2A-309) in PTL.
 - 9.5 Verify 2DG1 Output breaker (2A-308) in PTL.
 - 9.6 IF PLC available,
THEN perform the following:
 - 9.6.1 Touch ELECTRICAL BUS CONTROL.
 - 9.6.2 Touch 4160 V BREAKERS.
 - 9.6.3 Touch 2A-902.
 - 9.7 Perform the following as needed to close 2A-902:
 - Touch CLOSE on PLC.
 - Use 2A-902 Control switch (2HS-7101).
 - Locally operate 2A-902 per Exhibit 4.
 - 9.8 Close and hold 2A3 - 2A4 Tie (2A-310) in close position for 3 seconds.
 - 9.9 Verify 2A3 voltage indicates ~ 4160 volts.
 - 9.10 Manually start desired loads on 2A3 not to exceed limits of step 8.0 of this Attachment.
 - 9.11 Energize other buses as desired using appropriate sections of this Attachment.

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10.0 De-energizing 2A3 from AAC Generator

10.1 Verify 2A3 loads secured.

10.2 Open 2A3 - 2A4 Tie (2A-310).

10.3 IF 2A4 NOT energized from AACG (2A-410 open),
THEN perform the following:

10.3.1 IF PLC available,
THEN perform the following:

- A. Touch ELECTRICAL BUS CONTROL.
- B. Touch 4160 V BREAKERS.
- C. Touch 2A-902.

10.3.2 Perform the following as needed to open 2A-902:

- Touch TRIP on PLC.
- Use 2A-902 Control switch (2HS-7101).
- Locally operate 2A-902 per Exhibit 4.

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- 11.0 Energizing 2A4 from the AAC Generator (Dead-bus transfer only)
 - 11.1 Review step 8.0 of this Attachment.
 - 11.2 Verify 2A3 - 2A4 Tie breaker (2A-410) open.
 - 11.3 IF 2A3 NOT energized from AAC Generator,
THEN verify 2A3 - 2A4 Tie breaker (2A-310) open.
 - 11.4 Verify 2A4 Supply breaker (2A-409) in PTL.
 - 11.5 Verify 2DG2 Output breaker (2A-408) in PTL.
 - 11.6 IF PLC available,
THEN perform the following:
 - 11.6.1 Touch ELECTRICAL BUS CONTROL.
 - 11.6.2 Touch 4160 V BREAKERS.
 - 11.6.3 Touch 2A-902.
 - 11.7 Perform the following as needed to close 2A-902:
 - Touch CLOSE on PLC.
 - Use 2A-902 Control switch (2HS-7101).
 - Locally operate 2A-902 per Exhibit 4.
 - 11.8 Close and hold 2A3 - 2A4 Tie (2A-410) in close position for 3 seconds.
 - 11.9 Verify 2A4 voltage indicates ~ 4160 volts.
 - 11.10 Manually start desired loads on 2A4 not to exceed limits of step 8.0 of this Attachment.
 - 11.11 Energize other buses as desired using appropriate sections of this Attachment.

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12.0 De-energizing 2A4 from AAC Generator

12.1 Verify 2A4 loads secured.

12.2 Open 2A3 - 2A4 Tie (2A-410).

12.3 IF 2A3 NOT energized from AACG (2A-310 open),
THEN perform the following:

12.3.1 IF PLC available,
THEN perform the following:

- A. Touch ELECTRICAL BUS CONTROL.
- B. Touch 4160 V BREAKERS.
- C. Touch 2A-902.

12.3.2 Perform the following as needed to open 2A-902:

- Touch TRIP on PLC.
- Use 2A-902 Control switch (2HS-7101).
- Locally operate 2A-902 per Exhibit 4.

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13.0 Energizing 2A1 from the AAC Generator

13.1 Review step 8.0 of this Attachment.

13.2 Place the following handswitches in PTL and verify breakers open:

	PTL (✓)	Bkr Open (✓)
• SU #2 to 2A1 (2A-111)	_____	_____
• Unit Aux to 2A1 (2A-112)	_____	_____
• SU #3 to 2A1 (2A-113)	_____	_____
• LC 2B3 Feeder (2A-103)	_____	_____
• LC 2B9 Feeder (2A-109)	_____	_____
• EHC pump (2P-14A)	_____	_____
• Condensate pump (2P-2A)	_____	_____
• Condensate pump (2P-2C)	_____	_____
• Heater Drain pump (2P-8A)	_____	_____
• Auxiliary Feed pump (2P-75)	_____	_____
• CCW pump (2P-33A)	_____	_____
• Main Chiller (2VCH-1A)	_____	_____

13.3 Verify the following breakers closed:

- 2A1 to 2B1 (2A-102)
- 2A1 to 2B7 (2A-104)

13.4 IF Instrument Air Compressor 2C-27A NOT available,
THEN perform the following:

- Cross-connect 2B1 and 2B2 using Cross Connecting 480v Non-ESF Buses section of 2107.001, Electrical System Operation.
- Place CCW pump (2P-33B) in PULL TO LOCK.
- Place EHC pump (2P-14B) in PULL TO LOCK.

13.5 IF CCW Pump 2P-33C NOT available,
THEN perform the following:

- Cross-connect 2B1 and 2B2 using Cross Connecting 480v Non-ESF Buses section of 2107.001, Electrical System Operation.
- Place EHC pump (2P-14B) in PULL TO LOCK.
- Place CCW pump (2P-33C) in PULL TO LOCK.
- Verify CCW pump (2P-33B) NOT in PULL TO LOCK.

13.6 Close at least ONE RCP CCW Isolation valve:

- 2CV-5255-1
- 2CV-5254-2
- 2CV-5236-1

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- 13.7 IF PLC available,
THEN perform the following:
 - 13.7.1 Touch ELECTRICAL BUS CONTROL.
 - 13.7.2 Touch 4160 V BREAKERS.
 - 13.7.3 Touch 2A-904.
- 13.8 Perform the following as needed to close 2A-904:
 - Touch CLOSE on PLC.
 - Use 2A-904 Control switch (2HS-7103).
 - Locally operate 2A-904 per Exhibit 4.
- 13.9 Verify 2A1 indicates ~ 4160 volts.
- 13.10 Verify at least one Instrument Air Compressor (2C-27A/B) running.
- 13.11 IF SW pump suction aligned to the Lake,
THEN restore Loop 2 CCW as follows:
 - 13.11.1 Verify SW aligned to CCW per 2202.010, Standard Attachments Exhibit 5, CCW/ACW/SW Alignment.
 - 13.11.2 Verify either 2P-9A or 2P-9B running (2K11-J7 clear).
 - 13.11.3 Verify either 2P-33B or 2P-33C running on Loop 2 CCW.
 - 13.11.4 Restore RCP CCW per 2202.010, Standard Attachment 21, Restoration of CCW to RCPs.
- 13.12 IF SW pump suction can NOT be aligned to the Lake,
THEN perform the following:
 - 13.12.1 Verify the following valves closed:
 - Loop 1 SW to CCW/Main Chillers (2CV-1530-1)
 - Loop 2 SW to CCW/Main Chillers (2CV-1531-2)
 - Loop 1 CCW/ACW Return Isol (2CV-1543-1)
 - Loop 2 CCW/ACW Return Isol (2CV-1542-2)
 - ACW Supply valve 2CV-1425-1
 - ACW Supply valve 2CV-1427-2
 - 13.12.2 Secure CCW and ACW using 2202.010, Standard Attachment 6, Securing CCW and ACW.
- 13.13 Notify Chemistry to sample RCS for Boron and Iodine per TS 4.4.8.
- 13.14 Start additional loads on 2A1 as desired NOT to exceed limits of step 8.0 of this Attachment.
- 13.15 Energize other buses as desired using appropriate sections of this Attachment.

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ATTACHMENT E

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14.0 De-energizing 2A1 from AAC Generator

14.1 Verify 2A1 loads secured.

14.2 IF PLC available,
THEN perform the following:

14.2.1 Touch ELECTRICAL BUS CONTROL.

14.2.2 Touch 4160 V BREAKERS.

14.2.3 Touch 2A-904.

14.3 Perform the following as needed to open 2A-904:

- Touch TRIP on PLC.
- Use 2A-904 Control switch (2HS-7103).
- Locally operate 2A-904 per Exhibit 4.

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ATTACHMENT E

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NOTE

If an EFIC initiate signal present when A3 is energized, then EFW pump (P-7B) will auto start if not in PTL.

15.0 Energizing A3 or A4 from AAC Generator

15.1 Verify the following breakers open:

- A3 - A4 Tie (A-310)
- A3 - A4 Tie (A-410)

15.2 IF PLC available,
THEN perform the following:

15.2.1 Touch ELECTRICAL BUS CONTROL.

15.2.2 Touch 4160 V BREAKERS.

15.2.3 Touch 2A-901.

15.3 Perform the following as needed to close 2A-901:

- Touch CLOSE on PLC.
- Use 2A-901 Control switch (2HS-7100).
- Locally operate 2A-901 per Exhibit 4.

15.4 Coordinate with Unit 1 to load A3/A4 not to exceed limits in step 8.0 of this Attachment.

15.5 Energize other buses as desired using appropriate sections of this Attachment.

16.0 De-energizing A3/A4 from the AAC Generator

16.1 Verify A3 or A4 loads secured.

16.2 IF PLC available,
THEN perform the following:

16.2.1 Touch ELECTRICAL BUS CONTROL.

16.2.2 Touch 4160 V BREAKERS.

16.2.3 Touch 2A-901.

16.3 Perform the following as needed to open 2A-901:

- Touch TRIP on PLC.
- Use 2A-901 Control switch (2HS-7100).
- Locally operate 2A-901 per Exhibit 4.

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ATTACHMENT E

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17.0 Energizing A1 from the AAC Generator

- 17.1 Verify A1 stripped of all non-essential loads.
- 17.2 IF PLC available,
THEN perform the following:
 - 17.2.1 Touch ELECTRICAL BUS CONTROL.
 - 17.2.2 Touch 4160 V BREAKERS.
 - 17.2.3 Touch 2A-903.
- 17.3 Perform the following as needed close 2A-903:
 - Touch CLOSE on PLC.
 - Use 2A-903 Control switch (2HS-7102).
 - Locally operate 2A-903 per Exhibit 4.
- 17.4 Verify A1 indicates ~ 4160 volts.
- 17.5 Start desired loads on A1 not to exceed limits in step 8.0 of this Attachment.
- 17.6 Energize other buses as desired using appropriate sections of this Attachment.

18.0 De-energizing A1 from the AAC Generator

- 18.1 Verify A1 loads secured.
- 18.2 IF PLC available,
THEN perform the following:
 - 18.2.1 Touch ELECTRICAL BUS CONTROL.
 - 18.2.2 Touch 4160 V BREAKERS.
 - 18.2.3 Touch 2A-903.
- 18.3 Perform the following as needed to open 2A-903:
 - Touch TRIP on PLC.
 - Use 2A-903 Control switch (2HS-7102).
 - Locally operate 2A-903 per Exhibit 4.

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EXHIBIT 1

10/08/04

AAC GENERATOR LOCAL START AND STOP

PAGE 1 OF 2

This Exhibit is used to perform a Local start of the AAC Generator as directed by Attachment E. A Local start is performed if both PCs on 2C14 and 2C435 have failed. If PLC-A has failed, annunciators on 2C435 and on 2K12 will be unavailable. Engine protection will be limited to Engine Overspeed, High Crankcase pressure, Low Lube Oil pressure and Emergency Stop (manual). 2A9 breakers will require local operation to open and close. If the 2B16 PLC has failed, 2B16 supply breakers will have to be manually operated. A loss of DC Control Power will require manual operation of the Air Start Solenoids.

- 1.0 Place Local/Remote switch (2HS-7118) in LOCAL on 2C440.
- 2.0 Place AND hold Engine Control switch (2HS-7117) to START for ~ 35 seconds or until generator frequency comes on scale.
- 3.0 IF engine does NOT start in ~ 35 seconds,
THEN perform the following:
 - 3.1 Manually operate Control Air to 2P-244 Pre-Lube Pump solenoid (2SV-7224) for > 10 seconds by rotating manual operator stem clockwise.
 - 3.2 WHEN > 10 seconds have elapsed,
THEN rotate 2SV-7224 stem counter-clockwise.
 - 3.3 Manually operate either 2K-9 Air Start Solenoid (2SV-7222 OR 2SV-7223) by slowly rotating manual operator stem clockwise.
 - 3.4 WHEN engine starts,
THEN disengage manual operators by rotating stem counter-clockwise.
- 4.0 Verify the following:
 - AAC Gen voltage ~ 4160 volts using Volt Raise/Lower switch (2HS-7116).
 - AAC Gen frequency ~ 60 Hz (900 RPM) using Speed Raise/Lower switch (2HS-7115).
- 5.0 Verify the following breaker positions:
 - 5.1 AAC Generator Output breaker (2A-1001) closed.
 - 5.2 London Feed to LC 2B16 (2B16-A1) open.
 - 5.3 AAC Generator Output to LC 2B16 (2B16-B1) closed.
- 6.0 Return to procedure in effect for AAC Generator loading.

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EXHIBIT 1

10/08/04

AAC GENERATOR LOCAL START AND STOP

PAGE 2 OF 2

7.0 WHEN desired to locally secure AAC Generator,
THEN perform the following:

7.1 Verify the following breakers open:

- 2A-901 AAC to 4.16KV Switchgear A3
- 2A-902 AAC to 4.16KV Switchgear 2A4
- 2A-903 AAC to 4.16KV Switchgear A1
- 2A-904 AAC to 4.16KV Switchgear 2A1

7.2 Adjust voltage to 4160 volts using Voltage Raise/Lower switch (2HS-7116) on 2C440.

7.3 Adjust frequency to 60 Hz using Speed Raise/Lower switch (2HS-7115) on 2C440.

7.4 Operate engine unloaded for at least 10 minutes AND verify Jacket Water Out temperature (2TI-7156) < 190°F.

7.5 Place Engine Control switch (2HS-7117) to STOP.

7.6 IF the AAC engine continues to run,
THEN close Air Supply to Fuel Rack Linkage Air Cylinder (2AAC-56).

- WHEN engine stops,
THEN open 2AAC-56.

7.7 Verify the following breaker positions:

7.7.1 AAC Generator Output breaker (2A-1001) open.

7.7.2 AAC Generator Output to LC 2B16 (2B16-B1) open.

7.7.3 London Feed to LC 2B-16 (2B16-A1) closed.

7.8 IF local control no longer necessary,
THEN perform the following:

7.8.1 Verify Engine Control switch in MID position.

7.8.2 Place Local / Remote switch on 2C440 in STANDBY.

7.9 Verify AAC Generator alarms reset and concerns resolved.

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EXHIBIT 2

09/12/02

AAC GENERATOR 4160 V BREAKER MANIPULATIONS

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1.0 RACKING IN 4160 V BREAKERS

- 1.1 Establish Electrical Safety PPE using 2107.001 (Electrical System Operations) Exhibit 9, ELECTRICAL SAFETY REQUIREMENTS.
- 1.2 Verify breaker open by either of the following:
 - Open flag on front of breaker door.
 - Position flag on front of breaker.
- 1.3 IF breaker is in Test,
THEN perform the following:
 - 1.3.1 Discharge closing springs by depressing PUSH-TO-TRIP button.
 - 1.3.2 De-energize DC Control Power per either of the following:
 - For 2A-1001 open DC Control Power switch in upper breaker cabinet.
 - For 2A-901 thru 2A-905 pull fuse block labeled CLOSE CKT FUSE-20A. (Fuse block may be rotated 180° and reinserted in holder for storage.)
 - 1.3.3 Disconnect breaker secondary contacts by withdrawing breaker racking arm and rotating up to the vertical position.
- 1.4 Install racking tool in racking access hole in the lower left corner of breaker door.
- 1.5 Push racking tool in to uncover the hex drive nut.
- 1.6 Rotate racking tool clockwise to rack breaker in until breaker reaches stops and position indicator above access hole indicates CONN.
- 1.7 Remove racking tool.
- 1.8 Perform either of the following:
 - For 2A-1001 close DC Control Power switch in upper breaker cabinet.
 - For 2A-901 thru 2A-905, install fuse block labeled CLOSE CKT FUSE-20A. (Remove and rotate 180° as necessary)
- 1.9 IF DC power available,
THEN verify springs charged and proper breaker position lights illuminated on breaker door.

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EXHIBIT 2

09/12/02

AAC GENERATOR 4160 V BREAKER MANIPULATIONS

PAGE 2 OF 2

2.0 RACKING OUT 4160 V BREAKERS

- 2.1 Establish Electrical Safety PPE using 2107.001 (Electrical System Operations) Exhibit 9, ELECTRICAL SAFETY REQUIREMENTS.
- 2.2 Verify breaker open by either of the following:
 - Green open light illuminated.
 - Open flag indicated on front of breaker.
- 2.3 De-energize DC Control Power per either of the following:
 - For 2A-1001 open DC Control Power switch in upper breaker cabinet.
 - For 2A-901 thru 2A-905, pull fuse block labeled CLOSE CKT FUSE-20A. (Fuse block may be rotated 180° and reinserted in holder for storage)
- 2.4 Install racking tool in racking access hole in the lower left corner of breaker door.
- 2.5 Push racking tool in to uncover the hex drive nut.
- 2.6 Rotate racking tool counter-clockwise to rack breaker out until breaker reaches stops and position indicator above access hole indicates TEST/DISC. Springs will discharge automatically.
- 2.7 Remove racking tool.
- 2.8 IF desired to place breaker in Test,
THEN perform the following:
 - 2.8.1 Open breaker door, pull breaker racking arm out and down until parallel with floor.
 - 2.8.2 Insert racking arm into breaker to engage secondary contacts.
 - 2.8.3 Perform either of the following to energize DC Control Power:
 - For 2A-1001 close DC Control Power switch in upper breaker cabinet.
 - For 2A-901 thru 2A-905, install fuse block labeled CLOSE CKT FUSE-20A. (Remove and rotate 180° as necessary)
 - 2.8.4 IF DC power available,
THEN verify springs charged and proper breaker position
lights illuminated on breaker door.

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EXHIBIT 3

09/12/02

AAC GENERATOR 480 V BREAKER MANIPULATIONS

PAGE 1 OF 1

1.0 RACKING OUT 480 V LOAD CENTER BREAKER

- 1.1 Establish Electrical Safety PPE using 2107.001 (Electrical System Operations) Exhibit 9, ELECTRICAL SAFETY REQUIREMENTS.
- 1.2 Verify breaker open by observing the following:
 - Green breaker open light illuminated
 - Contact Position window indicates open
- 1.3 Lift racking shutter and insert racking crank.
- 1.4 Rotate racking crank counter-clockwise until breaker fully racked out.
- 1.5 IF desired to discharge closing springs,
THEN perform the following after breaker is fully racked out:
 - Depress the Close Pushbutton
 - Depress the Open Pushbutton
- 1.6 Remove racking crank.

2.0 RACKING IN 480 V LOAD CENTER BREAKER

- 2.1 Establish Electrical Safety PPE using 2107.001 (Electrical System Operations) Exhibit 9, ELECTRICAL SAFETY REQUIREMENTS.
- 2.2 Verify breaker open by observing Contact Position window indicates open.
- 2.3 Lift racking shutter and insert racking crank.
- 2.4 Rotate racking crank clockwise until breaker is fully racked in.
- 2.5 Verify closing springs automatically charge as breaker is racked in by observing white closing springs charged light illuminated and the stored energy window indicates charged.
- 2.6 Remove racking crank and close racking shutter.

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EXHIBIT 4

04/08/03

AAC GENERATOR 4160 V BREAKER OPERATION WITHOUT DC

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NOTE

A breaker without DC control power cannot be tripped or closed remotely, by interlocks or protective circuitry.

1.0 CLOSING 4160 V SWITCHGEAR BREAKER WITH NO DC CONTROL POWER

- 1.1 Establish Electrical Safety PPE using 2107.001 (Electrical System Operations) Exhibit 9, ELECTRICAL SAFETY REQUIREMENTS.
- 1.2 Open breaker cubicle door.
- 1.3 Verify breaker position by observing position flag on front of breaker.
- 1.4 Check breaker closing springs charged by observing springs charged indicator on front of breaker.
- 1.5 IF closing spring charging is required,
THEN insert charging tool into manual charging slot on front of breaker and pump until springs indicate charged.
- 1.6 Close breaker with manual close push button on front of breaker.
- 1.7 IF additional breaker closures are required,
THEN repeat steps 1.5 and 1.6 above.

NOTE

A closed breaker always has the opening springs charged.

2.0 OPENING 4160 V SWITCHGEAR BREAKER WITH NO DC CONTROL POWER

- 2.1 Establish Electrical Safety PPE using 2107.001 (Electrical System Operations) Exhibit 9, ELECTRICAL SAFETY REQUIREMENTS.
- 2.2 Open breaker cubicle door.
- 2.3 Verify breaker position by observing position flag on front of breaker.
- 2.4 Open breaker by pushing manual trip push button on the front of breaker.

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EXHIBIT 5

09/12/02

AAC GENERATOR 480 V BREAKER OPERATION WITHOUT DC

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NOTE

A breaker without DC control power cannot be tripped or closed remotely, by interlocks or protective circuitry.

1.0 CLOSING 480 V LOAD CENTER BREAKER WITH NO DC CONTROL POWER

- 1.1 Establish Electrical Safety PPE using 2107.001 (Electrical System Operations) Exhibit 9, ELECTRICAL SAFETY REQUIREMENTS.
- 1.2 Verify breaker position by observing open/closed contact position window.
- 1.3 Check closings springs charged by observing stored energy window.
- 1.4 IF closing spring charging is required,
THEN pump gray charging handle on front of breaker until springs indicate charged.
- 1.5 Depress the CLOSE pushbutton by inserting an object with small diameter into the hole in the cover plate.
- 1.6 IF additional breaker closures are required,
THEN repeat steps 1.4 and 1.5 above.

NOTE

A closed breaker always has the opening springs charged.

2.0 OPENING 480 V LOAD CENTER BREAKER WITH NO DC CONTROL POWER

- 2.1 Establish Electrical Safety PPE using 2107.001 (Electrical System Operations) Exhibit 9, ELECTRICAL SAFETY REQUIREMENTS.
- 2.2 Verify breaker position by observing open/closed contact position window.
- 2.3 Open the breaker with manual push to open button.

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EXHIBIT 6

09/09/97

2Y-27 UNINTERRUPTIBLE POWER SUPPLY ALARM CODES

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This Exhibit is used to identify 2Y-27 alarms. An alarming condition is indicated by an LED on 2Y-27 front panel. An audible tone sequence identifies the specific alarm per the following table. (• indicates short beep, - indicates long beep)

CODE	DESCRIPTION
A • -	Low Battery
B - • • •	Near Low Battery
C - • - •	High Battery
D - • •	Low Runtime Left
E •	Low AC Out
F • • - •	High AC Out
G - - •	Output Overload
H • • • •	High Ambient Temp
I • •	Heatsink Overtemp
J • - - -	User Test
K - • -	Reserved Alarm
L • - • •	Check Cooling
M - -	Check Battery
N - •	Check Inverter
O - - -	Memory Check
P • - - •	Shutdown Activated

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SUPPLEMENT 1

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AAC GENERATOR QUARTERLY TEST

The purpose of this test is to prove operability of the Alternate AC Diesel Generator. **This Supplement satisfies NRC Commitment P1851.**

1.0 INITIAL CONDITIONS (May be performed in any order)

- 1.1 AAC Generator aligned per Attachment A. _____
- 1.2 Notify Unit 1 of intent to perform this surveillance. _____
- 1.3 Contact Dispatcher to determine if any potential grid disturbances exist that prevent tying AAC Generator to grid. _____
- 1.4 Record the following readings on 2C440:
 - AAC Generator KWH meter (2K9, KWH) _____ KWHx10
 - AAC Generator Total Run Hours (2KQI-7279) _____ Hrs
- 1.5 Jacket Water Expansion Tank Level (2LI-7176) 1/4 to 3/4. _____
- 1.6 Fuel Oil Day Tank Level (2LI-7201A or 2LI-7201B) 40 to 84%. _____
- 1.7 Sump oil level between ADD and FULL marks on Keep Warm side of dipstick. _____
- 1.8 Air Start Lubricator (2M-21A/B/C) oil levels in sight glass. _____
- 1.9 Generator inboard and outboard bearing oil levels 1/4 to 3/4 in sight glass. _____
- 1.10 Manual jacking gear eccentric disengaged (Hex nut protruding from housing). _____
- 1.11 Overspeed air damper open (Air Manifold Inlet, top of engine). _____
- 1.12 Governor hydraulic fluid level \geq 1/2. _____
- 1.13 Drain moisture from components as follows:
 - 1.13.1 Open 2M-12 Exhaust Silencer Drain (2AAC-1020).
 - WHEN moisture removed, THEN close 2AAC-1020. _____
 - 1.13.2 Open 2T-16A Starting Air Receiver Drain (2AAC-1016A).
 - WHEN moisture removed, THEN close 2AAC-1016A. _____
 - 1.13.3 Open 2T-16B Starting Air Receiver Drain (2AAC-1016B).
 - WHEN moisture removed, THEN close 2AAC-1016B. _____

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SUPPLEMENT 1

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2.0 TEST METHOD

2.1 Start AAC Generator as follows:

- | | | |
|-------|--|-------|
| 2.1.1 | Touch ELECTRICAL BUS CONTROL. | _____ |
| 2.1.2 | Touch 4160 V BREAKERS. | _____ |
| 2.1.3 | Verify the following breakers open: | |
| | • 2A-901, AAC to 4.16KV Switchgear A3 | _____ |
| | • 2A-902, AAC to 4.16KV Switchgear 2A4 | _____ |
| | • 2A-903, AAC to 4.16KV Switchgear A1 | _____ |
| | • 2A-904, AAC to 4.16KV Switchgear 2A1 | _____ |
| 2.1.4 | Touch ENGINE START/STOP. | _____ |
| 2.1.5 | Touch START SCREEN. | _____ |

NOTE

Start Constraints are reset by clearing the condition and resetting PLC. PLC is reset using the Annunciator Screen.

- | | | |
|-------|--|-------|
| 2.1.6 | Verify Start Constraints clear. (Green) | |
| | • KEY SWITCH IN STANDBY | _____ |
| | • FUEL SOLENOID OPEN | _____ |
| 2.1.7 | Check Start Constraint PRE-LUBE LEVEL OK clear. | _____ |
| 2.1.8 | IF PRE-LUBE LEVEL OK NOT clear,
<u>THEN</u> perform the following: | |
| | A. Verify Automatic Transfer Mode Selector
switch above 2B16-B1 in AUTO to ensure power
available to 2B-161. | _____ |
| | B. Verify 2B161-B4 closed to supply power to
Keep Warm and Continuous Lube pump (2P-238). | _____ |
| | C. Verify 2P-238 handswitch (2HS-7240) on 2C457
in ON. | _____ |
| | D. IF PRE-LUBE LEVEL OK will NOT clear,
<u>THEN</u> do NOT continue. | _____ |
| 2.1.9 | Touch START button. | _____ |

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SUPPLEMENT 1

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- 2.2 WHEN generator reaches ~ 900 RPM and 4160 volts,
THEN perform the following:
- 2.2.1 Touch ELECTRICAL BUS CONTROL. _____
- 2.2.2 Touch 480 V BREAKERS. _____
- 2.2.3 Verify AAC Generator Output breaker (2A-1001) closed. _____
- 2.2.4 Verify London Feed to LC 2B161 (2B16-A1) open. _____
- 2.2.5 Verify AAC Generator Output to 2B161 (2B16-B1) closed. _____
- 2.3 Touch GENERATOR CONTROL. _____
- 2.4 Verify Load Control Selection set to desired PC: _____
- AAC Building
 - Control Room
- 2.5 Touch ENTER USER DEMAND. _____
- 2.6 Enter 1500 KW on keypad. _____
- 2.7 Touch OK. _____
- 2.8 IF desired to adjust ramp rate (normally 5 KW/sec),
THEN touch RAMP RATE INCREASE or DECREASE as necessary. _____
- Record Ramp Rate Setting _____ KW/sec
- 2.9 WHEN at least 5 minutes of operation at 900 RPM has elapsed,
THEN verify the following:
- Jacket Water Pump Discharge pressure (2PI-7154) > 10 psi g _____
 - Lube Oil From Cooler pressure (2PI-7126) > 40 psi g _____
 - Jacket Water Outlet temperature (2TI-7156) rising _____
 - Lube Oil From Cooler temperature (2TI-7122) rising _____

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SUPPLEMENT 1

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- 2.10 IF desired to feed 2A1 bus,
THEN close AAC Generator to 2A1 (2A-904) as follows:
- 2.10.1 Touch ELECTRICAL BUS CONTROL. _____
 - 2.10.2 Touch SYNCHRONIZE. _____
 - 2.10.3 Touch 2A-904 on SELECT BREAKER TO SYNC module.
(Synchroscope will energize) _____
 - 2.10.4 Verify 2A-904 touch pad highlighted and red
light on. _____
 - 2.10.5 Verify PERM light illuminated on SPM-A MODULE MODE. _____
 - 2.10.6 Touch Voltage touch pads to match generator and
bus voltages. _____
 - 2.10.7 Touch Speed touch pads to cause synchroscope to
rotate slowly in the FAST direction. _____
 - 2.10.8 WHEN synchroscope passes through -90°,
THEN perform either of the following until the
synchroscope passes through 0° to close 2A-904. _____
 - Touch and hold TOUCH TO CLOSE SYNC BREAKER.
 - Hold 2A-904 Control switch (2HS-7103) in close.
 - 2.10.9 Verify 2A-904 closed by 2A-904 Status red light lit. _____
 - 2.10.10 Verify Load rises to ~ 1500 KW. _____

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SUPPLEMENT 1

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- 2.11 IF desired to feed A1 bus,
THEN close AAC Generator to A1 (2A-903) as follows:
 - 2.11.1 Notify Unit 1 of intent. _____
 - 2.11.2 Touch ELECTRICAL BUS CONTROL. _____
 - 2.11.3 Touch SYNCHRONIZE. _____
 - 2.11.4 Touch 2A-903 on SELECT BREAKER TO SYNC module.
(Synchroscope will energize) _____
 - 2.11.5 Verify 2A-903 touch pad highlighted and red light on. _____
 - 2.11.6 Verify PERM light illuminated on SPM-A MODULE MODE. _____
 - 2.11.7 Touch Voltage touch pads to match generator and bus voltages. _____
 - 2.11.8 Touch Speed touch pads to cause synchroscope to rotate slowly in the FAST direction. _____
 - 2.11.9 WHEN synchroscope passes through -90°,
THEN perform either of the following until the synchroscope passes through 0° to close 2A-903.
 - Touch and hold TOUCH TO CLOSE SYNC BREAKER.
 - Hold 2A-903 Control switch (2HS-7102) in close.
 - 2.11.10 Verify 2A-903 closed by 2A-903 Status red light lit. _____
 - 2.11.11 Verify load rises to ~ 1500 KW. _____
- 2.12 Wait 5 minutes at ~ 1500 KW. _____
- 2.13 Load AAC Generator to ~ 3000 KW as follows:
 - 2.13.1 Touch GENERATOR CONTROL. _____
 - 2.13.2 Touch ENTER USER DEMAND. _____
 - 2.13.3 Enter 3000 KW on keypad. _____
 - 2.13.4 Touch OK. _____
 - 2.13.5 Verify load rises to ~ 3000 KW. _____
- 2.14 Wait 5 minutes at ~ 3000 KW. _____

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SUPPLEMENT 1

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<p style="text-align: center;"><u>NOTE</u></p> <p>Commitment P1851 requires an AACG capable of supplying one of the four ESF Buses. A conservative value of 3135 KW (2850 + 10%) was selected for full load to preclude any question of operability due to load capability. It is desirable to test the AACG at full load (4200-4400 KW) when possible.</p>
--

- 2.15 Load AAC Generator to > 3135 KW as follows:
 - 2.15.1 Touch GENERATOR CONTROL. _____
 - 2.15.2 Touch ENTER USER DEMAND. _____
 - 2.15.3 Enter a load value of > 3135 KW on keypad. _____
Value entered _____ KW
 - 2.15.4 Touch OK. _____
 - 2.15.5 Verify load commences to rise. _____
- 2.16 WHEN load reaches ~ _____ KW (value in Step 2.15.3),
THEN record the following data:
 - Generator Output Voltage _____ Volts
 - Generator Output Current _____ Amps
 - Generator Kilovars _____ KVAR
- 2.17 Commence taking AAC Diesel Generator Log (OPS-B39). _____
- 2.18 After 15 minutes record vibration data in Step 3.1 from PC
or handheld vibration measurement instrument. _____
- 2.19 IF vibration data greater than Acceptable Normal Range,
THEN contact Predictive Maintenance. _____

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SUPPLEMENT 1

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2. 20 WHEN AACG has operated at least two hours at > 3135 KW,
THEN unload the generator as follows:

2. 20. 1 Touch GENERATOR CONTROL. _____

2. 20. 2 Veri fy Load Control Selecti on set to desi red PC: _____
 • AAC Bui l di ng
 • Control Room

2. 20. 3 Touch ENTER USER DEMAND. _____

2. 20. 4 Enter 200 KW on keypad. _____

2. 20. 5 Touch OK. _____

2. 20. 6 WHEN load stabili zed between 200 and 400 KW,
THEN touch ELECTRICAL BUS CONTROL. _____

2. 20. 7 Touch 4160 V BREAKERS. _____

2. 20. 8 I F AAC Generator feeding 2A1,
THEN perform the follo wi ng: _____

A. Touch 2A-904. _____

B. WHEN desi red to open 2A-904,
THEN perform the follo wi ng as needed to
open 2A-904: _____
 • Touch TRIP.
 • Use 2A-904 Control swi tch (2HS-7103).

C. Check 2A-904 open by 2A-904 Status green
light lit. _____

2. 20. 9 I F AAC Generator feeding A1,
THEN perform the follo wi ng: _____

A. Noti fy Uni t 1 of i ntent. _____

B. Touch 2A-903. _____

C. WHEN desi red to open 2A-903,
THEN perform the follo wi ng as needed to
open 2A-903: _____
 • Touch TRIP.
 • Use 2A-903 Control swi tch (2HS-7102).

D. Check 2A-903 open by 2A-903 Status green
light lit. _____

E. Noti fy Uni t 1 2A-903 breaker open. _____

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SUPPLEMENT 1

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- 2.21 Touch SWITCH TO SYNC screen. _____
- 2.22 Adjust voltage to 4160 volts using VOLTAGE RAISE/LOWER touch pads. _____
- 2.23 Adjust frequency to 60 Hz using SPEED RAISE/LOWER touch pads. _____
- 2.24 Operate engine unloaded until the following conditions met: _____
 - At least 10 minutes elapsed
 - Jacket Water Out temperature (2TI-7156) < 190° F
- 2.25 Secure engine as follows:
 - 2.25.1 Touch ENGINE START/STOP. _____
 - 2.25.2 Touch STOP SCREEN. _____
 - 2.25.3 Touch STOP. _____
 - 2.25.4 Touch ELECTRICAL BUS CONTROL. _____
 - 2.25.5 Touch 480 V BREAKERS. _____
 - 2.25.6 Verify 2A-1001 open. _____
 - 2.25.7 Verify 2B16-A1 closed. _____
 - 2.25.8 Verify 2B16-B1 open. _____
- 2.26 Verify AAC Generator alarms reset or concerns resolved. Refer to 2203.012Z, Annunciator 2C435 Corrective Action. _____

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SUPPLEMENT 1

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3.0 ACCEPTANCE CRITERIA

3.1 Record Vibration Data in Table below.

Table 1				
TEST POINT	DESCRIPTION	MEASURED VALUE	ACCEPTABLE NORMAL RANGE	DATA IN ACCEPTABLE NORMAL RANGE?
2VT-7270A	Engine Outboard Bearing Horizontal		< 1.05 IN/SEC	YES NO
2VT-7270B	Engine Inboard Bearing Vertical		< 1.10 IN/SEC	YES NO
2VT-7270C	Generator Outboard Bearing Horizontal		< 0.45 IN/SEC	YES NO
2VT-7270D	Generator Outboard Bearing Vertical		< 0.55 IN/SEC	YES NO
2VT-7270E	Generator Inboard Bearing Horizontal		< 0.45 IN/SEC	YES NO
2VT-7270F	Generator Inboard Bearing Vertical		< 0.50 IN/SEC	YES NO

3.2 Did AACG accelerate to at least 900 rpm (60 hertz) during engine start? YES NO

3.3 Did AACG operate at > 3135 KW for at least two hours? YES NO

3.4 IF NO circled in Step 3.2 or 3.3, THEN perform the following:

- Declare AAC Generator inoperable. _____
- Notify Unit 1. _____
- Initiate Condition Report. _____
- Initiate WR/WO. _____

3.5 IF NO circled in Table 1, THEN document action taken in Comments. _____

3.6 IF handheld vibration measurement instrument used, THEN record the following information: _____

Instrument number: _____ Cal Due Date: _____

Performed by: _____ Date: _____

Comments: _____

Performed By _____ Date _____

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SUPPLEMENT 1

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4.0 SUPERVISOR REVIEW AND ANALYSIS

4.1 IF NO answered to 3.2 or 3.3,
THEN perform the following corrective actions:

- Verify Condition Report initiated. _____
- Verify WR/WO initiated. _____

Comments: _____

4.2 Are all administrative requirements of this test satisfied? YES NO

Supervisor _____ Date _____

PROC./WORK PLAN NO. 2104.037	PROCEDURE/WORK PLAN TITLE: ALTERNATE AC DIESEL GENERATOR OPERATIONS	PAGE: 63 of 70 CHANGE: 008-00-0
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SUPPLEMENT 2

PAGE 1 OF 8

AAC GENERATOR 18 MONTH TEST

The purpose of this test is to prove the Alternate AC Diesel Generator can be started and loaded to > 3135 KW within 10 minutes. This supplement also satisfies the Quarterly Test. **This Supplement satisfies NRC Commitment P1851.**

1.0 INITIAL CONDITIONS (MAY BE PERFORMED IN ANY ORDER)

- 1.1 AAC Generator aligned per Attachment A. _____
- 1.2 Notify Unit 1 of intent to perform this surveillance. _____
- 1.3 Contact Dispatcher to determine if any potential grid disturbances exist that prevent tying AAC Generator to grid. _____
- 1.4 Record the following readings on 2C440: _____
 - AAC Generator KWH meter (2K9, KWH) _____ KWHx10
 - AAC Generator Total Run Hours (2KQI -7279) _____ Hrs
- 1.5 Jacket Water Expansion Tank Level (2LI -7176) 1/4 to 3/4. _____
- 1.6 Fuel Oil Day Tank Level (2LI -7201A or 2LI -7201B) 40 to 84%. _____
- 1.7 Sump oil level between ADD and FULL marks on Keep Warm side of dipstick. _____
- 1.8 Air Start Lubricator (2M-21A/B/C) oil levels in sight glass. _____
- 1.9 Generator inboard and outboard bearing oil levels 1/4 to 3/4 in sight glass. _____
- 1.10 Manual jacking gear eccentric disengaged (Hex nut protruding from housing). _____
- 1.11 Overspeed air damper open (Air Manifold Inlet, top of engine). _____
- 1.12 Governor hydraulic fluid level \geq 1/2. _____
- 1.13 Currently calibrated Stopwatch Serial No. _____
- 1.14 Drain moisture from components as follows:
 - 1.14.1 Open 2M-12 Exhaust Silencer Drain (2AAC-1020). _____
 - WHEN moisture removed, _____
 - THEN close 2AAC-1020. _____
 - 1.14.2 Open 2T-16A Starting Air Receiver Drain (2AAC-1016A). _____
 - WHEN moisture removed, _____
 - THEN close 2AAC-1016A. _____
 - 1.14.3 Open 2T-16B Starting Air Receiver Drain (2AAC-1016B). _____
 - WHEN moisture removed, _____
 - THEN close 2AAC-1016B. _____

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SUPPLEMENT 2

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2.0 TEST METHOD

2.1 Start AAC Generator as follows:

- 2.1.1 Touch ELECTRICAL BUS CONTROL. _____
- 2.1.2 Touch 4160 V BREAKERS. _____
- 2.1.3 Verify the following breakers open:
 - 2A-901, AAC to 4.16KV Switchgear A3 _____
 - 2A-902, AAC to 4.16KV Switchgear 2A4 _____
 - 2A-903, AAC to 4.16KV Switchgear A1 _____
 - 2A-904, AAC to 4.16KV Switchgear 2A1 _____
- 2.1.4 Touch ENGINE START/STOP. _____
- 2.1.5 Touch START SCREEN. _____

NOTE

Start Constraints are reset by clearing the condition and resetting PLC. PLC is reset using the Annunciator Screen.

- 2.1.6 Verify Start Constraints clear. (Green) _____
 - KEY SWITCH IN STANDBY
 - FUEL SOLENOID OPEN
- 2.1.7 Check Start Constraint PRE-LUBE LEVEL OK clear. _____
- 2.1.8 IF PRE-LUBE LEVEL OK NOT clear,
THEN perform the following:
 - A. Verify Automatic Transfer Mode Selector switch above 2B16-B1 in AUTO to ensure power available to 2B-161. _____
 - B. Verify 2B161-B4 closed to supply power to Keep Warm and Continuous Lube pump (2P-238). _____
 - C. Verify 2P-238 handswitch (2HS-7240) on 2C457 in ON. _____
 - D. IF PRE-LUBE LEVEL OK will NOT clear,
THEN do NOT continue. _____

NOTE

Time from Start to when diesel loaded > 3135 KW shall be < 10 minutes.

- 2.1.9 Start engine as follows:
 - Measure elapsed time from operation of Start button until diesel loaded > 3135 KW. _____
 - Touch START button. _____

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SUPPLEMENT 2

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- 2.2 WHEN generator reaches ~ 900 RPM and 4160 volts,
THEN perform the following:
- 2.2.1 Touch ELECTRICAL BUS CONTROL. _____
- 2.2.2 Touch 480 V BREAKERS. _____
- 2.2.3 Verify AAC Generator Output breaker (2A-1001) closed. _____
- 2.2.4 Verify London Feed to LC 2B161 (2B16-A1) open. _____
- 2.2.5 Verify AAC Generator Output to 2B161 (2B16-B1) closed. _____
- 2.3 Touch GENERATOR CONTROL. _____
- 2.4 Verify Load Control Selection set to desired PC: _____
- AAC Building
 - Control Room
- 2.5 Touch ENTER USER DEMAND. _____

NOTE

Commitment P1851 requires an AACG capable of supplying one of the four ESF Buses. A conservative value of 3135 KW (2850 + 10%) was selected for full load to preclude any question of operability due to load capability. It is desirable to test the AACG at full load (4200-4400 KW) when possible.

- 2.6 Enter load value of > 3135 KW on keypad. _____
Value entered _____ KW
- 2.7 Touch OK. _____
- 2.8 Adjust the ramp rate to \geq 15 KW/S. _____
Record Ramp Rate Setting _____ KW/S

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SUPPLEMENT 2

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2.9 Synchronize and close AAC Generator to 2A1 (2A-904) as follows:

- | | | |
|--------|---|-------|
| 2.9.1 | Touch ELECTRICAL BUS CONTROL. | _____ |
| 2.9.2 | Touch SYNCHRONIZE. | _____ |
| 2.9.3 | Touch 2A-904 on SELECT BREAKER TO SYNC module.
(Synchroscope will energize) | _____ |
| 2.9.4 | Verify 2A-904 touch pad highlighted and red light on. | _____ |
| 2.9.5 | Verify PERM light illuminated on SPM-A MODULE MODE. | _____ |
| 2.9.6 | Touch Voltage touch pads to match generator and bus voltages. | _____ |
| 2.9.7 | Touch Speed touch pads to cause synchroscope to rotate slowly in the FAST direction. | _____ |
| 2.9.8 | WHEN synchroscope passes through -90°,
<u>THEN</u> perform either of the following until the synchroscope passes through 0° to close 2A-904. <ul style="list-style-type: none"> • Touch and hold TOUCH TO CLOSE SYNC BREAKER. • Hold 2A-904 Control switch (2HS-7103) in close. | _____ |
| 2.9.9 | Verify 2A-904 closed by 2A-904 Status red light lit. | _____ |
| 2.9.10 | WHEN load reaches _____ KW (value in Step 2.6),
<u>THEN</u> record the following data: <ul style="list-style-type: none"> • Stop the Stopwatch and record time _____ min • Generator Output Voltage _____ Volts • Generator Output Current _____ Amps • Generator Kilovars _____ KVAR | _____ |
| 2.10 | Commence taking AAC Diesel Generator Log (OPS-B39). | _____ |
| 2.11 | After 15 minutes record vibration data in Step 3.1 from PC or handheld vibration measurement instrument. | _____ |
| 2.12 | IF vibration data greater than Acceptable Normal Range,
<u>THEN</u> contact Predictive Maintenance. | _____ |

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SUPPLEMENT 2

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- 2.13 WHEN AACG has operated at least two hours at > 3135 KW,
THEN unload the generator as follows:
- 2.13.1 Touch GENERATOR CONTROL. _____
- 2.13.2 Verify LOAD CONTROL SELECTION set to desired PC: _____
- AAC Building
 - Control Room
- 2.13.3 Touch ENTER USER DEMAND. _____
- 2.13.4 Enter 200 KW on keypad. _____
- 2.13.5 Touch OK. _____
- 2.13.6 WHEN load stabilized between 200 and 400 KW,
THEN touch ELECTRICAL BUS CONTROL. _____
- 2.13.7 Touch 4160 V BREAKERS. _____
- 2.13.8 Touch 2A-904. _____
- 2.13.9 WHEN desired to open 2A-904,
THEN perform the following as needed to open 2A-904: _____
- Touch TRIP
 - Use 2A-904 Control switch (2HS-7103).
- 2.13.10 Check 2A-904 open by 2A-904 Status green light lit. _____
- 2.14 Touch SWITCH TO SYNC screen. _____
- 2.15 Adjust voltage to 4160 volts using VOLTAGE RAISE/LOWER touch pads. _____
- 2.16 Adjust frequency to 60 Hz using SPEED RAISE/LOWER touch pads. _____
- 2.17 Operate engine unloaded until the following conditions met: _____
- At least 10 minutes elapsed
 - Jacket Water Out temperature (2TI-7156) < 190° F

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SUPPLEMENT 2

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- 2. 18 Secure engine as follows:
 - 2. 18. 1 Touch ENGINE START/STOP. _____
 - 2. 18. 2 Touch STOP SCREEN. _____
 - 2. 18. 3 Touch STOP. _____
 - 2. 18. 4 Touch ELECTRICAL BUS CONTROL. _____
 - 2. 18. 5 Touch 480 V BREAKERS. _____
 - 2. 18. 6 Verify 2A-1001 open. _____
 - 2. 18. 7 Verify 2B16-A1 closed. _____
 - 2. 18. 8 Verify 2B16-B1 open. _____
- 2. 19 Verify AAC Generator alarms reset or concerns resolved.
Refer to 2203.012Z, Annunciator 2C435 Corrective Action. _____

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SUPPLEMENT 2

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3.0 ACCEPTANCE CRITERIA

3.1 Record Vibration Data in Table below.

Table 1				
TEST POINT	DESCRIPTION	MEASURED VALUE	ACCEPTABLE NORMAL RANGE	DATA IN ACCEPTABLE NORMAL RANGE?
2VT-7270A	Engine Outboard Bearing Horizontal		< 1.05 IN/SEC	YES NO
2VT-7270B	Engine Inboard Bearing Vertical		< 1.10 IN/SEC	YES NO
2VT-7270C	Generator Outboard Bearing Horizontal		< 0.45 IN/SEC	YES NO
2VT-7270D	Generator Outboard Bearing Vertical		< 0.55 IN/SEC	YES NO
2VT-7270E	Generator Inboard Bearing Horizontal		< 0.45 IN/SEC	YES NO
2VT-7270F	Generator Inboard Bearing Vertical		< 0.50 IN/SEC	YES NO

3.2 Was the time recorded in step 2.9.10 \leq 10 minutes? YES NO

3.3 Did AACG accelerate to at least 900 rpm (60 hertz) during engine start? YES NO

3.4 Did AACG operate at > 3135 KW for at least two hours? YES NO

3.5 IF NO circled in step 3.2, 3.3 or 3.4, THEN perform the following:

- Declare AAC Generator inoperable. _____
- Notify Unit 1. _____
- Initiate Condition Report. _____
- Initiate WR/WO. _____

3.6 IF NO circled in Table 1, THEN document action taken in Comments. _____

3.7 IF handheld vibration measurement instrument was used, THEN record the following information: _____

Instrument number: _____ Cal Due Date: _____

Performed by: _____ Date: _____

Comments: _____

Performed By _____ Date _____

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SUPPLEMENT 2

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4.0 SUPERVISOR REVIEW AND ANALYSIS

4.1 IF NO answered to 3.2, 3.3 or 3.4,
THEN perform the following corrective actions:

- Verify Condition Report initiated. _____
- Verify WR/WO initiated. _____

Comments: _____

4.2 Are all administrative requirements of this test satisfied? YES NO

Supervisor _____ Date _____

ENTERGY OPERATIONS INCORPORATED ARKANSAS NUCLEAR ONE

TITLE: ALTERNATE SHUTDOWN

DOCUMENT NO.
2203.014

CHANGE NO.
015-05-0

WORK PLAN EXP. DATE
N/A

TC EXP. DATE
N/A

SET #

SAFETY-RELATED
☒ YES ☐ NO

IPTE
☐ YES ☒ NO

TEMP ALT
☐ YES ☒ NO

When you see these TRAPS

Get these TOOLS

Time Pressure

Effective Communication

Distraction/Interruption

Questioning Attitude

Multiple Tasks

Placekeeping

Over Confidence

Self Check

Vague or Interpretive Guidance

Peer Check

First Shift/Last Shift

Knowledge

Peer Pressure

Procedures

Change/Off Normal

Job Briefing

Physical Environment

Coaching

Mental Stress (Home or Work)

Turnover

VERIFIED BY

DATE

TIME

FORM TITLE:

VERIFICATION COVER SHEET

FORM NO.
1000.006A

CHANGE NO.
050-00-0

**ENTERGY OPERATIONS INCORPORATED
ARKANSAS NUCLEAR ONE**

Page 1

TITLE: ALTERNATE SHUTDOWN		DOCUMENT NO. 2203.014	CHANGE NO. 015-05-0
AFFECTED UNIT: <input type="checkbox"/> UNIT 1 <input checked="" type="checkbox"/> UNIT 2	<input checked="" type="checkbox"/> PROCEDURE <input type="checkbox"/> ELECTRONIC DOCUMENT <input type="checkbox"/> WORK PLAN, EXP. DATE _____	SAFETY-RELATED <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
TYPE OF CHANGE: <input type="checkbox"/> NEW <input checked="" type="checkbox"/> PC <input type="checkbox"/> TC <input type="checkbox"/> DELETION <input type="checkbox"/> REVISION <input type="checkbox"/> EZ EXP. DATE: N/A			
DOES THIS DOCUMENT:			
1. Supersede or replace another procedure? (If YES, complete 1000.006B for deleted procedure.)		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
2. Alter or delete an existing regulatory commitment? (If YES, coordinate with Licensing before implementing.)		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
3. Require a 50.59 Review per Form 1000.006S? (If No, attach completed Form 1000.006S) (If 50.59 Evaluation, OSRC review required.)		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
4. Changes Surveillance Test Program (i.e. Technical Specifications, NRC Commitment, surveillance activity, see Step 7.5)? (If YES, complete 1000.009A)		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
5. Create an Intent Change? (If YES, Standard Approval Process required.)		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
6. Implement or change IPTE requirements? (If YES, complete 1000.143A. OSRC review required.)		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
7. Implement or change a Temporary Alteration? (If YES, then OSRC review required.)		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
Was the Master Electronic File used as the source document?		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
INTERIM APPROVAL PROCESS		STANDARD APPROVAL PROCESS	
ORIGINATOR SIGNATURE: (Includes review of Att. 13) DATE: _____ Print and Sign name: NA PHONE #: _____		ORIGINATOR SIGNATURE: (Includes review of Att. 13) DATE: 2/7/2005 <i>Roger Pierce</i> Print and Sign name: Roger Pierce PHONE #: 3059	
SUPERVISOR APPROVAL: * N/A DATE: _____		INDEPENDENT REVIEWER: DATE: _____ <i>Chadman</i> 2-7-05	
SRO UNIT ONE:** N/A DATE: _____		ENGINEERING: N/A DATE: _____	
SRO UNIT TWO:** N/A DATE: _____		Code Programs - NDE: N/A DATE: _____	
Interim approval allowed for non-intent changes requiring no 50.59 evaluation that are stopping work in progress. Standard Approval required for intent changes or changes requiring a 50.59 evaluation. *If change not required to support work in progress, Department Head must sign. **If both units are affected by change, both SRO signatures are required. (SRO signature required for safety related procedures only.)		UNIT SURVEILLANCE COORDINATOR: DATE: _____ N/A	
		SECTION LEADER: DATE: 2-15-05 <i>SM</i>	
		QUALITY ASSURANCE: N/A DATE: _____	
		OTHER SECTION LEADERS: N/A DATE: _____	
		OTHER SECTION LEADERS: N/A DATE: _____	
		OTHER SECTION LEADERS: N/A DATE: _____	
		OTHER SECTION LEADERS: N/A DATE: _____	
OSRC CHAIRMAN/TECHNICAL REVIEWER: DATE: 2-15-05 <i>SM</i>		OTHER SECTION LEADERS: N/A DATE: _____	
FINAL APPROVAL: DATE: 3-12-05 <i>M. Randle</i>		OTHER SECTION LEADERS: N/A DATE: _____	
REQUIRED EFFECTIVE DATE: 3-28-05		OTHER SECTION LEADERS: N/A DATE: _____	
FORM TITLE: PROCEDURE/WORK PLAN APPROVAL REQUEST		FORM NO. 1000.006B	CHANGE NO. 054-00-0

**ENTERGY OPERATIONS INCORPORATED
ARKANSAS NUCLEAR ONE**

TITLE: Alternate Shutdown		DOCUMENT NO. 2203.014	CHANGE NO. 015-05-0
<input checked="" type="checkbox"/> PROCEDURE <input type="checkbox"/> WORK PLAN, EXP. DATE <u>N/A</u>		PAGE <u>1</u> OF <u>1</u>	
<input type="checkbox"/> ELECTRONIC DOCUMENT			
TYPE OF CHANGE: <input type="checkbox"/> NEW <input checked="" type="checkbox"/> PC <input type="checkbox"/> TC <input type="checkbox"/> DELETION <input type="checkbox"/> REVISION <input type="checkbox"/> EZ EXP. DATE: <u>N/A</u>			
AFFECTED SECTION: (Include step # if applicable)	DESCRIPTION OF CHANGE: (For each change made, include sufficient detail to describe reason for the change.)		
Section 1 ,Step 11	Step changed to verify off-line SPDS Computer operable prior to swapping.		
Section 5, old step 6	Deleted, unnecessary due to installation of ER-ANO-2000-2768. Renumbered subsequent steps (no 50 .59 per 1000.006S # 2 & 11).		
Section 6, old step 7	Deleted, unnecessary due to installation of ER-ANO-2000-2768. Renumbered subsequent steps (no 50 .59 per 1000.006S # 2 & 11).		
Throughout	Due to deletion of previously mentioned steps, updated step numbers referenced in procedure (no 50 .59 per 1000.006S # 4).		
Section 9, Step 33	Changed pressure value from 275 to 300 psia (no 50.59 per 1000.006S # 11).		
Section 9, Step 6	Changed RCS Cooldown rate in NOTE prior to this step.		
Attachment J, Step 1	Changed RCS cooldown rate.		
FORM TITLE: DESCRIPTION OF CHANGE		FORM NO. 1000.006C	CHANGE NO. 050-00-0

ALTERNATE SHUTDOWN

PURPOSE

This procedure provides alternate shutdown capability to comply with 10CFR50 Appendix R and to mitigate the consequences of a significant fire in any one of the fire zones listed below.

ENTRY CONDITIONS

ANY of the following conditions exist:

1. Fire in the Control Room that renders the Control Room uninhabitable.
2. Fire in the Control Room that threatens damage to a major portion of vital controls.
3. Confirmed fire in ANY of the fire zones listed below that threatens a loss of plant controls or indications:

2098-L	Cable Spreading Room
2199-G	Unit 2 Control Room
2150-C	Core Protection Calculator Room (elevation 404)
2136-I	Radiation Protection (RP) Office (elevation 386)
2137-I	Upper South Electrical Penetration Room
2119-H	Control Room Printer Room
2098-C	Core Protection Calculator Room (elevation 372)

EXIT CONDITIONS

1. Plant control is re-established from the Control Room.

OR

2. An Alternate Shutdown Cooldown has been successfully completed.

PROC NO	TITLE	REV	DATE	PAGE
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1. Manually trip Reactor.
2. Manually trip Turbine.
3. IF operation from Control Room can continue (dependent upon fire damage), THEN perform the following:
 - A. Handle component failures on a case-by-case basis.
 - B. Verify instrumentation, where possible, against SPDS Alternate Shutdown display.
 - C. IF subsequent fire damage requires Control Room evacuation, THEN GO TO Step 4.
 - D. GO TO 2202.001, Standard Post Trip Actions.
4. Close RWT (2T3) Outlet valves:
 - 2CV-5630-1
 - 2CV-5631-2
5. Close ALL of the following Letdown Isolation valves:
 - 2CV-4820-2
 - 2CV-4821-1
 - 2CV-4823-2
6. Establish RCS boration as follows:
 - A. Open BOTH BAM Tank Gravity Feed valves (2CV-4920-1/2CV-4921-1).
 - B. Close VCT Outlet valve (2CV-4873-1).
7. IF EFAS NOT actuated, THEN actuate EFAS by performing the following:
 - A. Place ALL four EFAS switches to ACTUATE on 2C03.
 - B. Place ALL four EFAS switches to ACTUATE on 2C14.
 - C. WHEN ALL EFAS switches placed in ACTUATE, THEN return EFAS switches to NORMAL.
8. Trip Main Feedwater pumps.
 - 2P1A
 - 2P1B
9. Close MSIVs.

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10. WHEN steps 1 through 9 completed, THEN place the following handswitches in PTL:
 - A. RCPs
 - B. 2A309 "2A1 to 2A3"
 - C. 2A409 "2A2 to 2A4"
11. IF off-line SPDS Computer is operable
THEN swap SPDS computers using 2HS-9012 on 2C69A.
12. Obtain the following:
 - A. Emergency key rings.
 - B. Hi Rad key sets.
13. Evacuate to Alternate Shutdown cabinet AND perform assigned section.
 - SM - Section 2, SM Follow-up Actions.
 - CRS - Section 3, CRS Follow-up Actions.
 - EO - Section 4, EO Follow-up Actions.
 - RO 1 - Section 5, RO 1 Follow-up Actions.
 - RO 2 - Section 6, RO 2 Follow-up Actions.
 - SE - Section 7, SE Follow-up Actions.

END

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NOTE

- Operator actions should NOT be delayed for Radiation Protection, Security, or any other concerns.
- Normal exposure limits apply except as approved by the SM or Emergency Coordinator.
- Elevators should NOT be used when performing this procedure.
- Prompt completion of these actions overrides all other procedures, technical specifications, or verbal directions other than those from Operations Management.

1. Announce the following twice using the Plant Paging system:

"ATTENTION ALL PERSONNEL, ATTENTION ALL PERSONNEL.
THERE IS A FIRE IN THE (designated fire zones).
UNIT 2 PLANT CONTROL WILL BE ESTABLISHED FROM THE
TSC. PERFORM ALTERNATE SHUTDOWN."

2. Obtain the following:

- Emergency Key Ring from Control Room or Security.
- Hand-held radio with headset from Alternate Shutdown locker.
- Flashlight from Alternate Shutdown locker.

3. Perform equipment tests as follows:

- Radio check of hand-held radio (Channel 5).
- Verify flashlight in good working order.

4. Locally trip Main Turbine from front standard.

5. Locally trip BOTH MFWP turbines from front standards.

- 2P1A
- 2P1B

6. Report to Technical Support Center.

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7. Select Alternate Shutdown display on SPDS.
8. IF Alternate Shutdown Display NOT available,
THEN obtain Alternate Shutdown printout as follows:
 - A. Verify printer toggle switch (2HS-9027) selected to 2.
 - B. Verify printer on-line.
 - C. Use N-10 function to obtain printout.
9. IF SW NOT available to ANY DG (CRS Steps 5 and 7, RO 1 Step 3, and RO 2 Step 3),
THEN notify CRS to secure affected DG (CRS Step 6 or 8).
10. IF BOTH 4160v Vital buses de-energized,
THEN direct EO to energize ONE 4160v Vital bus using AACG (EO Step 5).

NOTE

SG A level indication NOT qualified for Alternate Shutdown use.

11. Select SG A Level indications (L1079-1/L1079-2) on SPDS operator console and cross-check between indications to determine operable instruments.
12. Establish communications with operators by radio or phone.
13. Initiate Emergency Plan using 1903.010, Emergency Action Level Classification.
14. Declare 50.54X, refer to TS 6.2.2, Facility Staff.
15. Commence Attachment E, Safe Shutdown Systems Checklist.
16. Monitor SPDS display for indications of RCS overcooling which may be caused by EITHER of the following:
 - A. Excessive steaming of SGs.
 - B. Excessive EFW flow.

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17. Monitor SPDS for PZR level and RCS pressure trends as follows:

A. Maintain PZR level 29 to 80% by directing local control of Charging pumps as needed (RO 1 step 11, RO 2 step 16).

- 1) IF PZR level indication (L4627-2C) on SPDS indicates an asterisk, THEN use SPDS point (L4627-1) for PZR level indication.
- 2) IF SPDS point L4627-1 used for PZR level, THEN use Attachment L, PZR Level Correction Curve to compensate for temperature.

B. Maintain RCS pressure 1800 to 2250 psia as follows:

- 1) IF RCS pressure less than 1800 psia, THEN perform ONE of the following:
 - IF PZR heaters available, THEN direct CRS to control PZR heaters using Attachment G, PZR Heater Operations (CRS step 44).
 - IF PZR heaters NOT available, THEN direct RO 1 and RO 2 to raise PZR level by operating Charging pumps (RO 1 step 11, RO 2 step 16).
- 2) IF RCS pressure greater than 2250 psia AND Aux Spray available, THEN direct an operator to initiate Aux Spray using Attachment K, PZR Spray Operation.
- 3) IF RCS pressure rises with no corresponding rise in PZR level, THEN direct CRS to de-energize Backup heaters by opening the following breakers:
 - 2B922 "PRESSURIZER BACKUP HEATERS"
 - 2B923 "PRESSURIZER BACKUP HEATERS"
 - 2B1022 "PRESSURIZER BACKUP HEATERS"
 - 2B1023 "PRESSURIZER BACKUP HEATERS"

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18. Record run-times of Charging pumps on Attachment E, Safe Shutdown Systems Checklist to determine amount of boric acid added to RCS.

NOTE

Natural Circulation develops in approximately 15 minutes. Plant response will be delayed due to longer loop cycle times.

19. Check Natural Circulation in at least ONE loop as indicated by the following:
- Loop ΔT less than 50°F.
 - T_H and T_C constant or lowering.
 - RCS MTS 30°F or greater.
 - IF CETs available, THEN check ΔT between T_H and average CETs less than 10°F.
20. IF Natural Circulation NOT indicated, THEN perform the following:
- A. Verify continuous demand for EFW flow to maintain SG levels.
 - B. Verify continuous demand for operation of SG Safety valves or ADVs to maintain SG pressure.
21. WHEN additional operators available, THEN consider the following:
- A. Establish SG pressure control by operating Upstream ADVs using Attachment F, Local Operation of ADVs.
 - B. Establish local DG watch.
 - C. Assign additional CRS to commence Section 8, Hot Standby and Recovery.

END

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NOTE

- Operator actions should NOT be delayed for Radiation Protection, Security, or any other concerns.
- Normal exposure limits apply except as approved by the SM or Emergency Coordinator.
- Elevators should NOT be used when performing this procedure.
- Prompt completion of these actions overrides all other procedures, technical specifications, or verbal directions other than those from Operations Management.

1. Obtain the following:

- Emergency Key Ring from Control Room or Security.
- Red "CRS" Alternate Shutdown bag from Alternate Shutdown locker.
- Hand-held radio with headset from Alternate Shutdown locker.
- Flashlight from Alternate Shutdown locker.

2. Perform equipment tests as follows:

- Radio check of hand-held radio (Channel 5).
- Verify flashlight in good working order.

3. Open the following breakers:

- 2D01-21 "2D27 MOTOR CONTROL CENTER SUPPLY"
- 2D01-22 "125V ESF PANEL 2RA1 DC POWER SUPPLY"

4. Open the following breakers:

- 2D02-21 "2D26 MOTOR CONTROL CENTER SUPPLY"
- 2D02-22 "125V ESF PANEL 2RA2 DC POWER SUPPLY"

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5. IF 4160v Vital bus 2A4 energized, THEN perform the following:
 - A. Verify ONE SW pump running on 4160v Vital bus 2A4 as follows:
 - 2A402 "SERVICE WATER PUMP 2P4C" breaker closed and ammeter indicates amps.

OR

 - 2A403 "SERVICE WATER PUMP 2P4B" breaker closed and ammeter indicates amps.
 - B. Open DC control power breaker for EACH SW pump on 4160v Vital bus 2A4.
 - 2A402 "SERVICE WATER PUMP 2P4C"
 - 2A403 "SERVICE WATER PUMP 2P4B"
 - C. IF 2P4B running, THEN open 2D22, Breaker 27 "2P-4B DISCONNECT CONTROL POWER".
6. IF SW pump NOT available to 2DG2, THEN inform TSC (by radio or extension 6605, 6611, or 6601) AND secure 2DG2 using 2104.036, Emergency Diesel Generator Operations, Exhibit 2, Starting 2DG2 Without DC Control Power.
7. IF 4160v Vital bus 2A3 energized, THEN perform the following:
 - A. Verify ONE SW pump running on 4160v Vital bus 2A3 as follows:
 - 2A302 "SERVICE WATER PUMP 2P4A" breaker closed and ammeter indicates amps.

OR

 - 2A303 "SERVICE WATER PUMP 2P4B" breaker closed and ammeter indicates amps.
 - B. Open DC control power breaker for EACH SW pump on 4160v Vital bus 2A3:
 - 2A302 "SERVICE WATER PUMP 2P4A"
 - 2A303 "SERVICE WATER PUMP 2P4B"
 - C. IF 2P4B running, THEN open 2D22, Breaker 27 "2P-4B DISCONNECT CONTROL POWER".
8. IF SW pump NOT available to 2DG1, THEN inform TSC (by radio or extension 6605, 6611, or 6601) AND secure 2DG1 using 2104.036, Emergency Diesel Generator Operations, Exhibit 1, Starting 2DG1 Without DC Control Power.
9. Inform TSC (by radio or extension 6605, 6611, or 6601) of SW pump status (Attachment E, Safe Shutdown Systems Checklist steps 3.C and 3.D).

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10. Open the following breakers:

- 2RS3, Breaker 6 "BATTERY ELIMINATOR 2D35"
- 2RS4, Breaker 6 "BATTERY ELIMINATOR 2D36"

11. Open the following breakers:

- 2D23, Breaker 10 "HIGH POINT VENT PANEL 2C336-1"
- 2D24, Breaker 10 "HIGH POINT VENT PANEL 2C336-2"

12. WHEN EO has IA to MSIVs isolated (EO step 4), THEN perform the following:

A. Open 2D23, Breaker 1, "125V DC IN PANEL 2C17".

B. Inform RO 1, 2D23 Breaker 1 open (RO 1 step 10).

13. Inform RO 2, 2D26 and 2D27 de-energized (CRS steps 3 and 4) (RO 2 step 14).

14. Inform RO 1, 2D26 and 2D27 de-energized (CRS steps 3 and 4) (RO 1 step 8).

15. Inform TSC (by radio or extension 6605, 6611, or 6601) 2D26 and 2D27 de-energized (Attachment E, Safe Shutdown Systems Checklist step 1.A).

16. De-energize charging spring motor and open the following breakers:

CHARGING SPRING MOTOR POWER OFF	BREAKER OPEN	BREAKER
_____ _____ _____	_____ _____ _____	2B621 "MCC 2B61 SUPPLY" 2B623 "PZR PROP HTR 2SCR-2" 2B633 "H ₂ RECOMBINER #2 2M-55B"

17. De-energize charging spring motor and open the following breakers:

CHARGING SPRING MOTOR POWER OFF	BREAKER OPEN	BREAKER
_____ _____ _____	_____ _____ _____	2B521 "MCC 2B51 SUPPLY" 2B523 "PZR PROP HTR 2SCR-1" 2B533 "H ₂ RECOMBINER #1 2M-55A"

18. Inform RO 2, 2B51 and 2B61 de-energized (RO 2 step 10).

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NOTE

VCT Outlet valve (2CV-4873-1) maximum stroke time is 20 seconds.

19. WHEN BAMT Gravity Feed valves open (RO 2 step 8),
THEN close VCT Outlet valve as follows:
 - A. Locally at breaker 2B54-D4, verify "VCT OUTLET 2CV-4873-1" valve closed.
 - B. Open breaker 2B54-D4, "VCT OUTLET 2CV-4873-1".
 - C. Inform RO 2 that VCT Outlet valve (2CV-4873-1) de-energized (RO 2 step 12).
20. Check 2DG1 supplying 4160v Vital bus 2A3 as follows:
 - A. Breaker 2A308 "2DG 1 OUTPUT BREAKER" voltmeter indicates 4100 to 4200v.
 - B. Breaker 2A308 "2DG 1 OUTPUT BREAKER" ammeter indicates amps.
21. Check 2DG2 supplying 4160v Vital bus 2A4 as follows:
 - A. Breaker 2A408 "2DG 2 OUTPUT BREAKER" voltmeter indicates 4100 to 4200v.
 - B. Breaker 2A408 "2DG 2 OUTPUT BREAKER" ammeter indicates amps.
22. Inform TSC (by radio or extension 6605, 6611, or 6601) of 2DG1 and 2DG2 status (Attachment E, Safe Shutdown Systems Checklist steps 2.A. and 2.C).
23. IF ANY 4160v Vital bus 2A3/2A4 energized, THEN GO TO Step 26.

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24. IF 2DG1 NOT running AND available, THEN perform the following:
- A. Verify 2DG1 SW Outlet valve (2CV-1503-1) open (RO 2 Step 10).
 - B. Start 2DG1 using 2104.036, Emergency Diesel Generator Operations, Exhibit 1.
 - C. Verify ONE SW pump running on 4160v Vital bus 2A3 as follows:
 - 2A302 "SERVICE WATER PUMP 2P4A" breaker closed and ammeter indicates amps.
 - OR
 - 2A303 "SERVICE WATER PUMP 2P4B" breaker closed and ammeter indicates amps.
 - D. Open DC control power breaker for EACH SW pump on 4160v Vital bus 2A3:
 - 2A302 "SERVICE WATER PUMP 2P4A"
 - 2A303 "SERVICE WATER PUMP 2P4B"
 - E. IF 2P4B running,
THEN open 2D22, Breaker 27 "2P-4B DISCONNECT CONTROL POWER".
 - F. Inform TSC (by radio or extension 6605, 6611, or 6601) of SW pump status (Attachment E, Safe Shutdown Systems Checklist step 3.C).
 - G. Inform TSC (by radio or extension 6605, 6611, or 6601) of 2DG1 status (Attachment E, Safe Shutdown Systems Checklist step 2.A).
 - H. IF 2DG1 supplying 4160v Vital bus 2A3, THEN GO TO Step 26.

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25. IF 2DG2 NOT running AND available, THEN perform the following:
- A. Verify 2DG2 SW Outlet valve (2CV-1504-2) open (RO 2 Step 10).
 - B. Start 2DG2 using 2104.036, Emergency Diesel Generator Operations, Exhibit 2.
 - C. Verify ONE SW pump running on 4160v Vital bus 2A4 as follows:
 - 2A402 "SERVICE WATER PUMP 2P4C" breaker closed and ammeter indicates amps.
 - OR
 - 2A403 "SERVICE WATER PUMP 2P4B" breaker closed and ammeter indicates amps.
 - D. Open DC control power breaker for EACH SW pump on 4160v Vital bus 2A4:
 - 2A402 "SERVICE WATER PUMP 2P4C"
 - 2A403 "SERVICE WATER PUMP 2P4B"
 - E. IF 2P4B running,
THEN open 2D22, Breaker 27 "2P-4B DISCONNECT CONTROL POWER".
 - F. Inform TSC (by radio or extension 6605, 6611, or 6601) of SW pump status (Attachment E, Safe Shutdown Systems Checklist step 3.D).
 - G. Inform TSC (by radio or extension 6605, 6611, or 6601) of 2DG2 status (Attachment E, Safe Shutdown Systems Checklist step 2.C).

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26. WHEN EO has EFW pump 2P7A "TRIP & TV" valve (2CV-0336) throttled (EO step 8), THEN open 2D24 Breaker 1 "125V DC IN PANEL 2C16."
27. Inform EO, 2D24 Breaker 1 open (EO step 11).
28. IF 2DG1 supplying 2A3, THEN perform the following:

A. Verify the following breakers closed and open DC control power breakers:

BREAKER CLOSED	DC CTRL POWER BREAKER OPEN	BREAKER
_____ _____	_____ _____	2A308 "2DG 1 OUTPUT BREAKER" 2A301 "2A3-2B5 FEEDER BKR"

B. Verify the following breakers open and open DC control power breakers:

BREAKER OPEN	DC CTRL POWER BREAKER OPEN	BREAKER
_____ _____ _____ _____ _____ _____	_____ _____ _____ _____ _____ _____	2A310 "2A3-2A4 TIE" 2A304 "CTMT SPRAY PUMP 2P-35A" 2A305 "LPSI PUMP 2P-60A" 2A306 "HPSI PMP 2P-89A" 2A307 "HPSI PMP 2P-89C" 2A309 "2A3 SUPPLY BKR"

29. IF AACG supplying 2A3, THEN perform the following:

A. Verify the following breakers closed and open DC control power breakers:

BREAKER CLOSED	DC CTRL POWER BREAKER OPEN	BREAKER
_____ _____	_____ _____	2A310 "2A3-2A4 TIE" 2A301 "2A3-2B5 FEEDER BKR"

B. Verify the following breakers open and open DC control power breakers:

BREAKER OPEN	DC CTRL POWER BREAKER OPEN	BREAKER
_____ _____ _____ _____ _____ _____	_____ _____ _____ _____ _____ _____	2A304 "CTMT SPRAY PUMP 2P-35A" 2A305 "LPSI PUMP 2P-60A" 2A306 "HPSI PMP 2P-89A" 2A307 "HPSI PMP 2P-89C" 2A308 "2DG 1 OUTPUT BREAKER" 2A309 "2A3 SUPPLY BKR"

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30. WHEN EO has EFW pump 2P7A "TRIP & TV" valve (2CV-0336) throttled (EO step 11), THEN open 2A311 "EFW PUMP 2P-7B" breaker and open 2A311 DC control power breaker.
31. IF 2DG2 supplying 2A4, THEN perform the following:

A. Verify the following breakers closed and open DC control power breakers:

BREAKER CLOSED	DC CTRL POWER BREAKER OPEN	BREAKER
_____	_____	2A408 "2DG 2 OUTPUT BREAKER"
_____	_____	2A401 "2A4-2B6 FEEDER BKR"

B. Verify the following breakers open and open DC control power breakers:

BREAKER OPEN	DC CTRL POWER BREAKER OPEN	BREAKER
_____	_____	2A404 "CTMT SPRAY PUMP 2P-35B"
_____	_____	2A405 "LPSI PUMP 2P-60B"
_____	_____	2A406 "HPSI PMP 2P-89B"
_____	_____	2A407 "HPSI PMP 2P-89C"
_____	_____	2A409 "2A4 SUPPLY BKR"
_____	_____	2A410 "2A3-2A4 TIE"

32. IF AACG supplying 2A4, THEN perform the following:

A. Verify the following breakers closed and open DC control power breakers:

BREAKER CLOSED	DC CTRL POWER BREAKER OPEN	BREAKER
_____	_____	2A410 "2A3-2A4 TIE"
_____	_____	2A401 "2A4-2B6 FEEDER BKR"

B. Verify the following breakers open and open DC control power breakers:

BREAKER OPEN	DC CTRL POWER BREAKER OPEN	BREAKER
_____	_____	2A404 "CTMT SPRAY PUMP 2P-35B"
_____	_____	2A405 "LPSI PUMP 2P-60B"
_____	_____	2A406 "HPSI PMP 2P-89B"
_____	_____	2A407 "HPSI PMP 2P-89C"
_____	_____	2A408 "2DG2 OUTPUT BREAKER"
_____	_____	2A409 "2A4 SUPPLY BKR"

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33. Open 2D21, Breaker 4 "2C33, (SIT N₂ SUPPLY, BYPASS, AND VENT VLVS)."
34. Open the following breakers:
 - 2D23, Breaker 2 "DG A CONTROL #1, 2C107"
 - 2D23, Breaker 6 "DG A FIELD FLASHING, 2E11"
 - 2D23, Breaker 8 "DG A CONTROL #2, 2C107"
35. Open 2D22, Breaker 27 "2P-4B DISCONNECT CONTROL POWER".
36. Open the following breakers:
 - 2D24, Breaker 2 "DG B CONTROL, 2C108, SOLENOID AS3"
 - 2D24, Breaker 6 "DG B FIELD FLASHING, 2E21"
 - 2D24, Breaker 8 "DG B CONTROL, 2C108, SOLENOID AS-4"
37. Inform TSC (by radio or extension 6605, 6611, or 6601) of the following:
 - A. 2P7A control power de-energized
(Attachment E, Safe Shutdown Systems Checklist step 1.E).
 - B. 4160v Vital bus 2A3 ESFAS components defeated
(Attachment E, Safe Shutdown Systems Checklist step 2.B).
 - C. 4160v Vital bus 2A4 ESFAS components defeated
(Attachment E, Safe Shutdown Systems Checklist step 2.D).
 - D. DC buses 2D21, 2D22, 2D23, and 2D24 aligned
(Attachment E, Safe Shutdown Systems Checklist step 2.E).
38. Align MCCs 2B54 and 2B64 using Attachment D, 2B54 and 2B64 Lineup.
39. Align MCCs 2B51 and 2B53 using Attachment A, 2B51 and 2B53 Lineup.
40. Re-energize MCC 2B51 by closing breaker 2B521 "MCC 2B51 SUPPLY."
41. WHEN MCC 2B61 aligned using Attachment C, 2B61, 2B62, and 2B63 Lineup (RO 2 step 17), THEN re-energize MCC 2B61 by closing breaker 2B621 "MCC 2B61 SUPPLY."

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42. Inform TSC (by radio or extension 6605, 6611, or 6601) MCC 2B51 and 2B61 re-energized (Attachment E, Safe Shutdown Systems Checklist steps 2.G and 2.H).
43. Verify SPDS AC Unit (2VUC-30) restarted on restoration of power.
44. IF PZR heaters available,
THEN control PZR heaters as directed by TSC using Attachment G, PZR Heater Operations.
45. Monitor DG operations.
46. IF only ONE DG running AND other DG available,
THEN RETURN TO Step 24 or Step 25 to place appropriate DG in service.
47. Maintain communications with TSC.

END

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NOTE

- Operator actions should NOT be delayed for Radiation Protection, Security, or any other concerns.
- Normal exposure limits apply except as approved by the SM or Emergency Coordinator.
- Elevators should NOT be used when performing this procedure.
- Prompt completion of these actions overrides all other procedures, technical specifications, or verbal directions other than those from Operations Management.

1. Obtain the following:

- Emergency key ring.
- Blue "EO" Alternate Shutdown bag from Alternate Shutdown locker.
- Hand-held radio with headset.
- Flashlight from Alternate Shutdown locker.

2. Perform equipment tests as follows:

- Radio check of hand-held radio (Channel 5).
- Verify flashlight in good working order.

3. Verify RCP breakers tripped on 6900v Non-vital buses 2H1/2H2 and open DC control power breaker for EACH RCP breaker.

BREAKER OPEN	DC CTRL POWER BREAKER OPEN	BREAKER
_____	_____	2H11 "RCP 2P-32A"
_____	_____	2H12 "RCP 2P-32D"
_____	_____	2H21 "RCP 2P-32B"
_____	_____	2H22 "RCP 2P32C"

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4. Locally isolate IA to MSIVs as follows:
 - A. Close IA supply from 2T91 "2F-356 I/N" valve (2MS-540).
 - B. Close IA supply "IA TO 2CV-1010-1" valve (2IA-166).
 - C. Open filter vent on MSIV "IA FILTER 2CV-1010-1 AIR CONTROL VLV" valve (2F-356).
 - D. Close IA supply from 2T91 "2F-357 I/N" valve (2MS-539).
 - E. Close IA supply "2CV-1060-2 AIR ISOL" valve (2IA-93).
 - F. Open filter vent on MSIV "IA FILTER 2CV-1060-2 AIR CONTROL VLV" valve (2F-357).
 - G. Inform CRS IA to MSIVs isolated (CRS step 12).
5. IF directed by SM, THEN energize ONE 4160v Vital bus using Attachment N, Alternate AC Diesel Generator Operation.
- * 6. Check SW pressure 55 to 118 psig every 5 minutes.
 - A. 2PIS-0711-2 "SW TO 2P-7A"
 - B. 2PIS-0716-1 "SW TO 2P-7B"
 - C. Inform TSC (by radio or extension 6605, 6611, or 6601) Loop One and Loop Two SW pressure (Attachment E, Safe Shutdown Systems Checklist step 3.E).
 - D. IF SW pressure less than 55 psig OR greater than 118 psig, THEN notify TSC immediately (by radio or extension 6605, 6611, or 6601).
7. Verify the following valves open:
 - "EFW PUMP 2P7A STEAM SUPPLY" 2CV-0340-2
 - "2P-7A DISCH 2PI-0773" 2EFW-0773A
 - "2P-7A DISCH 2PI-0773" 2EFW-0773B
8. Throttle EFW Pump 2P7A "TRIP & TV" valve (2CV-0336) to allow governor valve to open fully.

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9. IF EFW pump 2P7A tripped, THEN reset Trip and Throttle valve as follows:
- A. Turn "TRIP & TV" valve (2CV-0336) handwheel clockwise so screw rotation will raise sliding nut and latch lever to engage with trip hook.

NOTE

This action allows tappet spring force to move the emergency tappet downward and the tappet nut to locate in the "trip reset" position. This holds the emergency connecting rod in position under its spring tension.

- B. Manually reset mechanical trip linkage by pulling emergency connecting rod against spring force, moving emergency head lever away from emergency tappet and tappet nut.

CAUTION

Applying ANY lateral force when pushing downward on emergency tappet may result in bending.

- C. IF tappet spring force does NOT reposition emergency tappet, THEN press downward on emergency tappet to place it in trip reset position on head bracket.
- D. Verify flat side of tappet nut aligned to flat of emergency head lever to prevent disengaging latch lever and trip hook.
- E. Throttle EFW pump 2P7A "TRIP & TV" valve (2CV-0336) to allow Governor valve to open fully.
10. Inform CRS and TSC (by radio or extension 6605, 6611, or 6601) that EFW Pump 2P7A Trip and Throttle valve (2CV-0336) throttled and operating properly (CRS step 26; TSC Attachment E, Safe Shutdown Systems Checklist step 1.B).
11. WHEN CRS has opened 2D24 Breaker 1 (CRS step 27), THEN throttle 2P7A Trip and Throttle valve to maintain pump discharge pressure 1000 to 1300 psig.
12. Inform CRS that EFW pump 2P7A Trip and Throttle valve (2CV-0336) throttled (CRS step 30).
13. Maintain communications with TSC.

END

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NOTE

- Operator actions should NOT be delayed for Radiation Protection, Security, or any other concerns.
- Normal exposure limits apply except as approved by the SM or Emergency Coordinator.
- Elevators should NOT be used when performing this procedure.
- Prompt completion of these actions overrides all other procedures, technical specifications, or verbal directions other than those from Operations Management.

1. Obtain the following:

- Emergency key ring from Control Room or Security.
- Hi Rad key set from Control Room or Alternate Shutdown locker.
- White "RO" Alternate Shutdown bag from Alternate Shutdown locker.
- Hand-held radio with headset from Alternate Shutdown locker.
- Flashlight from Alternate Shutdown locker.

2. Perform equipment tests as follows:

- Radio check of hand-held radio (Channel 5).
- Verify flashlight in good working order.

3. Check SW pressure 55 to 118 psig.

A. 2PIS-0711-2 "SW TO 2P-7A"

B. 2PIS-0716-1 "SW TO 2P-7B"

C. IF SW pressure less than 55 psig OR greater than 118 psig,
THEN notify TSC immediately (by radio or extension 6605, 6611, or 6601).

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NOTE

BAM Tank Gravity Feed Outlet valves (2CV-4920-1/2CV-4921-1) maximum stroke time is 20 seconds.

4. Locally at MCC 2B52, verify the following valves open and open their breakers.
 - 2B52-K4 "BAM TANK GRAVITY FEED 2T6A 2CV-4920-1"
 - 2B52-F1 "BAM TANK GRAVITY FEED 2T6B 2CV-4921-1"
5. Inform RO 2 that 2CV-4920-1 and 2CV-4921-1 de-energized (RO 2 step 8).
6. WHEN "RWT SUCT TO CHG PMP" (2CV-4950-2) valve de-energized (RO 2 step 5), THEN verify 2CV-4950-2 closed.
7. Inform TSC (by radio or extension 6605, 6611, or 6601) "RWT SUCT TO CHG PMP" valve (2CV-4950-2) closed (Attachment E, Safe Shutdown Systems Checklist step 4.A.3).
8. WHEN CRS has de-energized 2D26 and 2D27 (CRS steps 3 and 4), THEN perform the following:
 - A. Verify "2P-7A COND SUCT MOV" valve (2CV-0795-2) open.
 - B. Verify "EFW SW to EFWP 2P-7A" valve (2CV-0711-2) closed.
 - C. Verify "2P7A DISCH CV TO SG B" valve (2CV-1039-1) open.
 - D. Throttle open "2P-7A DISCH CV TO SG B" valve (2CV-1076-2) as directed by TSC to maintain level in SG B.
9. Inform TSC (by radio or extension 6605, 6611, or 6601) 2CV-1039-1 open and 2CV-1076-2 throttled (Attachment E, Safe Shutdown Systems Checklist step 1.C).
10. WHEN CRS has opened 2D23, Breaker 1 (CRS step 12), THEN perform the following:
 - A. Verify "2P7A/7B RECIRC FLUSH LINE CV" valve (2CV-0798-1) closed.
 - B. Verify "EFW FLUSH VALVE" (2CV-0714-1) closed.

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11. Perform the following:
 - A. Inform TSC (by radio or extension 6605, 6611, or 6601) of Charging pump 2P36A status (running or NOT running).
 - B. Operate 2P36A from breaker 2B52-A5 as follows (Attachment E, Safe Shutdown Systems Checklist step 4.D):
 - 1) Place Local/Remote switch in LOCAL.
 - 2) Cycle 2P36A using START/STOP switch as directed by TSC.
12. Align MCC 2B52 per Attachment B, 2B52 Lineup.
13. WHEN MCCs 2B53 (CRS step 39) and 2B63 (RO 2 step 17) aligned, THEN verify 2P7B EFW train aligned as follows:
 - A. "2P-7B COND SUCT MOV" valve (2CV-0789-1) open.
 - B. "SW TO EFWP 2P-7B" valve (2CV-0716-1) closed.
 - C. "2P7B DISCH TO SG 'B' CV" valve (2CV-1036-2) open.
 - D. "2P-7B DISCH CV TO SG B" valve (2CV-1075-1) closed.
14. Inform TSC (by radio or extension 6605, 6611, or 6601) EFW Pump 2P7B standby alignment to SG B complete (Attachment E, Safe Shutdown System Checklist Step 1.F).
15. Maintain communications with TSC.

END

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NOTE

- Operator actions should NOT be delayed for Radiation Protection, Security, or any other concerns.
- Normal exposure limits apply except as approved by the SM or Emergency Coordinator.
- Elevators should NOT be used when performing this procedure.
- Prompt completion of these actions overrides all other procedures, technical specifications, or verbal directions other than those from Operations Management.

1. Obtain the following:

- Emergency key ring from Control Room or Security.
- Hi Rad key set from Control Room or Alternate Shutdown locker.
- White "RO" Alternate Shutdown bag from Alternate Shutdown locker.
- Hand-held radio with headset from Alternate Shutdown locker.
- Flashlight from Alternate Shutdown locker.

2. Perform equipment tests as follows:

- Radio check of hand-held radio (Channel 5).
- Verify flashlight in good working order.

3. Verify BOTH DG Service Water Outlet valves open:

A. "2DG1 SW OUTLET" 2CV-1503-1

NOTE

Valve operator for "2DG2 SW OUTLET" (2CV-1504-2) located in locked box next to valve.

B. "2DG2 SW OUTLET" 2CV-1504-2

C. IF SW valves can NOT be opened,
THEN notify TSC immediately (by radio or extension 6605, 6611, or 6601).

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4. Verify Letdown isolated by performing the following:
 - A. Verify "LD CONTAINMENT ISOL" valve (2CV-4823-2) maintained closed by performing the following:
 - 1) Close IA supply valve.
 - 2) Vent air pressure off supply regulator.
 - B. Verify "LD THROTTLE CONTROL VLV" (2CV-4816) closed by performing the following:
 - 1) Close IA supply valve.
 - 2) Vent air pressure off supply regulator.
 - C. Verify "LD THROTTLE CONTROL VLV" (2CV-4817) closed by performing the following:
 - 1) Close IA supply valve.
 - 2) Vent air pressure off supply regulator.
5. Open the following breakers:
 - 2B62-E4 "CHG PUMP FLOW TO REGEN HX 2CV-4840-2"
 - 2B62-F2 "CHARGING PUMP SUCTION FROM RWT 2CV-4950-2"
6. Inform RO 1 RWT Suction to Charging Pumps valve (2CV-4950-2) de-energized (RO 1 step 6).
7. Verify "2P-36A/B FLOW CONT" valve (2CV-4840-2) open.
8. WHEN de-energized by RO 1 (step 4), THEN verify BAMT Gravity Feed Outlet valves open:
 - "BAM TK GRAVITY FEED 2T6A" 2CV-4920-1
 - "BAM TK GRAVITY FEED 2T6B" 2CV-4921-1
9. Inform CRS that BAM Tank Gravity Feed Outlet valves open (CRS Step 19).

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10. WHEN CRS has de-energized MCCs 2B61 and 2B51 (CRS steps 16 and 17),
THEN verify BOTH DG Service Water Outlet valves open:

- "2DG1 SW OUTLET" 2CV-1503-1

NOTE

Valve operator for "2DG2 SW OUTLET" (2CV-1504-2) located in locked box next to valve.

- "2DG2 SW OUTLET" 2CV-1504-2
11. Inform TSC (by radio or extension 6605, 6611, or 6601) of the following:
- A. SW aligned to 2DG1 (2CV-1503-1) de-energized and open
(Attachment E, Safe Shutdown Systems Checklist step 3.A).
 - B. SW aligned to 2DG2 (2CV-1504-2) de-energized and open
(Attachment E, Safe Shutdown Systems Checklist step 3.B).
12. WHEN VCT Outlet valve (2CV-4873-1) de-energized by CRS (CRS step 19),
THEN verify VCT Outlet valve (2CV-4873-1) closed.
13. Verify "VCT MAKEUP ISOLATION" valve (2CV-4941-2) maintained closed by performing the following:
- A. Close IA supply valve.
 - B. Vent air pressure off supply regulator.
14. WHEN CRS has de-energized DC buses 2D26 and 2D27 (CRS steps 3 and 4),
THEN perform the following:
- A. Verify "2P7A DISCH TO SG 'A' CV" valve (2CV-1037-1) open.
 - B. Throttle "2P7A DISCH TO SG 'A' CV" valve (2CV-1026-2) as directed by TSC to maintain level in SG A.
15. Inform TSC (by radio or extension 6605, 6611, or 6601) EFW Discharge valve 2CV-1037-1 open and 2CV-1026-2 throttled
(Attachment E, Safe Shutdown Systems Checklist step 1.D).

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16. Perform the following:
 - A. Inform TSC (by radio or extension 6605, 6611, or 6601) of Charging pump 2P36B status (running or NOT running).
 - B. Operate 2P36B from Breaker 2B62-A5 as follows:
(Attachment E, Safe Shutdown Systems Checklist step 4.D).
 - 1) Place Local/Remote switch in LOCAL.
 - 2) Cycle 2P36B using START/STOP switch as directed by TSC.
17. Align MCCs 2B61, 2B62, and 2B63 using Attachment C, 2B61, 2B62, and 2B63 Lineup.
18. WHEN MCC 2B51 (CRS step 39) AND MCC 2B63 aligned (RO 2 step 17),
THEN align 2P7B EFW train as follows:
 - A. Verify "2P7B DISCH TO SG 'A' CV" valve (2CV-1038-2) open.
 - B. Verify "2P7B DISCH CV TO SG 'A' CV" valve (2CV-1025-1) closed.
19. Inform TSC (by radio or extension 6605, 6611, or 6601) of the following:
 - A. BAMT Gravity Feed Outlet valves open
(Attachment E, Safe Shutdown Systems Checklist steps 4.A.1 and 4.A.2).
 - B. "2P-36A/B FLOW CONT" valve (2CV-4840-2) open
(Attachment E, Safe Shutdown Systems Checklist step 4.B.1).
 - C. "LD CONTAINMENT ISOL" valve (2CV-4823-2) closed
(Attachment E, Safe Shutdown Systems Checklist step 4.C).
 - D. EFW pump 2P7B standby alignment to SG A complete
(Attachment E, Safe Shutdown Systems Checklist step 1.G).
20. Maintain communications with TSC.

END

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NOTE

- Operator actions should NOT be delayed for Radiation Protection, Security, or any other concerns.
- Normal exposure limits apply except as approved by the SM or Emergency Coordinator.
- Elevators should NOT be used when performing this procedure.
- Prompt completion of these actions overrides all other procedures, technical specifications, or verbal directions other than those from Operations Management.

1. Perform the following:
 - A. Notify Unit 1 Control Room an Alternate Shutdown is being performed on Unit 2 AND give both the location and extent of the fire.
 - B. IF fire in the Unit 2 Control Room,
THEN perform the following:
 - 1) Notify Unit 1 to begin an immediate plant shutdown.
 - 2) Direct Inside AO OR other qualified Fire Brigade member to relieve a Unit 1 operator from the Fire Brigade to support Unit 1 plant shutdown.
2. Shift electrical power for SPDS Room Cooler (2VUC-30) to Unit 1 as follows:
 - A. Open Unit 2 electrical power supply disconnect (2S-120B).
 - B. Shift electrical disconnect (2S-120A/B) manual interlock slide bar.
 - C. Close Unit 1 electrical power supply disconnect (2S-120A).
 - D. Check "Load Connected To Emergency" light lit.
 - E. Check 2VUC-30 restarts after 10 second time delay.
3. Proceed to third floor Administration Building - TSC and obtain copy of 2203.014, Alternate Shutdown.
4. Assist SM in implementing Emergency Plan using 1903.010, Emergency Action Level Classification.
 - A. At a minimum, an Alert shall be declared.
 - B. All emergency teams should be called out.
5. Call out additional operators. At least one additional operator for EACH position should be called out.

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6. IF ANY Safety Function in Step 7 NOT satisfied, THEN inform SM.
7. Review Safety Functions every 15 minutes for first hour and every 30 minutes thereafter:
 - A. Reactivity Control: Reactor power lowering.
 - B. Vital Auxiliaries: At least ONE 4160v Vital bus energized.
 - C. RCS Inventory Control: PZR level 10 to 80%.
 - D. RCS Pressure Control: RCS pressure 1800 to 2250 psia.
 - E. Core Heat Removal: RCS margin to saturation greater than 30°F, refer to Attachment H, P-T Limits.
 - F. RCS Heat Removal: At least ONE SG level maintained 160 to 420 inches.
 - G. CNTMT: CNTMT Temperature less than 140°F and CNTMT pressure less than 16 psia.
8. Assist SM as required (maintain Attachment E, Safe Shutdown Systems Checklist; record Charging pump run times, etc.).

END

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NOTE

Because of the serious nature of this event and the potentially limited number of plant parameters available to protect the primary plant, it is essential that on shift operators focus their attention on protecting the primary plant with the assured alternate shutdown equipment. Any decisions and actions involving recovery of non-alternate shutdown equipment should be accomplished by Operations Management and extra operators. The SM should be kept aware of these actions but NOT become directly involved.

1. Verify initial conditions as follows:
 - A. Alternate Shutdown to Hot Standby natural circulation conditions established (SM Step 19).
 - B. At least ONE 4160v Vital AC bus energized.
 - C. At least ONE train Vital MCCs energized and aligned using Attachments A, B, C, and D.
 - D. SG levels:
 - 1) 160 to 420 inches and trending to 385 inches.
 - 2) Locally maintained by ONE of the following:
 - EFW pump 2P7A with manual control of Trip and Throttle valve and EFW Block valves.
 - EFW pump 2P7B with manual control of EFW Block valves.
 - E. SG pressure maintained by ONE of the following:
 - Operation of SG Safety valves.

OR

 - Local control of SDBCS ADV Upstream Isolation valves (2CV-1002/2CV-1052).

OR

 - Local control of SDBCS Upstream ADVs (2CV-1001/2CV-1051).
 - F. RCS pressure and PZR level maintained as follows:
 - 1) Local operation of PZR heaters.
 - 2) Local control of Charging pumps.

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2. Maintain Hot Standby Conditions as follows:

A. WHEN additional operators available, THEN locally perform the following:

- 1) Monitor DGs.
- 2) Return Inverters 2Y25 and 2Y26 to normal AC power using 2107.003, Inverter and 120V AC Electrical System Operation.
- 3) Verify "RWT 2T-3 DISCH TO 2P-35A/B" valves (2CV-5630-1/2CV-5631-2) closed.

B. Control RCS pressure 1800 to 2250 psia using Attachment G, PZR Heater Operation.

C. Maintain PZR level 29 to 80% by local control of Charging pump 2P36A or 2P36B.

NOTE

Charging pump run times are used to calculate the amount of boric acid added to the RCS.

D. Record Charging pump start and stop times on Attachment E, Safe Shutdown Systems Checklist.

E. IF desired to shift EFW from 2P7A to 2P7B, THEN locally perform the following:

- 1) Verify 2P7B Discharge valves closed:
 - "2P7B DISCH CV TO SG 'A'" 2CV-1025-1
 - "2P-7B DISCH CV TO SG B" 2CV-1075-1
- 2) Start EFW Pump 2P7B at 4160v Vital bus 2A3 by manually closing breaker 2A311.
- 3) Close 2P7A "TRIP & TV" valve (2CV-0336) while throttling 2CV-1025-1 to maintain SG A level AND throttling 2CV-1075-1 to maintain SG B level.
- 4) WHEN 2P7A discharge pressure less than SG pressure, THEN close "TRIP & TV" valve (2CV-0336) to secure 2P7A.
- 5) Verify 2CV-1076-2 and 2CV-1026-2 in throttled position.
- 6) IF 2P7A required, THEN slowly re-establish flow by throttling open "TRIP & TV" valve (2CV-0336) AND maintain 2P7A discharge pressure greater than SG pressure.

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3. IF ANY of the following conditions met,
THEN GO TO Section 9, Alternate Shutdown Cooldown:
 - A. Control of a majority of plant equipment can NOT be re-established from Control Room.
 - B. ALL prerequisites of Step 4.A can NOT be satisfied.
 - C. RCS pressure can NOT be maintained greater than 1800 psia.
4. Return Plant control to Control Room as follows:
 - A. The following prerequisites should be met before returning overall plant control to Control Room:
 - 1) Control Room SPDS Alternate Shutdown display operational.
 - 2) Widespread fire damage has NOT occurred in Cable Spreading room.
 - 3) Plant communications (radio, dial phone, Gaitronics) operational from Control Room.
 - 4) Control Room habitable with little likelihood of re-evacuation.
 - B. IF ALL conditions in Step 4.A satisfied, THEN perform the following:
 - 1) Direct an extra SRO to temporarily assume overall plant control at TSC.
 - 2) SM return to Control Room.
 - 3) Re-establish overall plant control from Control Room.

(Step 4 continued on next page)

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4. (continued)

CAUTION

Component control circuits located in cabinets where widespread fire damage occurred should NOT be re-energized.

NOTE

Components found non-operational from the Control Room will require continued local and manual operation as directed from Control Room or TSC.

C. Establish operation of the following components (one at a time) from Control Room and verify associated control cabinet NOT damaged by fire:

- EFW Discharge valves
- EFW pump 2P7A Turbine governor control
- Charging pumps
- PZR Proportional heaters
- SDBCS Upstream valves
- EFW pump 2P7B breaker control

(Step 4 continued on next page)

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4. (continued)

NOTE

- Re-establishing additional component controls will be determined by Operations Management based on extent of damage.
- These efforts should NOT be allowed to interfere with the operating crews control of the primary plant using the Safe Shutdown System components.

D. IF desired to restore additional equipment control to Control Room, THEN refer to appropriate operating procedure.

E. IF RCPs can be restarted, THEN restore DC control power to the following breakers:

- 2H11 "RCP 2P-32A"
- 2H12 "RCP 2P-32D"
- 2H21 "RCP 2P-32B"
- 2H22 "RCP 2P32C"

F. Re-energize PZR Spray valves by closing the following breakers:

- 2B53-H2 "SERIES BKR FOR 2B53-H3, 2CV-4652"
- 2B53-H3 "PRESSURIZER B SPRAY VALVE 2CV-4652"
- 2B61-L1 "SERIES BKR FOR 2B61-L4, 2CV-4651"
- 2B61-L4 "PRESSURIZER A SPRAY VLV 2CV-4651"

G. Verify PZR Spray valves closed:

- 2CV-4651
- 2CV-4652

H. GO TO 2203.013, Natural Circulation Operations.

END

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NOTE

- This section provides steps necessary to perform a natural circulation cooldown using basic Safe Shutdown system components.

1. Verify initial conditions as follows:
 - A. At least ONE 4160v Vital AC bus energized.
 - B. At least ONE train Vital MCCs energized and aligned using Attachments A, B, C, and D.
 - C. SG levels maintained as follows:
 - 1) 160 to 420 inches and trending to 385 inches.
 - 2) Locally maintained by ONE of the following:
 - EFW pump 2P7A, with manual control of Trip and Throttle valve and EFW Block valves.
 - EFW pump 2P7B with manual control of EFW block valves.
 - D. SG pressures being maintained by local manual operation of ONE of the following:
 - SDBCS Upstream ADVs (2CV-1001/2CV-1051)
 - SDBCS Upstream MOV Isolation valves (2CV-1002/2CV-1052)
 - E. RCS pressure and PZR level being maintained by:
 - 1) Local operation of Charging pumps.
 - 2) Local control of PZR heaters.
2. Verify at least ONE complete crew of additional operators available to assist with cooldown.

NOTE

Maintaining MTS as high as possible will minimize possibility of Reactor Vessel Head void formation.

- *3. Maintain RCS MTS greater than 30°F AND less than 200°F, refer to Attachment H, P-T Limits.

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NOTE

Boric acid addition assumes BAM tank concentration of 4375 ppm. Manual boron calculations may be performed using 2103.004, Soluble Poison Concentration Control.

4. Calculate Boric Acid Addition Requirement for -1% SDM as follows:

A. IF BAMT readings available, THEN perform the following:

1) Log BAMT levels.

"A" BAMT _____% "B" BAMT _____%

Total BAMT Inventory = "A" BAMT + "B" BAMT
= _____% + _____%
= _____%

2) Calculate gallons Boric Acid Available

117 gallons per % times total BAMT Inventory in %
117 X _____%
= _____ gallons Boric Acid Available

B. IF Boric Acid available volume is known, THEN perform one of the following:

- IF 7000 gallons or more of Boric Acid available, THEN use Charging pump flow rate to determine amount of time needed to add 7000 gallons of boric acid from BAM tanks to RCS to achieve -1% SDM (160 minutes at 44 gpm or 80 minutes at 88 gpm) AND record in step 4.D.
- IF less than 7000 gallons of Boric Acid Available, THEN use Charging pump flow rate to determine amount of time needed to pump all available Boric Acid from BAM tanks to RCS to achieve -1% SDM (Available Boric Acid in gallons divided by Charging Flowrate) AND record in step 4.D.

_____ gallons ÷ _____ gpm

C. IF Boric Acid available volume is unknown, THEN station an operator at running CCP suction to monitor suction pressure using local pressure gage at 2PI-4833/2PI-4843 AND record NA in step 4.D

D. Record Charging Pump Run Time to deliver Boric Acid required for -1% SDM

_____ minutes.

E. Record RWT Level Indication (2LIS-5643A – west side of RWT.) _____%

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5. IF Condensate pump running, THEN locally close Feedwater Block valves.

- "FEEDWATER BLOCK VLV TO SGA" 2CV-1023-2
- "FEEDWATER BLOCK VLV TO SGB" 2CV-1073-2

NOTE

RCS Tech Spec cooldown rate limit is 100°F/HR (constant) ,
NOT to exceed 50°F in any 1/2 hour period (step),

(TS 3.4.9.1 adjusted for instrument uncertainty)

PZR cooldown rate limits are as follows:

- With PZR water phase temperature >200°F, maximum PZR cooldown rate is 175°F/ hour.
- With PZR water phase temperature ≤200°F, maximum PZR cooldown rate is 100°F/ hour.

* 6. Commence cooldown to 275°F T_C as follows:

- A. Locally control RCS cooldown rate within TS limits using SDBCS Upstream ADVs (do NOT exceed makeup capacity of available Charging pumps).
- B. IF RWT level 6% or less (L5636-1/L5637-2/L5639-3/L5640-4),
THEN maintain RCS cooldown rate less than 30°F per hour.
- C. Maintain PZR level 29 to 80% during cooldown.
- D. Allow RCS pressure to lower without use of Aux spray.
- E. Notify Electrical Maintenance to perform Attachment M,
SDC Suction MOV Cable Determination.

* 7. Monitor RCS Cooldown rates as follows:

- A. Record RCS T_C and PZR temperature using Attachment J, RCS Cooldown Table.
- B. Plot RCS pressure versus RCS T_C using Attachment H, P-T Limits every 15 minutes.

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CAUTION

RCS pressure may be greater than HPSI shutoff head when BAM tank volume depleted.

NOTE

Sufficient RCS shrinkage should occur by the time RCS temperature reaches 380°F.

8. WHEN required BAM tank volume added to RCS OR CCP suction pressure less than 22 psig, THEN align RCS makeup as follows:
- A. IF RWT level greater than 6% (L5636-1/L5637-2/L5639-3/L5640-4),
THEN perform the following:
- 1) Open "RWT SUCT TO CHG PMP" valve (2CV-4950-2).
 - 2) Close "BAM TK GRAVITY FEED 2T6A/B" valves (2CV-4920-1/2CV-4921-1).
- B. IF RWT level 6% or less (L5636-1/L5637-2/L5639-3/L5640-4),
THEN perform the following:
- 1) Check CNTMT Sump level greater than 86 inches (L5645-1/L5646-2).
 - 2) IF CNTMT Sump level greater than 86 inches,
THEN align ONE HPSI pump to CNTMT sump as follows:
 - a) Verify selected train "RWT 2T-3 DISCH TO 2P-35A/B" valve (2CV-5630-1/2CV-5631-2) closed.
 - b) Unlock AND close "RECIRC/TEST LINE I/N ISOL" valve (2BS-26).
 - c) Verify selected train "CTMT SUMP SUCTION ISOL" (2CV-5649-1/2CV-5650-2) open.
 - d) Start ONE HPSI pump on train aligned to CNTMT sump.
 - e) Throttle HPSI Injection MOVs as necessary to maintain PZR level 29 to 80%.
 - f) Check running HPSI Pump Suction pressure greater than 3 psig.
 - 2PI-5090 "2P-89A SUCT"
 - 2PI-5100 "2P-89B SUCT"
 - 2PI-5098 "SIS 2P-89C SUCTION"
 - g) IF running HPSI Pump Suction pressure 3 psig or less, THEN secure HPSI pump AND RETURN TO Step 8.B.2.a to align opposite train to CNTMT sump.

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- * 9. Monitor for void formation in Reactor vessel or idle SG loop as follows:
- A. Rapid rise in PZR level while depressurizing or rapid drop in PZR level while raising RCS pressure.
 - B. RVLMS LVL 01 indicates DRY (SPDS points LV2L01A/LV2L01A).
 - C. Upper Head thermocouples indicate saturated conditions (SPDS points CV2DOMEA/CV2DOME B)

NOTE

RCS cooldown with a void is acceptable should PZR heaters NOT be available OR hold times for void considerations impractical.

- *10. IF RCS voiding inhibits depressurization, THEN perform the following:
- A. Terminate RCS depressurization.
 - B. Locally energize ALL available PZR heaters AND raise RCS pressure.
 - C. Verify PZR level lowering (void collapsing).
 - D. Raise RCS pressure 50 psia above value at which PZR outsurge stops.
 - E. Maintain present RCS pressure for 2 hours to allow Reactor vessel head and idle SG loop cooling.
- *11. Check EFW Pump suction status as follows:
- A. Monitor EFW pump CST level and EFW pump suction pressure.
 - B. IF CST level less than 15%, THEN locally transfer EFW suction to alternate CST using 2106.006, Emergency Feedwater System Operations.
 - C. IF BOTH CST levels less than 15%, THEN perform the following:
 - 1) Locally align Q CST to EFW suction.
 - 2) Notify Unit 1 SM Unit 2 aligned to Q CST to provide SG makeup.
 - 3) IF Q CST level drops below 12 feet, THEN inform Unit 1 SM.
 - D. IF EFW suction pressure less than 5 psig AND CST NOT available, THEN locally align SW to EFW suction.

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12. IF Aux Spray NOT available,
THEN reduce RCS pressure by PZR alternate filling and draining method.
13. IF AUX Spray available,
THEN reduce RCS pressure to 650 to 700 psia using Attachment K, PZR Spray Operation.
14. WHEN RCS pressure 650 to 700 psia, THEN close SIT Outlet valves as follows:
 - A. Unlock and close the following breakers:
 - 2B51-F2 "SIT 2T-2A OUTLET 2CV-5003-1"
 - 2B51-H1 "SIT 2T-2B OUTLET 2CV-5023-1"
 - 2B61-F2 "SIT 2T-2C OUTLET 2CV-5043-2"
 - 2B61-H1 "SIT 2T-2D OUTLET 2CV-5063-2"

CAUTION

Gloves and face shield are required personnel protection to work inside breaker cubicles.

- B. Close EACH SIT Outlet valve by depressing contactor on right side of valve controller inside breaker cubicle.
- C. WHEN SIT Outlet valve closed,
THEN release contactor and open SIT Outlet valve breakers.
- D. IF unable to operate SIT Outlet valves from MCC breakers,
THEN consider CNTMT entry to manually close SIT Outlet valves.

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15. IF Reactor Vessel Head temperature available (SPDS points CV2DOMEA/CV2DOME B), THEN perform the following:
- A. IF Reactor Vessel Head temperature less than 410°F, THEN GO TO Step 17.
 - B. IF Reactor Vessel Head temperature greater than 410°F AND RCS pressure can be maintained 650 to 700 psia, THEN perform the following:
 - 1) Reduce and maintain RCS pressure 650 to 700 psia.
 - 2) Maintain RCS pressure and temperature limits using Attachment H, P-T Limits.
 - 3) Continue RCS cooldown to 310°F.
 - 4) WHEN Reactor Vessel Head temperature less than 410°F, THEN GO TO Step 17.
16. IF Reactor Vessel Head temperature NOT available AND RCS pressure can be maintained 650 to 700 psia, THEN perform the following:
- A. Reduce and maintain RCS pressure 650 to 700 psia.
 - B. Continue RCS cooldown to 310°F.
 - C. Maintain RCS pressure and temperature limits using Attachment H, P-T Limits.
 - D. WHEN 15 hours expired since cooldown started, THEN GO TO Step 17.

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CAUTION

Gloves and face shield are required personnel protection to work inside breaker cubicles.

17. WHEN RCS T_C 270 to 275°F AND pressure less than 400 psia, THEN place LTOP in-service as follows:
- A. Open LTOP Isolation valve (2CV-4731-2) at breaker 2B61-L2 as follows:
- 1) Depress left side contactor on valve controller in breaker 2B61-L2 "LTOP RELIEF ISOL 2CV-4731-2".
 - 2) WHEN valve indicates open, THEN release contactor and open breaker 2B61-L2.
- B. Open LTOP Isolation valve (2CV-4741-1) at breaker 2B51-K2 as follows:
- 1) Remove danger tag and close breaker.
 - 2) Depress left side contactor on valve controller in breaker 2B51-K2 "LTOP RELIEF ISOL 2CV-4741-1".
 - 3) WHEN valve indicates open, THEN release contactor and open breaker 2B51-K2.
- C. Open LTOP Isolation valve (2CV-4730-1) at breaker 2B51-E4 as follows:
- 1) Remove danger tag and close breaker.
 - 2) Depress left side contactor on valve controller in breaker 2B51-E4 "LTOP RELIEF ISOL 2CV-4730-1".
 - 3) WHEN valve indicates open, THEN release contactor and open breaker 2B51-E4.
- D. Open LTOP Isolation valve (2CV-4740-2) at breakers 2D26-A2 and 2D26-A3 as follows:
- 1) Open ALL breakers on Motor Control Center (2D26) except 2D26-A2 and 2D26-A3.
 - 2) Close "2D26 MOTOR CONTROL CENTER SUPPLY" breaker 2D02-21.
 - 3) Depress left side contactor on valve controller in breaker 2D26-A3 "PZR LTOP RELIEF VLV ISOL".
 - 4) WHEN valve indicates open, THEN release contactor and open breaker 2D26-A3.
- E. IF unable to open LTOP Isolation valves from MCC breaker, THEN consider CNTMT entry to locally open valves.

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18. Verify Shutdown Cooling system aligned for operation using 2104.004, Shutdown Cooling System, Attachment A.
19. Verify RCS pressure and temperature within SDC window, refer to Attachment H, P-T Limits.
20. Verify the following breakers open:
 - 2B51-E1 "LPSI 2P60A RECIRC ISOL 2CV-5123-1"
 - 2B51-G1 "LPSI TO 2P32A LOOP 2CV-5017-1"
 - 2B52-A3 "LPSI 2P60B RECIRC ISOL 2CV-5124-1"
 - 2B52-G4 "CNTMT SPRAY HEADER ISOL 2CV-5612-1"

 - 2B52-H1 "LPSI TO 2P32B LOOP 2CV-5037-1"
 - 2B61-J1 "LPSI TO 2P32C LOOP 2CV-5057-2"
 - 2B62-G4 "CNTMT SPRAY HEADER ISOL 2CV-5613-2"
 - 2B62-H1 "LPSI TO 2P32D LOOP 2CV-5077-2"
21. Locally verify the following valves closed:
 - "2E-35A ISOL TO CSS" 2CV-5612-1
 - "2E-35B ISOL TO CSS" 2CV-5613-2
 - "LPSI 2P60A MINI RECIRC CV" 2CV-5123-1
 - "LPSI 2P-60B MINI RECIRC CV" 2CV-5124-1
22. Locally verify the following valves open:
 - "LOOP #1 ESF HDR ISOL" 2CV-1400-1
 - "LOOP #2 ESF HDR ISOL VLV" 2CV-1406-2
 - "2E-52A INLET" 2CV-1445-1
 - "2E52B INLET" 2CV-1446-2

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23. Align SW to ONE SDC HX as follows:

- IF desired to align SDC HX 2E35A, THEN perform the following:
 - A. Verify breaker 2B52-G1 "SW INLET TO SDN CLG HX 2E35A 2CV-1453-1" open.
 - B. Open "SW TO 'A' SDC HX" valve (2CV-1453-1).
- IF desired to align SDC HX 2E35B, THEN perform the following:
 - A. Verify breaker 2B62-G1 "SW INLET TO SDN CLG HX 2E35B 2CV-1456-2" open.
 - B. Open "2E35B INLET" valve (2CV-1456-2).

24. Install SDC pump vent rigs using 2104.004, Shutdown Cooling System.

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25. Commence SDC as follows:

- A. IF PZR level lowers greater than 5% due to opening SDC RC Suction Isolation valves, THEN perform the following:
- 1) Close at least ONE SDC RC Isolation valve.
 - 2) Investigate cause of leakage.
- B. Verify Electrical Maintenance has completed Attachment M, SDC Suction MOV Cable Determination.

CAUTION

Gloves and face shield are required personnel protection to work inside breaker cubicles.

- C. Open SDC RC Isolation valves at associated breaker as follows:
- 1) Verify breaker closed.
 - 2) Depress left side contactor on valve controller in breaker.
 - 3) WHEN valve indicates open, THEN release valve contactor and open breaker.
 - 2B51-G2 "SHUTDOWN COOLING RC ISOLATION 2CV-5084-1"
 - 2B52-E5 "SHUTDOWN COOLING RC ISOLATION 2CV-5038-1"
 - 2B62-E5 "SHUTDOWN COOLING RC ISOL 2CV-5086-2"
- D. IF unable to operate SDC RC Suction valves from breaker, THEN consider CNTMT entry to manually open SDC Suction valves.

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26. Align LPSI Injection MOVs as follows:

A. Locally open ONE of the following LPSI Injection MOVs ~ 10%:

- "SIS LP HDR SHUT-OFF" 2CV-5017-1
- "SIS LP HDR SHUT-OFF" 2CV-5037-1
- "SIS LP HDR SHUT-OFF" 2CV-5057-2
- "SIS LP HDR SHUT-OFF" 2CV-5077-2

B. IF ANY LPSI Injection MOV will NOT operate, THEN contact maintenance for assistance.

27. Locally start selected LPSI pump:

- 2A305 "LPSI PUMP 2P-60A"
- 2A405 "LPSI PUMP 2P-60B"

28. Verify SDC flow greater than 100 gpm (SPDS point F5091).

29. WHEN LPSI temperatures (SPDS points T5095/T5096) stabilized,
THEN perform the following:

A. Locally open ALL LPSI Injection MOVs.

B. Adjust "LPSI DISCHARGE HEADER" valve 2CV-5091 using 2104.040, LPSI System,
Exhibit 1 to control SDC flow rate.

C. IF ANY LPSI Injection MOV will NOT operate, THEN contact maintenance for assistance.

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*30. IF less than 10°F MTS exists, THEN perform the following:

A. Terminate efforts to establish SDC.

CAUTION

Gloves and face shield are required personnel protection to work inside breaker cubicles.

B. Close at least ONE SDC RC Isolation valve at associated breaker as follows:

- 1) Verify breaker closed.
- 2) Depress right side contactor on valve controller in breaker.
- 3) WHEN valve indicates closed, THEN release valve contactor and open breaker.
 - 2B51-G2 "SHUTDOWN COOLING RC ISOLATION 2CV-5084-1"
 - 2B62-E5 "SHUTDOWN COOLING RC ISOL 2CV-5086-2"

C. Raise RCS pressure to restore RCS MTS.

D. Verify RCS heat removal via SGs.

*31. Maintain RCS cooldown rate within TS limits by locally controlling "LPSI HDR CV" valve (2CV-5093) using 2104.040, LPSI System, Exhibit 2.

32. Maintain plant as directed by Operation Management.

33. Verify final conditions as follows:

- A. RCS temperature 120 to 200°F.
- B. RCS pressure less than 300 psia.
- C. Shutdown cooling system in-service.
- D. LTOP Relief valves in-service.

END

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ATTACHMENT A

2B51 and 2B53 LINEUP

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NOTE

All component breakers marked with a pound sign (#) are NOT vital for safe shutdown. Component breakers may be opened at the discretion of SM for DG loading concerns or fire exists in the component area.

1. Open ALL breakers on MCC 2B51 EXCEPT the following:
 - # • 2B51-A3 "INSTRUMENTATION X-FMR 2X13"
 - # • 2B51-C3 "RED BATTERY ROOM EXHAUST FAN 2VEF-61"
 - # • 2B51-D1 "INSTRUMENTATION X-FMR 2X11"
 - # • 2B51-M3 "BATTERY CHARGER 2D31A"

 - # • 2B51-N4 "INVERTER 2Y1113"
2. Open ALL breakers on MCC 2B53 EXCEPT the following:
 - 2B53-C3 "SPDS INVERTER (PRIMARY) 2Y-26"
 - 2B53-C4 "SPDS ROOM COOLER, 2VUC-30 AND 2VE-6"
 - # • 2B53-E1 "INVERTER 2Y-11"
 - 2B53-K3 "2DG1 FUEL XFER PUMP 2P16A"

 - # • 2B53-K4 "EFW PUMP ROOM CLR 2VUC-6B"
3. Inform TSC (by radio or extension 6605, 6611, or 6601) 2B51 and 2B53 aligned (Attachment E, Safe Shutdown Systems Checklist Step 2.F.7 and 2.F.8).
4. Inform RO 1, 2B53 aligned per Attachment A, 2B51 and 2B53 lineup (RO 1, Step 13).
5. Inform RO 2, 2B51 aligned per Attachment A, 2B51 and 2B53 Lineup (RO 2, Step 18).

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ATTACHMENT B

2B52 LINEUP

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NOTE

All component breakers marked with a pound sign (#) are NOT vital for safe shutdown. Component breakers may be opened at the discretion of SM for DG loading concerns or fire exists in the component area.

1. Open all breakers on MCC 2B52 EXCEPT the following:
 - 2B52-A5 "CHARGING PUMP 2P36A" (to be controlled manually at breaker for makeup as required)
 - 2B52-B5 "2DG2 RM EXH FAN DAMPER 2TCDM-8687 & 8689"
 - 2B52-C6 "EMER DIESEL GEN #1 ROOM EXHAUST FAN 2VEF-24A"
 - 2B52-C7 "EMER DIESEL GEN #1 ROOM EXHAUST FAN 2VEF-24B"

 - # • 2B52-D1 "2DG1 STARTING AIR COMPRESSOR 2C4A"
 - # • 2B52-D2 "2DG1 STARTING AIR COMPRESSOR 2C4B"
 - # • 2B52-E3 "INTAKE STRUC FAN 2VEF-25A"
 - # • 2B52-L1 "COMPUTER INVERTER (PRIMARY) 2Y25"
2. Inform TSC (by radio or extension 6605, 6611, or 6601) 2B52 aligned (Attachment E, Safe Shutdown Systems Checklist Step 2.F.1).

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ATTACHMENT C

2B61, 2B62, AND 2B63 LINEUP

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NOTE

All component breakers marked with a pound sign (#) are NOT vital for safe shutdown. Component breakers may be opened at the discretion of SM for DG loading concerns or fire exists in the component area.

1. Open ALL breakers on MCC 2B61 EXCEPT the following:
 - # • 2B61-C1 "INVERTER 2Y22"
 - # • 2B61-C6 "INSTRUMENTATION XFMR 2X14"
 - # • 2B61-D1 "INSTRUMENTATION XFMR 2X12"
 - # • 2B61-N1 "BATTERY CHARGER 2D32B"

 - # • 2B61-N4 "INVERTER 2Y2224"
2. Open ALL breakers on MCC 2B62 EXCEPT the following:
 - 2B62-A5 "CHARGING PMP 2P36B" (To be controlled manually at breaker for makeup as required)
 - 2B62-B5 "DG RM EXH FAN DAMPER 2TCDM-8690-2 & 8692-2"
 - 2B62-C6 "EMER DIESEL GEN #2 ROOM EXHAUST FAN 2VEF-24C"
 - 2B62-C7 "EMER DIESEL GEN #2 ROOM EXHAUST FAN 2VEF-24D"

 - # • 2B62-D1 "2DG2 STARTING AIR COMPR 2C4C"
 - # • 2B62-D2 "2DG2 STARTING AIR COMPR 2C4D"
 - # • 2B62-E3 "INTAKE STRUCT FAN 2VEF-25B"
3. Open ALL breakers on MCC 2B63 EXCEPT the following:
 - # • 2B63-A2 "EFW PUMP ROOM CLR 2VUC-6A"
 - 2B63-K5 "2DG2 FUEL TRANSFER PUMP 2P16B"
4. Inform TSC (by radio or extension 6605, 6611, or 6601) 2B61, 2B62, and 2B63 aligned (Attachment E, Safe Shutdown Systems Checklist Steps 2.F.2, 2.F.3, and 2.F.4).
5. Inform RO 1, 2B63 aligned per Attachment C, 2B61, 2B62, and 2B63 Lineup (RO 1, Step 13).
6. Inform CRS, 2B61 aligned per Attachment C, 2B61, 2B62, and 2B63 lineup (CRS Step 41).

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ATTACHMENT D

2B54 AND 2B64 LINEUP

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NOTE

All component breakers marked with a pound sign (#) are NOT vital for safe shutdown. Component breakers may be opened at the discretion of SM for DG loading concerns or fire exists in the component area.

1. Open ALL breakers on MCC 2B54 EXCEPT the following:

- # • 2B54-E2 "INVERTER 2Y13"
- # • 2B54-G3 "BATTERY CHARGER 2D31B"
- # • 2B54-H3 "BATTERY CHARGER 2D-32B ALTERNATE SUPPLY" (IF 2D-32B NOT in service supplying 125v Vital DC bus 2D01, THEN 2B54-H3 should be locked open)
 - 2B54-J1 "POWER & LIGHTING PANEL 2S01/21PC"
- 2B54-J4 "SERIES BKR FOR 2B54-K2, 27LA" (2X-27, Lighting Transformer for 27LA)"
- 2B54-J6 "2XL43/43LA ALTERNATE SOURCE" (IF 2XL43/43LA aligned to 2B64-D2, THEN 2B54-J6 should be locked open)
- # • 2B54-J9 "SPDS INVERTER (ALTERNATE) 2Y26"
- # • 2B54-K1 "COMPUTER INVERTER (ALTERNATE) 2Y25"
- 2B54-K2 "LIGHTING TRANSFORMER 27LA (2X27)"

2. Open ALL breakers on MCC 2B64 EXCEPT the following:

- 2B64-D2 "2XL43/43LA PRIMARY SOURCE"
- # • 2B64-D3 "BATTERY CHARGER 2D32A"
- # • 2B64-D5 "BATTERY CHARGER 2D31B ALTERNATE SUPPLY" (IF 2D31B NOT in service supplying 125v Vital DC bus 2D02, THEN 2B64-D5 should be locked open)
- # • 2B64-E2 "INVERTER 2Y24"
- # • 2B64-E5 "BATTERY CHARGER 2D-33"
- # • 2B64-G2 "RED BATTERY ROOM EXHAUST FAN 2VEF-65"
- # • 2B64-K2 "AB BATTERY ROOM EXHAUST FAN 2VEF-49"

3. Inform TSC (by radio or extension 6605, 6611, or 6601) 2B54 and 2B64 aligned (Attachment E, Safe Shutdown Systems Checklist steps 2.F.5 and 2.F.6).

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ATTACHMENT E

SAFE SHUTDOWN SYSTEMS CHECKLIST

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CAUTION

Fire damage may result in spurious closure of EFW pump 2P7A Steam Supply Isolation valves 2CV-1000-1 and 2CV-1050-2.

1. EMERGENCY FEEDWATER

- A. DC power removed from 2P7A EFW train MOVs (CRS steps 3 and 4).
- B. 2P7A Trip and Throttle valve throttled to prevent turbine overspeed (EO step 8)
- C. 2CV-1039-1 open and 2CV-1076-2 throttled to maintain SG B level 160 to 420 inches and trending to 385 inches (RO 1 step 8).
- D. 2CV-1037-1 open and 2CV-1026-2 throttled to maintain SG A level 160 to 420 inches and trending to 385 inches (RO 2 step 14).
- E. 2P7A EFW Turbine control power de-energized (CRS step 26).
- F. 2P7B EFW train standby alignment to SG B complete (RO 1 step 13)
 - "2P-7B COND SUCT MOV" valve (2CV-0789-1) open.
 - "SW TO EFWP 2P-7B" valve (2CV-0716-1) closed.
 - "2P7B DISCH TO SG 'B' CV" valve (2CV-1036-2) open.
 - "2P-7B DISCH CV TO SG B" valve (2CV-1075-1) closed.
- G. 2P7B EFW train alignment to SG A completed (RO 2 step 18).
 - "2P7B DISCH TO SG 'A' CV" valve (2CV-1038-2) open.
 - "2P7B DISCH CV TO SG 'A' CV" valve (2CV-1025-1) closed.

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ATTACHMENT E

SAFE SHUTDOWN SYSTEMS CHECKLIST

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2. ELECTRICAL SYSTEMS

- A. 2DG1 running or 2DG1 running in override (no DC control power) with associated breaker control circuits defeated and 4160v Vital bus 2A3 energized (CRS Step 20 or 24).
- B. 4160v Vital bus 2A3 ESFAS components defeated (CRS step 28 or 29).
- C. 2DG2 running or 2DG2 running in override (no DC control power) with associated breaker control circuits defeated and 4160v Vital bus 2A4 energized (CRS Step 21 or 25).
- D. 4160v Vital bus 2A4 ESFAS components defeated (CRS step 31 or 32).
- E. 125v Vital DC buses 2D21, 2D22, 2D23, and 2D24 aligned (CRS steps 33, 34, 35 and 36).
- F. The following buses aligned using appropriate attachments:
 - 1) 2B52, Attachment B (RO 1 step 12)
 - 2) 2B61, Attachment C (RO 2 step 17)
 - 3) 2B62, Attachment C (RO 2 step 17)
 - 4) 2B63, Attachment C (RO 2 step 17)
 - 5) 2B54, Attachment D (CRS step 38)
 - 6) 2B64, Attachment D (CRS step 38)
 - 7) 2B51, Attachment A (CRS step 39)
 - 8) 2B53, Attachment A (CRS step 39)
- G. MCC 2B51 re-energized (CRS step 40)
- H. MCC 2B61 re-energized (CRS step 41)

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ATTACHMENT E

SAFE SHUTDOWN SYSTEMS CHECKLIST

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3. SERVICE WATER

- A. SW aligned to 2DG1 (2CV-1503-1 de-energized and open) (RO 2 step 10).
- B. SW aligned to 2DG2 (2CV-1504-2 de-energized and open) (RO 2 step 10).
- C. ONE SW pump operating from 4160v Vital bus 2A3 and DC control power removed (CRS step 7 or 24).
- D. ONE SW pump operating from 4160v Vital bus 2A4 and DC control power removed (CRS step 5 or 25).
- E. SW Supply and Return headers aligned as indicated by normal header pressures at EFW pump suctions and normal operating temperatures on components cooled by SW (EO step 6).

4. REACTOR COOLANT SYSTEM MAKEUP

- A. Charging pump suction aligned to BAM tank via Gravity Feed Outlet valves as follows:
 - 1) "BAM TK GRAVITY FEED 2T6A" valve (2CV-4920-1) open (RO 2 step 8).
 - 2) "BAM TK GRAVITY FEED 2T6B" valve (2CV-4921-1) open (RO 2 step 8).
 - 3) "RWT SUCT TO CHG PMP" valve (2CV-4950-2) closed (RO 1 step 6).
- B. Charging flowpath available to RCS via ONE of the following:
 - 1) Charging Header Isolation "2P-36A/B FLOW CONT" valve (2CV-4840-2) open (RO 2 step 7).
 - 2) 2CVC-115 open AND ANY HPSI Header #1 Injection MOV open:
 - "HPSI HDR #1 FLOW CONTROL" 2CV-5015-1
 - "HPSI HDR #1 FLOW CONTROL" 2CV-5035-1
 - "HPSI HDR #1 FLOW CONTROL" 2CV-5055-1
 - "HPSI HDR #1 FLOW CONTROL" 2CV-5075-1

(Step 4 continued on next page)

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ATTACHMENT E

SAFE SHUTDOWN SYSTEMS CHECKLIST

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4. (continued)

C. Letdown isolated (RO 2 step 4).

D. PZR level maintained 29 to 80%.

E. WHEN 160 minutes total Charging pump run time completed,
THEN align RCS makeup using Section 9, Alternate Shutdown Cooldown, Step 8.

CHARGING PUMP RUN TIME			
START	STOP	RUN TIME	TOTAL

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ATTACHMENT F

LOCAL OPERATION of ADVs

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CAUTION

Main Steam Safety valve area will be extremely noisy.

1. Obtain the following:
 - Hand-held radio with headset.
 - Master Key Ring from Security.
 - Alternate Shutdown flashlight from Alternate Shutdown locker.
 - Valve operator from Alternate Shutdown locker.
 - Pair of gloves from Alternate Shutdown locker.

NOTE

2CV-1002 and 2CV-1052 may be verified de-energized by completion of MCC electrical alignments 2B53 (CRS step 39) and 2B63 (RO 2 step 17).

2. Verify Upstream ADV Isolation Valve breakers open:
 - 2B63-A3 "ADV UPSTREAM ISOL 2CV-1002"
 - 2B53-D3 "ADV UPSTREAM ISOL 2CV-1052"
3. Locally verify Upstream ADV Isolation valves closed:
 - "SG-A ADV ISOLATION" 2CV-1002
 - "SG-B ADV ISOLATION" 2CV-1052

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ATTACHMENT F

LOCAL OPERATION of ADVs

PAGE 2 OF 2

4. Unisolate SG A pressure gauge (2PI-1007) by opening the following:
 - "2CV-1001 HDR DRN" 2MS-3005
 - "2CV-1001 HDR DRN" 2MS-3006
5. Locally fail open "A SG ATMOSPHERIC DUMP VALVE" (2CV-1001) as follows:
 - A. Close IA supply "IA TO 2CV-1001" valve (2IA-287).
 - B. Open filter vent "2CV-1001 AIR BLEEDOFF" valve.
6. Unisolate SG B pressure gauge (2PI-3008) by opening the following:
 - "2CV-1051 HDR VENT" 2MS-3007
 - "2CV-1051 HDR VENT ISOL" 2MS-3008
7. Locally fail open "B SG ATMOSPHERIC DUMP VALVE" (2CV-1051) as follows:
 - A. Close IA supply "IA TO 2CV-1051" valve (2IA-94).
 - B. Open filter vent "2CV-1051 AIR BLEEDOFF" valve.
8. Manually operate 2CV-1002 to maintain A SG pressure 950 to 1050 psia using local pressure indication or as directed by TSC.
9. Manually operate 2CV-1052 to maintain B SG pressure 950 to 1050 psia using local pressure indication or as directed by TSC.

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ATTACHMENT G

PZR HEATER OPERATIONS

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NOTE

Breaker control power may be disconnected by removing control power fuses from desired PZR heater breakers should heater control circuits be faulted and preventing PZR heater operation.

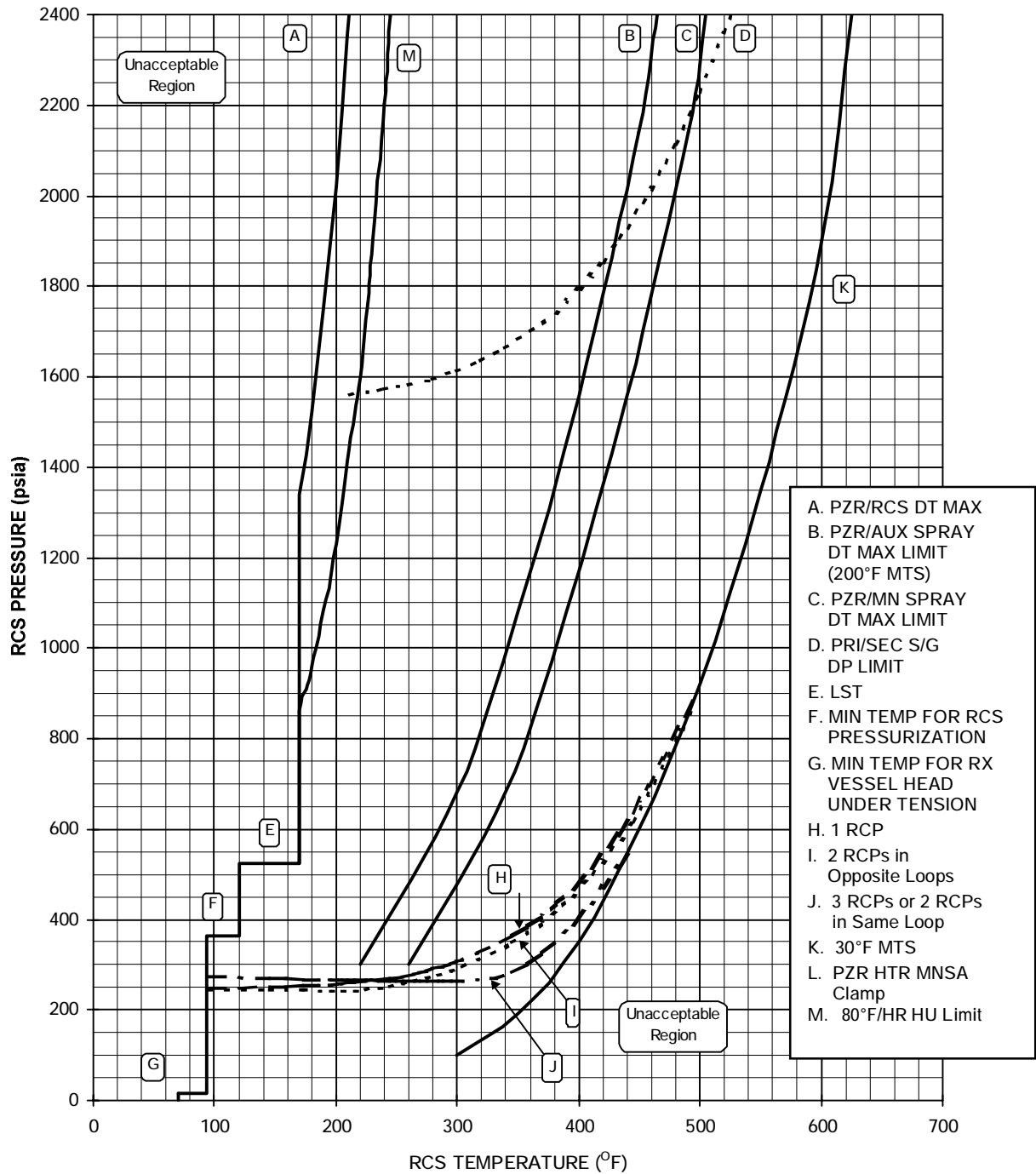
1. Operate PZR Proportional heaters on SCR panels 2C117 and 2C118 in Lower South Electrical Penetration room as follows:
 - A. Verify "PZR PROP HTR CONT SW" (2HS-4640B and 2HS-4641B) in OFF.
 - B. Unlock and place "PZR PROP HTR SEL SW" handswitch (2HS-4640A and 2HS-4641A) in EMERG.
 - C. Close Breaker 2B523 "PRESSURIZER PROPORTIONAL HEATER 2SCR-1".
 - D. Close Breaker 2B623 "PRESSURIZER PROPORTIONAL HEATER 2SCR-2".
 - E. Control PZR Proportional heaters by placing "PZR PROP HTR CONT SW" (2HS-4640B / 2HS-4641B) to ON or OFF as directed by TSC.
2. WHEN directed by TSC to operate PZR Backup heaters,
THEN operate breakers as required on Load Centers 2B9 and 2B10 .
 - 2B922 "REACTOR PRESSURIZER BACKUP HEATERS"
 - 2B923 "REACTOR PRESSURIZER BACKUP HEATERS"
 - 2B1022 "REACTOR PRESSURIZER BACKUP HEATERS"
 - 2B1023 "REACTOR PRESSURIZER BACKUP HEATERS"

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ATTACHMENT H

P-T LIMITS

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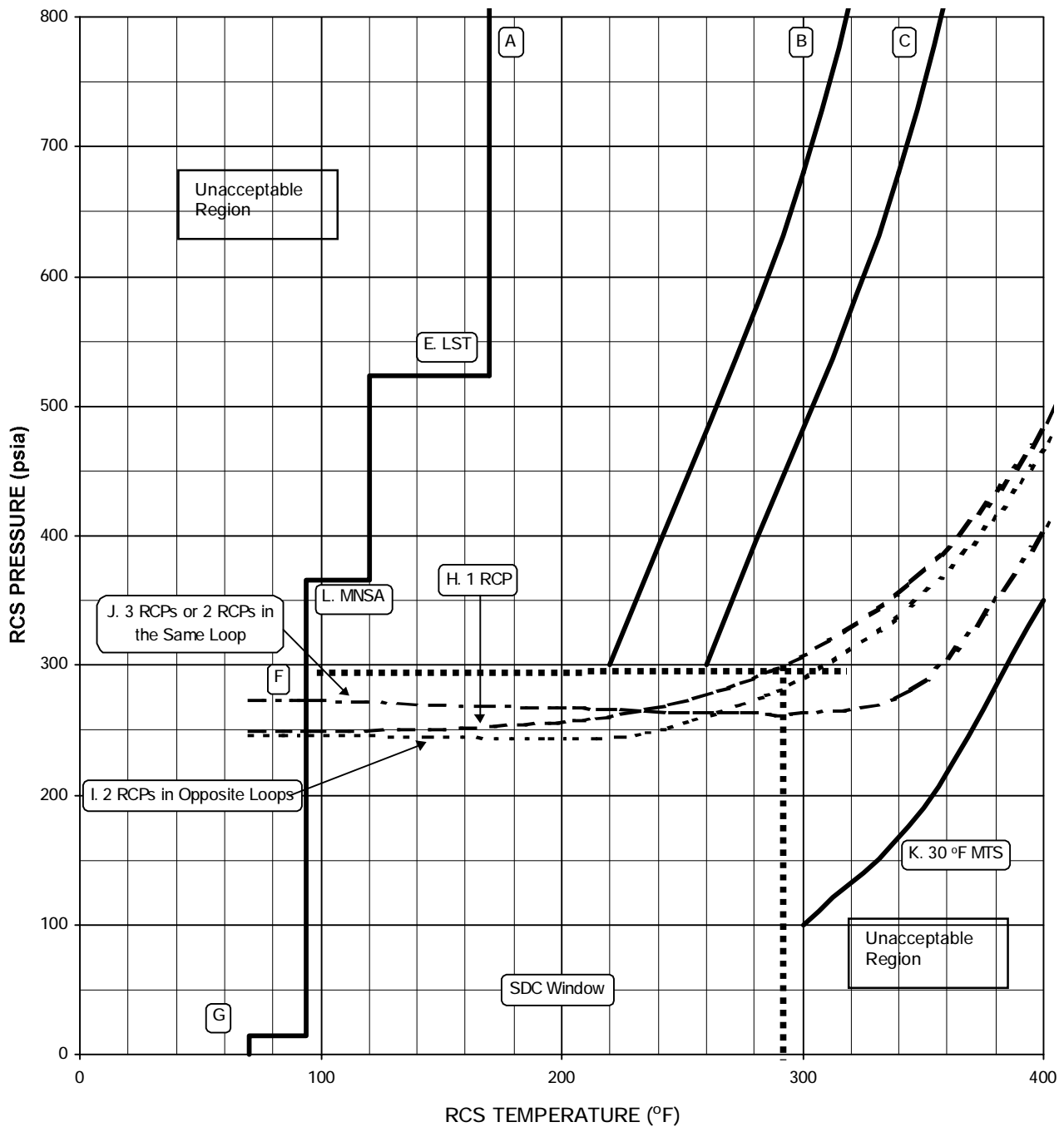
- Use 200°F MTS line for PTS limit for uncontrolled RCS cooldown below 500°F TC.
- Use RCS TH in forced circulation to determine RCS MTS.
- Use average CETs in natural circulation to determine RCS MTS.
- Stay to right of primary to secondary ΔP curve during controlled cooldown.

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ATTACHMENT H

P-T LIMITS

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- Use 200°F MTS line for PTS limit for uncontrolled RCS cooldown below 500°F TC.
- Use RCS TH in forced circulation to determine RCS MTS.
- Use average CETs in natural circulation to determine RCS MTS.

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ATTACHMENT J

RCS COOLDOWN TABLE

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1. RCS cooldown rate limit is 100°F/HR (constant),
NOT to exceed 50°F in any 1/2 hour period (step).
- (TS 3.4.9.1 adjusted for instrument uncertainty)
2. Record RCS T_C every 15 minutes.
3. Calculate the change in T_C after the second reading is recorded.
4. Multiply the change in T_C by four and record cooldown rate.
5. Forward completed form to Operations Management.

TIME	RCS T_C	CHANGE IN T_C		COOLDOWN RATE °F/hr
			X 4	
			X 4	
			X 4	
			X 4	
			X 4	
			X 4	
			X 4	
			X 4	
			X 4	
			X 4	

Completed by: _____

Date: _____

Reviewed by: _____

Date: _____

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ATTACHMENT J

RCS COOLDOWN TABLE

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Date: _____

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Date: _____

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ATTACHMENT J

RCS COOLDOWN TABLE

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1. Maximum allowable PZR cooldown rate is as follows:
 - With PZR water phase temperature $>200^{\circ}\text{F}$, maximum PZR cooldown rate is $175^{\circ}\text{F}/\text{hour}$.
 - With PZR water phase temperature $\leq 200^{\circ}\text{F}$, maximum PZR cooldown rate is $100^{\circ}\text{F}/\text{hour}$.
2. Record PZR temperature every 15 minutes using SPDS Point T4627-2, PZR water phase temperature from TSC.
3. Calculate the change in PZR temperature after the second reading is recorded.
4. Multiply the change in PZR temperature by four and record cooldown rate.
5. Forward completed form to Operations Management.

TIME	PZR TEMP	CHANGE IN PZR TEMP		COOLDOWN RATE °F/hr
			X 4	
			X 4	
			X 4	
			X 4	
			X 4	
			X 4	
			X 4	
			X 4	
			X 4	
			X 4	

Completed by: _____

Date: _____

Reviewed by: _____

Date: _____

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ATTACHMENT J

RCS COOLDOWN TABLE

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[illegible]

Completed by: _____

Date: _____

Reviewed by: _____

Date: _____

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ATTACHMENT K

PZR SPRAY OPERATION

PAGE 1 OF 2

CAUTION

Gloves and face shield are required personnel protection to work inside breaker cubicles.

NOTE

For breakers without local handswitches, manual operation of appropriate motor starter contactor within breaker may be required (left-hand contactor to open valve, right-hand contactor to close valve).

1. Locally verify at least ONE Charging pump (2P36A/B/C) running.
2. Verify Regenerative Heat Exchanger to RCP B/C Valves closed:
 - A. 2CV-4827-2
 - Breaker 2B61-G4 "REGEN HX TO RCP B 2CV-4827-2"
 - Breaker 2B61-H8 "SERIES BKR FOR 2B61-G4, 2CV-4827-2"
 - B. 2CV-4831-2
 - Breaker 2B61-G3 "REGEN HX TO RCP C 2CV-4831-2"
 - Breaker 2B61-H7 "SERIES BKR FOR 2B61-G3, 2CV-4831-2"
3. Verify PZR Spray valves closed:
 - A. 2CV-4651
 - Breaker 2B61-L4 "PRESSURIZER A SPRAY VLV 2CV-4651"
 - Breaker 2B61-L1 "SERIES BKR FOR 2B61-L4, 2CV-4651"
 - B. 2CV-4652
 - Breaker 2B53-H3 "PRESSURIZER B SPRAY VALVE 2CV-4652"
 - Breaker 2B53-H2 "SERIES BKR FOR 2B53-H3, 2CV-4652"

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ATTACHMENT K

PZR SPRAY OPERATION

PAGE 2 OF 2

4. Open "AUX PZR SPRAY" valve (2CV-4824-2) as necessary.
- Breaker 2B64-B4 "SERIES BKR FOR 2B64-E3, 2CV-4824-2"
 - Breaker 2B64-E3 "AUX PZR SPRAY 2CV-4824-2"
5. Record the following data:

TIME		TEMPERATURE		
SPRAY VALVE OPENED	SPRAY VALVE CLOSED	PZR WATER T4627-2	SPRAY TEMP T4825 (IF AVAILABLE)	DIFFERENCE

6. Forward completed form to Unit 2 Systems Engineering, NSSS.

Completed by: _____ Date: _____

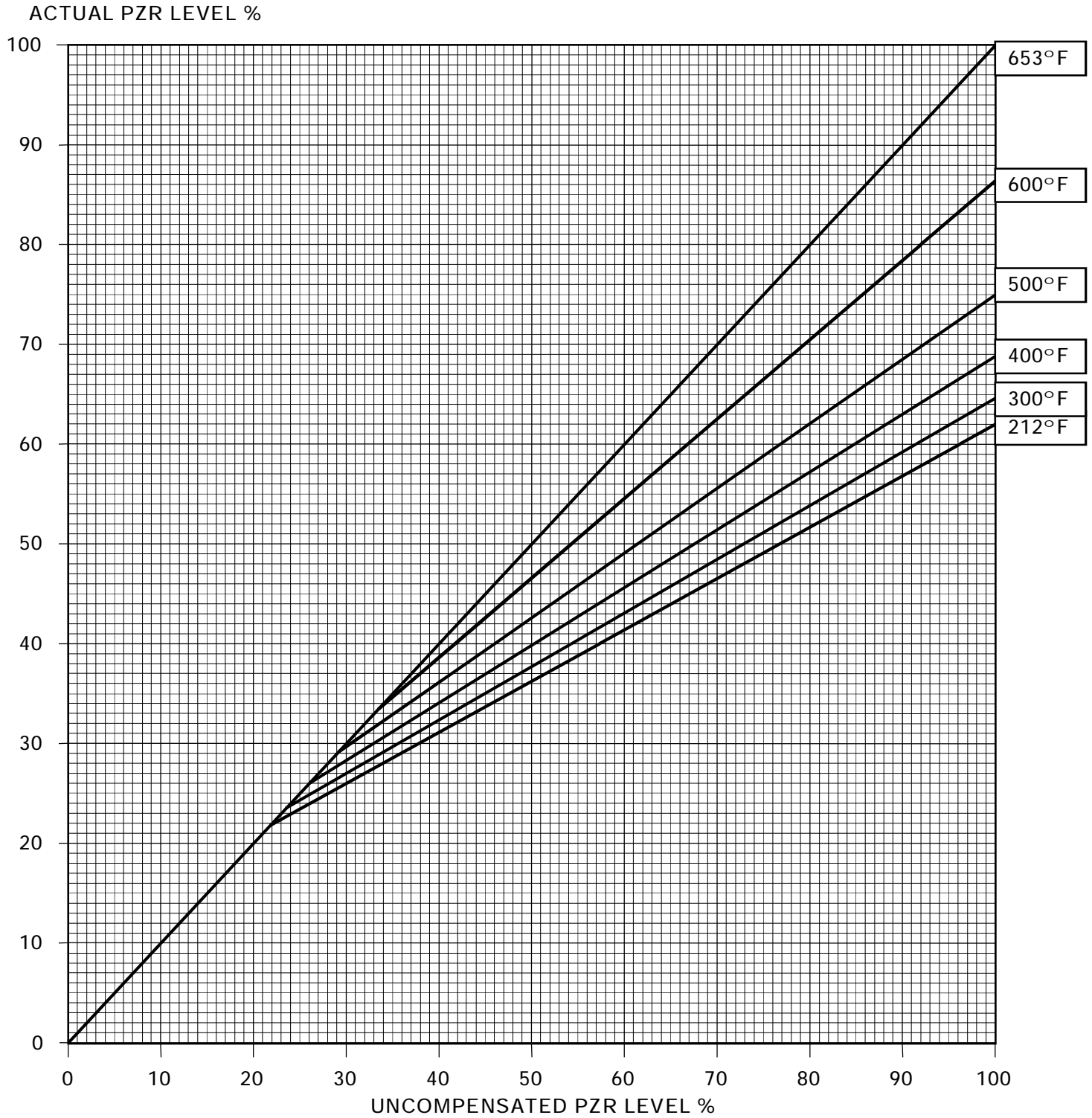
Reviewed by: _____ Date: _____

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ATTACHMENT L

PZR LEVEL CORRECTION CURVE

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ATTACHMENT M

SDC SUCTION MOV CABLE DETERMINATION

PAGE 1 OF 4

1. Locally perform cable determinations at breaker "SHUTDOWN COOLING RC ISOLATION 2CV-5038-1" (2B52-E5) for Shutdown Cooling Suction valve (2CV-5038-1) as follows:

A. Lift ALL Cable R2B52E5D wires:

	Lifted by:	Verified by:
1) 21F (Terminal #21F)	_____	_____
2) 11F (Terminal #11F)	_____	_____
3) 11R (Terminal #11R)	_____	_____
4) 21R (Terminal #21R)	_____	_____
5) 3R (Terminal #3R)	_____	_____
6) 3G (Terminal #3G)	_____	_____
7) U (Terminal #U)	_____	_____

B. Verify ANY blown control power fuses replaced.

2. Locally perform cable determinations at breaker "SHUTDOWN COOLING RC ISOLATION 2CV-5084-1" (2B51-G2) for Shutdown Cooling Suction valve (2CV-5084-1) as follows:

A. Lift ALL Cable R2B51G2E wires:

	Lifted by:	Verified by:
1) 21F (Terminal #21F)	_____	_____
2) 11F (Terminal #11F)	_____	_____
3) 1R (Terminal #1R)	_____	_____
4) 2R (Terminal #2R)	_____	_____
5) 3R (Terminal #3R)	_____	_____
6) 3G (Terminal #3G)	_____	_____
7) U (Terminal #U)	_____	_____
8) 2F (Terminal #2F)	_____	_____
9) 21R (Terminal #21R)	_____	_____

B. Install jumper between terminals 2F and 11F.

1) Installed by: _____.

2) Verified by: _____.

C. Verify ANY blown control power fuses replaced.

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ATTACHMENT M

SDC SUCTION MOV CABLE DETERMINATION

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3. Locally perform cable determinations at breaker "SHUTDOWN COOLING RC ISOL 2CV-5086-2" (2B62-E5) for Shutdown Cooling Suction valve (2CV-5086-2) as follows:

A. Lift ALL Cable G2B62E5E wires:

	Lifted by:	Verified by:
1) 21F (Terminal #SP2)	_____	_____
2) 11F (Terminal #SP1)	_____	_____
3) 1R (Terminal #1R)	_____	_____
4) 2R (Terminal #2R)	_____	_____
5) 3R (Terminal #3R)	_____	_____
6) 3G (Terminal #3G)	_____	_____
7) U (Terminal #U)	_____	_____
8) 2F (Terminal #2F)	_____	_____
9) 21R (Terminal #SP3)	_____	_____

B. Install jumper between terminals 2F and SP1.

1) Installed by: _____.

2) Verified by: _____.

C. Verify ANY blown control power fuses replaced.

4. WHEN directed by Operations, THEN locally restore cable terminations at breaker "SHUTDOWN COOLING RC ISOLATION 2CV-5038-1" (2B52-E5) for Shutdown Cooling Suction valve (2CV-5038-1) as follows:

A. Restore ALL Cable R2B52E5D wires:

	Restored by:	Verified by:
1) 21F (Terminal #21F)	_____	_____
2) 11F (Terminal #11F)	_____	_____
3) 11R (Terminal #11R)	_____	_____
4) 21R (Terminal #21R)	_____	_____
5) 3R (Terminal #3R)	_____	_____
6) 3G (Terminal #3G)	_____	_____
7) U (Terminal #U)	_____	_____

B. Verify ANY blown control power fuses replaced.

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ATTACHMENT M

SDC SUCTION MOV CABLE DETERMINATION

PAGE 3 OF 4

5. WHEN directed by Operations, THEN locally restore cable terminations at breaker "SHUTDOWN COOLING RC ISOLATION 2CV-5084-1" (2B51-G2) for Shutdown Cooling Suction valve (2CV-5084-1) as follows:

A. Restore ALL Cable R2B51G2E wires:

	Restored by:	Verified by:
1) 21F (Terminal #21F)	_____	_____
2) 11F (Terminal #11F)	_____	_____
3) 1R (Terminal #1R)	_____	_____
4) 2R (Terminal #2R)	_____	_____
5) 3R (Terminal #3R)	_____	_____
6) 3G (Terminal #3G)	_____	_____
7) U (Terminal #U)	_____	_____
8) 2F (Terminal #2F)	_____	_____
9) 21R (Terminal #21R)	_____	_____

B. Remove jumper between terminals 2F and 11F.

- 1) Removed by: _____.
- 2) Verified by: _____.

C. Verify ANY blown control power fuses replaced.

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ATTACHMENT M

SDC SUCTION MOV CABLE DETERMINATION

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6. WHEN directed by Operations, THEN locally restore cable terminations at breaker "SHUTDOWN COOLING RC ISOL 2CV-5086-2" (2B62-E5) for Shutdown Cooling Suction valve (2CV-5086-2) as follows:

A. Restore ALL Cable G2B62E5E wires:

	Restored by:	Verified by:
1) 21F (Terminal #SP2)	_____	_____
2) 11F (Terminal #SP1)	_____	_____
3) 1R (Terminal #1R)	_____	_____
4) 2R (Terminal #2R)	_____	_____
5) 3R (Terminal #3R)	_____	_____
6) 3G (Terminal #3G)	_____	_____
7) U (Terminal #U)	_____	_____
8) 2F (Terminal #2F)	_____	_____
9) 21R (Terminal #SP3)	_____	_____

B. Remove jumper between terminals 2F and SP1.

- 1) Removed by: _____.
- 2) Verified by: _____.

C. Verify ANY blown control power fuses replaced.

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ATTACHMENT N

ALTERNATE AC DIESEL GENERATOR OPERATION

PAGE 1 OF 2

1. IF local PLC available,
THEN start the AAC Generator by performing the following:
 - A. Reset PLC by touching "Reset PLC".
 - B. Touch ENGINE START/STOP.
 - C. Touch START Screen.
 - D. Touch AND hold EMERGENCY START until engine speed reaches 180 RPM.
 - E. Verify Generator frequency ~ 60 Hz (900 RPM) and voltage ~ 4160 volts.
 - F. Touch ELECTRICAL BUS CONTROL.
 - G. Touch 4160 v BREAKERS.
 - H. Verify AAC Generator Output breaker (2A-1001) closed.
2. IF unable to use local PLC,
THEN perform local start using Exhibit 1 of Alternate AC Diesel Generator Operations (2104.037).
3. IF desired to energize 2A3 from the AAC Generator,
THEN perform the following:
 - A. Verify 2A4 NOT being supplied by the AAC Generator.
 - B. Contact CRS to verify the following breakers open with DC control power removed:
 - 2A3 - 2A4 Tie breaker (2A-310)
 - 2A3 - 2A4 Tie breaker (2A-410)
 - 2A3 Supply breaker (2A-309)
 - 2DG1 Output breaker (2A-308)
 - C. IF local PLC available,
THEN perform the following:
 - 1) Touch ELECTRICAL BUS CONTROL.
 - 2) Touch 4160 V BREAKERS.
 - 3) Touch 2A-902.
 - D. Perform the following as needed to close 2A-902:
 - Touch CLOSE on PLC.
 - Use 2A-902 Control switch (2HS-7101).
 - Locally operate 2A-902 per Exhibit 4 of Alternate AC Diesel Generator Operations (2104.037).
 - E. Contact CRS to manually close 2A-310 to energize 2A3.

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ATTACHMENT N

ALTERNATE AC DIESEL GENERATOR OPERATION

PAGE 2 OF 2

4. IF desired to energize 2A4 from the AAC Generator,
THEN perform the following:
- A. Verify 2A3 NOT being supplied by the AAC Generator.
 - B. Contact CRS to verify the following breakers open with DC control power removed:
 - 2A3 - 2A4 Tie breaker (2A-310)
 - 2A3 - 2A4 Tie breaker (2A-410)
 - 2A4 Supply breaker (2A-409)
 - 2DG2 Output breaker (2A-408)
 - C. IF local PLC available,
THEN perform the following:
 - 1) Touch ELECTRICAL BUS CONTROL.
 - 2) Touch 4160 V BREAKERS.
 - 3) Touch 2A-902.
 - D. Perform the following as needed to close 2A-902:
 - Touch CLOSE on PLC.
 - Use 2A-902 Control switch (2HS-7101).
 - Locally operate 2A-902 per Exhibit 4 of Alternate AC Diesel Generator Operations (2104.037).
 - E. Contact CRS to manually close 2A-410 to energize 2A4.

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JOB PERFORMANCE MEASURE

UNIT: 2 REV #: 001 DATE: _____SYSTEM/DUTY AREA: Chemical and Volume Control SystemTASK: Operate Charging Pump 2P36B Locally During Alternate ShutdownJTA#: ANO2ROCVCSOFFNORM46KA VALUE RO: 3.8 SRO: 3.4 KA REFERENCE: 004 A4.08APPROVED FOR ADMINISTRATION TO: RO: X SRO: XTASK LOCATION: INSIDE CR: _____ OUTSIDE CR: X BOTH: _____

SUGGESTED TESTING ENVIRONMENT AND METHOD (PERFORM OR SIMULATE):

PLANT SITE: Simulate SIMULATOR: _____ LAB: _____

POSITION EVALUATED: RO: _____ SRO: _____

ACTUAL TESTING ENVIRONMENT: SIMULATOR: _____ PLANT SITE: _____ LAB: _____

TESTING METHOD: SIMULATE: _____ PERFORM: _____

APPROXIMATE COMPLETION TIME IN MINUTES: 30 MinutesREFERENCE(S): AOP 2203.014, Rev. 15-05-0

EXAMINEE'S NAME: _____ SSN: _____

EVALUATOR'S NAME: _____

THE EXAMINEE'S PERFORMANCE WAS EVALUATED AGAINST THE STANDARDS CONTAINED IN THIS JPM AND IS DETERMINED TO BE:

SATISFACTORY: _____ UNSATISFACTORY: _____

PERFORMANCE CHECKLIST COMMENTS:

Start Time _____ Stop Time _____ Total Time _____

SIGNED: _____ DATE: _____

SIGNATURE INDICATES THIS JPM HAS BEEN COMPARED TO ITS APPLICABLE PROCEDURE BY A QUALIFIED INDIVIDUAL (NOT THE EXAMINEE) AND IS CURRENT WITH THAT REVISION.

JOB PERFORMANCE MEASURE**THE EXAMINER SHALL REVIEW THE FOLLOWING WITH THE EXAMINEE:**

The examiner shall review the "Briefing Checklist - System Walkthrough" portion of 1064.023 Attachment 6 with the examinee.

JPM INITIAL TASK CONDITIONS:

The control room has been evacuated as required by 2203.014, "Alternate Shutdown". Simulate obtaining keys, handheld radio and flashlight from the alternate shutdown locker. Enter controlled access area if necessary, using normal ingress and egress methods and follow all normal procedural controls for radiological, security and other concerns during the performance of this JPM.

TASK STANDARD:

Charging pump (2P36B) has been started from breaker 2B62-A5.

TASK PERFORMANCE AIDS:

2203.014, Alternate Shutdown Section 6, RO 2 Follow-up Actions. Mark through steps 1, 2, 3 and 4 to indicate completion.

SIMULATOR SETUP:

None.

EXAMINER'S NOTES:

JOB PERFORMANCE MEASURE

INITIATING CUE:

The CRS directs, "Perform applicable steps of Alternate Shutdown AOP for RO2, Section 6. Steps 1 through 4 have been completed."

CRITICAL ELEMENTS (C): 3, 4, 6, 8, 9, 10

START TIME: _____

PERFORMANCE CHECKLIST		STANDARDS	(Circle One)
NOTE: Examinee will enter CAA by normal means. The following actions are performed on the 354' elevation of the auxiliary building.			
1. (Step 5)	Open breakers 2B62-E4, power to 2CV-4840-2 and 2B62-F2, power to 2CV-4950-2. <u>Examiner's CUE</u> Breaker 2B62-E4 is open. Both red and green lights OFF. Breaker 2B62-F2 is open. Both red and green lights OFF.	At MCC 62, open breakers 2B62-E4, power to 2CV-4840-2 and 2B62-F2, power to 2CV 4950-2. Observed both red and green lights OFF for 2B62-E4, and 2B62-F2.	N/A SAT UNSAT
2. (Step 6)	Inform RO 1 on radio that power has been removed from 2CV-4950-2. Examiner's CUE: Give the following response when contacted as RO 1: "Understand RWT Suction To Charging Pumps Valve 2CV-4950-2 is de-energized (RO1 step 6)."	Contacted RO 1 by radio and inform that RWT Suction To Charging Pumps valve 2CV-4950-2 is de-energized (RO1 step 6).	N/A SAT UNSAT
NOTE: The following actions would be performed on the 354' elevation of the auxiliary building in the Upper South Piping Penetration Room (USPPR). Area around 2CV 4840-2 may be contaminated and possibly high radiation area, DO NOT ALLOW ENTRY and provide the following cue when candidate starts to perform step.			

JOB PERFORMANCE MEASURE

PERFORMANCE CHECKLIST			STANDARDS	(Circle One)
(C)	3. (Step 7)	<p>Examiners cue:</p> <p>How would you verify position of valve 2CV 4840-2?</p> <p>After discussion, if correct provide the following:</p> <p>2CV 4840-2 is OPEN.</p>	<p>Verify 2CV-4840-2 OPEN</p> <p><u>DISCUSS ONLY:</u></p> <p>Verify that pointer on valve indicates open.</p> <p><u>AND/OR</u></p> <p>Screw threads on the valve stem are at the upper part of the gland packing area (the shiny part of the stem is exposed).</p>	N/A SAT UNSAT
<p>Examiner's CUE:</p> <p>After transitioning from previous location, Give the following message: " RO 1 reports on the radio that the BAMT Gravity Feed Outlet valves, 2CV-4920-1 and 2CV-4921-1 are de-energized."</p> <p>The Examinee will then transition to the 386' of the CAA to the Boric Acid Tank Room.</p>				
(C)	4. (Step 8)	<p>Verify 2CV-4920-1 and 2CV-4921-1 are OPEN.</p> <p><u>Examiner's initial CUE:</u></p> <p>2CV-4920-1 and 2CV-4921-1 are CLOSED.</p> <p><u>Give the following after valve opening simulated:</u></p> <p><u>Examiner's CUE:</u></p> <p>2CV-4920-1 and 2CV-4921-1 are OPEN.</p>	<p>In Boric Acid Tank Room under each Boric Acid Tank, verified 2CV-4920-1 and 2CV-4921-1 are OPEN by one of the following methods on each valve:</p> <p>Manual engagement lever would be depressed and hand-wheel taken to the open direction until valve travel stopped.</p> <p><u>AND/OR</u></p> <p>Verify that pointer on valve indicates open.</p> <p><u>AND/OR</u></p> <p>Screw threads on the valve stem are at the upper part of the gland packing area (the shiny part of the stem is exposed).</p>	N/A SAT UNSAT
	5. (Step 9)	<p>Inform CRS on radio that BAM Tank Gravity Feed Outlet Valves are OPEN (CRS step 19).</p> <p>Examiner's Cue:</p> <p>"Understand BAM Tank Gravity Feed Outlet Valves are OPEN (CRS step 19)."</p>	<p>Contact CRS on radio and inform that BAM Tank Gravity Feed Outlet Valves are OPEN (CRS step 19).</p>	N/A SAT UNSAT

JOB PERFORMANCE MEASURE

PERFORMANCE CHECKLIST		STANDARDS		(Circle One)
Examiner's NOTE: Inform the examinee that steps 10 and 11 of section 6 will NOT be performed as part of this JPM.				
Examiner's CUE: Provide the following message: "CRS reports that the VCT outlet valve 2CV-4873-1 has been de-energized."				
Examiner's NOTE: This valve, 2CV 4873-1 is located on 354' level of the CAA inside the VCT room and is in a locked high radiation area. DO NOT ALLOW ENTRY. Discuss how valve would be verified closed, if entry were made, when outside the room.				
(C)	6. (Step 12)	Verify VCT Outlet Valve 2CV-4873-1 is closed. <u>Examiner's CUE:</u> 2CV 4873-1 is CLOSED.	On 354' level inside VCT room, verified 2CV-4873-1 CLOSED by one of the following methods: <u>DISCUSS ONLY</u> Manual engagement lever would be depressed and handwheel taken to the open direction until valve travel stopped. <u>AND/OR</u> Verify that pointer on valve indicates open. <u>AND/OR</u> Screw threads on the valve stem are at the upper part of the gland packing area (the shiny part of the stem is exposed).	N/A SAT UNSAT
	7. (Step 13)	Verify VCT Makeup Isolation Valve 2CV-4941-2 maintained CLOSED. <u>Examiner CUES:</u> 2CV-4941-2 is CLOSED. Instrument Air Supply valve is CLOSED. Air Pressure is VENTED.	On 354' level outside VCT Room, verified 2CV-4941-2 is maintained CLOSED by: Closing Instrument Air Supply valve. <u>AND</u> Venting air pressure off supply regulator.	N/A SAT UNSAT
Examiner's CUE: Inform the examinee that Steps 14 and 15 of Section 6 will NOT be performed as part of this JPM.				

JOB PERFORMANCE MEASURE

PERFORMANCE CHECKLIST		STANDARDS		(Circle One)
Transition Step: MCC 62 is located on 354' elevation of the CAA.				
	8. (Step 16.A)	Inform TSC that 2P36B is not running. Examiner Cues: "Green light is ON and Red Light is OFF on 2B62-A5." When TSC is contacted provide the following: "Understand Charging Pump 2P36B is not running. Start Charging Pump 2P36B."	At breaker 2B62-A5, observed Green light ON and Red light OFF and informed the TSC Charging Pump 2P36B is NOT running.	N/A SAT UNSAT
NOTE: If examinee requests Attachment E, Safe Shutdown Systems Checklist step 4.D, provide the following message: "Step 4.D states PZR level maintained 29 to 80%."				
(C)	9. (Step 16.B.1)	Place local/remote handswitch (2HS-4843-2) for 2P36B to LOCAL. Examiner's CUE: Local/remote handswitch in LOCAL.	At breaker 2B62-A5, rotated local/remote handswitch (2HS-4843-2) to LOCAL.	N/A SAT UNSAT
(C)	10. (Step 16.B.2)	Start Charging Pump (2P36B). Examiner's CUE: Handswitch is in START. Green light OFF; Red light ON.	At breaker 2B62-A5, rotated start/stop handswitch (2HS-4844-2) to START. Observed green light OFF, red light ON	N/A SAT UNSAT
Examiner's Note: When examinee starts 'B' Charging Pump this JPM has completed. There are additional steps in the attachment that are not necessary to perform for this JPM.				
END				

STOP TIME: _____

JOB PERFORMANCE MEASURE

EXAMINER'S COPY

JPM INITIAL TASK CONDITIONS:

The control room has been evacuated as required by 2203.014, "Alternate Shutdown". Simulate obtaining keys, handheld radio and flashlight from the alternate shutdown locker. Enter controlled access area if necessary, using normal ingress and egress methods and follow all normal procedural controls for radiological, security and other concerns during the performance of this JPM.

INITIATING CUE:

The CRS directs, "Perform applicable steps of Alternate Shutdown AOP for RO2, Section 6. Steps 1 through 4 have been completed."

JOB PERFORMANCE MEASURE

EXAMINEE'S COPY

JPM INITIAL TASK CONDITIONS:

The control room has been evacuated as required by 2203.014, "Alternate Shutdown". Simulate obtaining keys, handheld radio and flashlight from the alternate shutdown locker. Enter controlled access area if necessary, using normal ingress and egress methods and follow all normal procedural controls for radiological, security and other concerns during the performance of this JPM.

INITIATING CUE:

The CRS directs, "Perform applicable steps of Alternate Shutdown AOP for RO2, Section 6. Steps 1 through 4 have been completed."

JOB PERFORMANCE MEASURE

UNIT: 2 REV #: 008 DATE: _____SYSTEM/DUTY AREA: Emergency and Abnormal OperationsTASK: Perform local operations of the proportional heatersJTA #: ANO2ROEOPAOPOFFNORM126KA VALUE RO: 3.3 SRO: 3.6 KA REFERENCE: 010 A2.01APPROVED FOR ADMINISTRATION TO: RO: X SRO: XTASK LOCATION: INSIDE CR: _____ OUTSIDE CR: X BOTH: _____

SUGGESTED TESTING ENVIRONMENT AND METHOD (PERFORM OR SIMULATE):

PLANT SITE: Simulate SIMULATOR: _____ LAB: _____

POSITION EVALUATED: RO: _____ SRO: _____

ACTUAL TESTING ENVIRONMENT: SIMULATOR: _____ PLANT SITE: X LAB: _____TESTING METHOD: SIMULATE: X PERFORM: _____APPROXIMATE COMPLETION TIME IN MINUTES: 15 minutesREFERENCE(S) OP 2203.014, Attachment G Rev. 015-05-0

EXAMINEE'S NAME: _____ SSN: _____

EVALUATOR'S NAME: _____ DATE: _____

THE EXAMINEE'S PERFORMANCE WAS EVALUATED AGAINST THE STANDARDS CONTAINED IN THIS JPM AND IS DETERMINED TO BE:

SATISFACTORY: _____ UNSATISFACTORY: _____

PERFORMANCE CHECKLIST COMMENTS: _____

Start Time: _____ Stop Time: _____ Total Time: _____

Signature indicates this JPM has been compared to its applicable procedure by a qualified individual (not the examinee) and is current with that revision.

SIGNED: _____ DATE: _____

JOB PERFORMANCE MEASURE**THE EXAMINER SHALL REVIEW THE FOLLOWING WITH THE EXAMINEE:**

The examiner shall review the "Briefing Checklist - System Walkthrough" portion of OP 1064.023 Attachment 6 with the examinee.

JPM INITIAL TASK CONDITIONS:

The following conditions exist:

1. A fire has occurred in the Control Room rendering the Control Room uninhabitable.
2. RCS pressure is 1840 psia.
3. Pressurizer Level is 44%

TASK STANDARD:

Proportional heater control has been established locally at 2C117 and 2C118 and the heaters have been energized.

TASK PERFORMANCE AIDS:

1. OP 2203.014, Attachment G

JOB PERFORMANCE MEASURE

INITIATING CUE: The CRS provides the following direction:

Energize pressurizer proportional heaters locally and raise pressurizer pressure as directed by TSC using AOP 2203.014, Attachment G

CRITICAL ELEMENTS (C): 3, 4, 5, 6, 7

START TIME: _____

PERFORMANCE CHECKLIST		STANDARDS		(Circle One)
<u>TRANSITION NOTE:</u> Go to the lower south electrical penetration room. NOTE log onto RWP prior to entry into this room. Examiner my prompt examinee prior to transitioning to LSEPR, if desired.				
	1. (Step 1.A)	Verify "PZR PROP HTR CONT SW" (2HS-4640B) position. <u>Examiner's CUE:</u> 2HS-4640B indicates OFF.	On panel 2C117, verified 2HS-4640B in OFF.	N/A SAT UNSAT
	2. (Step 1.A)	Verify "PZR PROP HTR CONT SW" (2HS-4641B) position. <u>Examiner's CUE:</u> 2HS-4641B indicates OFF.	On panel 2C118, verified 2HS-4641B in OFF.	N/A SAT UNSAT
(C)	3. (Step 1.B)	Place "PZR PROP HTR SEL SW" (2HS-4640A) in EMERG. <u>Examiner's CUE:</u> 2HS-4640A indicates EMERG.	On panel 2C117, verified key inserted in key switch. Rotated 2HS-4640A to EMERG position.	N/A SAT UNSAT
(C)	4. (Step 1.B)	Place "PZR PROP HTR SEL SW" (2HS-4641A) in EMERG. <u>Examiner's CUE:</u> 2HS-4641A indicates EMERG.	On panel 2C118, verified key inserted in key switch. Rotated 2HS-4641A to EMERG.	N/A SAT UNSAT
<u>TRANSITION NOTE:</u> Go to the 2B5/2A3 Switchgear room.				

JOB PERFORMANCE MEASURE

PERFORMANCE CHECKLIST			STANDARDS	(Circle One)
(C)	5. (Step 1.C)	Close breaker 2B523 "PRESSURIZER PROPORTIONAL HEATER 2SCR-1". <u>Examiner's CUE:</u> Pushed 'Close' push button. Breaker 2B523 red CLOSED flag showing.	On load center 2B5, depressed breaker 2B523 "CLOSE" push button. Observed breaker red "CLOSED" flag indicated.	N/A SAT UNSAT
TRANSITION NOTE: Go to the 2B6/2A4 switchgear room.				
(C)	6. (Step 1.D)	Close breaker 2B623 "PRESSURIZER PROPORTIONAL HEATER 2SCR-2" <u>Examiner's CUE:</u> Pushed 'Close' push button. Breaker 2B623 red CLOSED flag showing.	On load center 2B6, depressed breaker 2B623 "CLOSE" push button. Observed breaker red "CLOSED" flag indicated.	N/A SAT UNSAT
TRANSITION NOTE: Go to the lower south electrical penetration room.				
EXAMINER'S NOTE: Examinee may contact TSC and state that they are standing by to energize the proportional heaters. If this is communicated to the TSC, provide direction to energize the heaters and stand by.				
(C)	7. (Step 1.E)	Energize all proportional heaters. <u>EXAMINER'S CUE:</u> 2HS-4640B is in 'ON' position. 2HS 4641B is in "ON" position.	On panel 2C117, placed "PZR PROP HTR CONT SW" (2HS-4640B) in ON. On panel 2C118, placed "PZR PROP HTR CONT SW" (2HS-4641B) in ON.	N/A SAT UNSAT
END				

**STOP
TIME:** _____

JOB PERFORMANCE MEASURE

Examiner's Copy

JPM INITIAL TASK CONDITIONS

1. A fire has occurred in the Control Room rendering the Control Room uninhabitable.
2. RCS pressure is 1840 psia.
3. Pressurizer Level is 44%

INITIATING CUE:

The CRS provides the following direction:

“Energize pressurizer proportional heaters locally and raise pressurizer pressure as directed by TSC using AOP 2203.014, Attachment G”

JOB PERFORMANCE MEASURE

Examinee's Copy

JPM INITIAL TASK CONDITIONS

4. A fire has occurred in the Control Room rendering the Control Room uninhabitable.
5. RCS pressure is 1840 psia.
6. Pressurizer Level is 44%

INITIATING CUE:

The CRS provides the following direction:

“Energize pressurizer proportional heaters locally and raise pressurizer pressure as directed by TSC using AOP 2203.014, Attachment G”

Facility: ANO-2		Scenario No.: 1 (New)		Op-Test No.: 2006-1	
Page 1					
Examiners:			Operators:		
<p>Initial Conditions:</p> <p>20% MOL, All Engineered Safety Features systems are in standby. Plant startup following a five day stator water cooling outage. 2P27, MFP standby lube oil pump tagged out for maintenance. Green Train Maintenance Week.</p>					
<p>Turnover:</p> <p>20%. 250 EFPD. EOOS indicates 'Minimal Risk.' Plant Startup in progress; OP 2104.004 section 9, raising power above 20%, is the controlling procedure. 2P27, MFP standby lube oil pump tagged out for maintenance. Green Train Maintenance Week.</p>					
Event No.	Malf. No.	Event Type*	Event Description		
1	Raise Power above 20%	R (ATC)	Raise reactor and turbine power.		
2	XRCCHAPCNT	I (ATC)	Pressurizer control channel pressure fails high.		
3	CCWFAILBAUTO CCW2P33CPWR	C (CBOT)	Loop II Component Cooling Water pump 'C' Trips and 'B' Component Cooling Water pump fails to automatically start.		
4	RCP2P32AASLK	M (ATC) N (CBOT)	Reactor Coolant System inter-system leak into Component Cooling Water system resulting in Loss of Coolant Accident and Safety Injection Actuation System (post reactor trip).		
5	BUS2H2	M (ALL)	2H2 lockout. Loss of 2 Reactor Coolant Pump's and one condenser circulating water pump.		
6	RPSRXAUTO	C (ATC)	Reactor Protection System fails to automatically trip the reactor on loss of Reactor Coolant Pumps.		
7	XMSHDRPRS	I (CBOT)	Steam Dump and Bypass Control System fails to automatically open bypass and dump valves to control Steam Generator pressure.		
8	HPI2P89AFAL	C (CBOT)	2P89A, 'A' High Pressure Safety Injection pump fails to auto-start.		

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

Facility: ANO-2	Scenario No.: 1 (New)	Op-Test No.: 2006-1	
Page 1			
Examiners:	Operators:		
Initial Conditions:			
20% MOL, All Engineered Safety Features systems are in standby. Plant startup following a five day stator water cooling outage. 2P27, MFP standby lube oil pump tagged out for maintenance. Green Train Maintenance Week.			
Turnover:			
20%. 250 EFPD. EOOS indicates 'Minimal Risk.' Plant Startup in progress; OP 2104.004 section 9, raising power above 20%, is the controlling procedure. 2P27, MFP standby lube oil pump tagged out for maintenance. Green Train Maintenance Week.			
Event No.	Malf. No.	Event Type*	Event Description
1	Raise Power above 20%	R (ATC)	Raise reactor and turbine power.
2	XRCCHAPCNT	I (ATC)	Pressurizer control channel pressure fails high.
3	CCWFAILBAUTO CCW2P33CPWR	C (CBOT)	Loop II Component Cooling Water pump 'C' Trips and 'B' Component Cooling Water pump fails to automatically start.
4	RCP2P32AASLK	M (ATC) N (CBOT)	Reactor Coolant System inter-system leak into Component Cooling Water system resulting in Loss of Coolant Accident and Safety Injection Actuation System (post reactor trip).
5	BUS2H2	M (ALL)	2H2 lockout. Loss of 2 Reactor Coolant Pump's and one condenser circulating water pump.
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8	HPI2P89AFAL	C (CBOT)	2P89A, 'A' High Pressure Safety Injection pump fails to auto-start.

Scenario #1 Objectives

- 1) Evaluate individual response to a failure of a Pressurizer pressure instrument.
- 2) Evaluate individual response to a failure of a running Component Cooling Water Pump.
- 3) Evaluate individual response to an inter-system loss of coolant event.
- 4) Evaluate individual ability to perform an escalation in plant power.
- 5) Evaluate individual ability to mitigate failure of a non-vital 6900 VAC bus.
- 6) Evaluate individual ability to monitor operation of ESF equipment.
- 7) Evaluate individual response to a failure Reactor Protection System.
- 8) Evaluate individual response to a failure of automatic operation of Steam dump and bypass control system.

SCENARIO #1 NARRATIVE

Simulator session begins with the plant at 20% power steady state. The plant is ready for a power escalation to 100% following completion of required Core Operating Limits Supervisory System (COLSS) surveillances. 2P27, Main feed pump standby lube oil pump is tagged out for maintenance.

When the crew has completed their control room walk down and brief, the crew should begin a power escalation following the reactivity control plan provided.

When the required reactivity manipulation is completed, the Channel '1' Pressurizer, PZR, pressure control channel will fail high. This will result in both normal spray valves opening causing actual PZR pressure to lower. AOP 2203.018, PZR Systems Malfunctions, will be entered and actions directed by the CRS. The ATC operator will verify that the other pressure control channel is reading correctly and select channel '2' for control. The CBOT will take the Steam Dump and Bypass Control System, SDBCS, master controller to 'AL' and adjust the set point to 1000 psia. If no action is taken, the plant will trip when PZR pressure rises above 2362 psia.

10 minutes after the 'A' PZR pressure transmitter fails, 'C' component cooling water pump trips and 'B' fails to automatically start. The ATC will announce the 'low CCW flow to RCP's' alarms on 2K11. The CRS will enter RCP emergencies AOP and direct actions to be completed. The CBOT will manually start 'B' CCW pump and verify CCW flow to the RCP's by observing that the Alarms on 2K11 clear.

One minute after 'C' CCW pump trips, a RCS leak into CCW from 'A' RCP. The ATC will announce the 'process liquid radiation High' alarm will come in due to Loop 2 CCW radiation levels exceeding the set point. The CBOT may observe loop 2 CCW surge tank level rising and announce it when placing 'B' CCW pump in service. The CRS will enter OP2203.016, excess RCS leakage AOP and direct actions. The CBOT will align loop 2 CCW surge tank vent to the gas collection header and monitor RCP seal performance. The ATC will isolate letdown and verify that the leak into CCW is not from the letdown heat exchanger. The plant startup will be terminated and plans made to take the unit off line.

SCENARIO #1 NARRATIVE (continued)

When the actions for a RCS leak into CCW are completed, a lockout will occur on 2H2 and result in DNBR trips on all four CPC's without a Reactor trip due to a failure of RPS to automatically trip the reactor. The ATC will manually trip the reactor.

Following the Reactor trip, the main steam pressure input to the SDBCS master controller will fail low. This will prevent the SDBCS from automatically opening valves to the condenser to control Steam Generator pressure. The RCS will heat up until the Main Steam Safety Valves open to control pressure. The CBOT will manually control steam pressure by taking manual control of the SDBCS valves from 2C04 and maintain the pressure band given by the CRS.

Also post trip the RCS to CCW leak will be raised to 250gpm. The ATC will secure all four RCP's. The CBOT will manually isolate CCW to containment to confine the leak to containment and isolate the controlled bleed off relief valve to the quench tank to minimize heat up of the RCP seals, upon direction from the CRS. These actions will be completed before Standard Post Trip Actions, SPTA's, are started.

The crew will assess safety functions by completing SPTA's, diagnose a loss of coolant accident and enter the LOCA EOP 2202.003. The CRS will direct the ATC to cool down the RCS. The ATC will cool down the RCS using the SDBCS bypass valves to the condenser and plot and record the cooldown using standard attachments 1 and 8.

When SIAS is actuated, 'A' High Pressure Safety Injection, HPSI, pump will fail to automatically start. The CBOT will manually start 'A' HPSI pump from 2C17.

Simulator Instructions for Scenario 1

Reset simulator to MOL 20% power IC steady state.
 Markup OP 2102.004, power operations up to step 9.1.
 Ensure that AACG is secured and annunciators clear.
 Ensure hotwell level is ~80%.
 Place MINIMAL RISK and Green Train Maintenance Week signs on 2C11.
 Swing ESF equipment aligned to the Green train.
 'B' CCP lead charging pump.
 2PCV0231, Gland sealing steam pressure control valve failed closed.
 T1, T2, T4 set to false.
 T3 set to "qh4r5228", 'B' CCW pump red light ON
 T5 set to RXTRP, Reactor Trip

Event No.	Malf. No. / Trigger Number	Value/ Ramp Time	Event Description
1	Raise Power above 20%		No malfunctions inserted in event #1.
2	XRCCHAPCNT Trigger = T1	2500/ 0.0MIN	Pressurizer control channel pressure fails high.
3	CCWFAILBAUTO CCW2P33CPWR Trigger = T2	TRUE	Loop II Component Cooling Water pump 'C' Trips and 'B' Component Cooling Water pump fails to automatically start.
4	RCP2P32AASLK Trigger = T3 with 1 minute delay	50 / 0.0 MIN (250 post trip)	Reactor Coolant System inter-system leak into Component Cooling Water system initial value 50 gpm. Raise LKRT to 250 gpm leak post reactor trip.
5	BUS2H2 Trigger = T4	TRUE	2H2 lockout. Loss of 2 Reactor Coolant Pump's and one condenser circulating water pump.
6	RPSRXAUTO No Trigger	TRUE	Reactor Protection System fails to automatically trip the reactor on loss of Reactor Coolant Pumps.
7	XMSHDRPRS Trigger = T5	750 / 0.0MIN	Input pressure to Steam Dump and Bypass Control System master controller fails low.
8	HPI2P89AFAL No trigger	TRUE	2P89A, 'A' High Pressure Safety Injection pump fails to auto-start.

Simulator Instructions for Scenario 1

Cued by lead Trigger T1 Channel 1 PZR pressure transmitter fails High.
examiner

Cue: Report that I & C planner will begin planning work on failed PZR pressure instrument.

At T= 10 Trigger T2 'C' CCW trips and 'B' CCW fails to auto-start.
minutes after
T1

Cue: As AO report that the 'B' CCW pump is running normally.
As AO report that smell of burning insulation around 'C' CCW pump and that paint on motor has blistered.
As AO report that 2B721, 'C' CCW pump breaker has tripped on over-current.

At one Trigger T3 RCS to CCW leakage @ 50 gpm.
minute after
'B' CCW
pump start

Cue: As Auxiliary Operator, maintain loop 2 surge tank within level band given by CRS.
As Chemistry, acknowledge need to sample CCW for activity.
As RP, acknowledge need to perform surveys and post as required.

CUED by Trigger T4 Lockout on 2H2.
Lead Failure of RPS to automatically actuate.
Examiner

Cue: As Auxiliary Operator, report that lockout on 2H2 is due to a ground fault relay trip on 2H2.
As work week manager, report that a planning team has been assembled to determine failure.

Reactor Trip Trigger T5 SDBCS main steam pressure input to master controller.

Reactor Trip No trigger Raise RCS to CCW Leakage to 250 gpm.

SIAS No trigger 'A' HPSI pump fails to start following SIAS actuation signal.
Actuation

Op-Test No.: 1			Scenario No.: 1			Event No.: 1		
Event Description: Plant power escalation from 20%.								
Time		Position		Applicant's Actions or Behavior				
		ALL		Crew will conduct brief for power increase.				
		CRS		Implement normal operating procedure 2102.004, power operations section 9.0. <ul style="list-style-type: none">• Use Attachment A for ASI control during power escalation.• Monitor ASI AND AZ Tilt as calculated by COLSS and compare to CPC's.				
		CRS		Direct CBOT to monitor symmetrical LP Turbine steam inlet ΔT during power escalation: <ul style="list-style-type: none">• MSR 2E-12B RS to LPT B Temp (T0500) OR 2TRS-0211, point 29• MSR 2E-12B RS to LPT A Temp (T0447) OR 2TRS-0211, point 30• MSR 2E-12A RS to LPT A Temp (T0440) OR 2TRS-0211, point 31• MSR 2E-12A RS to LPT B Temp (T0450) OR 2TRS-0211, point 32				

Op-Test No.: 1			Scenario No.: 1			Event No.: 1		
Event Description: Plant power escalation from 20%.								
Time		Position		Applicant's Actions or Behavior				
		CRS		Direct ATC to dilute to raise RCS temperature and adjust turbine load using load set potentiometer at a rate specified in Reactor Engineering supplied reactivity plan.				
		ATC		Commence RCS dilution using OP2104.003, Chemical addition. Verify Reactor makeup water pump running. Verify mode selector switch (2HS-4928) in DILUTE. Verify reactor makeup water flow controller (2FIC-4927) in MANUAL or AUTO and demand less than CCP flow. Verify VCT makeup isolation valve (2CV-4941-2) open. Depress red pushbutton on reactor makeup water flow batch controller (2FQIS-4927). Verify that 2FQIS-4927 has desired quantity set and 2FIC-4927 indicates desired flow. Obtain PEER check.				

Op-Test No.: 1			Scenario No.: 1			Event No.: 1		
Event Description: Plant power escalation from 20%.								
Time		Position		Applicant's Actions or Behavior				
		ATC		Adjust turbine load to maintain reference temperature and RCS average temperature within two degrees. Obtain initial PEER check then use reactivity aid and maintain reference temperature within band given by CRS of RCS temperature.				
Termination criteria: Reactivity manipulation completed or at lead examiner's discretion.								

Op-Test No.: 1			Scenario No.: 1			Event No.: 2		
Event Description: Channel '1' Pressurizer Pressure instrument will fail High.								
Time	Position	Applicant's Actions or Behavior						
	ATC	Announce annunciator 2K10-E6 Pressurizer Pressure Control Channel 1 Pressure HI / LO alarm is due to High pressure.						
	CRS	Refer to PZR Systems Malfunctions AOP 2203.028 and direct board operators actions. Refer to TS 3.2.8 if pressure not 2025 to 2275 psia. Could direct placing SDBCS valves in manual closed						
	ATC	Compare channels and determine Channel 1 failed High. Place PZR Pressure Channel Select switch (2HS-4626) to Channel 2. Restore heaters to automatic control, if secured. Verify that PZR heaters respond as designed. Verify that PZR spray valves close.						
	CBOT	Recognize and announce that SDBCS valves are opening (cycling on permissive set point) due to PZR instrument failure biasing master controller set point down. (Will cause Tave to lower ~2°F) Place SDBCS Master controller in AUTO local and adjust set-point to 1000 psia.						
Termination Criteria: PZR pressure control selected to channel 2 in auto control or at lead examiner's discretion.								

Op-Test No.: 1		Scenario No.: 1	Event No.: 3
Event Description: Loop II Component Cooling Water pump 'C' Trips and 'B' Component Cooling Water pump fails to automatically start.			
Time	Position	Applicant's Actions or Behavior	
	ATC	Announce annunciators: <ul style="list-style-type: none"> • 2K11-A1, A3, A5, A7 – 'A', 'B', 'C', and 'D' RCP CCW low flow 	
	CRS	Implement AOP 2203.025, Reactor Coolant Pump Emergencies <ul style="list-style-type: none"> • Record Time CCW lost (if not restored W/I 10 minutes; direct ATC to manually trip the reactor and secure RCP's) • Check that RCP Controlled Bleed off temperature > 180°F • Direct CBOT to manually start 'B' CCW pump (this may be done out of sequence) 	
	CBOT	On panel 2C14, manually start 'B' CCW pump. On 2K11, verify CCW low flow alarms clear.	
Termination Criteria: CCW is restored to RCP's or at lead examiner's discretion.			

Op-Test No.: 1			Scenario No.: 1			Event No.: 4		
Event Description: 50 GPM RCS to CCW leak from 'A' RCP seal.								
Time		Position		Applicant's Actions or Behavior				
		ATC / CBOT		Announce PZR level lowering (letdown flow at minimum), PZR pressure dropping. Announce 2K11 C10, Process liquid radiation high alarm due to Loop 2 CCW (The CBOT may observe loop 2 CCW surge tank level rising and announce it when placing 'B' CCW pump in service.)				

Op-Test No.: 1		Scenario No.: 1	Event No.: 4
Event Description: 50 GPM RCS to CCW leak from 'A' RCP seal.			
Time	Position	Applicant's Actions or Behavior	
	CRS	<p>Implement OP-2203.016, Excess RCS leakage:</p> <ul style="list-style-type: none"> • Direct ATC to start and stop CCP's as required to maintain PZR level. • Direct ATC and CBOT to perform RCS leak-rates using loop 2 surge tank level change and RCS mass balance • Implement step 9.E <ul style="list-style-type: none"> ○ Verify leakage into CCW by loop 2 surge tank level rise and radiation levels going up ○ Go to Attachment A <ul style="list-style-type: none"> § Direct ATC to isolate letdown and determine that leakage does not stop. § Direct CBOT to align loop 2 CCW surge tank vents to GCH and to monitor RCP seal performance. § Direct AO to maintain loop 2 surge tank level 40-50% § Verify all RCS samples are isolated. § Notify chemistry to sample CCW § Notify RP to monitor for elevated dose rates and post as required. § Go back to Step 10 in AOP • Direct ATC to perform a plant shutdown using Attachment R, RCS boration from RWT. • Declare EAL 2.2, ALERT, RCS leakage >44gpm • TS 3.4.6.2, RCS leakage > 10 GPM 	

Op-Test No.: 1			Scenario No.: 1			Event No.: 4		
Event Description: 50 GPM RCS to CCW leak from 'A' RCP seal.								
Time	Position	Applicant's Actions or Behavior						
	ATC	Maintain PZR level within band set by CRS manually starting CCP's						
	ATC / CBOT	Calculate an RCS leak rate of ~50 gpm.						
	ATC	Isolate letdown using 2CV-4820-2 and determine that leakage is NOT due from letdown heat exchanger. (Letdown may or may not be restored.)						
	CBOT	On 2C14, align loop 2 CCW surge tank vents to GCH using 2CV 5218 and monitor RCP seal performance.						
	ATC	Stop power escalation, if not done previously and make preparations to start plant shutdown using RWT.						
Termination criteria: When plant shutdown is directed / briefed or at lead examiner's discretion (Event is continued after event 6).								

Op-Test No.: 1			Scenario No.: 1			Event No.: 5		
Event Description: 2H2 lockout.								
Time		Position		Applicant's Actions or Behavior				
		ATC		DNBR trips on all four CPC channels but reactor did not trip. Report that 'B' and 'C' RCP's tripped.				
		CBOT		Report lockout alarm on 2H2. Report that 'B' Circulating water pump tripped and discharge valve is closed.				
		CRS		Direct ATC to manually trip the reactor.				
Termination criteria: When 2H2 lockout recognized and Reactor Trip required or at lead examiner's discretion.								

Op-Test No.: 1			Scenario No.: 1			Event No.: 6		
Event Description: Reactor Protection System fails to automatically trip the reactor on loss of Reactor Coolant Pumps.								
Time		Position		Applicant's Actions or Behavior				
CRITICAL STEP		ATC		Manually trips the reactor from 2C03. Announces that the reactor has tripped.				
		CRS		Recognizes that Technical Specification 3.0.3 should be entered due to failure of RPS to automatically trip. Recognizes that a safety limit of DNBR has been exceeded (TS 2.1.1)				
		CRS		Recognizes that EAL 6.2, ALERT, failure to complete an Automatic trip when valid RPS set point exceeded should be declared.				
Termination criteria: When Reactor Trip is completed or at lead examiner's discretion.								

Op-Test No.: 1		Scenario No.: 1	Event No.: 4
Event Description: (Continued) Raised RCS to CCW leakage (250gpm)			
Time	Position	Applicant's Actions or Behavior	
	CRS	Implement OP 2203.016 Attachment 'A' post reactor trip actions: <ul style="list-style-type: none">• Direct ATC to verify ALL RCP's stopped.• Direct ATC to place BOTH PZR Spray valve hand-switches in MANUAL and closed:<ul style="list-style-type: none">○ 2CV-4651○ 2CV-4652• Direct CBOT to close RCP CCW Supply valve (2CV-5236-1).• Direct CBOT to close RCP CCW Return valves:<ul style="list-style-type: none">○ 2CV-5254-2○ 2CV-5255-1• Direct CBOT to close RCP Bleed off valves to VCT closed:<ul style="list-style-type: none">○ 2CV-4846-1○ 2CV-4847-2• Direct ATC to close RCP Bleed off Relief Isolation to Quench Tank (2CV-4856).	
	ATC	On 2C04, take all RCP hand switches to stop or PTL.	
	ATC	On 2C04, take PZR normal spray valves to manual.	
CRITICAL STEP	CBOT	On 2C17 take 2CV 5236-1 to close. On 2C17, take CV 5255-1 to close. On 2C16, take 2CV 5254-2 to close.	

Op-Test No.: 1			Scenario No.: 1			Event No.: 4		
Event Description: (Continued) Raised RCS to CCW leakage (250gpm)								
Time		Position		Applicant's Actions or Behavior				
		ATC / CBOT		On 2C09, take hand switch 2CV 4856 to close.				
		CRS		Direct Manual Actuation of SIAS / CIAS				
		ATC		ON 2C03, Manually Actuate of SIAS / CIAS and/or announce automatic actuation of SIAS/CIAS (See event 8)				
		CRS		Implement Standard Post Trip Actions , notify operators to monitor Exhibit 7 CBO Reactor Trip Checklist, track safety functions, and direct board operator actions.				
		ATC		Check reactivity control: Reactor power decreasing. All CEA's inserted.				

Op-Test No.: 1			Scenario No.: 1			Event No.: 4		
Event Description: (Continued) Raised RCS to CCW leakage (250gpm)								
Time		Position		Applicant's Actions or Behavior				
		CBOT		Check maintenance of vital auxiliaries: Main turbine tripped. Generator output and exciter breakers open. All 4160v and 6900 v Non-Vital busses energized except lockout on 2H2. ALL 4160v and 480v vital AC bus energized. All 125v vital DC bus energized.				
		ATC		Check inventory control: PZR level 16 to 80%. Report PZR level lowering and all CCP's running.				
		ATC		Check RCS pressure control: RCS pressure 1800 to 2300 psia. Report Pressurizer pressure is lowering and all heaters are off (if level is less than 20%). If RCS pressure less than 1400 psia, then trip one RCP in each loop.				

Op-Test No.: 1			Scenario No.: 1			Event No.: 4		
Event Description: (Continued) Raised RCS to CCW leakage (250gpm)								
Time		Position		Applicant's Actions or Behavior				
		ATC		Check core heat removal by forced circulation: RCP 's running Loop ΔT less than 10° F. RCS MTS 30° F or greater. Service water pump suction aligned to Lake. Component cooling water aligned to RCPs. SW not aligned to CCW and ACW				
		CBOT		Restore SW to ACW per Exhibit 5. (NOTE: This action requires several minutes) Check SIAS actuated. Maintain SW pressure greater than 85 psig.				
		CBOT		Check RCS Heat Removal: Report SG levels and main feed water is in RTO. Report feed water line intact. Report SG pressures (See event 7) Report RCS Tcold value and trend.				

Op-Test No.: 1			Scenario No.: 1			Event No.: 4		
Event Description: (Continued) Raised RCS to CCW leakage (250gpm)								
Time		Position		Applicant's Actions or Behavior				
		ATC		Check CNTMT parameters: Temperature greater than 140° F and rising. Pressure rising could be greater than 16 psia. Status of radiation alarms: CAMS (2K10-B6) possibly IN ALARM (unless isolated by SIAS) Area radiation (2K11-B10) IN ALARM Process liquid (2K11-C10) IN ALARM Secondary Sys Radiation Hi (2K11-A10) NOT in alarm Verify all containment cooling fans running with SW aligned Verify SIAS/CCAS actuated when pressure > 18.3psia				
		CBOT		Will open 2CV0233, bypass around 2PCV0231 which is simulated closed to match condition of valve at plant. This is in response to low gland seal pressure.				
		CRS		Notify SM to perform the following: SE report to control room. Announce reactor trip on plant page. Refer to Tech Specs and EALs.				
		CRS		Direct CBOs to acknowledge all control room annunciators and announce all significant alarms. Diagnose Loss of Coolant Accident				

Op-Test No.: 1			Scenario No.: 1			Event No.: 4		
Event Description: (Continued) Raised RCS to CCW leakage (250gpm)								
Time	Position	Applicant's Actions or Behavior						
	CRS	Implement Loss of Coolant procedure and open place keeping page.						
	ALL	Perform crew brief and review mitigation strategies and floating steps.						
	CRS	Contact chemistry to sample SG for activity						
	CRS	Determine applicable floating steps: <ul style="list-style-type: none"> • Commence cool down to less than SDC window. • HPSI Override Criteria. 						
	CBOT	Restore ESF/Non-ESF systems: <ul style="list-style-type: none"> • Verify at least one SW pump running in each loop. • Verify DG SW outlet valves open. • Verify SW suction aligned to Lake. • Check 4160v Non-vital buses energized from offsite power. • Check 4160v Vital buses energized from offsite power. • Start SW pumps as needed to maintain header pressure. • Restore SW to ACW per Exhibit 5. • Maintain SW header greater than 85 psig. 						
	CBOT	Verify HPSI flow to RCS (See Event 8)						
	CBOT	Verify all CNTMT Cooling Fans running in emergency mode.						
	CBOT	Verify SG levels greater than 22.2%.						

Op-Test No.: 1		Scenario No.: 1	Event No.: 4
Event Description: (Continued) Raised RCS to CCW leakage (250gpm)			
Time	Position	Applicant's Actions or Behavior	
	CBOT	Align Feedwater: <ul style="list-style-type: none">•Check EFW pump 2P7B running.•Secure EFW pump 2P7A.•Verify AFW pump 2P75 secured.•Secure running MFW pump and close ALL FW blocks.	
	ATC /CBOT	Verify Safety Injection flow to RCS: Check HPSI flow using Exhibit 2. Check LPSI flow using Exhibit 3.	
	ATC	Check LOCA is limited to containment. <ul style="list-style-type: none">•Containment sump level going up.•Containment temperature, humidity and pressure are going up.•Auxiliary Building radiation levels steady.•Auxiliary building sump is less than 53%.•Waste tanks 2T20 A/B levels are steady.	
	ATC	Check CNTMT Isolation parameters. CNTMT pressure exceeds 18.3 psia. CNTMT RADIATION HI alarm 2K10-A6 NOT in alarm. Verify ONE Penetration Room Ventilation Fan Running.	
	ATC	Check CNTMT pressure trend not exceeded 23.3 psia. Verify CSAS actuated on PPS inserts. <ul style="list-style-type: none">•Stop ALL RCP's, place spray valves in manual closed.•Verify spray pumps running with greater than 1875 gpm each.	
	CBOT	Terminate CNTMT Spray if conditions met.	
	CBOT	Start both Hydrogen Analyzers per 2104.044.	

Op-Test No.: 1			Scenario No.: 1			Event No.: 4		
Event Description: (Continued) Raised RCS to CCW leakage (250gpm)								
Time	Position	Applicant's Actions or Behavior						
	CBOT	Verify All available miscellaneous CNTMT ventilation running: <ul style="list-style-type: none"> •CNTMT Bldg. Recirc fans (2VSF-31A-D) •Reactor Cavity fans (2VSF-34A&B) •Three CEDM Shroud Cooling fans (2VSF-35s) 						
	CBOT	Check ALL AC and vital DC buses energized.						
	ATC	Check IA pressure greater than 65 psig.						
	CRS	Check <u>LOCA not isolated and proceed to Section 3</u>						
CRITICAL STEP	ATC	Perform controlled cooldown to 275°F. (Float Step) <ul style="list-style-type: none"> •Reset low PZR pressure and low SG pressure set points. •Record and plot cooldown on Attachments 1 and 8. Initiate cooldown using SDBCS bypass valves.						
	CBOT	Verify EFW feeding Steam Generators. Secure Running MFP. Close Feed water Block valves. Verify one Condensate pump running.						
	CBOT	Maintain SG levels 45 to 90%. Check CST level greater than 82%						
	ATC	Restore PZR level. Maintain 29% to 80%						
	ATC	Verify Natural Circulation: <ul style="list-style-type: none"> •Loop ΔT less than 50° F. •Thot and Tcold constant or lowering. •RCS MTS 30° F or greater. •ΔT between Thot and average CET's less than 10° F. 						

Op-Test No.: 1		Scenario No.: 1	Event No.: 4
Event Description: (Continued) Raised RCS to CCW leakage (250gpm)			
Time	Position	Applicant's Actions or Behavior	
	CRS	Check that RCP restart criteria is NOT met.	
	ATC	Check RCS void free: <ul style="list-style-type: none"> •PZR level stable using aux spray. •RVLMS LVL 01 indicates WET. •Upper head thermocouples indicate subcooled. 	
	CBOT ATC	Override HPSI when termination criteria met: <ul style="list-style-type: none"> •RCS MTS 30° F or greater. •PZR level greater than 29% and controlled. •RVLMS LVL 03 or higher indicates WET. •At least one SG available – Level 10 to 90% with FW available OR level being restored with FW flow greater than 485 gpm. Throttle HPSI flow OR place HPSI pump in PTL as needed to control RCS pressure, inventory, and heat removal.	
Termination criteria: RCS Cool down in progress or at examiner's discretion.			

Op-Test No.: 1			Scenario No.: 1			Event No.: 7		
Event Description: Steam Dump and Bypass Control System fails to automatically open bypass and dump valves to control Steam Generator pressure.								
Time		Position		Applicant's Actions or Behavior				
		CBOT		Recognize and announce that SDBCS is NOT maintaining steam Generator pressure.				
		CRS		Direct CBOT to manually control Steam Generator pressure by either taking manual control of a SDBCS bypass valve or place the SDBCS master controller in manual and adjust output to open SDBCS bypass valve(s) to maintain Steam Generator pressure 950 to 1000 psia.				
		CBOT		Manually control SDBCS valves to control Steam Generator pressure.				
Termination criteria: SDBCS is controlled manually or at the discretion of the lead examiner.								

Op-Test No.: 1			Scenario No.: 1			Event No.: 8		
Event Description: 2P89A, 'A' High Pressure Safety Injection pump fails to auto-start.								
Time		Position		Applicant's Actions or Behavior				
		CBOT		Recognizes and announces failure of 'A' HPSI pump to automatically start.				
		CRS		CBOT to manually start 'A' HPSI pump.				
		CBOT		On 2C17, took hand switch for 'A' HPSI pump to start and verified discharge pressure (if pressure < 1450psia, verified flow to RCS).				
Termination criteria: When 'A' HPSI pump is started or at the discretion of the lead examiner.								

Facility: ANO-2		Scenario No.: 2 (Modified)		Op-Test No.: 2006-1	
Page 1					
Examiners:			Operators:		
Initial Conditions: 100% MOL, All ESF systems in standby. Green Train Maintenance Week.					
Turnover: 100%. 250 EFPD. EOOS indicates 'Minimal Risk. Green Train Maintenance Week. 'B' main chiller is tagged out for oil change out.					
Event No.	Malf. No.	Event Type*	Event Description		
1	COND2P2AWIND	C(CBOT)	'A' Condensate Pump motor winding with rise resulting in manual start of 'D' Condensate Pump and securing 'A' Condensate Pump.		
2	XCV2LT4861	I (ATC)	Volume Control Tank level instrument fails low resulting in Refueling Water Tank being aligned to Coolant Charging Pump suction.		
3	CWS2P3BBOL	R (ATC) N (CBOT)	Trip 2P3B, 'B' Circulating Water Pump, which causes a partial loss of main condenser circulating water flow resulting in a rapid down power to ~ 90% power.		
4	MSSGBLK	M (CBOT) M (ATC)	'B' Steam Generator Excess Steam Demand (ESD) inside containment results in manual reactor trip and control of Reactor Coolant System heat up and Pressurizer pressure post SG blowdown.		
5	CEA51STUCK	C (ATC)	Control Element Assembly #51 stuck on reactor trip results in Emergency Boration.		
6	CV1036-2 CV1075-1	C (CBOT)	'B' Emergency Feed Water (EFW) Pump to 'B' Steam Generator valves fail to close from control room resulting in over feeding Steam Generator with ESD cooldown of RCS unnecessarily. Secure 'B' EFW pump.		
7	BS2P35BFAL BS2P35AFAULT	C (CBOT)	'B' Spray Pump fails to start. Can be manually started. 'A' Spray Pump cannot be restarted.		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor					

Facility: ANO-2	Scenario No.: 2 (Modified)	Op-Test No.: 2006-1	
Page 1			
Examiners:	Operators:		
Initial Conditions: 100% MOL, All ESF systems in standby. Green Train Maintenance Week.			
Turnover: 100%. 250 EFPD. EOOS indicates 'Minimal Risk. Green Train Maintenance Week. 'B' main chiller is tagged out for oil change out.			
Event No.	Malf. No.	Event Type*	Event Description
1	COND2P2AWIND	C(CBOT)	'A' Condensate Pump motor winding temperature will rise resulting in manual start of 'D' Condensate Pump and securing 'A' Condensate Pump.
2	XCV2LT4861	I (ATC)	Volume Control Tank level instrument fails low resulting in Refueling Water Tank being aligned to Coolant Charging Pump suction.
3	CWS2P3BBOL	R (ATC) N (CBOT)	Trip 2P3B, 'B' Circulating Water Pump, which causes a partial loss of main condenser circulating water flow resulting in a rapid down power to ~ 90% power.
4	MSSGBLK	M (CBOT) M (ATC)	'B' Steam Generator Excess Steam Demand (ESD) inside containment results in manual reactor trip and control of Reactor Coolant System heat up and Pressurizer pressure post SG blow down.
5	CEA51STUCK	C (ATC)	Control Element Assembly #51 stuck on reactor trip results in Emergency Boration.
6	CV1036-2 CV1075-1	C (CBOT)	'B' Emergency Feed Water (EFW) Pump to 'B' Steam Generator valves fail to close from control room resulting in over feeding Steam Generator with ESD cool down of RCS unnecessarily. Secure 'B' EFW pump.
7	BS2P35BFAL BS2P35AFAULT	C (CBOT)	'B' Spray Pump fails to start. Can be manually started. 'A' Spray Pump cannot be restarted.
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Scenario #2 Objectives

- 1) Evaluate individual response to a failure of a running Condensate Pump.
- 2) Evaluate individual response to a failure of a Volume Control Tank level transmitter.
- 3) Evaluate individual response to a trip of a Circulating Water Pump.
- 4) Evaluate individual ability to mitigate an Excess Steam Demand inside Containment.
- 5) Evaluate individual response to a stuck out CEA after a Reactor Trip.
- 6) Evaluate individual response to a failure of the Emergency Feed water system to operate correctly.
- 7) Evaluate individual response to a failure of both Containment Spray Pumps.

SCENARIO #2 NARRATIVE

Simulator session begins with the plant at 100% power steady state. The 'B' Main Chiller is tagged out for oil change out.

When the crew has completed their control room walk down and brief, the 'A' condensate pump motor will begin to heat up and alarm. The crew will start the standby condensate pump and trip 'A' condensate pump in response to the Annunciator Corrective action procedure, OP 2203.012C.

10 minutes after start of event 1, one of the Volume Control Tank level transmitters, 2LT4861, will fail low. The crew will respond to VCT low low level alarm, 2K12 G5. This will result in the VCT outlet valve to the charging pump suction to close and the Refueling Water tank (RWT) suction to the charging pumps to open. RCS temperature and pressure will lower until the ATC positions the VCT outlet valve manually opened and the RWT valve manually closed.

When Charging pump suction has been restored to the VCT, 'B' circulating water pump will trip due to a phase to ground fault on the motor. This will result in the crew rapidly reducing turbine load to restore condenser vacuum (turbine trip occurs at 7"Hg ABS) by manually lowering turbine load and aligning emergency boration to the CCP suction. When vacuum is lowered to less than 6" Hg ABS, the crew will secure emergency boration and align normal boration to reduce vacuum to less than 5.3"HgABS to clear high condenser pressure alarms and clear the steam dump and bypass control system condenser interlock.

When the ATC has completed the reactivity manipulation, a steam line break will occur on 'A' Steam Generator inside the containment building. The crew will recognize the leak and manually trip the reactor and should manually actuate Main Steam Isolation Signal, MSIS, before automatic actuation. The crew will complete Standard Post Trip Actions, OP2202.001, and diagnose an Excess Steam Demand event and enter OP 2202.005. The crew will manually open the upstream atmospheric dump valves on 'A' steam generator to control RCS temperature approximately constant and manually open the Auxiliary spray valve to control Pressurizer pressure approximately constant when 'B' Steam Generator has boiled dry. When parameters have returned to high pressure safety injection, HPSI, override values the crew will manually secure HPSI and manually start and stop Coolant Charging Pumps as required to maintain Pressurizer level at set point.

SCENARIO #2 NARRATIVE (continued)

Following the Reactor trip, CEA 51 will stick partway into the core on reactor trip. This will require the ATC to manually align emergency boration to the reactor coolant system.

Following an Emergency Feed Actuation Signal, the isolation valves to 'B' steam generator from 'B' Emergency Feed Water Pump, EFW, will fail to close from both the control room and locally. The CBOT must secure the 'B' EFW pump from 2C17 to stop feeding the steam generator with the ruptured steam piping and cause further overcooling of the reactor coolant system.

Following a Containment Spray Actuation Signal, the 'B' Containment Spray Pump will fail to automatically start and the 'A' Containment Spray Pump will trip on a motor overload. The CBOT must manually start the 'B' Containment Spray pump from 2C16 to prevent exceeding design pressure of the containment building.

Simulator Instructions for Scenario 2

Reset simulator to MOL 100% power IC steady state.
 Ensure that AACG is secured and annunciators clear.
 Ensure hotwell level is ~80%.
 Place MINIMAL RISK and Green Train Maintenance Week signs on 2C11.
 Swing ESF equipment aligned to the Green train.
 'B' CCP lead charging pump.
 2PCV0231, Gland sealing steam pressure control valve failed closed.
 T1, T2, T3, T4 set to false.
 T5 set to 'RXTRP', Reactor trip
 T6 set to 'EFAS2 action', Emergency Feed Actuation Signal channel 2

Event No.	Malf. No. / Trigger Number	Value/ Ramp Time	Event Description
1	COND2P2AWIND Trigger = T1	TRUE/ 0.0 MIN	'A' Condensate Pump motor winding temperature will rise resulting in manual start of 'D' Condensate Pump and securing 'A' Condensate Pump.
2	XCV2LT4861 Trigger = T2	0/ 0.0MIN	Volume Control Tank level instrument fails low resulting in Refueling Water Tank being aligned to Coolant Charging Pump suction.
3	CWS2P3BBOL CWS2P3BTRP Trigger = T3	TRUE / 0.0 MIN	Trip 2P3B, 'B' Circulating Water Pump, which causes a partial loss of main condenser circulating water flow resulting in a rapid down power to ~ 90% power.
4	MSSGBLK Trigger = T4	3 / 30.0 MIN	'B' Steam Generator Excess Steam Demand (ESD) inside containment results in manual reactor trip and control of Reactor Coolant System heat up and Pressurizer pressure post SG blow down.
5	CEA51STUCK Trigger = T5	TRUE	Control Element Assembly #51 stuck on reactor trip results in Emergency Boration.
6	CV1036-2 CV1075-1 DO_HS_1036_R DO_HS_1075_R Trigger = T6	1.0 / 0.0 MIN	'B' Emergency Feed Water (EFW) Pump to 'B' Steam Generator valves fail to close from control room resulting in over feeding Steam Generator with ESD cool down of RCS unnecessarily. Secure 'B' EFW pump.
7	BS2P35BFAL BS2P35AFAULT Set to TRUE	TRUE	'B' Spray Pump fails to start. Can be manually started. 'A' Spray Pump cannot be restarted.

Op-Test No.: 1			Scenario No.: 2			Event No.: 1		
Event Description: 'A' Condensate Pump motor winding temperature will rise resulting in manual start of 'D' Condensate Pump and securing 'A' Condensate Pump.								
Time		Position		Applicant's Actions or Behavior				
		CRS		<p>CRS will refer to ACA 2203.012C, F6, BRG/WNG temperature high and direct actions:</p> <ul style="list-style-type: none">• Check 2TRS-0610 to determine affected pump.(CBOT)• Press ACK ALM1 on 2TRS-0610 to acknowledge alarm and allow Reflash. (CBOT)• Verify Condensate Pump Area coolers running(AO)<ul style="list-style-type: none">○ 2VUC-14A○ 2VUC-14B• Verify CCW aligned to affected pump per Component Cooling Water System Operations (2104.028). (AO)• Verify Condensate Recircs (2CV-0662 and 2CV-0663) closed. (CBOT)• Start standby Condensate pump using Condensate and Feed water Operations (2106.016). (CBOT)• Direct AO to open vent 2CS16B. <p>(note may or may not perform all above steps prior to starting or stopping condensate pumps. Dependant on rate of temperature rise on 'A' condensate pump)</p>				

Op-Test No.: 1			Scenario No.: 2			Event No.: 1		
Event Description: 'A' Condensate Pump motor winding temperature will rise resulting in manual start of 'D' Condensate Pump and securing 'A' Condensate Pump.								
Time		Position		Applicant's Actions or Behavior				
		CBOT		On 2C12, use 2TRS-0610, determine and report that 'A' condensate motor winding is going up. On 2C02, verify that both condensate recircs are closed by observing no output demand on controller nor any flow indicated.				
		CBOT		Using OP 2106.016, Condensate operations, section 7.2, start 'D' condensate from 2C02. Stop 'A' Condensate pump.				
Termination criteria: 'D' Condensate Pump started and 'A' Condensate Pump stopped or at lead examiner's discretion.								

Op-Test No.: 1		Scenario No.: 2	Event No.: 2
Event Description: Volume Control Tank level instrument fails low resulting in Refueling Water Tank being aligned to Coolant Charging Pump suction.			
Time	Position	Applicant's Actions or Behavior	
	ATC	Announce annunciator 2K12-G5 VCT 2T4 LEVEL LO LO verify on 2C09 that actual level in VCT has not dropped (Chart recorder and VCT pressure).	
	CRS	Implement Annunciator Corrective Action AOP 2203.012L.	
	ATC	Report level indicates normal on 2LIS-4857 but 2LT-4861 reads 0% on computer. Reports charging pump suction swapping to RWT.	
	ATC	May secure charging to stop boration if crew has not determined indication is a failed instrument and VCT level is normal. OR When faulty instrument identified, then manually reopen VCT outlet and close the RWT to CCP suction valve.	
	CBOT / ATC	Reduce turbine load to maintain Tave within 2° F of Tref if Tave lowered.	
	CRS	Contact maintenance/Work Week Manager to troubleshoot failed instrument.	
Termination criteria: Charging suction manually aligned to the VCT and RWT to CCP valve closed or at the discretion of the lead examiner.			

Op-Test No.: 1			Scenario No.: 2			Event No.: 3		
Event Description: Trip 2P3B, 'B' Circulating Water Pump.								
Time		Position		Applicant's Actions or Behavior				
		ATC		Announce 2K12, A9, Circ water potential failure alarm. Recognize and announce that 'B' circulating water pump has tripped and discharge valve is going closed.				
		CBOT		Recognize and announce Main Condenser lowering vacuum: 2K03 A3, 2E11A Pressure HI 2K03 B3, 2E11A Turb Hood Press HI 2K03 E4, Vacuum pump 2C5B Auto Start 2K02 B14, Condenser Interlock				
		CRS		Enter 2203.019, Loss of condenser vacuum and direct the following actions: <ul style="list-style-type: none"> • Verify both vacuum pumps running • Reduce MTG load to maintain Tc less than 554.7°F and condenser vacuum < 6.5 inHg. • Commence emergency boration using exhibit 1. • Secure Emergency boration when condenser vacuum is < 6.5 inHg. • Enter Tcold Tech Spec 3.2.6, if Tc exceeds 554.7°F. 				
		CBOT		Reduce MTG load to maintain Tc less than 554.7°F and condenser vacuum < 6.5 inHg.				

Op-Test No.: 1			Scenario No.: 2			Event No.: 3		
Event Description: Trip 2P3B, 'B' Circulating Water Pump.								
Time	Position	Applicant's Actions or Behavior						
	ATC	Commence boration using Exhibit 1.						
	ATC	When vacuum is less than 6.5 inHg. Secure emergency boration.						
	CRS	Direct ATC to reduce commence a normal boration at power and reduce turbine load to maintain Tave vs Tref less than 2°F and to reduce condenser vacuum to less than 5.3in Hg ABS. Contact Ops Management. Call Reactor Engineering.						
	ATC	Align normal boration to RCS. Reduce turbine load to maintain Tave within 2° of Tref until condenser vacuum is less than 5.3 in Hg ABS. Insert CEA's to maintain ASI \pm .27 or as directed by CRS.						
Termination criteria: When ATC has completed reactivity manipulations or at discretion of lead examiner.								

Op-Test No.: 1			Scenario No.: 2			Event No.: 4		
Event Description: Excess Steam Demand on 'B' Steam Generator.								
Time		Position		Applicant's Actions or Behavior				
		ATC / CBOT		Recognize and announce indications of MS line break inside containment. Pressurizer level lowering. Pressurizer pressure lowering. Tave lowering. Plant Power rising. Steam and Feed flow rising. Containment pressure/temperature/humidity rising.				
		CRS		Direct ATC to manually trip the reactor and actuate main steam isolation, MSIS.				
		ATC		From 2C03, manually trip the reactor. Verify and announce that the reactor has tripped. Manually actuate MSIS.				
		CRS		Implement Standard Post Trip Actions , notify operators to monitor Exhibit 7 CBO Reactor Trip Checklist, track safety functions, and direct board operator actions.				

Op-Test No.: 1			Scenario No.: 2			Event No.: 4		
Event Description: Excess Steam Demand on 'B' Steam Generator.								
Time		Position		Applicant's Actions or Behavior				
		ATC		Check reactivity control: Reactor power decreasing. Report CEA 51 not inserted and emergency boration in progress. (Event 5)				
		ATC		Check inventory control: PZR level 16 to 80%. Report PZR level lowering and all CCP's running.				
		ATC		Check RCS pressure control: RCS pressure 1800 to 2300 psia. Report Pressurizer pressure is lowering and all heaters are off. Trip all Reactor Coolant Pumps due to valid CSAS.				

Op-Test No.: 1			Scenario No.: 2			Event No.: 4		
Event Description: Excess Steam Demand on 'B' Steam Generator.								
Time		Position		Applicant's Actions or Behavior				
		CBOT		Check maintenance of vital auxiliaries: Main turbine tripped. Generator output and exciter breakers open. All 4160v and 6900 v Non-Vital busses energized. ALL 4160v and 480v vital AC bus energized. EDG's running unloaded with service water aligned (SIAS) All 125v vital DC bus energized.				
		ATC		Check core heat removal by natural circulation (RCP's secured due to CSAS): Take all spray valve hand switches to manual and closed.				

Op-Test No.: 1			Scenario No.: 2			Event No.: 4		
Event Description: Excess Steam Demand on 'B' Steam Generator.								
Time		Position		Applicant's Actions or Behavior				
		CBOT		Check RCS Heat Removal: Report SG levels > 10% and main feed water is secured. Manually actuate EFW if not previously actuated. Secure feed to 'B' SG. (Event 6) Report feed water line intact. Report MSIS actuated. Line up to steam 'A' SG using 2CV1001(AOV) and 2CV1002(MOV) may start steaming 'A' SG but pressure must be maintained above 'B' SG pressure.				
		ATC		Check CNTMT parameters: Temperature greater than 140° F and rising. Pressure rising could be greater than 16 psia. Status of radiation alarms: CAMS (2K10-B6) NOT in alarm Area radiation (2K11-B10) NOT in alarm Process liquid (2K11-C10) NOT in alarm Secondary Sys Radiation Hi (2K11-A10) NOT in Alarm. Verify all containment cooling fans running with SW aligned Verify SIAS and CCAS actuated. Verify CSAS actuated but spray flow less than 1875GPM (Event 7)				

Op-Test No.: 1			Scenario No.: 2			Event No.: 4		
Event Description: Excess Steam Demand on 'B' Steam Generator.								
Time		Position		Applicant's Actions or Behavior				
		CRS		Notify SM to perform the following: SE report to control room. Announce reactor trip on plant page. Refer to Tech Specs and EALs.				
		CRS		Direct CBOs to acknowledge all control room annunciators and announce all significant alarms. Diagnose Excess Steam Demand EOP entry.				
		ALL		Perform crew brief and review floating steps.				

Op-Test No.: 1		Scenario No.: 2	Event No.: 4
Event Description: Excess Steam Demand on 'B' Steam Generator.			
Time	Position	Applicant's Actions or Behavior	
	CRS	<p>Implement Excess Steam Demand procedure, OP 2202.005, and direct the following actions:</p> <ul style="list-style-type: none"> • Verify Steam Generator Sample Valves OPEN • Contact Chemistry to sample both steam Generators for activity • SM to refer to EAL's (Classify event as NUE 3.1, Uncontrolled SG depressurization resulting in MSIS) • Verify SIAS/MSIS actuated • Verify MSIV's closed • Verify service water pumps running / maintain SW pressure greater than 85 psig / SW aligned to CCW and ACW • Verify EDG running properly • Verify Vital and Non-vital electrical busses energized from off site power • Establish CCW flow to RCP's • Verify 'B' Steam Generator with ESD • Isolate 'B' SG using attachment 10 • Direct board operators to maintain post SG blow down RCS temperature and pressure • Direct board operators to override High Pressure Safety Injection 	

Op-Test No.: 1			Scenario No.: 2			Event No.: 4		
Event Description: Excess Steam Demand on 'B' Steam Generator.								
Time		Position		Applicant's Actions or Behavior				
		CBOT		Establish CCW flow to RCP's using attachment 21, if not previously completed.				
CRITICAL STEP		CBOT / ATC		Maintain RCS temperature within P-T curve limits by steaming intact SG using EITHER of the following: <ul style="list-style-type: none"> • Upstream ADV. • Upstream ADV Isolation MOV. Maintain RCS pressure within P-T curve limits using PZR heaters and Attachment 27, Auxiliary PZR Spray Operation				
		CBOT / ATC		Override HPSI when the following are satisfied: <ul style="list-style-type: none"> • RCS MTS 30°F or greater. • PZR level greater than 29% [50%] and controlled. • RVLMS LVL 03 or higher elevation indicates WET. • At least ONE intact SG available for Heat Removal by EITHER of the following: <ul style="list-style-type: none"> ○ Level 10 to 90% [20 to 90%] with FW available. ○ Level being restored with total FW flow of 485 gpm or greater. Override HPSI - Throttle HPSI flow OR place HPSI pumps in PTL as needed to control RCS pressure, inventory and heat removal.				
Termination Criteria: RCS temperature and pressure stabilize and HPSI overridden with PZR controlled or at discretion of lead examiner.								

Op-Test No.: 1			Scenario No.: 2			Event No.: 5		
Event Description: One CEA fails to insert into the core requiring emergency boration by the ATC.								
Time		Position		Applicant's Actions or Behavior				
CRITICAL STEP		ATC		Recognize and announce that CEA 51 did not insert fully into the core. Perform Emergency Boration using Exhibit 1.				
		CRS		Recognize Technical Specification entry 3.1.1.1, Shutdown Margin				
Termination Criteria: Emergency Boration established or at discretion of lead examiner.								

Op-Test No.: 1			Scenario No.: 2			Event No.: 6		
Event Description: B' Emergency Feed Water (EFW) Pump to 'B' Steam Generator valves fail to close.								
Time		Position		Applicant's Actions or Behavior				
		CBOT		Recognizes and announces that on 2C17 2CV 1036-2 and 2CV 1075-1 are open and feeding 'B' Steam Generator.				
		CRS		Direct closing 2CV 1036-2 and 2CV 1075-1 or securing 2P7B, 'B' Emergency Feed Water pump. (May contact WCO to close valves locally) Recognize Technical Specification entry 3.7.1.2, Emergency Feed Water.				
		CBOT		On 2C17, attempted to override and close EFW valves to 'B' SG but will be unsuccessful. Places 2P7B in Pull-to-lock and verifies pump is secured.				
Termination criteria: When 'B' Emergency Feed Water Pump is secured or at lead examiner's discretion.								

Op-Test No.: 1			Scenario No.: 2			Event No.: 7		
Event Description: 'B' Spray Pump fails to start. 'A' Spray Pump cannot be restarted.								
Time		Position		Applicant's Actions or Behavior				
		CBOT		Recognizes and announces that both containment spray pumps have failed to start.				
		CRS		Directs CBOT to attempt manual start both containment spray pumps.				
CRITICAL STEP		CBOT		From 2C16, manually starts 'B' Containment Spray Pump, 2P35B and verifies > 1875gpm spray flow to containment. Reports than 'A' Containment Spray Pump will not start from control room.				
		CRS		Recognize Technical Specification entry 3.0.3, due to failure of BOTH containment spray pumps to automatically start.				
Termination criteria: When 'B' Containment Spray Pump started or at lead examiner's discretion.								