Job Performance Measure "A"

Facility: **Vogtle**

Task No: N/A

Title: Perform Control Rod Operability Test

JPM No: V-LO-JP-14410-HL17

K/A Reference: 001A2.17 RO 3.3 SRO 3.8

Examinee: ______________________ NRC Examiner: ______________

Facility Evaluator: ________________ Date: ____________________

<u>Method of testing:</u>

Simulated Performance ____________ Actual Performance _____________

Classroom __________ Simulator __________ Plant _________

NOTE: **For time considerations, the students may be allowed to "pre-brief" this JPM and allowed to review 14410-1 prior to starting the JPM.**

Read to the examinee:

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this job performance measure will be satisfied.

Initial Conditions: **Unit 1 is at 100% power. 14410-1, "Control Rod Operability Test" is to be performed. All prerequisites and initial conditions have been verified.**

Initiating Cue: **The SS has directed you as the OATC to perform 14410-1 starting with CBA.**

Task Standard: Candidate completes 14410-1 for CBA and manually trips reactor per AOP 18003-C guidance when two rods are dropped and performs IOAs of 19000-C, "Reactor Trip Or Safety Injection."

Required Materials: 14410-1, "Control Rod Operability Test" Ver.19.1 procedure copy with Section 4.0 completed.

General References: None

Time Critical Task: No

Validation Time: 15 minutes

SIMULATOR SETUP:

Simulator Setup:

1. Reset to IC # 211 for HL-17 NRC Exam

Simulator Setup from Scratch:

1. Reset to IC # 14 (100%, MOL)
2. Insert malfunction RD13A on Trigger 1
3. Insert malfunction RD13B on Trigger 1 with 10 sec delay

Setup time: 5 minutes

Performance Information

Critical steps denoted with an asterisk

Step 5.0 TEST STARTED _________ ___________ ___________

DATE TIME MODE

Standard: Candidate records DATE, TIME, and MODE.

Comment:

Candidate reviews NOTES prior to step 5.1.1:

> NOTES
>
> - This test is applicable to each control bank not fully inserted.
> - A reactor startup or shutdown, moving rods at least 10 steps, will satisfy this surveillance. The following instructions are written for the normal, all-banks-withdrawn condition.

Standard: Candidate reviews NOTES.

Comment:

Step 5.1.1 Record the INITIAL Group Step Counter and Individual Rod Position Indicator readings for the control bank being tested on Data Sheet 1.

Standard: Candidate should record group step counter position as 228 and individual rod position indicator readings as 228 on Data Sheet 1 and initials step for CBA.

Comment:

Step 5.1.2 Record the initial IPC Bank Demand readings for the control bank being tested on Data Sheet 1.

Standard: Candidate should record IPC Bank Demand readings as 228 on Data Sheet 1 and initials step for CBA.

Comment:

Step *5.1.3 Place ROD BANK SELECTOR SW 1-HS-40041 to the individual bank position for the control bank being tested.

Standard: Candidate places 1-HS-40041 in CBA and initials step for CBA.

CUE: If peer check is requested, "Peer Check request noted."

Comment:

NOTES

- QMCB Annunciator ALB10-D06 ROD DEV may energize in the next step when rods are inserted 10 steps.
- QMCB Annunciator ALB10-C04 ROD BANK LO LIMIT will energize in the next step if rod insertion to 10 steps above the RIL occurs.

Standard: Candidate reviews NOTES prior to step 5.1.4.

Comment:

Step *5.1.4 Using ROD MOTION SWITCH 1-HS-40040, insert the control bank being tested at least 10 steps as indicated on group step counters.

Standard: Candidate inserts Rods a minimum of 10 steps and initials step for CBA.

CUE: If peer check is requested, "Peer Check request noted."

Comment:

Step 5.1.5 Check RODS IN light is lit and a change in position occurs for each control rod being tested on the DRPI Display Panel.

Standard: Candidate observes RODS IN light and DRPI change for all rods and initials step for CBA.

Comment:

Step 5.1.6 Record the TEST Group Step Counter and Individual Rod Position Indicator readings of control bank being tested on Data Sheet 1.

Standard: Candidate records readings for group 1 and 2 step counters on Data Sheet 1 and individual DRPI readings Data Sheet 1 and initials step for CBA.

Comment:

Step 5.1.7 Record the test IPC Bank Demand reading for the control bank being tested on Data Sheet 1.

Standard: Candidate records IPC Bank Demand readings on Data Sheet 1 and initials step for CBA.

Comment:

Step *5.1.8 Using ROD MOTION SWITCH 1-HS-40040, withdraw the control bank being tested to the INITIAL position recorded on Group Step Counter(s) in Step 5.1.1 or as required by plant conditions.

Standard: Candidate withdraws CBA to 228 steps on group step counters and initials step for CBA. Rods can be withdrawn up to 230 steps if they are returned to 228 steps with SS approval.

CUE: If peer check is requested, "Peer Check request noted."

CUE: If rods are withdrawn >228 steps and SS approval requested, "Return CBA to 228 steps."

Comment:

Step 5.1.9 Check RODS OUT light is lit and individual control rod movement occurs on the DRPI Display Panel.

Standard: Candidate observes RODS OUT light and DRPI indication changes and initials step for CBA.

Comment:

CAUTIONS

- If energized, ALB10-C04 should reset when rods are withdrawn at, or just prior to, 228 steps. In the following step, rods should NOT be withdrawn greater than 228 steps.
- SS approval shall be obtained prior to exceeding 228 steps.

Standard: Candidate reviews cautions prior to step 5.1.10.

Comments:

Step 5.1.10 IF ALB10-C04 ROD BANK LO LIMIT energized when rods were inserted AND did NOT reset, when rods were withdrawn to the ARO position, perform the following:

a. WITHDRAW rods until the alarm resets (228 steps shall NOT be exceeded without SS approval).

Standard: Candidate determines step is N/A and N/A placed in CBA initial block.

Comment:

Step 5.1.10 b. WHEN ALB10-C04 has reset, INSERT rods back to the ARO position.

Standard: Candidate determines step is N/A and N/A placed in CBA initial block.

Comment:

Step 5.1.11 Record the AS LEFT Group Step Counter and Individual Rod Position Indicator readings of the control bank being tested on Data Sheet 1.

Standard: Candidate records readings on Data Sheet 1. See page 15 for example.

Comment:

Step 5.1.12 Record final IPC Bank Demand reading for the control bank being tested on Data Sheet 1.

Standard: Candidate records readings on Data Sheet 1. See page 15 for example.

Comment:

Step 5.1.13 Based on a change (SAT) or no change (UNSAT) of position on DRPI for each rod in the bank for a change of at least 10 steps on group step counters, record Satisfactory (SAT) or Unsatisfactory (UNSAT) by initialing appropriate space on Data Sheet 1.

Standard: Candidate initials SAT space on Data Sheet 1. See page 15 for example.

Comment:

Step 5.1.14 Repeat Section 5.1 until all required Control Banks have been tested.

Standard: Candidate initials step and returns to Step 5.1.1.

Comment:

For Control Bank B

Sep 5.1.1 Record the INITIAL Group Step Counter and Individual Rod Position Indicator readings for the control bank being tested on Data Sheet 1.

Standard: Candidate should record group step counter position as 228 and individual rod position indicator readings as 228 on Data Sheet 1 and initials step for CBB. See page 15 for example.

Comment:

Step 5.1.2 Record the initial IPC Bank Demand readings for the control bank being tested on Data Sheet 1.

Standard: Candidate should record IPC Bank Demand readings as 228 on Data Sheet 1 and initials step for CBB. See page 15 for example.

Comment:

Step *5.1.3 Place ROD BANK SELECTOR SW 1-HS-40041 to the individual bank position for the control bank being tested.

Standard: Candidate places 1-HS-40041 in CBB and initials step for CBB.

CUE: If peer check is requested, "Peer Check request noted."

Comment:

NOTES
• QMCB Annunciator ALB10-D06 ROD DEV may energize in the next step when rods are inserted 10 steps. • QMCB Annunciator ALB10-C04 ROD BANK LO LIMIT will energize in the next step if rod insertion to 10 steps above the RIL occurs.

Standard: Candidate reviews NOTES prior to step 5.1.4.

Comment:

Step 5.1.4 Using ROD MOTION SWITCH 1-HS-40040, insert the control bank being tested at least 10 steps as indicated on group step counters.

Standard: Candidate inserts Rods.

CUE: If peer check is requested, "Peer Check request noted."

NOTE to Sim operator: Insert Trigger 1 after rod motion is initiated.

Comment:

Candidate observes two rods dropped.

Standard: Candidate observes DRPI indication for rods H6 and H10 rod bottom light lit and the following alarms:

ALB10-C02	POWER RANGE CHANNEL DEVIATION (Will alarm and subsequently clear if acknowledged)
ALB10-D06	ROD DEV
ALB10-E05	ROD AT BOTTOM
ALB10-F05	TWO OR MORE RODS AT BOTTOM

Comment:

Annunciator response procedure 17010-1 performed for window F05 , TWO OR MORE RODS AT BOTTOM

1.0 **PROBABLE CAUSE**

1. Two or more dropped rods.

2. Loss of 120V AC power to Data A and Data B cabinets.

2.0 **AUTOMATIC ACTIONS**

NONE

NOTE
The alarm is enabled when the shutdown banks are fully withdrawn and control bank A is more than 12 steps off the bottom.

3.0 **INITIAL OPERATOR ACTIONS**

Go to 18003-C, "Rod Control System Malfunction".

4.0 **SUBSEQUENT OPERATOR ACTIONS**

NONE

5.0 **COMPENSATORY OPERATOR ACTIONS**

NONE

NOTE to examiner: The candidate may also enter 18003-C directly as symptoms are met.

Standard: Candidate going to 18003-C, “Rod Control System Malfunction” OR immediately tripping the reactor is acceptable. If the reactor is not tripped within 5 minutes (Power Range Upper and Lower Detector Hi Flux Deviation-QPTR alarms) of the rod drop, this step becomes critical and performance is unsatisfactory.

Comment:

18003-C, "Rod Control System Malfunction" entered.

Standard: Candidate enters procedure and selects Section A.

Comment:

Step A1 Stop any load changes in progress.

Standard: Candidate checks Main Turbine At Set Load light lit and MWs steady.

Comment:

Step A2 Check the following:

a. DRPI - AVAILABLE.

Standard: DRPI LED display lit.

Comment:

Step A2 b. Only one Rod dropped by observing DRPI.

Standard: Candidate determines two rods dropped and goes to the RNO column.

Comment:

***Step A2 RNO** **Trip the Reactor** and Go to 19000 C, E 0 REACTOR TRIP OR SAFETY INJECTION.

Standard: Candidate trips reactor using either the A panel or C panel Reactor Trip handswitch and performs Immediate Operator Actions (IOAs) of 19000-C. If candidate goes past this step without tripping the reactor this step performance is unsatisfactory.

Step 1 Checks Reactor trip:
Rod Bottom Lights - **LIT**
Reactor Trip and Bypass Breakers - **OPEN**
Neutron Flux – **LOWERING**

Step 2 Check Turbine trip:
All Turbine Stop Valves - **CLOSED.**

Step 3 Check power to AC Emergency Busses:
Both busses –energized

Step 4 Check if SI is actuated:
Any SI annunciator – LIT. **NO**
SI ACTUATED BPLB window – LIT. **NO**

Step 4 RNO Check if SI is required:
If one or more of the following conditions has occurred:

PRZR pressure $\leq$ 1870 psig. **NO**
Steam line pressure $\leq$585 psig. **NO**
Containment pressure $\geq$ 3.8 psig. **NO**
Automatic alignment of ECCS equipment. **NO**

CUE: When IOAs complete, "Another operator will perform 19000-C,"Reactor Trip or Safety Injection".

Comment:

Terminating cue: Student returns initiating cue sheet.

Verification of Completion

Job Performance Measure No. V-NRC-JP-14410-HL17

Examinee's Name:

Examiner's Name:

Date Performed:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:____

____

____

Response:____

____

____

____

Result: Satisfactory/Unsatisfactory

Examiner's signature and date: ______________________________ ________

DATA SHEET 1 - CONTROL ROD OPERABILITY TEST

CON+TROL BANK	POSITION (STEPS)			MOVEMENT	
	INITIAL	TEST	AS LEFT	SAT	UNSAT
CBA					
Group 1 Step Counter	228	218	228		
DRPI H6	228	216	228	INITIALS	
DRPI H10	228	216	228	INITIALS	
Group 2 Step Counter	228	218	228		
DRPI F8	228	216	228	INITIALS	
DRPI K8	228	216	228	INITIALS	
IPC Bank Demand	228	218	228	INITIALS	
CBB					
Group 1 Step Counter	228				
DRPI F2	228				
DRPI B10	228				
DRPI K14	228				
DRPI P6	228				
Group 2 Step Counter	228				
DRPI B6	228				
DRPI F14	228				
DRPI P10	228				
DRPI K2	228				
IPC Bank Demand	228				
CBC					
Group 1 Step Counter					
DRPI H2					
DRPI B8					
DRPI H14					
DRPI P8					
Group 2 Step Counter					
DRPI F6					
DRPI F10					
DRPI K10					
DRPI K6					
IPC Bank Demand					

Initial Conditions: Unit 1 is at 100% power. 14410-1, "Control Rod Operability Test" is to be performed. All prerequisites and initial conditions have been verified.

Initiating Cue: The SS has directed you as the OATC to perform 14410-1 starting with CBA.

CONTROL ROD OPERABILITY TEST

PROCEDURE USAGE REQUIREMENTS		SECTIONS
Continuous Use:	Procedure must be open and readily available at the work location. Follow procedure step by step unless otherwise directed.	**ALL**
Reference Use:	Procedure or applicable section(s) available at the work location for ready reference by person performing steps.	**NONE**
Information Use:	Available on plant site for reference as needed.	**NONE**

TABLE OF CONTENTS

1.0 PURPOSE

1.1 The purpose of this procedure is to demonstrate the operability of the Shutdown and Control Rods.

1.2 This test satisfies surveillance requirements of Technical Specification SR 3.1.4.2.

1.3 The frequency of this surveillance is at least once every 92 days.

2.0 APPLICABILITY

This surveillance is required for Modes 1 and 2.

3.0 PRECAUTIONS AND LIMITATIONS

3.1 Changes in turbine load and boron concentration should be avoided during this test.

3.2 The reactor shall be monitored during all rod manipulations for any abnormal conditions.

3.3 Plant conditions shall be stable after a bank has been tested before testing the next bank.

3.4 Before transferring to AUTOMATIC reactor control, Tavg shall be within ±1°F of Tref.

3.5 Both groups for each rod bank shall be at the same step counter position prior to repositioning bank.

3.6 Overlap rod bank motion is preserved only if the Rod Bank Selector Switch is in MANUAL or AUTO.

3.7 Tavg/Tref deviation shall be maintained less than or equal to 3°F.

3.8 The Shift Supervisor (SS) shall be notified immediately if unsatisfactory rod movement occurs.

3.9 When the ARO position is less than 228 steps, it may be necessary to withdraw rods to 228 steps, to reset ALB10-C04, then insert rods back to the ARO position.

3.10 An attempt to withdraw a group or bank past 231 steps will result in an error between indicated demand position and actual position. Control or Shutdown banks CANNOT be physically withdrawn greater than 231 steps.

3.11 If demand for any Rods in the Control Banks A, B, C, or D or Shutdown Banks A or B exceeds 231 steps it will be necessary to reset demand position on Step Counters, Bank Overlap Unit, Master Cycler, and the IPC.

INITIALS

4.0 PREREQUISITES OR INITIAL CONDITIONS

4.1 The SS shall verify this surveillance test does not affect other tests presently in progress or jeopardize plant operation prior to granting approval to perform this surveillance test. EMT

SS APPROVAL

4.2 **Notify** Chemistry that Control Rod Operability will be performed and **record** name of individual notified in the Unit control log. EMT

4.3 **Verify** the Digital Rod Position Indication System is operable. EMT

4.4 **Verify** Tavg is within ±1°F of Tref. EMT

4.5 **Verify** that 1 of the 3 group select lights (Group A, B, or C) are illuminated on each of the 5 Rod Control Power Supply Cabinets prior to any rod movement. This will verify that fuses FU61 or FU62 are not blown. EMT

INITIALS

5.0 INSTRUCTIONS

TEST STARTED ________ ________ ________
DATE TIME MODE

5.1 CONTROL BANK OPERABILITY TEST

CBA/CBB/CBC/CBD

> NOTES
>
> - This test is applicable to each control bank not fully inserted.
> - A reactor startup or shutdown, moving rods at least 10 steps, will satisfy this surveillance. The following instructions are written for the normal, all-banks-withdrawn condition.

5.1.1 **Record** the INITIAL Group Step Counter and Individual Rod Position Indicator readings for the control bank being tested on Data Sheet 1. ___/___/___/___

5.1.2 **Record** the initial IPC Bank Demand reading for the control bank being tested on Data Sheet 1. ___/___/___/___

5.1.3 **Place** ROD BANK SELECTOR SW 1-HS-40041 to the individual bank position for the control bank being tested. ___/___/___/___

> NOTES
>
> - QMCB Annunciator ALB10-D06 ROD DEV may energize in the next step when rods are inserted 10 steps.
> - QMCB Annunciator ALB10-C04 ROD BANK LO LIMIT will energize in the next step if rod insertion to 10 steps above the RIL occurs.

5.1.4 Using ROD MOTION SWITCH 1-HS-40040, **insert** the control bank being tested at least 10 steps as indicated on group step counters. ___/___/___/___

INITIALS

5.1.5 **Check** RODS IN light is lit and a change in position occurs for each control rod being tested on the DRPI Display Panel. ___/___/___/___

5.1.6 **Record** the TEST Group Step Counter and Individual Rod Position Indicator readings of control bank being tested on Data Sheet 1. ___/___/___/___

5.1.7 **Record** the test IPC Bank Demand reading for the control bank being tested on Data Sheet 1. ___/___/___/___

5.1.8 Using ROD MOTION SWITCH 1-HS-40040, **withdraw** the control bank being tested to the INITIAL position recorded on Group Step Counter(s) in Step 5.1.1 or as required by plant conditions. ___/___/___/___

5.1.9 **Check** RODS OUT light is lit and individual control rod movement occurs on the DRPI Display Panel. ___/___/___/___

CAUTIONS

- If energized, ALB10-C04 should reset when rods are withdrawn at, or just prior to, 228 steps. In the following step, rods should NOT be withdrawn greater than 228 steps.
- SS approval shall be obtained prior to exceeding 228 steps.

5.1.10 IF ALB10-C04 ROD BANK LO LIMIT energized when rods were inserted AND did NOT reset, when rods were withdrawn to the ARO position, perform the following:

a. **Withdraw** rods until the alarm resets (228 steps shall NOT be exceeded without SS approval). ___/___/___/___

b. WHEN ALB10-C04 has reset, **insert** rods back to the ARO position. ___/___/___/___

INITIALS

5.1.11 **Record** the AS LEFT Group Step Counter and Individual Rod Position Indicator readings of the control bank being tested on Data Sheet 1. ___/___/___/___

5.1.12 **Record** final IPC Bank Demand reading for the control bank being tested on Data Sheet 1. ___/___/___/___

5.1.13 Based on a change (SAT) or no change (UNSAT) of position on DRPI for each rod in the bank for a change of at least 10 steps on group step counters, **record** Satisfactory (SAT) or Unsatisfactory (UNSAT) by initialing appropriate space on Data Sheet 1. ___/___/___/___

5.1.14 **Repeat** Section 5.1 until all required Control Banks have been tested. ___/___/___/___

INITIALS

5.2 SHUTDOWN BANK OPERABILITY TEST

SBA/SBB/SBC/SBD/SBE

NOTES

- This test is applicable to each shutdown bank not fully inserted.
- A reactor startup or shutdown, moving rods at least 10 steps, will satisfy this surveillance. The following instructions are written for the normal, all-banks-withdrawn condition.

5.2.1 **Record** the INITIAL Group Step Counter and Individual Rod Position Indicator readings for the shutdown bank being tested on Data Sheet 1. ___/___/___/___/___

5.2.2 **Place** ROD BANK SELECTOR SW 1-HS-40041 to the individual bank position for the shutdown bank being tested. ___/___/___/___/___

NOTE

QMCB Annunciator ALB10-D06 ROD DEV may energize in the next step when rods are inserted 10 steps.

5.2.3 Using ROD MOTION SWITCH 1-HS-40040, **insert** the shutdown bank being tested at least 10 steps as indicated on group step counters. ___/___/___/___/___

5.2.4 **Check** RODS IN light is lit and a change in position occurs for each shutdown rod on the DRPI Display Panel. ___/___/___/___/___

5.2.5 **Record** the TEST Group Step Counter and Individual Rod Position Indicator readings of shutdown bank being tested on Data Sheet 1. ___/___/___/___/___

5.2.6 Using ROD MOTION SWITCH 1-HS-40040, **withdraw** the shutdown bank being tested to the INITIAL position recorded on Group Step Counter(s) in Step 5.2.1 or as required by plant conditions. ___/___/___/___/___

		INITIALS
5.2.7	**Check** RODS OUT light is lit and individual shutdown rod movement occurs on the DRPI Display Panel.	___/___/___/___/___
5.2.8	**Record** the AS LEFT Group Step Counter and Individual Rod Position Indicator readings of the shutdown bank being tested on Data Sheet 1.	___/___/___/___/___
5.2.9	**Check** IPC indication agrees with Group Step Counter and Individual Rod Position Indicators.	___/___/___/___/___
5.2.10	Based on a change (SAT) or no change (UNSAT) of position on DRPI for each rod in the bank for a change of at least 10 steps on group step counters, **record** Satisfactory (SAT) or Unsatisfactory (UNSAT) by initialing appropriate space on Data Sheet 1.	___/___/___/___/___
5.2.11	**Repeat** section 5.2 until all required Shutdown Banks have been tested.	___/___/___/___/___

5.3 RESTORATION

5.3.1	IF required, **reset** ALL RODS OUT position per Attachment 1.	________
5.3.2	At the completion of all bank testing, **verify** ROD BANK SELECTOR SW 1-HS-40041 is in auto or manual as directed by the SS.	
	AUTO	________
		________ IV
	MANUAL	________
		________ IV

6.0 ACCEPTANCE CRITERIA

Each Shutdown and Control Rod NOT fully inserted moves freely as indicated by change of position on DRPI for a change of at least 10 steps on Group Step Counters.

7.0 EVALUATION AND REVIEW

7.1 TEST PURPOSE

☐ Surveillance

☐ Maintenance Retest

☐ Other (explain) ______________________________

7.2 Results obtained through performance of this procedure meet ACCEPTANCE CRITERIA of Section 6.0.

☐ YES ☐ NO

7.3 IF NO was checked, **notify** the SS and **refer** to Technical Specification LCO 3.1.4

7.4 Comments (include any abnormal conditions and corrective actions taken):

____

____

____

Test Completed and SS Notified: ______________________________

Signature Date/Time

Supervisory Review: ______________________________

Signature Date/Time

8.0 REFERENCES

- Technical Specifications

COMMITMENTS

1984300229 1985303147 1986307730 1995329967 1984300229
1985303147 1986307730

END OF PROCEDURE TEXT

DATA SHEET 1 - CONTROL ROD OPERABILITY TEST

Sheet 1 of 3

CONTROL BANK	POSITION (STEPS)			MOVEMENT	
	INITIAL	TEST	AS LEFT	SAT	UNSAT
CBA					
Group 1 Step Counter					
DRPI H6					
DRPI H10					
Group 2 Step Counter					
DRPI F8					
DRPI K8					
IPC Bank Demand					
CBB					
Group 1 Step Counter					
DRPI F2					
DRPI B10					
DRPI K14					
DRPI P6					
Group 2 Step Counter					
DRPI B6					
DRPI F14					
DRPI P10					
DRPI K2					
IPC Bank Demand					
CBC					
Group 1 Step Counter					
DRPI H2					
DRPI B8					
DRPI H14					
DRPI P8					
Group 2 Step Counter					
DRPI F6					
DRPI F10					
DRPI K10					
DRPI K6					
IPC Bank Demand					

DATA SHEET 1 - CONTROL ROD OPERABILITY TEST Sheet 2 of 3

CONTROL BANK	POSITION (STEPS)			MOVEMENT	
	INITIAL	TEST	AS LEFT	SAT	UNSAT
CBD					
Group 1 Step Counter	______	______	______		
DRPI D4	______	______	______	______	______
DRPI M12	______	______	______	______	______
Group 2 Step Counter	______	______	______		
DRPI D12	______	______	______	______	______
DRPI M4	______	______	______	______	______
DRPI H8	______	______	______	______	______
IPC Bank Demand	______	______	______	______	______

SHUTDOWN BANK	POSITION (STEPS)			MOVEMENT	
	INITIAL	TEST	AS LEFT	SAT	UNSAT
SBA					
Group 1 Step Counter	______	______	______		
DRPI D2	______	______	______	______	______
DRPI B12	______	______	______	______	______
DRPI M14	______	______	______	______	______
DRPI P4	______	______	______	______	______
Group 2 Step Counter	______	______	______		
DRPI B4	______	______	______	______	______
DRPI D14	______	______	______	______	______
DRPI P12	______	______	______	______	______
DRPI M2	______	______	______	______	______
SBB					
Group 1 Step Counter	______	______	______		
DRPI G3	______	______	______	______	______
DRPI C9	______	______	______	______	______
DRPI J13	______	______	______	______	______
DRPI N7	______	______	______	______	______
Group 2 Step Counter	______	______	______		
DRPI C7	______	______	______	______	______
DRPI G13	______	______	______	______	______
DRPI N9	______	______	______	______	______
DRPI J3	______	______	______	______	______

DATA SHEET 1 - CONTROL ROD OPERABILITY TEST

SHUTDOWN BANK	POSITION (STEPS)			MOVEMENT	
	INITIAL	TEST	AS LEFT	SAT	UNSAT
SBC					
Group 1 Step Counter	______	______	______		
DRPI E3	______	______	______	______	______
DRPI C11	______	______	______	______	______
DRPI L13	______	______	______	______	______
DRPI N5	______	______	______	______	______
SBD					
Group 1 Step Counter	______	______	______		
DRPI C5	______	______	______	______	______
DRPI E13	______	______	______	______	______
DRPI N11	______	______	______	______	______
DRPI L3	______	______	______	______	______
SBE					
Group 1 Step Counter	______	______	______		
DRPI H4	______	______	______	______	______
DRPI D8	______	______	______	______	______
DRPI H12	______	______	______	______	______
DRPI M8	______	______	______	______	______

Data Sheet Completed By: ______________________________________

Signature Date/Time

ATTACHMENT 1 - RESETTING ALL RODS OUT (ARO) POSITION

Sheet 1 of 3

INITIALS

1.0 To reset All Rods Out (ARO) Position, perform the following:

> **NOTE**
>
> Resetting All Rods Out position should be performed when there will be minimum impact on AFD oscillations.

a. **Obtain** Shift Supervisor approval to reset ARO position. ________

b. **Notify** Reactor Engineering (RE) that Control Rod ARO Position is being reset and **request** RE to adjust Plant Computer software in accordance with 87046-C, "All Rods Out Repositioning." ________

c. **Determine** desired new ARO position from Reactor Engineering. ________

> **NOTES**
>
> - A rod bank should not be positioned to the ARO position unless already at a stable power level that will sustain the ARO position.
> - After repositioning, all rod banks must have the same relative position as before. Rod tip-to-tip distance must not change.

d. **Verify** both groups for each rod bank are at the same step-counter position prior to bank repositioning. ________

e. **Maintain** Tavg at program by adjusting turbine load or RCS boron concentration. ________

f. **Record** the initial IPC Bank Demand Position for all Control Banks in the Unit Control Log. ________

g. **Verify** Tavg-Tref are matched. ________

h. **Review** Precautions 3.10 and 3.11. ________

ATTACHMENT 1 - RESETTING ALL RODS OUT (ARO) POSITION

Sheet 2 of 3

INITIALS

i. **Position** the ROD BANK SELECTOR SWITCH to the bank to be positioned:

SBE ☐ SBD ☐ SBC ☐ SBB ☐ SBA ☐

CBD ☐ CBC ☐ CBB ☐ CBA ☐

CAUTIONS

- Do NOT insert rods below the insertion limits as required by Technical Specifications LCO 3.1.5 or LCO 3.1.6.
- Partially inserted control banks must be moved the same number of steps as fully withdrawn banks to maintain proper bank overlap.

j. **Withdraw** or **insert** the selected bank the required number of steps:

SBE ☐ SBD ☐ SBC ☐ SBB ☐ SBA ☐

CBD ☐ CBC ☐ CBB ☐ CBA ☐

k. **Repeat** Steps 1.0.i and 1.0.j until all rods have been positioned. ________

l. At the completion of all bank testing, **place** ROD BANK SELECTOR SW 1-HS-40041 in auto or manual as directed by the SS.

AUTO ________

____
IV

MANUAL ________

____
IV

m. **Record** the new ARO Position in Unit Control Log. ________

ATTACHMENT 1 - RESETTING ALL RODS OUT (ARO) POSITION Sheet 3 of 3

INITIALS

n. **Check** IPC Bank Demand Position Display is accurate: ________

o. IF required, **Reset** IPC bank demand (steps) to agree with Rod Bank Step counters per 13505-1 Section 4.3.1. ________

p. **Record** final displays in the Unit Control Log. ________

q. **Notify** Reactor Engineering (RE) that ARO Repositioning is complete, and **request** RE to verify Plant Computer software has been adjusted. ________

Job Performance Measure “B”

Facility: **Vogtle**

Task No: V-LO-TA-37009

Task Title: Transfer ECCS Pumps To Cold Leg Recirculation

JPM No: V-NRC-JP-19013-HL17

K/A Reference: 006A4.05 RO 3.9 SRO 3.8

Examinee: ______________________ NRC Examiner: ______________________

Facility Evaluator: __________________ Date: __________________________

<u>Method of testing:</u>

Simulated Performance ________________ Actual Performance ________________

Classroom __________ Simulator __________ Plant ___________

Read to the examinee:

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this job performance measure will be satisfied.

THIS IS A TIME CRITICAL JP M

Initial Conditions:	**A large break LOCA has occurred. While performing 19010-C, “Loss of Reactor or Secondary Coolant”, RWST level decreased below 29%. Transition to 19013-C is required based on foldout page guidance.**
Initiating Cue:	**The SS has directed you to “Transfer the ECCS pumps to cold leg recirculation using 19013-C”.**

Task Standard: Determines Cold Leg recirculation flow path **NOT** available per 19013-C, Attachment A and a transition is required to 19111-C, Loss of Emergency Coolant Recirculation.

Required Materials: 19013-C, "Transfer to Cold Leg Recirculation" Ver. 29.0.

General References: None

Time Critical Task: Yes

Validation Time: 6 minutes

SIMULATOR SETUP:

Simulator Setup:

1. Reset to IC # 212 for HL-17 NRC Exam.

Simulator Setup from Scratch:

If new setup is required, then perform the following:

1. Reset to IC 14 (MOL 100%).
2. Override HV-8812A to the **OPEN** position.
3. Override HV-8811B to the **SHUT** position.
4. Insert malfunction RC03C at 100% (DBA LOCA)
5. Trip all RCPs
6. Reset SI
7. Allow simulation to run until RWST is 28% or after CNMT Emergency Sump levels are ≥ 14 inches, set RF: TK02 = 28% (RWST)
8. Ensure HV-8811A is **FULL OPEN**
9. Acknowledge/Reset alarms
10. Freeze Simulator

Setup time: 18 minutes

Performance Information

Critical steps denoted with an asterisk

START TIME FOR TIME CRITICAL__________

Reviews NOTES prior to step 1 regarding FRP implementation, steps 1 – 12 performance without delay, and RWST inventory time limits.

Standard: N/A

Comment:

Reviews CAUTION prior to step 1 regarding offsite power loss after SI reset.

Standard: N/A

Comment:

Step 1 Verifies SI reset.

Standard: Candidate verifies BPLP window 1.5 (white Auto SI blocked light) - ON

BPLP window 1.4 (red SI Actuated light) - OFF

Comment:

Step 2 Checks CNMT Emergency Sump levels $\geq$ 13.5 inches.

Standard: Candidate checks both LI-764 and LI-765 $\geq$ 13.5 inches (should be ~ 60+ inches)

Comment:

Step # 3 Initiate **ATTACHMENT A** to align ECCS Pumps to the Cold Leg Recirculation flow path and continue with Step 4.

CUE: "The SS will continue with step 4 while you perform Attachment A".

Standard: Candidate initiates ATTACHMENT A.

Comment:

ATTACHMENT A
COLD LEG RECIRCULATION VALVE ALIGNMENT

Step 1 Check CCW cooling for RHR heat exchangers.

a. CCW pumps - 2 running in each train.

b. CCW pumps discharge pressures and flows - NORMAL.

c. NSCW cooling for CCW heat exchangers:

- NCSW Pumps - TWO RUNNING EACH TRAIN.
- NSCW CLG TOWER Fans - FOUR IN AUTO EACH TRAIN.

Standard: Candidate determines the following:

2 CCW **and** 2 NSCW pumps per train

Red lights - ON
Green lights - OFF
Amber lights - OFF

CCW pressures – in green bands (PI-1874 and PI-1875 ~ 90 psig).

CCW flows – in green bands (FI-1876 and FI-1877 ~ 9500 gpm).

NSCW Cooling Tower Fans, all 8 hand switches in AUTO.

Comment:

Step 2 Align RHR Pump A flow path:

a. Check RHR Pump A - RUNNING.

Standard: Candidate checks HS-0620:

Red light - ON
Green light - OFF
Amber light - OFF

Comment:

Step 2.b Check CNMT SUMP TO RHR PMP-A SUCTION HV-8811A - OPEN.

Standard: Candidate checks HS-8811A: Red light - ON
Green light - OFF

Comment:

Step 2.c Close RWST TO RHR PMP-A SUCTION HV-8812A.

Standard: Attempts to close HV-8812A by turning hand switch counter clockwise to the left.
Candidate determines HV-8812A will **NOT** close.

Red light remains - ON
Green light remains - OFF

Comment:

***Step 2.c** **RNO - <u>IF</u> HV-8812A will not close, <u>THEN</u> stop RHR Pump A.**

Standard: Candidate places RHR pump A hand switch HS-0620 to STOP.

Green light - ON
Red light - OFF
Amber light - OFF

Goes to step 3.

Comment:

Step 3 Align RHR Pump B flow path:

a. Check RHR Pump B – RUNNING.

Standard: Candidate checks HS-0621:

Red light - ON
Green light - OFF
Amber light - OFF

Comment:

Step 3.b Check CNMT SUMP TO RHR PMP-B SUCTION HV-8811B – OPEN.

Standard: Candidate determines HV-8811B is CLOSED.

Green light - ON
Red light - OFF

Comment:

RNO *Step 3.b **<u>IF</u> HV-8811B is <u>NOT</u> open, <u>THEN</u> perform the following:**

1. Stop RHR Pump B.

STOP TIME FOR TIME CRITICAL__________

Standard: Candidate places RHR pump B hand switch HS-0621 to STOP.

Green light - ON
Red light - OFF
Amber light - OFF

Comment:

RNO 3.b.2 Close RWST TO RHR PMP-B SUCTION HV-8812B.

Standard: Candidate places places HS-8812B to the CLOSE position.

Green light - ON
Red light - OFF

Comment:

RNO 3.b.3 Open HV-8811B.

Standard: Attempts to open HV-8811B by placing rotating hand switch clock wise to open.

Candidate Determines HV-8811B will **NOT** open.

Red light remains - OFF
Green light remains - ON

Comment:

RNO 3.b.4 Start RHR Pump B.

Standard: Does **NOT** start RHR pump B which has no suction source.

NOTE: If candidate starts RHR pump B, the step would become critical and be evaluated as **UNSAT**.

CUE: If SS is notified No RHR pumps available, "SS acknowledges the report."

Comment:

RNO 3.b.5 Go to Step 3.d.

Standard: Goes to step 3.d.

Comment:

Step 3.d Check RHR PMP-B TO COLD LEG 3&4 ISO VLV HV-8809B – OPEN.

Standard: Candidate checks HS-8809B:

Red light - ON
Green light - OFF

Comment:

Step 3.e Check RHR Heat Exchanger B flow indicator FI-619A - GREATER THAN 500 GPM.

Standard: Candidate determines on FI-0619A that RHR flow is < 500 gpm (~ 0 gpm).

Comment:

RNO *Step 3.e <u>IF</u> no RHR Pump is delivering CNMT Sump water to its discharge header, <u>THEN</u> go to 19111-C, ECA-1.1 LOSS OF EMERGENCY COOLANT RECIRCULATION.

Standard: Candidate determines a transition to 19111-C is required and informs the SS.

CUE: "The SS will initiate 19111-C, ECA-1.1 Loss of Emergency Coolant Recirculation". Another operator will perform the actions of 19111-C".

Comment:

Terminating cue: Student returns initiating cue sheet

Verification of Completion

Job Performance Measure No. V-LO-JP-19013-HL17

Examinee's Name:

Examiner's Name:

Date Performed:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:____

Response:____

Result: Satisfactory/Unsatisfactory

Examiner's signature and date: ______________________________ _________

THIS IS A TIME CRITICAL JPM

Initial Conditions:	**A large break LOCA has occurred. While performing 19010-C, "Loss of Reactor or Secondary Coolant", RWST level decreased below 29%. Transition to 19013-C is required based on foldout page guidance.**
Initiating Cue:	**The SS has directed you to "Transfer the ECCS pumps to cold leg recirculation using 19013-C".**

EMERGENCY OPERATING PROCEDURE
CONTINUOUS USE

PURPOSE

This procedure provides the necessary instructions for transferring the ECCS and containment spray system to the cold leg recirculation mode. (Applicable in Modes 1, 2, and 3.)

ENTRY CONDITIONS

- 18004-C, REACTOR COOLANT SYSTEM LEAKAGE
- 19005-C, ES-0.0 REDIAGNOSIS
- 19010-C, E-1 LOSS OF REACTOR OR SECONDARY COOLANT
- 19012-C, ES-1.2 POST LOCA COOLDOWN AND DEPRESSURIZATION
- 19102-C, ECA-0.2 LOSS OF ALL AC POWER RECOVERY WITH SI REQUIRED
- 19121-C, ECA-2.1 UNCONTROLLED DEPRESSURIZATION OF ALL STEAM GENERATORS
- 19131-C, ECA-3.1 SGTR WITH LOSS OF REACTOR COOLANT: SUBCOOLED RECOVERY DESIRED
- 19132-C, ECA-3.2 SGTR WITH LOSS OF REACTOR COOLANT SATURATED RECOVERY DESIRED
- 19221-C, FR-C.1 RESPONSE TO INADEQUATE CORE COOLING
- 19222-C, FR-C.2 RESPONSE TO DEGRADED CORE COOLING
- 19223-C, FR-C.3 RESPONSE TO SATURATED CORE COOLING
- 19231-C, FR-H.1 RESPONSE TO LOSS OF SECONDARY HEAT SINK
- 19241-C, FR-P.1 RESPONSE IMMINENT PRESSURIZED THERMAL SHOCK CONDITION
- 19261-C, FR-I.1 RESPONSE TO HIGH PRESSURIZER LEVEL
- 19262-C, FR-I.2 RESPONSE TO LOW PRESSURIZER LEVEL
- 19263-C, FR-I.3 RESPONSE TO VOIDS IN REACTOR VESSEL

MAJOR ACTIONS

- Align SI system for recirculation.
- Align Containment spray system for recirculation if necessary.

CONTINUOUS ACTIONS

Step	Actions
__ 1 CAUTION	– Monitor 4160V AC Emergency Busses to restart ESF equipment.
__ 7	– Monitor RWST level less than 8% to stop any ECCS pumps taking suction from it.
__ 8	– Monitor RCS pressure greater than 1625 psig to stop SI pumps.
__ 15	– Monitor RHR pump suction condition for CNMT sump blockage.
__ 16	– Monitor RWST level less than 8% to place CNMT Spray in Recirc mode.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTES

- FRPs should not be implemented until at least one flow path exists from the CNMT Sump to the RCS Cold Legs and the completion of Step 12.
- Steps 1 through 12 should be performed without delay.
- The RWST inventory between the RWST LO-LO and Empty alarms is sufficient for a minimum of approximately 11 minutes of ECCS injection flow assuming that the RHR pumps are isolated from the RWST or stopped within the first 6 minutes after the RWST LO-LO alarm is received.

CAUTION

If offsite power is lost after SI reset, action is required to restart the following ESF equipment if plant conditions require their operation:

- RHR Pumps
- SI Pumps
- Post-LOCA Cavity Purge Units
- Containment Coolers in low speed (Started in high speed on a UV signal).
- ESF Chilled Water Pumps (If CRI is reset).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__1. Verify SI Reset.	1. IF SI will NOT reset, THEN initiate ATTACHMENT B.
__2. CNMT Emergency Sump level - GREATER THAN OR EQUAL TO 13.5 INCHES: LI-764 LI-765	__2. IF CNMT Sump level indicators LI-764 and LI-765 are both less than 13.5 INCHES, THEN stop RHR Pumps A and B and go to 19111-C, ECA-1.1 LOSS OF EMERGENCY COOLANT RECIRCULATION.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__3. Initiate ATTACHMENT A to align ECCS Pumps to the Cold Leg Recirculation flowpath and continue with Step 4.	
__4. Notify Health Physics that radiation levels in the Auxiliary Building will change when Cold Leg Recirculation is established.	
__5. Make a page announcement to clear personnel from the Auxiliary Building prior to initiating Cold Leg Recirculation.	
__6. Initiate Continuous Actions Page.	
__*7. **Check RWST level – GREATER THAN 8%.**	__*7. Stop any ECCS Pumps taking suction from the RWST.
*8. **Check if SI pumps should be stopped.**	
__a. RCS pressure - GREATER THAN 1625 PSIG.	__a. IF RCS pressure rises to greater than 1625 psig, THEN stop SI Pumps. __ Go To Step 9.
__b. Stop SI Pumps.	
__9. Check ATTACHMENT A - COMPLETE.	__9. Do NOT continue with this procedure until ATTACHMENT A has been COMPLETED.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. Restart the ECCS Pumps in the following order as necessary:	
__a. RHR	
__b. SI	
__c. CCP	
11. Isolate ECCS Pumps from RWST:	
a. Close RWST TO CCP A&B SUCTION Valves:	
__• LV-112D __• LV-112E	
__b. Place lockout selector switch HS-8806A, RWST TO SI PMP ISO VLV to the ON position.	
__c. Close RWST TO SI PUMPS HV-8806.	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
12. Check at least one flow path exists from CNMT Sump to RCS Cold Legs:	__12. Recheck valve alignment and Pump status.
RCS Cold Leg injection from CCPs:	__IF one complete injection path can NOT be established between the CNMT Sump and the RCS Cold Legs, THEN go to 19111-C, ECA-1.1 LOSS OF EMERGENCY COOLANT RECIRCULATION.
__a. RHR supplying CCP suction header.	
__b. CCP(s) injecting through the BIT.	
-OR-	
RCS Cold Leg injection from SIPs:	
__a. RHR supplying SIP suction header.	
__b. SIP(s) injecting into RCS Cold Legs.	
__13. FRP implementation may resume at this time.	
14. Dispatch an operator to the Shutdown Panels to disable RWST TO CCP A&B SUCTION Valves:	
a. At Shutdown Panel A:	
__• Place HS-0112H in local.	
__• Verify LV-0112D is closed.	

Step 14 continued on next page

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
b. At Shutdown Panel B: __• Place HS-0112F in local. __• Verify LV-0112E is closed.	
***15. Monitor RHR Pumps suction condition:** __• RHR Pump Amps – STABLE. IPC Points: J9623 J9624 __• Discharge Flow - NORMAL FOR RCS PRESSURE. IPC Points: F0626 F0627 __• Discharge Pressure - STABLE. IPC Points: P6310 P6311	*15. IF CNMT Sump blockage is suspected and at least one ECCS train appears to be unaffected, THEN: __a. Request guidance from the TSC. __b. Establish more frequent monitoring of RHR Pump suction conditions for blockage. __IF suspected CNMT Sump blockage prevents maintaining at least one ECCS train in the recirculation mode, THEN go to 19113-C, ECA-1.3 RECIRCULATION SUMP BLOCKAGE.
__***16. Check RWST level – LESS THAN OR EQUAL TO 8%.**	__*16. WHEN RWST level lowers to less than 8%, THEN return to Step 16 of this procedure. __Go to procedure and step in effect.

ACTION/EXPECTED RESPONSE — RESPONSE NOT OBTAINED

CAUTIONS

- The specified actions in Steps 17 through 19 should be promptly completed to avoid loss of CS Pump suction.
- Local observation of CS Pump suction and discharge pressure gauges should only be performed if radiation levels permit.

  UNIT 1 (AB D75) UNIT 2 (AB D06)

__17. Reset Containment Spray.

18. Align CS Pump A for recirculation:

a. Open CS Pump A suction valves from Containment Emergency Sump:

__• HV-9002A, CNMT SPRAY PUMP A CNMT SUMP SUCT IRC

__• HV-9003A, CNMT SPRAY PUMP A CNMT SUMP SUCT ORC

Response Not Obtained:

a. Locally open:

__ 1-HV-9003A (AB-C134)
__ 2-HV-9003A (AB-C124)

__ IF valves can NOT be opened, THEN stop CS Pump A.

__ Go to Step 19.

b. Close CNMT SPRAY PUMP A RWST SUCT ISO VLV:

__• HV-9017A

Step 18 continued on next page

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
c. Check Train A CS proper operation using the following indications, if available: __ Pump suction pressure PI-0972 - GREATER THAN 7 PSIG. __ Pump discharge pressure PI-0974 - APPROXIMATELY 185 PSIG ABOVE SUCTION PRESSURE. __ Containment pressure - STABLE <u>OR</u> LOWERING.	__c. Verify valve alignment correct: __• HV-9002A - OPEN __• HV-9003A - OPEN __• HV-9017A - CLOSED __• HV-9001A - OPEN
19. Align CS Pump B for recirculation:	
a. Open CS Pump B suction valves from Containment Emergency Sump: __• HV-9002B, CNMT SPRAY PUMP B CNMT SUMP SUCT IRC __• HV-9003B, CNMT SPRAY PUMP B CNMT SUMP SUCT ORC	a. Locally open: __ 1-HV-9003B (FHB-C08) __ 2-HV-9003B (FHB-C02) __ <u>IF</u> valves can <u>NOT</u> be opened, <u>THEN</u> stop CS Pump B. __ Go to Step 20.
b. Close CNMT SPRAY PUMP B RWST SUCT ISO VLV: __• HV-9017B	

Step 19 continued on next page

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
c. Check Train B CS proper operation using the following indications, if available:	c. Verify valve alignment correct.
__ Pump suction pressure PI-0973 - GREATER THAN 7 PSIG.	__• HV-9002B - OPEN __• HV-9003B - OPEN __• HV-9017B - CLOSED __• HV-9001B - OPEN
__ Pump discharge pressure PI-0975 - APPROXIMATELY 185 PSIG ABOVE SUCTION PRESSURE.	
__ Containment pressure - STABLE <u>OR</u> LOWERING.	
__20. Initiate RWST makeup using 13701, BORIC ACID SYSTEM	
21. Determine if transfer to HOT Leg Recirculation will be required:	__21. Consult TSC.
__• Entry was from 19010-C, E-1 LOSS OF REACTOR OR SECONDARY COOLANT.	
__22. Return to procedure and step in effect.	

END OF PROCEDURE TEXT

ATTACHMENT A

COLD LEG RECIRCULATION VALVE ALIGNMENT

1. Check CCW Cooling for RHR Heat Exchangers:

__a. CCW Pumps – TWO RUNNING IN EACH TRAIN.

a. Start or stop CCW Pumps as required to verify only two CCW Pumps running per train.

__ If three CCW Pumps were running, THEN check that CCW system pressure relief valves did not lift and remain open by monitoring the CCW Surge Tank levels on computer point(s) L2671 and L2672,

__b. CCW pump discharge pressures and flows – NORMAL.

b. Verify CCW system alignment by initiating 11715, COMPONENT COOLING WATER SYSTEM ALIGNMENT.

c. NSCW cooling for CCW Heat exchangers:

- __ NCSW Pumps – TWO RUNNING EACH TRAIN.
- __ NSCW CLG TOWER Fans - FOUR IN AUTO EACH TRAIN.

c. Perform the following:

- __ Start or stop NSCW pumps as required to verify only two NSCW pumps running per train.
- __ Start NSCW CLG TOWER Fans as required.

ATTACHMENT A

Sheet 2 of 7

COLD LEG RECIRCULATION VALVE ALIGNMENT

2. Align RHR Pump A flow path:

__a. Check RHR Pump A – RUNNING.

__a. Start RHR Pump A.

__ IF RHR Pump A can NOT be started, THEN go to Step 3.

__b. Check CNMT SUMP TO RHR PMP-A SUCTION HV-8811A - OPEN.

b. IF HV-8811A is NOT open, THEN perform the following:

__1) Stop RHR Pump A.

__2) Close RWST TO RHR PMP-A SUCTION HV-8812A.

__3) Open HV-8811A.

__4) Start RHR Pump A.

__5) Go to Step 2.d.

__c. Close RWST TO RHR PMP-A SUCTION HV-8812A.

__c. IF HV8812A will not close, THEN stop RHR Pump A.

__ Go to Step 3.

Step 2 continued on next page

ATTACHMENT A

COLD LEG RECIRCULATION VALVE ALIGNMENT

__d. Check RHR PMP-A TO COLD LEG 1&2 ISO VLV HV-8809A – OPEN.	__d. Open HV-8809A. __ IF HV-8809A can NOT be opened from QMCB or locally, THEN go to Step 3. 1-HV-8809A (AB-A09) 2-HV-8809A (AB-A103)
__e. Check RHR Heat Exchanger A flow indicator FI-618A – GREATER THAN 500 GPM.	__e. Recheck valve and pump status. __ Go to Step 3.
3. Align RHR Pump B flow path:	
__a. Check RHR Pump B – RUNNING.	__a. Start RHR Pump B. __ IF no RHR Pumps can be started, THEN go to 19111-C, ECA-1.1 LOSS OF EMERGENCY COOLANT RECIRCULATION.

Step 3 continued on next page

ATTACHMENT A

COLD LEG RECIRCULATION VALVE ALIGNMENT

__b. Check CNMT SUMP TO RHR PMP-B SUCTION HV-8811B – OPEN.	b. <u>IF</u> HV-8811B is <u>NOT</u> open, <u>THEN</u> perform the following: __1) Stop RHR Pump B. __2) Close RWST TO RHR PMP-B SUCTION HV-8812B. __3) Open HV-8811B. __4) Start RHR Pump B. __5) Go to Step 3.d.
__c. Close RWST TO RHR PMP-B SUCTION HV-8812B.	c. <u>IF</u> HV8812B will not close, <u>THEN</u> stop RHR Pump B. __ Go to Step 4.
__d. Check RHR PMP-B TO COLD LEG 3&4 ISO VLV HV-8809B – OPEN.	__d. Open HV-8809B. __ <u>IF</u> HV-8809B can <u>NOT</u> be opened from QMCB or locally, <u>THEN</u> go to Step 3.e 1-HV-8809B (FHB-A10) 2-HV-8809B (FHB-A01)
__e. Check RHR Heat Exchanger B flow indicator FI-619A - GREATER THAN 500 GPM.	__e. <u>IF</u> no RHR Pump is delivering CNMT Sump water to its discharge header, <u>THEN</u> go to 19111-C, ECA-1.1 LOSS OF EMERGENCY COOLANT RECIRCULATION.

ATTACHMENT A

Sheet 5 of 7

COLD LEG RECIRCULATION VALVE ALIGNMENT

4. Check if SI Pumps should be stopped.

__a. RCS pressure - LESS THAN 1625 PSIG.

__a. Stop SI Pumps.

__ Go to Step 5.

5. Align SI Pump(s) miniflow isolations:

__a. Place lockout selector switch HS-8813A, SIS PMPS MINI FLO ISO VLV to the ON position.

b. Close SIP miniflow isolation valves:

- __ HV-8813, SIS PMPS COMMON MINI FLOW ISO VLV
- __ HV-8814, SI PMP-A MINI FLOW ISO VLV
- __ HV-8920, SI PMP-B MINI FLOW ISO VLV

COLD LEG RECIRCULATION VALVE ALIGNMENT

6. Align CCP(s) miniflow isolations:

   a. Close CCP alternate miniflow isolation valves:

      __• HV-8508A, CCP-A RV TO RWST ISOLATION

      __• HV-8508B, CCP-B RV TO RWST ISOLATION

      __• HV-8509A, CCP-B RV TO RWST ISOLATION

      __• HV-8509B, CCP-A RV TO RWST ISOLATION

   b. Verify white Pressure Control Mode light - NOT LIT:

      __• HV-8508A, CCP-A RV TO RWST ISOLATION

      __• HV-8508B, CCP-B RV TO RWST ISOLATION

7. Align ECCS cross-connect and system isolation valves:

   a. Close RHR Pump discharge cross-connect isolation valves:

      __• HV-8716A, RHR TRAIN A TO HOT LEG CROSSOVER ISO

      __• HV-8716B, RHR TRAIN B TO HOT LEG CROSSOVER ISO

Step 7 continued on next page

ATTACHMENT A

COLD LEG RECIRCULATION VALVE ALIGNMENT

b. Open CCP suction header to SIP suction header cross-connect isolation valves:

__• HV-8924, SI PMP-A SUCTION XCONN TO CCP SUCTION HEADER

__• HV-8807A, SI PMP-A SUCTION XCONN TO CCP SUCTION HEADER

__• HV-8807B, SI PMP-A SUCTION XCONN TO CCP SUCTION HEADER

c. Open RHR to CCP and SIP suction isolation valves:

__• HV-8804A, RHR PMP-A DISCH TO CHG PMPS SUCT

__• HV-8804B, RHR TO SI PMP-B ISO VLV

ATTACHMENT B

Sheet 1 of 1

RESPONSE TO INADVERTENT SI AND INABILITY TO RESET OR BLOCK SI

1. Identify the affected train. Circle: A Train B Train

NOTE

De-energizing the two 48 VDC power supplies to a train of SSPS will result in the following:

- General Warning
- ALB05-E06 or ALB05-F06 will illuminate
- Undervoltage Driver output de-energizes
- Reactor Trip condition (Reactor Trip Breaker OPEN) on the affected train (already initiated from the Turbine Trip)
- 48 VDC is removed from all master relays

__2. At the affected train SSPS Logic Cabinet, de-energize both two 48 VDC power supplies (Located in the upper 2 sections) by placing the ON/OFF switch to the OFF position.

__3. At the affected train Safeguards Test Cabinet (STC) #1, reset SSPS Slave Relays by momentarily turning TEST RESET SWITCH S-821 to the RESET position.

__4. At the affected train Safeguards Test Cabinet (STC) #2, reset SSPS Slave Relays by momentarily turning TEST RESET SWITCH S-921 to the RESET position.

__5. At the affected train, locate and open the Output Cabinet and place the MODE SELECTOR Switch in the TEST position and check the OPERATE lamp NOT lit.

__6. Notify I&C to investigate the affected train SSPS to determine the source of the SI signal.

END OF ATTACHMENT B

REFERENCES / COMMENTS

Commitment / Comment

1984300045
1984301126
1984301128
1984301129
1984301130
1984301133
1984301134
1984301145
1984301180
1984301408
1984301801
1984301821
1984302001
1984302002
1984302003
1984302441
1984302990
1984303005
1984303006
1985303538
1985304284
1985304285
1985304393
1985304398
1985305694
1985306031
1987310324
1987311769
1991323544

Job Performance Measure "C"

Facility: Vogtle

Task No: V-LO-TA-37011

Task Title: Depressurize RCS to Reduce Break Flow to Ruptured Steam Generator-Normal Pressurizer Spray Not Available and 1st PORV block valve fails to open. (Alternate Path)

JPM No: V-NRC-JP-19030-HL17

K/A Reference: 038EA1.04 RO 4.3 SRO 4.1

Examinee: ______________________ NRC Examiner: ______________________

Facility Evaluator: ______________________ Date: ______________________

Method of testing:

Simulated Performance ________________ Actual Performance ________________

Classroom ________________ Simulator ______________ Plant ________________

Read to the examinee:

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this job performance measure will be satisfied.

Initial Conditions: **A tube rupture has occurred on SG-1. The crew has transitioned from 19000-C, "E-0 Reactor Trip or Safety Injection" to 19030-C, "E-3 Steam Generator Tube Rupture." Steps 1 through 33 of 19030-C have been performed. Normal pressurizer spray was not available.**

Initiating Cue: **The SS has directed you to "Depressurize the RCS beginning with EOP 19030-C step 34."**

Task Standard: RCS depressurized using a PORV to at or slightly below ruptured SG pressure per EOP 19030-C.

Required Materials: EOP 19030-C Ver. 37.1, “Steam Generator Tube Rupture”.

General References: None

Time Critical Task: No

This JPM is reuse from Exam 2011-301. The JPM number was V-LO-JP-19030-007.

Validation Time: 11 minutes

<u>SIMULATOR SETUP:</u>

Simulator Setup:

1. Reset to IC # 213 for HL-17 NRC Exam.

Simulator Setup from Scratch:

1. Reset to IC # 14 (100% MOL).
2. Override: PIC 455B to “CNT DN.”
3. Override: PIC-455C to “CNT DN.”
4. Insert malfunction SG01A at 50%.
5. Initiate manual Rx Trip and SI.
6. Throttle AFW flow to ~ 200gpm per SG.
7. Verify ruptured SG level > 10% NR.
8. Perform 19030 steps 1 through 33.
9. Insert Override HS-8000G to Block
10. Insert Override HS-8000H to Block
11. Ack/Reset alarms.
12. Freeze simulator

Setup time from scratch: 20 minutes

Performance Information

Critical steps denoted with an asterisk and bolded.

***Step 34 Depressurize RCS using a PRZR PORV to refill PRZR:**

a. Arm one available train of COPS and check PRZR PORV Block Valve – OPEN.

NOTE to simulator operator: After candidate arms COPS, remove the override from the other train of COPS.

Standard: The candidate recognizes that the PRZR PORV Block Valve did not OPEN.

Comment:

Step 34.a RNO

Open PRZR PORV Block Valve.

Standard: The candidate recognizes that the PRZR PORV Block Valve did not remain open when handswitch released.

Comment:

***Step 34.a** **Arm one available train of COPS and check PRZR PORV Block Valve – OPEN.**

Standard: The candidate now arms the opposite train of COPS and checks the Block Valve OPEN. If the candidate does not use the second PORV and goes to Auxiliary Spray , then performance is unsatisfactory.

NOTE to examiner: The candidate may block the first train of COPS before arming the opposite train.

CUE: If asked, "SS desires the COPS train placed in Block."

Comment:

***Step 34.b** **Open one PRZR PORV.**

Standard: The candidate opens one PRZR PORV.

Comment:

Step 34.c Go To Step 37.

Standard: The candidate goes to Step 37.

Comment:

***Step 37** **Check if ANY of the following conditions are satisfied:**

BOTH of the following:

-RCS pressure – LESS THAN RUPTURED SG(s) PRESSURE.
-PRZR level – GREATER THAN 9% [37% ADVERSE.]

OR

-RCS Subcooling – LESS THAN 24°F [38 °F ADVERSE.]

OR

-PRZR level – GREATER THAN 75% [52% ADVERSE.]

Standard: The candidate monitors these parameters until one of the criteria is satisfied.

Comment:

***Step 38** **Terminate RCS depressurization:**

a) Verify Normal PRZR Spray valve(s) – CLOSED.

b) Verify PRZR PORV(s) – CLOSED.

c) Block COPS.

d) Check Auxiliary Spray – IN SERVICE.

Standard: The candidate checks Normal PRZR Spray valves CLOSED.
The candidate shuts the open PORV.
The candidate blocks both trains of COPS.

Note To Examiner: One train of COPS may have been previously blocked prior to arming the opposite train.

The candidate checks auxiliary spray NOT IN SERVICE.

Comment:

***Step 39** **Check RCS pressure – RISING.**

Standard: **Candidate notes that RCS pressure is RISING.**

Comments:

Terminating Cue: "Another operator will continue this procedure."

Verification of Completion

Job Performance Measure No. V-NRC-JP-19030-HL17

Examinee's Name:

Examiner's Name:

Date Performed:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:____

Response:____

Result: Satisfactory/Unsatisfactory

Examiner's signature and date: ________________________________ ________

Initial Conditions:	**A tube rupture has occurred on SG-1. The crew has transitioned from 19000-C, "E-0 Reactor Trip or Safety Injection" to 19030-C, "E-3 Steam Generator Tube Rupture." Steps 1 through 33 of 19030-C have been performed. Normal pressurizer spray was not available.**
Initiating Cue:	**The SS has directed you to "Depressurize the RCS beginning with EOP 19030-C step 34."**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

The Upper Head region of the vessel may void during RCS depressurization if RCPs are not running. This will result in a rapidly rising PRZR level.

CAUTIONS

- The PRT may rupture if a PRZR PORV is used to depressurize the RCS. This may result in abnormal Containment conditions.
- Cycling of the PRZR PORV should be minimized.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
34. Depressurize RCS using a PRZR PORV to refill PRZR:	
__a. Arm one available train of COPS and check PRZR PORV Block Valve - OPEN.	__a. Open PRZR PORV Block Valve.
__b. Open one PRZR PORV.	__b. Go to Step 35.
__c. Go to Step 37.	
__35. Check at least one SI Pump - RUNNING.	__35. Go to 19133-C, ECA-3.3 SGTR WITHOUT PRESSURIZER PRESSURE CONTROL.
__36. Establish Auxiliary Spray by performing the following:	__36. IF Auxiliary Spray can NOT be established, THEN go to 19133-C, ECA-3.3 SGTR WITHOUT PRESSURIZER PRESSURE CONTROL.
__a. Verify PRZR Heaters - OFF.	
__b. Verify at least one CCP running.	

Step 36 continued on next page

Step 36 continued on next page

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
c. Close BIT DISCH ISOLATION valves: __• HV-8801A __• HV-8801B	
__d. Set SEAL FLOW CONTROL HC-0182 to maximum seal flow (HV-0182 closed).	
e. Open CHARGING TO RCS ISOLATION valves: __• HV-8105 __• HV-8106	
f. Open PRZR AUX SPRAY VALVE: __• HV-8145	
g. Close CHARGING TO LOOP ISO valves: __• HV-8146 __• HV-8147	
h. Verify closed PRZR Spray Valves: __• PV-0455B __• PV-0455C	
__i. Adjust RCP SEAL FLOW CONTROL HC-0182 as necessary to establish 8 to 13 gpm.	
__j. Adjust CHARGING FLOW CONTROL FIC-0121 as necessary to establish required Aux Spray flow.	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
37. Check if ANY of the following conditions are satisfied: BOTH of the following: __1) RCS pressure - LESS THAN RUPTURED SG(s) PRESSURE. __2) PRZR level - GREATER THAN 9% [37% ADVERSE]. -OR- __ RCS Subcooling - LESS THAN 24°F [38°F ADVERSE]. -OR- __ PRZR level - GREATER THAN 75% [52% ADVERSE].	__37. Do NOT continue until termination criteria is met.
38. Terminate RCS depressurization:	
__a. Verify Normal PRZR Spray valve(s) - CLOSED.	__a. IF a Normal Spray valve can NOT be closed, THEN stop RCP 4. __ IF PRZR pressure continues lowering uncontrollably, THEN stop RCP 1.
__b. Verify PRZR PORV(s) - CLOSED.	__b. Close PORV Block Valve.
__c. Block COPS.	

Step 38 continued on next page

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__d. Check Auxiliary Spray - IN SERVICE.	__d. Go to Step 39.
e. Stop Auxiliary Spray:	__e. Isolate Auxiliary Spray line.
1) Open CHARGING TO LOOP ISO VALVE:	
__ HV-8146	
-OR-	
__ HV-8147	
2) Close PRZR AUX SPRAY VALVE:	
__• HV-8145	
__39. Check RCS pressure - RISING.	__39. Close PRZR PORV Block Valve. __ <u>IF</u> RCS pressure stabilizes or rises, <u>THEN</u> go to Step 40. <u>IF</u> pressure continues to lower, <u>THEN</u> perform the following: a. Check the following conditions for indication of leakage from PRZR PORV: __• Valve status indications __• PORV discharge line temperature

Step 39 continued on next page
Step 39 continued on next page

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	__b. Go to 19131-C, ECA-3.1 SGTR WITH LOSS OF REACTOR COOLANT: SUBCOOLED RECOVERY DESIRED.

CAUTION

ECCS FLOW SHOULD BE TERMINATED when termination criteria are satisfied to prevent overfilling of the ruptured SGs.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
*40. **Check if ECCS flow should be terminated:**	
__a. RCS Subcooling - GREATER THAN 24°F [38°F ADVERSE].	__a. Go to 19131-C, ECA-3.1 SGTR WITH LOSS OF REACTOR COOLANT: SUBCOOLED RECOVERY DESIRED.
b. Secondary Heat Sink: __ Total feed flow to SGs - GREATER THAN 570 GPM AVAILABLE. -OR- __ NR level in at least one intact SG - GREATER THAN 10% [32% ADVERSE].	__b. Go to 19131-C, ECA-3.1 SGTR WITH LOSS OF REACTOR COOLANT: SUBCOOLED RECOVERY DESIRED.

Step 40 continued on next page

Job Performance Measure "D"

Facility: Vogtle

Task No: V-LO-TA-16001

Task Title: Start an RCP at NOPT-ALT path

JPM No: V-NRC-JP-13003-HL17

K/A Reference: 003A2.02 RO 3.7 SRO 3.9

Examinee: ______________________ NRC Examiner: ______________________

Facility Evaluator: ______________________ Date: ______________________

Method of testing:

Simulated Performance ______________ Actual Performance ______________

Classroom ______________ Simulator ______________ Plant ______________

NOTE: **For time considerations, the students may be allowed to "pre-brief" this JPM and allowed to review 13003-1 prior to starting the JPM.**

Read to the examinee:

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this job performance measure will be satisfied.

Initial Conditions: **Plant is in mode 3 at NOPT. RCP #2 was tagged out to perform a balance shot.**

Maintenance is complete, the standby alignment has been verified.

RCP #2 has been hand-rotated, and visual inspection performed.

All personnel are out of Containment.

All remaining RCPs are in service.

Initiating Cue: **The SS has directed you to "Start RCP # 2 using 13003-1, "Reactor Coolant Pump Operation".**

Task Standard: Start an RCP per 13003-1, then shutdown per 13003-1 on failure of #1 seal.

Required Materials: SOP 13003-1, "Reactor Coolant Pump Operation" Ver. 45.0.
ARP 17008-1, "ARP for ALB08 on Panel 1A2 on MCB" Ver.18.0

General References: None

Time Critical Task: No

Validation Time: 11 minutes

SIMULATOR SETUP:

Simulator Setup:

1. Reset to IC # 214 for HL-17 NRC Exam.

Simulator Setup from Scratch:

1. Reset to IC # 4 (ready to pull critical).
2. Reset Hi Flux at Shutdown Alarm setpoints.
3. Unblock Hi Flux At Shutdown Alarms.
4. Open both breakers for RCP 2.
5. Insert Malfunction RP06B on Trigger 1 with a final value of 18.6% with a 10 sec ramp.
6. Establish stable plant conditions.
7. Ack/Reset alarms.
8. Freeze simulator.

Setup time from scratch: 10 minutes

Performance Information

Critical steps denoted with an asterisk and bolded.

Candidate reviews 13003-1

Standard: Candidate reviews 13003-1 precautions and limitations and selects section 4.1.2.

Comment:

Step 4.1.2 Starting an RCP.

Standard: Candidate chooses section.

Comment:

Step 4.1.2.1 When starting RCP 1, verify RCS pressure LESS than 1800 psig.

Standard: Candidate determines step is not applicable.

CUE: If CV is requested,"CV request noted."

Comment:

> **CAUTION**
>
> Following outages when all RCPs have been stopped, the potential exists that low boron concentration water may have accumulated in an RCS loop. This could result in a loss of core shutdown margin if this low boron water is injected into the core.

Standard: Candidate reads caution and determines it is not applicable.

Comment:

Step 4.1.2.2 WHEN starting the first RCP, Refer to 12001-C or 12002-C as appropriate to determine whether special actions are needed to assure adequate shutdown margin will be maintained during start of the idle pump.

Standard: Candidate determines step is not applicable.

Comment:

NOTE

The following steps should be repeated for each RCP to be started.

Standard: The candidate reads note.

Comment:

Step 4.1.2.3 Verify the RCP has been aligned to STANDBY per 11003-1, "Reactor Coolant Pump Alignment."

Standard: Candidate determines this step is complete from initial conditions.

CUE: If asked, "Refer to initial conditions".

Comment:

Step 4.1.2.4 IF in MODE 3 (Tavg greater than or equal to 350°F), Go to Step 4.1.2.8.

Standard: The candidate goes to step 4.1.2.8.

Comment:

***Step 4.1.2.8 Start the RCP Oil Lift Pump for the associated RCP to be started.**

Standard: The candidate places 1HS-0556 to START and releases and verifies:

Red light - ON
Green light - OFF
Blue light - ON after a short delay

Comment:

Step 4.1.2.9 IF maintenance was performed on the RCP to be started OR the RCP has been shutdown for an extended outage, perform the following:

a. Visually inspect the applicable RCP by checking the following items:

- No visible oil leaks.
- Pump free from obstructions.
- No excess external seal leakage.
- The oil level in the RCP Oil Drain Tank is less than 1 inch in the sight glass to be able to collect any subsequent leakage during operation.

b. The applicable RCP SHOULD be hand-rotated and verified that free rotation and proper seal parameters are met.

c. Obtain Engineering concurrence PRIOR to start of ANY RCP that will not hand rotate.

Standard: The candidate determines this step completed from initial conditions.

CUE: If asked, "Refer to initial conditions".

Comment:

Step 4.1.2.10 Establish the required conditions for starting an RCP as listed in Table 1.

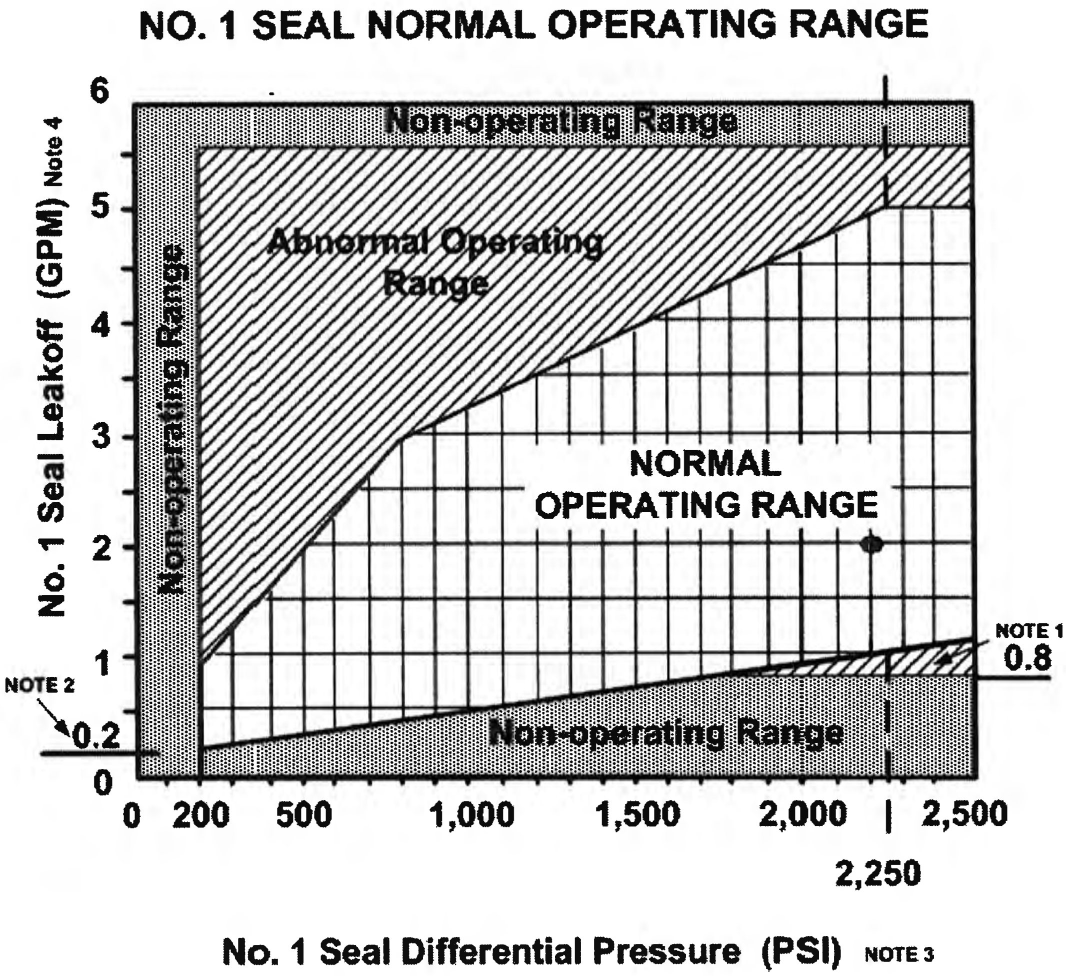
TABLE 1 - RCP PRESTART CONDITIONS

ITEM	REQUIRED VALUE
Number 1 Seal Flow	8-13 gpm
Number 1 Seal Leakoff	Within Figure 2
Number 1 Seal DP	>200 psid
Standpipe Level - ALB08: A02-D02, A03-D03	No Alarm
Upper & Lower Oil Rsvr Lvl - ALB11: A05-D05, A06-D06	*No Alarm
ACCW Total Flow from RCP - ALB04: D02 1) Lube Oil & Motor Coolers - ALB04: A03-D03 2) Thermal Barrier Heat Exchanger - ALB04: A05-D05	 **No Alarm **No Alarm
ACCW Temperature At RCP 1) Lube Oil & Motor Coolers - ALB04: A04-D04 2) Thermal Barrier Heat Exchanger - ALB61: A01	 **No Alarm **No Alarm
VCT Pressure	>18 psig

* An RCP start is permitted at the discretion of the Unit Shift Supervisor, if the actual level is not decreasing.

** With Westinghouse and Operations management approval, RCPs may be started without ACCW flow to perform 30 second and 1 minute air sweeps per 13001-1, "Reactor Coolant System Filling and Venting" or to verify proper rotation following electrical maintenance (less than 1 minute). General Manager approval will be required for starting RCPs without ACCW for any other operation. RCP operation without ACCW cooling for more than 10 minutes is prohibited.

FIGURE 2

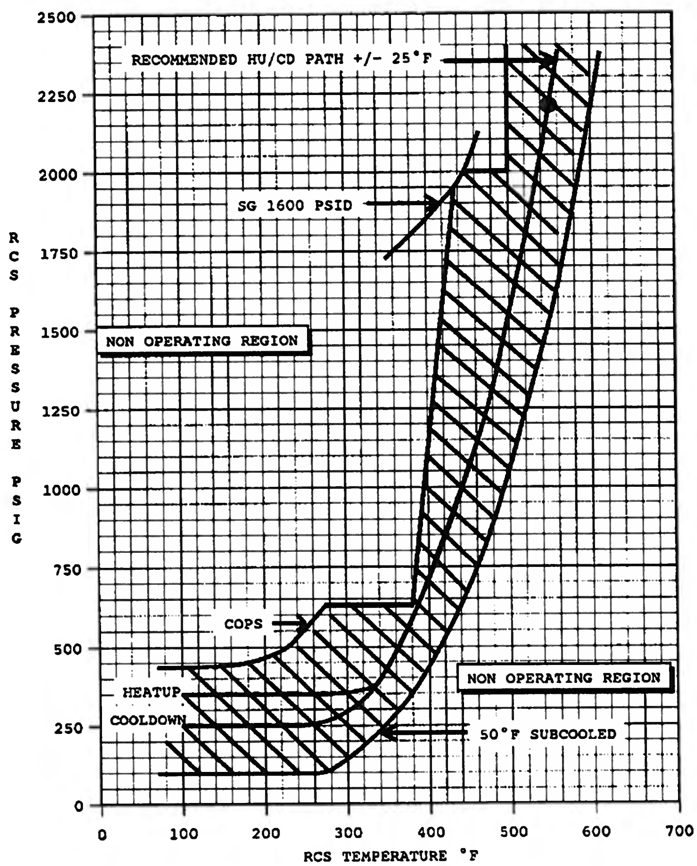


1. If the No. 1 seal leak rates are outside the normal (1.0-5.0 gpm) but within the operating limits ((0.8-5.5 gpm), continue pump operation. VERIFY that seal injection flow exceeds No. 1 seal leak rate for the affected RCP. Closely monitor pump and seal parameters and contact Engineering for further instructions.
2. Minimum startup requirements are 0.2 gpm at 200 PSID differential across the No. 1 seal. For startups at differential pressures greater than 200 PSID, the minimum No. 1 seal leak rate requirements are defined in the NO. 1 SEAL NORMAL OPERATING RANGE (e.g., at 1000 psi differential pressure, do not start the RCP with less than 0.5 gpm).
3. No.1 Seal Differential Press = RCS WR Press – VCT Press.
4. Per Westinghouse Technical Bulletin ESBU-TB-93-01-R1, total #1 seal leakoff is the sum of #1 seal leakoff and #2 seal leakoff. #1 seal leakoff is read directly at the MCB and #2 seal leakoff can be obtained from instrumentation in Containment.

Standard: The candidate verifies all conditions are met.

Comment:

Step 4.1.2.11 Verify the RCS conditions are acceptable for RCP operation per the RCS Pressure-Temperature Curve in the UOPS.



Standard: The candidate verifies condition in acceptable range.

Comment:

Step 4.1.2.12 Verify NO vibration alarms for the associated RCP to be started.

Standard: The candidate verifies alarms ALB08-E04, ALB08-E05, and ALB08-F05 are clear.

Comment:

CAUTION

An RCP shall NOT be started if its associated Steam Generator secondary water temperature is greater than 10°F above its RCS loop temperature.

Standard: The candidate reads caution and determines RCP can be started.

Comment:

Step 4.1.2.13 Verify the RCP Oil Lift Pump has been running for at least two minutes.

Standard: The candidate verifies condition met.

Comment:

Step 4.1.2.14 IF starting the first RCP with a bubble in the Pressurizer, perform the following to minimize Pressurizer surge line temperature changes:

a. Raise flow through the in-service RHR heat exchanger to establish a slightly lowering trend in RCS temperature,

b. Lower charging flow to establish a slightly lowering trend in Pressurizer level.

Standard: The candidate reads step and determines it not applicable.

Comment:

Step 4.1.2.15 Verify personnel clear of RCP to be started.

Standard: Candidate reads step and determines it is met.

CUE: If asked , "Refer to initial conditions".

Comment:

NOTE
If an RCP (or RCP motor) will be started without ACCW cooling, per limitation 2.1.6, RCP parameters, especially bearing temperatures, should be monitored closely while the pump is running.

Standard: Candidate reads step and determines it is not applicable.

Comment:

***Step 4.1.2.16 Start the RCP by placing the RCP 1E Control Switch in START and then placing the RCP Non-1E Control Switch in START:**

RCP	1E Control Switch	Non-1E Control Switch
Loop 2	**1-HS-0496A**	**1-HS-0496B**

Standard: Candidate places 1-HS-0496A to START and releases and verifies:

Green light - OFF
Amber light - OFF
Red light - ON

Candidate places 1-HS-0496B to START and releases and verifies:

Green light - OFF
Amber light - OFF
Red light - ON

NOTE to Simulator Operator: Insert Trigger 1 after both switches are placed in Start.

Comment:

ALB08-B05 RCP 2 CONTROLLED LKG HI/LO FLOW alarms

Standard: Candidate responds to alarm using 17008-1 for window B05.

NOTE to examiner: The candidate may go directly to 13003-1 section 4.2.1 for seal abnormality if they diagnose the seal abnormality. If this occurs go to step 4.2.1.1 on page 13.

Comment:

NOTE
RCP 2 No. 1 seal water leakoff high range flow may be monitored using computer point F0160.

Standard: Candidate reads note.

Comment:

17008-1 step 1 Observe seal injection flow and seal leakoff flow, as well as excess letdown temperature and pressure for indication of an actual seal anomaly.

Standard: Candidate checks indications and determines an actual seal anomaly is present due to hi #1 seal leakoff flow.

Comment:

17008-1 step 2 IF a seal problem is indicated, Go To 13003-1, "Reactor Coolant Pump Operation".

Standard: Candidate goes to 13003-1 and selects section 4.2.1.

Comment:

13003-1

Step 4.2.1.1 IF the Plant Computer is available, trend the computer data points listed in Table 2.

Standard: Candidate determines IPC is available and trends points.

CUE: When candidate checks IPC points, "Another operator will continue with trending points per table 2".

Comment:

Step 4.2.1.2 IF the Plant Computer is NOT available, perform the following:

a. Monitor the QMCB indication listed in Table 2 at least hourly for the next 8 hours.

b. IF NO further seal degradation exists after 8 hours, consult with the Shift Supervisor (SS) for less frequent monitoring.

Standard: Candidate marks step N/A.

Comment:

Step 4.2.1.3 Monitor the No. 1 seal for further degradation using Figure 1 and RCP Trip Criteria as follows:

a. Evaluate the monitored indications using Figure 1, "RCP Seal Abnormalities Tree."

Standard: Candidate goes to Figure 1 and evaluates as highlighted. Figure 2 on the next page indicates the approximate point the candidate should determine as a decision on figure 1.

FIGURE 1 - RCP SEAL ABNORMALITIES DECISION TREE

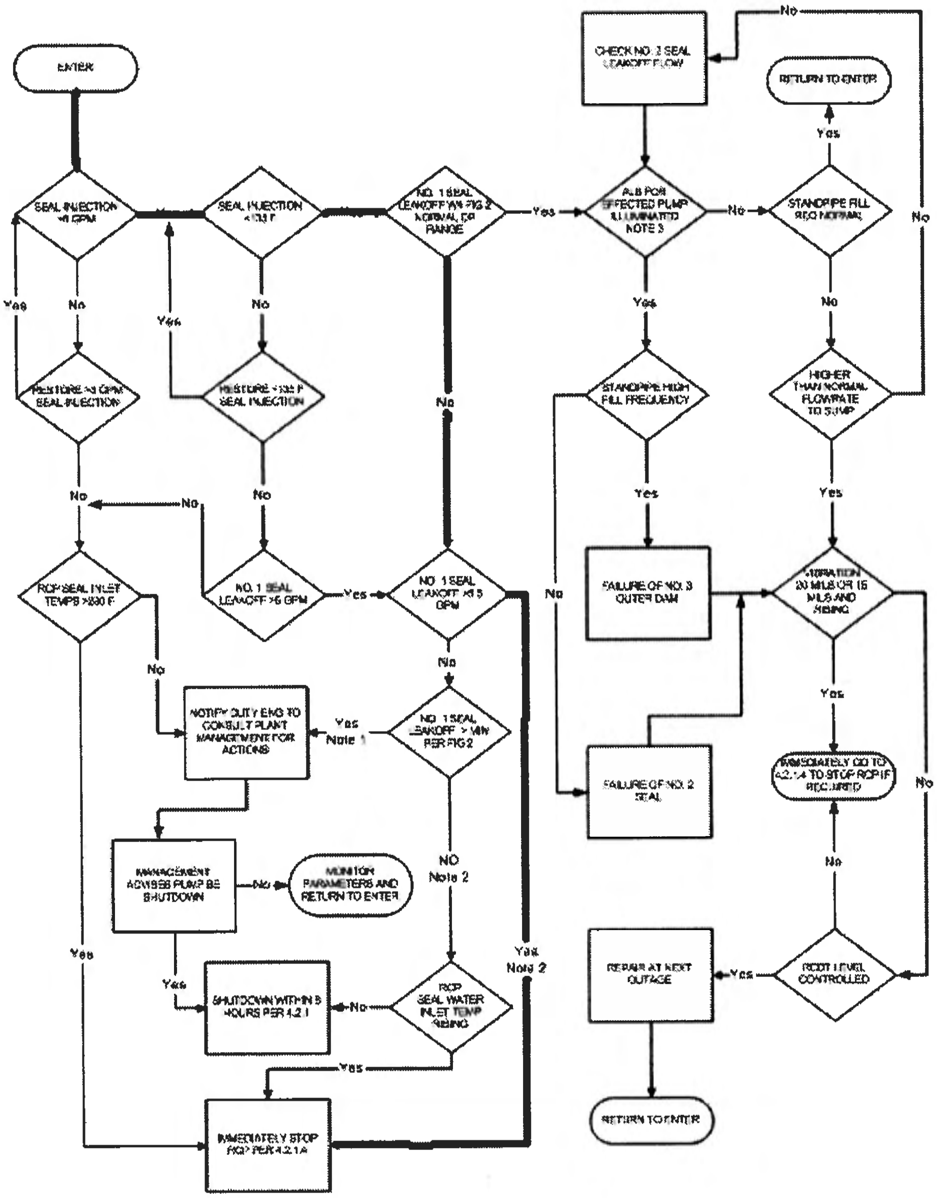
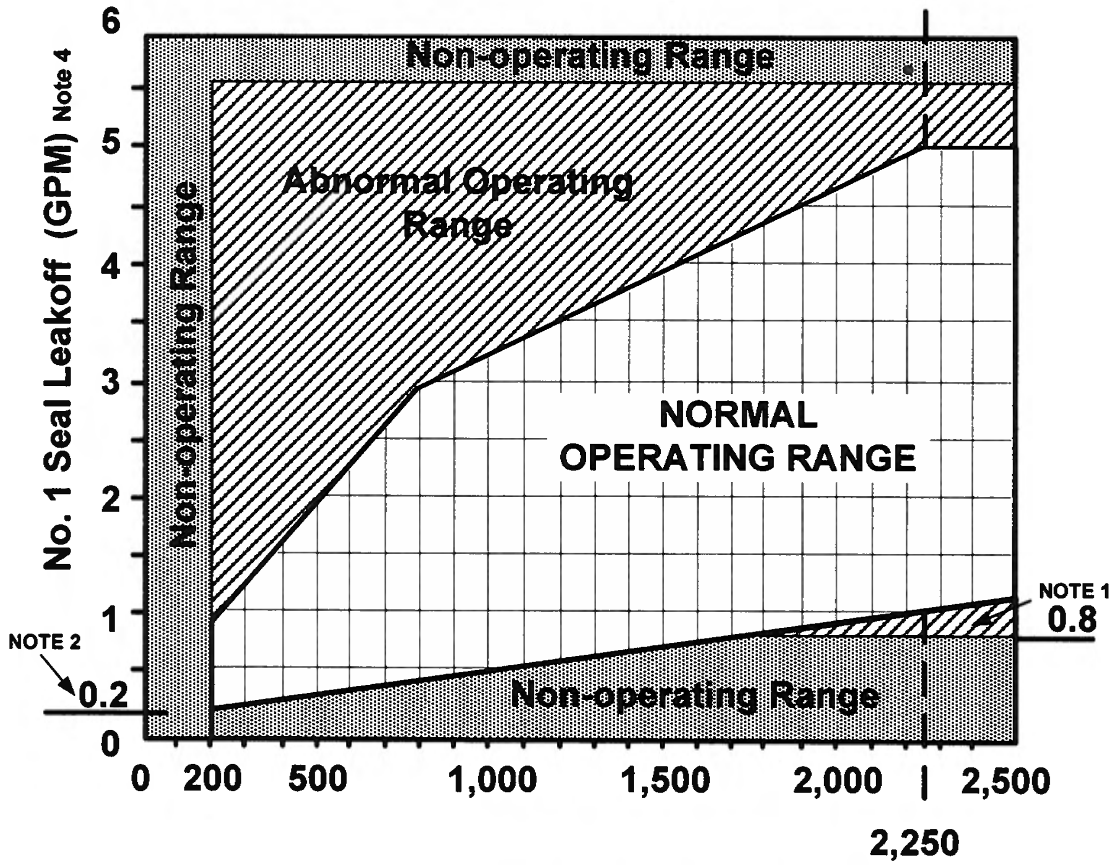


FIGURE 2

NO. 1 SEAL NORMAL OPERATING RANGE



1. If the No. 1 seal leak rates are outside the normal (1.0-5.0 gpm) but within the operating limits ((0.8-5.5 gpm), continue pump operation. VERIFY that seal injection flow exceeds No. 1 seal leak rate for the affected RCP. Closely monitor pump and seal parameters and contact Engineering for further instructions.

2. Minimum startup requirements are 0.2 gpm at 200 PSID differential across the No. 1 seal. For startups at differential pressures greater than 200 PSID, the minimum No. 1 seal leak rate requirements are defined in the NO. 1 SEAL NORMAL OPERATING RANGE (e.g., at 1000 psi differential pressure, do not start the RCP with less than 0.5 gpm).

3. No.1 Seal Differential Press = RCS WR Press – VCT Press.

4. Per Westinghouse Technical Bulletin ESBU-TB-93-01-R1, total #1 seal leakoff is the sum of #1 seal leakoff and #2 seal leakoff. #1 seal leakoff is read directly at the MCB and #2 seal leakoff can be obtained from instrumentation in Containment.

Comment:

***Step 4.2.1.3 b. IF evaluation of the monitored indications using Figure 1 requires immediate pump shutdown, Go to Step 4.2.1.4.**

Standard: Candidate goes to step 4.2.1.4.

Comment:

Step 4.2.1.4. WHEN directed by the SS, perform an RCP shutdown as follows:

a. Start the RCP Oil Lift Pump for affected RCP, if available.

b. IF Reactor Power is greater than 15% Rated Thermal Power:

(1) Trip the Reactor and initiate 19000-C, "E-0 Reactor Trip Or Safety Injection".

(2) WHEN the immediate operator actions of 19000-C are complete, Go to Step 4.2.1.4.d.

c. IF Reactor Power is less than 15% Rated Thermal Power, initiate 18005-C, "Partial Loss Of Flow."

Standard: Candidate determines a. is done,
b. is Not applicable due to plant conditions
c. must be done

CUE: When SS direction requested, "The SS is not available."

CUE: When 18005-C initiation is determined, "An extra operator will initiate 18005-C".

Comment:

***Step 4.2.1.4.d Stop the RCP by placing the RCP Non-1E Control Switch in STOP and then placing the RCP 1E Control Switch in STOP:**

RCP	**Non-1E Control Switch**	**1E Control Switch**
Loop 2	**1-HS-0496B**	**1-HS-0496A**

Standard: Candidate places 1-HS-0496B to STOP and releases and verifies:

Green light - OFF
Amber light - OFF
Red light - ON

Candidate places 1-HS-0496A to STOP and releases and verifies:

Green light - OFF
Amber light - OFF
Red light - ON

Comment:

CAUTION

If RCP #1 or #4 is stopped, the associated Spray Valve is placed in manual and closed to prevent spray short cycling.

Step 4.2.1.4e IF RCP #1 OR #4 is stopped, verify its associated spray valve is placed in MANUAL and closed.

- RCP 1: 1-PIC-0455C
- RCP 4: 1-PIC-0455B

Standard: Candidate marks step N/A

Comment:

***Step 4.2.1.4.f** **WHEN the RCP comes to a complete stop (as indicated by reverse flow), close the RCP Seal Leakoff Isolation valve for the affected pump.**

RCP 2: 1-HV-8141B

Standard: Candidate determines reverse flow by observing loop 2 RCS flow meters indicate approximately 15%. Candidate then places 1HS-8141B to CLOSE and verifies the following on the handswitch:

Red light - OFF
Green Light - ON

Comment:

Step 4.2.1.4.g Secure the associated RCP Oil Lift Pump.

Standard: The candidate places 1HS-0556 to STOP and releases and verifies:

Red light - OFF
Green light - ON
Blue light - OFF

Comment:

Step 4.2.1.4 h IF RCP shutdown was due to loss of RCP seal cooling, review Limitation 2.2.11 for recovery action.

Standard: Candidate marks step N/A.

Comment:

Terminating Cue: Candidate returns initiating cue sheet

Verification of Completion

Job Performance Measure No. V-NRC-JP-13003-HL17

Examinee's Name:

Examiner's Name:

Date Performed:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:____

____

____

Response:____

____

____

____

Result: Satisfactory/Unsatisfactory

Examiner's signature and date: ____________________________ ________

Initial Conditions:	**Plant is in mode 3 at NOPT. RCP #2 was tagged out to perform a balance shot.**
	Maintenance is complete, the standby alignment has been verified.
	RCP #2 has been hand-rotated, and visual inspection performed.
	All personnel are out of Containment.
	All remaining RCPs are in service.
Initiating Cue:	**The SS has directed you to "Start RCP # 2 using 13003-1, "Reactor Coolant Pump Operation".**

REACTOR COOLANT PUMP OPERATION

PROCEDURE USAGE REQUIREMENTS		SECTIONS
Continuous Use:	Procedure must be open and readily available at the work location. Follow procedure step by step unless otherwise directed.	**ALL**
Reference Use:	Procedure or applicable section(s) available at the work location for ready reference by person performing steps.	**NONE**
Information Use:	Available on plant site for reference as needed.	**NONE**

TABLE OF CONTENTS

1.0 PURPOSE

This procedure provides the necessary instructions for startup, operation and shutdown of the RCPs. Procedure instructions include the following steps:

4.1.1 Aligning an RCP for Standby

4.1.2 Starting an RCP

4.2.1 Pump Operation with A Seal Abnormality

4.3.1 RCP Shutdown

4.4.1 Filling RCP Standpipe

4.4.2 Restoring Seal Injection Flow and Coupling RCPs

4.4.3 Uncoupling and Backseating RCPs and Securing Seal Injection Flow

2.0 PRECAUTIONS AND LIMITATIONS

2.1 PRECAUTIONS

2.1.1 An RCP (or RCP motor) should NOT be started if its bus is supplied from the same Reserve Auxiliary Transformer through which a Diesel Generator is paralleled to the grid. The pump starting current may trip the Diesel Generator Breaker.

2.1.2 If RHR is in the Shutdown Cooling Mode, RCS Pressure shall be less than 365 psig prior to stopping a Reactor Cooling Pump, to preclude lifting an RHR Suction Relief.

2.1.3 Since Control Room indication of RCP number one seal leakoff flow is from 0 to 6 gpm, a reading of 6 gpm should be considered to indicate greater than 6 gpm flow when evaluating RCP seal abnormalities.

2.1.4 Whenever the RCS temperature is above 160°F, at least one Reactor Coolant Pump (RCP) should be in operation, preferably pump 4 to verify best spray flow. Operations Management approval (with Westinghouse concurrence) is required to stop all RCPs above 160°F.

2.1.5 When starting the first RCP with a bubble in the Pressurizer, the additional RCP heat input may cause an insurge of cooler RCS water into the pressurizer. Surge line temperature may be controlled by monitoring surge line temperature and adjusting RHR cooling and charging flow to verify a net outsurge from the pressurizer.

2.1.6 With Westinghouse and Operations management approval, RCPs may be started without ACCW flow to perform 30 second and 1 minute air sweeps per 13001-1, "Reactor Coolant System Filling and Venting" or to verify proper rotation following electrical maintenance (less than 1 minute). General Manager approval will be required for starting RCPs without ACCW for any other operation. Operation without ACCW in service for more than 10 minutes is prohibited.

2.1.7 Seal Injection flow should be maintained to coupled RCPs when RCS level is greater than the 190 foot elevation, however, if necessary, seal injection may be secured to RCPs above the 190 foot elevation provided RCS level is maintained constant.

2.1.8 RCPs should NOT be uncoupled and placed on their back seat until the RCS is depressurized and vented.

2.1.9 RCS pressure must be LESS than1800 psig when starting Unit 1 Reactor Coolant Pump1. (GP-18753)

2.2 LIMITATIONS

2.2.1 If seal injection is NOT in service AND the reactor coolant temperature is greater than 150°F, Auxiliary Component Cooling Water shall be supplied to the thermal barrier.

2.2.2 When the reactor coolant pressure is less than 100 psig, the No. 1 Seal Leakoff Valves should be closed.

2.2.3 The RCP seal injection flow should be maintained greater than 8 gpm and less than 13 gpm any time seal injection is required.

2.2.4 With the reactor coolant temperature greater than 400°F, the seal injection temperature should be maintained less than 135°F.

2.2.5 The following primary to secondary temperature limitations apply for RCP start:

- In order to prevent a low temperature RCS overpressure event, Technical Specification LCO 3.4.6, Note 2 requires that during MODE 4 operation below the COPS arming temperature as specified in the PTLR, the secondary side water temperature of each Steam Generator Temperature be less than 50˚F above each of the RCS cold leg temperatures prior to the start of an RCP. Additionally, while in MODE 4 with no other RCPs running, this differential temperature limit is reduced to 25°F at an RCS temperature of 350°F and varies linearly to 50°F at an RCS temperature of 200°F as shown in figure 3. This verifies RHR system design pressures are not exceeded when the RHR suction reliefs are used for cold overpressure protection.

- To verify the above limits are not exceeded, an administrative limit, FSAR 5.2.2.10.2.c, is established such that an RCP shall NOT be started if its associated Steam Generator secondary water temperature is greater than 10°F above its RCS cold leg loop temperature.

- SGBD temperatures are preferred to SG skin temperatures when establishing conditions for starting a Reactor Coolant Pump. However, in Mode 5 SGBD is not required to be in service and SG skin temperatures can be used instead.

2.2.6 An RCP should NOT be started with the reactor critical. (Ref 18005-C)

2.2.7 The following conditions for the No. 1 Seal must be established prior to RCP start:

- 200 psid minimum differential pressure across No. 1 Seal.

- A minimum VCT pressure of 18 psig.

- Minimum No. 1 Seal Leakoff as obtained from Figure 2.

2.2.8 The following starting duty cycle for the RCP should be observed:

- Only one RCP shall be started at any one time.

- Two successive starts are permitted, provided the motor is permitted to coast to a stop between starts.

- A third start may be made when the winding and core have cooled by running for a period of 20 minutes, or by standing idle for a period of 45 minutes.

2.2.9 During RCS filling and venting, RCS pressure must be greater than 325 psig prior to starting an RCP to verify adequate seal D/P is maintained throughout RCS fill and vent. If necessary, the RCP should be stopped prior to seal D/P dropping less than 200 psid. If the seal D/P goes below 200 psid during pump operation or coast down, the RCP should be evaluated before restarting the RCP.

2.2.10 An RCP shall be stopped if any of the following conditions exist.

- Motor bearing temperature exceeds 195°F.
- Motor stator winding temperature exceeds 311°F.
- Seal water inlet temperature exceeds 230°F
- Total loss of ACCW for a duration of 10 minutes.
- RCP shaft vibration of 20 mils or greater.
- RCP frame vibration of 5 mils or greater.
- Differential pressure across the number 1 seal of less than 200 psid.

2.2.11 If a loss of RCP seal cooling (Seal Injection and/or ACCW to Thermal barrier) occurs, resulting in RCP shutdown due to exceeding operating limits, then the unit should be cooled down to Mode 5 to facilitate recovery. Upon reaching Mode 5, ACCW to the Thermal barrier should be restored. Seal injection should then be returned to service. This sequence should prevent seal damage, RCP shaft bowing, ACCW System damage, etc. due to excessive thermal stresses.

INITIALS

3.0 PREREQUISITES AND INITIAL CONDITIONS

3.1 **Verify** the Reactor Coolant Drain Tank is in service. RW

3.2 **Verify** the Chemical and Volume Control System is available to supply seal flow to the RCPs. RW

3.3 **Verify** the Volume Control Tank is in service. RW

INITIALS

4.0 INSTRUCTIONS

4.1 STARTUP

4.1.1 **Align** the RCPs for standby per 11003-1, "Reactor Coolant Pump Alignment." ________

4.1.2 **Starting an RCP**

Critical
4.1.2.1 When starting **RCP 1**, **verify** RCS pressure LESS than 1800 psig. ________

____
CV

> **CAUTION**
>
> Following outages when all RCPs have been stopped, the potential exists that low boron concentration water may have accumulated in an RCS loop. This could result in a loss of core shutdown margin if this low boron water is injected into the core.

4.1.2.2 WHEN starting the first RCP, **Refer to** 12001-C or 12002-C as appropriate to determine whether special actions are needed to assure adequate shutdown margin will be maintained during start of the idle pump. ________

> NOTE
>
> The following steps should be repeated for each RCP to be started.

4.1.2.3 **Verify** the RCP has been aligned to STANDBY per 11003-1, "Reactor Coolant Pump Alignment." ________

4.1.2.4 IF in MODE 3 (Tavg greater than or equal to 350°F), **Go to** Step 4.1.2.7. ________

INITIALS

> NOTE
>
> SGBD temperatures are preferred to SG skin temperatures when establishing conditions for starting a Reactor Coolant Pump. SG Skin temperatures should only be used if SGBD cannot be placed in service OR if the SGBD temperature indication for the RCP to be started is inoperable.

4.1.2.5 IF in MODE 4 (Tavg less than 350°F), **initiate** blowdown flow from the applicable Steam Generator per 13605-1, "Steam Generator Blowdown Processing System." ________

4.1.2.6 WHEN SG Blowdown has been in service for at least one hour AND SGBD temperatures have stabilized (rate of change less than 1°F per hour):

a. **Verify** Steam Generator secondary water temperature is less than or equal to 10°F above the RCS Loop Tc for the RCP to be started. ________

RCS Loop	SG Blowdown Temp	RCS Loop Temp
Loop 1	1-TI-1175 or 1-TI-5734 (IPC: T9883)	1-TI-0413B (IPC: T0406)
Loop 2	1-TI-1176 or 1-TI-5735 (IPC: T9884)	1-TI-0423B (IPC: T0426)
Loop 3	1-TI-1177 or 1-TI-5736 (IPC: T9885)	1-TI-0433B (IPC: T0446)
Loop 4	1-TI-1178 or 1-TI-5737 (IPC: T9886)	1-TI-0443B (IPC: T0466)

b. **Record** the measured delta-T for the RCP to be started in the Unit Control Log (or the UOP in progress). ________

INITIALS

> NOTE
>
> Step 4.1.2.6 is to be performed only if SGBD cannot be placed in service or SGBD temperature instrumentation for the RCP to be started is inoperable.

4.1.2.7 IF Steam Generator blowdown CANNOT be placed in service OR any loop SGBD TI is NOT available, perform the following:

a. **Measure** the Steam Generator metal surface temperature with a contact pyrometer (Measure skin temperature on the lower handhole or other similar location on the lower shell.) ________

b. **Verify** the difference between Steam Generator skin temperature and RCS Tc for the RCP to be started is ≤10°F. ________

c. **Record** the measured Temperature difference for the RCP to be started in the Control Room Log (or the UOP in progress). ________

d. **Record** the Pyrometer ID number in the Control Room Log. ________

4.1.2.8 **Start** the RCP Oil Lift Pump for the associated RCP to be started. ________

INITIALS

4.1.2.9 IF maintenance was performed on the RCP to be started OR the RCP has been shutdown for an extended outage, perform the following:

a. Visually **inspect** the applicable RCP by checking the following items:

- No visible oil leaks. ________
- Pump free from obstructions. ________
- No excess external seal leakage. ________
- The oil level in the RCP Oil Drain Tank is less than 1 inch in the sight glass to be able to collect any subsequent leakage during operation. ________

b. The applicable RCP SHOULD be **hand-rotated** ~~the applicable RCP~~ and **verifiedy** that free rotation and proper seal parameters are met. ________

c. **Obtain** Engineering concurrence PRIOR to start of ANY RCP that will not hand rotate. ________

4.1.2.10 **Establish** the required conditions for starting an RCP as listed in Table 1. ________

4.1.2.11 **Verify** the RCS conditions are acceptable for RCP operation per the RCS Pressure-Temperature Curve in the UOPS. ________

4.1.2.12 **Verify** NO vibration alarms for the associated RCP to be started. ________

CAUTION

An RCP shall NOT be started if its associated Steam Generator secondary water temperature is greater than 10°F above its RCS loop temperature.

4.1.2.13 **Verify** the RCP Oil Lift Pump has been running for at least two minutes. ________

INITIALS

4.1.2.14 IF starting the first RCP with a bubble in the Pressurizer, perform the following to minimize Pressurizer surge line temperature changes:

a. **Raise** flow through the in-service RHR heat exchanger to establish a slightly lowering trend in RCS temperature, ________

b. **Lower** charging flow to establish a slightly lowering trend in Pressurizer level. ________

4.1.2.15 **Verify** personnel clear of RCP to be started. ________

> NOTE
>
> If an RCP (or RCP motor) will be started without ACCW cooling, per limitation 2.1.6, RCP parameters, especially bearing temperatures, should be monitored closely while the pump is running.

4.1.2.16 **Start** the RCP by placing the RCP 1E Control Switch in START and then placing the RCP Non-1E Control Switch in START:

	RCP	1E Control Switch	Non-1E Control Switch	
•	Loop 1	1-HS-0495A	1-HS-0495B	________
•	Loop 2	1-HS-0496A	1-HS-0496B	________
•	Loop 3	1-HS-0497A	1-HS-0497B	________
•	Loop 4	1-HS-0498A	1-HS-0498B	________

4.1.2.17 WHEN the RCP has operated for at least one minute, **stop** the RCP Oil Lift Pump. ________

4.1.2.18 **Adjust** charging flow, as necessary to maintain desired Pressurizer level. ________

4.1.2.19 **Monitor** the reactor coolant pressure, loop flow, pump vibration and pump seal parameters to verify proper pump operation. ________

INITIALS

4.2 SYSTEM OPERATION

4.2.1 Pump Operation With A Seal Abnormality

4.2.1.1 IF the Plant Computer is available, **trend** the computer data points listed in Table 2. ________

4.2.1.2 IF the Plant Computer is NOT available, perform the following:

a. **Monitor** the QMCB indication listed in Table 2 at least hourly for the next 8 hours. ________

b. IF NO further seal degradation exists after 8 hours, **consult** with the Shift Supervisor (SS) for less frequent monitoring. ________

4.2.1.3 **Monitor** the No. 1 seal for further degradation using Figure 1 and RCP Trip Criteria as follows:

a. **Evaluate** the monitored indications using Figure 1, "RCP Seal Abnormalities Tree." ________

b. IF evaluation of the monitored indications using Figure 1 requires immediate pump shutdown, **Go to** Step 4.2.1.4. ________

c. IF any of the following RCP Trip Criteria is exceeded, **Go To** Step 4.2.1.4 for immediate RCP shutdown. ________

RCP TRIP CRITERIA	
Motor bearing temperature	>195°F
Motor stator-winding temperature	>311°F
Seal water inlet temperature	>230°F
RCP shaft vibration	≥20 mils
RCP Frame vibration	≥5 mils
#1 seal Differential Pressure	<200 psid
#1 seal leakoff flow (sum of #1 seal leakoff as indicated on the MCB and #2 seal leakoff read locally in containment)	< minimum on Figure 2 with pump bearing / seal inlet temperature increasing
Total loss of ACCW for a duration of 10 minutes	

INITIALS

d. WHEN directed by Figure 1, **stop** the affected RCP within 8 hours as follows:

(1) **Establish** 9 gpm or greater seal injection flow to the affected pump. ________

(2) **Stop** the affected RCP by continuing with Step 4.2.1.4. ________

4.2.1.4 WHEN directed by the SS, perform an RCP shutdown as follows:

a. **Start** the RCP Oil Lift Pump for affected RCP, if available. ________

b. IF Reactor Power is greater than 15% Rated Thermal Power:

(1) **Trip** the Reactor and **initiate** 19000-C, "E-0 Reactor Trip Or Safety Injection." ________

(2) WHEN the immediate operator actions of 19000-C are complete, **Go to** Step 4.2.1.4.d. ________

c. IF Reactor Power is less than 15% Rated Thermal Power, **initiate** 18005-C, "Partial Loss Of Flow." ________

d. **Stop** the RCP by placing the RCP Non-1E Control Switch in STOP and then placing the RCP 1E Control Switch in STOP:

	RCP	Non-1E Control Switch	1E Control Switch	
•	Loop 1	1-HS-0495B	1-HS-0495A	________
•	Loop 2	1-HS-0496B	1-HS-0496A	________
•	Loop 3	1-HS-0497B	1-HS-0497A	________
•	Loop 4	1-HS-0498B	1-HS-0498A	________

INITIALS

CAUTION

If RCP #1 or #4 is stopped, the associated Spray Valve is placed in manual and closed to prevent spray short cycling.

e. IF RCP #1 OR #4 is stopped, **verify** its associated spray valve is placed in MANUAL and closed.

- RCP 1: 1-PIC-0455C ________
- RCP 4: 1-PIC-0455B ________

f. WHEN the RCP comes to a complete stop (as indicated by reverse flow), **close** the RCP Seal Leakoff Isolation valve for the affected pump.

- RCP 1: 1-HV-8141A ________
- RCP 2: 1-HV-8141B ________
- RCP 3: 1-HV-8141C ________
- RCP 4: 1-HV-8141D ________

g. **Secure** the associated RCP Oil Lift Pump. ________

h. IF RCP shutdown was due to loss of RCP seal cooling, **review** Limitation 2.2.11 for recovery action. ________

INITIALS

4.3 SHUTDOWN

4.3.1 RCP Shutdown

CAUTIONS

- If RHR is in the Shutdown Cooling Mode, RCS Pressure shall be less than 365 psig prior to stopping a Reactor Coolant Pump (This is to preclude lifting a RHR Suction Relief).
- If RCP #1 or #4 is to be stopped, the associated Spray Valve is placed in manual and closed to prevent spray short cycling.

4.3.1.1 IF RCP #1 or #4 is to be stopped, **place** the associated spray valve in MANUAL and **close** the valve:

- RCP 1: 1-PIC-0455C ________
- RCP 4: 1-PIC-0455B ________

4.3.1.2 IF in Modes 1 or 2, perform an RCP shutdown as follows:

a. **Start** the RCP Oil Lift Pump for affected RCP, if available. ________

b. IF Reactor Power is Greater than 15% Rated Thermal Power:

(1) **Trip** the Reactor and **initiate** 19000-C, "E-0 Reactor Trip Or Safety Injection". ________

(2) WHEN the immediate operator actions of 19000-C are complete, **stop** the RCP by placing its Non-1E Control Switch in STOP and then placing its 1E Control Switch in STOP:

RCP	Non-1E Control Switch	1E Control Switch	
Loop 1	1-HS-0495B	1-HS-0495A	________
Loop 2	1-HS-0496B	1-HS-0496A	________
Loop 3	1-HS-0497B	1-HS-0497A	________
Loop 4	1-HS-0498B	1-HS-0498A	________

INITIALS

c. IF Reactor Power is less than 15% Rated Thermal Power:

(1) **Stop** the RCP by placing its Non-1E Control Switch in STOP and then placing its 1E Control Switch in STOP:

RCP	Non-1E Control Switch	1E Control Switch	
Loop 1	1-HS-0495B	1-HS-0495A	________
Loop 2	1-HS-0496B	1-HS-0496A	________
Loop 3	1-HS-0497B	1-HS-0497A	________
Loop 4	1-HS-0498B	1-HS-0498A	________

(2) **Initiate** 18005-C, "Partial Loss Of Flow." ________

4.3.1.3 IF in Mode 3 or below, perform an RCP shutdown as follows:

a. **Start** the RCP Oil Lift Pump for affected RCP, if available. ________

b. **Stop** the RCP by placing its Non-1E Control Switch in STOP and then **place** its 1E Control Switch in STOP:

RCP	Non-1E Control Switch	1E Control Switch	
Loop 1	1-HS-0495B	1-HS-0495A	________
Loop 2	1-HS-0496B	1-HS-0496A	________
Loop 3	1-HS-0497B	1-HS-0497A	________
Loop 4	1-HS-0498B	1-HS-0498A	________

NOTE

When stopping the last RCP, its Oil Lift Pump needs to run for at least 10 minutes after stopping the RCP.

4.3.1.4 WHEN the RCP has coasted to a stop (as indicated by reverse flow), **stop** the RCP Oil Lift Pump. ________

INITIALS

4.4 NON-PERIODIC OPERATION

4.4.1 Filling RCP Standpipe

NOTE

Normally the RCP Standpipes will be filled automatically by a control signal from the RCP Standpipe Level Switch.

4.4.1.1 IF Reactor Make up Water System is aligned in AUTO, **start** an RMWS Pump per 13733-1, "Reactor Makeup Water System." ________

4.4.1.2 **Open** the RCP Standpipe Level Control Valve for the appropriate standpipe to be filled and **return** the applicable handswitch to AUTO:

- RCP 1: 1-LV-0181 1-HS-0181 ________
- RCP 2: 1-LV-0180 1-HS-0180 ________
- RCP 3: 1-LV-0179 1-HS-0179 ________
- RCP 4: 1-LV-0178 1-HS-0178 ________

4.4.1.3 WHEN the valve(s) opened in Step 4.4.1.2 closes, **align** Reactor Make up Water Pump as directed by SS per 13733-1. ________

INITIALS

4.4.2 Restoring Seal Injection Flow And Coupling RCPs

NOTE

Independent verifications performed in this section are to be documented on Checklist 1, "Independent Verification."

4.4.2.1 **Establish** the following Prerequisites:

- The RCP(s) to be coupled is (are) electrically tagged per NMP-AD-003. ________
- RCS level less than 98% Pressurizer Cold Cal Level, (1-LI-462) AND NOT being changed. ________
- CVCS Charging is in service AND a Seal Injection flow path is available for the RCP(s) to be coupled. ________
- Maintenance is standing by at the RCP(s) to be coupled with the lifting device installed and ready to lift the impeller. ________

4.4.2.2 **Establish** continuous communications with Maintenance personnel stationed at the RCP to be coupled. ________

4.4.2.3 **Set** Seal Flow Control Valve 1-HV-182 to minimum. (Only applicable for the first pump to be coupled) ________

CAUTION

If the seal leak-off valve for an uncoupled RCP is opened, a leak path from the coupled RCPs to the CTMT sump will be established.

4.4.2.4 **Verify** RCP Seal Leakoff Isolation Valves are closed:

- RCP 1 1-HV-8141A ________
- RCP 2 1-HV-8141B ________
- RCP 3 1-HV-8141C ________
- RCP 4 1-HV-8141D ________

INITIALS

CAUTION

The time between removing the impeller from its backseat and establishing seal injection flow should be kept to a minimum to minimize the possibility of crud infiltration.

4.4.2.5 **Notify** Maintenance to remove the RCP from its backseat and begin coupling. ________

4.4.2.6 WHEN the RCP impeller has been lifted AND coupling bolt installation commenced, **establish** Seal Injection flow to the RCP as follows:

a. **Close** the Seal Injection Line Drain Valve for the appropriate RCP: (IV REQUIRED)

- RCP 1: CVCS SEALS RCP 1 SEAL INJ WTR INL DRN TO SUMP, 1-1208-U4-007 ________

  (1) **Remove** apparatus installed to direct water flow to drain. ________

- RCP 2: CVCS SEALS RCP 2 SEAL INJ WTR INL DRN TO SUMP, 1-1208-U4-362 ________

  (1) **Remove** apparatus installed to direct water flow to drain. ________

- RCP 3: CVCS SEALS RCP 3 SEAL INJ WTR INL DRN TO SUMP, 1-1208-U4-363 ________

- RCP 4: CVCS SEALS RCP 4 SEAL INJ WTR INL DRN TO SUMP, 1-1208-U4-364 ________

INITIALS

b. **Open** Seal Injection Isolation valve for the appropriate RCP: (IV REQUIRED).

- RCP 1: 1-HV-8103A 1-HS-8103A ________
- RCP 2: 1-HV-8103B 1-HS-8103B ________
- RCP 3: 1-HV-8103C 1-HS-8103C ________
- RCP 4: 1-HV-8103D 1-HS-8103D ________

c. As seal injection is established to each RCP, **adjust** Seal Injection Flow Control Valve 1-HV-182 to obtain between 8 and 13 gpm to each of the coupled RCPs:

- RCP 1 ________
- RCP 2 ________
- RCP 3 ________
- RCP 4 ________

NOTE

Maintenance should use new gaskets when restoring the blind flanges at the Seal Injection Line Drain Valves.

4.4.2.7 **Verify** Maintenance restores the blind flange at the Seal Injection Line Drain Valve for the appropriate RCP:

- RCP 1: Blind Flange at CVCS SEALS RCP 1 SEAL INJ WTR INL DRN TO SUMP, 1-1208-U4-007 ________
- RCP 2: Blind Flange at CVCS SEALS RCP 2 SEAL INJ WTR INL DRN TO SUMP, 1-1208-U4-362 ________
- RCP 3: Blind Flange at CVCS SEALS RCP 3 SEAL INJ WTR INL DRN TO SUMP, 1-1208-U4-363 ________
- RCP 4: Blind Flange at CVCS SEALS RCP 4 SEAL INJ WTR INL DRN TO SUMP, 1-1208-U4-364 ________

INITIALS

4.4.2.8 WHEN notified by Maintenance that the RCP is coupled, **enter** this status in the Unit Control Log:

- RCP 1 coupled, entered in Unit Control Log ________
- RCP 2 coupled, entered in Unit Control Log ________
- RCP 3 coupled, entered in Unit Control Log ________
- RCP 4 coupled, entered in Unit Control Log ________

INITIALS

4.4.3 Uncoupling and Backseating RCPs and Securing Seal Injection Flow

NOTE

Independent verifications performed in this section are to be documented on Checklist 1, "Independent Verification."

4.4.3.1 **Verify** the following conditions:

- The RCP(s) to be uncoupled is (are) electrically tagged per NMP-AD-003 "Equipment Clearance and Tagging." ________
- An RCS vent path or alternative is established per 12006-C, "Unit Cooldown to Cold Shutdown." ________
- RCS level is NOT being changed. ________
- Maintenance is standing by at the RCP(s) to be uncoupled with the lifting device installed and ready to lift the impeller. ________

4.4.3.2 **Verify** Seal Injection flow to each coupled RCP is between 8 and 13 gpm. (Maintain 8 to 13 gpm to each coupled RCP.) ________

4.4.3.3 **Establish** communications with Maintenance at the RCP to be backseated. ________

INITIALS

> NOTE
>
> The time between removing seal injection flow and placing the RCP on its backseat should be kept to a minimum to minimize the possibility of crud infiltration into the seal.

4.4.3.4 WHEN requested by Maintenance AND just prior to lowering the impeller onto its backseat, **isolate** Seal injection to the uncoupled RCP as follows:

a. **Close** Seal Injection Isolation valve for the appropriate RCP: (IV REQUIRED)

- RCP 1: 1-HV-8103A 1-HS-8103A ________
- RCP 2: 1-HV-8103B 1-HS-8103B ________
- RCP 3: 1-HV-8103C 1-HS-8103C ________
- RCP 4: 1-HV-8103D 1-HS-8103D ________

b. **Adjust** 1-HV-182, as necessary to maintain between 8 and 13 gpm to each of the coupled RCPs:

- After RCP-1 Seal Injection Isolation ________
- After RCP-2 Seal Injection Isolation ________
- After RCP-3 Seal Injection Isolation ________
- After RCP-4 Seal Injection Isolation ________

4.4.3.5 **Notify** Maintenance that Seal Injection is isolated and to:

- Backseat RCP-1 ________
- Backseat RCP-2 ________
- Backseat RCP-3 ________
- Backseat RCP-4 ________

INITIALS

4.4.3.6 WHEN notified by Maintenance that the RCP is on its backseat, **enter** this status in the Unit Control Log:

- RCP-1 on backseat, entered in Unit Control Log ________
- RCP-2 on backseat, entered in Unit Control Log ________
- RCP-3 on backseat, entered in Unit Control Log ________
- RCP-4 on backseat, entered in Unit Control Log ________

NOTE

The seal injection inlet line drains for RCP 1 and 2 will require a drain hose be attached and routed to a floor drain to limit area contamination when the valve is opened.

4.4.3.7 **Verify** the blind flange removed at the Seal Injection Line Drain Valve for the back seated RCP and for RCPs 1 and 2 an appropriate drain hose configuration installed:

- RCP 1: Blind Flange at CVCS SEALS RCP 1 SEAL INJ WTR INL DRN TO SUMP, 1-1208-U4-007 ________

  Drain hose installed ________

- RCP 2: Blind Flange at CVCS SEALS RCP 2 SEAL INJ WTR INL DRN TO SUMP, 1-1208-U4-362 ________

  Drain hose installed ________

- RCP 3: Blind Flange at CVCS SEALS RCP 3 SEAL INJ WTR INL DRN TO SUMP, 1-1208-U4-363 ________
- RCP 4: Blind Flange at CVCS SEALS RCP 4 SEAL INJ WTR INL DRN TO SUMP, 1-1208-U4-364 ________

INITIALS

> NOTE
>
> SS should be notified if any drain rate is greater than approximately 1 gpm.

4.4.3.8 **Open** the Seal Injection Line Drain Valve for the back seated RCP:

- RCP 1: CVCS SEALS RCP 1 SEAL INJ WTR INL DRN TO SUMP, 1-1208-U4-007 ________
- RCP 2: CVCS SEALS RCP 2 SEAL INJ WTR INL DRN TO SUMP, 1-1208-U4-362 ________
- RCP 3: CVCS SEALS RCP 3 SEAL INJ WTR INL DRN TO SUMP, 1-1208-U4-363 ________
- RCP 4: CVCS SEALS RCP 4 SEAL INJ WTR INL DRN TO SUMP, 1-1208-U4-364 ________

4.4.3.9 As directed by the SS, continue to **isolate** the RCP per NMP-AD-003 "Equipment Clearance and Tagging." ________

5.0 REFERENCES

P&IDs

- 1X4DB111 Reactor Coolant System
- 1X4DB112 Reactor Coolant System
- 1X4DB113 RTD Bypass Reactor Coolant System
- 1X4DB114 Chemical & Volume Control System

ELEMENTARY DIAGRAMS

- 1X3D-BD-B01A Reactor Coolant Pump 1-1201-P6-001-M01
- 1X3D-BD-B01B Reactor Coolant Pump 1-1201-P6-002-M01
- 1X3D-BD-B01C Reactor Coolant Pump 1-1201-P6-003-M01
- 1X3D-BD-B01D Reactor Coolant Pump 1-1201-P6-004-M01
- 1X3D-BD-B01E RCP Oil Lift Pump 1-1201-P6-001-P01
- 1X3D-BD-B01F RCP Oil Lift Pump 1-1201-P6-002-P01
- 1X3D-BD-B01G RCP Oil Lift Pump 1-1201-P6-003-P01
- 1X3D-BD-B01H RCP Oil Lift Pump 1-1201-P6-004-P01
- 1X3D-BD-B01N Reactor Coolant Pump 1-1201-P6-001-M01
- 1X3D-BD-B01P Reactor Coolant Pump 1-1201-P6-002-M01
- 1X3D-BD-B01X Reactor Coolant Pump 1-1201-P6-003-M01
- 1X3D-BD-B01Y Reactor Coolant Pump 1-1201-P6-004-M01

ONE LINE DIAGRAMS

- 1X3D-AA-C01A 13.8kV Switchgear 1NAA
- 1X3D-AA-C02A 13.8kV Switchgear 1NAB
- 1X3D-AA-C03A RCP Under-Frequency & Under-Voltage Protection
- 1X3D-AA-F05A 480V MCC 1NBE
- 1X3D-AA-F06A 480V MCC 1NBF

FSAR

- Section 5.4.1

TECHNICAL MANUAL

- 1X6AB09-119 RCP Technical Manual

PROCEDURES

- 11003-1 "Reactor Coolant Pump Alignment"
- 13002-1 "Reactor Coolant Drain Tank Operation"
- 13006-1 "Chemical & Volumn Control System"
- 13007-1 "VCT Gas Control and RCS Chemical Addition"
- 13716-1 "Auxiliary Component Cooling Water System"

MISCELLANEOUS

- RER 99-0218 Response to Westinghouse document NSAL 99-005 for restoration of seal injection/cooling flow following extended loss. (Greater than One hour).
- ESBU-TB-93-01-R1 Westinghouse RCP Technical Bulletin
- IN 96-58 RCP Seal Replacement With Pump On Backseat (included as Attachment 1 of this procedure)
- GP-16589 Westinghouse Letter – RCP Backseat Float Pressure
- GP-18753 Westinghouse Letter-LTR-PMO-07-39-Reactor Coolant Pump Motor Oil Line Separation

COMMITMENTS

1984300007 1984300013 1984300015 1984301121 1984302198
1984302199 1985303292 2000341363

END OF PROCEDURE TEXT

TABLE 1 - RCP PRESTART CONDITIONS

ITEM	REQUIRED VALUE
Number 1 Seal Flow	8-13 gpm
Number 1 Seal Leakoff	Within Figure 2
Number 1 Seal DP	>200 psid
Standpipe Level - ALB08: A02-D02, A03-D03	No Alarm
Upper & Lower Oil Rsvr Lvl - ALB11: A05-D05, A06-D06	*No Alarm
ACCW Total Flow from RCP - ALB04: D02 1) Lube Oil & Motor Coolers - ALB04: A03-D03 2) Thermal Barrier Heat Exchanger - ALB04: A05-D05	 **No Alarm **No Alarm
ACCW Temperature At RCP 1) Lube Oil & Motor Coolers - ALB04: A04-D04 2) Thermal Barrier Heat Exchanger - ALB61: A01	 **No Alarm **No Alarm
VCT Pressure	>18 psig

* An RCP start is permitted at the discretion of the Unit Shift Supervisor, if the actual level is not decreasing.

** With Westinghouse and Operations management approval, RCPs may be started without ACCW flow to perform 30 second and 1 minute air sweeps per 13001-1, "Reactor Coolant System Filling and Venting" or to verify proper rotation following electrical maintenance (less than 1 minute). General Manager approval will be required for starting RCPs without ACCW for any other operation. RCP operation without ACCW cooling for more than 10 minutes is prohibited.

TABLE 2 - RCP SEAL PARAMETER INDICATION   Sheet 1 of 2

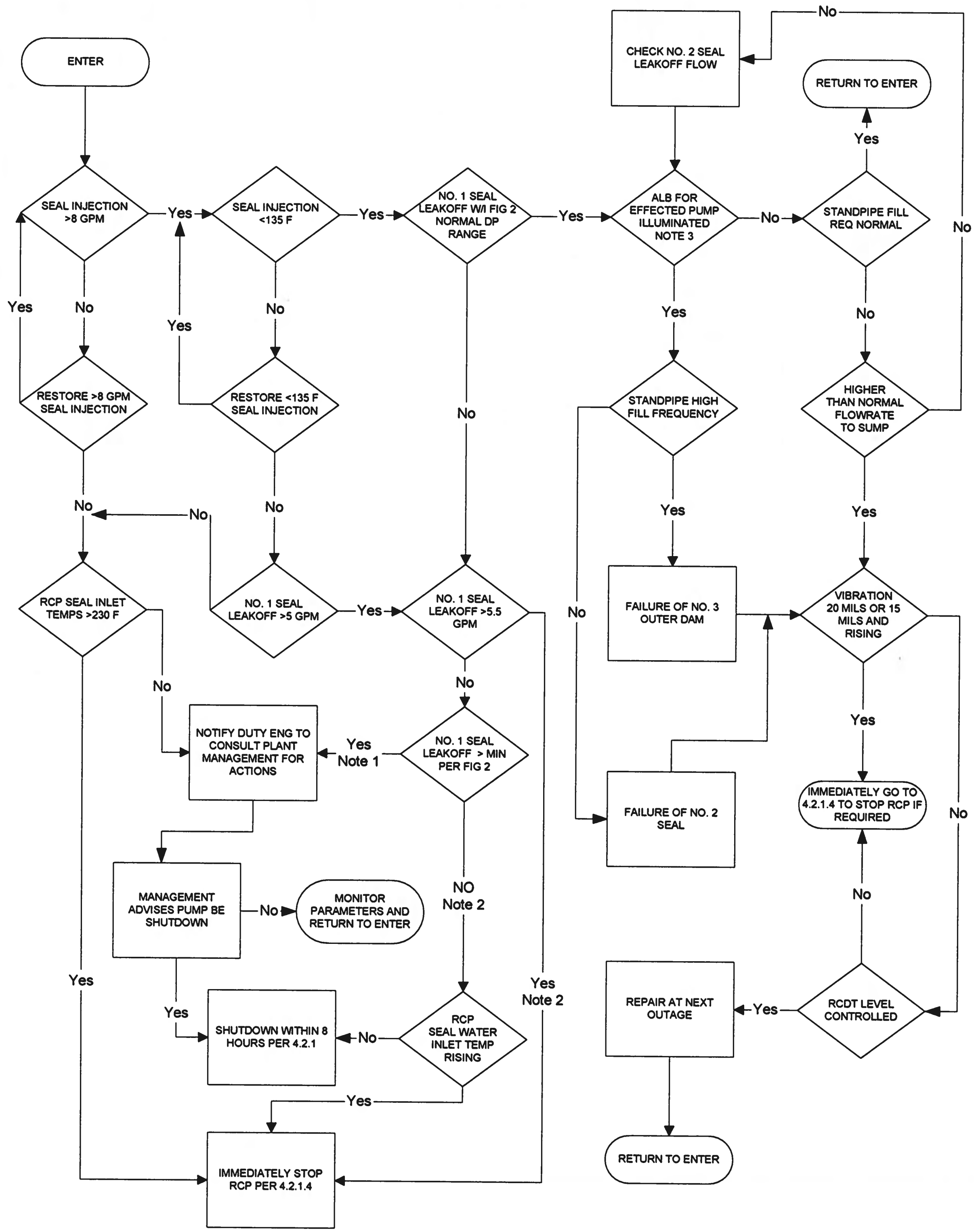
PARAMETER	INSTRUMENT USED	PLANT COMPUTER POINT
RCP Seal Injection Flow 1. QMCB Indication 2. Computer Point Available	RCP 1 1-FI-0145A RCP 2 1-FI-0144A RCP 3 1-FI-0143A RCP 4 1-FI-0142A	F0131 F0129 F0127 F0125
RCP Seal Injection Temperature 1. Measured at the VCT Outlet 2. QMCB Indication 3. Computer Point Available	1-TI-0116	T0140
Number 1 Seal Differential Pressure* 1. QMCB Indication	RCP 1 1-PDI-0153 RCP 2 1-PDI-0152 RCP 3 1-PDI-0151 RCP 4 1-PDI-0150	N/A
Estimation of Number 1 Seal Differential Pressure* 1. QMCB Indication 2. Computer Point Available	VCT 1-PI-0115 CHG DISCH 1-PI-0120	P0139 P0142
Number 1 Seal Leakoff High Flow 1. QMCB Indication 2. Computer Point Available	RCP 1 1-FI-0160A RCP 2 1-FI-0160B RCP 3 1-FI-0158A RCP 4 1-FI-0158B	F0161 F0160 F0159 F0158
Number 1 Seal Leakoff Low Flow 1. QMCB Indication Only	RCP 1 1-FI-0156A RCP 2 1-FI-0156B RCP 3 1-FI-0154A RCP 4 1-FI-0154B	N/A
Number 1 Seal Inlet Temperature 1. Computer Point Only	RCP 1 1-TE-0173 RCP 2 1-TE-0171 RCP 3 1-TE-0169 RCP 4 1-TE-0167	T0181 T0182 T0183 T0184
Number 1 Seal Inlet Temperature 1. Computer Point Only	RCP 1 1-TE-0172 RCP 2 1-TE-0170 RCP 3 1-TE-0168 RCP 4 1-TE-0166	T0417 T0437 T0457 T0477

* If Individual Number 1 Seal Differential Pressure indicators are at max range (400 PSID), an estimate of the dP may be made by subtracting VCT pressure from the charging discharge header pressure.

TABLE 2 - RCP SEAL PARAMETER INDICATION Sheet 2 of 2

PARAMETER	INSTRUMENT USED	PLANT COMPUTER POINT
Motor Lower Radial Bearing Temperature 1. Computer Point Only	RCP 1 1-TE-0483B RCP 2 1-TE-0484B RCP 3 1-TE-0485B RCP 4 1-TE-0486B	T0415 T0435 T0455 T0475
Motor Upper Radial Bearing Temperature 1. Computer Point Only	RCP 1 1-TE-0483A RCP 2 1-TE-0484A RCP 3 1-TE-0485A RCP 4 1-TE-0486A	T0413 T0433 T0453 T0473
Motor Thrust Bearing UPPER Shoe Temperature 1. Computer Point Only	RCP 1 1-TE-0479A RCP 2 1-TE-0480A RCP 3 1-TE-0481A RCP 4 1-TE-0482A	T0414 T0434 T0454 T0474
Motor Thrust Bearing Lower Shoe Temperature 1. Computer Point Only	RCP 1 1-TE-0479B RCP 2 1-TE-0480B RCP 3 1-TE-0481B RCP 4 1-TE-0482B	T0416 T0436 T0456 T0476
Motor Stator Winding Temperature 1. Computer Point Only	RCP 1 1-TE-0487 RCP 2 1-TE-0488 RCP 3 1-TE-0489 RCP 4 1-TE-0490	T0412 T0432 T0452 T0472
Vibration Proximity Probe 1. Vibration Monitor Panel	RCP 1 1-XE-0471A RCP 2 1-XE-0472A RCP 3 1-XE-0473A RCP 4 1-XE-0474A	N/A
Vibration Proximity Probe 1. Vibration Monitor Panel	RCP 1 1-XE-0471B RCP 2 1-XE-0472B RCP 3 1-XE-0473B RCP 4 1-XE-0474B	N/A
Vibration Proximity Probe 1. Vibration Monitor Panel	RCP 1 1-XE-0471C RCP 2 1-XE-0472C RCP 3 1-XE-0473C RCP 4 1-XE-0474C	N/A

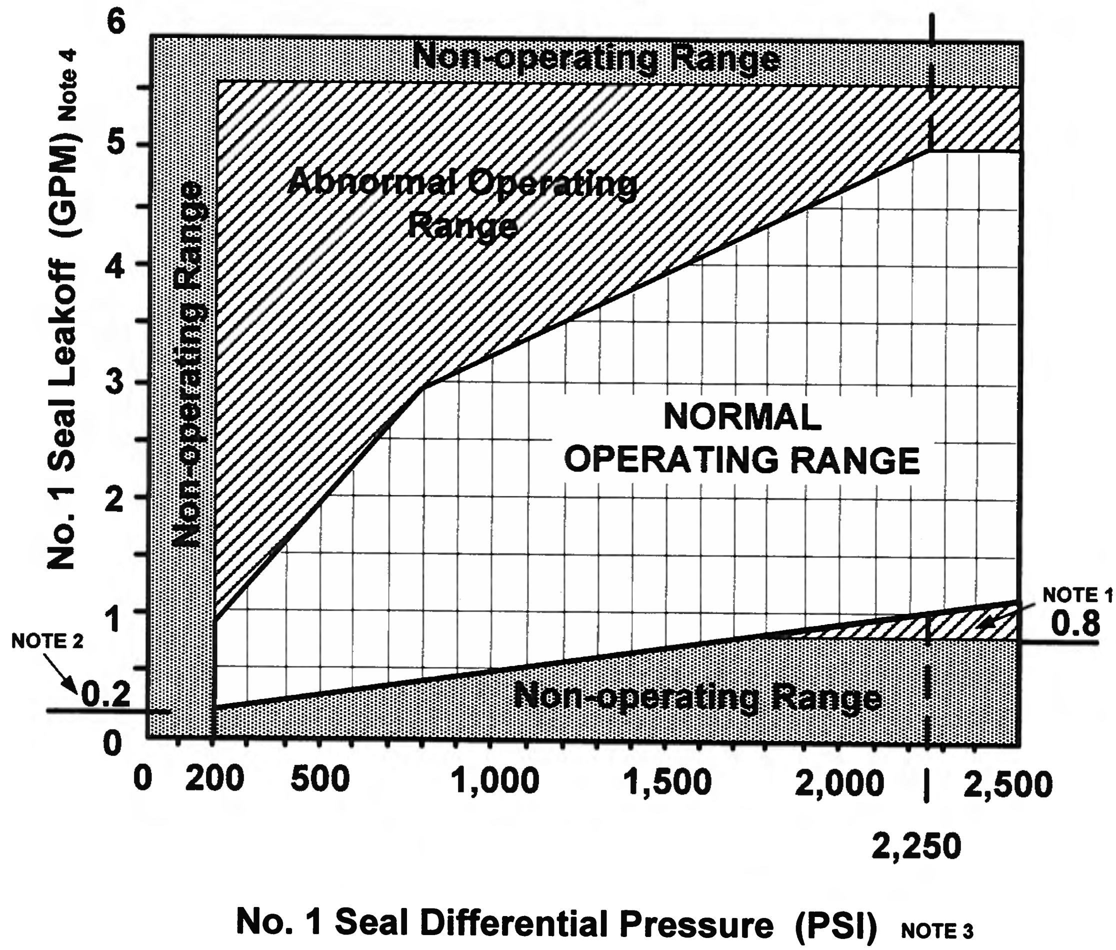
FIGURE 1 - RCP SEAL ABNORMALITIES DECISION TREE



Note 1: Abnormal Operating Range of Figure 2
Note 2: Non-operating Range of Figure 2
Note 3: ALB08 A-04, B-04, C-04 or D-04

FIGURE 2

NO. 1 SEAL NORMAL OPERATING RANGE



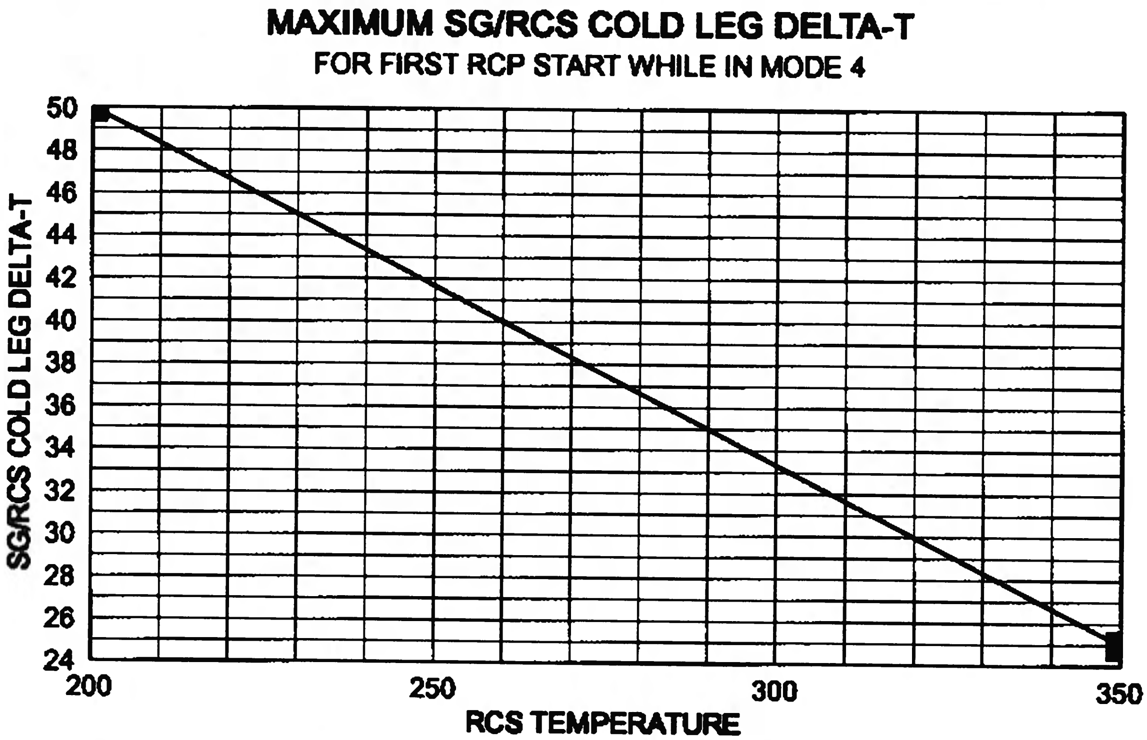
1. If the No. 1 seal leak rates are outside the normal (1.0-5.0 gpm) but within the operating limits ((0.8-5.5 gpm), continue pump operation. VERIFY that seal injection flow exceeds No. 1 seal leak rate for the affected RCP. Closely monitor pump and seal parameters and contact Engineering for further instructions.

2. Minimum startup requirements are 0.2 gpm at 200 PSID differential across the No. 1 seal. For startups at differential pressures greater than 200 PSID, the minimum No. 1 seal leak rate requirements are defined in the NO. 1 SEAL NORMAL OPERATING RANGE (e.g., at 1000 psi differential pressure, do not start the RCP with less than 0.5 gpm).

3. No.1 Seal Differential Press = RCS WR Press – VCT Press.

4. Per Westinghouse Technical Bulletin ESBU-TB-93-01-R1, total #1 seal leakoff is the sum of #1 seal leakoff and #2 seal leakoff. #1 seal leakoff is read directly at the MCB and #2 seal leakoff can be obtained from instrumentation in Containment.

FIGURE 3


MAXIMUM SG/RCS COLD LEG DELTA-T
FOR FIRST RCP START WHILE IN MODE 4
SG/RCS COLD LEG DELTA-T
50
48
46
44
42
40
38
36
34
32
30
28
26
24
200
250
300
350
RCS TEMPERATURE

Checklist 1 - Independent Verification

Sheet 1 of 1

STEP NUMBER	ITEM (VALVE, SWITCH, BREAKER, ETC.)	ITEM POSITION	POSITIONED BY	VERIFIED BY	DATE/TIME
4.4.2.6.a	1-1208-U4-007	CLOSED			
4.4.2.6.a	1-1208-U4-362	CLOSED			
4.4.2.6.a	1-1208-U4-363	CLOSED			
4.4.2.6.a	1-1208-U4-364	CLOSED			
4.4.2.6.b	1-HV-8103A	OPEN			
4.4.2.6.b	1-HV-8103B	OPEN			
4.4.2.6.b	1-HV-8103C	OPEN			
4.4.2.6.b	1-HV-8103D	OPEN			
4.4.3.4.a	1-HV-8103A	CLOSED			
4.4.3.4.a	1-HV-8103B	CLOSED			
4.4.3.4.a	1-HV-8103C	CLOSED			
4.4.3.4.a	1-HV-8103D	CLOSED			

Reviewed for Completeness ______________________ / ______________________

SS / Date

WINDOW B05

ORIGIN	SETPOINT
1-FT-0160	4.8 gpm
1-FT-0156	0.8 gpm

RCP 2
CONTROLLED LKG
HI/LO FLOW

1.0 **PROBABLE CAUSE**

1. High Flow:

   a. Flashing in the Seal Leakoff Line due to loss of seal injection flow or high seal injection temperature,

   b. Failure of Number 1 Seal.

2. Low Flow:

   a. Low differential pressure across Number 1 Seal,

   b. High Volume Control Tank (VCT) pressure,

   c. Excess letdown in service,

   d. Failure of Number 2 Seal.

2.0 **AUTOMATIC ACTIONS**

NONE

WINDOW B05
(Continued)

3.0 INITIAL OPERATOR ACTIONS

NOTE

RCP 2 No. 1 seal water leakoff high range flow may be monitored using computer point F0160.

1. **Observe** seal injection flow and seal leakoff flow, as well as excess letdown temperature and pressure for indication of an actual seal anomaly.

2. IF a seal problem is indicated, **Go To** 13003-1, "Reactor Coolant Pump Operation".

3. IF an instrument problem is indicated, **initiate** maintenance as required.

4.0 SUBSEQUENT OPERATOR ACTIONSS

NONE

5.0 COMPENSATORY OPERATOR ACTIONS

1. **Verify** proper seal leakoff using 1-FI-0156B and 1-FI-0160B once per shift, and refer to 13003-1, "Reactor Coolant Pump Operation" if leakoff is outside the limits.

2. **Log** corrective actions to repair the disabled annunciator or reasons for no action on 10018-C, "Annunciator Control", Figure 2.

3. **Log** compensatory actions on 10018-C, "Annunciator Control", Figure 5.

END OF SUB-PROCEDURE

REFERENCES: 1X4DB114, 1X6AB09-119, PLS

Job Performance Measure "E"

Facility: **Vogtle**

Task No: V-LO-TA-37003B

Task Title: Transfer AFW Pump Suction to Condensate Storage Tank 2

JPM No: V-NRC-JP-13610-HL17

K/A Reference: 061G2.1.23 4.3 / 4.4

Examinee: ______________________ NRC Examiner: ____________________

Facility Evaluator: ________________ Date: ________________________

Method of testing:

Simulated Performance _____________ Actual Performance _______________

Classroom __________ Simulator _____________ Plant __________

Read to the examinee:

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this job performance measure will be satisfied.

Initial Conditions: **A reactor trip has occurred due to a feed water transient. A crane has impacted the CST 1 manway causing leakage. CST 1 level is 14%.**

Initiating Cue: **The SS has directed you to switch to alternate CST by initiating 13610-1, "AUXILIARY FEEDWATER SYSTEM".**

Task Standard: Student transfers AFW pump suction to CST 2 with miniflows realigned to CST 2.

Required Materials: 13610-1,"Auxiliary Feedwater System" Ver. 49.0

General References: None

Time Critical Task: No

Validation Time: 10 minutes

SIMULATOR SETUP:

Simulator Setup:

1. Reset to IC # 215 for HL-17 NRC Exam.

Simulator Setup from Scratch:

1. Reset to IC # 14 (100% MOL).
2. Initiate manual Rx Trip
3. Throttle AFW flow to ~ 200 gpm per SG.
4. Isolate Demin makeup performing the following:

   Place 1HS-5158 to CLOSE
   Place 1HS-5162 to CLOSE

Note: Step 5 must be complete prior to doing step 6 or CST 1 will not override.

5. Drain CST 2 to 69% by performing the following:
   a. Set Remote function. TK04a to 68%
   b. Set Remote function TK04b to ON
   c. When CST 2 indicates Set Remote function TK04b to Off
6. Drain CST 1 to 14% by performing the following:
   a. Set Remote function. TK03a to 14%
   b. Set Remote function TK03b to ON
   c. When CST 2 indicates Set Remote function TK03b to Off
7. Acknowledge/reset alarms
8. Freeze the simulator

Setup time: 10 minutes

Performance Information

Critical steps denoted with an asterisk

Section 4.4.1 to transfer AFW suction to CST 2 selected.

Standard: Candidate selects section 4.4.1.

Comment:

NOTE
Independent Verifications performed in this Section should be documented on Checklist 3.

Standard: Candidate reads note.

Comment:

NOTE
Comply with the requirements of Technical Specification LCO 3.7.6 when in MODE 1, 2, and 3.

Standard: Candidate reads note.

Comment:

Step 4.4.1.1 To transfer Train A Motor Driven Auxiliary Feedwater Pump to CST-2, perform the following:

***a. Open CST-2 SPLY TO MDAFW PMP-A 1-HV-5119 using 1HS-5119A. (IV Required)**

Standard: Candidate opens 1HV-5119 and signs "Performed By" space on Checklist 3.

Cue: IF CV requested, "CV request is noted."

Cue: IF IV requested, "IV is completed."

Comment:

Step 4.4.1.1.b. Unlock and Close MDAFW 3 SUCT FROM CST 1 1-HV-5095. (IV Required)

Standard: Candidate directs SO to unlock and close 1HV-5095.

Cue: When SO direction given, "SO has completed valve manipulation".

Cue: IF IV requested, "IV is completed."

Comment:

Step 4.4.1.1 c. Unlock, open, and relock AFW MDAFW PUMP A RECIRC TO CST-2 1-1302-U4-185. (IV Required)

Standard: Candidate directs SO to unlock and open and relock 1-1302-U4-185.

Cue: When SO direction given, "SO has completed valve manipulation".

Cue: IF IV requested, "IV is completed."

Comment:

Step 4.4.1.1.d. Unlock, close, and relock AFW MDAFW PUMP A RECIRC TO CST-1 1-1302-U4-180. (IV Required)

Standard: Candidate directs SO to unlock and close and relock 1-1302-U4-180.

Cue: When SO direction given, "SO has completed valve manipulation".

Cue: IF IV requested, "IV is completed."

Comment:

Step 4.4.1.2 To transfer Train B Motor Driven Auxiliary Feedwater Pump to CST-2, perform the following:

***a. Open CST-2 SPLY TO MDAFW PMP-B 1-HV-5118 using 1-HS-5118A. (IV Required)**

Standard: Candidate OPENS 1-HV-5118 and signs "Performed By" space on Checklist 3.

Cue: IF IV requested, "IV is completed."

Comment:

Step 4.4.1.2 .b. Unlock and Close MDAFW 2 SUCT FROM CST 1 1-HV-5094. (IV Required)

Standard: Candidate directs SO to unlock and close 1HV-5094.

Cue: When SO direction given, "SO has completed valve manipulation".

Cue: IF IV requested, "IV is completed."

Comment:

Step 4.4.1.2. c. Unlock, open, and relock AFW MDAFW PUMP B RECIRC TO CST-2 1-1302-U4-184. (IV Required)

Standard: Candidate directs SO to unlock, open and relock 1-1302-U4-184.

Cue: When SO direction given, "SO has completed valve manipulation".

Cue: IF IV requested, "IV is completed."

Comment:

Step 4.4.1.2. d. Unlock, close, and relock AFW MDAFW PUMP B RECIRC TO CST-1 1-1302-U4-181. (IV Required)

Standard: Candidate directs SO to unlock, close and relock 1-1302-U4-181.

Cue: When SO direction given, "SO has completed valve manipulation".

Cue: IF IV requested, "IV is completed."

Comment:

Step 4.4.1.3 To transfer Train C Turbine Driven Auxiliary Feedwater Pump to CST-2, perform the following:

***a. Open CST-2 SPLY TO TDAFW 1-HV-5113 using 1-HS-5113A. (IV Required)**

Standard: Candidate OPENS 1-HV-5113 and signs "Performed By" space on Checklist 3.

Cue: IF IV requested, "IV is completed."

Comment:

Step 4.4.1.3. b. Unlock and Close TDAFW PMP SUCT FROM CST 1 1-HV-5093. (IV Required)

Standard: Candidate directs SO to unlock and close 1HV-5093.

Cue: When SO direction given, "SO has completed valve manipulation"

Cue: IF IV requested, "IV is completed."

Comment:

Step 4.4.1.3 c. Unlock, open, and relock AFW TDAFW PUMP RECIRC TO CST-2 1-1302-U4-183. (IV Required)

Standard: Candidate directs SO to unlock, open and relock 1-1302-U4-183.

Cue: When SO direction given, "SO has completed valve manipulation".

Cue: IF IV requested, "IV is completed."

Comment:

Step 4.4.1.3 d Unlock, close, and relock AFW TDAFW PUMP RECIRC TO CST-1 1-1302-U4-182. (IV Required)

Standard: Candidate directs SO to unlock, close and relock 1-1302-U4-182.

Cue: When SO direction given, "SO has completed valve manipulation".

Cue: IF IV requested, "IV is completed."

Comment:

Terminating cue: Student returns initiating cue sheet. Informs SS that transfer of AFW pump suction to CST 2 is complete.

Verification of Completion

Job Performance Measure No. V-NRC-JP-13610-HL17

Examinee's Name:

Examiner's Name:

Date Performed:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:____

Response:____

Result: Satisfactory/Unsatisfactory

Examiner's signature and date: ____________________ ________

Initial Conditions: A reactor trip has occurred due to a feed water transient. . A crane has impacted the CST 1 manway causing leakage. CST 1 level is 14%.

Initiating Cue: The SS has directed you to switch to alternate CST by initiating 13610-1, "AUXILIARY FEEDWATER SYSTEM".

Job Performance Measure "F"

Facility: Vogtle

Task No: V-LO-TA-29013

Task Title: Dilute Containment With Service Air

JPM No: V-NRC-JP-13130-HL17

K/A Reference: 028A4.01 RO 4.0 SRO 4.0

Examinee: ____________________ NRC Examiner: ____________________

Facility Evaluator: ____________________ Date: ____________________

Method of testing:

Simulated Performance ________________ Actual Performance ________________

Classroom ______________ Simulator ______________ Plant ___________

Read to the examinee:

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this job performance measure will be satisfied.

Initial Conditions: **A LOCA has occurred on Unit 1. The crew is performing 19010-C. The TSC has requested that the Hydrogen concentration of the Containment atmosphere be reduced.**

Initiating Cue: **The SS has directed you to "Dilute the Containment hydrogen concentration using service air per 13130-1".**

Task Standard: Containment dilution using service air is properly initiated per 13130-1.

Required Materials: 13130-1, "Post Accident Hydrogen Control" Ver. 19.0.

General References: None

Time Critical Task: No

This JPM is a repeat from Exam 2010-301. The JPM number was V-NRC-JP-13130-001.

Validation Time: 8 minutes

SIMULATOR SETUP:

Simulator Setup: Reset to IC #216 for HL-17 NRC Exam.

Simulator Setup from Scratch:

1. Reset to IC # 14 (MOL 100%)
2. Insert malfunction RC05C at 50% (Hot Leg Break).
3. Throttle AFW flow to 600 gpm.
4. Use Remote Function ED08 to set CNMT H_2 at 4.5%.
5. Use Remote Function ED07 to override CNMT H_2.
6. Trip RCPs.
7. Verify RCS pressure rising.
8. Reset SI.
9. Stop RHR pumps.
10. Place both CNMT H_2 monitors in service per 13130-1.
11. Ack/Reset alarms.

14. Freeze simulator

Setup time from scratch: 20 minutes

Performance Information

Critical steps denoted with an asterisk and bolded.

Candidate determines that 13130-1, "Post-Accident Hydrogen Control" is applicable.

Standard: Candidate selects 13130-1, section 4.4.2 for "Diluting Containment Hydrogen Concentration Using The Service Air System".

Comment:

NOTE: Note stating Containment design pressure is 52 psig.

CAUTION: Do not perform this section if containment pressure is greater than 40 psig unless so directed by the Emergency Director.

Standard: Candidate reviews NOTE and CAUTION prior to step 4.4.2.1 and determines that they are not applicable.

Comment:

Step *4.4.2.1 **Reset CIA by taking the following hand switches to RESET and observe ALB06-E06 extinguished.**

- **1HS-40120**
- **1HS-40122**

Standard: Candidate rotates 1HS-40120 to the RESET position.

Candidate rotates 1HS-40122 to the RESET position.

Candidate verifies annunciator ALB06-E06 orange window light is OFF. (CNMT ISO PHASE A ACTUATION)

Comment:

Step *4.4.2.2 **Open SERVICE AIR CNMT HDR ISOL 1-HV-9385 as follows:**

a. Place 1-HS-9385A on Main Control Room Panel QPCP to OPEN.

b. Hold 1-HS-9385B on Panel QPCP in OPEN until 1-HV-9385 is fully open.

NOTE to examiner: The candidate must manipulate the hand switches in the proper sequence stated above or the valve will not open. It is a single valve with a dual hand switch.

Standard: Candidate manipulates HV-9385 in proper sequence to open the valve.

a. 1-HS-9385A rotated to OPEN first.

b. 1HS-9385B rotated to OPEN and HELD until valve opens.

c. HV-9385, red light LIT, green light OFF.

Comment:

Step *4.4.2.3 **Open one SERVICE AIR CNMT POST LOCA PURGE valve using its Control Switch on QPCP.**

1-HV-9380A

OR

1-HV-9380B

Standard: Candidate rotates either 1-HV-9380A or 1-HV-9380B to the open position.

1-HV-9380A red light LIT, green light OFF

OR

1-HV-9380B red light LIT, green light OFF.

Comment:

Step 4.4.2.4 Check Service Air Header 1-PI-9377 and Instrument Air Dryer to SCS Equipment 1-PI-9361 pressures on Main Control Room Panel QMCB.

Standard: Candidate checks Service and Instrument air pressures on referenced instruments.

Comment:

Step 4.4.2.5 IF air pressures fall to 80 psig or less, SERVICE AIR DRYER SUPPLY OUTLET ISO 1-PV-9375 isolates service air to dryers; restore purge air flow as follows:

a. Reset 1-PV-9375 per 13710-1 to restore Service Air Supply.

b. Throttle Service Air Dryer Bypass Valve 1-2401-U4-551, as necessary to maintain air pressure 1-PI-9377 and 1-PI-9361 greater than 85 psig.

Standard: Candidate determines header pressure has remained above 80 psig and this step is not applicable.

1-PI-9377, Service Air Header pressure remain > 80 psig.

1-PI-9361 Instrument Air Header pressure remains > 80 psig.

Comment:

Step 4.4.2.6 Monitor containment hydrogen concentration through sampling and per Section 4.2.1 and/or 4.2.2 of this procedure.

CUE: "An extra RO will initiate monitoring of H2 concentration, the SS will notify Chemistry to begin sampling".

Standard: Candidate informs SS of necessity for sampling.

Comment:

Step 4.4.2.7 Monitor containment pressure 1-PI-0934, 1-PI-0935, 1-PI-0936, and 1-PI-0937.

IF, containment pressure rises to 40 psig OR to the value specified by the Emergency Director, terminate dilution per step 4.4.2.8.

CUE: After Candidate observes Containment pressure < 40 psig, "an extra RO will continue monitoring of Containment pressure.

Standard: Candidate observes Containment pressure is < 40 psig on Containment pressure instruments.

Comment:

Terminating cue: Candidate returns initiating cue sheet and / or informs SS that the Containment has been diluted with Service Air per 13130-1.

Verification of Completion

Job Performance Measure No. V-NRC-JP-13130H-L17

Examinee's Name:

Examiner's Name:

Date Performed:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:____

Response:____

Result: Satisfactory/Unsatisfactory

Examiner's signature and date: ______________________________________

Initial Conditions: A LOCA has occurred on Unit 1. The crew is performing 19010-C. The TSC has requested that the Hydrogen concentration of the Containment atmosphere be reduced.

Initiating Cue: The SS has directed you to "Dilute the Containment hydrogen concentration using service air per 13130-1".

POST-ACCIDENT HYDROGEN CONTROL

PROCEDURE USAGE REQUIREMENTS		SECTIONS
Continuous Use:	Procedure must be open and readily available at the work location. Follow procedures step by step unless otherwise directed.	**ALL**
Reference Use:	Procedure or applicable section(s) available at the work location for ready reference by person performing steps.	**NONE**
Information Use:	Available on plant site for reference as needed.	**NONE**

1.0 PURPOSE

This procedure provides instructions for operation of the Containment Hydrogen Monitoring System, the Post-LOCA Cavity Purge System, and the Post-LOCA Containment Hydrogen Purge System during normal and post-LOCA conditions. Instructions are provided in the following sections.

4.1.1 Placing The Containment Hydrogen Monitoring System In Standby

4.1.2 Deleted

4.1.3 Placing The Post-LOCA Cavity Purge And Post-LOCA Containment Hydrogen Purge Systems In Standby

4.2.1 Containment Hydrogen Monitor 1-1513-P5-HMA Operation (Hydrogen Measurement)

4.2.2 Containment Hydrogen Monitor 1-1513-P5-HMB Operation (Hydrogen Measurement)

4.4.1 Deleted

4.4.2 Diluting Containment Hydrogen Concentration Using The Service Air System

4.4.3 Post-LOCA Containment Hydrogen Purge System Operation

4.4.4 Changing O_2 Reagent Gas Bottles At The H_2 Monitors

2.0 PRECAUTIONS AND LIMITATIONS

2.1 PRECAUTIONS

2.1.1 Adhere to all applicable radiological controls.

2.1.2 Train A Hydrogen Monitor Supply Valves 1-HV-2792A, 1-HV-2792B, 1-HV-2791B, and Return Valve 1-HV-2793B may be opened in Modes 1, 2, 3, and 4 under administrative control as described in the basis for Technical Specification LCO 3.6.3.

2.1.3 Train B Hydrogen Monitor Supply Valves 1-HV-2790A, 1-HV-2790B, 1-HV-2791A, and Return Valve 1-HV-2793A may be opened in Modes 1, 2, 3, and 4 under administrative control as described in the basis for Technical Specification LCO 3.6.3.

2.1.4 This procedure does not administratively control opening of both IRC and ORC Hydrogen Monitor Valves (on the same penetration) as allowed in Technical Specification LCO 3.6.3 Note 1.

2.2 LIMITATIONS

2.2.1 When first energized, the Hydrogen Monitors require a 6 hour warm-up period in standby before accurate readings may be obtained.

2.2.2 In Analyze Mode, Low Analyzer Flow, Analyzer Cell Failure, Low Calibration Gas Pressure, Low Reagent Gas Pressure, Low Hot Box Temperature and switching between Standby and Analyze Modes will generate a Common Failure Alarm. In Standby Mode, low analyzer flow and analyzer cell failure are bypassed.

3.0 <u>PREREQUISITES OR INITIAL CONDITIONS</u>

Hydrogen Monitor sample line heat tracing is operating.

INITIALS

4.0 INSTRUCTIONS

4.1 STARTUP

4.1.1 Placing The Containment Hydrogen Monitoring System In Standby

4.1.1.1 **Perform** Section A of 11130-1, "Post-Accident Hydrogen Control Alignment", if required. ________

4.1.1.2 **Perform** Checklist 1 to align Containment Hydrogen Monitoring System remote - operated components for system startup. ________

NOTE
The Hydrogen Monitors require a 6 hour warm-up period in STANDBY before accurate readings may be obtained.

4.1.1.3 On Control Room Panel QPCP, **place** Mode Switch 1-HS-22900 in STANDBY and **verify** Power ON light illuminates. ________

4.1.1.4 At local Containment Hydrogen Monitor Panel 1-1513-P5-HMA (Auxiliary Building Level B), perform the following:

a. IF no lights are lit, **press** the Circuit Breaker reset pushbutton, located inside the panel. ________

b. **Verify** FUNCTION SELECTOR Switch 1-HS-22902 in SAMPLE. ________

c. IF Common Failure Light is lit, **reset** by depressing reset button 1-HS-22955. ________

4.1.1.5 On Control Room Panel QPCP, **place** MODE SWITCH 1-HS-22901 in STANDBY and **verify** POWER ON light illuminates. ________

INITIALS

4.1.1.6 At local Containment Hydrogen Monitor Panel 1-1513-P5-HMB (Fuel Handling Building Level A), perform the following:

a. IF no lights are lit, **press** the Circuit Breaker ON Pushbutton located inside the panel. ________

b. **Verify** FUNCTION SELECTOR Switch 1-HS-22903 in SAMPLE. ________

c. IF Common Failure Light is lit, **reset** by depressing RESET Button 1-HS-22956. ________

INITIALS

4.1.2 Deleted

4.1.3 Placing The Post-LOCA Cavity Purge And Post-LOCA Containment Hydrogen Purge Systems In Standby

4.1.3.1 **Perform** Section B of 11130-1, "Post-Accident Hydrogen Control Alignment" if required. ________

4.1.3.2 **Perform** Checklist 2 to align the Post-LOCA Containment Hydrogen Purge System remote - operated valves for standby. ________

INITIALS

4.2 SYSTEM OPERATION

4.2.1 Containment Hydrogen Monitor A 1-1513-P5-HMA Operation (Hydrogen Measurement)

> NOTE
>
> The Hydrogen Monitors require a 6 hour warm-up period in STANDBY before accurate readings may be obtained.

> **CAUTION**
>
> The Hydrogen Monitor Isolation Valves must remain closed except during Hydrogen Monitor operation while in Modes 5 or 6 or during post accident conditions to ensure containment integrity is maintained.

4.2.1.1 IF the following conditions exist, THEN **notify** maintenance to implement 28834-1, to provide power to Containment Isolation Valves 1-HV-2791B and 1-HV-2793B:

a. A post accident condition (LOCA) exist AND, ________

b. 125 VDC Bus 1BD11 is not available AND, ________

c. Containment Hydrogen Concentration is required. ________

4.2.1.2 **Verify** the Hydrogen Monitor A sample line heat tracing temperature is greater than 260°F:

a. At Heat Tracing Panel 1-1817-U3-007B,(1AB-B07) **read** the temperature for circuit C1-7 and C1-8. ________

b. IF less than 260°F, **notify** the Control Room immediately. ________

4.2.1.3 **Open** the H_2 MONITOR A SPLY ISO IRC:

a. 1-HV-2792A ________

b. 1-HV-2792B ________

4.2.1.4 **Open** H_2 MONITOR A SPLY ISO ORC 1-HV-2791B. ________

INITIALS

4.2.1.5 **Open** H_2 MONITOR A RTN ISO ORC 1-HV-2793B. ________

4.2.1.6 **Place** Mode Switch 1-HS-22900 in ANALYZE. ________

4.2.1.7 **Verify** Function Selector Switch 1-HS-22904 in Sample position. ________

4.2.1.8 Momentarily **depress** Remote Control Selector Pushbutton 1-HS-22944 and **verify** Sample Light LIT. ________

> NOTE
>
> Indication of hydrogen concentration is available within 30 minutes of initiating flow through the monitors. This is accomplished by operating the monitors in Standby during normal plant operation.

4.2.1.9 **Note** containment hydrogen concentration as indicated by CONTAIN H_2 MONITOR TRN A 1-AI-12979 on QMCB <u>WHEN</u> indications stabilize. ________

4.2.1.10 <u>WHEN</u> hydrogen monitoring is no longer desired, **place** Mode Switch 1-HS-22900 in STAND BY. ________

4.2.1.11 **Close** the Hydrogen Monitor A Isolations by placing their control switches to close:

a. 1-HV-2792A ________

b. 1-HV-2792B ________

c. 1-HV-2791B ________

d. 1-HV-2793B ________

INITIALS

4.2.2 Containment Hydrogen Monitor B 1-1513-P5-HMB Operation (Hydrogen Measurement)

> NOTE
>
> The Hydrogen Monitors require a 6 hour warm-up period in STANDBY before accurate readings may be obtained.

> **CAUTION**
>
> The Hydrogen Monitor Isolation Valves must remain closed except during Hydrogen Monitor operation while in Modes 5 or 6 or during post accident conditions to ensure containment integrity is maintained.

4.2.2.1 IF the following conditions exist, THEN **notify** maintenance to implement 28834-1 to provide power to Containment Isolation Valves 1-HV-2791A and 1-HV-2793A:

a. A post accident condition (LOCA) exist AND, ________

b. 125 VDC Bus 1AD11 is not available AND, ________

c. Containment Hydrogen Concentration is required. ________

4.2.2.2 **Verify** the Hydrogen Monitor B sample line heat tracing temperature is greater than 260°F:

a. At Heat Tracing Panel 1-1817-U3-007A,(1FHB-A10) **read** the temperature for circuit C1-1 and C1-2. ________

b. IF less than 260°F, **notify** the Control Room immediately. ________

4.2.2.3 **Open** the Hydrogen Monitor Supply Isolations Inside Reactor Containment:

a. 1-HV-2790A ________

b. 1-HV-2790B ________

4.2.2.4 **Open** H_2 MONITOR B SPLY ISO ORC 1-HV-2791A. ________

INITIALS

4.2.2.5 **Open** H_2 MONITOR B RTN ISO ORC 1-HV-2793A. ________

4.2.2.6 **Place** MODE SWITCH 1-HS-22901 in ANALYZE. ________

4.2.2.7 **Verify** Function Selector Switch 1-HS-22905 in Sample position. ________

4.2.2.8 Momentarily **depress** Remote Control Selector Pushbutton 1-HS-22945 and **verify** Sample Light LIT. ________

> NOTE
>
> Indication of hydrogen concentration is available within 30 minutes of initiating flow through the monitors. This is accomplished by operating the monitors in Standby during normal plant operation.

4.2.2.9 **Note** containment hydrogen concentration as indicated by CONTAIN H_2 MONITOR TRN B 1-AI-12980 on QMCB <u>WHEN</u> indications stabilize. ________

4.2.2.10 <u>WHEN</u> Hydrogen Monitoring is no longer desired, **place** MODE SWITCH 1-HS-22901 in STAND BY. ________

4.2.2.11 **Close** the Hydrogen Monitor B Isolations by placing their control switches to close:

a. 1-HV-2790A ________

b. 1-HV-2790B ________

c. 1-HV-2791A ________

d. 1-HV-2793A ________

INITIALS

4.3 SHUTDOWN

NONE

4.4 NON PERIODIC OPERATION

4.4.1 Deleted

4.4.2 Diluting Containment Hydrogen Concentration Using The Service Air System

> NOTES
>
> Containment design pressure is 52 psig.

> **CAUTION**
>
> Do not perform this section if containment pressure is greater than 40 psig unless so directed by the Emergency Director.

4.4.2.1 **Reset** CIA by taking the following handswitches to RESET and **observe** ALB06-E06 extinguished:

- 1HS-40120 ________
- 1HS-40122 ________

4.4.2.2 **Open** SERVICE AIR CNMT HDR ISOL 1-HV-9385 as follows:

a. **Place** 1-HS-9385A on Main Control Room Panel QPCP to OPEN. ________

b. **Hold** 1-HS-9385B on Panel QPCP in OPEN until 1-HV-9385 is fully open. ________

INITIALS

4.4.2.3 **Open** one SERVICE AIR CNMT POST LOCA PURGE Valve using its Control Switch on QPCP:

1-HV-9380A ________

OR

1-HV-9380B ________

4.4.2.4 **Check** Service Air Header 1-PI-9377 and Instrument Air Dryer To SCS Equipment 1-PI-9361 pressures on Main Control Room Panel QMCB. ________

4.4.2.5 IF air pressures fall to 80 psig or less, SERVICE AIR DRYER SUPPLY OUTLET ISO 1-PV-9375 isolates service air to dryers; **restore** purge air flow as follows:

a. **Reset** 1-PV-9375 per 13710-1 to restore Service Air Supply. ________

b. **Throttle** Service Air Dryer Bypass Valve 1-2401-U4-551 as necessary to maintain air pressure 1-PI-9377 and 1-PI-9361 greater than 85 psig. ________

4.4.2.6 **Monitor** containment hydrogen concentration through sampling and per Section 4.2.1 and/or 4.2.2 of this procedure. ________

4.4.2.7 **Monitor** containment pressure 1-PI-0934, 1-PI-0935, 1-PI-0936, and 1-PI-0937. IF pressure rises to 40 psig OR to the value specified by the Emergency Director, **terminate** dilution per Step 4.4.2.8.

INITIALS

4.4.2.8 WHEN containment hydrogen concentration falls to 3.5%, **terminate** dilution as follows:

a. **Close** SERVICE AIR CNMT HDR ISOL 1-HV-9385 using either 1-HS-9385A or 1-HS-9385B on Control Room Panel QPCP. ________

b. **Verify** closed both Service Air Containment Post-LOCA Purge Valves using their Control Switches on Panel QPCP:

(1) 1-HV-9380A ________

(2) 1-HV-9380B ________

4.4.2.9 Periodically **monitor** containment hydrogen concentration and **repeat** this section as required to maintain the concentration below 4.0%. ________

INITIALS

4.4.3 Post-LOCA Containment Hydrogen Purge System Operation

NOTE

If plant conditions warrant, the Emergency Director may waive the Gaseous Release Permit requirement.

CAUTIONS

- The Post-LOCA Containment Hydrogen Purge System is to be operated only if the containment hydrogen concentration cannot be maintained below 4% by other means.
- The Post-LOCA Containment Hydrogen Purge System is designed to operate with a maximum pressure of 3 psi downstream of CNMT POST LOCA PURGE EXH DUCT CONTROL VLV 1-FV-2693.

4.4.3.1 **Initiate** a Gaseous Release Permit. ________

4.4.3.2 **Verify** containment atmosphere is sampled and analyzed. ________

4.4.3.3 **Verify** the Service Air System is operating. ________

4.4.3.4 **Verify** compliance with the ODCM Section 3.1.1 Table 3-1 for the gaseous effluent monitoring requirements. ________

4.4.3.5 **Verify** the Auxiliary Building Heating Ventilation And Air Conditioning System is operating. ________

4.4.3.6 **Place** disconnect switch at local Heater Control Panel 1-1508-N7-001-H01 to ON. ________

4.4.3.7 **Push** RESET button at local Heater Control Panel 1-1508-N7-001-H01 and **verify** that reset red light is ON. ________

Critical

4.4.3.8 Due to high radiation area potential, **verify** Containment Inside Isolation Valves 1-HV-2624A and 1-HV-2624B are closed and remain closed during the performance of the next step and until personnel have exited the area. ________

____
CV

INITIALS

4.4.3.9 **Unlock** and **open** POST LOCA PURGE CTB ISO VALVE 1-1508-U4-012. (KEY# 1OP3-381)[Equip. Bldg. roof (Dog House)] ________

4.4.3.10 **Verify** all conditions of the Gaseous Release Permit that must be satisfied prior to the release are met, unless the permit requirement has been waived by the Emergency Director. ________

4.4.3.11 **Reset** CVI by placing the following handswitches to the RESET position:

- 1HS-40121 ________
- 1HS-40123 ________

4.4.3.12 **Open** one CTB POST LOCA PURGE EXH IRC ISO VLV using its Control Switch on Main Control Room Panel QHVC:

1-HV-2624A ________

<u>OR</u>

1-HV-2624B ________

4.4.3.13 **Place** CNMT POST LOCA PURGE EXH DUCT CONTROL VLV 1-HS-2693 (QHVC @ E-30) to the MOD position to initiate containment venting. ________

4.4.3.14 **Verify** Post-LOCA Purge Exhaust flow rises to between 450 and 500 standard cubic feet per minute using 1-UI-2693B. ________

4.4.3.15 **Monitor** 1-UI-2693B, plant vent stack flow (using IPC Computer point F5106 or F6417) and vent stack radiation. **Verify** compliance with the Gaseous Release Permit, if required. ________

4.4.3.16 **Reset** CIA by taking the following handswitches to RESET and **observe** ALB06-E06 extinguished:

- 1HS-40120 ________
- 1HS-40122 ________

INITIALS

4.4.3.17 **Open** SERVICE AIR CNMT HDR ISOL 1-HV-9385 as follows:

a. **Place** Control switch 1-HS-9385A on Main Control Room Panel QPCP to OPEN. ________

b. **Hold** Control switch 1-HS-9385B on Panel QPCP in open until 1-HV-9385 is fully open. ________

4.4.3.18 **Open** one SERVICE AIR CNMT POST LOCA PURGE Valve using its Control Switch on QPCP:

1-HV-9380A ________

OR

1-HV-9380B ________

4.4.3.19 **Check** Compressed Air Header 1-PI-9377 and Instrument Air Dryer Outlet Header 1-PI-9361 pressures on Main Control Room Panel QMCB. ________

4.4.3.20 IF air pressures fall to 80 psig or less, SERVICE AIR DRYER SUPPLY INLET ISO 1-PV-9375 isolates service air to dryers; **restore** purge air flow as follows:

a. **Reset** 1-PV-9375 per 13710-1 to restore Service Air Supply. ________

b. **Throttle** Service Air Dryer Bypass Valve 1-2401-U4-551, as necessary to maintain air pressure on 1-PI-9377 and 1-PI-9361 greater than 85 psig. ________

INITIALS

4.4.3.21 WHEN containment hydrogen concentration falls to 3.5%, **terminate** the purge as follows:

a. **Close** SERVICE AIR CNMT HDR ISOL 1-HV-9385 using EITHER 1-HS-9385A OR 1-HS-9385B on Control Room Panel QPCP. ________

b. **Verify** closed both SERVICE AIR CNMT POST LOCA PURGE Valves using their Control Switches on Panel QPCP:

(1) 1-HV-9380A ________

(2) 1-HV-9380B ________

c. **Verify** Closed both CTB POST LOCA PURGE EXH IRC ISOL Valves using their Control Switches on Control Room Panel QHVC:

(1) 1-HV-2624A ________

(2) 1-HV-2624B ________

d. **Close** CNMT POST LOCA PURGE EXH DUCT CONTROL VLV 1-FV-2693 using 1-HS-2693. ________

e. **Place** disconnect switch at local HEATER CONTROL PANEL 1-1508-N7-001-H01 to OFF. ________

f. **Close** and **lock** POST LOCA PURGE CTB ISO VALVE 1-1508-U4-012. ________

g. **Complete** processing of the Gaseous Release Permit if initiated. ________

4.4.3.22 Periodically **monitor** containment hydrogen concentration and **maintain** it less than 4.0%. ________

INITIALS

4.4.4 Changing O_2 Reagent Gas Bottles At The H_2 Monitors

> **CAUTION**
>
> Non-Sparking tools should be used for the removal and installation of components associated with replacement of the 0_2 reagent gas bottle.

4.4.4.1 **Notify** the SSS to procure a 249 ft^3 O_2 bottle, purity 99.99%, stock number 91060-00028168, or equivalent. ________

4.4.4.2 **Transport** the replacement O_2 bottle to the applicable H_2 monitor bottle rack. ________

4.4.4.3 At the H_2 monitor reagent gas bottle rack, **close** the isolation valve for the bottle to be removed. ________

4.4.4.4 Slowly **crack** the regulator fitting to relieve pressure. ________

4.4.4.5 **Remove** the regulator from the empty bottle. ________

4.4.4.6 **Remove** the empty bottle from the rack, and **tag** and **store** as appropriate per 00280-C, “Compressed Gas Safety”. ________

4.4.4.7 **Install** the replacement bottle in the rack and **secure**. ________

4.4.4.8 **Install** the regulator on the replacement bottle. ________

4.4.4.9 Slowly **open** the isolation valve on the replacement bottle <u>WHILE</u> **monitoring** regulator pressure. ________

4.4.4.10 If necessary, **adjust** the regulator to obtain an indication of 35 psig by turning the regulator handle clockwise to increase pressure or counter-clockwise to decrease pressure. ________

4.4.4.11 **Remove** the empty bottle from the Aux bldg for return to the warehouse. ________

5.0 REFERENCES

5.1 VEGP FSAR Section 6.2.5

5.2 PROCEDURES

5.2.1	13305-1,	"Auxiliary Building Heating, Ventilation, And Air Conditioning System"
5.2.2	13710-1,	"Service Air System"
5.2.3	13901-1,	"Heat Tracing"

5.3 P&IDs

5.3.1	1X4DB213-1	Purification And Clean-up System
5.3.2	1X4DB213-2	Purification And Clean-up System
5.3.3	1X4DB214-2	Containment, Control Rod Drive Mechanism, Cavity, And Reactor Support Cooling System
5.3.4	1X4DB203	Equipment Building Heating, Ventilation, And Air Conditioning System
5.3.5	1X4DB186-1	Service Air System
5.3.6	1X4DB175-2	Instrument And Service Air System

5.4 ELEMENTARY DIAGRAMS

5.4.1	1X3D-BG-B02X	Containment, Control Rod Drive Mechanism, Cavity And Reactor Support Cooling System
5.4.2	1X3D-BG-B02Y	Containment, Control Rod Drive Mechanism, Cavity And Reactor Support Cooling System
5.4.3	1X3D-BG-B04A	Purification And Clean-up System: 1-HV-2624A
5.4.4	1X3D-BG-B04B	Purification And Clean-up System: 1-HV-2624B
5.4.5	1X3D-BG-B05B	Purification And Clean-up System: 1-HV-2790A, B, 2791B And 2793B

5.4.6	1X3D-BG-B05E	Purification And Clean-up System: 1-HV-2791A, 2792A, B And 2793A
5.4.7	1X3D-BG-B06F	Purification And Clean-up System: 1-HV-1508-012
5.4.8	1X3D-BG-B06H	Containment Post-LOCA Purge Exhaust Duct Isolation Valves
5.4.9	1X3D-BH-R01D	Service Air System 1-HV-9380A
5.4.10	1X3D-BH-R01E	Service Air System 1-HV-9380B
5.4.11	1X3D-BH-R01H	Containment Service Air Header Isolation 1-HV-9385

5.5 TECHNICAL MANUALS

AX5AA05-43 Containment Hydrogen Monitor

5.6 COMMITMENTS

1984300033 1984302998 1984302999
1985304320

END OF PROCEDURE TEXT

CHECKLIST 1

Sheet 1 of 1

CONTAINMENT H_2 MONITORING SYSTEM

REMOTE-OPERATED COMPONENTS

ALIGNMENT FOR SYSTEM STARTUP

COMPONENT	DESCRIPTION	CONDITION REQUIRED	LINEUP (INITIALS)	VERIFICATION (INITIALS)
1-HS-22900	H_2 MONITOR HMA MODE SWITCH	OFF	_______	_______
1-HV-2792A	H_2 MONITOR A SPLY ISO IRC	CLOSED	_______	_______
1-HV-2792B	H_2 MONITOR A SPLY ISO IRC	CLOSED	_______	_______
1-HV-2791B	H_2 MONITOR A SPLY ISO ORC	CLOSED	_______	_______
1-HV-2793B	H_2 MONITOR A RTN ISO ORC	CLOSED	_______	_______
1-HS-22901	H_2 MONITOR HMB MODE SWITCH	OFF	_______	_______
1-HV-2790A	H_2 MONITOR B SPLY ISO IRC	CLOSED	_______	_______
1-HV-2790B	H_2 MONITOR B SPLY ISO IRC	CLOSED	_______	_______
1-HV-2791A	H_2 MONITOR B SPLY ISO ORC	CLOSED	_______	_______
1-HV-2793A	H_2 MONITOR B RTN ISO ORC	CLOSED	_______	_______
1-HV-8221	CNMT ATMOSPHERE PASS SAMPLE ISOLATION	CLOSED	_______	_______

Reviewed By: ______________________________ ________________
Date

CHECKLIST 2

Sheet 1 of 1

POST-LOCA CONTAINMENT HYDROGEN

PURGE SYSTEM REMOTE-OPERATED VALVE

ALIGNMENT FOR STANDBY

COMPONENT	DESCRIPTION	CONDITION REQUIRED	LINEUP (INITIALS)	VERIFICATION (INITIALS)
1-HV-2624A	CTB POST LOCA PURGE EXH IRC ISO VLV	CLOSED	_______	_______
1-HV-2624B	CTB POST LOCA PURGE EXH IRC ISOLATION	CLOSED	_______	_______
1-FV-2693	CNMT POST LOCA PURGE EXH DUCT CONTROL VLV	CLOSED	_______	_______
1-HV-9385	SERVICE AIR CONTAINMENT HEADER ISOLATION	CLOSED	_______	_______
1-HV-9380A	SERVICE AIR CNMT POST LOCA PURGE	CLOSED	_______	_______
1-HV-9380B	SERVICE AIR CNMT POST LOCA PURGE	CLOSED	_______	_______

Reviewed By: ______________________ ______________

Date

Job Performance Measure "G"

Facility: **Vogtle**

Task No: V-LO-TA-01034

Task Title: Energizing 4160V Bus AA02 (BA03) from Alternate incoming source (RAT) using 13427A/B-1/2

JPM No: V-NRC-JP-13427-HL17

K/A Reference: 062A4.01 RO 3.3 SRO 3.1

Examinee: ____________________ NRC Examiner: ________________________

Facility Evaluator: ________________ Date: _________________________________

<u>Method of testing:</u>

Simulated Performance ______________ Actual Performance _________________

Classroom ______________ Simulator _______________ Plant ______________

Read to the examinee:

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this job performance measure will be satisfied.

Initial Conditions: **Unit 1 is in Mode 3. Multiple failures have resulted in RAT 1A, DG 1A, bus 1BA03, and the SAT becoming unavailable. The crew is performing 19100-C, "ECA- 0.0 Loss of All AC Power."**

Initiating Cue: **The SS has directed you to energize 1AA02 from RAT 1B using 13427A-1, "4160V AC BUS 1AA02 1E ELECTRICAL DISTRUBUTION SYSTEM."**

Task Standard: 1AA02 energized from RAT 1B.

Required Materials: 13427A-1, Ver. 7.0

General References: None

Time Critical Task: No

Validation Time: 10 minutes

SIMULATOR SETUP:

This JPM has been snapped to IC # 217 for the HL-17 NRC Exam.

SIMULATOR SETUP FROM SCRATCH.

1. Reset to IC # 14 (100%, MOL)
2. Insert malfunction EL02 Loss of Reserve Auxiliary Transformer 1NXRA)
3. Insert malfunction EL07B Loss of Control Bldg 4.16 KV SWGR 1BA03
4. Insert Malfunction EL14A Emerg Diesel Fails to Start- 1A
5. Trip Reactor
6. Isolate normal letdown
7. Emergency stop DG1B
8. Trip all RCPs
9. Throttle AFW flow to ~ 200 gpm/SG
10. Acknowledge / Reset alarms
11. Freeze simulator

Setup time: 5 minutes

Performance Information

Critical steps denoted with an asterisk

Procedure Section 4.4.1 selected.

Standard: Candidate selects section 4.4.1.

Comment:

NOTES
• IF in Modes 1, 2, 3, or 4, Section 4.4.1 of this procedure may only be performed IF the Normal Incoming Source, Emergency DG 1A, AND the redundant 1E 4160V AC bus 1BA03 are all lost simultaneously. • IF in Modes 5 or 6, Section 4.4.1 may be performed with the other power sources available WHEN authorized by the SM.

Standard: Reviews NOTES prior to step 4.4.1.1.

Note to Examiner: Conditions specified in first bullet are given in the initial conditions.

Comment:

Step 4.4.1.1 Obtain authorization from the SM to energize the 4160V AC Bus 1AA02 from the Alternate Incoming Source.

Standard: Requests SM permission.

Cue: WHEN requested, "SM authorizes this procedure."

Comment:

Step 4.4.1.2 Check Alternate Incoming Source Voltage is available.

Standard: Candidate verifies alternate source Potential lights Lit or uses alternate incoming voltmeter switch (Keyed) to verify voltage.

Comment:

Step 4.4.1.3 IF in MODE 5 OR 6, perform the following steps. OTHERWISE, go to step 4.4.1.8.

Standard: Mode 3 is stated in initial conditions. Candidate goes to step 4.4.1.8.

NOTE to examiner:Go to 4.4.1.8 if the step is performed correctly. Steps 4.4.1.4 to 4.4.1.7 are included with responses.

Comment:

Step 4.4.1.4 Verify an Alternate Incoming Source is properly aligned.

a. If 1AA02 will be energized from RAT 1NXRB, verify applicable sections of 13145-1, "Reserve Auxiliary Transformers," have been performed prior to performing this section.

OR

b. If 1AA02 will be energized from SAT, verify applicable sections of 13418-C, "Standby Auxiliary Transformer Unit One Train A Operations" have been performed prior to performing this section. Check Alternate Incoming Source Voltage is available.

Standard: Candidate verifies 13415-1 has been performed.

CUE: When requested, "13415-1 has been performed for RAT 1B."

Comment:

Step 4.4.1.5 If the Non Class 1E 4160V AC Buses associated with RAT 1NXRB are energized from the UATs by backfeed, place handswitch 1HS-1NA0401 Alternate Incoming Breaker in the PULL-TO-LOCK position and Caution Tag.

Standard: Candidate determines step is not applicable. UAT backfeed is not present.

Comment:

Step 4.4.1.6 IF RAT 1NXRB is in service AND will be connected to 1AA02, **verify** the following:

- The sum total load of 1AA02 and 1BA03 is less than 1350 amps.
- With NO UAT backfeed of the non-1E 4160V AC in progress, the total load of 1NA04 is less than 1000 amps.

Standard: Candidate verifies load less than the limits by 1AA02 and 1BA03 de-energized and checking bus 1NA04 Alt Incoming Ammeter < 1000 amps.

Comment:

Step 4.4.1.7 IF the SAT is in service for RAT 1NXRB AND will be connected to 1BA03 AND 1AA02, perform the following:

a. Check total load on 1AA02 and 1BA03 will be less than 1735 amps.

b. Place handswitch 1HS-1NA0401 in PULL-TO-LOCK and install a Caution Tag.

c. Place one train of SSPS in test per 13503A-1, "Reactor Control Solid State Protection System," and Caution Tag.

Standard: Candidate determines step is not applicable.

Comment:

CAUTION

Placing two sync switches to ON position at the same time will blow PT fuses. A sync scope meter indication of 12 o'clock may indicate a sync switch is ON.

Step 4.4.1.8 Verify BRKR 1AA0205 SYNCHRONIZING SWITCH and BRKR 1AA0219 SYNCHRONIZING SWITCH are BOTH in OFF:

1AA0205 SYNCHRONIZING SWITCH – OFF
1AA0219 SYNCHRONIZING SWITCH – OFF

Standard: Candidate inserts key into each switch and verifies they are in off (switch handle vertical).

Comment:

Step *4.4.1.9 **Place the BRKR 1AA0201 SYNCHRONIZING SWITCH to ON.**

Standard: Candidate places key in switch and places switch in ON (turns switch clockwise).

Comment:

Step *4.4.1.10 **Close ALTERNATE INCOMING BRKR 1AA0201 using handswitch 1-HS-1AA0201.**

CUE: WHEN requested, "CV request noted."

Standard: Candidate places handswitch to CLOSE and releases handswitch. Verifies red light illuminates.

Comment:

Step 4.4.1.11 Check white potential lights lit for Bus 1AA02.

Standard Candidate checks Bus potential lights –LIT.

Comment:

Step 4.4.1.12 Check Bus 1AA02 voltage across all three phases to be 4160V AC (4025VAC to 4326VAC) on BUS 1AA02 Voltmeter.

Standard: Candidate places key switch in the Bus voltmeter selector switch and checks voltage within limits on all phases.

Comment:

Step 4.4.1.13 Place BRKR 1AA0201 SYNCHRONIZING SWITCH to OFF.

Standard Candidate places sync switch to off.

Comment:

Step 4.4.1.14 Verify Train A 480V AC 1E Switchgears energized by performing the following:

a. Check that white potential lights are lit for:
- -1AB04
- -1AB05
- -1AB15
- -1NB01

Standard: Candidate checks potential lights are all dark.

Comment:

Step 4.4.1.14 b. If any Train A 480V AC 1E Switchgear NOT energized, obtain SM permission and energize per 13429-1, "480V AC 1E Electrical Distribution System."

Standard: Candidate requests SM permission to energize per SOP.

Cue: "When asked, The SS will energize the buses using 19100-C and complete remaining steps of 13427A-1 section 4.4.1."

Comment:

Terminating cue: Student returns initiating cue sheet

Verification of Completion

Job Performance Measure No. V-NRC-JP-13427-HL17

Examinee's Name:

Examiner's Name:

Date Performed:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:____

Response:____

Result: Satisfactory/Unsatisfactory

Examiner's signature and date: __________________________ ________

Initial Conditions: Unit 1 is in Mode 3. Multiple failures have resulted in RAT 1A, DG 1A, bus 1BA03, and the SAT becoming unavailable. The crew is performing 19100-C, "ECA- 0.0 Loss of All AC Power."

Initiating Cue: The SS has directed you to energize 1AA02 from RAT 1B using 13427A-1, "4160V AC BUS 1AA02 1E ELECTRICAL DISTRUBUTION SYSTEM."

Job Performance Measure "H"

Facility: **Vogtle**

Task No: V-LO-TA-23005

Task Title: Manually Align CRI due to smoke entering MCR air intakes

JPM No: V-NRC-JP-13301-HL17

K/A Reference: 067AA1.05 RO 3.0 SRO 3.1

Examinee: ______________________ NRC Examiner: ______________________

Facility Evaluator: ____________________ Date: __________________________

Method of testing:

Simulated Performance _____________ Actual Performance_________________

Classroom ______________ Simulator ____________ Plant _____________

Read to the examinee:

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this job performance measure will be satisfied.

Initial Conditions: **A large brush fire is causing smoke to enter the control room through the outside air intakes resulting in a concern for Control Room habitability.**

Initiating Cue: **The SS has directed you to "Manually actuate control room isolation per 13301-C, "CBCR Normal HVAC and Emergency Filtration System." Close the Outside Air supply dampers for both Units."**

Task Standard: Manually align CR HVAC for CRI in accordance with 13301-C Section 4.4.1. with outside air intakes shut.

Required Materials: 13301-C, "CBCR Normal HVAC and Emergency Filtration System" Ver. 28.3

17050-1, Annunciator Response Procedures for ALB50 on QHVC Panel Ver. 19.1

General References: None

Time Critical Task: No

Validation Time: 10 minutes

SIMULATOR SETUP:

Snapped to IC # 218 for HL-17 NRC Exam.

If new setup is required, then perform the following:

1. Reset to IC 14 (MOL 100%).
2. Insert override annunciator ALB50B02 to ON.
3. Acknowledge/Reset alarms.
4. Freeze simulator

Setup time: 3 minutes

Performance Information

Critical steps denoted with an asterisk

Annunciator Response 17050-1 Window B02 for CR OSA Smoke Detected (If Referenced)

NOTE
If Control Room isolation is initiated, the system must be restored to normal prior to purging the Control Room of smoke.

1. Analyze the situation and if necessary, initiate a Control Room isolation per 13301-C, "Control Building Control Room Normal And Essential HVAC System."

2. Dispatch an operator to investigate the source of the smoke.

3. <u>IF</u> toxic gas concentration is greater than allowable limits <u>OR</u> <u>IF</u> detected odor is considered a personnel safety hazard, <u>THEN</u>:

    a. Evacuate non-essential control room personnel to a safe area.

    b. Direct all essential control room personnel to don breathing apparatus.

Standard: The candidate may reference this ARP or go directly to 13301-C.

Comment:

Refers to procedure 13301-C and determines section 4.4.1 should be performed.

Standard: Candidate selects Section 4.4.1.

Comment:

NOTES
• This section is written using Unit 1 and Common component designations. Unit 2 designations are shown in parenthesis. • If the TRAIN B CR FLTR UNIT SUPPLY FAN fails to start on actuation, the Train A Fan will start after a 30 second time delay. • The TSC Air Filtration System will automatically start on manual initiation of Control Room Isolation.

ALB05-D05 GROUP 4 MONITOR LIGHT COMP OFF NORM
ALB39-D05 480V SWGR ANB30 TROUBLE
ALB50-B03 CR HI/LO DIFF PRESS

CUE: If expected alarms reported to OATC, "OATC is notified."

Standard: Candidate reads notes and expected annunciators.

Comment:

***Step 4.4.1.1 To manually initiate Control Room Isolation, place either CR ISO MANUAL ACTUATION Switch in ACTUATE:**

<u>TRAIN A</u>	**<u>TRAIN B</u>**
1-HS-12195A [A4]	**1-HS-12196A [A6]**

Standard: Candidate rotates one or both hand switches clockwise to the ACTUATE position and determines that the actuation occurs.

Green lights - OFF
Red lights - OFF

NOTE to the Examiner: The following alarms will alarm on the actuation:

ALB50-B03	CR HI/LO DIFF PRESS	immediately
ALB50-A03	CR NORM SPLY FANS LO AIR FLOW	delayed 30 seconds
ALB53-C07	CHLR TRN A EVAP WTR HI/LO TEMP	delayed 2 minutes
ALB53-C08	CHLR TRN B EVAP WTR HI/LO TEMP	

Comment:

Step 4.4.1.2 Verify that TRAIN B CR FLTR UNIT LEAD SUPPLY AIR FAN starts.

<u>TRAIN B</u>

1-1531-N7-002 [B10]

Standard: Candidate verifies Train B filter unit running.

Red light - ON
Green light - OFF
Amber light - OFF

Comment:

Step 4.4.1.3 Verify that TRAIN A CR FLTR UNIT STANDBY SUPPLY AIR FAN does NOT start:

TRAIN A

1-1531-N7-001 [B8]

Standard: Candidate verifies standby air fan does not start.

Checks green light remains - ON
Red light remains - OFF
Amber light remains - OFF

Comment:

Step 4.4.1.4 Verify that both KIT TOIL + CONF RM EXH ISO DMPRs close:

TRAIN A	TRAIN B
A-HV-12162 [D6]	A-HV-12163 [D7]

Standard: Candidate verifies both dampers in CLOSED position.

Green lights - ON
Red lights - OFF

Comment:

Step 4.4.1.5 Verify that both CR NORM AIR SUPPLY ISO DMPRs close:

TRAIN A	TRAIN B
1-HV-12146 [C6]	1-HV-12147 [C7]

Standard: Candidate verifies both dampers in CLOSED position.

Green light - ON
Red light - OFF

Comment:

Step 4.4.1.6 Verify that both CR NORM AIR RTN ISO DMPRs close:

TRAIN A	TRAIN B
1-HV-12149 [E6]	1-HV-12148 [E7]

Standard: Candidate verifies both dampers in CLOSED position.

Green light - ON
Red light - OFF

Comment:

Step 4.4.1.7 Verify that the CR FILTER UNIT OUTLET AIR DMPR on the running train is open:

<u>TRAIN B</u>

1-HV-12129 [C11]

Standard: Candidate verifies damper open.

Red light - ON
Green light - OFF

Comment:

Step 4.4.1.8 Verify that the CR RTN FAN INLET AIR DMPR on the running train is open:

<u>TRAIN B</u>

1-HV-12131 [D10]

Standard: Candidate verifies damper open.

Red light - ON
Green light - OFF

Comment:

Step 4.4.1.9 Verify that the CR NORMAL HVAC UNIT INTAKE ISO DMPR on the running train is closed:

<u>TRAIN B</u>

A-HV-12152 [B7]

Standard: Candidate verifies damper closed.

Green light - ON
Red light - OFF

Comment:

Step 4.4.1.10 Verify that the CR NORM AC UNIT SUPPLY FANS, A-1531-A7-001 [C4] and A-1531-A7-002 [C5], shut down.

Standard: Candidate verifies both AC units shutdown.

Green lights - ON
Amber lights - ON
Red lights - OFF

Comment:

Step 4.4.1.11 Verify that the CR NORM AC UNIT EXH FAN, A-1531-B7-009 [D4] and A-1531-B7-010 [D5], shut down.

Standard: Candidate verifies both exhaust units shutdown.

Green lights - ON
Red lights - OFF

Comment:

Step 4.4.1.12 Verify that the KITCH TOILET AND CONF RM EXH FAN, A-HS-12164 in the Shift AA's Office, stops.

CUE: **When Candidate indicates need to verify status, "The Control Building Operator reports A-HS-12164's green light is lit and the fan has stopped."**

Standard: Candidate determines Kitchen Toilet and Conference room exhaust fan is stopped.

Comment:

NOTE
If it is necessary to isolate outside air to the Control Room in the next step, both the Unit 1 and Unit 2 dampers should be shut.

Standard: Candidate reads note.

Comment:

***Step 4.4.13** **IF Control Room outside air is restricted for Control Room habitability due to smoke or toxic gas intake, THEN close the CR OUTSIDE AIR SUPPLY DAMPERS for BOTH Units:**

UNIT 1	UNIT 2
1-HS-12114 [E8]	2-HS-12114
1-HS-12115 [E10]	2-HS-12115

Standard: Candidate rotates both hand switches counterclockwise to the CLOSE position and releases. Candidate verifies the handswitch indication as follows:

Green lights – ON
Red lights – OFF

Candidate indicates that the Unit 2 Valves must be closed on the Unit 2 QHVC panel.

CUE: When candidate indicates need to shut unit 2 valves, "Unit 2 UO has shut 2HV-12114 and 2HV-12115."

Comment:

Step 4.4.1.14 Verify proper operation of the TSC Air Filtration System per 13303-C, "Technical Support Center And Central Alarm Station HVAC Systems."

CUE: When candidate indicates need to verify operation, "Another operator will verify proper operation of the TSC Air Filtration System."

Standard: Candidate addresses step.

Comment:

Step 4.4.1.15 Verify proper Essential Chiller operation.

CUE: Another operator will verify proper operation of the ESF Chiller.

Standard: Candidate addresses step.

Comment:

Terminating cue: Student returns initiating cue sheet

Verification of Completion

Job Performance Measure No. V-NRC-JP-13301-HL17

Examinee's Name:

Examiner's Name:

Date Performed:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:____

Response:____

Result: Satisfactory/Unsatisfactory

Examiner's signature and date: ______________________________ __________

Initial Conditions: A large brush fire is causing smoke to enter the control room through the outside air intakes resulting in a concern for Control Room habitability.

Initiating Cue: The SS has directed you to "Manually actuate control room isolation per 13301-C, "CBCR Normal HVAC and Emergency Filtration System." Close the Outside Air supply dampers for both Units."

Job Performance Measure "A" Alternate

Facility: **Vogtle**

Task No: V-LO-TA-09028

Task Title: Perform Manual Makeup with Loss of Boric Acid Flow

JPM No: V-NRC-JP-13009-HL17

K/A Reference: 004A4.12 3.8 / 3.3

Examinee: ____________________ NRC Examiner: ____________________

Facility Evaluator:____________________________ Date: ______________

Method of testing:

Simulated Performance _____________ Actual Performance ________________

Classroom _____________ Simulator ____________ Plant ____________

NOTE: **For time considerations, the Candidates may be allowed to "pre-brief" this JPM and allowed to review 13009-1 prior to starting the JPM.**

Read to the examinee:

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this job performance measure will be satisfied.

Initial Conditions: **VCT level is 32%.**

Initiating Cue: **The SS has directed you to perform a Manual Makeup per 13009-1 to raise VCT to 50%.**

Task Standard: Candidate initiates manual makeup to raise VCT level and stops the makeup when the Boric Acid flow stops.

Required Materials: 13009-1, "CVCS Reactor Makeup Control System Ver. 48.0

General References: None

Time Critical Task: No

Validation Time: 15 minutes

SIMULATOR SETUP:

Simulator Setup:

Reset to IC # 219 for HL-17 NRC Exam

Simulator Setup from Scratch:

1. Reset to IC-14 (MOL 100%)
2. Ensure Boric Acid transfer pump 1 is in AUTO /Pump 2 STOP
3. Lower VCT level to 32% and allow VCT pressure to stabilize
4. Insert the following on Trigger 1:
   Annunciator ALB36D01 480V MCC 1ABD TROUBLE to ON
   Override light A-LO_HS0276A_Y to OFF
   Override light A-LO_HS0276A_G to OFF
   Override light A-LO_HS0276A_R to OFF
   Override HS-276A to STOP with 1 sec delay
   Override HS-277A to STOP
5. Insert the following on Trigger 2:
   Annunciator ALB37D01 480V MCC 1BBD TROUBLE to ON
   Override light A-LO_HS0277A_Y to OFF
   Override light A-LO_HS0277A_G to OFF
   Override light A-LO_HS0277A_R to OFF
   Override HS-277A to STOP with 1 sec delay
   Override HS-276A to STOP

6. Freeze the simulator
7. Ensure RCS boron status board is marked **RCS 917 ppm BAST 7000 ppm**

8. RESET INTEGRATORS SETPOINT TO ZERO, MUST BE DONE EACH RESET.

Note to simulator operator:

After each reset, go to run to allow VCT Hi/Lo pressure to alarm and clear (less than 30 secs) and then go back to freeze.

Setup time: 3 minutes

Performance Information

Critical steps denoted with an asterisk

Candidate refers to 13009-1, CVCS Reactor Makeup Control System, section 4.6, Manual Makeup.

Standard: Candidate selects section 4.6 manual makeup.

Comment:

CAUTIONS

If Manual Makeup is being performed to maintain VCT level when letdown is being diverted, letdown should not exceed 75 gpm.

BAST concentration is inaccurate until sampled following batching. Temperature and power should be closely monitored following manual makeup to the VCT with the BAST concentration inaccurate.

Standard: Candidate reviews CAUTIONS prior to step 4.6.1 and determines they are not applicable to current conditions.

Comment:

Step 4.6.1 Manual Makeup at 100 GPM Total Flow.

Standard: Candidate chooses section.

Comment:

NOTE

Volumetric change in VCT is equal to 19.2 gallons per percent change in level.

Standard: Candidate reviews NOTE prior to step 4.6.1.1

Comment:

Step 4.6.1.1 Set TOTAL MAKEUP Integrator 1-FQI-0111 to the desired amount of Total Makeup Water.

Standard: Candidate sets 1-FQI-0111 to 344 to 348 gallons (19.2 gallons / % X 18% = 345.6 gallons) by depressing the gray pushbutton under the digit to be changed to toggle the reading up or down. The red pushbutton will reset reading to all zeros.

Comment:

CAUTION

Digital counters and thumbwheel settings on BORIC ACID TO BLENDER Integrator 1-FQI-0110 read in tenth-gallon increments.

Standard: Candidate reviews CAUTION prior to step 4.6.1.2.

Comment:

Step 4.6.1.2 Set BORIC ACID TO BLENDER Integrator 1-FQI-0110 to the amount of boric acid as follows:

a. Calculate volume of boric acid using the following calculation.

$$\text{Gallons of Boric Acid} = \frac{\text{Total M/U x RCS Cb}}{\text{BAST Cb}}$$

Standard: Candidate calculates 45.326 gallons (346 X 917 / 7000).

Comment:

Step 4.6.1.2 b. Review logs for recent makeups to confirm calculated volume of Boric Acid is appropriate.

Cue: WHEN logs requested, "There are no recent makeups in the log".

Standard: Candidate attempts to check logs.

Comment:

NOTE

Minor adjustments from the calculated boric acid volume and recent makeup data may be required based on burnup, plant conditions, and desired RCS temperature response.

Standard: Candidate reviews NOTE prior to step 4.6.1.2 c.

Comment:

Step 4.6.1.2 c. Adjust Boric Acid to Blender Integrator 1-FQI-0110 to the desired volume based on plant conditions and desired reactivity response.

Standard: Candidate sets Integrator to calculated volume of 45.2 to 42.5 gals by depressing the gray pushbutton under the digit to be changed to toggle the reading up or down. The red pushbutton will reset reading to all zeros. Applies caution, the first digit is in tenths.

Comment:

Step 4.6.1.3 Adjust BORIC ACID Flow Controller 1-FIC-0110 pot setting using the following Formula and verify controller is in AUTO:

$$\text{1-FIC-0110 pot setting} = \frac{\text{RCS Cb x 25}}{\text{BAST Cb}}$$

Standard: Candidate calculates (917 x 25 / 7000) = 3.275 and adjusts 1-FIC-0110 pot to the correct setting (3.26 to 3.30).

Comment:

***Step 4.6.1.4 Place VCT MAKEUP CONTROL 1-HS-40001B in STOP.**

Standard: Candidate places 1-HS-40001B to STOP

Green Light - ON
Red Light - OFF

Comment:

***Step 4.6.1.5 Place VCT MAKEUP MODE SELECT 1-HS-40001A in MAN.**

Standard: Candidate places 1-HS-40001A to MAN, one click clockwise.

Comment:

Step 4.6.1.6 Verify the following:

- BA TO BLENDER 1-HS-0110A in AUTO.
- RX MU WTR TO BA BLENDER 1-HS-0111A in AUTO.
- One Boric Acid Transfer Pump in AUTO or START.
- One Reactor Makeup Water Pump in AUTO or START.
- Verify TOTAL MAKEUP Flow controller 1-FIC-0111 is in AUTO with pot set for 100 gpm (approximately 6.25) total flow rate.

Standard: Candidate verifies:

1-HS-0110A in AUTO
1-HS-0111A in AUTO
One BA Transfer Pump in AUTO (placing in START is acceptable)
One Reactor MU Water Pump in AUTO (placing in START is acceptable)
1-FIC-0111 in AUTO set at ~ 6.25

NOTE: This is the normal setup for these components.

Comment:

NOTE

While letdown is configured for 120 gpm, the preferred flow path for Manual Makeup is through 1-FV-0110B BLENDER OUTLET TO CHARGING PUMPS SUCT. The design capacity of the VCT spray nozzles would be challenged with 120 gpm letdown in service and the addition of the makeup flow upstream of the VCT (1X6AH04-00024). This could prevent makeup from reaching the desired flow rate. Thus, 1-FV-0111B should only be used if 1-FV-0110B is not available.

Standard: Candidate reads note.

Comment:

CAUTION

With either Blender Outlet valve handswitch in the open position, an automatic isolation will not occur due to a Boric Acid and/or Total Makeup Flow Deviations.

Standard: Candidate reads caution. It is applicable to this evolution.

Comment:

***Step 4.6.1.7 Opens one of the following valves:**

Blender Outlet to Charging Pumps Suction 1-FV-0110B

<u>OR</u>

Blender Outlet to VCT 1-FV-0111B

Standard: Places either 1-FV-0110B or 1-FV-0111B to open.

Red light - ON
Green light - OFF

Comment:

NOTES

- Manual makeup can be stopped at any time by placing 1-HS-40001B in STOP.
- VCT level should be maintained between 30 and 87 percent. (1-LIC-0185 controller pot should normally be set to 8.7.)
- VCT Pressure 1-PI-115 should be maintained between 20 and 45 psig.

Standard: Candidate reads notes.

Comment:

*Step 4.6.1.8 **Place VCT MAKEUP CONTROL 1-HS-40001B in START and perform the following.**

- Verify Boric Acid Transfer Pump is running.
- Verify Reactor Makeup Water Pump is running.
- Verify Boric Acid to Blender 1-FV-0111A throttles open to provide the correct flow of boric acid.
- Verify Reactor MU Water to Blender 1-FV-0111A throttles open to provide total flow.
- If desired, control Boric Acid Flow controller 1-FIC-0110 by adjusting pot OR using up/down pushbuttons to control boric acid at the desired flowrate.

Standard: **Candidate places 1-HS-40001B to START.**

Candidate verifies bulleted items above work as desired.

NOTE to examiner: Bulleted items above should work as designed.

Note to Simulator operator: After items verified,
IF BATP #1 in service insert Trigger 1
IF BATP #2 in service insert Trigger 2

Comment:

***Step 4.6.1.9** **Monitors counters on Boric Acid to Blender Integrator 1-FQI-0110 and Total Makeup Integrator 1-FQI-0111 and perform the following:**

- WHEN counter on 1-FQI-0110 BORIC ACID TO BLENDER Integrator reaches its setpoint, verify 1-FV-0110A BORIC ACID TO BLENDER is closed.
- WHEN counter on 1-FQI-0111 TOTAL MAKEUP Integrator reaches its setpoint, verify 1-FV-0111A REACTOR MAKEUP WATER TO BLENDER is closed.

Note to Simulator operator: If candidate attempts to start other BAT pump it will not start.

Standard: Candidate places 1-HS-40001B to STOP after boric acid flow drops and before dilution flow is stopped by the integrator per Note before step 4.1.6.8 to stop an undesired dilution.

Comment:

Candidate reports failure to Shift Supervisor.

Standard: Candidate reports failure to Shift Supervisor.

CUE: When failure is reported, "The SS desires Maintenance to troubleshoot before proceeding."

Terminating cue: Candidate returns initiating cue sheet.

Verification of Completion

Job Performance Measure No. V-NRC-JP-13009-HL17

Examinee's Name:

Examiner's Name:

Date Performed:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:____

Response:____

Result: Satisfactory/Unsatisfactory

Examiner's signature and date: ___________________________ ________

Initial Conditions:	**VCT level is 32%.**
Initiating Cue:	**The SS has directed you to perform a Manual Makeup per 13009-1 to raise VCT to 50%.**

Revision to this procedure may require software update to Manual Makeup Spreadsheet.

CVCS REACTOR MAKEUP CONTROL SYSTEM

PROCEDURE LEVEL OF USE CLASSIFICATION PER NMP-AP-003	
CATEGORY	**SECTIONS**
Continuous:	**ALL**
Reference:	**NONE**
Information:	**NONE**

TABLE OF CONTENTS

1.0 PURPOSE

This procedure provides instructions for operation of the CVCS Reactor Makeup Control System. Instructions are provided in the following sections:

4.1 Automatic Makeup

4.2 Boration

4.3 Dilution

4.4 Alternate Dilution

4.5 Reactivity Adjustments for Maintaining RCS Steady State Conditions

4.6 Manual Makeup

4.7 Frequent Dilutions While Controlling Reactor Power

4.8 Frequent Borations While Controlling Reactor Power

4.9 Emergency Boration

4.10 Boration From The Boric Acid Storage Tank (BAST) Through Manual Valve 1-1208-U4-505

4.11 Boration From The RWST With BAST Out Of Service

4.12 Establish Dual Flow Paths From BAST To Obtain RCS Boron Requirements For Cooldown.

2.0 PRECAUTIONS AND LIMITATIONS

2.1 PRECAUTIONS

2.1.1 When critical, the effects of changing Reactor Coolant System (RCS) boron concentration shall be monitored by observing the resulting changes in coolant average temperature.

2.1.2 Automatic Control Rod withdrawal function has been disabled. The only function enabled when Control Rod handswitch is placed in AUTO, is automatic insertion when Tavg is at least 1-1/2 degrees above Tref.

2.1.3 The effects of changing Reactor Coolant System boron concentration, while the reactor is subcritical, shall be monitored by observing the source range count rate. If the count rate increases at an unexpected rate, the boron concentration change operation shall be stopped.

2.1.4 To ensure thorough mixing, at least one Reactor Coolant Pump (RCP) should be operating while boron concentration is being changed. If boron concentration changes with no RCP running, coolant with a relatively low boron concentration may be trapped in the RCS loop piping. Reactor Engineering should be contacted to determine if special precautions need to be taken. This could prevent an inadvertent dilution of the RCS during RCS drain or RCP starts.

2.1.5 The boron concentration of the initial 15 gallons of flow introduced to the CVCS from the Reactor Makeup System will be determined by the previous dilution, boration, or makeup performed. The boron concentration in the line from the blending tee to the VCT or charging pump suction should be considered when anticipating Reactor response.

2.1.6 VCT backpressure may affect Boric Acid flow if VCT pressure is high in the normal operating band. It may be necessary to start a second Boric Acid Transfer Pump (BATP) to achieve adequate flow.

2.1.7 Operators should not attempt simultaneous RCS makeup and Boric Acid (BA) batching operations to the BAST. Operators should be especially cautious during acid-free batch flow to a BAST. A BATP startup could lead to an inadvertent dilution event.

2.1.8 Prior to makeup from a freshly batched BAST, Operators should obtain a valid BAST concentration after the BAST is recirculated.

2.1.9 A design feature of the makeup control system may result in too much boric acid being added to the VCT near EOL conditions. Therefore, per RMOG recommendations, the preferred method of makeup to avoid over-borations at EOL conditions (less than 300 ppm C_b) is MANUAL makeup in lieu of AUTO makeup.

2.1.10 Reactivity impact due to metered Zinc addition is negligible.

2.2 LIMITATIONS

2.2.1 The boron concentration difference between the reactor coolant loops and pressurizer should not exceed 50 ppm.

2.2.2 If an inadvertent dilution from an inactive portion of the RCS occurs, operators will immediately take steps to prevent any further excursion. The SS or SM will notify the Duty Manager immediately. The Duty Manager or other management will determine specific recovery actions to adjust boron concentration.

2.2.3 The Boric Acid System and the Refueling Water Storage Tank (RWST) may be required to be OPERABLE per the following Technical Specification and Technical Requirements Manual requirements:

TR 13.1.2	Boration Flow Path, Shutdown - Mode 5
TR 13.1.3	Boration Flow Path, Operating - Modes 1, 2, 3, and 4
TR 13.1.6	Borated Water Sources, Shutdown - Mode 5
TR 13.1.7	Borated Water Sources, Operating - Modes 1, 2, 3, 4
LCO 3.5.4	RWST - Modes 1, 2, 3, and 4

2.2.4 When in Mode 6 or Mode 5 with the reactor coolant loops not filled, LCOs 3.9.1, 3.9.2, and 3.4.8 apply. Reactor Makeup Water Valves 1-1208-U4-175, 176, 177, and 183 shall be closed and secured in position. However, 1-1208-U4-176 and 177 may be opened for short time periods for chemistry control if the RCS is in compliance with the Boron concentration requirements of LCO 3.9.1 or the SHUTDOWN MARGIN requirements of LCO 3.1.1 and the high flux at shutdown alarm is OPERABLE.

2.2.5 The Total Makeup Flow Loop, F-0111, has a low flow cutoff of 5% of the calibration range of 0-160 gpm, which equals 8 gpm. In the event of transmitter drift, this cutoff ensures the counter only counts when flow is present. Therefore, it can be expected that the Total Makeup Flow Totalizer will not count at flow rates near or below 8 gpm. Additionally, the Total Makeup Totalizer may not indicate accurately at flow rates above the maximum calibration range of 160 gpm.

2.2.6 The Boric Acid Flow Loop, F-0110, has a low flow cutoff of 5% of the calibration range of 0-40 gpm, which equals 2 gpm. In the event of transmitter drift, this cutoff ensures the counter only counts when flow is present. Therefore, it can be expected that the Boric Acid Flow Totalizer will not count at flow rates near or below 2 gpm. Additionally, the Boric Acid Totalizer may not indicate accurately at flow rates above the maximum calibration range of 40 gpm.

INITIALS

3.0 PREREQUISITES OR INITIAL CONDITIONS

3.1 **Verify** the Chemical and Volume Control System (CVCS) is capable of receiving makeup. ________

3.2 **Verify** the Boric Acid System is capable of supplying concentrated boric acid solution to the CVCS. ________

3.3 **Verify** Reactor Makeup Water is available to the Boric Acid Blender. ________

3.4 **Verify** Instrument Air is supplied to Reactor Makeup Control System Valves. ________

3.5 **Verify** Boric Acid Heat tracing is operating. ________

3.6 **Verify** boric acid solution is available to the Charging Pumps from the RWST. ________

3.7 **Verify** Control Power is available to the Reactor Makeup Control System. ________

3.8 **Verify** sampling is available. ________

INITIALS

4.0 INSTRUCTIONS

4.1 AUTOMATIC MAKEUP

4.1.1 **Determine** the RCS boron concentration by sample analysis or from BORON METER 1-AI-40134. ________

4.1.2 **Place** VCT MAKEUP CONTROL 1-HS-40001B in STOP. ________

4.1.3 **Place** VCT MAKEUP MODE SELECT 1-HS-40001A in OFF. ________

4.1.4 **Determine** the desired Boric Acid Blender controller 1-FIC-0110 potentiometer setting using Tab 2.2 in the Plant Technical Data Book (PTDB) and **adjust** 1-FIC-0110 potentiometer as required. ________

4.1.5 **Verify** Boric Acid Blender Controller 1-FIC-0110 is in AUTO. ________

4.1.6 **Verify** TOTAL MAKEUP Flow Controller 1-FIC-0111 pot is set for 100 gpm (approximately 6.25) and in AUTO. ________

4.1.7 **Verify** one (1) Boric Acid Transfer Pump is running or in AUTO. ________

4.1.8 **Verify** one (1) Reactor Makeup Water Pump is running or in AUTO. ________

4.1.9 **Verify** BA TO BLENDER 1-HS-0110A is in AUTO. ________

4.1.10 **Verify** RX MU WTR TO BA BLENDER 1-HS-0111A is in AUTO. ________

4.1.11 **Verify** BLENDER OUTLET TO VCT 1-HS-0111B is in AUTO. ________

4.1.12 **Verify** BLENDER OUTLET TO CHARGING PUMPS SUCT 1-HS-0110B is in AUTO. ________

4.1.13 **Place** VCT MAKEUP MODE SELECT 1-HS-40001A in AUTO. ________

4.1.14 **Place** VCT MAKEUP CONTROL 1-HS-40001B in START. ________

> NOTE
>
> 1-LIC-0185 controller pot should normally be set to 8.7.

4.1.15 **Verify** VCT 1-LI-0185 level is automatically controlled between 30 and 50 percent. ________

INITIALS

4.2 BORATION

4.2.1 **Determine** the existing RCS boron concentration from Boron Meter 1-AI-40134 Or by sample analysis. ________

4.2.2 To determine the number of gallons of boric acid required to borate the RCS, perform the following:

IF borating to required boron for a xenon free cool down, **obtain** the maximum boron concentration for the cool down range from the PTDB Tab 1.3.4-T1 and T2. ________

OR

IF borating to a desired boron concentration, **determine** the desired change in boron concentration by subtracting the existing concentration from the desired concentration. ________

THEN

Determine the amount of boric acid necessary to accomplish the desired change in boron concentration using PTDB Tab 2.3 and **correct** the obtained value using PTDB Tab 2.1. ________

4.2.3 **Place** VCT MAKEUP CONTROL 1-HS-40001B in STOP. ________

4.2.4 **Place** VCT MAKEUP MODE SELECT 1-HS-40001A in BOR. ________

NOTE

If necessary, boric acid flow may be adjusted using 1-FIC-0110 with SS concurrence. Changes to pot setting should be logged in the Control Room Log and restored at completion of activity.

4.2.5 **Adjust** potentiometer on Boric Acid Blender Flow Controller 1-FIC-0110 as desired and **verify** in AUTO. ________

INITIALS

> **CAUTION**
>
> Digital counter setting on BORIC ACID TO BLENDER integrator 1-FQI-0110 reads in tenth-gallon increments.

4.2.6 **Set** BORIC ACID TO BLENDER integrator 1-FQI-0110 to the desired amount of Boric Acid. ________

4.2.7 **Verify** the following:

- BA TO BLENDER 1-HS-0110A is in AUTO. ________
- BLENDER OUTLET TO CHARGING PUMPS SUCT 1-HS-0110B is in AUTO. ________
- One Boric Acid Transfer Pump in AUTO or START. ________
- RX MU WTR TO BA BLENDER 1-FV-0111A is closed with 1HS-0111A in AUTO. ________
- BLENDER OUTLET TO VCT 1-FV-0111B is closed with 1HS-0111B in AUTO. ________

> NOTES
>
> - Boration can be manually stopped at any time by placing 1-HS-40001B in STOP.
> - VCT Pressure, 1-PI-115 should be maintained between 20 and 45 psig.

4.2.8 **Place** VCT MAKEUP CONTROL 1-HS-40001B in START and perform the following: ________

- **Verify** Boric Acid Transfer Pump is running. ________
- **Verify** 1-FV-0110B is open. ________
- **Verify** 1-FV-0110A throttles open to provide desired flow on 1-FI-0110A. ________
- **Monitor** BORIC ACID TO BLENDER integrator 1-FQI-0110. ________

INITIALS

4.2.9 WHEN 1-FQI-0110 BORIC ACID TO BLENDER integrator reaches its setpoint, **verify** boration stops and the following valves close:

- 1-FV-0110A, BA TO BLENDER ________
- 1-FV-0110B, BLENDER OUTLET TO CHARGING PUMPS SUCT ________

4.2.10 **Flush** approximately 15 gallons of Reactor Makeup Water through 1-FV-0110B by performing the following:

a. **Place** VCT MAKEUP MODE SELECT 1-HS-40001A to ALT DIL. ________

b. **Set** TOTAL MAKEUP integrator 1-FQI-0111 for 13 to 15 gallons. ________

c. **Place** BLENDER OUTLET TO VCT 1-HS-0111B in CLOSE. ________

d. **Place** VCT MAKEUP CONTROL 1-HS-40001B in START. ________

e. **Verify** flow is indicated on 1-FI-0110B. ________

f. WHEN TOTAL MAKEUP integrator 1-FQI-0111 reaches the desired setpoint, **verify** the following valves close:

- 1-FV-0111A, RX MU WTR TO BA BLENDER ________
- 1-FV-0110B, BLENDER OUTLET TO CHARGING PUMPS SUCT ________

4.2.11 **Verify** 1-FIC-0110 potentiometer is set to setting recorded prior to boration (or as directed by SS) ________

INITIALS

4.2.12 **Align** Reactor Makeup Control system for automatic operation as follows:

	COMPONENT	NAME	POSITION	
a.	1-HS-0111B	BLENDER OUTLET TO VCT	AUTO	________
b.	1-HS-40001A	VCT MAKEUP MODE SELECT	AUTO	________
c.	1-HS-40001B	VCT MAKEUP CONTROL	START	________

4.2.13 IF BA TRANSFER PUMP was placed in START at Step 4.2.7, return to AUTO or as directed by SS. ________

4.2.14 **Monitor** RCS Tavg, source range count rate, and Reactor Power as applicable. ________

4.2.15 **Operate** the Pressurizer Back-up Heaters as necessary to equalize boron concentration between the RCS and the Pressurizer. ________

4.2.16 **Verify** desired boration through sample analysis or from Boron Concentration Meter 1-1208-T6-006 (1-AI-40134). ________

INITIALS

4.3 DILUTION

NOTE

Frequent dilutions can raise VCT level to the point where VCT pressure reaches 40 psig. 1-LIC-0185 may be adjusted to allow divert to the RHT at a lower level to limit VCT pressure increase.

CAUTION

The flow rate through the RCS shall be greater than 3000 gpm whenever the RCS boron concentration is being reduced.

4.3.1 **Determine** the existing RCS boron concentration from Boron Meter 1-AI-40134 or by sample analysis. ________

4.3.2 **Determine** the amount of Reactor Makeup Water necessary to accomplish the desired change in boron concentration using PTDB Tab 2.4 and **correct** the obtained value using PTDB Tab 2.1. ________

4.3.3 **Place** VCT MAKEUP CONTROL 1-HS-40001B in STOP. ________

4.3.4 **Place** VCT MAKEUP MODE SELECT 1-HS-40001A to DIL. ________

4.3.5 **Place** TOTAL MAKEUP 1-FIC-0111 in AUTO OR in MANUAL and **set** to the desired flow rate. ________

4.3.6 **Set** TOTAL MAKEUP integrator 1-FQI-0111 for the desired amount of Reactor Makeup Water. ________

4.3.7 **Verify** the following:

- RX MU WTR TO BA BLENDER 1-HS-0111A is in AUTO. ________
- BLENDER OUTLET TO VCT 1-HS-0111B is in AUTO. ________
- One Reactor Makeup Water Pump in AUTO or START. ________
- BA TO BLENDER 1-FV-0110A is closed. ________
- BLENDER OUTLET TO CHARGING PUMPS SUCT 1-FV-0110B closed. ________

INITIALS

NOTES

- Dilution can be manually stopped at any time by placing 1-HS-40001B in STOP.
- VCT Pressure, 1-PI-115 should be maintained between 20 and 45 psig.

4.3.8 **Place** VCT MAKEUP CONTROL 1-HS-40001B in START and perform the following: ________

- **Verify** Reactor Makeup Water Pump is running. ________
- **Verify** 1-FV-0111B is open. ________
- **Verify** 1-FV-0111A throttles open to provide desired flow on 1-FI-0110B. ________
- **Monitor** TOTAL MAKEUP integrator 1-FQI-0111. ________

4.3.9 IF desired, and with SS concurrence, **lower** pot setting on 1-LIC-0185, to limit VCT pressure increase. ________

Initial Pot Setting:_______ New Pot Setting:_______

4.3.10 WHEN TOTAL MAKEUP integrator 1-FQI-0111 reaches its setpoint, **verify** Dilution stops and the following valves close:

- 1-FV-0111A RX MU WTR TO BA BLENDER ________
- 1-FV-0111B BLENDER OUTLET TO VCT ________

4.3.11 **Align** Reactor Makeup Control system for automatic operation as follows:

a. **Verify** TOTAL MAKEUP Flow Controller 1-FIC-0111 is in AUTO and potentiometer set for the desired flow rate. ________

b. **Place** 1-HS-40001A VCT MAKEUP MODE SELECT in AUTO. ________

c. **Place** 1-HS-40001B VCT MAKEUP CONTROL in START. ________

		INITIALS
4.3.12	IF Reactor Makeup Water Pump was placed in START at Step 4.3.7, return to AUTO or as directed by SS.	________
4.3.13	**Monitor** RCS Tavg, control bank position, source range count rate, and Reactor Power as applicable.	________
4.3.14	**Operate** the Pressurizer Back-up Heaters as necessary to equalize boron concentration between the RCS and the Pressurizer.	________
4.3.15	**Verify** desired dilution through sample analysis or from Boron Meter 1-AI-40134.	________
4.3.16	IF VCT level controller 1-LIC-0185 pot setting was lowered, **restore** to original setting recorded in Step 4.3.9 and **record** in Unit Control Log.	________

INITIALS

4.4 ALTERNATE DILUTION

NOTE

Frequent dilutions can raise VCT level to the point where VCT pressure reaches 40 psig. 1-LIC-0185 may be adjusted to allow divert to the RHT at a lower level to limit VCT pressure increase.

CAUTION

The flow rate through the RCS shall be greater than 3000 gpm whenever the RCS boron concentration is being reduced.

4.4.1 **Determine** the desired amount of Reactor Makeup Water to add to the RCS. ________ gals ________

4.4.2 **Verify** the Reactor Makeup System aligned for automatic operation. ________

4.4.3 **Establish** the following alignment:

COMPONENT	NAME	POSITION	
1-HS-40001B	VCT MAKEUP CONTROL	STOP	________
1-HS-40001A	VCT MAKEUP MODE SELECT	ALT DIL	________
1-FQI-0111	TOTAL MAKEUP Integrator	________ gals	________

4.4.4 IF diluting to the Charging Pump suction, **obtain** SS concurrence to place BLENDER OUTLET TO VCT 1-HS-0111B in CLOSE. ________

INITIALS

NOTES

- Dilution can be manually stopped at any time by placing 1-HS-40001B in STOP.
- VCT Pressure, 1-PI-115 should be maintained between 20 and 45 psig.

4.4.5 **Place** VCT MAKEUP CONTROL 1-HS-40001B in START and **verify** flow is indicated on 1-FI-0110B. ________

4.4.6 If desired, dilution flow may be adjusted to desired flow using 1-FIC-0111 with SS concurrence.

Initial Pot Setting:_______ New Pot Setting:_______ ________

4.4.7 IF desired, and with SS concurrence, **lower** pot setting on 1-LIC-0185, to limit VCT pressure increase. ________

Initial Pot Setting:_______ New Pot Setting:_______

4.4.8 WHEN 1-FQI-0111 reaches desired setpoint, **verify** the following components align to the position indicated:

COMPONENT	NAME	POSITION	
1-FV-0111A	RX MU WTR TO BA BLENDER	CLOSED	________
1-FV-0111B	BLENDER OUTLET TO VCT	CLOSED	________
1-FV-0110B	BLENDER OUTLET TO CHARGING PUMPS SUCT	CLOSED	________

4.4.9 **Verify** 1-HS-0111B BLENDER OUTLET TO VCT is in AUTO. ________

INITIALS

4.4.10 **Align** Reactor Makeup Control System for automatic operation as follows:

	COMPONENT	NAME	POSITION	
a.	1-HS-40001A	VCT MAKEUP MODE SELECT	AUTO	________
b.	1-HS-40001B	VCT MAKEUP CONTROL	START	________

4.4.11 **Operate** the Pressurizer Back-up Heaters as necessary to equalize C_b between the RCS and the Pressurizer. ________

4.4.12 **Monitor** RCS Tavg, control bank position, or source range count rate as applicable. ________

4.4.13 **Verify** desired dilution through sample analysis or from Boron Meter 1-AI-40134, as necessary. ________

4.4.14 IF 1-FIC-0111 pot setting was changed; **restore** pot setting for 100 gpm (approximately 6.25), and **log** in Unit Control Log. ________

4.4.15 IF VCT level controller 1-LIC-0185 pot setting was lowered, **restore** to original setting recorded in Step 4.4.7 and **record** in Unit Control Log. ________

INITIALS

4.5 REACTIVITY ADJUSTMENTS FOR MAINTAINING RCS STEADY STATE CONDITIONS

4.5.1 Boration For Maintaining RCS Steady State Conditions

4.5.1.1 **Determine** the amount of boric acid to add: _______ gals _________

4.5.1.2 **Verify** the Reactor Makeup System is aligned for automatic operation. _________

4.5.1.3 **Perform** the following alignment:

a. **Place** VCT MAKEUP CONTROL 1-HS-40001B in the STOP position. _________

b. **Place** VCT MAKEUP MODE SELECT 1-HS-40001A in the BOR position. _________

> **CAUTION**
>
> Digital counters and thumbwheel settings on BORIC ACID TO BLENDER Integrator 1-FQI-0110 read in tenth-gallon increments.

c. BORIC ACID TO BLENDER 1-FQI-0110 Integrator set for: _______ gallons _________

4.5.1.4 Initiate Boration flow as follows:

a. **Place** VCT MAKEUP CONTROL 1-HS-40001B in START. _________

b. **Verify** flow is indicated on 1-FI-0110A. _________

4.5.1.5 <u>WHEN</u> 1-FQI-0110 BORIC ACID TO BLENDER Integrator reaches its setpoint, **verify** boration stops and the following valves close:

- 1-FV-0110A, BA TO BLENDER _________
- 1-FV-0110B, BLENDER OUTLET TO CHARGING PUMPS SUCT _________

INITIALS

4.5.1.6 **Flush** approximately 15 gallons of Reactor Makeup Water through 1-FV-0110B by performing the following:

a. **Place** VCT MAKEUP MODE SELECT 1-HS-40001A to ALT DIL. ________

b. **Set** TOTAL MAKEUP Integrator 1-FQI-0111 for 13 to 15 gallons. ________

c. **Place** BLENDER OUTLET TO VCT 1-HS-0111B in CLOSE. ________

d. **Place** VCT MAKEUP CONTROL 1-HS-40001B in START. ________

e. **Verify** flow is indicated on 1-FI-0110B. ________

f. WHEN TOTAL MAKEUP Integrator 1-FQI-0111 reaches the desired setpoint, **verify** the following valves close:

- 1-FV-0111A, RX MU WTR TO BA BLENDER ________
- 1-FV-0110B, BLENDER OUTLET TO CHARGING PUMPS SUCT ________

4.5.1.7 **Align** Reactor Makeup Control System for automatic operation as follows:

	COMPONENT	NAME	POSITION	
a.	1-HS-0111B	BLENDER OUTLET TO VCT	AUTO	________
b.	1-HS-40001A	VCT MAKEUP MODE SELECT	AUTO	________
c.	1-HS-40001B	VCT MAKEUP CONTROL	START	________

4.5.1.8 **Operate** the Pressurizer Back-up Heaters as necessary to equalize C_b between the RCS and the Pressurizer. ________

4.5.1.9 **Monitor** RCS Tavg and reactor power for expected response. ________

INITIALS

4.5.2 Dilution For Maintaining RCS Steady State Conditions

4.5.2.1 **Determine** amount of Reactor Makeup Water to add: _______ gals _______

4.5.2.2 **Verify** the Reactor Makeup System is aligned for automatic operation. _______

4.5.2.3 **Establish** the following alignment:

a. **Place** VCT MAKEUP CONTROL 1-HS-40001B in the STOP position. _______

> NOTE
>
> If it is desired to direct all dilution flow to the top of the VCT, DIL should be selected in the following step.

b. **Place** VCT MAKEUP MODE SELECT 1-HS-40001A in the ALT DIL <u>OR</u> DIL position. _______

c. TOTAL MAKEUP 1-FQI-0111 Integrator _______ gals _______

4.5.2.4 **Place** VCT MAKEUP CONTROL 1-HS-40001B in START and **verify** flow is indicated on 1-FI-0110B. _______

4.5.2.5 <u>WHEN</u> 1-FQI-0111 reaches desired setpoint, **verify** the following components align to the position indicated:

<u>COMPONENT</u>	<u>NAME</u>	<u>POSITION</u>	
1-FV-0111A	RX MU WTR TO BA BLENDER	CLOSED	_______
1-FV-0111B	BLENDER OUTLET TO VCT	CLOSED	_______
1-FV-0110B	BLENDER OUTLET TO CHARGING PUMPS SUCT	CLOSED	_______

INITIALS

4.5.2.6 **Align** Reactor Makeup Control System for automatic operation as follows:

	SWITCH	NAME	POSITION	
a.	1-HS-40001A	VCT MAKEUP MODE SELECT	AUTO	________
b.	1-HS-40001B	VCT MAKEUP CONTROL	START	________

4.5.2.7 **Operate** the Pressurizer Back-up Heaters as necessary to equalize C_b between the RCS and the Pressurizer. ________

4.5.2.8 **Monitor** RCS Tavg and reactor power for expected response. ________

INITIALS

4.6 MANUAL MAKEUP

> **CAUTIONS**
>
> - If Manual Makeup is being performed to maintain VCT level when letdown is being diverted, letdown should not exceed 75 gpm.
> - BAST concentration is inaccurate until sampled following batching. Temperature and power should be closely monitored following manual makeup to the VCT with the BAST concentration inaccurate.

4.6.1 Manual Makeup At 100 GPM Total Flow

> NOTE
>
> Volumetric change in VCT is equal to 19.2 gallons per percent change in level.

4.6.1.1 **Set** TOTAL MAKEUP Integrator 1-FQI-0111 to the desired amount of Total Makeup Water. ________

> **CAUTION**
>
> Digital counters and thumbwheel settings on BORIC ACID TO BLENDER Integrator 1-FQI-0110 read in tenth-gallon increments.

4.6.1.2 **Set** BORIC ACID TO BLENDER Integrator 1-FQI-0110 to the desired amount of boric acid as follows:

a. **Calculate** estimated volume of Boric Acid using the following calculation. ________

$$\text{Gallons of Boric Acid} = \frac{\text{Total M/U} \times \text{RCS } C_b}{\text{BAST } C_b}$$

b. **Review** logs for recent makeups to confirm calculated volume of Boric Acid is appropriate. ________

INITIALS

NOTE

Minor adjustments from the calculated boric acid volume and recent makeup data may be required based on burnup, plant conditions, and desired RCS temperature response.

c. **Adjust** Boric Acid to Blender Integrator 1-FQI-0110 to the desired volume based on plant conditions and desired reactivity response. ________

4.6.1.3 **Adjust** BORIC ACID Flow Controller 1-FIC-0110 pot setting using the following formula and **verify** controller is in AUTO: ________

$$\text{1-FIC-0110 pot setting} = \frac{\text{RCS } C_b \times 25}{\text{BAST } C_b}$$

4.6.1.4 **Place** VCT MAKEUP CONTROL 1-HS-40001B in STOP. ________

4.6.1.5 **Place** VCT MAKEUP MODE SELECT 1-HS-40001A in MAN. ________

4.6.1.6 **Verify** the following:

- BA TO BLENDER 1-HS-0110A in AUTO. ________
- RX MU WTR TO BA BLENDER 1-HS-0111A in AUTO. ________
- One Boric Acid Transfer Pump in AUTO or START. ________
- One Reactor Makeup Water Pump in AUTO or START. ________
- **Verify** TOTAL MAKEUP Flow controller 1-FIC-0111 is in AUTO with pot is set for 100 gpm (approximately 6.25) total flowrate. ________

INITIALS

NOTE

While letdown is configured for 120 gpm, the preferred flow path for Manual Makeup is through 1-FV-0110B BLENDER OUTLET TO CHARGING PUMPS SUCT. The design capacity of the VCT spray nozzles would be challenged with 120 gpm letdown in service and the addition of the makeup flow upstream of the VCT (1X6AH04-00024). This could prevent makeup from reaching the desired flow rate. Thus, 1-FV-0111B should only be used if 1-FV-0110B is not available.

CAUTION

With either Blender Outlet valve handswitch in the open position, an automatic isolation will not occur due to a Boric Acid and/or Total Makeup Flow Deviations.

4.6.1.7 **Open** one of the following valves:

BLENDER OUTLET TO CHARGING PUMPS SUCT 1-FV-0110B ________

OR

BLENDER OUTLET TO VCT 1-FV-0111B ________

INITIALS

NOTES

- Manual makeup can be stopped at any time by placing 1-HS-40001B in STOP.
- VCT level should be maintained between 30 and 87 percent. (1-LIC-0185 controller pot should normally be set to 8.7.)
- VCT Pressure 1-PI-115 should be maintained between 20 and 45 psig.

4.6.1.8 **Place** VCT MAKEUP CONTROL 1-HS-40001B in START and perform the following: ________

- **Verify** Boric Acid Transfer Pump is running. ________
- **Verify** Reactor Makeup Water Pump is running. ________
- **Verify** BORIC ACID TO BLENDER 1-FV-0110A throttles open to provide the correct flow of boric acid. ________
- **Verify** REACTOR MU WTR TO BLENDER 1-FV-0111A throttles open to provide correct total flow. ________
- If desired, **control** Boric Acid Flow controller 1-FIC-0110 by adjusting pot OR using up/down pushbuttons to control boric acid at the desired flowrate. ________

4.6.1.9 **Monitor** counters on BORIC ACID TO BLENDER Integrator 1-FQI-0110 and TOTAL MAKEUP Integrator 1-FQI-0111 and perform the following:

- WHEN counter on 1-FQI-0110 BORIC ACID TO BLENDER Integrator reaches its setpoint, **verify** 1-FV-0110A BORIC ACID TO BLENDER is closed. ________
- WHEN counter on 1-FQI-0111 TOTAL MAKEUP Integrator reaches its setpoint, **verify** 1-FV-0111A REACTOR MAKEUP WATER TO BLENDER is closed. ________

INITIALS

4.6.1.10 If desired, **flush** approximately 15 gallons of Reactor Makeup Water through 1-FV-0110B by performing the following:

a. **Place** VCT MAKEUP MODE SELECT 1-HS-40001A to ALT DIL. ________

b. **Set** TOTAL MAKEUP Integrator 1-FQI-0111 for 13 to 15 gals. ________

c. **Place** BLENDER OUTLET TO VCT 1-HS-0111B in CLOSE. ________

d. **Place** VCT MAKEUP CONTROL 1-HS-40001B in START. ________

e. **Verify** flow is indicated on 1-FI-0110B. ________

f. WHEN TOTAL MAKEUP Integrator 1-FQI-0111 reaches the desired setpoint, **verify** 1-FV-0111A RX MU WTR TO BA BLENDER is closed. ________

4.6.1.11 **Verify** Boric Acid Flow controller 1-FIC-0110 is in AUTO and potentiometer is set for current RCS C_b. ________

4.6.1.12 **Align** Reactor Makeup Control system for automatic operation as follows:

	COMPONENT	NAME	POSITION	
a.	1-HS-0111B	BLENDER OUTLET TO VCT	AUTO	________
b.	1-HS-0110B	BLENDER OUTLET TO CHARGING PUMPS SUCTION	AUTO	________
c.	1-HS-40001A	VCT MAKEUP MODE SELECT	AUTO	________
d.	1-HS-40001B	VCT MAKEUP CONTROL	START	________

INITIALS

4.6.1.13 **Verify** the following valves are closed:

- 1-FV-0111B BLENDER OUTLET TO VCT ________
- 1-FV-0110B BLENDER OUTLET TO CHARGING PUMPS SUCT ________

4.6.1.14 IF Boric Acid Transfer Pump was placed in START at Step 4.6.1.6, return to AUTO or as directed by SS. ________

4.6.1.15 IF Reactor Makeup Water Pump was placed in START at Step 4.6.1.6, return to AUTO or as directed by SS. ________

4.6.1.16 **Operate** the Pressurizer Back-up Heaters as necessary to equalize C_b between the RCS and the Pressurizer. ________

> NOTE
>
> Automatic Control Rod withdrawal function has been disabled. The only function enabled when Control Rod handswitch is placed in AUTO is automatic insertion when Tavg is at least 1.5 degrees above Tref.

4.6.1.17 **Monitor** RCS Tavg, control bank position, or power level as applicable. ________

INITIALS

> NOTE
>
> The calculations performed in this section may be performed with the use of an approved PC-based spreadsheet.

4.6.2 Manual Makeup At Operator Selected Total Flow Rates

4.6.2.1 **Place** VCT Makeup Control 1-HS-40001B in STOP. ________

4.6.2.2 **Place** VCT Makeup Mode Select 1-HS-40001A in MANUAL. ________

4.6.2.3 **Determine** the desired total makeup flowrate (m_T). ________

4.6.2.4 **Calculate** Total Makeup Flow Controller 1-FIC-0111 potentiometer setpoint: ________

1-FIC-0111 potentiometer setpoint = (m_T X 10) ÷ 160

4.6.2.5 **Adjust** Total Makeup Flow Controller 1-FIC-0111 potentiometer to the calculated value. ________

4.6.2.6 **Verify** Total Makeup Controller 1-FIC-0111 is in AUTO. ________

4.6.2.7 **Determine** the total volume of blended RCS makeup required. ________

4.6.2.8 **Set** TOTAL MAKEUP Integrator 1-FQI-0111 for the total makeup volume to the RCS. ________

INITIALS

4.6.2.9 **Determine** the Boric Acid Flowrate by using the following formula: ________

$$\dot{m}_{BA} = \left[\frac{C_{RCS}}{C_{ba}}\right] \times \dot{m}_T$$

where:

m_{BA} = Boric Acid Flowrate
C_{RCS} = Concentration of the RCS
C_{ba} = Concentration of the BAST
m_T = Total Makeup Flowrate

4.6.2.10 **Determine** the Boric Acid Blender Controller 1-FIC-0110 potentiometer setpoint: ________

$$\text{1-FIC-0110 setpoint} = \left[\frac{\dot{m}_{BA}}{40}\right] \times 10$$

where:

m_{BA} = Boric Acid Flowrate

4.6.2.11 **Adjust** Boric Acid Blender Controller 1-FIC-0110 Pot to the value determined in Step 4.6.2.10 and **place** the controller in AUTO. ________

4.6.2.12 **Determine** the amount of boric acid solution from the BAST required to provide the proper blended RCS makeup volume using the following formula: ________

$$V_{BA} = \frac{V_{M/U} \times \dot{m}_{BA}}{\dot{m}_T}$$

where:

V_{BA} = Volume of Boric acid solution from BAST
$V_{M/U}$ = Total volume of blended RCS makeup from Step 4.6.2.8
m_{BA} = Boric acid flow rate from Step 4.6.2.9
m_T = Total makeup flow rate from Step 4.6.2.3

INITIALS

CAUTION

Digital counters and thumbwheel settings on BORIC ACID TO BLENDER Integrator 1-FQI-0110 read in tenth-gallon increments.

4.6.2.13 **Set** BORIC ACID TO BLEND control integrator 1-FQI-0110 to the volume determined in Step 4.6.2.12. ________

4.6.2.14 **Verify** the following:

- BA TO BLENDER 1-HS-0110A is in AUTO. ________
- REACTOR MU TO BA BLENDER 1-HS-0111A is in AUTO. ________
- One (1) Boric Acid Transfer pump in AUTO or START. ________
- One (1) Reactor Makeup Water pump in AUTO or START. ________

NOTE

While letdown is configured for 120 gpm, the preferred flow path for Manual Makeup is through 1-FV-0110B BLENDER OUTLET TO CHARGING PUMPS SUCT. The design capacity of the VCT spray nozzles would be challenged with 120 gpm letdown in service and the addition of makeup flow upstream of the VCT (1X6AH04-00024). This could prevent makeup from reaching the desired flow rate. Thus, 1-FV-0111B should only be used if 1-FV-0110B is not available.

CAUTION

With either Blender Outlet valve handswitch in the open position, an automatic isolation will not occur due to a Boric Acid and/or Total Makeup Flow Deviations.

4.6.2.15 **Open** one of the following valves:

BLENDER OUTLET TO CHARGING PUMPS SUCT 1-FV-0110B ________

OR

BLENDER OUTLET TO VCT 1-FV-0111B ________

INITIALS

4.6.2.16 **Place** VCT MAKEUP CONTROL 1-HS-40001B to START. ________

4.6.2.17 **Verify** Boric Acid Transfer pump is running. ________

4.6.2.18 **Verify** Reactor Makeup Water pump is running. ________

4.6.2.19 **Verify** proper blender operation as follows:

- BORIC ACID TO BLENDER 1-FV-0110A throttles open to provide the correct flow of boric acid. ________
- REACTOR MAKEUP WTR TO BLENDER 1-FV-0111A throttles open to provide correct total flow. ________
- If desired, **control** BORIC ACID flow controller 1-FIC-0110 by adjusting pot OR using up/down pushbuttons to control boric acid at the desired flowrate. ________

NOTE

Makeup can be stopped at any time by placing VCT MAKEUP CONTROL Switch 1-HS-40001B to STOP.

4.6.2.20 **Monitor** BORIC ACID TO BLENDER integrator 1-FQI-0110 and TOTAL MAKEUP integrator 1-FQI-0111 and perform the following:

- WHEN 1-FQI-0110 BORIC ACID TO BLENDER integrator reaches its setpoint, **verify** 1-FV-0110A BORIC ACID TO BLENDER is closed. ________
- WHEN 1-FQI-0111 TOTAL MAKEUP integrator reaches its setpoint, **verify** 1-FV-0111A REACTOR MAKEUP WATER TO BLENDER is closed. ________

4.6.2.21 **Verify** the following handswitches are in AUTO:

- 1-HS-110B BLENDER OUTLET TO CHARGING PUMPS SUCT ________
- 1-HS-111B BLENDER OUTLET TO VCT ________

INITIALS

4.6.2.22 If desired, **flush** approximately 15 gallons of reactor makeup through 1-FV-0110B by performing the following:

a. **Place** VCT MAKEUP MODE SELECT 1-HS-40001A to ALT DIL. ________

b. **Set** TOTAL MAKEUP Integrator 1-FQI-0111 for 13 to 15 gals. ________

c. **Place** BLENDER OUTLET TO VCT 1-HS-0111B in CLOSE. ________

d. **Place** VCT MAKEUP CONTROL 1-HS-40001B in START. ________

e. **Verify** flow is indicated on 1-FI-0110B. ________

f. <u>WHEN</u> TOTAL MAKEUP Integrator 1-FQI-0111 reaches the desired setpoint, **verify** the following valves close:

- 1-FV-0111A RX MU WTR TO BA BLENDER ________
- 1-FV-0110B BLENDER OUTLET TO CHARGING PUMP SUCT ________

4.6.2.23 **Align** Reactor Makeup Control System for automatic makeup per Section 4.1. ________

4.6.2.24 **Operate** the Pressurizer Back-up Heaters as necessary to equalize C_b between the RCS and the Pressurizer. ________

4.6.2.25 **Monitor** RCS temperature, Control Bank position, or power levels as applicable. ________

INITIALS

NOTES

- This section can be used during power changes when necessary to frequently dilute the RCS for temperature control. The use of this section shall be authorized by the SS.
- Frequent dilutions can raise VCT level to the point where VCT pressure reaches 40 psig. 1-LIC-0185 may be adjusted to allow divert to the RHT at a lower level to limit VCT pressure increase.

4.7 FREQUENT DILUTIONS WHILE CONTROLLING REACTOR POWER

4.7.1 **Determine** the amount of Reactor Makeup Water necessary to accomplish the power change or accommodate the expected impact of Xenon.

_________ gals H_2O _________

4.7.2 **Verify** the Reactor Makeup System is aligned for automatic operation. _________

4.7.3 **Start** one Reactor Makeup Water Pump:

RX MU WTR PMP-1 1-HS-7762 _________

RX MU WTR PMP-2 1-HS-7763 _________

4.7.4 **Place** VCT MAKEUP CONTROL 1-HS-40001B in STOP. _________

4.7.5 As directed by the SS, **place** VCT MAKEUP MODE SELECT 1-HS-40001A in either the ALT DIL or DIL position. _________

4.7.6 As directed by the SS, **lower** pot setting on 1-LIC-0185, to limit VCT pressure increase. _________

Initial Pot Setting:_______ New Pot Setting:_______ _________

INITIALS

4.7.7 **Set** TOTAL MAKEUP Integrator 1-FQI-0111 for the desired amount of Reactor M/U Water.

________ gals H_2O ________

NOTE

If VCT MAKEUP MODE SELECT 1-HS-40001A was placed in the DIL position in Step 4.7.5, Step 4.7.8 may be marked N/A.

4.7.8 If required, **close** 1-FV-0110B as necessary to raise or maintain RCS hydrogen concentration. ________

4.7.9 At SS direction, dilution flow may be adjusted to desired flow using 1-FIC-0111 (**record** in AUTO LOG).

Initial Pot Setting: _______ New Pot Setting: _______ ________

4.7.10 **Place** VCT MAKEUP CONTROL 1-HS-40001B in START and **verify** flow is indicated on 1-FI-0110B. ________

4.7.11 WHEN TOTAL MAKEUP Integrator 1-FQI-0111 reaches its setpoint, **verify** dilution stops and the following valves close:

- 1-FV-0111A RX MU WTR TO BA BLENDER ________
- 1-FV-0111B BLENDER OUTLET TO VCT ________
- 1-FV-0110B BLENDER OUTLET TO CHARGING PUMPS SUCT ________

4.7.12 **Operate** the Pressurizer Back-up Heaters as necessary to equalize C_b between the RCS and the Pressurizer. ________

4.7.13 **Monitor** RCS temperature, Control Bank position, or power levels as applicable. ________

INITIALS

CAUTION

If frequent dilutions are to be continued past the end of the shift, step 4.7.14 should be marked N/A and this section completed to include realignment to the normal configuration. The new on coming shift can then initiate the section from the beginning to continue frequent dilution.

4.7.14 **Repeat** Steps 4.7.10 through 4.7.13 as necessary to continue power ramp and/or compensate for Xenon. ________

4.7.15 IF 1-FV-0110B was closed in Step 4.7.8, **place** 1HS-110B in AUTO. ________

4.7.16 **Stop** the Reactor Makeup Water Pump started in Step 4.7.3:

RX MU WTR PMP-1	1-HS-7762	________
RX MU WTR PMP-2	1-HS-7763	________

4.7.17 IF dilution flow pot setting was changed, **restore** 1-FIC-0111 to the initial setting recorded in Step 4.7.9 (**record** in AUTOLOG).

4.7.18 IF VCT level controller 1-LIC-0185 pot setting was lowered, **restore** to initial setting recorded in Step 4.7.6 (**record** in AUTO LOG). ________

4.7.19 WHEN frequent dilutions are no longer required, **align** RX M/U CONTOL System for automatic makeup per Section 4.1. ________

INITIALS

NOTES

- This section can be used during power changes when necessary to frequently borate the RCS for temperature or AFD control. The use of this section shall be authorized by the SS.
- Frequent borations can raise VCT level to the point where VCT pressure reaches 40 psig. 1-LIC-0185 may be adjusted to allow divert to the RHT at a lower level to limit VCT pressure increase.

4.8 FREQUENT BORATIONS WHILE CONTROLLING REACTOR POWER

4.8.1 **Determine** the amount of boric acid necessary for desired change in boron concentration using PTDB Tab 2.3 and **correct** the obtained value using PTDB Tab 2.1 or use instructions provided by Reactor Engineering.

_______ gals Boric Acid _________

4.8.2 **Verify** the Reactor Makeup System is aligned for automatic operation. _________

4.8.3 **Place** VCT MAKEUP CONTROL 1-HS-40001B in STOP. _________

4.8.4 **Place** VCT MAKEUP MODE SELECT 1-HS-40001A in BOR. _________

4.8.5 IF desired, AND with SS concurrence, Boric Acid flow may be adjusted to desired flow using 1-FIC-0110. _________

Initial Pot Setting:_______ New Pot Setting:_______ _________

4.8.6 IF desired, AND with SS concurrence, **lower** pot setting on 1-LIC-0185, to limit VCT pressure increase. _________

Initial Pot Setting:_______ New Pot Setting:_______ _________

INITIALS

CAUTION

Digital counters and thumbwheel settings on BORIC ACID TO BLENDER Integrator 1-FQI-0110 read in tenth-gallon increments.

4.8.7 **Set** BORIC ACID TO BLENDER integrator 1-FQI-0110 for the desired amount of boric acid.

Boric Acid _______ gals _________

4.8.8 **Place** VCT MAKEUP CONTROL 1-HS-40001B in START, and **verify** flow is indicated on 1-FI-0110A. _________

4.8.9 WHEN BORIC ACID TO BLENDER integrator 1-FQI-0110 reaches its setpoint, **verify** boration stops and the following valves close:

- 1-FV-0110A, BORIC ACID TO BLENDER _________
- 1-FV-0110B, BLENDER OUTLET TO CHARGING PUMPS SUCT _________

4.8.10 **Operate** the Pressurizer Back-up Heaters as necessary to equalize C_b between the RCS and the Pressurizer. _________

4.8.11 **Monitor** RCS temperature, Control Bank position, or power levels as applicable. _________

4.8.12 **Repeat** Steps 4.8.7 through 4.8.11 to borate as necessary to continue power change and/or compensate for Xenon. _________

INITIALS

4.8.13 WHEN frequent borations are no longer required, **flush** approximately 15 gallons of Reactor Makeup Water through 1-FV-0110B by performing the following:

a. **Place** VCT MAKEUP MODE SELECT 1-HS-40001A to ALT DIL. ________

b. **Set** TOTAL MAKEUP Integrator 1-FQI-0111 for 13 to 15 gallons. ________

c. **Place** BLENDER OUTLET TO VCT 1-HS-0111B in CLOSE. ________

d. **Place** VCT MAKEUP CONTROL 1-HS-40001B in START. ________

e. **Verify** flow is indicated on 1-FI-0110B. ________

f. WHEN TOTAL MAKEUP integrator 1-FQI-0111 reaches the desired setpoint, **verify** the following valves close:

- 1-FV-0111A, RX MU WTR TO BA BLENDER ________
- 1-FV-0110B, BLENDER OUTLET TO CHARGING PUMPS SUCT ________

4.8.14 IF Boric Acid flow controller 1-FIC-0110 was adjusted in Step 4.8.5, **reset** to Initial Pot Setting. ________

Final Pot Setting:________ ________

4.8.15 **Align** RX M/U CONTROL System for automatic makeup per Section 4.1. ________

4.8.16 IF VCT level controller 1-LIC-0185 pot setting was lowered, **restore** to initial setting recorded in Step 4.8.6 and **record** in Unit Control Log. ________

INITIALS

4.9 EMERGENCY BORATION

> NOTE
>
> Table 1 provides a convenient tool for checking Emergency Boration flow path alternatives.

4.9.1 Emergency Boration Through 1-HV-8104

4.9.1.1 **Start** one (1) Boric Acid Transfer Pump. ________

4.9.1.2 **Verify** a Charging Pump is running. ________

4.9.1.3 **Open** EMERGENCY BORATE valve 1-HV-8104. ________

> NOTE
>
> The following step assumes that with 12 gpm of seal return, 30 gpm will be supplied to the RCS.

4.9.1.4 **Place** 1-FIC-0121 in MANUAL. ________

4.9.1.5 **Adjust** 1-FIC-0121 to maintain flow greater than 42 gpm. ________

> NOTES
>
> - IPC computer point for Boric Acid flow Rate is F0183 (GPM).
> - Computer point for Boric Acid Totalized Flow is UF0183 (Gallons).

4.9.1.6 **Verify** Emergency Boration flow 1-FI-0183A greater than 30 gpm. ________

4.9.1.7 <u>IF</u> flow is less than 30 gpm, **start** the second Boric Acid Transfer Pump. ________

4.9.1.8 **Operate** the Pressurizer Backup Heaters as necessary to equalize boron concentration between the RCS and the Pressurizer. ________

INITIALS

4.9.1.9 **Check** plant conditions are consistent with the boration of the RCS: ________

RCS Tavg may be dropping.

NIS may be dropping.

4.9.1.10 **Determine** the amount of boric acid required to allow termination of Emergency Boration. ________

NOTE

Monitor Boric Acid Flow Rate computer point F0183. After flow has started the totalized flow should be reset by selecting "Reset Boric Acid Flow Totalizer" from the IPC System Menu.

4.9.1.11 WHEN the determined amount of boric acid has been added to the RCS, **close** 1-HV-8104. ________

4.9.1.12 **Return** the Boric Acid Transfer Pumps to the desired system configuration. ________

4.9.1.13 **Restore** 1-FIC-0121 to the AUTO position. ________

4.9.1.14 **Direct** Chemistry to sample and report the RCS boron concentration, or **monitor** the Boron Meter 1-AI-40134 if available. ________

INITIALS

4.9.2 Emergency Boration Through The Normal Charging Flow Path

4.9.2.1 **Start** one (1) Boric Acid Transfer Pump. ________

4.9.2.2 **Verify** a Charging Pump is running. ________

4.9.2.3 **Open** the following valves:

- 1-FV-0110A, BA TO BLENDER ________
- 1-FV-0110B, BLENDER OUTLET TO CHARGING PUMPS SUCT ________

> NOTE
>
> The following step assumes that with 12 gpm of seal return, 30 gpm will be supplied to the RCS.

4.9.2.4 **Place** 1-FIC-0121 in MANUAL. ________

4.9.2.5 **Adjust** 1-FIC-0121 to maintain flow greater than 42 gpm. ________

4.9.2.6 **Verify** Emergency Boration flow 1-FI-0110A is greater than 30 gpm. ________

4.9.2.7 IF flow is less than 30 gpm, **start** the second Boric Acid Transfer Pump. ________

4.9.2.8 **Operate** the Pressurizer Backup Heaters as necessary to equalize boron concentration between the RCS and the Pressurizer. ________

4.9.2.9 **Check** plant conditions are consistent with RCS boration: ________

RCS Tavg may be dropping.

NIS may be dropping.

INITIALS

4.9.2.10 **Determine** the amount of boric acid required to allow termination of Emergency Boration. ________

4.9.2.11 WHEN the determined amount of boric acid has been added to the RCS, **close** the following valves:

- 1-FV-0110A ________
- 1-FV-0110B ________

4.9.2.12 **Establish** automatic makeup per Section 4.1. ________

4.9.2.13 **Restore** 1-FIC-0121 to the AUTO position. ________

4.9.2.14 **Direct** Chemistry to sample and report the RCS boron concentration, or **monitor** the Boron Meter 1-AI-40134 if available. ________

INITIALS

4.9.3 Emergency Boration From The RWST Through The Normal Charging Flow Path

4.9.3.1 **Verify** one (1) Charging Pump is running and supplied with cooling water. ________

4.9.3.2 **Open** the following Charging Pump Suctions from the RWST:

- 1-LV-0112D ________
- 1-LV-0112E ________

4.9.3.3 **Close** the following VCT Outlet Isolations:

- 1-LV-0112B ________
- 1-LV-0112C ________

4.9.3.4 **Place** 1-LV-0112A to the HUT position. ________

4.9.3.5 **Place** 1-FIC-0121 in MANUAL, ________

4.9.3.6 **Adjust** Charging Line Flow Controller 1-FIC-0121 to obtain Charging Flow 1-FI-0121C greater than 100 gpm, ________

4.9.3.7 **Adjust** Charging Seal Flow Control 1-HV-0182 as necessary to maintain RCP seal injection flow at approximately 40 gpm (between 8 and 13 gpm per pump). ________

4.9.3.8 <u>IF</u> required for RCS inventory control, **place** an additional letdown orifice in service per 13006-1. ________

4.9.3.9 **Operate** the Pressurizer Backup Heaters as necessary to equalize boron concentrations between the RCS and the Pressurizer. ________

4.9.3.10 **Check** for indications consistent with RCS boration: ________

RCS Tavg may be dropping.

NIS may be dropping.

INITIALS

4.9.3.11 WHEN boration is complete, perform the following:

a. **Open** the following VCT OUTLET ISOLATION valves

- 1-LV-0112B ________
- 1-LV-0112C ________

b. **Close** the following Charging Pump Suctions from the RWST:

- 1-LV-0112D ________
- 1-LV-0112E ________

c. **Place** 1-HS-0112A to the AUTO position. ________

d. **Restore** 1-FIC-0121 to the AUTO position IF it was placed in MANUAL. ________

4.9.3.12 **Direct** Chemistry to sample and report the RCS boron concentration, or **monitor** Boron Meter 1-AI-40134 if available. ________

INITIALS

4.9.4 Emergency Boration From The RWST Through The BIT Isolation Valves

4.9.4.1 **Verify** one (1) Charging Pump is running and supplied with cooling water. ________

4.9.4.2 **Open** the following Charging Pump Suctions from the RWST:

- 1-LV-0112D ________
- 1-LV-0112E ________

4.9.4.3 **Close** the following VCT Outlet Isolations:

- 1-LV-0112B ________
- 1-LV-0112C ________

4.9.4.4 **Place** 1-LV-0112A to the HUT position. ________

4.9.4.5 **Open** the following BIT DISCH ISOLATION valves:

- 1-HV-8801A ________
- 1-HV-8801B ________

4.9.4.6 **Verify** BIT Flow (1-FI-0917A), plus total seal injection flow, minus total seal return flow is greater than 87.5 gpm. ________

4.9.4.7 **Adjust** Charging Line Flow Controller 1-FIC-0121 as necessary to maintain RCP seal injection flow at maximum flow less than 13 gpm per pump. ________

4.9.4.8 IF required for RCS inventory control, **place** an additional letdown orifice in service per 13006-1. ________

4.9.4.9 **Operate** the Pressurizer Backup Heaters as necessary to equalize boron concentrations between the RCS and the Pressurizer. ________

INITIALS

4.9.4.10 **Check** for indications consistent with RCS boration: ________

RCS Tavg may be dropping.

NIS may be dropping.

4.9.4.11 WHEN boration is complete, **perform** the following:

a. **Open** the following VCT OUTLET ISOLATION valves:

- 1-LV-0112B ________
- 1-LV-0112C ________

b. **Close** the following Charging Pump Suctions from the RWST:

- 1-LV-0112D ________
- 1-LV-0112E ________

c. **Place** 1-HS-0112A to the AUTO position. ________

d. **Restore** 1-FIC-0121 to the AUTO position IF it was placed in MANUAL. ________

4.9.4.12 **Close** the following BIT DISCH ISOLATION valves:

- 1-HV-8801A ________
- 1-HV-8801B ________

4.9.4.13 **Direct** Chemistry to sample and report the RCS boron concentration or **monitor** Boron Meter 1-AI-40134 if available. ________

INITIALS

4.9.5 Emergency Borate Using the RHR Pump (Mode 6)

CAUTION

This section should only be used in Mode 6 with reactor cavity level 23 feet above the Reactor Vessel Flange using RHR as an Emergency borated water source.

4.9.5.1 **Notify** (and **evacuate** as necessary) personnel in the Reactor Cavity and Spent Fuel Pool areas that RHR will be injecting into the Reactor Vessel. ________

4.9.5.2 **Stop** Core Alterations and/or Fuel Movement activities in progress. ________

4.9.5.3 IF using Train A RHR, **perform** the following:

a. **Verify** open Train A RHR pump suction from the RWST 1-HV-8812A (1-HS-8812A). ________

b. **Verify** open Train A RHR Cold Leg Discharge Valve 1-HV-8809A (1-HS-8809A). ________

c. **Start** Train A RHR pump 1-HS-620. ________

4.9.5.4 IF using Train B RHR, perform the following:

a. **Verify** open Train B RHR pump suction from the RWST 1-HV-8812B (1-HS-8812B). ________

b. **Verify** open Train B RHR Cold Leg Discharge Valve 1-HV-8809B (1-HS-8809B). ________

c. **Start** Train B RHR pump 1-HS-621. ________

INITIALS

4.9.5.5 **Monitor** Reactor Cavity level and **initiate** one or more of the following actions to prevent or minimize overflow of the Reactor cavity and Spent Fuel Pool:

a. IF Train A RHR is in service, **throttle** flow using 1-HV-618 to maintain flow on 1-FI-0618A OR IPC Point F0626 greater than 100 gpm. ________

b. IF Train B RHR is in service, **throttle** flow using 1-HV-619 to maintain flow on 1-FI-0619A or IPC Point F0627 greater than 100 gpm. ________

c. **Initiate** the following actions to remove excess water from the Reactor Cavity:

NOTE

The following sub-steps are intended as suggestions only. Other drain flow paths may be suitable. More than one drain flow path may be established as needed.

- **Maximize** RHR letdown from the Shutdown Cooling RHR train. ________
- With the Fuel Transfer Tube Open, **initiate** draining the Spent Fuel Pool. ________
- **Initiate** Draining the Reactor Cavity. ________

4.9.5.6 **Check** for indications consistent with RCS boration:

- Source Range Count rate is stable or decreasing. ________
- RCS boron samples show increasing boron concentration. ________
- Adequate Shutdown Margin per 14005-1. ________

INITIALS

4.9.5.7 WHEN boration is no longer required, perform the following:

a. **Stop** the RHR pump being used for Emergency Boration. ________

b. **Isolate** Reactor Cavity Drain paths initiated per previous steps. ________

c. **Re-align** RHR that was used for Emergency boration per 14406-1. ________

INITIALS

4.9.6 Emergency Borate Using the SI Pump (Mode 6)

CAUTION

This section should only be used in Mode 6 when the Reactor Vessel head is removed and an SI pump is to be used as an Emergency borated water source .

4.9.6.1 **Notify** (and **evacuate** as necessary) personnel in the Reactor Cavity (and Spent Fuel Pool, if applicable) areas that SI will be injecting into Reactor Vessel. ________

4.9.6.2 **Check** status of SI Pump suction from the RWST, 1-HV-8806: ________

a. **Verify** open 1-HV-8813 SIS PMPS COMMON MINIFLOW ISO VLV. ________

b. IF 1-HV-8806 is open, **continue** with Step 4.9.6.3 or 4.9.6.4 as applicable. ________

c. IF 1-HV-8806 is not open, perform the following:

(1) **Place** lockout handswitch 1-HS-8806A in the ON position. ________

(2) **Open** 1-HV-8806 using 1-HS-8806. ________

INITIALS

4.9.6.3 IF using Train A SI Pump, perform the following:

a. **Verify** open Train A SI pump suction from the RWST 1-HV-8923A (1-HS-8823A). ________

b. **Verify** open train A SI Pump Discharge Valve 1-HV-8821A (1-HS-8821A). ________

c. **Verify** open 1-HV-8814 SI PMP-A MINIFLOW ISO VLV. ________

d. **Check** status of SI COMMON COLD LEG INJECTION VALVE, 1-HV-8835:

(1) IF 1-HV-8835 is open, **continue** with Step 4.9.6.3e. ________

(2) IF 1-HV-8835 is not open, perform the following:

(a) **Place** lockout handswitch 1-HS-8835A in the ON position. ________

(b) **Open** 1-HV-8835 using 1-HS-8835. ________

e. **Start** Train A SI pump 1-HS-998A. ________

f. **Verify** SI injection flow into the Reactor Vessel 1-FI-0918 (IPC Pt F0918) greater than 100 gpm. ________

INITIALS

4.9.6.4 IF using Train B SI Pump, perform the following:

a. **Verify** open Train B SI pump suction from the RWST 1-HV-8923B (1-HS-8823B). ________

b. **Verify** open train B SI Pump Discharge Valve 1-HV-8821B (1-HS-8821B). ________

c. **Verify** open 1-HV-8920 SI PMP-B MINIFLOW ISO VLV. ________

d. **Check** status of SI COMMON COLD LEG INJECTION VALVE, 1-HV-8835:

(1) IF 1-HV-8835 is open, **continue** with Step 4.9.6.4e. ________

(2) IF 1-HV-8835 is NOT open, perform the following:

(a) **Place** lockout handswitch 1-HS-8835A in the ON position. ________

(b) **Open** 1-HV-8835 using 1-HS-8835. ________

e. **Start** Train B SI pump 1-HS-999A. ________

f. **Verify** SI injection flow into the Reactor Vessel 1-FI-0922 (IPC Pt F0922) greater than 100 gpm. ________

INITIALS

4.9.6.5 **Monitor** Reactor Vessel level (or Cavity Level) and **initiate** one or more of the following actions to prevent or minimize overflow of the Reactor Vessel (or the Reactor Cavity):

> NOTE
>
> The following sub-steps are intended as suggestions only. Other options may be suitable. More than one drain flow path may be established as needed:

Locally **throttle** SI discharge valves to maintain flow greater than 100 gpm.

- 1-HV-8821A SI PUMP A TO COLD LEG ISO ________
- 1-HV-8821B SI PUMP B TO COLD LEG ISO ________
- 1-HV-8835 COLD LEG INJ FROM SIS ________

Initiate actions to remove excess water from the Reactor Vessel (Reactor Cavity):

- **Initiate** or **raise** RHR letdown from the Shutdown Cooling RHR train. ________
- With the Fuel Transfer Tube open, **initiate** draining the Spent Fuel Pool. ________
- **Initiate** Draining the Reactor Cavity. ________

4.9.6.6 **Check** for indications consistent with RCS boration:

- Source Range Count rate is stable or decreasing. ________
- RCS boron samples show increasing boron concentration. ________
- Adequate Shutdown Margin per 14005-1. ________

INITIALS

4.9.6.7 WHEN boration is no longer required:

a. **Stop** the SI pump being used for Emergency Boration. ________

b. **Stabilize** Reactor Vessel (Reactor Cavity) Level by adjusting letdown or charging flow as required. ________

c. **Re-align** SI for Emergency Boration per 14406-1, ________

d. IF the Reactor Vessel overflowed into a dry Reactor Cavity, **initiate** Reactor Cavity cleanup if required. ________

INITIALS

4.10 BORATION FROM THE BORIC ACID STORAGE TANK (BAST) THROUGH MANUAL VALVE 1-1208-U4-505

4.10.1 **Verify** BA TO BLENDER 1-FV-0110A is closed and 1-HS-0110A is in the CLOSED position. ________

4.10.2 **Verify** EMERGENCY BORATE valve 1-HV-8104 is closed. ________

4.10.3 **Verify** CCP-B SUCTION 1-HV-8471B is open. ________

4.10.4 **Verify** a Charging Pump is running. ________

4.10.5 **Start** a Boric Acid Transfer Pump: ________

Boric Acid Transfer Pump 1	1-HS-0276A
Boric Acid Transfer Pump 2	1-HS-0277A

4.10.6 **Open** BAST TO CCP-B SUCTION 1-1208-U4-505. ________

4.10.7 **Verify** boration flow 1-FI-0110A of approximately 25 gpm. ________

4.10.8 **Check** plant conditions are consistent with the boration of the RCS: ________

RCS Tavg may be dropping.

NIS may be dropping.

4.10.9 WHEN the boration is complete, **close** 1-1208-U4-505. (IV REQUIRED) ________

4.10.10 **Return** the Boric Acid Transfer Pumps to the desired system configuration. ________

4.10.11 **Operate** the Pressurizer Backup Heaters as necessary to equalize boron concentration between the RCS and Pressurizer. ________

4.10.12 **Direct** Chemistry to sample and report the RCS boron concentration, or **monitor** the Boron Meter 1-AI-40134 if available. ________

INITIALS

4.11 BORATION FROM THE RWST WITH BAST OUT OF SERVICE

NOTES

- A stopwatch will be required for timing requirements in this section.
- This section should only be used when the BAST is out of service.

4.11.1 **Record** the following data: ________

RWST C_b (C_{RWST}) ________ ppm

Initial RCS C_b (C_{int}) ________ ppm

Desired final RCS C_b (C_{fin}) ________ ppm

Flowrate from RWST to RCS (gpm)
(Charging – Seal leakoff) ________ gpm

Volume of RCS (V_{RCS}) 61,346 gallons

4.11.2 **Calculate** the volume of boric acid (V_{ba}) to change C_{int} to C_{fin}: ________

$$V_{ba} = V_{RCS} \times \ln \frac{(C_{RWST} - C_{int})}{(C_{RWST} - C_{fin})}$$ ________ gal

4.11.3 **Calculate** time (T) required to charge volume determined in Step 4.11.2: ________

$$T = \frac{V_{ba}}{Flow}$$ ________ minutes

4.11.4 **Verify** VCT MAKEUP CONTROL 1-HS-40001B is in STOP. ________

4.11.5 **Verify** a charging pump is running. ________

INITIALS

CAUTION

The intent in the following steps is to only allow flow from RSWT to the RCS for the time calculated in Step 4.11.3. The operator should review and be familiar with Steps 4.11.6 through 4.11.12.

4.11.6 Simultaneously **start** a stopwatch and **open** one of the following RWST TO CCP A & B SUCTION valves:

1-LV-0112D ________

OR

1-LV-0112E ________

4.11.7 **Close** the following VCT OUTLET isolations:

- 1-LV-0112B ________
- 1-LV-0112C ________

4.11.8 **Place** LETDOWN DIVERT 1-LV-112A to the HUT position. ________

4.11.9 **Place** Charging Line Flow Controller 1-FIC-0121 in MANUAL and **adjust** as necessary to maintain NET charging at the flowrate recorded in Step 4.11.1. ________

4.11.10 **Operate** the pressurizer backup heaters as necessary to equalize boron concentrations between the RCS and Pressurizer. ________

4.11.11 **Monitor** RCS Tavg and NIS indications. ________

4.11.12 WHEN the time recorded in Step 4.11.3 has elapsed, perform the following:

a. **Open** the following VCT OUTLET ISOLATIONS: (IV REQUIRED)

- 1-LV-0112B ________
- 1-LV-0112C ________

INITIALS

b. **Close** the RWST to charging pump suction isolation valve opened in Step 4.11.6: (IV REQUIRED) ________

RWST TO CCP A & B SUCTION 1-LV-0112D

RWST TO CCP A & B SUCTION 1-LV-0112E

c. **Place** LETDOWN DIVERT 1-HS-112A to AUTO. ________

d. **Return** Charging Line Flow Controller 1-FIC-0121 to AUTO. ________

e. **Place** VCT MAKEUP CONTROL 1-HS-40001B in AUTO. ________

4.11.13 **Notify** Chemistry to sample and report RCS boron concentration, or **monitor** Boron Meter 1-AI-40134 to verify desired boration. ________

INITIALS

NOTES

- This section is designed to expedite RCS boron requirements for cooldown in conjunction with 12006-C.
- The following steps use both BAT pumps and establish concurrent flow paths from the BAST to the RCS via the CVCS blender and via the emergency boration flow path through 1-HV-8104.
- TOTAL boric acid flow through CVCS Blender and 1-HV-8104 shall not exceed 120 gpm for one BAT pump running or 130 gpm for both BAT pumps running. (RER 2004-V0015)
- Boration may be secured at any time for evaluation then resumed with supervisory concurrence.

4.12 ESTABLISH DUAL FLOW PATHS FROM BAST TO OBTAIN RCS BORON REQUIREMENTS FOR COOLDOWN

4.12.1 **Record** the desired RCS boron concentration for cooldown as determined in 12006-C. ________ ppm ________

4.12.2 **Determine** the amount of boric acid necessary to accomplish the desired change in RCS boron concentration, using PTDB Tab 2.3 and **correct** the obtained value using PTDB Tab 2.1.

Boric Acid to RCS _________ gallons ________

NOTE

BAST Volume is equal to 438 gallons/percent level.

4.12.3 **Estimate** the Change(% Δ) in Level of the BAST required to provide the desired amount of Boric Acid injected into the RCS:

_______ gallons of BA to RCS ÷ 438 = _______ % Δ in BAST ________

4.12.4 **Calculate** and **record** Target Level in BAST required to inject the desired amount of Boric Acid into the RCS:

Current Lvl _____ % - _____ % Δ = Target Lvl _____ % ________

INITIALS

4.12.5 **Establish** boration from the BAST through 1-HV-8104 by performing the following:

4.12.5.1 **Verify** the following CCP SUCTION Valves are open:

- 1-HV-8471A ________
- 1-HV-8471B ________

4.12.5.2 **Verify** a Charging Pump is running. ________

4.12.5.3 **Start** Boric Acid Transfer Pump 1, 1-HS-0276A. ________

4.12.5.4 **Open** EMERGENCY BORATE valve 1-HV-8104 and **monitor** flow on 1-FI-183A. ________

INITIALS

4.12.6 **Establish** manual boration from the BAST through CVCS blender by performing the following:

4.12.6.1 **Place** VCT MAKEUP CONTROL 1-HS-40001B in STOP. ________

4.12.6.2 **Place** VCT MAKEUP MODE SELECT 1-HS-40001A in MAN. ________

> **CAUTION**
>
> Digital counters and thumbwheel settings on BORIC ACID TO BLENDER integrator 1-FQI-0110 read in tenth-gallon increments.

4.12.6.3 **Set** BORIC ACID TO BLENDER integrator 1-FQI-0110 for approximately half of the total boric acid needed. ________

4.12.6.4 **Verify** TOTAL MAKEUP 1FQI-0111 is set to zero. ________

4.12.6.5 **Verify** Boric Acid Blender Flow Controller 1-FIC-0110 is in AUTO with potentiometer setpoint at 40 gpm. ________

4.12.6.6 **Verify** BA TO BLENDER 1-HS-0110A is in AUTO. ________

> **CAUTION**
>
> With either Blender Outlet valve handswitch in the open position, an automatic isolation will not occur due to a Boric Acid and/or Total Makeup Flow Deviations.

4.12.6.7 **Open** BLENDER OUTLET TO CHARGING PUMPS SUCT 1-HS-0110B. ________

4.12.6.8 **Verify** 1-HV-0111A RX MU WTR TO BA BLENDER is closed. ________

4.12.6.9 **Verify** 1-HV-0111B BLENDER OUTLET TO VCT is closed. ________

4.12.6.10 **Verify** Boric Acid Transfer Pump 2 Handswitch, 1-HS-0277A is in AUTO. ________

INITIALS

NOTES

- Placing 1HS-40001B in START resets the flow integrating counter to zero and enables the batch integrator to close valve 1FV-0110A when the integrator setpoint has been exceeded. This also enables the BA Flow Deviation alarm.
- TOTAL Boric Acid Flow through CVCS Blender and 1-HV-8104 should not exceed 120 gpm for one BAT pump running or 130 gpm for both BAT pumps running. (RER 2004-V0015)
- Actual Flow will normally be less than demand flow when 1-FIC-0110 is at 100% demand.
- Boric Acid Flow Deviation Alarm, ALB-7 F01 should be expected while valve 1FV-0110A adjusts to the demand setting. The alarm will remain in, if actual flow deviates from demand flow by ±0.8 gpm

4.12.6.11 **Place** VCT MAKEUP CONTROL 1-HS-40001B in START. ________

4.12.6.12 **Verify** demand on 1-FIC-0110 indicates approximately 100% demand, and boric acid flow does not exceed the TOTAL allowable Boric Acid Flow Rate. ________

NOTE

High VCT pressure reduces blender makeup flowrate.

4.12.6.13 **Position** 1-HV-0111A RX MU WTR TO BA BLENDER as needed to maintain the following:

- VCT Pressure 1-PI-115 between 20 and 45 psig. ________
- VCT 1-LI-0185 level between 30% and 87%. ________

INITIALS

4.12.6.14 **Monitor** the following:

- Boric Acid Flow on 1-FI-0110A ________
- Boric Acid Flow on 1-FI-183A ________
- BAST Level or Trend on IPC using L6320 or L6321 ________
- BORIC ACID TO BLENDER Integrator 1-FQI-0110 ________

4.12.6.15 If desired, **control** Boric Acid Flow controller 1-FIC-0110 by adjusting pot or using up/down pushbuttons to control boric acid at the desired flowrate. ________

4.12.6.16 **Operate** Pressurizer Backup Heaters as necessary to equalize boron concentration between RCS and Pressurizer. ________

4.12.6.17 WHEN 1-FQI-0110 reaches the desired setpoint, **verify** the boration stops through this flow path and BA TO BLENDER 1-FV-0110A closes. ________

4.12.6.18 If desired, **re-initiate** boration through blender beginning with Step 4.12.6.3. ________

4.12.6.19 WHEN the desired amount of Boric Acid has been injected into the RCS, **verify** the following valves are closed:

VALVE	NAME	HANDSWITCH	
1-HV-8104	EMERGENCY BORATE	1-HS-8104(CLOSE)	________
1-FV-0110A	BA TO BLENDER	1-HS-0110A(AUTO)	________
1-FV-0110B	BLENDER OUTLET TO CHARGING PUMPS SUCT	1-HS-0110B(AUTO)	________
1-HV-0111A	RX MU WTR TO BA BLENDER	1-HS-0111A(AUTO)	________

4.12.6.20 **Return** the Boric Acid Transfer Pumps to the desired system configuration. ________

INITIALS

> NOTE
>
> Flushing the blender is not required until the desired RCS boron concentration is attained.

4.12.7 WHEN boration is complete, **flush** approximately 15 gallons of Reactor Makeup Water through 1-FV-0110B by performing the following:

a. **Place** VCT MAKEUP MODE SELECT 1-HS-40001A to ALT DIL. ________

b. **Set** TOTAL MAKEUP Integrator 1-FQI-0111 for 13 to 15 gals. ________

c. **Place** BLENDER OUTLET TO VCT 1-HS-0111B in CLOSE. ________

d. **Place** VCT MAKEUP CONTROL 1-HS-40001B in START. ________

e. **Verify** flow indicated on 1-FI-0110B. ________

f. WHEN TOTAL MAKEUP Integrator 1-FQI-0111 reaches the desired setpoint, **verify** the following valves close:

- 1-FV-0111A RX MU WTR TO BA BLENDER ________
- 1-FV-0110B BLENDER OUTLET TO CHARGING PUMPS SUCT ________

4.12.8 **Align** Reactor Makeup Control System for Automatic Makeup per Section 4.1. ________

4.12.9 **Verify** desired boration through sample analysis or from Boron Concentration Meter 1-1208-T6-006 (1-AI-40134). ________

4.12.10 **Adjust** potentiometer on 1-FIC-0110 Boric Acid Blender Flow Controller for the new RCS boron concentration and **verify** in AUTO. ________

4.12.11 **Record** potentiometer setting in the Unit-1 Control Log. ________

5.0 REFERENCES

- FSAR, Section 9.3.4
- Technical Specifications

PROCEDURES

- 13006-1 "Chemical And Volume Control System"
- 13701-1 "Boric Acid System"
- 13733-1 "Reactor Makeup Water System"
- 13711-1 "Instrument Air System"
- 13901-1 "Heat Tracing System"
- 13105-1 "Safety Injection System"
- 13405-1 "125V DC Electrical Distribution System"
- 13432-1 "120V AC Non 1E Instrument Distribution System"

P&IDs

- 1X4DB116-1 Chemical And Volume Control System
- 1X4DB116-2 Chemical And Volume Control System
- 1X4DB118 Chemical And Volume Control System
- 1X4DB119 Safety Injection System
- 1X4DB121 Safety Injection System
- 1X4DB184 Reactor Makeup Water Storage Tank And Degasifier

ELEMENTARY DIAGRAMS

- 1X3D-BD-B03Q Reactor Coolant Makeup Control
- 1X3D-BD-L05B Reactor Makeup Water Storage Tank & Degasifier
- 1X3D-BD-L05A Reactor Makeup Water Storage Tank & Degasifier
- 1X3D-BD-C02C Chemical & Volume Control System 1-FY-0110B, E, F
- 1X3D-BD-C02D Chemical & Volume Control System 1-FY-0111A & 1-FY-0111B
- 1X3D-BD-C01F Chemical & Volume Control System 1-1208-P6-001-M01
- 1X3D-BD-C01G Chemical & Volume Control System 1-1208-P6-007-M01
- AX6AA04-30 VEGP Precautions, Limitation and Setpoints for Nuclear Steam Supply Systems

COMMITMENTS

1984301141	1984301147	1984301150	1984301814
1985303118	1985303240	1985303668	1985304318
1985304456	1985305272	1985305273	1987311779
1994329090	1995329394	1996332474	1996332570
1996332834	1997335585		

END OF PROCEDURE TEXT

TABLE 1

EMERGENCY BORATION FLOW PATH ALTERNATIVES

Flow path	BATP	Valve Alignments	Other Pump Required	Flows	Flow	Note
HV8104	At least one	**OPEN** 1HV-8104	Any charging pump	**>42 GPM** 1FI-0121C	**>30 GPM** 1FI-0183A	Operate heaters
Charging Flow path	At least one	**OPEN** 1FV-0110A 1FV-0110B	Any charging pump	**>42 GPM** 1FI-0121C	**>30 GPM** 1FI-0110A	Operate heaters
RWST to Regen Hx	NA	**OPEN** 1LV-0112D 1LV-0112E **CLOSE** 1LV-0112B 1LV-0112C 1LV-0112A	Any charging pump	**>100 GPM** 1FI-0121C	**8 to 13 GPM** seal injection flow 1HV-0182	Operate heaters
RWST to BIT	NA	**OPEN** 1HV-8801A 1HV-8801B	Any charging pump	BIT flow (1FI-0917A) + total seal flow - seal return flow **>87.5 GPM**	Adjust 1FIC-0121C to **<13 GPM** per RCP	Operate heaters
RHR (Mode 6)	NA	**OPEN** HV-8812A/B HV-8809A/B	RHR other than S/D Cooling	>100 gpm	See Proc.	Establish water removal path to prevent vessel overflow
SI (Mode 6)	NA	**OPEN** HV-8923A/B HV-8821A/B HV-8835	SI	>100 gpm	See Proc.	Establish water removal path to prevent vessel or cavity overflow

Job Performance Measure "D" Alternate

Facility: **Vogtle**

Task No: V-LO-TA-12004

Task Title: Place RHR Train A In Service

JPM No: V-NRC-JP-13011-HL17

K/A Reference: 005A4.01 RO 3.6 SRO 3.4

Examinee: ______________________ NRC Examiner: ______________________

Facility Evaluator: ______________________________ Date: ________________

Method of testing:

Simulated Performance ______________ Actual Performance ________________

Classroom ______________ Simulator _____________ Plant _____________

NOTE: **For time considerations, the Candidates may be allowed to "pre-brief" this JPM and allowed to review 13011-1 prior to starting the JPM.**

Read to the examinee:

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this job performance measure will be satisfied.

Initial Conditions: A plant cooldown from Mode 4 to Mode 5 is in progress in accordance with UOP 12006-C, Section C.

Power has been restored to RHR loop suction valves 1HV-8701A/B and 1HV-8702A/B.
Instrument air has been restored to RHR System Flow Control Valves per 13011-1,"Residual Heat Removal System".

Initiating Cue: The SS has directed you to "Place RHR Train A in service with 100 gpm letdown flow and establish a 50°F/hr cooldown rate using 13011-1."

Task Standard: Candidate places RHR Train A in service with a cooldown established.

Required Materials: 13011-1, “Residual Heat Removal System” Ver. 69.0. Step 4.3.3 is initialed. Checklist 7, step 4.3.3 is initialed.

General References: None

Time Critical Task: No

Validation Time: 30 minutes

SIMULATOR SETUP:

Simulator Setup:

Reset to IC # 220 for HL-17 NRC Exam

Simulator Setup from Scratch:

1. Reset to 21 (BOL mode 4)
2. Ensure both trains of CCW in service
3. Set RF RH01A1 to NORMAL
4. Set RF RH01A2 to NORMAL
5. Set RF RH01B1 to NORMAL
6. Set RF RH01B2 to NORMAL
7. Set RF07C to IN
8. Set RF07D to IN
9. Adjust ARV setpoints to obtain a 10 deg F/hr cooldown rate if necessary
10. Set RF SI10 A to Rkout on Trigger 1
11. Set RF:RH2 to align letdown from train A on Trigger 2
12. Ack/Reset alarms
13. Freeze simulator

REMOVE GREEN DOTS from ALB34E06,E07,F06,F07

Setup time: 10 minutes

Performance Information

Critical steps denoted with an asterisk

Candidate selects proper procedure section.

Standard: Candidate selects section 4.3 PLACING TRN-A RHR IN SERVICE FOR RCS COOLDOWN FROM STANDBY READINESS.

Comment:

Step 4.3.1 Notify HP that this RHR system change could affect area radiation levels so that surveys can be taken and personnel made aware of the changed condition.

Standard: Candidate notifies HP per step 4.3.1.

NOTE to Simulator Operator: When HP is contacted, "HP is ready to take surveys."

Comment:

Step 4.3.2 If this is the second RHR train to be placed in shutdown cooling alignment, verify that Train B RHR HX inlet temperature (computer point T0631) is less than 225 °F.

Standard: Candidate determines this step is not applicable.

Comment:

Step 4.3.3 Restore power to RHR PMP A SUCTION FROM HOT LEG LOOP 1 Inlet Isolations and air to RHR System Flow Control Valves as follows: (IV REQUIRED)

a. IF shutdown, place Inverter 1CD1I5 in service per 13405 1, "125V DC 1E Electrical Distribution System."

b. Install the annunciator card associated with ALB34 E06 and check ALB34 E06 illuminates.

c. At 1CD1I5N, unlock and close the disconnect for 1 HV 8701B.

d. Check ALB34 E06 extinguishes.

e. Close K2 link for breaker 1ABE 15.

f. Unlock and close RHR PMP A SUCTION FROM HOT LEG LOOP 1, 1 HV 8701A Supply Breakers 1ABE 15.

g. Close INST AIR LINE 136 DRAIN 1 2420 U4 152 (RC 89).

h. Restore air to RHR System Flow Control Valves by opening INSTR AIR ISOLATION TO LINE 136 1 2420 U4 151 (RC 85 overhead).

Standard: Candidate notes these steps already performed from initial conditions and step signoffs.

Comment:

***Step 4.3.4 b. Close RHR-TRN-A HEAT EXCH OUTLET using 1-HIC 606A and check closure at Group 1 MLB 01 2.2 or by computer point UD8701.**

Standard: Candidate depresses 1-HIC-606A down arrow pushbutton until 0% demand and/or pushbutton illuminates.

Candidate verifies MLB01 2.2 RHR DISCH HV-606 CLOSED.

OR

Candidate verifies computer point UD8701 - CLOSED.

Comment:

Step 4.3.4 c. Close RHR TRN-A HEAT EXCH BYPASS using 1-FIC-618A and check closure by computer point UD8696.

Standard: Candidate verifies 1-FIC-618A down arrow pushbutton LIT and 100% demand.

Candidate verifies computer point UD8696 - CLOSED.

Comment:

Step 4.3.4 d. Verify open RHR PMP-A TO COLD LEG 1&2 ISO VLV 1-HV-8809A. (IV REQUIRED)

Standard: Candidate places 1-HS-8809A in momentarily in OPEN and releases.
Candidate verifies RED Light - ON
Candidate verifies GREEN Light - OFF

CUE: If IV is re requested, "IV is complete."

Comment:

Step 4.3.4 e. Place RHR PUMP-A 1-HS-0620 in PULL TO LOCK.

Standard: Candidate places 1-HS-0620 in PULL TO LOCK position.
Candidate verifies GREEN Light - OFF
Candidate verifies AMBER Light - OFF
Candidate verifies RED Light - OFF

Comment:

***Step 4.3.4 f. Close RWST TO RHR PMP-A SUCTION 1-HV-8812A.**

Standard: Candidate places 1-HS-8812A in momentarily in CLOSE and releases.
Candidate verifies RED Light - ON
Candidate verifies GREEN Light - OFF

Comment:

***Step 4.3.4 g. Open RHR PMP-A SUCTION FROM HOT LEG LOOP 1 1-HV-8701A.**

Standard: Candidate places 1-HS-8701A in momentarily in OPEN and releases.
Candidate verifies RED Light - ON
Candidate verifies GREEN Light - OFF

Comment:

Step 4.3.4 h. Open RHR SUCTION VENT LINE TRN-A 1-HV-10465.

Standard: Candidate places 1-HS-10465 in OPEN.
Candidate verifies RED Light - ON
Candidate verifies GREEN Light - OFF

Comment:

***Step 4.3.4 i. WHEN operator at 1-HV-10465 reports water flowing to the floor drain, close 1-HV-10465.**

NOTE to Examiner: If step 4.3.4h is not performed, then this step becomes non-critical.

Standard: Candidate contacts operator at 1-HV-10465 drain pipe and asks if water is flowing.

NOTE to Simulator Operator: When contacted report, "Water is flowing to the floor drain."

Candidate places 1-HS-10465 in CLOSE.
Candidate verifies RED Light - OFF
Candidate verifies GREEN Light - ON

Comment:

***Step 4.3.4 j. Open RHR PMP-A SUCTION FROM HOT LEG LOOP 1 Valve 1-HV-8701B.**

Standard: Candidate places 1-HS-8701B in momentarily in OPEN and releases.
Candidate verifies RED Light - ON
Candidate verifies GREEN Light - OFF

Comment:

Step 4.3.4 k. Place RHR PMP A 1-HS-0620 in AUTO.

Standard: Candidate places 1-HS-0620 in AUTO position.
Candidate verifies GREEN Light - ON
Candidate verifies AMBER Light - OFF
Candidate verifies RED Light - OFF

Comment:

Step 4.3.5 Remove power from RHR to Charging Isolation Valve as follows:

a. Check 1-HV-8804A CLOSED.

b. Open breaker 1ABB-05 to valve 1-HV-8804A.

c. Open K2 links for breaker 1ABB-05 and tag per NMP-AD-003, "Equipment Clearance and Tagging."

Standard: Candidate checks 1HS-8804A GREEN light - ON RED light -OFF

Candidate contacts local operator to perform Tagout to perform steps b. and c.

NOTE to Simulator Operator: When contacted to remove power, Insert Trigger 1 and report, "Power is removed, Tagout is hung."

Comment:

Step 4.3.6 Verify train related CCW System is in service per 13715-1, "Component Cooling Water System."

Standard: Candidate verifies CCW Train A is in service by two pumps running, normal flows (~10000 gpm) and pressures (~ 90 psig).

Comment:

Step 4.3.7 Start up TRN-A RHR as follows:

a. Verify open RHR PMP-A MINIFLOW ISO 1-FV-0610.

Standard: Candidate verifies 1-HS-0610 RED light - ON GREEN light - OFF.

Comment:

CAUTION

In order to prevent excessive RHR heat up and possible pump damage, RHR HEAT EXCH OUTLET for Train A 1-HV-0606 and RHR HEAT EXCH BYPASS for Train A 1-FV-0618 must be closed. Actual valve position should be monitored at Group 1 MLB 01 2.2 or by computer point prior to pump start.

Standard: Candidate reads caution.

Comment:

***Step 4.3.7 b. Start RHR PUMP A.**

Standard: Candidate places 1-HS-0620 in START position and releases.
Candidate verifies GREEN Light - OFF
Candidate verifies AMBER Light - OFF
Candidate verifies RED Light - ON

Comment:

Step 4.3.7 c. Establish RHR Letdown per Section 4.5.

Standard: Candidate goes to section 4.5.
Candidate selects Section 4.5.4.

Comment:

Step 4.5.4 Establishing RHR Letdown.

Step 4.5.4.1 Close RHR LETDOWN TO CVCS ISOLATION Valve using 1-HC-128.

Standard: Candidate verifies 1HC-128 down arrow pushbutton – LIT.

Comment:

NOTES

- Only one train of RHR should be aligned for letdown operation. This prevents pressurizing the suction of an idle RHR Pump from the operating RHR train.
- Precaution 2.1.10 should be reviewed.
- Pressure on the suction of the idle RHR Train may increase if there is leak by past the manual letdown isolation valve.

Standard: Candidate reads notes.

Comment:

Step 4.5.4.2 Open the RHR to CVCS Letdown Isolation of the operating RHR train that will be used for letdown:

Train A-RHR HX A OUTLET XCONN ISO TO CVCS LTDN 1-1205-U4-021. (IV REQUIRED)

Standard: Candidate contacts local operator to perform step.

NOTE to Simulator Operator: When contacted to open, insert Trigger 2 function and report, "1-1205-U4-021 is open."

Comment:

Step 4.5.4.3 IF CVCS letdown is NOT in service, close LOW PRESSURE LETDOWN Control Valve 1-PV-0131.

Standard: Candidate determines this step is not applicable.

Comment:

NOTES

- Design maximum CVCS letdown flow is 120 gpm.
- The RHR Hx outlet Low Pressure Letdown Relief Valve 1-PSV-8856A (1-PSV-8856B) lifts to the BRS RHT at 600 psig.
- During Solid Plant conditions only 1-PIC-0131 should be used for letdown flow control and 1-HV-0128 should remain in the FULL OPEN position.

Standard: Candidate reads notes.

Comment:

Step 4.5.4.4 IF in Solid Plant conditions, slowly fully open the RHR LETDOWN TO CVCS ISOLATION Valve using 1-HC-128 while adjusting the Letdown Pressure Controller 1-PIC-0131 as required to obtain the desired Letdown Flow as indicated on 1-FI-0132C.

Standard: Candidate determines this step is not applicable.

Comment:

Step 4.5.4.5 IF NOT in Solid Plant Condition, adjust the Letdown Pressure Controller 1-PIC-0131 and/or RHR Letdown Isolation using 1-HC-128 as required to obtain the desired Letdown Flow as indicated on 1-FI-0132C.

CUE: If asked, "Refer to initial conditions".

CUE: If candidate adjusts charging, "An extra operator will control charging flow."

Standard: Candidate opens 1-HC-128 depressing the UP arrow pushbutton to establish 100 gpm flow on 1-FI-0132C. 1-PIC-0131 may be also adjusted to control flow.

Comment:

Candidate goes to Step 4.3.8

Standard: Candidate goes to Step 4.3.8

Comment:

Step 4.3.8 Warm up the TRN A RHR as follows:

NOTE

Due to leak-by of the RHR Hx Outlet and Bypass Valves, RHR warming will begin as soon as the pump is started. However, due to miniflow cooling back to the suction of the pump, the temperature rise at the Hx inlet is only expected to reach approximately 200°F with the RCS at approximately 350°F. A rapid temperature rise should be expected when the miniflow valve goes closed.

Standard: Candidate reads note.

Comment:

---

a. Monitor RHR TRN A Heat Exchanger Inlet Temperature using Plant Computer T0630, until the temperature stabilizes.

Standard: Candidate monitors IPC point T0630 until temperature stabilizes.

Note: Temperature should be stable.

Comment:

CAUTION

If the RCS is under vacuum, a minimum flow rate of about 1200 gpm for 3 minutes is needed to refill the voided section of RHR discharge piping. 1500 gpm should NOT be exceeded during the refill period. Flow rates are to be adjusted very slowly any time flow is being increased due to possible water hammer concerns.

Standard: Candidate reads caution and determines it does not apply.

Comment:

Step 4.3.8 b. Throttle open the RHR TRN-A HEAT EXCH BYPASS using 1-FIC-618A until RHR PMP A MINIFLOW ISO VLV 1-FV-0610 closes.

Standard: Candidate depresses the UP arrow pushbutton on 1-FIC-618A until 1-HS-0610 indicates GREEN Light – ON RED Light – OFF.

Comment:

Step 4.3.8 c. Complete RHR warm up by monitoring RHR Hx Inlet Temperature using Plant Computer T0630, until the temperature stabilizes.

Standard: Candidate monitors T0630 until temp stabilizes.

Note: Temperature should stabilize in 3 to 5 minutes.

Comment:

Step 4.3.9 WHEN RHR warm up is completed, initiate full flow to the RCS as follows:

NOTES

- >3200 gpm indicated flow ensures >3000 gpm actual flow for all temperatures.
- 3000 gpm RHR flow is required for Mode 6.

Standard: Candidate reads notes.

Comment:

CAUTION

If the RCS is under vacuum, a minimum flow rate of about 1200 gpm for 3 minutes is needed to refill the voided section of RHR discharge piping. 1500 gpm should NOT be exceeded during the refill period. Flow rates are to be adjusted very slowly any time flow is being increased due to possible water hammer concerns.

Standard: Candidate reads caution again and it still does not apply.

Comment:

***Step 4.3.9 a. Throttle open the RHR HEAT EXCH BYPASS for Train A using 1-FIC-618A to the desired flow rate (nominally 3000 gpm).**

Standard: Candidate depresses the UP arrow pushbutton on 1-FIC-618A until flow is approximately 3200 gpm (3000 gpm acceptable) on 1FI-0618A.

Comment:

Step 4.3.9 b. Verify the RHR PMP-A MINIFLOW ISO VLV 1-FV-0610 closes.

Standard: Candidate verifies 1HS-0610 GREEN Light - ON
RED Light - OFF

Comment:

CAUTION

The RHR Heat Exchanger Train A Bypass Flow Controller Potentiometer should be set for a minimum flow of 3000 gpm (Pot setting: 3.6 for 3000 gpm, 4.1 for 3200 gpm) prior to placing controller in AUTO. The potentiometer setting for the desired flow rate (gpm) is approximately equal to $(\text{Desired Flow}/5000)^2 \times 10$.

Standard: Candidate reads caution.

Comment:

Step 4.3.9 c. Place the RHR TRN-A HEAT EXCH BYPASS Flow Controller 1-FIC-0618A in AUTO if desired.

Standard: Candidate verifies potentiometer set for 4.1 (3.6 acceptable) and depresses the AUTO/MAN pushbutton and verifies the AUTO portion of the light illuminates.

Comment:

NOTE

During Solid Plant conditions, only 1 PIC 0131 should be used for letdown flow control and 1 HV 0128 should remain in the FULL OPEN position.

Standard: Candidate reads note

Comment:

Step 4.3.9 d. Adjust the LOW PRESSURE LETDOWN Controller 1-PIC-0131 and/or LETDOWN FROM RHR Control Valve 1-HC-0128 as required to maintain desired letdown flow.

Standard: Candidate adjusts1-HC-128 as necessary to maintain 100 gpm flow on 1-FI-0132C. 1-PIC-0131 may be also adjusted to control flow.

Comment:

***Step 4.3.9 e. Slowly throttle RHR TRN A HEAT EXCH OUTLET using 1-HIC-606A to establish desired RCS cooling.**

Standard: Candidate depresses and releases the UP arrow pushbutton on 1-HIC-606A in increments allowing 1FIC-0618A to adjust to maintain 3000 - 3200 gpm and monitors cooldown rate and RCS cold leg temperatures to verify cooldown rate is rising.

Comment:

Step 4.3.10 IF RCS cooling using both RHR trains is desired, place the second train in service:

IF RHR B is in STANDBY READINESS, use Section 4.4.

IF RHR B is NOT in STANDBY READINESS, use Section 5.3.

CUE: If asked, "Refer to initial conditions".

Standard: Candidate determines both trains are not desired.

Comment:

Step 4.3.11 Establish RCS Cool down per 12006 C, "Unit Cool down To Cold Shutdown."

Standard: Candidate throttles 1-HIC-606A to obtain cooldown rate approximately 50°F /hr per the cooldown rate on SPDS top level display or trend of wide range Tcold points..

Comment:

Terminating cue: Candidate returns initiating cue sheet

Verification of Completion

Job Performance Measure No. V-NRC-JP-13011-HL17

Examinee's Name:

Examiner's Name:

Date Performed:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:____

____

____

Response:____

____

____

____

Result: Satisfactory/Unsatisfactory

Examiner's signature and date: ____________________________ ________

Initial Conditions:	**A plant cooldown from Mode 4 to Mode 5 is in progress in accordance with UOP 12006-C, Section C.**
	Power has been restored to RHR loop suction valves 1HV-8701A/B and 1HV-8702A/B.
	Instrument air has been restored to RHR System Flow Control Valves per 13011-1,"Residual Heat Removal System".
Initiating Cue:	**The SS has directed you to "Place RHR Train A in service with 100 gpm letdown flow and establish a 50°F/hr cooldown rate using 13011-1."**

Job Performance Measure "I"

Facility: **Vogtle**

Task No: V-LO-TA-60025

Task Title: **Establish RWST Gravity Drain Through RHR Pumps to RCS Hot Legs**

JPM No: V-NRC-JP-18019-HL17

K/A Reference: 025G2.1.20 RO 4.6 SRO 4.6

Examinee: ______________________ NRC Examiner: ______________________

Facility Evaluator: __________________ Date: ______________________________

<u>Method of testing:</u>

Simulated Performance ______________ Actual Performance ____________________

Classroom ______________ Simulator ____________ Plant _____________

Read to the examinee:

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this job performance measure will be satisfied.

Initial Conditions: **During mid-loop operations, Unit 2 experienced a loss of all AC power to the 1E buses. The crew is attempting to align the RWST for gravity drain to the RCS.**

The RCS is at 0 psig and the Reactor Vessel head removed.

Initiating Cue: **The SS has directed you to "Perform AOP 18019-C Attachment A, to align Train A for gravity drain at the greatest possible flowrate."**

Task Standard: RWST Gravity Drain aligned through RHR.

Required Materials: 1) AOP 18019-C Ver. 29.0
2) RWP and required dosimetry.

This JPM is a reuse from Exam 2011-301. The JPM number was V-NRC-JP-18019-003.

General References: None

Time Critical Task: No

Validation Time: 12 minutes

Performance Information

Critical steps denoted with an asterisk

ATTACHMENT A: RWST GRAVITY DRAIN TO RCS

NOTE
This attachment should not be used if an ECCS pump is available.

Standard: Determines ECCS pump not available due to loss of all AC power to 1E busses.

Comment:

ATTACHMENT A: RWST GRAVITY DRAIN TO RCS

CAUTION
An RCS pressure of 35 psig allows no RWST to RCS gravity drain.

Step 1: Check RCS pressure – LESS THAN 35 psig.

Standard: Determines RCS pressure < 35 psig.

Comment:

Step 2: Verify at least one of the following RCS Vent Paths:

a RV head removed.
b..... other conditions that are NOT applicable.

Standard: Determines RV head off from initial conditions.

Comment:

NOTES

- It is desirable to gravity drain to a closed cold leg using Section A or B.
- If a closed cold leg is unavailable, Section C or D should be performed for gravity drain to a hot leg.
- Gravity drain paths through the RHR loops are preferable since these can achieve the greatest flow rate.

Standard: Student reads note.

Comment:

Step 3: If desired to gravity drain from RWST through RHR pumps to cold legs, then go to Section A of this attachment.

CUE: "Flow paths using the cold leg are UNAVAILABLE."

Standard: Student determines Section A should not be used due to flow path to cold leg not available.

Comment:

Step 4: If desired to gravity drain from RWST through SI pumps to cold legs, then go to Section B of this attachment.

Standard: Determines Section B should not be used due to a closed cold leg being unavailable from cue in previous step.

Comment:

Step 5: IF desired to gravity drain from RWST through RHR pumps to hot legs, THEN Go to Section C of this attachment.

Standard: Determines Section C should be used.

Comment:

ATTACHMENT A
SECTION C: RWST GRAVITY DRAIN THROUGH
RHR PUMPS TO HOT LEGS

NOTE to examiner: This valve is inaccessible, the path of ingress should be to the closest point allowed by radiological conditions. Use attached pictures or flow loop valve for student to indicate valve position and describe operation. The first three pictures are for this valve. (Closed)

***C1. Locally throttle open the following RWST TO RHR PMP-A SUCTION VALVE.**

2-HV-8812A (AB-D22)

Standard: Locates valve and determines current position is closed based on valve position indicator.

Throttles open 2-HV-8812A (AB-D22).

NOTE to examiner: The student should indicate he would depress the manual lever down to engage the handwheel and turn the handwheel counterclockwise.

Comment:

NOTE to examiner: This valve is inaccessible, the path of ingress should be to the closest point allowed by radiological conditions. Use attached pictures or flow loop valve for student to indicate valve position and describe operation. The fourth and fifth pictures are for this valve. (Open)

***C2.** **Locally close the following RHR PMP-A TO COLD LEG ISO VLV valve:**

2-HV-8809A (AB-A103)

Standard: **Locates valve and determines current position is open based on valve position indicator.**

Determines valve position then closes valve 2-HV-8809A (AB-A103).

NOTE to examiner: The student should indicate he would depress the manual lever down to engage the handwheel and turn the handwheel clockwise.

Comment:

C3. Verify RHR PMP-A SUCTION FROM HOT LEG LOOP isolation valve open:

CUE: **"The RHR Suction from hot leg loop isolation valves have been verified open."**

Standard: None.

Comment:

C4. RV level may be maintained by throttling valves in Step C1 or by cycling valves in Step C3.

Standard: Valves are left open to achieve greatest flow per initial conditions.

Comment:

Terminating cue: Student returns initiating cue sheet

Verification of Completion

Job Performance Measure No. V-NRC-JP-18019-HL17

Examinee's Name:

Examiner's Name:

Date Performed:

Number of Attempts:

Time to Complete:

Question Documentation:

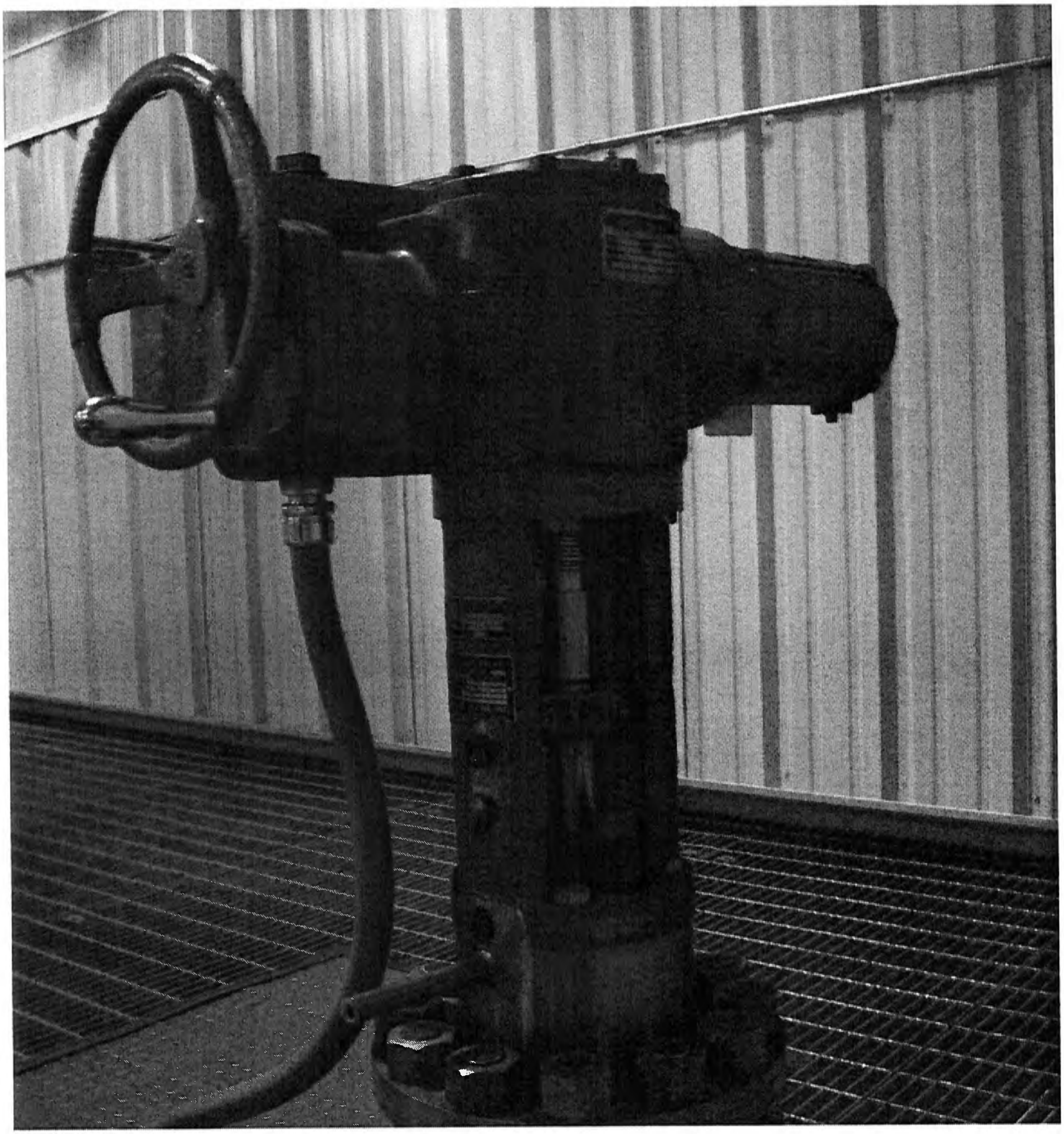
Question:____

Response:____

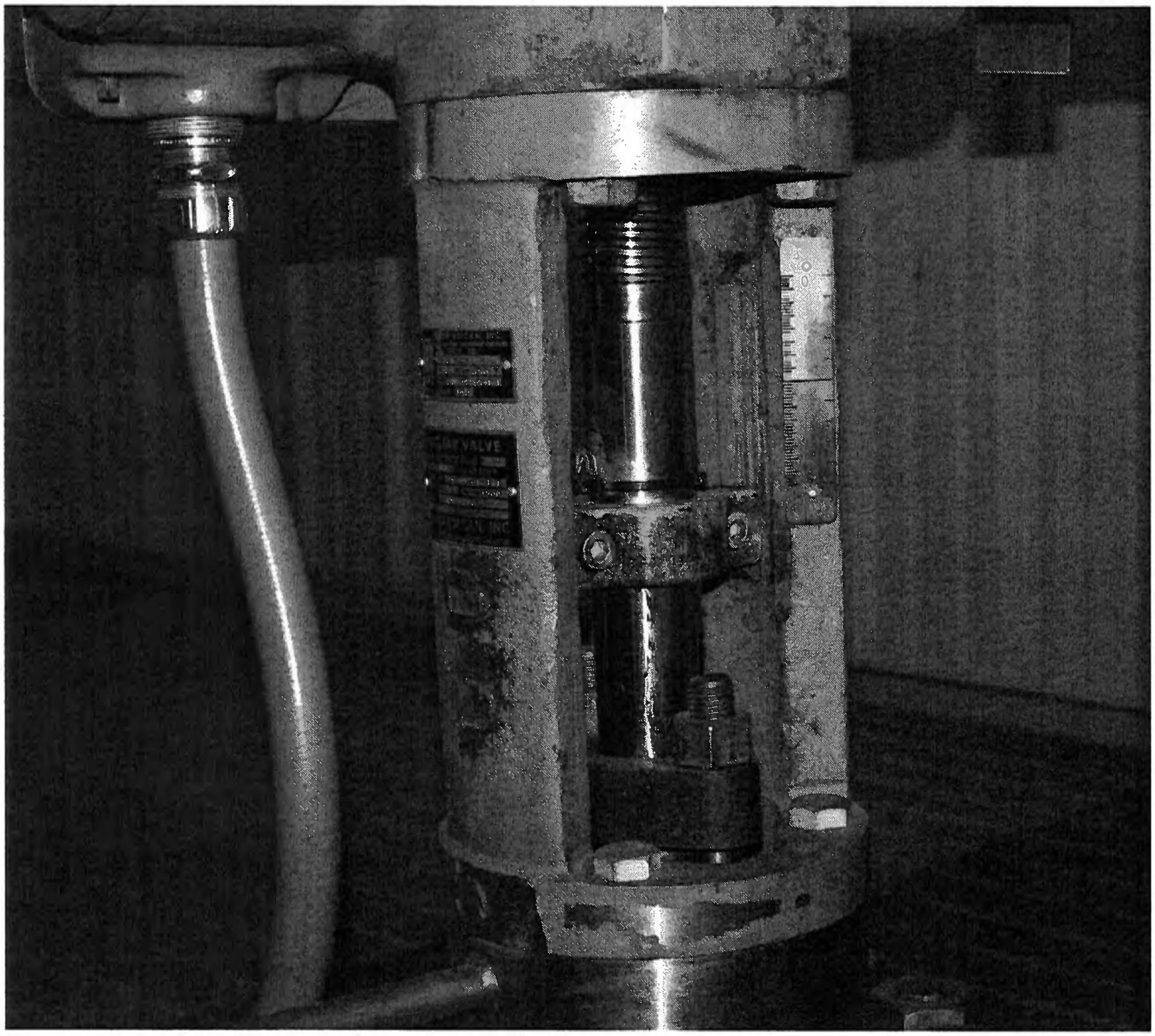
Result: Satisfactory/Unsatisfactory

Examiner's signature and date: ______________________________ _________

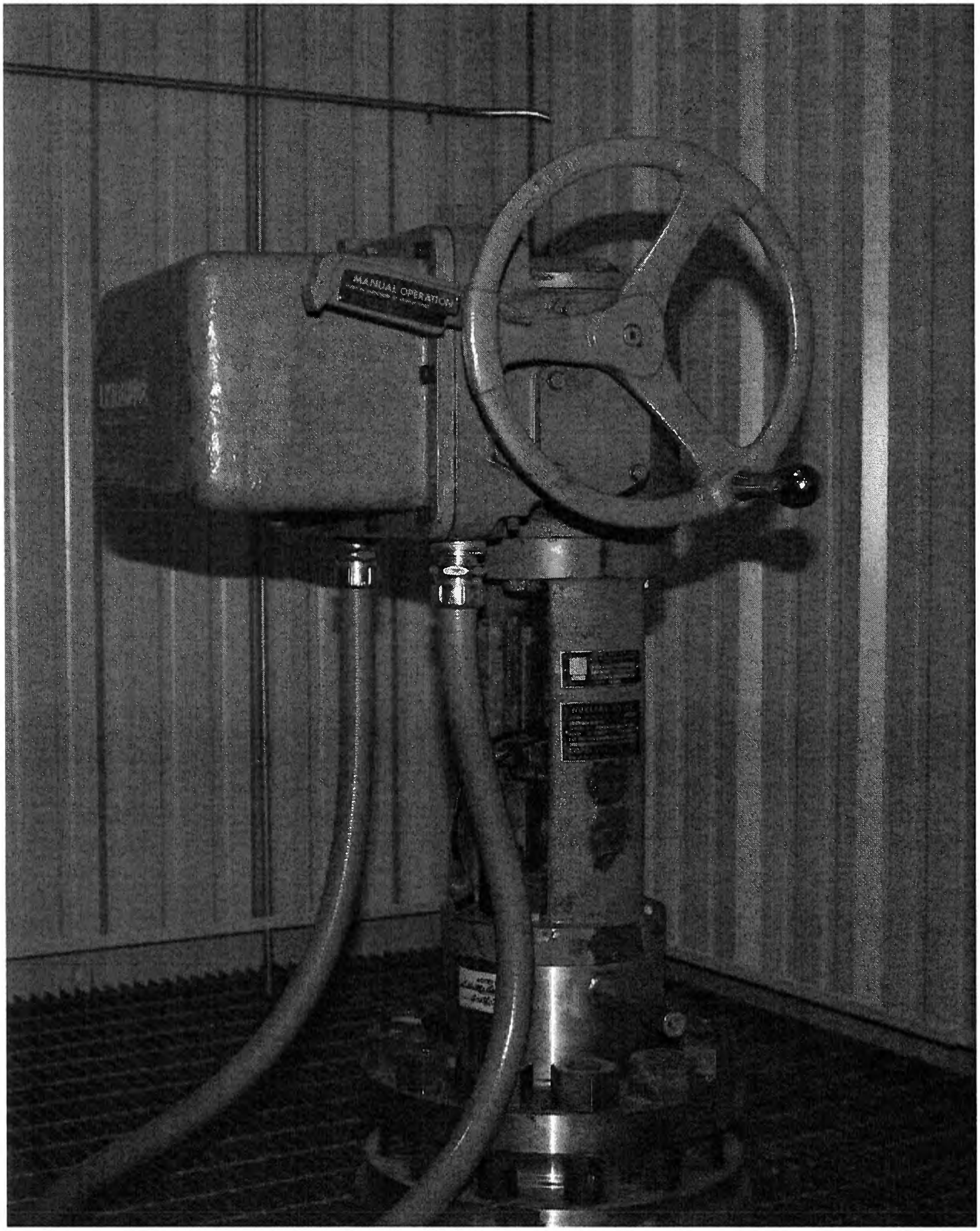
MOV PICTURES



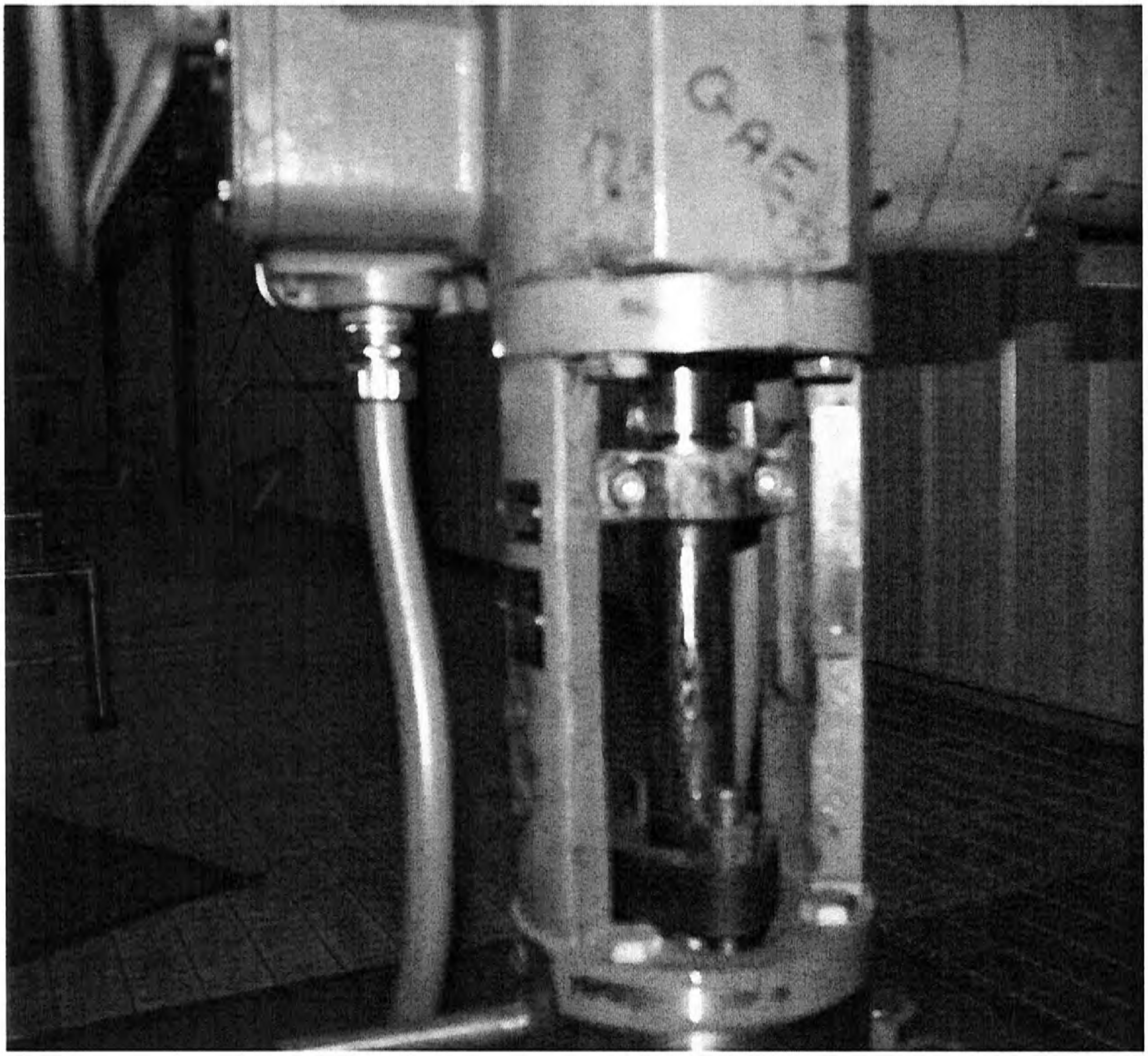
Picture 1



Picture 2



Picture 3



Picture 4

Picture 5

Initial Conditions: During mid-loop operations, Unit 2 experienced a loss of all AC power to the 1E buses. The crew is attempting to align the RWST for gravity drain to the RCS.

The RCS is at 0 psig and the Reactor Vessel head removed.

Initiating Cue: The SS has directed you to "Perform AOP 18019-C Attachment A, "RWST Gravity Drain to RCS"; to align Train A for gravity drain at the greatest possible flowrate."

ATTACHMENT A
RWST GRAVITY DRAIN TO RCS

NOTE

This attachment should not be used if an ECCS pump is available.

CAUTION

An RCS pressure of 35 psig allows no RWST to RCS gravity drain.

1. Check RCS pressure - LESS THAN 35 PSIG.

2. Verify at least one of the following RCS Vent Paths:

   a. RV head removed.

   b. RV head on and RCS level ≤191' and with a cold leg opening, an adequate RCS vent path is an SG hot leg manway on an SG with no nozzle dam installed.

   c. RV head on and RCS level ≤191' and with no cold leg opening:

      1) A minimum of three pressurizer code safeties removed.

         -OR-

      2) The pressurizer manway removed.

         -OR-

      3) An SG hot leg manway removed on an SG with no nozzle dams installed.

Step 2 continued on next page

RWST GRAVITY DRAIN TO RCS

d. RV head on and RCS level between 191' and 207' (15% pressurizer level):

1) 16 days or more after shutdown and with the core reloaded:

a) A minimum of one pressurizer code safety removed with RWST level greater than or equal to 86%.

-OR-

b) The pressurizer manway removed.

2) With the core NOT offloaded:

a) A minimum of three pressurizer code safeties removed.

-OR-

b) The pressurizer manway removed.

NOTES

- It is desirable to gravity drain to a closed leg using Section A or B.
- If a closed cold leg is unavailable, Section C or D should be performed for gravity drain to a hot leg.
- Gravity drain paths through the RHR loops are preferable since these can achieve the greatest flow rate.

3. IF desired to gravity drain from RWST through RHR pumps to cold legs, THEN Go to Section A of this attachment.

4. IF desired to gravity drain from RWST through SI pumps to cold legs, THEN Go to Section B of this attachment.

ATTACHMENT A

RWST GRAVITY DRAIN TO RCS

5. IF desired to gravity drain from RWST through RHR loops to hot legs, THEN Go to Section C of this attachment.

6. IF desired to gravity drain from RWST through SI pumps to hot legs, THEN Go to Section D of this attachment.

ATTACHMENT A

A - RWST GRAVITY DRAIN THROUGH RHR PUMPS TO COLD LEGS

A1. Locally throttle open to the RCS using RWST TO RHR PMP-A(B) SUCTION valves:

UNIT 1:

- 1-HV-8812A (AB-D48)
- 1-HV-8812B (AB-D49)

UNIT 2

- 2-HV-8812A (AB-D22)
- 2-HV-8812B (AB-D21)

A2. Close RHR PMP-A(B) DOWNSTREAM SUCTION FROM HOT LEG LOOP-1(4) HV-8701A(HV-8702A).

ATTACHMENT A

Sheet 5 of 7

B - RWST GRAVITY DRAIN THROUGH SI PUMPS TO COLD LEGS

B1. Verify HV-8835 - OPEN.

B2. Locally throttle open the following SI PMP-A(B) TO COLD LEG ISO VLV valves:

<u>UNIT 1:</u>

- 1-HV-8821A (AB-B15)
- 1-HV-8821B (AB-B19)

<u>UNIT 2</u>

- 2-HV-8821A (AB-B119)
- 2-HV-8821B (AB-B117)

ATTACHMENT A

Sheet 6 of 7

C - RWST GRAVITY DRAIN THROUGH RHR SUCTION LOOPS TO HOT LEGS

C1. Locally throttle open the following RWST TO RHR PMP-A(B) SUCTION valves:

UNIT 1:

- 1-HV-8812A (AB-D48)
- 1-HV-8812B (AB-D49)

UNIT 2

- 2-HV-8812A (AB-D22)
- 2-HV-8812B (AB-D21)

C2. Locally close the following RHR PMP-A(B) TO COLD LEG 1 & 2 (3 & 4) ISO VLVs:

UNIT 1:

- 1-HV-8809A (AB-A09)
- 1-HV-8809B (FHB-A10)

UNIT 2

- 2-HV-8809A (AB-A103)
- 2-HV-8809B (FHB-A01)

C3. Verify RHR PMPA(B) SUCTION FROM HOT LEG LOOP isolation valves open:

- HV-8701A (HV-8702A)
- HV-8701B (HV-8702B)

C4. RV level may be maintained by throttling valves in Step C1 or by cycling valves in Step C3.

ATTACHMENT A

D - RWST GRAVITY DRAIN THROUGH SI PUMPS TO HOT LEGS

D1. Locally throttle open the following SI PMP-A(B) TO HOT LEG ISO VLV valves:

UNIT 1:

- 1-HV-8802A (AB-A09)
- 1-HV-8802B (FHB-A10)

UNIT 2

- 2-HV-8802A (AB-A103)
- 2-HV-8802B (FHB-A01)

END OF ATTACHMENT A

Job Performance Measure "J"

Facility: **Vogtle**

Task No: V-LO-TA-60047 Establish Local Control of 1E Switchgears

Task Title: Align local controls per 18038-2.

JPM No: V-NRC-JP-18038-HL17

K/A Reference: 068AA1.21 RO 3.9 SRO 4.1

Examinee: ______________________ NRC Examiner: ______________________

Facility Evaluator: __________________ Date: ______________________

Method of testing:

Simulated Performance ______________ Actual Performance ________________

Classroom ____________ Simulator ____________ Plant ____________

NOTE to the Examiner: This JPM should begin at the Unit 2 Shutdown Panel A.

Read to the examinee:

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this job performance measure will be satisfied.

Initial Conditions: **Unit 2 Control Room has been evacuated due to a fire and the crew is performing 18038-2, "Operation From Remote Shutdown Panels."**

The crew is at minimum shift manning.

You are the operator at Shutdown Panel A.

The Safe Shutdown SO is manning Shutdown Panel C.

The SS is manning Shutdown Panel B.

Local control is established at all Shutdown Panels.

Initiating Cue: **The SS has directed you to: "Perform steps 17 through 19 of AOP 18038-2."**

Task Standard: All Transfer switches on 2AA02 and 2BA03 placed in LOCAL, stop RCPs and isolate letdown when no ACCW pump is running.

Required Materials: 18038-2, "Operation From Remote Shutdown Panels" Ver 25.2

General References: None

Time Critical Task: No

Validation Time: 20 minutes

Performance Information

Critical steps denoted with an asterisk and bolded.

***Step 17. Place all transfer switches on 2AA02-00 (CB-A16) to LOCAL.**

Note to the Examiner: Candidate may place switches to local in any order.

Standard: Candidate aligns switches (turns handle clockwise) and verifies associated breaker control switch indications illuminate as follows:

HS-2AA0219B placed in LOCAL.

Cue: When asked about breaker handswitch indication, provide "RED lights OFF GREEN lights ON."

HS-2AA0201B placed in LOCAL.

Cue: When asked about breaker handswitch indication, provide "RED lights OFF GREEN lights ON."

HS-2AA0205B placed in LOCAL.

Cue: When asked about breaker handswitch indication, provide "RED lights ON GREEN lights OFF."

HS-2AA0204B placed in LOCAL.

Cue: When asked about breaker handswitch indication, provide "RED lights ON GREEN lights OFF."

HS-2AA0206B placed in LOCAL.

Cue: When asked about breaker handswitch indication, provide "RED lights ON GREEN lights OFF."

HS-2AA0209B placed in LOCAL.

Cue: When asked about breaker handswitch indication, provide "RED lights ON GREEN lights OFF."

HS-2AA0218B placed in LOCAL.

Cue: When asked about breaker handswitch indication, provide "RED lights ON GREEN lights OFF."

Comment:

***Step 18. Place all transfer switches on 2BA03-00 (CB-A15) to LOCAL.**

Note to the Examiner: Candidate may place switches to local in any order.

Standard: Candidate aligns switches (turns handle clockwise) and verifies associated breaker control switch indications illuminate as follows:

HS-2BA0319B placed in LOCAL.

Cue: When asked about breaker handswitch indication, provide "RED lights OFF GREEN lights ON."

HS-2BA0301B placed in LOCAL.

Cue: When asked about breaker handswitch indication, provide "RED lights ON GREEN lights OFF."

HS-2BA0305B placed in LOCAL.

Cue: When asked about breaker handswitch indication, provide "RED lights OFF GREEN lights ON."

HS-2BA0304B placed in LOCAL.

Cue: When asked about breaker handswitch indication, provide "RED lights ON GREEN lights OFF."

HS-2BA0306B placed in LOCAL.

Cue: When asked about breaker handswitch indication, provide "RED lights ON GREEN lights OFF."

HS-2BA0309B placed in LOCAL.

Cue: When asked about breaker handswitch indication, provide "RED lights ON GREEN lights OFF."

HS-2BA0318B placed in LOCAL.

Cue: When asked about breaker handswitch indication, provide "RED lights ON GREEN lights OFF."

Comment:

Note to the Examiner: The control switches on the front of the breaker cubicles provides breaker indication only. It has control function only with the breaker in TEST position.

Step 19 Verify at least one ACCW Pump RUNNING (approximately 62 amps):

2AA02-15

-OR-

2BA03-20

Cue: When the candidate states he/she is looking at the ammeter on 2AA02 cubicle 15, indicate 0 amps.

Cue: When the candidate states he/she is looking at the ammeter on 2BA03 cubicle 20, indicate 0 amps.

Cue: If candidate looks at cubicle breaker test switch lights, Provide, "RED lights OFF GREEN lights ON."

Cue: If candidate attempts to close either breaker using the cubicle breaker test switch, provide, "nothing happened."

Standard: The candidate determines no ACCW pumps running and goes to RNO of step 19.

Comment:

***Step 19 RNO a. Stop all RCPs**

NOTE to examiner: All transfer switches will be in LOCAL and flags matched with component status. This was done in previous steps.

Standard: The candidate returns to Shutdown Panel A and stops RCPs 2 and 3 by:

Cue: When asked about RCP handswitch indication, provide "RED lights ON GREEN lights OFF."

Placing 2HS-496D and/or 2HS-496F for RCP 2 to STOP and release.
RED lights-OFF
GREEN lights-ON

Cue: When asked about RCP handswitch indication after switch taken to STOP, provide "RED light OFF GREEN light ON."

Placing 2HS-497D and/or 2HS-497F for RCP 3 to STOP and release.
RED lights-OFF
GREEN lights-ON

Cue: When asked about RCP handswitch indication after switch taken to STOP, provide "RED light OFF GREEN light ON."

Contacts SS at Shutdown Panel B to have RCPs 1 and 4 stopped.

Cue: If SS contacted, "RCPs 1 and 4 are stopped."

The candidate may go to Shutdown Panel B and stop RCPs 1 and 4 by:

Cue: When asked about RCP handswitch indication, provide "RED light ON GREEN light OFF."

Placing 2HS-495D and/or 2HS-495F for RCP 1 to STOP and release
RED lights-OFF
GREEN lights-ON

Cue: When asked about RCP handswitch indication after switch taken to STOP, provide "RED light OFF GREEN light ON."

Placing 2HS-498D and/or 2HS-498F for RCP 4 to STOP and release
RED lights-OFF
GREEN lights-ON

Cue: When asked about RCP handswitch indication after switch taken to STOP, provide "RED light OFF GREEN light ON."

Comment:

***Step 19 RNO** **b. Isolate letdown by closing LETDOWN ISOLATION VLV UPSTREAM 2-LV-460 (Shutdown Panel A) and LETDOWN ISOLATION VLV DOWNSTREAM 2-LV-459 (Shutdown Panel A.)**

Standard: The candidate is at Shutdown Panel A and isolates letdown by closing at least one of the following valves:

Cue: When asked about handswitch indication, provide "RED lights ON GREEN lights OFF."

Placing 2HS-459B to CLOSE
RED lights-OFF
GREEN lights-ON

Cue: When asked about handswitch indication, after switch taken to CLOSE, provide "RED light OFF GREEN light ON."

Placing 2HS-460B to CLOSE
RED lights-OFF
GREEN lights-ON

Cue: When asked about handswitch indication, after switch taken to CLOSE, provide "RED lights ON GREEN lights OFF."

Comment:

Terminating Cue: The Candidate returns initiating cue sheet.

Verification of Completion

Job Performance Measure No. V-NRC-JP-18038-HL17

Examinee's Name:

Examiner's Name:

Date Performed:

Number of Attempts:

Time to Complete:

Question Documentation:

Question: ____

____

____

Response: ____

____

____

____

Result: Satisfactory/Unsatisfactory

Examiner's signature and date: ______________________ ________

Initial Conditions: Unit 2 Control Room has been evacuated due to a fire and the crew is performing 18038-2, "Operation From Remote Shutdown Panels."

The crew is at minimum shift manning.

You are the operator at Shutdown Panel A.

The Safe Shutdown SO is manning Shutdown Panel C.

The SS is manning Shutdown Panel B.

Local control is established at all Shutdown Panels.

Initiating Cue: The SS has directed you to: "Perform steps 17 through 19 of AOP 18038-2."

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__g. Initiate ATTACHMENT J to align required Train A ESF HVAC.	
14. Perform the following at Shutdown Panel B:	
__a. Verify control switches are aligned per ATTACHMENT I.	
__b. Place all transfer switches to LOCAL.	
__c. Verify NSCW in service.	
__d. Place ESF CHILLED WTR PMP-2 2-HS-22413B in NORMAL-AFTER-START.	
__e. Place ESF CHILLER-2 in service by taking 2-HS-22443B to START.	
__f. Match applicable switch flags with component status.	
__g. Initiate ATTACHMENT K to align required Train B ESF HVAC.	
__15. Verify total AFW flow throttled to minimum - GREATER THAN 570 GPM.	
__16. At Shutdown Panel C, place all transfer switches to LOCAL:	
__17. Place all transfer switches on 2AA02-00 (CB-A16) to LOCAL.	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__18. Place all transfer switches on 2BA03-00 (CB-A15) to LOCAL.	
*19. **Verify at least one ACCW Pump RUNNING (approximately 62 amps):** __ 2AA02-15 -OR- __ 2BA03-20	*19. Perform the following: __a. Stop all RCPs. __b. Isolate letdown by closing LETDOWN ISOLATION VLV UPSTREAM 2-LV-460 (Shutdown Panel A) and LETDOWN ISOLATION VLV DOWNSTREAM 2-LV-459 (Shutdown Panel A.)

NOTE

A screwdriver may be required to loosen the seismic clips on the NFMS Amplifier panel.

__20. Transfer NFMS Amplifier to remote in the Train B isolator assembly by placing switch in the "App R" position (CB-B19).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

Verification of associated Train sequencer energized may be used as a diverse indication that 2AY2A and 2BY2B are energized.

__21. Check 120V AC Vital Buses 2AY2A and 2BY2B - ENERGIZED.

__21. Restore power to 2AY2A and 2BY2B from their respective regulating transformer by initiating 13431, 120V AC 1E VITAL INSTRUMENT DISTRIBUTION SYSTEM.

NOTE

When directed by the Emergency Plan, the Warble tone can be sounded from the Telephone/Page Distribution Cabinet (CB R322) by depressing the red Pri 3 button.

__22. Initiate 91001-C, EMERGENCY CLASSIFICATION AND IMPLEMENTING INSTRUCTIONS.

Job Performance Measure "K"

Facility: **Vogtle**

Task No: V-LO-TA-60030

Task Title: Place Steam Pressure Bistables in the Tripped Condition

JPM No: V-NRC-JP-18001-HL17

K/A Reference: 012A4.04 RO 3.3 SRO 3.3

Examinee: ______________________ NRC Examiner: __________________

Facility Evaluator: ____________________ Date: __________________________

Method of testing:

Simulated Performance ________________ Actual Performance ________________

Classroom ___________ Simulator _____________ Plant _____________

Read to the examinee:

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this job performance measure will be satisfied.

Initial Conditions: **Unit 2 SG2 Steam Pressure Channel 2PI-524 has failed. The Control Room Operators have stabilized the plant in accordance with the AOP.**

Initiating Cue: **The SS has directed you to "Trip channel 2PT-524 bistables listed in Table F2 of 18001-C and place the associated Master Test Switch in TEST."**

Task Standard: Candidate places Unit 2 SG 2 pressure channel bistables PS-524A and PS-524B in TEST and Master Test Switch 873 switch 6 in TEST per 18001-C.

Required Materials:
1. 18001-C, "Systems Instrumentation Malfunction" Ver 33.0 Table F2
2. NSSS protection cabinet key

General References: None

Time Critical Task: No

Validation Time: 10 minutes

Performance Information

Critical steps denoted with an asterisk

Cautions in Table F2

ALL test switches for the failed pressure transmitter should be tripped. Only one channel for each steam generator should be tripped.

The bistable input is placed in the tripped state by positioning the Selector Switch on the specified test card to TEST.

The bistable input identified by the switch number should agree with the location specified by CAB, CARD, and B/S before tripping a bistable input. If a discrepancy exists, CAB-CARD-B/S should be used, not switch number.

Bypassing another channel for Surveillance Testing with a channel inoperable is permitted provided the inoperable channel is in the tripped condition and the channel being tested is not bypassed for more than 12 hours.

Standard: Candidate reads cautions.

Comment:

Candidate determines the correct bistables to be manipulated.

Standard: Candidate selects PT-524 (Table F2, sheet 2 of 3). Bistables are in Protection Cabinet 1 Frame/Card 8/41, bistable switches 1 & 2. Master Test Switch is on Frame/Card 8/73 switch 6.

Comment:

Candidate obtains keys from the OATC.

Standard: Candidate obtains keys and informs OATC that he will cause PCS cabinet door open alarm when he accesses Protection set 1.

Comment:

Candidate locates protection set cabinet 1 and Card frame 8.

Standard: Candidate locates protection set cabinet 1 and opens the center cabinet door. Card frame 8 is the center frame.

Comment:

Candidate locates card 41

Note to examiner: the card numbering is as follows:

3 5 6 7	3 5 5 7	3 5 4 7	3 5 3 7	3 5 2 7	3 5 1 7	3 5 0 7	2 4 9 6	2 4 8 6	2 4 7 6	2 4 6 6	2 4 5 6	2 4 4 6	2 4 3 6	2 4 2 6	2 4 1 6

Card 41 is the grey position.

Standard: Candidate locates card 41.

Comment:

*** Candidate places bistable switch BS1 to TEST.**

Standard: Candidate places BS1 toggle switch (up) to TEST and verify S20 LED above switch lit.

Comment:

*** Candidate places bistable switch BS2 to TEST.**

Standard: Candidate places BS2 toggle switch (up) to TEST and verify S20 LED above switch lit.

Comment:

Candidate locates card 73

Note to examiner: the card numbering is as follows:

3 5 6 7	3 5 5 7	3 5 4 7	3 5 3 7	3 5 2 7	3 5 1 7	3 5 0 7	2 4 9 6	2 4 8 6	2 4 7 6	2 4 6 6	2 4 5 6	2 4 4 6	2 4 3 6	2 4 2 6	2 4 1 6

Card 73 is the grey position

Standard: Candidate locates card 73.

Comment:

*** Candidate places bistable switch BS6 to TEST.**

Standard: Candidate places BS6 toggle switch (up) to TEST and verify S20 LED above switch lit.

Comment:

Terminating cue: Student returns initiating cue sheet

Verification of Completion

Job Performance Measure No. V-NRC-JP-18001-HL17

Examinee's Name:

Examiner's Name:

Date Performed:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:____

____

____

____

____

Response:____

____

____

____

____

____

Result: Satisfactory/Unsatisfactory

Examiner's signature and date: ______________________ ________

Initial Conditions:	**Unit 2 SG2 Steam Pressure Channel 2PI-524 has failed. The Control Room Operators have stabilized the plant in accordance with the AOP.**
Initiating Cue:	**The SS has directed you to "Trip channel 2PT-524 bistables listed in Table F2 of 18001-C and place the associated Master Test Switch in TEST."**

TABLE F2

Sheet 1 of 3

CAUTIONS

- ALL test switches for the failed pressure transmitter should be tripped. Only one channel for each steam generator should be tripped.
- The bistable input is placed in the tripped state by positioning the Selector Switch on the specified test card to TEST.
- The bistable input identified by the switch number should agree with the location specified by CAB, CARD, and B/S before tripping a bistable input. If a discrepancy exists, CAB-CARD-B/S should be used, not switch number.
- Bypassing another channel for Surveillance Testing with a channel inoperable is permitted provided the inoperable channel is in the tripped condition and the channel being tested is not bypassed for more than 12 hours.

SSPS INPUT	CAB	FRAME /CARD	B/S	SWITCH	Initial
PT-514 Failure (Channel 1)					
SG1 Low Pressure SI	1	8/36	1	PS-514A	(____)
SG1 Low Pressure SLI	1	8/36	2	PS-514B	(____)
MASTER TEST SWITCH		8/73		5	(____)
PT-515 Failure (Channel 2)					
SG1 Low Pressure SI	2	8/36	1	PS-515A	(____)
SG1 Low Pressure SLI	2	8/36	2	PS-515B	(____)
MASTER TEST SWITCH		8/73		5	(____)
PT-516 Failure (Channel 4)					
SG1 Low Pressure SI	4	8/35	1	PS-516A	(____)
SG1 Low Pressure SLI	4	8/35	2	PS-516B	(____)
MASTER TEST SWITCH		8/73		5	(____)

TABLE F2 Sheet 2 of 3

SSPS INPUT	CAB	FRAME /CARD	B/S	SWITCH	Initial
PT-524 Failure (Channel 1)					
SG2 Low Pressure SI	1	8/41	1	PS-524A	(____)
SG2 Low Pressure SLI	1	8/41	2	PS-524B	(____)
MASTER TEST SWITCH		8/73		6	(____)
PT-525 Failure (Channel 2)					
SG2 Low Pressure SI	2	8/41	1	PS-525A	(____)
SG2 Low Pressure SLI	2	8/41	2	PS-525B	(____)
MASTER TEST SWITCH		8/74		6	(____)
PT-526 Failure (Channel 3)					
SG2 Low Pressure SI	3	8/35	1	PS-526A	(____)
SG2 Low Pressure SLI	3	8/35	2	PS-526B	(____)
MASTER TEST SWITCH		8/74		1	(____)

SSPS INPUT	CAB	FRAME /CARD	B/S	SWITCH	Initial
PT-534 Failure (Channel 1)					
SG3 Low Pressure SI	1	8/48	1	PS-534A	(____)
SG3 Low Pressure SLI	1	8/48	2	PS-534B	(____)
MASTER TEST SWITCH		8/74		4	(____)
PT-535 Failure (Channel 2)					
SG3 Low Pressure SI	2	8/48	1	PS-535A	(____)
SG3 Low Pressure SLI	2	8/48	2	PS-535B	(____)
MASTER TEST SWITCH		8/73		4	(____)
PT-536 Failure (Channel 3)					
SG3 Low Pressure SI	3	8/36	1	PS-536A	(____)
SG3 Low Pressure SLI	3	8/36	2	PS-536B	(____)
MASTER TEST SWITCH		8/74		4	(____)

TABLE F2

Sheet 3 of 3

SSPS INPUT	CAB	FRAME /CARD	B/S	SWITCH	Initial
PT-544 Failure (Channel 1)					
SG4 Low Pressure SI	1	8/49	1	PS-544A	(____)
SG4 Low Pressure SLI	1	8/49	2	PS-544B	(____)
MASTER TEST SWITCH		8/74		7	(____)
PT-545 Failure (Channel 2)					
SG4 Low Pressure SI	2	8/49	1	PS-545A	(____)
SG4 Low Pressure SLI	2	8/49	2	PS-545B	(____)
MASTER TEST SWITCH		8/74		7	(____)
PT-546 Failure (Channel 4)					
SG4 Low Pressure SI	4	8/36	1	PS-546A	(____)
SG4 Low Pressure SLI	4	8/36	2	PS-546B	(____)
MASTER TEST SWITCH		8/73		6	(____)

END OF TABLE F2