JOB PERFORMANCE MEASURE SETUP SHEET

System:	E12, Residual Heat Removal
Time Critical:	No
Alternate Path:	Yes
Applicability:	RO
Safety Function:	4 – Heat Removal From The Core
Setting:	Simulator
Validated:	36 minutes
References:	SOI-E12 Rev. 71 & ONI-E12-2 Rev. 38
Required Material	SOI-E12 - Residual Heat Removal System
Tasks:	205-535-01-01 Warmup and Initiate Shutdown Cooling from Standby Readiness
Task Standard:	Initiate SDC in Alternate Return Path mode prior to exceeding 200° F in vessel.
K/A Data:	205000 Ability to (a) predict the impacts of the following on the Shutdown Cooling System (RHR Shutdown Cooling Mode); and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: A2.06 SDC/RHR pump trips. Importance RO 3.4 / SRO 3.5. A2.10 R Valve operation. Importance: RO 2.9 SRO 2.9 Ability to manually operate and/or monitor in the control room: A4.01 SDC/RHR pumps Importance RO 3.7 / SRO 3.7. A4.03 SDC/RHR discharge valves Importance RO 3.6 / SRO 3.5. A4.09 System flow. Importance RO 3.1 / SRO 3.1

JOB PERFORMANCE MEASURE SETUP SHEET contd.

1. Simulator Setup Instructions: Reset simulator to a shutdown IC with RPV temperature about 160°. Insert malfunctions *mv06_1e12f0053a* & cb01_1e12C0002b for F053A failure and RHR B pump breaker trip. Set decay heat level to obtain a H/U rate of ~ 40°/hr (~8.83E6 watts). Maintain reactor vessel level between 260 and 270 inches using G33 blowdown. Simulator driver to control vessel level. Complete necessary portions of SOI-E12 Sect 4.7 through Step 4.7.18. Provide marked-up copy of SOI-E12. **For 2017 ILO: Reset simulator to IC 68. Load schedule E12-506. Place simulator in freeze. Place simulator in run after reading Initial Conditions to Operator. Remove Attachment 42 from SOI and give to Evaluator.**

2. Location / Method: Simulator / performance

3. Initial Condition: The plant shutdown due to scram yesterday. Currently in Mode 4 and the Unit Supervisor is operating in IOI-12, Maintaining Cold Shutdown. RHR B was operating in Shutdown Cooling when the pump tripped 20 minutes ago. The Unit Supervisor has entered ONI-E12-2 Loss of Decay Heat Removal. Reactor Recirculation pumps are in operation. Reactor temperature band is 135 to 145° F. RPV temperature was 140° F prior to trip. Current RPV temperature is ~160° F. The RO shifting SDC loops became ill.

4. Initiating Cue: The Unit Supervisor directs you the Reactor Operator to continue shifting Shutdown Cooling loops from B to A using RHR A through the Normal Return Path. Section 4.7 Shutdown Cooling Startup for RHR A is complete through Step 4.7.18. Monitor Reactor Temperature per IOI-12.

Start Time: _____ **End Time**: _____

Operator: _____

JPM BODY SHEET

Standard: Performer obtains or simulates obtaining all materials, procedures, tools, keys, radios, etc… before performing task.

Standard: Performer follows management expectations with regards to safety and communication standards.

Step 1

SOI-E12, RESIDUAL HEAT REMOVAL SYSTEM

2.0 Precautions And Limitations

2.2 Observe the following limitations during the operation of the RHR pumps:
- Do not operate the RHR pump against a shutoff head for greater than 8 seconds.

2.6 Operation of the LPCI mode of RHR with injection flow to the vessel shall only be done in an accident condition, a plant emergency condition, or an approved test condition of short duration. ONI-E12-2, Loss of Decay Heat Removal, and IOI-11, Shutdown From Outside Control Room, direct the use of the LPCI injection lines as Alternate Shutdown Cooling flow paths. Use of this flow path is still subject to reportability (as described in PAP-1604) when used for Alternate Shutdown Cooling.

4.7 Shutdown Cooling Startup for RHR A(B)

Operator reviews place-kept copy of SOI-E12 including Precautions and Limitations and panel H13-P601.

Standard: The Operator reviews place-kept copy of SOI-E12

Instructor Cue: None

Notes: None

SAT ___ UNSAT ___

Comment(s): _____

Step 2

4.7.19 Hold the Oncoming RJR HX'S BYPASS VALVE in CLOSE for 59-62 seconds.
1E12-F048A

Critical Step:	The Operator closes 1E12-F048A for 59-62 seconds.
Instructor Cue:	None
Notes:	If the Operator fails to close the valve inside this time band, this Critical Step can be recovered in JPM **Step 9.**

SAT ___ UNSAT ___

Comment(s): _____

Step 3

4.7.20 Hold the Oncoming RHR HX'S OUTLET VALVE in CLOSE until closed.
1E12-F003A

Critical Step:	The Operator closes 1E12-F003A.
Instructor Cue:	None
Notes:	None

SAT ___ UNSAT ___

Comment(s): _____

Step 4

4.7.21	It is desired to establish the Normal Return Path	1E12-F053A	1E12-F053B
	RHR Upper Pool Cooling Isol is closed	1E12-F037A	1E12-F037B
	LPCI Injection Valve is closed	1E12-F042A	1E12-F042B
	THEN PERFORM the following:		

4.7.21.a IF the Feedwater System is shutdown, THEN VERIFY the Oncoming RHR loop FDW HDR SHUTOFF is closed, to prevent flow to the feedwater system.

1B21-F065A

1B21-F065B

Standard: The Operator observes that feedwater is shutdown and the B21-F065's are closed.

Instructor Cue: None

Notes: None

SAT ___ UNSAT ___

Comment(s): _____

Step 5

CAUTIONS

- The RHR PUMP MIN FLOW VALVE is downpowered in the closed position. Throttling open the RHR HX'S BYPASS VALVE, 1E12-F048A(B) after starting the pump ensures pump min flow requirements are met following pump start.
- Maintain RHR Shutdown Cooling flow greater than 2575 gpm to ensure that the RHR PUMP A(B) has adequate minimum flow.

4.7.21.b INITIATE flow through the SHUTDOWN COOLING TO FDW SHUTOFF as follows: 1E12-F053A

4.7.21.b.1 PERFORM the following simultaneously:

- HOLD the SHUTDOWN COOLING TO FDW SHUTOFF in OPEN, UNTIL open. 1E12-F053A
- TAKE the RHR PUMP to START. 1E12-C002A

4.7.21.b.2 WITHIN 8 seconds, THROTTLE RHR HX'S BYPASS VALVE, UNTIL RHR PUMP FLOW is at least 2575 gpm.

Standard The Operator starts to open 1E12-F053A and starts RHR A pump.

Critical Step: If the operator starts the RHR pump, he must shut it down.

Instructor Cue: If necessary, after report of valve failure, if pump was started, question operator on a course of action.

Direct Operator to establish shutdown cooling.

Notes: Operator may or may not start pump if he notices failure of 1E12-F053A. 1E12-F053A is failed closed and will lose indication simulating blown fuse. If Operator started pump, the Minimum Flow Valve was down-powered per step 4.7.10.c and the pump will not have minimum flow protection.

SAT ___ UNSAT ___

Comment(s): _____

Step 6

4.7.22	It is desired to establish the Refuel Return Path	1E12-F037A	1E12-F037B

Operator determines that this step is N/A.

Standard:	This Step is N/A. The Operator cannot use Refuel Mode Path.
Instructor Cue:	None
Notes:	Plant not in Mode 5, Vessel Head installed.

SAT ___ UNSAT ___

Comment(s): _____

Step 7

CAUTION

- Operation of the RHR Loop with Vessel Injection via the LPCI Injection Line has the potential to result in fatigue failure of incore instrument tubes and burnishing of fuel channels.
- The RHR PUMP MIN FLOW VALVE is downpowered in the closed position. Throttling open the RHR HX'S BYPASS VALVE, 1E12-F048A(B) after starting the pump ensures pump min flow requirements are met following pump start.
- Maintain RHR Shutdown Cooling flow greater than 2575 gpm to ensure that the RHR PUMP A(B) has adequate minimum flow.

4.7.23

It is desired to establish the Alternate Return Path	1E12-F042A	1E12-F042B
Normal Shutdown Cooling return path is unavailable	1E12-F053A	1E12-F053B
Refuel Shutdown Cooling return path is unavailable	1E12-F037A	1E12-F037B
THEN PERFORM the following:		

4.7.23.a REFER TO Alternate Shutdown Cooling Data (Attachment 42) and TAKE Pre-Start Data.

Standard: The Operator requests/obtains/completes Attachment 42.

Instructor Cue: None

Notes: When Operator goes to 'green' book to obtain Att-42, provide him with a Yellow copy of Attachment 42.

SAT ___ UNSAT ___

Comment(s): _____

Step 8

CAUTIONS

- The RHR PUMP MIN FLOW VALVE is downpowered in the closed position. Throttling open the RHR HX'S BYPASS VALVE, 1E12-F048A(B) after starting the pump ensures pump min flow requirements are met following pump start.
- Maintain RHR Shutdown Cooling flow greater than 2575 gpm to ensure that the RHR PUMP A(B) has adequate minimum flow.

4.7.23.b INITIATE flow through the LPCI INJECTION VALVE as follows: 1E12-F042A

4.7.23.b.1 PERFORM the following simultaneously:

- TAKE the LPCI INJECTION VALVE to OPEN. 1E12-F042A
- TAKE the RHR PUMP to START. 1E12-C002A

Critical Step: The Operator takes 1E12-F042A to OPEN and starts RHR A pump.

Instructor Cue: None

Notes: None

SAT ___ UNSAT ___

Comment(s): _____

Step 9

4.7.23.b.2 WITHIN 8 seconds, THROTTLE RHR HX'S BYPASS VALVE, UNTIL RHR PUMP FLOW is at least 2575 gpm.

1E12- F048A 1E12-R603A

4.7.23.c JOG OPEN the RHR HX'S BYPASS VALVE in 1000-2000 gpm increments, UNTIL RHR PUMP FLOW is 2575-7100 gpm.

1E12- F048A 1E12-R603A

Critical Step:	Within 8 seconds the Operator opens 1E12-F048A until flow is > 2575 gpm then controls flow within directed band.
Instructor Cue:	Reactor coolant temperature band is 135 to 145 deg F
Notes:	If JPM **Step 2** was performed correctly, this Step is **not** Critical. Reactor coolant temperature should be between 165 and 180 degrees if Operator establishes flow with some urgency. If Operator delays and spends time reviewing the procedure, Reactor temperature could be as high as 190 degrees. Initial flow will be 3500 gpm. Temperature indication will be RHR Out on SPDS or Point 5 on recorder with E12-F003A closed.

SAT ___ UNSAT ___

Comment(s): _____

Step 10

4.7.23.d NOTIFY the following of the use of the Shutdown Cooling return flow to the Vessel via LPCI INJECTION VALVE so the required fuel inspection may be scheduled:

- Reactor Engineering.
- Outage Planning.

4.7.23.e INITIATE a special report to the NRC in accordance with NOP-OP-1015, Event Notifications.

4.7.23.f GO TO RHR Shutdown Cooling Operations for RHR A(B).

Standard:	The Operator will proceed to Section 7.6, RHR Shutdown Cooling Operations for RHR A(B).
Instructor Cue:	Steps 4.7.23.d & e are being performed by the Shift Manager.
Notes:	None

SAT ___ UNSAT ___

Comment(s): _____

Step 11

7.6 RHR Shutdown Cooling Operations for RHR A(B)

NOTES

- Normal Design parameters for Shutdown Cooling/Test Mode operation:
  - RHR Pump Flow 7000-7100 gpm.
  - RHR Pump Amps 95-110 Amps.
  - RHR A Head Spray Flow 0 – 500 gpm.
  - RHR Suction Pressure Less than 135 psig.
  - RHR HX ESW Outlet Temps Less than 108°F.
  - RHR Pump Suct Temp Less than 100°F (Refuel Mode).
  - RHR HX'S RHR Outlet Temp Less than 86°F (Refuel Mode).
- The following actions can be performed in any logical order or repeated to support current plant conditions.

Step 11 - Continued next page

Step 11 - Continued

7.6.1 OBSERVE the following limitations when in Shutdown Cooling:

- MAINTAIN cooldown rate less than 100ºF in any 1 hour period.
- DO NOT allow any RHR piping which has been inadvertently drained to be refilled with water from the Reactor Vessel.
- MAINTAIN Vessel temperature below 190ºF while in Shutdown Cooling.
- WHEN using the normal OR refuel mode return paths, THEN MAINTAIN the following:
  - MAINTAIN RHR Pump flow at 7000-7100 gpm during steady state conditions.
  - MAINTAIN RHR Pump flow at 6000-7100 gpm during system adjustments.
- WHEN using the alternate return path, THEN MONITOR the following additional items:
  - MAINTAIN RHR flow in the band 2575-7100 gpm. 1E12-F042A
  - MAINTAIN RHR H2O DISCH temperature greater than 65°F. 1E12-R601 Pt 5

Standard: The Operator establishes flow of 2575-7100 gpm.

Instructor Cue: None

Notes: Reactor temperature will increase steadily if cooling is not established.

SAT ___ UNSAT ___

Comment(s): _____

Step 12

7.6.2 PERFORM the following as needed to maintain desired cooldown rate AND RHR Pump flow 7000-7100 (alternate return path 2575-7100):
1E12-R603A 1E12-R603B:

- THROTTLE RHR HX'S OUTLET VALVE. 1E12-F003A
- THROTTLE RHR HX'S BYPASS VALVE. 1E12-F048A

Critical Step:	The Operator throttles opens 1E12-F003A and 1E12-F048A is throttled close to establish a cooldown.
Instructor Cue:	Establish a cooldown to restore temperature within band of 135 to 145 degrees.
Notes:	Exceeding 200 degrees Reactor Water temperature would be a failure. 200 degrees is a MODE change. Operator can establish full cooling and not have a problem with 100 degrees per hour. Terminate JPM once satisfied with cooldown rate.

SAT ___ UNSAT ___

Comment(s): _____

Terminating Cue: Shutdown Cooling Flow established through Alternate Return path, a cooldown rate has been established and Reactor Water Temperature is maintained less than 200 degrees.

Evaluation Results: SAT_____ UNSAT_____

End Time _____

JPM CUE SHEET

INITIAL CONDITIONS:	• The plant shutdown due to scram yesterday. • Currently in Mode 4 and the Unit Supervisor is operating in IOI-12 Maintaining Cold Shutdown. • RHR B was operating in Shutdown Cooling when the pump tripped 20 minutes ago. • The Unit Supervisor has entered ONI-E12-2 Loss of Decay Heat Removal. • Reactor Recirculation pumps are in operation. • Reactor temperature band is 135 to 145 degrees F. • RPV temperature was 140 degrees F prior to trip. • Current RPV temperature is 160° F. • The RO shifting SDC loops became ill.
INITIATING CUE:	• The Unit Supervisor directs you the Reactor operator to continue shifting Shutdown Cooling loops from B to A using RHR A through the Normal Return Path. Section 4.7 • Shutdown Cooling Startup for RHR A is complete through Step 4.7.18. • Monitor Reactor Temperature per IOI-12.

RESIDUAL HEAT REMOVAL SYSTEM

Effective Date: 5-2-17

Preparer: Michael Garnett / 4-4-17
Date

Approver: Ed Condo / 4-6-17
Date

TABLE OF CONTENTS

1.0 SCOPE

This instruction provides the detailed operating instructions for the Residual Heat Removal (RHR) System.

2.0 PRECAUTIONS AND LIMITATIONS

2.1 Portions of this system are covered by Technical Specifications; these include the equipment and controls necessary to support RHR system operation in the following modes:

- Low Pressure Coolant Injection (LPCI)
- Containment Spray
- Suppression Pool Cooling
- Shutdown Cooling

Also, this system has controls which are related to T.S. 3.3.3.2, Remote Shutdown System.

2.2 Observe the following limitations during the operation of the RHR pumps:

- Do NOT operate the RHR pump against a shutoff head for greater than 8 seconds.
- All pump trips shall be investigated prior to restarting the pump, except during emergency conditions in which operation of the pump is required to provide protection of the plant or public.
- Observe the following pump restart limitations:
  - The motor may be started twice successively from ambient temperature or once from rated motor temperature.
  - Repetitive starts are governed by motor operating temperature. In absence of thermal devices to determine machine temperature, the following can be used as a guide: the motor can be assumed to have returned to rated temperature after 80 minutes idle time or 30 minutes running time, after which time another start is permissible.

- Limit RHR pump flow as follows:
  - 8520 gpm with flow bypassing the RHR heat exchangers. This limit is based on RHR Pump runout flow.
  - 7800 gpm with flow through the RHR heat exchangers. This limit is based on RHR heat exchanger maximum flow.

2.3 Any time it is suspected that the RHR Loops are NOT filled or the system has been breached, fill and vent the RHR Loop as applicable.

2.4 The reactor shall be placed and maintained in a Cold Shutdown condition whenever a loop of RHR is used in the Fuel Pool Cooling Assist mode.

2.5 The disconnect, MCC EF1B07-H, for SHUTDOWN COOLING OTBD SUCT ISOL, 1E12-F008, shall be closed only to perform Shutdown Cooling or related shutdown operations. It shall be open during all other conditions to satisfy 10CFR50 Appendix R considerations.

2.6 Operation of the LPCI mode of RHR with injection flow to the vessel shall only be done in an accident condition, a plant emergency condition, or an approved test condition of short duration. ONI-E12-2, Loss of Decay Heat Removal, and IOI-11, Shutdown From Outside Control Room, direct the use of the LPCI injection lines as Alternate Shutdown Cooling flow paths. Use of this flow path is still subject to reportability (as described in NOP-OP-1015, Event Notifications) when used for Alternate Shutdown Cooling.

2.7 Water Hammer:

Do NOT start a pump in the effected loop prior to ensuring the loop is filled. This could result in water hammer in a loop that is severe enough to cause component damage or pressure boundary failure. Potential causes of voiding include:

- A loss of pumping power with RHR A(B) TEST VALVE TO SUPR POOL, 1E12-F024A(B), open.
- A Division 1(2) RHR Isolation during Shutdown Cooling Operation may allow steam voids to form.
- Opening RHR A(B) SUPR POOL SUCTION VALVE, 1E12-F004A(B), when the RHR Pump A(B) suction piping is filled with water that is at greater than 200°F.

- Deviation from written instructions when operating the system.
- Maintenance or testing on portions of the system that require realigning valves.

2.8 If it becomes necessary to close RHR A(B) TO CNTMT SHUTOFF, 1E12-F027A(B), then to prevent back leakage or thermal changes from over pressurizing the isolated piping refer to RHR A(B) To Cntmt Shutoff 1E12-F027A(B) Operation and perform the actions.

2.9 If the RHR PUMP A(B,C), MIN FLOW VALVE, 1E12-F064A(B,C), is NOT capable of opening to provide minimum flow (except as allowed in 3.5.2 for Shutdown Cooling),
Then declare RHR Pump A(B,C) INOPERABLE and take one of the following actions:

- Ensure RHR Pump A(B,C), 1E12-C002A(B,C) breaker open with its control power fuses removed.
- Provide increased monitoring whenever RHR Pump A(B,C) is in operation to ensure RHR A(B,C) does NOT operate at less than 1650 gpm for greater than 8 seconds.
- If RHR A(B) Pump is operated at less than 1650 gpm for greater than 8 seconds, an Engineering analysis of RHR Pump A(B,C) shall be performed prior to declaring RHR Pump A(B,C) OPERABLE.

2.10 Operation of RHR Loop A in the Test Mode or Suppression Pool Cooling when SPCU is in operation through the Suppression Pool Return Line Bypassing RHR A could result in loss of flow to the SPCU pump.

2.11 If LPCS & RHR A WATER LEG PUMP, 1E21-C002, or RHR B & C WATER LEG PUMP, 1E12-C003, are shutdown,
Then the respective Feedwater Leakage Control System (N27A or N27B), will become inoperable.

2.12 If RHR A, B, or C are placed on alternate keep fill or the respective Waterleg pump is shutdown the affected RHR loop will be inoperable.

2.13 To provide a suction to the LPCS & RHR A WATER LEG PUMP, 1E21-C002, the LPCS SUPR POOL SUCTION VALVE, 1E21-F001, must be open.

2.14 To provide suction to the RHR B & C WATER LEG PUMP, 1E12-C003, the RHR C SUPR POOL SUCTION VALVE, 1E12-F105, must be open.

2.15 Prior to placing RHR in Shutdown Cooling mode, RPV pressure shall be less than 135 psig.

2.16 RP should be notified prior to conducting Suppression Pool evolutions, so the survey frequency may be increased as necessary.

2.17 Opening of RHR PUMP A(B) MIN FLOW VALVE, 1E12-F064A(B) or RHR A(B) UPPER POOL COOLING ISOL, 1E12-F037A(B), while in shutdown cooling could result in the draining of the vessel. Do NOT allow any RHR piping, which has been inadvertently drained down, to refill with Reactor Vessel Water.

2.18 Valve alignments and system manipulations on the RHR system when SHUTDOWN COOLING OTBD SUCT ISOL, 1E12-F008, and SHUTDOWN COOLING INBD SUCT ISOL, 1E12-F009, are open shall be supervised by the Shift Manager or Unit Supervisor when required by OAI-0201 Section 4.4.2.

2.19 LPCI operability requires flow both through the RHR Heat Exchangers and the RHR Heat Exchanger Bypass line; therefore, anytime RHR A(B) HX'S INLET VALVE, 1E12-F047A(B), is NOT open or either RHR A(B) HX'S OUTLET VALVE, 1E12-F003A(B), or RHR A(B) HX'S BYPASS VALVE, 1E12-F048A(B), is NOT capable of automatically opening LPCI shall be declared INOPERABLE.

2.20 When 1E12-F024A(B) is open, system flow through 1E12-F024A(B) shall be maintained greater than 6000 gpm. 6000 gpm is the minimum flow allowable to prevent voiding at the high point in the RHR system piping. The normal Suppression Pool Cooling/Test Mode flow is 7100-7300 gpm.

2.21 The pump rotation during fill and vent operations shall be minimized.

2.22 Operating the RHR System in a Secondary Mode of operation, except Shutdown Cooling, will *INOP the LPCI mode of RHR due to the system being unable to realign within the Technical Specification response time requirements.

With temperature is less than 200°F the LPCI does NOT need to be declared inoperable when the RHR loop is in Shutdown Cooling as long as it can be realigned to the LPCI mode (either remotely or locally), is NOT otherwise inoperable.

When placing a loop of RHR in Shutdown Cooling greater than 200°F the RHR loop shall be considered inoperable for ALL Modes except Shutdown Cooling Mode of operation due to the possiblilty of system voiding during a Shutdown Cooling Isolation.

2.23 When venting or draining the ESW side of the RHR Heat Exchangers the expelled water should NOT be discharged to Radwaste. This lake water will shorten the life of the Radwaste demineralizers and biologically foul the resin which will cause gas buildup in Radwaste shipping containers. The preferred actions are to collect this water in a container which RP and CHEM can sample for release outside the RRA or have RP and CHEM approve running the vent/drain hose to a non-radiological drain. In the event lake water must be drained to a radiological drain, Radwaste shall be informed of amount of lake water to be drained and the drain to receive it.

2.24 If the RHR HX ESW inlet or outlet valves, 1P45-F014A(B) or 1P45-F068A(B), are NOT full open the associated RHR loop shall be declared inoperable. This is because the valves may NOT reposition properly during accident conditions.

2.25 The RHR pumps should NOT be operated in minimum flow for excessive periods of time. If an RHR pump is operated in minimum flow for greater than 1 hour, a Condition Report should be generated for Engineering to evaluate the effects on the pump.

2.26 Erosion may occur on the RHR Pump minimum flow lines. Consideration should be given to placing RHR Pumps in the suppression pool cooling/test mode during extended operation rather than leaving them in minimum flow.

2.27 Leakage past the following valves is considered Leakage Outside Containment. To control leakage past these valves, they shall be torqued to the following specified values in Mode 1, 2, or 3:

- 1E12F0071A - 140 FT/LBS.
- 1E12F0072A - 140 FT/LBS
- 1E12F0511A - 123 FT/LBS.
- 1E12F0071B - 96 FT/LBS.
- 1E12F0072B - 96 FT/LBS
- 1E12F0511B - 123 FT/LBS.
- 1E12F0071C - 96 FT/LBS.
- 1E12F0072C - 96 FT/LBS.

1E12F0511B is not normally closed; however, if it should need to be closed due to leakage past 1E12F0071B or 1E12F0072B, it will need to be torqued to 123 FT/LBS.

2.28 If a Loop of RHR has been drained that Loop of RHR shall be run in Suppression Pool Cooling/Test Mode (RHR A,B), RHR Loop C Flush/Test Mode (RHR C) to sweep air pockets from portions of the system that cannot be vented prior to the Loop being declared operable.

2.29 The following table provides torque specifications when manually operating selected valves:

Valve	Hand Wheel Torque
1E12-F010	285 ft-lbs
1E12-F039A(B,C)	206 ft-lbs
1E12-F066A	93 ft-lbs
1E12-F085A	400 inch-lbs
1E12-F502A,C	120 ft-lbs
1E12-F552A	106 ft-lbs
1E12-F599A	30 ft-lbs +25%, -0%
1E12-F621	118 ft-lbs

2.30 Observe the following RHR Pump Motor Oil level limitations as can be determined when the pump motors are de-energized:

- RHR Pump A (B, C), 1E12-C002A (B, C) oil levels should be maintained within 7/16” above and below the reference line of the oil reservoir sight glass.
- RHR B & C WATER LEG PUMP, 1E12-C003 constant level oiler should be maintained per the specified inches below shaft centerline stated on the Oil Level Plate.

2.31 RHR A can NOT be operated in Shutdown Cooling when ADHR system is aligned for decay heat removal.

2.32 OAI-0502 requires a minimum vent duration of 2 minutes after a solid stream of fluid has been achieved when venting ECCS systems. Steps for venting state for at least 2 minutes. Time of the vent starts when an air free stream is achieved.

END OF SECTION

7.5 Shifting Shutdown Cooling From Loop A(B) to Loop B(A)

❑	7.5.1	REFER TO Shutdown Cooling Startup and PLACE the Oncoming loop in service.	**Loop B**	**Loop A**
❑	7.5.2	REFER TO Shutdown Cooling Shutdown to Standby Readiness and SHUTDOWN the Offgoing RHR loop.	Loop A	Loop B

END OF SECTION

4.7 Shutdown Cooling Startup for RHR A(B)

NOTES

- Both Loops of RHR may be placed in Shutdown Cooling by performing all the required Steps for one loop and then performing the required Steps for the other loop.
- Local Field Actions maybe required in the following places:
- CC 620' Switchgear rooms to operate disconnect stitches.
- AX 620'RHR B Penetration Room to operate flush valves.
- AX 574' to operate RHR B to Radwaste Shutoff Valve, 1E12-F504 (RHR B only).

NA 4.7.1

		Loop A	Loop B
A Loss of Shutdown Cooling has NOT occurred			
NOT Operating in EOPs			
The Oncoming Shutdown Cooling Loop flowpath has NOT been maintained filled and vented the last 10 days	The Oncoming RHR Loop has NOT operated in Shutdown Cooling within the last 10 days		
A waiver for the requirement to perform RHR Loop flushing from Operations Manager has NOT been granted			
THEN PERFORM the following:			

☐ 4.7.1.a CONFIRM the Oncoming RHR loop RHR SHUTDOWN CLG SUCT valve is closed. — 1E12-F006A — 1E12-F006B

NA 4.7.1.b

Information Tag is on the RHR Conductivity Alarm window(s)	Caution Tag is on the RHR Conductivity Alarm window(s)
❑ THEN REFER TO Placing RHR Conductivity Alarm In Service and VERIFY the actions are complete.	

1H13-P601-20-G5 **1H13-P601-17-G5**

NOTE

Both loops of RHR should be flushed when placing SDC into service during non-refueling periods. Only one loop needs to be flushed prior to establishing Shutdown Cooling. The second loop of RHR should be flushed when Mode 4 is reached to make it available for use in the SDC mode. Delaying the flush of the second RHR loop minimizes inoperability time and the time to establish Shutdown Cooling.

❑ 4.7.1.c REFER TO Flush of RHR Loop A(B) When in Standby Readiness Mode and VERIFY the flush the oncoming loop is complete.

NA 4.7.1.d
❑ IF the Suppression Pool water does NOT meet the limits for transfer quality per Chemistry, THEN REFER TO Flush of RHR A(B) With CST Water and VERIFY the actions complete.

❑ 4.7.1.e REFER TO SOI-P45/49 and VERIFY the associated Emergency Service Water System Loop in operation. Loop A Loop B

❑ 4.7.1.f REFER TO SOI-P42 and VERIFY the associated Emergency Closed Cooling System Loop in operation. Loop A Loop B

NOTES

- With temperature is less than 200°F the LPCI does NOT need to be declared inoperable for the LPCI Mode when the RHR loop is in Shutdown Cooling as long as it can be realigned to the LPCI mode (either remotely or locally), is NOT otherwise inoperable.
- When placing a loop of RHR in Shutdown Cooling greater than 200°F the RHR loop shall be considered inoperable for ALL Modes except Shutdown Cooling Mode of operation due to the possiblilty of system voiding during a Shutdown Cooling Isolation.

NA 4.7.2 ❑ IF operating in MODE 3, THEN NOTIFY the Unit Supervisior that RHR loop being placed into Shutdown Cooling will be inoperable for ALL Modes except Shutdown Cooling Mode, UNTIL Mode 4 is entered.

❑ 4.7.3 NOTIFY Radiation Protection of the Change to Shutdown Cooling Operation.

NA 4.7.4 ❑ IF Placing RHR A in service, THEN CONFIRM the ADHR system is NOT in service removing Decay heat.

NA 4.7.5 Performing Section 7.5, Shifting Shutdown Cooling From Loop A(B) to Loop B(A)

Starting RHR A in Shutdown Cooling	Loop A	
RHR B pump is NOT running		**1E12-C002B**
☐ THEN VERIFY RHR B SHUTDOWN CLG SUCT valve control switch in CLOSED.		**1E12-F006B**

NA 4.7.6 Performing Section 7.5, Shifting Shutdown Cooling From Loop A(B) to Loop B(A)

Starting RHR B in Shutdown Cooling		Loop B
RHR A pump is NOT running	**1E12-C002A**	
☐ THEN VERIFY RHR A SHUTDOWN CLG SUCT valve control switch in CLOSED.	**1E12-F006A**	

☐ 4.7.7 VERIFY RHR B HX'S SECOND VENT TO SUPR POOL is CLOSED. — 1E12-F073B

4.7.8 VERIFY the following:

☐ • RHR SUPR POOL SUCTION VALV keylock switch in CLOSED.	1E12-F004A	1E12-F004B
☐ • RHR HX'S BYPASS VALVE is OPEN.	1E12-F048A	1E12-F048B

☐ • RHR HX'S OUTLET VALVE is OPEN. 1E12-F003A 1E12-F003B

NOTE

SHUTDOWN COOLING OTBD SUCT ISOL, 1E12-F008, disconnect MCC EF1B07-H can be verified closed by power being present to the valve position indication.

☐ 4.7.9 VERIFY the SHUTDOWN COOLING OTBD SUCT ISOL, 1E12-F008, valve disconnect is CLOSED. **EF1 B07-H**

☐ 4.7.10 REFER TO SOI-P45/49 and VERIFY Emergency Service Water System Loop in operation. A B

☐ 4.7.11 REFER TO SOI-P42 and VERIFY Emergency Closed Cooling System Loop in operation. A B

NA 4.7.12

SHUTDOWN COOLING OTBD SUCT ISOL is closed	SHUTDOWN COOLING INBD SUCT ISOL is closed	1E12-F008	1E12-F009
THEN PERFORM the following:			

4.7.12.a WHEN Reactor Vessel pressure is less than 135 psig,
THEN VERIFY the following are reset:

☐ • Trip unit 1B21-N679D (1H13-P694).

☐ • Trip unit 1B21-N679A (1H13-P691).

☐ • Trip unit 1B21-N679C (1H13-P693).

☐ • Trip unit 1B21-N679B (1H13-P692).

N/A	4.7.12.b	MOMENTARILY DEPRESS BOTH of the following to reset the NS^4 logic:		
☐		• MSL & NS4 OTBD ISOL SEAL IN RESET.	**1B21H -S32**	
☐		• MSL & NS4 INBD ISOL SEAL IN RESET.		**1B21H -S33**
☐	4.7.13	HOLD the Oncoming RHR HX'S OUTLET VALVE in CLOSE for 54-56 seconds.	1E12-F003A	1E12-F003B
NA	4.7.14	IF the Oncoming RHR PUMP MIN FLOW VALVE is energized, THEN PERFORM the following:	1E12-F064A	1E12-F064B
☐	4.7.14.a	VERIFY the Oncoming loop RHR PUMP MIN FLOW VALVE is closed.	1E12-F064A	1E12-F064B
☐	4.7.14.b	PERFORM independent verification of the Oncoming RHR PUMP MIN FLOW VALVE position.	1E12-F064A	1E12-F064B
☐	4.7.14.c	OPEN the Oncoming RHR PUMP MIN FLOW VALVE, 1E12-F064, disconnect.	**EF1 B07-CC**	**EF1 D07-CC**

NOTE

RPV level may increase during Quenching steam voids due to flow from the Condensate Transfer System while performing the following steps.

NA	4.7.15	IF SHUTDOWN COOLING OTBD SUCT ISOL is closed, THEN PERFORM the following:	1E12-F008	
☐	4.7.15.a	VERIFY SHUTDOWN COOLING INBD SUCT ISOL is closed.		1E12-F009

NA	4.7.15.b	IF Reactor Temperature is greater than or equal to 200°F, THEN PERFORM the following to collapse steam voids:		
☐	4.7.15.b.1	REFER TO Flush Valve Operation and MANUALLY SLOWLY OPEN the Shtdn Cooling Suct Hdr Flush Supply, UNTIL flow noise is heard.	1E12-F315	
☐	4.7.15.b.2	WHEN the RHR suction piping has filled for approximately 5 minutes, THEN REFER TO Flush Valve Operation and MANUALLY SLOWLY OPEN the Shtdn Cooling Suct Hdr Flush Supply.	1E12-F315	
NA	4.7.15.c	IF Reactor Temperature is less than 200°F,		
☐		THEN REFER TO Flush Valve Operation and MANUALLY OPEN the Shtdn Cooling Suct Hdr Flush Supply.	1E12-F315	
☐	4.7.15.d	TAKE the SHUTDOWN COOLING OTBD SUCT ISOL to OPEN.	1E12-F008	
☐	4.7.16	VERIFY the Oncoming RHR SHUTDOWN CLG SUCT in OPEN.	1E12-F006A	1E12-F006B

NA	4.7.17	IF SHUTDOWN COOLING INBD SUCT ISOL is closed, THEN PERFORM the following:		1E12-F009
NA ☐	4.7.17.a	IF Shtdn Cooling Suct Hdr Flush Supply is closed, THEN REFER TO Flush Valve Operation and MANUALLY SLOWLY OPEN the Shtdn Cooling Suct Hdr Flush Supply.	1E12-F315	
☐	4.7.17.b	HOLD RHR B HX'S SECOND VENT TO SUPR POOL in OPEN, UNTIL open.		1E12-F073B
☐	4.7.17.c	WHEN the Suction Header has vented for 5 minutes, THEN HOLD RHR B HX'S SECOND VENT TO SUPR POOL in CLOSE, UNTIL closed.		1E12-F073B
☐	4.7.17.d	REFER TO Flush Valve Operation and CLOSE the Shtdn Cooling Suct Hdr Flush Supply.	1E12-F315	
☐	4.7.17.e	TAKE SHUTDOWN COOLING INBD SUCT ISOL to OPEN.	1E12-F009	

CAUTION

The following step will reduce Reactor Vessel Water inventory. Reactor Vessel level should be raised to near the high level alarm setpoint prior to this step to prevent exceeding the low level setpoint.

NA	4.7.18	IF Reactor Temperature is greater than 200°F, THEN PERFORM the following to warmup the RHR suction piping:		
NA ❑	4.7.18.a	IF placing RHR A in Shutdown Cooling, THEN TAKE RHR A TO RADWASTE ISOL to OPEN.	1E12-F049	
NA ❑	4.7.18.b	IF placing RHR B in Shutdown Cooling, THEN OPEN RHR B to Radwaste Shutoff Valve.		1E12-F504
❑	4.7.18.c	VERIFY that Radwaste is ready to receive water from RHR.		
❑	4.7.18.d	NOTIFY Radwaste that a flush is to be commenced.		
❑	4.7.18.e	NOTE the Oncoming RHR IN to HXTR Temperature on RHR TEMPERATURES recorder. Temp: _____ °F	1E12-R601 Pt 1 (red)	1E12-R601 Pt 2 (dark green)

NOTE

The dust and oil film, which may accumulate during standby readiness periods, may "smoke" when heated during the performance of the following steps.

❑	4.7.18.f	THROTTLE the RHR TO RADWASTE ISOL in OPEN for 1 to 3 seconds.	1E12-F040

NA	4.7.18.g	RHR DISCH to RW Temperature on the RHR TEMPERATURES recorder is 200°F	RHR DISCH to RW Temperature on the RHR TEMPERATURES recorder has stabilized near RPV temperature	1E12-R601 Pt 11 (light green)	
❑		THEN VERIFY RHR TO RADWASTE ISOL is CLOSED.		1E12-F040	
NA	4.7.18.h	IF placing RHR A in Shutdown Cooling, THEN TAKE the RHR A TO RADWASTE ISOL to CLOSE.		1E12-F049	
❑					
NA	4.7.18.i	IF placing RHR B in Shutdown Cooling, THEN CLOSE the RHR B to Radwaste Shutoff Valve.			1E12-F504
❑					
❑	4.7.18.j	NOTIFY Radwaste that the flush has been secured.			
❑	4.7.18.k	THROTTLE open RHR HX'S DUMP VALVE for 1 to 3 seconds.		1E12-F011A	1E12-F011B
NA	4.7.18.l	RHR IN To HXTR temperature has risen 5-10°F from the initial temperature noted	RHR IN To HXTR temperature on the RHR TEMPER-ATURES recorder has stabilized near RPV temperature	10 minutes has elapsed	1E12-R601 Pt 1 (red) / 1E12-R601 Pt 2 (dark green)
❑		THEN HOLD RHR HX'S DUMP VALVE in CLOSE, UNTIL closed.		1E12-F011A	1E12-F011B

❑	4.7.19	HOLD the Oncoming RHR HX'S BYPASS VALVE in CLOSE for 59-62 seconds.	1E12-F048A	1E12-F048B
❑	4.7.20	HOLD RHR HX'S OUTLET VALVE in CLOSE, UNTIL closed.	1E12-F003A	1E12-F003B
NA	4.7.21	It is desired to establish the Normal Return Path	1E12-F053A	1E12-F053B
		RHR Upper Pool Cooling Isol is closed	1E12-F037A	1E12-F037B
		LPCI Injection Valve is closed	1E12-F042A	1E12-F042B
		THEN PERFORM the following:		
NA ❑	4.7.21.a	IF the Feedwater System is shutdown, THEN VERIFY the Oncoming RHR loop FDW HDR SHUTOFF is closed, to prevent flow to the feedwater system.	**1B21-F065A**	**1B21-F065B**

CAUTIONS

- The RHR PUMP MIN FLOW VALVE is downpowered in the closed position. Throttling open the RHR HX'S BYPASS VALVE, 1E12-F048A(B) after starting the pump ensures pump min flow requirements are met following pump start.
- Maintain RHR Shutdown Cooling flow greater than 2575 gpm to ensure that the RHR PUMP A(B) has adequate minimum flow.

	4.7.21.b	INITIATE flow through the SHUTDOWN COOLING TO FDW SHUTOFF as follows:	1E12-F053A	1E12-F053B
	4.7.21.b.1	PERFORM the following simultaneously:		
❑		• HOLD the SHUTDOWN COOLING TO FDW SHUTOFF in OPEN, UNTIL open.	1E12-F053A	1E12-F053B
❑		• TAKE the RHR PUMP to START.	1E12-C002A	1E12-C002B
❑	4.7.21.b.2	WITHIN 8 seconds, THROTTLE RHR HX'S BYPASS VALVE, UNTIL RHR PUMP FLOW is at least 2575 gpm.	1E12-F048A 1E12-R603A	1E12-F048B 1E12-R603B
❑	4.7.21.c	JOG OPEN the RHR HX'S BYPASS VALVE in 1000-2000 gpm increments, UNTIL RHR PUMP FLOW is 6000-7100 gpm.	1E12-F048A 1E12-R603A	1E12-F048B 1E12-R603B
❑	4.7.21.d	GO TO RHR Shutdown Cooling Operations for RHR A(B).		

NA	4.7.22	It is desired to establish the Refuel Return Path	1E12-F037A	1E12-F037B
		Shutdown Cooling To Fdw Shutoff is closed	1E12-F053A	1E12-F053B
		LPCI Injection Valve is closed	1E12-F042A	1E12-F042B
		RHR to Cntmt Pools Spectacle Flange blank is removed	1E12-D501A	1E12-D501B
		The RPV Head has been removed		
		The Containment Pools are filled		
		THEN PERFORM the following:		
❑	4.7.22.a	MONITOR FPCC SURGE TANK LEVEL while establishing Refuel Mode Shutdown Cooling.	**G41-R366A**	**G41-R366B**

(INTENTIONALLY BLANK)

CAUTIONS

- The RHR PUMP MIN FLOW VALVE is downpowered in the closed position. Throttling open the RHR HX'S BYPASS VALVE, 1E12-F048A(B) after starting the pump ensures pump min flow requirements are met following pump start.
- Maintain RHR Shutdown Cooling flow greater than 2575 gpm to ensure that the RHR PUMP A(B) has adequate minimum flow.

	4.7.22.b	INITIATE flow through the RHR UPPER POOL COOLING ISOL as follows:	1E12-F037A	1E12-F037B
❑	4.7.22.b.1	PERFORM the following simultaneously:		
		• HOLD the RHR UPPER POOL COOLING ISOL in OPEN, UNTIL open.	1E12-F037A	1E12-F037B
		• TAKE the RHR PUMP to START.	1E12-C002A	1E12-C002B
❑	4.7.22.b.2	WITHIN 8 seconds, THROTTLE RHR HX'S BYPASS VALVE, UNTIL RHR PUMP FLOW is at least 2575 gpm.	1E12-F048A 1E12-R603A	1E12-F048B 1E12-R603B
❑	4.7.22.c	JOG OPEN the RHR HX'S BYPASS VALVE in 1000-2000 gpm increments, UNTIL RHR PUMP FLOW is 7000-7100 gpm.	1E12-F048A 1E12-R603A	1E12-F048B 1E12-R603B
❑	4.7.22.d	GO TO RHR Shutdown Cooling Operations for RHR A(B).		

CAUTIONS

- Operation of the RHR Loop with Vessel Injection via the LPCI Injection Line has the potential to result in fatigue failure of incore instrument tubes and burnishing of fuel channels.
- The RHR PUMP MIN FLOW VALVE is downpowered in the closed position. Throttling open the RHR HX'S BYPASS VALVE, 1E12-F048A(B) after starting the pump ensures pump min flow requirements are met following pump start.
- Maintain RHR Shutdown Cooling flow greater than 2575 gpm to ensure that the RHR PUMP A(B) has adequate minimum flow.

NA 4.7.23

It is desired to establish the Alternate Return Path	1E12-F042A	1E12-F042B
Normal Shutdown Cooling return path is unavailable	1E12-F053A	1E12-F053B
Refuel Shutdown Cooling return path is unavailable	1E12-F037A	1E12-F037B
THEN PERFORM the following:		

❑ 4.7.23.a REFER TO Alternate Shutdown Cooling Data (Attachment 42) and TAKE Pre-Start Data.

(INTENTIONALLY BLANK)

CAUTIONS

- The RHR PUMP MIN FLOW VALVE is downpowered in the closed position. Throttling open the RHR HX'S BYPASS VALVE, 1E12-F048A(B) after starting the pump ensures pump min flow requirements are met following pump start.
- Maintain RHR Shutdown Cooling flow greater than 2575 gpm to ensure that the RHR PUMP A(B) has adequate minimum flow.

	4.7.23.b	INITIATE flow through the LPCI INJECTION VALVE as follows:	1E12-F042A	1E12-F042B
❑	4.7.23.b.1	PERFORM the following simultaneously:		
		• TAKE the LPCI INJECTION VALVE to OPEN.	1E12-F042A	1E12-F042B
		• TAKE the RHR PUMP to START.	1E12-C002A	1E12-C002B
❑	4.7.23.b.2	WITHIN 8 seconds, THROTTLE RHR HX'S BYPASS VALVE, UNTIL RHR PUMP FLOW is at least 2575 gpm.	1E12-F048A 1E12-R603A	1E12-F048B 1E12-R603B
❑	4.7.23.c	JOG OPEN the RHR HX'S BYPASS VALVE in 1000-2000 gpm increments, UNTIL RHR PUMP FLOW is 2575-7100 gpm.	1E12-F048A 1E12-R603A	1E12-F048B 1E12-R603B

	4.7.23.d	NOTIFY the following of the use of the Shutdown Cooling return flow to the Vessel via LPCI INJECTION VALVE so the required fuel inspection may be scheduled:	1E12-F042A	1E12-F042B
❑		• Reactor Engineering.		
❑		• Outage Planning.		
❑	4.7.23.e	INITIATE a special report to the NRC in accordance with NOP-OP-1015, Event Notifications.		
❑	4.7.23.f	GO TO RHR Shutdown Cooling Operations for RHR A(B).		

END OF SECTION

7.6 RHR Shutdown Cooling Operations for RHR A(B)

NOTES

- Normal Design parameters for Shutdown Cooling/Test Mode operation:

o	RHR Pump Flow	7000-7100 gpm.
o	RHR Pump Amps	95-110 Amps.
o	RHR A Head Spray Flow	0 – 500 gpm.
o	RHR Suction Pressure	Less than 135 psig.
o	RHR HX ESW Outlet Temps	Less than 108°F.
o	RHR Pump Suct Temp	Less than 100°F (Refuel Mode).
o	RHR HX'S RHR Outlet Temp	Less than 86°F (Refuel Mode).

- The following actions can be performed in any logical order or repeated to support current plant conditions.

❑ 7.6.1 OBSERVE the following limitations when in Shutdown Cooling:

- MAINTAIN cooldown rate less than 100°F in any 1 hour period.
- DO NOT allow any RHR piping which has been inadvertently drained to be refilled with water from the Reactor Vessel.
- MAINTAIN Vessel temperature below 190°F while in Shutdown Cooling.
- WHEN using the normal OR refuel mode return paths, THEN MAINTAIN the following:
  - MAINTAIN RHR Pump flow at 7000-7100 gpm during steady state conditions.

- MAINTAIN RHR Pump flow at 6000-7100 gpm during system adjustments.

- WHEN using the alternate return path, THEN MONITOR the following additional items: — 1E12-F042A, 1E12-F042B

  - MAINTAIN RHR FLOW in the band 2575-7100 gpm. — 1E12-F042A, 1E12-F042B

  - MAINTAIN RHR H2O DISCH temperature greater than 65°F. — 1E12-R601 Pt 5 (magenta), 1E12-R601 Pt 6 (orange)

❑ 7.6.2 PERFORM the following as needed to maintain desired cooldown rate AND RHR Pump flow 7000-7100 (alternate return path 2575-7100): — 1E12-R603A, 1E12-R603B

- THROTTLE RHR HX'S OUTLET VALVE. — 1E12-F003A, 1E12-F003B

- THROTTLE RHR HX'S BYPASS VALVE. — 1E12-F048A, 1E12-F048B

NA 7.6.3

RHR A is in Shutdown Cooling
Head spray is desired
THEN PERFORM the following:

❑ 7.6.3.a CONFIRM that the RCIC INJECTION VLV is closed. — 1E51-F013

NOTE

The HD SPRAY FLOW 1E12-R607 indication taps in downstream of the RHR Pump flow 1E12-R603A(B) indicator. Changing head Spray flow does not change RHR Pump flow.

❑	7.6.3.b	PERFORM the following, UNTIL HD SPRAY FLOW is 500 gpm AND RHR Pump flow 7000-7100 (alternate return path 2575-7100):	1E12-R607 1E12-R603A	 1E12-R603A
		• THROTTLE RHR HX'S OUTLET VALVE.	1E12-F003A	1E12-F003B
		• THROTTLE RHR HX'S BYPASS VALVE.	1E12-F048A	1E12-F048B
		• THROTTLE RHR A HEAD SPRAY ISOL.	1E12-F023	
❑	7.6.3.c	WHEN the Rx Vessel pressure is at atmospheric pressure, THEN VERIFY RHR A HEAD SPRAY ISOL is closed.	1E12-F023	
NA	7.6.4	IF oncoming loop of ESW was NOT started per SOI-P45/49, THEN PERFORM the following:		
	7.6.4.a	VERIFY the following:		
❑		• ESW PMP HOUSE VENT SUPP FAN 1, is RUNNING.	**1M32-C001A**	**1M32-C001B**
❑		• ESW PMP HOUSE EXH LOUVER 70 is OPEN	**1M32-F070A**	**1M32-F070B**
❑		• ESW PUMP DISCH VALVE is fully OPEN	**1P45-F130A**	**1P45-F130B**

❑ 7.6.4.b RECORD ESW flow channel check in the Narrative Log.

NA 7.6.4.c IF lake temperature is less than 34°F,
❑ THEN REFER TO SOI-P45/49 and PERFORM de-icing operation.

❑ 7.6.4.d DIRECT Chemistry to perform the following:

- OBTAIN Tech Spec samples of flow through the RHR Heat Exchangers as required.
- CHLORINATE ESW as required**.**

NA 7.6.5

Information Tag is on the RHR Conductivity Alarm window(s)	Caution Tag is on the RHR Conductivity Alarm window(s)	**1H13-P601-20-G5**	**1H13-P601-17-G5**

❑ THEN REFER TO Placing RHR Conductivity Alarm In Service and VERIFY the actions are complete.

NA 7.6.6 IF the LPCI INJECTION VALVE is open, 1E12-F042A 1E12-F042B
❑ THEN REFER TO Alternate Shutdown Cooling Data (Attachment 42) and TAKE Post-Start Data Alternate Shutdown Cooling Return Path Startup Data.

❑ 7.6.7 PERFORM Independent Verification of the required components for Shutdown Cooling Startup for RHR A(B).

NA 7.6.8 ❑ IF RPV temperature is less than 200°F, THEN NOTIFY the Unit Supervisior that RHR loop(s) in Shutdown Cooling may be declared operable for LPCI, Suppression Pool Cooling, Shutdown Cooling and Containment Spray Modes.

NA 7.6.9

RPV temperature is less than 200°F			
Opposite loop of RHR is available for shutdown cooling		**Loop B**	**Loop A**
THEN PERFORM the following:			

❑	7.6.9.a	REFER TO Flush of RHR Loop A(B) When in Standby Readiness Mode and VERIFY the Opposite loop of RHR has been flushed.	**Loop B**	**Loop A**
NA ❑	7.6.9.b	IF Suppression Pool is NOT transfer quality, THEN REFER TO Flush of RHR A(B) With CST Water and VERIFY the actions are complete.		

NOTES

- The flow path for the RHR Loop operating in Refuel Mode Shutdown Cooling will be:
  - RHR Loop A - Separator Storage Well to Reactor Cavity.
  - RHR Loop B - Dryer and Fuel Storage Well to Reactor Cavity.
- This Step can be used during refueling operations as necessary to minimize flow-induced turbulence.

NA 7.6.10

It is desired to Improve Water Clarity	Desire to Align RHR Shutdown Cooling Flow to the Upper Pools
THEN PERFORM the following:	

❑	7.6.10.a	VERIFY the Reactor Vessel Head is removed.		
❑	7.6.10.b	VERIFY the Upper Pools are filled.		
❑	7.6.10.c	VERIFY the RHR to Cntmt Pools Spectacle Flange is aligned with the blank removed and the spacer ring installed.	1E12-D501A	1E12-D501B
❑	7.6.10.d	PERFORM the following as need, UNTIL RHR PUMP FLOW is 7000-7100 gpm AND desired flow to the upper pools is established:	1E12-R603A	1E12-R603B
		• THROTTLE RHR UPPER POOL COOLING ISOL.	1E12-F037A	1E12-F037B
		• THROTTLE SHUTDOWN COOLING TO FDW SHUTOFF.	1E12-F053A	1E12-F053B

NA	7.6.10.e	Feedwater is aligned to feed the RPV		
		SHUTDOWN COOLING TO FDW SHUTOFF is closed	1E12-F053A	1E12-F053B
❑		THEN OPEN the associated FDW HDR SHUTOFF valve.	**1B21-F065A**	**1B21-F065B**
NA	7.6.11	RHR UPPER POOL COOLING ISOL is open / RHR UPPER POOL COOLING ISOL is throttled	1E12-F037A	1E12-F037B
		Desired to use the Normal Mode Shutdown Cooling path		
		THEN PERFORM the following:		
❑	7.6.11.a	VERIFY the associated FDW HDR SHUTOFF valve is CLOSED.	**1B21-F065A**	**1B21-F065B**
❑	7.6.11.b	PERFORM the following as need, UNTIL RHR PUMP FLOW is 7000-7100 gpm RHR UPPER POOL COOLING ISOL is closed:	1E12-R603A	1E12-R603B
			1E12-F037A	1E12-F037B
		• THROTTLE RHR UPPER POOL COOLING ISOL.	1E12-F037A	1E12-F037B
		• THROTTLE SHUTDOWN COOLING TO FDW SHUTOFF.	1E12-F053A	1E12-F053B

CAUTION

Maintain RHR Shutdown Cooling flow greater than 2575 gpm to ensure that the RHR PUMP A(B) has adequate minimum flow.

NA	7.6.12	Desire to Align RHR Shutdown Cooling Flow to the Normal Mode	Desire to Align RHR Shutdown Cooling Flow to the Refuel Mode	1E12-F053A 1E12-F053B 1E12-F037A 1E12-F037B
		LPCI INJECTION VALVE is open		1E12-F042A 1E12-F042B
		THEN PERFORM the following:		
❑	7.6.12.a	PERFORM the following as needed to establish RHR PUMP FLOW 2750-3500 gpm, WHILE maintaining desired cooldown rate:		1E12-R603A 1E12-R603B
		• THROTTLE RHR HX'S OUTLET VALVE.		1E12-F003A 1E12-F003B
		• THROTTLE OPEN RHR HX'S BYPASS VALVE.		1E12-F048A 1E12-F048B
NA	7.6.12.b	IF aligning RHR Shutdown Cooling Flow to the Normal Mode, THEN PERFORM the following:		
❑	7.6.12.b.1	VERIFY the associated FDW HDR SHUTOFF is closed.		**1B21-F065A 1B21-F065B**
❑	7.6.12.b.2	HOLD the SHUTDOWN COOLING TO FDW SHUTOFF in OPEN, UNTIL open.		1E12-F053A 1E12-F053B

❑	7.6.12.b.3	TAKE the LPCI INJECTION VALVE to CLOSED.	1E12-F042A	1E12-F042B

NOTE

The flow path for the RHR Loop operating in Refuel Mode Shutdown Cooling will be:

- RHR Loop A - Separator Storage Well to Reactor Cavity.
- RHR Loop B - Dryer and Fuel Storage Well to Reactor Cavity.

NA	7.6.12.c	IF aligning RHR Shutdown Cooling Flow to the Refuel Mode, THEN PERFORM the following:		
❑	7.6.12.c.1	VERIFY the Reactor Vessel Head is removed.		
❑	7.6.12.c.2	VERIFY the Upper Pools are filled.		
❑	7.6.12.c.3	VERIFY the RHR to Cntmt Pools Spectacle Flange is aligned with the blank removed and the spacer ring installed.	1E12-D501A	1E12-D501B
❑	7.6.12.c.4	HOLD the RHR UPPER POOL COOLING ISOL in OPEN, UNTIL open.	1E12-F037A	1E12-F037B
❑	7.6.12.c.5	TAKE the LPCI INJECTION VALVE to CLOSED.	1E12-F042A	1E12-F042B

❑	7.6.12.d	PERFORM the following as needed to establish RHR PUMP FLOW 7000-7100 gpm:	1E12-R603A	1E12-R603B
		• THROTTLE RHR HX'S OUTLET VALVE.	1E12-F003A	1E12-F003B
		• THROTTLE OPEN RHR HX'S BYPASS VALVE.	1E12-F048A	1E12-F048B

NOTE

RPV level can be estimated to be 200 gallons per inch of Reactor Vessel Level.

NA	7.6.13	IF it is desired to Lower Reactor Level to Radwaste, THEN PERFORM the following:		
❑	7.6.13.a	VERIFY Radwaste System is aligned to receive the flow from RHR.		
❑	7.6.13.b	VERIFY that the Reactor coolant temperature is less than 140°F.		
❑	7.6.13.c	THROTTLE the following valves as needed to establish RHR PUMP FLOW 6000-6500 gpm:	1E12-R603A	1E12-R603B
		• RHR HX'S OUTLET VALVE	1E12-F003A	1E12-F003B
		• RHR HX'S BYPASS VALVE	1E12-F048A	1E12-F048B

NA ❑	7.6.13.d	IF it is NOT desired to establish a continuous drain down, THEN THROTTLE the following valves as needed to establish RHR PUMP FLOW 4500 gpm:	1E12-R603A	1E12-R603B
		• RHR HX'S OUTLET VALVE	1E12-F003A	1E12-F003B
		• RHR HX'S BYPASS VALVE	1E12-F048A	1E12-F048B
NA ❑	7.6.13.e	IF using RHR A, THEN TAKE the RHR A TO RADWASTE ISOL to OPEN.	1E12-F049	
NA ❑	7.6.13.f	IF using RHR B, THEN OPEN the RHR B To Radwaste Shutoff Valve.		1E12-F504
❑	7.6.13.g	NOTIFY Radwaste RPV draining is beginning.		

CAUTION

Performance of the following step can cause a rapid decrease in RPV level. Discharge flow to Radwaste can drain up to 8"/min from the RPV.

❑	7.6.13.h	THROTTLE the RHR TO RADWASTE ISOL, UNTIL the desired rate of RPV level decrease is achieved, WHILE maintaining RHR PUMP AMPS less than 95 amps.	1E12-F040	
			1E12-R100A	1E12-R100B

NA ❑	7.6.13.i	IF continuous drain down is being used, THEN WHILE maintaining RHR PUMP AMPS between 90-95 amps, PERFORM the following as needed to maintain desired heatup AND blowdown rates:	1E12-R100A 1E12-R603A	1E12-R100A 1E12-R603B
		• THROTTLE RHR HX'S OUTLET VALVE	1E12-F003A	1E12-F003B
		• THROTTLE RHR HX'S BYPASS VALVE	1E12-F048A	1E12-F048B
		• THROTTLE RHR TO RADWASTE ISOL	1E12-F040	

NA 7.6.13.j

The desired RPV level is achieved	Continuous blowdown is no longer required
THEN PERFORM the following:	

❑	7.6.13.j.1	HOLD the RHR TO RADWASTE ISOL in CLOSE, UNTIL closed.	1E12-F040	
NA ❑	7.6.13.j.2	IF using RHR A, THEN TAKE the RHR A TO RADWASTE ISOL to CLOSE.	1E12-F049	
NA ❑	7.6.13.j.3	IF using RHR B, THEN CLOSE the RHR B To Radwaste Shutoff Valve.		1E12-F504

❑	7.6.13.j.4	PERFORM the following as needed to establish RHR PUMP FLOW 7000-7100:	1E12-R603A	1E12-R603B
		• THROTTLE RHR HX'S OUTLET VALVE.	1E12-F003A	1E12-F003B
		• THROTTLE RHR HX'S BYPASS VALVE.	1E12-F048A	1E12-F048B
❑	7.6.13.j.5	PERFORM independent verification of the required components.		

NOTE

RPV level can be estimated to be 200 gallons per inch of Reactor Vessel Level.

NA	7.6.14	IF it is desired to Lower Reactor Level to the Suppression Pool, THEN PERFORM the following:	
❑	7.6.14.a	VERIFY that the Reactor coolant temperature is less than 140°F.	
	7.6.14.b	NOTIFY Radiation Protection of the following:	
❑		• A Suppression Pool evolution will be conducted which may affect suppression pool water level and/or activity.	
❑		• Surveys should be performed for Containment 599' elevation to evaluate the radiological impact of the evolution.	

❑	7.6.14.c	THROTTLE the following valves as needed to establish RHR PUMP FLOW 6000-6500 gpm:	1E12-R603A	1E12-R603B
		• RHR HX'S OUTLET VALVE	1E12-F003A	1E12-F003B
		• RHR HX'S BYPASS VALVE	1E12-F048A	1E12-F048B
❑	7.6.14.d	THROTTLE the following valves as needed to establish RHR PUMP FLOW 4500 gpm:	1E12-R603A	1E12-R603B
		• RHR HX'S OUTLET VALVE	1E12-F003A	1E12-F003B
		• RHR HX'S BYPASS VALVE	1E12-F048A	1E12-F048B
❑	7.6.14.e	WHILE maintaining RHR PUMP AMPS less than 95 amps, THROTTLE the RHR HX'S DUMP VALVE, UNTIL the desired rate of RPV level decrease is achieved.	1E12-R100A 1E12-F011A	1E12-R100B 1E12-F011B
❑	7.6.14.f	WHEN the desired RPV level is achieved, THEN HOLD the RHR HX'S DUMP VALVE in CLOSE, UNTIL closed.	1E12-F011A	1E12-F011B
❑	7.6.14.g	PERFORM the following as needed to establish RHR PUMP FLOW 6900-7100 gpm:	1E12-R603A	1E12-R603B
		• THROTTLE RHR HX'S OUTLET VALVE	1E12-F003A	1E12-F003B
		• THROTTLE RHR HX'S BYPASS VALVE	1E12-F048A	1E12-F048B

❑	7.6.14.h	PERFORM independent verification of the required components.	
NA	7.6.15	IF desired to raise Reactor Water Level Using Condensate Transfer and Storage Water, THEN PERFORM the following:	
❑	7.6.15.a	REFER TO Flush Valve Operation and OPEN the SHTDN COOLING SUCT HDR FLUSH SUPPLY valve.	1E12-F315
❑	7.6.15.b	WHEN the desired Reactor water level is achieved, THEN REFER TO Flush Valve Operation and CLOSE SHTDN COOLING SUCT HDR FLUSH SUPPLY valve.	1E12-F315
❑	7.6.15.c	PERFORM independent verification of the required components.	
	7.6.16	WHEN desired to shutdown RHR, THEN PERFORM the following:	
❑	7.6.16.a	CONFIRM Lowering Reactor Level to Radwaste is NOT in progress.	
❑	7.6.16.b	CONFIRM Lowering Reactor Level to the Suppression Pool is NOT in progress.	
❑	7.6.16.c	CONFIRM Raising Reactor Water Level Using Condensate Transfer and Storage Water is NOT in progress.	

❑ 7.6.16.d GO TO Shutdown Cooling Shutdown to Standby Readiness.

END OF SECTION

ATTACHMENT 42 - Alternate Shutdown Cooling Data
Page 1 of 1

NOTE

The LOOP column indicates what must be verified for specific sections/steps.

Shutdown Cooling Loop: Loop A ___ Loop B ___

Parameter	Instrument	Reading	Loop
Pre-Start Data:			
RHR IN to HXTR	1E12-R601, Pt 1(red)		A
	1E12-R601, Pt 2 (dark green)		B
RHR H2O DISCH	1E12-R601, Pt 5 (magenta)		A
	1E12-R601, Pt 6 (orange)		B
Drywell Avg. Temperature	D23ED033 (1D23-R210A(B))		
Reactor Bulk Water Temp.	(1)		
Post-Start Data:			
RHR IN to HXTR	1E12-R601, Pt 1(red)		A
	1E12-R601, Pt 2 (dark green)		B
RHR H2O DISCH	1E12-R601, Pt 5 (magenta)		A
	1E12-R601, Pt 6 (orange)		B
RHR Pump Flow	1E12-R603A		A
	1E12-R603B		B
Drywell Avg. Temperature	D23ED033 (1D23-R210A(B))		
Reactor Bulk Water Temp.	(1)		

instrument for this parameter. Record which instrument was used in the instrument column.

- ❑ Forward the original to the Responsible System Engineer, PNED/SES
- ❑ Forward a copy to the System Design Engineer, PNED/DES
- ❑ Forward a copy to the Lead Engineer, Piping Analysis, PNED/DES.

JOB PERFORMANCE MEASURE SETUP SHEET

System:	G43 – Suppression Pool Makeup System
Time Critical:	No
Alternate Path:	No
Applicability:	RO/SRO
Safety Function:	5 – Containment Integrity
Setting:	Simulator
Validated:	7 minutes
References:	EOP-SPI 3.2 Rev 1
Tasks:	002-503-05-01 Initiate SPMU
Task Standard:	Initiate SPMU per EOP-SPI 3.2
Required Material:	EOP-SPI 3.2, SPMU Initiation
K / A Data:	295030 - Ability to operate and/or monitor the following as they apply to Low Suppression Pool Water Level: EA1.04 Suppression pool make-up system: Mark-III. Importance: RO 4.0 / SRO 4.0

1. Setup Instructions: Reset simulator to a power IC. Insert Malfunctions PC04 to 35%, h13p60118ad3 to OFF, h13p60118e2 to ON, mv011e12f0001 to FAI, ry02_g43k1 to FAI, and ry02_g43k2 to FAI. Insert Remote Function LP03 to OUT. Place simulator in RUN and allow SP level to lower to < 17.8'. Take a snapshot. **(For 2017 ILO Exam, reset to IC-65 – no other actions needed)**

2. Location / Method: Simulator / Perform

3. Initial Condition: The Plant is at rated power. A leak in the LPCS Suppression Pool Suction line is causing Suppression Pool level to lower. All attempts to stop the leak have failed. The US has entered EOP-2 Primary Containment Control for lowering Suppression Pool level.

4. Initiating Cue: The Unit supervisor directs you the Reactor Operator to initiate SPMU per EOP-SPI 3.2.

Start Time: _____ **End Time**: _____

Candidate: _____

JPM BODY SHEET

Standard: Performer obtains or simulates obtaining all materials, procedures, tools, keys, radios, etc… before performing task.

Standard: Performer follows management expectations with regards to safety and communication standards.

Step 1

EOP-SPI 3.2, SPMU Initiation

1.0 VERIFY the following keylock switches are in AUTO:

- SUPR POOL MAKE-UP A LOGIC G43-S6
- SUPR POOL MAKE-UP B LOGIC G43-S8

Standard: The Operator locates correct switches on H13-P601 and verifies in AUTO.

Instructor Cue: None

Notes: None

SAT ___ UNSAT ___

Comment(s): _____

Step 2

2.0 IF a LOCA signal is present, THEN GO TO Step 5.0 of this instruction.

Standard: The Operator verifies no LOCA signal present and proceeds to Step 3.0.

Instructor Cue: If asked, NO LOCA signal present.

Notes: None

SAT ___ UNSAT ___

Comment(s): _____

Step 3

NOTE
Placing SPMU test keylock switches in TEST with the SPMU mode switch in AUTO will automatically open SPMU shutoff valves when a Suppression Pool low-low level condition exists.

3.0 AT H13-P869, PLACE SUPR POOL MAKEUP A FULL FLW TEST PERM keylock switch in TEST. G43-S13

Critical Step: Operator places G43-S13 in TEST.

Instructor Cue: None

Notes: Switch G43-S13 is located on East wall of Simulator

SAT ___ UNSAT ___

Comment(s): _____

Step 4

4.0 AT H13-P868, PLACE SUPR POOL MAKEUP B FULL FLW TEST PERM keylock switch in TEST. G43-S12

Critical Step: Operator places G43-S12 in TEST.

Instructor Cue: None

Notes: Switch G43-S12 is located on East wall of Simulator

SAT ___ UNSAT ___

Comment(s): _____

Step 5

5.0 PERFORM Steps 6.0 and 7.0 in any order with the priority being a division that has electric power readily available

NOTES

- Normally BOTH divisions of SPMU are initiated. If Division 2 SPMU is successful and alternate power is required to initiate Division 1 SPMU, then it is NOT required to initiate Division 1 SPMU as the SPMU would be completed prior to being able to complete the next step.
- Division 3 to Division 1 480 Volt Crosstie, ONI-SPI C-6 provides temporary power to Initiate Suppression Pool Makeup. When power is needed to a component the infield operator needs to be notified so actions to power the component can be completed.

6.0 IF required to Initiate Division 1 SPMU, THEN PERFORM the following:

6.1 IF AC power is lost to Division 1 480 Volt AC busses AND Bus EF-1-E-1 is energized, THEN REFER TO Division 3 To Division 1 480 Volt Crosstie, ONI-SPI C-6 concurrently with this procedure to apply power to Division 1 480 Volt AC busses.

6.2 ARM AND DEPRESS the SUPR PL MAKE-UP A MANUAL INITIATION pushbutton. G43-S5

Critical Step: Operator Arms and Depresses G43-S5.

Instructor Cue: None

Notes: Step 6.1 is N/A.

SAT ___ UNSAT ___

Comment(s): _____

Step 6

6.3 CONFIRM the following valves are OPEN:

- SUPR PL MAKE-UP A FIRST SHUTOFF. G43-F030A
- SUPR PL MAKE-UP A SECOND SHUTOFF. G43-F040A

Standard: The Operator confirms G43-F030A and G43-F040A open.

Instructor Cue: None

Notes: None

SAT ___ UNSAT ___

Comment(s): _____

Step 7

NOTES

- Normally BOTH divisions of SPMU are initiated. If Division 1 SPMU is successful and alternate power is required to initiate Division 2 SPMU, then it is NOT required to initiate Division 2 SPMU as the SPMU would be completed prior to being able to complete the next step.
- Division 3 to Division 2 480 Volt Crosstie, ONI-SPI C-7 provides temporary power to Initiate Suppression Pool Makeup. When power is needed to a component the infield operator needs to be notified so actions to power the component can be completed.

7.0 IF required to Initiate Division 2 SPMU, THEN PERFORM the following:

7.1 IF AC power is lost to Division 2 480 Volt AC busses AND Bus EF-1-E-1 is energized, THEN REFER TO Division 3 To Division 2 480 Volt Crosstie, ONI-SPI C-7 concurrently with this procedure to apply power to Division 2 480 Volt AC busses.

7.2 ARM AND DEPRESS the SUPR PL MAKE-UP B MANUAL INITIATION pushbutton. G43-S7

Critical Step: Operator Arms and Depresses G43-S7.

Instructor Cue: None

Notes: Step 7.1 is N/A.

SAT ___ UNSAT ___

Comment(s): _____

Step 8

7.3 CONFIRM the following valves are OPEN:

- SUPR PL MAKE-UP B FIRST SHUTOFF. G43-F030B
- SUPR PL MAKE-UP B SECOND SHUTOFF. G43-F040B

Standard: The Operator confirms the SPMU valves are open and that suppression pool level is rising.

Instructor Cue: None

Notes: None

SAT ___ UNSAT ___

Comment(s): _____

Step 9

NOTE
Division 3 to Division 1 480 Volt Crosstie, ONI-SPI C-6 provides temporary power to isolate flow to the upper pools. When power is needed to a component the infield operator needs to be notified so actions to power the component can be completed.

8.0 IF the CNTMT POOLS SUPP ISOL valve is OPEN, THEN ISOLATE flow to the upper Pools as follows: G41-F100

8.1 IF AC power is lost to Division 1 480 Volt AC busses AND Bus EF-1-E-1 is energized, THEN REFER TO Division 3 To Division 1 480 Volt Crosstie, ONI-SPI C-6 concurrently with this procedure to apply power to Division 1 480 Volt AC busses.

8.2 VERIFY CLOSED CNTMT POOLS SUPP ISOL. G41-F100

Critical Step: Operator closes G41-F100.

Instructor Cue: None

Notes: Step 8.1 is N/A.

Terminate the JPM.

SAT ___ UNSAT ___

Comment(s): _____

Terminating Cue: Reports to Unit Supervisor that EOP-SPI 3.2 is complete and SPMU is in progress.

Evaluation Results: **SAT_____ UNSAT_____**

End Time: _____

JPM CUE SHEET

INITIAL CONDITIONS:	• The Plant is at rated power. • A leak in the LPCS Suppression Pool Suction line is causing Suppression Pool level to lower. • All attempts to stop the leak have failed. • The US has entered EOP-2 Primary Containment Control for lowering Suppression Pool level.
INITIATING CUE:	The Unit Supervisor directs you the Reactor Operator to initiate SPMU per EOP-SPI 3.2.

JOB PERFORMANCE MEASURE SETUP SHEET

System:	M25/M26 Control Room Ventilation and Emergency Recirc System
Time Critical:	No
Alternate Path:	Yes
Applicability:	RO/SRO
Safety Function:	9 - Radioactivity Release
Validated Time:	19 Minutes
References:	SOI-M25/26 Rev. 24, ARI-H13-P904-0002 Rev 11, NOP-OP-1002 Rev 12, & Cyc-14 T/O EPY-M25-005
Required Material:	SOI-M25/26, Control Room HVAC And Emergency Recirculating System
Task:	037-532-01-01 Shift from (Manual) EMERG RCIRC to NORM 037-524-01-01 Respond to Alarms
Task Standard:	Shift Control Room HVAC from Emergency Recirc to NORMAL and respond to low flow alarm.
K/A:	290003 – A2.03 Ability to (a) predict the impacts of the following on the CONTROL ROOM HVAC; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Initiation/reconfiguration failure. Importance: RO 3.4 SRO 3.6

1. Setup Instructions: Reset simulator to any IC with M25A running in ER and M25B S/D to Secured Status. (**For 2017 ILO Exam, reset to IC 64**) **Insert Schedule file JPM-M25-502.sch and verify Event file JPM-M25-502.evt loads. Acknowledge alarms**. Place a Yellow Switch Caps on M25 B Supply Fan and M26 B Emergency Recirc Fan. Provide Operator with Yellow copy of SOI-M25/26.
2. Location / Method: Simulator / Performance
3. Initial Condition: Control Room Ventilation is running in Emergency Recirc for a monthly Div. 2 diesel run, which is now complete. CR HVAC Supply Fan B is tagged out to replace a broken belt.
4. Initiating Cue: The Unit Supervisor directs you, the Reactor Operator, to shift Control Room Ventilation to NORMAL.

Start Time: _____ **Stop Time:** _____

Candidate: _____

JPM BODY SHEET

Standard: Performer obtains or simulates obtaining all materials, procedures, tools, keys, radios, etc before performing task.

Standard: Performer follows management expectations with regards to safety and communication standards.

Step 1

SOI-M25/26, Control Room HVAC And Emergency Recirculating System

7.6 Shifting From EMERG RCIRC To NORM

7.6.1 IF the CONT RM HVAC A INBD SUPP DMPR is closed, THEN PERFORM Reset of Emergency Recirculation Auto Initiation.

M25-F020B

7.6.2 IF the CONT RM HVAC B INBD SUPP DMPR is closed, THEN PERFORM Reset of Emergency Recirculation Auto Initiation.

M25-F020A

7.6.3 IF the electric heater is in service, THEN PERFORM the following:

Standard: Steps 7.6.1, 7.6.2, and 7.6.3 are N/A.

Instructor Cue: None.

Notes: None.

SAT ___ UNSAT ___

Comment(s): _____

Step 2

7.6.4 PLACE both of the following in NORM:

- CONT RM HVAC TRAIN A MODE SELECT M25-S7
- CONT RM HVAC TRAIN B MODE SELECT M25-S8

Critical Step: Operator places M25-S7 in NORM.

Instructor Cue: None.

Notes: Operator should place M25-S8 in NORM, as this causes multiple 'B' side dampers to realign. However, with M25B train S/D, placing & M25-S8 in NORM will not have any effect and is not Critical.

About 60 seconds after placing S7 in NORM, CONT RM HVAC RETURN FAN A, M25-C002A will alarm on Low Flow.

SAT ___ UNSAT ___

Comment(s): _____

Step 3

7.6.1 CONFIRM components are in the proper configuration in accordance with the appropriate attachment:

- Train A in Operation and Train B Shutdown (Attachment 5)

Standard: Operator commences verifying component lineup.

Instructor Cue: If asked to report positions of M24-F051A & F051B, - Both open.

Notes: Return Fan low flow annunciator (P904-02-A1) will alarm while operator is verifying component lineup.

SAT ___ UNSAT ___

Comment(s): _____

Step 4

ARI-H13-P904-0002-A1

1.0 CAUSE OF ALARM

1.1 Flow through CONT RM HVAC RETURN FAN A, M25-C002A, less than 24,000 CFM, as sensed by M25-N700A, when fan is running

4.0 SUBSEQUENT OPERATOR ACTIONS

4.1 DETERMINE 0M25 flow. M25-K120A

4.2 REFER TO SOI-M25/26 and SHIFT to HVAC Train B in the desired operating mode.

Standard:	Operator reviews ARI and suggests course of action.
Instructor Cue:	If Operator requests flow data from NLO, respond, "Flow is 20,000 CFM."
	If Operator asks NLO about M25-F110A, report it does not appear to be full open.
	If Operator does not suggest a course of action, ask what they recommend.
Notes:	Per the ARI, the Operator should shift to the B train in the NORMAL mode. However, since B train Supply and Emergency Recirc fans are tagged out, the shift cannot occur. In this instance, shifting A train back to Emergency Recirc mode will solve the problem as ER Mode stops the Return Fan.

SAT ___ UNSAT ___

Comment(s): _____

Step 5

SOI-M25/26, Control Room HVAC And Emergency Recirculating System

7.5 Shifting From NORM Or SMOKE CLEAR To EMERG RCIRC

7.5.1 PLACE both of the following in EMERG RCIRC:
- CONT RM HVAC TRAIN A MODE SELECT M25-S7
- CONT RM HVAC TRAIN B MODE SELECT M25-S8

Critical Step: Operator places M25-S7 in EMERG RCIRC.

Instructor Cue: None

Notes: Operator should place M25-S8 in EMERG RECIRC, as this causes multiple 'B' side dampers to realign. However, with M25B train S/D, placing & M25-S8 in EMERG RCIRC will not have any effect and is not Critical.

SAT ___ UNSAT ___

Comment(s): _____

Step 6

7.5.2 CONFIRM components are in the proper configuration in accordance with the appropriate attachment:
- Train A in Operation and Train B Shutdown (Attachment 5)

Standard: Operator commences verifying component lineup.

Instructor Cue: If asked to report positions of M24-F051A & F051B, - Both Closed.

Notes: None

SAT ___ UNSAT ___

Comment(s): _____

Step 7

ATTACHMENT 5 - Configuration with Train A in Operation and Train B Shutdown

Train A Components	M25-S7 & S8 Position	NORM	EMERG RCIRC	SMOKE CLEAR
CONT RM HVAC RETURN FAN A, M25-C002A		ON	OFF	ON

Critical Step: Operator stops Return Fan A.

Instructor Cue: If Operator does not stop Return Fan A or doesn't suggest a course of action, ask what they recommend.

If Operator contacts NLO to ask if Return fan is still running, inform Operator that the Return fan is running.

Notes: During confirmation of components the operator should notice that the Return Fan failed to stop and M25-F110A damper is in mid-position and should inform evaluator that he is taking the fan control switch to STOP.

Per NOP-OP-1002, Conduct of Operations, Step 4.10.3 Automatic System Response Versus Manual Actions:

5. If automatic actions fail to occur when required, it is the responsibility of the operator to take manual actions to perform the system or component function. Pump or component auto start failures are examples where operators are expected to take manual action.

SAT ___ UNSAT ___

Comment(s): _____

Step 7

7.5.3 IF train is being shifted due to an emergency condition, THEN TAKE the following to CLOSE:

7.5.4

Control Room relative humidity is ≥ 70%	Control Room relative humidity is unknown		
TAKE the CONT RM EMG RCIRC ELEC HTG CONT to START.		M26-D001A	M26-D001B

Standard: Steps 7.5.3 and 7.5.4 are N/A.

Instructor Cue: None

Notes: Operator will check humidity on ICS.

Terminate the JPM

SAT ___ UNSAT ___

Comment(s): _____

Terminating Cue: A Train of Control Room Ventilation is running in Emergency Recirc and Return Fan A is shutdown.

Evaluation Results: **SAT_____ UNSAT_____**

End Time: _____

JPM CUE SHEET

INITIAL CONDITIONS:	• Control Room Ventilation is running in Emergency Recirc for a monthly Div. 2 diesel run, which is now complete. • CR HVAC Supply Fan B is tagged out to replace a broken belt.
INITIATING CUE:	The Unit Supervisor directs you, the Reactor Operator, to shift Control Room Ventilation to NORMAL.

JOB PERFORMANCE MEASURE SETUP SHEET

System:	D51 Seismic Monitoring System
Time Critical:	Yes
Alternate Path:	No
Applicability:	RO/SRO
Safety Function:	2 – Reactor Water Inventory Control
Setting:	Plant (non-RRA)
Validated Time:	25 Minutes
References:	ONI-D51 Rev 20 SOI-P72 Rev 9
Required Material	ONI-D51 – Earthquake Attachment 3
Task:	029-502-01-04 Operate Plant Underdrain Pumps 276-504-01-01 Monitor the Service Water System Operation 277-508-01-01 Monitor ESW System Operation
Task Standard:	Perform outside inspection for earthquake damage and shutdown Underdrain Pump per ONI-D51 Attachment 3.
K/A Data:	203000 Knowledge of the effect that a loss or malfunction of the following will have on the RHR/LPCI: Injection Mode: – K6.10, Component cooling water systems IR 3.0 / 3.1. 219000 Ability to (a) predict the impacts of the following on the RHR/LPCI: Torus/Suppression Pool Cooling Mode; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: – A2.15 Loss of, or inadequate, heat exchanger cooling flow IR 3.3 / 3.4

1. Setup Instructions: Provide Operator with a copy of ONI-D51 Attachment 3

2. Location / Method: Plant / Simulation

3. Initial Condition: OBE Earthquake has occurred; Five minutes ago, the Unit Supervisor entered ONI-D51.

4. Initiating Cue: The Unit Supervisor directs you as a Plant Operator to perform Attachment 3 of ONI-D51. **This JPM is Time Critical**

Start time _____ **End time** _____

Operator _____

JPM BODY SHEET

Standard: Performer obtains or simulates obtaining all materials, procedures, tools, keys, radios, etc… before performing task.

Standard: Performer follows management expectations with regards to safety and communication standards.

Step 1

ONI-D51 – Earthquake

Attachment 3 - Outside Actions

3.0 PROCEDURE

NOTE
The first ESW Inspection is required to be completed within 30 minutes of an OBE.

3.1 ESW Inspection

3.1.1 OBSERVE the following for possible indication of intake structure, intake tunnel or discharge tunnel damage:

- ESW forebay level
- ESW forebay water clarity
- Discharge tunnel entrance water level

Critical Step: Operator performs ESW inspection within 30 minutes.

Instructor Cue: ESW Forebay level is approximately 1 foot lower than recorded on Rounds this morning. Other conditions are as-found

Notes: ESW forebay level gauge is under north steps in ESW pumphouse. ESW forebay inspection must be done north of the screens. Service Water Weir markings are in 1 foot increments. (Water level is normally 18" to 24" over the weir).

Operator should inform the Control Room when ESW inspection done.

SAT ___ UNSAT ___

Comment(s): Time Complete for Time Critical Step _____

Step 2

3.1.2 CONTACT Engineering if any indication of blockage is noted.

3.1.3 REPEAT the inspection in Step 3.1.1 within 3 hours and once every 24 hours thereafter UNTIL Engineering has determined the inspections are no longer necessary.

Standard:	Operator contacts Engineering to report lower forebay level.
Instructor Cue:	Respond as Engineering
Notes:	None.
SAT ___	**UNSAT ___**

Step 3

NOTE
Underdrain Pumps, P72-C001E, is controlled from Underdrain Pump Local Control Station H51-P338E at Unit 1 Aux. Boiler Bldg. Elev. 620'.

3.2 Underdrain Pump Shutdown

3.2.1 PERFORM the following:

- VERIFY UNDERDRAIN PUMPS control switch in OFF P72-C001E
- VERIFY all Temporary Underdrain Pumps are shutdown at the local control panels.

Critical Step:	Operator simulates placing the P72-C001E in OFF, and verifying all temporary underdrain pumps are shutdown.
Instructor Cue:	• Initially, P72-C001E is in AUTO. • P72-C001E Switch in OFF (when operator simulates placing in OFF) • Temporary underdrain pumps are shutdown.
Notes:	Terminate the JPM.
SAT ___	**UNSAT ___**
Comment(s): _____	

Terminating Cue: Operator completes ESW inspection within 30 minutes, and placed Underdrain Pump switch in OFF.

Evaluation Results: SAT_____ UNSAT_____

End time _____

JPM CUE SHEET

INITIAL CONDITIONS:	• OBE Earthquake has occurred; • Five minutes ago, the Unit Supervisor entered ONI-D51.
INITIATING CUE:	The Unit Supervisor directs you as a Plant Operator to perform Attachment 3 of ONI-D51. **This JPM is Time Critical**

JOB PERFORMANCE MEASURE SETUP SHEET

System:	Fire Protection
Time Critical:	No
Alternate path:	No
Applicability:	RO/SRO
Safety Function:	8 - Plant Service Systems
Setting:	Plant (RRA)
Validated:	28 minutes
References:	SOI-P54 (WTR) Rev 23
Task Standard:	Initiate Deluge manually on Main Transformer C and Isophase Bus Duct per SOI-P54(WTR)
Task #:	286-511-04-04 Perform Manual Initiation of Transformer, Isophase Bus Duct, or Hydrogen Seal Oil Deluge System
Required Material:	SOI-P54 (WTR), Fire Protection System – Water Section 7.2
K / A Data:	600000 AK1.02 Knowledge of the operation applications of the following concepts as they apply to Plant Fire On Site: Fire Fighting 2.9 / 3.1 AA1.08 Ability to operate and / or monitor the following as they apply to Plant Fire On Site: Firefighting equipment used on each class of fire 2.6 / 2.9

1. Setup Instructions: When operator requests, provide operator with copy of SOI-P54(WTR).

2. Location / Method: Plant / Simulation

3. Initial Condition: A fire has been reported in 'C' phase of the Main Transformer. The US has entered ONI-P54, FIRE. The Main Transformers and main generator have been deenergized.

4. Initiating Cue: The Unit Supervisor directs you as the Field Supervisor to initiate deluge on the C Main Transformer.

Start Time: _____ **End Time**: _____

Candidate: _____

JPM BODY SHEET

Standard: Performer obtains or simulates obtaining all materials, procedures, tools, keys, radios, etc… before performing task.

Standard: Performer follows management expectations with regards to safety and communication standards.

Step 1

SOI-P54(WTR), FIRE PROTECTION SYSTEM - WATER

2.0 PRECAUTIONS AND LIMITATIONS

2.5 When any Main Transformer Deluge System is initiated for the purpose of combating a fire, the Isophase Bus Duct Deluge shall also be initiated.

2.16 The Deluge Systems of the three Main Transformers AND two Startup Transformers shall be aligned to support manual initiation only.

Standard: The Operator reviews SOI-P54(WTR) and determines deluge must be manually initiated.

Instructor Cue: None

Notes: None

SAT ___ UNSAT ___

Comment(s): _____

Step 2

7.2 Emergency/Manual Deluge Initiation (Transformer, Isophase Bus Duct, and Hydrogen Seal Oil)

NOTES

- Attachment 14 contains a listing of the components used in this section.
- The following section may be performed by the Fire Brigade, Fire Protection Personnel, Operators or other individuals as required.
- When any Main Transformer Deluge System is initiated for the purpose of combating a fire, the Isophase Bus Duct Deluge shall also be initiated.

Standard: The Operator determines that the Isophase Bus Duct Deluge shall also be initiated.

Instructor Cue: None

Notes: None

SAT ___ UNSAT ___

Comment(s): _____

Step 2

7.2.1 VERIFY OPEN the (*C Main Transformer deluge*) system Supply Isolation Valve.
1P54-F900

Critical Step:	Operator refers to Attachment 14 to obtain correct valve number and simulates opening the C Main Transformer Supply Isolation valve.
Instructor Cue:	• As Operator is opening valve, The Supply Isolation Valve stem is extending. • The Supply Isolation Valve is Open. • If asked, no flow noise is heard.
Notes:	None

SAT ___ UNSAT ___

Comment(s): _____

Step 3

7.2.2 OPEN the (*C Main Transformer*) Manual Initiation Valve door at the associated deluge valve.
1P54-F904

Standard:	Operator simulates breaking door seal and simulates opening Manual Initiation Valve door.
Instructor Cue:	None
Notes:	When operator simulates opening valve door, show picture #1 of Manual Initiation Valve.

SAT ___ UNSAT ___

Comment(s): _____

Step 4

7.2.3 PULL the (*C Main Transformer*) valve forward.

1P54-F904

Critical Step:	Operator refers to Attachment 14 to obtain correct valve number and simulates opening the C Main Transformer Manual Initiation valve.
Instructor Cue:	• The Manual Initiation Valve is Open. • If asked, flow noise is heard when BOTH the Supply Isolation and the Manual Initiation Valves are opened.
Notes:	When operator identifies Manual Initiation Valve enclosure, show Picture #1 of Manual Initiation Valve.

SAT ___ UNSAT ___

Comment(s): _____

Step 5

7.2.1 VERIFY OPEN the (*Isophase Bus Duct deluge*) system Supply Isolation Valve.

1P54-F1460

Critical Step:	Operator refers to Attachment 14 to obtain correct valve number and simulates opening the Isophase Bus Duct Supply Isolation valve.
Instructor Cue:	• As Operator is opening valve, The Supply Isolation Valve stem is extending. • The Supply Isolation Valve is Open. • If asked, no flow noise is heard.
Notes:	None

SAT ___ UNSAT ___

Comment(s): _____

Step 6

7.2.2 OPEN the (*Isophase Bus Duct*) Manual Initiation Valve door at the associated deluge valve.

Standard:	Operator simulates breaking door seal and simulates opening Manual Initiation Valve door.
Instructor Cue:	None
Notes:	When operator simulates opening valve door, show picture #2 of Manual Initiation Valve.

SAT ___ UNSAT ___

Comment(s): _____

Step 7

7.2.3 PULL the (*Isophase Bus Duct*) valve forward.

1P54- F1464

Critical Step:	Operator refers to Attachment 14 to obtain correct valve number and simulates opening the Isophase Bus Duct Manual Initiation valve.
Instructor Cue:	• The Manual Initiation Valve is Open. • If asked, flow noise is heard when BOTH the Supply Isolation and the Manual Initiation Valves are opened.
Notes:	When operator identifies Manual Initiation Valve enclosure, show Picture #2 of Manual Initiation Valve.

SAT ___ UNSAT ___

Comment(s): _____

Step 8

7.2.4 IF Manual-Electric Initiation is desired, THEN BREAK the glass on the Manual Release Station for the associated deluge system.

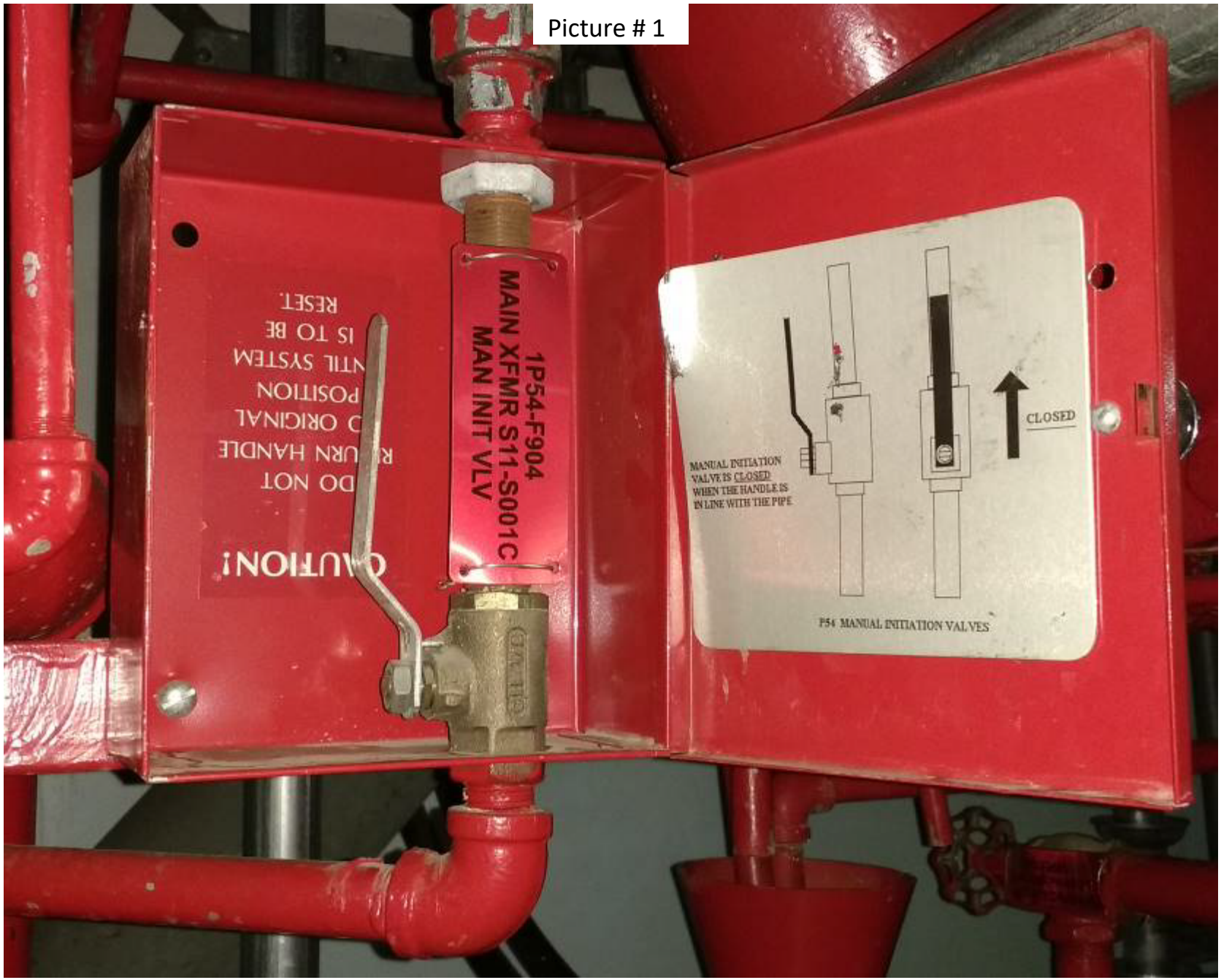
Standard:	Step 7.2.4 is N/A as Manual-Electric Initiation is not available.
Instructor Cue:	None
Notes:	Terminate JPM
SAT ___	**UNSAT ___**
Comment(s):	_____

Terminating Cue: Manual deluge on Main Transformer 'C' and the Isophase Bus Duct has been initiated per SOI-P54 section 7.2.

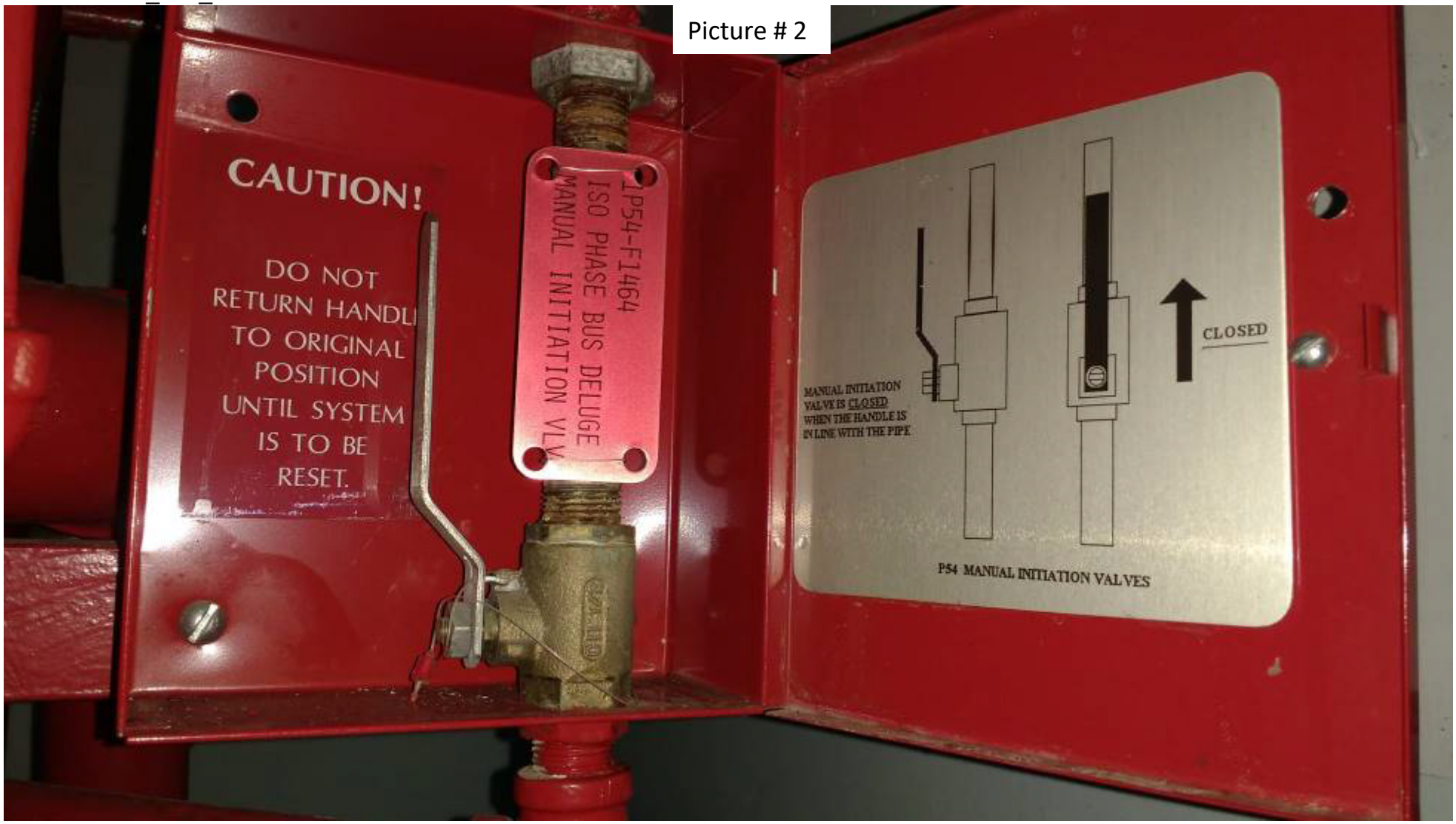
Evaluation Results: **SAT_____** **UNSAT_____**

End Time _____

Picture # 1


1P54-F904
MAIN XFMR S11-S001C
MAN INIT VLV
MANUAL INITIATION VALVE IS CLOSED WHEN THE HANDLE IS IN LINE WITH THE PIPE
CLOSED
P54 MANUAL INITIATION VALVES

Picture # 2


CAUTION!
DO NOT
RETURN HANDL
TO ORIGINAL
POSITION
UNTIL SYSTEM
IS TO BE
RESET.
1P54-F1464
ISO PHASE BUS DELUGE
MANUAL INITIATION VLV
MANUAL INITIATION
VALVE IS CLOSED
WHEN THE HANDLE IS
IN LINE WITH THE PIPE
CLOSED
P54 MANUAL INITIATION VALVES

JPM CUE SHEET

INITIAL CONDITIONS:	• A fire has been reported in 'C' phase of the Main Transformer. • The US has entered ONI-P54, FIRE. • The Main Transformers and main generator have been deenergized.
INITIATING CUE:	The Unit Supervisor directs you as the Field Supervisor to initiate deluge on the C Main Transformer.