Facility: Surry Power Station Scenario No.: 3 Op-Test No.: 2021-301

Examiners: ______________________ Operators: ______________________

Initial Conditions: Unit 1 100% MOL. 1-SD-P-1B degraded requiring ramp down to 84%.

- Containment Smoke and heat detectors are non-functional due local fire panel failure. TRM Section 3.3.1, Fire Detection Instrumentation, Condition B, Smoke Detectors, and Condition C, Heat Detectors is in effect. Containment air temperatures monitored once/hour, and restore to Functional status in 14 days. OC-18 for Containment Temperature Monitoring being performed by Unit 2 BOP for both Units.

Turnover: The Team will pre-brief ramp to 84% power in accordance with 1-OP-TM-005 prior to Simulator entry, and commence the ramp following turnover.

Event No.	Event Type*	Event Description
1	R – RO/SRO N - BOP	Upon assuming the Unit, the Team will commence a Ramp down to 84% power at the normal rate per 1-OP-TM-005 (.5%/ min).
2	I – BOP I - SRO TS-SRO	Power Range Channel 1, N41, fails LOW. AP-53.00/AP-4.00.
3	C – BOP C - SRO	"A" CN pump trips on overcurrent, "C" CN pump fails to auto start. **(CT-1)** AP-21.00.
4	C – RO/SRO TS - SRO	Presurizer Pressure Master Pressure Controller Fails Low. AP-53.00/AP-31.00.
5	C – BOP/RO C – SRO N-BOP/SRO	Momentary Loss of Vital Bus I. (1-AP-10.01)
6/7	M - All	Steam break on MS Header in Turbine Building; Upon reactor trip, TDAFW pump steam supply line ruptures, causing 3 faulted SG condition. Steam header break isolated by MSTVs. E-0, E-2, ECA-2.1. **(CT-2 and CT-3).**
8	C - BOP	Failures for BOP to identify/correct in E-0 Attachments. 1-CH-MOV-1381, auto close fail. 1-VS-MOD-103B auto close fail. MDAFW pumps fail to auto start.

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

LIST OF CRITICAL TASKS

CT #	EVENT	DESCRIPTION	MET (✓)
CT-1	CN pump trip	The BOP must start the standby Condensate pump prior to SG level causing an auto or manual reactor trip.	
CT-2	3 Faulted SGs	Restore at least one MDAFW pump prior to SG WR level lowering to FR-H.1 Feed and Bleed criteria (12%). Failing to do this would significantly complicate the scenario by challenging heat sink.	
CT-3	3 Faulted SGs	Lower AFW flowrate to 60 gpm to each SG if RCS cooldown rate is > 100°F/hour to prevent entry into FR-P.1. Failing to do this could cause an entry into FR-P.1 which is not needed.	

Event 1: Unit 1 Ramp to 84% power IAW 1-OP-TM-005. *(R- SRO/RO. N – BOP).*

This Event is a ramp down in power using control rods, CVCS blender (boration), and turbine controls to lower reactor power to 84%.

Verifiable Action(s):

1) RO will manipulate control rods to control delta flux and/or Tave.
2) RO will manipulate CVCS control to establish a normal boration to assist in Tave control.
3) BOP will manipulate Turbine Controls to establish power decrease.

Event 2: Power Range Channel 1 (N41) Fails LOW. *(I – BOP, I – SRO, TS – SRO).*

After the Team has ramped down in power at the normal rate, and the Evaluating Team is ready, the failure of N41 in the LOW direction is initiated. The Team will address the failure IAW AP-53.00 and AP-4.00.

Verifiable Actions(s):

1) BOP: Stop turbine ramp by placing in "HOLD".
2) BOP: Will perform Attachment 1 of AP-4.00 to place N44 in "TRIP".

Technical Specifications:

1) TS Table 3.7-1, Item 2, Operator Action 2, Place Failed Channel in trip within 72 hours, Inoperable channel may be bypassed up to 12 hours for surveillance testing, Either Thermal Power restricted to ≤ 75% of rated power and Neutron Flux trip setpoint reduced to ≤ 85% of Rated Power within 78 hours; OR the Quadrant Power Tilt monitored at least once per 12 hours. QPT shall be monitored using the in-core detectors.
2) TS-3.12.D, Quadrant Power Tilt. If the reactor is operating above 75% power with one ex-core nuclear channel out of service, the QPT shall be determined once per day, or a change in power level > 10%, or 30 inches of control rod motion.

Event 3: Trip of Running "A" CN pump with Failure of auto start of "C" CN pump. *(C – BOP, C - SRO).*

When the evaluating Team is ready, the malfunction for the trip of a running condensate pump will be initiated. The BOP will identify the trip of one of the running CN pumps and feed flow less steam flow on all SGs. BOP will perform the Immediate Actions of AP-21.00 and start the non-running condensate pump. The Team will complete AP-21.00 actions.

Verifiable Action(s):

1) BOP: Perform Immediate Actions of AP-21.00, Loss of Feedwater, and start a second Condensate pump.

Critical Task:

CT-1: The BOP must start the standby Condensate pump prior to SG level dropping low enough to cause an auto or manual reactor trip.

Event #4: Pressurizer Pressure MPC Fails LOW. *(C – RO, C – SRO, TS - SRO)*

When the Evaluating Team is ready, the failure of Pressurizer Pressure Master Pressure Controller 1-RC-PC-1444J (LOW) is implemented. This failure results in Master Pressure output lowering to minimum, causing all heaters to turn on, and preventing spray valves from opening. Pressurizer pressure will rise until the operator takes manual control of either the Master Pressure controller or spray controllers to lower pressure. If the operator fails to take corrective action in a timely manner, the Pressurizer PORV 1-RC-PCV-1455C will cycle open and close around its setpoint.

Verifiable Actions:

1) RO: Place Master Pressure controller in Manual and raise demand to open the PRZR spray valves; or place both spray valves in Manual and raise demand to open them. Restore pressure to normal band.

Technical Specifications:

1) TS 3.1.A.6.a, Relief Valves. With one or both PORVs inoperable but capable of being manually cycled, within 1 hour either restore the PORV(s) to OPERABLE status or close the associated block valve(s) and maintain power to the associated block valve(s). Otherwise, be in at least HOT SHUTDOWN within the next 6 hours and reduce Reactor Coolant System average temperature to < 350°F within the following 6 hours.

Event 5: Momentary loss of Vital Bus I. *(C – BOP/RO/SRO, TS – SRO, N-BOP/SRO)*

When Evaluating Team is ready, the next event will be initiated. This event is a momentary loss of Vital Bus I. The loss is due to a trip of the Inverter output breaker on fault, followed by the Static switch closing (2 sec later) to power Vital bus I.

Verifiable Action(s):

1) BOP: Return Normal Letdown to service IAW 1-OP-CH-020.
2) RO: Close Letdown Isolation valves, 1-CH-LCV-1460A and 1-CH-LCV-1460B.
3) RO: Open 1-RM-TV-100, and 1-RM-TV-100C
4) RO/BOP: Open 1-IA-TV-100, and 1-IA-TV-101A.
5) RO/BOP: Reset NI-41 Dropped rod signal.

Event #6/7: Steam break on Header followed by 3 Faulted SGs in SFGDs. (M –All)

When the evaluating Team is ready, the Major event will be initiated. This event is a steam break on the MS header in the Turbine Building, followed three (3) faulted SGs in Unit 1 SFGDs. The MSTVs close to isolate the Steam Break in the Turbine Building. During the transient the MDAFW pumps will not start following auto/manual initiation of SI, and only the ‘B’ MDAFW pump will manually start. The Team progresses through E-0, E-2, and then a transition to ECA-2.1 is made. The Team will identify a cooldown rate in excess of 100°F/hour and throttle AFW to ~ 60 gpm. This will result in a transition to FR-H.1, then a return to ECA-2.1.

Verifiable Actions:

1) RO: Trip the reactor and perform E-0 Immediate Actions.
2) BOP: Perform E-0 Attachments 1, 2, and 3. Identify and correct failure of the “A” FRV failing to close on the SI, 1-CH-MOV-1381 auto close, and 1-VS-MOD-103B failing to auto close. Also manually starts the MDAFW pump, 1-FW-P-3B.

Critical Task:

1) **CT-2:** Restore at least one MDAFW pump prior to SG WR level lowering to FR-H.1 Feed and Bleed criteria (12%). This would take approximately 12 minutes with no operator action. Failing to do this would significantly complicate the scenario by challenging heat sink.
2) **CT-3**: Lower AFW flowrate to 60 gpm to each SG if RCS cooldown rate is > 100°F/hour to prevent entry into FR-P.1. Failing to do this could cause an entry into FR-P.1 which is not needed.

The scenario may be terminated when the Evaluation Team is ready and after return to ECA-2.1 from FR-H.1.

Scenario Recapitulation

Total Malfunctions: 9
Abnormal Events: 6: AP-53.00 (two), AP-4.00, AP-10.01, AP-31.00, AP-21.00, Major
Transients: 2 (MSL Rupture, 3 Faulted SGs)
EOPs Entered: 2 (E-0, E-2)
EOP Contingencies: 2 (ECA-2.1, FR-H.1)

Initial Conditions: Unit 1 100% MOL. 1-SD-P-1B degraded requiring ramp down to 84%. Turnover: The Team will pre-brief ramp to 84% power in accordance with 1-OP-TM-005 prior to Simulator entry, and commence the ramp following turnover.
Equipment Status/ Procedures/ Alignments/ Data Sheets/ etc.: ○ Containment Smoke and heat detectors are non-functional due local fire panel failure (2 days ago). TRM Section 3.3.1, Fire Detection Instrumentation, Condition B, Smoke Detectors, and Condition C, Heat Detectors is in effect. Containment air temperatures monitored once/hour, and restore to Functional status in 14 days.
Turnover: The Team will pre-brief ramp to 84% power in accordance with 1-OP-TM-005 prior to Simulator entry, and commence the ramp following turnover. Another shift will perform the actual Heater Drain pump swap, and subsequent ramp up to 100%.

Scenario Objectives.

A. Given the Unit at 100% Power, commence a ramp to 84% in accordance with 1-OP-TM-005, Unit Ramping Operations.

B. Given the failure of N-41, Channel I Power Range Channel in the low direction, respond to the failure in accordance with 0-AP-53.00, Loss of Vital Instrumentation/Controls and 1-AP-4.00, Nuclear Instrumentation Malfunction.

C. Given the momentary loss of VB I, stabilize the plant iaw 1-AP-10.01, LOSS OF VB I.

D. Given the failure of the of Pressurizer Pressure Master Pressure Controller 1-RC-PC-1444J (LOW); respond in accordance with 0-AP-53.00, Loss of Vital Instrumentation/Controls and 1-AP-31.00, Increasing or Decreasing RCS Pressure, to regain control of RCVS pressure prior to automatic opening of a PRZR PORV..

E. Given an overcurrent trip of the “A” CN pump and the failure of the “C” CN pump to start, respond in accordance with 1-AP-21.00, Loss of Main Feedwater Flow, to restore feedflow to normal.

F. Given a steam break in Unit 1 Turbine Building, automatic steam line isolation, reactor trip, and a subsequent fault on the TDAFW steam supply line, respond in accordance with 1-E-0, Reactor Trip or Safety Injection, 1-E-2, Faulted Steam Generator Isolation, and 1-ECA-2.1, Uncontrolled Depressurization of All Steam Generators.

G. Given the failure of 1-CH-MOV-1381, Seal Return Isolation MOV, and 1-VS-MOD-103B, MCR Isolation Damper, to reposition on the Safety Injection signal, utilize E-0, Attachments 1 and 3 to identify and correct the condition

.

OPERATING PLAN:

Unit 1 is at 100% power with RCS boron concentration of 795 ppm.

During the last shift, 1-SD-P-1B, “B” High Pressure Drain Pump has started to degrade based on elevated vibration levels. The Team will ramp the unit to 84% based on 1-OP-TM-005 to ~84% power. All systems and crossties are operable with the following exception:

- Unit 1 and 2 Containment Temperature to the MCR Fire Panel are non-functional. In accordance with TRM Section 3.3.1, Fire Detection Instrumentation, Condition B, Smoke Detectors, and Condition C, Heat Detectors, are in effect. Containment air temperatures monitored once/hour, and restore to Functional status in 14 days. OC-18 for Containment Temperature Monitoring being performed by Unit 2 BOP for both Units.

Unit #2 is at 100% power with all systems and crossties operable.

Shift orders are to commence a Ramp to 84% power in accordance with 1-OP-TM-005, Unit Ramping Operations, using the Ramp Plan provided, upon relieving the watch. The SM has directed a 0.5%/min ramp rate to be used for the ramp. Performance of 1-OP-TM-005 has been authorized and has been PSA analyzed for current plant conditions. Another operator will operate the MSRs IAW 1-OP-TM-007, MSR Operation During or Following power reductions. The next shift will perform the Heater Drain pump swap and subsequent ramp up to 100%.

The previous shift performed two 30 gallon dilutions for temperature control.

Event Description: 1-OP-TM-005, Unit Ramping Operations, Ramp Down to 84% Power

Cue: Following Turnover, and Evaluators Ready

Time	Position	Applicant's Action or Behavior
	Team	1-OP-TM-005, Unit Ramping Operations Team will pre-brief Initial Conditions, Precautions and Limitations, and procedure prior to entering simulator. The team will be provided with a copy of 1-OP-TM-005, Unit Ramping (Marked up to Section 5.2); 1-OP-CH-007, Blender Operations; and a Reactivity plan.
	SRO	1-OP-TM-005, Unit Ramping Operations Section 5.1 will be completed (signed off), but will be reviewed by the team prior to entering the simulator. Section 5.2 begins on page 12 of this guide.
	SRO	1-OP-TM-005, Unit Ramping Operations 5.1 Preparations for Turbine Ramp Down 5.1.1 Review all lighted annunciator windows for adverse conditions that could impact the performance of this procedure. **Will be initialed as complete. – No annunciators Lit.** 5.1.2 Review the Tagout File for tagouts that could impact this procedure. **Will be initialed as complete. – MCR FP Panel Tagged out, OC-18 performed by Unit 2 BOP.** 5.1.3 Review the Plant Status Log for conditions that could impact this procedure. **Will be initialed as complete. – No items in the plant status log.**

Event Description: 1-OP-TM-005, Unit Ramping Operations, Ramp Down to 84% Power

Cue: Following Turnover, and Evaluators Ready

	SRO	1-OP-TM-005, Unit Ramping Operations Note prior to Step 5.1.4: Rod height adjustments should be used to maintain Delta Flux as recommended by Reactor Engineering. Boration or dilution should be used to account for power defect and Xenon changes to maintain reference temperature. 5.1.4 Check or align letdown orifices for anticipated power change IAW 1-OP-CH-006, Shifting or Increasing/Decreasing Letdown Flow. **Will be initialed as complete.** 5.1.5 For scheduled power level changes greater than 10%, verify that a reactivity plan has been provided by Reactor Engineering. Otherwise, direct the STA to notify Reactor Engineering and request recommendations for control of core parameters. • Delta Flux control • Recommendations for Rod height and/or RCS Boron adjustments • Expected Xenon transient **Will be initialed as complete. The team will be given a reactivity plan.** 5.1.6 <u>TM</u> Have an Electrician remove the seal-in contacts from the MSR STM SUP valves IAW Attachment 5, Moisture Separator MOV Seal-in Contact Defeat. **Will be initialed as complete.** 5.1.7 Enter the Temporary Modification as a Procedurally Controlled Modification (PCTM) in the Unit 1 Temporary Modification Log. **Will be initialed as complete.** Caution prior to Step 5.1.8: Energizing additional PRZR heaters may cause a change in RCS average temperature due to a difference in boron concentration between the PRZR and the RCS. 5.1.8 Return PRZR Backup Heaters to the MANUAL ON position IAW 1-OP-RC-019, Pressurizer Heater Operation. **Will be initialed as complete.** 5.1.9 Record the Target Power Level, the Current Power Level, and the Percent Power Change below. <u>IF</u> the Target Power Level is unknown, <u>THEN</u> enter N/A for this step. Current Power Level ____100%____ Minus Target Power Level - ____84%____ Equals Percent Power Change = ____16%____ **Will be initialed as complete.**

Event Description: 1-OP-TM-005, Unit Ramping Operations, Ramp Down to 84% Power

Cue: Following Turnover, and Evaluators Ready

		Note prior to Step 5.1.10: If a shift turnover is required while Subsection 5.2 is in progress, Steps 5.1.10, 5.1.11 and 5.1.12, as applicable, must be performed for the relieving shift. Multiple signoffs are provided for this purpose. 5.1.10 Check that the Shift Manager (who is the designated Test Coordinator) or his designee has reviewed the Detailed Pre-Job Briefing Checklist and Responsibilities in Attachment 1 (page 3 of 5) and conducted a Detailed Pre-Job Briefing with all personnel performing the unit ramp. **Will be initialed as complete.** 5.1.11 Check that the Senior Operations Manager or Operations Manager on Call has reviewed the Management Expectations Briefing Checklist in Attachment 1(page 2 of 5) and briefed the Operations Department and support personnel on management expectations. This step may be marked N/A if the ramp is required due to an emergent issue and a Senior Operation Manager or Operations Manager On Call is not available in a timely manner. **Will be initialed as complete.** 5.1.12 The pre-job brief shall include the items in Attachment 2, Pre-job Brief Expectations for Reactivity Control. **Will be initialed as complete.** . 5.1.13 Determine the specific rate of Reactor Power change and the methods which will be used to achieve this rate of change. Rate of Power Change _____0.5% per minute_________ Minus Target Power Level - ___Turbine, Boration, Rods____ **Will be filled in, and initialed as complete**. 5.1.14 Notify Energy Supply (MOC), Chemistry, and the Polishing Building that the power change is imminent. **Will be initialed as complete. Team will re-perform these steps prior to entering simulator.** The Team will commence with Section 5.2. Several steps may be completed prior to entering the simulator (i.e., marked N/A).

Event Description: 1-OP-TM-005, Unit Ramping Operations, Ramp Down to 84% Power

Cue: Following Turnover, and Evaluators Ready

<table>
<tr><td></td><td>SRO/RO</td><td>1-OP-TM-005, Unit Ramping Operation

5.2 Power Reduction Between 100% and 50% Reactor Power

Caution prior to Step 5.2.1: To maintain positive control of the Reactor, control rods shall be moved in a deliberate, carefully controlled manner while the response of the Reactor is closely monitored.

Note prior to step 5.2.1: Steps in this subsection may be performed out of sequence with permission from Shift Supervision.

5.2.1 Initiate Attachment 4, Reactivity Control and Monitoring During Ramp.

Another operator will perform Attachment 4, 1-OP-TM-005. This step can be signed off.

Crew performs step and initials step completion.

Notes prior to Step 5.2.2:
• The ramp rate may be changed, or stopped as required to control Plant parameters.
• Normal ramp rate is obtained using Position 6 on the LOAD RATE % PER MIN thumbwheel. A change in the ramp rate thumbwheel to position 8, or position 1, or stopping and starting the ramp, may be necessary to control plant parameters.
• If the power reduction is stopped during the ramp down, IMP OUT may be used to assist in stabilizing the Turbine.

5.2.2 Check or place Turbine in IMP IN or IMP OUT as determined by Shift Supervision.

Crew places Turbine in IMP IN or IMP OUT (normally use IMP IN)

5.2.3 Commence the power reduction at the ramp rate specified by Shift Supervision.

Crew places Turbine to “GO” and commences ramp rate at 0.5%/min.

Note prior to step 5.2.4: During power reduction, the Valve Position Limiter should be maintained approximately 2 to 3 percent avobe the steady state power level. The Turbine control valves should <u>not</u> run up against the Valve Position Limiter.

5.2.4 Lower the Valve Position Limiter and maintain the Limiter <u>as close as reasonably possible</u> above the actual turbine load during power reduction.

Crew operates Valve Position Limiter and signs off the step.</td></tr>
</table>

Event Description: 1-OP-TM-005, Unit Ramping Operations, Ramp Down to 84% Power

Cue: Following Turnover, and Evaluators Ready

	SRO/RO BOP	1-OP-TM-005, Unit Ramping Operation Note prior to step 5.2.5: Alternate indications of Reactor Power, such as Core ΔT, First Stage Pressure, Condensate and Feedwater performance parameters, and Electrical output, should be reviewed and compared during power reduction. 5.2.5 Borate, dilute or use control rods as required to maintain ΔØ in band. Observe the expected response on FR-I-113, BA – PRI WTR FLOW, and Y1C-113, BA SUP BATCH INTEGRATOR. **Crew will use 1-OP-CH-007, BLENDER OPERATIONS, for the necessary Boration during the ramp.** NOTE: 1-OP-CH-007, 5.3, Boration is found at the end of this section. Caution prior to step 5.2.6: The Turbine will momentarily (1.5 seconds) shift to MANUAL when placing in IMP IN. To minimize Governor valve oscillations, the GV Tracking Meter should read as close to zero as possible before transferring to IMP IN. Note: Minor fluctuations in GV Tracking is normal. GV Tracking is working as designed. 5.2.6 <u>IF</u> the Turbine control is in IMP OUT, <u>THEN</u> perform the following substeps <u>WHEN</u> Reactor power is approximately 90 – 91%. <u>IF</u> the Turbine control is in IMP IN, <u>THEN</u> enter N/A to the following substeps. a. Stabilize the unit.. b. Check the GV Tracking Meter as close to zero as possible. c. Place the Turbine in IMP IN. d. Recommence the load reduction. **Crew performs step and initials step completion. (Anticipate step is N/A)** 5.2.7 Operate MSRs IAW 1-OP-TM-007, MSR Operation During or Following Power Reductions, as the Turbine load lowers. **Another operator will be briefed and perform this function.** 5.2.8 <u>IF</u> the 2nd Point Extraction can <u>NOT</u> continue to supply the Auxiliary Steam Heater, <u>**THEN**</u> check that 1-AS-PCV-100, Auxiliary Steam Header PCV, is controlling Auxiliary Steam Header pressure between 160 psib and 180 psig. Enter N/A if the Auxiliary Steam Header is being supplied from an alternate source. **Crew performs step and initials step completion** Note: steps 5.2.9 thru step 5.2.13 deal primarily with actions at 60 % power (which is below the power limit specified to ramp to.)

Event Description: 1-OP-TM-005, Unit Ramping Operations, Ramp Down to 84% Power

Cue: Following Turnover, and Evaluators Ready

		5.2.14 Continue the power ramp to 84 percent (approximate) power. *Evaluator's Note: No further actions are expected for this event.*
		-- END EVENT 1 --

Event Description: 1-OP-TM-005, Unit Ramping Operations, Ramp Down to 84% Power

Cue: Following Turnover, and Evaluators Ready

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5.3 **Boration**

NOTE: This subsection will be used for the first boration of the shift. Attachment 2 will be used as a guide for further borations for the remainder of the shift, unless Excess Letdown is in service.

______ ______ IV 5.3.1 Determine the required integrator setpoint by performing the following:

______________ gal (-) _____________= ___________ Integrator setpoint

(Desired Boration) (anticipated additional flow, dependent on flowrate)

______ 5.3.2 Notify Shift Supervision of impending Boration. **(Reference 2.4.1)**

______ 5.3.3 Place the MAKE-UP MODE CNTRL switch in the STOP position.

Op-Test No.: Surry 2021-1 **Scenario No.: 3** **Event No.: 1**

Event Description: 1-OP-TM-005, Unit Ramping Operations, Ramp Down to 84% Power

Cue: Following Turnover, and Evaluators Ready

5.3.4 Adjust both of the following controllers for the flow rate and total gallons of Boric Acid for the boration. IF the **BA FLOW CNTRL** controller setpoint has previously been set, THEN enter N/A for that Substep.

_____ a. 1-CH-FC-1113A, BA FLOW CNTRL _________ GPM (IAW Attachment 9)

_____ b. Record the number of gallons of Boric Acid to be added from Step 5.3.1.

______________ GAL

c. Enter the number of gallons of BA to be added in 1-CH-YIC-1113, BA SUPPLY BATCH INTEGRATOR (GAL) as follows:

_____ 1. Depress PRESET A Button (Controller will read the last value entered into the controller; reads in tenths of gallons.)

_____ 2. To clear PRESET A, depress the CLR Button. Enter N/A if not required.

_____ 3. Enter desired PRESET A value. Enter N/A if not required.

_____ 4. Depress ENT Button.

_____ 5.3.5 Place the MAKE-UP MODE SEL switch in the BORATE position.

_____ 5.3.6 Place the MAKE-UP MODE CNTRL switch in the START position.

5.3.7 Check all of the following conditions.

_____ a. 1-CH-FCV-1113A, BORIC ACID TO BLENDER, is controlling in AUTO.

_____ b. 1-CH-FCV-1113B, BLENDER TO CHG PUMP, is open.

_____ c. 1-CH-FCV-1114A, PGW TO BLENDER, is closed.

_____ d. 1-CH-FCV-1114B, BLENDER TO VCT, is closed.

Event Description: 1-OP-TM-005, Unit Ramping Operations, Ramp Down to 84% Power

Cue: Following Turnover, and Evaluators Ready

______ 5.3.8 IF performing a unit ramp, THEN adjust Boric Acid flow on 1-CH-FC-1113A as required. Otherwise, enter N/A.

5.3.9 IF unit is on Excess Letdown AND divert of flow is necessary for inventory control OR Reactivity Management, THEN perform the following substeps. Otherwise, enter N/A. (**Reference 2.4.3**)

______ a. Check closed or slowly close 1-CH-HCV-1137, EXCESS LETDOWN FLOW.

______ b. Place 1-CH-HCV-1389, EXCESS LETDOWN DIVERT, to the PDTT position.

______ c. Slowly open 1-CH-HCV-1137 until approximately 15 gpm flow is established to the PDTT.

______ d. Check 1-CC-TI-108, EXCESS LETDOWN HX CC OUTLET TEMP, indicates less than 150°F.

______ e. Check 1-CH-TI-1139, EXCESS LETDOWN HX OUTLET TEMP, is less than 195°F.

______ f. Adjust RCP Seal Injection and/or Charging Flow as necessary to control inventory.

______ g. WHEN VCT and/or PRZR level have been adjusted, THEN return Excess letdown to the VCT by placing 1-CH-HCV-1389 to the VCT position.

______ 5.3.10 IF it is desired to stop the Boration before the selected amount, THEN place the MAKE-UP MODE CNTRL switch in the STOP position. IF the BA SUPPLY BATCH INTEGRATOR (GAL) is used to stop the flow, THEN enter N/A for this step.

______ 5.3.11 WHEN the desired amount of makeup has been reached, THEN check 1-CH-FCV-1113B closes.

Event Description: 1-OP-TM-005, Unit Ramping Operations, Ramp Down to 84% Power

Cue: Following Turnover, and Evaluators Ready

5.3.12 WHEN boration is complete, THEN do the following. IF boric acid is to remain in the Blender to support ramping the Unit, THEN enter N/A.

______ a. Manually blend approximately 20 gallons to flush the boration path IAW Subsection 5.5.

______ b. Enter N/A for Steps 5.3.13 through 5.3.15.

______ 5.3.13 Place the MAKE-UP MODE SEL switch in the AUTO position.

______ 5.3.14 Place the MAKE-UP MODE CNTRL switch in the START position.

______ 5.3.15 Notify Shift Supervision of Blender status. **(Reference 2.4.1)**

Performed by: ______________________ ________ ______________________ ________
Signature Initial Print Date

______________________ ________ ______________________ ________
Signature Initial Print Date

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Event Description: 1-OP-TM-005, Unit Ramping Operations, Ramp Down to 84% Power

Cue: Following Turnover, and Evaluators Ready

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Attachment 2
REPEATED BORATIONS

NOTE:
- This attachment will be used for repeated Borations after the initial Subsection 5.3 has been filled out for the shift.
- Attachment 4 will be used for repeated Manual Makeups after the initial Subsection 5.5 has been filled out for the shift.
- Subsection 5.3 should be used for further Borations if Unit is on Excess Letdown.

Procedure Steps:	**Gal/Initial (1)**	**Gal/Initial (2)**	**Gal/Initial (3)**
	Perf	**Perf**	**Perf**
2.1 Notify Shift Supervision of impending Boration. **(Reference 2.4.1)**			
2.2 Notify STA of impending Boration.			
2.3 Place the MAKE-UP MODE CNTRL switch in the STOP position.			
2.4 Check set or set BA flow controller for the Boration.			
2.5 Record the number of gallons of BA to be entered into the BA Integrator.	/	/	/
2.6 Depress PRESET A Button on 1-CH-YIC-1113.			
2.7 To clear PRESET A, depress the CLR Button on 1-CH-YIC-1113. Enter N/A if not required.			
2.8 Enter desired PRESET A value from Step 2.5 on 1-CH-YIC-1113. Enter N/A if not required.			
2.9 Depress ENT Button on 1-CH-YIC-1113.			
2.10 Place the MAKE-UP MODE SEL switch in the BORATE position.			
2.11 Place the MAKE-UP MODE CNTRL switch in the START position.			
2.12 Check proper valve positions.			
2.13 WHEN the desired amount of Boration has been completed, THEN check proper valve positions.			

Event Description: 1-OP-TM-005, Unit Ramping Operations, Ramp Down to 84% Power

Cue: Following Turnover, and Evaluators Ready

Attachment 2
REPEATED BORATIONS

2.14 WHEN boration is complete, THEN perform the following. IF boric acid is to remain in the Blender to support ramping the Unit, THEN enter N/A.			
a. Enter N/A for Steps 2.15, 2.16, and 2.17.			
b. GO TO Subsection 5.5 or Attachment 4.			
2.15 Place the MAKE-UP MODE SEL switch in the AUTO position.			
2.16 Place the MAKE-UP MODE CNTRL switch in the START position.			
2.17 Notify Shift Supervision of Blender status. **(Reference 2.4.1)**			

Event Description: **Power Range N41 Fails Low.**

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	Team	N41 Fail Low Diagnose this failure using the following alarms and indications: Annunciator 1G-E4, NIS PWR RNG CH AVG FLUX DEVIATION Annunciator 1G-H1, NIS DROPPED ROD FLUX DECREASE > 5% PER 2 SECS N41 indication on Benchboard and NI Drawer Fail Low.
	RO	0-AP-53.00, Loss of Vital Instrumentation/Controls. Perform Immediate Actions of AP-53.00: [1] CHECK REDUNDANT INSTRUMENT CHANNEL(S) INDICATION – NORMAL. [2] PLACE AFFECTED CONTROL(S)/ COMPONENT(S) IN MANUAL CONTROL AND STABILIZE PARAMETER USING REDUNDANT INDICATION NOTE: Crew may go straight to AP-4.00 (this is <u>not</u> incorrect). **Reports to SRO: Immediate Actions of AP-53.00 complete, N41 failed LOW**.
	SRO	0-AP-53.00 The SRO will lead a transient brief. During the brief, the failure of N41 will be discussed. The RO/BOP will report Annunciators received related to the event, and Critical Parameters affected. STA will have no input for the brief.
	SRO RO	0-AP-53.00 3. CHECK REACTOR POWER – LESS THAN OR EQUAL TO 100% Report reactor power is less than 100%, and provides current reactor power indication.

Event Description: **Power Range N41 Fails Low.**

Cue: By Examiner.

	SRO	0-AP-53.00 Notes prior to Step 4. • Step 4 failures are listed in order of performance priority. Only the failed instrument/control and associated step number should be read aloud. • When the affected instrument/controller malfunction(s) has been addressed by this procedure, recovery actions should continue at Step 13. 4. DETERMINE THE FAILED INSTRUMENT / CONTROL AND GO TO APPROPRIATE STEP OR PROCEDURE: • NI Malfunction, 1-AP-4.00 ***SRO Transitions to AP-4.00***.
	SRO	1-AP-4.00, Nuclear Instrument Malfunction SRO will conduct focus brief, changes to parameters or Unit status will be discussed. RO/BOP will provide input for Unit Status change. STA will have no input for the brief. SRO will continue 1-AP-4.00
	SRO BOP	1-AP-4.00, Nuclear Instrument Malfunction NOTE Prior to STEP 1: Attachments 6, 7, and 8 show one-line diagrams of Nuclear Instrumentation. Acknowledges Note.
	SRO BOP	1-AP-4.00, Nuclear Instrument Malfunction. 1 CHECK NI MALFUNCTION – POWER RANGE FAILURE. Reports Yes, N41 Failed.
	SRO BOP	1-AP-4.00, Nuclear Instrument Malfunction. 2. STABILIZE UNIT CONDITIONS RO reports that Unit conditions are stable. Note: The crew may decide to continue the ramp in order to better control the plant. This is acceptable provide the crew maintains control of RCS temperature and Delta Flux.

Event Description: **Power Range N41 Fails Low.**

Cue: By Examiner.

	SRO BOP	1-AP-4.00, Nuclear Instrument Malfunction. 3. CHECK N-44 – FAILED. RO reports that NO, N-41 has Failed. 3RNO. GO TO STEP 6
	SRO BOP	1-AP-4.00, Nuclear Instrument Malfunction. 6. CHECK N-43 - FAILED Reports NO, N41 has failed. GOES TO STEP 8.
	SRO BOP	1-AP-4.00, Nuclear Instrument Malfunction. 8. CHECK POWER RANGE CHANNELS - ONLY ONE FAILED Reports Yes, only N41 Failed.
	SRO BOP	1-AP-4.00, Nuclear Instrument Malfunction. NOTE Prior to Step 9: Performance of Attachment 1 to place the failed Power Range Channel in trip requires I&C assistance for N-41, N-42, or N-43. Acknowledges NOTE.
	SRO	1-AP-4.00, Nuclear Instrument Malfunction. 9. INITIATE ATTACHMENT 1 TO PLACE FAILED CHANNEL IN TRIP WITHIN 72 HOURS Directs BOP to perform 1-AP-4.00, Attachment 1, Part 1, 2, and 3. *Note: Attachment 1 actions are on pages 25 - 27.*
	SRO RO	1-AP-4.00, Nuclear Instrument Malfunction. 10. CHECK NI MALFUNCTION – INTERMEDIATE RANGE FAILURE Reports No, Power Range Failure SRO GOES to Step 19
	SRO RO	1-AP-4.00, Nuclear Instrument Malfunction. 19. CHECK NI MALFUNCTION – SOURCE RANGE FAILURE Reports No, Power Range Failure SRO Goes to Step 38

Event Description: **Power Range N41 Fails Low.**

Cue: By Examiner.

	SRO	1-AP-4.00, Nuclear Instrument Malfunction. 38. NOTIFY THE FOLLOWING • Instrument Shop • OM on call
	SRO	Notifies Shift Manager of Unit status, procedures used, and Tech Spec Requirements. Requests that the Shift Manager notify I&C and the OMOC.
		--- END OF EVENT 2 ---

Event Description: **Power Range N41 Fails Low.**

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	BOP	1-AP-4.00, Attachment 1: ONE POWER RANGE CHANNEL INOPERABLE 1. Record the following indications for the failed Power Range Channel: • Power Level • Delta Flux • Upper Detector Current • Lower Dectector Current Applicant records indications.
	BOP	1-AP-4.00, Attachment 1: ONE POWER RANGE CHANNEL INOPERABLE 2. Perform the following at the NIS panel within 72 hours. • Comparator and Rate Drawer **a. Select the failed channel on the COMPARATOR CHANNEL DEFEAT switch. (N-41)** b. Check annunciator 1G-E4, NIS PWR RANGE CH AVG FLUX DEVIATION - NOT LIT. *Annunciator will be NOT LIT*. • Miscellaneous Control and Indication Panel a. **Select the failed channel on the ROD STOP BYPASS switch. (N-41).** b. Check annunciator 1G-G1, NIS PWR RNG HI FLUX ROD STOP - NOT LIT. Annunciator will be NOT LIT. c**. Select the failed channel on the UPPER SECTION defeat switch. (N-41).** d. IF Reactor power greater than 50%, THEN check annunciator 1G-C4, UPPER ION CHAMBER DEVIATION OR AUTO DEFEAT < 50% - NOT LIT. (annunciator will remain LIT if any Power Range channel less than 50%) e**. Select the failed channel on the LOWER SECTION defeat switch. (N-41).** f. IF Reactor power greater than 50%, THEN check annunciator 1G-D4, LOWER ION CHAMBER DEVIATION OR AUTO DEFEAT < 50% - NOT LIT. (annunciator will remain LIT if any Power Range channel less than 50%)

Event Description: **Power Range N41 Fails Low.**

Cue: By Examiner.

	BOP	1-AP-4.00, Attachment 1: ONE POWER RANGE CHANNEL INOPERABLE NOTE Prior to Step 3: Annunciator NIS PWR RNG HI STPT (1E-E5, 1E-F5, 1E-G5, or 1E-H5) for the channel being placed in trip, NIS PWR RNG LOSS OF DET VOLT (1G-C3), and NIS DROPPED ROD FLUX DECREASE > 5% PER 2 SEC (1G-H1) will alarm when the instrument power fuses are pulled If Reactor power is less than 10%, annunciator NIS PWR RNG LO STPT HI FLUX (1E-D5) will alarm when the instrument power fuses are pulled. Acknowledges NOTE.
	BOP	1-AP-4.00, Attachment 1: ONE POWER RANGE CHANNEL INOPERABLE BOP Notifies RO prior to Removing Instrument Fuses (a. Below) 3. Place the failed Power Range channel in trip IAW the following: a. **At the Power Range drawer, remove the INSTRUMENT POWER fuses. (N-41).** b. **At the Power Range drawer, put the POWER RANGE TEST switch in the TEST position. (N-41).** c. Check annunciator 1G-H1, NIS DROPPED ROD FLUX DECREASE > 5% PER 2 SEC - LIT. Annunciator will be LIT. d. Check annunciator 1G-C3, NIS PWR RNG LOSS OF DET VOLT - LIT. Annunciator will be LIT. e. IF Reactor power less than 10%, THEN check annunciator 1E-D5, NIS PWR RNG LO STPT HI FLUX - LIT. Annunciator will not be NOT LIT.
	BOP	1-AP-4.00, Attachment 1: ONE POWER RANGE CHANNEL INOPERABLE 4. Remove the following PCS points for the failed channel from scan: • **N-41, N0041A and N0042A** • N-42, N0043A and N0044A • N-43, N0045A and N0046A • N-44, N0047A and N0048A **The BOP will remove these points from scan**. ***Only N-41 points (in BOLD Above) will be taken off scan***. *Note: Only the Shift Manager Computer has the rights to take PCS points out of scan.*
	SRO	1-AP-4.00, Attachment 1: ONE POWER RANGE CHANNEL INOPERABLE 5. Notify I&C to initiate 0-ICM-ZZ-001, Placing Technical Specifications Channel in Trip to place OTDT and OPDT for the failed Power Range channel in TRIP and check the associated annunciators LIT.

Event Description: **Power Range N41 Fails Low.**

Cue: By Examiner.

		1-AP-4.00, Attachment 1: ONE POWER RANGE CHANNEL INOPERABLE 6. <u>IF</u> Reactor power is greater than 75%, <u>THEN</u> do either a <u>OR</u> b below. a. Determine the core quadrant balance using the incore movable detectors when any of the following occur: • Twelve hours have passed since the last core quadrant balance was performed. • A change in Reactor power level greater than 10%. • Control Rod movement of greater than 30 inches. (48 steps) OR b. Within 12 hours, reduce Reactor power to less than or equal to 75% of rated power, and within 78 hours, reduce the High Flux trip setpoint to less than or equal to 85% of rated power.
		1-AP-4.00, Attachment 1: ONE POWER RANGE CHANNEL INOPERABLE 7. <u>IF</u> Reactor power is less than or equal to 75%, and will remain there, <u>THEN</u> within 78 hours, reduce the High Flux trip setpoint to less than or equal to 85% power.
		1-AP-4.00, Attachment 1: ONE POWER RANGE CHANNEL INOPERABLE 8. Refer to Tech Spec Table 3.7-1, Item 2, 5, 6, and 20. 9. Refer to Tech Spec 3.12.D. SRO Consults Tech Specs and identifies: 1) **TS Table 3.7-1, Item 2 Nuclear Flux Power Range,** Operator Action 2, Place Failed Channel in trip within 72 hours, Inoperable channel may be bypassed up to 12 hours for surveillance testing, Either Thermal Power restricted to ≤ 75% of rated power and Neutron Flux trip setpoint reduced to ≤ 85% of Rated Power within 78 hours; OR the Quadrant Power Tilt monitored at least once per 12 hours. QPT shall be monitored using the in-core detectors. 2) **TS Table 3.7-1, Item 5 OTDT,** Operator Action 6, Place Failed channel in trip within 72 hours. Inoperable channel may be bypassed up to 12 hours for surveillance testing. If the conditions are not satisfied in the time permitted, be in at least Hot Shutdown within 6 hours. 3) **TS Table 3.7-1, Item 6 OPDT,** Operator Action 6 (same as above). 4) **TS-3.12.D, Quadrant Power Tilt.** If the reactor is operating above 75% power with one ex-core nuclear channel out of service, the QPT shall be determined once per day, or a change in power level > 10%, or 30 inches of control rod motion
		BOP will return Attachment to SRO and report Parts 1-4 are complete. Return to AP-4.00 step 10.

Event Description: **Loss of 1-CN-P-1A w/flr of 1-CN-P-1C to auto start..**

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	Team	Trip "A" CN Pump, "C" CN pump Fails to auto start Diagnose the failure based on the following alarms and indications: • Annunciator 1K-D4, 4KV BKR AUTO TRIP. • Feedflow less than Steam flow on all SGs. • SG NR level lowering on all three SGs
	BOP	1-AP-21.00 Perform Immediate Actions of 1-AP-21.00. [1] CHECK MAIN FEED PUMP STATUS: a) Check Reactor Power – GREATER THAN 80% b) Check Main Feed Pumps – TWO RUNNING Identify power > 80% AND two Main Feed pumps running.
	BOP	1-AP-21.00 [2] START AN ADDITIONAL CONDENSATE PUMP Identify 1-CN-P-1C, "C" CN Pump, failed to auto start. **Start 1-CN-P-1C**. **CT-1:** The BOP must start the standby Condensate pump prior to SG level dropping low enough to cause an auto or manual reactor trip.

Event Description: **Loss of 1-CN-P-1A w/flr of 1-CN-P-1C to auto start..**

Cue: By Examiner.

	BOP	1-AP-21.00 [3] REDUCE TURBINE LOAD TO MATCH STEAM FLOW WITH FEED FLOW Use Valve Position Limiter OR Reduce Turbine load using Turbine Manual Monitor Feed flow/Steam flow mismatch and determine load reduction is not necessary. Report Immediate Actions of AP-21.00 are complete and SG levels are trending to program level.
	SRO	1-AP-21.00 Conduct Transient Brief, describe event that occurred, procedure used, procedure used to continue further actions. RO/BOP will provide alarms received during the event and Critical Parameters. STA will provide no input. SRO will finalize the Transient Brief, direct the RO to contact the Unit 1 Turbine Building Operator and the Service Building Operator to perform local checks on the “C” CN pump (post start), “A” CN pump (indications of cause for tripping) and status of “A” CN pump breaker. SRO will then continue with AP-21.00. **NOTE**: Team may use 1K-D4 ARP to place the “A” CN pump in PTL; common alarm for a number of loads; allows alarm to be received if other loads subsequently trip.
	SRO BOP SRO	1-AP-21.00 4. CHECK CONDENSATE POLISHING BLDG BYPASS - REQUIRED Main Feed Pump Suction Pressure - LESS THAN 400 PSIG Reports No, Feed Pump suction >400 psig (will report actual indicated pressure) Goes to Step 6
	SRO RO	1-AP-21.00 6. ENERGIZE ALL PRZR HEATERS Reports all pressurizer heaters energized.

Event Description: **Loss of 1-CN-P-1A w/flr of 1-CN-P-1C to auto start..**

Cue: By Examiner.

	SRO BOP	1-AP-21.00 7. CHECK STEAM DUMP OPERATION - REDUCING TAVE/TREF MISMATCH BASED ON DEMAND SIGNAL Reports Yes, steam dumps operating properly.
	SRO RO SRO RO	1-AP-21.00 **NOTE Prior to Step 8**: Depending on initial plant conditions, rod insertion or boration may be used to stabilize RCS temperature and maintain ΔFlux in band. Acknowledges NOTE. 8. CHECK CONTROL RODS - INSERTING IF NECESSARY Reports No, not necessary
	SRO RO	1-AP-21.00 9. CHECK ANNUNCIATOR 1E-E3, ΔFLUX DEVIATION - NOT LIT Reports Yes, Not Lit.
	SRO BOP	1-AP-21.00 10. CHECK ALL SG FLOWS - STEAM FLOW IS LESS THAN OR EQUAL TO FEED FLOW Reports Yes, Steam Flow is equal to Feed Flow.
	SRO BOP	1-AP-21.00 11. CHECK ALL SG LEVELS - AT OR TRENDING TO PROGRAMMED LEVEL Reports Yes, all SGs are ~ 44%.
	SRO RO	1-AP-21.00 12. CHECK TAVE - MATCHED WITH TREF Reports Yes, (will provide actual Tave/Tref mismatch.)
	SRO BOP	1-AP-21.00 13. CHECK FEED HEADER TO STEAM HEADER ΔP - AT LEAST 50 PSID Yes, (will provide actual ΔP indicated.)

Event Description: **Loss of 1-CN-P-1A w/flr of 1-CN-P-1C to auto start..**

Cue: By Examiner.

	SRO BOP	1-AP-21.00 14. CHECK AMPs ON EACH MOTOR OF THE RUNNING MAIN FEED PUMP(s) – LESS THAN 420 AMPS Reports Yes, (provides actual MFP amps indicated.)
	SRO BOP	1-AP-21.00 NOTE: The polishing building should be returned to service as soon as reasonably achievable to minimize iron transport and prevent entry in an Action Level. 15. CHECK OPERATION OF MAIN FEED PUMP(s) • Recirc valve position (**Closed**) • Discharge MOV position (**Open**) • Pump amps (Normal, may provide actual MFP Amp indication.)
	SRO RO	1-AP-21.00 16. CHECK REACTOR POWER CHANGE – LESS THAN 15% IN ONE HOUR Reports Yes, (will provide indicated reactor power.)
	SRO	1-AP-21.00 17. NOTIFY THE FOLLOWING: OMOC Maintenance Foreman SRO notifies Shift Manage of Plant Status, Completion of AP-21.00, Report results of local investigation of “B” CN pump and breaker, and requests OMOC and Maintenance Foreman be notified of the event. Evaluator Note: The crew may stop the ramp at this time, if they haven’t already. They may use 1-OP-CH-007, BLENDER OPS to stabilize the plant through dilutions.
		---End EVENT #3---

Op-Test No.: Surry 2021-3 Scenario No.: 3 Event No.: 4

Event Description: PRZR Master Pressure Controller fails LOW (0-AP-53.00)

Cue: When initiated by Team

Time	Position	Applicant's Action or Behavior
	RO	0-AP-53.00 Diagnoses Failure based on the following indications: • Master pressure controller output lowering from approximately 35% to 0%. • PRZR Spray Valves, 1-RC-PCV-1455A, and 1-RC-PCV-1455B remain closed. • All Pressurizer Heater Banks energize. • Annunciator 1C-F8, PRZR HI PRESS (5 min)
	RO	0-AP-53.00 Performs the Immediate Actions of AP-53.00 [1] **Checks redundant indications of pressurizer pressure – NORMAL** [2] **Places the Master Pressure Controller in MANUAL and raises output to ~ 30%.** Announces completion of Immediate Actions of AP-53.00.
	SRO	0-AP-53.00 Conducts brief using Brief Placard. RO Will report Critical parameters. BOP will report Critical Parameters. STA will state “Nothing to add”.
	SRO RO	0-AP-53.00 *3. VERIFY REACTOR POWER – LESS THAN OR EQUAL TO 100% Reports reactor power approximately 84% using PCS indication.

Op-Test No.: Surry 2021-3 Scenario No.: 3 Event No.: 4 Page 33 of 90

Event Description: PRZR Master Pressure Controller fails LOW (0-AP-53.00)

Cue: When initiated by Team

	SRO	0-AP-53.00 CAUTION: If Reactor power has been affected by a secondary transient, Turbine adjustment may be needed to control Tave. NOTES before Step 4 • Step 4 failures are listed in order of performance priority. Only the failed instrument/control and associated step number should be read aloud. • When the affected instrument/controller malfunction(s) has been addressed by this procedure, recovery actions should continue at Step 13.
	SRO RO	0-AP-53.00 *4. DETERMINE THE FAILED INSTRUMENT / CONTROL AND GO TO APPROPRIATE STEP OR PROCEDURE: • PRZR Pressure Control, Step 5
	SRO SRO RO	0-AP-53.00 **NOTE**: RCS pressure reduction will cause a slight decrease in RCS Tave due to negative reactivity from the moderator pressure coefficient. 5. CHECK PRZR SPRAY VALVE CONTROLLERS – NORMAL Reports PRZR Spray Valve Controller Normal.
	SRO	0-AP-53.00 6. GO TO 1-AP-31.00, INCREASING OR DECREASING RCS PRESSURE Transitions to 1-AP-31.00.
	SRO RO	1-AP-31.00 [1] CHECK PRZR PORVS – CLOSED Checks PRZR PORVs closed.

Event Description: PRZR Master Pressure Controller fails LOW (0-AP-53.00)

Cue: When initiated by Team

	SRO	SRO will hold a brief on entry to AP-31.00. SRO will direct RO to maintain RCS pressure at 2235 psig ± band, and pressure to be monitored by RO at a specific frequency.
	SRO RO	1-AP-31.00 CAUTION: A Safety Injection may occur if the unit is not tripped prior to RCS pressure decreasing below 2100 psig. 2. CHECK RCS PRESSURE – LOWERING Reports No, RCS pressure initially rising.
		1-AP-31.00 Step 2RNO IF procedure was entered due to rising RCS pressure, THEN GO TO Step 12. GOES TO Step 12
	SRO RO	1-AP-31.00 12. CHECK RCS PRESSURE – RISING. Reports No, pressure is currently stable (reports value and trend). Goes to Step 17.
	SRO RO	1-AP-31.00 17. CHECK MASTER CONTROLLER – IN MANUAL Reports, “Yes, MASTER PRESSURE CONTROLLER IS IN MANUAL.
	SRO	1-AP-31.00 18. DECLARE 1-RC-PCV-1455C INOPERABLE. Declares 1-RC-PCV-1455C is INOPERABLE.
	SRO RO	1-AP-31.00 19. CHECK PRZR PORVS – EITHER INOPERABLE. • **1-RC-PCV-1455C** • 1-RC-PCV-1456 Reports, Yes, 1-RC-PCV-1455C is inoperable.

Event Description: PRZR Master Pressure Controller fails LOW (0-AP-53.00)

Cue: When initiated by Team

	SRO RO	1-AP-31.00 20. CLOSE BLOCK VALVE FOR INOPERABLE PORV • **1-RC-MOV-1536 if 1-RC-PCV-1455C INOPERABLE**. • 1-RC-MOV-1535 if 1-RC-PCV-1456 INOPERABLE. Note: The SRO may determine that this action stops the 1 hour clock.
	SRO RO	1-AP-31.00 21. CHECK PRZR PORVS – EITHER INCAPABLE OF BEING MANUALLY CYCLED. Reports NO, both PORVs are capable of being manually cycled. Goes to RNO, THEN goes to Step 23
	SRO	1-AP-31.00 23. NOTIFY THE FOLLOWING: • OMOC • STA • I&C Contacts the above named individuals
	SRO	1-AP-31.00 24. REFER TO TECH SPECS: • 3.1.A.5 – Not applicable for this event. • **3.1.A.6. A, Relief Valves - With one or both PORVs inoperable but capable of being manually cycled, within 1 hour either restore the PORV(s) to OPERABLE status or close the associated block valve(s) and maintain power to the associated block valve(s).** Otherwise, be in at least HOT SHUTDOWN within the next 6 hours and reduce Reactor Coolant System average temperature to < 350°F within the following 6 hours • 3.1.C – Not applicable for this event.
	SRO STA	1-AP-31.00 25. REVIEW APPLICABILITY: • VPAP-2802 • EAL MATRIX SU6.1 The STA will report that he has reviewed these documents and discussed the results with the Shift Manager.

Event Description: PRZR Master Pressure Controller fails LOW (0-AP-53.00)

Cue: When initiated by Team

	SRO	1-AP-31.00 26. RESTORE PRESSURE CONTROL SYSTEM(S) TO NORMAL Maintains Pressurizer Pressure Control Systems in MANUAL.
		---END OF EVENT 4---

Event Description: Momentary Loss of Vital Bus I

Cue: Cue by Evaluator.

Time	Position	Applicant's Action or Behavior
	Team	Momentary Loss of Vital Bus I Diagnose this failure using the following alarms and indications: Annunciator 1E-A2/A3/A4, RC LOOP 1A/1B/1C LO FLOW CH-1. Annunciator 1E-B2, RC LOOP 1A LO FLOW CH-2 Annunciator 1E-F6, PRZR LO LVL CH-1 Annunciator 1E-F4, RX TRIP CH-1 PRZR LO PRESS Annunciator 1E-F7, PRZR LO PRESS SI CH-1 Annunciator 1F-E7, STM GEN 1A LO-LO LVL CH-1 Momentary loss of Vital Bus I on Vertical Board Team enters 1-AP-10.01, LOSS OF VITAL BUS I. **Note: At Chief Examiner's discretion** an operator will contact MCR and report that a Security officer bumped UPS 1A-1 while on rounds. He heard what sounded like breakers operating.
	SRO	1-AP-10.01 Conducts Transient Brief of 1-AP-10.01
	SRO RO	1-AP-10.01 1. CHECK UNIT AT POWER RO reports that Yes Unit 1 is at power.
	SRO RO/BOP	1-AP-10.01 2. CHECK LETDOWN STATUS a) Check 1-CH-TV-1204A-CLOSED or DEENERGIZED. **b) Close Letdown Isolation valves; 1-CH-LCV-1460A and 1-CH-LCV-1460B.** c) **Manually control charging flow to minimize PRZR rate of fill**. **RO CLOSES 1-CH-LCV-1460A and 1-CH-LCV-1460B and reduces Charging flow.**
	SRO BOP	1-AP-10.01 3. CHECK CONDENSER VACUUM STATUS a) Check for Vacuum lowering or 1-SV-TV-103 Closed or deenergized. BOP reports NO and team GOES to step 4.

Event Description: Momentary Loss of Vital Bus I

Cue: Cue by Evaluator.

	SRO RO/BOP	1-AP-10.01 4. CHECK CTMT IA STATUS a) Check 1-IA-TV-100A DEENERGIZED (NO goes to RNO). **RNO: Check open or open 1-IA-TV-100.** **RO opens 1-IA-TV-100.**
	SRO	1-AP-10.01 5. CHECK SI ACTUATED. NO goes to step 7.
	SRO	1-AP-10.01 7. CHECK PRZR PRESSURE CONTROL SYSTEM a) Check PRZR heaters – DEENERGIZED (NO) RNO: GO TO STEP 8.
	SRO	1-AP-10.01 8. CHECK RCP COOLING STATUS a) Check 1-CC-TV-140B – DEENERGIZED (NO **opens 1-CC-TV-140B**) **RO opens 1-CC-TV-140B.**
	SRO	1-AP-10.01 9. CHECK CTMP PARTICULATE/GAS RM STATUS. a) Check 1-RM-TV-100A OR 1-RM-TV-100C DEENERGIZED (NO GOES TO STEP 10)
	SRO	1-AP-10.01 10.CHECK CTMT VACUUM PUMP STATUS a) Check 1-CV-TV-150A or 1-CV-TV-150C DEENERGIZED (NO GOES TO STEP 11)
	SRO	1-AP-10.01 11. CHECK CTMT SUMP PUMP STATUS a) Check 1-DA-TV-100 – DEENERGIZED (NO GOES TO STEP 12)
	SRO	1-AP-10.01 12. CHECK PDTT PUMP STATUS a) Check 1-DG-TV-108A – DEENERGIZED (NO GOES TO STEP 13)

Event Description: Momentary Loss of Vital Bus I

Cue: Cue by Evaluator.

	SRO	1-AP-10.01 13. REFER TO ATTACHMENT 1 FOR A LIST OF MAJOR COMPONENT FAILURES. Team may or not refer to the Attachment at this time because power is restored.
	SRO	1-AP-10.01 14. Direct STA to initiate 0-NSP-CM-001, PLANT COMPUTER SYSTEM (PCS) OPERABILITY. Not necessary to do at this time since power is restored.
	SRO RO	1-AP-10.01 NOTES before step 15 • A de-energized AC Vital Bus shall be re-energized within 2 hours <u>OR</u> the unit must be placed in Hot Shutdown within the next 6 hours. • Vital Bus 1-IA voltage can be read on PCS (ERF if not removed) Computer point V1VB002A. • All Vital Bus voltages can be read on Group Review 25. • Loss of Vital Bus 1-IA de-energizes ICCM Train A. Acknowledges the Notes.
	SRO	1-AP-10.01 15. CHECK BOTH SECTION OF VITAL BUS DE-ENERGIZED. Per 15 RNO team will go to step 17 because the bus is restored.
	SRO	1-AP-10.01 NOTE: Shift Supervision must determine the appropriateness of the following steps depending on initial plant condition when Vital Bus was lost. 17. CHECK EXCESS LETDOWN IN SERVICE. RO answers NO, team directed to GO TO STEP 20.

Event Description: Momentary Loss of Vital Bus I

Cue: Cue by Evaluator.

	SRO RO/BOP	1-AP-10.01 20. RETURN NORMAL LETDOWN TO SERVICE IAW 1-OP-CH-020. BOP directed to perform 1-OP-CH-020. Note: 1-OP-CH-020 is at the end of this section. The BOP will probably be assigned to do this.
	SRO	1-AP-10.01 21. CHECK RCP SEAL LEAKOFF TEMPERATURE – LESS THAN 235°F. RO answers YES and team proceeds to step 22.
	SRO	1-AP-10.01 22. OPEN CC WATER THERMAL BARRIER RETURN TVs. This step was already done, team proceeds to next step.
	SRO RO/BOP	1-AP-10.01 23. RETURN CTMT PARTICULATE GAS RADIATION MONITOR TO SERVICE. a) OPEN CTMT GAS and Particulate Radiation Monitoring Trip valves: • **1-RM-TV-100A** • 1-RM-TV-100B • **1-RM-TV-100C** **b) Start the Radiation Monitor Pump.** c) Notify HP that the radiation monitor has been returned to service. **Operator opens 1-RM-TV-100A, 100C, and starts Radiation Monitor pump.**
	SRO RO/BOP	1-AP-10.01 24. RESTORE CTMT IA COMPRESSOR TO SERVICE: a) Open 1-IA-TV-100 (opened previously at step 4) **b) Open 1-IA-TV-101A (opens 1-IA-TV-101A)** c) Open or check open 1-IA-TV-101B (Checks open) d) Start 1-IA-C-4A or 1-IA-C-4B (Checks that one is running) e) Place IA compressor NOT started in AUTO (One comp should be in auto) f) Locally close 1-IA-446, 447. (Should already be closed) Team proceeds to next step.

Event Description: Momentary Loss of Vital Bus I

Cue: Cue by Evaluator.

	SRO	1-AP-10.01 25. RETURN AIR EJECTOR RADIATION MONITOR TO SERVICE. Air Ejector Rad monitor is in service.
	SRO RO/BOP	1-AP-10.01 26. Return the following pumps to service: • CTMT Sump Pumps; 1-DA-P-4A and 1-DA-P-4B. • CTMT Vacuum Pumps; 1-CV-P-1A and 1-CV-P-1B. • Primary Drain Xfer pumps; 1-DG-P-1A and 1-DG-P-1B. No expected operator action since power was momentarily lost. Pumps will remain in pre-event condition (one pump in AUTO, the other pump in OFF)
Remaining steps in AP-10.01 are mostly administrative or require other operator support. At Chief Examiner's discretion proceed to the next event.		
	SRO	1-AP-10.01 27. Restore SG Blowdown IAW 1-OP-BD-001, STEAM GENERATOR BLOWDOWN SYSTEM OPERATIONS. This should be done by another operator.
	SRO RO/BOP	1-AP-10.01 28. OPEN MS LINE TRAP TVs: • 1-MS-TV-109. Operator opens 1-MS-TV-109.
	SRO	1-AP-10.01 29. ALIGN AREA VENTILATION IAW SHIFT SUPERVISION DIRECTION: • Fuel Building. • Decon Building. Operators assigned to restore ventilation as necessary.
	SRO RO/BOP	1-AP-10.01 30. RESET NI-41 DROPPED ROD SIGNAL BY PLACING POWER RANGE TEST SWITCH TO RESET. RO places power range test switch to reset.

Event Description: Momentary Loss of Vital Bus I

Cue: Cue by Evaluator.

	SRO	1-AP-10.01 31. RESET CTMT ISOLATION TVs: • 1-SS-TV-102 • 1-DA-TV-100A • 1-DG-TV-108A • 1-VG-TV-109A • 1-SI-TV-101A • 1-SS-TV-100A • 1-SS-TV-101A • 1-SS-TV-102A • 1-SS-TV-106A Another operator will be assigned this.
	SRO	1-AP-10.01 32. NOTIFY THE FOLLOWING • OMOC • Manager Operations
		---END OF EVENT 5---

Event Description: Momentary Loss of Vital Bus I

Cue: Cue by Evaluator.

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Init Verif

5.0 INSTRUCTIONS

_______ 5.1 **Placing Letdown in Service Following Auto or Manual Isolation**

CAUTION

To make certain that the design flow of 60 gpm will not be exceeded, the Cation Bed Demin will **not** be in service when putting in Normal Letdown.

_______ 5.1.1 Verify removed or remove the Cation Bed Demin from service IAW 1-OP-CH-012, Removal from and Return to Service of CVCS Cation Bed Demin.

_______ 5.1.2 Verify PRZR level is greater than 14.4 percent on selected channels.

_______ 5.1.3 Verify Annunciator 1C-E8, PRZR LO LVL HTRS OFF & LETDOWN ISOL, is NOT LIT.

_______ 5.1.4 Verify or place at least one CC pump is in service.

5.1.5 Verify closed or close all of the following valves.

_______ • 1-CH-LCV-1460A, LETDOWN LINE ISOL

_______ • 1-CH-LCV-1460B, LETDOWN LINE ISOL

_______ • 1-CH-HCV-1200A, LETDOWN ORIFICE ISOL

_______ • 1-CH-HCV-1200B, LETDOWN ORIFICE ISOL

_______ • 1-CH-HCV-1200C, LETDOWN ORIFICE ISOL

Event Description: Momentary Loss of Vital Bus I

Cue: Cue by Evaluator.

5.1.6 Verify open or open both of the Letdown Line Trip valves.

______ • 1-CH-TV-1204A, LETDOWN LINE I/S TV

______ • 1-CH-TV-1204B, LETDOWN LINE O/S TV

______ 5.1.7 Verify or adjust 1-CH-PCV-1145, LETDOWN LINE PRESS CNTRL, setpoint as required. (approximately 5.0 for 300 psig)

______ 5.1.8 Verify or place 1-CH-PCV-1145, LETDOWN LINE PRESS CNTRL, in MAN and OPEN (0% demand).

______ 5.1.9 Verify or place 1-CH-TCV-1143, LETDOWN LINE DIVERT, in the DIVERT position. Enter N/A if Shift Supervision determines that IXs are to remain in service.

______ 5.1.10 Verify or place 1-CH-HCV-1244, DEBOR DEMINS DIVERT, in the NORMAL position. Enter N/A if Shift Supervision determines that IX is to remain in service.

______ 5.1.11 Verify or place 1-CH-LCV-1115A, VCT LEVEL DIVERT,in AUTO and is aligned to the VCT (red light LIT).

NOTE: Flashing in the Non-Regen Heat Exchanger is indicated by unstable letdown flow as indicated on 1-CH-FI-1150.

5.1.12 Initiate Normal Charging and Letdown by performing the following substeps.

______ a. Open 1-CH-FCV-1122, CHG FLOW CNTRL, and establish a charging flow of greater than or equal to 45 gpm as indicated on 1-CH-FI-1122A, CHG LINE FLOW.

b. Open both of the following Letdown Line Isolation valves.

______ • 1-CH-LCV-1460A, LETDOWN LINE ISOL

______ • 1-CH-LCV-1460B, LETDOWN LINE ISOL

Event Description: Momentary Loss of Vital Bus I

Cue: Cue by Evaluator.

NOTE:
- If RCS pressure is low, both 60 gpm orifices or all three may need to be placed in service.
- The 45 gpm orifice should normally be placed in service first.
- Care must be taken to ensure letdown flow does not exceed 125 gpm. Alarm setpoint for 1D-F4, LO PRESS LETDOWN LINE HI FLOW, is 130 gpm.

______ c. Open one of the following valves and place the control switch in AUTO. (✓)

____ 1-CH-HCV-1200A, LETDOWN ORIFICE ISOL

____ 1-CH-HCV-1200B, LETDOWN ORIFICE ISOL

____ 1-CH-HCV-1200C, LETDOWN ORIFICE ISOL

______ d. Verify 1-CH-FI-1150, LETDOWN LINE FLOW, indicates proper flow rate based on orifice placed in service.

______ e. Verify 1-CC-TCV-103, NRHX OUTLET TEMP CNTRL, is controlling in AUTO as indicated by output demand.

______ f. Verify 1-CH-TI-1144, NON-REGEN HX OUTLET TEMP, is at approximately 100°F.

Event Description: Momentary Loss of Vital Bus I

Cue: Cue by Evaluator.

NOTE: If two additional orifices will be placed in service at this time, only one may be placed in service at a time and flow rates must be allowed to stabilize before the third orifice is placed in service.

5.1.13 IF additional orifices are desired at this time, THEN place additional Letdown Orifices(s) in service IAW the following substeps. Otherwise, enter N/A.

______ a. Open and place in AUTO the following Letdown Orifice Isolation valves, as required. (✓)

____ 1-CH-HCV-1200A, LETDOWN ORIFICE ISOL

____ 1-CH-HCV-1200B, LETDOWN ORIFICE ISOL

____ 1-CH-HCV-1200C, LETDOWN ORIFICE ISOL

______ b. Verify 1-CH-FI-1150, LETDOWN LINE FLOW, indicates correct flow for orifices in service.

______ 5.1.14 Slowly close 1-CH-PCV-1145 to obtain letdown line pressure between 300 psig and 350 psig as indicated on 1-CH-PI-1145. **(Ref. 2.4.1)**

______ 5.1.15 Place 1-CH-PCV-1145 in AUTO.

______ 5.1.16 Verify Letdown parameters are normal for existing plant conditions and that there are no signs of flashing in the letdown system. Adjust charging flow as required.

______ 5.1.17 IF Ion Exchangers are NOT in service, THEN return Letdown Ion Exchangers to service IAW 1-OP-CH-011. Otherwise, enter N/A.

______ 5.1.18 Manipulate charging flow as required for existing plant conditions.

Event Description: Main Steam Break in Turbine Building, Reactor Trip W/ SI.

Cue: by Evaluator.

Time	Position	Applicant's Action or Behavior
	Team	Diagnose the failure based upon the following alarms and indications: Annunciator 1H-G5, STM GEN 1A LVL ERROR Annunciator 1H-G6, STM GEN 1B LVL ERROR Annunciator 1H-G7, STM GEN 1C LVL ERROR Annunciator 1H-A4, T AVG < > T REF DEVIATION Annunciator 1F-F4,(G4), STM GEN 1A CH3 (CH4) HI STM LINE FLOW Annunciator 1F-F5 (G5), STM GEN 1B CH3 (CH4) HI STM LINE FLOW Annunciator 1F-F6 (G6), STM GEN 1C CH3 (CH4) HI STM LINE FLOW All SG NR Level indications rising
	SRO	Direct RO to trip the reactor and perform the Immediate Actions of 1-E-0.
	RO	1-E-0, Reactor Trip or Safety Injection [1] CHECK REACTOR TRIP: a) Manually trip reactor **Presses reactor trip button.** b) Check the following: All Rods On Bottom light – LIT Identifies All Rods on Bottom LIT on CERPI Screen. Reactor trip and bypass breakers – OPEN Identifies Reactor Trip and Bypass breakers Open on Benchboard Mimic. Neutron flux – LOWERING Identifies PR NI N41, N42, and N41 indications at ~0%; and IR indicators N35/N36 Lowering. Reports to SRO “Reactor Tripped”.

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Event Description: Main Steam Break in Turbine Building, Reactor Trip W/ SI.

Cue: by Evaluator.

	RO	1-E-0, Reactor Trip or Safety Injection [2] CHECK TURBINE TRIP: a) Manually trip the turbine **Presses both Turbine Trip pushbuttons – simultaneously**. b) Check all turbine stop valves – CLOSED Identifies Turbine SVs closed using indication lights on Turbine Control section. c) Isolate reheaters by closing MSR steam supply SOV 1-MS-SOV-104 **Places 1-MS-SOV-104 control switch in close.** d) Check generator output breakers – OPEN (Time Delayed) Identifies Main generator output breakers open. Reports to SRO “Turbine is Tripped”.
	RO	1-E-0, Reactor Trip or Safety Injection [3] CHECK BOTH AC EMERGENCY BUSES – ENERGIZED Identifies “H” and “J” buses are energized by checking Voltage indicated on #1 and #3 EDG control panels. Reports “Both AC Emergency Buses energized.”

Event Description: Main Steam Break in Turbine Building, Reactor Trip W/ SI.

Cue: by Evaluator.

	RO	1-E-0, Reactor Trip or Safety Injection [4] CHECK IF SI INITIATED: a) Check if SI is actuated: LHSI pumps – RUNNING Identifies A/B LHSI pumps running using breaker and amp indications. SI annunciators – LIT A-F-3 (SI Initiated Train A) A-F-4 (SI Initiated Train B) Identifies both Annunciators LIT. b) Manually initiate SI **Presses Manual SI buttons, Train “A” and Train “B”.** Reports E-0 Immediate Actions are complete, Have SI flow to the core.”
	SRO	1-E-0, Reactor Trip or Safety Injection Hands out Continuous Action Pages for E-0 to RO and BOP, provides Attachments 1, 2, and 3 to BOP. Leads a Transient Brief to describe the Plant Status, and asks RO/BOP if any items identified during the E-0 Immediate Actions would have higher priority than continuing with E-0. RO/BOP may identify MSTVs close following reactor trip and safety injection. STA will have no input for the brief. SRO closes the Transient Brief and continues E-0 with the RO.
	SRO	1-E-0, Reactor Trip or Safety Injection 5. INITIATE ATTACHMENT 1 Directs BOP to perform E-0 Attachment 1, 2, and 3. **CT-2:** Restore at least one MDAFW pump prior to SG WR level lowering to FR-H.1 Feed and Bleed criteria (12%). Failing to do this would significantly complicate the scenario by challenging heat sink E-0 Attachments and components BOP will identify and reposition begin at <u>section 8</u> of this scenario guide.

Op-Test No.: Surry 2021-1 Scenario No.: 3 Event No.: 6 Page 50 of 90

Event Description: Main Steam Break in Turbine Building, Reactor Trip W/ SI.

Cue: by Evaluator.

		1-E-0, Reactor Trip or Safety Injection
	SRO RO	*6. CHECK RCS AVERAGE TEMPERATURE STABLE AT 547°F OR TRENDING TO 547°F
	SRO	Report NO, RCS Temperature lowering (and provide current Tave value). Goes to Step 6 RNO
		IF temperature less than 547°F AND lowering, THEN do the following: a) Stop dumping steam.
	RO	Reports Yes, Steam Dumps are closed.
	SRO	b) IF cooldown continues, THEN control total feed flow. Maintain total feed flow greater than 350 gpm [450 gpm] until narrow range level greater than 12% [18%] in at least one SG.
	RO	Identify RCS Tave Lowering.
	SRO	Direct RO to throttle AFW to all SGs to ~120 gpm.
	RO	**Throttle AFW to the SGs to ~120 gpm per SG** and report when complete.
	SRO	c) IF Cooldown continues, THEN close MSTVs.
	RO	Reports MSTVs are closed. May report that all three SGs appear to be faulted.

Event Description: Main Steam Break in Turbine Building, Reactor Trip W/ SI.

Cue: by Evaluator.

		1-E-0, Reactor Trip or Safety Injection
	SRO	7. CHECK PRZR PORVs AND SPRAY VALVES:
		a) PRZR PORVs – CLOSED
	RO	Reports Yes, PRZR PORVs closed.
	SRO	b) PRZR spray controls Demand at Zero OR **Controlling pressure** *(previous to Rx Trip, RO controlling pressure manually)*.
	RO	Reports Yes, Demand at zero.
	SRO	c) PORV block valves - AT LEAST ONE OPEN
	RO	Reports Yes, one block valve open.
		1-E-0, Reactor Trip or Safety Injection
	SRO	NOTE Prior to Step 8: Seal injection flow should be maintained to all RCPs.
	RO	Acknowledges NOTE.
	SRO	*8. CHECK RCP TRIP AND MINIFLOW RECIRC CRITERIA:
		a) Charging Pumps - AT LEAST ONE RUNNING AND FLOWING TO RCS
	RO	Reports Yes, 3 running and flowing to the RCS. May report 2 running depending upon BOP speed of progression through E-0, Attachment 1.
	SRO	b) RCS subcooling - LESS THAN 30°F [85°F]
	RO	Reports No, subcooling is (provides actual subcooling value.)
	SRO	Step 8 RNO: Goes to Step 9.

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Event Description: Main Steam Break in Turbine Building, Reactor Trip W/ SI.

Cue: by Evaluator.

	SRO RO SRO SRO	1-E-0, Reactor Trip or Safety Injection 9. CHECK IF SGs ARE NOT FAULTED: Check pressures in all SGs: STABLE OR RISING AND GREATER THAN 100 PSIG Reports No, SG pressures are (current value) and lowering. Step 9 RNO: IF any SG pressure lowering in an uncontrolled manner OR is completely depressurized, THEN GO TO 1-E-2, FAULTED STEAM GENERATOR ISOLATION. SRO Announces transition to E-2; RO/BOP acknowledge transition.
	SRO RO SRO	1-E-2, Faulted SG Isolation SRO conducts a focus brief, identifies that all three SGs as faulted, and asks if RO has identified any condition that would prevent continuing with E-2 to a transition to ECA-2.1. Report No, agree on continuing with E-2. SRO closes Focus Brief and continues with E-2.
	SRO RO SRO RO	1-E-2, Faulted SG Isolation **CAUTIONS Prior to Step 1**: • At least one SG must be maintained available for RCS cooldown. • Any faulted SG or secondary break should remain isolated during subsequent recovery actions unless needed for RCS cooldown. Acknowledges CAUTIONS. 1. CHECK MSTV AND BYPASS VALVE ON AFFECTED SG(s) – CLOSED Reports Yes, MSTVs and bypass valves closed.

Event Description: Main Steam Break in Turbine Building, Reactor Trip W/ SI.

Cue: by Evaluator.

		1-E-2, Faulted SG Isolation
	SRO	2. CHECK IF ANY SG SECONDARY SIDE IS INTACT:
		Check pressures in all SGs – ANY STABLE OR RISING
	RO	Reports No, All SG pressures are (provides current pressure) and lowering.
	SRO	Step 7 RNO: IF all SG pressures lowering in an uncontrolled manner, THEN GO TO 1-ECA-2.1, UNCONTROLLED DEPRESSURIZATION OF ALL STEAM GENERATORS.
	SRO	Announces transition to ECA-2.1. RO/BOP acknowledge transition.

Event Description: Three Faulted SGs in Safeguards.

Cue: by Evaluator.

	SRO RO/BOP SRO	1-ECA-2.1, Uncontrolled Depressurization of All Steam Generators. SRO conducts Focus brief to update on Plant Status, and handout Continuous Action Pages for ECA-2.1. SRO will ask team members if any conditions have been identified that precludes continuing with ECA-2.1. Report that no conditions have been identified. Continues with ECA-2.1.
	SRO RO RO RO	1-ECA-2.1, Uncontrolled Depressurization of All Steam Generators CAUTION Prior to Step 1: If the TD AFW pump is the only available source of feed flow, steam supply to the TD AFW pump must be maintained from at least one SG. 1. CHECK SECONDARY PRESSURE BOUNDARY: • MSTVs and bypass valves – CLOSED Report Yes, closed. • SG PORVs – CLOSED Report Yes, Closed. • Main Steam line NRVs – CLOSED (1-MS-NRV-101A / B / C) Report No, Open SRO will direct RO to Close the NRVs **RO will close NRVs and report when they completed stroking close**d. • TD AFW pump steam supply valves – CLOSED Report No, Safeguards inaccessible. • Feed REG valves – CLOSED Report Yes, Closed • SG FW bypass flow valves – CLOSED Report Yes, Closed • SG FW isolation MOVs – CLOSED Report No, Open

Event Description: Three Faulted SGs in Safeguards.

Cue: by Evaluator.

	SRO RO	SRO will direct RO to Close the FW isolation MOVs. **RO will close FW isolation MOVs and report when they completed stroking closed.** • SG blowdown TVs – CLOSED Report Yes, Closed.
	SRO RO SRO STA SRO RO SRO SRO	1-ECA-2.1, Uncontrolled Depressurization of All Steam Generators CAUTION Prior to Step 2: A minimum of 60 gpm [100 gpm] feed flow must be maintained to each SG with a narrow range level less than 12% [18%]. Acknowledges CAUTION. NOTE prior to Step 2: Shutdown Margin should be monitored during RCS cooldown. Acknowledge NOTE. 2. CONTROL FEED FLOW TO MINIMIZE RCS COOLDOWN: a) Check cooldown rate in RCS cold legs - LESS THAN 100°F/hr Reports No, Cooldown rate is (provides current value.) STA will agree with Cooldown Rate determined by RO. **Step 2 RNO: Lower feed flow to 60 gpm [100 gpm] to each SG. GO TO Step 2c.** **Directs RO to throttle flow to ~ 60 gpm to each SG.** When AFW is throttled less than a total of 350 gpm, STA will report that a RED Path on the Heat Sink Status Tree is indicated. Will announce transition to FR-H.1. RO/BOP will acknowledge transition. BOP will suspend E-0 Attachments. SRO will read CAUTION Prior to STEP 1, FR-H.1: If total feed flow is less than 350 gpm [450 gpm] due to operator action, this procedure should NOT be performed. SRO will announce Transition back to ECA-2.1. RO/BOP will acknowledge transition. **CT-3:** Lower AFW flowrate to 60 gpm to each SG if RCS cooldown rate is > 100°F/hour to prevent entry into FR-P.1. Failing to do this could cause an entry into FR-P.1 which is not needed.

Event Description: Three Faulted SGs in Safeguards.

Cue: by Evaluator.

		1-ECA-2.1, Uncontrolled Depressurization of All Steam Generators
	SRO	**NOTE** Prior to Step 3: Seal injection flow should be maintained to all RCPs.
	RO	Acknowledges NOTE.
	SRO	3. CHECK RCP TRIP AND MINIFLOW RECIRC CRITERIA:
		a) Charging Pumps - AT LEAST ONE RUNNING AND FLOWING TO RCS
	RO	Reports Yes, (identifies number of CH pumps running). **Note**: based on speed of BOP progression through Attachment 1 of 1-E-0, 3 or 2 CH pumps may be running at this time.
	SRO	b) RCS subcooling - LESS THAN 30°F [85°F].
	RO	Reports No, (identifies actual subcooling).
	SRO	GOES to Step 4.
		1-ECA-2.1, Uncontrolled Depressurization of All Steam Generators
	SRO	**CAUTION Prior to Step 4**: If any PRZR PORV opens because of high PRZR pressure, the PORV must be checked closed or isolated after pressure lowers to less than 2335 psig.
	RO	Acknowledges CAUTION.
	SRO	4. CHECK PRZR PORVs AND BLOCK VALVES:
		a) Power to PRZR PORV block valves – AVAILABLE
	RO	Reports Yes, power available to both Block Valves.
	SRO	b) PRZR PORVs – CLOSED
	RO	Reports Yes, both PRZR PORVs closed.
	SRO	c) PRZR PORV block valves - AT LEAST ONE OPEN
	RO	Reports Yes, One block valve open.

Event Description: Three Faulted SGs in Safeguards.

Cue: by Evaluator.

		1-ECA-2.1, Uncontrolled Depressurization of All Steam Generators
	SRO	5. CHECK SECONDARY RADIATION:
		a) Initiate periodic activity sampling of all SGs IAW Attachment 1.
	SRO	Confers with Shift Manager to initiate periodic sampling.
	SRO	b) Check unisolated secondary radiation monitors:
	RO/Unit 2 RO Unit 2	Main steamline – Report Yes, Main Steam Radiation Normal. TD AFW pump exhaust – Reports Yes, TDAFW Radiation normal. Condenser air ejector – Reports Yes, Condenser A/E Radiation normal.
	SRO	c) Secondary Radiation – NORMAL
	RO	Reports Yes, Secondary Radiation Normal.
		1-ECA-2.1, Uncontrolled Depressurization of All Steam Generators
	SRO	**CAUTION Prior to Step 6**: RCS pressure should be monitored. If RCS pressure lowers in an uncontrolled manner to less than 250 psig [400 psig], one LHSI pump must be manually restarted to supply water to the RCS.
	RO	Acknowledges CAUTION
	SRO	6. CHECK IF LHSI PUMPS SHOULD BE STOPPED:
		a) Check LHSI pumps - ANY RUNNING WITH SUCTION ALIGNED TO RWST
	RO	Report Yes, (identifies number of LHSI pumps running) with suction aligned to RWST.
	SRO	b) Check RCS pressure:
		1) Pressure – GREATER THAN 250 PSIG [400 PSIG]
		2) Pressure - STABLE OR RISING
	RO	Reports Yes, RCS pressure is (gives actual pressure) Reports No, RCS pressure lowering.
	SRO	6. b) RNO GO TO Step 7.

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Event Description: Three Faulted SGs in Safeguards.

Cue: by Evaluator.

		Scenario Termination based on Evaluator Cue, SI Re-initiation, and Cooldown rate has been controlled. **---END OF EVENT 7---** **---END OF SCENARIO** #3---

E-O Attachments 1, 2, and 3. FOLDOUT PAGES FOR REFERENCED PROCEDURES

NUMBER 1-E-0	ATTACHMENT TITLE SYSTEM ALIGNMENT VERIFICATION	ATTACHMENT 1
REVISION 77		PAGE 1 of 8

STEP	ACTION/ EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. ___	CHECK FW ISOLATION:	☐ Manually close valves and stop pumps.
	• Feed pump discharge MOVs - CLOSED	
	☐ • 1-FW-MOV-150A	
	☐ • 1-FW-MOV-150B	
	☐ • MFW pumps - TRIPPED	
	☐ • Feed REG valves - CLOSED	
	☐ • SG FW bypass flow valves - DEMAND AT ZERO	
	☐ • SG blowdown TVs - CLOSED	
2. ___	CHECK CTMT ISOLATION PHASE I:	☐ Manually close valves.
	☐ • Phase I TVs - CLOSED	
	☐ • 1-CH-MOV-1381 - CLOSED	
	☐ • 1-SV-TV-102A - CLOSED	
	• PAM isolation valves - CLOSED	
	☐ • 1-DA-TV-103A	
	☐ • 1-DA-TV-103B	
3. ___	CHECK AFW PUMPS RUNNING:	
	☐ a) MD AFW pumps - RUNNING (Time Delayed)	☐ a) Manually start pumps.
	☐ b) TD AFW pump - RUNNING IF NECESSARY	b) Manually open steam supply valves. ☐ • 1-MS-SOV-102A ☐ • 1-MS-SOV-102B

E-O Attachments 1, 2, and 3. FOLDOUT PAGES FOR REFERENCED PROCEDURES

NUMBER 1-E-0	ATTACHMENT TITLE SYSTEM ALIGNMENT VERIFICATION	ATTACHMENT 1
REVISION 77		PAGE 2 of 8

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. ___	CHECK SI PUMPS RUNNING: ☐ • CHG pumps - RUNNING ☐ • LHSI pumps - RUNNING	☐ Manually start pumps.
5. ___	CHECK CHG PUMP AUXILIARIES: ☐ • CHG pump CC pump - RUNNING ☐ • CHG pump SW pump - RUNNING	☐ Manually start pumps.
6. ___	CHECK INTAKE CANAL: ☐ • Level - GREATER THAN 24 FT ☐ • Level - BEING MAINTAINED BY CIRC WATER PUMPS	☐ IF level is less than 24 ft OR lowering in an uncontrolled manner, THEN initiate 0-AP-12.01, LOSS OF INTAKE CANAL LEVEL.

E-O Attachments 1, 2, and 3. FOLDOUT PAGES FOR REFERENCED PROCEDURES

NUMBER 1-E-0	ATTACHMENT TITLE SYSTEM ALIGNMENT VERIFICATION	ATTACHMENT 1
REVISION 77		PAGE 3 of 8

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7.___	CHECK IF MAIN STEAMLINES SHOULD BE ISOLATED:	
	a) Check if ANY of the following annunciators - HAVE BEEN LIT ☐ • E-F-10 (High Steam Flow SI) ☐ • B-C-4 (Hi Hi CLS Train A) ☐ • B-C-5 (Hi Hi CLS Train B)	a) Do the following: ☐ IF annunciator E-H-10 (Hdr/Line SI) LIT, THEN GO TO Step 7.d. ☐ IF annunciator E-H-10 NOT LIT, THEN GO TO Step 8.
	☐ b) Check MSTVs - CLOSED	☐ b) Manually close valves.
	c) Check either of the following - ACTUATED ☐ • Hi steam flow SI OR ☐ • Header to line SI	☐ c) GO TO Step 8.
	d) Check RWST crosstie valves - OPEN ☐ • 1-SI-TV-102A ☐ • 1-SI-TV-102B ☐ • 2-SI-TV-202A ☐ • 2-SI-TV-202B	☐ d) Manually open valves.
	☐ e) Check RCS pressure - LESS THAN 185 PSIG	☐ e) Put BOTH RMT mode transfer switches in REFUEL.

E-O Attachments 1, 2, and 3. FOLDOUT PAGES FOR REFERENCED PROCEDURES

NUMBER 1-E-0	ATTACHMENT TITLE	ATTACHMENT 1
REVISION 77	SYSTEM ALIGNMENT VERIFICATION	PAGE 4 of 8

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
*8. ___	CHECK IF CS REQUIRED:	
	☐ a) CTMT pressure - HAS EXCEEDED 23 PSIA	a) Do the following: 1) IF CTMT pressure has exceeded 17.7 psia, THEN check or align the following valves: ☐ • 1-RM-TV-100A - CLOSED ☐ • 1-RM-TV-100B - CLOSED ☐ • 1-RM-TV-100C - CLOSED ☐ • 1-SV-TV-102 - CLOSED ☐ • 1-IA-TV-101A - CLOSED ☐ • 1-IA-TV-101B - CLOSED ☐ • 1-IA-AOV-103 - OPEN ☐ 2) GO TO Step 10.
	☐ b) Manually initiate HI HI CLS	
	☐ c) Trip all RCPs	

(STEP 8 CONTINUED ON NEXT PAGE)

E-O Attachments 1, 2, and 3. FOLDOUT PAGES FOR REFERENCED PROCEDURES

NUMBER 1-E-0	ATTACHMENT TITLE SYSTEM ALIGNMENT VERIFICATION	ATTACHMENT 1
REVISION 77		PAGE 5 of 8

STEP	ACTION/ EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8.	CHECK IF CS REQUIRED: (Continued)	
	☐ d) Check CS pumps - RUNNING	d) Perform the following to start CS pumps: 1) For 1-CS-P-1A: ☐ a. Open or check open CS pump suction 1-CS-MOV-100A. ☐ b. Start 1-CS-P-1A. c. Open or check open the following CS pump discharge valves: ☐ • 1-CS-MOV-101A ☐ • 1-CS-MOV-101B 2) For 1-CS-P-1B: ☐ a. Open or check open CS pump suction 1-CS-MOV-100B. ☐ b. Start 1-CS-P-1B. c. Open or check open the following CS pump discharge valves: ☐ • 1-CS-MOV-101C ☐ • 1-CS-MOV-101D
	☐ e) Initiate Attachment 4	

E-O Attachments 1, 2, and 3. FOLDOUT PAGES FOR REFERENCED PROCEDURES

NUMBER 1-E-0	ATTACHMENT TITLE	ATTACHMENT 1
REVISION 77	SYSTEM ALIGNMENT VERIFICATION	PAGE 6 of 8

STEP	ACTION/ EXPECTED RESPONSE	RESPONSE NOT OBTAINED
*9. ___	CHECK IF RS REQURIED:	
	☐ a) Check RWST level - LESS THAN OR EQUAL TO 60%	a) Do the following: ☐ 1) Continue to monitor RWST level. 2) GO TO Step 10. IF RWST level lowers to less than or equal to 60%, THEN perform Step 9.b through Step 9.d.
	☐ b) Check ISRS pumps - RUNNING	☐ b) Manually Start Pumps.
	☐ c) Check OSRS pumps - RUNNING (Time Delayed)	☐ c) Manually Start Pumps.
	☐ d) Check OSRS pumps - NOT CAVITATING	☐ d) Put affected OSRS pump in PTL.
*10. ___	BLOCK LOW PRZR PRESS SI SIGNAL:	
	☐ a) Check PRZR pressure - LESS THAN 2000 psig	☐ a) GO TO Step 11. WHEN PRZR pressure less than 2000 psig, THEN perform Steps 10.b and 10.c.
	☐ b) Turn both LO PRZR PRESS & STM HDR/LINE ΔP switches to block	
	☐ c) Check Permissive Status light C-2 - LIT	
*11. ___	BLOCK LOW TAVE SI SIGNAL:	
	☐ a) Check RCS Tave - LESS THAN 543°F	☐ a) GO TO Step 12. WHEN Tave less than 543°F, THEN perform Steps 11.b and 11.c.
	☐ b) Turn both HI STM FLOW & LO TAVG OR LP switches to block	
	☐ c) Check Permissive Status light F-1 - LIT	

E-O Attachments 1, 2, and 3. FOLDOUT PAGES FOR REFERENCED PROCEDURES

NUMBER 1-E-0	ATTACHMENT TITLE	ATTACHMENT 1
REVISION 77	SYSTEM ALIGNMENT VERIFICATION	PAGE 7 of 8

STEP	ACTION/ EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE:
- CHG pumps should be run in the following order of priority: C, B, A.
- Subsequent SI signals may be reset by reperforming Step 12.

STEP	ACTION/ EXPECTED RESPONSE	RESPONSE NOT OBTAINED
12. ___	CHECK SI FLOW:	
	a) HHSI to cold legs - FLOW INDICATED ☐ • 1-SI-FI-1961 (NQ) ☐ • 1-SI-FI-1962 (NQ) ☐ • 1-SI-FI-1963 (NQ) ☐ • 1-SI-FI-1943 or 1-SI-FI-1943A	☐ a) Manually start pumps and align valves. IF flow NOT established, THEN consult with Shift Supervision to establish another high pressure injection flowpath while continuing with this procedure. ☐ • Alternate SI to cold legs ☐ • Hot leg injection
	☐ b) Check CHG pumps - THREE RUNNING	☐ b) GO TO Step 12.e.
	☐ c) Reset SI	
	☐ d) Stop one CHG pump and put in AUTO	
	☐ e) RCS pressure - LESS THAN 185 PSIG	e) IF two LHSI pumps are running, THEN do the following: ☐ 1) Check reset or reset SI. ☐ 2) Stop one LHSI pump and put in AUTO. ☐ 3) GO TO Step 13. ☐ IF one LHSI pump running, THEN GO TO Step 13.
	☐ f) LHSI flow - INDICATED	☐ f) Manually start pumps and align valves.

E-O Attachments 1, 2, and 3. FOLDOUT PAGES FOR REFERENCED PROCEDURES

NUMBER 1-E-0	ATTACHMENT TITLE	ATTACHMENT 1
REVISION 77	SYSTEM ALIGNMENT VERIFICATION	PAGE 8 of 8

STEP	ACTION/ EXPECTED RESPONSE	RESPONSE NOT OBTAINED
13. ___	CHECK TOTAL AFW FLOW - GREATER THAN 350 GPM [450 GPM]	☐ IF SG narrow range level greater than 12% [18%] in any SG, THEN control feed flow to maintain narrow range level AND GO TO Step 14. ☐ IF SG narrow range level less than 12% [18%] in all SGs, THEN manually start pumps AND align valves as necessary. ☐ IF AFW flow greater than 350 GPM [450 GPM] can NOT be established, THEN GO TO 1-FR-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK.
14. ___	CHECK AFW MOVs - OPEN	☐ Manually align valves as necessary.
15. ___	INITIATE SI VALVE ALIGNMENT IAW ATTACHMENT 2	
16. ___	INITIATE VENTILATION, AC POWER, AND SFP STATUS CHECKS IAW ATTACHMENT 3	
17. ___	CHECK RCS DILUTION FLOWPATH - ISOLATED AND LOCKED, SEALED, OR OTHERWISE SECURED ☐ • Close and lock, seal, or otherwise secure 1-CH-223	Close and lock, seal, or otherwise secure the following: ☐ • 1-CH-212 ☐ • 1-CH-215 ☐ • 1-CH-218

E-O Attachments 1, 2, and 3. FOLDOUT PAGES FOR REFERENCED PROCEDURES

NUMBER 1-E-0	ATTACHMENT TITLE CHECKING SI VALVE ALIGNMENT	ATTACHMENT 2
REVISION 77		PAGE 1 of 2

NOTE: Components previously aligned by SI termination steps, must not be realigned by this Attachment.

1. ___ Check opened or open CHG pump suction from RWST MOVs.
   - ☐ • 1-CH-MOV-1115B
   - ☐ • 1-CH-MOV-1115D

2. ___ Check closed or close CHG pump suction from VCT MOVs.
   - ☐ • 1-CH-MOV-1115C
   - ☐ • 1-CH-MOV-1115E

3. ___ Check running or start at least two CHG pumps. (listed in preferred order)
   - ☐ • 1-CH-P-1C
   - ☐ • 1-CH-P-1B
   - ☐ • 1-CH-P-1A

4. ___ Check opened or open HHSI to cold legs MOVs.
   - ☐ • 1-SI-MOV-1867C
   - ☐ • 1-SI-MOV-1867D

5. ___ Check closed or close CHG line isolation MOVs.
   - ☐ • 1-CH-MOV-1289A
   - ☐ • 1-CH-MOV-1289B

6. ___ Check closed or close Letdown orifice isolation valves.
   - ☐ • 1-CH-HCV-1200A
   - ☐ • 1-CH-HCV-1200B
   - ☐ • 1-CH-HCV-1200C

7. ___ Check opened or open LHSI suction from RWST MOVs.
   - ☐ • 1-SI-MOV-1862A
   - ☐ • 1-SI-MOV-1862B

E-O Attachments 1, 2, and 3. FOLDOUT PAGES FOR REFERENCED PROCEDURES

NUMBER 1-E-0	ATTACHMENT TITLE CHECKING SI VALVE ALIGNMENT	ATTACHMENT 2
REVISION 77		PAGE 2 of 2

8. ___ Check opened or open LHSI to cold legs MOVs.

   - ☐ • 1-SI-MOV-1864A
   - ☐ • 1-SI-MOV-1864B

9. ___ Check running or start at least one LHSI pump.

   - ☐ • 1-SI-P-1A
   - ☐ • 1-SI-P-1B

10. ___ Check High Head SI flow to cold legs indicated.

    - ☐ • 1-SI-FI-1961
    - ☐ • 1-SI-FI-1962
    - ☐ • 1-SI-FI-1963
    - ☐ • 1-SI-FI-1943 or 1-SI-FI-1943A

11. ___ IF flow not indicated, THEN manually start pumps and align valves. IF flow NOT established, THEN consult with Shift Supervision to establish another high pressure injection flow path while continuing with this procedure.

    - ☐ • Alternate SI to Cold legs
    - ☐ • Hot leg injection

E-O Attachments 1, 2, and 3. FOLDOUT PAGES FOR REFERENCED PROCEDURES

NUMBER 1-E-0	ATTACHMENT TITLE	ATTACHMENT 3
REVISION 77	AUXILIARY VENTILATION, AC POWER, AND SFP STATUS CHECKS	PAGE 1 of 6

1. ___ Check or place REFUEL SFTY MODE switches in NORMAL.

2. ___ Check ventilation alignment IAW Tables 1 and 2.

TABLE 1
UNIT #1 VENTILATION PANEL

	MARK NUMBER	EQUIPMENT STATUS
☐	1-VS-F-4A & B	OFF
☐	1-VS-HV-1A & B	OFF
☐	1-VS-F-8A & B	OFF
☐	1-VS-F-9A & B	GREEN
☐	1-VS-F-59	GREEN
☐	1-VS-F-6	OFF
☐	1-VS-F-39	GREEN
☐	1-VS-F-7A & B	GREEN
☐	1-VS-HV-5	GREEN
☐	1-VS-F-56A & B	GREEN
☐	1-VS-F-40A & B	GREEN
☐	1-VS-HV-4	OFF
☐	2-VS-F-40A or B	RED
☐	2-VS-HV-4	OFF

E-O Attachments 1, 2, and 3. FOLDOUT PAGES FOR REFERENCED PROCEDURES

NUMBER 1-E-0	ATTACHMENT TITLE	ATTACHMENT 3
REVISION 77	AUXILIARY VENTILATION, AC POWER, AND SFP STATUS CHECKS	PAGE 2 of 6

TABLE 2
VNTX PANEL

	MARK NUMBER	EXPECTED EQUIPMENT STATUS		RESPONSE NOT OBTAINED
☐	a. AOD-VS-107A & B AOD-VS-108	RED GREEN	☐	a. Place AUX BLDG CENTRAL AREA MODE switch to FILTER.
☐	b. MOD-VS-100A & B AOD-VS-106	RED GREEN	☐	b. • Place MOD-VS-100A to FILTER. • Place MOD-VS-100B to FILTER.
☐	c. MOD-VS-200A & B AOD-VS-206	GREEN RED	☐	c. • Place MOD-VS-200A to UNFILTER. • Place MOD-VS-200B to UNFILTER.
☐	d. AOD-VS-103A & B AOD-VS-104	GREEN GREEN	☐	d. • Place AOD-VS-103A in UNFILTER. • Place AOD-VS-103B in UNFILTER. • Place AOD-VS-104 in FILTER.
☐	e. AOD-VS-101A & B AOD-VS-102	GREEN GREEN	☐	e. Place AOD-VS-101A and 101B in UNFILTER.
☐	f. AOD-VS-111A & B	GREEN	☐	f. Place COMBINE CONTAINMENT EXHAUST in ISOLATE.
☐	g. AOD-VS-110	GREEN	☐	g. Place AOD-VS-109A and 109B in FILTER.
☐	h. AOD-VS-112A & B	GREEN	☐	h. • Place AOD-VS-112A in CLOSE. • Place AOD-VS-112B in CLOSE.
☐	i. MOD-VS-58A & B 1-VS-F-58A & B	RED RED	☐	i. Start 1-VS-F-58A and 1-VS-F-58B.

3. ___ Check filtered exhaust flow: (as read on FI-VS-117A and FI-VS-117B)

- ☐ • Total flow - GREATER THAN 32400 cfm

AND

- ☐ • Flow through each filter bank - LESS THAN 39600 cfm

E-O Attachments 1, 2, and 3. FOLDOUT PAGES FOR REFERENCED PROCEDURES

NUMBER 1-E-0	ATTACHMENT TITLE AUXILIARY VENTILATION, AC POWER, AND SFP STATUS CHECKS	ATTACHMENT 3
REVISION 77		PAGE 3 of 6

4. ___ Check all Station Service Buses - ENERGIZED. IF NOT, THEN initiate 1-AP-10.07, LOSS OF UNIT 1 POWER.

5. ___ Check annunciator VSP-J2 - LIT.

6. ___ Check Unit 1 RSST LTC time delay bypass light - LIT.

7. ___ Check stopped or stop 1-VS-AC-4.

8. ___ Place 1-VS-43-VS103X, MCR ISOLATION switch to the OFF position.

9. ___ Check closed or close MCR isolation dampers.

- ☐ • 1-VS-MOD-103A
- ☐ • 1-VS-MOD-103B
- ☐ • 1-VS-MOD-103C
- ☐ • 1-VS-MOD-103D

E-O Attachments 1, 2, and 3. FOLDOUT PAGES FOR REFERENCED PROCEDURES

NUMBER 1-E-0	ATTACHMENT TITLE	ATTACHMENT 3
REVISION 77	AUXILIARY VENTILATION, AC POWER, AND SFP STATUS CHECKS	PAGE 4 of 6

* *

CAUTION:
- Only one Emergency Supply Fan must be started in the following step.
- Chilled Water flow to the in-service Unit 1 MCR AHU must be throttled to at least 15 gpm when the Emergency Supply fan is started.
- Chilled Water flow to the in-service Unit 2 MCR AHU must be throttled to at least 25 gpm when the Emergency Supply fan is started.
- An Emergency Supply Fan must not be started if the filter is wet.

* *

10. Immediately start ONE Emergency Supply Fan IAW the following: (1-VS-F-41 or 2-VS-F-41 preferred)

a. IF 1-VS-F-41, CONT RM EMERG SUP FAN, will be used, THEN perform the following substeps.

___ 1. Open 1-VS-MOD-104A, CONT RM EMERG SUP MOD.

___ 2. Start 1-VS-F-41.

b. IF 2-VS-F-41, CONT RM EMERG SUP FAN, will be used, THEN perform the following substeps.

___ 1. Open 2-VS-MOD-204A, CONT RM EMERG SUP MOD.

___ 2. Start 2-VS-F-41.

c. IF 1-VS-F-42, CONT RM EMERG SUP FAN, will be used, THEN perform the following substeps.

___ 1. Open 1-VS-MOD-104B, CONT RM EMERG SUP MOD.

___ 2. Start 1-VS-F-42.

d. IF 2-VS-F-42, CONT RM EMERG SUP FAN, will be used, THEN perform the following substeps.

___ 1. Open 2-VS-MOD-204B, CONT RM EMERG SUP MOD.

___ 2. Start 2-VS-F-42.

e. ___ Adjust Chilled Water flow to MCR AHUs IAW Step 10 Caution.

E-O Attachments 1, 2, and 3. FOLDOUT PAGES FOR REFERENCED PROCEDURES

NUMBER 1-E-0	ATTACHMENT TITLE AUXILIARY VENTILATION, AC POWER, AND SFP STATUS CHECKS	ATTACHMENT 3
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11. ___ Check readings on the following Differential Pressure Indicators - POSITIVE PRESSURE INDICATED.
    - ☐ • PDI-VS-100, D.P.-U1CR/U1TB (Unit 2 Turbine Ventilation Panel)
    - ☐ • PDI-VS-101, D.P.-U1RR/U1TB (Unit 2 Turbine Ventilation Panel)
    - ☐ • PDI-VS-200, D.P.-U2CR/U2TB (Unit 2 Turbine Ventilation Panel)
    - ☐ • PDI-VS-201, D.P.-U2RR/U2TB (Unit 2 Turbine Ventilation Panel)
    - ☐ • 1-VS-PDI-118 (Unit 1 Computer Room)
    - ☐ • 1-VS-PDI-116 (Near Unit 1 Semi-Vital Bus)
    - ☐ • 2-VS-PDI-215 (Unit 2 AC Room)
    - ☐ • 2-VS-PDI-206 (Near Unit 2 Semi-Vital Bus)

12. ___ IF any reading NOT positive, THEN initiate Attachment 6 to secure MCR boundary fans.

13. ___ Check initiated or initiate 0-AP-50.00, OPPOSITE UNIT EMERGENCY.

14. ___ Check the following MCR and ESGR air conditioning equipment operating. IF NOT, THEN start equipment within 1 hour IAW the appropriate subsection of 0-OP-VS-006, CONTROL ROOM AND RELAY ROOM VENTILATION SYSTEM.
    - ☐ • One Control Room chiller
    - ☐ • One Unit 1 Control Room AHU
    - ☐ • One Unit 2 Control Room AHU
    - ☐ • One Unit 1 ESGR AHU
    - ☐ • One Unit 2 ESGR AHU

15. ___ IF both of the following conditions exist, THEN check that Load Shed is activated.
    - ☐ • Unit 2 - SUPPLIED BY RSST
    - ☐ • Unit 2 RCPs - RUNNING

16. ___ IF Load Shed is required and not activated, THEN initiate 0-AP-10.10, LOSS OF AUTO LOAD SHED.

E-O Attachments 1, 2, and 3. FOLDOUT PAGES FOR REFERENCED PROCEDURES

NUMBER 1-E-0	ATTACHMENT TITLE	ATTACHMENT 3
REVISION 77	AUXILIARY VENTILATION, AC POWER, AND SFP STATUS CHECKS	PAGE 6 of 6

NOTE:
- SFP checks should be initiated WITHIN ONE TO TWO HOURS of EOP entry.
- Loss of power may render SFP indications and alarms non-functional and require local checks. Power supplies are as follows:
  - TI-FC-103, Unit 1 Semi-Vital Bus
  - TI-FC-203, Unit 2 Semi-Vital Bus
  - 1-FC-LIS-104, Panel 1ABDA1
- Loss of AC Power to the SFP level indicator is indicated if both low and high level alarms are in simultaneously. (0-VSP-C4 and 0-VSP-D4)
- 1-DRP-003, CURVE BOOK, provides a graph for SFP time to 200°F if loss of SFP cooling occurs.

17. ___ Initiate monitoring SFP parameters:
    - ☐ • SFP level - Greater than Cooling Pump suction AND Stable
    - ☐ • SFP temperature - Stable or Lowering
    - ☐ • SFP Cooling Pumps - Either Running
    - ☐ • Component Cooling - Normal
    - ☐ • SFP Radiation - Normal

18. ___ Continue to monitor parameters every one to two hours or until authorized to terminate monitoring by the Station Emergency Manager and/or the Shift Manager.

19. ___ Notify the Station Emergency Manager and/or the Shift Manager of the status and trend of SFP parameters.

20. ___ IF any abnormality or adverse trend is identified, THEN initiate 0-AP-22.02, MALFUNCTION OF SPENT FUEL PIT SYSTEMS.

E-O Attachments 1, 2, and 3. FOLDOUT PAGES FOR REFERENCED PROCEDURES

NUMBER 1-E-0	CONTINUOUS ACTIONS PAGE	REVISION 77

1. RCP TRIP CRITERIA

   Trip all RCPs if BOTH conditions listed below occur:

   a. Charging Pumps - AT LEAST ONE RUNNING AND FLOWING TO RCS
   b. RCS Subcooling - LESS THAN 30°F [85°F]

2. MINIFLOW RECIRC CRITERIA

   a. CLOSED - When RCS pressure is less than 1275 psig [1475 psig] AND RCP Trip Criteria are met (RCPs OFF).
   b. OPEN - When RCS pressure is greater than 2000 psig.

3. ADVERSE CONTAINMENT CRITERIA

   Use Adverse Containment setpoints if EITHER condition listed below occurs:

   - Containment Pressure - GREATER THAN 20 PSIA
   - Containment Radiation - GREATER THAN 1.0E5 R/HR

4. COLD LEG RECIRCULATION SWITCHOVER CRITERIA

   GO TO 1-ES-1.3, TRANSFER TO COLD LEG RECIRCULATION, if RWST level lowers to less than 20%.

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1. AMSAC RESET CRITERIA

   AMSAC may be manually reset when level in all three SGs is greater than 13% or six minutes have elapsed since the Reactor trip. When AMSAC is reset, AMSAC ARMED annunciator H-D-1 should clear and affected components may be realigned as needed.

2. TD AFW PUMP SHUTDOWN CRITERIA

   The TD AFW pump may be secured when SG NR level is greater than 22% in at least 2 SGs, AMSAC is reset, and no auto-start signal exists. To secure the pump, the pump SOV control switches must be taken to OPEN-RESET and then to CLOSE.

3. MANUAL SI ALIGNMENT

   If SI fails to automatically align, Attachment 2 may be used for guidance on manual SI valve alignment.

4. * TRANSIENT AFW FLOW CONTROL (IF SI in progress)

   Attachment 7 may be used for guidance on transient AFW flow control.

5. * FAULTED SG ISOLATION AND AFW FLOW CONTROL (IF SI in progress)

   Attachment 8 may be used for guidance on faulted SG(s) isolation and AFW flow control.

6. * RUPTURED SG ISOLATION AND AFW FLOW CONTROL (IF SI in progress)

   Attachment 9 may be used for guidance on ruptured SG(s) isolation and AFW flow control.

7. * LOSS OF RCP SUPPORT CONDITIONS

   Trip RCPs if a loss of a support condition occurs. (for example, loss of CC)

* Preemptive Actions

E-O Attachments 1, 2, and 3. FOLDOUT PAGES FOR REFERENCED PROCEDURES

NUMBER 1-E-0	CONTINUOUS ACTION STEPS	REVISION 77

1. Check RCS Average Temperature - STABLE AT OR TRENDING TO 547°F. (E-0, Step 6)
2. Monitor RCP Trip and Miniflow Recirc Criteria. (E-0, Step 8)
3. Check SG Narrow Range Level - ANY SG GREATER THAN 12%. (Control feed flow to maintain Narrow Range Level between 22% and 50%) (E-0, Step 25)
4. Monitor LHSI pumps and secure as necessary. (E-0, Step 30)

NOTE: Subsequent SI signals may be reset by reperforming Step 12 of Attachment 1.

5. Monitor CTMT pressure and check CLS initiation as necessary. (Attachment 1, Step 8)
6. Monitor RWST level and check RS initiation as necessary. (Attachment 1, Step 9)
7. Block Low PRZR Pressure SI signal when less than 2000 psig. (Attachment 1, Step 10)
8. Block Low Tave SI signal when less than 543°F. (Attachment 1, Step 11)

E-O Attachments 1, 2, and 3. FOLDOUT PAGES FOR REFERENCED PROCEDURES

CONTINUOUS ACTIONS PAGE FOR 1-ECA-2.1

1. SI REINITIATION CRITERIA

   Following SI termination or SI flow reduction, manually start SI pumps as necessary if EITHER condition listed below occurs:
   - RCS subcooling based on CETCs - LESS THAN 30°F [85°F]
   - PRZR level - CANNOT BE MAINTAINED GREATER THAN 22% [50%]

2. ADVERSE CONTAINMENT CRITERIA

   Use Adverse Containment setpoints if EITHER condition listed below occurs:
   - Containment Pressure - GREATER THAN 20 PSIA
   - Containment Radiation - GREATER THAN 1.0E5 R/HR

3. E-2 TRANSITION CRITERIA

   GO TO 1-E-2, FAULTED STEAM GENERATOR ISOLATION, if any SG pressure raises at any time, except while performing SI Termination in Steps 13 to 23.

4. COLD LEG RECIRCULATION SWITCHOVER CRITERIA

   GO TO 1-ES-1.3, TRANSFER TO COLD LEG RECIRCULATION, if RWST level lowers to less than 20%.

5. AFW SUPPLY SWITCHOVER CRITERIA (Refer to Attachment 5)

   Transfer to one of the following alternate AFW water supplies if ECST level lowers to less than 20%.

   a. 1-CN-TK-2, using 1-CN-150.
   b. 1-CN-TK-3, using AFW Booster Pumps.
   c. AFW Crosstie.
   d. Firemain.

6. RCP START CRITERIA

   - Following a loss of all seal cooling, affected RCP(s) should NOT be started without prior status evaluation.
   - RCPs should be run in the following order of priority to provide PRZR spray: C, A and B.

SIMULATOR OPERATOR'S GUIDE

Simulator Setup

Initial Conditions:

Recall IC -378 **and implement TRIGGER #30 to activate all passive malfunctions and verify Trigger #30 implemented.**

❑ ❑ ❑ **Enter/Verify the following MALFUNCTIONS:**

Malfunction	Delay	Ramp	Trigger	Value	Final	Delete in	Trigger Type (Auto or Manual)
NI1001 POWER RANGE CHNL N41 FAILURE	5	0	1	0	-1		A
CN1503 Disable CN-P-1C Autostart	0	0	3	FALSE	TRUE		M
CN0101 MAIN CN PUMP CN-P-1A TRIPS: OVR-CURREN	5	0	3	FALSE	TRUE		M
RC1501 PRZR PRESS CONTROLLER FAILURE	5	60	5	0	-1		M
EL2001 LOSS OF 120V AC VITAL BUS I	5	0	7	FALSE	TRUE	2	M
EL2002 LOSS OF 120V AC VITAL BUS IA	5	0	7	FALSE	TRUE	2	M
V2KA8 K-A-8 UPS SYSTEM 1A TROUBLE	2	0	7	ON	OFF		M
MS0101 'A' MAIN STM LINE RUPTURE AT HEADER	5	180	9	0	20		M
MS02 STM SUP LINE TO STM HDR AFW PP RUPTURES	20	0	9	FALSE	TRUE		M
MS0401 'A' MAIN STM LINE RUPTURE BEFORE TRIP VV	20	600	9	0	2.0		M
MS0402 'B' MAIN STM LINE RUPTURE BEFORE TRIP VV	20	600	9	0	2.0		M
MS0403 'C' MAIN STM LINE RUPTURE BEFORE TRIP VV	20	600	9	0	2.0		M
FP0301 FPS FACP07 ALARM HORN FAILURE	0	0	30	FALSE	TRUE		M
FP0302 FPS PC SPEAKER FAILURE	0	0	30	FALSE	TRUE		M
CH59 Disable CH-MOV-381 AUTO Closure	0	0	30	FALSE	TRUE		M
VS2002 DISABLE VS-MOD-103B AUTO CLOSE	0	0	30	FALSE	TRUE		M
FW48 DISABLE AFWP3A AUTO START	0	0	30	FALSE	TRUE		M

SIMULATOR OPERATOR'S GUIDE

FW49 DISABLE AFWP3B AUTO START	0	0	30	FALSE	TRUE		M

❑ ❑ ❑ **Enter/Verify the following EVENT TRIGGERS:**

TRIGGER	TYPE	DESCRIPTION
1	Manual	N41 Fails LOW
3	Manual	"A" CN Pump Trip on Overcurrent/"C" CN Pump Fail to Auto Start
5	Manual	1-RC-PT-1444 Fail High
7	Manual	Momentary loss of Vital Bus I
9	Manual	Steam Break in Turbine Building, followed by TDAFW Pump Steam Supply Pipe Break In SFGDS
30	Manual	FP0301 FPS FACP07 ALARM HORN FAILURE
30	Manual	FP0302 FPS PC SPEAKER FAILURE
30	Manual	CH59 Disable CH-MOV-381 AUTO Closure
30	Manual	VS2002 DISABLE VS-MOD-103B AUTO CLOSE
30	Manual	FW48/49 DISABLE FW-P-3A/3B AUTO START

SIMULATOR OPERATOR'S GUIDE

Verify the following control room setup:

- ❑ ❑ ❑ Place the simulator in RUN and verify normal 100% power operation indications.
- ❑ ❑ ❑ Verify All pink magnets collected from previous scenarios.
- ❑ ❑ ❑ Verify vertical board PCS monitor on ALARM SCREEN.
- ❑ ❑ ❑ Reset ICCMs.
- ❑ ❑ ❑ Verify all calcalc points are displayed on PCS: U9103, U9104, U9105V.
- ❑ ❑ ❑ Verify Component Switch Flags; 1-VS-F-58A and 1-VS-F-58B switches (AUTO AFTER STOP).
- ❑ ❑ ❑ Verify Brass Caps properly placed (Hi-Hi CLS, MSTVs, CH-MOV-1350, CW and SW MOVs, CTMT Hogger suction, CNDSR Vacuum breaker).
- ❑ ❑ ❑ Radiation Monitors all clear.
- ❑ ❑ ❑ Verify SG PORVs set for 1035 psig.
- ❑ ❑ ❑ Verify "D" bank rod height at 229 steps and Bank Overlap Counter at 612.
- ❑ ❑ ❑ Advance Charts.
- ❑ ❑ ❑ Place blue magnets above switches 1-MS-MOV-100A/B/C/D.
- ❑ ❑ ❑ Verify Containment Instrument Air Compressors are on Inside Suction (all RMs reset).
- ❑ ❑ ❑ Verify SYNC keys in proper place.
- ❑ ❑ ❑ Verify MOL reactivity plans and benchboard Reactivity Placard is current.
- ❑ ❑ ❑ Reset Blender Integrators for Boric Acid to 100 and PG to 1000.
- ❑ ❑ ❑ Verify Stop Watches are available for RO and BOP.
- ❑ ❑ ❑ Verify Simulator "Session In Progress" light is turned ON.
- ❑ ❑ ❑ Verify no persons are logged onto network computer to ensure no procedures displayed.

SIMULATOR OPERATOR'S GUIDE

❑ ❑ ❑ Verify PCS time matches Sim time.

❑ ❑ ❑ Spot check all ARPs are clean, **verify** the following Procedures are available in the procedure drawers.

❑ E-0	❑ E-2	❑ ECA-2.1	❑ 0-AP-53.00
❑ 1-OP-CH-020	❑ 1-AP-4.00	❑ 1-AP-21.00	❑ 1-AP-31.00
❑ 1-FR-H.1	❑ 1-OP-TM-005	❑ 1-OPT-RP-001	❑ 1-AP-10.01
❑ 1-OPT-RX-001		❑ 0-OP-ZZ-002	

❑ **Verify Reactivity Placard is current.**

❑ Verify ∆Flux target matces PCS.

❑ Verify ALL PINK MAGNETS are accounted for.

❑ Reset Blender Integrators for Boric Acid to 100 and PG 1000.

ARPs to verify clean:			
Event 2	Event 3	Event 4	Event 5
1G-E4 1G-H1	1K-D4	1C-G8	1E-A2 1E-B2 1E-F6 1E-F7 1F-E7

SIMULATOR OPERATOR'S GUIDE

Brief

This simulator performance scenario is performed in the EVALUATION MODE. You should not direct questions to the evaluators. Otherwise, you should perform as if you were in the MCR.

Your ability to maintain a log is not being graded, but maintaining a rough log is recommended to help during briefs.

If you need to communicate with the Unit 2 operator, verbally state, "Unit 2" and an instructor will locate to the Unit 2 area and respond to you as quickly as possible.

In the unlikely event that the simulator fails such that illogical indications result, the session will be terminated. In other words, respond to what you see. If there is a problem with the simulation, the session will be terminated or adjusted as appropriate based on the specific problem.

Assign operating positions.

	TEAM 1	TEAM 2	TEAM 3
SRO			
RO			
BOP			

Ask for and answer questions.

SIMULATOR OPERATOR'S GUIDE

OPERATING PLAN:

Unit 1 is at 100% power with RCS boron concentration of 795 ppm.

During the last shift, 1-SD-P-1B, "B" High Pressure Drain Pump has started to degrade based on elevated vibration levels. The Team will ramp the unit to 84% based on 1-OP-TM-005. All systems and crossties are operable with the following exception:

- Unit 1 and 2 Containment Temperature to the MCR Fire Panel are non-functional. In accordance with TRM Section 3.3.1, Fire Detection Instrumentation, Condition B, Smoke Detectors, and Condition C, Heat Detectors, are in effect. Containment air temperatures monitored once/hour, and restore to Functional status in 14 days. OC-18 for Containment Temperature Monitoring being performed by Unit 2 BOP for both Units.

Unit #2 is at 100% power with all systems and crossties operable.

Shift orders are to commence a Ramp to 84% power in accordance with 1-OP-TM-005, Unit Ramping Operations, using the Ramp Plan provided, upon relieving the watch. The SM has directed a 0.5%/min ramp rate to be used for the ramp. Performance of 1-OP-TM-005 has been authorized and has been PSA analyzed for current plant conditions. Another operator will operate the MSRs IAW 1-OP-TM-007, MSR Operation During or Following power reductions. The next shift will perform the Heater Drain pump swap and subsequent ramp up to 100%.

The previous shift performed two 30 gallon dilutions for temperature control.

When the team has accepted the shift, proceed to the Session Conduct Section.

SIMULATOR OPERATOR'S GUIDE

EVENT 1 Ramp down in power from 100% to 84% IAW 1-OP-TM-005, Unit Ramping Operations

The Team will pre-brief the Unit Ramp prior to entering the Simulator. The Team will be provided a Copy of 1-OP-TM-005, Unit Ramping Operations, signed off to Section 5.1 for the power reduction. Following the pre-brief, the Team will enter the Simulator and walk down the control boards. When the Team and the Evaluators are ready, the Simulator will be placed in run.

Shift Manager:

- **If contacted**, acknowledge start of Ramp to 84%.
- **If asked:** I&C is standing by to adjust IRPIs as necessary.

I&C:

- **If contacted**: Standing by to adjust IRPIs as necessary.

System Operator/MOC

- **If contacted**: acknowledge Surry Unit 1 starting ramp to 84% at normal rate.

Field Operators:

- **If contacted as Unit 1 Turbine Building**: monitoring Lube oil temperatures during ramp.
- **If contacted as Polishing Building Operator**: There are 6 Beds in service; D/P ~27 psig.

Role play as other individuals as needed.

SIMULATOR OPERATOR'S GUIDE

EVENT 2 **PR Channel N-41 Fail Low**

When cued by examiner, implement **Trigger #1**.

Operations Supervisor/Management:

- **If contacted**, acknowledge N-41 failure.
- **If contacted,** will notify I&C of the failure, will notify the OMOC.
- **When notified**: acknowledge but do not imply agreement with Tech Spec requirements as identified by the SRO.
- **If contacted,** will take responsibility for writing the CR.
- **If asked:** will notify Reactor Engineering of need to perform flux map.
- **If asked:** SM will confer with the OMOC concerning continuing the ramp.

STA:

- **If contacted**, acknowledge Tech Spec requirements for the failure, but do not imply agreement with requirements identified by the SRO.
- **If the team has a transient brief:** The STA will have no input for the brief.
- **If asked:** will notify Reactor Engineering of need to perform flux map.

Maintenance/Work Week Coordinator:

- **If contacted**, will acknowledge instrumentation failure and commence investigations and/or efforts to place the channel in trip.

Role play as other individuals as needed.

SIMULATOR OPERATOR'S GUIDE

EVENT 3 **1-CN-P-1A trip/Failure of 1-CN-P-1C to auto start**

When cued by examiner, implement **Trigger #3**.

CT-1: The BOP must start the standby Condensate pump prior to SG level dropping low enough to cause an auto or manual reactor trip.

Operations Supervisor/Management:

- **If contacted**, Acknowledge failure.
- **If contacted:** Take responsibility for submitting CR.
- **If contacted:** Will notify Maintenance and OMOC of the failure.

Maintenance/ Work Week Coordinator:

If contacted, will acknowledge the failure, contact Maintenance to commence investigation.

STA:

- **If contacted**, Acknowledge the failure
- **If the team has a transient brief:** Will have no input for a transient brief.

Field Operators:

When contacted to check status of CN Pumps: Wait three (3) minutes and report 1-CN-P-1C conditions normal after start; 1-CN-P-1A exhibits no obvious cause for the trip.

When contacted to check status of 1-EP-BKR-15B4: Wait 3 minutes and report breaker 15A4 has timed overcurrent drop on "A" phase.

Role play as other individuals as needed.

SIMULATOR OPERATOR'S GUIDE

EVENT 4 Master PRZR Pressure Controller, 1-RC-PC-144J Fails Low.

When cued by examiner, implement **Trigger #5**.

Operations Supervisor/Management:

- **If contacted**, acknowledge the failure of the Master Pressurizer Controller.
- **If asked:** will contact I&C and OMOC of the failure.
- **If contacted:** acknowledge Tech Specs requirement related to the failure, but do not imply agreement.
- **If contacted:** will take responsibility for submitting CR.
- **If asked:** SM will confer with the OMOC concerning continuing the ramp with Pressurizer Pressure control in manual.

STA:

- **If contacted**, acknowledge the failure of the Master Pressurizer Controller.
- **If contacted**: acknowledge Tech Specs requirement related to the failure, but do not imply agreement.
- **If the team has a transient brief:** The STA will have no input for the brief.

Maintenance/ Work Week Coordinator:

- **If contacted**, will acknowledge the failure, contact I&C to commence investigation of the failed controller.

Role-play as other individuals as needed.

SIMULATOR OPERATOR'S GUIDE

EVENT 5 **Momentary loss of Vital Bus I**

When cued by examiner, implement **Trigger #7**.

Operations Supervisor/Management:

- **If contacted**, acknowledge the failure of Vital Bus I.
- **If contacted,** will notify I&C of the failure, will notify the OMOC.
- **If contacted**: will take responsibility for submitting CR.

STA:

- **If contacted**, acknowledge the failure.
- **If the team has a transient brief:** The STA will have no input for the brief.

I&C:

- **If requested**: will prepare for placing the channel in trip.

Maintenance/ Work Week Coordinator:

- **If contacted**, will notify Electrical Maintenance of the failure to commence investigation.

Field Operator

- **If contacted to investigate,** Report back after 3 minutes that you spoke with a security guard who thinks he may have bumped up against UPS 1A-1. The Static switch is carrying VBI, no other problems noted.

Role-play as other individuals as needed.

SIMULATOR OPERATOR'S GUIDE

EVENT 6 Steam Header Break in TB

When cued by examiner, implement **Trigger #9**.

CT-2: Restore at least one MDAFW pump prior to SG WR level lowering to FR-H.1 Feed and Bleed criteria (12%). Failing to do this would significantly complicate the scenario by challenging heat sink.

Operations Supervisor/Management:

- **If contacted:** Acknowledge Reactor Trip and SI; agree to notify the OMOC.
- **If contacted to close 1-CH-223:** Acknowledge order (this will take approx. 45 min)

STA:

- **If the team has a transient brief:** The STA will have no input for the brief.
- **If asked:** Annunciator 1E-F3 (Hi Steam Flow SI) came in and cleared quickly.

Unit Two:

- **If asked**, RWST cross-ties on Unit 2 are closed.
- **If asked,** Simulate manually opening Unit 2 RWST cross-tie valves.
- **If asked,** External MCR D/P indicators indicate the same as indicated pressure on Unit 2 Vent Panel.
- **If contacted,** Unit Two has implemented AP-50.00, and all conditions on U2 are normal.
- **When:** BOP reaches Page 6 of E-0, Attachment 3, you will take responsibility for the Attachment at this point.
- **If asked:** Unit 1 main steam and condenser A/E radiation is normal.

Field Operators: (Wait 4 minutes from direction to check Safeguards and report of conditions.)

- **If contacted**, SFGDs steam side is inaccessible; steam is blowing out of the steam side louvers.

Role play as other individuals as needed.

SIMULATOR OPERATOR'S GUIDE

EVENT 7 **3 Faulted SG in SFGDs**

CT-3: Lower AFW flowrate to 60 gpm to each SG if RCS cooldown rate is > 100°F/hour to prevent entry into FR-P.1. Failing to do this could cause an entry into FR-P.1 which is not needed.

STA:

- **If the team has a transient brief:** The STA will have no input for the brief.
- **When Team has throttled to < 350 gpm:** Notify SRO of Red Path on Heat Sink Status Tree.

Unit Two:

- **If asked**, RWST cross-ties on Unit 2 are closed.
- **If asked,** Simulate manually opening Unit 2 RWST cross-tie valves.
- **If asked,** External MCR D/P indicators indicate the same as indicated pressure on Unit 2 Vent Panel.
- **If requested**, Chilled Water flows have been adjusted per caution prior to Step 10 of E-0, Attachment 3.

Field Operators: (Wait 4 minutes from direction to check Safeguards and report of conditions.)

- **If contacted**, SFGDs steam side is inaccessible; steam is blowing out of the steam side louvers.

Role play as other individuals as needed.

Scenario Termination based on Evaluator Cue, SI Re-initiation, and Cooldown rate has been controlled.

Facility: Surry Power Station Scenario No.: 4 Op-Test No.: 2021-301

Examiners: ______________________ Operators: ______________________

Initial Conditions: Unit 1 at 13% power, with plant startup in progress; BOL. Unit 2 at 100% power. All systems and crossties are operable with the following exceptions:

- Unit 1 startup is in progress per 1-GOP-1.8 and 1-OP-TM-001.
- Containment Smoke and heat detectors are non-functional due local fire panel failure (2 days ago). TRM Section 3.3.1, Fire Detection Instrumentation, Condition B, Smoke Detectors, and Condition C, Heat Detectors is in effect. Containment air temperatures monitored once/hour, and restore to Functional status in 14 days. OC-18 for Containment Temperature Monitoring being performed by Unit 2 BOP for both Units.

Turnover: The Crew will be provided a copy of 1-GOP-1.8 and 1-OP-TM-001 and a ramp plan to place Unit 1 online.

Event No.	Event Type*	Event Description
1 N	N BOP/SRO R SRO/RO	Place Unit 1 MFRVs in AUTO and ramp up IAW 1-GOP-1.8/1-OP-TM-001.
2 N	I-BOP/SRO TS-SRO	1-CC-RM-105 fails with failure of vent valve auto closure. ARP 0-RM-L5/M5.
3 N	C-RO/SRO	Normal Charging Flow Controller 1-CH-FC-1122C fails high. 0-AP-53.00.
4 N	C-BOP/SRO	Trip of running EH pump with failure of standby pump auto start. ARP TS-D2. **(CT-1)**
5	C-RO/SRO TS-SRO	“A” CH SW pump trip with failure of “B” CH SW pump auto start. ARP 1D-G5.
6 N	C-RO/SRO	Dropped Rod. 0-AP-1.00, 1-E-0, 1-ES-0.1.
7	M-ALL	SBLOCA, with auto start failure of both LHSI pumps. 1-AP-16.00, 1-E-0. **(CT-2)**
8	M-ALL	LBLOCA, with “A” and “B” CS pump auto start failure, failure of CS Discharge MOVs to auto open. “A” CS pump lockout. 1-FR-Z.1, 1-E-0. **(CT-3)**

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

LIST OF CRITICAL TASKS

CT #	EVENT	DESCRIPTION	MET (✓)
CT-1	4,	Start standby EH fluid pump prior to turbine control valves failing closed. (~8 1/2 minutes, 6 minutes from the first Annunciator, with no operator action). Failure to respond to this event will result in an unnecessary turbine/reactor trip.	
CT-2	7,	Start at least one LHSI pump prior to exiting 1-E-0 to restore function. Failure to do this, prior to exiting 1-E-0, will create a challenge to Core Cooling during the subsequent LBLOCA.	
CT-3	8,	Establish "B" train of Containment Spray flow within 15 minutes of Containment Pressure reaching 23 psia to prevent unnecessary EAL escalation. Because of the failure of the Containment Spray pumps to start, there is a loss of that function. Failure to establish one train of CS Pump flow within 15 minutes will result in a potential loss of the Containment barrier (per the EAL Matrices). That, paired with the Loss of RCS barrier, will require escalation from an Alert to a Site Area Emergency.	

Event 1: Place Unit On-Line and Ramp Up in Power. (R – RO/SRO, N- BOP/SRO)

The Team will pre-brief 1-GOP-1.8, Unit Startup, HSD to Max Allowable Power (step 5.6.27), and 1-OP-TM-001 (Section 5.8), Turbine-Generator Startup to 20% - 25% Turbine Power prior to Simulator entry. A reactivity plan will be provided for the Team use during the pre-brief and in the Simulator for the Ramp up in power. The Team will place the Main Feedwater Regulating Valves in AUTO, close the Feedwater bypass HCVs, and commence a ramp up in power. To allow the team time to set up PCS trends, a surrogate operator will be responsible for feed water control until the team relieves the watch; the BOP will then assume SG level control and the surrogate will leave the simulator floor.

Verifiable Action(s):

1) RO: Manipulate rod control and CVCS Blender to control Tave and ΔFlux during the power escalation.
2) BOP: Place Main FRVs in AUTO.
3) BOP: Manually close Main Feed Bypass HCVs during power escalation.

Event 2: 1-CC-RI-105, CC RM, fail high without associated auto action. (I – BOP/SRO, TS – SRO)

After the Team has raised power, stable control of SG NR level with FRVs in auto has been achieved, and the Evaluation Team is ready, the malfunction is initiated. This failure causes 1-CC-RI-105 Alert and High alarms to actuate with the failure of HCV-CC-100, CC Surge TK VNT Isol VV, to auto close. The BOP will respond to the RM alarm and take action IAW with RM Annunciator Response Procedure.

Verifiable Action(s):

1) BOP: Close HCV-CC-100, CC Surge Tank vent valve.

Technical Specifications (1):

1) **Tech Spec 3.13.E,** Whenever the component cooling water radiation monitor is inoperable, the surge tank vent valve shall remain closed. (This Tech Spec also satisfies Tech Spec Table 3.7-5.)

Event 3: Charging flow controller 1-CH-FT-1122C Fail High. *(C – RO/SRO)*

When the Evaluation Team is ready, the malfunction will be actuated. The malfunction will cause The Charging flow transmitter to Fail High. This will cause charging flow to lower, resulting in Letdown perturbations based on reduced cooling in the Regen Heat Exchanger. Also, Pressurizer level will lower. The RO is expected to diagnose the failure based on alarms and indications received and take manual control of CH flow.

Verifiable Action(s):

1) RO: Take manual control of CH flow.
2) RO: Control Charging flow within the designated PRZR Level band.

Event 4: Running EH pump trips, standby EH pump fails to auto start. *(C – BOP/SRO)*

This failure causes the running EH pump to trip with the backup pump failing to auto trip. Approximately 2 minutes after the EH pump trip, Annunciator TS-D2 will come in for Low EH fluid pressure. The BOP will perform the ARP, diagnose the failure based on alarms and EH pump status, and start 1-EH-P-MP2.

Verifiable Action(s):

1) BOP: Start 1-EH-P-MP2.

Critical Task(s):

CT-1: Start standby EH fluid pump prior to automatic OR manual reactor/turbine trip. (~8 1/2 minutes, 6 minutes from the first Annunciator, with no operator action). Failure to respond to this event will result in turbine control valves failing closed and an unnecessary turbine/reactor trip.

Event 5: Trip of the running CH pump SW pump, with failure of the redundant pump to auto start. (C – RO/SRO, TS - SRO)

This failure causes the running CH pump SW pump (1-SW-P-10A) to trip, and the redundant pump fails to auto start on low pressure. The Team should respond by implementing ARP 1D-G5, SW OR CC PPS DISCH TO CHG PUMPS LO PRESS, start 1-SW-P-10B, and verify CH Pump SW flow restored.

Verifiable Action(s):

1) RO: Start 1-SW-P-10B.

Technical Specifications (1):

1) Tech Spec 3.0.1, Place the Unit in HSD in 6 hours, CSD in the following 30 hours, in effect.

Technical Requirements Manual (1):

1) **TRM 3.7.9, Appendix R Alternate Shutdown Equipment and MRule(a)(4) Fire Risk Equipment, Table 3.7.9-1, 1-SW-P-10A.** With 1-SW-P-10A nonfunctional:
-A.2, Implement App R hourly fire watch in Unit 1 ESR, Unit 1 and 2 Turbine Buildings Basement North Wall, MER 3 within 14 days.
-A.3, Restore instrument to functional status within 60 days.
<u>**NOTE:**</u> *1-SW-P-10B will remain FUNCTIONAL because it is still capable of performing its design function per the TRM definition: to provide cooling support for the Charging Pump seals and lube oil coolers.*

Event #6: Dropped Control Rod. (C – RO/SRO)

This Event will cause a lowering rector power, lowering RCS temperature and pressure, and result in annunciator 1G-H2, RPI Rod Bottom < 20 Steps. With reactor power below 25%, 0-AP-1.00 will direct 1-E-0 entry. That team may take conservative action and go to 1-E-0 directly. The team will transition to 1-ES-0.1 to stabilize the unit at HSD.

Verifiable Action(s):

1) RO: Perform immediate action steps of 1-E-0.
2) BOP: Throttle AFW flow to all S/Gs.

Event #7: SBLOCA with failure of LHSI pumps to auto start. (M – ALL)

The RO will diagnose the RCS leakage due to the alarms and indications received, and perform the Immediate Actions of 1-AP-16.00. When leakage is determined to be greater than the capacity of a single CH pump, The RO will manually initiate Safety

Injection and return to 1-E-0. The BOP will start at least one LHSI pump IAW 1-E-0 Attachments 1 and 2.

Verifiable Action(s):

1) RO: Manually initiates Safety Injection and re-performs immediate action steps of 1-E-0.
2) BOP: Manually starts at least one LHSI pump.

Critical Task(s):

CT-2: Start at least one LHSI pump before transition to 1-FR-C.1 is required. Because of the failure of the LHSI pumps to auto start, there is a total loss of available high volume RCS makeup. Failure to do this in a timely manner will create a challenge to Core Cooling during the subsequent LBLOCA.

Event #8: LBLOCA with no running Containment Spray pumps. (M – All)

This Event will cause a sudden drop in RCS pressure, multiple Containment radiation alarms, and a rise in Containment pressure. Hi CLS and Hi Hi CLS will actuate, but the “A” CS pump breaker will lockout, the “B” CS pump will fail to auto start, and the CS Pump discharge MOVs will fail to auto open. Orange path criteria will be met for Containment and the Team will transition to 1-FR-Z.1. The Team is expected to align CS flow using the “B” CS pump and return to 1-E-1.

Verifiable Action(s):

1) RO: Start “B” Containment Spray (CS) pump.
2) RO: Open “B” CS Pump Discharge MOVs.
3) RO: Stop all RCPs.
4) BOP: Close CH pump miniflow Recirc MOVs.

Critical Task(s)

CT-3: Establish “B” train of Containment Spray flow within 15 minutes of Containment Pressure reaching 23 psia to prevent unnecessary EAL escalation. Because of the failure of the Containment Spray pumps to start, there is a loss of that function. Failure to establish one train of CS Pump flow within 15 minutes will result in a potential loss of the Containment barrier (per the EAL Matrices). That, paired with the Loss of RCS barrier, will require escalation from an Alert to a Site Area Emergency.

The Scenario is terminated when the Team restores Containment Spray or Evaluator discretion.

Scenario Recapitulation
Total Malfunctions: 7
Abnormal Events: 5, ARP 1-RM-L5/-M5, 0-AP-53.00, ARP TS-D2, ARP 1D-G5, 0-AP-1.00.
Major Transients: 2
EOPs Entered: 2 (E-0, ES-0.1, E-1)
EOP Contingencies: 1 (FR-Z.1)

Initial Conditions: Unit 1 at 13% power, with plant startup in progress; BOL. Unit 2 at 100% power. All systems and crossties are operable with the following exceptions:
Equipment Status/ Procedures/ Alignments/ Data Sheets/ etc.: o Unit 1 startup is in progress per 1-GOP-1.8 and 1-OP-TM-001. o Containment Smoke and heat detectors are non-functional due local fire panel failure (2 days ago). TRM Section 3.3.1, Fire Detection Instrumentation, Condition B, Smoke Detectors, and Condition C, Heat Detectors is in effect. Containment air temperatures monitored once/hour, and restore to Functional status in 14 days. OC-18 for Containment Temperature Monitoring being performed by Unit 2 BOP for both Units.
Turnover The Team will pre-brief placing unit 1 Main Feedwater Regulating Valves in AUTO and continuing the power escalation in accordance with 1-GOP-1.8 and 1-OP-TM-001 and a ramp plan prior to Simulator entry, and commence following turnover. The performance of this procedure has been analyzed based on the current plant configurations and the PSA indicates green.

Scenario Objectives:

A. Given Station Operating Procedures and an approved ramp plan, perform a Unit 1 power escalation.

B. Given a failure of Component Cooling Radiation Monitoring, respond in accordance with ARPs 0-RM-L5 and –M5.

C. Given a failure of the Normal Charging Flow Controller, respond in accordance with 0-AP-53.00, Loss of Vital Instrumentation / Controls.

D. Given a loss of the running EH pump with auto start failure of the standby pump, respond in accordance with ARP TS-D2.

E. Given a loss of the running Charging SW pump with auto start failure of the standby pump, respond in accordance with ARP 1D-G5.

F. Given a dropped rod below 25% reactor power, respond in accordance with 0-AP-1.00, Rod Control Malfunction, and 1-E-0, Reactor Trip or Safety Injection.

G. Given a small break loss of Reactor Coolant, respond in accordance with 1-AP-16.00, excessive RCS leakage, and 1-E-0, Reactor Trip or Safety Injection.

H. Given a large break loss of Reactor Coolant with a loss of both Containment Spray pumps, respond in accordance with 1-FR-Z.1, Response to Containment High Pressure.

SHIFT TURNOVER INFORMATION

OPERATING PLAN:

The initial conditions have Unit 1 online at 13% reactor power with the following parameters:

- RCS boron concentration of 1413 ppm.
- Steam Dumps are in AUTO in Tave mode.
- Pimp is 8%.
- RCS Tave is 550°F; Tref is 549°F.
- Rod Control is in MANUAL.
- A surrogate operator is controlling S/G levels at 40% ± 4%, using the main feedwater bypass HCVs until the team relieves the watch. At that time, the team will assume feed control and the surrogate will leave the simulator.

Unit startup is in progress, with reactor power being held at 13% for turnover.

All systems and crossties are operable with the following exception:

- Containment Smoke and heat detectors are non-functional due local fire panel failure (2 days ago). TRM Section 3.3.1, Fire Detection Instrumentation, Condition B, Smoke Detectors, and Condition C, Heat Detectors is in effect. Containment air temperatures monitored once/hour, and restore to Functional status in 14 days. OC-18 for Containment Temperature Monitoring being performed by Unit 2 BOP for both Units.

Unit #2 is at 100% power with all systems and crossties operable.

Shift orders are to place unit 1 main feedwater regulating valves in AUTO and commence power escalation in accordance with 1-GOP-1.8 (starting at step 5.6.27), 1-OP-TM-001 and a ramp plan upon relieving the watch. From there, continue the power escalation to 20-25% turbine power. Performance of these startup procedures have been authorized and have been PSA analyzed for current plant conditions.

The last shift performed dilutions as necessary to support unit startup, with PG currently in the blender piping.

Event Description: Place unit online.

Cue: When team ready.

Time	Position	Applicant's Action or Behavior
	Team	**1-GOP-1.8** Team will pre-brief Initial Conditions, Precautions and Limitations, and procedure prior to entering simulator.
	SURROGATE BOP RO/BOP	**1-GOP-1.8** **NOTE:** *1-OP-CH-021 (*Alternate Dilution Using Blender*) procedure steps are contained at the end of this section.* *When the team has relieved the watch, turnover feed control responsibilities over to the BOP and leave the simulator floor.* **NOTES** prior to step 5.6.27: • Steam Flow / Feed Flow indications do not have to be matched to be considered stable. • All three MFRVs should be placed in Auto at the same time to ease the transition to Auto feed control. 5.6.27 <u>WHEN</u> Feedwater temperature is greater than 260°F (PCS points T0418A, T0438A, T0458A) with stable Steam Flow / Feed Flow, <u>THEN</u> perform the following: a. Check that the MFRVs are closed. **b. Place the MFRVs in Auto.** **c. <u>WHEN</u> MFRV demand exceeds approximately 9%, <u>THEN</u> slowly close the MFRV Bypass HCVs as the MFRVs come open.** **NOTE:** When the Steam Dumps are fully closed, Tave will lower as Turbine power is raised. 5.6.28 <u>IF</u> the Steam Header Pressure controller is in Auto, <u>THEN</u> as Turbine power level is raised, perform the following. Enter N/A if controller in Manual. a. Check that the Steam Dumps modulate closed. b. <u>WHEN</u> the Steam Dumps are closed, <u>THEN</u> place the Steam Header Pressure controller in Manual. **NOTE:** Step 5.6.28 will already be initialed as complete.

Event Description: Place unit online.

Cue: When team ready.

Time	Position	Applicant's Action or Behavior
		1-GOP-1.8
	RO/BOP	5.6.29 IF the Steam Header Pressure controller is in Manual, THEN as Turbine power level continues to rise, reduce the STM DUMP VVS DEMAND signal to zero while maintaining Reactor power constant. Enter N/A if controller was operated in Auto.
	RO/BOP	**NOTE:** Step 5.6.29 will already be initialed with "N/A"
		5.6.30 Place the STM DUMP MODE SEL switch in the TAVG position as follows.
		a. Check STM HDR pressure controller demand at zero.
		b. Place STM DUMP CNTRL switch to OFF/RESET.
		c. Place STM DUMP MODE SEL switch to RESET and spring return to TAVG.
		d. Check annunciator 1H-D7, STM DUMP PERM, is NOT LIT.
		e. Place STM DUMP CNTRL switch to ON.
		NOTE: Step 5.6.30 will already be initialed as complete. **NOTE:** Annunciators 1H-A3/-B3/-C3 (LOOP A/B/C HI/LO TAVG) may alarm during the ramp and are expected. **NOTE:** Annunciator 0-BR-D2 (OVHD GAS COMPR STDBY START) may come in during the ramp and is expected; Unit 2 will perform the ARP is directed.
		END OF GOP ACTIONS – 1-OP-TM-001 ACTIONS BEGIN NEXT PAGE.

Op-Test No.: Surry 2021-1 Scenario No.: 4 Event No.: 1 Page 12 of 81

Event Description: Place unit online.

Cue: When team ready.

Time	Position	Applicant's Action or Behavior
	SRO	**1-OP-TM-001** **CAUTIONS** prior to Step 5.8.1: • Constant communication between the Reactor Operators on the S/G Level Controls, the Control Rods, Steam Dumps, and the Turbine must be maintained to prevent temperature or level transients. • Rapid Loading of the Turbine - Generator may cause a Steam Generator High Level Trip. **NOTES** prior to Step 5.8.1: • Shift Supervision may authorize entry or exit from this subsection at any step or substep based upon existing plant conditions. N/A must be entered for the specific steps or substeps in the subsection that were not performed as a result of the authorized exit or entry. • Ramping the Turbine at 1%/min until the Steam Dumps are closed will aid in the transition to auto feed control. Once the Steam Dumps are closed the normal ramp rate is Position 6. • In the OPER AUTO mode, Turbine loading may be stopped by depressing the HOLD pushbutton and may be restarted by depressing the GO pushbutton.
	SRO/BOP	**1-OP-TM-001** 5.8.1 **With the OPER AUTO mode selected, set the desired load in the SETTER and depress the GO pushbutton.** 5.8.2 Maintain the System Voltage on the 230 KV BUS VOLT meter as requested by the System Operator. 5.8.3 WHEN Turbine power rises above 10%, THEN check PCS alarm Y2060D, Exh Hood Sprays OFF, is received. 5.8.4 WHEN IMPULSE CHAMBER PRESSURE (Turbine Power) passes through 30 percent OR when the startup has stabilized, THEN check or depress the IMP IN pushbutton AND check that the IMP IN light is LIT and the IMP OUT light is NOT LIT. Enter N/A if Turbine control will remain in IMP OUT. *Evaluator's Note: No further actions are expected for this event.* **NOTE:** *If the team is allowed to ramp above 25% reactor power, reactor power may remain above 25% at Event 6 after the dropped rod; a reactor trip will not be required. If this occurs, the examiner may direct inserting Trigger 25 to drop an additional control rod.*
		END EVENT 1

Event Description: Place unit online.

Cue: When team ready.

Time	Position	Applicant's Action or Behavior
	RO	**1-OP-CH-021,** Alternate Dilution Using Blender 5.1 Alternate Dilution **NOTE:** This subsection will be used for the first alternate dilution of the shift. Attachment 1 will be used as a guide for further alternate dilutions for the remainder of the shift. **NOTE:** If unit on Excess Letdown, 1-OP-CH-007 should be used. 5.1.1 Determine the required integrator setpoint by performing the following: _________________ gal (-) ______________= ______ Integrator setpoint (Desired Dilution) (anticipated additional flow, dependent on flowrate)
	UNIT 2	*If asked, perform IV for Step 5.1.1.* 5.1.2 Notify Shift Supervision of impending Alternate Dilution. 5.1.3 Notify STA of impending Alternate Dilution. 5.1.4 Place the MAKE-UP MODE CNTRL switch in the STOP position. 5.1.5 Adjust both of the following controllers for the flow rate and total gallons of Primary Grade water for the dilution. IF the PG FLOW CNTRL controller setpoint has previously been set, <u>THEN</u> N/A Substep 5.1.5.a. a. 1-CH-FC-1114A, PG FLOW CNTRL ______ GPM (IAW Attachment 2) b. Record number of gallons of PG to be added from Step 5.1.1 and enter into 1-CH-YIC-1114A, PRI WATER SUP BATCH INTEGRATOR (GAL) as follows: 1. Depress PRESET A Button (Controller will read the last value entered into the controller; reads in gallons.) 2. To clear PRESET A, depress the CLR Button. Enter N/A if not required. 3. Enter desired PRESET A value. Enter N/A if not required. 4. Depress ENT Button

Event Description: Place unit online.

Cue: When team ready.

Time	Position	Applicant's Action or Behavior
	RO	1-OP-CH-021, Alternate Dilution Using Blender 5.1.6 Place the MAKE-UP MODE SEL switch in the ALT DIL position. 5.1.7 IF it is desired to direct the dilution water to the charging pump suction only, THEN place 1-CH-FCV-1114B, BLENDER TO VCT, in the CLOSE position. Otherwise, enter N/A. 5.1.8 Place the MAKE-UP MODE CNTRL switch in the START position. 5.1.9 Check all of the following conditions. a. 1-CH-FCV-1113A, BORIC ACID TO BLENDER, is closed. b. 1-CH-FCV-1113B, BLENDER TO CHG PUMP, is open. c. 1-CH-FCV-1114A, PGW TO BLENDER, is controlling in AUTO. d. 1-CH-FCV-1114B, BLENDER TO VCT, is open. IF Step 5.1.7 was performed, THEN enter N/A. 5.1.10 IF it is desired to stop the Dilution before the selected amount, THEN place the MAKE-UP MODE CNTRL switch in the STOP position. IF the PRI WATER SUP BATCH INTEGRATOR (GAL) is used to stop the flow, THEN enter N/A for this step. 5.1.11 WHEN the desired amount of makeup has been reached, THEN check both of the following valves closed. • 1-CH-FCV-1113B • 1-CH-FCV-1114B
	RO	5.1.12 Check or place 1-CH-FCV-1114B in AUTO. 5.1.13 Check or place the following controllers in Automatic. • 1-CH-FC-1113A, BA FLOW CNTRL • 1-CH-FC-1114A, PG FLOW CNTRL 5.1.14 Place the MAKE-UP MODE SEL switch in the AUTO position. 5.1.15 Place the MAKE-UP MODE CNTRL switch in the START position. 5.1.14 Notify Shift Supervision of Blender status. **(Reference 2.4.1)** ***Additional Alternate Dilutions will be performed using 1-OP-CH-021, Attachment 1 (Next Page).***

Event Description: Place unit online.

Cue: When team ready.

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Attachment 1

REPEATED ALTERNATE DILUTIONS

NOTE: This attachment will be used for repeated Dilutions after the initial Subsection 5.1 has been filled out for the shift.

Procedure Steps:	Gal/Initial (1)	Gal/Initial (2)	Gal/Initial (3)
	Perf.	Perf.	Perf.
1.1 Notify Shift Supervision of impending Alternate Dilution. **(Reference 2.4.1)**			
1.2 Notify STA of impending Alternate Dilution.			
1.3 Place the MAKE-UP MODE CNTRL switch in the STOP position.			
1.4 Check set or set PG flow controller for the dilution.			
1.5 Record the number of gallons of PG to be entered into the PG Integrator.	/	/	/
1.6 Depress PRESET A Button on 1-CH-YIC-1114A.			
1.7 To clear PRESET A, depress the CLR Button on 1-CH-YIC-1114A. Enter N/A if not required.			
1.8 Enter desired PRESET A value from Step 1.5 on 1-CH-YIC-1114A. Enter N/A if not required.			
1.9 Depress ENT Button on 1-CH-YIC-1114A.			
1.10 Place the MAKE-UP MODE SEL switch in the ALT DIL position.			
1.11 IF it is desired to direct the dilution water to the charging pump suction only, THEN place 1-CH-FCV-1114B, BLENDER TO VCT, in the CLOSE position. Otherwise, enter N/A.			
1.12 Place the MAKE-UP MODE CNTRL switch in the START position.			
1.13 Check proper valve positions.			
1.14 WHEN the desired amount of makeup has been reached, THEN check proper valve positions.			
1.15 Check or place 1-CH-FCV-1114B in AUTO.			
1.16 Check or place BA flow controller in AUTOMATIC.			
1.17 Check or place PG flow controller in AUTOMATIC.			
1.18 Place the MAKE-UP MODE SEL switch in the AUTO position.			
1.19 Place the MAKE-UP MODE CNTRL switch in the START position.			
1.20 Notify Shift Supervision of Blender status. **(Reference 2.4.1)**			

Op-Test No.: Surry 2021-1 Scenario No.: 4 Event No.: 2 Page 16 of 81

Event Description: CC RM Fail upscale with failure of HCV-CC-100 to auto close.

Cue: After MFRVs in AUTO and Bypass HCVs closed.

Time	Position	Applicant's Action or Behavior
	BOP	Diagnoses failure of 1-RM-CC-105 with the following indications/alarms: Alarms: • 0-RM-L5 CC HX A/B OUT ALERT/FAILURE • 0-RM-M5 1-CC-RI-105 HIGH Indications: 1-CC-RI-105 indicates a step change to 5.7 E+06 cpm. 1-CC-RI-105, HIGH, WARN and RANGE lights LIT. **NOTE**: RM-M5 Guidance located at end of this section, starting at page 17.
	BOP SRO	0-RM-L5 **NOTES** Prior to Step 1: • If a monitor fails, the automatic functions associated with that monitor must be checked or performed. • When HP has surveyed the area and declared radiation levels normal, the components that were realigned due to monitor failure may be returned to normal and activities in the affected area may continue. • Tech Spec 3.13.E requires that HCV-CC-100 remain closed if either CC radiation monitor is inoperable.
	BOP	0-RM-L5 1. CHECK ALARM - READING ON MONITOR GREATER THAN OR EQUAL TO ALERT SETPOINT <u>OR</u> RADIATION LEVEL HAS TRENDED UP • 1-CC-RI-105, HDR A • 1-RM-RR-150C, Pen 1 BOP will identify that the meter indicates a steeply rising trend. Goes to RNO. **NOTE:** It is expected for the team to determine the rad monitor has failed, based on the RM indication and stable indication on the other CC RM (106).
	BOP	0-RM-L5, Step 1 RNO a) <u>IF</u> all EEEEEs indicated on display, <u>THEN</u> GO TO 0-OPT-RM-001, Radiation Monitoring Equipment Check. **NOTE:** The team will not perform 0-OPT-RM-001.

Op-Test No.: Surry 2021-1 Scenario No.: 4 Event No.: 2

Event Description: CC RM Fail upscale with failure of HCV-CC-100 to auto close.

Cue: After MFRVs in AUTO and Bypass HCVs closed.

Time	Position	Applicant's Action or Behavior
	BOP	RM-M5 ***Note**: Candidate may refer to this ARP initially in response to the High Alarm.* **NOTE** before step 1: • If a monitor fails, the automatic functions associated with that monitor should be verified or performed. • When HP has surveyed the area and declared radiation levels normal, the components that were realigned due to monitor failure may be returned to normal and activities in the affected area may continue. • **Tech Spec 3.13.E requires that HCV-CC-100 remain closed if either CC radiation monitor is inoperable.** 1. CHECK ALARM - READING ON MONITOR GREATER THAN OR EQUAL TO HIGH SETPOINT • 1-CC-RI-105, HDR A • 1-RM-RI-150C, Pen 1 Identifies Monitor reading is greater than High Alarm.
	BOP UNIT 2	RM-M5 2. CHECK CC HEAD TANK VENT VALVE - CLOSED a) Place HCV-CC-100 in OFF (Unit 1) **Places HCV-CC-100 in Off.** b) Place SOV-CC-200 in CLOSE (Unit 2) Directs Unit 2 operator to place SOV-CC-200 in close. Reports that SOV-CC-200 has been placed in CLOSE.

Op-Test No.: Surry 2021-1 Scenario No.: 4 Event No.: 2

Event Description: CC RM Fail upscale with failure of HCV-CC-100 to auto close.

Cue: After MFRVs in AUTO and Bypass HCVs closed.

Time	Position	Applicant's Action or Behavior
	BOP	RM-M5 **NOTE** before step 3: The following components are the most likely sources of inleakage to the CC System: • RCP Thermal Barrier • NRHX • Primary Sample coolers • Excess Letdown HX • HRSS coolers • RHR HX • SFP coolers • RHR Pump Seal coolers 3. MONITOR CC HEAD TANK LEVEL AND CC TEMP FOR INCREASING LEAKAGE TO CC SYSTEM
	BOP BOP	RM-M5 4. NOTIFY HP TO DO THE FOLLOWING: • Check area evacuated as necessary • Control access as necessary • Investigate cause • Determine need for setpoint change Notifies HP.
	BOP	RM-M5 5. PERFORM ( )-OPT-RC-10.0, REACTOR COOLANT LEAKAGE OR ( )-AP-16.00, EXCESSIVE RCS LEAKAGE, AS NECESSARY Notifies RO/SRO to perform 1-OPT-RC-10.0, as necessary. Determines 1-AP-16.00 is not necessary.
	BOP	RM-M5 6. DETERMINE LEAKAGE SOURCE BY SAMPLING AS NECESSARY Notifies SRO concerning Step.

Op-Test No.: Surry 2021-1 Scenario No.: 4 Event No.: 2

Event Description: CC RM Fail upscale with failure of HCV-CC-100 to auto close.

Cue: After MFRVs in AUTO and Bypass HCVs closed.

Time	Position	Applicant's Action or Behavior
	BOP	RM-M5 7. ISOLATE LEAKAGE Notifies SRO of need to isolate leakage if discovered by sampling. No isolation is required.
	BOP	RM-M5 8 PROVIDE NOTIFICATIONS AS NECESSARY: • Shift Supervision • OMOC • STA • Health Physics • Instrumentation Department Informs SRO of required notifications.
		END EVENT 2

Op-Test No.: Surry 2021-1 Scenario No.: 4 Event No.: 3

Event Description: Normal Charging Flow Controller Fails High (1-CH-FC-1112C).

Cue: Examiner cue.

Time	Position	Applicant's Action or Behavior
	RO	Charging Line Flow Controller 1-CH-FC-1122 Fails High. Diagnose the failure based on the following alarms and indications: • 1-CH-FC-1122C indicates maximum demand. • Charging Line Flow, 1-CH-FI-1122A shows step drop to 0 gpm. • Annunciator 1D-E5, CHG PP TO REGEN HX HI-LO FLOW • Pressurizer Level lowers slowly on all Level channels. • Pressurizer Pressure lowers slowly on all channels. • VCT Level rising slowly.
	SRO	Enters 0-AP-53.00, Loss of Vital Instrumentation / Controls. **NOTE:** The team pay perform ARP 1D-E5, CHG PP TO REGEN HX HI-LO FLOW, in addition to 0-AP-53.00.
	RO	Performs immediate actions of 0-AP-53.00, Loss of Vital Instrumentation / Controls: [1] CHECK REDUNDANT INSTRUMENT CHANNEL(S) INDICATION - NORMAL Checks Pressurizer Level Protection Channels 1, 2 and 3 are NORMAL. [2] PLACE AFFECTED CONTROL(S)/COMPONENT(S) IN MANUAL CONTROL AND STABILIZE PARAMETER USING REDUNDANT INDICATION **Places 1-CH-FCV-1122 in manual and raises charging flow.** Reports 0-AP-53.00 Immediate Actions are complete.

Event Description: Normal Charging Flow Controller Fails High (1-CH-FC-1112C).

Cue: Examiner cue.

Time	Position	Applicant's Action or Behavior
	SRO STA	Conduct a Brief using the Briefing Placard and obtains Critical Parameter information from the RO and BOP. The SRO will update the Shift Manager during AP-progression. SRO will provide a band for control of PRZR level with CH flow in MANUAL. *STA will have no input for the brief.*
	RO	0-AP-53.00 3. VERIFY REACTOR POWER – LESS THAN OR EQUAL TO 100% RO will identify that reactor power is less than 100% using PCS Display of Core Thermal Power.
	SRO	0-AP-53.00 Caution prior to step 4: • If Reactor power has been affected by a secondary transient, Turbine adjustment may be needed to control Tave. Notes Prior to Step 4: • Step 4 failures are listed in order of performance priority. Only the failed instrument/control and associated step number should be read aloud. • When the affected instrument/controller malfunction(s) has been addressed by this procedure, recovery actions should continue at Step 11.
	SRO RO	0-AP-53.00 *4. DETERMINE THE FAILED INSTRUMENT / CONTROL AND GO TO APPROPRIATE STEP OR PROCEDURE: Identifies that 1-CH-FC-1112C is not on the list at Step 4. Based on the second Note at Step 4, recovery actions should continue at Step 11. NOTE: *The team may perform Step 9 based on Charging Flow impact on Pressurizer Level Control. Step 9 is included on the next page.*

Op-Test No.: Surry 2021-1 Scenario No.: 4 Event No.: 3

Event Description: Normal Charging Flow Controller Fails High (1-CH-FC-1112C).

Cue: Examiner cue.

Time	Position	Applicant's Action or Behavior
		Step 9, AP-53.00
	SRO	9 a) CHECK PRZR LEVEL CONTROL CHANNELS – NORMAL
	RO	Responds "NO, 1-RC-FC-1122C Abnormal."
	SRO	9 a) RNO 1) Place either of the following in MANUAL: • 1-CH-FC-1122C, CHG FLOW CNTRL, OR • 1-CH-LC-1459G, PRZR LEVEL CNTRL
	RO	Responds "Yes, 1-CH-FC-1122C is in MANUAL"
	SRO	9 a) RNO 2) Control PRZR Level at Program Level.
	RO	Responds "Maintain PRZR Level at program ± band set by SRO"
	SRO	9 a) RNO 3) Move PRZR Level – CH SEL switch to Defeat the failed channel.
	RO/BOP	Responds "There is no failed channel."
	SRO	9 a) RNO 4) Check or place recorder 1-RC-LR-1459 on an operable channel.
	BOP	Responds 1-RC-LR-1459 is on an operable channel.
	SRO	9a) RNO 5) Refer to Tech Specs 3.1.A.5, Table 3.7-1 Item 9, and Table 3.7-6, Item 13. • 3.1.A.5 (If Pzr heaters deenergized): This LCO is met. • Table 3.7-1, item 9: This LCO is met. • TS Table 3.7-6, Item 13: This LCO is met.

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Event Description: Normal Charging Flow Controller Fails High (1-CH-FC-1112C).

Cue: Examiner cue.

Time	Position	Applicant's Action or Behavior
	SRO	0-AP-53.00 9. a) RNO 6) Refer to Attachment 3. SRO hands Attachment 3, Pressurizer Level Control diagram to RO/BOP for review. **Note:** *Attachment 3 is at the end of this section.*
	SRO RO SRO RO SRO RO SRO RO	0-AP-53.00 9. b) Check Pressurizer Heaters - Energized. Checks Required Pressurizer Heaters energized, and reports that Pressurizer heaters are energized. 9. c) Check Letdown – IN SERVICE. Reports Letdown in service. 9. d) Check PRZR level control – IN AUTOMATIC. Reports pressurizer level control in MANUAL. 9. d) RNO Do the following as required: 1) Check PRZR level restored to program. 2) Unsaturate ( )-CH-LC-( )459G, PRZR LEVEL CNTRL, as required. 3) Return ( )-CH-FCV-( )122 to AUTOMATIC by checking or placing the following in AUTOMATIC: • ( )-CH-FCV-( )122, CHG FLOW CNTRL • ( )-CH-LC-( )459G, PRZR LEVEL CNTRL. Notifies SRO that Charging flow control cannot be returned to AUTOMATIC; maintains manual control.
	SRO SRO RO/BOP	0-AP-53.00 Recalls NOTE 2 Prior to Step 4 and goes to Step 11 of AP-53.00. 11. Check Calorimetric – Functional IAW 1-OPT-RX-001, Attachment 4. **Performs Attachment 4, and reports Calorimetric is functional.**

Op-Test No.: Surry 2021-1 Scenario No.: 4 Event No.: 3

Event Description: Normal Charging Flow Controller Fails High (1-CH-FC-1112C).

Cue: Examiner cue.

Time	Position	Applicant's Action or Behavior
	SRO STA	0-AP-53.00 12. REVIEW THE FOLLOWING: • Tech Spec 3.7 • VPAP 2802 Notifications and Reports • TRM • Reg Guide 1.97 • EP-AA-303, Equipment Important to Emergency Response. Directs STA to review all documents listed. *STA reports that "all documents have been reviewed and discussed with the Shift Manager."*
	SRO	0-AP-53.00 13. CHECK ADDITIONAL INSTRUMENT / CONTROLLER MALFUNCTION - EXISTS The team will identify that no new additional failures exist (i.e., all failures have already been addressed), proceed to the RNO section, and this will direct the team to Step 15.
	SRO	0-AP-53.00 15. PROVIDE NOTIFICATIONS AS NECESSARY: • Shift Supervision • OMOC • STA (PRA determination) • I&C
		END EVENT #3

Op-Test No.: Surry 2021-1 Scenario No.: 4 Event No.: 3

Event Description: Normal Charging Flow Controller Fails High (1-CH-FC-1112C).

Cue: Examiner cue.

NUMBER 0-AP-53.00	ATTACHMENT TITLE PRESSURIZER LEVEL CONTROL	ATTACHMENT 3
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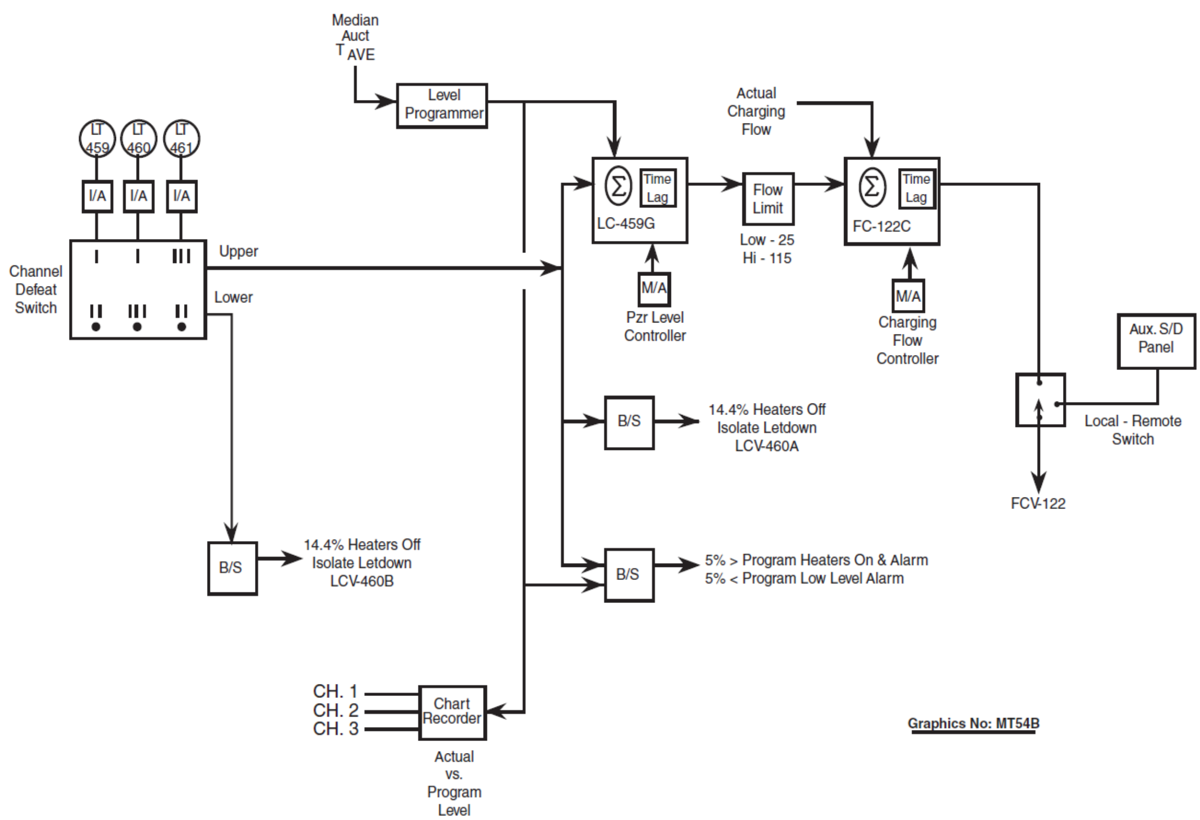

PZR LEVEL CONTROL

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Event Description: Trip of running EH pump with failure of Stby to Auto Start. (1-TS-D2)

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	BOP	Diagnose loss of the running EH pump by one or more of the following conditions: • 1-EH-P-MP1 green light indication. • PCS Status Change, Y2067D EHC FLUID PMP BKR. • Annunciator 1-TS-D2 LIT, EH FLUID LO PRESS (approx. 3 min) **NOTE**: *The SRO may hold a focus brief and start the standby EH pump prior to reading ARP TS-D2.*
	SRO	1-TS-D2 Briefs the loss of the running EH pump and directs team to performance of 1-TS-D2, EH FLUID LO PRESS.
	BOP	1-TS-D2 NOTE: The EH fluid lo pressure alarm is set to actuate at 1550 psig. Actuation between 1500-1600 psig is acceptable. 1. CHECK STANDBY EH PUMP-AUTO STARTED • MP1 • MP2 **BOP starts 1-EH-P-MP2.** **Critical Task (CT-1): Start the standby EH Fluid Pump prior to automatic OR manual Reactor/Turbine trip.**
	BOP	1-TS-D2 2. LOCALLY CHECK EH SYSTEM – LEAKAGE INDICATED. Contacts Field Operator to determine if there is any EH leakage.
	BOP	1-TS-D2 3. ATTEMPT TO RETURN EH PRESSURE TO NORMAL. a) Check annunciator 1-TS-D1 – NOT LIT b) Locally identify and isolate leakage c) Start the standby EH pump and stop the running EH pump as necessary to isolate leakage. d) Initiate refilling of the EH reservoir as necessary. e) Check EH pressure – RETURNED TO NORMAL f) Submit a Condition Report g) GO TO Step 5

Event Description: Trip of running EH pump with failure of Stby to Auto Start. (1-TS-D2)

Cue: By Examiner.

	BOP	BOP reports that annunciator 1-TS-D1 is NOT LIT. Field operator reports that there is no indicated leakage and all conditions are normal.
		END EVENT 4

Op-Test No.: Surry 2021-1 Scenario No.: 4 Event No.: 5 Page 28 of 81

Event Description: "A" CH SW pump overload trip, with auto start failure of "B" CH SW pump.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
		1-SW-P-10A overload trip / 1-SW-P-10B fail to auto start
	RO	Diagnose the failure based on the following alarms and indications: Annunciator 1D-G5, SW OR CC PPS DISCH TO CHG PPS LO PRESS. 1-SW-P-10A NOT running.
	SRO	Direct performance of ARP 1D-G5
	RO	**NOTE**: *The SRO may hold a focus brief and start the standby CH SW pump prior to reading ARP 1D-G5.* **RO starts 1-SW-P-10B.** **NOTE**: *SRO may direct the BOP to perform 0-AP-12.00, Service Water System Abnormal Conditions. 0-AP-12.00 actions located at end of this section.*
		1D-G5 Annunciator Response Procedure
	BOP	1. CHECK CHG PUMP CC <u>OR</u> SW PP(S) - TESTING IN PROGRESS
	RO	Reports No, testing not in progress.
	BOP	Step 1 RNO: GO TO Step 3.
		1D-G5 Annunciator Response Procedure
		Note before Step 3: The standby CH Pump SW Pump will auto-start at 8 psig.
	BOP	3. CHECK STANDBY CHG PUMP CC PP OR SW PP - AUTO STARTED
	RO	Report No, 1-SW-P-10B not running.
	BOP	Step 3 RNO DO the following:
		a) Check running or start one CHG Pump CC and/or SW PP.
	RO	**Starts 1-SW-P-10B.**
	BOP	b) Locally check CHG Pump CC and SW PPs.
	RO/BOP	Dispatches an Operator to check the CH Pump CC and SW pumps.
	BOP	c) Monitor CHG Pump CC and SW flows on PCS (ERFCS if not removed): 1-CC-P-2A, F1CC003A 1-CC-P-2B, F1CC004A 1-SW-P-10A, F1SW007A 1-SW-P-10B, F1SW008A
	RO/BOP	Monitors parameters using the PCS

Op-Test No.: Surry 2021-1 Scenario No.: 4 Event No.: 5

Event Description: "A" CH SW pump overload trip, with auto start failure of "B" CH SW pump.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	BOP RO BOP	1D-G5 Annunciator Response Procedure 3.d) <u>IF</u> CHG Pump CC and SW PPs are operating normally, <u>THEN</u> do the following: Reports Yes, Pumps are operating properly. 1) Submit a Condition Report. 2) Increase surveillance of CHG Pump CC and SW PPs. 3) Increase surveillance of CHG Pump temperature using PCS Digital Trend #1. 4) GO TO Step 13.
	BOP	1D-G5 Annunciator Response Procedure 13. PROVIDE NOTIFICATIONS: • OMOC • STA • System Engineering Notifies SRO of required notifications.
	SRO SRO SRO	Reviews Tech Specs: **T.S. 3.0.1 is in effect**, because the requirements of Tech Spec 3.3.B.3 (also 3.2.C.1) are not met. Place the unit in HSD in 6 hours, and CSD in the next 30 hours. Reviews TRM: **TRM 3.7.9, TRM 3.7.9.A.2** (MRule – No, App 'R' – yes), Implement App R fire watch in the area(s) associated with the **nonfunctional equipment in** Table 3.7.9-1 in accordance with TRM Section 5.2 within 14 days and restore the equipment to functional status in 60 days. **<u>NOTE:</u>** *1-SW-P-10B will remain FUNCTIONAL because it is still capable of performing its design function per the TRM definition: to provide cooling support for the Charging Pump seals and lube oil coolers.* Notifies Shift Manager of T.S.3.0.1 in effect. **NOTE:** *Informs the SRO that they will call the OMOC and will update the team on the course of action to be taken. The Shift Manager will not call back.*
		NOTE: This is the end of the event using ARP 1D-G5. The next pages contain steps in 0-AP-12.00, Service Water Abnormal Conditions, in the event the team uses that procedure instead.

Event Description: “A” CH SW pump overload trip, with auto start failure of “B” CH SW pump.

Cue: By Examiner.

Op-Test No.: Surry 2021-1 Scenario No.: 4 Event No.: 5

Event Description: "A" CH SW pump overload trip, with auto start failure of "B" CH SW pump.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
		0-AP-12.00
	SRO	Note: A copy of this procedure is located in MER 3. Direct performance of ARP 1D-G5
		1. CHECK MER 3 OR 4 EQUIPMENT - AFFECTED • Charging Pump Service Water Pumps • MER 3 Chillers
	RO	Identifies Charging Pump SW pumps affected, Goes to Step 2.
		0-AP-12.00
	SRO	2. Check Charging Pump SW Pumps Affected.
	RO	Continues to Step 3.
		0-AP-12.00
	SRO	CAUTION: Charging pumps should be secured if bearing temperatures reach 185°F. NOTE: • Preparations should be made to shift charging pumps if bearing temperatures exceed 180°F. • The system engineer should be notified as soon as possible if charging pump bearing temperatures exceed 180°F.
		0-AP-12.00
	SRO	3. CHECK CHG PUMP TEMPERATURES - LESS THAN 180°F
	BOP	Checks CH Pump temperatures using PCS.

Op-Test No.: Surry 2021-1 Scenario No.: 4 Event No.: 5 Page 32 of 81

Event Description: "A" CH SW pump overload trip, with auto start failure of "B" CH SW pump.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
		0-AP-12.00
	SRO	Note: A vacuum condition in the SW header(s) is indicated by abnormal conditions on multiple SW header loads.
		4. CHECK SW PARAMETERS – NORMAL a) MER 3 b) MER 4
	BOP	Directs Service Building Operator to check status of MER 3 and 4 SW parameters using 0-AP-12.00, Pages 3 and 4.
		Field operators will report Unit 1 Charging SW Pumps are not running and discharge pressures are not greater than 15 psig.
	SRO	Goes to Step 4 RNO.
		0-AP-12.00
	SRO	Step 4 RNO.
		<u>IF</u> a vacumm condition exists in the SW header(s), <u>THEN</u> do the following.
	RO	Reports no vacuum condition exists.
	SRO	<u>IF</u> SW header(s) <u>NOT</u> in a vacuum, <u>THEN</u> perform the following: a) Check running or Start standby CHG pump SW pump(s).
	RO	**Starts 1-SW-P-10B**
		END EVENT #5

Event Description: Dropped Rod below 25% reactor Power.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
		Diagnose the failure using the following: Alarm: 1G-H2, RPI ROD BOTTOM < 20 STEPS Indications: SBB G-9 CERPI indicates 0 steps. Any Rod On Bottom light lit Rod-to-Rod Deviation light lit. Tave and NI levels lowering **NOTE**: *The team will likely trip the reactor and go to 1-E-0, based on the dropped rod at low power. If so, 1-E-0 instructions begin at page 34.* **NOTE:** *If the team is allowed to ramp above 25% reactor power, reactor power may remain above 25% after the dropped rod; a reactor trip will not be required. If this occurs, the examiner may direct inserting Trigger 25 to drop an additional control rod.*
	SRO	0-AP-1.00 Enters 0-AP-1.00 (Rod Control System Malfunction).
	SRO	CAUTION prior to Step 1: • If Tave decreases below 541 °F, ( )-E-0, Reactor Trip or Safety Injection, must be implemented.
	RO	[1] CHECK FOR EITHER OF THE FOLLOWING: • Continuous rod withdrawal • Continuous rod insertion Reports no rod motion and Immediate actions of 0-AP-1.00 are complete.
	SRO STA	Conduct a Brief using the Briefing Placard and obtains Critical Parameter information from the RO and BOP. The SRO will update the Shift Manager during AP progression. *STA will have no input for the brief.*

Event Description: Dropped Rod below 25% reactor Power.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
		0-AP-1.00 (0-AP-1.00 Step 1 RNO directs going to Step 6)
	SRO	6. CHECK IF ANY ROD DROPPED: • **Annunciator ( )G-H2, RPI ROD BOTTOM ≤ 20 STEPS - LIT** OR • Annunciator ( )G-H1, NIS DROPPED ROD FLUX DECREASE ≥ 5% PER 2 SEC - LIT OR • **Rod Bottom Lights - ANY LIT** OR • **Any Rod On Bottom light - LIT** OR • Indication of a partially dropped rod in the core
	RO	Reports multiple indications of a dropped rod in the core.
		0-AP-1.00
	SRO	7. CHECK REACTOR STATUS PRIOR TO FAILURE – CRITICAL
	RO	Reports yes, reactor critical.
		0-AP-1.00
	SRO	8. CHECK ONLY ONE ROD AFFECTED
	RO	Reports yes, only one rod affected. **NOTE:** *If Trigger 25 was required, the RO will report no and a reactor trip will be required.*
		0-AP-1.00
	SRO	9. CHECK REACTOR POWER – GREATER THAN 25%
	RO	Reports NO, reactor power is less than 25%.
	SRO	Goes to RNO: Trip Reactor and GO TO ( )-E-0, REACTOR TRIP OR SAFETY INJECTION. **Directs RO to perform immediate actions of 1-E-0.**

Op-Test No.: Surry 2021-1 Scenario No.: 4 Event No.: 6

Event Description: Dropped Rod below 25% reactor Power.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	RO	1-E-0 – Reactor Trip or Safety Injection [1] CHECK REACTOR TRIP: a) Manually trip reactor **Pushes the reactor trip push buttons.** b) Check the following: • All Rods On Bottom light – LIT • Reactor trip and bypass breakers – OPEN • Neutron flux - LOWERING
	RO RO	1-E-0 – Reactor Trip or Safety Injection [2] CHECK TURBINE TRIP: a) Manually trip the turbine **Pushes both turbine trip push buttons.** b) Check all turbine stop valves - CLOSED c) Isolate reheaters by closing MSR steam supply SO**V** • 1-MS-SOV-104 d) Check generator output breakers – OPEN (Time Delayed)
	RO	1-E-0 – Reactor Trip or Safety Injection [3] CHECK BOTH AC EMERGENCY BUSES - ENERGIZED

Op-Test No.: Surry 2021-1 Scenario No.: 4 Event No.: 6

Event Description: Dropped Rod below 25% reactor Power.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
		1-E-0 – Reactor Trip or Safety Injection
	RO	[4] CHECK IF SI INITIATED: a) Check if SI is actuated: • LHSI pumps – RUNNING • SI annunciators – LIT • A-F-3 SI INITIATED – TRAIN A • A-F-4 SI INITIATED – TRAIN B RO will determine that SI has not occurred and perform step 4a RNO actions:
	RO	4a RNO Check if SI is required or imminent as indicated by any of the following: • Low PRZR pressure • High CTMT pressure • High steamline differential pressure • High steam flow with low Tave or low line pressure IF SI is required, THEN GO TO Step 4b. IF SI is not required, GO TO ES-0.1. *Determines that SI is NOT imminent. Does Not Manually initiate SI.*
	SRO	Transitions to 1-ES-0.1

Op-Test No.: Surry 2021-1 Scenario No.: 4 Event No.: 6 Page 37 of 81

Event Description: Dropped Rod below 25% reactor Power.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
		1-ES-0.1
	SRO	*After the immediate actions of 1-E-0 are reported as complete, the SRO will check off immediate action steps in his copy of 1-E-0. After the immediate actions are verified, the team will conduct a brief.*
	STA	*The STA will state that he has no input.*
	SRO	**NOTE:** If this procedure is being entered from 1-E-0, REACTOR TRIP OR SAFETY INJECTION, following a tube leak of less than 150 gpm, 1-AP-24.01, LARGE STEAM GENERATOR TUBE LEAK, should be used for guidance instead of this procedure.
		* 1.CHECK RCS TEMPERATURE CONTROL a) Check RCPS - ANY RUNNING
	RO	Reports all RCPs running
	SRO	b) Monitor RCS Average Temperature 1) STABLE AT 547°F OR 2) TRENDING TO 547°F
	RO	Reports RCS Tave at 547 °F and stable
	SRO	Assigns BOP to perform Attachment 5, Transient AFW Control.
		NOTE: 1-ES-0.1 CAP and Attachment 5 are included at the end of this section.

Op-Test No.: Surry 2021-1 Scenario No.: 4 Event No.: 6

Event Description: Dropped Rod below 25% reactor Power.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
		1-ES-0.1
	SRO	2. CHECK FW STATUS: a) Check RCS Average temperatures – L:ESS THAN 554°F
	RO	Reports Tave less than 554°F
	SRO	b) Check Feed REG valves – CLOSED
	RO/BOP	Reports MFRVs are closed
	SRO	c) Close SG FW isolation MOVs • 1-FW-MOV-154A • 1-FW-MOV-154B • 1-FW-MOV-154C
	RO/BOP	**Closes 1-FW-MOV-154A/B/C**
	SRO	*NOTE: Once 1-FW-MOV-154C is closed the SBLOCA will automatically trigger in.*
		d) Check AFW pumps – RUNNING • Motor Driven AFW pumps • TD AFW pump
	RO/BOP	
	SRO	Reports, NO, TD AFW pump is not running (auto-start failure) Goes to Step 2.d) RNO.
		1-ES-0.1
	SRO	Step 2d RNO: <u>IF</u> AFW pump(s) required, <u>THEN</u> do the following: 1) Start MD AFW pumps.
	RO	Reports MD AFW pumps are running.
	SRO	2) Open TD AFW pump steam supply valves: • 1-MS-SOV-102A • 1-MS-SOV-102B
	RO/BOP	**Places control switches for 1-MS-SOV-102A and -102B in OPEN.**
	SRO	3) GO TO Step 2e
		END EVENT #6

Op-Test No.: Surry 2021-1 Scenario No.: 4 Event No.: 6

Event Description: Dropped Rod below 25% reactor Power.

Cue: By Examiner.

CONTINUOUS ACTIONS PAGE FOR 1-ES-0.1

1. SI INITIATION CRITERIA

   Initiate SI and GO TO 1-E-0, REACTOR TRIP OR SAFETY INJECTION, if EITHER condition listed below occurs, OR is imminent.

   - RCS subcooling based on CETCs - LESS THAN 30°F
   - Any automatic SI setpoint is exceeded:
     - Low PRZR pressure
     - High CTMT pressure
     - High steamline differential pressure
     - High steamline flow with low Tave or low line pressure

2. AFW SUPPLY SWITCHOVER CRITERIA (Refer to Attachment 4)

   Transfer to one of the following alternate AFW water supplies if ECST level lowers to less than 20%.

   a. 1-CN-TK-2, using 1-CN-150.

   b. 1-CN-TK-3, using AFW Booster Pumps.

   c. AFW Crosstie.

   d. Firemain.

3. AMSAC RESET CRITERIA

   AMSAC may be manually reset when level in all three SGs is greater than 13% or six minutes have elapsed since the Reactor trip. When AMSAC is reset, annunciator H-D-1 should clear and affected components may be realigned as needed.

4. TD AFW PUMP SHUTDOWN CRITERIA

   The TD AFW pump may be secured when SG NR level is greater than 22%, AMSAC is reset, and no auto-start signal exists. To secure the pump, the pump SOV control switches must be taken to OPEN-RESET and then to CLOSE.

5. TRANSIENT AFW FLOW CONTROL

   Refer to Attachment 5 for guidance on transient AFW flow control.

Event Description: Dropped Rod below 25% reactor Power.

Cue: By Examiner.

NUMBER 1-ES-0.1	ATTACHMENT TITLE	ATTACHMENT 5
REVISION 55	TRANSIENT AFW FLOW CONTROL	PAGE 1 of 1

1. ___ Check running or start AFW Pumps, as necessary.
   - ☐ 1-FW-P-3A
   - ☐ 1-FW-P-3B
   - ☐ 1-FW-P-2

2. ___ Maintain minimum AFW flow of 540 gpm with RCP(s) in service until one SG Narrow Range level is greater than 12%.

3. ___ Maintain minimum AFW flow of 350 gpm with NO RCPs running, until one SG Narrow Range level is greater than 12%.

NOTE: AFW to idle loop(s) (RCP secured), should be throttled to prevent depressurization of the SG and subsequent Header / Line SI. AFW flow between approximately 60 gpm and 100 gpm should be adequate to prevent a Header / Line SI.

4. ___ WHEN minimum heat sink has been verified, THEN AFW MOVs should be controlled to maintain intact SG Narrow Range levels between 22% and 50% by throttling AFW Isolation MOVs:
   - ☐ SG A, 1-FW-MOV-151E and 1-FW-MOV-151F
   - ☐ SG B, 1-FW-MOV-151C and 1-FW-MOV-151D
   - ☐ SG C, 1-FW-MOV-151A and 1-FW-MOV-151B

5. Isolate AFW header with deenergized Emergency Bus MOVs by closing the following header isolation valves:

___ Emergency Bus H deenergized:	☐ 1-FW-141	☐ 1-FW-156	☐ 1-FW-171
___ Emergency Bus J deenergized:	☐ 1-FW-140	☐ 1-FW-155	☐ 1-FW-170

Op-Test No.: Surry 2021-1 Scenario No.: 4 Event No.: 7 Page 41 of 81

Event Description: Small Break LOCA with failure of Low Head SI pumps to auto start.

Cue: Examiner cue.

Time	Position	Applicant's Action or Behavior
	Team	Diagnoses excessive RCS leakage by the following: Alarms: 1C-B8, PRZR LO PRESS 1B-A3, CTMT SUMP HI LVL 1-RM-Q8, CTMT GAS ALERT/FAILURE Indications: Containment sump level rising Lowering RCS Pressure PRZR Level decreasing Team may go back to E-O based on ES-0.1 CAP.
	SRO	Directs RO to re-perform Immediate Actions of AP-16.00.
	RO	1-AP-16.00 Notes before step 1: • If SI Accumulators are isolated, 1-AP-16.01, SHUTDOWN LOCA, should be used for guidance. • RCS average temperature has a direct impact on pressurizer level. [1] MAINTAIN PRZR LEVEL: • Isolate Letdown • Control Charging flow **Closes 1-CH-LCV-1460A and 1-CH-LCV-1460B.** **Raises Charging flow using 1-CH-FCV-1122 to control PRZR level.**

Op-Test No.: Surry 2021-1 Scenario No.: 4 Event No.: 7

Event Description: Small Break LOCA with failure of Low Head SI pumps to auto start.

Cue: Examiner cue.

Time	Position	Applicant's Action or Behavior
	SRO STA	1-AP-16.00 The team will hold a short transient brief, commensurate with the event. *STA will have no input for the brief.* *NOTE: As soon as team determines leak is in excess of Charging flow, the SRO will direct team goes back to E-0 and manually initiates SI.*
	SRO RO SRO	1-AP-16.00 2. VERIFY THE FOLLOWING PARAMETERS – STABLE OR INCREASING • PRZR Level • PRZR Pressure • RCS Subcooling Identifies Pressurizer level and pressure are still lowering. Goes to Step 2 RNO. Directs the Immediate Actions of 1-E-0. **NOTE**: *SRO may direct RO to manually safety inject at this point due to degrading plant parameters. SRO may direct RO to Manually initiate SI at Step 4 of 1-E-0.*

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Event Description: Small Break LOCA with failure of Low Head SI pumps to auto start.

Cue: Examiner cue.

Time	Position	Applicant's Action or Behavior
	RO	1-E-0, Reactor Trip or Safety Injection (high level steps only for Steps 1 – 3) [1] CHECK REACTOR TRIP:
	RO	[2] CHECK TURBINE TRIP:
	RO	[3] CHECK BOTH AC EMERGENCY BUSES - ENERGIZED
	RO RO SRO STA	1-E-0 [4] CHECK IF SI INITIATED: a) Check if SI is actuated: • LHSI pumps – RUNNING • SI annunciators – LIT • A-F-3 SI INITIATED – TRAIN A • A-F-4 SI INITIATED – TRAIN B b) **Manually initiate SI** **The RO will manually initiate SI at step 4 by pushing both SI pushbuttons.** Reports Immediate actions of 1-E-0 are complete, with High Head SI flow to the core. SI is initiated. No LHSI pumps are running. After the immediate actions of 1-E-0 are reported as complete, the SRO will check off immediate action steps in his copy of 1-E-0. After the immediate actions are verified, the team will conduct a commensurate brief. *STA will have no input for the brief.*

Event Description: Small Break LOCA with failure of Low Head SI pumps to auto start.

Cue: Examiner cue.

Time	Position	Applicant's Action or Behavior
	SRO	1-E-0 5. INITIATE ATTACHMENT 1. **Directs RO to perform Attachment 2 of 1-E-0. Directs BOP to perform Attachments 1 and 3 of 1-E-0**. **NOTE:** *Attachment 1, 2, and 3 located at the end of this section. Also acceptable for SRO to direct BOP to perform all Attachments because HHSI is operating.*
	SRO RO SRO RO SRO RO SRO RO SRO RO	1-E-0 CAUTION: 1-MS-15 may need to be closed to stop RCS cooldown and 1-MS-17 opened to supply AS to GS. *6. CHECK RCS AVERAGE TEMPERATURE • STABLE AT 547°F OR • TRENDING TO 547°F Reports no, RCS temperature is lowering (and provide current temperature). Goes to Step 6 RNO (if RCS temperature is less than 547°F and lowering): <u>IF</u> temperature less than 547°F AND lowering, <u>THEN</u> do the following: a) Stop dumping steam. Reports Yes, Steam Dumps are closed. b) <u>IF</u> cooldown continues, <u>THEN</u> control total feed flow. Maintain total feed flow greater than 350 gpm [450 gpm] until narrow range level greater than 12% [18%] in at least one SG. Identify RCS Tave Lowering. Direct RO to throttle AFW to each SG to ~120 gpm. Throttle AFW to the SGs to ~120 gpm per SG and report when complete. c) <u>IF</u> RCS cooldown is occurring, <u>THEN</u> close 1-MS-15 <u>AND</u> open 1-MS-17 to align AS to GS. d) <u>IF</u> Cooldown continues, <u>THEN</u> close MSTVs. Reports they will monitor RCS temperature for cooldown.

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Event Description: Small Break LOCA with failure of Low Head SI pumps to auto start.

Cue: Examiner cue.

Time	Position	Applicant's Action or Behavior
		1-E-0
	SRO	7. CHECK PRZR PORVs AND SPRAY VALVES:
		a) PRZR PORVs – CLOSED
	RO	Reports Yes, PRZR PORVs closed.
	SRO	b) PRZR spray controls Demand at Zero OR Controlling pressure
	RO	Reports Yes, Demand at zero.
	SRO	c) PORV block valves - AT LEAST ONE OPEN
	RO	Reports Yes, both block valves open.
		1-E-0 Step 8
		NOTE Prior to Step 8: Seal injection flow should be maintained to all RCPs.
	SRO	*8. CHECK RCP TRIP AND MINIFLOW RECIRC CRITERIA:
		a) Charging Pumps - AT LEAST ONE RUNNING AND FLOWING TO RCS
	RO	Reports Yes, 3 running and flowing to the RCS. May report 2 running depending upon BOP speed of progression through E-0, Attachment 1.
	SRO	b) RCS subcooling - LESS THAN 30°F [85°F]
	RO	Reports No, RCS subcooling is (value greater than 30°F).
	SRO	Goes to Step 8.b) RNO:
		8.b) RNO: GO TO Step 9
		Goes to Step 9.

Op-Test No.: Surry 2021-1 Scenario No.: 4 Event No.: 7 Page 46 of 81

Event Description: Small Break LOCA with failure of Low Head SI pumps to auto start.

Cue: Examiner cue.

Time	Position	Applicant's Action or Behavior
	SRO RO	1-E-0 9. CHECK IF SGs ARE NOT FAULTED: • Check pressures in all SGs a) STABLE OR INCREASING AND b) GREATER THAN 100 PSIG Will observe either stable SG pressures, or a slightly lowering trend on SG pressures (attributed to the RCS cooldown). The team will not transition to 1-E-2.
	SRO RO	1-E-0 10. CHECK IF SG TUBES ARE NOT RUPTURED: • Condenser air ejector radiation – NORMAL • SG blowdown radiation – NORMAL • SG MS radiation – NORMAL • TD AFW pump exhaust radiation – NORMAL • SG NR Level - NOT INCREASING IN AN UNCONTROLLED MANNER Observes all parameters are normal.
	SRO RO SRO	1-E-0 11 CHECK RCS - INTACT INSIDE CTMT • CTMT radiation - NORMAL • CTMT pressure - NORMAL • CTMT RS sump level – NORMAL Reports Containment pressure, sump level, and/or radiation NOT normal. Goes to Step 11 RNO. Goes to 1-E-1, Loss of Reactor or Secondary Coolant. **NOTE:** *The next event (Large Break LOCA) will be inserted after the SRO makes the transition to 1-E-1, during the 1-E-1 transient brief.*
		END EVENT #7

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Event Description: Small Break LOCA: E-0 ATTACHMENTS 1-3.

Cue: Examiner cue.

Time	Position	Applicant's Action or Behavior
	BOP	**ATTACHMENT 1 OF E-0** 1. CHECK FW ISOLATION: • Feed pump discharge MOVs – CLOSED • 1-FW-MOV-150A • 1-FW-MOV-150B • MFW pumps – TRIPPED • Feed REG valves – CLOSED • SG FW bypass flow valves – DEMAND AT ZERO • SG blowdown TVs – CLOSED
	BOP	ATTACHMENT 1 OF E-0 2. CHECK CTMT ISOLATION PHASE I: • Phase I TVs – CLOSED • 1-CH-MOV-1381 – CLOSED • 1-SV-TV-102A – CLOSED • PAM isolation valves – CLOSED • 1-DA-TV-103A • 1-DA-TV-103B
	BOP	ATTACHMENT 1 OF E-0 3. CHECK AFW PUMPS RUNNING: a) MD AFW pumps – RUNNING (Time Delayed) b) TD AFW pump - RUNNING IF NECESSARY

Event Description: Small Break LOCA: E-0 ATTACHMENTS 1-3.

Cue: Examiner cue.

Time	Position	Applicant's Action or Behavior
	BOP	Attachment 1 of 1-E-0 4. CHECK SI PUMPS RUNNING: • CHG pumps – RUNNING • LHSI pumps – RUNNING **Starts both LHSI pumps**, if not previously started in Attachment 2. **Critical Task (CT-2):** Start at least one LHSI pump prior to required transition to 1-FR-C.1.
	BOP	5. CHECK CHG PUMP AUXILIARIES: • CHG pump CC pump – RUNNING • CHG pump SW pump - RUNNING
	BOP	6. CHECK INTAKE CANAL: • Level - GREATER THAN 24 FT • Level - BEING MAINTAINED BY CIRC WATER PUMPS
	BOP	7. CHECK IF MAIN STEAMLINES SHOULD BE ISOLATED: a) Check if ANY of the following annunciators - HAVE BEEN LIT • E-F-10 (High Steam Flow SI) • B-C-4 (Hi Hi CLS Train A) • B-C-5 (Hi Hi CLS Train B) Identifies annunciators not lit, annunciator E-H-10 also not lit, and goes to step 8.

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Event Description: Small Break LOCA: E-0 ATTACHMENTS 1-3.

Cue: Examiner cue.

Time	Position	Applicant's Action or Behavior
	BOP	Attachment 1 of 1-E-0 *8 CHECK IF CS REQUIRED: a) CTMT pressure – HAS EXCEEDED 23 PSIA 8, a) RNO Do the following: 1) IF CTMT pressure has exceeded 17.7 psia, THEN check or align the following valves: Identifies CTMT pressure is elevated, but still below 17.7 psia. 2) GO TO Step 10.
	BOP	Attachment 1 of 1-E-0 *10. BLOCK LOW PRZR PRESS SI SIGNAL: a) Check PRZR pressure – LESS THAN 2000 psig b) **Turn both LO PRZR PRESS & STM HDR/LINE ΔP switches to block** c) Verify Permissive Status light C-2 - LIT BOP may block the low pressurizer pressure SI signal depending on current RCS pressure.
	BOP	Attachment 1 of 1-E-0 *11. BLOCK LOW TAVE SI SIGNAL: Step may not be performed at this time (if Tave is greater than 543°F). a) Check RCS Tave - LESS THAN 543°F b) **Turn both HI STM FLOW & LO TAVG OR LP switches to block** c) Verify Permissive Status light F-1 - LIT

Event Description: Small Break LOCA: E-0 ATTACHMENTS 1-3.

Cue: Examiner cue.

Time	Position	Applicant's Action or Behavior
	BOP	Attachment 1 of 1-E-0 **NOTE:** • CHG pumps should be run in the following order of priority: C, B, A. • Subsequent SI signals may be reset by re-performing Step 12. 12. CHECK SI FLOW: a) HHSI to cold legs - FLOW INDICATED • 1-SI-FI-1961 (NQ) • 1-SI-FI-1962 (NQ) • 1-SI-FI-1963 (NQ) • 1-SI-FI-1943 or 1-SI-FI-1943A b) Check CHG pumps - THREE RUNNING c) Reset SI. d) Stop one CHG pump and out in AUTO **Stops one CHG pump and leaves control switch in AUTO.** e) RCS pressure - LESS THAN 185 PSIG RNO: e) IF two LHSI pumps are running, THEN do the following: 1) Check reset or reset SI. 2) Stop one LHSI pump and put in AUTO. 3) GO TO Step 13 **Resets SI.** **Stops one LHSI pump and leaves control switch in AUTO.** Goes to Step 13.
	BOP	Attachment 1 of 1-E-0 13. CHECK TOTAL AFW FLOW - GREATER THAN 350 GPM [450 GPM]
	BOP	Attachment 1 of 1-E-0 14. CHECK AFW MOVs - OPEN BOP will identify that all AFW MOVS are not open.

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Event Description: Small Break LOCA: E-0 ATTACHMENTS 1-3.

Cue: Examiner cue.

Time	Position	Applicant's Action or Behavior
	BOP	Attachment 1 of 1-E-0 15. INITIATE SI VALVE ALIGNMENT IAW ATTACHMENT 2 **NOTE:** *See attached copy of Attachment 2. (following this attachment)* **NOTE:** *Depending on SRO prioritization, this attachment may already be completed by The RO.*
	BOP Unit 2	16. INITIATE VENTILATION, AC POWER, AND SFP STATUS CHECKS IAW ATTACHMENT 3 **NOTE:** *See attached copy of Attachment 2.* *Unit 2 Operator will state that Unit 2 is at 100% power (if asked)* *Unit 2 will also accept responsibility to complete Attachment 3 if asked after differential pressure indications are requested.*
	BOP Unit 2	17. CHECK RCS DILUTION FLOWPATH - ISOLATED AND LOCKED, SEALED, OR OTHERWISE SECURED • Close and lock, seal, or otherwise secure 1-CH-223 *May contact the Desk (WCC) SRO to Close and lock, seal, or otherwise secure 1-CH-223.* *Unit 2 will also accept responsibility to complete Attachment 3 if asked after differential pressure indications are requested.*

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Event Description: Small Break LOCA: E-0 ATTACHMENTS 1-3.

Cue: Examiner cue.

Time	Position	Applicant's Action or Behavior
	RO	ATTACHMENT 2 of 1-E-0 **NOTE:** Components previously aligned by SI termination steps, must not be realigned by this Attachment.
	RO	ATTACHMENT 2 of 1-E-0 1. Check opened or open CHG pump suction from RWST MOVs. • 1-CH-MOV-1115B • 1-CH-MOV-1115D
	RO	ATTACHMENT 2 of 1-E-0 2. Check closed or close CHG pump suction from VCT MOVs. • 1-CH-MOV-1115C • 1-CH-MOV-1115E
	RO	ATTACHMENT 2 of 1-E-0 3. Check running or start at least two CHG pumps. (listed in preferred order) • 1-CH-P-1C • 1-CH-P-1B • 1-CH-P-1A
	RO	ATTACHMENT 2 of 1-E-0 4. Check opened or open HHSI to cold legs MOVs. • 1-SI-MOV-1867C • 1-SI-MOV-1867D
	RO	ATTACHMENT 2 of 1-E-0 5 Check closed or close CHG line isolation MOVs. • 1-CH-MOV-1289A • 1-CH-MOV-1289B

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Event Description: Small Break LOCA: E-0 ATTACHMENTS 1-3.

Cue: Examiner cue.

Time	Position	Applicant's Action or Behavior
	RO	ATTACHMENT 2 of 1-E-0 6. Check closed or close Letdown orifice isolation valves. • 1-CH-HCV-1200A • 1-CH-HCV-1200B • 1-CH-HCV-1200C
	RO	ATTACHMENT 2 of 1-E-0 7. Check opened or open LHSI suction from RWST MOVs. • 1-SI-MOV-1862A • 1-SI-MOV-1862B
	RO	ATTACHMENT 2 of 1-E-0 8. Check opened or open LHSI to cold legs MOVs. • 1-SI-MOV-1864A • 1-SI-MOV-1864B
	RO	ATTACHMENT 2 of 1-E-0 9. Check running or start at least one LHSI pump. • **1-SI-P-1A** • **1-SI-P-1B** **Starts both LHSI pumps, if not already started in Attachment 1.**
	RO	ATTACHMENT 2 of 1-E-0 10. Check High Head SI flow to cold legs indicated. • 1-SI-FI-1961 • 1-SI-FI-1962 • 1-SI-FI-1963 • 1-SI-FI-1943 or 1-SI-FI-1943A

Event Description: Small Break LOCA: E-0 ATTACHMENTS 1-3.

Cue: Examiner cue.

	RO	ATTACHMENT 2 of 1-E-0 11. IF flow not indicated, THEN manually start pumps and align valves. IF flow NOT established, THEN consult with Shift Supervision to establish another high pressure injection flow path while continuing with this procedure. • Alternate SI to Cold legs • Hot leg injection Enters “N/A” for this step.

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Event Description: Small Break LOCA: E-0 ATTACHMENTS 1-3.

Cue: Examiner cue.

NUMBER 1-E-0	ATTACHMENT TITLE	ATTACHMENT 3
REVISION 77	AUXILIARY VENTILATION, AC POWER, AND SFP STATUS CHECKS	PAGE 1 of 6

1. ___ Check or place REFUEL SFTY MODE switches in NORMAL.

2. ___ Check ventilation alignment IAW Tables 1 and 2.

TABLE 1
UNIT #1 VENTILATION PANEL

	MARK NUMBER	EQUIPMENT STATUS
☐	1-VS-F-4A & B	OFF
☐	1-VS-HV-1A & B	OFF
☐	1-VS-F-8A & B	OFF
☐	1-VS-F-9A & B	GREEN
☐	1-VS-F-59	GREEN
☐	1-VS-F-6	OFF
☐	1-VS-F-39	GREEN
☐	1-VS-F-7A & B	GREEN
☐	1-VS-HV-5	GREEN
☐	1-VS-F-56A & B	GREEN
☐	1-VS-F-40A & B	GREEN
☐	1-VS-HV-4	OFF
☐	2-VS-F-40A or B	RED
☐	2-VS-HV-4	OFF

Event Description: Small Break LOCA: E-0 ATTACHMENTS 1-3.

Cue: Examiner cue.

NUMBER 1-E-0	ATTACHMENT TITLE	ATTACHMENT 3
REVISION 77	AUXILIARY VENTILATION, AC POWER, AND SFP STATUS CHECKS	PAGE 2 of 6

TABLE 2
VNTX PANEL

	MARK NUMBER	EXPECTED EQUIPMENT STATUS		RESPONSE NOT OBTAINED
☐	a. AOD-VS-107A & B AOD-VS-108	RED GREEN	☐	a. Place AUX BLDG CENTRAL AREA MODE switch to FILTER.
☐	b. MOD-VS-100A & B AOD-VS-106	RED GREEN	☐	b. • Place MOD-VS-100A to FILTER. • Place MOD-VS-100B to FILTER.
☐	c. MOD-VS-200A & B AOD-VS-206	GREEN RED	☐	c. • Place MOD-VS-200A to UNFILTER. • Place MOD-VS-200B to UNFILTER.
☐	d. AOD-VS-103A & B AOD-VS-104	GREEN GREEN	☐	d. • Place AOD-VS-103A in UNFILTER. • Place AOD-VS-103B in UNFILTER. • Place AOD-VS-104 in FILTER.
☐	e. AOD-VS-101A & B AOD-VS-102	GREEN GREEN	☐	e. Place AOD-VS-101A and 101B in UNFILTER.
☐	f. AOD-VS-111A & B	GREEN	☐	f. Place COMBINE CONTAINMENT EXHAUST in ISOLATE.
☐	g. AOD-VS-110	GREEN	☐	g. Place AOD-VS-109A and 109B in FILTER.
☐	h. AOD-VS-112A & B	GREEN	☐	h. • Place AOD-VS-112A in CLOSE. • Place AOD-VS-112B in CLOSE.
☐	i. MOD-VS-58A & B 1-VS-F-58A & B	RED RED	☐	i. Start 1-VS-F-58A and 1-VS-F-58B.

3. ___ Check filtered exhaust flow: (as read on FI-VS-117A and FI-VS-117B)

☐ • Total flow - GREATER THAN 32400 cfm

AND

☐ • Flow through each filter bank - LESS THAN 39600 cfm

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Event Description: Small Break LOCA: E-0 ATTACHMENTS 1-3.

Cue: Examiner cue.

NUMBER 1-E-0	ATTACHMENT TITLE	ATTACHMENT 3
REVISION 77	AUXILIARY VENTILATION, AC POWER, AND SFP STATUS CHECKS	PAGE 3 of 6

4. ___ Check all Station Service Buses - ENERGIZED. IF NOT, THEN initiate 1-AP-10.07, LOSS OF UNIT 1 POWER.

5. ___ Check annunciator VSP-J2 - LIT.

6. ___ Check Unit 1 RSST LTC time delay bypass light - LIT.

7. ___ Check stopped or stop 1-VS-AC-4.

8. ___ Place 1-VS-43-VS103X, MCR ISOLATION switch to the OFF position.

9. ___ Check closed or close MCR isolation dampers.

- ☐ 1-VS-MOD-103A
- ☐ 1-VS-MOD-103B
- ☐ 1-VS-MOD-103C
- ☐ 1-VS-MOD-103D

Event Description: Small Break LOCA: E-0 ATTACHMENTS 1-3.

Cue: Examiner cue.

NUMBER 1-E-0	ATTACHMENT TITLE AUXILIARY VENTILATION, AC POWER, AND SFP STATUS CHECKS	ATTACHMENT 3
REVISION 77		PAGE 4 of 6

* *

CAUTION:
- Only one Emergency Supply Fan must be started in the following step.
- Chilled Water flow to the in-service Unit 1 MCR AHU must be throttled to at least 15 gpm when the Emergency Supply fan is started.
- Chilled Water flow to the in-service Unit 2 MCR AHU must be throttled to at least 25 gpm when the Emergency Supply fan is started.
- An Emergency Supply Fan must not be started if the filter is wet.

* *

10. Immediately start ONE Emergency Supply Fan IAW the following: (1-VS-F-41 or 2-VS-F-41 preferred)

a. IF 1-VS-F-41, CONT RM EMERG SUP FAN, will be used, THEN perform the following substeps.

___ 1. Open 1-VS-MOD-104A, CONT RM EMERG SUP MOD.

___ 2. Start 1-VS-F-41.

b. IF 2-VS-F-41, CONT RM EMERG SUP FAN, will be used, THEN perform the following substeps.

___ 1. Open 2-VS-MOD-204A, CONT RM EMERG SUP MOD.

___ 2. Start 2-VS-F-41.

c. IF 1-VS-F-42, CONT RM EMERG SUP FAN, will be used, THEN perform the following substeps.

___ 1. Open 1-VS-MOD-104B, CONT RM EMERG SUP MOD.

___ 2. Start 1-VS-F-42.

d. IF 2-VS-F-42, CONT RM EMERG SUP FAN, will be used, THEN perform the following substeps.

___ 1. Open 2-VS-MOD-204B, CONT RM EMERG SUP MOD.

___ 2. Start 2-VS-F-42.

e. ___ Adjust Chilled Water flow to MCR AHUs IAW Step 10 Caution.

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Event Description: Small Break LOCA: E-0 ATTACHMENTS 1-3.

Cue: Examiner cue.

NUMBER 1-E-0	ATTACHMENT TITLE	ATTACHMENT 3
REVISION 77	AUXILIARY VENTILATION, AC POWER, AND SFP STATUS CHECKS	PAGE 5 of 6

11. ___ Check readings on the following Differential Pressure Indicators - POSITIVE PRESSURE INDICATED.
    - ☐ PDI-VS-100, D.P.-U1CR/U1TB (Unit 2 Turbine Ventilation Panel)
    - ☐ PDI-VS-101, D.P.-U1RR/U1TB (Unit 2 Turbine Ventilation Panel)
    - ☐ PDI-VS-200, D.P.-U2CR/U2TB (Unit 2 Turbine Ventilation Panel)
    - ☐ PDI-VS-201, D.P.-U2RR/U2TB (Unit 2 Turbine Ventilation Panel)
    - ☐ 1-VS-PDI-118 (Unit 1 Computer Room)
    - ☐ 1-VS-PDI-116 (Near Unit 1 Semi-Vital Bus)
    - ☐ 2-VS-PDI-215 (Unit 2 AC Room)
    - ☐ 2-VS-PDI-206 (Near Unit 2 Semi-Vital Bus)

12. ___ IF any reading NOT positive, THEN initiate Attachment 6 to secure MCR boundary fans.

13. ___ Check initiated or initiate 0-AP-50.00, OPPOSITE UNIT EMERGENCY.

14. ___ Check the following MCR and ESGR air conditioning equipment operating. IF NOT, THEN start equipment within 1 hour IAW the appropriate subsection of 0-OP-VS-006, CONTROL ROOM AND RELAY ROOM VENTILATION SYSTEM.
    - ☐ One Control Room chiller
    - ☐ One Unit 1 Control Room AHU
    - ☐ One Unit 2 Control Room AHU
    - ☐ One Unit 1 ESGR AHU
    - ☐ One Unit 2 ESGR AHU

15. ___ IF both of the following conditions exist, THEN check that Load Shed is activated.
    - ☐ Unit 2 - SUPPLIED BY RSST
    - ☐ Unit 2 RCPs - RUNNING

16. ___ IF Load Shed is required and not activated, THEN initiate 0-AP-10.10, LOSS OF AUTO LOAD SHED.

Event Description: Small Break LOCA: E-0 ATTACHMENTS 1-3.

Cue: Examiner cue.

NUMBER 1-E-0	ATTACHMENT TITLE AUXILIARY VENTILATION, AC POWER, AND SFP STATUS CHECKS	ATTACHMENT 3
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NOTE:
- SFP checks should be initiated WITHIN ONE TO TWO HOURS of EOP entry.
- Loss of power may render SFP indications and alarms non-functional and require local checks. Power supplies are as follows:
  - TI-FC-103, Unit 1 Semi-Vital Bus
  - TI-FC-203, Unit 2 Semi-Vital Bus
  - 1-FC-LIS-104, Panel 1ABDA1
- Loss of AC Power to the SFP level indicator is indicated if both low and high level alarms are in simultaneously. (0-VSP-C4 and 0-VSP-D4)
- 1-DRP-003, CURVE BOOK, provides a graph for SFP time to 200°F if loss of SFP cooling occurs.

17. ___ Initiate monitoring SFP parameters:

- ☐ • SFP level - Greater than Cooling Pump suction AND Stable
- ☐ • SFP temperature - Stable or Lowering
- ☐ • SFP Cooling Pumps - Either Running
- ☐ • Component Cooling - Normal
- ☐ • SFP Radiation - Normal

18. ___ Continue to monitor parameters every one to two hours or until authorized to terminate monitoring by the Station Emergency Manager and/or the Shift Manager.

19. ___ Notify the Station Emergency Manager and/or the Shift Manager of the status and trend of SFP parameters.

20. ___ IF any abnormality or adverse trend is identified, THEN initiate 0-AP-22.02, MALFUNCTION OF SPENT FUEL PIT SYSTEMS.

Op-Test No.: Surry 2015-1 Scenario No.: 4 Event No.: 8 Page 61 of 81

Event Description: Large Break LOCA with failure of Containment Spray actuation.

Cue: Examiner cue, after 1-E-0 Attachments 1 and 2.

Time	Position	Applicant's Action or Behavior
	SRO STA	1-E-1 The team will conduct a transient brief. During the brief, the Large Break LOCA will begin. At that time, the SRO will truncate the brief and continue in 1-E-1. *STA will have no input for the brief.*
	Team STA	Diagnoses Large Break LOCA by the following: Alarms: Multiple Hi and Hi-Hi CLS alarms Multiple Containment Radiation alarms Indications: Containment pressure rising Rapidly lowering RCS Pressure *Reports an ORANGE path for Containment when the team identifies CS not in service, or after Step 1 of 1-E-1 is complete, whichever is sooner.* **NOTE:** *1-FR-Z.1 begins on the next page of this guide.*
	 SRO RO SRO RO SRO RO	1-E-1 **NOTE:** *It is expected that the team has addressed RCP Trip and CH miniflow Recirc criteria by the time this step is reached.* 1. CHECK RCP TRIP AND MINIFLOW RECIRC CRITERIA: a) Charging Pumps - AT LEAST ONE RUNNING AND FLOWING TO RCS Reports Yes, 3 running and flowing to the RCS. b) RCS subcooling - LESS THAN 30°F [85°F] Reports RCS subcooling is less than 30°F [85°F]. c) Stop all RCPs d) RCS pressure - LESS THAN 1275 psig [1475 PSIG] e) Close CHG pump miniflow recirc valves: • 1-CH-MOV-1275A • 1-CH-MOV-1275B • 1-CH-MOV-1275C Reports RCPs are stopped and CHG pump Mini-flow recirc valves closed.

Event Description: Large Break LOCA with failure of Containment Spray actuation.

Cue: Examiner cue, after 1-E-0 Attachments 1 and 2.

Time	Position	Applicant's Action or Behavior
		1-FR-Z.1, Response to Containment High Pressure
	SRO	Acknowledges recommendation by STA and transitions to 1-FR-Z.1.
		1-FR-Z.1
	SRO	CAUTION before step 1: If 1-ECA-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION, is in effect, containment spray systems should be operated as directed by 1-ECA-1.1, instead of Step 1 below.
		1 CHECK IF CS REQUIRED: a) Check CTMT pressure - HAS INCREASED TO GREATER THAN 23 PSIA b) Check CS pumps – RUNNING
	RO	Reports no CS pumps running.
	SRO	Goes to Step 1 b) RNO.
		RNO b) <u>IF</u> RWST level greater than 3%, <u>THEN</u> start CS pumps. <u>IF</u> any CS pump can <u>NOT</u> be started, <u>THEN</u> monitor OSRS pumps for cavitation.
	RO	**Starts 1-CS-P-1A / 1B. Determines that 1-CS-P-1A trips immediately on overcurrent.**
	SRO	• <u>IF</u> cavitation is indicated, <u>THEN</u> put affected OSRS pump in PTL
	RO	Reports no cavitation indicated.
	SRO	c) Check CS system valves - OPEN • 1-CS-MOV-100A • 1-CS-MOV-100B • 1-CS-MOV-101A and B • 1-CS-MOV-101C and D • 1-CS-MOV-102A and B
	RO	Reports No, 1-CS-MOV-101A/B/C/D are closed.
	SRO	Goes to Step 1 c) RNO.
		c) RNO Manually align CS valves.
	RO	**Manually opens 1-CS-MOV-101A/B/C/D.**
		Critical Task (CT-3): Start at least one CS pump prior to exiting 1-FR-Z.1 to restore function. (Starting "B" CS Pump <u>and</u> opening <u>either</u> 1-CS-MOV-101C or 1-CS-MOV-101D satisfies this CT)

Op-Test No.: Surry 2015-1 Scenario No.: 4 Event No.: 8 Page 63 of 81

Event Description: Large Break LOCA with failure of Containment Spray actuation.

Cue: Examiner cue, after 1-E-0 Attachments 1 and 2.

	SRO RO	d) Stop all RCPs Reports yes, RCPs are stopped. **NOTE:** *After completion of Step 1, the Examiner may terminate the scenario.*
	 SRO RO	1-FR-Z.1 2. CHECK SW FLOW TO RS HXs - GREATER THAN 4750 GPM a) Check the following valves – OPEN • 1-SW-MOV-103A, B, C, and D • 1-SW-MOV-104A, B, C, and D • 1-SW-MOV-105A, B, C, and D Reports all listed MOVs are open.
	 SRO RO SRO	1-FR-Z.1 3. CHECK RS SYSTEMS: a) Check RWST level -LESS THAN 60% Reports RWST level is greater than 60%. Goes to 3.a) RNO. a) Do the following: 1) Monitor RWST level. 2) <u>WHEN</u> RWST level is less than 60%, <u>THEN</u> perform Steps 3b and 3c. Goes to Step 4.
	 SRO RO/BOP	1-FR-Z.1 4. CHECK INTAKE CANAL LEVEL – GREATER THAN 24 FT Reports Intake Canal Level greater than 24 feet.

Op-Test No.: Surry 2015-1 Scenario No.: 4 Event No.: 8 Page 64 of 81

Event Description: Large Break LOCA with failure of Containment Spray actuation.

Cue: Examiner cue, after 1-E-0 Attachments 1 and 2.

	SRO	1-FR-Z.1 5. CHECK CTMT ISOLATION VALVES - CLOSED IAW ATTACHMENT 1 Directs BOP to perform Attachment 1.
	SRO	1-FR-Z.1 6. CHECK MSTVs – CLOSED Reports yes, MSTVs are closed.
	SRO BOP SRO	1-FR-Z.1 Cautions before step 7: • At least one SG must be maintained available for RCS cooldown. • If all SGs are faulted, at least 60 gpm [100 gpm] feed flow should be maintained to each SG. 7. CHECK IF FEED FLOW SHOULD BE ISOLATED TO ANY SG(s): a) Check pressures in all SGs: • ANY SG PRESSURE DECREASING IN AN UNCONTROLLED MANNER OR • ANY SG COMPLETELY DEPRESSURIZED Reports SGs NOT Faulted. Goes to Step 8.
		1-FR-Z.1 8 CHECK SERVICE WATER AVAILABLE: a) Check Intake Canal level – BEING MAINTAINED BY CIRC WATER PUMPS Reports current Intake Canal Level, being maintained by CW pumps. b) RETURN TO procedure and step in effect Returns to 1-E-1.
		End Event 8 END of Scenario

SIMULATOR OPERATOR'S GUIDE

Simulator Scenario Checklist

- ❑ Perform Simulator Turnover Pre-session, and Post-session Checklist prior to the first Scenario of the day.
- ❑ Perform Simulator Turnover Post-session Checklist after the last Scenario of the day.

Perform/Verify Simulator Setup:

❑ ❑ ❑ Recall IC -379 (13%) **and verify Trigger #30 implemented.**

OR

Recall Base 5% IC, Perform applicable seps of 1-GOP-1.8/1-OP-TM-001 to place the unit online, block P-10 permissives and place Steam Dump control in Auto (Tave mode). Open Schedule file for Scenario 6. Run Schedule file, and i**mplement Trigger 30.**

❑ ❑ ❑ Verify the NI-NR-A and B Chart recorders are on 1 min/div speed.

❑ ❑ ❑ Verify the SF/FF recorders are on narrow range, and Tave/Tref recorder is on wide range.

❑ ❑ ❑ Verify PRZR LVL-CH SEL positioned to CH3/CH2 (Position 3).

❑ ❑ ❑ Verify 1-EH-P-MP1 is red-flagged, and 1-EH-P-MP2 is green-flagged.

SIMULATOR OPERATOR'S GUIDE

❑ ❑ ❑ **Enter/Verify the following MALFUNCTIONS:**

Malfunction	Delay	Ramp	Trigger	Value	Final	Trigger Type (Auto or Manual)
RM1109 PROCESS RAD MONITOR RI-CC-105 FAILURE	5	10	1	3450	6e+06	MANUAL
CC07 DISABLE CC-HCV-100 AUTO CLOSURE	0	0	1	FALSE	TRUE	MANUAL
CH28 CHG LINE FLOW CONTROLLER FC-1122A FAILS	5	30	3	0	+2.0	MANUAL
TU1802 EH FLUID PUMP 2 FAILS TO AUTO START	0	0	5	FALSE	TRUE	MANUAL
TU1001 LOSS OF FLUID PUMP 1	5	0	5	FALSE	TRUE	MANUAL
SW1202 Disable SW-P-10B Auto Start	0	0	7	FALSE	TRUE	MANUAL
SW0401 OVERLOAD TRIP OF PUMP SW-P-10A	5	0	7	FALSE	TRUE	MANUAL
RD1214 DROPPED RCCA, G-9, SHUT DOWN BANK B	5	0	9	FALSE	TRUE	MANUAL
SI4001 DISABLE LHSI PUMP SI-P-1A AUTO START	0	0	11	FALSE	TRUE	AUTO
SI4002 DISABLE LHSI PUMP SI-P-1B AUTO START	0	0	11	FALSE	TRUE	AUTO
RC04 RCS LEAK NONISOLABLE (0-1200 GPM)	5	60	11	0	35	AUTO
RC0101 RCS COLD LEG A PIPE RUPTURE	5	120	13	0	50	MANUAL
CS1601 DISABLE CSP1A AUTO START	0	0	13	FALSE	TRUE	MANUAL
CS1602 DISABLE CSP1B AUTO START	0	0	13	FALSE	TRUE	MANUAL
CS12 DISABLE CSMOV101A AUTO OPEN	0	0	13	FALSE	TRUE	MANUAL
CS13 DISABLE CSMOV101B AUTO OPEN	0	0	13	FALSE	TRUE	MANUAL
CS14 DISABLE CSMOV101C AUTO OPEN	0	0	13	FALSE	TRUE	MANUAL
CS15 DISABLE CSMOV101D AUTO OPEN	0	0	13	FALSE	TRUE	MANUAL
CS0801 CS-P-1A BKR 14H5 OVERCURRENT TRIP	5	0	15	FALSE	TRUE	AUTO
RD1205 DROPPED RCCA, J-3, SHUT DOWN BANK A	5	0	25	FALSE	TRUE	MANUAL
FP0301 FPS FACP07 ALARM HORN FAILURE	0	0	30	FALSE	TRUE	MANUAL
FP0302 FPS PC SPEAKER FAILURE	0	0	30	FALSE	TRUE	MANUAL

SIMULATOR OPERATOR'S GUIDE

❑ ❑ ❑ **Enter/Verify the following EVENT TRIGGERS:**

Event ID	Event code	Command
11	Fwmov154c <= 0.02	Sets Trigger 11
15	CVP000>23	Sets Trigger 15

TRIGGER	TYPE	DESCRIPTION
1	MAN	Fails CC-RM-105 high.
3	MAN	Fails Normal Charging Flow Controller high.
5	MAN	Trips running EH pump and defeats auto start of standby pump.
7	MAN	Trips running Charging SW pump and defeats auto start of standby pump.
9	MAN	Drops control rod G-9.
11	AUTO	Small Break LOCA and defeats auto start of both LSHI pumps when 1-FW-MOC-154C is closed.
13	MAN	Large Break LOCA and defeats auto start of "B" CS pump and all CS discharge MOVs. .
15	AUTO	Lockout of 1-CS-P-1A 5 seconds after Containment Pressure exceeds 23 psia
25	MAN	(Contingency) Drops additional RCCA if power > 25% at Event 6.
30	MAN ACTIVE	FP0301 FPS FACP07 ALARM HORN FAILURE FP0302 FPS PC SPEAKER FAILURE

SIMULATOR OPERATOR'S GUIDE

Verify the following control room setup:

❑ ❑ ❑ Place the simulator in RUN and verify normal 5% power operation indications.

❑ ❑ ❑ Verify Red Magnets on the following components:

❑ ❑ ❑ Verify All pink magnets collected from previous scenarios.

❑ ❑ ❑ Verify vertical board PCS monitor on ALARM SCREEN.

❑ ❑ ❑ Reset ICCMs.

❑ ❑ ❑ Verify all calcalc points are displayed on PCS: None.

❑ ❑ ❑ Verify Component Switch Flags; 1-VS-F-58A and 1-VS-F-58B switches (AUTO AFTER STOP).

❑ ❑ ❑ Verify Brass Caps properly placed (Hi-Hi CLS, MSTVs, CH-MOV-1350, CW and SW MOVs, CTMT Hogger suction, CNDSR Vacuum breaker).

❑ ❑ ❑ Radiation Monitors all clear.

❑ ❑ ❑ Verify SG PORVs set for 1035 psig.

❑ ❑ ❑ Verify "D" bank rod height at 145 steps and Bank Overlap Counter at 529.

❑ ❑ ❑ Advance Charts.

❑ ❑ ❑ Verify Containment Instrument Air Compressors are on Inside Suction (all RMs reset).

❑ ❑ ❑ Verify SYNC keys in proper place.

❑ ❑ ❑ Verify BOL reactivity plans and benchboard Reactivity Placard is current.

❑ ❑ ❑ Reset Blender Integrators for Boric Acid to 100 and PG to 1000.

❑ ❑ ❑ Verify Stop Watches are available for RO and BOP.

❑ ❑ ❑ Verify Simulator "Session In Progress" light is turned ON.

❑ ❑ ❑ Verify no persons are logged onto network computer to ensure no procedures displayed.

❑ ❑ ❑ Verify PCS time matches Sim time.

❑ ❑ ❑ Check PCS Delta Flux target matched reactivity placard.

❑ ❑ ❑ Verify fresh copies of 1-GOP-1.8 and 1-OP-TM-001 are available in a binder.

❑ ❑ ❑ Verify no Dropped Rod report in printer.

SIMULATOR OPERATOR'S GUIDE

❑ ❑ ❑ Spot check all ARPs are clean, **verify** the following ARPs are clean.

0-RM-L5	1D-G5		
0-RM-M5			
1D-E5	1G-H2		
	TS-D2		

❑ ❑ ❑ Verify CLEAN copies of the following procedures are in place.

CSFSTs	0-AP-53.00	0-AP-1.00	1-AP-16.00
1-E-0	1-ES-0.1	1-E-1	1-FR-Z.1
1-OP-ZZ-002	1-OPT-RX-001	1-OP-CH-007	

SIMULATOR CREW BRIEF

This simulator performance scenario is performed in the EVALUATION MODE. You should not direct questions to the evaluators. Otherwise, you should perform as if you were in the MCR.

Your ability to maintain a log is not being graded, but maintaining a rough log is recommended to help during briefs.

If you need to communicate with the Unit 2 operator, verbally state, “Unit 2” and an instructor will locate to the Unit 2 area and respond to you as quickly as possible.

In the unlikely event that the simulator fails such that illogical indications result, the session will be terminated. In other words, respond to what you see. If there is a problem with the simulation, the session will be terminated or adjusted as appropriate based on the specific problem.

Assign operating positions.

	TEAM 1	TEAM 2	TEAM 3
SRO			
RO			
BOP			

Ask for and answer questions.

SIMULATOR CREW TURNOVER

Conduct shift turnover:

Unit 1 is online at 13% reactor power with the following parameters:

- RCS boron concentration of 1413 ppm.
- Steam Dumps are in AUTO in Tave mode.
- Pimp is 8%.
- RCS Tave is 550°F; Tref is 549°F.
- Rod Control is in MANUAL.
- A surrogate operator is controlling S/G levels at 40% ± 4%, using the main feedwater bypass HCVs until the team relieves the watch. At that time, the team will assume feed control and the surrogate will leave the simulator.

Unit startup is in progress, with reactor power being held at 13% for turnover.

All systems and crossties are operable with the following exception:

- Containment Smoke and heat detectors are non-functional due local fire panel failure (2 days ago). TRM Section 3.3.1, Fire Detection Instrumentation, Condition B, Smoke Detectors, and Condition C, Heat Detectors is in effect. Containment air temperatures monitored once/hour, and restore to Functional status in 14 days. OC-18 for Containment Temperature Monitoring being performed by Unit 2 BOP for both Units.

Unit #2 is at 100% power with all systems and crossties operable.

Shift orders are to place unit 1 main feedwater regulating valves in AUTO and commence power escalation in accordance with 1-GOP-1.8 (starting with step 5.6.27), 1-OP-TM-001 and a ramp plan upon relieving the watch. From there, continue the power escalation to 20-25% turbine power. Performance of these startup procedures have been authorized and have been PSA analyzed for current plant conditions.

The last shift performed dilutions as necessary to support unit startup, with PG currently in the blender piping.

SIMULATOR OPERATOR'S GUIDE

Pre Session Checks:			
Safety Injection Section (Magnets)	**CW/SW Section**	**RCS Section**	**CVCS**
SI-MOV-1865A □ R □ G SI-MOV-1865B □ R □ G SI-MOV-1865C □ R □ G SI-MOV-1869A □ R □ G SI-MOV-1869B □ R □ G SI-MOV-1890A □ R □ G □ T/O SI-MOV-1890B □ R □ G □ T/O SI-MOV-1890C □ R □ G □ T/O Brass Cap □ CLS TR A □ CLS TR B	Brass Caps SW MOVs □ 103A □ 103B □ 103C □ 103D CW MOVs □ 106A □ 106B □ 106C □ 106D CW Inlet Throttle Plaques (10%) □ 100A □ 100B □ 100C □ 100D CTMT Hogger Suction Cap □	Tcold Loop Stop Pos (R – O) □ A □ B □ C Loop Bypass Valves (G – C) □ A □ B □ C Thot Loop Stop Pos (R - O) □ A □ B □ C SFP PPs Pwr □Norm □ Alt PZR Level Recorder □	Core Life Plaque □ Ramp Plan Book □ OP-RX-010 Book □ PG Int Set 1000 □ BA Int Set 100 □ Tavg/Tref Rec. □ NI-NR-B □ Group Step Ctrs □ CERPIs □ CH-MOV-1350 □
Main Steam/Feedwater	**Electrical/VSP**	**PCS**	**RM/WD/BR**
SG PORVs Set □ MSTV Caps □ A □ B □ C SF/FF Rec Scale □ Cond Vac Bkr Cap □	Synch Key □ SVB Power □ H □ J LO System Switches □ VS-F-58A Pwr □ H □ J □ Grn Flag VS-F-58B Pwr □ H □ J □ Grn Flag	PCS Main Screen U9103 □ U9104 □ U9105V □ Alarm Screen (List) □	RM-112 □ A □ B □ C RM-113 □ A □ B □ C Comm RM Pwr □ 1J □ 2J Synch Key □

Post Session Checks:
PCS Screens (Cleared/Display) □ RO □ BOP □ SM □ STA □ PCs Logged OFF (including Booth) □ Phone cleared □ Recall IC-1 □ Restore NI-NR, SF/FF, and Tave/Tref Chart recorder settings □ Advance Charts □ Procedures Changed □ Red Light □ Binders Stored □ Trash Picked Up/Emptied □ Vacuum Req'd? □ Pink Magnets in Drawer □ BB and VB Scenario Magnets removed □ E-Mail to SSG Required □ DVD Finalized □ EAL Charts □ Note Pads □ Manning Sheets □ Sticky Tabs (SRO/SM/ARPs) □ Markers (ARPs) □ Personnel/Comms Tracking Sheets (Booth) □ Floor timers reset/In place □ Booth timers reset/In place □ Printers ready/have paper

SIMULATOR OPERATOR'S GUIDE

EVENT 1 Place unit online

When the team and Examiner ready, place the Simulator in RUN.

30 minutes prior to the beginning of the scenario, provide the team with a copy of 1-GOP-1.8, 1-OP-TM-001, 1-OP-CH-021 and an approved ramp plan.

System Operator and Energy Supply (MOC):

If contacted, acknowledge the unit is coming online. Acknowledge when the unit is placed online.

Operations Supervisor/Management/Work Week Coordinator:

If contacted, acknowledge the unit is coming online.

Surrogate RO (Feed Control):

Provide feed control until the team is ready to assume the watch. At that time, turn over feed control responsibilities, relieve yourself and leave the simulator floor.

Shift Technical Advisor:

If asked to support monitoring while placing the unit online; acknowledge the request, but do not provide any information about the unit.

Field operator:

If dispatched, report all Main Transformer pumps and fans are in operation.

If contacted as CP, report that 5 polishers are in service.

Unit 2:

- If **0-BR-D2, OVHD GAS COMPR STBY START** alarms (Due to VCT backing up), perform actions of ARP 0-BR-D2.

Role play as other individuals as needed.

SIMULATOR OPERATOR'S GUIDE

EVENT 2 1-CC-RM-105 failure

When cued by examiner, implement **Trigger 1**.

Shift Manager:

- **If contacted**, will acknowledge the failure of 1-CC-RM-105 and will also acknowledge any TS LCOs.
- **If asked,** will contact the OMOC.
- **If asked,** will take responsibility for contacting I&C department.
- **If asked,** will take responsibility for writing the CR.

STA:

- **If contacted**, will acknowledge the failure of 1-CC-RM-105 and will also acknowledge any TS LCOs.
- **If asked,** the STA will report that all documents have been reviewed and discussed with the Shift Manager.
- **If the team has a transient brief:** The STA will state that he has nothing to add.

Maintenance/Work Week Coordinator:

- **If contacted**, will acknowledge instrumentation failure and commence investigations.

Health Physics:

- **If contacted**, will acknowledge the failure of 1-CC-RM-105.
- **If asked,** will take responsibility for conducting local surveys.

Unit 2 Operator:

- **If asked,** will report they have placed SOV-CC-200 in CLOSE.
- **If asked,** will take responsibility for performing 1-OPT-RC-10.0.

Role play as other individuals as needed.

SIMULATOR OPERATOR'S GUIDE

EVENT 3 **Charging Flow Controller fails high.**

When cued by examiner, implement **Trigger 3**.

BOOTH NOTE: Ensure Blender is not operating when malfunction is entered.

Operations Supervisor/Management:

- **If contacted**, will acknowledge the failure of the Charging Flow Controller and also acknowledge entry into 0-AP-53.00.
- **If contacted,** will contact the OMOC.
- **If contacted,** will take responsibility for writing the CR.

STA:

- **If contacted**, will acknowledge the failure of the Charging Flow Controller.
- **If asked,** the STA will report that all documents have been reviewed and discussed with the Shift Manager.
- **If contacted,** will take responsibility for writing the CR.
- **If the team has a transient brief:** The STA will state that he has nothing to add.

Unit 2:

- If **0-BR-D2, OVHD GAS COMPR STBY START** alarms (Due to VCT backing up), perform actions of ARP 0-BR-D2.

Maintenance/Work Week Coordinator:

If contacted, will acknowledge the Charging Flow Controller failure and commence investigations.

Role play as other individuals as needed.

SIMULATOR OPERATOR'S GUIDE

EVENT 4 **EH pump trip, standby EH pump fails to auto start.**

When cued by examiner, implement **Trigger 5**.

Critical Task (CT-1): Start the standby EH Fluid Pump prior to automatic OR manual Reactor/Turbine trip.

Operations Supervisor/Management:

- **If contacted**, will acknowledge the failure of 1-EH-P-MP1 and MP-2 to auto-start.
- **If asked,** will contact the OMOC.
- **If contacted,** will take responsibility for writing the CR.

STA:

- **If contacted**, will acknowledge the failure of 1-EH-P-MP1 and MP-2 to auto-start.
- **If asked,** the STA will report that all documents have been reviewed and discussed with the Shift Manager.
- **If contacted,** will take responsibility for writing the CR.
- **If the team has a transient brief:** The STA will state that he has nothing to add.

Maintenance/Work Week Coordinator:

If contacted, will acknowledge EH pump failure and commence investigations.

Field Operators: (Wait three minutes between direction to perform local action/status check and report.)

- **If contacted**, 1-EH-P-MP1 will have no local indications for cause of the trip.
- **If contacted,** to investigate breaker MCC 1A1-2-7C (1-EH-P-MP1), report the breaker is in the ON position.
- **If contacted**, 1-EH-P-MP2 post start checks are sat.

Unit 2 Operator:

- **If contacted**, will acknowledge the failure of 1-EH-P-MP1 and MP-2 to auto-start. Also acknowledge when 1-EH-P-MP-2 is running.

Role play as other individuals as needed.

SIMULATOR OPERATOR'S GUIDE

EVENT 5 **'A' CH SW pump trip, failure of 'B' CH SW pump to auto start.**

When cued by examiner, implement **Trigger 7**.

Operations Supervisor/Management:

- **If contacted**, will acknowledge the failure of CH CC and will also acknowledge any TS LCOs.
- **If contacted,** will contact the OMOC.
- **If contacted,** will take responsibility for writing the CR.

STA:

- **If contacted**, will acknowledge the failure of CH CC.
- **If asked,** the STA will report that all documents have been reviewed and discussed with the Shift Manager.
- **If contacted,** will take responsibility for writing the CR.
- **If the team has a transient brief:** The STA will state that he has nothing to add.

Field Operators: (Wait three minutes between direction to perform local action/status check and report.)

- **If contacted**, report CH SW parameters consistent with the number of CH SW pumps running.
- **If contacted**, 1-SW-P-10A will have no local indications for cause of the trip.
- **When contacted,** to investigate breaker MCC 1H1-1-1D (1-SW-P-10A), report the breaker is in the ON position.
- **If contacted**, 1-SW-P-10B post start checks are sat.

Maintenance/Work Week Coordinator:

If contacted, will acknowledge the CH SW pump failure and commence investigations.

Role play as other individuals as needed.

SIMULATOR OPERATOR'S GUIDE

EVENT 6 **Dropped Rod below 25% reactor power**

When cued by examiner, implement **Trigger 9**.

If reactor power is allowed to ramp above 25%, an additional dropped RCCA will be necessary. If that occurs, implement **Trigger 25** when cued by examiner.

Operations Supervisor/Management:

- **If contacted**, will acknowledge the dropped rod and will also acknowledge any TS LCOs and entry into 0-AP-1.00 / 1-E-0 (as notified).
- **If contacted,** will contact the OMOC.
- **If asked,** will take responsibility for contacting I&C department.
- **If contacted,** will take responsibility for writing the CR.

STA:

- **If contacted**, will acknowledge the dropped rod and will also acknowledge any TS LCOs and entry into 0-AP-1.00 / 1-E-0 (as notified).
- **If asked,** the STA will report that all documents have been reviewed and discussed with the Shift Manager.
- **If contacted,** will take responsibility for writing the CR.
- **If the team has a transient brief:** The STA will state that he has nothing to add.

Maintenance/Work Week Coordinator:

- **If contacted**, will acknowledge the dropped rod and commence investigations.

Unit 2 Operator:

- **If asked,** will perform 0-AP-50.00.

Role play as other individuals as needed.

SIMULATOR OPERATOR'S GUIDE

EVENT 7 **Small Break LOCA with failure of LHSI pumps to auto start**

When 1-FW-MOV-154C is manually closed by the team, **Trigger 11** will automatically insert.

Critical Task (CT-2): Start at least one LHSI pump prior to requiring transition to 1-FR-C.1.

Operations Supervisor/Management:

- **If contacted**, will acknowledge the small break LOCA and entry into 1-E-0.
- **If contacted,** will acknowledge the need to evaluate EPIPs. (Will not discuss EALs with the team.)
- **If contacted,** will take responsibility for writing the CR.

STA:

- **If contacted**, will acknowledge the small break LOCA and entry into 1-E-0.
- **If contacted,** will acknowledge the need to evaluate EPIPs. (Will not discuss EALs with the team.)
- **If contacted,** will take responsibility for writing the CR.
- **If the team has a transient brief:** The STA will state that he has nothing to add.

Maintenance/Work Week Coordinator:

- **If contacted**, will acknowledge failure of LHSI pumps to auto start and will commence investigation.

Unit 2 Operator:

- **If contacted**, will acknowledge the Safety Injection initiation on unit 1.

Role play as other individuals as needed.

SIMULATOR OPERATOR'S GUIDE

EVENT 8 **Large Break LOCA with failure of CS pumps and valves to automatically align**

When cued by examiner, implement **Trigger 13**.

Booth Note: To ensure team enters FR-Z.1 insert trigger AFTER operator has completed Attachment 1 and Attachment 2 of E-0 and team is performing E-1 Step 1.

Critical Task (CT-3): Start at least one CS pump prior to exiting 1-FR-Z.1 to restore function.

Operations Supervisor/Management:

- **If contacted**, will acknowledge the large break LOCA, loss of Containment Spray function and entry into 1-E-1 / 1-FR-Z.1 (as notified).
- **If contacted,** will acknowledge the need to evaluate EPIPs. (Will not discuss EALs with the team.)
- **If contacted,** will take responsibility for writing the CR.

STA:

- ***When the team identifies the loss of Containment Spray function (or after Step 1 of 1-E-1 is complete (whichever is sooner), report an ORANGE path to 1-FR-Z.1 using the CSFSTs.***
- **If contacted**, will acknowledge the large break LOCA, loss of Containment Spray function and entry into 1-E-1 / 1-FR-Z.1 (as notified).
- **If contacted,** will acknowledge the need to evaluate EPIPs. (Will not discuss EALs with the team.)
- **If contacted,** will take responsibility for writing the CR.
- **If the team has a transient brief:** The STA will state that he has nothing to add.

Maintenance/Work Week Coordinator:

- **If contacted**, will acknowledge failure of CS pumps to auto start and align, and will commence investigation.

Unit 2 Operator:

- **If contacted**, will acknowledge the CLS Hi-Hi initiation on unit 1.

Role play as other individuals as needed.

SIMULATOR OPERATOR'S GUIDE

The scenario will end upon completing step 1 of 1-FR-Z.1, or at the lead examiners discretion.

Facility: Surry Power Station **Scenario No.: 5** **Op-Test No.: 2021-301**

Examiners: ______________ Operators: ______________

Initial Conditions: Unit 1 and 2 at 100% power; MOL. All systems and crossties are operable with the following exceptions:

- AAC DG is tagged out for maintenance, per VPAP-2802, Notifications and Reports, Section 6.30.1, a review of Reportability is required if the AAC DG is out of service greater than 14 days.

Turnover: The Team will pre-brief conduct of PT-18.6I, PZR Block Valve Stroke Test

Event No.	Event Type*	Event Description
1	N RO/SRO TS SRO	Test cycle Pressurizer PORV, Block Valve breaker will trip when re-opened. (1-PT-18.6I)
2	I RO/SRO TS SRO	PRZR Level Transmitter fails low. 0-AP-53.00 **(CT-1)**
3	C BOP/SRO	"B" Main Feed Reg Valve Controller fails low. 0-AP-53.00 **(CT-2)**
4	C BOP/SRO	SG "C" PORV fails open. 1-AP-38.00.
5	R RO/SRO N BOP	Isophase Bus Duct Hi Temp, requiring ramp to 90% power. ARP 1G-E5, 0-AP-23.00.
6	C RO/SRO C BOP	Steam Generator Tube Leak "B" SG at approximately 20 gpm. 1-AP-16.00, 1-AP-24.00. Auto actions of Air Ejector Hi RM do not function, requiring manual alignment.
7	M ALL	SGTL "B" SG escalates to SGTR. 1-E-0, 1-E-3 **(CT-3)**
8	M ALL	PRZR PORV 1-RC-PCV-1455C will not open when switch placed in "open" position. 1-ECA-3.3.

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

CT #	EVENT	DESCRIPTION	MET (✓)
CT-1	2, PZR Level Transmitter Fails Low	Stabilize Pressurizer Level to prevent automatic OR manual Reactor Trip. With no operator action, Pressurizer level will continue to rise to the high level reactor trip setpoint (88%).	
CT-2	3, B SG MFRV Controller Fails Low	Stabilize B SG Level prior to automatic OR manual Reactor Trip. With no operator action, a Reactor trip will occur in approximately 2 minutes.	
CT-3	7, SGTR	Isolate feedwater flow into the ruptured S/G before S/G ‘B’ NR reaches 100%. Failing to isolate Feedwater into the ruptured S/G will cause the S/G to fill faster. Once NR level reaches 100% there is no accurate method for determining S/G level due to the inaccuracy of the WR S/G levels. Once a S/G is fully flooded the hydrodynamic loading on the S/G, MS lines, and other components may exceed their allowable stress rating, possibly causing the S/G to fail catastrophically. Note: With no operator action it is estimated that SG C will fill to 100% in approximately 40 minutes from the time the SG is ruptured.	

Event 1: PT-18.6 I, PZR Block Valve Stroke Test. (N- RO/SRO, TS - SRO)

The Team will pre-brief this evolution prior to entering the Simulator. Upon entry of the Team to the Simulator, the Scenario brief will be given, Questions answered, and the Team allowed ~ 5 minutes to become acclimated to the Simulator Environment.
When the RO closes 1-RC-MOV-1535, 1-RC-PCV-1456 block valve, and attempts to re-open 1-RC-MOV-1535, a series of triggers actuate to trip the power supply breaker to 1-RC-MOV 1535.

Verifiable Action(s):

1) RO will close 1-RC-MOV-1535 and time the stroke.
2) RO will place the 1-RC-MOV-1456 PORV control switch in the “close” position following Tech Spec review.

Technical Specifications:

The SRO will review Tech Specs (3.1.A.6.d) and determine a one (1) hour clock exists to place 1-RC-PCV-1456 in manual (switch to close); and a 72 hour clock to return the block valve to an OPERABLE status, or be in HSD in 6 hours and RCS temperature <350°F within the next 6 hours.

This Event sets up entry into ECA-3.3, SGTR without Pressure Control; Major Event later in the Scenario.

Event 2: PRZR level Upper Channel Fails Low (-.2 DEG) PRZR level on selected Upper Channel fails to ~25%. (I – RO, TS – SRO). ARP 1C-D8, PRZR LO Level.

The RO will diagnose the failure based on CH to Regen HX Hi/Low flow alarm (Annunciator 1D-E5) or identification of CH flow increasing and PZR level Channel III decreasing.

Verifiable Actions(s):

1) The RO will place CH flow in Manual and control PRZR level at setpoint IAW AP-53.00, Loss of Vital Instrumentation/Controls.
2) BOP will select an operable channel on the pressurizer level recorder.
3) The RO will defeat the failed channel IAW AP-53.00, and return CH flow to automatic when normal PRZR level restored.

Critical Task:

CT-1: Stabilize Pressurizer Level prior to automatic OR manual Reactor Trip.

Technical Specifications (1):

1) **TS 3.7, Table 3.7-1, item 9** (Pressurizer High Water Level), Operator Action 7. With the number of OPERABLE Channels less than the Total number of channels; place the failed channel in trip in 72 hours, allowable to bypass the channel for up to 12 hours for surveillance, if requirements not met reduce power to less than P-7 (10%) within the next 6 hours.

TRM Actions (1):

1) **TRM section 3.3.2, Table 3.3.2-1**, Pressurizer Level Channel 1-RC-LI-1461. Condition A applies, Implement a Fire Watch in cable vault and tunnel and the emergency switchgear room of the affected Unit (Unit 1) IAW TRM Section 5.2 (Hourly), within 14 days and restore the failed channel in 60 days.

Event 3: B SG Main Feed Reg Valve Controller Fails Low. *(C – BOP/SRO)*

BOP will diagnose the failure based upon alarms and indications received and take the Immediate Actions of 0-AP-53.00. The Team will implement 0-AP-53.00, Loss of Vital Instrumentation/Controls. The BOP will manually control "B" SG NR level for the remainder of the scenario.

Verifiable Action(s):

1) BOP will place the "B" FRV in manual and verify proper response.
2) BOP will maintain "B" SG level at program band.

Critical Task:

CT-2: Stabilize B SG Level prior to automatic OR manual Reactor Trip.

Event #4: SG 'C' PORV fails open. (C – BOP/SRO)

The BOP will diagnose the failure based upon PCS alarms and indication received. The Team will initiate 1-AP-38.00, Main Steam System Control Malfunction.

Verifiable Actions:

1) BOP: Place the "C" SG PORV in Manual and lower output to close the PORV.

Event 5: ISOPHASE BUS DUCT HI TEMP REQUIRING 10% Power Reduction. (R – RO, R – SRO, N – BOP)

The SRO will lead a Team Brief where the reactivity plan will be discussed to reduce reactor power in 10% increments to lower isophase bus duct temp to less than 239 deg. F. The RO and SRO will be credited with a Reactivity Manipulation and the BOP with a Normal Evolution.

Verifiable Action(s):

1) RO: Manipulate control rods to control delta flux and/or Tave.
2) RO: Manipulate CVCS controls to Emergency Borate.
3) RO: Manipulate CVCS control to establish a normal boration to assist in Tave control.
4) BOP: Manipulate Turbine Controls to establish power reduction.

Event #6: Steam Generator Tube Leak "B" Steam Generator. **Failure of Auto actions of A/E RM.** (C – RO/SRO, C – BOP)

When the Evaluation Team is satisfied with the Reactivity manipulation, the event will be triggered. A SGTL of approximately 20 gpm will initiate requiring the RO to perform ARP 1A-A3, N-16 HIGH, which will direct evaluation of 1-AP-16.00 based on the observable change in RCS inventory trends. The actions of 1-AP-16.00 to quantify the leakrate. The A/E RM will go into High alarm due to the primary to secondary leakage; the BOP will manually align A/E discharge to containment IAW A/E RM ARP.

Verifiable Actions:

1) RO will isolate LD flow and place charging flow in manual to quantify leakrate.
2) BOP will respond to failure of auto actions on A/E RM High alarm by swapping A/E discharge to containment.

Event #7: SGTR in "B" SG, approximately 600 gpm. (M – ALL)

When the evaluation Team is ready, a SGTR in the "B" SG will be implemented. The RO will re-assess RCS leakage in response to alarms and indications received. The RO will determine that RCS leakage exceeds the capacity of a single CH pump, and the Team will return to E-0 and manually initiate SI.

The SRO will perform a commensurate brief and continue with E-0. While the RO and SRO continue with E-0, the BOP will be directed to perform E-0 Attachments 1 through 3. BOP Failures in E-0 Attachments; 1-SI-P-1B not start, 1-CH-HCV-1200 A/B not close, VS-MOD-103A not close, 1-MS-TV-109 and 1-DA-TV-100A/B not close.

Verifiable Actions:

1) RO: Increase CH flow in manual per Immediate Action Steps of 1-AP-16.00, Excessive RCS Leakage to determine if RCS leakage is greater than the capacity of a single CH pump.
2) RO: Re-perform High Level Steps of 1-E-0, and manually Safety Inject on Step 4 of 1-E-0.
3) BOP: Perform actions of Attachments 1 through 3 of 1-E-0. BOP Failures in 1-E-0 Attachments: 1-SI-P-1B not auto start, 1-CH-HCV-1200 A/B not auto close, 1-VS-MOD-103A not auto close, 1-MS-TV-109 and 1-DA-TV-100A/B will not auto close (Listed as Event 9).

Critical Task:

CT-3: Isolate feedwater flow into the ruptured S/G before S/G 'B' NR reaches 100%. Failing to isolate Feedwater into the ruptured S/G will cause the S/G to fill faster. Once NR level reaches 100% there is no accurate method for determining S/G level due to the inaccuracy of the WR S/G levels. Once a S/G is fully flooded the hydrodynamic loading on the S/G, MS lines, and other components may exceed their allowable stress rating, possibly causing the S/G to fail catastrophically. Note: With no operator action it is estimated that SG C will fill to 100% in approximately 40 minutes from the time the SG is ruptured.

Event #8: SGTR with Loss of Pressure control. (M – All)

The Team continues through the EOP progression 1-E-0 to 1-E-3.

After the Team has completed the rapid cooldown of 1-E-3 and moves to the Depressurization steps, the Team will be presented with the inability to depressurize the RCS (No RCPs – No Spray available), 1 PZR PORV inoperable, and the last Pzr PORV not responding to placing the control switch in Open. This will require the Team to Transition to 1-ECA-3.3, SGTR without Pressure Control.

When 1-ECA-3.3 is entered, it is expected that the ruptured SG level will be > 73% NR leading to Team moving to Step 6, Check If SI Can Be Terminated.

Verifiable Actions:

1) RO: Isolate AFW flow to the Ruptured SG.
2) BOP: Reset SI and secure “A” CH pump and one of the running LHSI pumps. (Discretionary CT – within 30 minutes).
3) RO: Manipulate steam dump controls for rapid cooldown.
4) RO/BOP: Block SI signals when conditions established.
5) RO: Manipulate SI/CVCS control to terminate SI, establish CH flow, and restore letdown flow.

The Scenario is terminated at Lead Evaluator discretion or at Step 17 of 1-ECA-3.3, “Check If CS Should Be Stopped” (CH and LD flow have been re-established).

Scenario Recapitulation
Total Malfunctions: 10
Abnormal Events: 6, 0-AP-53.00 (twice), ARP 1D-C5, 1-AP-38.00, 1-AP-24.00, 1-AP-16.00.
Major Transients: 1
EOPs Entered: 2 (1-E-0, 1-E-3)
EOP Contingencies: 1 (1-ECA-3.3)

Initial Conditions: Unit 1 and 2 Operating at 100%. Turnover: The Team will pre-brief conduct of PT-18.6I, PZR Block Valve Stroke Test
Equipment Status/ Procedures/ Alignments/ Data Sheets/ etc.: ○ AAC DG is tagged out for maintenance, per VPAP-2802, Notifications and Reports, Section 6.29.1, a review of Reportability is required if the AAC DG is out of service greater than 14 days.
Turnover: Team will perform PT-18.6I, PZR Block Valve Stroke Test. The performance of this procedure has been analyzed based on the current plant configurations and the PRA indicates green.

Scenario Objectives:

A. Given a failure of 1-RC-MOV-1535 to re-open during performance of 1-PT-18.6I, PZR Block Valve Stroke Test.

B. Given a pressurizer level channel deviation, respond IAW 0-AP-53.00 to control Pressurizer level.

C. Given a Low Failure of “B” SG Main Feed Reg Valve Controller, take action IAW 0-AP-53.00 to control SG level.

D. Given a failure of “C” SG PORV, respond IAW 1-AP-38.00.

E. Given degraded Isophase Bus Duct Cooling, respond IAW ARP 1G-E5 and 0-AP-23.00 to reduce power on Unit 1.

F. Given a SG “B” Tube Leak with failure of Air Ejector auto swapover, respond IAW ARPs 1-RM-G8 and 1A-A3.

G. Given a Design Basis SG Tube Rupture, respond IAW 1-E-0, and 1-E-3, Steam Generator Tube Rupture.

H. Given the Failure of 1-RC-PCV-1445C to open to depressurize the RCS, transition to 1-ECA-3.3, Steam Generator Tube Rupture without Pressurizer Pressure Control.

SHIFT TURNOVER INFORMATION

OPERATING PLAN:

The initial conditions have Unit 1 is at 100% power with RCS boron concentration of 760 ppm.

Unit conditions have been stable at approximately 100% power since the last refueling outage.

All systems and crossties are operable with the following exception:

- AAC DG is tagged out for maintenance. Expected to be returned to services in 3 days. Per VPAP-2802, Notifications and Reports, Section 6.29.1, a review of Reportability is required if the AAC DG is out of service greater than 14 days.

Unit #2 is at 100% power with all systems and crossties operable.

Shift orders are, upon relieving the watch, to perform PT-18.6I, PZR Block Valve Stroke Test. Performance of this procedure has been authorized and has been PSA analyzed for current plant conditions.

The last shift performed two 35 gallon dilutions followed by a manual makeup for training.

Event Description: Test Cycle Pressurizer Block Valves, Block Valve Trips on re-open, PT-18.6I.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
		1-PT-18.6I
	SRO/RO	**NOTE** – Team will pre-brief this evolution prior to entering the simulator. Initial Conditions and Precautions and Limitations will be completed before entering the simulator.
	RO	6.1.1 Check closed or close PRZR PORV 1-RC-PCV-1456.
	RO	6.1.2 Check key switch for PRZR PORV 1-RC-PCV-1456 OVPRESS Mitigating System is in DISABLE.
	RO	6.1.3 Check PRZR PORV Block Valve 1-RC-MOV-1535 is open. IF 1-RC-MOV-1535 is closed…
	RO	**6.1.4 Stroke PRZR PORV Block Valve 1-RC-MOV-1535 through one complete cycle, timing valve movement in each direction**. Time from signal initiation to complete valve travel.
	RO	Closes 1-RC-MOV-1535 and identifies it fails to reopen.

Event Description: Test Cycle Pressurizer Block Valves, Block Valve Trips on re-open, PT-18.6I.

Cue: By Examiner.

	SRO	**Refer to Technical Specification 3.1.A.6.d for required actions.** With one block valve inoperable, within 1 hour either restore the block valve to operable status or place the associated PORV in manual. In addition, restore the block valve to operable status in the next 72 hours or, be in at least HSD within the next 6 hours and reduce RCS temperature to < 350°F within the following 6 hours.
	RO	**Places 1-RC-PCV-1456 in "CLOSE".**
	SRO	Exit 1 hour clock to place 1-RC-PCV-1456 in manual. Start 72 Hour Clock to repair Block Valve.
	SRO	Direct RO/BOP to notify Service Building Operator to check status of 1H1-2S 6A breaker for 1-RC-MOV-1535.
	RO/BOP	Contact Service Building Operator to check status of 1-RC-MOV-1535 Breaker.
	RO/BOP	When notified by field operator that 1H1-2S 6A breaker is tripped, report information to the Team using a Focus Brief.
	SRO	Notify Shift Manager of Block Valve failure and suspension of PT performance. Request Electrical Maintenance support to investigate breaker trip.
	SRO	Perform brief to update Team on Technical Specification requirements. Brief driven by brief card and placards.
		-- END EVENT 1 –

Event Description: PRZR Level Transmitter Fails Low, 0-AP-53.00.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	RO	Diagnoses failure of 1-RC-LI-1461 with the following indications/alarms: Alarms: • 1C-D8 PRZR LO LEVEL Indications: • CH Flow rises on 1-CH-FI-1122A to ~110 gpm • PRZR Level on 1-RC-LI-1461 lowers to 25% In accordance with the immediate actions of 0-AP-53.00 the RO will take manual control of pressurizer level control by placing 1-CH-FV-1122 in manual and lowering charging flow to maintain program level (per 0-AP-53.00).
	SRO	Enters 0-AP-53.00, Loss of Vital Instrumentation / Controls.
	RO	0-AP-53.00 [1] CHECK REDUNDANT INSTRUMENT CHANNEL(S) INDICATION - NORMAL Checks 1-RC-LI-1459, Pressurizer Level Channel 1, and 1-RC-LI-1460, Pressurizer Level Channel 2 are NORMAL.
	RO	0-AP-53.00 [2] PLACE AFFECTED CONTROL(S)/COMPONENT(S) IN MANUAL CONTROL AND STABILIZE PARAMETER USING REDUNDANT INDICATION **Places 1-CH-FV-1122 in manual and lowers charging flow.** **Critical Task (CT-1): Stabilize Pressurizer Level prior to automatic OR manual Reactor Trip.**
	SRO STA	Conduct a Brief using the Briefing Placard and obtains Critical Parameter information from the RO and BOP. The SRO will update the Shift Manager during AP-progression. SRO will provide a band for control of PRZR level with CH flow in MANUAL. *The STA will state they have nothing to add to the brief.*
	RO	0-AP-53.00 *3 CHECK REACTOR POWER – LESS THAN OR EQUAL TO 100% Reports Actual Reactor Power and Trend using PCS 30 minute power indication.

Event Description: PRZR Level Transmitter Fails Low, 0-AP-53.00.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	SRO	0-AP-53.00 **CAUTION** Prior to Step 4: If Reactor power has been affected by a secondary transient, Turbine adjustment may be needed to control Tave. **NOTES** prior to Step 4: • Step 4 failures are listed in order of performance priority. Only the failed instrument/control and associated step number should be read aloud. • When the affected instrument/controller malfunction(s) has been addressed by this procedure, recovery actions should continue at Step 11.
	SRO RO	0-AP-53.00 *4 DETERMINE THE FAILED INSTRUMENT / CONTROL AND GO TO APPROPRIATE STEP OR PROCEDURE: • PRZR Level Control, Step 9. *The RO will identify that 1-RC-LI-1461 has failed.*
	SRO RO SRO RO SRO RO SRO RO/BOP SRO BOP SRO	0-AP-53.00 9. CHECK PRZR LEVEL CONTROL CHANNELS – NORMAL a) Check PRZR LVL Instrumentation - NORMAL *Responds "NO, 1-RC-LI-1461 Abnormal."* 9 a) RNO 1) Place either of the following in MANUAL: • 1-CH-FC-1122C, CHG FLOW CNTRL, OR • 1-CH-LC-1459G, PRZR LEVEL CNTRL *Responds "1-CH-FC-1122C is in MANUAL"* 9 a) RNO 2) Control PRZR Level at Program Level. *Responds "Maintain PRZR Level at program ± band set by SRO"* 9 a) RNO 3) Move PRZR LVL – CH SEL switch to defeat the failed channel. **Transfers CH SEL switch to 1 / 2 Position.** 9 a) RNO 4) Check or place recorder 1-RC-LR-1459 on an operable channel. *Checks or adjusts PRZR Level Recorder to 1-RC-LI-1459 or 1-RC-LI-1460.* **9a) RNO 5) Refer to Tech Spec 3.7-1, Item 9.** **TS 3.7, Table 3.7-1, item 9; Operator Action 7.** Number of Operable channels one less than Total number of channels: Place Inoperable channel in trip within 72 hours, allowed to bypass channel for 12 hours

Event Description: PRZR Level Transmitter Fails Low, 0-AP-53.00.

Cue: By Examiner.

	SRO	for surveillance, If conditions not met within allowed time, reduce power to less than P-7 in the next 6 hours. 9 a) RNO 6) Refer to Attachment 3. *SRO hands Attachment 3, Pressurizer Level Control diagram to RO/BOP for review.* **NOTE:** Attachment 3 (one-line diagram) is provided at the end of this section.
	SRO RO SRO RO SRO	0-AP-53.00 9 b) Check Pressurizer Heaters - Energized. *Reports Pressurizer heaters are energized.* 9 c) Check Letdown – IN SERVICE. *Reports Letdown is in service.* 9 d) Check PRZR level control – IN AUTOMATIC. *Reports pressurizer level control in MANUAL.*
	SRO SRO RO/BOP SRO RO/BOP	0-AP-53.00 9 d) RNO 1) Check PRZR level restored to program. 2) Unsaturate 1-CH-LC-1459G, PRZR LEVEL CNTRL, as required. **Places 1-CH-LC-1459G in MANUAL to unsaturated the controller.** 3) Return 1-CH-FCV-1122 to AUTOMATIC by checking or placing the following in AUTOMATIC: • 1- CH-FC-1122C, CHG FLOW CNTRL • 1-CH-LC-1459G, PRZR LEVEL CNTRL **Places 1-CH-FC-1122C and 1-CH-LC-1459G in AUTO.**
	SRO SRO	0-AP-53.00 Recalls NOTE 2 Prior to Step 4 and goes to Step 11 of AP-53.00. 11. CHECK CALORIMETRIC – FUNCTIONAL IAW 1-OPT-RX-001, ATTACHMENT 4 Directs BOP to perform 1-OPT-RX-001, Attachment 4.

Event Description: PRZR Level Transmitter Fails Low, 0-AP-53.00.

Cue: By Examiner.

	RO/BOP	Reports Yes, Calorimetric is Functional IAW 1-OPT-RX-001, Attachment 4. 1-OPT-RX-001, Attachment 4 at end of this section.
	SRO STA	0-AP-53.00 12. REVIEW THE FOLLOWING: • Tech Spec 3.7 • VPAP-2802, NOTIFICATIONS AND REPORTS • TRM SECTION 3.3, INSTRUMENTATION • Reg Guide 1.97 • EP-AA-303, Equipment Important to Emergency Response **TRM section 3.3.2, Table 3.3.2-1, Pressurizer Level Channel 1-RC-LI-1461. Condition A applies,** Implement a Fire Watch in cable vault and tunnel and the emergency switchgear room of the affected Unit (Unit 1) IAW TRM Section 5.2 within 14 days. *If directed to perform reviews required for the failure, STA will report reviews have been completed and results discussed with the Shift Manager.*
	SRO RO/BOP	0-AP-53.00 13. CHECK ADDITIONAL INSTRUMENT / CONTROLLER MALFUNCTION - EXISTS Reports No, no further malfunction exists. *SRO GOES TO Step 15.*
	SRO	0-AP-53.00 15. PROVIDE NOTIFICATIONS AS NECESSARY: • Shift Supervision • OMOC • STA (PRA determination) • I&C SRO consults Shift Manager concerning notification of OMOC of the failure and request for I&C assistance; Notifies STA to add failure to PRA program.
		-- END EVENT 2 –

Event description: "B" SG MFRV Controller Fails Low, 0-AP-53.00.

Cue: By Examiner.

Time	Position	Applicant's Action or Behavior
	BOP	Diagnoses failure of "B" MFRV Controller with the following: Alarms: • 1H-E6 STM GEN 1B FW >< STM FLOW • 1F-C8 STM GEN 1B CH 3 FW < STM FLOW • 1F-D8 STM GEN 1B CH 4 FW < STM FLOW • 1H-G6 STM GEN 1B LVL ERROR. Indications: • Lowering "B" SG Feed Flow on both CH-3 and CH-4 • Lowering "B" SG Level.
	SRO	Enters 0-AP-53.00 LOSS OF VITAL INSTRUMENTATION / CONTROLS
	BOP	0-AP-53.00 [1] CHECK REDUNDANT INSTRUMENT CHANNEL(S) INDICATION - NORMAL BOP identifies all other "B" SG indications are NORMAL.
	BOP	0-AP-53.00 [2] PLACE AFFECTED CONTROL(S)/COMPONENT(S) IN MANUAL CONTROL AND STABILIZE PARAMETER USING REDUNDANT INDICATION **BOP takes manual control of 'B' SG feed reg valve and increases demand (FF > SF) to restore level to program.** **Critical Task (CT-2): Stabilize B SG Level prior to prevent automatic OR manual Reactor Trip.**
	SRO STA	Conduct a Brief using the Briefing Placard and obtains Critical Parameter information from the RO and BOP. The SRO will update the Shift Manager during AP-progression. SRO will provide a band for control of "B" SG level with "B" FRV in MANUAL. *The STA will state they have nothing to add to the brief.*
	 SRO RO	0-AP-53.00 * VERIFY REACTOR POWER – LESS THAN OR EQUAL TO 100% *Checks Reactor Power < 100% using PCS Calorimetric. Due to restoration of FF on 1B SG, power increase may be noted. As required, the SRO may*

Event description: “B” SG MFRV Controller Fails Low, 0-AP-53.00.

Cue: By Examiner.

		direct the BOP to initiate Attachment 7. This attachment has a NOTE directing use of Delta-T and PRNIs as power indications due to the secondary transient
	SRO RO/BOP SRO	0-AP-53.00 **CAUTION** Prior to Step 4: If Reactor power has been affected by a secondary transient, Turbine adjustment may be needed to control Tave. **NOTES** prior to Step 4: • Step 4 failures are listed in order of performance priority. Only the failed instrument/control and associated step number should be read aloud. • When the affected instrument/controller malfunction(s) has been addressed by this procedure, recovery actions should continue at Step 11. *4. DETERMINE THE FAILED INSTRUMENT / CONTROL AND GO TO APPROPRIATE STEP OR PROCEDURE: *Identifies 1B SG Feed Flow affected*. Goes to Step 7.
	SRO SRO BOP SRO	0-AP-53.00 **CAUTION** Prior to Step 7: When CALCALC is based on Feedwater, changes in feed flow will affect calorimetric power. Reactor power must be monitored when adjusting feed flow. CHECK STEAM GENERATOR LEVEL CONTROL INSTRUMENTS – NORMAL • Steam Pressure • Steam Flow • Feed Flow • Steam Generator Level Determines SGWLCS <u>instrumentation</u> for ‘B’ SG is normal. Recalls the second note at Step 4 (When the affected instrument/controller malfunction(s) has been addressed by this procedure, recovery actions should continue at Step 11) Goes to Step 11.

Event description: “B” SG MFRV Controller Fails Low, 0-AP-53.00.

Cue: By Examiner.

	SRO BOP	0-AP-53.00 11. CHECK CALORIMETRIC – FUNCTIONAL IAW 1-OPT-RX-001, ATTACHMENT 4 Directs BOP to perform 1-OPT-RX-001, Attachment 4. Reports Yes, Calorimetric is Functional IAW 1-OPT-RX-001, Attachment 4.
	SRO SRO	0-AP-53.00 12. REVIEW THE FOLLOWING: • Tech Spec 3.7 • VPAP-2802, NOTIFICATIONS AND REPORTS • TRM SECTION 3.3, INSTRUMENTATION • Reg Guide 1.97 • EP-AA-303, Equipment Important to Emergency Response *If directed to perform reviews required for the failure, STA will report reviews have been completed and results discussed with the Shift Manager.*
	SRO RO	0-AP-53.00 13. CHECK ADDITIONAL INSTRUMENT / CONTROLLER MALFUNCTION - EXISTS Reports No, no further malfunction exists. *SRO GOES TO Step 15.*
	SRO	0-AP-53.00 15. PROVIDE NOTIFICATIONS AS NECESSARY: • Shift Supervision • OMOC • STA (PRA determination) • I&C SRO consults Shift Manager concerning notification of OMOC of the failure and request for I&C assistance; Notifies STA to add failure to PRA program.
		END EVENT 3

Event Description: “C” SG PORV spuriously opens, 0-AP-53.00 and 1-AP-38.00.

Cue: By Evaluator

Time	Position	Applicant’s Action or Behavior
	BOP	Diagnoses failure based on the following indications: “C” SG PORV RED open light LIT “C” SG SG PORV Demand ramping to 100% Rising CALCALC trends Multiple PCS alarms related to “C” SG parameters
	 BOP	0-AP-53.00 Perform Immediate Action Steps of 0-AP-53.00: [1] CHECK REDUNDANT INSTRUMENT CHANNEL(S) INDICATION – NORMAL *Identifies “C” SG pressure NORMAL.* [2] PLACE AFFECTED CONTROL(S)/ COMPONENT(S) IN MANUAL CONTROL AND STABILIZE PARAMETER USING REDUNDANT INDICATION **Places “C” SG PORV in Manual, and reduces demand to close the “C” SG PORV.** *Checks “C” SG PORV RED light out and GREEN light LIT.* *Reports Immediate Actions of 0-AP-53.00 complete.*
	 SRO RO BOP STA SRO	0-AP-53.00 Conducts a Transient Brief Summarizes Event and queries RO and BOP for Annunciators received and Critical Parameters. RO reports PCS alarms and CALCALC trend received. BOP reports SG parameters. STA will have no input for the Brief. SRO Concludes the Brief and continues 0-AP-53.00 at Step 3.
	 SRO BOP	0-AP-53.00 *3 CHECK REACTOR POWER – LESS THAN OR EQUAL TO 100% *Reports Actual Reactor Power and Trend using PCS 30-minute power indication.*

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Event Description: “C” SG PORV spuriously opens, 0-AP-53.00 and 1-AP-38.00.

Cue: By Evaluator

Time	Position	Applicant’s Action or Behavior
		0-AP-53.00 **CAUTION** Prior to Step 4: If Reactor power has been affected by a secondary transient, Turbine adjustment may be needed to control Tave. **NOTES** prior to Step 4: • Step 4 failures are listed in order of performance priority. Only the failed instrument/control and associated step number should be read aloud. • When the affected instrument/controller malfunction(s) has been addressed by this procedure, recovery actions should continue at Step 11.
	SRO	*4. DETERMINE THE FAILED INSTRUMENT / CONTROL AND GO TO APPROPRIATE STEP OR PROCEDURE: • Steam Dumps / SG PORVs 1-AP-38.00
	BOP	*Reports Yes, SG “C” SG PORV*.
	SRO	Goes to 1-AP-38.00
		Note: SRO may have directly entered 1-AP-38.00, Main Steam System Malfunction.
		1-AP-38.00 **NOTE** Prior to Step 1: Attachment 3 has one-line diagrams of steam dump permissive and modulating circuits.
	SRO	1. CHECK STEAM DUMP VALVES – CLOSED
	BOP	*Reports Yes, Steam Dumps closed*.

Event Description: “C” SG PORV spuriously opens, 0-AP-53.00 and 1-AP-38.00.

Cue: By Evaluator

Time	Position	Applicant's Action or Behavior
		1-AP-38.00
	SRO	2. CHECK SG PORVS – CLOSED
	BOP	Reports, Yes “C” SG PORV closed, but was open.
		(**NOTE:** *If 1-AP-38.00 was entered directly, the report will be No, “C” SG PORV open, and the team will perform Step 2 RNO.)*
	SRO	2. RNO IF SG pressure greater than desired pressure, THEN check PORV(s) close when SG pressure lowers below desired pressure AND GO TO Step 3.
	BOP	*Reports No, “C” SG Pressure NORMAL.*
	SRO	IF SG pressure less than desired pressure, THEN do the following:
		a) Place affected PORV controller in Manual and close valve.
	BOP	*Reports Yes, “C” SG PORV in Manual and closed*. (**NOTE:** If 0-AP-53.00 was not performed, this is where the BOP will place the “C” SG PORV Controller in MANUAL, lower output to 0%, and verify the valve closes.)
	SRO	b) IF any SG PORV NOT closed, THEN do either of the following:
	BOP	*Reports No, PORV is closed.*
	SRO	c) Check associated MS line pressure transmitter (1-MS-PI-101A, B, C) for the affected PORV at the ASD Panel to determine if transmitter failure is cause of PORV failure.
	BOP	Directs BOP to dispatch Service Bldg Inside operator to check status of MS line pressure indicators on Aux Shutdown Panel.
		Note: Service Bldg Inside operator will report 1-MS-PI-101C indicates 800 psig.
		SRO continues to Step 3, while awaiting local report.
		1-AP-38.00
	SRO	3. CHECK THE FOLLOWING CONDITIONS:
		• Reactor power - LESS THAN OR EQUAL TO 100%
		• Turbine load – NORMAL
	BOP	*Reports Yes, reactor power is less than 100% and Turbine load is normal.*

Event Description: “C” SG PORV spuriously opens, 0-AP-53.00 and 1-AP-38.00.

Cue: By Evaluator

Time	Position	Applicant’s Action or Behavior
	SRO BOP	1-AP-38.00 **NOTES** prior to Step 4: • The power reductions required by Step 4 are intended for failures causing full or partial closure of a control valve, or if valve closure is required for maintenance. • 1-MS-FCV-104B has been upgraded to a different style valve and may start to drift closed with IA pressure less than 65 psig. 4. CHECK MAIN TURBINE AND MSR STEAM CONTROL VALVES: a) MSR Steam supply MOVs and FCVs – NORMAL b) Turbine Governor Valves and Stop Valves – NORMAL c) Reheat Stop and Intercept Valves – NORMAL *Reports Yes, Turbine and MST Steam Control Valves normal.*
	SRO BOP	1-AP-38.00 5. CHECK TURBINE MONITORING LIGHTS – NORMAL *Reports Yes, Turbine Monitoring Lights are normal.*
	SRO RO/BOP	1-AP-38.00 6. STABILIZE UNIT CONDITIONS: a) Adjust Turbine load as necessary b) Borate or dilute as necessary *Report Yes, Unit Conditions Stable*.
	SRO RO/BOP	1-AP-38.00 7. SUBMIT CONDITION REPORT AS NECESSARY *Acknowledge CR submission required.*

Event Description: “C” SG PORV spuriously opens, 0-AP-53.00 and 1-AP-38.00.

Cue: By Evaluator

Time	Position	Applicant’s Action or Behavior
	SRO	1-AP-38.00 8. PROVIDE NOTIFICATIONS: • Shift Supervision • STA (PRA determination) • OMOC • MOC *SRO will contact Shift Manager; notify of failure, Unit Status, and procedure entered; request OMOC and I&C be notified.*
	SRO	1-AP-38.00 9. CHECK ABNORMAL CONDITION - CORRECTED 9 RNO: a) Consult with Shift Supervision. b) Submit Condition Report. c) IF problem of short term nature, THEN GO TO Step 10 when problem corrected. SRO will conduct a focus brief and discuss failure with the Crew; 1-AP-38.00 will be suspended until resolution by I&C.
		END EVENT 4

Event Description: Degraded Isophase Bus Duct Cooling, ARP 1G-E5 and 0-AP-23.00.

Cue: By Evaluator

Time	Position	Applicant's Action or Behavior
	BOP	Diagnoses failure based on the following indications: Alarms: 1G-E5, GEN LEADS CLG TRBL PCS Alarms for high Main Generator Phase Temperature Indications: Rising Main Generator "B" Phase Temperature on PCS (T2456A)
	BOP	ARP 1G-E5 **NOTE:** The following Computer points may be used to monitor duct temperature trend. • T2545A - 1-EP-TIS-IPBDA - Isolated Phase Bus Duct A Phase Air Temperature • T2546A - 1-EP-TIS-IPBDB - Isolated Phase Bus Duct B Phase Air Temperature • T2547A - 1-EP-TIS-IPBDC - Isolated Phase Bus Duct C Phase Air Temperature 1 SEND OPERATOR TO 1-EP-PNL-IPBD1, IPBD LOCAL ANNUNCIATOR PANEL 2 LOCALLY CHECK DROP – HIGH TEMPERATURE *Field operator will report Yes, the local drop is "High Temperature".*
	BOP	ARP 1G-E5 **NOTE:** Do not delay required actions while establishing portable fan cooling. 3. LOCALLY CHECK TEMPERATURE INDICATION ON 1-EP-PNL IPBD2, TEMPERATURE MONITORING SYSTEM • Phase Temp greater than 115°C / 239°F (Any of three phases) *Field operator will report local temperature <u>in Celsius</u>.*

Event Description: Degraded Isophase Bus Duct Cooling, ARP 1G-E5 and 0-AP-23.00.

Cue: By Evaluator

Time	Position	Applicant's Action or Behavior
		ARP 1G-E5
	BOP	4. REDUCE TURBINE LOAD BY 10% OF CURRENT LOAD AT NORMAL RAMP RATE
	SRO	*Directs the RO to review the Reactivity Plan for a 10% Turbine Load reduction at normal ramp rate.* *Informs the team they are initiating 0-AP-23.00, Rapid Load Reduction.* *(0-AP-23.00 actions begin on the next page.)*

Event Description: Degraded Isophase Bus Duct Cooling, ARP 1G-E5 and 0-AP-23.00.

Cue: By Evaluator

Time	Position	Applicant's Action or Behavior
	 SRO STA RO SRO	**Start of 0-AP-23.00** Conducts a Brief summarizing the Event and Establish priorities. The RO/BOP will report Annunciators received related to the event, and Critical Parameters affected. STA will have no input for the brief. Reactivity control during 0-AP-23.00 Ramp: 65 gallons of Boric Acid needed to reduce power to 90% using normal boration. Control Bank 'D' rod height at end of ramp 213 Steps. Completes Brief and continues with 0-AP-23.00.
	SRO	0-AP-23.00 Caution Prior to Step 1: • Conservative decision-making must be maintained during rapid load reductions. Refer to Attachment 1 for trip criteria. Notes Prior to Step 1: • Actions that can be completed independently of preceding steps may be performed out of sequence as directed by the SRO • When the Turbine is not being actively ramped, the REFERENCE and SETTER values must remain matched to prevent inadvertent ramp. • Pre-planned reactivity plans located in the Main Control Room will be used as guidance for ramping down to the desired power level. • The ramp rate in IMP OUT is nonlinear and therefore pre-planned reactivity plans based on IMP IN are not as accurate. However, total amounts of boration and dilution can be used as guidance. • For ramp rates greater than or equal to 1%/minute, Rod Control should remain in Automatic if available.
	RO	0-AP-23.00 1. **TURN ON ALL PRZR HEATERS**

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Event Description: Degraded Isophase Bus Duct Cooling, ARP 1G-E5 and 0-AP-23.00.

Cue: By Evaluator

		0-AP-23.00
		2. INITIATE PLANT LOAD REDUCTION AT 2%/MINUTE OR LESS:
	BOP	a) Verify turbine valve position - NOT ON LIMITER
		The turbine is NOT on the limiter.
	RO	b) Insert control rods in AUTO or MANUAL as necessary to maintain Tave and Tref within 5°F.
	SRO	a) Check or place Turbine in Operator Auto.
	BOP	d) **Verify or place turbine in IMP IN or IMP OUT as determined by Shift Supervision**
	SRO	The SRO can choose IMP IN or IMP OUT.
	BOP	e) **Adjust SETTER to desired power level**
		f) **Adjust LOAD RATE %/MIN thumbwheel to desired ramp rate (setting of 6 = 0.3%/minute)**
		g) **Initiate Turbine load reduction using OPERATOR AUTO (pushes the GO button)**
		h) **Reduce Turbine Valve Position Limiter as load decreases**
		The BOP will periodically reduce the limiter setpoint during the ramp.
		0-AP-23.00
	SRO	3. CHECK EMERGENCY BORATION – REQUIRED
	RO	*Report No, not required.*
	SRO	Goes to Step 3 RNO – GO TO Step 5.

Event Description: Degraded Isophase Bus Duct Cooling, ARP 1G-E5 and 0-AP-23.00.

Cue: By Evaluator

	RO	0-AP-23.00 5. ESTABLISH A NORMAL BORATION TO MAINTAIN CONTROL ROD POSITION ABOVE THE LO-LO INSERTION LIMITS IAW ATTACHMENT 4 Attachment 4 (Boration) and 5 (Manual Makeups) are at the end of this section. SRO may direct manual rod motion to maintain Δ flux within specified band.
	SRO	0-AP-23.00 Notes Prior to Step 6: • If at any time plant conditions no longer require rapid load reduction, actions should continue at Step 36. • RCS Tave must be maintained less than or equal to 577°F and RCS pressure must be maintained greater than or equal to 2205 psig. Tech Spec 3.12.F.1 should be reviewed if either parameter is exceeded. • I & C should be contacted to provide assistance with adjusting IRPIs.

Event Description: Degraded Isophase Bus Duct Cooling, ARP 1G-E5 and 0-AP-23.00.

Cue: By Evaluator

	RO	0-AP-23.00 6. CONTROL RAMP RATE TO MAINTAIN RCS PRESSURE GREATER THAN 2205 PSIG
	RO	0-AP-23.00 *7. CHECK LETDOWN ORIFICES – TWO IN SERVICE *Evaluator note: two orifices will already be in service.*
	BOP	0-AP-23.00 8. MONITOR STEAM DUMPS FOR PROPER OPERATION
	SRO	0-AP-23.00 9. NOTIFY THE FOLLOWING: • Energy Supply (MOC) • Polishing Building • Chemistry • OMOC
	SRO SM STA	0-AP-23.00 10. EVALUATE THE FOLLOWING: • EPIP applicability *The Shift Manager will review EPIPs for applicability. (They are not applicable.)* • VPAP-2802, NOTIFICATIONS AND REPORTS, applicability *If directed to review VPAP-2802. The STA reports completion of review of VPAP-2802 and required notifications discussed with SM.* *No further actions are required for this event.*
	SRO RO SRO	0-AP-23.00 11. CHECK RAMP WILL BE TO LESS THAN APPROXIMATELY 35% REACTOR POWER Reports No, ramping to 90% power. Goes to Step 11 RNO – GO TO Step 13.

Event Description: Degraded Isophase Bus Duct Cooling, ARP 1G-E5 and 0-AP-23.00.

Cue: By Evaluator

		0-AP-23.00
	SRO	*13. CHECK REACTOR POWER HAS LOWERED MORE THAN 15% IN ONE HOUR.
	RO	Reports No, Reactor power will not be lowered more than 15% in one hour.
	SRO	Goes to Step 13 RNO – GO TO Step 15.
		0-AP-23.00
	SRO	**CAUTION:** Secondary plant evolutions affecting Feedwater Flow or temperature will affect RCS temperature and Reactor Power. This effect will be greater at beginning of core life due to a lower value for isothermal temperature coefficient. The operating team must be prepared to mitigate the effects of the secondary evolutions on the RCS. 15. AT APPROXIMATELY 70% REACTOR POWER CHECK AUXILIARY STEAM MAINTAINING BETWEEN 160 AND 180 PSIG.
		END EVENT #5

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Event Description: Degraded Isophase Bus Duct Cooling, ARP 1G-E5 and 0-AP-23.00.

Cue: By Evaluator

		0-AP-23.00 Attachment 4 (NORMAL BORATION) Actions
	RO	1. **Place the MAKE-UP MODE CNTRL switch in the STOP position.**
	RO	2. **Adjust 1-CH-YIC-1113 to desired total gallons**
	RO	3. **Adjust 1-CH-FC-1113A to desired flow rate.**
	RO	4. **Place the MAKE-UP MOD SEL switch in the BORATE position**.
	RO	5. **Place the MAKE MODE CNTRL switch in the START position.**
	RO	6. Verify proper valve positions.
	RO	7. Adjust boration rate using 1-CH-FC-1113A, as necessary.
	RO	8. WHEN boration is complete, THEN perform the following. IF boric acid is to remain in the Blender to support ramping the Unit, THEN enter N/A. a) Manually blend approximately 20 gallons to flush the boration path IAW Attachment 5, Manual Makeups. b) Enter N/A for the remaining steps in this Attachment. *Attachment 5 is on the next page*
	RO	9. Verify controllers for Primary Grade water and Boric Acid are set correctly.
	RO	10. **Place the MAKE-UP MODE SEL switch in the AUTO position.**
	RO	11. **Place the MAKE-UP MODE CNTRL switch in the START position.**
	RO	12. Notify Shift Supervision of blender status.

Event Description: Degraded Isophase Bus Duct Cooling, ARP 1G-E5 and 0-AP-23.00.

Cue: By Evaluator

		0-AP-23.00 Attachment 5 (Manual Makeups) Actions
		1. Place the MAKE-UP MODE CNTRL switch in the STOP position.
		2. Check controllers for the flow rate of Boric Acid and Primary Grade water are set correctly.
		3. Check integrators for the gallons of Boric Acid and Primary Grade water are set correctly.
		4. Place the MAKE-UP MODE SEL switch in the MANUAL position.
		5. Place the MAKE-UP MODE CNTRL switch in the START position.
		6. Open 1-CH-FCV-1113B, BLENDER TO CHG PUMP.
		7. Check proper valve positions.
		8. WHEN the Manual Makeup operation is complete, THEN place 1-CH-FCV-1 113B in the AUTO position
		9. Place the MAKE-UP MODE CNTRL switch in the STOP position.
		10. Check or place the control switches in the AUTO position.
		11. Check controllers for Primary Grade water and Boric Acid are set correctly.
		12. Place the MAKE-UP MODE SEL switch in the AUTO position.
		13. Place the MAKE-UP MODE CNTRL switch in the START position.
		14. Notify Shift Supervision of blender status.

Event Description: SG Tube Leak 20 gpm, A/E Auto Functions Fail,

Cue: By Evaluator.

Time	Position	Applicant's Action or Behavior
	Team BOP Unit 2	Diagnose SGTL B SG based on the following: Alarms: • 1A-B3 N-16 ALERT • 1A-A3 N-16 HIGH • RM-G8 CNDSR AIR EJECTOR ALERT/FAILURE • RM-H8 1-SV-RI-111 HIGH Indications: • Increasing trend on 1-MS-RR-193, Control Room N16 Trend Recorder, from Normal to 200 GPD. • STM LINE B Trend will Lead STM LINE A and STM LINE B. Perform ARP 1A-A3, N-16 HIGH. *Note: ARP 1A-A3 is included in this guide after ARP 1-RM-H8.* *Note: Unit 2 Operator will only silence and announce the alarms for A/E and Blowdown RM. If asked, Unit 2 will state they are unavailable to perform the ARPs or any actions associated with the ARPs.*
	 BOP	ARP RM-H8, A/E RM HIGH (Unit 2 will hand the ARP to the BOP at Step 6) NOTE: On a high alarm, air ejector gaseous effluent is diverted from vent stack to containment. 6. CHECK AUTOMATIC ACTIONS – VALVES POSITIONED AS FOLLOWS: • 1-SV-TV-103 – CLOSED **Identifies 1-SV-TV-103 Open, places control switch in CLOSE.** • 1-SV-TV-102 – OPEN **Identifies 1-SV-TV-102 Closed, places control switch in OPEN**.
	 BOP	RM-H8 7. CHECK AIR EJECTOR VENT TO CTMT VV - OPEN • 1-SV-TV-102A *Identifies 1-SV-TV-102A open* *Report to SRO that A/E manually aligned to containment.* ***Note:*** *No other verifiable actions are in this ARP.*

Event Description: SG Tube Leak 20 gpm, A/E Auto Functions Fail,

Cue: By Evaluator.

Time	Position	Applicant's Action or Behavior
	BOP	RM-H8 8. LOCALLY CHECK PROPER AIR EJECTOR OPERATION AND LOOP SEAL INTACT *Direct Field operator to locally check Air Ejector operation and loop seals intact.*
	BOP	RM-H8 9. CHECK FLOW RATE MEASURING DEVICES – OPERABLE: • 1-CN-SC-1A • 1-CN-SC-1B *Direct Field operator to locally check Air Ejector flow rates*
	BOP	RM-H8 10. PROVIDE NOTIFICATIONS AS NECESSARY: • Shift Supervision • OMOC • STA • Health Physics • Instrumentation Department *Informs the SRO of required notifications.*

Event Description: SG Tube Leak 20 gpm, A/E Auto Functions Fail,

Cue: By Evaluator.

Time	Position	Applicant's Action or Behavior
	BOP	ARP 1A-A3, N-16 HIGH NOTES before Step 1: • N-16 Radiation Monitor setpoints are available in the NI/Radiation Monitor information book. • N-16 Radiation Monitor readings are invalid when Reactor power is less than 25%. 1. CHECK REACTOR POWER – GREATER THAN 25% *Identifies Reactor power is greater than 25% (value depending on ramp in progress).*
	BOP	1A-A3 2. CHECK N-16 RECORDER - ANY MONITOR READING GREATER THAN OR EQUAL TO HIGH SETPOINT • 1-MS-RR-193 *Identifies all three monitors reading greater than setpoint.*
	BOP	1A-A3 NOTE before Step 3: A Steam Generator tube leak of 150 gpd equates to 0.1 gpm. Leaks of this size will probably not cause an observable change in primary system parameters. 3. CHECK RCS LEAK RATE: • PRZR level – DECREASING <u>OR</u> • Annunciator 1D-E5, CHG PP TO REGEN HX HI-LO FLOW – LIT <u>OR</u> • A discernible negative change in VCT level trend has developed *Depending on the control of the ramp, the team may identify a discernable negative change in VCT level trend.*
	BOP SRO	1A-A3 4. INITIATE 1-AP-16.00, EXCESSIVE RCS LEAKAGE Direct the RO to perform the Immediate Action Steps of 1-AP-16.00.

Event Description: SG Tube Leak 20 gpm, A/E Auto Functions Fail,

Cue: By Evaluator.

Time	Position	Applicant's Action or Behavior
	 RO RO	1-AP-16.00 NOTE: • If SI Accumulators are isolated, 1-AP-16.01, SHUTDOWN LOCA, should be used for guidance. • RCS average temperature has a direct impact on pressurizer level. [1] ___ MAINTAIN PRZR LEVEL: • Isolate Letdown **Close 1-CH-LCV-1460A and 1-CH-LCV-1460B** • Control Charging flow **Place 1-CH-FCV-1122, CH Flow Control Valve, in Manual.** *Monitor CH Flow on 1-CH-FI-1122* **Identify RCS leak rate less than the capacity of a single CH pump.** *Continue adjustment of CH flow to quantify leak rate to determine if reactor trip required*
	 SRO	1-AP-16.00 Upon report of completion of Immediate Action Step of 1-AP-16.00, Perform a commensurate brief; continue to Step 2 of 1-AP-16.00.
	 SRO RO	1-AP-16.00 2. CHECK THE FOLLOWING PARAMETERS - STABLE OR INCREASING • PRZR level • PRZR pressure • RCS subcooling Report that PRZR Level is rising; Pressure and Subcooling are stable *RO continues actions to quantify leakrate*
	 SRO RO	1-AP-16.00 3. PLACE THE FOLLOWING COMPONENTS IN OFF: • CTMT sump pumps **Places 1-DA-P-4B control switch on OFF** • CTMT vacuum pumps **Places 1-CV-P-1A control switch in OFF**

Event Description: SG Tube Leak 20 gpm, A/E Auto Functions Fail,

Cue: By Evaluator.

Time	Position	Applicant's Action or Behavior
		1-AP-16.00
	SRO	NOTE before Step 4: Shift Supervision and STA must remain informed of RCS leak rate for EPIP applicability.
	SRO	4. CHECK REACTOR TRIP – REQUIRED • Leak rate - GREATER THAN 50 GPM OR • Adequate makeup not being provided by blender
	RO	Reports RCS leak rate is less than 50 gpm.
	SRO	GO TO Step 7.
		NOTE: *Due to transient on RCS caused by Ramp for previous event, exact quantification of leak rate will be difficult.*
		1-AP-16.00
	SRO	7. CHECK SECONDARY RADIATION - NORMAL OR STABLE IF THERE IS PRE-EXISTING TUBE LEAK • Air Ejector Rad Monitor • SG Blowdown Rad Monitors • Main Steam Line Rad Monitors • Secondary sample • N-16 Rad Monitors
	RO	Reports No, secondary radiation is not normal, based on multiple secondary RM alarms in.
	SRO	Goes to Step 7 RNO:
		1-AP-16.00
	SRO	Step 7 RNO: Do the following: a) Consult with Shift Manager. b) IF Reactor trip NOT required, THEN initiate 1-AP-24.00, MINOR SG TUBE LEAK.
	RO	Reports Reactor trip is not required.
		NOTE: *Performing 1-AP-24.00 is not part of this scenario. If not done already, the next event (SGTR) is to be initiated at this time.*
		END EVENT 6

Event Description: SGTL becomes SGTR (600) gpm, AP-16.00, E-0, RCPs trip on swap to RSST, E-3.

Cue: By Evaluator, prior to entry to 1-AP-24.00.

Time	Position	Applicant's Action or Behavior
	RO RO	Diagnose SGTR B SG based on the following: Indications: • Change in Pressurizer level trend. • Change in B SG Level trend • Change in B MS Rad Monitor trend Alarms: • 1C-B8 PRZR LO PRESS • 1C-D8 PRZR LO LVL • 0-RMA-A2 UNIT 1 MN STM ABC RAD ON ALERT / HI 1-AP-16.00 *(Performed a second time)* NOTE: • If SI Accumulators are isolated, 1-AP-16.01, SHUTDOWN LOCA, should be used for guidance. • RCS average temperature has a direct impact on pressurizer level. [1] MAINTAIN PRZR LEVEL: • Isolate Letdown • Control Charging flow **With 1-CH-FCV-1122, CH Flow Control Valve, already in Manual, raises flow to maximum.** Reports Immediate Actions of 1-AP-16.00 are complete.
	SRO	1-AP-16.00 Upon report of completion of Immediate Action Step of 1-AP-16.00, Perform a commensurate brief; continue to Step 2 of 1-AP-16.00.
	SRO RO	1-AP-16.00 2. CHECK THE FOLLOWING PARAMETERS - STABLE OR INCREASING • PRZR level • PRZR pressure • RCS subcooling Reports that PRZR Level, Pressure and Subcooling are all lowering. Goes to Step 2 RNO.
	SRO	1-AP-16.00 Step 2 RNO. GO TO 1-E-0, REACTOR TRIP OR SAFETY INJECTION. Directs RO to perform 1-E-0 Immediate Actions.

Event Description: SGTL becomes SGTR (600) gpm, AP-16.00, E-0, RCPs trip on swap to RSST, E-3.

Cue: By Evaluator, prior to entry to 1-AP-24.00.

Time	Position	Applicant's Action or Behavior
	RO	1-E-0, Reactor Trip or Safety Injection [1] CHECK REACTOR TRIP: a) Manually trip reactor **Pushes a reactor trip pushbutton.** b) Check the following: • All Rods On Bottom light – LIT • Reactor trip and bypass breakers – OPEN • Neutron flux – DECREASING *Reports "Reactor Tripped" at completion of Step 1.*
	RO	1-E-0 [2] CHECK TURBINE TRIP: a) Manually trip the turbine **Pushes the turbine trip push buttons.** b) Check all turbine stop valves - CLOSED c) **Isolate reheaters by closing MSR steam supply SOV** • **1-MS-SOV-104** d) Verify generator output breakers – OPEN (Time Delayed) *Reports "Turbine Tripped" at completion of Step 2.*
	RO	1-E-0 [3] VERIFY BOTH AC EMERGENCY BUSES – ENERGIZED *Reports "Both AC Emergency Buses Energized" at completion of Step 3.*

Event Description: SGTL becomes SGTR (600) gpm, AP-16.00, E-0, RCPs trip on swap to RSST, E-3.

Cue: By Evaluator, prior to entry to 1-AP-24.00.

Time	Position	Applicant's Action or Behavior
		1-E-0
	RO	[4] CHECK IF SI INITIATED: a) Check if SI is actuated: • LHSI pumps – RUNNING • SI annunciators – LIT • A-F-3 SI INITIATED – TRAIN A • A-F-4 SI INITIATED – TRAIN B
	RO	RO will determine that SI has not occurred and perform step 4a RNO actions: 4a RNO Check if SI is required or imminent as indicated by any of the following: • Low PRZR pressure • High CTMT pressure • High steamline differential pressure • High steam flow with low Tave or low line pressure IF SI is required, THEN GO TO Step 4b. *Determines SI is imminent.* **Manually depresses SI Initiation pushbuttons.** **NOTE:** *The SRO may have directed the RO to manually initiate SI at Step 4 of 1-E-0. In that case, the RO will have already determined that SI is imminent.*
	RO	RO reports "1-E-0 Immediate Actions are complete, SI is in service" after completion of Step 4. After the immediate actions of 1-E-0 are reported as complete, the SRO will check off immediate action steps in his copy of 1-E-0 and conduct a commensurate brief. During the Brief RO/BOP reports that ALL RCPs are tripped. Identify 1B SG experiencing a SG Tube Rupture.
	STA	*The STA will have nothing to add to the brief.*
	SRO	Establish priorities at Brief End, RO: • 1-E-0, Attachment 9, RUPTURED SG ISOLATION AND AFW FLOW CONTROL. BOP: • 1-E-0 Attachments 1, 2, and 3. • Contact Service Building Operator to check status of RCP breakers.

Event Description: SGTL becomes SGTR (600) gpm, AP-16.00, E-0, RCPs trip on swap to RSST, E-3.

Cue: By Evaluator, prior to entry to 1-AP-24.00.

Time	Position	Applicant's Action or Behavior
	SRO/BOP	1-E-0 5. Initiate Attachment 1 (***Attachment 1, 2, and 3 actions contained under last section of Event 9***.
	SRO/RO	SRO may direct the RO to perform Attachment 9 of 1-E-0 for Ruptured SG Isolation and AFW Control. This may or may not be initiated at any time during the performance of E-0. ***Attachment 9 actions are contained at the end of this section, beginning at page 52***.
	SRO RO SRO RO	1-E-0 CAUTION before Step 6: 1-MS-15 may need to be closed to stop RCS cooldown and 1-MS-17 opened to supply AS to GS. *6. CHECK RCS AVERAGE TEMPERATURE • STABLE AT 547°F OR • TRENDING TO 547°F *Reports No, Tave less than 547°F and lowering.* Goes to Step 6 RNO. **NOTE:** *Based on the duration of the 1-E-0 transient brief, RCS Tave may not be lowering at this time.* 6. RNO: IF temperature less than 547°F AND lowering, THEN do the following: a) Stop dumping steam. b) IF cooldown continues, THEN control total feed flow. Maintain total feed flow greater than 350 gpm [450 gpm] until narrow range level greater than 12% [18%] in at least one SG. c) IF RCS cooldown is occurring, THEN close 1-MS-15 AND open 1-MS-17 to align AS to GS. d) IF cooldown continues, THEN close MSTVs. **Throttles total AFW flow to stop RCS cooldown.**

Event Description: SGTL becomes SGTR (600) gpm, AP-16.00, E-0, RCPs trip on swap to RSST, E-3.

Cue: By Evaluator, prior to entry to 1-AP-24.00.

Time	Position	Applicant's Action or Behavior
	SRO	1-E-0 7. CHECK PRZR PORVs AND SPRAY VALVES: a) PRZR PORVs – CLOSED b) PRZR spray controls • Demand at Zero (or) • Controlling Pressure c) PORV block valves - AT LEAST ONE OPEN
	SRO RO	1- E-0 NOTE before Step 8: Seal injection flow should be maintained to all RCPs. *8. CHECK RCP TRIP AND MINIFLOW RECIRC CRITERIA: a) Charging Pumps – AT LEAST ONE RUNNING AND FLOWING TO RCS Two or three Charging pumps will be running and flowing to the RCS. b) RCS subcooling - LESS THAN 30°F [85°F] RCS subcooling will NOT be less than 30 °F RNO for the step is to go to step 9.

Event Description: SGTL becomes SGTR (600) gpm, AP-16.00, E-0, RCPs trip on swap to RSST, E-3.

Cue: By Evaluator, prior to entry to 1-AP-24.00.

Time	Position	Applicant's Action or Behavior
	SRO RO	1-E-0 9. CHECK IF SGs ARE NOT FAULTED: • Check pressures in all SGs a) STABLE OR INCREASING AND b) GREATER THAN 100 PSIG Reports a slightly decreasing trend on SG pressures. This will be attributed to the RCS cooldown. The team will not transition to 1-E-2.
	SRO RO SRO	1-E-0 10. CHECK IF SG TUBES ARE NOT RUPTURED: • Condenser air ejector radiation – NOT NORMAL • SG blowdown radiation – NOT NORMAL • SG MS radiation – NORMAL • TD AFW pump exhaust radiation – NORMAL • SG NR Level - NOT INCREASING IN AN UNCONTROLLED MANNER Reports No, 'B' SG NR level going up uncontrollably. RNO: GO TO 1-E-3, STEAM GENERATOR TUBE RUPTURE.
	SRO STA	The team will hold a transition brief. During the brief it will be identified that 'B' SG is ruptured, current isolation status of the ruptured SG and that the team is transitioning to 1-E-3. *The STA will have nothing to add to the transient brief.*

Op-Test No.: Surry 2021-1 Scenario No.: 5 Event No.: 7

Event Description: SGTL becomes SGTR (600) gpm, AP-16.00, E-0, RCPs trip on swap to RSST, E-3.

Cue: By Evaluator, prior to entry to 1-AP-24.00.

Time	Position	Applicant's Action or Behavior
		BEGIN Step 1, 1-E-3:
	SRO	NOTE before Step 1: Seal injection flow should be maintained to all RCPs.
		*CHECK RCP TRIP AND MINIFLOW RECIRC CRITERIA:
		a) Charging Pumps – AT LEAST ONE RUNNING AND FLOWING TO RCS
	RO	*RO will identify that two charging pumps are running.*
	SRO	b) RCS subcooling - LESS THAN 30°F [85°F]
	RO	*RO will identify that RCS subcooling is greater than 30°F*
	SRO	Goes to Step 1 RNO - GO TO step 2
		1-E-3
	SRO	2. IDENTIFY RUPTURED SG(s):
		• Unexpected rise in any SG narrow range level OR • High radiation from any SG MS line monitor OR • High radiation from any SG blowdown line OR • High radiation from any SG sample
	RO	Reports 'B' SG NR level rising unexpectedly.

Event Description: SGTL becomes SGTR (600) gpm, AP-16.00, E-0, RCPs trip on swap to RSST, E-3.

Cue: By Evaluator, prior to entry to 1-AP-24.00.

Time	Position	Applicant's Action or Behavior
		1-E-3
	SRO	CAUTIONS before Step 3: • If the TD AFW pump is the only available source of feed flow, steam supply to the TD AFW pump must be maintained from at least one SG. • At least one SG must be maintained available for RCS cooldown. 3. ISOLATE RUPTURED SG(s): a) Adjust ruptured SG PORV controller setpoint to 1035 psig b) Check ruptured SG(s) PORV – CLOSED c) Verify blowdown TVs from ruptured SG(s) – CLOSED d) Locally close steam supply valve(s) to TD AFW pump: • 1-MS-120 for 'B' SG
	RO	*If 1-MS-120 not closed iaw attachment 9 of 1-E-0, then a field operator will be dispatched to close it at this time.* e) **Close ruptured SG(s) MSTV (1-MS-TV-101B**)

Op-Test No.: Surry 2021-1 Scenario No.: 5 Event No.: 7 Page 45 of 90

Event Description: SGTL becomes SGTR (600) gpm, AP-16.00, E-0, RCPs trip on swap to RSST, E-3.

Cue: By Evaluator, prior to entry to 1-AP-24.00.

Time	Position	Applicant's Action or Behavior
		1-E-3
	SRO	CAUTION before Step 4: If any ruptured SG is faulted, feed flow to that SG should remain isolated during subsequent recovery actions unless needed for RCS cooldown. *4. CHECK RUPTURED SG LEVEL: a) Narrow range level – GREATER THAN 12% [18%] b) Stop feed flow to ruptured SG(s)
	RO	**Identifies 'B' SG level >12%, closes 1-FW-MOV-151C/D to isolate AFW Flow**
	SRO	c) Check ruptured SG AFW MOVs auto-open signal – DEFEATED *Identifies auto-open signal not defeated, SRO goes to Step 4 c) RNO*
	RO	**NOTE**: *BOP may have performed the following IAW Attachment 9.* 1) Select the ruptured SG AFW MOVs using the following switches: • **H TRAIN DISABLE SELECTOR SWITCH (C)** • **J TRAIN DISABLE SELECTOR SWITCH (D)** 2) Defeat the auto-open signal for the selected MOVs by placing the following key switches in the DISABLE SELECTED position: • **H TRAIN AUTO OPEN ENABLE SWITCH** • **J TRAIN AUTO OPEN ENABLE SWITCH**
		1-E-3
	SRO	CAUTION before Step 5: Major steam flow paths from the ruptured SG(s) should be isolated before initiating RCS cooldown. 5. CHECK RUPTURED SG(S) PRESSURE - GREATER THAN 350 PSIG
	RO	*Reports Yes, 'B' SG pressure ~ 1000 psig.*

Op-Test No.: Surry 2021-1 Scenario No.: 5 Event No.: 7

Event Description: SGTL becomes SGTR (600) gpm, AP-16.00, E-0, RCPs trip on swap to RSST, E-3.

Cue: By Evaluator, prior to entry to 1-AP-24.00.

Time	Position	Applicant's Action or Behavior
	 SRO RO	1-E-3 *6. CHECK LOW PRZR PRESS SI SIGNAL – BLOCKED • Permissive Status light C-2 – LIT *Identifies PSL C-2 is LIT*. **NOTE**: *BOP should have completed this action in E-0, Attachment 1.*
	 SRO RO SRO RO	1-E-3 *7. CHECK LOW TAVE SI SIGNAL – BLOCKED • Permissive Status light F-1 – LIT Identifies PSL F-1 NOT LIT. WHEN Tave less than 543°F, THEN do the following: **a) Turn both HI STM FLOW & LO TAVG OR LP switches to block.** b) Check Permissive Status light F-1 - LIT. **NOTE**: *These actions may be performed after the 1-E-3 cooldown is initiated.* **NOTE**: *BOP may have completed this action in E-0, Attachment 1, if Tave was allowed to lower below 543°F.*
	 SRO SRO/BOP	1-E-3 CAUTIONS and NOTE before Step 8: **CAUTION**: • Flow on each Main Steamline should be kept less than 1.0 x 10^6 PPH to prevent Main Steamline isolation during RCS cooldown with the Steam Dumps. • If no RCPs are running, RCS cooldown and depressurization may cause a false Integrity Status Tree indication on the ruptured loop. The Cold Leg indication on the ruptured loop should be disregarded until after the performance of Step 36. **NOTE**: RCP trip criteria does NOT apply after initiation of an operator controlled cooldown. 8. INITIATE RCS COOLDOWN: a) Determine required core exit temperature (ONE TIME): Concur Target CETC temperature 485 °F if SG pressure between 901 and 1000 psig, or 495° if SG pressure between 1001 and 1085 psig.

Event Description: SGTL becomes SGTR (600) gpm, AP-16.00, E-0, RCPs trip on swap to RSST, E-3.

Cue: By Evaluator, prior to entry to 1-AP-24.00.

Time	Position	Applicant's Action or Behavior
		1-E-3
	SRO	Step 8, continued:
	BOP	b) **Place Steam Dump Mode Select switch in Steam Pressure mode**
	RO	c) Check RCS Tave - LESS THAN 543°F
	BOP \	d) **Place the STM DUMP CNTRL switch in BYP INTLK and then return to ON**
	RO	e) Check Bypass Status light D-2 – LIT
	BOP	f) **Dump steam to condenser from intact SG(s) at maximum rate**
	SRO	g) Check CETCs - LESS THAN REQUIRED TEMPERATURE
		When RCS Temperature < 543°F, SRO will direct the block of HSF SI and check of PSL F-1 LIT. *When RCS pressure < 2000 psig, SRO will direct the block of Low Pressure/Header-to-Line SI Signal, and check the PSL C-2 LIT.*
	RO	**Performs the Block of SI Signals and check of PSLs when directed**.
		h) Stop RCS cooldown
	RO	**When target CETC Temperature reached, RO throttles back on steam dumps.**
	SRO	i) Maintain CETCs - LESS THAN REQUIRED TEMPERATURE
		SRO will direct a band for control of CETC temperature.
		1-E-3
	SRO	*9. CHECK INTACT SG LEVELS:
		a) Any narrow range level – GREATER THAN 12% [18%]
		b) Check emergency buses – BOTH ENERGIZED
		c) Control feed flow to maintain narrow range level between 22% and 50%
	RO/BOP	**Adjust AFW to restore "A" and "C" SG NR Level to 22-50%.**

Event Description: SGTL becomes SGTR (600) gpm, AP-16.00, E-0, RCPs trip on swap to RSST, E-3.

Cue: By Evaluator, prior to entry to 1-AP-24.00.

Time	Position	Applicant's Action or Behavior
	 SRO	1-E-3 **CAUTION before Step 10:** If any PRZR PORV opens because of high PRZR pressure, the PORV must be verified closed or isolated after pressure lowers to less than 2335 psig. *10. CHECK PRZR PORVs AND BLOCK VALVES: a) Power to PRZR PORV block valves – AVAILABLE b) PRZR PORVs – CLOSED c) PRZR PORV block valves - AT LEAST ONE OPEN
	 SRO RO	1-E-3 11. RESET BOTH TRAINS OF SI *Push SI Reset Pushbuttons if SI not previously reset*.
	 SRO RO	1-E-3 12. RESET CLS: a) Check CTMT pressure – HAS EXCEEDED 17.7 psia *Report No, CTMT has not exceeded 17.7 psia.* RNO a) GO TO Step 13.
	 SRO RO SRO RO SRO RO	1-E-3 13. CHECK INSTRUMENT AIR AVAILABLE: a) Check annunciator B-E-6 - NOT LIT *Report Yes, B-E-6 Not Lit*. b) Check at least one CTMT IA compressor – RUNNING • 1-IA-C-4A or 1-IA-C-4B *Report Yes, 1-IA-C-4A running* c) Check 1-IA-TV-100 – OPEN *Report Yes, 1-IA-TV-100 open*.

Event Description: SGTL becomes SGTR (600) gpm, AP-16.00, E-0, RCPs trip on swap to RSST, E-3.

Cue: By Evaluator, prior to entry to 1-AP-24.00.

Time	Position	Applicant's Action or Behavior
		1-E-3
	SRO	14. ALIGN CONDENSER AIR EJECTOR TO CTMT:
		a) Check the following: • 1-SV-TV-102 – OPEN • 1-SV-TV-103 – CLOSED
	RO	*Reports valves in required position. Valves Manually Aligned by BOP on A/E RM auto failure during Event 6*.
	SRO	b) Open the following valve: • 1-SV-TV-102A
	RO/BOP	**Opens 1-SV-TV-102A**.
		1-E-3
	SRO	CAUTION before Step 15: RCS pressure should be monitored. If RCS pressure decreases in an uncontrolled manner to less than 250 psig [400 psig], one LHSI pump must be manually restarted to supply water to the RCS.
		*15. CHECK IF LHSI PUMPS SHOULD BE STOPPED:
		a) Check LHSI pumps - ANY RUNNING WITH SUCTION ALIGNED TO RWST
	RO	*Reports one LHSI pump running with suction aligned to RWST*.
		b) RCS pressure – GREATER THAN 250 PSIG [400 PSIG]
	RO	*Reports RCS pressure greater than 250 psig*.
		c) Stop LHSI pumps and put in AUTO
	RO	**Stops running LHSI pump and places in AUTO**.

Event Description: SGTL becomes SGTR (600) gpm, AP-16.00, E-0, RCPs trip on swap to RSST, E-3.

Cue: By Evaluator, prior to entry to 1-AP-24.00.

Time	Position	Applicant's Action or Behavior
		1-E-3
	SRO	16. CHECK IF RCS COOLDOWN SHOULD BE STOPPED: a) Check CETCs - LESS THAN REQUIRED TEMPERATURE
	RO/BOP	*Reports CETCs < required temperature*
	SRO	b) Stop RCS cooldown
	RO/BOP	*Reports RCS Coodown stopped*.
	SRO	c) Maintain CETCs - LESS THAN REQUIRED TEMPERATURE
	RO/BOP	*Reports that RCS temperature being maintained in required band*.
		1-E-3
	SRO	17. CHECK RUPTURED SG(s) PRESSURE - STABLE OR INCREASING
	BOP	Reports Yes, "B" SG pressure stable.
		1-E-3
	SRO	18. CHECK RCS SUBCOOLING BASED ON CETCs - GREATER THAN 50°F [105°F]
	BOP	Reports indicated subcooling value.
		1-E-3
	SRO	19. DEPRESSURIZE RCS TO MINIMIZE BREAK FLOW AND REFILL PRZR: a) Check normal spray – AVAILABLE • RCP C AND 1-RC-PCV-1455B - BOTH AVAILABLE OR • RCPs A and B, AND 1-RC-PCV-1455A – BOTH AVAILABLE
	RO	*Identifies No pressurizer spray available, SRO Goes To Step 19 a) RNO – GO TO Step 20.*

Event Description: SGTL becomes SGTR (600) gpm, AP-16.00, E-0, RCPs trip on swap to RSST, E-3.

Cue: By Evaluator, prior to entry to 1-AP-24.00.

Time	Position	Applicant's Action or Behavior
		1-E-3
	SRO	CAUTIONS and NOTE before Step 20: **CAUTION:** • The PRT may rupture if a PRZR PORV is used for RCS depressurization. Rupturing the PRT may result in abnormal containment conditions. • Cycling of the PRZR PORV should be minimized. **NOTE:** The upper head region may void during RCS depressurization if RCPs are not running. This will result in a rapidly increasing PRZR level. 20. DEPRESSURIZE RCS USING PRZR PORV TO MINIMIZE BREAK FLOW AND REFILL PRZR: a) PRZR PORV - AT LEAST ONE AVAILABLE b) Open one PRZR PORV until ANY of the following conditions satisfied: (Attachment 3 lists conditions) • PRZR level - GREATER THAN 69% <u>OR</u> • RCS subcooling based on CETCs - LESS THAN 30°F [85°F] <u>OR</u> • BOTH of the following exist: 1) RCS pressure - LESS THAN RUPTURE SG(s) PRESSURE 2) PRZR level - GREATER THAN 22% [50%]
	RO	**When Attempt Made to open 1-RC-PCV-1455C, PCV will Not Open.**
	SRO	**Transition to 1-ECA-3.3**

Event Description: SGTL becomes SGTR (600) gpm, AP-16.00, E-0, RCPs trip on swap to RSST, E-3.

Cue: By Evaluator, prior to entry to 1-AP-24.00.

Time	Position	Applicant's Action or Behavior
	RO/BOP	ATTACHMENT 9 of 1-E-0 1. Check SI is in progress. <u>IF</u> SI <u>NOT</u> in progress, <u>THEN</u> RETURN TO procedure step in effect. RO/BOP identifies that SI is in progress.
	RO/BOP	ATTACHMENT 9 of 1-E-0 2. Identify Ruptured SG by one of the following conditions: • Unexpected rise in any SG Narrow Range level • High radiation from any SG MS line monitor • High radiation from any SG Blowdown line Identifies 'B' SG as the ruptured SG
	RO/BOP	ATTACHMENT 9 of 1-E-0 3. Check running or start AFW Pumps, as necessary • 1-FW-P-3A • 1-FW-P-3B • 1-FW-P-2
	RO/BOP	ATTACHMENT 9 of 1-E-0 4. When ruptured SG Narrow Range level is greater than 12%, then isolate feed flow to ruptured SG by closing SG AFW Isolation MOVs: • SG B, 1-FW-MOV-151C and 1-FW-MOV-151D **RO/BOP closes 1-FW-MOV-151C/D when SG level is greater than 12% Narrow Range**. **This step completes Critical Task (CT-3): Isolate feed flow to the ruptured SG before "B" SG NR Level reaches 100%.**
	RO/BOP	ATTACHMENT 9 of 1-E-0 5. Select the ruptured SG AFW MOVs using the following switches: • H TRAIN DISABLE SELECTOR SWITCH • J TRAIN DISABLE SELECTOR SWITCH

Event Description: SGTL becomes SGTR (600) gpm, AP-16.00, E-0, RCPs trip on swap to RSST, E-3.

Cue: By Evaluator, prior to entry to 1-AP-24.00.

	RO/BOP	ATTACHMENT 9 of 1-E-0 6. Disable the auto-open signal for the selected MOVs by placing the following keyswitches in the DISABLE SELETED position: • **H TRAIN AUTO OPEN ENABLE SWITCH** • **J TRAIN AUTO OPEN ENABLE SWITCH**
	RO/BOP	ATTACHMENT 9 of 1-E-0 CAUTION: At least one SG must be maintained available for RCS heat sink. 7. Locally close steam supply valve to the TD AFW pump: • SG B, 1-MS-120 RO/BOP directs field operator to close 1-MS-120. *The field operator will acknowledge the requirement to close 1-MS-120. The field operator will later report that 1-MS-120 is closed.*
	RO/BOP	ATTACHMENT 9 of 1-E-0 8. Control Feed Flow to the SG IAW the following requirements: • Minimum AFW flow is 350 gpm with SI initiated, until one SG Narrow Range level is greater than 12% • When minimum heat sink has been verified, AFW MOVs should be controlled to maintain intact SG Narrow Range levels between 22% and 50%. • SG A, 1-FW-MOV-151E and 1-FW-MOV-151F • SG C, 1-FW-MOV-151A and 1-FW-MOV-151B
	RO/BOP	ATTACHMENT 9 of 1-E-0 9. Isolate AFW header with deenergized Emergency Bus MOVs by closing the following header isolation valves *No Emergency Bus MOVs are deenergized.*
		END EVENT #7

Event Description: 1-RC-PCV-1455C not open, 1-ECA-3.3

Cue: Transition from 1-E-3.

Time	Position	Applicant's Action or Behavior
		1-ECA-3.3 Actions
	SRO	**CAUTION:** If no RCPs were running during the cooldown performed in 1-E-3, SI flow may cause a false Integrity Status Tree indication on the ruptured loop. The Cold Leg indication on the ruptured loop should be disregarded until after the performance of Step 21.
		1. CHECK RUPTURED SG(S) NARROW RANGE LEVEL - LESS THAN 75% [73%]
	RO	*Reports that 'B' SG Level is greater than 75%.*
	SRO	1. RNO - GO TO Step 6
		1-ECA-3.3
	SRO	6. CHECK IF SI CAN BE TERMINATED:
		a) Check RCS subcooling based on CETCs - GREATER THAN 30°F [85°F]
	RO/BOP	*Identifies that RCS subcooling is greater than 30°F.*
		b) Check secondary heat sink: • Total feed flow to SGs – GREATER THAN 350 GPM [450 GPM] AVAILABLE <u>OR</u> • Narrow range level in at least one intact SG - GREATER THAN 12% [18%]
	RO/BOP	*Identifies That >350 gpm AFW Available, and "A" and "C" SG NR level >12%.*
	SRO	c) Check RVLIS indication - GREATER THAN VALUE FROM TABLE
	RO/BOP	*Identify that RVLIS Full Range is Greater than 63%.*

RCPs Running	RVLIS INDICATION	
	Full Range	Dynamic Range
0	GREATER THAN 63%	
1		GREATER THAN 36%
2		GREATER THAN 51%
3		GREATER THAN 82%

Event Description: 1-RC-PCV-1455C not open, 1-ECA-3.3

Cue: Transition from 1-E-3.

Time	Position	Applicant's Action or Behavior
	SRO BOP	1-ECA-3.3 Step 6, continued: d) Check any ruptured SG narrow range level - INCREASING IN AN UNCONTROLLED MANNER OR OFFSCALE HIGH *Identify that 'B' SG Level is Off-Scale High*.
	SRO RO	7. STOP ALL BUT ONE CHG PUMP AND PUT IN AUTO **Secures one of the running charging pumps**
	SRO RO RO	8. ISOLATE HHSI TO COLD LEGS: a) Verify the following: 1) CHG pump suctions from RWST - OPEN • 1-CH-MOV-1115B • 1-CH-MOV-1115D 2) Check CHG pump miniflow recirc valves - OPEN • 1-CH-MOV-1275A • 1-CH-MOV-1275B • 1-CH-MOV-1275C • 1-CH-MOV-1373 b) Close HHSI to Cold Leg: • **1-SI-MOV-1867C** • **1-SI-MOV-1867D** • 1-SI-MOV-1842
		END Event 8 **End Scenario**

Event Description: BOP Failures. 1-SI-P-1B not auto start, 1-CH-HCV-1200 A/B not close, 1-VS-MOD-103A not close, 1-MS-TV-109 and 1-DA-TV-100 A/B not close.

Cue: Pre-load Malfunctions.

	BOP	Attachment 1 OF 1-E-0 1. CHECK FW ISOLATION: • Feed pump discharge MOVs – CLOSED • 1-FW-MOV-150A • 1-FW-MOV-150B • MFW pumps – TRIPPED • Feed REG valves – CLOSED • SG FW bypass flow valves – DEMAND AT ZERO • SG blowdown TVs – CLOSED
	BOP	Attachment 1 OF 1-E-0 2. CHECK CTMT ISOLATION PHASE I: • Phase I TVs – CLOSED • 1-CH-MOV-1381 – CLOSED • 1-SV-TV-102A – CLOSED • PAM isolation valves – CLOSED • 1-DA-TV-103A • 1-DA-TV-103B **BOP will identify 1-DA-TV-100A/B, and 1-MS-TV-109 OPEN and CLOSE them.**
	BOP	Attachment 1 OF 1-E-0 3. CHECK AFW PUMPS RUNNING: a) MD AFW pumps – RUNNING (Time Delayed) b) TD AFW pump - RUNNING IF NECESSARY

Event Description: BOP Failures. 1-SI-P-1B not auto start, 1-CH-HCV-1200 A/B not close, 1-VS-MOD-103A not close, 1-MS-TV-109 and 1-DA-TV-100 A/B not close.

Cue: Pre-load Malfunctions.

	BOP	Attachment 1 of 1-E-0 4. CHECK SI PUMPS RUNNING: • CHG pumps – RUNNING • LHSI pumps – RUNNING **BOP starts 1-SI-P-1B**
	BOP	Attachment 1 OF 1-E-0 5. CHECK CHG PUMP AUXILIARIES: • CHG pump CC pump – RUNNING • CHG pump SW pump - RUNNING
	BOP	Attachment 1 OF 1-E-0 6. CHECK INTAKE CANAL: • Level - GREATER THAN 24 FT • Level - BEING MAINTAINED BY CIRC WATER PUMPS
	BOP	Attachment 1 OF 1-E-0 7. CHECK IF MAIN STEAMLINES SHOULD BE ISOLATED: a) Check if ANY of the following annunciators - HAVE BEEN LIT • E-F-10 (High Steam Flow SI) • B-C-4 (Hi Hi CLS Train A) • B-C-5 (Hi Hi CLS Train B) Identifies annunciators not lit and goes to step 8.
	BOP	Attachment 1 OF 1-E-0 *8. CHECK IF CS REQUIRED: a) CTMT pressure – HAS EXCEEDED 23 PSIA Identifies pressure has not exceeded 23 or 17.7 psia and goes to step 10.

Event Description: BOP Failures. 1-SI-P-1B not auto start, 1-CH-HCV-1200 A/B not close, 1-VS-MOD-103A not close, 1-MS-TV-109 and 1-DA-TV-100 A/B not close.

Cue: Pre-load Malfunctions.

	BOP	Attachment 1 of 1-E-0 *10. BLOCK LOW PRZR PRESS SI SIGNAL: a) Check PRZR pressure – LESS THAN 2000 psig **b) Turn both LO PRZR PRESS & STM HDR/LINE ΔP switches to block** c) Check Permissive Status light C-2 - LIT BOP may block the low pressurizer pressure SI signal depending on current RCS pressure.
	BOP	Attachment 1 OF 1-E-0 *11. BLOCK LOW TAVE SI SIGNAL: Step may not be performed at this time (if Tave is greater than 543°F). a) Check RCS Tave - LESS THAN 543°F b) Turn both HI STM FLOW & LO TAVG OR LP switches to block c) Check Permissive Status light F-1 - LIT
	BOP	Attachment 1 OF 1-E-0 **NOTE:** • CHG pumps should be run in the following order of priority: C, B, A. • Subsequent SI signals may be reset by re-performing Step 12. 12. CHECK SI FLOW: a) HHSI to cold legs - FLOW INDICATED • 1-SI-FI-1961 (NQ) • 1-SI-FI-1962 (NQ) • 1-SI-FI-1963 (NQ) • 1-SI-FI-1943 or 1-SI-FI-1943A b) Check CHG pumps - THREE RUNNING **c) Reset SI** **d) Stop one CHG pump and out in AUTO**

Event Description: BOP Failures. 1-SI-P-1B not auto start, 1-CH-HCV-1200 A/B not close, 1-VS-MOD-103A not close, 1-MS-TV-109 and 1-DA-TV-100 A/B not close.

Cue: Pre-load Malfunctions.

	BOP	Attachment 1 of 1-E-0 e) RCS pressure - LESS THAN 185 PSIG RNO: e) IF two LHSI pumps are running, THEN do the following: 1) Verify reset or reset SI. 2) Stop one LHSI pump and put in AUTO. **Stops either 1-SI-P-1A or 1B and leaves control switch in AUTO.** 3) GO TO Step 13.
	BOP	Attachment 1 of 1-E-0 13. CHECK TOTAL AFW FLOW - GREATER THAN 350 GPM [450 GPM]
	BOP	Attachment 1 of 1-E-0 14. CHECK AFW MOVs - OPEN BOP will identify that all AFW MOVS are not open and will read the RNO portion of this step and manually align valves as necessary.
	BOP	Attachment 1 of 1-E-0 15. INITIATE SI VALVE ALIGNMENT IAW ATTACHMENT 2 See attached copy of Attachment 2. (Next page of this guide)
	BOP	Attachment 1 of 1-E-0 16. INITIATE VENTILATION, AC POWER, AND SFP STATUS CHECKS IAW ATTACHMENT 3 *Attachment 3 follows Attachment 2 on next page* **Identify failure of 1-VS-MOD-103A CLOSES the MOD.** *Unit 2 Operator will state that Unit 2 is at 100% power (if asked)* *Unit 2 will also accept responsibility to complete Attachment 3 if it is given to Unit 2 at the point where differential pressure indications are requested.*

Event Description: BOP Failures. 1-SI-P-1B not auto start, 1-CH-HCV-1200 A/B not close, 1-VS-MOD-103A not close, 1-MS-TV-109 and 1-DA-TV-100 A/B not close.

Cue: Pre-load Malfunctions.

	BOP	Attachment 1 of 1-E-0 17. CHECK RCS DILUTION FLOWPATH - ISOLATED AND LOCKED, SEALED, OR OTHERWISE SECURED • Close and lock, seal, or otherwise secure 1-CH-223 *May contact the Desk (WCC) SRO to Close and lock, seal, or otherwise secure 1-CH-223.*

Event Description: BOP Failures. 1-SI-P-1B not auto start, 1-CH-HCV-1200 A/B not close, 1-VS-MOD-103A not close, 1-MS-TV-109 and 1-DA-TV-100 A/B not close.

Cue: Pre-load Malfunctions.

Time	Position	Applicant's Action or Behavior
	BOP	Attachment 2 of 1-E-0 **NOTE:** Components previously aligned by SI termination steps, must not be realigned by this Attachment.
	BOP	Attachment 2 of 1-E-0 1. Check opened or open CHG pump suction from RWST MOVs. • 1-CH-MOV-1115B • 1-CH-MOV-1115D
	BOP	Attachment 2 of 1-E-0 2. Check closed or close CHG pump suction from VCT MOVs. • 1-CH-MOV-1115C • 1-CH-MOV-1115E
	BOP	Attachment 2 of 1-E-0 3. Check running or start at least two CHG pumps. (listed in preferred order) • 1-CH-P-1C • 1-CH-P-1B • 1-CH-P-1A
	BOP	Attachment 2 of 1-E-0 4. Check opened or open HHSI to cold legs MOVs. • 1-SI-MOV-1867C • 1-SI-MOV-1867D
	BOP	Attachment 2 of 1-E-0 5. Check closed or close CHG line isolation MOVs. • 1-CH-MOV-1289A • 1-CH-MOV-1289B

Event Description: BOP Failures. 1-SI-P-1B not auto start, 1-CH-HCV-1200 A/B not close, 1-VS-MOD-103A not close, 1-MS-TV-109 and 1-DA-TV-100 A/B not close.

Cue: Pre-load Malfunctions.

	BOP	Attachment 2 of 1-E-0 6. Check closed or close Letdown orifice isolation valves. • **1-CH-HCV-1200A** • **1-CH-HCV-1200B** • 1-CH-HCV-1200C **RO/BOP will CLOSE 1-CH-HCV-1200A and 1-CH-HCV-1200B**
	BOP	Attachment 2 of 1-E-0 7. Check opened or open LHSI suction from RWST MOVs. • 1-SI-MOV-1862A • 1-SI-MOV-1862B
	BOP	Attachment 2 of 1-E-0 8. Check opened or open LHSI to cold legs MOVs. • 1-SI-MOV-1864A • 1-SI-MOV-1864B
	BOP	Attachment 2 of 1-E-0 9. Check running or start at least one LHSI pump. • 1-SI-P-1A • 1-SI-P-1B **BOP START 1-SI-P-1B** *if not already performed in Attachment 1.*
	BOP	Attachment 2 of 1-E-0 10. Check High Head SI flow to cold legs indicated. • 1-SI-FI-1961 • 1-SI-FI-1962 • 1-SI-FI-1963 • 1-SI-FI-1943 or 1-SI-FI-1943A

Event Description: BOP Failures. 1-SI-P-1B not auto start, 1-CH-HCV-1200 A/B not close, 1-VS-MOD-103A not close, 1-MS-TV-109 and 1-DA-TV-100 A/B not close.

Cue: Pre-load Malfunctions.

	BOP	Attachment 2 of 1-E-0 11. IF flow not indicated, THEN manually start pumps and align valves. IF flow NOT established, THEN consult with Shift Supervision to establish another high pressure injection flow path while continuing with this procedure. • Alternate SI to Cold legs • Hot leg injection

Event Description: BOP Failures. 1-SI-P-1B not auto start, 1-CH-HCV-1200 A/B not close, 1-VS-MOD-103A not close, 1-MS-TV-109 and 1-DA-TV-100 A/B not close.

Cue: Pre-load Malfunctions.

NUMBER 1-E-0	ATTACHMENT TITLE	ATTACHMENT 3
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1. ___ Check or place REFUEL SFTY MODE switches in NORMAL.

2. ___ Check ventilation alignment IAW Tables 1 and 2.

TABLE 1
UNIT #1 VENTILATION PANEL

	MARK NUMBER	EQUIPMENT STATUS
☐	1-VS-F-4A & B	OFF
☐	1-VS-HV-1A & B	OFF
☐	1-VS-F-8A & B	OFF
☐	1-VS-F-9A & B	GREEN
☐	1-VS-F-59	GREEN
☐	1-VS-F-6	OFF
☐	1-VS-F-39	GREEN
☐	1-VS-F-7A & B	GREEN
☐	1-VS-HV-5	GREEN
☐	1-VS-F-56A & B	GREEN
☐	1-VS-F-40A & B	GREEN
☐	1-VS-HV-4	OFF
☐	2-VS-F-40A or B	RED
☐	2-VS-HV-4	OFF

Event Description: BOP Failures. 1-SI-P-1B not auto start, 1-CH-HCV-1200 A/B not close, 1-VS-MOD-103A not close, 1-MS-TV-109 and 1-DA-TV-100 A/B not close.

Cue: Pre-load Malfunctions.

NUMBER 1-E-0	ATTACHMENT TITLE	ATTACHMENT 3
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TABLE 2
VNTX PANEL

MARK NUMBER	EXPECTED EQUIPMENT STATUS	RESPONSE NOT OBTAINED
☐ a. AOD-VS-107A & B AOD-VS-108	RED GREEN	☐ a. Place AUX BLDG CENTRAL AREA MODE switch to FILTER.
☐ b. MOD-VS-100A & B AOD-VS-106	RED GREEN	☐ b. • Place MOD-VS-100A to FILTER. • Place MOD-VS-100B to FILTER.
☐ c. MOD-VS-200A & B AOD-VS-206	GREEN RED	☐ c. • Place MOD-VS-200A to UNFILTER. • Place MOD-VS-200B to UNFILTER.
☐ d. AOD-VS-103A & B AOD-VS-104	GREEN GREEN	☐ d. • Place AOD-VS-103A in UNFILTER. • Place AOD-VS-103B in UNFILTER. • Place AOD-VS-104 in FILTER.
☐ e. AOD-VS-101A & B AOD-VS-102	GREEN GREEN	☐ e. Place AOD-VS-101A and 101B in UNFILTER.
☐ f. AOD-VS-111A & B	GREEN	☐ f. Place COMBINE CONTAINMENT EXHAUST in ISOLATE.
☐ g. AOD-VS-110	GREEN	☐ g. Place AOD-VS-109A and 109B in FILTER.
☐ h. AOD-VS-112A & B	GREEN	☐ h. • Place AOD-VS-112A in CLOSE. • Place AOD-VS-112B in CLOSE.
☐ i. MOD-VS-58A & B 1-VS-F-58A & B	RED RED	☐ i. Start 1-VS-F-58A and 1-VS-F-58B.

3. ___ Check filtered exhaust flow: (as read on FI-VS-117A and FI-VS-117B)

- ☐ • Total flow - GREATER THAN 32400 cfm

AND

- ☐ • Flow through each filter bank - LESS THAN 39600 cfm

Event Description: BOP Failures. 1-SI-P-1B not auto start, 1-CH-HCV-1200 A/B not close, 1-VS-MOD-103A not close, 1-MS-TV-109 and 1-DA-TV-100 A/B not close.

Cue: Pre-load Malfunctions.

NUMBER 1-E-0	ATTACHMENT TITLE	ATTACHMENT 3
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4. ___ Check all Station Service Buses - ENERGIZED. IF NOT, THEN initiate 1-AP-10.07, LOSS OF UNIT 1 POWER.

5. ___ Check annunciator VSP-J2 - LIT.

6. ___ Check Unit 1 RSST LTC time delay bypass light - LIT.

7. ___ Check stopped or stop 1-VS-AC-4.

8. ___ Place 1-VS-43-VS103X, MCR ISOLATION switch to the OFF position.

9. ___ Check closed or close MCR isolation dampers.
   - ☐ • 1-VS-MOD-103A
   - ☐ • 1-VS-MOD-103B
   - ☐ • 1-VS-MOD-103C
   - ☐ • 1-VS-MOD-103D

Event Description: BOP Failures. 1-SI-P-1B not auto start, 1-CH-HCV-1200 A/B not close, 1-VS-MOD-103A not close, 1-MS-TV-109 and 1-DA-TV-100 A/B not close.

Cue: Pre-load Malfunctions.

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* *

CAUTION:
- Only one Emergency Supply Fan must be started in the following step.
- Chilled Water flow to the in-service Unit 1 MCR AHU must be throttled to at least 15 gpm when the Emergency Supply fan is started.
- Chilled Water flow to the in-service Unit 2 MCR AHU must be throttled to at least 25 gpm when the Emergency Supply fan is started.
- An Emergency Supply Fan must not be started if the filter is wet.

* *

10. Immediately start ONE Emergency Supply Fan IAW the following: (1-VS-F-41 or 2-VS-F-41 preferred)

a. IF 1-VS-F-41, CONT RM EMERG SUP FAN, will be used, THEN perform the following substeps.

___ 1. Open 1-VS-MOD-104A, CONT RM EMERG SUP MOD.

___ 2. Start 1-VS-F-41.

b. IF 2-VS-F-41, CONT RM EMERG SUP FAN, will be used, THEN perform the following substeps.

___ 1. Open 2-VS-MOD-204A, CONT RM EMERG SUP MOD.

___ 2. Start 2-VS-F-41.

c. IF 1-VS-F-42, CONT RM EMERG SUP FAN, will be used, THEN perform the following substeps.

___ 1. Open 1-VS-MOD-104B, CONT RM EMERG SUP MOD.

___ 2. Start 1-VS-F-42.

d. IF 2-VS-F-42, CONT RM EMERG SUP FAN, will be used, THEN perform the following substeps.

___ 1. Open 2-VS-MOD-204B, CONT RM EMERG SUP MOD.

___ 2. Start 2-VS-F-42.

e. ___ Adjust Chilled Water flow to MCR AHUs IAW Step 10 Caution.

Event Description: BOP Failures. 1-SI-P-1B not auto start, 1-CH-HCV-1200 A/B not close, 1-VS-MOD-103A not close, 1-MS-TV-109 and 1-DA-TV-100 A/B not close.

Cue: Pre-load Malfunctions.

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11. ___ Check readings on the following Differential Pressure Indicators - POSITIVE PRESSURE INDICATED.

- ☐ • PDI-VS-100, D.P.-U1CR/U1TB (Unit 2 Turbine Ventilation Panel)
- ☐ • PDI-VS-101, D.P.-U1RR/U1TB (Unit 2 Turbine Ventilation Panel)
- ☐ • PDI-VS-200, D.P.-U2CR/U2TB (Unit 2 Turbine Ventilation Panel)
- ☐ • PDI-VS-201, D.P.-U2RR/U2TB (Unit 2 Turbine Ventilation Panel)
- ☐ • 1-VS-PDI-118 (Unit 1 Computer Room)
- ☐ • 1-VS-PDI-116 (Near Unit 1 Semi-Vital Bus)
- ☐ • 2-VS-PDI-215 (Unit 2 AC Room)
- ☐ • 2-VS-PDI-206 (Near Unit 2 Semi-Vital Bus)

12. ___ IF any reading NOT positive, THEN initiate Attachment 6 to secure MCR boundary fans.

13. ___ Check initiated or initiate 0-AP-50.00, OPPOSITE UNIT EMERGENCY.

14. ___ Check the following MCR and ESGR air conditioning equipment operating. IF NOT, THEN start equipment within 1 hour IAW the appropriate subsection of 0-OP-VS-006, CONTROL ROOM AND RELAY ROOM VENTILATION SYSTEM.

- ☐ • One Control Room chiller
- ☐ • One Unit 1 Control Room AHU
- ☐ • One Unit 2 Control Room AHU
- ☐ • One Unit 1 ESGR AHU
- ☐ • One Unit 2 ESGR AHU

15. ___ IF both of the following conditions exist, THEN check that Load Shed is activated.

- ☐ • Unit 2 - SUPPLIED BY RSST
- ☐ • Unit 2 RCPs - RUNNING

16. ___ IF Load Shed is required and not activated, THEN initiate 0-AP-10.10, LOSS OF AUTO LOAD SHED.

Event Description: BOP Failures. 1-SI-P-1B not auto start, 1-CH-HCV-1200 A/B not close, 1-VS-MOD-103A not close, 1-MS-TV-109 and 1-DA-TV-100 A/B not close.

Cue: Pre-load Malfunctions.

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NOTE:
- SFP checks should be initiated WITHIN ONE TO TWO HOURS of EOP entry.
- Loss of power may render SFP indications and alarms non-functional and require local checks. Power supplies are as follows:
  - TI-FC-103, Unit 1 Semi-Vital Bus
  - TI-FC-203, Unit 2 Semi-Vital Bus
  - 1-FC-LIS-104, Panel 1ABDA1
- Loss of AC Power to the SFP level indicator is indicated if both low and high level alarms are in simultaneously. (0-VSP-C4 and 0-VSP-D4)
- 1-DRP-003, CURVE BOOK, provides a graph for SFP time to 200°F if loss of SFP cooling occurs.

17. ___ Initiate monitoring SFP parameters:

☐ • SFP level - Greater than Cooling Pump suction AND Stable

☐ • SFP temperature - Stable or Lowering

☐ • SFP Cooling Pumps - Either Running

☐ • Component Cooling - Normal

☐ • SFP Radiation - Normal

18. ___ Continue to monitor parameters every one to two hours or until authorized to terminate monitoring by the Station Emergency Manager and/or the Shift Manager.

19. ___ Notify the Station Emergency Manager and/or the Shift Manager of the status and trend of SFP parameters.

20. ___ IF any abnormality or adverse trend is identified, THEN initiate 0-AP-22.02, MALFUNCTION OF SPENT FUEL PIT SYSTEMS.

FOLDOUT PAGES FOR REFERENCED PROCEDURES

NUMBER 1-E-0	CONTINUOUS ACTIONS PAGE	REVISION 77

1. RCP TRIP CRITERIA

   Trip all RCPs if BOTH conditions listed below occur:

   a. Charging Pumps - AT LEAST ONE RUNNING AND FLOWING TO RCS

   b. RCS Subcooling - LESS THAN 30°F [85°F]

2. MINIFLOW RECIRC CRITERIA

   a. CLOSED - When RCS pressure is less than 1275 psig [1475 psig] AND RCP Trip Criteria are met (RCPs OFF).

   b. OPEN - When RCS pressure is greater than 2000 psig.

3. ADVERSE CONTAINMENT CRITERIA

   Use Adverse Containment setpoints if EITHER condition listed below occurs:

   - Containment Pressure - GREATER THAN 20 PSIA
   - Containment Radiation - GREATER THAN 1.0E5 R/HR

4. COLD LEG RECIRCULATION SWITCHOVER CRITERIA

   GO TO 1-ES-1.3, TRANSFER TO COLD LEG RECIRCULATION, if RWST level lowers to less than 20%.

---

1. AMSAC RESET CRITERIA

   AMSAC may be manually reset when level in all three SGs is greater than 13% or six minutes have elapsed since the Reactor trip. When AMSAC is reset, AMSAC ARMED annunciator H-D-1 should clear and affected components may be realigned as needed.

2. TD AFW PUMP SHUTDOWN CRITERIA

   The TD AFW pump may be secured when SG NR level is greater than 22% in at least 2 SGs, AMSAC is reset, and no auto-start signal exists. To secure the pump, the pump SOV control switches must be taken to OPEN-RESET and then to CLOSE.

3. MANUAL SI ALIGNMENT

   If SI fails to automatically align, Attachment 2 may be used for guidance on manual SI valve alignment.

4. * TRANSIENT AFW FLOW CONTROL (IF SI in progress)

   Attachment 7 may be used for guidance on transient AFW flow control.

5. * FAULTED SG ISOLATION AND AFW FLOW CONTROL (IF SI in progress)

   Attachment 8 may be used for guidance on faulted SG(s) isolation and AFW flow control.

6. * RUPTURED SG ISOLATION AND AFW FLOW CONTROL (IF SI in progress)

   Attachment 9 may be used for guidance on ruptured SG(s) isolation and AFW flow control.

7. * LOSS OF RCP SUPPORT CONDITIONS

   Trip RCPs if a loss of a support condition occurs. (for example, loss of CC)

* Preemptive Actions

FOLDOUT PAGES FOR REFERENCED PROCEDURES

NUMBER	CONTINUOUS ACTION STEPS	REVISION
1-E-0		77

1. Check RCS Average Temperature - STABLE AT OR TRENDING TO 547°F. (E-0, Step 6)
2. Monitor RCP Trip and Miniflow Recirc Criteria. (E-0, Step 8)
3. Check SG Narrow Range Level - ANY SG GREATER THAN 12%. (Control feed flow to maintain Narrow Range Level between 22% and 50%) (E-0, Step 25)
4. Monitor LHSI pumps and secure as necessary. (E-0, Step 30)

NOTE: Subsequent SI signals may be reset by reperforming Step 12 of Attachment 1.

5. Monitor CTMT pressure and check CLS initiation as necessary. (Attachment 1, Step 8)
6. Monitor RWST level and check RS initiation as necessary. (Attachment 1, Step 9)
7. Block Low PRZR Pressure SI signal when less than 2000 psig. (Attachment 1, Step 10)
8. Block Low Tave SI signal when less than 543°F. (Attachment 1, Step 11)

FOLDOUT PAGES FOR REFERENCED PROCEDURES

CONTINUOUS ACTIONS PAGE FOR 1-E-3

1. SI REINITIATION CRITERIA

   Manually operate SI pumps and align valves as necessary if EITHER condition listed below occurs:
   - RCS subcooling based on CETCs - LESS THAN 30°F [85°F]
   - PRZR level - CANNOT BE MAINTAINED GREATER THAN 22% [50%]

   IF SI reinitiation occurs after Step 23, THEN GO TO 1-ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED RECOVERY.

2. ADVERSE CONTAINMENT CRITERIA

   Use Adverse Containment setpoints if EITHER condition listed below occurs:
   - Containment pressure - GREATER THAN 20 PSIA
   - Containment Radiation - GREATER THAN 1.0E5 R/HR

3. SECONDARY INTEGRITY CRITERIA

   GO TO 1-E-2, FAULTED STEAM GENERATOR ISOLATION, if any SG pressure is lowering in an uncontrolled manner or has completely depressurized, and has not been isolated, unless needed for RCS cooldown.

4. AFW SUPPLY SWITCHOVER CRITERIA (Refer to Attachment 8)

   Transfer to one of the following alternate AFW water supplies if ECST level lowers to less than 20%.
   a. 1-CN-TK-2, using 1-CN-150.
   b. 1-CN-TK-3, using AFW Booster Pumps.
   c. AFW Crosstie.
   d. Firemain.

5. MULTIPLE TUBE RUPTURE CRITERIA

   STABILIZE the plant and RETURN TO 1-E-3, STEAM GENERATOR TUBE RUPTURE, Step 1, if any intact SG level rises in an uncontrolled manner or any intact SG has abnormal radiation.

6. AMSAC RESET CRITERIA

   AMSAC may be manually reset when level in all three SGs is greater than 13% or six minutes have elapsed since the Reactor trip. When AMSAC is reset, annunciator H-D-1 should clear and affected components may be realigned as needed.

7. TD AFW PUMP SHUTDOWN CRITERIA

   The TD AFW pump may be secured when SG NR level is greater than 22%, AMSAC is reset, and no auto-start signal exists. To secure the pump, the pump SOV control switches must be taken to OPEN-RESET and then to CLOSE.

FOLDOUT PAGES FOR REFERENCED PROCEDURES

CONTINUOUS ACTIONS PAGE FOR 1-ECA-3.3

1. SI REINITIATION CRITERIA

Following SI termination or SI flow reduction, manually start SI pumps as necessary and GO TO 1-ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED RECOVERY DESIRED, if EITHER condition listed below occurs:

- RCS subcooling based on CETCs - LESS THAN 30°F [85°F]
- RVLIS indication - LESS THAN VALUE FROM TABLE

RCPs Running	RVLIS INDICATION	
	Full Range	Dynamic Range
0	LESS THAN 63%	——
1	——	LESS THAN 36%
2	——	LESS THAN 51%
3	——	LESS THAN 82%

2. ADVERSE CONTAINMENT CRITERIA

Use Adverse Containment setpoints if EITHER condition listed below occurs:

- Containment Pressure - GREATER THAN 20 PSIA
- Containment Radiation - GREATER THAN 1.0E5 R/HR

3. SECONDARY INTEGRITY CRITERIA

GO TO 1-E-2, FAULTED STEAM GENERATOR ISOLATION, if any SG pressure is lowering in an uncontrolled manner or has completely depressurized, and has not been isolated unless needed for RCS cooldown.

4. AFW SUPPLY SWITCHOVER CRITERIA (Refer to Attachment 7)

Transfer to one of the following alternate AFW water supplies if ECST level lowers to less than 20%.

a. 1-CN-TK-2, using 1-CN-150.

b. 1-CN-TK-3, using AFW Booster Pumps.

c. AFW Crosstie.

d. Firemain.

5. RCP START CRITERIA

- Following a loss of all seal cooling, affected RCP(s) should NOT be started without prior status evaluation.
- RCPs should be run in the following order of priority to provide PRZR spray: C, A and B.

SIMULATOR CREW BRIEF

Simulator Scenario Checklist

- ❑ Perform Simulator Turnover Pre-session, and Post-session Checklist prior to the first Scenario of the day.
- ❑ Perform Simulator Turnover Post-session Checklist after the last Scenario of the day.

Perform/Verify Simulator Setup:

❑ ❑ ❑ Recall IC-380 (100%) **and verify Trigger #30 implemented.**

OR

Recall Base IC (IC-001), Open Schedule, and Event Files for Scenario 5. Run Schedule file, and i**mplement Trigger 30.**

❑ ❑ ❑ Verify Impulse Pressure is selected for channel 3.

❑ ❑ ❑ **Enter/Verify the following MALFUNCTIONS:**

Malfunction	Delay	Ramp	Trigger	Value	Final	Trigger Type (Auto or Manual)
RC4903 PRZR LEVEL XMTR CH 3 FAILURE (461)	5	20	1	0.0	-0.3	Manual
FW1902 B S/G MN FD FLOW CNTRLR FC-1488 FAILS	5	30	3	0.0	-0.5	Manual
MS1503 SG C PORV CONTROLLER FAILS HIGH/LOW	5	30	5	0.0	+1.0	Manual
GL0102 IPBD CONDUCTOR TEMPERATURE HIGH PHASE B	0	0	7	0.0	70	Manual
RC2402 STEAM GENERATOR B TUBE RUPTURE	5	30	9	0.0	3	Manual
RC2402 STEAM GENERATOR B TUBE RUPTURE (New Event)	5	30	11	0.0	100	Manual
RC64 MOV-RC-535 49 Thermal Overload	0	0	16	1	0	AUTO
RC5601 RC-P-1A BKR 15A3 SPURIOUS TRIP	0	0	17	FALSE	TRUE	AUTO
RC5602 RC-P-1B BKR 15B3 SPURIOUS TRIP	0	0	17	FALSE	TRUE	AUTO
RC5603 RC-P-1C BKR 15C3 SPURIOUS TRIP	0	0	17	FALSE	TRUE	AUTO
AS02 DISABLE SV-TV-102 AUTO OPEN	0	0	30	FALSE	TRUE	ACTIVE
AS05 DISABLE SV-TV-103 AUTO CLOSURE	0	0	30	FALSE	TRUE	ACTIVE
SI2409 SI RELAY CI1A FAILS TO ACTUATE	0	0	30	FALSE	TRUE	ACTIVE
SI2505 SI RELAY SI5B FAILS TO ACTUATE	0	0	30	FALSE	TRUE	ACTIVE

SIMULATOR CREW BRIEF

❑ ❑ ❑ **Enter/Verify the following EVENT TRIGGERS:**

Event ID	Event code	Command
Trigger setup to trip 1-RC-MOV-1535 breaker when control switch in open to stroke test open time, Event 1. Trigger 14 sets when 1-RC-MOV-1535 closed. Trigger 15 sets when 1-RC-MOV-1535 control switch taken to open. Trigger 16 set when both Trigger 14 and 15 are TRUE. Trigger 16 implements Remote Function trip of 1-RC-MOV-1535 breaker.		
14	rcmov535 <= 0.0002	Sets Trigger 14
15	mov535_open	Sets Trigger 15
16	et_array(14) & et_array(15)	Sets Trigger 16
Trigger setup to trip A, B, C, RCPs when Main Generator Output breakers open. (EL2 Auto Trigger). Actuates Trigger which implements Malfunction RC5601/5602/5603.		
17	"!(elg102_bkr(2) & elg1T240_bkr)"	Sets Trigger 17

❑ ❑ **Enter/Verify the following REMOTE FUNCTIONS:**

Description	Delay	Ramp	Trigger	Value	Final	Trigger Type (Auto or Manual)
AAC_SMS_MODE OFF AAC DG LOCAL MODE SWITCH POSITION	0	0	30	STANDBY	OFF	MANUAL
MS-120 STEAM GENERATOR B STEAM SUPPLY TO FW-P-2	300	15	13	100	0	MANUAL

❑ ❑ **Enter/Verify the following SWITCH OVERRIDES:**

Override	Override To:	Trigger
PCV455C_OPEN RC-PCV-1455C OPEN POS PRZR RELIEF VALVE	OFF	11
PCV455C_ENABLE RC-PCV-1455C ENABLE POS OVERPRESS MITIGATION ENABLE	OFF	11

SIMULATOR CREW BRIEF

TRIGGER	TYPE	DESCRIPTION
1	MAN	Fails PZR Level CH III to 25%.
3	MAN	B SG MFRV controller fails low.
5	MAN	C SG PORV fails open
7	MAN	B Isophase Bus Duct High Temperature
9	MAN	Steam Generator Tube Leak, 20 gpm
11	MAN	Overrides 1-RC-PCV-1455C control switch in Close Overrides OPMS key switch for PCV-1455C in DISABLE
13	MAN	Close 1-MS-120 B SG supply to TDAFW Pump
16	AUTO	Open Breaker to 1-RC-MOV-1535
17	AUTO	Spurious Trip A/B/C RCPs when Gen. Output Bkrs open
30	ACTIVE	AS02 DISABLE SV-TV-102 OPEN AS03 DISABLE SV-TV-103 CLOSE SI2409 SI RELAY CI1A FAILS TO ACTUATE SI2505 SI RELAY SI5B FAILS TO ACTUATE AAC_SMS_MODE OFF AAC DG LOCAL MODE SWITCH POSITION

SIMULATOR CREW BRIEF

Verify the following control room setup:

- ❑ ❑ ❑ Place the simulator in RUN and verify normal 100% power operation indications.
- ❑ ❑ ❑ Verify All pink magnets collected from previous scenarios.
- ❑ ❑ ❑ Verify vertical board PCS monitor on ALARM SCREEN.
- ❑ ❑ ❑ Reset ICCMs.
- ❑ ❑ ❑ Verify all calcalc points are displayed on PCS: U9103, U9104, U9105V.
- ❑ ❑ ❑ Verify Component Switch Flags; 1-VS-F-58A and 1-VS-F-58B switches (AUTO AFTER STOP).
- ❑ ❑ ❑ Verify Brass Caps properly placed (Hi-Hi CLS, MSTVs, CH-MOV-1350, CW and SW MOVs, CTMT Hogger suction, CNDSR Vacuum breaker).
- ❑ ❑ ❑ Radiation Monitors all clear.
- ❑ ❑ ❑ Verify SG PORVs set for 1035 psig.
- ❑ ❑ ❑ Verify “D” bank rod height at 229 steps and Bank Overlap Counter at 612.
- ❑ ❑ ❑ Verify Chart recorders are on the correct scale (SF/FF and Tave/Tref) and speed (NI)
- ❑ ❑ ❑ Advance Charts.
- ❑ ❑ ❑ **Verify Air Ejector Discharge is aligned through 1-SV-TV-103 (all RMs reset).**
- ❑ ❑ ❑ Verify SYNC keys in proper place.
- ❑ ❑ ❑ Verify MOL reactivity plans and benchboard Reactivity Placard is current.
- ❑ ❑ ❑ Reset Blender Integrators for Boric Acid to 100 and PG to 1000.
- ❑ ❑ ❑ Verify Stop Watches are available for RO and BOP.
- ❑ ❑ ❑ Verify Simulator “Session In Progress” light is turned ON.
- ❑ ❑ ❑ Verify no persons are logged onto network computer to ensure no procedures displayed.
- ❑ ❑ ❑ Verify PCS time matches Sim time.

SIMULATOR CREW BRIEF

❑ ❑ ❑ Spot check all ARPs are clean, **verify** the following ARPs are clean.

1A-A3	1F-D8		
1A-B3	1G-E5		
1C-B8	1H-E6		
1C-D8	1-RM-G8		
1F-C8	1-RM-H8		

❑ ❑ ❑ Verify CLEAN copies of the following procedures are in place.

❑ AP-53.00 (2)	❑ AP-18.00	❑ AP-23.00	❑ AP-16.00
❑ AP-24.00	❑ E-0	❑ E-3	❑ ECA-3.3
❑ OP-CH-007		❑ Reactivity Sheet	
❑ OP-ZZ-002		❑ **PT-18.6I**	

SIMULATOR CREW BRIEF

Brief

This simulator performance scenario is performed in the EVALUATION MODE. You should not direct questions to the evaluators. Otherwise, you should perform as if you were in the MCR.

Your ability to maintain a log is not being graded, but maintaining a rough log is recommended to help during briefs.

If you need to communicate with the Unit 2 operator, verbally state, “Unit 2” and an instructor will locate to the Unit 2 area and respond to you as quickly as possible.

In the unlikely event that the simulator fails such that illogical indications result, the session will be terminated. In other words, respond to what you see. If there is a problem with the simulation, the session will be terminated or adjusted as appropriate based on the specific problem.

Assign operating positions.

	TEAM 1	TEAM 2	TEAM 3
SRO			
RO			
BOP			

Ask for and answer questions.

SIMULATOR OPERATOR'S GUIDE

Conduct shift turnover:

The initial conditions have Unit 1 is at 100% power with RCS boron concentration of 760 ppm.

Unit conditions have been stable at approximately 100% power since the last refueling outage.

All systems and crossties are operable with the following exception:

- AAC DG is tagged out for maintenance. In accordance with VPAP-2802, Notifications and Reports, Section 6.29.1, a review of Reportability is required if the AAC DG is out of service greater than 14 days.

Unit #2 is at 100% power with all systems and crossties operable.

Shift orders are to maintain 100% power on Unit #1 and upon relieving the watch, perform PT-18.6I, Pressurizer Block Valve Stroke Test. Performance of PT-18.6I has been authorized and has been PSA analyzed for current plant conditions.

The last shift performed two 35 gallon dilutions followed by a manual makeup. "A" BAST boron concentration is 8.0 w/%.

SIMULATOR OPERATOR'S GUIDE

Pre Session Checks:			
Safety Injection Section (Magnets)	**CW/SW Section**	**RCS Section**	**CVCS**
SI-MOV-1865A □ R □ G SI-MOV-1865B □ R □ G SI-MOV-1865C □ R □ G SI-MOV-1869A □ R □ G SI-MOV-1869B □ R □ G SI-MOV-1890A □ R □ G □ T/O SI-MOV-1890B □ R □ G □ T/O SI-MOV-1890C □ R □ G □ T/O Brass Cap □ CLS TR A □ CLS TR B	Brass Caps SW MOVs □ 103A □ 103B □ 103C □ 103D CW MOVs □ 106A □ 106B □ 106C □ 106D CW Inlet Throttle Plaques (10%) □ 100A □ 100B □ 100C □ 100D CTMT Hogger Suction Cap □	Tcold Loop Stop Pos (R – O) □ A □ B □ C Loop Bypass Valves (G – C) □ A □ B □ C Thot Loop Stop Pos (R - O) □ A □ B □ C SFP PPs Pwr □Norm □ Alt PZR Level Recorder □	Core Life Plaque □ Ramp Plan Book □ OP-RX-010 Book □ PG Int Set 1000 □ BA Int Set 100 □ Tavg/Tref Rec. □ NI-NR-B □ Group Step Ctrs □ CERPIs □ CH-MOV-1350 □
Main Steam/Feedwater	**Electrical/VSP**	**PCS**	**RM/WD/BR**
SG PORVs Set □ MSTV Caps □ A □ B □ C SF/FF Rec Scale □ Cond Vac Bkr Cap □	Synch Key □ SVB Power □ H □ J LO System Switches □ VS-F-58A Pwr □ H □ J □ Grn Flag VS-F-58B Pwr □ H □ J □ Grn Flag	PCS Main Screen U9103 □ U9104 □ U9105V □ Alarm Screen (List) □	RM-112 □ A □ B □ C RM-113 □ A □ B □ C Comm RM Pwr □ 1J □ 2J Synch Key □

Post Session Checks:
PCS Screens (Cleared/Display) □ RO □ BOP □ SM □ STA □ PCs Logged OFF (including Booth) □ Phone cleared □ Recall IC-1 □ Advance Charts □ Procedures Changed □ Red Light □ Binders Stored □ Trash Picked Up/Emptied □ Vacuum Req'd? □ Pink Magnets in Drawer □ BB and VB Scenario Magnets removed □ E-Mail to SSG Required □ DVD Finalized □ EAL Charts □ Note Pads □ Manning Sheets □ Sticky Tabs (SRO/SM/ARPs) □ Markers (ARPs) □ Personnel/Comms Tracking Sheets (Booth) □ Floor timers reset/In place □ Booth timers reset/In place □ Printers ready/have paper

SIMULATOR OPERATOR'S GUIDE

EVENT 1 **Test Cycle PORV Block Valves, 1-PT-18.6I**

BOOTH:
30 minutes prior to the beginning of the scenario, provide the team with a copy of 1-PT-18.6I, Pressurizer Block Valve Stroke Test. The team will pre-brief the PT prior to entering the simulator.

Trigger setup to trip 1-RC-MOV-1535 breaker when control switch in open to stroke test open time, Event 1. Monitor the following triggers as 1-RC-MOV-1535 is closed/opened.

Trigger 14 sets (becomes Active) when 1-RC-MOC-1535 closed.
Trigger 15 sets (becomes Active) when 1-RC-MOV-1535 control switch taken to open.
Trigger 16 sets when both Trigger 14 and 15 are TRUE.
Trigger 16 implements the Malfunction to trip 1-RC-MOV-1535 breaker.

Operations Supervisor/Management/Work Week Coordinator:

- **If contacted**, will acknowledge 1-RC-MOV-1535 breaker tripped when the valve was re-opened, suspension of the PT, and Tech Spec Clock identified (1 hour/72 hour).

Field Operator: (3 *minute delay from request to answer*)

- **If Contacted**, as Service Building Operator, to check the status of 1-RC-MOV-1535 breaker, 1H1-2S 6A; report that the breaker has tripped (in the "trip free" position).

STA:

- **If contacted,** will take responsibility for writing the CR.

SIMULATOR OPERATOR'S GUIDE

EVENT 2 **PRZR Level Transmitter 1-RC-LI-1461 Fail to 25%, 0-AP-53.00.**

When cued by examiner, implement **Trigger #1**.

Critical Task (CT-1): Stabilize Pressurizer Level prior to automatic OR manual Reactor Trip.

Operations Supervisor/Management:

- **If contacted**, will acknowledge the failure of 1-RC-LI-1461. The individual(s) contacted will also acknowledge any TS LCOs and entry into AP-53.00.
- **If contacted,** will recommend to the team that channels remain as they are for now (i.e., do not perform 1-OP-RP-001 at this time).
- **If contacted,** will take responsibility for writing the CR.

STA:

- **If contacted,** will take responsibility for writing the CR.
- **If the team has a transient brief:** The STA will state they have nothing to add.

Field Operators:

Maintenance/Work Week Coordinator:

- **If contacted**, will acknowledge instrumentation failure and commence investigations and/or efforts to place the channel in trip.

Unit 2 Operator:

- No action for this event.

Role play as other individuals as needed.

SIMULATOR OPERATOR'S GUIDE

EVENT 3 **"B" Main Feed Reg Valve Controller Fails Low, 0-AP-53.00.**

When cued by examiner, implement **Trigger #3**.

Critical Task (CT-2): Stabilize B SG Level prior to automatic OR manual Reactor Trip.

Operations Supervisor/Management:

- **If contacted**, acknowledge B MFRV controller failure.
- **If contacted,** will take responsibility for writing the CR.
- **If contacted,** will acknowledge entry into 0-AP-53.00.

STA:

- **If contacted**, will acknowledge B MFRV controller failure.
- **If contacted,** will take responsibility for writing the CR.
- **IF contacted:** CEP-0029 has been reviewed, Reg. Guide 1.97 only requires one channel of Feed Flow indication per steam generator. VPAP-2802 and TRM section 3.3 are not affected.
- **IF contacted:** acknowledge that TRM 3.3.5 requires the calorimetric program be changes from the Feedwater UFM System to the Normalized Feedwater Venturi System, within 1 hour; and, Restore the UFM system to FUNCTIONAL status in 48 hours.
- **If the team has a transient brief:** The STA will state they have nothing to add.

Field Operators:

- Will perform actions as directed.

Maintenance/ Work Week Coordinator:

- **If contacted**, will acknowledge the B MFRV controller failure and contact I&C to commence preparation to troubleshoot.

Unit 2:

- **If contacted**, will acknowledge the B MFRV controller failure.

Role-play as other individuals as needed.

SIMULATOR OPERATOR'S GUIDE

EVENT 4 **"C" SG PORV spuriously opens, 0-AP-53.00 and 1-AP-38.00.**

When the Evaluator indicates Ready, Activate Trigger #5.

Operations Supervisor/Management:

- **If contacted**, will acknowledge the failure of "C" SG PORV.
- **If contacted,** will take responsibility for writing the CR.
- **If contacted,** will acknowledge entry into 0-AP-53.00 and 1-AP-38.00.

STA:

- **If contacted**, will acknowledge the failure of "C" SG PORV.
- **If contacted,** will take responsibility for writing the CR.
- **If the team has a transient brief:** The STA will state they have nothing to add.

Maintenance/ Work Week Coordinator:

- **If contacted**, will acknowledge the failure and notify I&C to investigate.

Field Operators: *(Wait three (3) minutes from direction of a local action to the report of local condition found.)*

- **If contacted**, the operator will report no abnormalities observed locally at the "C" SG PORV.
- **If contacted**, the operator will report 1-MS-PI-101C indicates ~780 psig (at the Aux Shutdown Panel).

Unit 2:

- **If contacted**, will acknowledge the failure of "C" SG PORV.

Role-play as other individuals as needed.

SIMULATOR OPERATOR'S GUIDE

EVENT 5 **"B" Isophase Bus Duct High Temperature, ARP 1G-E5 and 0-AP-23.00.**

When the Evaluator is ready, implement Trigger # 7. (Annunciator 1G-E5 will alarm ~4 minutes after the trigger is inserted.)

Operations Supervisor/Management:

- **If contacted**, will acknowledge the high "B" Phase IBD Temperature.
- **If contacted**, will acknowledge the required 10% load reduction.
- **If contacted,** will take responsibility for writing the CR.
- **When contacted:** The Shift Manager will review EPIPs for applicability.

STA:

- **If contacted**, will acknowledge the high "B" Phase IBD Temperature.
- **If contacted,** will take responsibility for writing the CR.
- **When contacted:** The STA reports that he has completed his review of VPAP-2802 and no notifications are required.
- **If the team has a transient brief:** The STA will state they have nothing to add.
- **If asked,** will concur with the reactivity plan for the load reduction.

Unit 2 Operator:

- **If notified of Ramp:** Acknowledge ramp of Unit 1.

Field Operators:

- **If contacted**, the condensate polishing building operator will acknowledge the need to ramp the unit.
- **If contacted**, report the "B" Phase High Air Temperature drop is in.
- **If contacted**, report the temporary fans are staged for the isophase bus ducts.
- **NOTE:** ***To report IBD Air temperatures, convert PCS indication from °F to °C and report that value. To convert, use the following: (°F – 32°) x 5/9 = °C***

Role play as other individuals as needed.

SIMULATOR OPERATOR'S GUIDE

EVENT 6 **"B" SGTL 20 gpm, A/E RM Auto Actions Fail.**

When the Evaluator is ready, implement Trigger # 9.

Critical Task (CT-2): Manually align A/E discharge to containment IAW A/E RM ARP prior to SGTR.

Note: It would be preferable to wait until power is 90% to implement this failure to allow for ramp stabilization prior to creating RCS leak to allow the team to assess leakrate with more precision.

Operations Supervisor/Management:

- **If contacted**, will acknowledge RCS leakage into the 'B' SG. Will also acknowledge any TS information (time permitting) and information related to radiation monitors alarming.
- **If contacted,** will take responsibility for writing the WR and CR.
- **If contacted,** will take responsibility for writing the CR.
- **If contacted,** will acknowledge entry into 1-AP-16.00.

Unit 2 Operator:

- **When** radiation alarms sound on the radiation alarm panel, silence the alarms when directed and report the alarm to the Unit 1 SRO.
- **If asked,** Unit 2 will state they are unavailable to perform the ARPs or any actions associated with the ARPs. Unit 2 Operator will only silence and announce the alarms for A/E and Blowdown RM.
- **If contacted,** Unit Two has implemented 0-AP-50.00, and all conditions on U2 are normal.

STA:

- **If contacted**, will acknowledge the RCS leakage into the 'B' SG.
- **If asked** to calculate the RCS leak rate, state that it is difficult to ascertain at this time, but you will continue to monitor as time permits.
- **If contacted,** will take responsibility for writing the CR.
- **If the team has a transient brief:** The STA will state they have nothing to add.

Field Operators:

- **If contacted**, the air ejector loop seal temperatures are normal.

EVENT 7 **"B" SGTR (600) gpm). RCPs Trip on swap to RSST. 1-AP-16.00, 1-E-0, 1-E-3.**

SIMULATOR OPERATOR'S GUIDE

When Examiner ready, implement Trigger 11.

Critical Task (CT-3): Isolate feed flow to the ruptured SG before "B" SG NR Level reaches 100%.

Operations Supervisor/Management:

- **If contacted**, will acknowledge the SGTR on "B" SG.
- **If contacted,** will acknowledge entry into 1-E-0, 1-E-3.
- **If contacted,** will take responsibility for writing the WR and CR.
- **If contacted**, will acknowledge the isolation of 'B' SG (if informed).

STA:

- **If the team has a transient brief:** The STA will state they have nothing to add.

Unit Two:

- **If asked**, blowdown and air ejector RM readings are [*as indicated at the time*].
- **If requested**, acknowledge RM alarms, and perform ARP actions.
- **If asked:** Silence the alarms at the Fire Protection IMS Panel.
- **If contacted,** Unit Two has implemented 0-AP-50.00, and all conditions on U2 are normal.
- **If asked:** Unit 2 RWST cross-tie valves are open.
- **If asked:** take responsibility to notify HP of "B" SG PORV lifting.

Field Operators (3 minutes after being contacted):

- **If contacted**, report all RCP breakers (15A3, 15B3, 15C3) are open with no other abnormal conditions.
- **If contacted**, field operators will perform valve manipulations as required:
  - Closing 1-MS-120 – implement Trigger 13. When the Final value for MS_120 = 0, report 1-MS-120 is closed.
  - Acknowledge direction to place Number 1 and 2 Turbine Building Sump pumps in OFF locally, and initiate 0-OSP-PL-003, Turbine Building Sump Pump Status Verification.

SIMULATOR OPERATOR'S GUIDE

EVENT 8 **PZR PORV 1-RC-PCV-1455C not open, 1-ECA-3.3.**

Operations Supervisor/Management:

- **If contacted,** will acknowledge entry into 1-ECA-3.3.
- **If contacted**, will acknowledge the SGTR on "B" SG.
- **If contacted,** will take responsibility for writing the CR.
- **If contacted**, will acknowledge the isolation of 'B' SG (if informed).

STA:

- **If the team has a transient brief:** The STA will state they have nothing to add.

Unit Two:

- **If asked**, blowdown and air ejector RM readings are [*as indicated at the time*].
- **If requested**, acknowledge RM alarms, and perform ARP actions.
- **If contacted,** Unit Two has implemented 0-AP-50.00, and all conditions on U2 are normal.

Field Operators:

- **If contacted**, field operators will perform valve manipulations as required:
  - 1-MS-120 – set ms_120 to zero upon request

EVENT 9 **BOP Failures, 1-SI-P-1B no auto start, 1-CH-HCV-1200 A/B not close, 1-VS-MOD-103A not close, 1-MS-TV-109 and 1-DA-TV-100A/B not close.**

Operations Supervisor/Management:

- **If contacted,** will take responsibility for writing the WR and CR.

Unit Two:

- **If contacted,** Unit Two has implemented 0-AP-50.00, and all conditions on U2 are normal.
- **If asked,** MCR differential pressure is as found. Unit 2 will assume responsibility for throttling SW flow IAW E-0, Attachment 3 guidance.

SIMULATOR OPERATOR'S GUIDE

Field Operators:

- **If contacted**, field operators will perform valve manipulations as required.

Maintenance/Work Week Coordinator:

- **If contacted**, will acknowledge the failures and commence investigations.

HP:

- **If contacted**, will acknowledge "B" SGTR.

STA:

- **If asked**, will report that he will calculate the time to 'B' fill, time permitting.
- **If contacted**, will enter the control room and commence reviewing status trees and prepare for the transient brief (items are reported "as you see them or previously reported").

Role play as other individuals as needed.

The scenario will end upon reaching Step 11 of 1-ECA-3.3 or at the lead examiners discretion.

U.S. Nuclear Regulatory Commission
Surry Power Station

SR21301
Simulator Job Performance Measure [KA: 024AA1.17 3.9/3.9]
[Alternate Path]

Applicant________________________________ Start Time___________________

Examiner_______________________________

Date ___________________________________ Stop Time___________________

Title

Emergency Borate the RCS in accordance with 1-AP-3.00, Emergency Boration

K/A: 024AA1.17, Ability to operate and / or monitor the following as they apply to Emergency Boration: Emergency borate control valve and indicators (3.9 / 3.9).

Applicability	**Validation Time**	**Actual Time**
RO/SRO(I)/SRO(U)	7 Minutes	____ Minutes

Conditions

- Task is to be PERFORMED in the simulator.

Standards

- Manually adjusts Charging flow to > 75 gpm.
- Attempts to open 1-CH-MOV-1350.
- Aligns charging to RWST (Sequence Critical):
    - Opens 1-CH-MOV-1115B OR D.
    - CLOSES 1-CH-MOV-1115C OR E.

Procedures

- 1-AP-3.00, Emergency Boration.

Tools and Equipment

- None

Safety Considerations

- None

Simulator Setup

- Recall 100% power IC and initialize or recall IC-381. Place simulator in RUN.
- Set 1-CH-MOV-1350 to thermal on auto trigger when .001 open. CH73 Trigger 1, Auto Trigger Event CHMOV350 .ge. 0.0001".
- Insert meter Override CHFI110, EMRG BORATE FLOW, 0, ACTIVE.
- Trip Reactor and Stabilize at Hot Shutdown.
- Adjust CH flow using 1-CH-LC-1459G to 50 gpm and return to Auto.

PERFORMANCE CHECKLIST

Notes to the Evaluator

- Task critical elements are bolded and denoted as a **CRITICAL STEP**.
- *An additional instructor may be needed to silence alarms for the examinee.*
- **START TIME_______:**

STEP 1 NOTES Prior to Step 1 (AP-3.0 step 1) • If a Reactor Trip occurs or is required, 1-E-0, REACTOR TRIP OR SAFETY INJECTION, should be implemented. • When the Reactor is shutdown with the Shutdown Banks withdrawn, tripping the Shutdown Banks may eliminate the need for emergency boration. **STANDARD:** • Acknowledges Notes. **EVALUATOR'S NOTE:** **COMMENTS:**	**_______ SAT** **_______ UNSAT**
STEP 2 (CRITICAL STEP) CHECK CHARGING FLOW – GREATER THAN 75 GPM (AP-3.0 step 1) **STANDARD:** a) Checks CHG Line Flow on 1-CH-FI-1122A and identifies flow < 75 gpm. b) Goes to Step 1 RNO c) **Manually adjusts charging flow to greater than 75 gpm. CRITICAL STEP** • Using 1-CH-LC-1459G, PRZR LEVEL CNTRL, in Manual -OR- • Using 1-CH-FCV-1122, CHG FLOW CNTRL in Manual **EVALUATOR'S NOTE:** NONE. **COMMENTS:**	**_______ SAT** **_______ UNSAT**

STEP 3 START EMERGENCY BORATION (AP-3.0 step 2a) a) Transfer the in-service BATP to FAST. **STANDARD:** • Places control switch for 1-CH-P-2A, Boric Acid Transfer Pump to FAST. • Identifies RED "Slow" Light - OUT; RED "FAST" light - LIT • Acknowledges Annunciator 1D-C5, BA XFER PPS NON-AUTO CONT. **EVALUATOR'S NOTE:** NONE. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 4 (CRITICAL STEP) START EMERGENCY BORATE (AP-3.0 step 2b) NOTE: Opening breaker prior to local operation of 1-CH-MOV-1350 is NOT required in this AP, based on the urgent need to borate. b) Open 1-CH-MOV-1350. **STANDARD:** a) Acknowledges Note. b) **Open 1-CH-MOV-1350. CRITICAL STEP** • Removes Brass Cap on 1-CH-MOV-1350 control switch and places in OPEN position. • Identifies RED and GREEN MOV Indicating lights extinguish. • Identifies "0" indicated flow on 1-CH-FI-1110, EMRG BORATE FLOW indicator. • Reports trip indication for 1-CH-MOV-1350 to Evaluator. • **GOES to Step 2b) RNO. (This begins the Faulted Portion of the JPM).** **EVALUATOR'S NOTE:** **When Notified**: Acknowledge 1-CH-MOV-1350 indication report. **IF asked**: Will direct electricians to investigate MCC 1H1-2S 7C breaker status. **BOOTH OPERATOR**: **IF Asked**: Report that a time compression has occurred and 1-CH-P-2A breaker MCC-1H1-2S 7C Thermal Overload is tripped. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 5 (CRITICAL STEP) START EMERGENCY BORATION (AP-3.0 step 2b RNO) Locally open 1-CH-MOV-1350. <u>IF</u> 1-CH-MOV-1350 can NOT be opened, <u>THEN</u> do the following: 1) Manually open 1-CH-FCV-1113A. 2) Locally open 1-CH-228. 3) Monitor Boric Acid flow on FR-1-113. 4) GO TO Step 3. 5) If neither valve can be opened, <u>THEN</u> manually align CHG pump suction to the RWST <u>AND</u> GO TO Step 5. **STANDARD:** a) Directs Auxiliary Building Operator to locally open 1-CH-MOV-1350, Emergency Borate MOV. b) Acknowledges Statement: "IF 1-CH-MOV-1350 can NOT be opened…:" c) Manually open 1-CH-FCV-1113A. • Checks 1-CH-FCV-1113A indicates open. • Places 1-CH-FCV-1113A control switch in OPEN. d) Directs Auxiliary Building Operator to Open 1-CH-228. e) Monitors for Boric Acid flow on FR-1-1113 (red trace). f) Acknowledge Statement "IF neither valve can be opened, THEN manually align CHG pump suction to the RWST AND GO TO Step 5. **g) Opens 1-CH-MOV-1115B <u>AND</u> 1-CH-MOV-1115D,** CH Pump Suction from RWST. **<u>CRITICAL STEP, and Sequence Critical</u>:** Either 1-CH-MOV-1115B **<u>OR</u> 1**-CH-MOV-1115D **<u>OPEN</u>** will provide the necessary flowpath to the CH Pump and will satisfy the Critical Step. **This must be done before closing 1-CH-MOV-1115C, and 1115E.** **h) Closes 1-CH-MOV-1115C <u>AND</u> 1-CH-MOV1115E,** CH Pump Suction From VCT. **<u>Critical Step.</u>** Either 1-CH-MOV-1115C **<u>OR</u>** 1-CH-MOV-1115E **<u>CLOSED</u>** will isolate the CH pump suction from the VCT and will satisfy the Critical Step**.** Goes to Step 5 . **EVALUATOR'S NOTE:** **CUE:** Another operator will take over from here. **BOOTH OPERATOR:** **If Directed**: Report that a "Time Compression has occurred" and MCC 1H1-2S 7C breaker is open. **When Directed**: Report that a 'Time Compression has occurred" and 1-CH-MOV-1350 motor will not disengage, and the handwheel will not move. **When Directed**: Report that a 'Time Compression has occurred" and 1-CH-228 handwheel spins without changing valve stem position. **After flow from the RWST**; Announce the following: "Time compression, Shutdown Margin has been verified. **COMMENTS:** **END OF JPM**	_______ **SAT** _______ **UNSAT**

STOP TIME: _______

Operator Directions Handout
(TO BE READ TO APPLICANT BY EXAMINER)

Initiating Conditions

Unit 1 tripped approximately 10 minutes ago. The STA just informed the Team that we have a challenge to our shutdown margin requirements based on RCS boron results just obtained from Chemistry. The STA recommends a twenty (20) minute emergency boration.

Initiating Cues

- Here is a copy of 1-AP-3.00, Emergency Borate. Your task is to Emergency Borate from the Boric Acid Storage tanks for twenty (20) minutes in accordance with 1-AP-3.00.
- When you finish the actions necessary to accomplish this, please inform me.

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Initiating Conditions

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- When you finish the actions necessary to accomplish this, please inform me.

Dominion Energy

SURRY POWER STATION

ABNORMAL PROCEDURE

NUMBER	PROCEDURE TITLE	REVISION
1-AP-3.00	EMERGENCY BORATION (WITH 1 ATTACHMENT)	6
		PAGE 1 of 4

PURPOSE

To provide guidance for conditions requiring and methods of emergency boration.

ENTRY CONDITIONS

1) Unexplained rise in Source Range count rate when shutdown.

2) Any transient that challenges the Tech Spec shutdown margin of 1.77% $\Delta K/K$.

3) Failure of normal boration methods or effectiveness.

4) Shift Supervision direction.

CONTINUOUS USE

STEP	ACTION/ EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE:
- If a Reactor Trip occurs or is required, 1-E-0, REACTOR TRIP OR SAFETY INJECTION, should be implemented.
- When the Reactor is shutdown with the Shutdown Banks withdrawn, tripping the Shutdown Banks may eliminate the need for emergency boration.

STEP	ACTION/ EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1.___	CHECK CHARGING FLOW - GREATER THAN 75 GPM	☐ Manually adjust charging flow to greater than 75 gpm.
2.___	START EMERGENCY BORATION	
	☐ a) Transfer the in-service BATP to FAST	a) Manually align CHG pump suction to the RWST: ☐ 1) Open 1-CH-MOV-1115B and D. ☐ 2) Close 1-CH-MOV-1115C and E. ☐ 3) GO TO Step 5.

NOTE: Opening breaker prior to local operation of 1-CH-MOV-1350 is NOT required in this AP, based on the urgent need to borate.

STEP	ACTION/ EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	☐ b) Open 1-CH-MOV-1350	☐ b) Locally open 1-CH-MOV-1350. IF 1-CH-MOV-1350 can NOT be opened, THEN do the following: ☐ 1) Manually open 1-CH-FCV-1113A. ☐ 2) Locally open 1-CH-228. ☐ 3) Monitor Boric Acid flow on FR-1-113 (red trace). ☐ 4) GO TO Step 3. ☐ IF neither valve can be opened, THEN manually align CHG pump suction to the RWST AND GO TO Step 5.

(STEP 2 CONTINUED ON NEXT PAGE)

STEP	ACTION/ EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2.	START EMERGENCY BORATION (Continued)	
	c) Monitor EMRG BORATE FLOW	
☐	• 1-CH-FI-1110	
3.___	STOP BORATION WHEN DESIRED	
☐	a) Close 1-CH-MOV-1350	a) Locally close: ☐ • 1-CH-MOV-1350 OR ☐ • 1-CH-228 ☐ b) Check or place 1-CH-FCV-1113A in Auto.
☐	b) Transfer the in-service BATP to AUTO	
4.___	TURN ALL PRZR HEATERS ON	
5.___	CHECK UNIT - AT POWER	☐ GO TO Step 8.
6.___	CHECK REACTOR AND TURBINE POWER - MATCHED AND STABLE	☐ Manually adjust control rods or turbine power as necessary. ☐ IF plant parameters can NOT be stabilized AND a Reactor Trip is imminent, THEN trip the Reactor and GO TO 1-E-0, REACTOR TRIP OR SAFETY INJECTION.
7.___	CHECK ΔFLUX - IN BAND	☐ Borate, dilute, or adjust control rod height as necessary to return Δflux to operating band.

STEP	ACTION/ EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE: Emergency boration has raised the boric acid concentration to the RCP seals.

STEP	ACTION/ EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8. ___	CHECK CHARGING FLOW	
	☐ a) Charging flow control - IN AUTO	☐ a) Put charging flow control in AUTO.
	☐ b) Charging flow - STABLE	☐ b) IF charging flow can NOT be controlled in AUTO, THEN put charging flow in MANUAL.
9. ___	CHECK CHG PUMP SUCTION - ALIGNED TO THE VCT	Align CHG pump suction to the VCT: ☐ a) Open 1-CH-MOV-1115C and E. ☐ b) Close 1-CH-MOV-1115B and D.
10. ___	CONSULT WITH CHEMISTRY AND SHIFT SUPERVISION AND DEENERGIZE PRZR HEATERS IAW 1-OP-RC-019, PRESSURIZER BACKUP HEATER OPERATION	
11. ___	NOTIFY THE FOLLOWING: ☐ • STA ☐ • Chemistry ☐ • OM on call ☐ • Reactor Engineer	

- END -

U.S. Nuclear Regulatory Commission
Surry Power Station

SR21301
Simulator Job Performance Measure 013A4.01
[Alternate Path]

Applicant________________________________	Start Time___________________
Examiner_______________________________	
Date ___________________________________	Stop Time___________________

Title

Transfer the SI System to the Cold Leg Recirculation Mode

K/A: 006A3.08 Ability to monitor automatic operation of the ECCS, including: Automatic transfer of ECCS flowpaths. (4.2/4.3)

Applicability	**Validation Time**	**Actual Time**
RO/SRO(I)	10 Minutes	______ minutes

Conditions

- Task is to be PERFORMED in the simulator.

Standards

- Determines only one LHSI pump in service and secures 1-CH-P-1B and places in PTL.
- Manually initiate RMT by depressing both Train RMT pushbuttons simultaneously.
- Opens 1-SI-MOV-1860B by placing control switch to OPEN.
- Closes 1-SI-MOV-1862B by placing control switch to CLOSE after 1-SI-MOV-1860B is FULL OPEN.
- Closes 1-CH-MOV-1115B by placing control switch to CLOSE.
- Closes 1-CH-MOV-1115D by placing control switch to CLOSE.
- Long term RMT established before SI pump cavitates as indicated by fluctuating amps and discharge pressure.

Procedures

- 1-ES-1.3, Transfer to Cold Leg Recirculation. (Rev. 20)

Tools and Equipment	**Safety Considerations**
• None	• None

Simulator Setup

- Recall **IC-382**.

  -OR-

- Call up 100% power IC and initialize. Place simulator in RUN.
- Initiate malfunction for “A” loop cold leg rupture (RC0101).
- Perform E-0 & transition to 1-E-1. Perform 1-E-1 through Step 21, which checks for transition to ES-1.3.
- Two (2) LHSI pumps, two (2) HHSI pumps & all ISRS pumps, OSRS pumps and CS pumps should be running. HHSI pumps should be on redundant flowpath alignment and charging pump mini-flow recirc valves should be closed.
- When RWST level is 21% insert the following malfunctions:
  - EL1201 – Loss of 480v Emergency Switchgear 1H. This will result in loss of power to 1-RS-P-1A (ISRS), 1-RS-P-2A (OSRS), and 1-SI-P-1A (LHSI). The red lights should remain lit, but there will be no amps indicated for these pumps.
  - SI1701, 1702. This will cause a loss of RMT (AUTO).
  - SI29. This will disable SI-MOV-1860B from auto opening.
  - SI31. This will disable SI-MOV-1862B from auto closing.
  - CH78, 79. This will disable CH-MOV-1115B and D from auto closing.
- When RWST level is 20% (RWST LOW LEVEL alarm is LIT), freeze simulator for performance.

Notes

- When possible place Simulator in RUN prior to the candidate entering the Simulator.

PERFORMANCE CHECKLIST

Notes to the Evaluator

- Task critical elements are **bolded**.
- *An additional instructor may be needed to silence and acknowledge alarms for the examinee.*
- **START TIME:**

STEP 1: CAUTIONS and NOTES Prior to Step 1. **STANDARD:** a) Reads caution that SI recirc flow to RCS must be maintained at all times. b) Reads caution that transfer to recirculation may cause high radiation in the Auxiliary Building. c) Notes that Steps 1 through 5 should be performed without delay and FRs should not be implemented before completion of these steps. d) Notes that if sump blockage or a complete loss of sump suction capability occurs, FRs should NOT be implemented until directed in Attachment 1, or in 1-ECA-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION. **COMMENTS:**	**_______ SAT** **_______ UNSAT**
STEP 2: CHECK OR PLACE BOTH RMT MODE TRANSFER SWITCHES IN RMT. *(Step 1)* **STANDARD:** Verifies BOTH RMT Transfer Switches in RMT position. **COMMENTS:**	**_______ SAT** **_______ UNSAT**

STEP 3: RESET SI. *(Step 2)* **STANDARD:** Depresses both SI Reset Pushbuttons on Benchboard 1-1. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 4: CHECK SI RECIRC PHASE HEAT SINK. *(Step 3)* Check SW flow established to at least two RSHXs. *(Step 3a)* **STANDARD:** Checks the following flow indications for SW flow to at least two RS HXs: a) 1-SW-FI-106A (SW flow to "A" RSHX). b) 1-SW-FI-106B (SW flow to "B" RSHX). c) 1-SW-FI-106C (SW flow to "C" RSHX). d) 1-SW-FI-106D (SW flow to "D" RSHX). **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 5: Check AC emergency buses - ENERGIZED BY OFF-SITE POWER. *(Step 3b)* **STANDARD:** a) Checks "H" Bus voltage indicated (between 4000 and 4400 volts). b) Checks "H" Bus normal supply breaker, 15H8, closed (red light on & green off). c) Checks "J" Bus voltage indicated (between 4000 and 4400 volts). d) Checks "J" Bus normal supply breaker, 15J8, closed (red light on & green off). **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 6: Check RS pumps associated with RSHXs supplied by SW - AT LEAST TWO RUNNING. *(Step 3c)* **STANDARD:** Checks if the following pumps to determine if at least two are running: a) 1-RS-P-1A (associated w/ A RSHX) – breaker closed BUT NO AMPS INDICATED. b) 1-RS-P-1B (associated w/ B RSHX) – breaker closed, amps indicated. c) 1-RS-P-2A (associated w/ C RSHX) – breaker closed BUT NO AMPS INDICATED. d) 1-RS-P-2B (associated w/ D RSHX) - breaker closed, amps indicated. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 7: **CRITICAL STEP** CHECK LHSI PUMPS. *(Step 4)* LHSI pumps – BOTH RUNNING. *(Step 4a)* IF RCS pressure is less than 185 psig AND only one LHSI pump can be started then run only ONE CHG pump. IF SI headers are split, then run the CHG pump supplying the normal header and place the remaining CHG pump in PTL. **STANDARD:** a) Checks 1-SI-P-1A breaker indication red light on BUT NO amps indicated. b) Check RCS Pressure – LESS THAN 185 psig. • Checks 1-SI-P-1B breaker indication red light on and amps indicated. • **Determines only one LHSI pump in service and secures 1-CH-P-1B and places in PTL. CRITICAL STEP** (the 'B' CHG pump is supplying the alternate header**).** • Verifies 1-CH-P-1A in PTL. • Checks RCS Pressure is less than 185 psig (yes). **EVALUATOR'S NOTE:** • **Cue: If asked about SI headers,** state that SI headers are split. Note: this is also given under Initial Conditions. • **NOTE:** The operator can determine which pump is running on the normal and alternate headers by vertical board indication. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 8: ALIGNS SI SYSTEM FOR RECIRC. *(Step 5a & b)* • CAUTION: If suction source is lost to any SI or CS pump, the pump should be stopped. a) Close CHG pump miniflow recirc valves • 1-CH-MOV-1275A • 1-CH-MOV-1275B • 1-CH-MOV-1275C b) RWST Level – LESS THAN 13% **STANDARD** a) Checks 1-CH-MOV-1275A, 1275B, and 1275C closed by observing green light on and red light off for each MOV. b) Checks RWST level less than 13% on the following indicators: • 1-CS-LI-100A • 1-CS-LI-100B • 1-CS-LI-100C • 1-CS-LI-100D 1) If RWST level not less than 13%, waits for level to reach 13%. **EVALUATOR'S NOTE:** If annunciators 1A-A2, 1A-B2, 1A-C2, and 1A-D2 are lit, the operator should identify auto RMT failure and proceed to Step 5c. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 9: **CRITICAL STEP** Check Phase 1 - INITIATED. *(Step 5c(1) and RNO)* **STANDARD:** a) Checks Phase 1 White Status light NOT lit. (Goes to RNO) **b) Pushes both RMT actuation pushbuttons for Train A.** **c) Pushes both RMT actuation pushbuttons for Train B.** d) Verifies RMT has actuated and that valves automatically align. **EVALUATOR'S NOTE:** • Phase 1 White Status light is lit. (Alternate Path) • RMT actuation pushbuttons will function when pushed. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 10: LHSI discharge to HHSI - OPEN. *(Step 5c(2))* **STANDARD:** a) Checks OPEN 1-SI-MOV-1863A by observing red light on and green light off. b) Checks OPEN 1-SI-MOV-1863B by observing red light on and green light off. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 11: LHSI Recirc valves - CLOSED. *(Step 5c(3))* **STANDARD:** a) Checks CLOSED 1-SI-MOV-1885A closed by observing green light on & red off. b) Checks CLOSED 1-SI-MOV-1885B closed by observing green light on & red off. c) Checks CLOSED 1-SI-MOV-1885C closed by observing green light on & red off. d) Checks CLOSED 1-SI-MOV-1885D closed by observing green light on & red off. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 12: Check Phase 2 - INITIATED. *(Step 5d(1) and RNO)* **STANDARD:** a) Checks Phase 2 Amber Status light LIT. b) Ensures 1 minute elapsed since RMT *should have actuated* prior to continuing. **EVALUATOR'S NOTE:** • Phase 2 amber light will automatically light <u>one minute after Phase 1</u>. • Phase 2 amber light will work, but only the 'A' train will respond. This is the train that has the de-energized LHSI pump. The 'B' train will not automatically respond, requiring the operator to manually align the 'B' train. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

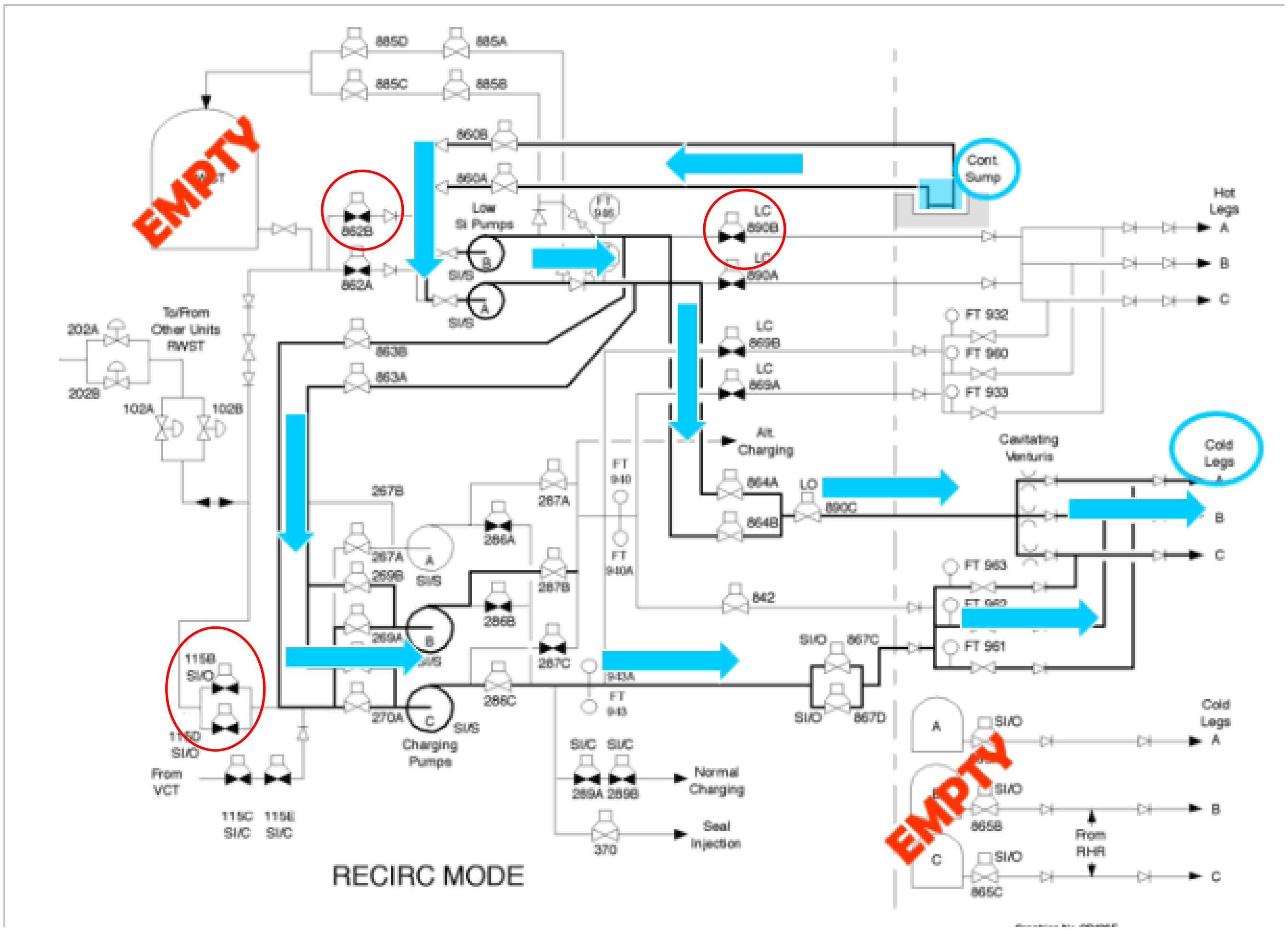
STEP 13: **CRITICAL STEP** LHSI suction from sump - OPEN. *(Step 5d(2))* **STANDARD:** a) Checks OPEN 1-SI-MOV-1860A open by observing red light on & green off. **b) Opens 1-SI-MOV-1860B by placing control switch to OPEN. CRITICAL STEP** c) Checks 1-SI-MOV-1860B open by observing red light on & green off. **EVALUATOR'S NOTE:** These valves take approximately 1 minute to open. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 14: **CRITICAL STEP** LHSI suction from RWST - CLOSED. *(Step 5d(3))* **STANDARD:** a) Checks CLOSED 1-SI-MOV-1862A closed by observing green light on & red off. **b) Closes 1-SI-MOV-1862B by placing control switch to CLOSE. CRITICAL STEP. Note: MOV-1862B should not be closed until after MOV-1860B is FULL OPEN.** c) Checks 1-SI-MOV-1862B closed by observing green light on & red off. **EVALUATOR'S NOTE:** • Fully opening 1-SI-MOV-1860B prior to closing 1-SI-MOV-1862B ensures a suction flow path to the "B" Low Head SI Pump. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 15: CRITICAL STEP.	
CHG pump suction from RWST valves - CLOSED. *(Step 5d(4))* **STANDARD:** **a) Closes 1-CH-MOV-1115B by placing control switch to CLOSE. CRITICAL STEP.** b) Checks 1-CH-MOV-1115B closed by observing green light on & red off. **c) Closes 1-CH-MOV-1115D by placing control switch to CLOSE. CRITICAL STEP.** d) Checks 1-CH-MOV-1115D closed by observing green light on & red off. **EVALUATOR'S NOTE:** • Both 1-CH-MOV-1115B, and 1115D need to be CLOSED to isolate this suction path. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 16: Check recirculation flow - ESTABLISHED. *(Step 5e)* **STANDARD:** **Verifies SI flow to the Rx core via cold leg flowpath by checking the following flow instrumentation: CRITICAL STEP. Recirc flow should be established prior to any indication of pump cavitation. Pump cavitation is indicated by fluctuating pump amps (1-SI-P-1B) and flow fluctuations (1-SI-FI-1946)** • 1-SI-FI-1945 (A LHSI FT) – 0 gpm, • 1-SI-FI-1946 (B LHSI FT) - ~3400 gpm, • 1-SI-FI-1961 (A Loop FT) - ~ 150 gpm, • 1-SI-FI-1962 (B Loop FT) - ~ 150 gpm, • 1-SI-FI-1963 (C Loop FT) - ~ 150 gpm, • 1-SI-FI-1943 (Total flow normal hdr) - ~440 gpm, • 1-SI-FI-1943A (Total flow normal hdr) - ~ 440 gpm, • 1-SI-FI-1940 (Total flow alt hdr) – 0 gpm, • 1-SI-FI-1940A (Total flow alt hdr) – 0 gpm. **EVALUATOR'S NOTE:** • No flow should be noted on the "A" LHSI and Alternate Header flow indicators since 1-SI-P-1A has no power and only the Charging Pump aligned to the Normal Header is running. • **NOTE: Indications of pump cavitation would constitute failure of this JPM.** • **CUE:** Another operator will take over from here. **COMMENTS:** **END**	_______ **SAT** _______ **UNSAT**

STOP TIME: _________

Simplified drawing of RECIRC MODE. Shown in red circles are the MOVs the operator will need to manually operate in order to place the 'B' train in RMT.



Operator Directions Handout
(TO BE READ TO APPLICANT BY EXAMINER)

Initial Conditions

- A Large-Break LOCA has occurred on Unit 1.
- A few minutes ago, power was lost to 480V switchgear 1H. Electrical maintenance has been dispatched to investigate.
- RWST level is lowering and the team has just transitioned to 1-ES-1.3.
- The SI headers are split.

Initiating Cue

- Perform steps 1-5 of 1-ES-1.3, Transfer to Cold Leg Recirculation.

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Initial Conditions

- A Large-Break LOCA has occurred on Unit 1.
- A few minutes ago, power was lost to 480V switchgear 1H. Electrical maintenance has been dispatched to investigate.
- RWST level is lowering and the team has just transitioned to 1-ES-1.3.
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Initiating Cue

- Perform steps 1-5 of 1-ES-1.3, Transfer to Cold Leg Recirculation.

SURRY POWER STATION

EMERGENCY PROCEDURE

NUMBER	PROCEDURE TITLE	REVISION
1-ES-1.3	TRANSFER TO COLD LEG RECIRCULATION (WITH 3 ATTACHMENTS)	21
		PAGE 1 of 11

PURPOSE

To provide guidance to transfer the Safety Injection System to the cold leg recirculation mode.

TIME CRITICAL ACTIONS

ENTRY CONDITIONS

This procedure is applicable when RCS temperature is greater than or equal to 350°F assuming RHR is not in service. Using this procedure in any other plant condition requires a step by step evaluation to determine if a specified action is still applicable.

Transition from any of the following procedures:

- 1-E-1, LOSS OF REACTOR OR SECONDARY COOLANT,
- 1-ECA-2.1, UNCONTROLLED DEPRESSURIZATION OF ALL STEAM GENERATORS,
- From any other emergency response procedure whenever RWST level reaches 20%.

CONTINUOUS USE

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

* *

CAUTION:
- SI recirculation flow to RCS must be maintained at all times.
- Transfer to recirculation may cause high radiation in the Auxiliary Building.

* *

NOTE:
- Steps 1 through 5 should be performed without delay. FRs should NOT be implemented before the completion of these steps.
- If sump blockage or a complete loss of sump suction capability occurs, FRs should NOT be implemented until directed in Attachment 1, or in 1-ECA-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION.

1.___ CHECK OR PLACE BOTH RMT MODE TRANSFER SWITCHES IN RMT

2.___ RESET SI

3.___ CHECK SI RECIRC PHASE HEAT SINK

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
☐ a) Check SW flow established to at least two RS HXs	☐ a) IF less than 24 hours after reactor trip, THEN establish SW flow to at least two RS HXs. ☐ IF greater than 24 hours after reactor trip, THEN establish SW flow to at least one RS HX.
☐ b) Check AC emergency buses - ENERGIZED BY OFFSITE POWER	☐ b) Stop CC and RHR pump(s) energized by EDG(s).
c) Check RS pumps associated with RS HXs supplied by SW - AT LEAST TWO RUNNING ☐ • 1-RS-P-1A RS HX A ☐ • 1-RS-P-1B RS HX B ☐ • 1-RS-P-2A RS HX C ☐ • 1-RS-P-2B RS HX D	☐ c) Start RS pump(s) associated with RS HX(s) supplied by SW.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4.___	CHECK LHSI PUMPS	
	☐ a) LHSI pumps - BOTH RUNNING	a) Do the following: ☐ IF RCS pressure is less than 185 psig, THEN start both LHSI pumps. IF RCS Pressure is less than 185 psig AND only one LHSI pump can be started, THEN run only one CHG pump IAW the following: ☐ 1) IF SI headers are split, THEN run the CHG pump supplying the normal header AND place remaining CHG pumps in PTL. ☐ 2) IF SI headers are NOT split, THEN run ONE CHG pump in the preferred order - C, B, A, AND place remaining CHG pumps in PTL. ☐ IF RCS pressure is greater than 185 psig, THEN check running or start only one LHSI pump. ☐ IF no LHSI pumps can be started, THEN GO TO 1-ECA-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION. ☐ GO TO Step 5.
	☐ b) Check RCS Pressure - LESS THAN 185 PSIG	☐ b) Stop one LHSI pump and place in PTL.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

* *

CAUTION: If suspension source is lost to any SI or spray pump, the pump should be stopped.

* *

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5.___	ALIGN SI SYSTEM FOR RECIRC	
	a) Close CHG pump miniflow recirc valves	☐ a) Manually close 1-CH-MOV-1373.
	☐ • 1-CH-MOV-1275A ☐ • 1-CH-MOV-1275B ☐ • 1-CH-MOV-1275C	☐ IF 1-CH-MOV-1373 does NOT close manually, THEN locally close.
	☐ b) RWST Level - LESS THAN 13%	☐ b) Do NOT continue. WHEN RWST level less than 13%, THEN GO TO Step 5c.
	c) Check Phase 1 - INITIATED	c) Initiate RMT.
	☐ 1) White Phase 1 Status light on bench board - LIT	☐ Push both RMT actuation pushbuttons for each train.
	2) LHSI discharge to HHSI - OPEN ☐ • 1-SI-MOV-1863A ☐ • 1-SI-MOV-1863B	☐ IF RMT has NOT actuated, THEN manually align valves.
	3) LHSI recirc valves - CLOSED ☐ • 1-SI-MOV-1885A ☐ • 1-SI-MOV-1885B ☐ • 1-SI-MOV-1885C ☐ • 1-SI-MOV-1885D	

(STEP 5 CONTINUED ON NEXT PAGE)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5.	ALIGN SI SYSTEM FOR RECIRC (Continued)	
	d) Check Phase 2 - INITIATED	☐ d) IF swap over does NOT occur after 1 minute time delay, THEN manually align valves.
☐	1) Amber Phase 2 Status light on bench board - LIT	
	2) LHSI suction from sump - OPEN	
☐	• 1-SI-MOV-1860A	
☐	• 1-SI-MOV-1860B	
	3) LHSI suction from RWST - CLOSED	
☐	• 1-SI-MOV-1862A	
☐	• 1-SI-MOV-1862B	
	4) CHG pump suction from RWST valves - CLOSED	
☐	• 1-CH-MOV-1115B	
☐	• 1-CH-MOV-1115D	
☐	e) Check recirculation flow - ESTABLISHED	☐ e) Start pumps and align valves. ☐ IF at least one flow path from the sump to the RCS can NOT be established or maintained, THEN GO TO 1-ECA-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION.

U.S. Nuclear Regulatory Commission
Surry Power Station

SR21301
Simulator Job Performance Measure [KA: 038EA1.04 4.3/4.1]

Applicant________________________________ Start Time___________________

Examiner_______________________________

Date ___________________________________ Stop Time___________________

Title

Depressurize the RCS to minimize SGTR Breakflow.

K/A: 038EA1.04, Ability to operate and / or monitor the following as they apply to a SGTR: PZR spray, to reduce coolant system pressure (4.3 / 4.1).

Applicability	Validation Time	Actual Time
RO/SRO(I)/SRO(U)	10 Minutes	____ Minutes

Conditions

- Task is to be PERFORMED in the simulator.

Standards

- Opens both Pressurizer Spray valves to begin depressurization.
- Determines Spray Termination is satisfied.
- Closes both Pressurizer Spray valves to stop depressurization prior to the Pressurizer reaching Solid conditions.

Procedures

- 1-E-3, Steam Generator Tube Rupture.

Tools and Equipment

- None

Safety Considerations

- None

Simulator Setup

- Initialize Simulator to IC #383 OR Call up 100% power IC and perform the following:
    - Enter malfunction for SGTR in "B" SG at ~450 gpm (RC2402 @ 50% degradation).
    - Call up the "B" Main Steam line & close 1-MS-120.
    - Place sim in RUN, trip Unit, perform 1-E-0 and transition to 1-E-3. Perform 1-E-3 up to Step 19, (incl SI blocks). RCPs should still be running & subcooling greater than 50°F. Throttle AFW flow to A & C SGs down to ~175 gpm.
    - Verify SR NIS detectors are energized and the SR scale is indicated on 1-NI-NR-A/B.
    - Freeze simulator until ready for JPM performance.

PERFORMANCE CHECKLIST

Notes to the Evaluator

- Operator is given a copy of 1-E-3, SGTR, Step 19 during directions
- Task critical elements are bolded and denoted as a **CRITICAL STEP**.
- *An additional instructor may be needed to silence alarms for the examinee.*
- **START TIME_______:**

STEP 1 1-E-3 Step 19 a) Check normal spray – AVAILABLE • RCP C AND 1-RC-PCV-1455B - BOTH AVAILABLE OR • RCPs A and B, AND 1-RC-PCV-1455A – BOTH AVAILABLE **STANDARD:** a) Checks all RCPs are running. b) Checks both Pressurizer Spray valves are in AUTO. **EVALUATOR'S NOTE:** **COMMENTS:**	**_______ SAT** **_______ UNSAT**

STEP 2 (CRITICAL STEP) 1-E-3 Step 19, continued b) Spray PRZR with maximum available spray **STANDARD:** **a) Places PZR spray valve controllers (1-RC-PC-1444G and 1-RC-PC-1444H) in MANUAL and raises valve demand to open both for maximum available spray. CRITICAL STEP.** **<u>OR</u>** **b) Places PZR Master Controller (1-CH-PC-1444J) in MANUAL and raises demand to open both spray valves for maximum available spray (keeps Output < 80% to prevent PORV from opening). CRITICAL STEP.** **EVALUATOR'S NOTE:** Performing <u>either</u> Standard a) or b) satisfies the **CRITICAL STEP**. **NOTE:** If PZR Master Controller output is allowed to reach 80%, PZR PORV 1455C will open and annunciator 1D-H4 (BLUE) will alarm. This constitutes JPM failure. **COMMENTS:**	

STEP 3 **(CRITICAL STEP)** 1-E-3 Step 19, continued c) Check PRZR pressure satisfactorily lowering until ANY of the following satisfied: (Attachment 3 lists conditions) • PRZR level - GREATER THAN 69% <u>OR</u> • RCS subcooling based on CETCs - LESS THAN 30°F [85°F] <u>OR</u> • BOTH of the following exist: 1) RCS pressure - LESS THAN RUPTURED SG(s) PRESSURE 2) PRZR level - GREATER THAN 22% [50%] <u>OR</u> • BOTH of the following exist: 1) RCS pressure - WITHIN 300 PSI OF RUPTURED SG(s) PRESSURE 2) PRZR level - GREATER THAN 52% **STANDARD:** a) Monitors all associated critical parameters listed instep 19 c). **b) Identifies one of the four bulleted criteria are satisfied.** c) Continues to Step 19 d). **EVALUATOR'S NOTE:** • During Validation: RCS press within 300# with PRZR level > 52% was criteria reached. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

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STEP 4 (CRITICAL STEP)

1-E-3 Step 19, continued

d) Close PRZR normal spray valves

STANDARD:

a) **Places PZR spray valve controllers (1-RC-PC-1444G and 1-RC-PC-1444H) in MANUAL and lowers valve demand to close both spray valves prior to the Pressurizer going Solid. CRITICAL STEP.**
OR
b) **Places PZR Master Controller (1-CH-PC-1444J) in MANUAL and lowers demand to close both spray valves prior to the Pressurizer going Solid. CRITICAL STEP.**

EVALUATOR'S NOTE:

Note: Operator may place Spray valve controllers in AUTO or the control switches to CLOSE to close valves.
Note: Full closed indication on both spray valves (i.e. Green light lit, Red light off), whether auto or manual operation is used, satisfies the CRITICAL STEP.
Note: Pressurizer solid indications are; Pressurizer level indication 100%, and RCS pressure rising rapidly. Pressurizer Solid indications will be reached in approximately 8 minutes after meeting conditions to stop depressurization.

COMMENTS:

</td>
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_______ **SAT**

_______ **UNSAT**

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STEP 6 Reports to Shift Manager **STANDARD:** a) Reports that 1-E-3 depressurization is complete. **EVALUATOR'S NOTE:** **COMMENTS:** **END OF JPM**	_______ **SAT** _______ **UNSAT**

STOP TIME: _______

Operator Directions Handout
(TO BE READ TO APPLICANT BY EXAMINER)

Initiating Conditions

There is a SGTR in the Unit 1 "B" SG. The SG has been identified and isolated, SI has been blocked and the RCS cooled down to the target temperature. We are at Step 19 of 1-E-3 and ready to perform the RCS depressurization to minimize the SGTR breakflow.

Initiating Cues

- Here is a copy of 1-E-3 Step 19. Your task is to depressurize the RCS IAW Step 19.
- When you finish the actions necessary to accomplish this, please inform me.

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Initiating Conditions

There is a SGTR in the Unit 1 "B" SG. The SG has been identified and isolated, SI has been blocked and the RCS cooled down to the target temperature. We are at Step 19 of 1-E-3 and ready to perform the RCS depressurization to minimize the SGTR breakflow.

Initiating Cues

- Here is a copy of 1-E-3 Step 19. Your task is to depressurize the RCS IAW Step 19.
- When you finish the actions necessary to accomplish this, please inform me.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
17. ___	CHECK RUPTURED SG(s) PRESSURE - STABLE OR RISING	IF ruptured SG pressure is 250 psi greater than pressure of highest intact SG used for cooldown, THEN do the following: ☐ a) Check ruptured SG isolation. ☐ b) Initiate cooldown at less than 100°F/hr using intact SG(s). ☐ c) Maintain ruptured SG pressure greater than 250 psi above pressure of highest intact SG used for cooldown. ☐ IF 250 psi pressure differential does NOT exist OR can NOT be maintained by cooldown, THEN GO TO 1-ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED RECOVERY.
18. ___	CHECK RCS SUBCOOLING BASED ON CETCs - GREATER THAN 50°F [105°F]	☐ GO TO 1-ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED RECOVERY.
19. ___	DEPRESSURIZE RCS TO MINIMIZE BREAK FLOW AND REFILL PRZR:	
	a) Check normal spray - AVAILABLE ☐ • RCP C AND 1-RC-PCV-1455B - BOTH AVAILABLE OR ☐ • RCPs A and B, AND 1-RC-PCV-1455A - BOTH AVAILABLE	☐ a) GO TO Step 20.
	☐ b) Spray PRZR with maximum available spray	

(STEP 19 CONTINUED ON NEXT PAGE)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
19.	DEPRESSURIZE RCS TO MINIMIZE BREAK FLOW AND REFILL PRZR: (Continued)	
	c) Check PRZR pressure satisfactorily lowering until ANY of the following satisfied: (Attachment 3 lists conditions)	c) Do the following:
		☐ 1) Close normal spray valves.
	☐ • PRZR level - GREATER THAN 69%	2) <u>IF</u> a spray valve will <u>NOT</u> close, <u>THEN</u> stop the RCP(s) supplying the failed spray valve.
	<u>OR</u>	
	☐ • RCS subcooling based on CETCs - LESS THAN 30°F [85°F]	☐ • RCP A for 1-RC-PCV-1455A ☐ • RCP C for 1-RC-PCV-1455B
	<u>OR</u>	
	• BOTH of the following exist:	☐ 3) GO TO Step 20.
	☐ 1) RCS pressure - LESS THAN RUPTURED SG(s) PRESSURE	
	☐ 2) PRZR level - GREATER THAN 22% [50%]	
	<u>OR</u>	
	• BOTH of the following exist:	
	☐ 1) RCS pressure - WITHIN 300 PSI OF RUPTURED SG(s) PRESSURE	
	☐ 2) PRZR level - GREATER THAN 52%	
	☐ d) Close PRZR normal spray valves	d) Stop RCP(s) supplying failed open spray valves: ☐ • RCP A for 1-RC-PCV-1455A ☐ • RCP C for 1-RC-PCV-1455B
	☐ e) GO TO Step 22	

U.S. Nuclear Regulatory Commission
Surry Power Station

SR21301
Simulator Job Performance Measure 005A2.03
[Alternate Path]

Applicant________________________________ Start Time___________________

Examiner_______________________________

Date ___________________________________ Stop Time___________________

Title

RESPOND TO A LOSS OF DECAY HEAT REMOVAL

K/A: 005A2.03 Ability to (a) predict the impacts of the following malfunctions or operations on the RHRS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: RHR pump / motor malfunction. (2.9 / 3.1)

Applicability	Validation Time	Actual Time
RO/SRO(I)	13 minutes	______minutes

Conditions

- Task is to be PERFORMED in the simulator.

Standards

- Lower RHR HX outlet temperature by opening 1-RH-HCV-1758.
- Manually close RH Control valves; 1-RH-FCV-1605, and 1-RH-HCV-1758.
- Manually start RHR pump 1-RH-P-1B started.
- Manually opens 1-RH-FCV-1605.
- Manually opens 1-RH-HCV-1758.
- Manually opens 1-CC-TV-109A.

Procedures

- 1-AP-27.00, Loss of Decay Heat Removal Capability.

Tools and Equipment
- None

Safety Considerations
- None

Simulator Setup

- Recall **IC-384**.

  -OR-

- Call up RHR IC (028) and initialize. Place simulator in RUN.
- Verify "A" RHR pump running and "B" in AUTO.
- Verify 1-RH-FCV-1605 in auto with flow rate set at 3400 gpm.
- Verify 1-RH-HCV-1758 set at approximately 81% demand (9.03 on pot).
- Ensure PCS display has OSP-RC-001 displayed.
- Place simulator in FREEZE until ready to perform JPM.

Place Simulator in RUN and let the candidate take the watch.

When the Evaluator is ready implement the following malfunctions/overrides to cause a loss of RHR:

  - MALF RH0501, RHR pump 1-RH-P-1A Overcurrent trip T1.
  - OVRD TVCC109A_CLOSE (auto deletes after 10 seconds)

- **Simulator Operator Note**: Place RED magnets on 1-RH-MOV-1700, 1701 and 1720A red bulbs. Place green magnets on SI accumulator green bulbs and verify magnets are correct for SI system for CSD. Place a white magnet and green arrow on the Pressurizer level cold cal channel 1-RC-LI-1460 and make sure the trend recorder is set for this channel.

Notes

  - This JPM is pre-briefed.

PERFORMANCE CHECKLIST

Notes to the Evaluator

- Task critical elements are **bolded**.
- *An additional instructor may be needed to silence and acknowledge alarms for the examinee.*
- **START TIME:**

STEP 1: **CRITICAL STEP** Adjusting RHR temperature. (1-OP-ZZ-002, step 5.16.1) NOTE: The thermal design rated flow for the RHR Heat Exchanger is 4200 gpm. 5.16.1 RHR temperature can be adjusted by performing one or both of the following. Enter N/A for any valves not operated. o Adjust 1-RH-HCV-1758, RHR HXS FLOW. o Adjust SW outlet valves for 1-CC-E-1A or 1-CC-E-1B as required. 1-SW-39. **STANDARD:** • Acknowledges note. • **Lowers RHR HX outlet temperature by opening 1-RH-HCV-1758. This is a CRITICAL STEP.** **EVALUATOR'S NOTES:** • **IF ASKED: for preference on raising cooldown rate.** Respond by telling operator that they should use the method requiring adjusting of 1-RH-HCV-1758. • **Once the applicant identifies AP-**27.00 as required THEN tell applicant where a copy is located. **BOOTH NOTE: When Evaluator is ready implement Malfunctions to cause trip of 1-RH-P-1A, AND closure of T-CC-TV-109A.** **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 2: ***CAUTIONS and NOTE PRIOR TO STEP 1*** (AP-27.00 step 1) **CAUTION:** • Loss of RHR due to a total loss of IA is addressed by 0-AP-40.00, NON-RECOVERABLE LOSS OF IA. • Loss of RHR due to a total loss of AC Power is addressed by 1-AP-10.27, LOSS OF ALL AC POWER WHILE ON RHR. • Loss of RHR may cause CTMT radiological and heat stress conditions to degrade. Local actions in CTMT should be coordinated with HP. • During solid plant operation, inadvertent actuation of the OPMS may occur if letdown is isolated. • If RCS boiling occurs, non-essential personnel should be evacuated from CTMT. **NOTE:** EPIPs may be applicable. **STANDARD:** • Acknowledges note and acknowledges cautions and recognizes that a total loss of IA or AC Power is not occurring. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 3: CHECK ENTRY INTO THIS PROCEDURE DUE TO LOSS OF INVENTORY. (AP-27.00*Step 1)* **STANDARD:** • Determines that RCS inventory is NOT lowering and performs RNO to transition to procedure STEP 5. **EVALUATOR'S NOTE:** **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 4: CHECK RHR PUMP - ONE RUNNING AND PROVIDING FLOW. *(Step 5)* **STANDARD:** • Checks that no RHR pumps are running by observing zero amps indicated and 1-RH-P-1A has red and amber lights lit, 1-RH-P-1B has green light lit. 1-RH-P-1A also has overload light due to overcurrent trip. Goes to RNO. **EVALUATOR'S NOTES:** • **Note:** Annunciator 1B-G7, RHR PP 1A IN LOCAL CONTROL OR OL TRIP, will be LIT. The Applicant should not attempt to restart 1-RH-P-1A. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 5: **CRITICAL STEP** IF Emergency Bus power is available, THEN do the following: *(Step 5d-g RNO)* d) Manually close RH control valves: o 1-RH-FCV-1605 o 1-RH-HCV-1758 e) Start one RHR pump. f) Adjust RH control valves to return flow to pre-event rate: o 1-RH-FCV-1605 o 1-RH-HCV-1758 g) <u>IF</u> an RHR pump can <u>NOT</u> be started, <u>THEN</u> GO TO Step 17. *(NO, proceeds to step 6)* **STANDARD:** • **Places 1-RH-FCV-1605 in manual and closes valve. CRITICAL STEP.** • Notes setpoint on ten turn pot for 1-RH-HCV-1758 (9.8) and then **closes 1-RH-HCV-1758 using ten turn pot**. **CRITICAL STEP.** • **Starts 1-RH-P-1B by taking control switch to the start position and verifying amps are indicated. CRITICAL STEP.** • **Manually opens 1-RH-FCV-1605 using controller pushbuttons. CRITICAL STEP.** • **Manually opens 1-RH-HCV-1758. CRITICAL STEP.** • Proceeds to Step 6 since an RHR pump was started and the cause of trip was NOT due to a loss of Emergency Bus power. **EVALUATOR NOTE:** • 1-RH-FCV-1605, and 1-RH-HCV-1758 should be opened to the approximate pre-event value. However it's not critical that this exact value be established.	_______ **SAT** _______ **UNSAT**

COMMENTS:	
STEP 6: CHECK RHR FLOW - INDICATED ON RHR SYS FLOW. *(Step 6)* • 1-RH-FI-1605 **STANDARD:** • Checks RHR flow restored on 1-RH-FI-1605. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 7: CHECK RHR PUMP – VORTEXING *(Step 7)* • Flow indication on 1-RH-FI-1605 - OSCILLATING • Amperage indication - OSCILLATING **STANDARD:** • Checks flow steady on 1-RH-FI-1605 and amps steady for 1-RH-P-1B. • Goes to step 7 RNO and transitions to Step 13. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 8: CHECK RHR HEAT SINK: *(Step 13)* a) Flow on 1-RH-FI-1605 - NORMAL b) CC to RHR HX 1) In-Service RHR HX CC Outlet HDR Flow - NORMAL • 1-CC-FI-110A OR • 1-CC-FI-110B **STANDARD:** • Checks flow on 1-RH-FI-1605 indicating normal (approximately 3400 gpm) • Checks CC to RHR HX on 1-CC-FI-110A NOT normal at zero gpm. Goes to RNO.	_______ **SAT** _______ **UNSAT**

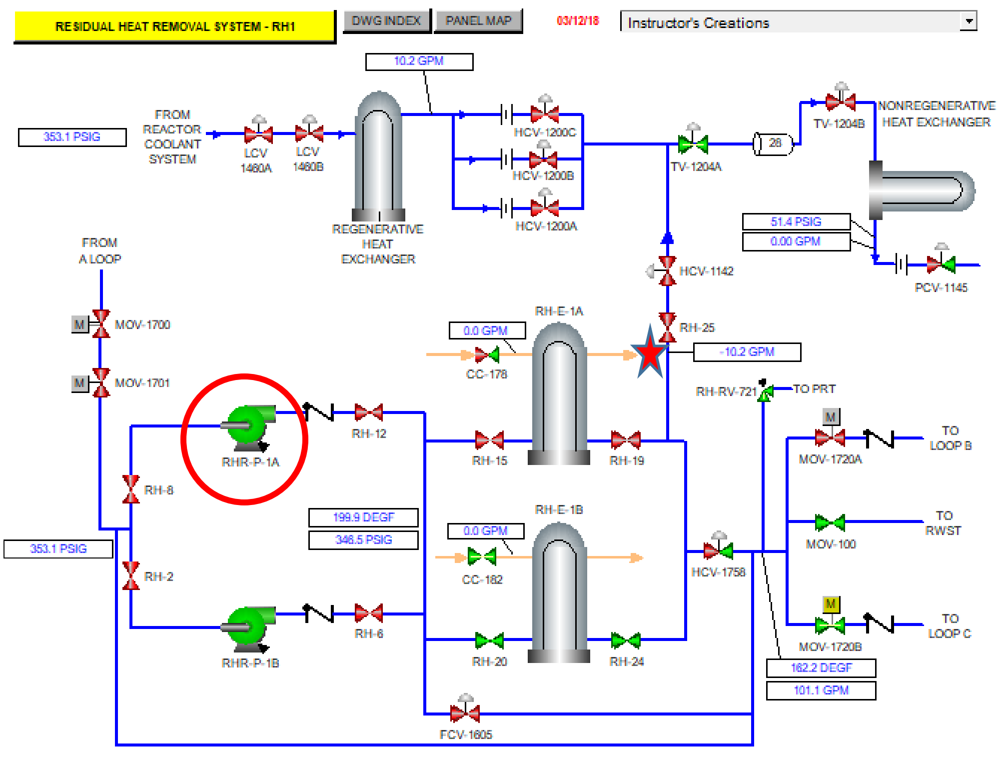
EVALUATOR'S NOTE: **COMMENTS:**	

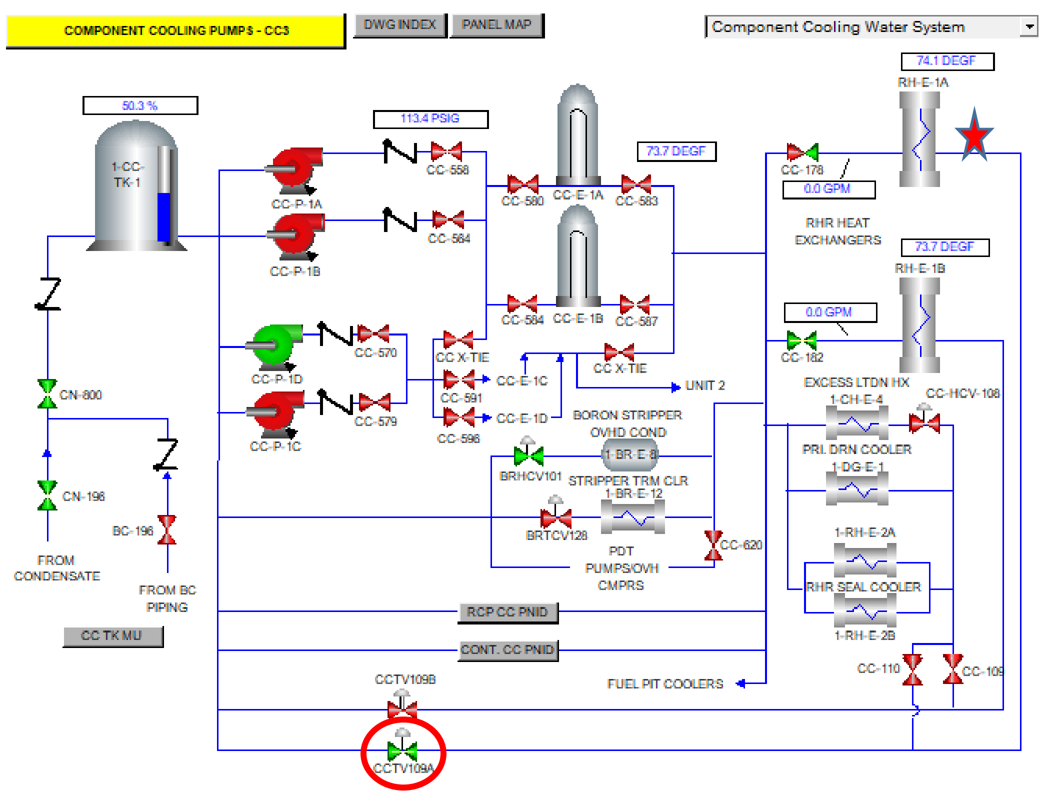
STEP 9: **CRITICAL STEP** 1) Check opened or open 1-CC-TV-109A or 1-CC-TV-109B. *(Step 13b(1) RNO)* **STANDARD:** **a) Opens 1-CC-TV-109A. CRITICAL STEP** **EVALUATOR'S NOTE:** • **<u>If asked for In service RHR/HX</u>**: Inform the Candidate that this information has already been provided. (information provided on Cue sheet). • **1**-CC-TV-109B is OPEN which is normal, but there is no flow through that valve because there are other manual valves that need to be open to provide flow. It is possible the candidate would believe the step is satisfied because 1-CC-TV-109B is open. In service RHR/HX is the <u>'A' RHR HX</u>. This is incorrect because it is NOT the in-service HX. If this happens the candidate can recover by performing next step and realizing that temp is not lowering. • **Note**: If the operator doesn't depress the OPEN pushbutton long enough, 1-CC-TV-109A may reclose. If this happens the operator should try to reopen 1-CC-TV-109A. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 10: In-Service RHR HX CC Outlet Header Temp -NORMAL. (Step 13b(2)) **STANDARD:** • Monitors 1-CC-TI-109A and determines that temperature is returning to Normal.. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 12: Check RCS TEMPERATURE –STABLE OR LOWERING. *(Step 14)* **STANDARD:** a) Monitors RCS temperature. b) May adjust 1-RH-HCV-1758. **EVALUATOR'S NOTE:** • Adjustment of 1-RH-HCV-1758 not critical because this was performed/satisfied by returning HCV-1758 to pre-event value in step 6. **COMMENTS:** **END OF JPM**	_______ **SAT** _______ **UNSAT**

STOP TIME:

SIM DRAWING RHR & COMP COOLING FOLLOWING LOSS OF RHR PUMP





Operator Directions Handout
(TO BE READ TO APPLICANT BY EXAMINER)

Initial Conditions

- The Unit has been operating on RHR with 1-RH-P-1A in service on "A" RHR HX at 3400 gpm.
- The Pressurizer is at 60% Cold Cal and slowly rising in preparation for going solid.
- RCS temperature: 177 ^{o}F and stable.

Initiating Cues

- You are to lower RCS temperature and stabilize the RCS cold leg (C) to between 170^{o}F – 175^{o}F per 1-OP-ZZ-002, Maintenance of Plant Operations, section 5.16, Adjusting RHR Temperatures. It is desirable that you stabilize by adjusting 1-RH-HCV-1758.

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Initial Conditions

- The Unit has been operating on RHR with 1-RH-P-1A in service on "A" RHR HX at 3400 gpm.
- The Pressurizer is at 60% Cold Cal and slowly rising in preparation for going solid.
- RCS temperature: 177 ^{o}F and stable.

Initiating Cues

- You are to lower RCS temperature and stabilize the RCS cold leg (C) to between 170^{o}F – 175^{o}F per 1-OP-ZZ-002, Maintenance of Plant Operations, section 5.16, Adjusting RHR Temperatures. It is desirable that you stabilize by adjusting 1-RH-HCV-1758.

  .

Dominion Energy		PROCEDURE NO: **1-OP-ZZ-002**
SURRY POWER STATION		REVISION NO: **40**
PROCEDURE TYPE: **OPERATING PROCEDURE**		UNIT NO: **1**
PROCEDURE TITLE: **MAINTENANCE OF PLANT OPERATIONS**		

REACT MGT						

REVISION SUMMARY:

Revised procedure in response to Operations Feedback, FBOP 2021-015208:

- Added Commitment Document 2.4.3.
- Added bullet to the Note at the beginning of Subsection 5.4.

PROCEDURE USED:	☐ Entirely	☐ Partially	**Note:** If used partially, note reasons in remarks.
PROBLEMS ENCOUNTERED:	☐ NO	☐ YES	**Note:** If YES, note problems in remarks.

REMARKS: ____

____ (Use back for additional remarks.)

SHIFT SUPERVISION:	DATE:

CONTINUOUS USE

TABLE OF CONTENTS

TABLE OF CONTENTS

1.0 PURPOSE

1.1 To provide guidance for maintaining stable, steady state conditions, other than during startups or shutdowns being performed by procedures intended for plant maneuvers.

2.0 REFERENCES

2.1 Source Documents

2.1.1 UFSAR 3.3.1, Reactivity Control Aspects of the Reactor

2.1.2 UFSAR 3.3.2.7, Summary of Control Rod Requirements

2.1.3 UFSAR 10, Steam and Power Conversion

2.1.4 UFSAR 8.3, System Interconnections

2.1.5 UFSAR 9.2, Boron Recovery System

2.1.6 UFSAR 9.7, Vent and Drain System

2.2 Technical Specifications Surry Power Station Units 1 and 2

None

2.3 Technical References

2.3.1 1-GOP-1.5, Unit Startup, 2% Reactor Power to Max Allowable Power

2.3.2 1-GOP-2.1, Power Decrease from Max Allowable Power to Less Than 30% Reactor Power

2.3.3 1-OPT-RX-001, Reactor Power Calorimetric Using PCS Computer Program

2.3.4 1-OP-26.5, 230 KV Switchyard Voltage

2.3.5 1-DRP-003, Curve Book

2.3.6 DCP 08-007, Feedwater Ultrasonic Flow Meter Installation - PCS / Unit 1

2.4 Commitment Documents

2.4.1 PI-S-2003-5491, INPO AFI Response

2.4.2 CR379270, Noted an Increase in Unit 2 PDTT Level when Unit 1 PDTT was Pumped Down

2.4.3 CR1169569/CA8415970, CA to Licensing to document and track requirements/assignments associated with DEQ approval of the SLR

3.0 INITIAL CONDITIONS

None

4.0 PRECAUTIONS AND LIMITATIONS

4.1 Control Rods shall be maintained greater than the programmed insertion limits at all times.

4.2 Alternate indications of Reactor Power, such as Core ΔT, First Stage Impulse Pressure, Calorimetric, NIS, Condensate and Feedwater performance parameters, and Electrical output, should be reviewed and compared to validate Unit output.

4.3 This procedure shall not be used to exceed any reactor power level that was not previously obtained by an appropriate ramp procedure, e.g. 1-OP-TM-005, Unit Ramping Operations, or 1-GOP-1.5, Unit Startup, 2% Reactor Power to Max Allowable Power.

5.16 Adjusting RHR Temperature

NOTE: The thermal design rated flow for the RHR Heat Exchanger is 4200 gpm.

5.16.1 RHR temperature can be adjusted by performing one or both of the following. Enter N/A for any valves not operated.

- Adjust 1-RH-HCV-1758, RHR HXS FLOW.

  ____ 1 ____ 2

  ____ 3 ____ 4

- Adjust SW outlet valves for 1-CC-E-1A or 1-CC-E-1B as required.

  - 1-SW-39, CC HX A SW Outlet

    N/A 1 N/A 2

    ____ 3 ____ 4

  - 1-SW-35, CC HX B SW Outlet

    ____ 1 ____ 2

    ____ 3 ____ 4

Performed by:

Signature	Initial	Print	Date
Signature	Initial	Print	Date
Signature	Initial	Print	Date

U.S. Nuclear Regulatory Commission
Surry Power Station

SR21301
Simulator Job Performance Measure [KA: 028A4.03 3.1/3.3]

Applicant________________________________ Start Time___________________

Examiner_______________________________

Date ___________________________________ Stop Time___________________

Title

Place Hydrogen Analyzer in Service Following a LOCA in accordance with 1-E-1, Loss of Reactor or Secondary Coolant.

K/A: 028A4.03, Ability to manually operate and / or monitor in the control room: Location and operation of hydrogen sampling and analysis of containment atmosphere, including alarms and indications (3.1 / 3.3).

Applicability	**Validation Time**	**Actual Time**
RO/SRO(I)/SRO(U)	7 Minutes	_____ Minutes

Conditions

- Task is to be PERFORMED in the simulator.
- A LOCA has occurred from 100% power.
- A determination of Containment Hydrogen concentration is desired.

Standards

- Places XFER CKT UNIT #1 TO UNIT #2 in the UNIT 1 position.
- Places H2 Analyzer (H2A-GW-104) Heat Trace Panel 6, 1-HT-HTP-6, in ON.
- Opens 1-GW-TV-100, 1-GW-TV-101, 1-GW-TV-102, and 1-GW-TV-103.
- Places H2A-GW104 in ANALYZE.

Procedures

- 1-E-1, Attachment 2, Hydrogen Analyzer Operation.

Tools and Equipment

- None

Safety Considerations

- None

Simulator Setup

- Recall IC #385 OR do the following:
- Call up 100% IC, initialize & place simulator in RUN.
- Initiate LBLOCA malfunction. Continue until Recirc Mode Transfer is complete.
- Allow CTMT pressure to increase and return to < 18 psia.
- Place selector switch for H2A-GW104 in the Unit 2 position.
- Verify selector switch for the H_2 ANALYZER (H2A-GW-104) HEAT TRACE PANEL 6, 1-HT-HTP-6, is in the AUTO position & reset SI. Check heat tracing de-energized.
- Freeze simulator.

PERFORMANCE CHECKLIST

Notes to the Evaluator

- Task critical elements are bolded and denoted as a **CRITICAL STEP**.
- *An additional instructor may be needed to silence alarms for the examinee.*
- **START TIME_______:**

STEP 1 NOTES Prior to Step 1 (1-E-1 Attachment 2, Section I) • Containment pressure should be between 9 and 60 PSIA. • Containment temperature should be between 40°F and 290°F. **STANDARD:** • Acknowledges Notes. **EVALUATOR'S NOTE:** **COMMENTS:**	**_______ SAT** **_______ UNSAT**
STEP 2 Select Hydrogen Analyzer to be placed in service: (Attachment 2, Step 1) H2A-GW104 or H2A-GW204 **STANDARD:** a) Determines from Initial Conditions that the Unit 1 Hydrogen Analyzer (1-H2A-GW-104) is to be placed in service and checks the applicable block. b) Goes to Step 2. **EVALUATOR'S NOTE:** **If asked,** tell the Candidate this information has already been provided. **COMMENTS:**	**_______ SAT** **_______ UNSAT**

STEP 3 (CRITICAL STEP) IF H2A-GW104 is to be placed in service, THEN do the following: (Attachment 2, step 2.a.) **a. Put selector switch XFER CKT UNIT #1 TO UNIT #2 (for H2A-GW104) in the UNIT 1 position.** (Switch is located on Unit 1 PAM Panel.) **STANDARD:** • **Places selector switch "XFER CKT UNIT #1 TO UNIT #2" (for H2A-GW104) to the UNIT 1 position. (CRITICAL STEP)** • Checks WHITE analyzer indicating light for Unit 1 is LIT. **EVALUATOR'S NOTE:** ***This step is also sequence critical; it must be performed before Step 6 of this JPM.*** **COMMENTS:**	**_______ SAT** **_______ UNSAT**
STEP 4 (CRITICAL STEP) ENERGIZE HEAT TRACING (Attachment 2, Step 2.b.) **b. Put selector switch H2 ANALYZER (H2A-GW-104) HEAT TRACE PANEL 6, 1-HT-HTP-6, in ON. Record the time Heat Tracing is energized _________.** **STANDARD:** • **Places selector switch for H_2 ANALYZER (H2A-GW-104) HEAT TRACE PANEL 6, 1-HT-HTP-6, in the ON position. (CRITICAL STEP)** • Checks RED light illuminates after switch is in ON position. • Records time that heat tracing was energized in the appropriate block. **EVALUATOR'S NOTE:** ***This step is also sequence critical; it must be performed before Step 6 of this JPM.*** **COMMENTS:**	**_______ SAT** **_______ UNSAT**

STEP 5 (CRITICAL STEP) ALIGN FLOW PATH (Attachment 2, Steps 2.c., 2.d., 2.e., 2.f.) **c. Open 1-GW-TV-100, H2 ANALYZER VLV.** **d. Open 1-GW-TV-101, H2 ANALYZER VLV.** **e. Open 1-GW-TV-103, H2 ANALYZER VLV.** **f. Open 1-GW-TV-102, H2 ANALYZER VLV.** **STANDARD:** **(a) Places control switch for 1-GW-TV-100 in OPEN. (CRITICAL STEP)** (b) Checks valve open by observing red indicating light lit & green off. **(c) Places control switch for 1-GW-TV-101 in OPEN. (CRITICAL STEP)** (d) Checks valve open by observing red indicating light lit & green off. **(e) Places control switch for 1-GW-TV-103 in OPEN. (CRITICAL STEP)** (f) Checks valve open by observing red indicating light lit & green off. **(g) Places control switch for 1-GW-TV-102 in OPEN. (CRITICAL STEP)** (h) Checks valve open by observing red indicating light lit & green off. . **EVALUATOR'S NOTE:** ***The order of valve operation is NOT sequence critical, but performing this step before Step 6 of this JPM IS sequence critical.*** **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 6 (CRITICAL STEP) ENSURES MINIMUM TIME REQUIREMENT MET FOR HEAT TRACING (Attachment 2, Steps 2.g and 2.h.) NOTE: Before the Hydrogen Analyzer is placed in service, the heat tracing circuit must be energized for 20 minutes. g. Check that 20 minutes have elapsed since the time recorded in Step 2b. h. Put selector switch H2 ANALYZER H2A-GW104 in the ANALYZE position. **STANDARD:** (a) Acknowledges NOTE before substep g. (b) Determines the 20 minute period has NOT yet elapsed and a wait period will be required. (c) Following a 20 minute heat tracing warm-up period, proceeds to next step. **(d) Places H2A-GW104 mode select switch to the ANALYZE position. (CRITICAL STEP)** (e) Checks RED and GREEN lights are both illuminated after switch is in ANALYZE position. **EVALUATOR'S NOTE:** **After the Candidate reports a 20 minute wait period is required,** inform them a TIME COMPRESSION has occurred and 20 minutes have elapsed. ***This step is sequence critical.*** **After the Candidate places H2A-GW104 to ANALYZE,** inform them another operator will continue from here and the JPM is complete. **COMMENTS:** **END OF JPM**	**_______ SAT** **_______ UNSAT**

STOP TIME: _______

____

____

____

____

____

____

____

Operator Directions Handout
(TO BE READ TO APPLICANT BY EXAMINER)

Initial Conditions

- There has been a Large Break LOCA on Unit 1.

Initiating Cues

- Here is a copy of 1-E-1, Attachment 2, Hydrogen Analyzer Operation. I need you to place Unit 1's hydrogen analyzer in service on Unit 1 Containment.
- When you finish the actions necessary to accomplish this, please inform me.

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Initial Conditions

- There has been a Large Break LOCA on Unit 1.

Initiating Cues

- Here is a copy of 1-E-1, Attachment 2, Hydrogen Analyzer Operation. I need you to place Unit 1's hydrogen analyzer in service on Unit 1 Containment.
- When you finish the actions necessary to accomplish this, please inform me.

NOTE: • Containment pressure should be between 9 and 60 PSIA.

• Containment temperature should be between 40°F and 290°F.

I. PLACING HYDROGEN ANALYZER IN SERVICE

1. ___ Select Hydrogen Analyzer to be placed in service:

___ H2A-GW104 or ___ H2A-GW204

2. ___ IF H2A-GW104 is to be placed in service, THEN do the following:

___ a. Put selector switch XFER CKT UNIT #1 TO UNIT #2 in the UNIT 1 position. (Switch is located on Unit 1 Post Accident Monitoring Panel.)

___ b. Put selector switch H2 ANALYZER (H2A-GW-104) HEAT TRACE PANEL 6, 1-HT-HTP-6, in ON. Record the time Heat Tracing is energized __________ .

___ c. Open 1-GW-TV-100, H2 ANALYZER VLV.

___ d. Open 1-GW-TV-101, H2 ANALYZER VLV.

___ e. Open 1-GW-TV-103, H2 ANALYZER VLV.

___ f. Open 1-GW-TV-102, H2 ANALYZER VLV.

NOTE: Before the Hydrogen Analyzer is placed in service, the heat tracing circuit must be energized for 20 minutes.

___ g. Check that 20 minutes have elapsed since the time recorded in Step 2b.

___ h. Put selector switch H2 ANALYZER H2A-GW104 in the ANALYZE position.

3. ___ IF H2A-GW204 is to be placed in service, THEN do the following:

___ a. Put selector switch XFER CKT UNIT #2 TO UNIT #1 in the UNIT 1 position. (Switch is located on Unit 2 Post Accident Monitoring Panel.)

___ b. Put selector switch H2 ANALYZER (H2A-GW-204) HEAT TRACE PANEL 7, 1-HT-HTP-7, in ON. Record the time Heat Tracing is energized ___________ .

___ c. Open 1-GW-TV-104, H2 ANALYZER VLV.

___ d. Open 1-GW-TV-105, H2 ANALYZER VLV.

___ e. Open 1-GW-TV-107, H2 ANALYZER VLV.

___ f. Open 1-GW-TV-106, H2 ANALYZER VLV.

NOTE: Before the Hydrogen Analyzer is placed in service, the heat tracing circuit must be energized for 20 minutes.

___ g. Check that 20 minutes have elapsed since the time recorded in Step 3b.

___ h. Put selector switch H2 ANALYZER H2A-GW204 in the ANALYZE position.

II. REMOVING HYDROGEN ANALYZER FROM SERVICE

1. ___ IF H2A-GW104 is to be removed from service, THEN do the following:

___ a. Put selector switch H2 ANALYZER H2A-GW104 in the STANDBY position.

___ b. Close 1-GW-TV-100, H2 ANALYZER VLV.

___ c. Close 1-GW-TV-101, H2 ANALYZER VLV.

___ d. Close 1-GW-TV-103, H2 ANALYZER VLV.

___ e. Close 1-GW-TV-102, H2 ANALYZER VLV.

___ f. De-energize H2A-GW104 Heat Tracing circuit by putting selector switch H2 ANALYZER (H2A-GW-104) HEAT TRACE PANEL 6, 1-HT-HTP-6, to OFF and then back to AUTO.

2. ___ IF H2A-GW204 is to be removed from service, THEN do the following:

___ a. Put selector switch H2 ANALYZER H2A-GW204 in the STANDBY position.

___ b. Close 1-GW-TV-104, H2 ANALYZER VLV.

___ c. Close 1-GW-TV-105, H2 ANALYZER VLV.

___ d. Close 1-GW-TV-107, H2 ANALYZER VLV.

___ e. Close 1-GW-TV-106, H2 ANALYZER VLV.

___ f. De-energize H2A-GW204 Heat Tracing circuit by putting selector switch H2 ANALYZER (H2A-GW-204) HEAT TRACE PANEL 7, 1-HT-HTP-7, to OFF and then back to AUTO.

U.S. Nuclear Regulatory Commission
Surry Power Station

SR21301
Simulator Job Performance Measure [KA 064.A4.06]
[Alternate Path]

Applicant________________________________ Start Time___________________

Examiner_______________________________

Date ___________________________________ Stop Time___________________

Title

Respond to a Failure of #3 EDG to Start and Load on 1J 4160V Bus.

K/A: 064.A4.06; Manual start, loading, and stopping of the ED/G, RO 3.9 / SRO 3.9

Applicability	**Validation Time**	**Actual Time**
RO	9 Minutes	____ Minutes

Conditions

- Task is to be PERFORMED in the simulator.

Standards

- EMERG GEN NO. 3 ENGINE START pushbutton is depressed.
- AUTO-EXERCISE EMERG GEN 3 switch is placed in AUTO.
- SYNC-ACB-15J3 key switch is placed to ON.
- EMERG GEN NO 3 FIELD FLASH pushbutton is depressed.
- Attempts to raise incoming voltage by placing EMERG GEN NO 3 VOLT ADJ to RAISE.
- EDG 3 secured by depressing both ENGINE STOP pushbuttons simultaneously.

Procedures

- 0-AP-17.05, EDG 3 – Emergency Operations.

Tools and Equipment

- None

Safety Considerations

- None

Simulator Setup

- Call up 100% power IC and initialize (IC386). Place simulator in RUN.
- Load the following Malfunctions/Overrides:
    - EL0501, Loss of reserve Station Service XMFMR A, TRUE T1.
    - ED0503, EDG3 Voltage Regulator Failure, -1, T1.
    - ED0403, EDG 3 Auto Start Failure T1.
    - Remote U2_EGR3_Bypass to U2, T3.
    - Remote SW_25J3_RF to PTL, T3.
- Strip the 1J bus per Attachment 3.
- Place AUTO-EXERCISE EMERG GEN 3 switch to EXERCISE.
- Acknowledge Alarms.
- Freeze and Snap IC until ready for evaluation.

Notes

PERFORMANCE CHECKLIST

Notes to the Evaluator

- This JPM may be **Pre-briefed** as directed by the Chief Examiner.
- Task critical elements are bolded.
- *An additional instructor may be needed to silence and acknowledge alarms for the examinee, and perform actions for Unit 2.*
- **START TIME _____:**

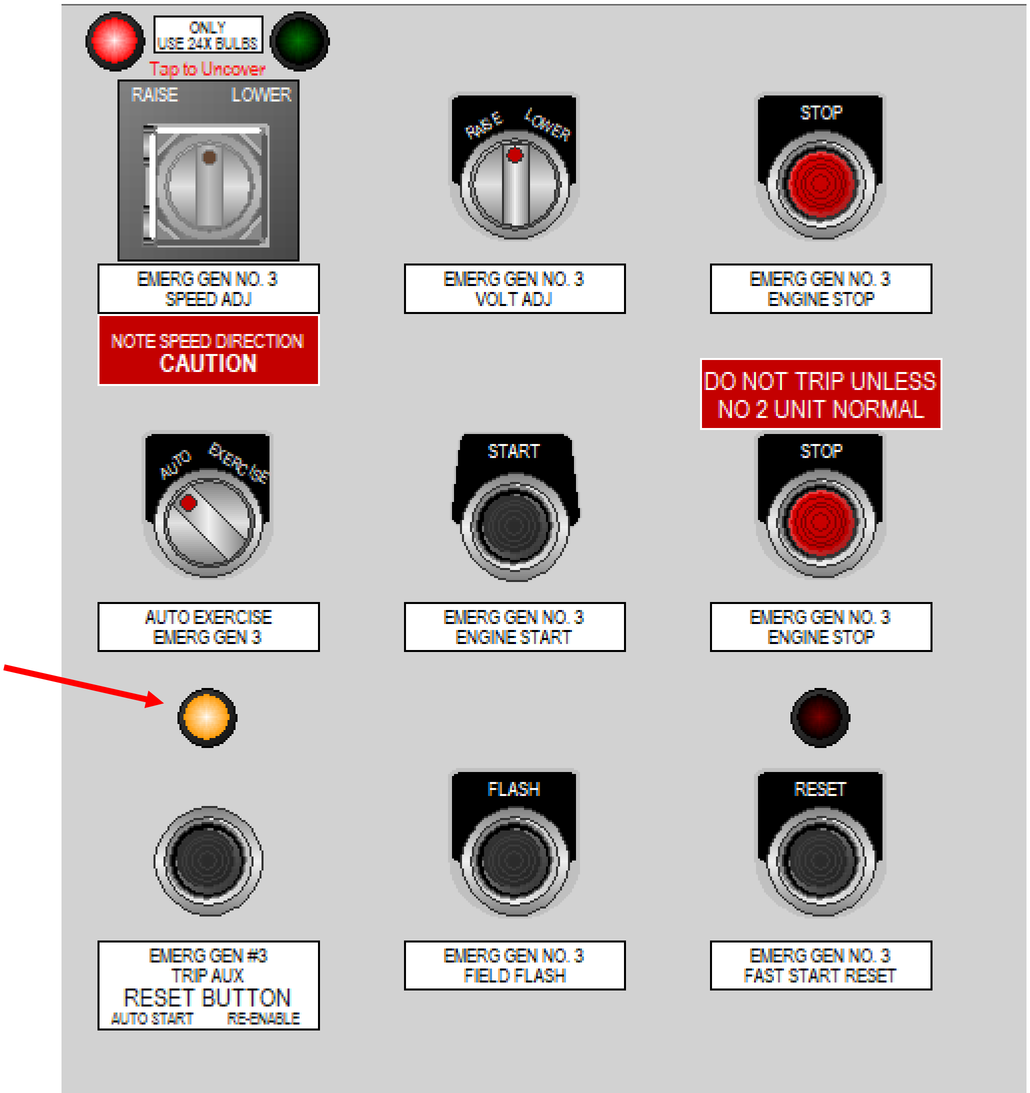
STEP 1**:** **CRITICAL STEP** Check Load Limit at maximum, Start EDG 3, Check #3 EDG Speed at 900 RPM, Place #3 EDG AUTO EXERCISE Switch in Auto. (Step 4, 5, and 6 of Attachment 2) **STANDARD:** **a) Candidate presses the EDG NO. 3 Engine Start pushbutton. CRITICAL STEP.** b) Candidate will check EDG started using RPM indication. **c) Candidate will place the AUTO-EXERCISE Switch for EDG #3 in AUTO position. CRITICAL STEP.** d) Candidate will note that #3 EDG has not energized the 1J Bus. e) Candidate returns to AP-17.05, Step 8. **EVALUATOR'S NOTE:** **COMMENTS:**	
STEP 2**:** CHECK BOTH J BUSES - ENERGIZED BY OFFSITE POWER. (Step 8) **STANDARD:** a) Candidate Identifies 1J Bus is still de-energized. b) Candidate Goes To Step 10. **EVALUATOR'S NOTE:** **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 3: Notes prior to Step 10 • If the B DC Bus is deenergized, the EDG output breaker and the J Bus load breakers must be closed manually. • The following conditions must exist for the EDG output breaker to close automatically: • EDG speed greater than 870 rpm • EDG INCOMING voltage greater than 113 volts • J8 breaker open • Control switch for the J3 breaker in AUTO AFTER TRIP • DC control power available to the J3 breaker CHECK EDG 3 - SUPPLYING J BUS. (Step 10) **STANDARD:** a) Acknowledges Notes. b) Candidate Identifies 15J3 – NOT Closed. c) Candidate performs RNO. Identifies that loads are already stripped per Attachment 3. d) Candidate goes to step 15 **EVALUATOR'S NOTE:** • **Evaluator Cue:** Attachment 3 has been completed by another operator. • **IF asked**: Status of Breaker 25-J3, reply "refer to the Initial conditions". **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 4: **CRITICAL STEP** CHECK EDG 3 INCOMING VOLTAGE GREATER THAN 113 VOLTS. (Step 15) **STANDARD:** **a) Candidate turns SYNC-ACB-15J3 key switch to ON. CRITICAL STEP.** **b) Candidate identifies no generator voltage and momentarily depresses EMERG GEN NO 3 FIELD FLASH pushbutton. Identifies Voltage established. CRITICAL STEP.** **c) Candidate attempts to raise incoming voltage to 120 volts using the EMERG GEN NO 3 VOLT ADJ control switch. CRITICAL STEP.** **d)** Candidate determines there is no Voltage increase, and goes to 15.c RNO. **EVALUATOR'S NOTE:** **Evaluator Note:** Operator may go to 15bRNO because of step 15 b wording. **Evaluator Cue: If asked to check the Field Ckt Breaker**. Report that field operator has checked the Field Ckt Breaker was closed. **Evaluator Cue: If asked to reset the NO FIELD annunciator on the EDG Control panel.** Report that field operator has reset this annunciator. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 5: **CRITICAL STEP** SECURES #3 EDG. (Step 15.c RNO) **STANDARD:** a) Candidate notifies Electrical Department. **b) Candidate secures #3 EDG by momentarily pressing the EMERG GEN NO.3 ENGINE STOP pushbuttons. CRITICAL STEP.** c) Candidate notifies Shift Manager. **EVALUATOR'S NOTE:** • If asked to notify the Electrical department: Acknowledge request. • **Both ENGINE STOP pushbuttons must be depressed simultaneously.** • The EDG will go into a cooldown cycle and will shutdown in 9.5-13 minutes. The amber light for the Aux Trip relay is an indication that both pushbuttons were depressed simultaneously and the Diesel is in a cooldown cycle. • If the applicant continues and closes 15-J3, this constitutes failure because of elevated bus current and potential damage to equipment. • **Evaluator Cue:** After this step is done inform applicant that another operator will take over from here. **BOOTH NOTE:** • **Ensure Synch key is returned to the proper location.** **COMMENTS:** **JPM ENDS**	_______ **SAT** _______ **UNSAT**

STOP TIME_______:

CUTAWAY OF EDG3 PANEL. After <u>BOTH</u> ENGINE STOP PUSHBUTTONS ARE DEPRESSED, THE AUX TRIP RELAY LIGHT WILL LIGHT. There will be no other indications that the EDG has been shutdown because the EDG is in a cooldown cycle.



Operator Directions Handout
(TO BE READ TO APPLICANT BY EXAMINER)

Initial Conditions

- Unit 1 operating at 100% power.
- The Loss of the “A” RSST has occurred and #3 EDG has failed to start and load on 1J 4160V Bus.
- Starting and loading #3 EDG on the 1J 4160V bus IAW 0-AP-17.05, EDG 3 – Emergency Operations is in progress and is complete through step 3 of Attachment 2.

Initiating Cues

- You are the Unit 1 BOP and are to continue with starting and loading of #3 EDG per 0-AP-17.05, starting with Attachment 2 step 4.
- When you finish the actions necessary to accomplish this, please inform me.

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Initial Conditions

- Unit 1 operating at 100% power.
- The Loss of the “A” RSST has occurred and #3 EDG has failed to start and load on 1J 4160V Bus.
- Starting and loading #3 EDG on the 1J 4160V bus IAW 0-AP-17.05, EDG 3 – Emergency Operations is in progress and is complete through step 3 of Attachment 2.

Initiating Cues

- You are the Unit 1 BOP and are to continue with starting and loading of #3 EDG per 0-AP-17.05, starting with Attachment 2 step 4.
- When you finish the actions necessary to accomplish this, please inform me.

U.S. Nuclear Regulatory Commission
Surry Power Station

SR21301
Simulator Job Performance Measure 015A1.01

Applicant________________________________ Start Time___________________

Examiner_______________________________

Date ___________________________________ Stop Time___________________

Title

Adjust the PRNIs in accordance with 1-OPT-RX-001

K/A: 015A1.01 Ability to predict and/or monitor changes in parameters to prevent exceeding design limits associated with operating the NIS controls including: NIS calibration by heat balance. (3.5 / 3.8)

Applicability	**Estimated Time**	**Actual Time**
RO/SRO	10 Minutes	____ Minutes

Conditions

- **This JPM to be Pre-briefed with marked up copy of procedure.**
- This JPM is performed in the Simulator.
- Unit 1 operating at 89.5% power. 1-OPT-RX-001 has been completed up to Section 6.2.

Standards

- Places rod control in Manual prior to adjusting N44 gain pot.
- Adjusts N44 Gain Potentiometer to a minimum indication of 89.5% IAW 1-OPT-RX-001, Section 6.2 and Attachment 1.
- Places rod control in Auto with no rod motion.

Initiating Cues

- Unit 1 operating at 89.5% power.
- The Unit 1 RO has completed 1-OPT-RX-001, Section 6.1.
- You are to perform 1-OPT-RX-001, Section 6.2.

Terminating Cues

- 1-OPT-RX-001, Attachment 1, has been completed.

Procedures

- 1-OPT-RX-001, Reactor Power Calorimetric Using PCS Computer Program, Rev. 51

Tools and Equipment

Safety Considerations

- None
- None

Simulator Setup

- Recall **IC-387**.

  -OR-

- Call up 90% power IC and initialize.
- Place simulator in RUN.
- **Adjust/Check N41, N42, and N43 to 89.5% indication using drawer gain control.**
- Adjust N44 to an indication of 88% power using the drawer gain control.
- Place Simulator in Freeze until JPM performance.

Notes

- The Applicant is given the marked-up copy of 1-OPT-RX-001. This evolution may be pre-briefed.
- When possible place Simulator in RUN prior to the candidate entering the Simulator.

PERFORMANCE CHECKLIST

Notes to the Evaluator

- Task critical elements are **bolded**.
- *An additional instructor may be needed to silence alarms for the examinee.*
- **START TIME:**

STEP 1: Compare each NI channel percent power indication with the Calcalc Total Thermal Pwr (UFM, Venturi or Normalized Feedwater) or Calcalc 10-Min Avg Pwr (Steam Flow), whichever is the standard. (Each NI should be within + 2% and - 0% of the Calorimetric value if Reactor power is greater than or equal to 90%, OR within + 4% and - 0% of the Calorimetric value if Reactor power is less than 90%.). *(Step 6.2.1)* **STANDARD:** a) Reads and Initials Step 6.2.1. b) Refers to Step 6.1.12 to determine Calcalc Total Thermal Power: 89.5%. c) Locates to PRNI drawers and observes N41 indicating 90%, N42 indicating 90%, N43 indicating 90%, and N44 indicating 88%. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 2: **NOTE**: Gain potentiometer adjustment can cause average flux deviation alarms as well as high flux rod stop alarms. This should be anticipated when adjusting gain potentiometers. (Reference 2.4.6). **STANDARD:** Reviews NOTE prior to Step 6.2.2. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 3: IF the NI Channel is within tolerance but adjustment will better align it with the calorimetric, THEN obtain Shift Supervision concurrence AND adjust NI Channel IAW Attachment 1 to the value recorded in Step 6.1.12 or Step 6.1.13. Record initials on Attachment 1. IF no NI adjustment is made, OR NI is NOT within tolerance, THEN enter N/A. *(Step 6.2.2)* **STANDARD:** Enters N/A and Initials Step 6.2.2. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 4: IF NI channel is NOT within tolerance, THEN obtain Shift Supervision concurrence AND adjust the gain potentiometer on the front panel of each NI Channel IAW Attachment 1 to the value recorded in Step 6.1.12 or Step 6.1.13. Record initials on Attachment 1. IF all NI channels are within tolerance, THEN enter N/A. *(Step 6.2.3)* **STANDARD:** a) Initials Step 6.2.3. b) Reports to Shift Manager (Evaluator) that N44 requires adjustment, and requests authorization to make these adjustments. c) Initiates Attachment 1. **EVALUATOR'S NOTE:** **If asked:** Shift Supervision has concurred with adjustment of PRNIs. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 5: Attachment 1, 1-OPT-RX-001, NI Calibration. **CAUTION**: To prevent introducing non-conservative High Flux Trip and High Flux Rod Stop setpoints, setpoint changes required by the following step must be completed before any associated Gain Potentiometer adjustments are performed. **STANDARD:** Reviews CAUTION Prior to Step 1 of Attachment 1. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 6: IF Reactor power is less than 90% AND the Gain Potentiometer on any NI will be decreased, THEN before adjusting NIs, have I & C lower the High Flux Trip and High Flux Rod Stop setpoints on all NIs based on current Reactor power level. Otherwise, enter N/A. (Reference 2.4.5). *(Attachment 1, Step 1)* **STANDARD:** Enters N/A and Initials Step 1 of Attachment 1. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 7: N41. (*Attachment 1 Table*) **STANDARD:** a) Enters N/A in Item 3) block, N41 column of the Table. b) Enters N/A in item 4) block, N41 column of the Table. c) Enters N/A in Item 5) block, N41 column of the Table. **EVALUATOR'S NOTE:** A **KEY** is provided on Page 9 of 11, depicting the completed Table on Page 26 of 1-OPT-RX-001. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 8: N42. (*Attachment 1 Table*) **STANDARD:** a) Enters N/A in Item 3) block, N42 column of the Table. b) Enters N/A in item 4) block, N42 column of the Table. c) Enters N/A in Item 5) block, N42 column of the Table. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 9: N43. (*Attachment 1 Table*) **STANDARD:** a) Enters N/A in Item 3) block, N43 column of the Table. b) Enters N/A in item 4) block, N43 Column of the Table. c) Enters N/A in Item 5) block, N43 column of the Table. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 10: CRITICAL STEP	
N44. (*Attachment 1 Table*) **STANDARD:** **a) Places Rod control in manual**, and initials item 2) block, N44 column of the Table**. CRITICAL STEP.** b) Enters 88% in Item 3) block, N44 column of the Table. c Checks alternate indications of reactor Power (i.e., N41, N42, N43, Turbine Impulse Pressure, and Calorimetric power) prior to adjustment of N44 IAW P&L 4.6. **d) Adjusts gain control on N44 Drawer to 89.5% indication. (Band: 89.5 – 93.5%). CRITICAL STEP.** e) Enters Initials in item 4) block, N44 Column of the Table. f) Records 89.5% in Item 5) block, N44 column of the Table. h) Allows at least one (1) minute to pass before placing rod control in automatic following gain control manipulation. **i) Places Rod control in Automatic, with no rod motion.** Initials item 6) block, N44 column of the Table. **CRITICAL STEP.** **EVALUATOR'S NOTE:** When N44 gain control is adjusted, it will be adjusted in the *clockwise* direction. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 11: NOTIFY NUCLEAR SHIFT MANAGER (EVALUATOR) WITH STATUS OF TASK. Candidate should report completion of N44 gain adjustment and that rod control is in AUTO. **COMMENTS:** ** **JPM COMPLETE** **	_______ **SAT** _______ **UNSAT**

STOP TIME:

KEY
(for Examiner)

	NI-41	NI-42	NI-43	NI-44
2) Place rod control to MANUAL. Enter N/A if NI-44 will NOT be adjusted.				Candidate Initials
3) Record As Found NI power level for each channel to be adjusted. Enter N/A for channel(s) not being adjusted.	N/A	N/A	N/A	88%
4) Adjust the Gain Potentiometer on the front panel of each NI channel to the new Reactor Power value and initial appropriate block(s). Enter N/A for channel(s) not being adjusted.	N/A	N/A	N/A	Candidate Initials
5) Record As Left NI power level for each channel adjusted. Enter N/A for channel(s) not adjusted.	N/A	N/A	N/A	89.5%
6) Allow at least one minute to pass before placing the rod control back to AUTO. Enter N/A if NI-44 was NOT adjusted.				Candidate Initials

Operator Directions Handout
(TO BE READ TO APPLICANT BY EXAMINER)

Initial Conditions

- Unit 1 is operating at 89.5%.
- The Unit 1 RO has completed 1-OPT-RX-001, Section 6.1, Calculating Reactor Power Using Primary Performance Program, and recorded CALCALC Total Thermal Power on Step 6.1.12.

Initiating Cues

- You are to perform 1-OPT-RX-001, Section 6.2, Adjusting NI Channels.

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Initial Conditions

- Unit 1 is operating at 89.5%.
- The Unit 1 RO has completed 1-OPT-RX-001, Section 6.1, Calculating Reactor Power Using Primary Performance Program, and recorded CALCALC Total Thermal Power on Step 6.1.12.

Initiating Cues

- You are to perform 1-OPT-RX-001, Section 6.2, Adjusting NI Channels.

U.S. Nuclear Regulatory Commission
Surry Power Station

SR21301
Simulator Job Performance Measure [KA: 036G2.1.44 3.9/3.8]

Applicant________________________________ Start Time___________________

Examiner_______________________________

Date ___________________________________ Stop Time___________________

Title

MCR pressure boundary verification using 0-AP-22.00, Fuel Handling Abnormal Conditions

K/A: 036G2.1.44, Knowledge of RO duties in the control room during fuel handling, such as responding to alarms from the fuel handling area, communication with the fuel storage facility, systems operated from the control room in support of fueling operations, and supporting instrumentation (3.9 / 3.8).

Applicability	**Validation Time**	**Actual Time**
RO/SRO(I)/SRO(U)	7 Minutes	____ Minutes

Conditions

- Task is to be PERFORMED in the simulator.

Standards

- Closes either 1-VS-MOD-103A or -103C.
- Closes either 1-VS-MOD-103B or -103D.
- Opens one of the following MODs: 1-VS-MOD-104A, 2-VS-MOD-204A, 1-VS-MOD-104B, 2-VS-MOD-204B.
- Starts the ONE Supply fan associated with the opened MOD: 1-VS-F-41, 1-VS-F-42, 2-VS-F-41, 2-VS-F-42.
- Places 1-VS-43-VS103X to OFF.

Procedures

- 0-AP-22.00, Fuel Handling Abnormal Conditions.

Tools and Equipment

- None

Safety Considerations

- None

Simulator Setup

- Recall IC 388, or recall 100% IC and initialize.
- Place simulator in RUN.

PERFORMANCE CHECKLIST

Notes to the Evaluator

- Task critical elements are bolded and denoted as a **CRITICAL STEP**.

- **START TIME_______:**

STEP 1 CHECK FUEL REPAIR – IN PROGRESS (0-AP-22.00 step 1) **STANDARD:** a) Recalls from initial conditions or Shift Manager prompt that fuel repair is not in progress. b) Goes to Step 4 **EVALUATOR'S NOTE:** **IF asked**: Fuel repair was not in progress. **COMMENTS:**	**_______ SAT** **_______ UNSAT**
STEP 2 STOP FUEL HANDLING OPERATIONS (0-AP-22.00 step 4) **STANDARD:** a) Recalls from initial conditions that the Fuel Building has been evacuated, or from Shift Manager prompt that fuel handling operations are secured. b) Goes to Step 5. **EVALUATOR'S NOTE:** **IF asked**: Fuel handling operations are secured. **COMMENTS:**	**_______ SAT** **_______ UNSAT**

STEP 3 EVACUATE THE AFFECTED AREA (0-AP-22.00 step 5) • Containment OR • Fuel Building **STANDARD:** a) Recalls from initial conditions that the Fuel Building has been evacuated, or from Shift Manager prompt that fuel handling operations are secured. b) Goes to Step 6. **EVALUATOR'S NOTE:** **IF asked**: The Fuel Building has been evacuated. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 4 CHECK MCR EMERGENCY VENTILATION – NOT IN SERVICE (0-AP-22.20 step 6) **STANDARD:** a) Observes on the MCR Ventilation panel that no emergency ventilation fans are running. b) Observes normal MCR ventilation is in service. c) Goes to Step 7. **EVALUATOR'S NOTE:** . **COMMENTS:**	_______ **SAT** _______ **UNSAT**

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STEP 5 **CRITICAL STEP**

SECURE NORMAL VENTILATION (0-AP-3.0 step 7)
a) Close 1-VS-MOD-103A
b) Close 1-VS-MOD-103B
c) Close 1-VS-MOD-103C
d) Close 1-VS-MOD-103D

STANDARD:

a) Turns control switch for 1-VS-MOD-103A to CLOSE.
b) Turns control switch for 1-VS-MOD-103B to CLOSE.
c) Turns control switch for 1-VS-MOD-103C to CLOSE.
d) Turns control switch for 1-VS-MOD-103D to CLOSE.
e) Observes GREEN lights lit for 1-VS-MOD-103A/B/C/D.
f) Goes to Step 8.
.

EVALUATOR'S NOTE:

- **NOTE: 1-VS-MOD-103A and -103C are in series. Closing <u>either</u> MOD satisfies the CRITICAL STEP.**
- **NOTE: 1-VS-MOD-103B and -103D are in series. Closing <u>either</u> MOD satisfies the CRITICAL STEP.**

COMMENTS:

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_______ **SAT**

_______ **UNSAT**

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STEP 6

VERIFY STOPPED OR STOP MCR VENTILATION FANS (0-AP-22.00 step 8)

- 1-VS-F-15
- 1-VS-AC-4

STANDARD:

a) Observes GREEN light lit for 1-VS-F-15.
b) Observes GREEN light lit for 1-VS-AC-4.
c) Goes to Step 9

EVALUATOR'S NOTE:

NOTE: 1-VS-AC-4 will automatically stop when 1-VS-MOD-103A or -103C are closed. 1-VS-F-15 will automatically stop when either 1-VS-MOD-103B or -103D are closed.

COMMENTS:

</td><td>

_______ **SAT**

_______ **UNSAT**

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STEP 7

CAUTIONS before Step 9.

STANDARD:

a) Acknowledges Cautions concerning Unit 1 and Unit 2 MCR AHU Chilled water flow rates.
b) Acknowledges Cautions concerning flowing through a wet filter.
c) Acknowledges Cautions concerning the limit of one Emergency Supply fan.

EVALUATOR'S NOTE:

- **Cue: IF asked,** another operator will throttle Chilled water to the in-service MCR Air Handling Units (AHU)

COMMENTS:

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_______ **SAT**

_______ **UNSAT**

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STEP 8 CRITICAL STEP	
IMMEDIATELY START ONE EMERGECNY SUPPLY FAN IAW THE FOLLOWING (1-VS-F-41 OR 2- VS-F -41 PREFERRED) (0-AP-22.00 step 9) a) Start 1-VS-F-41 IAW the following: 1) Open 1-VS-MOD-104A, CONT RM EMERG SUP MOD 2) Start 1-VS-F-41 OR b) Start 2-VS-F-41 IAW the following: 1) Open 2-VS-MOD-204A, CONT RM EMERG SUP MOD 2) Start 2-VS-F-41 OR c) Start 1-VS-F-42 IAW the following: 1) Open 1-VS-MOD-104B, CONT RM EMERG SUP MOD 2) Start 1-VS-F-42 OR d) Start 2-VS-F-42 IAW the following: 1) Open 2-VS-MOD-204B, CONT RM EMERG SUP MOD 2) Start 2-VS-F-42 e) Adjust Chilled Water flow to MCR AHUs IAW Step 9 Caution **STANDARD:** a) **Opens ONE of the following MODs: CRITICAL STEP** **1-VS-MOD-104A** **2-VS-MOD-204A** **1-VS-MOD-104B** **2-VS-MOD-204B** b) **Starts the Emergency Supply "41" or "42" fan associated with the opened MOD. CRITICAL STEP.** **EVALUATOR'S NOTE:** • **NOTE: Opening ONE Emergency supply MOD and its associated Supply fan satisfies the CRITICAL STEP.** • **CUE: Another operator will take care of Chilled Water.** • **NOTE: The applicant should only start one fan, however if he starts two fans this does not constitute a failure of this Critical Step, as long as he opens the correct MOD associated with the Emergency Fan.** **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 9 CRITICAL STEP PLACE 1-VS-43-VS103X, MCR ISOLATION SWITCH ON UNIT 2 VS PANEL IN OFF (0-AP-22.00 step 10) **STANDARD:** **a) Places 1-VS-43-VS103X switch in OFF. CRITICAL STEP** **EVALUATOR'S NOTE:** **COMMENTS:** **END OF JPM**	_______ **SAT** _______ **UNSAT**

STOP TIME: _______

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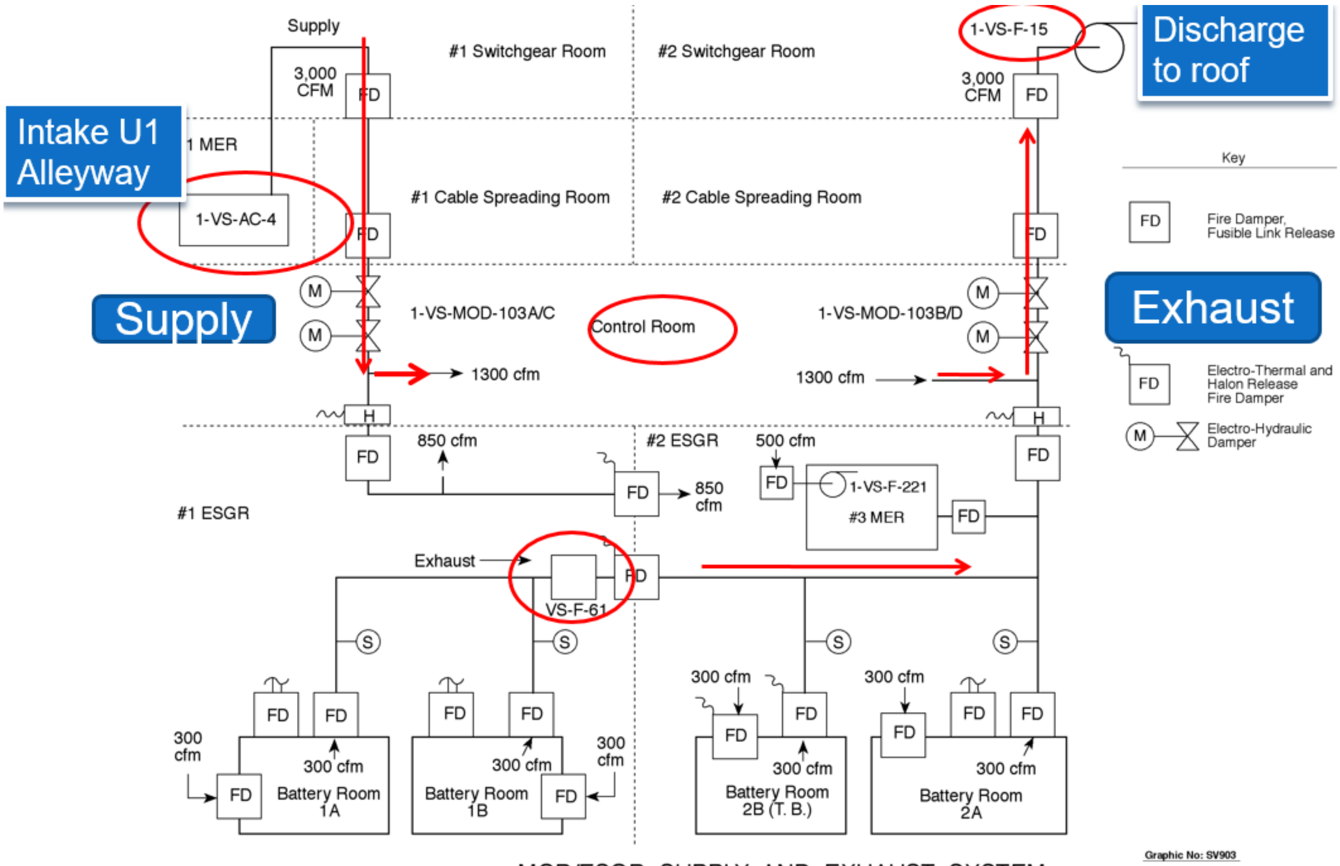
Examiner Key



MCR/ESGR SUPPLY AND EXHAUST SYSTEM

Operator Directions Handout
(TO BE READ TO APPLICANT BY EXAMINER)

Initiating Conditions

- Unit 1 is operating at 100% power; Unit 2 is in Refueling Shutdown. Fuel shuffling was in progress in the Fuel Building.
- There has been a Fuel Handling accident in the Fuel Building.
- The Fuel Handling crew has placed the leaking fuel assembly in the designated storage location and has evacuated the Fuel Building.

Initiating Cues

- Your task is to perform 0-AP-22.00, Fuel Handling Abnormal Conditions.
- When you finish the actions necessary to accomplish this, please inform me.
- This JPM is NOT Time Critical.

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Initiating Conditions

- Unit 1 is operating at 100% power; Unit 2 is in Refueling Shutdown. Fuel shuffling was in progress in the Fuel Building.
- There has been a Fuel Handling accident in the Fuel Building.
- The Fuel Handling crew has placed the leaking fuel assembly in the designated storage location and has evacuated the Fuel Building.

Initiating Cues

- Your task is to perform 0-AP-22.00, Fuel Handling Abnormal Conditions.
- When you finish the actions necessary to accomplish this, please inform me.
- This JPM is NOT Time Critical.

SURRY POWER STATION

ABNORMAL PROCEDURE

NUMBER	PROCEDURE TITLE	REVISION
0-AP-22.00	FUEL HANDLING ABNORMAL CONDITIONS (WITH 2 ATTACHMENTS)	24
		PAGE 1 of 6

PURPOSE

To provide guidance in the event of fuel failure during handling.

TIME CRITICAL ACTIONS

ENTRY CONDITIONS

1) Fuel cladding failure as determined by radiation monitor alarm from any of the following monitors:
   - 1-RM-RM-152, New Fuel Storage Area
   - 1-RM-RM-153, Fuel Pit Bridge
   - 1-VG-RM-131, MGPI Monitor
   - ( )-RM-RM-( )59/( )60, Containment Particulate/Gas
   - ( )-RM-RM-( )62, Manipulator Crane
2) Fuel cladding failure as determined by observation. (bubbles or cloudiness, separation of fuel rod)

CONTINUOUS USE

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1.___	CHECK FUEL REPAIR - IN PROGRESS	☐ GO TO Step 4.
2.___	CHECK LOCAL RADIATION CONDITIONS - NORMAL	☐ GO TO Step 4.
3.___	GO TO STEP 20	
4.___	STOP FUEL HANDLING OPERATIONS	
5.___	EVACUATE THE AFFECTED AREA ☐ • Containment OR ☐ • Fuel Building	
6.___	CHECK MCR EMERGENCY VENTILATION - NOT IN SERVICE	☐ GO TO Step 10.
7.___	SECURE NORMAL MCR VENTILATION ☐ a) Close 1-VS-MOD-103A ☐ b) Close 1-VS-MOD-103B ☐ c) Close 1-VS-MOD-103C ☐ d) Close 1-VS-MOD-103D	
8.___	VERIFY STOPPED OR STOP MCR VENTILATION FANS ☐ • 1-VS-F-15 ☐ • 1-VS-AC-4	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

* *

CAUTION:
- Chilled water flow to the in-service Unit 1 MCR AHU must be throttled to at least 15 gpm when the Emergency Supply fan is started.
- Chilled water flow to the in-service Unit 2 MCR AHU must be throttled to at least 25 gpm when the Emergency Supply fan is started.
- An Emergency Supply Fan must not be started if the filter is wet.
- Only one Emergency Supply Fan must be started.

* *

9.___ IMMEDIATELY START <u>ONE</u> EMERGENCY SUPPLY FAN IAW THE FOLLOWING:
(1-VS-F-41 OR 2-VS-F-41 PREFERRED)

a) Start 1-VS-F-41 IAW the following:

☐ 1) Open 1-VS-MOD-104A, CONT RM EMERG SUP MOD

☐ 2) Start 1-VS-F-41

<u>OR</u>

b) Start 2-VS-F-41 IAW the following:

☐ 1) Open 2-VS-MOD-204A, CONT RM EMERG SUP MOD

☐ 2) Start 2-VS-F-41

<u>OR</u>

(STEP 9 CONTINUED ON NEXT PAGE)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9.	IMMEDIATELY START ONE EMERGENCY SUPPLY FAN IAW THE FOLLOWING: (1-VS-F-41 OR 2-VS-F-41 PREFERRED) (Continued)	
	c) Start 1-VS-F-42 IAW the following:	
☐	1) Open 1-VS-MOD-104B, CONT RM EMERG SUP MOD	
☐	2) Start 1-VS-F-42	
	OR	
	d) Start 2-VS-F-42 IAW the following:	
☐	1) Open 2-VS-MOD-204B, CONT RM EMERG SUP MOD	
☐	2) Start 2-VS-F-42	
☐	e) Adjust Chilled Water flow to MCR AHUs IAW Step 9 Caution	
10.___	PLACE 1-VS-43-VS103X, MCR ISOLATION SWITCH ON UNIT 2 VS PANEL IN OFF	
11.___	INITIATE ATTACHMENT 1	
12.___	CHECK ANY MAIN STATION BATTERY - FRESHENING CHARGE IN PROGRESS	☐ GO TO Step 14.
13.___	NOTIFY ELECTRICAL DEPARTMENT THAT BATTERY ROOM MUST BE MONITORED FOR EXPLOSIVE CONCENTRATION	
14.___	NOTIFY THE FOLLOWING:	
☐	• Shift Supervision	
☐	• Health Physics	

U.S. Nuclear Regulatory Commission
Surry Power Station

SR21301
Simulator Job Performance Measure APE003 AA1.02 (3.6, 3.4)

Applicant__________________________	Start Time____________________
Examiner__________________________	Stop Time____________________
Date ______________________________	SAT _________ UNSAT ________

Title

RECOVER A DROPPED ROD

K/A: APE003 AA1.02 (3.6, 3.4), Ability to operate and / or monitor the following as they apply to the Dropped Control Rod: Controls and components necessary to recover rod.

Applicability	**Validated Time**	**Actual Time**
RO/SRO(I)/SRO(U)	13 Minutes	____ Minutes

Conditions

- Task is to be PERFORMED in the simulator.

Standards

1. Rotates ROD CONT MODE SEL SWITCH from the MANUAL to the CBA position.
2. Places all disconnect switches for affected bank in "disconnect".
3. Places switch for P-10 in "connect".
4. Resets the GROUP 2 step counter to zero for CBA.
5. Places SHUTDN AND CONT ROD CONT SWITCH to the OUT position.
6. Candidate contacts I&C to reset CBA bank demand to 000
7. Fully withdraws the affected rod.
8. Places all disconnect switches for affected bank in "CONNECT".
9. Momentarily depresses ROD CONT SYS INTERNAL ALARM RESET pushbutton
10. Places ROD CONT MODE SEL switch to MANUAL.

Procedures

- 0-AP-1.01, Control Rod Misalignment.

Tools and Equipment
- None

Safety Considerations
- None

Simulator Setup

- Reset to IC 361 OR Call up 70% power IC.
- Call up “CERPI_MTP_F_KEY” using remotes RD system.
- Enter the following malfunction:
    - RD1224, DROPPED RCCA, P-10 CONTROL BANK A, INSERT
- Enter the following REMOTE:
    - CERPI_MTP_F_KEY, Position to ACTIVE, Event 3, Delay 0, Insert
    - CBA_MAN_POS, CERPI CB A Demand Position Manual Input, FINAL VALUE to 0, Delay 5, TRIGGER 3, INSERT.
    - CERPI_MTP_F_KEY, Position to INACTIVE, Event 3, Delay 10, Insert
- Perform 0-AP-1.00 through step 23 and transition to 0-AP-1.01 step 5, perform through step 13 and stabilize plant.
- Set up trend recorder for Tave and Tref to **wide range** indication.
- REMOVE MALFUNCTION (RD1224) & freeze simulator until ready to perform JPM.
- Place a Pink Magnet next to the Control Bank ‘A’ Rod Position Recorder.

Procedure Setup:

- Mark-up a copy of 0-AP-1.01 by initialing steps 5 through step 13.
    - Note that AP-1.00 step 23 directs the operator to 0-AP-1.01 STEP 5

PERFORMANCE CHECKLIST

Notes to the Evaluator

- Task critical elements are bolded and denoted as a **CRITICAL STEP**.
- *An additional instructor may be needed to silence and acknowledge alarms for the examinee.*
- **START TIME_______**

STEP 1: 0-AP-1.01 – CAUTIONS prior to step 14: • This procedure is NOT valid for realignment of a control rod if Reactor is subcritical. • Realignment SHALL be performed with Reactor power held less than or equal to 75%. **STANDARD:** Candidate acknowledges cautions. **COMMENTS:**	**_______ SAT** **_______ UNSAT**
STEP 2: **CRITICAL STEP** 0-AP-1.01 – STEP 14 TRANSFER ROD CONT MODE SEL SWITCH TO AFFECTED BANK **STANDARD:** a. **Rotates ROD CONT MODE SEL SWITCH from the MANUAL to the CBA position [CRITICAL STEP]**. b. Verifies rod speed indication of 48 spm on ROD SPEED SI-1-408. c. Records Rod P-10 in CBA affected. **COMMENTS:**	**_______ SAT** **_______ UNSAT**

STEP 3: 0-AP-1.01 – STEP 15 RECORD AFFECTED ROD AND ROD BANK: • Rod:___________ • Rod Bank:___________ **STANDARD:** a) Enters P-10 for affected rod b) Enters CBA for affected rod bank **COMMENTS:**	**_______ SAT** **_______ UNSAT**
STEP 4: **CRITICAL STEP** 0-AP-1.01 – STEP 16 ALIGN LIFT COIL DISCONNECT SWITCHES FOR AFFECTED BANK: a) Place all disconnect switches to DISCONNECTED/DOWN position b) Place affected rod disconnect switch to CONNECTED/UP position c) Have alignment of disconnect switches independently checked **STANDARD:** a) Proceeds behind Vertical Board 1-2 to Lift Coil Disconnect Switch Panel and opens panel door. b) Notes sign requiring removal of jewelry prior to entry. **c) Places all disconnect switches for affected bank in "disconnect".** • **F-2 [CRITICAL STEP]** • **B-10 [CRITICAL STEP]** • **K-14 [CRITICAL STEP]** • **P-6 [CRITICAL STEP]** • **K-2 [CRITICAL STEP]** • **B-6 [CRITICAL STEP]** • **F-14 [CRITICAL STEP]** **d) Places switch for P-10 in "connect" [CRITICAL STEP].** e) Requests alignment of Lift Coil Disconnect Switches to be independently verified. **EVALUATOR'S NOTE/CUE:** • If asked: Lift Coil Disconnect Switches have been independently verified. **COMMENTS:**	**_______ SAT** **_______ UNSAT**

STEP 5: 0-AP-1.01 – STEP 17 RECORD BANK POSITION OF AFFECTED ROD. (ENTER N/A FOR NON-AFFECTED GROUP): • Group 1 Step Counter:____________ • Group 2 Step Counter:____________ **STANDARD:** (a) Enters N/A for Group 1 Step Counter (b) Enters 229 for Group 2 Step Counter **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 6: 0-AP-1.01 - CAUTIONS prior to step 18: • The affected withdrawal rate during realignment is limited to 2/P (P=fraction of Core Power where 100% power is equal to 1.0) steps per hour (if not a whole number, round down to the whole number) if affected rod remains misaligned for more than 12 hours or the duration of misalignment can NOT be determined. • The withdrawal rate limitation may be relaxed with authorization from the Reactor Engineer or Nuclear Analysis and Fuels. **STANDARD:** a) Acknowledges CAUTIONS b) Recalls from initial conditions that rod dropped 1 hour ago and these cautions are NOT applicable. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 7: 0-AP-1.01 – STEP 18 RECORD THE FOLLOWING: • Reactor power:____________ • Withdrawal rate:__________ **STANDARD:** a) Candidate records current reactor power (approximately 70%) b) Candidate records withdrawal rate at 48 steps/minute. **EVALUATOR'S NOTE/CUE:** **If asked**: Do not exceed 75% power, a 1 dpm SUR, or temperature >569°F during dropped rod recovery. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 8: 0-AP-1.01 - NOTE prior to step 19: Refer to Attachment 2 before resetting Group Step Counter. **STANDARD:** Candidate refers to attachment 2 for assistance in resetting group step counters. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 9: 0-AP-1.01 – STEP 19 CHECK AFFECTED ROD - ON BOTTOM **STANDARD:** Candidate verifies P10 at 0 (zero) steps. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 10: 0-AP-1.01 – STEP 20 REFER TO TECH SPEC 3.12.E. **STANDARD:** Candidate directs the Shift Manager to review Tech Specs. **EVALUATOR'S NOTE/CUE:** **If asked**: The shift manager review of Tech Spec 3.12.E is complete and continue with the task. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 11: 0-AP-1.01 - NOTE prior to step 21: If only one dropped rod, then only one Group Step Counter and one Bank Demand will be reset. **STANDARD:** Candidate acknowledges the NOTE. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
Step 12 **CRITICAL STEP** 0-AP-1.01 – STEP 21 RESET AFFECTED GROUP STEP COUNTER TO 0. **STANDARD:** Utilizing attachment 2 as guidance**, the candidate resets the GROUP 2 step counter to zero for CBA [CRITICAL STEP].** **EVALUATOR'S NOTE/CUE:** **If asked**: Provide golf tee to candidate to assist in resetting the group step counter. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

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Step 13 **CRITICAL STEP**

0-AP-1.01 – STEP 22 HAVE I&C RESET AFFECTED BANK DEMAND TO 000.

STANDARD:

Candidate contacts I&C to reset CBA bank demand to 000 [CRITICAL STEP].

BOOTH NOTES:

When asked to reset affected bank as IC, report that 1G-E2, 1G-G5, and 1G-H5 will be received as part of the resetting of the affected bank demand.

- Initiate TRIGGER 3 to reset affect bank demand to 0 (zero).
- When 1G-E2 clear (or 10 seconds has elapsed), report back to candidate that the “A” control bank demand has been reset to zero.

COMMENTS:

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Step 14

0-AP-1.01 - NOTE prior to step 21: Annunciator ( )G-A6, ROD CONT SYS URGENT FAILURE, will alarm when the affected rod is withdrawn indicating that the lift coils of the remaining rods in the bank are deenergized..

STANDARD:

Candidate acknowledges NOTE

COMMENTS:

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Step 15 **CRITICAL STEP**

0-AP-1.01 – STEP 23 REALIGN AFFECTED ROD TO ITS BANK POSITION RECORDED IN STEP 17.

STANDARD:

a) **Places SHUTDN AND CONT ROD CONT SWITCH to the OUT position [CRITICAL STEP]**.
b) Verifies outward rod motion indicated by observing affected rod IPRI.
c) Acknowledges annunciator 1G-A6 (ROD CONT SYS URGENT FAILURE).
d) **Withdraws affected rod to required position (229 steps) [CRITICAL STEP]**.
e) Continuously monitors SUR, PR NI's, IR NI's, ΔT, Tave, group step counters, IRPI, rod speed, out indication light and TR-1-409A.

COMMENTS:

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Step 16 **CRITICAL STEP** 0-AP-1.01 – STEP 24 PLACE AFFECTED BANK LIFT COIL DISCONNECT SWITCHES TO THE CONNECTED/UP POSITION **STANDARD:** a) Proceeds behind Vertical Board 1-2 to Lift Coil Disconnect Switch Panel and opens panel door. b) Notes sign requiring removal of jewelry prior to entry. **c) Places all disconnect switches for affected bank in "CONNECT".** • **F-2 [CRITICAL STEP]** • **B-10 [CRITICAL STEP]** • **K-14 [CRITICAL STEP]** • **P-6 [CRITICAL STEP]** • **K-2 [CRITICAL STEP]** • **B-6 [CRITICAL STEP]** • **F-14 [CRITICAL STEP]** d) Requests alignment of Lift Coil Disconnect Switches to be independently verified. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
Step 17 0-AP-1.01 – STEP 25 HAVE ALIGNMENT OF DISCONNECT SWITCHES INDEPENDENTLY CHECKED **STANDARD:** Candidate requests independent verification of disconnect switch positions. **EVALUATOR'S NOTE/CUE:** • If asked: Lift Coil Disconnect Switches have been independently verified. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

Step 18 **CRITICAL STEP** 0-AP-1.01 – STEP 26 RESET ROD CONTROL URGENT FAILURE • Depress ROD CONT SYS INTERNAL ALARM RESET pushbutton **STANDARD:** a) **Momentarily depresses ROD CONT SYS INTERNAL ALARM RESET pushbutton [CRITICAL STEP].** b) Verifies annunciator 1G-A6 (ROD CONT SYS URGENT FAILURE) clears. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
Step 19 **CRITICAL STEP** 0-AP-1.01 – STEP 27 TRANSFER ROD CONT MODE SEL SWITCH TO MANUAL **STANDARD:** **Rotates ROD CONT MODE SELECT Switch from the CBA position to the MANUAL position [CRITICAL STEP].** **COMMENTS:**	_______ **SAT** _______ **UNSAT**
Step 20 REPORTS TO SHIFT MANAGER (EVALUATOR). **STANDARD:** Verbal status report made that rod withdrawn and rod control in manual. **COMMENTS:** **JPM END**	_______ **SAT** _______ **UNSAT**

STOP TIME:

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Operator Directions Handout
(TO BE READ TO APPLICANT BY EXAMINER)

Initial Conditions

- With the unit stable at 70% power, control Rod P-10 dropped about 1 hour ago due to a failed fuse.
- Instrument Techs have replaced the fuse.
- A pre-job brief has been held and we are now ready to withdraw the rod.
- I&C is standing by for your instructions.

Initiating Cues

- Here's a copy of 0-AP-1.01, I want you to recover the dropped control rod IAW steps 14 through and including step 27.
- When you finish the actions necessary to accomplish this and return the rods to MANUAL, please inform me.

.

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Initial Conditions

- With the unit stable at 70% power, control Rod P-10 dropped about 1 hour ago due to a failed fuse.
- Instrument Techs have replaced the fuse.
- A pre-job brief has been held and we are now ready to withdraw the rod.
- I&C is standing by for your instructions.

Initiating Cues

- Here's a copy of 0-AP-1.01, I want you to recover the dropped control rod IAW steps 14 through and including step 27.
- When you finish the actions necessary to accomplish this and return the rods to MANUAL, please inform me.

U.S. Nuclear Regulatory Commission
Surry Power Station

SR21301
Simulator Job Performance Measure
[Alternate Path]

Applicant________________________________ Start Time___________________

Examiner________________________________ Stop Time___________________

Date ___________________________________ SAT _________ UNSAT ________

Title

RESPOND TO RCP SEAL FAILURE IAW 1-AP-9.00 (ALTERNATE PATH)

K/A: 002A2.01 Ability to predict the impacts loss of coolant inventory on the RCS and based on those predictions use procedures to correct, control, or mitigate 4.3/4.4.

Applicability	**Validation Time**	**Actual Time**
RO/SRO(I)/SRO(U)	8 Minutes	_____ Minutes

Conditions

- Task is to be PERFORMED in the simulator.
- ARP 1C-C4, RCP 1C SEAL LEAKOFF HI FLOW， has directed initiation of 1-AP-9.00

Standards

- Depresses Reactor Trip pushbutton.
- After 5 minutes closes 1-RC-PCV-1455B Spray Valve.
- Stops 1-RC-P-1C.

Procedures

- 1-AP-9.00 - RCP ABNORMAL CONDITIONS

Tools and Equipment

- None

Safety Considerations

- None

Simulator Setup

- Reset to IC 362 OR Call up 100% power IC and initialize. Place simulator in RUN.
- Malfunctions, RC1203 (Failure of RCP Seal #1), Final Value = 100%, Insert.
- Malfunctions, RC1303 (Failure of RCP Seal #2), Final Value = 50%, Event 1, Insert

PERFORMANCE CHECKLIST

Notes to the Evaluator

- Task critical elements are bolded and denoted as a **CRITICAL STEP**.
- *An additional instructor may be needed to silence and acknowledge alarms for the examinee.*
- **START TIME_______:**

STEP 1: 1-ARP-1C-C4 – STEP 1, CHECK NUMBER 1 SEAL LEAKOFF GREATER THAN 3.0 GPM. - OBSERVES THE CAUTIONS AND NOTES PRIOR TO STEP 1. **STANDARD:** Uses 1-CH-FR-1190 and determines seal leakoff is 3.08 gpm. **COMMENTS:**	**_______ SAT** **_______ UNSAT**
STEP 2: 1-ARP-1C-C4 – STEP 2, INITIATE 1-AP-9.00, RCP ABNORMAL CONDITIONS. **STANDARD:** Candidate initiates 1-AP-9.00. **COMMENTS:** • Provide 1-AP-9.00 when candidate identifies this is the procedure that is to be performed next.	**_______ SAT** **_______ UNSAT**

STEP 3: 1-AP-9.00 - OBSERVES THE CAUTIONS AND NOTES PRIOR TO STEP 1. **CAUTION**: If RCP seal injection flow is lost, RCP seal or bearing temperatures can be expected to reach maximum operating limits within one to two hours, even with normal Thermal Barrier CC flow. **NOTE**: • If an RCP needs to be tripped with the Reactor critical, a Reactor trip must be performed before securing the RCP. • Attachment 1 and Attachment 6 list PCS points which may be used to monitor RCP performance. • If PCS unavailable, monitor RCP temperatures on 1-RC-TR-1448. **STANDARD:** Candidate acknowledges Caution and Notes **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 4: 1-AP-9.00 - STEP 1 – * CHECK SEAL INJECTION - FLOW INDICATED **STANDARD:** Uses Vertical Board meter and observes Seal Injection flows to all RCPs. • 1-CH-FI-1130A – “A” RCP Seal Injection Flow • 1-CH-FI-1127A – “B” RCP Seal Injection Flow • 1-CH-FI-1124A – “C” RCP Seal Injection Flow **EVALUATOR’S NOTE:** The (*) denotes a continuous action step. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 5: 1-AP-9.00 - STEP 2 - CHECK RCS PRESSURE – LESS THAN 2100 PSIG **STANDARD:** Determines RCS Pressure is NOT less than 2100 PSIG and goes to Step 4 per Step 2 RNO. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 6: 1-AP-9.00 - STEP 4 – *CHECK RCP SEAL WATER OUTLET TEMPERATURE-LESS THAN 200°F • PCS Point T0181A - RCP A • PCS Point T0182A - RCP B • PCS Point T0183A - RCP C **STANDARD:** a) Checks PCS Point T0183A – for RCP C less than 200°F. b) May check the other RCP Seal Water Outlet Temperatures as well. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 7: 1-AP-9.00 - OBSERVES THE NOTE PRIOR TO STEP 5. NOTE: First, Second, and Third Stage Seal DP is indicated on the PCS, or may be determined using Notes on Attachment 1, page 2. **STANDARD:** Candidate acknowledges note. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 8: 1-AP-9.00 - Step 5 - *CHECK RCP SEAL STAGES – NOT FAILED • ΔP across each seal stage – LESS THAN 2000 PSID **STANDARD:** Checks differential across each seal stage less than 2000 psid on PCS. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 9: 1-AP-9.00 - OBSERVES THE NOTE PRIOR TO STEP 6. NOTE: Differential pressure of greater than 1440 psid is an indication that one seal stage has failed and a second seal stage is degrading. Unit operation with only one failed seal stage is acceptable. **STANDARD:** Candidate acknowledges note. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 10: 1-AP-9.00 - STEP 6 – *CHECK RCP SEAL STAGES – LESS THAN ONE SEAL STAGE FAILED**.** • ΔP across each seal stage – LESS THAN 1440 PSID **STANDARD:** Checks differential across each seal stage less than 1440 psid on PCS. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 11: 1-AP-9.00 - OBSERVES THE CAUTION AND NOTES PRIOR TO STEP 7. • CAUTION: RCPs may be operated without seal water return flow for up to 30 minutes. • NOTES: • Attachment 3 may be used to check suspect Seal Leakoff flow instrumentation. • Changes to RCS chemistry, e.g., large dilutions or borations, can affect RCP Seal Leakoff and Number 2 & 3 Seal DP values. Use other instrumentation as necessary to validate changing conditions. **STANDARD:** Candidate acknowledges caution and notes. **BOOTH NOTE:** **When the operator is reading the CAUTION and NOTES before Step 7, insert TRIGGER 1 to fail the second stage.** **EVALUATOR'S NOTE:** a) At this point the candidate may go one of either two paths: • Identifies Seal stage #3 is > 2000 PSID and returns to Step 5 RNO (JPM Step 13) • Continues with step 7 (next JPM step) **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 12: 1-AP-9.00 - STEP 7 - CHECK RCP SEAL LEAKOFF – LESS THAN 3.3 GPM. **STANDARD:** Observes seal leakoff at approximately 4.4 gpm and goes to RNO column. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

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STEP 13: **CRITICAL STEP**

1-AP-9.00 - STEP 7 RNO - Do the following:
a) IF flow greater than 4.2 gpm, THEN do the following:
1) Trip the Reactor.
2) Initiate 1-E-0, Reactor Trip or Safety Injection.

STANDARD:

a) Informs the Shift Manager of the need to trip the reactor and initiate 1-E-0
b) **Depresses a Reactor Trip pushbutton [CRITICAL STEP]**
c) Identifies that All Rods on Bottom Light – is LIT, Rx Trip and Bypass Breakers – OPEN, Neutron Flux Lowering.
d) Manually trips turbine.
e) Checks all Turbine Stop Valves – CLOSED.
f) Isolates the MSR Steam Supply by closing 1-MS-SOV-104.
g) Checks generator output breakers - OPEN
h) Checks both AC Emergency Buses - ENERGIZED.
i) Verifies SI is not actuated or required: LHSI Pumps not running A-F-3/4 not LIT and no issues with PZR pressure, CTMT pressure, Steamline differential or High Steam flow.
j) Recommends transition to 1-ES-0.1, Rx Trip Response.

BOOTH NOTE:

EVALUATOR'S NOTE:
a) Direct the Operator to initiate 1-E-0 when informed of the requirement to trip the reactor.
b) Following completion of immediate actions, inform the candidate that another operator will perform ES-0.1 actions.

COMMENTS:

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STEP 14: CRITICAL STEP	
1-AP-9.00 - STEP 7 RNO (CONTINUED) - Do the following: 3) WHEN approximately five minutes have elapsed since Reactor Trip, THEN do the following: a. IF RCP A affected, THEN close 1-RC-PCV-1455A, Pressurizer Spray Valve From Loop A. b. IF RCP C affected, THEN close 1-RC-PCV-1455B, Pressurizer Spray Valve From Loop C. c. Stop the affected RCP(s). • 1-RC-P-1A • 1-RC-P-1B • 1-RC-P-1C d. GO TO Step 9. **STANDARD:** a) **After 5 minutes (time compressed), closes the spray valve by placing 1-RC-PCV-1455B in MANUAL and lowering demand to 0% OR by taking 1-RC-43-1455B to CLOSE [CRITICAL STEP].** b) **Stops 1-RC-P-1C [CRITICAL STEP]** c) GOES TO Step 9 **EVALUATOR'S NOTE/CUE:** • Inform the operator that a five minute time compression has occurred and they are to continue performing 1-AP-9.00. Another operator will perform 1-ES-0.1. • **When the operator continues to Step 9, inform them the JPM is complete**. **COMMENTS:** **JPM END**	_______ **SAT** _______ **UNSAT**

STOP TIME: ______________

NOTES:

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Operator Directions Handout
(TO BE READ TO APPLICANT BY EXAMINER)

Initial Conditions

- ARP 1C-C4, RCP 1C SEAL LEAKOFF HI FLOW, has been received.

Initiating Cues

- You are to perform ARP 1C-C4.
- Another Operator will monitor the rest of the plant
- When you finish the actions necessary to accomplish this, please inform me.

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Initial Conditions

- ARP 1C-C4, RCP 1C SEAL LEAKOFF HI FLOW, has been received.

Initiating Cues

- You are to perform ARP 1C-C4.
- Another Operator will monitor the rest of the plant.
- When you finish the actions necessary to accomplish this, please inform me.

SURRY POWER STATION
ANNUNCIATOR RESPONSE PROCEDURE

NUMBER	PROCEDURE TITLE	REVISION
1C-C4	RCP 1C SEAL LEAKOFF HI FLOW	3
		PAGE 1 of 2

REFERENCES 1C-20

1) UFSAR 9.1
2) 11448-ESK-10C
3) 11448-FM-88B, C
4) 1-DRP-005, Instrument Setpoints
5) Westinghouse TB NSD-TB-93-01-RO
6) 1-AP-9.00, RCP Abnormal Conditions
7) DCP 96-026, RCP Seal Leakoff Flow Transmitter Replacement
8) DCP 97-031, Replace MCR Ann Panel
9) DC SU-11-00012, Reactor Coolant Pump Seal Replacement (1-RC-P-1C)

PROBABLE CAUSE

1) Alarm actuates 1-CH-FE-1190C senses seal leakoff flow greater than or equal to 3.0 gpm.

   High seal leakoff flow may be caused by one of the following:
   - Failure of controlled leakage flow.
   - Excessive seal injection flow.
   - Seal failure.

2) Instrumentation failure has occurred.

CONTINUOUS USE

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1.___	CHECK NUMBER 1 SEAL LEAKOFF - GREATER THAN 3.0 GPM ☐ • 1-CH-FR-1190 (Pen 3 - Blue)	Do the following: ☐ a) Increase surveillance of RCP seal leakoff flow and associated parameters. ☐ b) Initiate a Condition Report. ☐ c) IF seal leakoff flow increases to 3.0 gpm, THEN GO TO 1-AP-9.00, RCP ABNORMAL CONDITIONS. ☐ d) GO TO Step 3.
2.___	INITIATE 1-AP-9.00, RCP ABNORMAL CONDITIONS	
3.___	PROVIDE NOTIFICATIONS AS NECESSARY: ☐ • OMOC ☐ • STA ☐ • Shift Supervision ☐ • System Engineering	

- END -

U.S. Nuclear Regulatory Commission
Surry Power Station

SR21301
Simulator Job Performance Measure EPE.E02.EK3.3 (3.9/3.9)
Alternate Path

Applicant________________________________	Start Time___________________
Examiner_______________________________	Stop Time___________________
Date ___________________________________	SAT _________ UNSAT ________

Title

RE-ESTABLISH NORMAL LETDOWN FOLLOWING SI

K/A: EPE.E02.EK3.3, Manipulations of controls required to obtain desires operating results during abnormal, and emergency situations. 3.9 / 3/9

Applicability	**Validated Time**	**Actual Time**
RO/SRO(I)/SRO(U)	21 Minutes	____ Minutes

Conditions

- Task is to be PERFORMED in the simulator.

Standards

- Places 1-CH-HCV-1389 to the PDTT position.
- Opens 1-CH-HCV-1201.
- Opens either 1-RC-HCV-1557A, or B, or C Loop Drain valves.
- Opens 1-CH-HCV-1137.
- Places 1-CH-HCV-1389 to the VCT position.

Procedures

- 1-ES-1.1, SI Termination, Rev. 52.
- 1-OP-CH-006, Shifting or Increasing/Decreasing Letdown Flow, Rev.22.

Tools and Equipment

- None

Safety Considerations

- None

Simulator Setup

- Reset to IC 363. OR Call up 100% power IC and initialize.
- Run through the following steps:
  - Initiate SI.
  - Perform E-0 and attachment 1
  - Reduce AFW flow to 200 gpm to each SG
  - Transition to ES-1.1 and perform it through Step 14.
- Insert the following overrides:
  - CHFC122C_RAISE, Override to OFF, INSERT
  - CHFC122C_AUTO, Override to OFF, INSERT
- Close 1-CH-LCV-1460A & B.
- Open 1-CC-TV-109B.
- Turn ON all pressurizer heaters.
- Press Green Pushbutton on 1-DG-TV-108A/B and pump down the PDTT until pump secures.
- Set seal injection at 8 gpm.
- Allow simulator until SR energize, place in freeze and snap until ready to run JPM.

PERFORMANCE CHECKLIST

Notes to the Evaluator

- Task critical elements are bolded and denoted as a **CRITICAL STEP**.
- *An additional instructor may be needed to silence and acknowledge alarms for the examinee.*
- **START TIME_______**

STEP 1: 1-ES-1.1 – STEP 15 ESTABLISH LETDOWN: a) Adjust CHG line flow to establish greater than 40 gpm **STANDARD:** a. Candidate attempts to raise charging flow and identifies that the charging flow controller will not respond. This is the ALTERNATE PATH start. b. Goes to Step 15 RNO, Establish excess letdown IAW 1-OP-CH-006, SHIFTING OR INCREASING/DECREASING LETDOWN FLOW. **COMMENTS:** • Provide copy of 1-OP-CH-006 to applicant after the applicant identifies this procedure.	**_______ SAT** **_______ UNSAT**
STEP 2: 1-OP-CH-006 – PRECAUTIONS AND LIMITATIONS. **STANDARD:** (a) Reviews initial conditions, precautions and limitations. (b) Determines Section 5.8 (Placing Excess Letdown in Service with Normal Letdown Isolated) is to be used. **COMMENTS:**	**_______ SAT** **_______ UNSAT**

STEP 3: 1-OP-CH-006 - STEP 5.8.1 Close or check closed the following: • 1-CH-LCV-1460A, LETDOWN LINE ISOL • 1-CH-LCV-1460B, LETDOWN LINE ISOL **STANDARD:** a) Candidate checks closed 1-CH-LCV-1460A. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 4: 1-OP-CH-006 - STEP 5.8.2 Check all of the following Loop Drain header isolation valves are closed. • 1-RC-HCV-1557A, LOOP A DRAIN • 1-RC-HCV-1557B, LOOP B DRAIN • 1-RC-HCV-1557C, LOOP C DRAIN **STANDARD:** Candidate verifies all listed valves are CLOSED **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 5: 1-OP-CH-006 - STEP 5.8.3 Check 1-CH-HCV-1201, EXCESS LETDOWN HX ISOL, valve is closed. **STANDARD:** Candidate verifies 1-CH-HCV-1201 is CLOSED **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 6: 1-OP-CH-006 - STEP 5.8.4 Check 1-CH-HCV-1137, EXCESS LETDOWN FLOW, setpoint is zero. **STANDARD:** Candidate verifies 1-CH-HCV-1137 demand is at ZERO. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 7: 1-OP-CH-006 - STEP 5.8.5 Check 1-CH-HCV-1389, EXCESS LETDOWN DIVERT, valve is in the VCT position. **STANDARD:** Candidate verifies 1-CH-HCV-1389 is in the VCT position. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 8: 1-OP-CH-006 - STEP 5.8.6 Check open or open 1-CH-MOV-1381, RCP SEAL RETURN. **STANDARD:** Candidate verifies 1-CH-MOV-1381 open. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
Step 9 1-OP-CH-006 - STEP 5.8.7 Check running at least one CC pump. **STANDARD:** Candidate verifies 1-CC-P-1A in service (RED bkr postion light and/or pump amps) **COMMENTS:**	_______ **SAT** _______ **UNSAT**
Step 10 1-OP-CH-006 - STEP 5.8.8 Check 1-CC-FI-109, LETDOWN HX OUTLT FLOW, is indicating approximately 140 gpm. **STANDARD:** Candidate verifies required flow as indicated on 1-CC-FI-109. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

Step 11 1-OP-CH-006 – NOTE prior to step 5.8.9 - The reset switch located on the RHR flats must be held in the open position until 1-CC-HCV-108, Excess Ldn HX CC Outlet Hand Cont Valve, opens fully. **STANDARD:** Candidate acknowledges NOTE **COMMENTS:**	_______ **SAT** _______ **UNSAT**
Step 12 1-OP-CH-006 - STEP 5.8.9 IF flow NOT indicated on 1-CC-FI-109, THEN locally reset and open 1-CC-HCV-108. Otherwise, enter N/A. **STANDARD:** Candidate enters N/A for this step as flow is established. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
Step 13 1-OP-CH-006 - STEP 5.8.10 Check 1-CC-TI-108, LETDOWN HX OUTLT TEMP, is indicating ambient. **STANDARD:** Candidate verifies ambient temperature indication on 1-CC-TI-108. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
Step 14 1-OP-CH-006 - STEP 5.8.11 Check 1-CH-PI-1138, EXCESS LETDOWN HX OUTLET PRESS, is indicating approximately 50 psig. **STANDARD:** Candidate verifies pressure indication on 1-CH-PI-1138 approximately 50 psig. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

Step 15 1-OP-CH-006 - STEP 5.8.12 Check 1-CH-TI-1139, EXCESS LETDOWN HX OUTLET TEMP, is indicating ambient. **STANDARD:** Candidate verifies ambient temperature indication on 1-CH-TI-1139. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
Step 16 1-OP-CH-006 – NOTES prior to step 5.8.13 • The first 50 gallons of Excess Letdown flow should be directed to the Primary Drain Transfer Tank (PDTT) so that the Excess Letdown flow is not returned to the RCS. • PCS points Y4020A and U0911 for PDTT level can be found on the Pressurizer & Primary Relief Tank screen. **STANDARD:** Candidate acknowledges NOTES **COMMENTS:**	_______ **SAT** _______ **UNSAT**
Step 17 **CRITICAL STEP** 1-OP-CH-006 - STEP 5.8.13 Place 1-CH-HCV-1389, EXCESS LETDOWN DIVERT, in the PDTT position to flush the Excess Letdown Heat Exchanger. **STANDARD:** **Candidate places 1-CH-HCV-1389 in the PDTT position [CRITICAL STEP]** **COMMENTS:**	_______ **SAT** _______ **UNSAT**
Step 18 1-OP-CH-006 - STEP 5.8.14 Check 1-CH-PI-1138, EXCESS LETDOWN HX OUTLET PRESS, indicates approximately 10 psig. **STANDARD:** Candidate verifies approximately 10 psig indicated on 1-CH-PI-1138. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

Step 19 **CRITICAL STEP** 1-OP-CH-006 - STEP 5.8.15 Open 1-CH-HCV-1201, EXCESS LETDOWN HX ISOL. **STANDARD:** **Candidate opens 1-CH-HCV-1201 [CRITICAL STEP]** **COMMENTS:**	**_______ SAT** **_______ UNSAT**
Step 20 1-OP-CH-006 – NOTE prior to step 5.8.16 - Letdown flow from the loops is not accounted for in the calorimetric while on Excess Letdown. **STANDARD:** Candidate acknowledges NOTE **EVALUATOR'S NOTE:** Reactor is tripped so calorimetric is not utilized at this time. **COMMENTS:**	**_______ SAT** **_______ UNSAT**
Step 21 1-OP-CH-006 - STEP 5.8.16 IF a calorimetric is being performed, THEN check initiated or initiate 1-OPT-RX-007, Shift Average Power Calculation. **STANDARD:** Candidate enters N/A for this step. **COMMENTS:**	**_______ SAT** **_______ UNSAT**

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Step 22

1-OP-CH-006 – CAUTIONS prior to step 5.8.17:

- There are several potential leak points downstream of the loop drain valves.
- Only one loop drain valve may be open above 200°F, to prevent the possibility of bypassing SI flow to the two intact loops in a Design Basis Accident, due to loop cross-connect through the drain header. (Ref. 2.3.6)

STANDARD:
Candidate acknowledges CAUTIONS.

EVALUATOR'S NOTE:
Candidate may ask for assistance in monitoring for RCS leakage. If asked, report that another operator will perform requested monitoring.

COMMENTS:

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_______ **SAT**

_______ **UNSAT**

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Step 23 **CRITICAL STEP**

1-OP-CH-006 - STEP 5.8.17 Open one of the following Loop Drain header isolation valves. (✓)

- 1-RC-HCV-1557A, LOOP A DRAIN
- 1-RC-HCV-1557B, LOOP B DRAIN
- 1-RC-HCV-1557C, LOOP C DRAIN

STANDARD:
Candidate opens <u>ONE</u> of the listed valves [CRITICAL STEP]

EVALUATOR'S CUE:
If asked: There is no preference to the valve chosen.

COMMENTS:

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_______ **UNSAT**

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Step 24

1-OP-CH-006 – NOTE prior to step 5.8.18:

- An Excess Letdown flow rate can be calculated by using 1-DG-LI-107, PDTT LEVEL (2.5% level change is approximately 15 gallons), and/or change in Charging Flow.
- Attachment 1 may be used to lower Pressurizer Level if required.

STANDARD:
Candidate acknowledges NOTES.

COMMENTS:

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_______ **UNSAT**

</td></tr>
</table>

Step 25 **CRITICAL STEP** 1-OP-CH-006 - STEP 5.8.18 Slowly open 1-CH-HCV-1137, EXCESS LETDOWN FLOW, until Pressurizer level is stable or lowering. **STANDARD:** **Candidate opens 1-CH-HCV-1137 [CRITICAL STEP]** **COMMENTS:**	_______ **SAT** _______ **UNSAT**
Step 26 1-OP-CH-006 - STEP 5.8.19 Check 1-CC-TI-108, EXCESS LETDOWN HX OUTLT TEMP, indicates less than 150°F. **STANDARD:** Candidate verifies 1-CC-TI-108 indicating less than 150°F **COMMENTS:**	_______ **SAT** _______ **UNSAT**
Step 27 1-OP-CH-006 - STEP 5.8.20 Check 1-CH-TI-1139, EXCESS LETDOWN HX OUTLET TEMP, indicates less than 195°F. **STANDARD:** Candidate verifies 1-CH-TI-1139 indicating less than 195°F **COMMENTS:**	_______ **SAT** _______ **UNSAT**

Step 28 1-OP-CH-006 – NOTES prior to step 5.8.21: • An RCS temperature change should be anticipated when placing Excess Letdown in service. (Ref. 2.4.3) • Reactor Coolant Pump seal leakoff flow may become erratic when rapid changes to seal injection and seal leakoff occur. Providing a slow, steady transition when affecting charging or seal leakoff flows should keep seal leakoff flow steady. If seal leakoff flow becomes erratic, seal injection flow should be stabilized and management consulted to determine course of action. (Ref. 2.4.4) **STANDARD:** Candidate acknowledges NOTES **COMMENTS:**	_______ **SAT** _______ **UNSAT**
Step 29 **CRITICAL STEP** 1-OP-CH-006 - STEP 5.8.21 WHEN the PDTT level has risen at least 10% as indicated on 1-DG-LI-107, THEN transfer flow from the PDTT to the VCT by placing 1-CH-HCV-1389, EXCESS LETDOWN DIVERT, to the VCT position. **STANDARD:** **Candidate places 1-CH-HCV-1389 to the VCT position [CRITICAL STEP]** **EVALUATOR'S NOTE:** • **Task may be ended at this point** as there are only checks remaining in this procedure. **COMMENTS:** **JPM END**	_______ **SAT** _______ **UNSAT**

STOP TIME:

Operator Directions Handout
(TO BE READ TO APPLICANT BY EXAMINER)

Initial Conditions

- Plant was initially at 100% power with all systems operating normal and in automatic.
- The crew is currently recovering from a spurious SI initiation.
- 1-E-0, Reactor Trip or Safety Injection, was performed and the team transitioned to 1-ES-1.1.
- 1-ES-1.1, SI Termination has been completed up to Step 15.
- Pressurizer level is 60% and slowly rising.

Initiating Cues

- You are to re-establish letdown by performing step 15 of 1-ES-1.1, and restore Pressurizer level to 22%.
  - When you finish the actions necessary to accomplish this, please inform me.

.

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Initial Conditions

- Plant was initially at 100% power with all systems operating normal and in automatic.
- The crew is currently recovering from a spurious SI initiation.
- 1-E-0, Reactor Trip or Safety Injection, was performed and the team transitioned to 1-ES-1.1.
- 1-ES-1.1, SI Termination has been completed up to Step 15.
- Pressurizer level is 60% and slowly rising.

Initiating Cues

- You are to re-establish letdown by performing step 15 of 1-ES-1.1, and restore Pressurizer level to 22%..
- When you finish the actions necessary to accomplish this, please inform me.

STEP	ACTION/ EXPECTED RESPONSE	RESPONSE NOT OBTAINED
15.___	ESTABLISH LETDOWN:	☐ Establish excess letdown IAW 1-OP-CH-006, SHIFTING OR INCREASING/DECREASING LETDOWN FLOW.
	☐ a) Adjust CHG line flow to establish greater than 40 gpm	
	b) Open letdown line pressure control valve: ☐ • 1-CH-PCV-1145	
	c) Check closed or close letdown orifice isolation valves: ☐ • 1-CH-HCV-1200A ☐ • 1-CH-HCV-1200B ☐ • 1-CH-HCV-1200C	
	d) Open letdown isolation valves: ☐ • 1-CH-TV-1204A ☐ • 1-CH-TV-1204B ☐ • 1-CH-LCV-1460A ☐ • 1-CH-LCV-1460B	
	☐ e) Open letdown orifice isolation valve(s)	
	f) Adjust letdown line pressure control valve to maintain letdown pressure: ☐ • 1-CH-PCV-1145	
	g) Adjust NRHX outlet temperature control valve to control letdown temperature, if necessary: ☐ • 1-CC-TCV-103	

U.S. Nuclear Regulatory Commission
Surry Power Station

SR21301
Simulator Job Performance Measure
[Alternate Path]

Applicant________________________________ Start Time___________________

Examiner_______________________________ Stop Time___________________

Date ___________________________________ SAT _________ UNSAT ________

Title

RESPOND TO A CONDENSATE PUMP AND REACTOR TRIP (ALTERNATE PATH)

K/A:

- **056A2.04, Loss of Condensate Pumps (2.6,2.8)**

Applicability	**Validation Time**	**Actual Time**
RO/SRO(I)/SRO(U)	6 Minutes	_____ Minutes

Conditions

- Task is to be PERFORMED in the simulator.

Standards

- Starts Condensate pump, 1-CN-P-1B.
- Secures Condensate pump, 1-CN-P-1C.
- Manually trips the reactor prior to two SGs reaching 12% WR.

Procedures

- 1-OP-CN-001 - CONDENSATE SYSTEM OPERATION
- 1-AP-21.00 – LOSS OF MAIN FEEDWATER FLOW

Tools and Equipment

- None

Safety Considerations

- None

Simulator Setup

- Reset to IC 365, OR Call up 100% power IC and initialize.
- Ensure 1-CN-P-1B is secured in AUTO
- Insert the following Malfunctions:
    - Malfunctions, RD18 (FAILURE OF AUTO TRIP TO SCRAM RX), Insert.
    - Malfunction CN0103 (Main CN Pump CN-P-1C Trips: Ovr-Current), Event 3, Insert
    - Malfunction CN1403 (CN Pump CN-P-1C Discharge Check Valve Failure), Event 3, Insert
    - Malfunction SI1301 (AMSAC Train "A" Fails to Activate), Insert
    - Malfunction SI1302 (AMSAC Train "A" Fails to Activate), Insert
- Create Event 3:
    - Events (on the toolbar)
    - Select Event 003
    - Edit Event
    - Event Code (the "|" below is the 'Operators" just to the right of the "&" button)
        - CNP1C_STOP | CNP1C_LOCK
    - OK

PRIOR TO JPM:

- Pre-brief the applicant for swapping Condensate pumps per 1-OP-CN-001, Section 5.4.

PERFORMANCE CHECKLIST

Notes to the Evaluator

- Task critical elements are bolded and denoted as a **CRITICAL STEP**.
- *An additional instructor may be needed to silence alarms for the examinee.*
- **START TIME_______:**

STEP 1: 1-OP-CN-001 – Initial Conditions & Precautions and Limitations. **STANDARD:** a) Reviews Initial Conditions b) Reviews Precautions and Limitations **EVALUATOR'S NOTE (If Asked):** • IC 3.2 - Makeup water is available to fill the condenser • P&L 4.13 – adequate CP demineralizers are in service to support the pump swap **COMMENTS:**	**_______ SAT** **_______ UNSAT**
STEP 2: 1-OP-CN-001 – STEP 5.4.1 Check the following conditions exist for condensate pump to be started. • Seal water in service. • Bearing Cooling water flow indicated to pump and motor. • Oil level in reservoir sight glass is mid-range.(one of six motors may have two sight glasses) **STANDARD:** Refers to Candidate Brief Sheet and determines these verifications are complete. **EVALUATOR'S NOTE (If Asked):** • All required conditions are MET **COMMENTS:**	**_______ SAT** **_______ UNSAT**

STEP 3: NOTE prior to step 5.4.2 - When Condensate Pump is started, HP Heater Drain Pump flow will be affected. The system should be monitored for proper response. **STANDARD:** Candidate acknowledges the NOTE. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 4: 1-OP-CN-001 – STEP 5.4.2 Check CALCALC 30 Minute Avg Power is less than or equal to 99.95%. IF CALCALC non-functional, THEN check Reactor Power is less than or equal to 100%. IF starting a Condensate Pump due to a secondary transient, THEN enter N/A. **STANDARD:** Trainee verifies CALCALC 30 minute average power $\leq$99.95% on PCS. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 5: **CRITICAL STEP** 1-OP-CN-001 – STEP 5.4.3 Start condensate pump selected to be started. (✓) • 1-CN-P-1B **STANDARD:** **Candidate starts 1-CN-P-1B [CRITICAL STEP].** **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 6: 1-OP-CN-001 – STEP 5.4.4 Check condensate pump discharge pressure, indicated on the local discharge pressure gauge, is between 550 psig and 650 psig, and LI-CN-103, CNDSR HOTWELL LVL, is stable. **STANDARD:** Contacts field operator to verify proper discharge pressure indication. **BOOTH NOTE:** • Local discharge pressure indicates 595 psig **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 7: **CRITICAL STEP** 1-OP-CN-001 – STEP 5.4.5 - Stop condensate pump to be removed from service and place control switch in AUTO or PTL. (✓) • 1-CN-P-1C **STANDARD:** a) **Secures 1-CN-P-1C [CRITICAL STEP].** b) Identifies significant drop in Main Feedwater Flow c) Candidate at this point can either elect to: • Continue in 1-OP-CN-001 • Transition to 1-AP-21.00. (AP-21 actions commence at step 10) • Go to 1-E-0 (E-0 actions commence at step 12). **EVALUATOR'S NOTE/CUE:** • **If asked**: it is desired to leave 1-CN-P-1C in AUTO. • With no operator action, the first reactor trip signal is reached at 1:20. • This step commences the alternate path of this task (check valve failure). **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 8: NOTE prior to step 5.4.6 - A stuck open check valve could cause the condensate pump to rotate backwards and result in a loss of feed. Do not attempt to start a pump that is rotating backwards. (Reference 2.4.12) **STANDARD:** a) Candidate acknowledges note b) Candidate may contact the turbine building operator to determine status of 1-CN-P-1C shaft rotation. c) IF candidate contacts the turbine building operator and identifies shaft rotation as a failed check valve, candidate may transition to AP-21.00 or 1-E-0. **BOOTH NOTE:** • If contacted, report that the shaft is turning on 1-CN-P-1C but direction cannot be determined. **COMMENTS:**	**_______ SAT** **_______ UNSAT**
STEP 9: 1-OP-CN-001 – STEP 5.4.6 Check Main Feed Pump suction pressure is normal. IF pressure NOT normal, THEN perform the following. IF pressure normal, THEN enter N/A. a. Start or check started the pump stopped in Step 5.4.5. (✓) • 1-CN-P-1C **STANDARD:** a) Candidate determines that pump should not be started based on previous NOTE. b) Candidate may transition to AP-21.00 or 1-E-0. **COMMENTS:**	**_______ SAT** **_______ UNSAT**
STEP 10: 1-AP-21.00 – [STEP 1] CHECK MAIN FEED PUMP STATUS: a) Check Reactor Power – GREATER THAN 80% b) Check Main Feed Pumps – TWO RUNNING **STANDARD:** a) Verifies reactor power >80% b) Identifies two main feed pumps in service **COMMENTS:**	**_______ SAT** **_______ UNSAT**

STEP 11: 1-AP-21.00 – [STEP 2] START AN ADDITIONAL CONDENSATE PUMP **STANDARD:** a) If Candidate identifies the discharge valve stuck open he should NOT attempt to start 1-CN-P-1C. b) If Candidate does NOT identify the failed discharge check valve he may attempt to start 1-CN-P-1C, BUT it won't start. c) Candidate recognizes that reactor trip is imminent and goes to 1-E-0. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 12: **CRITICAL STEP** 1-E-0 – [STEP 1] – CHECK REACTOR TRIP a) Manually trip reactor b) Check the following: • All rods on bottom light – LIT • Reactor trip and bypass breakers – OPEN • Neutron flux – LOWERING **STANDARD:** a) **Candidate depresses a reactor trip pushbutton prior to two SGs reaching 12%WR [Critical Step].** **EVALUATOR'S NOTE:** • Once the reactor has been manually tripped, inform the candidate that the task is complete. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
TASK COMPLETE	

STOP TIME: _______________

NOTES:

____

____

Operator Directions Handout
(TO BE READ TO APPLICANT BY EXAMINER)

Initial Conditions

- Unit 1 is at 100% with all systems in AUTO.
- Maintenance is scheduled for 1-CN-P-1C which is currently in service.

Initiating Cues

- You are to start 1-CN-P-1B and secure 1-CN-P-1C in accordance with 1-OP-CN-001 section 5.4. 1-CN-P-1C should be left in AUTO after it is secured.
- The following has been verified on 1-CN-P-1B
    - Seal water has been verified in service
    - BC water flow is indicated to pump and motor
    - Oil level in reservoir sight glass is mid-range
- An operator has been briefed and stationed in the turbine building near the condensate pumps.
- When you finish the actions necessary to accomplish this, please inform me.

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Initial Conditions

- Unit 1 is at 100% with all systems in AUTO.
- Maintenance is scheduled for 1-CN-P-1C which is currently in service.

Initiating Cues

- You are to start 1-CN-P-1B and secure 1-CN-P-1C in accordance with 1-OP-CN-001 section 5.4. 1-CN-P-1C should be left in AUTO after it is secured.
- The following has been verified on 1-CN-P-1B
    - Seal water has been verified in service
    - BC water flow is indicated to pump and motor
    - Oil level in reservoir sight glass is mid-range
- An operator has been briefed and stationed in the turbine building near the condensate pumps.
- When you finish the actions necessary to accomplish this, please inform me.

U.S. Nuclear Regulatory Commission
Surry Power Station

SR21301
Simulator Job Performance Measure WE14EA1.3

Applicant________________________________ Start Time___________________

Examiner_______________________________ Stop Time___________________

Date ___________________________________ SAT _________ UNSAT ________

Title

PERFORM 1-E-0 ATTACHMENT 4

K/A: WE14EA1.3 Ability to operate and/ or monitor the following as they apply to the (High Containment Pressure): Desired operating results during abnormal and emergency situations. (3.3 / 3.8)

Applicability	Validated Time	Actual Time
RO/SRO	14 Minutes	____ Minutes

Conditions

- Task is to be PERFORMED in the simulator.

Standards

- Closes 1-RM-TV-100B.
- Closes 1-IA-TV-101A.
- Secures Fan 1-VS-F-1B.
- Opens 1-SW-MOV-104B.
- Opens 1-SW-MOV-105C.
- Closes 1-CW-MOV-100B.
- Closes 1-CW-MOV-106C.

Procedures

- 1-E-0, Attachment 4 – CLS Component Verification (Rev 78)

Tools and Equipment

- None

Safety Considerations

- None

Simulator Setup

- ☐ Reset to IC 366. OR Call up 100% power IC and initialize.
- ☐ Enter Malfunctions:
  - ☐ CA03, Disable IA-TV-101A Auto Closure; Active
  - ☐ EL01, Loss of Offsite Power, **Trigger 1**
  - ☐ RC0101, RCS Cold Leg A Pipe Rupture; final value = 50, **Trigger 1**
  - ☐ RM1002, Disable RM-TV-100B Auto Close; Active
  - ☐ SW05, Disable SW-MOV-104B AUTO Open, INSERT
  - ☐ SW10, Disable SW-MOV-105C AUTO Open, INSERT
  - ☐ FP0301, FPS FACP07 ALARM HORN FAILURE, INSERT
  - ☐ FP0302, FPS PC SPEAKER FAILURE, INSERT
  - ☐ VS0802, Disable Cntmnt Recirc Fan VS-F-1B Auto Trip, INSERT
  - ☐ CW18, Disable CW-MOV-100B AUTO Closed, INSERT
  - ☐ CW23, Disable CW-MOV-106C AUTO Closed, INSERT
- ☐ Place Simulator in Run. Insert **Trigger 1**.
- ☐ Throttle AFW to 200 gpm per SG
- ☐ Perform 1-E-0 actions up to Attachment 1, Step 8e.
- ☐ Place Simulator in Freeze until JPM performance.

PERFORMANCE CHECKLIST

Notes to the Evaluator

- Task critical elements are bolded and denoted as a **CRITICAL STEP**.
- *An additional instructor may be needed to silence alarms for the examinee.*
- **START TIME: ________**

STEP 1: **CRITICAL STEP** Check Phase II and Phase III Containment Isolation Valves are closed. **STANDARD:** a) Locates to the Vertical Board. b) Checks Phase II and Phase III Containment Isolation Valves Closed / Green lights lit. **c) For valves out of position, closes the valves:** • **1-RM-TV-100B [CRITICAL STEP]** • **1-IA-TV-101A [CRITICAL STEP]** d) Applicant annotates Attachment. Applicant may also place “pink magnets” on valves out of position. **EVALUATOR’S NOTE:** **If asked**: Acknowledge components out of position. Tell Applicant to continue performing attachment. **COMMENTS:**	**_______ SAT** **_______ UNSAT**
STEP 2: **CRITICAL STEP** Checks Containment Air Recirculation Fans tripped. a) Checks Containment Air Recirculation Fans OFF (green & amber lights lit): • 1-VS-F-1A • 1-VS-F-1B **STANDARD:** a) Locates to the Unit 1 Ventilation Panel. b) Checks Containment Air Recirculation Fans OFF (green & amber lights lit) **c) Identifies 1-VS-F-1B in service and secures the fan by either placing fan in PTL or STOP. [CRITICAL STEP]** **COMMENTS:**	**_______ SAT** **_______ UNSAT**

STEP 3: **CRITICAL STEP** Checks Recirculation Spray Service Water in operation by verifying the following valves OPEN: • 1-SW-MOV-103A-D • 1-SW-MOV-104A-D • 1-SW-MOV-105A-D **STANDARD:** a) Locates to the Bench Board. b) Checks SW MOVs for all RSHXs Open / Red Lights lit: • **Identifies 1-SW-MOV-104B closed and opens the valve [CRITICAL STEP]** • **Identifies 1-SW-MOV-105C closed and opens the valve [CRITICAL STEP]** c) Checks SW flow by observing SW flow through 1-SW-FI-106A through-106D between 6,000 and 12,500 gpm. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 4: Checks RSHX SW RM Sample Pumps running. **STANDARD:** a) Locates to Radiation Monitoring Panel. b) Checks RSHX SW RM Sample Pumps running (*time delayed – 1 minute*). Red lights lit. **EVALUATOR'S NOTE:** **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 5: Checks RSHX RM Pump No-Flow annunciators clear. **STANDARD:** a) Locates to Vertical Board. b) Verifies all RSHX SW RM Pump alarms clear. c) Acknowledges NOTE that CLS must be reset to allow RM pumps to be secured from MCR. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 6: Checks Containment Spray and Recirc Spray Systems valve positions. **STANDARD:** a) Locates to Bench Board. b) Checks CS and RS System Valves Open / Red lights lit. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 7: **CRITICAL STEP** Checks Circulating and Service Water Systems isolation due to Hi-Hi CLS with LOOP. **STANDARD:** a) Recalls from Initial Conditions that a Loss of Offsite Power has also occurred. b) Checks CW isolation valves for Main Condenser Closed / Green lights lit. **c) Identifies that 1-CW-MOV-100B did not auto-close and MANUALLY CLOSES the valve [CRITICAL STEP].** **d) Identifies that 1-CW-MOV-106C did not auto-close and MANUALLY CLOSES the valve [CRITICAL STEP].** e) Checks SW isolation valves for BC and CC Heat Exchangers Closed / Green lights lit. **EVALUATOR'S NOTE:** **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 8:	
Notify Nuclear Shift Manager (Evaluator) Status of Task.	_______ **SAT**
Applicant should report completion of task. Applicant should also notify the SM (Evaluator) of components found out of position and actions taken.	_______ **UNSAT**
COMMENTS:	
JPM END	

STOP TIME: _______

Operator Directions Handout
(TO BE READ TO APPLICANT BY EXAMINER)

Initial Conditions

- A LBLOCA has occurred on Unit 1 concurrent with a loss of offsite power.
- The Operating Team is currently performing 1-E-1, Loss of Reactor or Secondary Coolant.

Initiating Cues

- You are to perform 1-E-0, Attachment 4 – CLS Component Verification.

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Initial Conditions

- A LBLOCA has occurred on Unit 1 concurrent with a loss of offsite power.
- The Operating Team is currently performing 1-E-1, Loss of Reactor or Secondary Coolant.

Initiating Cues

- You are to perform 1-E-0, Attachment 4 – CLS Component Verification.

LOCATION: Vertical Board

VALVE POSITION: CLOSED
LIGHTS: GREEN

__ 1-RM-TV-100C

__ 1-RM-TV-100B

__ 1-RM-TV-100A

__ 1-CC-TV-105A

__ 1-CC-TV-105B __ 1-CC-TV-140A __ 1-CC-TV-110A

__ 1-CC-TV-105C __ 1-CC-TV-140B __ 1-CC-TV-110B __ 1-CC-TV-110C __ 1-IA-TV-100

__ 1-SV-TV-102 __ 1-IA-TV-101A __ 1-IA-TV-101B

LOCATION: Unit 1 Vent Panel

RECIRC FAN STATUS: OFF
LIGHTS: AMBER

__ 1-VS-F-1A __ 1-VS-F-1B

LOCATION: Bench Board

VALVE POSITION: OPEN
LIGHTS: RED

__ 1-SW-MOV-105A __ 1-SW-MOV-105B __ 1-SW-MOV-105C __ 1-SW-MOV-105D

__ 1-SW-MOV-104A __ 1-SW-MOV-104B __ 1-SW-MOV-104C __ 1-SW-MOV-104D

__ 1-SW-MOV-103A __ 1-SW-MOV-103B __ 1-SW-MOV-103C __ 1-SW-MOV-103D

Check SW Outlet flow from RS HXs between 6,000 gpm and 12,500 gpm:

- 1-SW-FI-106A, RS HX A
- 1-SW-FI-106B, RS HX B
- 1-SW-FI-106C, RS HX C
- 1-SW-FI-106D, RS HX D

LOCATION: Radiation Monitoring Panel

PUMPS: RUNNING (Time delayed)

__ 1-SW-P-5A __ 1-SW-P-5B __ 1-SW-P-5C __ 1-SW-P-5D

LOCATION: Annunciator Panel A ALARMS: CLEAR

__ A-D-6 RS HX 1A RAD MON PP NO FLOW

__ A-E-6 RS HX 1B RAD MON PP NO FLOW

__ A-F-6 RS HX 1C RAD MON PP NO FLOW

__ A-G-6 RS HX 1D RAD MON PP NO FLOW

NOTE: CLS must be reset to allow securing rad monitor pumps from the MCR.

☐ IF alarm is LIT, THEN stop associated rad monitor pump AND monitor SW activity using RI-SW-120.

LOCATION: Bench Board VALVE POSITION: OPEN
LIGHTS: RED

__ 1-CS-MOV-102A __ 1-CS-MOV-102B

__ 1-RS-MOV-156A __ 1-RS-MOV-156B

__ 1-CS-MOV-101B __ 1-CS-MOV-101D

__ 1-CS-MOV-101A __ 1-CS-MOV-101C

__ 1-RS-MOV-155A __ 1-RS-MOV-155B __ 1-CS-MOV-100A __ 1-CS-MOV-100B

----------- IF EVENT - CLS HI HI AND LOSS OF RSS -----------

LOCATION: Bench Board VALVE POSITION: CLOSED
LIGHTS: GREEN

__ 1-CW-MOV-100A __ 1-CW-MOV-100B __ 1-CW-MOV-100C __ 1-CW-MOV-100D

__ 1-CW-MOV-106A __ 1-CW-MOV-106B __ 1-CW-MOV-106C __ 1-CW-MOV-106D

__ 1-SW-MOV-101A __ 1-SW-MOV-101B __ 1-SW-MOV-102A __ 1-SW-MOV-102B

U.S. Nuclear Regulatory Commission
Surry Power Station

SR21301
Simulator Job Performance Measure 056AK3.02 (4.4 / 4.7)
TIME CRITICAL

Applicant________________________________ Start Time___________________

Examiner_______________________________ Stop Time___________________

Date ___________________________________ SAT _________ UNSAT ________

Title

LOAD THE AAC DIESEL ON THE UNIT ONE J BUS

K/A:056 AK3.02, Knowledge of the reasons for the following responses as they apply to the Loss of Offsite Power: Actions contained in EOP for loss of offsite power.

Applicability	**Time Critical**	**Actual Time**
RO	10 Minutes	____ Minutes

Conditions

- Task is to be PERFORMED in the simulator.

Standards

- Place 0-AAC-43-15J8 in AAC position.
- Place the following components in PTL; 1-VS-F-1B, 1-SI-P-1B, Pzr Heater Group A, 1-CH-P-1B, 1-FW-P-3B, 1-RS-P-2B, 1-RS-P-1B, 1-CS-P-1B.
- Resets AMSAC by taking the AMSAC BYPASS switch to BYPASS.
- Rotates synch switch for 15J8 to the “ON” position.
- Closes breaker 15J8 by rotating 15J8 breaker HS clockwise to the CLOSE position for 5 seconds.

Procedures

- 0-AP-17.06, AAC Diesel Generator – Emergency Operations (Rev 31)

Tools and Equipment

- None

Safety Considerations

- None

Simulator Setup

- Call up IC # 364. OR 100% IC and initialize.
- Insert the following MALFUNCTIONS:
    - ED0201, EDG 1 AIR START SYSTEM FAILURE, INSERT
    - ED0203, EDG 3 AIR START SYSTEM FAILURE, INSERT
    - EL01, LOSS OF OFFSITE POWER, Delay 1 sec, INSERT
    - FP0301, FPS FACP07 ALARM HORN FAILURE, INSERT
    - FP0302, FPS PC SPEAKER FAILURE, INSERT
- Using InSight, set SA_223 to 1.
- Place the simulator in run, implement all malfunctions, and perform the ECA-0.0 to Step 5c RNO step 1.
- Freeze the simulator and save this condition.

NOTES:

Time Critical Operator Action Background

0-DRP-049 lists event “E11” operator action to “Align the AAC Diesel to respective emergency bus” with an action time of 10 minutes in accordance with ECA-0.0 and 0-AP-17.06. The DRP references training job aid 017, which contains the following for Plant Conditions:

- Loss of offsite power has occurred results in a loss of emergency busses. – OR – Offsite power is available and a loss of emergency busses has occurred.
- EDGs fail to auto start or auto load resulting in a loss of all emergency AC power.
- AAC DG is available to manually start and load.

These conditions are replicated in this JPM.

PERFORMANCE CHECKLIST

Notes to the Evaluator

- Task critical elements are Bolded.
- *An additional instructor may be needed to silence alarms for the examinee.*
- **START TIME:**

STEP 1: 0-AP-17.06 – NOTES prior to step 1 • A one-line diagram showing the AAC Electrical distribution is provided in Attachment 1. • The AAC Diesel Generator should automatically start when Transfer Buses D and F OR E and F are deenergized. **STANDARD:** Candidate acknowledges NOTES **EVALUATOR'S NOTE:** JPM is **TIME CRITICAL**. 0-DRP-049, Time Critical Operator Actions, E11, allows ***10 minutes*** to Align the AAC Diesel to respective emergency bus. Time starts when Simulator placed in RUN; Time Stops when breaker 15J8 closed and 1J bus energized. **If asked:** Unit 2 Transfer buses are de-energized, #2 EDG is supplying 2H emergency bus. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 2: 0-AP-17.06 – STEP 1 - CHECK EMERGENCY BUSES 1J and 2H - EITHER <u>OR</u> BOTH DE-ENERGIZED. **STANDARD:** a) Identifies 1J Bus is de-energized by observing zero (0) volts indicated on 1J bus. b) Identifies from instructions or Unit 2 inquiry that 2H energized. . **EVALUATOR'S NOTE:** **If asked:** "2H" Bus is energized from the #2 EDG. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 3:	

0-AP-17.06 – CAUTION prior to step 2 **STANDARD:** Candidate acknowledges CAUTION. **EVALUATOR'S NOTE:** **If asked:** Temporary Air Compressor is in service **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 4: 0-AP-17.06 – STEP 2 - GO TO APPROPRIATE STEP BASED ON DESIRED USE OF THE AAC DIESEL GENERATOR. **STANDARD:** a) Identifies 1J to be re-energized from the AAC Diesel from initial task briefing or Evaluator query. **EVALUATOR'S NOTE:** **If asked:** Load the AAC on 1J Bus. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 5: 0-AP-17.06 – STEP 3 - CHECK AAC DIESEL GENERATOR - AVAILABLE AND RUNNING. • Annunciator 0-WD-C2, AAC SYSTEM AVAILABLE BUS 1D – LIT AND • Annunciator 0-WD-D1, AAC GENERATOR TRIP - NOT LIT **STANDARD:** a) Observes 0-WD-C2, AAC SYSTEM AVAILABLE BUS 1D, is lit. b) Observes 0-WD-D1, AAC GENERATOR TRIP, is not lit. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 6: 0-AP-17.06 – CAUTION AND NOTE PRIOR TO STEP 4. • **CAUTION:** An overcurrent fault on 15D1 will prevent 0-AAC-BKR-05L3 from closing. • **NOTE**: Annunciator 0-WD-C2, AAC SYSTEM AVAILABLE BUS 1D, should go out when 0-AAC-BKR-05L3 closes. **STANDARD:** Candidate acknowledges CAUTION and NOTE **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 7: **CRITICAL STEP** 0-AP-17.06 – STEP 4 - ENERGIZE TRANSFER BUS D BY CLOSING 0-AAC-BKR-05L3. a) At Unit 1 EDG 3 Control Panel, place Transfer Switch NORMAL/AAC, 0-AAC-43-15J8, in AAC position b) Check Annunciator 1K-D3, BUS 1D UNDERVOLT - NOT LIT **STANDARD:** a) **Candidate places 0-AAC-43-15J8, in AAC position [CRITICAL STEP]** b) Check Annunciator 1K-D3, BUS 1D UNDERVOLT - NOT LIT. c) Candidate may check annunciator 0-WD-C2, AAC SYSTEM AVAILABLE BUS 1D extinguished (from NOTE prior to step). **COMMENTS:**	_______ **SAT** _______ **UNSAT**

<table>
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STEP 8: **CRITICAL STEP**

0-AP-17.06 – STEP 5a - CHECK OR PLACE THE FOLLOWING LOADS IN PTL.

a) Put the following switches in PTL / LOCKOUT:

- **1-VS-F-1B (14J7)**
- **1-SI-P-1B (14J3)**
- **1-RS-P-2B (14J8)**
- **1-RS-P-1B (14J4)**
- **1-CS-P-1B (14J5)**
- **PRZR Heater Group A (14J9)**
- **1-CH-P-1B (15J5)**
- 1-CH-P-1C (15J2, ALT)
- **1-FW-P-3B (15J4)**
- 1-CC-P-1B (15J10)
- 1-VS-F-58B, if powered from Alternate source, 14J13

STANDARD:

- Candidate places the above components in PTL / LOCKOUT with the exception of 1-VS-F-58B which is not powered from the Alternate Source
- **The following components MUST be in PTL: [CRITICAL STEP]**
  - **1-VS-F-1B**
  - **1-SI-P-1B**
  - **PRZR Heater Group A (14J9)**
  - **1-CH-P-1B (15J5)**
  - **1-FW-P-3B (15J4)**
  - **1-RS-P-1B**
  - **1-RS-P-2B**
  - **1-CS-P-1B**

EVALUATOR'S NOTE:

- Loads not listed as CRITICAL STEP are components that are already deenergized or aligned correctly.
- Placing 1-VS-F-58B in PTL does not constitute a critical task since neither unit has initiated SI (which would result in a need for the fan).

COMMENTS:

</td>
<td>

_______ **SAT**

_______ **UNSAT**

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</table>

STEP 9: 0-AP-17.06 – STEP 5b - Check breakers open by locally checking breaker position indicating lights – RED LIGHTS NOT LIT • 1-CS-P-1B (1-EP-BKR-14J5) • 1-RS-P-1B (1-EP-BKR-14J4) **STANDARD:** Candidate verifies RED LIGHTS are not lit on listed components. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 10: 0-AP-17.06 – STEP 5c - Check breakers open by locally checking breaker position indicating lights – RED LIGHTS NOT LIT • 1-FW-P-3B (1-EP-BKR-15J4) **STANDARD:** Candidate identifies that the RED LIGHT is LIT on 1-FW-P-3B and goes to the RNO. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 11: **CRITICAL STEP** 0-AP-17.06 – STEP 5c RNO - Do the following: • Reset AMSAC. OR • Locally open MD AFW pump breaker: • 1-FW-P-3B (1-EP-BKR-15J4) **STANDARD:** • **Candidate resets AMSAC by taking the AMSAC BYPASS switch to RESET. [CRITICAL STEP]** • Candidate may elect to locally open the associated breaker by contacting a field operator. **EVALUATOR'S NOTE/CUE:** • If candidate attempts to direct the local opening of 1-EP-BKR-15J4, inform them that no field operator is currently available. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 12: **CRITICAL STEP** 0-AP-17.06 – STEP 6 - ENERGIZE EMERGENCY BUS 1J. a) Place the Sync switch for 1-EP-BKR-15J8 in ON b) Check breaker 1-EP-BKR-15J3 is OPEN c) Close breaker 1-EP-BKR-15J8 by holding control switch in the Closed position for at least five seconds d) Place the Sync switch for 1-EP-BKR-15J8 in OFF **STANDARD:** a) Locates the generator synch switch and places it in 15J8. b) **Rotates the synch switch for 15J8 in the clockwise direction to the "ON" position [CRITICAL STEP].** c) Verifies breaker 15J3 is open (green light on red light off). d) **Rotates 15J8 breaker control switch in the clockwise direction to the close position** and holds for 5 seconds**, releases switch and verifies rotation back to 12:00 position [CRITICAL STEP].** **NOTE: TIME CRITICAL ACTION COMPLETE; TIME _________.** e) Verifies 15J8 breaker closed (Red light on, green light off). f) Verifies 1J Bus energized (frequency at approximately 60 HZ and voltage approximately 4200V). g) Rotates the synch switch for 15J8 in the counterclockwise direction to the "OFF" position. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 13: REPORTS TO SHIFT MANAGER (EVALUATOR) **Standards** Candidate reports AP-17.06 is completed up to Steps 1-6 are complete **STOP TIME: ______** **COMMENTS:** **JPM END**	_______ **SAT** _______ **UNSAT**

STOP TIME: _____

Operator Directions Handout
(TO BE READ TO APPLICANT BY EXAMINER)

Initial Conditions

- The station has sustained a complete loss of the switchyard.
- Unit 1 has sustained a loss of all AC power and Unit 2 has only the "H" Bus energized from #2 EDG.
- #3 EDG started, but tripped immediately.
- The team is in 1-ECA-0.0, Loss of all AC Power, and has determined that EMERG Bus 1J needs to be energized.
- Unit 2 has aligned the Temporary Diesel Air Compressor to supply instrument air.

Initiating Cue

- **This JPM is **TIME CRITICAL**.**
- Here is a copy of 0-AP-17.06, AAC Diesel Generator - Emergency Operations.
- I need you to restore power to Unit 1 "J" Bus with the AAC Diesel Generator by performing steps 1-6 of 0-AP-17.06, AAC Diesel Generator – Emergency Operations.
- When you finish the actions necessary to accomplish this, please inform me so I can have the Operating Team restore loads on the Unit 1 "J" Bus.

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Initial Conditions

- The station has sustained a complete loss of the switchyard.
- Unit 1 has sustained a loss of all AC power and Unit 2 has only the "H" Bus energized from #2 EDG.
- #3 EDG started, but tripped immediately.
- The team is in 1-ECA-0.0, Loss of all AC Power, and has determined that EMERG Bus 1J needs to be energized.
- Unit 2 has aligned the Temporary Diesel Air Compressor to supply instrument air.

Initiating Cue

- **This JPM is **TIME CRITICAL**.**
- Here is a copy of 0-AP-17.06, AAC Diesel Generator - Emergency Operations.
- I need you to restore power to Unit 1 "J" Bus with the AAC Diesel Generator by performing steps 1-6 of 0-AP-17.06, AAC Diesel Generator – Emergency Operations.
- When you finish the actions necessary to accomplish this, please inform me so I can have the Operating Team restore loads on the Unit 1 "J" Bus.

Dominion Energy

SURRY POWER STATION

ABNORMAL PROCEDURE

NUMBER	PROCEDURE TITLE	REVISION
0-AP-17.06	AAC DIESEL GENERATOR - EMERGENCY OPERATIONS (WITH 12 ATTACHMENTS)	30
		PAGE 1 of 28

PURPOSE

To provide guidance for starting, loading, and securing the AAC Diesel Generator.

TIME CRITICAL ACTIONS

ENTRY CONDITIONS

Shift Supervision direction <u>OR</u>

Transition from any of the following procedures.

- 1-ECA-0.0, LOSS OF ALL AC POWER
- 2-ECA-0.0, LOSS OF ALL AC POWER
- 1-AP-10.07, LOSS OF UNIT 1 POWER
- 2-AP-10.07, LOSS OF UNIT 2 POWER
- 0-AP-17.04, EDG 1 OR 2 - EMERGENCY OPERATIONS
- 0-AP-17.05, EDG 3 - EMERGENCY OPERATIONS
- 0-FCA-1.00, LIMITING MCR FIRE
- 1-FCA-2.00, UNIT 1 CONTAINMENT FIRE
- 2-FCA-2.00, UNIT 2 CONTAINMENT FIRE
- 1-FCA-3.00, LIMITING CABLE VAULT AND CABLE TUNNEL FIRE
- 2-FCA-3.00, LIMITING CABLE VAULT AND CABLE TUNNEL FIRE
- 1-FCA-4.00, LIMITING ESGR NUMBER 1 FIRE
- 2-FCA-4.00, LIMITING ESGR NUMBER 2 FIRE
- 0-FCA-7.00, LIMITING MER 3 FIRE
- 0-FCA-8.00, LIMITING AUXILIARY BUILDING FIRE

CONTINUOUS USE

STEP	ACTION/ EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE:
- A one-line diagram showing the AAC Electrical distribution is provided in Attachment 1.
- The AAC Diesel Generator should automatically start when Transfer Buses D and F OR E and F are deenergized.

1.___ CHECK EMERGENCY BUSES 1J AND 2H - EITHER OR BOTH DEENERGIZED

Check the following conditions:

- ☐ • Emergency Bus 1J - ENERGIZED BY EDG 3
- ☐ • Emergency Bus 2J - DEENERGIZED
- ☐ • Swapping of EDG 3 to Emergency Bus 2J - DESIRED
- ☐ IF all of the above conditions met, THEN GO TO Attachment 2.
- ☐ IF NOT, THEN RETURN TO procedure and step in effect.

* *

CAUTION: Loading of the AAC Diesel should consider availability of Instrument Air from 1-IA-C-1 or the Temporary Diesel Air Compressor.

* *

2.___ GO TO THE APPROPRIATE STEP BASED ON DESIRED USE OF THE AAC DIESEL GENERATOR

- ☐ • Step 3, Only Bus 1J to be energized
- ☐ • Step 16, Only Bus 2H to be energized
- ☐ • Step 28, Both 1J and 2H buses to be energized

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3. ___	CHECK AAC DIESEL GENERATOR - AVAILABLE AND RUNNING	Do the following:
	☐ • Annunciator 0-WD-C2, AAC SYSTEM AVAILABLE BUS 1D - LIT AND ☐ • Annunciator 0-WD-D1, AAC GENERATOR TRIP - NOT LIT	a) Perform Annunciator Response procedure(s) as necessary: ☐ • 0-WD-D1, AAC GENERATOR TRIP ☐ • 0-WD-D2, AAC SYSTEM ALARM ☐ • 0-WD-D3, AAC BUS 0L TROUBLE ☐ b) WHEN problem corrected, OR if no AUTO Start signal exists, THEN perform Attachment 3. ☐ c) WHEN the AAC Diesel Generator supplying Bus 0L, THEN GO TO Step 4.

STEP	ACTION/ EXPECTED RESPONSE	RESPONSE NOT OBTAINED

* *

CAUTION: An overcurrent fault on 15D1 will prevent 0-AAC-BKR-05L3 from closing.

* *

NOTE: Annunciator 0-WD-C2, AAC SYSTEM AVAILABLE BUS 1D, should go out when 0-AAC-BKR-05L3 closes.

STEP	ACTION/ EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4.___	ENERGIZE TRANSFER BUS D BY CLOSING 0-AAC-BKR-05L3:	
☐	a) At Unit 1 EDG 3 Control Panel, place Transfer Switch NORMAL/AAC, 0-AAC-43-15J8, in AAC position	
☐	b) Check Annunciator 1K-D3, BUS 1D UNDERVOLT - NOT LIT	b) Do the following: 1) Locally investigate breakers: ☐ • 15D1 ☐ • 0-AAC-BKR-05L3 ☐ 2) IF breakers normal, THEN locally turn on synch switch AND close (AAC BLDG) 0-AAC-BKR-05L3. ☐ 3) Contact the Electrical Department for assistance as necessary. ☐ 4) WHEN Transfer Bus D energized, THEN GO TO Step 5.

STEP	ACTION/ EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5.___	CHECK OR PLACE THE FOLLOWING LOADS IN PTL	
	a) Put the following switches in PTL / LOCKOUT:	
☐	• 1-VS-F-1B (14J7)	
☐	• 1-SI-P-1B (14J3)	
☐	• 1-RS-P-2B (14J8)	
☐	• 1-RS-P-1B (14J4)	
☐	• 1-CS-P-1B (14J5)	
☐	• PRZR Heater Group A (14J9)	
☐	• 1-CH-P-1B (15J5)	
☐	• 1-CH-P-1C (15J2, ALT)	
☐	• 1-FW-P-3B (15J4)	
☐	• 1-CC-P-1B (15J10)	
☐	• 1-VS-F-58B, if powered from Alternate source, 14J13	
	b) Check breakers open by checking breaker position indicating lights - RED LIGHTS NOT LIT	b) Locally open CS and ISRS pump breakers:
☐	• 1-CS-P-1B (14J-5)	☐ • 1-CS-P-1B (14J-5)
☐	• 1-RS-P-1B (14J-4)	☐ • 1-RS-P-1B (14J-4)
	c) Check breaker open by checking breaker position indicating lights - RED LIGHTS NOT LIT	c) Do the following:
☐	• 1-FW-P-3B (15J4)	☐ • Reset AMSAC.
		OR
		• Locally open MD AFW pump breaker:
		☐ • 1-FW-P-3B (15J4)

STEP	ACTION/ EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6.___	ENERGIZE EMERGENCY BUS 1J	
	☐ a) Place the Sync switch for 15J8 in ON	
	☐ b) Check breaker 15J3 is OPEN	☐ b) IF breaker 15J3 is closed, THEN notify Shift Supervision.
	☐ c) Close breaker 15J8 by holding control switch in the Closed position for at least five seconds	
	☐ d) Place the Sync switch for 15J8 in OFF	

* *

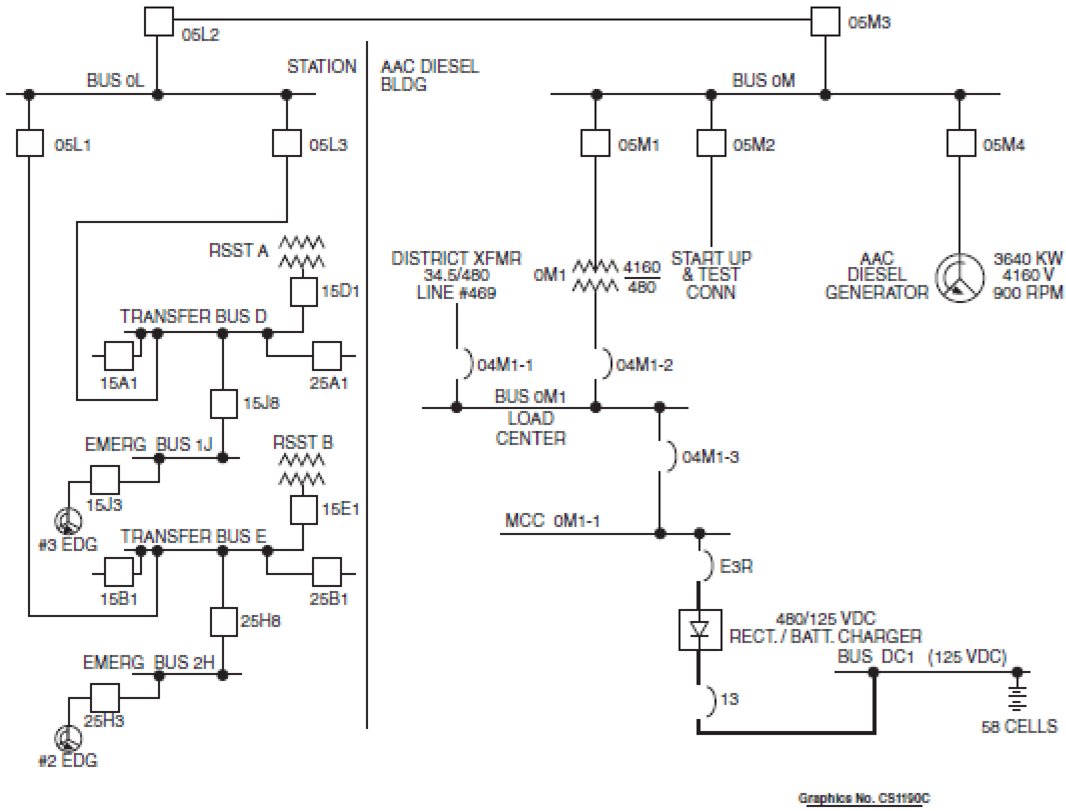
CAUTION: If all RCP seal cooling has been previously lost, a charging pump should NOT be started until the RCP seals are isolated.

* *

NOTE:
- The AAC Diesel Generator has a 4.0 hour fuel supply when operating at rated load of 3640 KW.
- The approximate power required for J bus loads are as follows:
  - CC pump, 450 KW
  - AFW pump, 310 KW
  - RHR pump, 215 KW
  - ISRS pump, 225 KW
  - CS pump, 170 KW
  - CTMT Air Recirc Fan, 100 KW
  - CHG pump, 430 KW
  - PRZR Heaters, 200 KW
  - OSRS pump, 245 KW
  - LHSI pump, 190 KW
  - Filtered Exhaust Fan, 125 KW

7.___ START LOADS ON EMERGENCY BUS 1J IAW SHIFT SUPERVISION DIRECTION

NUMBER 0-AP-17.06	ATTACHMENT TITLE	ATTACHMENT 1
REVISION 30	AAC ELECTRICAL DISTRIBUTION (ONE LINE DIAGRAM)	PAGE 1 of 1



SURRY POWER STATION
STATION BLACKOUT EDG DISTRIBUTION

U.S. Nuclear Regulatory Commission
Surry Power Station

SR21301
Simulator Job Performance Measure
[Alternate Path]

Applicant________________________________	Start Time___________________
Examiner_______________________________	Stop Time___________________
Date ___________________________________	SAT _________ UNSAT ________

Title

SWAP SGWLCS INPUTS (ALTERNATE PATH)

K/A: 016A2.01, Detector Failure (3.0,3.1)

Applicability	**Validation Time**	**Actual Time**
RO/SRO(I)/SRO(U)	5 Minutes	_____ Minutes

Conditions

- Task is to be PERFORMED in the simulator.
- “A” S/G SF & FF channels were aligned to Channel 4 to support channel III maintenance.
- Maintenance is complete and it is now desired to swap “A” S/G SF and FF to channel III IAW 1-OP-RP-001 steps 5.4.4 and 5.4.5.

Standards

- Places 1-FW-FCV-1478 in MAN.
- Places STM GEN A –FW FLOW CH SEL switch in CH-477 position.
- Places STM GEN A – STM FLOW CH SEL switch in CH-474 position.
- Places 1-FW-FCV-1478 in AUTO.
- Places 1-FW-FCV-1478 in MAN and controls demand to restore and stabilize feed flow at the proper S/G level (approx. 44%)

Initiating Cues

- You are to align the “A” Steam Flow and Feed Flow channels to channel III in accordance with 1-OP-RP-001 steps 5.4.4 and 5.4.5.
- When you finish the actions necessary to accomplish this, please inform me

Terminating Cues

- Candidate completes immediate actions of 0-AP-53.00 with “A” S/G level under their control.

Procedures

- 1-OP-RP-001 - ALIGNING CONTROL SYSTEM FOR PERFORMANCE OF CHANNEL I, II, III, AND IV PROCESS AND PROTECTION TESTING
- 0-AP-53.00 - LOSS OF VITAL INSTRUMENTATION / CONTROLS

Tools and Equipment

- None

Safety Considerations

- None

Simulator Setup

- ☐ Call up IC 367 OR 100% power IC and initialize.
- ☐ Align "A" S'G SF and FF channels to channel IV (YELLOW)
- ☐ Insert malfunction FW1801, A S/G MN FD FLOW XMTR FT-1477 FAILS, Final Value +1.0, Event 1, Insert
- ☐ Create the following EVENT
  - EVENTS
  - Event 001
  - Edit Event
  - Event code – "FWFC478F_AUTO & FWFC478F_WHITE & FWSEL_CH476_477" – *copy code within the quotes*.
  - OK

Notes:

This JPM is designed to be pre-briefed.

PERFORMANCE CHECKLIST

Notes to the Evaluator

- Task critical elements are bolded and denoted as a **CRITICAL STEP**.
- *An additional instructor may be needed to silence alarms for the examinee.*
- **START TIME_______:**

<table>
<tr><td>STEP 1:

1-OP-RP-001 – CAUTION and NOTES prior to step 5.4.4.
CAUTION Due to the sensitivity of the Calorimetric Program to changes in Feed Flow while using the UFM, consideration should be given to proactively reducing Turbine load to raise the available margin to Maximum Allowable Power limit.
NOTE: With Shift Supervision permission, steps within a subsection may be performed concurrently to limit the time a Feed Regulator valve is placed in MANUAL (i.e.; all three FRVs placed in MANUAL to allow swapping of SF/FF and Turbine First Stage Impulse Channels).
NOTE: The Feedwater Regulator valve(s) should not be placed in MANUAL unless maintenance or testing will be performed on Channel IV of the particular valve.
NOTE: Cycling Feed Flow / Steam Flow Channel select switches twice helps to ensure proper switch makeup.
STANDARD: Candidate acknowledges CAUTION and NOTES

EVALUATOR’S NOTE (If Asked):
Power reduction is not required for this task.
COMMENTS:</td><td>_______ SAT

_______ UNSAT</td></tr>
<tr><td>STEP 2:

1-OP-RP-001 – STEP 5.4.4 - Check the following switch positions. Do not manipulate switches.
STM GEN A - FW FLOW CH SEL SWITCH
☐ CH 477 position
☐ CH 476 position
STM GEN A - STM FLOW CH SEL SWITCH
☐ CH 474 position
☐ CH 475 position
STANDARD:
Candidate records AS-FOUND switch positions (CH476 / CH475).

COMMENTS:</td><td>_______ SAT

_______ UNSAT</td></tr>
</table>

STEP 3: **CRITICAL STEP** 1-OP-RP-001 – STEP 5.4.5 IF both switches are in CH 477 and CH 474 position, THEN enter N/A. IF either switch is NOT in the correct position, THEN perform the following: a. Place 1-FW-FCV-1478, SG A FEED REG, in MAN position. b. Cycle STM GEN A - FW FLOW CH SEL SWITCH at least twice and leave in CH-477 position. c. Cycle STM GEN A - STM FLOW CH SEL SWITCH at least twice and leave in CH-474 position. d. Check proper switch makeup by checking indications normal for plant conditions on 1-FW-FR-1478, SG A FLOW. e. Place 1-FW-FCV-1478, SG A FEED REG, in AUTO position. **STANDARD:** a. **Places 1-FW-FCV-1478 in MAN position. [CRITICAL STEP]** b. **Places STM GEN A - FW FLOW CH SEL SWITCH in CH-477 position [CRITICAL STEP – to leave in 477 position].** c. **Places STM GEN A - STM FLOW CH SEL SWITCH in CH-474 position [CRITICAL STEP – to leave in 474 position]**. d. Check proper switch makeup by checking indications on SF/FF recorder (1-FW-FR-1478). e. **Place 1-FW-FCV-1478 in AUTO position [CRITICAL STEP].** f. Upon restoration to AUTO, candidate identifies Feed Flow channel failure (1-FW-FI-1477 fails high) and commences the immediate actions of 0-AP-53.00. **EVALUATOR'S NOTE (If Asked):** • Another operator will monitor 1-FW-FCV-1478 while channel swap is performed. • Concurrent verifications have been performed. • Per the Note prior to step 5.4.4 the applicant will probably cycle the FW/STEAM FLOW selector switches twice (not critical). **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 4: 0-AP-53.00 – [STEP 1] CHECK REDUNDANT INSTRUMENT CHANNEL(S) INDICATION - NORMAL **STANDARD:** Candidate identifies normal feedwater flow on channel IV (1-FW-FI-1476). **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 5: CRITICAL STEP	
0-AP-53.00 – [STEP 2] PLACE AFFECTED CONTROL(S)/COMPONENT(S) IN MANUAL CONTROL AND STABILIZE PARAMETER USING REDUNDANT INDICATION **STANDARD:** a. **Candidate places the "A" FRV in MANUAL (1-FW-FCV-1478) and controls demand to restore and stabilize at the proper S/G level (approximately 44%) [CRITICAL STEP].** b. Candidate reports the immediate actions of 0-AP-53.00 are complete. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 6: TASK COMPLETE	

STOP TIME: ______________

NOTES:

____

____

____

____

____

Operator Directions Handout
(TO BE READ TO APPLICANT BY EXAMINER)

Initial Conditions

- Unit 1 is at 100% power.
- "A" S/G SF & FF channels were aligned to Channel IV to support channel III maintenance.
- Maintenance is complete and it is now desired to swap "A" S/G SF and FF to channel III IAW 1-OP-RP-001 step 5.4.4 and 5.4.5.

Initiating Cues

- You are to align the "A" Steam Flow and Feed Flow channels to channel III in accordance with 1-OP-RP-001 steps 5.4.4 and 5.4.5.
- When you finish the actions necessary to accomplish this, please inform me.

Operator Directions Handout

(TO BE GIVEN TO APPLICANT)

Initial Conditions

- Unit 1 is at 100% power.
- “A” S/G SF & FF channels were aligned to Channel IV to support channel III maintenance.
- Maintenance is complete and it is now desired to swap “A” S/G SF and FF to channel III IAW 1-OP-RP-001 step 5.4.4 and 5.4.5.

Initiating Cues

- You are to align the “A” Steam Flow and Feed Flow channels to channel III in accordance with 1-OP-RP-001 steps 5.4.4 and 5.4.5.
- When you finish the actions necessary to accomplish this, please inform me.

U.S. Nuclear Regulatory Commission
Surry Power Station

SR21301
In Plant Job Performance Measure EPE038G2.1.30

Applicant________________________________ Start Time___________________

Examiner_______________________________

Date ___________________________________ Stop Time___________________

Title

Locally Isolate U2 TDAFW pump.

K/A: EPE 038 G2.1.30, Steam Generator Tube Rupture Ability to locate and operate components, including local controls. (4.4/4.0)

Applicability	**Estimated Time**	**Actual Time**
RO/SRO	15 Minutes	

Conditions

- Task is to be SIMULATED in the Plant.
- Simulated plant conditions are that SGTRs have occurred and been identified in the Unit 2 "A" and “B” SGs. 2-E-3, SGTR, has been performed up to step 3d.

Standards

- 2-MS-87 is CLOSED.
- 2-MS-120 is CLOSED.

Initiating Cues

- Shift Manager direction.

Terminating Cues

- Report received that 2-E-3 step 3d is complete.

Procedures

- 2-E-3, Steam Generator Tube Rupture.

Tools and Equipment

- None

Safety Considerations

- Standard Personal Safety Equipment

PERFORMANCE CHECKLIST

Notes to the Evaluator

- This task is to be SIMULATED. Do NOT allow the operator to manipulate controls, operate switches or reposition valves.
- Task critical elements are bolded.
- **START TIME: ________**

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STEP 1: **CRITICAL STEP**

Locally close steam supply valve(s) to TD AFW pump. *(E-3, step 3d)*

STANDARD:

a) Operator reports to Unit two Safeguards.
b) Locates the "A" & "B" main steam lines in relation to "C".
c) Closes chain valve 2-MS-87. CRITICAL STEP
d) Closes chain valve 2-MS-120. CRITICAL STEP

NOTE: Only 2-MS-87 and 2-MS-120 are to be closed.

EVALUATOR’S NOTE:

- **Cue:** When they state they are closing each chain valve, report: “The chain stops pulling and the valve is closed.”
- Both chain valves must be closed to satisfy the Critical Step.

COMMENTS:

</td>
<td>

_______ **SAT**

_______ **UNSAT**

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STEP 3: Reports to Shift Manager that 2-E-3 Step 3d is complete. **EVALUATOR'S NOTE:** • Acknowledge report. **COMMENTS:** **** JPM COMPLETE ****	_______ **SAT** _______ **UNSAT**

STOP TIME: ______________________

Comments: ____

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Operator Directions Handout
(TO BE READ TO APPLICANT BY EXAMINER)

Initial Conditions

- This task is to be SIMULATED. Do NOT turn switches, manipulate controls or reposition valves.
- The Unit 2 "A" and “B” Steam Generators are Ruptured. We are in the process of isolating the Ruptured SGs iaw 2-E-3 step 3.
- 2-FW-P-3A and 2-FW-P-3B, “A” and “B” Motor Driven Aux Feedwater Pumps, are running.

Initiating Cues

- Here is Step 3 of 2-E-3. Your task is to perform Step 3d for the applicable Steam Generators.
- When you finish the actions necessary to accomplish this, please inform me.

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Initial Conditions

- This task is to be SIMULATED. Do NOT turn switches, manipulate controls or reposition valves.
- The Unit 2 "A" and "B" Steam Generators are Ruptured. We are in the process of isolating the Ruptured SGs iaw 2-E-3 step 3.
- 2-FW-P-3A and 2-FW-P-3B, "A" and "B" Motor Driven Aux Feedwater Pumps, are running.

Initiating Cues

- Here is Step 3 of 2-E-3. Your task is to perform Step 3d for the applicable Steam Generators.
- When you finish the actions necessary to accomplish this, please inform me.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

* *

CAUTION: • If the TD AFW pump is the only available source of feed flow, steam supply to the TD AFW pump must be maintained from at least one SG.

• At least one SG must be maintained available for RCS cooldown.

* *

3. ___ ISOLATE RUPTURED SG(s):

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
☑ a) Adjust ruptured SG PORV controller setpoint to 1035 psig	
☑ b) Check ruptured SG(s) PORV - CLOSED	☐ b) WHEN ruptured SG pressure less than 1035 psig, THEN check SG PORV closed.
	☐ IF PORV does NOT close, THEN put PORV controller in MANUAL AND close PORV.
	☐ IF PORV can NOT be closed, THEN locally isolate.
☑ c) Check blowdown TVs from ruptured SG(s) - CLOSED	☐ c) Manually close valves.
d) Locally close steam supply valve(s) to TD AFW pump: ☐ • 2-MS-87 for SG A ☐ • 2-MS-120 for SG B ☐ • 2-MS-158 for SG C	☐ d) IF at least one MD AFW pump running, THEN locally Trip the Overspeed Trip valve. IF NOT tripped, THEN close 2-MS-196.

(STEP 3 CONTINUED ON NEXT PAGE)

U.S. Nuclear Regulatory Commission
Surry Power Station

SR16301
In Plant Job Performance Measure 061K4.01
[Alternate Path]

Applicant________________________________ Start Time___________________

Examiner_______________________________

Date ___________________________________ Stop Time___________________

Title

LOCALLY START AN EDG.

K/A: APE068AA1.31 Ability operate and / or monitor the following as they apply to the Control Room Evacuation: EDG. (3.9/4.0)

Applicability	**Validation Time**	**Actual Time**
RO/SRO(I)/SRO(U)	20 Minutes	_____ Minutes

Conditions

- Task is to be SIMULATED in the plant.

Standards

- Depresses Engine Start pushbutton.
- Turns 4160 V EMERG GEN SUP FEED TO BUS 1H SYNCH TO "ON".
- Raises incoming voltage to 120 volts using EMERG GEN 1H VOLTAGE CONTROL HS.
- Places EMERG GEN 1H FAST START DEFEAT HS to ON.
- Closes breaker 15H3 by taking breaker control switch to CLOSE.

Procedures

- 0-FCA-12.00

Tools and Equipment
- None

Safety Considerations
- Standard PPE Required.

PERFORMANCE CHECKLIST

Notes to the Evaluator

- Task critical elements are **bolded**.
- This task is to be SIMULATED. Do NOT allow the operator to manipulate controls, operate switches or reposition valves
- **START TIME_______:**

STEP 1: NOTE and CAUTION prior to step 31. (FCA-12.00, step 31) • CAUTION: Personnel in the EDG Room should be wearing hearing protection at this time. • NOTE: Local EDG start will cause both start circuits to actuate simultaneously. **Standards** • Acknowledges Note and Caution. **Evaluator's Notes** **Evaluator's Comments**	**_______ SAT** **_______ UNSAT**

STEP 2: **CRITICAL STEP** LOCALLY START THE EDG. (AP-12.00, step 31). a) Depress the ENGINE START Pushbutton. b) Check EDG – STARTED. c) Check EDG SPEED – 900 RPM. d) Check EDG Output breaker closed. **Standards** **(a) Depresses the ENGINE START pushbutton (simulates). CRITICAL STEP.** (b) Check EDG started and speed at approximately 900 RPM. (c) Determines that EDG Output breaker (15H3) did NOT close. Goes to 31d RNO which directs the operator to return to step 9. **Evaluator's Cues** **Cue:** Acknowledge EDG Start and inform the operator that the Diesel is starting. **Cue:** When asked report that EDG is at 900 RPM by indicator on local panel. **Cue:** If asked about EDG Output breaker (15H3) report the green light is ON and the red light OFF **Evaluator's Notes** **Evaluator's Comments**	_______ **SAT** _______ **UNSAT**
STEP 3: NOTES prior to step 9. • The following conditions must exist in order for the EDG Output breaker to automatically close: o EDG speed is greater than 870 RPM. o EDG incoming voltage is greater than 113 volts. o The 15H8 breaker is opened. o The control switch for the 15H3 breaker is in the AFTER TRIP position. o DC control power is available to the breaker. **Standards** • Acknowledges NOTES. **Evaluator's Notes** **Evaluator's Comments**	_______ **SAT** _______ **UNSAT**

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STEP 4:

CHECK EDG SPEET – GREATER THAN 870 RPM. (FCA-12.00, step 9)

<u>Standards</u>

(a) Determines that EDG speed is greater than 870 RPM. Continues to step 10.

<u>Evaluator's Notes</u>

Evaluator Cue: If asked (again) indicate on the RPM meter that EDG speed is 900 RPM

<u>Evaluator's Comments</u>

</td><td>

_______ SAT

_______ UNSAT

</td></tr>
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STEP 5: **CRITICAL STEP**

CAUTION: EDG is running unloaded at this point.

RAISE EDG INCOMING VOLTAGE TO GREATER THAN 113 VOLTS: (FCA-12.00, step 10)

a) Turn 4160V EMERG GEN SUP FEED TO BUS 1H SYNC 15H3 to ON position.
b) CHECK generator voltage – ESTABLISHED.
c) Raise incoming voltage to 120 volts using EMERG GEN 1H VOLTAGE CONTROL HAND SW.

<u>Standards</u>

(a) Turn 4160V EMERG GEN SUP FEED TO BUS 1H SYNC 15H3 to ON position (simulates). CRITICAL STEP.
(b) Check generator voltage – ESTABLISHED. Determines generator voltage has been established.
(c) Raises incoming voltage to 120 volts using VOLTAGE CONTROL HS. CRITICAL STEP

<u>Evaluator's Cues</u>

Cue: After Synch sw is placed; If asked for generator voltage value. Indicate on voltage gauge that EDG voltage is APPROXIMATELY 115 VOLTS.
Cue: After Voltage control handswitch is operated indicate that Generator volts is rising to 120 volts.

<u>Evaluator's Notes</u>
If the operator incorrectly turns on the 15H8 Sync switch, both INCOMING and RUNNING volt meters will remain at 0 volts.

<u>Evaluator's Comments</u>

</td><td>

_______ SAT

_______ UNSAT

</td></tr>
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STEP 6: CHECK 15H8 BREAKER – OPEN. (FCA-12.00, step 11) **Standards** (a) Operator determines that breaker 15H8 is OPEN. **Evaluator's Cues** Cue: If asked breaker 15H8 indication is green light ON, red light OFF. **Evaluator's Notes** **Evaluator's Comments**	_______ **SAT** _______ **UNSAT**
STEP 7: CHECK CONTROL POWER FOR BREAKER 15H3 – AVAILABLE. (FCA-12.00, step 12) • Breaker indicating lights - LIT **Standards** • Operator determines that Breaker 15H3 has control power. **Evaluator's Cues** **Cue**: If asked for breaker indicating lights, report that the green light is ON and the red light is OFF. **Evaluator's Notes** **Evaluator's Comments**	_______ **SAT** _______ **UNSAT**

STEP 8: CHECK BREAKER 15H3 CLOSED. (FCA-12.00, step 13) **Standards** Operator determines that breaker 15H3 is NOT CLOSED. Goes to step 13 RNO, which directs the operator to go to step 15. **Evaluator’s Cues** Cue: If asked, breaker 15H3 is as you see it (green light lit, red light out). **Evaluator's Notes** **Evaluator's Comments**	_______ **SAT** _______ **UNSAT**
STEP 9: **CRITICAL STEP** MOMENTARILY PLACE EMERG GEN 1H FAST START DEFEAT HAND SW TO ON. (FCA-12.00, step 15) • Red light – ON. **Standards** • **Places EMERG GEN 1H FAST START DEFEAT HS TO ON. CRITICAL STEP.** • Checks red light on. **Evaluator’s Cues** **Cue:** When asked for light indication, state that light above Fast Start Defeat HS is ON. **Evaluator's Notes** **Evaluator's Comments**	_______ **SAT** _______ **UNSAT**

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STEP 10:

CHECK INCOMING VOLTAGE – 120 VOLTS. (FCA-12.00, step 16)

Standards

- Operator checks incoming voltage is 120 volts.

Evaluator's Cues

Cue: If Operator asks for incoming voltage (and indicates correct indicator). Inform him voltage is 120 volts.

Evaluator's Notes

Evaluator's Comments

</td><td>

_______ **SAT**

_______ **UNSAT**

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STEP 11:

NOTES before step 17:

- Running voltage will be zero and the synchroscope will be motionless at this time.
- If DC Bus A is deenergized, the EDG output breaker and Bus 1H load breakers must be manually closed.

Standards

- Acknowledges NOTES.

Evaluator's Notes

Evaluator's Comments

</td><td>

_______ **SAT**

_______ **UNSAT**

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STEP 12: CRITICAL STEP	
CLOSES EMERG SUP BREKER 15H3 (FCA-12.00, step 17) **Standards** • **Operator places HS for Breaker 15H3 to CLOSE. CRITICAL STEP.** **Evaluator's Cues** **Cue: When asked for status of breaker 15H3** report that red light is lit and green light is off. **Cue: If asked for changes to Running Voltage,** indicate that running voltage matches incoming voltage. **Evaluator's Notes** **Evaluator's Comments**	_______ **SAT** _______ **UNSAT**
STEP 13: TURN 4160 V EMERG GEN SUP FEED TO BUS 1H SYNCH 15H3 TO OFF**.** (FCA-12.00 step 18) **Standards** • Places 15H3 Synch switch to OFF. **Evaluator's Notes** **Evaluator's Comments**	_______ **SAT** _______ **UNSAT**

STOP TIME ___________:

Operator Directions Handout
(TO BE READ TO APPLICANT BY EXAMINER)

Initial Conditions

- This task is to be SIMULATED. Do NOT turn switches, manipulate controls or reposition valves.
- The Main Control Room has been evacuated due to a fire.
- The crew is initiating actions per 0-FCA-1.00, LIMITING MCR FIRE
- Offsite power to the station has been lost and EDG #1 has failed to auto start.

Initiating Cues

- Another operator has completed the pre-start checks per 0-FCA-12.00, up to step 30. The Service Bldg operator will close the stub bus breaker and complete the procedure once the EDG is loaded on the bus.
- Here is a copy of 0-FCA-12.00. Your task is to start the #1 Emergency Diesel Generator at the local panel per 0-FCA-12.00 starting at step 31.

.

Notes to the Evaluator

- This task is to be SIMULATED. Do NOT allow the operator to manipulate controls, operate switches or reposition valves.
- Critical step sequencing requirements: None.

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Initial Conditions

- This task is to be SIMULATED. Do NOT turn switches, manipulate controls or reposition valves.
- The Main Control Room has been evacuated due to a fire.
- The crew is initiating actions per 0-FCA-1.00, LIMITING MCR FIRE
- Offsite power to the station has been lost and EDG #1 has failed to auto start.

Initiating Cues

- Another operator has completed the pre-start checks per 0-FCA-12.00, up to step 30. The Service Bldg operator will close the stub bus breaker and complete the procedure once the EDG is loaded on the bus.
- Here is a copy of 0-FCA-12.00. Your task is to start the #1 Emergency Diesel Generator at the local panel per 0-FCA-12.00 starting at step 31.

U.S. Nuclear Regulatory Commission
Surry Power Station

SR21301
Simulator Job Performance Measure [KA: 036G2.1.44 3.9/3.8]

Applicant________________________________ Start Time___________________

Examiner_______________________________

Date ___________________________________ Stop Time___________________

Title

MCR pressure boundary verification in plant using 0-AP-22.00, Fuel Handling Abnormal Conditions

K/A: 036G2.1.44, Knowledge of RO duties in the control room during fuel handling, such as responding to alarms from the fuel handling area, communication with the fuel storage facility, systems operated from the control room in support of fueling operations, and supporting instrumentation. (3.9 / 3.8).

Applicability	**Validation Time**	**Actual Time**
RO/SRO(I)/SRO(U)	10 Minutes	____ Minutes

Conditions

- Task is to be SIMULATED in plant.

Standards

- Opens breaker 1-EP-DB-HVAC Ckt 1.
- Opens 2-EP-DB-HVAC Ckt 2.
- Opens 1-EP-BKR-1B2-1-2D.
- Opens 2-EP-BKR-2B2-1-4D.
- Opens 1-EP-BKR-1B2-1-3D.
- Opens 2-EP-BKR-2B2-1-3D.

Procedures

- 0-AP-22.00, Fuel Handling Abnormal Conditions.

Tools and Equipment

- None

Safety Considerations

- Ensure you use the handrail when climbing stairs.

PERFORMANCE CHECKLIST

Notes to the Evaluator

- Task critical elements are bolded and denoted as a **CRITICAL STEP**.
- ***NOTE:*** *The pictures in the JPM are on white paper, but are NOT to be included in the instructions given to the applicant. They are to be used during the JPM as an examiner cue for the first two breakers listed on 0-AP-22.00 Attachment 1, Step 3.*
- **START TIME_______:**

STEP 1 **CRITIAL STEP** Secure MCR boundary fans by opening the following breakers (0-AP-22.00 Attachment 1, step 3) **STANDARD:** a) **Opens the supply breaker for every location listed below:** ___ • **CABLE TRAY ROOM AIR HANDLING UNIT AHU-1, 1-EP-DB-HVAC, Ckt 1 (Unit 1 Switchgear Room, West wall)** ___ • **CABLE TRAY ROOM AIR HANDLING UNIT, 2-EP-DB-HVAC, Ckt 2 (Unit 2 Switchgear Room, South wall)** ___ • **1-VS-F-16, CABLE TUNNEL EXHAUST FAN, 1-EP-BKR-1B2-1-2D (Unit 1 Switchgear Room)** ___ • **2-VS-F-16, CABLE TUNNEL EXHAUST FAN, 2-EP-BKR-2B2-1-4D (Unit 2 Switchgear Room)** ___ • **1-VS-F-RAF-1, CABLE TRAY ROOM RETURN FAN, 1-EP-BKR-1B2-1-3D (Unit 1 Switchgear Room)** ___ • **2-VS-F-RAF-2, CABLE TRAY ROOM RET FAN, 2-EP-BKR-2B2-1-3D (Unit 2 Switchgear Room)** ___ • *1-VS-HV-2, CABLE VAULT HTG AND VENT UNITS, 1-EP-BKR-1A1-1EA1 (Unit 1 Upper Cable Vault) – <u>Will NOT be performed</u>* ___ • *2-VS-HV-2, CABLE VAULT HTG AND VENT UNIT, 2-EP-BKR-2A1-1EA1 (Unit 2 Upper Cable Vault) – <u>Will NOT be performed</u>* b) Goes to Step 4. **EVALUATOR'S NOTE:** **Note:** If the Candidate proceeds <u>downstairs</u> (toward the Upper Cable Vaults), inform the Candidate another operator will secure power to 1-VS-HV-2 and 2-VS-HV-2. **Cue:** For the first two breakers listed, provide the attached pictures for each breaker as needed to prevent opening the electrical panel doors. **IF asked**: For each of the breakers listed above, state the breaker is as they see it (all are expected to be closed). **IF asked**: After the Applicant simulates opening each of the breakers listed above, indicate the breaker is in the OFF position. **Note**: All listed breakers must be opened to satisfy the Critical Step. **COMMENTS:**	**_______ SAT** **_______ UNSAT**

STEP 2 Check readings on the following Differential Pressure Indicators - POSITIVE PRESSURE INDICATED (0-AP-22.20 Attachment 1, step 4) **STANDARD:** a) Either walks toward the Main Control Room or asks the Shift Manager for current Pressure indications. **EVALUATOR'S NOTE:** . Before the Candidate proceeds to the Main Control Room, inform them the JPM is complete. **COMMENTS:** **END OF JPM**	_______ **SAT** _______ **UNSAT**

STOP TIME: _______

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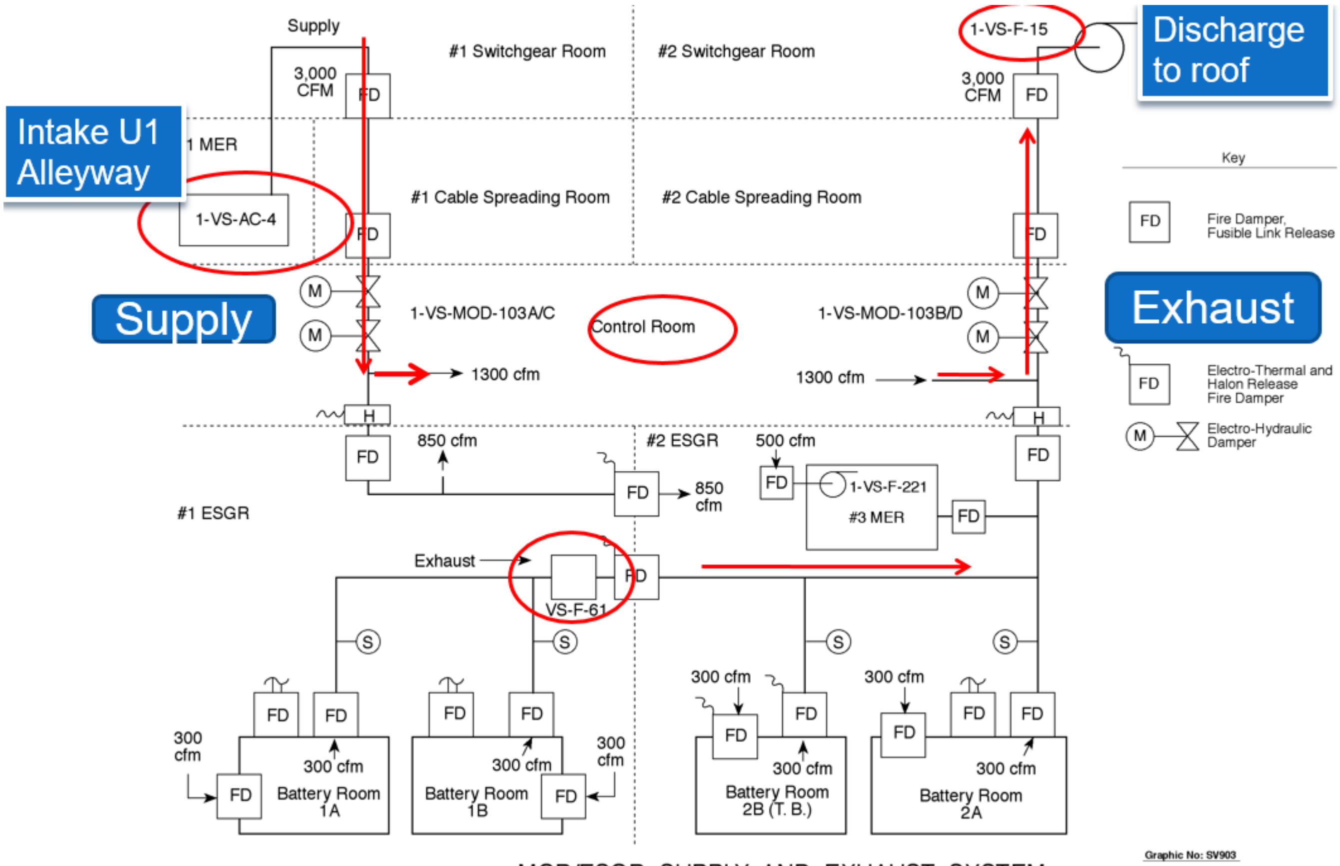


MCR/ESGR SUPPLY AND EXHAUST SYSTEM

Operator Directions Handout
(TO BE READ TO APPLICANT BY EXAMINER)

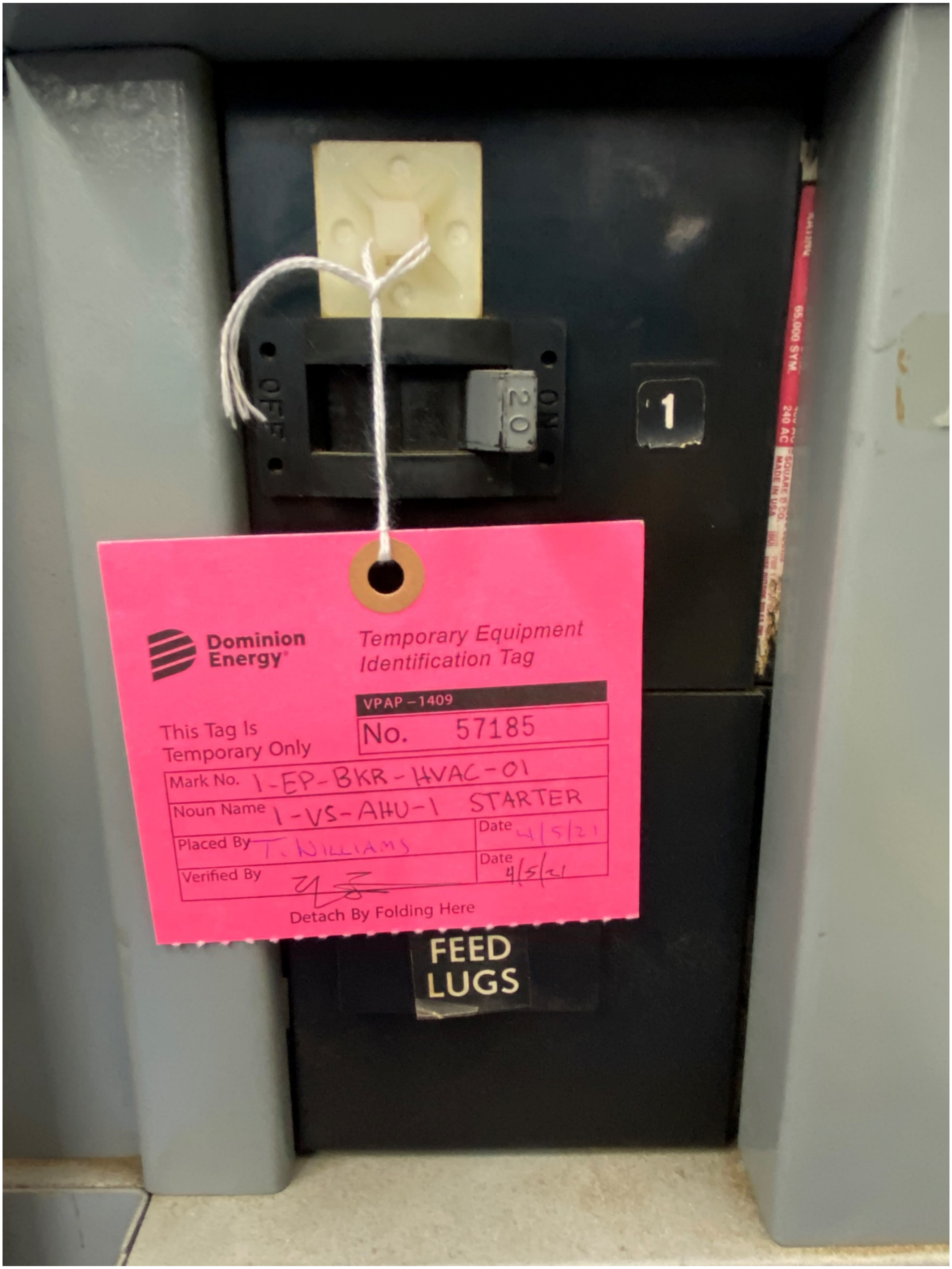
Initiating Conditions

- Unit 1 is operating at 100% power; Unit 2 is in Refueling Shutdown. Fuel shuffling was in progress in the Fuel Building.
- There has been a Fuel Handling accident in the Fuel Building.
- The Fuel Handling crew has placed the leaking fuel assembly in the designated storage location and has evacuated the Fuel Building.

Initiating Cues

- Your task is to perform Step 3 of 0-AP-22.00 Attachment 1, MCR Pressure Boundary Verification.
- When you finish the actions necessary to accomplish this, please inform me.


CABLE TRAY RM
HVAC 480V DISTR PNL
1-EP-DB-HVAC
1-EP-BKR-1B2-1-1B
CHECK (0)
MAIN
DISCONNECT
NON-AUTOMATIC
MAIN BREAKER
DANGER
I-LINE
PANELBOARD
FEED
LUGS


OFF
20
ON
1
Dominion Energy
Temporary Equipment Identification Tag
VPAP –1409
No. 57185
This Tag Is Temporary Only
Mark No. 1-EP-BKR-HVAC-01
Noun Name 1-VS-AHU-1 STARTER
Placed By T. WILLIAMS
Date 4/5/21
Verified By
Date 4/5/21
Detach By Folding Here
FEED LUGS
65,000 SYM.
240 AC
SQUARE D CO.
MADE IN USA


CABLE TRAY & SWGR RM
HVAC 480V DISTR PNL
2-EP-DB-HVAC
2-EP-BKR-24C1-3
CHECK (C)
MAIN BREAKER
MAIN
DISCONNECT
NON-AUTOMATIC
ON
OFF
SERIES 1
PLANT 7
HC 3256TS
DANGER
HAZARD OF ELECTRIC SHOCK
OR BURN
TURN OFF POWER SUPPLYING
THIS EQUIPMENT BEFORE
WORKING INSIDE
I-LINE
PANELBOARD
SQUARE D COMPANY
ELECTRICAL EQUIPMENT
CABLE TRAY ROOM
AIR HANDLING UNIT AHU-2
2-EP-BKR-HVAC-02
#2 CABLE TRAY ROOM
AIR HANDLING UNIT
AHU-2
SWGR RM CONDENSING UNIT
2-EP-BKR-HVAC-05
#5 SWGR. ROOM
CONDENSING UNIT
AC 4-60T
HVAC 240/120 VAC
DIST PANEL PWR FEED
2-EP-DB-HVAC-2A-06
CABLE TRAY RM
COND UNIT AC2-60T
2-EP-BKR-HVAC-07


CABLE TRAY ROOM
2 AIR HANDLING UNIT
AHU-2
ON
20
OFF
CABLE TRAY ROOM
AIR HANDLING UNIT AHU-2
2-EP-BKR-HVAC-02
CHECK (9)

Operator Directions Handout

(TO BE GIVEN TO APPLICANT)

Initiating Conditions

- Unit 1 is operating at 100% power; Unit 2 is in Refueling Shutdown. Fuel shuffling was in progress in the Fuel Building.
- There has been a Fuel Handling accident in the Fuel Building.
- The Fuel Handling crew has placed the leaking fuel assembly in the designated storage location and has evacuated the Fuel Building.

Initiating Cues

- Your task is to perform Step 3 of 0-AP-22.00 Attachment 1, MCR Pressure Boundary Verification.
- When you finish the actions necessary to accomplish this, please inform me.

NUMBER 0-AP-22.00	ATTACHMENT TITLE MCR PRESSURE BOUNDARY VERIFICATION	ATTACHMENT 1
REVISION 24		PAGE 1 of 3

1. ✓ Check readings on the following Differential Pressure Indicators - POSITIVE PRESSURE INDICATED.

- ☑ • PDI-VS-100, D.P.-U1CR/U1TB (Unit 2 Turbine Ventilation Panel)
- ☑ • PDI-VS-101, D.P.-U1RR/U1TB (Unit 2 Turbine Ventilation Panel)
- ☑ • PDI-VS-200, D.P.-U2CR/U2TB (Unit 2 Turbine Ventilation Panel)
- ☑ • PDI-VS-201, D.P.-U2RR/U2TB (Unit 2 Turbine Ventilation Panel)
- ☑ • 1-VS-PDI-118 (Unit 1 Computer Room)
- ☐ • 1-VS-PDI-116 (Near Unit 1 Semi-Vital Bus)
- ☑ • 2-VS-PDI-215 (Unit 2 AC Room)
- ☐ • 2-VS-PDI-206 (Near Unit 2 Semi-Vital Bus)

2. ✓ IF any reading NOT positive, THEN dispatch operator to perform Step 3 to secure MCR boundary fans. Otherwise, enter N/A for Steps 3 through 5.

3. Secure MCR boundary fans by opening the following breakers.

- ___ • CABLE TRAY ROOM AIR HANDLING UNIT AHU-1, 1-EP-DB-HVAC, Ckt 1 (Unit 1 Switchgear Room, West wall)
- ___ • CABLE TRAY ROOM AIR HANDLING UNIT, 2-EP-DB-HVAC, Ckt 2 (Unit 2 Switchgear Room, South wall)
- ___ • 1-VS-F-16, CABLE TUNNEL EXHAUST FAN, 1-EP-BKR-1B2-1-2D (Unit 1 Switchgear Room)
- ___ • 2-VS-F-16, CABLE TUNNEL EXHAUST FAN, 2-EP-BKR-2B2-1-4D (Unit 2 Switchgear Room)
- ___ • 1-VS-F-RAF-1, CABLE TRAY ROOM RETURN FAN, 1-EP-BKR-1B2-1-3D (Unit 1 Switchgear Room)
- ___ • 2-VS-F-RAF-2, CABLE TRAY ROOM RET FAN, 2-EP-BKR-2B2-1-3D (Unit 2 Switchgear Room)
- ___ • 1-VS-HV-2, CABLE VAULT HTG AND VENT UNITS, 1-EP-BKR-1A1-1EA1 (Unit 1 Upper Cable Vault)
- ___ • 2-VS-HV-2, CABLE VAULT HTG AND VENT UNIT, 2-EP-BKR-2A1-1EA1 (Unit 2 Upper Cable Vault)

U.S. Nuclear Regulatory Commission
Surry Power Station

SR21301
In Plant Job Performance Measure EPE011EA1.11 (4.2, 4.2)

Applicant________________________________	Start Time___________________
Examiner_______________________________	Stop Time___________________
Date ___________________________________	SAT _________ UNSAT ________

Title

LOCALLY ALIGN SW TO A RECIRC SPRAY HEAT EXCHANGER

K/A: EPE011EA1.11 (4.2, 4.2), Ability to operate and monitor the following as they apply to a Large Break LOCA: long-term cooling of core.

Applicability	**Estimated Time**	**Actual Time**
RO/SRO(I)/SRO(U)	10 Minutes	____ Minutes

Conditions

- Task is to be SIMULATED in the plant.
- Simulated plant conditions are that a LOCA is in progress with a loss of offsite power and subsequent loss of EDG #3. 2-SW-MOV-204C and 2-SW-MOV-205C cannot be opened from the control room and need to be locally opened to establish one train of RS heatsink.

Standards

1. Locally opens 2-SW-MOV-204C
2. Locally opens 2-SW-MOV-205C

Procedures

- 2-ECA-1.1, Loss of Emergency Coolant Recirculation, step 8c RNO.

Tools and Equipment	**Safety Considerations**
• None	• None

PERFORMANCE CHECKLIST

Notes to the Evaluator

- This task is to be SIMULATED. Do NOT allow the operator to manipulate controls, operate switches or reposition valves.
- Task critical elements are bolded.
- **START TIME: ________**

STEP 1: **CRITICAL STEP** Locally open 2-SW-MOV-204C ("C" RSHX SW INLET MOV) **STANDARD:** a) Operator reports to Unit two Safeguards and goes to the basement. b) Locates 2-SW-MOV-204C. **c) Manually declutches the MOV (presses handle DOWN) [CRITICAL STEP].** **d) Opens 2-SW-MOV-204C by turning handwheel counter-clockwise until indicator points to OPEN [CRITICAL STEP].** **EVALUATOR'S NOTE:** • **Cue:** When they correctly state they are opening the valve, report: "The pointer moves and the handwheel stops rotating when the indicator points to OPEN." • **Cue:** If declutch lever not depressed, then report that when the handwheel is rotated, no valve motion occurs. **COMMENTS:**	**_______ SAT** **_______ UNSAT**
STEP 2: **CRITICAL STEP** Locally open 2-SW-MOV-205C ("C" RSHX SW OUTLET MOV) **STANDARD:** a) Locates 2-SW-MOV-205C. **b) Manually declutches the MOV (presses handle DOWN) [CRITICAL STEP].** **c) Opens 2-SW-MOV-205C by turning handwheel counter-clockwise until indicator points to OPEN [CRITICAL STEP].** **EVALUATOR'S NOTE:** • **Cue:** When they correctly state they are opening the valve, report: "The pointer moves and the handwheel stops rotating when the indicator points to OPEN." • **Cue:** If declutch lever not depressed, then report that when the handwheel is rotated, no valve motion occurs **COMMENTS:**	**_______ SAT** **_______ UNSAT**

Step 3 CRITICAL STEP	
REPORTS TO SHIFT MANAGER (EVALUATOR). **STANDARD:** Verbal status report made that 2-SW-MOV-204C and 2-SW-MOV-205C have been opened. **COMMENTS:** **JPM END**	**_______ SAT** **_______ UNSAT**

STOP TIME:

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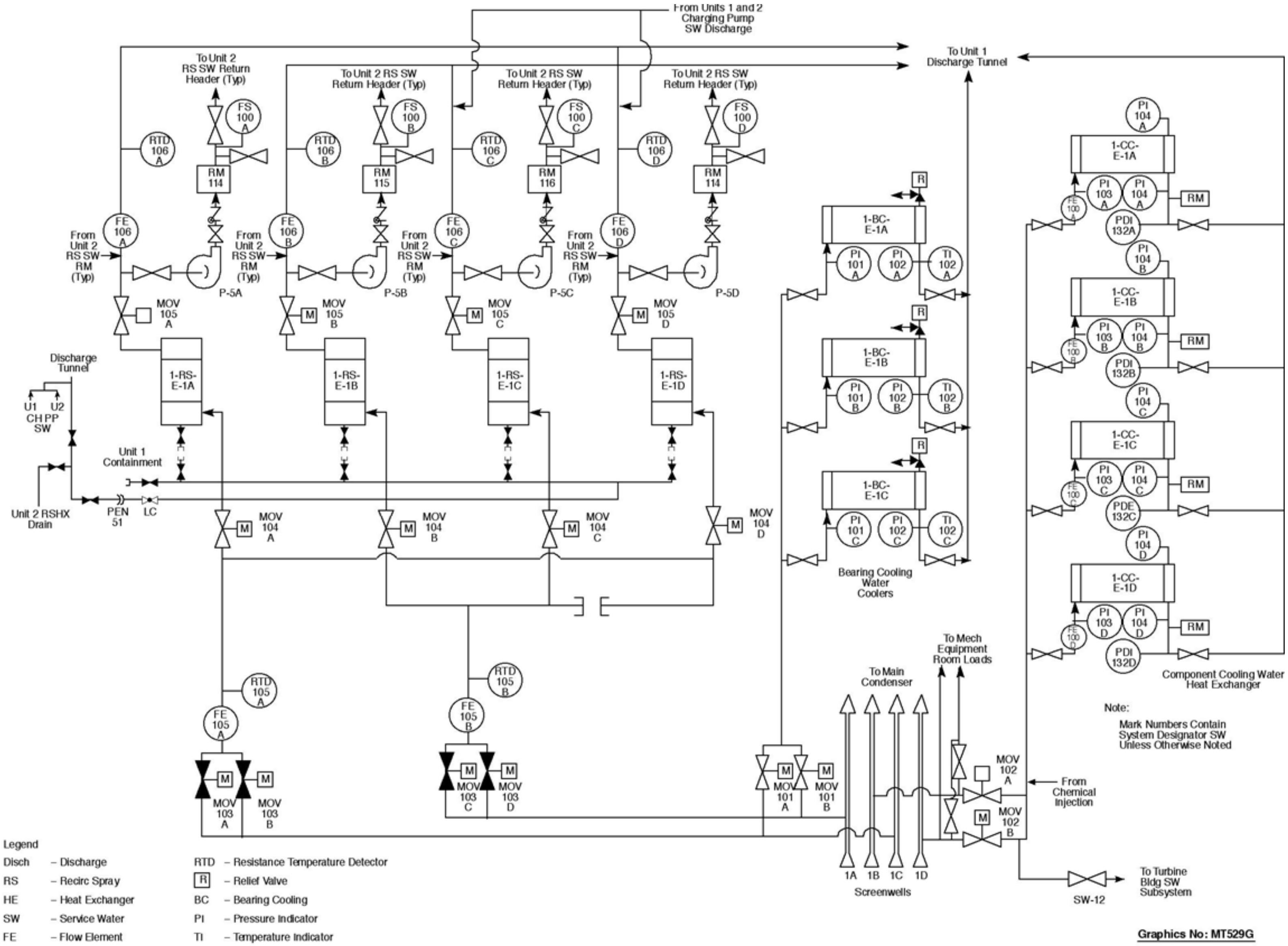

Legend

Disch	– Discharge	RTD	– Resistance Temperature Detector
RS	– Recirc Spray	R	– Relief Valve
HE	– Heat Exchanger	BC	– Bearing Cooling
SW	– Service Water	PI	– Pressure Indicator
FE	– Flow Element	TI	– Temperature Indicator
RM	– Radiation Monitor	Mech	– Mechanical
P	– Pump	CC	– Component Cooling
M MOV	– Motor Operated Valve	FS	– Flow Switch
E	– Heat Exchanger		

GRAVITY FLOW SERVICE WATER SYSTEM LOADS

Operator Directions Handout
(TO BE READ TO APPLICANT BY EXAMINER)

Initial Conditions

- This task is to be SIMULATED. Do NOT turn switches, manipulate controls or reposition valves.
- A Large Break LOCA has occurred on Unit 2 concurrent with a loss of offsite power.
- #3 EDG tripped on overspeed resulting in the loss of the 2J 4160v bus.
- The team is performing 2-ECA-1.1, Loss of Emergency Coolant Recirculation, step 8c RNO which has directed the team to “Align SW to at least two RS HXs.
- The “C” RSHX service water MOVs are CLOSED and cannot be opened from the control room.
- The supply breakers for each valve have been opened.
- 2-SW-MOV-203A through 2-SW-MOV-203D are all OPEN.

Initiating Cues

- Your task is to perform 2-ECA-1.1 step 8c RNO, by locally aligning SW flow to the “C” RSHX by manually operating 2-SW-MOV-204C and 2-SW-MOV-205C.
- When you finish the actions necessary to accomplish this please inform me.

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Initial Conditions

- This task is to be SIMULATED. Do NOT turn switches, manipulate controls or reposition valves.
- A Large Break LOCA has occurred on Unit 2 concurrent with a loss of offsite power.
- #3 EDG tripped on overspeed resulting in the loss of the 2J 4160v bus.
- The team is performing 2-ECA-1.1, Loss of Emergency Coolant Recirculation, step 8c RNO which has directed the team to “Align SW to at least two RS HXs.
- The “C” RSHX service water MOVs are CLOSED and cannot be opened from the control room.
- The supply breakers for each valve have been opened.
- 2-SW-MOV-203A through 2-SW-MOV-203D are all OPEN.

Initiating Cues

- Your task is to perform 2-ECA-1.1 step 8c RNO, by locally aligning SW flow to the “C” RSHX by manually operating 2-SW-MOV-204C and 2-SW-MOV-205C.
- When you finish the actions necessary to accomplish this please inform me.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

* *

CAUTION: Operation of an OSRS pump without the associated CS pump could cause cavitation as indicated by fluctuating amperage.

* *

NOTE: If CLS can NOT be reset, local breaker operation will be required to stop CS and ISRS pumps.

8.___ CHECK RECIRCULATION SPRAY SYSTEM:

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
a) Check for EITHER of the following:	☐ a) GO TO Step 10.
☑ • Any CS pump - RUNNING OR REQUIRED	
OR	
☑ • RWST level - LESS THAN 20%	
☑ b) Check CTMT sump level - GREATER THAN 4.0 ft	b) Do the following:
	☐ 1) Check CLS reset. IF NOT, THEN reset both trains of CLS.
	☐ 2) Stop RS pumps.
	☐ 3) WHEN sump level greater than 4.0 ft, THEN perform Steps 8.c and 8.d.
	☐ 4) GO TO Step 9.
☐ c) Check SW aligned to at least two RS HXs	☐ c) Align SW to at least two RS HXs.
☐ d) Start RS pumps associated with aligned RS HXs	

U.S. Nuclear Regulatory Commission
Surry Power Station

SR21301
In Plant Job Performance Measure 062A2.05 2.9/3.3

Applicant________________________________ Start Time___________________

Examiner_______________________________

Date ___________________________________ Stop Time___________________

Title

Transfer Semi-Vital bus power supply.

K/A: SYS062A2.05, Methods for energizing a dead bus, 2.9/3.3

Applicability	**Validated Time**	**Actual Time**
RO/SRO(I)	12 Minutes	____ Minutes

Conditions

- Task is to be SIMULATED in the Plant.

Standards

- Places 1-EP-1H1-1-2A1 breaker switch in the “OPEN” position.
- Contacts MCR and has the Unit 1 SVB manual transfer switch placed in the 1J1 position.
- Closes 1-EP-1J1-1-7D1 breaker.

Procedures

- 1-AP-10.05, Loss of Semi-Vital Bus, Revision 36.

Tools and Equipment

- None

Safety Considerations

- Standard Personal Safety Equipment

PERFORMANCE CHECKLIST

Notes to the Evaluator

- Task critical elements are **bolded** and denoted as **CRITICAL STEP**.
- This task is to be SIMULATED. Do NOT allow the Candidate to manipulate controls, operate switches or reposition valves
- **START TIME: ______**

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1-AP-10.05, Step 11

STEP 1: Acknowledge NOTE Prior to Step 11.

STANDARD:

a) Reviews NOTE: If the Semi-Vital Bus has been deenergized for greater than 30 minutes, the SG PORV controllers will return to Remote/Manual control when power is restored.

EVALUATOR'S NOTE:

If asked: Unit 1 SVB has been deenergized for 15 minutes.
If asked: Unit 1 SVB powered from the 1H bus supply prior to the power loss.

COMMENTS:

</td><td>

_______ SAT

_______ UNSAT

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1-AP-10.05, Step 11 **CRITICAL STEP**

Step 2 Locally open Semi-Vital Bus feeder breakers.

STANDARD:

(a) Locates to Unit 1 ESGR and Locates breaker 1-EP-BKR-1H1-1-2A1 on MCC 1H1-1.
(b) Simulates placing 1-EP-BKR-1H1-1-2A1 breaker switch in the "OPEN" position – CRITICAL STEP.
c) Locates breaker 1-EP-BKR-1J1-1-7D1 on MCC 1J1-1.
d) Checks breaker 1J1-1-7D1 in "open" position.

EVALUATOR'S NOTE:

If asked: Point to "ON" position on breaker 1H1-1-2A1.
If asked for 1H1-1-2A1 after opening: Point to the "OFF" position on breaker 1J1-1-7D1 handle.

COMMENTS:

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_______ **SAT**

_______ **UNSAT**

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1-AP-10.05, Step 11 **CRITICAL STEP**

Step 3b: Operate manual transfer switch to the desired power supply.

STANDARD:

a) **Contacts MCR (Evaluator) and requests Unit 1 SVB manual transfer switch to be placed in the 1J1 position. CRITICAL STEP.**

EVALUATOR'S NOTE:

When asked to transfer state: "A time compression has occurred, the SVB manual transfer switch has been swapped to the 1J1 position."

Acceptable for the Candidate to go to the MCR to simulate placing the manual transfer switch in the "1J" position.

COMMENTS:

</td><td>

_______ **SAT**

_______ **UNSAT**

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1-AP-10.05, Step 11 **CRITICAL STEP**

Step 4: Locally close the selected Semi-Vital Bus feeder breaker.

STANDARD:

a) Locates to breaker 1-EP-1J1-1-7D1 on MCC 1J1-1.
b) Simulates closing 1-EP-1J1-1-7D1 breaker. CRITICAL STEP.
c) Checks Semi-Vital Bus Energized by contacting MCR (Evaluator) to determine if SVB is energized.

EVALUATOR'S NOTE:

If asked: Inform Candidate that Unit 1 SVB has been reenergized.

COMMENTS:

</td><td>

_______ **SAT**

_______ **UNSAT**

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Step 5: Inform Shift Manager (Evaluator) of Task Completion.

STANDARD:

Informs Evaluator task has been completed,

EVALUATOR'S NOTE:

NONE

COMMENTS:

END OF JPM

</td><td>

_______ **SAT**

_______ **UNSAT**

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</table>

STOP TIME:

Operator Directions Handout
(TO BE READ TO APPLICANT BY EXAMINER)

Initial Conditions

- This task is to be SIMULATED. Do NOT turn switches, manipulate controls or reposition valves.
- A loss of Unit 1's Semi-Vital Bus has occurred.
- The team is performing 1-AP-10.05, LOSS OF SEMI-VITAL BUS.

Initiating Cues

- Here is a copy of 1-AP-10.05, Step 11. I need you to transfer the Unit 1 Semi-Vital Bus to the 1J Bus power supply by performing step 11 of 1-AP-10.05. When you inform me that the bus has been re-energized, I will have the Unit RO perform the required instrumentation evaluation.
- When you finish the actions necessary to accomplish this Task, please inform me.

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Initial Conditions

- This task is to be SIMULATED. Do NOT turn switches, manipulate controls or reposition valves.
- A loss of Unit 1's Semi-Vital Bus has occurred.
- The team is performing 1-AP-10.05, LOSS OF SEMI-VITAL BUS.

Initiating Cues

- Here is a copy of 1-AP-10.05, Step 11. I need you to transfer the Unit 1 Semi-Vital Bus to the 1J Bus power supply by performing step 11 of 1-AP-10.05. When you inform me that the bus has been re-energized, I will have the Unit RO perform the required instrumentation evaluation.
- When you finish the actions necessary to accomplish this Task, please inform me.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE: If the Semi-Vital Bus has been deenergized for greater than 30 minutes, the SG PORV controllers will return to Remote/Manual control when power is restored.

11.___ RESTORE POWER TO THE SEMI-VITAL BUS

a) Locally open or check open Semi-Vital Bus feeder breakers:

☐ • 1-EP-BKR-1H1-1-2A1

<u>AND</u>

☐ • 1-EP-BKR-1J1-1-7D1

☐ b) Operate manual transfer switch to the desired power supply

c) Locally close the selected Semi-Vital Bus feeder breaker:

☐ • 1-EP-BKR-1H1-1-2A1

<u>OR</u>

☐ • 1-EP-BKR-1J1-1-7D1

☐ d) Check Semi-Vital Bus - ENERGIZED

RESPONSE NOT OBTAINED: d) Do the following:

☐ 1) Coordinate with Electrical Department to restore Semi-Vital Bus to service.

☐ 2) GO TO Step 13.

☐ e) Review Attachment 2 to evaluate Main Control Board instrumentation powered from Foxboro racks MB-5, 6, 7, and 8

☐ f) Review Attachment 3 to check for failed indications, components, and shifted controllers

U.S. Nuclear Regulatory Commission
Surry Power Station

SR21301
In Plant Job Performance Measure 086A2.04, (3.3,3.9)
[Alternate Path]

Applicant________________________________ Start Time___________________

Examiner_______________________________ Stop Time___________________

Date ___________________________________ SAT _________ UNSAT ________

Title

INITIATE CO2 EDG CARDOX [Alternate Path]

K/A: 086A2.04, (3.3,3.9), Ability to (a) predict the impacts of the following malfunctions or operations on the Fire Protection System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Failure to actuate the FPS when required, resulting in fire damage.

Applicability	**Estimated Time**	**Actual Time**
RO/SRO(I)/SRO(U)	10 Minutes	____ Minutes

Conditions

- Task is to be SIMULATED in the plant.
- A fire has been reported in #2 EDG room and attempts to actuate CO2 from the MCR were unsuccessful.

Standards

1. Opens door at EDG 2 Local Panel.
2. Rotates EMPC throw-over lever at the local panel 180 degrees at the local panel for #2 EDG room.
3. Rotate EMPC throw-over lever at the Cardox supply tank 180 degrees.

Procedures

- 0-OP-FP-006, OPERATION OF FIRE PROTECTION SYSTEMS, Section 5.1.

Tools and Equipment
- None

Safety Considerations
- None

PERFORMANCE CHECKLIST

Notes to the Evaluator

- This task is to be SIMULATED. Do NOT allow the operator to manipulate controls, operate switches or reposition valves.
- Task critical elements are bolded.
- **START TIME: ________**

STEP 1: 0-OP-FP-006 – STEP 5.1.1 Determine hazard area(s) which require CO2. **STANDARD:** **a)** Operator recalls that fire is in #2 EDG room. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 2: 0-OP-FP-006 – STEP 5.1.2 Initiate CO2 at manual actuation station by pulling down cover and depressing pushbutton. **STANDARD:** a) Proceeds to CO2 control panel just outside #2 EDG room. b) Simulates pulling down cover and depressing actuation button. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 3: 0-OP-FP-006 – STEP 5.1.3 Check CO2 initiation and notify Main Control Room. IF CO2 fails to initiate THEN enter N/A AND GO TO Step 5.1.4. • Green “System Normal” light NOT LIT • Frost on CO2 supply piping • Red “Fire Indication” light LIT **STANDARD:** a) Candidate identifies that CO2 actuation did NOT occur and continues with step 5.1.4. **EVALUATOR’S NOTE/CUE:** • **CUE**: Report that Green “System Normal” light is **LIT** • **CUE**: There is no Frost on CO2 supply piping • **CUE**: Fire Indication” light is **NOT LIT** • **CUE:** If applicant goes to the wrong EDG then report the <u>opposite</u> indications. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 4: **CRITICAL STEP** 0-OP-FP-006 – STEP 5.1.4 IF CO2 fails to initiate, THEN break the glass AND open the door at the local panel for affected hazard(s). **STANDARD:** **a) Simulates breaking access glass and opening door at EDG 2 Local panel. CRITICAL STEP** **EVALUATOR’S NOTE:** Lever can be accessed without opening door. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 5: 0-OP-FP-006 – CAUTION prior to step 5.1.5: If CO2 is released using the Electro-Mechanical Pilot Controller (EMPC) manual throw-over lever, the operator must terminate the release by placing the throw-over lever in CLOSE after a predetermined time. The time is posted on the EMPC for the affected hazard area. **STANDARD:** a) Candidate acknowledges CAUTION **COMMENTS:**	**_______ SAT** **_______ UNSAT**
STEP 6: **CRITICAL STEP** 0-OP-FP-006 – STEP 5.1.5 Rotate EMPC throw-over lever at the local panel 180 degrees for the time specified on affixed instruction placard. **STANDARD:** **a) Candidate simulates rotation of the throw-over lever 180° [CRITICAL STEP].** **EVALUATOR'S NOTE/CUE:** **CUE**: **If asked**: Report that conditions did not change following rotation of throw-over lever (*or conditions are "as you see them"*). **COMMENTS:**	**_______ SAT** **_______ UNSAT**
STEP 7: 0-OP-FP-006 – STEP 5.1.6 Check CO2 initiation and notify Main Control Room. IF CO2 fails to initiate, THEN enter N/A AND GO TO Step 5.1.7. **STANDARD:** a) Candidate determines that CO2 failed to initiate and goes to step 5.1.7 **EVALUATOR'S NOTE/CUE:** **CUE**: **If asked**: Report that conditions did not change following rotation of throw-over lever (or conditions are "as you see them". **COMMENTS:**	**_______ SAT** **_______ UNSAT**

STEP 8: **CRITICAL STEP** 0-OP-FP-006 – STEP 5.1.7 IF CO2 fails to initiate, THEN leave EMPC throw-over lever in the OPEN position AND open the Master Control Valve (valve is located next to the Cardox supply tank outside of Unit 2 track-bay). **STANDARD:** a) Candidate relocates to just outside U2 track bay near the CO2 tank. **b) Candidate simulates breaking access glass and rotation of the throw-over lever 180° [CRITICAL STEP].** **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 9: 0-OP-FP-006 – STEP 5.1.8 Check CO2 initiation and notify Main Control Room **STANDARD:** a) Candidate contacts the MCR. b) Candidate may relocate back to just outside #2 EDG room to verify CO2 discharge. **EVALUATOR'S NOTE/CUE:** **CUE**: **If asked**: CO2 line from the tank is frosted. **If asked**: Just outside #2 EDG room, CO2 line is frosted. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 10: 0-OP-FP-006 – STEP 5.1.9 Return EMPC throw-over lever to the CLOSE position when directed by Main Control Room. **STANDARD:** **a)** Candidate awaits cue from MCR to terminate CO2 discharge. **EVALUATOR'S NOTE/CUE:** **CUE**: Another operator will terminate CO2 discharge at the appropriate time. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

Step 11: REPORTS TO SHIFT MANAGER (EVALUATOR). **STANDARD:** Verbal status report made that CO2 discharge has been initiated to #2 EDG room. **COMMENTS:** **JPM END**	_______ **SAT** _______ **UNSAT**

STOP TIME: ___________

Operator Directions Handout
(TO BE READ TO APPLICANT BY EXAMINER)

Initial Conditions

- This task is to be SIMULATED. Do NOT turn switches, manipulate controls or reposition valves.
- A fire has been reported in #2 EDG room and attempts to discharge CO2 from the control room have been unsuccessful.

Initiating Cues

- You are to locally discharge CO2 to #2 EDG room in accordance with 0-OP-FP-006, OPERATION OF FIRE PROTECTION SYSTEMS, section 5.1.
- When you finish the actions necessary to accomplish this please inform me.

.

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Initial Conditions

- This task is to be SIMULATED. Do NOT turn switches, manipulate controls or reposition valves.
- A fire has been reported in #2 EDG room and attempts to discharge CO2 from the control room have been unsuccessful.

Initiating Cues

- You are to locally discharge CO2 to #2 EDG room in accordance with 0-OP-FP-006, OPERATION OF FIRE PROTECTION SYSTEMS, section 5.1.
- When you finish the actions necessary to accomplish this please inform me.

U.S. Nuclear Regulatory Commission
Surry Power Station

SR16301
Administrative Job Performance Measure G2.1.19

Applicant________________________________ Start Time___________________

Examiner_______________________________

Date ___________________________________ Stop Time___________________

Title

Perform calculation of reactor power using 1-OPT-RX-003, Reactor Power Calorimetric using Feed Flow and PCS Computer Points (Manual).

K/A: G2.1.19, Ability to use plant computers to evaluate system or component status. (3.9 / 3.8)

Applicability	Validation Time	Actual Time
RO	45 Minutes	

Conditions

- Task is to be PERFORMED in the classroom.
- Unit 1 is at 90% power.
- Feedwater Ultrasonic Flow Measurement (UFM) is non-functional.

Standards

- Calculate Q_{total} within acceptable band (step 6.2.14)
- Calculate Reactor power in MWth within acceptable limits (step 6.2.15).
- Calculate Reactor power in % within acceptable band (step 6.2.16).

Initiating Cues

- Nuclear Shift Manager direction.

Terminating Cues

- 1-OPT-RX-003, Sections 6.1 and 6.2 completed.

Procedures

- 1-OPT-RX-003， Reactor Power Calorimetric using Feed Flow and PCS Computer Points (Manual)
- 1-DRP-003, Curve Book (Unit 1)

Tools and Equipment

- Calculator
- Extra copies of Attachment 3 pages 1 and 2.

Safety Considerations

Notes

- A marked-up copy of 1-OPT-RX-003 should be given to the Applicant.
- A copy of 1-DRP-003, Unit 1 Curve Book, or laptop shall be made available.

PERFORMANCE CHECKLIST

Notes to the Evaluator

- Task critical elements are **bolded**.
- **START TIME: ________**

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STEP 1

Obtain the values for SG Pressure, FW Temperature, and Main Feedwater Flow for each loop from the PCS computer. Record the computer point values in the appropriate boxes below and on Attachment 3, Page 1. *(Step 6.2.1)*

- U9171 SG A Corrected Stm Press __*829.98*__ psia
- U9172 SG B Corrected Stm Press __*828.62*__ psia
- U9173 SG C Corrected Stm Press __*827.66*__ psia

- T0418A SG A FW Temp (RTD-111A) __*431.16*_°F
- T0438A SG B FW Temp (RTD-111B) __*431.16*_°F
- T0458A SG C FW Temp (RTD-111C) __*431.16*_°F

U9174 SG A Filtered Average Feed Flow ___*3391.24*___ x 10^3 lbm/hr

U9175 SG B Filtered Average Feed Flow ___*3392.67*___ x 10^3 lbm/hr

U9176 SG C Filtered Average Feed Flow ___*3392.99*___ x 10^3 lbm/hr

STANDARD:

Using JPM Attachment 1 (PP Output Summary), Applicant fills in numbers for this step and on procedure Attachment 3.

EVALUATOR'S NOTE:

A completed table is attached at the end of this JPM showing all data.

COMMENTS:

</td><td>

_______ **SAT**

_______ **UNSAT**

</td></tr>
</table>

STEP 2 IF Feedwater temperature for any loop is greater than 443°F, THEN notify Reactor Engineering. Otherwise, enter N/A. *(Step 6.2.2)* **STANDARD:** a) Applicant notes that Feedwater temperature is 431.16°F. b) Applicant places N/A in initial block. **EVALUATOR'S NOTE:** A completed table is attached at the end of this JPM showing all data. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 3 IF Step 6.1.3 was performed, THEN return the Feed Reg Bypass HCVs to desired position. Otherwise, enter N/A. *(Step 6.2.3)* **STANDARD:** a) Applicant recalls that the Feed Reg Bypass HCVs were not manipulated. b) Enters N/A in initial block. **EVALUATOR'S NOTE:** **If asked**: Feed Reg Valve bypasses were not manipulated. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 4 Obtain pressurizer heater input by using the computer point listed below. Record this value in the appropriate box on Attachment 3, Page 2. (Enter 0 KW if computer point inoperable) *(Step 6.2.4)* • Q0400A Pressurizer Heater Power __*850.7*__ KW **STANDARD:** a) Applicant references attached PP Output Summary from PCS. b) Notes that PZR Heater Power is 850.7 KW. c) Records 850.7 KW in the step block and on page 2 of Attachment 3. **EVALUATOR'S NOTE:** A completed table is attached at the end of this JPM showing all data. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 5 **NOTE:** • Blowdown flow must be maintained as constant as possible. The most accurate data will be obtained by isolating blowdown, but isolation is not required. • PCS points for automatic Blowdown flow are the preferred inputs for the following step. *(NOTE prior to Step 6.2.5)* **STANDARD:** Applicant acknowledges NOTE. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 6 Obtain loop blowdown flow by using the PCS points or indicators listed below. Circle PCS point (preferred) or indicator used. Record these values in the appropriate boxes on Attachment 3, Page 1. *(Step 6.2.5)* • (F2551A) FPP0001K, FI-BD-103A or FI-BD-104A SG A BD Flow ___*57.540*___ gpm • (F2552A) FPP0002K, FI-BD-103B or FI-BD-104B SG B BD Flow ___*62.593*___ gpm • (F2553A) FPP0003K, FI-BD-103C or FI-BD-104C SG C BD Flow ___*58.400*___ gpm **STANDARD:** a) Applicant refers to attached PP Output Summary from PCS for blowdown flows. b) Circles the PCS point (F2551A, etc.) and records value in step and on Attachment 3. **EVALUATOR'S NOTE:** **If asked**: Blowdown is in AUTO mode for PCS. A completed table is attached at the end of this JPM showing all data. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 7 Find the enthalpy of steam, h_s, for each loop using Corrected Steam Pressure from Attachment 3 and the Enthalpy Steam Table (100% Quality) in 1-DRP-003. Record values in the appropriate boxes on Attachment 3, Page 1. *(Step 6.2.6)* **STANDARD:** a) Applicant locates Enthalpy Steam Table (100% Quality) in 1-DRP-003 (Attachment 72). b) Determines h_s for each loop. Applicant may interpolate exact values or round to the nearest psia. • Loop A – 1198.54 BTU/lbm *(band 1198.51 – 1198.57 BTU/lbm)* • Loop B – 1198.57 BTU/lbm *(band 1198.54 – 1198.60 BTU/lbm)* • Loop C – 1198.60 BTU/lbm *(band 1198.57 – 1198.63 BTU/lbm)* c) Records values on Attachment 3. **EVALUATOR'S NOTE:** The listed band was developed by rounding steam pressure to the nearest psia, then taking the enthalpy value for ±1 psia. A completed table is attached at the end of this JPM showing all data. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 8 **NOTE:** Using a FW pressure of 800 psia in the next step will be conservative for all Reactor Power levels. Find the enthalpy of feedwater, h_f, for each loop, using Feedwater Temperature from Attachment 3 and the Enthalpy Compressed Liquid Table (800 psia) in 1-DRP-003. Record values in the appropriate boxes on Attachment 3, Page 1. *(Step 6.2.7)* **STANDARD:** a) Acknowledges NOTE prior to step that using FW pressure of 800 psia is conservative. b) Applicant locates Enthalpy Compressed Liquid Table (800 psia) in 1-DRP-003 (Attachment 74). c) Determines h_f for each loop. Applicant may interpolate exact values or round to the nearest tenth of a degree. • Loop A – 409.61 BTU/lbm *(band 409.50 – 409.72 BTU/lbm)* • Loop B – 409.61 BTU/lbm *(band 409.50 – 409.72 BTU/lbm)* • Loop C – 409.61 BTU/lbm *(band 409.50 – 409.72 BTU/lbm)* d) Records values on Attachment 3. **EVALUATOR'S NOTE:** The listed band was developed by rounding feedwater temperature to the nearest tenth of a degree, then taking the enthalpy value for ±1/10th of a degree. A completed table is attached at the end of this JPM showing all data. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 9 Calculate $\Delta h_1 = h_s - h_f$ for each loop and record results in appropriate boxes on Attachment 3, Page 1. *(Step 6.2.8)* **STANDARD:** Applicant calculates Δh_1 and records values. • Loop A – 788.93 BTU/lbm *(band 788.79 – 789.07 BTU/lbm)* • Loop B – 788.96 BTU/lbm *(band 788.82 – 789.10 BTU/lbm)* • Loop C – 788.99 BTU/lbm *(band 788.82 – 789.13 BTU/lbm)* **EVALUATOR'S NOTE:** A completed table is attached at the end of this JPM showing all data. Listed band was developed by taking each respective loop $h_{s(max)} – h_{f(min)}$ for one limit, and $h_{s(min)} – h_{f(max)}$ for the other limit. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 10 Calculate Blowdown Flow M_{bd} (lbm/hr) = BD (gpm) x 496.6563 $\frac{\text{lbm/hr}}{\text{gpm}}$. Record values in the appropriate boxes on Attachment 3, Page 1. *(Step 6.2.9)* **STANDARD:** Applicant calculates M_{bd} and records values. • Loop A – 28577.60350 lbm/hr *(band 28577 – 28578 lbm/hr)* • Loop B – 31087.20779 lbm/hr *(band 31087 – 31088 lbm/hr)* • Loop C – 29004.72792 lbm/hr *(band 29004 – 29005 lbm/hr)* **EVALUATOR'S NOTE:** The listed band was developed by rounding up or down to the nearest whole number. A completed table is attached at the end of this JPM showing all data. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 11 Find the enthalpy of the blowdown, h_{bd}, for each loop, using the Corrected Steam Pressure from Attachment 3 and the Enthalpy Saturated Liquid Table in 1-DRP-003. Record values in the appropriate boxes on Attachment 3, Page 1. *(Step 6.2.10)* **STANDARD:** a) Applicant locates Enthalpy Saturated Liquid Table in 1-DRP-003 (Attachment 73). b) Determines h_{bd} for each loop. Applicant may interpolate exact values or round to the nearest psia. • Loop A – 515.00 BTU/lbm *(band 514.83 – 515.17 BTU/lbm)* • Loop B – 514.83 BTU/lbm *(band 514.66 – 515.00 BTU/lbm)* • Loop C – 514.66 BTU/lbm *(band 514.49 – 514.83 BTU/lbm)* c) Records values on Attachment 3. **EVALUATOR'S NOTE:** The listed band was developed by rounding steam pressure to the nearest psia, then taking the enthalpy value for ±1 psia. A completed table is attached at the end of this JPM showing all data. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 12	
Calculate $\Delta h_2 = h_s - h_{bd}$ for each loop and record results in appropriate boxes on Attachment 3, Page 1. *(Step 6.2.11)* **STANDARD:** Applicant calculates Δh_2 and records values. • Loop A – 683.54 BTU/lbm *(band 683.34 – 683.74 BTU/lbm)* • Loop B – 683.74 BTU/lbm *(band 683.54 – 683.94 BTU/lbm)* • Loop C – 683.94 BTU/lbm *(band 683.74 – 684.14 BTU/lbm)* **EVALUATOR'S NOTE:** A completed table is attached at the end of this JPM showing all data. Listed band was developed by taking each respective loop $h_{s(max)} – h_{bd(min)}$ for one limit, and $h_{s(min)} – h_{bd(max)}$ for the other limit. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 13 Perform the following for each loop: *(Step 6.2.12)* a. Calculate (M_f x Δh_1) and (M_{bd} x Δh_2) for each loop and record results in appropriate boxes on Attachment 3, Page 1 b. Calculate Q_{loop} = (M_f x Δh_1) - (M_{bd} x Δh_2) for each loop and record results in appropriate boxes on Attachment 3, Page 1.	_______ **SAT** _______ **UNSAT**

STANDARD:

a) Applicant calculates (M_f x Δh_1) and (M_{bd} x Δh_2) for each loop and record results in appropriate boxes on Attachment 3.

(M_{bd} x Δh_2)

- Loop A – 19,533,935.10 BTU/hr *(band 19,527,807.18 – 19,539,921.72 BTU/hr)*
- Loop B – 21,255,567.45 BTU/hr *(band 21,249,207.98 – 21,262,326.72 BTU/hr)*
- Loop C – 19,837,493.61 BTU/hr *(band 19,831,194.96 – 19,843,480.70 BTU/hr)*

(M_f x Δh_1)

- Loop A – 2,675,450,973 BTU/hr *(band 2,674,976,200 – 2,675,925,747 BTU/hr)*
- Loop B – 2,676,680,923 BTU/hr *(band 2,676,205,949 – 2,677,155,897 BTU/hr)*
- Loop C – 2,677,035,180 BTU/hr *(band 2,676,560,162 – 2,677,510,199 BTU/hr)*

b) Applicant calculates Q_{loop} = (M_f x Δh_1) - (M_{bd} x Δh_2) for each loop and record results in appropriate boxes on Attachment 3.

- Loop A – 2,655,917,038 BTU/hr *(band 2,655,436,278 – 2,656,397,940 BTU/hr)*
- Loop B – 2,655,425,356 BTU/hr *(band 2,654,943,622 – 2,655,906,689 BTU/hr)*
- Loop C – 2,657,197,686 BTU/hr *(band 2,656,716,681 – 2,657,679,004 BTU/hr)*

EVALUATOR'S NOTE:

- A completed table is attached at the end of this JPM showing all data.
- Listed band for Q_{bd} based on: ($m_{bd(min)}$) ($\Delta h_{2(min)}$) AND ($m_{bd(max)}$) ($\Delta h_{2(max)}$).
- Listed band for Q_{fw} based on: (m_{fw}) ($\Delta h_{1(min)}$) AND (m_{fw}) ($\Delta h_{1(max)}$).
- Listed band for Q_{loop} based on [$Q_{fw(max)}$ - $Q_{bd(min)}$], AND [$Q_{fw(min)}$ - $Q_{bd(max)}$]

COMMENTS:

STEP 14 Convert Pressurizer Heat Input from KW to BTU/hr by multiplying by 3413.0 BTU/hr/KW, and record results in appropriate boxes on Attachment 3, Page 2. *(Step 6.2.13)* **STANDARD:** a) Applicant multiplies PZR Heat Input (*850.7* KW) by 3413.0 BTU/hr/KW. b) Records 2,903,439.1 BTU/hr in appropriate block. **EVALUATOR'S NOTE:** A completed table is attached at the end of this JPM showing all data. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 15 **CRITICAL STEP** Calculate total heat from Reactor by using $Q_{Total} = Q_{loop\ A} + Q_{loop\ B} + Q_{loop\ C}$ (BTU/hr) - PRZR HTR Input (BTU/hr) - RCP Heat Input (BTU/hr) + Letdown, Seal Injection, and Charging Heat Loss (BTU/hr) + Insulation Loss (BTU/hr). Record results in appropriate box on Attachment 3, Page 2 *(Step 6.2.14)* **STANDARD:** Applicant calculates Q_{Total}. • **$Q_{loop\ A} + Q_{loop\ B} + Q_{loop\ C}$ = 7,968,540,080 BTU/hr** ***(band 7,967,096,581 – 7,969,983,633 BTU/hr)*** • **-RCP Heat Input + Letdown, Seal Injection, and Charging Heat Loss + Insulation Loss = – 18.78E6 BTU/hr** • **-PZR Heat Input = 2,903,439.1 BTU/hr** • **Q_T = 7,946,856,641 BTU/hr** ***(band 7,945,413,142 – 7,948,300,194 BTU/hr)*** **EVALUATOR'S NOTE:** A completed table is attached at the end of this JPM showing all data. Listed band for $Q_{loopTotal}$ based on $Q_{loop\ A+B+C(min)}$ AND $Q_{loop\ A+B+C(max)}$. Listed band for Q_T based on subtracting constants from $Q_{looptotal}$ band. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 16 CRITICAL STEP	
Divide Q_T by 3.413 x 10^6 to find Reactor output in MW_{th}. Record results in appropriate box on Attachment 3, Page 2. *(Step 6.2.15)* **STANDARD:** Applicant calculates Reactor output in MW_{th}. • **MW_{th} = 7,946,856,641 BTU/hr ÷ 3413000** **= 2,328.40804 *(band 2,327.985 – 2,328.83099)*** **EVALUATOR'S NOTE:** A completed table is attached at the end of this JPM showing all data. Listed band determined by dividing previous band limits by 3.413 E6. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 17 CRITICAL STEP	
Find the percent power level by using % Power = (MW_{th}/2587) x 100. Record results in appropriate box on Attachment 3, Page 2. *(Step 6.2.16)* **STANDARD:** Applicant calculates % Reactor Power. • **% Power = (2,328.0804 ÷ 2587) MWth x 100** **= 90.00 % *(band 90.10% - 89.90%)*** **EVALUATOR'S NOTE:** A completed table is attached at the end of this JPM showing all data. Band is based on rounding errors. The Applicant may sign and date the Attachment at this time and report the JPM completed. It is at the Evaluator's discretion to continue the procedure. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 18 IF the Manual Calorimetric Spreadsheet was used, THEN sign and date the computer generated printouts (performer and independent reviewer) and attach the printouts to this procedure. *(Step 6.2.17)* **STANDARD:** Applicant recalls that the Manual Calorimetric Spreadsheet was not used and enters N/A for the step. **EVALUATOR'S NOTE:** **If asked**: The Manual Calorimetric Spreadsheet was not used. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 19 IF Attachment 3 was used, THEN sign and date Attachment 3 (performer and independent reviewer). *(Step 6.2.18)* **STANDARD:** a) Applicant signs and dates Attachment 3. b) Requests an Independent Verifier to check work. **EVALUATOR'S NOTE:** The Applicant may report the JPM complete at this time. It is at the Evaluator's discretion to continue the procedure **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 20 **CAUTION** To prevent exceeding maximum rated Reactor thermal power, Reactor power must not be increased based on the result of this calorimetric. NOTE: Due to differences in the uncertainty calculations for Primary Plant Performance and the manual calorimetric, indicated power between the two may vary by 0.4%. IF Reactor Power as calculated is greater than 98.4%, THEN perform the following: *(Step 6.2.19)* a. Immediately reduce Reactor Power to less than 98.4% power IAW Attachment 4. b. Terminate this procedure and reperform calorimetric. **STANDARD:** Applicant notes that Reactor Power is 90%. Enters N/A in both blocks. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 21	
Report to Shift Manager (Evaluator) completion of Task.	_______ SAT _______ UNSAT
COMMENTS:	
** **JPM COMPLETE** **	

STOP TIME: ___________________________

Comments: ____

____

____

____

____

____

____

	LOOP A	LOOP B	LOOP C
Corrected Steam Pressure (psia)	U9171 *829.98*	U9172 *828.62*	U9173 *827.66*
Enthalpy Steam h_s (BTU/lbm)	***1198.54 (1198.51-1198.57)***	***1198.57 (1198.54-1198.60)***	***1198.60 (1198.57-1198.63)***
Feedwater Temp (°F)	T0418A *431.16*	T0438A *431.16*	T0458A *431.16*
Enthalpy FW h_f (BTU/lbm)	***409.61 (409.50-409.72)***	***409.61 (409.50-409.72)***	***409.61 (409.50-409.72)***
$\Delta h_1 = (h_s-h_f)$ BTU/lbm	***788.93 (788.79-789.07)***	***788.96 (788.82-789.10)***	***788.99 (788.82-789.13)***
Blowdown Flow (gpm)	(SG A) *57.540*	(SG B) *62.593*	(SG C) *58.400*
x Conversion gpm to lbm/hr	x 496.6563	x 496.6563	x 496.6563
Blowdown Flow M_{bd} (lbm/hr)	***28,577.6035 (28577-28578)***	***31,087.20779 (31087-31088)***	***29,004.72792 (29004-29005)***
Enthalpy h_{bd} (BTU/lbm)	***515.00 (514.83-515.17)***	***514.83 (514.66-515.00)***	***514.66 (514.49-514.83)***
$\Delta h_2 = (h_s-h_{bd})$ BTU/lbm	**683.54 (683.34-683.74)**	**683.74 (683.54-683.94)**	**683.94 (683.74-684.14)**
$M_{bd} \times \Delta h_2$ (BTU/hr)	***19,533,935.10 (19,527,807.18-19,539,921.72)***	***21,255,567.45 (21,249,207.98-21,262,326.72)***	***19,837,493.61 (19,831,194.96-19,843,480.70)***
Feedwater Flow M_{fw} (lbm/hr)	SG A Feed Flow *3391.24E3*	SG B Feed Flow *3392.67E3*	SG C Feed Flow *3392.99E3*
$M_{fw} \times \Delta h_1$ (BTU/hr)	***2,675,450,973 (2,674,976,200-2,675,925,747)***	***2,676,680,923 (2,676,205,949-2,677,155,897)***	***2,677,035,180 (2,676,560,162-2,677,510,199)***
$Q_{loop} = (M_{fw} \times \Delta h_1) - (M_{bd} \times \Delta h_2)$ BTU/hr	***2,655,917,038 (2,655,436,278-2,656,397,940)***	***2,655,425,356 (2,654,943,622-2,655,906,689)***	***2,657,197,686 (2,656,716,681-2,657,679,004)***

Pressurizer Heater Input (KW)	*850.7* (Q0400A)
x Conversion KW to BTU/hr	x 3413
Pressurizer Heater Input	= ***2,903,439.1*** *(2.9E6)*

$Q_{loop\ A} + Q_{loop\ B} + Q_{loop}$ C (BTU/hr)	= ***7,968,540,080 (7,967,096,581-7,969,983,633)***
- RCP Input + Letdown, Charging, and Seal Injection Losses + Insulation Losses	- 18.78 x 106 BTU/hr
- Pressurizer Heater Input (BTU/hr)	*- 2903439.1*
QT (BTU/hr)	= ***7,946,856,641 (7,945,413,142-7,948,300,194)***
MW_{th} = QT / 3413000	***= 2,328.40804 MW_{th} (2,327.985-2,328.83099)***
% POWER = (MW/th / 2587) x 100	***= 90.00417627% (89.90-90.10)***

- Instructor-calculated values are in ***BOLD Italics***.

Operator Directions Handout
(TO BE READ TO APPLICANT BY EXAMINER)

Initial Conditions

- Unit 1 is at a stable power and has been stable for 2 hours. No periodic tests or calibration evolutions are in progress.
- Feed Water Ultrasonic Flow Measurement (UFM) is non-functional.
- The PCS Calorimetric program is otherwise functional.
- The following unit conditions exist:
  - The Manual Calorimetric Spreadsheet will NOT be used.
  - Feed Water Regulating Valve bypass valves are closed.

Initiating Cues

- Using the attached PP Output Summary sheet, perform Section 6.2 of 1-OPT-RX-003, Reactor Power Calorimetric using Feed Flow and PCS Computer Points (Manual).
- Your calculations should be performed as follows:
  - Round off your calculations to four (4) significant digits.
  - Do NOT use scientific notation.

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Initial Conditions

- Unit 1 is at a stable power and has been stable for 2 hours. No periodic tests or calibration evolutions are in progress.

- Feed Water Ultrasonic Flow Measurement (UFM) is non-functional.

- The PCS Calorimetric program is otherwise functional.

- The following unit conditions exist:

  - The Manual Calorimetric Spreadsheet will NOT be used.
  - Feed Water Regulating Valve bypass valves are closed.

Initiating Cues

- Using the attached PP Output Summary sheet, perform Section 6.2 of 1-OPT-RX-003, Reactor Power Calorimetric using Feed Flow and PCS Computer Points (Manual).
- Your calculations should be performed as follows:
  - Round off your calculations to four (4) significant digits.
  - Do NOT use scientific notation.

Attachment 1

W1

Select Control Page Zoom Poke Recall 1/4 Help

DOMINION - SURRY 59010

89.83 P PCT 784.60 MWE UNIT 1 - PP OUTPUT SUMMARY

PP OUTPUT QUALITY DOWNGRADE:	NORMAL	
CURRENT SELECTED CALCALC:	FEED FLOW	

00:00

UFM AOT

CALCALC TOTAL THERMAL PWR % (U9104):	89.83 P	PCT
CALCALC 10 MIN AVG POWER % (U9105):	89.84 P	PCT
RUNNING SHIFT AVG POWER % (U9103):	B	PCT

CURRENT DATA:

CALCALC INST(1MIN) REACTOR PWR:	2323.02	MWTH
CALCALC INST(1MIN) REACT PWR %:	89.79	PCT
UNIT GROSS EFFICIENCY:	33.76	PCT

CURRENT SHIFT DATA:

SHIFT AVG PWR - UFM FW FLOW :	34.22	PCT
SHIFT AVG PWR - NORM FW FLOW :	34.78	PCT
SHIFT AVG PWR - NORM STM FLOW :	34.63	PCT
SHIFT AVG PWR - FW FLOW :	34.28	PCT
SHIFT AVG PWR - STM FLOW :	34.03	PCT
STM/FW SHIFT POWER DIFF :	0.25	PCT

PP200-DATA ENTRY

PP201-FLOW COMP

PP202-THERM COMP

PP206-RCS FLOW

	A	B	C	
FW UFM TEMPERATURE:	431.30	431.30	431.30	DEGF
FW NORM TEMPERATURE:	431.23	431.23	431.23	DEGF
FW RTD TEMPERATURE:	431.16 T0418A	431.16 T0438A	431.16 T0458A	DEGF
BLOWDOWN FLOW AUTO:	57.540 F2551A	62.593 F2552A	58.400 F2553A	GPM
BLOWDOWN FLOW MANUAL:	57.540	62.593	58.401	GPM
AUTO / MANUAL:	AUTO	AUTO	AUTO	
SG CORR STM PRESSURE:	829.98 U9171	828.62 U9172	827.66 U9173	PSIA

PRESSURIZER HTR POWER:	850.7 Q0400A	KW

1-OPT-RX-002

	A	B	C	
SG 1 MIN AVG STM FLOW:	3412.00	3363.56	3379.20	KLBH
SG 1 MIN AVG NORM STM FLOW:	3413.3	3459.9	3462.2	KLBH

1-OPT-RX-003

	A	B	C	
SG 1 MIN AVG UFM FW FLOW:	3377.7	3379.9		KLBH
SG 1 MIN AVG NORM FW FLOW:	3393.4	3439.8	3488.7	KLBH
SG FILT AVG FW FLOW:	3391.24 U9174	3392.67 U9175	3392.99 U9176	KLBH

NUMBER OF SHIFTS CONFIGURED IS: 2

CURRENT SHIFT IS: 1

PREVIOUS DAY DATA:

TOTAL THERMAL PWR % LAST DAY:	99.85	PCT
AVG GROSS HEAT RATE LAST DAY:	B	BTUKWH
AVG NET HEAT RATE LAST DAY:	B	BTUKWH

PREVIOUS SHIFT DATA:

SHIFT AVG POWER:	B	PCT
SHIFT AVG HEAT RATE GROSS:	B	BTUKWH
SHIFT AVG HEAT RATE NET:	B	BTUKWH

Operator Command Received.

U.S. Nuclear Regulatory Commission
Surry Power Station

SR10301
Administrative Job Performance Measure 2.1.5

Applicant________________________________ Start Time___________________

Examiner_______________________________

Date ___________________________________ Stop Time___________________

Title

Determine shift Core Crew composition.

K/A: G.2.1.5 – Ability to use procedures related to shift staffing, such as minimum crew complement, overtime limitations, etc. (2.5/3.9)

Applicability	**Validation Time**	**Actual Time**
SRO(I)(U)	15 Minutes	___________

Initial Conditions

- Task is PERFORMED in the CLASSROOM.

Standards

- Circles "MET" on the worksheet for the minimum D Shift complement.
- Lists the required actions in OP-AA-100: Attachment 2, 5.4.1 "a" and "b" on the worksheet.

Initiating Cue:

- You are to determine if the total D Shift complement requires a Condition Report.
- Based on current staffing, list all required actions to perform at the beginning of the shift.
- Record your answers on the attached form and submit them to me when complete.

Terminating Cues

- Completed worksheet given to the Evaluator.

Procedures

- OP-AA-100, Conduct Of Operations

Tools and Equipment

- Laptop for obtaining procedures

Safety Considerations

- None

PERFORMANCE CHECKLIST

Notes to the Evaluator.

- Task critical elements are bolded and noted by the words “Critical Step” at the end of the step.
- The Applicant is given a worksheet for this JPM.
- A laptop will be Available for the Applicant.
- **START TIME: __________**

STEP 1: Review of requirements in OP-AA-100, Conduct Of Operations. **STANDARD:** (a) Locates Shift Staffing requirements in Attachment 2, Section 5. (b) Notes at 5.2.1.b. that Core Crew requirement pertain to members that can stand watch in the Control Room: a. Shift Manager b. Unit Supervisor c. Shift Technical Advisor d. Reactor Operators (c) Determines that the Desk (WCC) SRO cannot be used to satisfy minimum core complement requirements. **EVALUATOR’S NOTE:** **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 2: **CRITICAL STEP** Evaluates current shift staffing against minimum core complement requirements. **STANDARD:** (a) Determines the following shift personnel meet the core crew requirements: a. Shift Manager b. Shift Technical Advisor (even if non-licensed) c. U1 SRO d. U1 OATC e. U2 Asst RO (b) Notes in OP-AA-100 Att. 2 Step 5.2.1.d that 5 Core Crew members are required to meet minimum core compliment at Surry. (c) Notes in OP-AA-100 Att. 2 Step 5.3.b that a CR is required when 5.2.1.d requirements are not met (in this case, they are MET). **(d) Circles NO on worksheet for "Condition Report Required?"** **EVALUATOR NOTES:** **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 3: **CRITICAL STEP** Determines all required actions based on team members not being part of the Core Crew. (OP-AA-100 Attachment 2) **STANDARD:** (a) Determines the actions of 5.4.1 apply due to individuals on shift not being part of the Core Crew. **(b) Lists the required actions in OP-AA-100, Attachment 2, 5.4.1 "a" and "b" on the worksheet.** **EVALUATOR NOTES:** • If the Candidate lists the specific procedure and step/substep numbers, it satisfies the **CRITICAL STEP**. (OP-AA-100, Attachment 2, 5.4.1.a. and b.) **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 4: Turns in attached worksheet. **STANDARD:** **EVALUATOR'S NOTE:** • Acknowledge the completion of the task. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STOP TIME: ___________

EXAMINER REFERENCE MATERIAL:

Defintitions:

A. Core Crew- Requires EVERY member of the associated crew members in order to be met (SM, both SROs, STA, and all ROs).

B. Minimum Core Complement- Requires at least 5 of the associated crew members of the team to be Core Crew members in order to be met.

From OP-AA-100, Attachment 2. CORE CREW requirement and MINIMUM CORE COMPLEMENT requirement:

5.2 Core Crew

5.2.1 Normal Operations

a. **ENSURE** minimum shift manning requirements are met as shown in Table 5.2-1, 5.2-2, 5.2-3, or 5.2-4.

b. Recognizing that changing even one crewmember can upset crew dynamics, **CONSIDER** core crew **NOT** met if one or more crew members standing watch in the control room are **NOT** normally assigned to that crew (Shift Manager, Unit Supervisor, Shift Technical Advisor, and Reactor Operators). This includes team members standing required proficiency watches and operators serving as a control room team member to cover for normal crew member absences (vacation, sick, etc.)

c. **IF** Shift Managers, Senior Reactor Operators, Reactor Operators, and Shift Technical Advisors who are re-assigned to a new crew have **NOT** met requirements of ATTACHMENT 2 section 5.1 and are standing watch in these positions, **THEN** **CONSIDER** core crew requirements **NOT** met.

d. **PLAN** shift schedules to maintain a minimum core complement of control room personnel normally assigned to that crew in accordance with the following requirements:

- North Anna and Surry: 5 control room team members normally assigned to that crew.
- Millstone: 3 control room team members normally assigned to that crew.
- V.C. Summer: 3 control room members normally assigned to that crew.

EXAMINER KEY:

1. Condition Report required? YES / NO (circle one)

2. List all required actions for current staffing:

   (From OP-AA-100, Attachment 2, 5.4.1.a. and b.)

DOMINION ENERGY

OP-AA-100
REVISION 43
PAGE 42 OF 87

ATTACHMENT 2
(Page 21 of 39)
Shift Operations

5.4 Mitigating Actions when **NOT** Meeting Core Crew Requirements

5.4.1 **IF** one or more crew members standing watch in the control room are **NOT** normally assigned to that crew in accordance with ATTACHMENT 2 step 5.2.1.b. or 5.2.1.c., **THEN DO** the following prior to or immediately after taking the watch:

a. Non-core crew members shall **REVIEW** the on-watch crew's crew notebook with a focus on crew and individual weaknesses, proficiency concerns, and leadership and team effectiveness gaps.

b. The shift manager and unit supervisor shall **REVIEW AND DISCUSS** individual performance focus areas and proficiency gaps for non-core crew members.

Operator Directions Handout
(TO BE READ TO APPLICANT BY EXAMINER)

Initial Conditions:

- Both units are at 100% power.
- You are a Tagging office RO, who has been called in to work as the Unit 1 Assistant RO.
- An RO normally assigned to this shift called out sick.
- Today's shift complement is as follows:
  - SM – core crew
  - STA (non-SRO licensed) – core crew
  - Desk (WCC) SRO – NOT core Crew
  - U1 SRO - core crew
  - U1 OATC – core crew
  - U1 Asst RO – (You)
  - U2 SRO – NOT core crew
  - U2 OATC –NOT core crew
  - U2 Asst RO – core crew

Initiating Cue:

- You are to perform the following:
  1) Determine if the total D Shift complement requires a Condition Report.
  2) Based on your determination, list all required actions to perform at the beginning of the shift.
- Record your answers on the attached form and submit them to me when complete.

Operator Directions Handout

(TO BE GIVEN TO APPLICANT)

<u>Initial Conditions:</u>

- Both units are at 100% power.
- You are a Tagging office RO, who has been called in to work as the Unit 1 Assistant RO.
- An RO normally assigned to this shift called out sick.
- Today's shift complement is as follows:
  - SM – core crew
  - STA (non-SRO licensed) – core crew
  - Desk (WCC) SRO – <u>NOT</u> core Crew
  - U1 SRO - core crew
  - U1 OATC – core crew
  - U1 Asst RO – (You)
  - U2 SRO – <u>NOT</u> core crew
  - U2 OATC –<u>NOT</u> core crew
  - U2 Asst RO – core crew

<u>Initiating Cue:</u>

- You are to perform the following:
  1) Determine if the total <u>D Shift complement</u> requires a Condition Report.
  2) Based on your determination, list all required actions to perform at the beginning of the shift.
- Record your answers on the attached form and submit them to me when complete.

Applicant name: ______________________________

1. Condition Report required? YES / NO (circle one)

2. List all required actions based on current staffing:

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U.S. Nuclear Regulatory Commission
Surry Power Station

SR10301
Administrative Job Performance Measure 2.2.13

Applicant________________________________ Start Time___________________

Examiner_______________________________

Date ___________________________________ Stop Time___________________

Title

Determine Tagging Boundaries

K/A: G.2.2.13 – Knowledge of Tagging and Clearance Procedures. (4.1/4.3)

Applicability	**Validation Time**	**Actual Time**
SRO(I)(U)	30 Minutes	___________

Initial Conditions

- Task is PERFORMED in the CLASSROOM.

Standards

- Submits table with Component IDs and required positions in accordance with Boundary "A" in Step 4, **OR**
- Submits table with Component IDs and required positions in accordance with Boundary "B" in Step 4.
- Submits correct sequence of tagged components in the following order: 1) electrical supply, 2) isolation valves, 3) drains and vents.

Initiating Cues

- Using the provided Station Drawings, you are to determine a tagging boundary adequate to support removal of 1-RT-27.
- On the attached table, list all components and their required positions.

Terminating Cues

- Attached table is completed and submitted.

Procedures

- OP-AA-200, Equipment Clearance
- 11448-FM-124A Sheet 2
- 11448-FE-1K

Tools and Equipment

- Laptop for obtaining procedures
- 11448-FM-124A Sheet 2
- 11448-FE-1K
- **High lighters**

Safety Considerations

- None

PERFORMANCE CHECKLIST

Notes to the Evaluator.

- Task critical elements are bolded and noted by the words “Critical Step” at the end of the step.
- A laptop will be Available for the Applicant.
- **START TIME: ___________**

STEP 1:	
Reviews the initial conditions of the JPM and refers to the drawings and OP-AA-200, Equipment Clearance. **STANDARD:** (a) Utilizes DocTop to obtain OP-AA-200, **EVALUATOR’S NOTE:** • **If asked**, provide candidate with system to drawing number summary sheet. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

<table>
<tr><td>STEP 2: CRITICAL STEP

Reviews electrical drawing 11448-FE-1K and identifies the electrical boundary (480V supply breaker)

STANDARD:

(a) Notes that 1-EP-BKR-1A2-1-4B will need to be opened
This is a critical step.
(b) Notes that 1-EP-BKR-1A2-1-4B will need to be the first tagged component in the tagout. The sequencing is a critical step.

EVALUATOR NOTES:
• Candidate may also no tag the control switch in OFF.
• Component ID and required position are <u>both</u> critical.

COMMENTS:</td><td>_______ SAT

_______ UNSAT</td></tr>
</table>

<table>
<tr><td>
STEP 3: CRITICAL STEP

Reviews mechanical drawing 11448-FM-124A SH2 and identifies the mechanical boundaries (suction, discharge, vent, and drain)

NOTE TO EVALUATOR:
There are two possible safe working boundaries for this component. They are listed below as Boundary “A” and Boundary “B”. All components for one choice are required for a safe working boundary.

STANDARD:

Isolation valves – For the selected Boundary, all CLOSED isolation valves must be included <u>AND</u> sequenced after the breaker tag in the previous step.

Boundary “A”
- 1-RT-25 – Suction Isol – CLOSED
- 1-RT-36 – Pump ALT suction – CLOSED
- 1-RT-88 – Chem injection Isol – CLOSED
- 1-RT-59 – Discharge isol – CLOSED
- 1-RT-32 – Discharge isol – CLOSED
- 1-RT-27 – Pump Suction – OPEN (<u>Not</u> CS)

Boundary “B”
- 1-RT-25 – Suction Isol – CLOSED
- 1-RT-37(38) – Suction Isol – CLOSED
- 1-RT-88 – Chem injection Isol – CLOSED
- 1-RT-59 – Discharge isol – CLOSED
- 1-RT-27 – Pump Suction – OPEN (<u>Not</u> CS)

Vents/Drains – Numerous Vents/drains exists – <u>at least one</u> of the following drains and at least one of the following vents shall be open. These must be sequenced after the Isolation valves.

Boundary “A”
- 1-RT-92 – Suction drain – OPEN
- 1-RT-28 – Suction drain – OPEN
- 1-RT-31 – Discharge drain – OPEN
- 1-RT-70 – Suction Vent – OPEN
- 1-RT-29 – Disch Vent – OPEN with PI removed

Boundary “B”
- 1-RT-92 – Suction drain – OPEN
- 1-RT-28 – Suction drain - OPEN
- 1-RT-31 – Discharge drain - OPEN
- 1-RT-70 – Suction Vent – OPEN
- 1-RT-29 – Disch Vent – OPEN with PI Removed
- 1-RT-33 – Loop Drain – OPEN
- 1-RT-67 – Suction Vent – OPEN – if 1-RT-38 used instead of 1-RT-37.

The correct sequence (breaker, isolations, vent/drain) is also required to satisfy the critical step.

EVALUATOR NOTES:
• Component ID and required position are <u>both</u> critical.
• If asked – 1-RT-S-1B will not be removed from the system.

COMMENTS:
</td>
<td>
_______ SAT

_______ UNSAT
</td></tr>
</table>

STEP 4 (Boundary "A"): **CRITICAL STEP**

Completes the attached table and reports that the task is complete.

STANDARD:
Table is completed as follows:

Boundary "A"

	Component ID Number / Name	Position
1	1-RT-P-1B Control Switch	OFF
2	**1-EP-BKR-1A2-1-4B ('B' RT Pump Supply Breaker)**	**OFF**
3	**1-RT-25 – Pump Suction Isolation**	**CLOSED**
3	**1-RT-36 – Pump ALT Suction**	**CLOSED**
3	**1-RT-88 – Chem Injection Isol**	**CLOSED**
3	**1-RT-59 – Pump Discharge Isol**	**CLOSED**
3	**1-RT-32 – Pump Discharge Isol**	**CLOSED**
3	1-RT-27 – Pump Suction	OPEN
	At least one of the following Drains	
4	**1-RT-92 – Suction Drain**	**OPEN**
4	**1-RT-28 – Suction Drain**	**OPEN**
4	**1-RT-31 – Discharge Drain**	**OPEN**
	At least one of the following Vents	
4	**1-RT-70 – Suction Vent**	**OPEN**
4	**1-RT-29 – Discharge Vent**	**OPEN w/ PI Removed**

EVALUATOR'S NOTE:

- **With the RT system at static head pressure, all isolation valves may be sequenced in any order, as long as they are AFTER the breaker and BEFORE the vents and drains, to satisfy the Critical Step.**
- **Because the Candidate cannot walk down the RT system, all vents and drains may sequenced in any order, as long as they are AFTER all isolation valves, to satisfy the Critical Step.**
- **Minimum of 1 vent and 1 drain required. Additional vents/drains may be utilized.**
- **Meeting all requirements of Boundary "A" <u>or</u> Boundary "B" Satisfies the Critical Step.**

COMMENTS:

_______ **SAT**

_______ **UNSAT**

STEP 4 (Boundary "B"): **CRITICAL STEP, continued**

_______ **SAT**

_______ **UNSAT**

Completes the attached table and reports that the task is complete.

STANDARD:
Table is completed as follows:

Boundary "B"

	Component ID Number / Name	Position
1	1-RT-P-1B Control Switch	OFF
2	**1-EP-BKR-1A2-1-4B ('B' RT Pump Supply Breaker)**	**OFF**
3	**1-RT-25 – Pump Suction Isolation**	**CLOSED**
3	**1-RT-37/38 – Pump Suction Isol**	**CLOSED**
3	**1-RT-88 – Chem Injection Isol**	**CLOSED**
3	**1-RT-59 – Pump Discharge Isol**	**CLOSED**
3	1-RT-27 – Pump Suction	OPEN
	At least one of the following Drains	
4	**1-RT-92 – Suction Drain**	**OPEN**
4	**1-RT-28 – Suction Drain**	**OPEN**
4	**1-RT-31 – Discharge Drain**	**OPEN**
4	**1-RT-33 – Loop Drain**	**OPEN**
	At least one of the following Vents	
4	**1-RT-70 – Suction Vent**	**OPEN**
4	**1-RT-29 – Discharge Vent**	**OPEN w/ PI Removed**
4	**1-RT-67 – Suction Vent** **EVALUATOR's NOTE – ONLY IF 1-RT-38 used vs. 1-RT-37**	**OPEN**

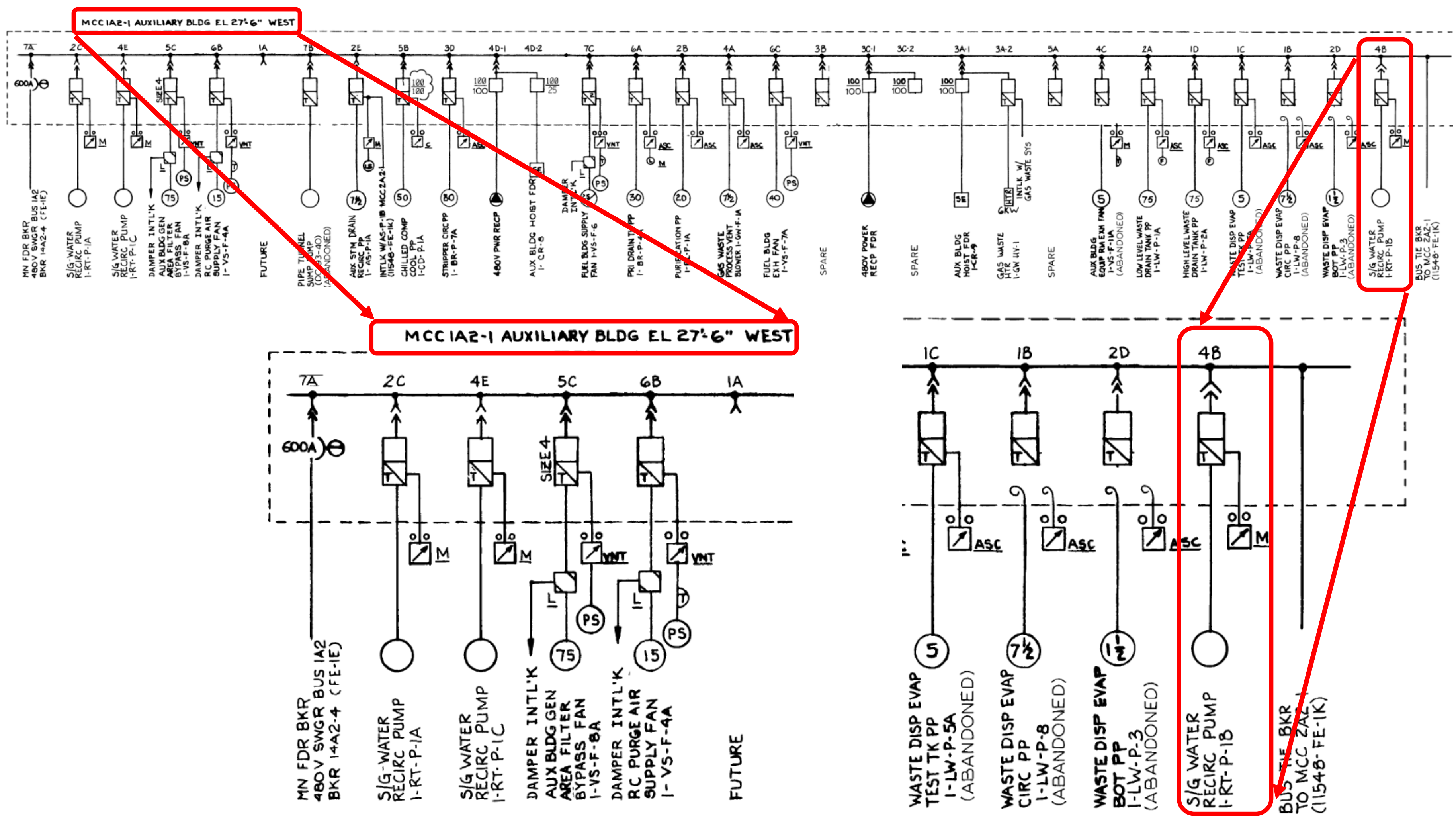
EVALUATOR'S NOTE:

- **With the RT system at static head pressure, all isolation valves may be sequenced in any order, as long as they are AFTER the breaker and BEFORE the vents and drains, to satisfy the Critical Step.**
- **Because the Candidate cannot walk down the RT system, all vents and drains may sequenced in any order, as long as they are AFTER all isolation valves, to satisfy the Critical Step.**
- **Minimum of 1 vent and 1 drain required. Additional vents/drains may be utilized.**
- **Meeting all requirements of Boundary "A" or Boundary "B" Satisfies the Critical Step.**

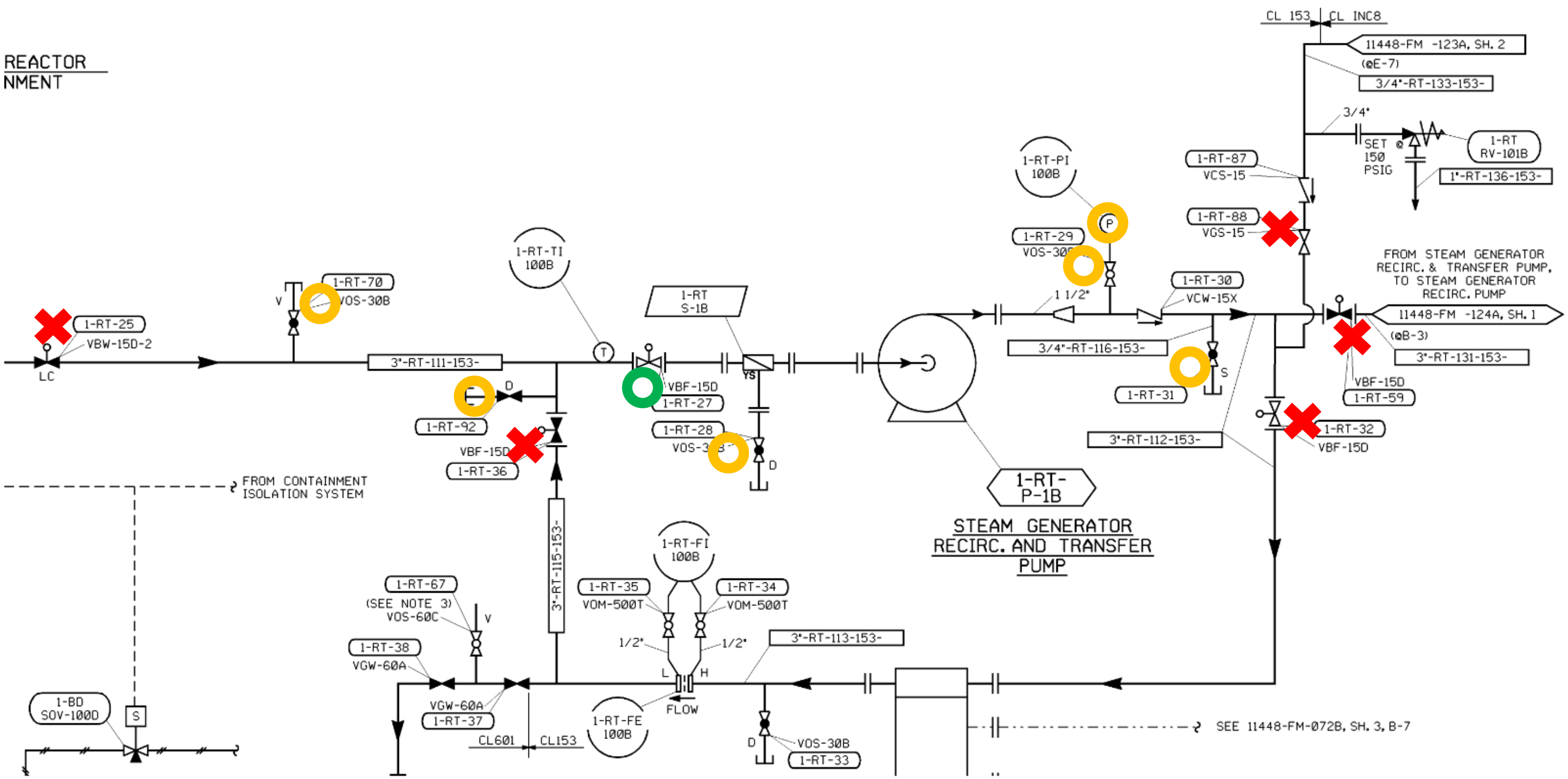
COMMENTS:

STOP TIME: ______________

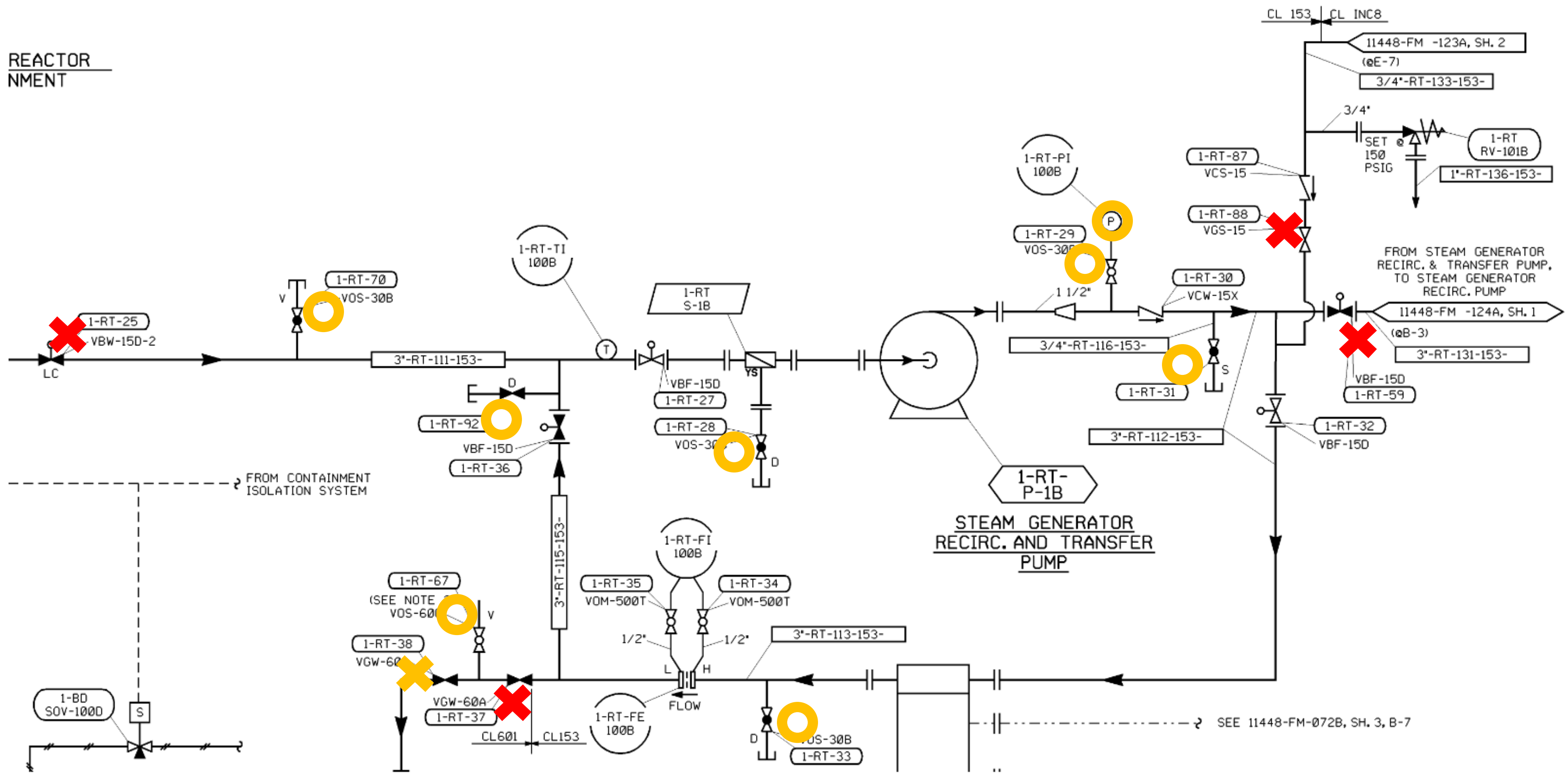
From 11448-FE-1K, Breaker for 1-RT-P-1B:



Boundary "A" Valves:



Boundary "B" Valves:



Operator Directions Handout
(TO BE READ TO APPLICANT BY EXAMINER)

Initial Conditions

- Unit One is at Refueling Shutdown. The Unit 1 “B” S/G Recirc Transfer system is secured, in preparation for tagout.
- A temporary suction blank needs to be installed on the “B” RT pump (1-RT-P-1B). The “B” RT pump normal suction valve, 1-RT-27, must be removed to install the suction blank.
- The suction strainer (1-RT-S-1B) will not be removed from the system.
- The eSOMS Clearance Module is not operational.

Initiating Cues

- Using the provided Station Drawings, you are to determine a tagging boundary adequate to support removal of 1-RT-27.
- **On the attached table, list all components and their required positions.** The number of blanks on this table does not indicate the number of steps in the tagout or the number of components to be tagged.
- For this JPM, correct tagging sequence is required.
- For this JPM, component noun names are not required.
- When you have completed the attached table, inform an examiner.

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Initial Conditions

- Unit One is at Refueling Shutdown. The Unit 1 “B” S/G Recirc Transfer system is secured, in preparation for tagout.
- A temporary suction blank needs to be installed on the “B” RT pump (1-RT-P-1B). The “B” RT pump normal suction valve, 1-RT-27, must be removed to install the suction blank.
- The suction strainer (1-RT-S-1B) will not be removed from the system.
- The eSOMS Clearance Module is not operational.

Initiating Cues

- Using the provided Station Drawings, you are to determine a tagging boundary adequate to support removal of 1-RT-27.
- **On the attached table, list all components and their required positions.** The number of blanks on this table does not indicate the number of steps in the tagout or the number of components to be tagged.
- For this JPM, correct tagging sequence is required.
- For this JPM, component noun names are not required.
- When you have completed the attached table, inform an examiner.

(TO BE GIVEN TO APPLICANT)

Applicant Name: ____

Tag sequence	Component ID Number	Position

U.S. Nuclear Regulatory Commission
Surry Power Station

SR09301
Administrative Job Performance Measure 2.3.7

Applicant________________________________ Start Time___________________

Examiner_______________________________

Date ___________________________________ Stop Time___________________

Title

Determine the applicability of a RWP for a specific job and determine which personnel may be assigned the task based on personal qualifications and dose limitations.

K/A: G2.3.7 Ability to comply with radiation work permit requirements during normal or abnormal conditions. (3.5/3.6)

Applicability	Validation Time	Actual Time
RO	10 Minutes	

Conditions

- Task is to be PERFORMED in the classroom.
- 1-BR-E-10A (Gas Stripper Steam Heater) has developed external leakage and requires isolation and tagging to minimize contamination.

Standards

- Calculate dose received to perform a task when given survey maps and equipment location at 320 mrem.
- Determine Operator # 1 cannot perform the task because he is not qualified on the watchstation.
- Determine Operator # 2 cannot perform the task because he would exceed 85% of the admin dose limits (1700 mREM).
- Determine Operator # 3 can perform the task.
- Determine that work cannot be performed with current RWP because the dose received would be greater than the RWP Dose limit.

Initiating Cues

- Shift Manager direction

Terminating Cues

RWP compliance and personnel selection complete.

Procedures

- VPAP-2101 – Radiation Protection Program

Question 1: Determine the dose received.

Assume the following Initial Conditions:

- 1-BR-E-10A (Gas Stripper Steam Heater) is to be tagged out and drained due to a suspected tube leak.
- This task will take one Operator 64 minutes to complete, working the entire time in the vicinity of the heat exchanger.
- All valves that will be manipulated or tagged are located in the immediate vicinity of the heat exchanger.

Included are copies of the Radiological Survey Map and an ALARA Component Locator Map for the area.

You are to determine:

1- Dose received by one operator to complete this task.

$$\frac{\text{300mr (dose rate in area)}}{\text{hour}} \times \text{64 min (time for task completion)} \times \frac{\text{1 hour}}{\text{60 minutes}}$$

ANSWER- 320 mrem – this is a critical task

Question 2: **Determine which operators can perform the task**

	Qualification Level	**Total dose received year to date**
Operator #1	Step 4	1247 mrem
Operator #2	Stepped Out	1600 mrem
Operator #3	Step 6	1278 mrem

(1) Which operator(s) could be assigned to perform this task based on qualification level and total dose? Include in your answer a reason why any operator cannot perform the task *(Assume no dose upgrades will be authorized).*

Standard:

Bolded & underlined text items are CRITICAL STEPS.

Operator #1: **<u>CANNOT</u>** be assigned the task. **<u>The Operator is not qualified on that Watchstation</u>**. The Operator must have completed step 5 in order to perform tasks in the Auxiliary Building.

Operator #2: **<u>CANNOT</u>** be assigned the task. **<u>The Operator would exceed 85% of the admin limits (1700 mRem//Yr)</u>**. If task were performed, the additional 320 mr would put the operator at 1920 mRem which is over the 85% of the admin limit. VPAP-2101 (next page) states that RCA Access will be denied until an upgrade is approved.

Operator #3: **<u>CAN</u>** be assigned the task. The Operator is qualified on the Watchstation and their quarterly dose is below the administrative limit.

VPAP-2101 Excerpts

a. **Radiation Worker Annual Administrative Dose Limits**

Type	**Radiation Worker Annual Administrative Dose Limits**
Total Effective Dose Equivalent (TEDE)	2.0 rem/calendar year at the worker's home site
Total Effective Dose Equivalent (TEDE)	3.0 rem/calendar year from all licensees

6.3.4 **Administrative Dose Controls - General Requirements**

NOTE: An integral part of administrative dose controls is the control of access to RCAs. RCA access control is addressed in Step 6.6.1.

a. The following control is in place to provide reasonable assurance that a worker will not exceed administrative dose limits.

If a worker's annual dose exceeds 85% of an administrative dose limit, the worker will be denied RCA access until an upgrade is approved.

b. Upgrades shall require approvals as follows:

1. TEDE > 2 rem/year per site not to exceed 3 rem/year from all licensees will require upgrade approvals from all of the following:
   - Worker
   - Department Manager
   - Manager Radiological Protection and Chemistry (i.e., the RPM)

Question 3: Determine if this task can be performed under RWP 09-0-1003-2 (attached) with one entry only, and provide justification for your answer.

- This task **CANNOT** be performed under RWP 09-0-1003-2 – **This determination (*CANNOT*) is a critical task**
- Expected dose to be received, 320 mr, is above the RWP Dose limit of 100 mr – **This reason (*in excess of RWP dose limit*) is a critical task**

STOP TIME:

NOTES:

Operator Directions Handout
(TO BE READ TO APPLICANT BY EXAMINER)

Initial Conditions:

- 1-BR-E-10A (Gas Stripper Steam Heater) is to be tagged out and drained due to a suspected tube leak.
- This task will take one Operator 64 minutes to complete, working the entire time in the vicinity of the heat exchanger.
- All valves that will be manipulated or tagged are located in the immediate vicinity of the heat exchanger.
- The following operators listed below with their Qualification level and Total Year to Date Dose is listed below:

	Qualification Level	Total dose received year to date
Operator #1	Step 4	1247 mrem
Operator #2	Stepped Out	1600 mrem
Operator #3	Step 6	1278 mrem

Initiating Cue:

- Attached to this JPM are copies of the Radiological Survey Map and an ALARA Component Locator Map for the area.
- You are to answer the following questions on the attached sheet:

1) What is the total dose received by one operator to complete this task?
2) Which operator(s) could be assigned to perform this task based on qualification level and total dose? Include in your answer a reason why any operator cannot perform the task *(Assume no dose upgrades will be authorized).*
3) Can this task be performed under the attached RWP with one entry, and with no changes to the RWP? Provide justification for your answer if the task cannot be performed with this RWP.

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Initial Conditions:

- 1-BR-E-10A (Gas Stripper Steam Heater) is to be tagged out and drained due to a suspected tube leak.
- This task will take one Operator 64 minutes to complete, working the entire time in the vicinity of the heat exchanger.
- All valves that will be manipulated or tagged are located in the immediate vicinity of the heat exchangers.
- The following operators listed below with their Qualification level and Total Year to Date Dose is listed below:

	Qualification Level	Total dose received year to date
Operator #1	Step 4	1247 mrem
Operator #2	Stepped Out	1600 mrem
Operator #3	Step 6	1278 mrem

Initiating Cue:

- Attached to this JPM are copies of the Radiological Survey Map and an ALARA Component Locator Map for the area.
- You are to answer the following questions on the attached Answer sheet:

1) What is the total dose received by one operator to complete this task?
2) Which operator(s) could be assigned to perform this task based on qualification level and total dose? Include in your answer a reason why any operator cannot perform the task *(Assume no dose upgrades will be authorized).*
3) Can this task be performed under the attached RWP with one entry, and with no changes to the RWP? Provide justification for your answer if the task cannot be performed with this RWP.

JPM ANSWER SHEET

NAME________________

1) The total dose received by one operator is _________ mrem.

2) Which of the following Operators can perform this task?

Operator #1 – Qualification Level = Step 4; Total Dose = 1247 mrem

CAN / CANNOT perform the task (circle one).

Justification-

____

____

Operator #2 – Qualification Level = Stepped Out; Total Dose = 1600 mrem

CAN / CANNOT perform the task (circle one).

Justification-

____

____

Operator #3 – Qualification Level = Step 6; Total Dose = 1278 mrem

CAN / CANNOT perform the task (circle one).

Justification-

____

____

3) Can this task be performed under this RWP as written? If the task cannot be performed provide reason in space below:

This task CAN / CANNOT be performed under RWP 09-0-1003-2.
Circle One

Justification:

____

____

____

VALID FROM 01-JAN-2009 00:00 TO 31-DEC-2009 23:59 RWP 09-1003-2 REV. NO 0

DOSE RATE ALARM:	1000	mrem/Hr	BUDGETED DOSE:	750	mrem
DOSE LIMIT ALARM:	100	mrem	ALARA EVALUATION NO:	09-002	

JOB LOCATIONS:
OCP; NO CTMTS – Owner Controlled Property excluding Unit 1 and Unit 2 Reactor Containments

---

JOB DESCRIPTION: Task 2: Station Operations Support in LHRAs.

THE MAXIMUM POSTED AREA THAT CAN BE ENTERED:
Locked High Radiation Areas

RADIOLOGICAL CONDITIONS: *Indicates estimated value for RWP Preparation. See survey forms for details.

GENERAL AREA RADIATION LEVELS (mrem/hr):
See current RCA surveys.

CONTACT/HOT SPOT RADIATION LEVELS (mrem/hr):
See current RCA surveys.

CONTAMINATION LEVELS (dpm/100cm2):
See current RCA surveys.

AIRBORNE RADIOACTIVITY (DAC):
<0.1

REQUIRED JOB COVERAGE:
Continuous
Routine

COVERAGE COMMENTS:
Continuous Health Physics Coverage is required for ALL entries into a Locked High Radiation Area not utilizing RMS.

DOSIMETRY REQUIREMENTS:
DAD/SRD TLD

RESPIRATORY REQUIREMENTS:

FFAP	As required based on airborne concentrations and work activities.
Other	As required based on airborne concentrations and work activities.
PAPH	As required based on airborne concentrations and work activities.

A RWP PRE-JOB BRIEFING IS REQUIRED:
BRIEFED BY AN HP TECHNICIAN AND SIGN ATTENDANCE SHEET.

TRAINING USE ONLY – NOT VALID FOR WORK IN RADIATION AREA

WORKER INSTRUCTIONS:

1. Upon receiving and DAD alarms, ensure equipment is left in a safe condition, leave the area and report to the Health Physics office.

2. Notify HP-Ops prior to system venting.

3. Notify HP-Ops prior to entry into overhead areas.

4. Ensure any liquids (i.e. oil, water) encountered during the job is contained and removed per HP-Ops instructions.

5. Read and discuss the following during the pre-job briefing:

    5.1 CR24062, Surry, "Improper valve lineup made during performance of 1-OP-CS-004."

HEALTH PHYSICS INSTRUCTIONS:

1. Workers must stop work and leave the area if WHOLE BODY dose rates are detected in excess of 5,000 mrem/hr.

2. Staytimes will be based on dose rates in the work area.

3. Neutron Dose determination is required for all entries into areas posted "Neutron Exposure Area". Estimate worker's neutron dose using C-HP-1031.023, Neutron and Noble Gas Dose Estimate Record.

4. Radiation survey is required prior to accessing overhead areas.

5. Radiation and contamination surveys are required for contaminated system entries.

6. Evaluate initial system entry smears for hot particles.

ATTACHMENT B
(Page 1 of 1)

Map Number	Location/Description	Reactor Power
384	**PDT, Gas Stripper and Liquid Waste Tank Room - Gate 11**	Unit(s) **Unit 1** 100% **Unit 2** 100%

Purpose:	Type: **Radiation**	**Contamination**	**Air Sample**
☐ Routine ☒ Special ☐ RWP	☒ Gamma ☐ Beta ☐ Neutron	☐ GA ☐ LA ☐ DRP	☐ GA ☐ WS ☐ BZ

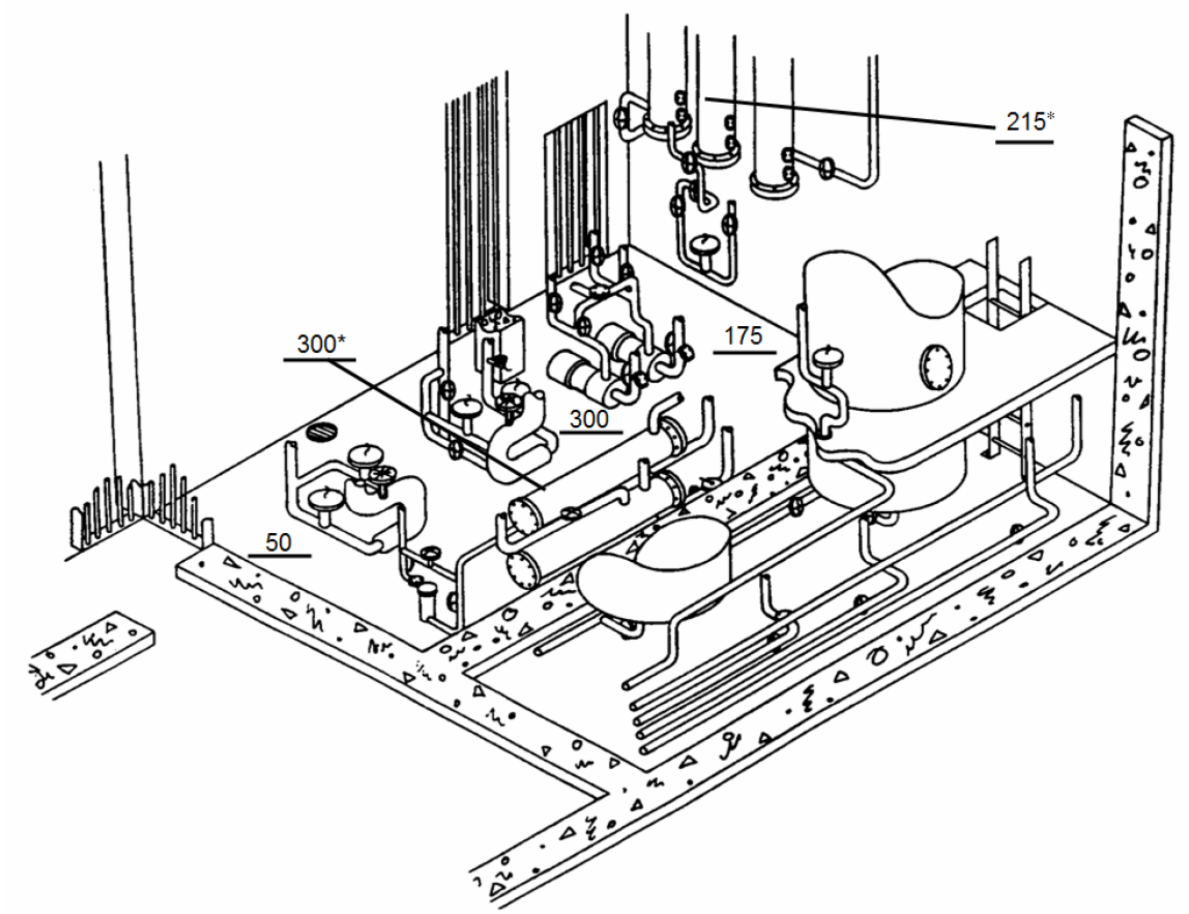
Instrument Model	Serial #
E-130A	152K

☐ All GA Smears < 1000 dpm/100cm^2
☐ All GA Smears < 20 dpm/100cm^2 Alpha
☐ All LA Smears < 1000 dpm/LAS

☐ Air Sample Results ____%DAC
☐ No DRP Detected
☐

Comments:
Support of 1-BR-E-10A maintenance, to include Ops tagout work.. All dose rates in mRem/hr.

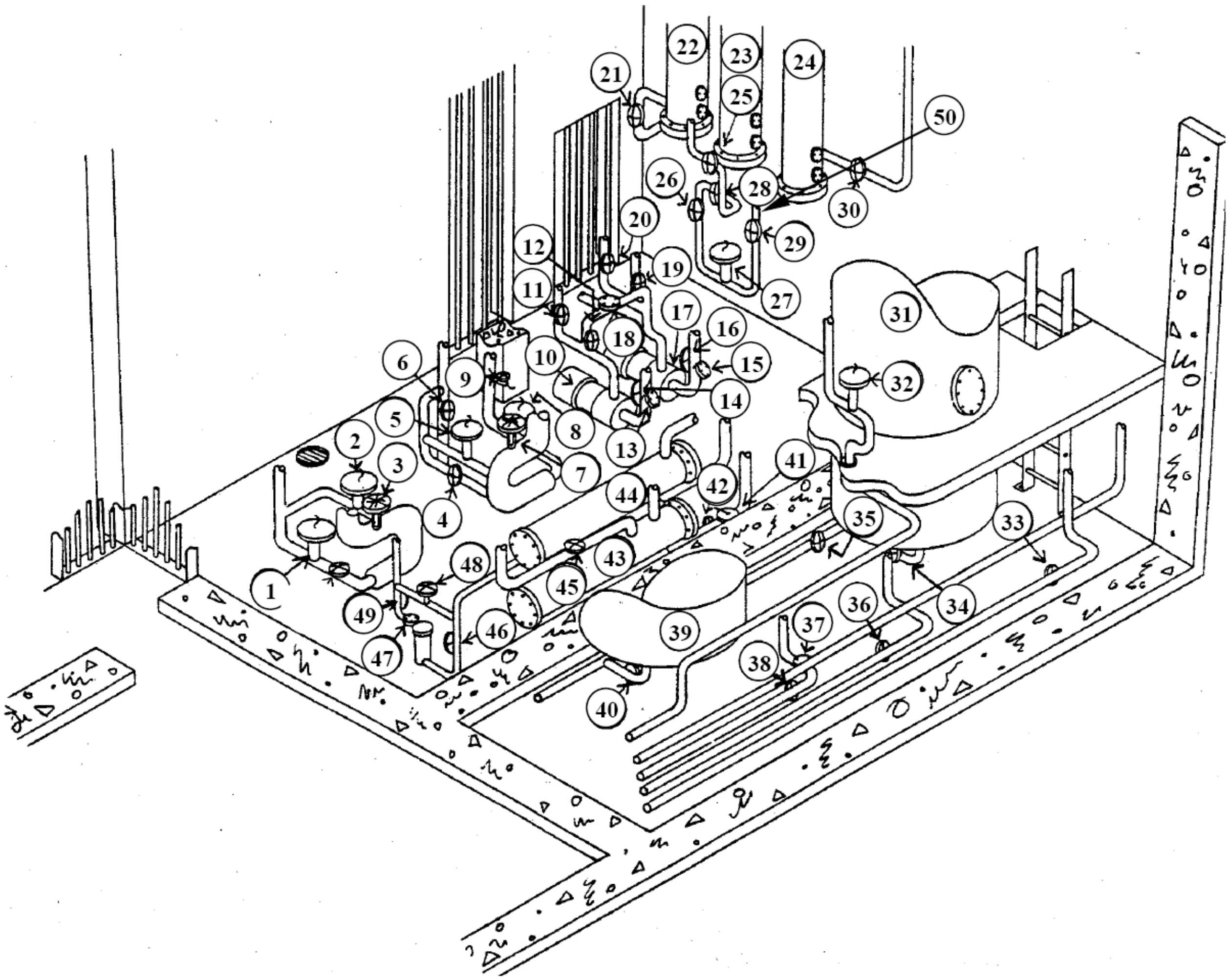
Surveyed By (Print/Signature)	Date	Time	Reviewed By (Print/Signature)	Date
RP Tech1	Today	0000	RP Tech2	Today



RA = Radiation Area	CA = Contaminated Area	LDWA = Low Dose Waiting Area
HRA = High Radiation Area	RCA = Radiological Control Area	HPA = Hot Particle Area
LHRA = Locked High Radiation Area	ARA = Airborne Radioactivity Area	NEA = Neutron Exposure Area
VHRA = Very High Radiation Area	RMA = Radioactive Material(s) Area	DRP = Discrete Radioactive Particle

1 =Smear Location △ = A/S Location # = G/A Dose Rate #* = Contact Dose Rate X X X = Radiological Boundary

RADIOLOGICAL PROTECTION
ALARA VALVE LOCATOR MAP
GATE 11 PDT AND GAS STRIPPER ROOM
Aux. Building 2' Elevation



1. 1-BR-TCV-103B
2. 1-AV-PCV-150B
3. 1-AS-77
4. 1-AS-174
5. 1-AV-PCV-150A
6. 1-AS-176
7. 1-AS-79
8. 1-BR-TVC-103A
9. 1-AS-80
10. 1-BR-P-7A
11. 1-BR-8
12. 1-BR-7
13. 1-BR-S-7A
14. 1-BR-3
15. 1-BR-S-7B
16. 1-BR-4
17. 1-BR-P-7B
18. 1-BR-10
19. 1-BR-26
20. 1-BR-25
21. 1-BR-39
22. 1-BR-E-6A
23. 1-BR-E-6B
24. 1-BR-E-12
25. 1-BR-15
26. 1-BR-11
27. 1-BR-PCV-131
28. 1-BR-12
29. 1-BR-13
30. 1-BR-47
31. 1-LW-TK-2B
32. 1-LW-HCV-109A
33. 1-LW-345
34. 1-LW-32
35. 1-LW-31
36. 1-LW-47
37. Not Labeled
38. Not Labeled
39. 1-LW-TK-2A
40. 1-LW-29
41. 1-BR-16
42. 1-BR-305
43. 1-BR-E-10B
44. 1-BR-E-10A
45. 1-AS-102
46. 1-AS-105
47. 1-AS-107
48. 1-AS-106
49. 1-AS-108
50. 1-BR-14

Valves Not Shown

1-CC-497	1-CC-507
1-CC-498	1-CC-508
1-CC-499	1-CC-509
1-CC-500	1-CC-510
1-CC-501	1-AS-104
1-CC-502	1-AS-176
1-CC-503	1-AS-177
1-CC-504	1-AS-180
1-CC-505	1-LW-46
1-CC-506	1-LW-40

1-LW-HCV-109B

FOR INFORMATION ONLY

U.S. Nuclear Regulatory Commission
Surry Power Station

SR10301
Administrative Job Performance Measure 2.2.12

Applicant________________________________ Start Time___________________

Examiner_______________________________

Date ___________________________________ Stop Time___________________

Title

Review 1-PT-41.1, Component Cooling Water Pumps Performance Test

K/A: G.2.2.12 – Knowledge of surveillance procedures. (3.7/4.1)

Applicability	**Validation Time**	**Actual Time**
SRO(I)(U)	30 Minutes	___________

Initial Conditions

- Task is PERFORMED in the CLASSROOM.

Standards

- Identifies 1-CC-P-1A delta-P is in the INOP range per Attachment 1.
- Identifies 1-CC-P-1B vibration point 9 is in the INOP range per Attachment 2.
- Determines that Technical Specification 3.13.B requires restoring three CC pumps to operable within 24 hours. If three pumps cannot be restored to operable within 24 hours, then the reactor must be placed in hot shutdown within the next 6 hours.

Initiating Cues

- Here is the completed 1-PT-41.1, Component Cooling Water Pumps Performance Test.
- You are to perform the Shift Supervision review of 1-PT-41.1.
- When you have completed this task please inform me so the Unit 2 team can commence performance of 2-PT-41.1.

Terminating Cues

- Review of 1-PT-41.1 is complete and Tech Specs reviewed.

Procedures

- 1-PT-41.1, Component Cooling Water Pumps Performance Test
- Tech Spec 3.13

Tools and Equipment

- Laptop for obtaining procedures
- Completed copy of 1-PT-41.1

Safety Considerations

- None

PERFORMANCE CHECKLIST

Notes to the Evaluator.

- Task critical elements are bolded and noted by the words “Critical Step” at the end of the step.
- The Applicant is given a completed copy of 1-PT-41.1.
- A laptop will be Available for the Applicant.
- **START TIME: ___________**

STEP 1: Review of 1-PT-41.1 procedure body. **STANDARD:** (a) Starts review of the procedure, starting at Section 6.1. (b) Identifies Step 6.3.1 is not initialed. (c) Identifies that all notes at the beginning of Section 6.5 are not circle/slashed. (d) Identifies the operator who performed Attachment 6 did not sign the table at Step 7.3.1. **EVALUATOR’S NOTE:** • Evaluator may direct the Applicant to provide comments after completing the 1-PT-41.1 review. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 2: **CRITICAL STEP** Evaluate the test results by reviewing the Acceptance criteria for the components tested. (Step 7.1.1, substep a.) • 1-CC-P-1A – ΔP and Vibration Values (Attachment 1) are **not** in the INOP Range. **STANDARD:** (a) Reviews data in Attachment 1. **(b) Identifies ΔP is in the INOP range (not in the SAT range).** **EVALUATOR NOTES:** • Evaluator may direct the Applicant to provide comments after completing the 1-PT-41.1 review. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 3: **CRITICAL STEP** Evaluate the test results by reviewing the Acceptance criteria for the components tested. (Step 7.1.1, substep b.) • 1-CC-P-1B – ΔP and Vibration Values (Attachment 2) are **not** in the INOP Range. **STANDARD:** (a) Reviews data in Attachment 2. **(b) Identifies Inboard Vibration (pt. 9) is in the INOP range (not in the SAT range).** **EVALUATOR NOTES:** • Evaluator may direct the Applicant to provide comments after completing the 1-PT-41.1 review. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 4: Evaluate the test results by reviewing the Acceptance criteria for the components tested. (Step 7.1.1, substep c.) • 1-CC-557, 1-CC-P-1A Discharge Check Valve, functioned correctly (Step 6.5.14 – 1-CC-557 fully closed). **STANDARD:** (a) Reviews Step 6.5.14 and determines 1-CC-557 fully closed. **EVALUATOR NOTES:** **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 5: Evaluate the test results by reviewing the Acceptance criteria for the components tested. (Step 7.1.1, substep d.) • 1-CC-563, 1-CC-P-1B Discharge Check Valve, functioned correctly (Step 6.4.14 – 1-CC-563 fully closed). **STANDARD:** (a) Reviews Step 6.4.14 and determines 1-CC-563 fully closed. **EVALUATOR NOTES:** **COMMENTS:**	

STEP 6: Document the test results. (Step 7.1.2) **STANDARD:** (a) Determines the test is unsatisfactory. (b) Determines 1-CC-P-1A is INOPERABLE. (c) Determines 1-CC-P-1B is INOPERABLE. **EVALUATOR NOTES:** • Evaluator may direct the Applicant to provide comments after completing the 1-PT-41.1 review. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 7: Report results of 1-PT-41.1 to Shift Manager STANDARD: (a) Informs Shift Manager that 1-PT-41.1 is UNSAT for 1-CC-P-1A and 1-CC-P-1B. EVALUATOR NOTES: COMMENTS:	_______ **SAT** _______ **UNSAT**

STEP 8: **CRITICAL STEP**	
Review of Tech Specs for applicability.	
STANDARD:	
(a) Determines that Technical Spec 3.13.B requires restoring three CC pumps to operable within 24 hours. If three pumps cannot be restored to operable within 24 hours, then the reactor must be placed in hot shutdown within the next 6 hours.	
EVALUATOR NOTES:	
• With both units at power, 3 of 4 CC pumps are required to be operable.	
COMMENTS:	
END OF JPM	

STOP TIME: ___________

Summary of 1-PT-41.1 conflicts:

CRITICAL STEPS:

- **Attachment 1, identifies Delta P for 1-CC-P-1A is in the INOP range (below SAT and ALERT ranges).**
- **Attachment 2, identifies Vibration pt. 9 for 1-CC-P-1B is in the INOP range.**
- **Determines that Technical Spec 3.13.B requires restoring three CC pumps to operable within 24 hours. If three pumps cannot be restored to operable within 24 hours, then the reactor must be placed in hot shutdown within the next 6 hours.**

Non-critical steps:

- Identifies Step 6.3.1 is not initialed.
- Identifies the Notes at beginning of Section 6.5 Not circle/slashed.
- Identifies the operator who performed Attachment 6 did not sign the table at Step 7.3.1.

Operator Directions Handout
(TO BE READ TO APPLICANT BY EXAMINER)

Initial Conditions:

- Both Units are at 100% power.
- The Unit 1 team has just finished performing 1-PT-41.1, Component Cooling Water Pumps Performance Test.
- The Unit 2 team is scheduled to perform 2-PT-41.1, Component Cooling Water Pumps Performance Test, after the 1-PT-41.1 Supervisor review is complete.

Initiating Cue:

- Here is the completed 1-PT-41.1, Component Cooling Water Pumps Performance Test.
- You are to perform the Shift Supervision review of 1-PT-41.1, and determine if Tech Spec requirements are met.
- Document your answers on the attached sheet.

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Initial Conditions:

- Both Units are at 100% power.
- The Unit 1 team has just finished performing 1-PT-41.1, Component Cooling Water Pumps Performance Test.
- The Unit 2 team is scheduled to perform 2-PT-41.1, Component Cooling Water Pumps Performance Test, after the 1-PT-41.1 Supervisor review is complete.

Initiating Cue:

- Here is the completed 1-PT-41.1, Component Cooling Water Pumps Performance Test.
- You are to perform the Shift Supervision review of 1-PT-41.1, and determine if Tech Spec requirements are met.
- Document your answers on the attached sheet.

Applicant name: ______________________________

1. 1-PT-41.1 test result: SAT / UNSAT (circle one)

2. Discrepancies noted, if any:

____
____
____
____
____
____
____
____
____
____
____
____

3. Tech Spec requirements MET / NOT MET (circle one)

   If NOT MET, what are the Tech Spec required actions?

____
____
____
____
____

U.S. Nuclear Regulatory Commission
Surry Power Station

SR2021301
Administrative Job Performance Measure G2.1.40

Applicant________________________________ Start Time___________________

Examiner_______________________________

Date ___________________________________ Stop Time___________________

Title

Authorize Fuel Movement

K/A: G2.1.40 Knowledge of refueling administrative procedures (2.8/3.9)

Applicability	**Estimated Time**	**Actual Time**
SRO(I)/SRO(U)	20 Minutes	

Conditions

- Task is to be PERFORMED in the simulator.

Standards

- Determines 1-VG-RI-131A is inoperable, which will prevent fuel movement per TS 3.10.B.1.
- Determines 1-VS-AC-1, and 1-VS-AC-2 are inoperable which will prevent fuel movement per TS 3.10.A.14.
- Only the above two conditions must be identified. Identification of any other condition will constitute unsatisfactory performance.

Procedures

- 1-OSP-ZZ-004, Unit 1 Safety Systems Status List For Cold Shutdown/Refueling Conditions.
- Technical Specifications

Tools and Equipment

- None

Safety Considerations

- None

<u>Simulator Set-up</u>

- Recall IC 390 (Protected) or (IC35 25% Cold Cal) and ensure that RHR pump discharge and RCS temperatures are below 140 ^oF.
- Align HHSI and fill pressurizer to 56.5% cold cal if necessary.
- Fail Rad Monitor 1-VG-RI-131A HI by inserting Malf RM0701.
- Fail Vent Stack #2 Rad Mon TRBS, 0-RMA-D5 by inserting Malf KAD5.
- Verify Alarms 0-RMA-D6, VENT STACK #2 PART ALERT/HI is lit.
- Simulate failure of MCR AHUs 1-VS-AC-1, and 1-VS-AC-2 by overriding red AND green lights OFF.
- Tagout 1-RH-P-1B and **<u>place a red magnet above control switch.</u>**
- VERIFY 1-RC-LR-100, RCS STANDPIPE RECORDER is turned ON.
- Override SR SUR bench board and backboard meters to 0 DPM:
  - NI31D to 9%
  - NI32D to 9%
  - CR_STARTUP_RT_N35 to ON.
- **Turn OFF SR Audio count rate.**

This JPM is to be Pre-briefed.

PERFORMANCE CHECKLIST

Notes to the Evaluator

- Task critical elements are bolded.
- **Determination of items to be in non-compliance that actually are in compliance constitutes a critical step failure.**
- **START TIME: _________________**

STEP 1: Refueling Containment Integrity set. Remarks: IAW 1-OP-FH-001 **STANDARD:** _____ Recalls (or refers to) turnover statement that refuel integrity is SET. _____ Initials in "D" block for *Refueling Containment Integrity set* **EVALUATOR NOTES:** • **If asked:** The shift manager has verified that refueling integrity is set as directed by 1-OP-FH-001. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

CRITICAL STEP

STEP 2:

_______ **SAT**

_______ **UNSAT**

Radiation Monitors Operable:

- Manipulator Crane 1 operable
- Containment Gaseous 1 operable
- Containment Particulate 1 operable
- SFP Bridge 1 operable
- Vent-Vent Gaseous 1 operable
- **Vent-Vent Particulate 0 operable**

Remarks:
Alarms 0-RMA-D6 is LIT.

STANDARD:

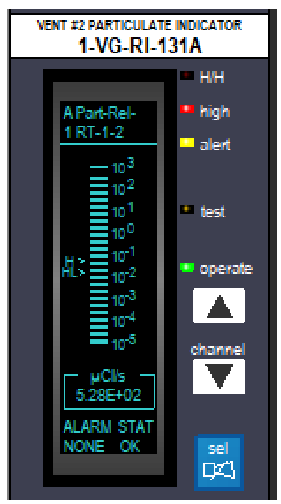
_____ Examines each radiation monitor and verifies normal readings.

_____ **Determines radiation monitor 1-VG-RI-131A inoperability prevents fuel movement. CRITICAL STEP.**

_____ **Determines that Tech Spec 3.10.B.1 is not met.**

EVALUATOR NOTES:

- **If asked:** Radiation monitors are as they appear.
- Shown is 1-VG-RI-131A.
- **If asked:** Have candidate continue and identify any other problems.



COMMENTS:

STEP 3: Source Range Detectors (audible indication in CTMT must be verified operable) • 2 operable Remarks: None **STANDARD:** _____ Observes normal indication on NI-31 _____ Observes normal indication on NI-32. **EVALUATOR NOTES:** • **If asked:** there is discernible audible count rate in containment. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 4: Cavity level > 23 feet. Remarks: OU-SU-201, should be maintained as high as possible. No fuel movement permitted if < 23 feet in Cavity **STANDARD:** _____ Recalls (or refers to) turnover statement that cavity level is 26.5'. _____ Determines that adequate cavity level exists to support fuel movement. **EVALUATOR NOTES:** • **If asked:** cavity level has been verified at 26.5'. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 5: RHR pump and Heat Exchanger: Cavity Level > 23 feet 1 operable Cavity Level < 23 feet 2 operable **STANDARD:** _____ Recalls (or refers to) turnover statement that cavity level is 26.5'. _____ Observes 1 RHR pump in operation and one tagged out. _____ Determines that with present cavity level and operable RHR pump, fuel movement can commence. **EVALUATOR NOTES:** • **If asked:** cavity level has been verified at 26.5'. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 6: Direct communication between the Control Room and Manipulator Crane Remarks: When changing core geometry **STANDARD:** _____ Recalls (or refers to) turnover statement that communications have been established. _____ Determines that communication capability allows for fuel movement. **EVALUATOR NOTES:** • **If asked:** operator is in the MCR equipped with a headset in communication with the refueling team. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 7: RCS Boron concentration- ≥ 2350 PPM (Admin limit) Remarks: RCS must be sampled at least once every 24 hours if the head is unbolted (Not required if defueled and cavity is drained below flange level. (Ref 2.3.15) **STANDARD:** _____ Recalls (or refers to) turnover statement that RHR pump discharge and cavity boron is currently 2404 ppm (sampled 30 minutes ago). _____ Determines that current boron concentration allows for fuel movement. **EVALUATOR NOTES:** • **If asked:** RHR pump discharge and cavity boron is currently 2404 ppm (sampled 30 minutes ago). **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 8: RHR Temperature: ≤140 °F Remarks: None **STANDARD:** _____ Observes RHR pump discharge temperature and determines that current RCS temperature allows for fuel movement. **EVALUATOR NOTES:** • **If asked:** All RCS loops are isolated and drained. • **If asked:** All CETCs have been disconnected. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 9: Reactor shutdown greater than 100 hours Remarks: For movement of irradiated fuel **STANDARD:** _____ Recalls (or refers to) turnover statement that unit has been shutdown 122 hours. _____ Determines that sufficient time from shutdown exists to allow fuel movement. **EVALUATOR NOTES:** • **If asked:** The reactor was shutdown 122 hours ago. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 10: Control Room and Relay Room Emergency Ventilation- 2 Trains Remarks: None **STANDARD:** _____ Examines current configuration of MCR/ESGR ventilation and determines that all fans are available. _____ Determines that current MCR/ESGR Emergency Ventilation configuration allows for fuel movement by observing the configuration of 1-VS-F-41/42 and 2-VS-F-41/42. **EVALUATOR NOTES:** • **If asked:** Conditions are as they appear. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 11: Control Room Chillers- 3 minimum Remarks: Operable IAW power supply requirements of TS 3.23 **STANDARD:** _____ Examines current configuration of MCR chillers and determines that all chillers are available. _____ Determines that current MCR Chiller configuration allows for fuel movement by observing the configuration of 1-VS-E-4A, B, C, D, E. **EVALUATOR NOTES:** • **If asked:** Conditions are as they appear. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

CRITICAL STEP

STEP 12:

_______ **SAT**

_______ **UNSAT**

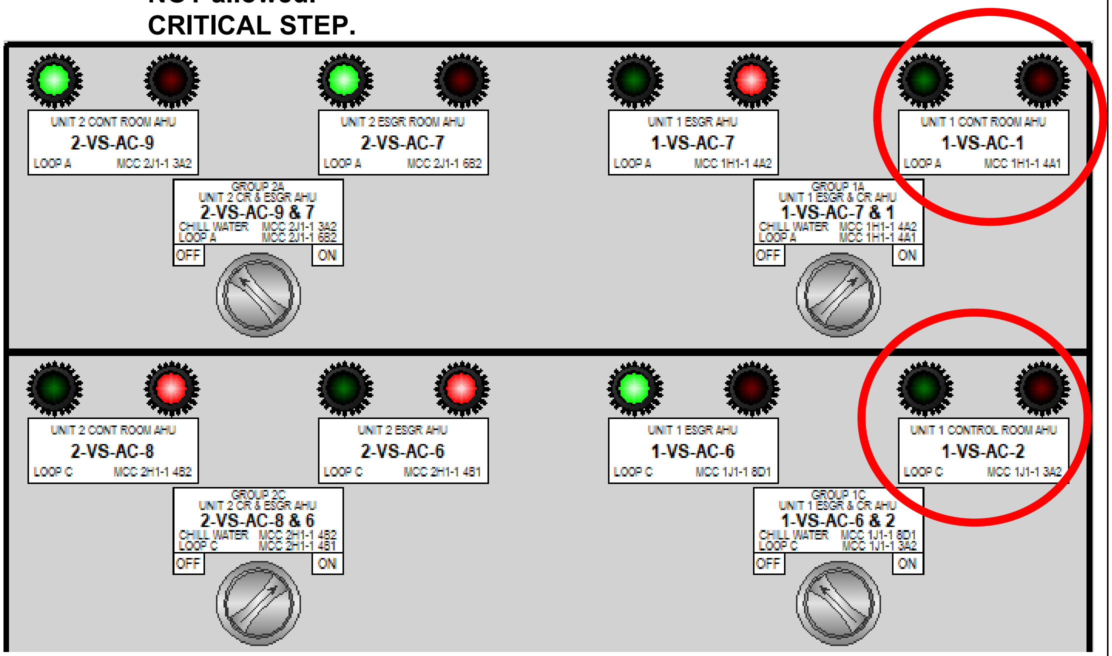
MCR/ESGR AHU- 8 minimum

Remarks: Selected AHUs should be in operation

STANDARD:

_____ **Examines current configuration of MCR/ESGR air handlers and determines that MCR Air Handling Units 1-VS-AC-1 AND 1-VS-AC-2 are NOT operating. CRITICAL STEP.**

_____ **Determines that per TECH SPECS 3.10.A.14 we need at least one Unit 1 MCR AHU in operation for fuel movement, therefore Fuel movement is NOT allowed.**
CRITICAL STEP.



EVALUATOR NOTES:

- **If an operator is dispatched locally to 1-VS-AC-1, and 1-VS-AC-2:** The AHUs supply breakers are both tripped with no indication as to the reason they are tripped. No other abnormalities noted.
- **IF asked:** Light bulbs have been checked and they are good.

COMMENTS:

STEP 13: 120 Volt Vital Buses- 2 minimum Remarks: None **STANDARD:** ______ Observes that all vital busses are energized and NO UPS/Battery charger alarms are LIT. ______ Recalls (or refers to) turnover statement that all vital bus UPS are in a normal **EVALUATOR NOTES:** • **If asked:** All vital bus UPS are in a normal configuration. • **If asked:** Both station batteries are operable and split out. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 14: SFP Cooling- 1 train available Remarks: None **STANDARD:** ______ Observes that one spent fuel cooling pump is in service. ______ Recalls (or refers to) turnover statement that both trains of SFP cooling are available with one in service. **EVALUATOR NOTES:** • **If asked:** both trains of SFP cooling are available with one in service. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 16: SFP makeup borated water source- 1 source available Remarks: None **STANDARD:** ______ Recalls (or refers to) turnover statement that all make-up flowpaths to the SFP are available. **EVALUATOR NOTES:** • **If asked:** All make-up flowpaths to the SFP are available. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 17: Reports to Shift Manager that task is complete **STANDARD:** _____ Reports that fuel movement **CANNOT** commence until the following problems are resolved: • **1-VG-RI-131A must be returned to operable status.** • **1-VS-AC-1, AND 1-VS-AC-2 must be returned to operable status.** **EVALUATOR NOTES:** • **Cue: Ask applicant: Are there any Tech Specs LCOs that are preventing fuel movement?** Answer: Yes, TS 3.10.B.1 (Rad monitor required for Fuel Bldg.); TS 3.10.A.14 for CR AHUs. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STOP TIME____**:**

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(Page 1 of 2)

Attachment 8

REFUELING OPERATIONS REQUIREMENTS

EQUIPMENT	MIN REQ	D	N	TECH SPECS	REMARKS
Refueling Containment Integrity set	As Required			3.10.A.1	IAW 1-OP-FH-001
Radiation Monitors: • Manipulator Crane • Containment Gaseous • Containment Particulate • SFP Bridge • Vent-Vent Gaseous • Vent-Vent Particulate	 1 operable 1 operable 1 operable 1 operable 1 operable 1 operable			3.10.A.3 3.10.B.1	If the Containment Air Recirculation fans are not running then refer to Tech Spec 3.10 for actions.
Source Range Detectors (audible indication in CTMT must be checked operable)	2 operable			3.10.A.2	
Cavity level > 23 feet	23 feet			3.10.A.6	OU-SU-201, should be maintained as high as possible. No fuel movement permitted if < 23 feet in Cavity.
RHR pump and Heat Exchanger: • Cavity Level > 23 feet • Cavity Level < 23 feet	 1 operable 2 operable			 3.10.A.4 3.10.A.5	
Direct communication between the Control Room and Manipulator Crane	Yes			3.10.A.8	When changing core geometry
RCS Boron concentration	≥ 2350 PPM (Admin limit)			CY-AP-PRI-100	RCS must be sampled at least once every 24 hours if the head is unbolted (Not required if defueled and cavity is drained below flange level. (Ref 2.3.15)
RHR Temperature	≤ 140°F			1.0.C.1	
Reactor shutdown greater than 100 hours	100 hours			3.10.A.9	For movement of irradiated fuel

Attachment 8
REFUELING OPERATIONS REQUIREMENTS

EQUIPMENT	MIN REQ	D	N	TECH SPECS	REMARKS
Control Room and Relay Room Emergency Ventilation	2 Trains			3.10.A.11 3.10.B.4	
Control Room Chillers	3			3.10.A.13	Operable IAW power supply requirements of TS 3.23
MCR/ESGR AHU	8			3.10.A.14	
120 Volt Vital Buses	2				As a minimum two 120 VAC Vital Buses shall be energized from the inverters connected to the respective DC Buses.
SFP Cooling	1 train available				(*) OU-AA-200, Attachment 5 OU-SU-201 SFP Cooling Pump powered from bus with available EDG preferred.
SFP makeup water source	2 sources available				(*) OU-AA-200, Attachment 5

(*) If equipment requirements are not met, then the STA/SRO involved in the review of outage schedules will coordinate development of contingency plans IAW OU-AA-200.

B. During irradiated fuel movement in the Fuel Building the following conditions are satisfied:

1. The fuel pit bridge area monitor and the ventilation vent stack 2 particulate and gas monitors shall be OPERABLE and continuously monitored to identify the occurrence of a fuel handling accident.

2. A spent fuel cask or heavy loads exceeding 110 percent of the weight of a fuel assembly (not including fuel handling tool) shall not be moved over spent fuel, and only one spent fuel assembly will be handled at one time over the reactor or the spent fuel pit.

   This restriction does not apply to the movement of the transfer canal door.

3. A spent fuel cask shall not be moved into the Fuel Building unless the Cask Impact Pads are in place on the bottom of the spent fuel pool.

4. Two MCR/ESGR EVS trains shall be OPERABLE.

   a. With one required train inoperable for reasons other than an inoperable MCR/ESGR envelope boundary, restore the inoperable train to OPERABLE status within 7 days. If the inoperable train is not returned to OPERABLE status within 7 days, comply with Specification 3.10.C.

   b. If two required trains are inoperable or one or more required trains are inoperable due to an inoperable MCR/ESGR envelope boundary, comply with Specification 3.10.C.

5. Manual actuation of the MCR/ESGR Envelope Isolation Actuation Instrumentation shall be OPERABLE as specified in TS 3.7.F.

6. Three chillers shall be OPERABLE in accordance with the power supply requirements of Specification 3.23.C. With one of the required OPERABLE chillers inoperable or not powered as required by Specification 3.23.C.1, return the inoperable chiller to OPERABLE status within 7 days or comply with Specification 3.10.C. With two of the required OPERABLE chillers inoperable or not powered as required by Specification 3.23.C.1, comply with Specification 3.10.C.

10. A spent fuel cask or heavy loads exceeding 110 percent of the weight of a fuel assembly (not including fuel handling tool) shall not be moved over spent fuel, and only one spent fuel assembly will be handled at one time over the reactor or the spent fuel pit.

    This restriction does not apply to the movement of the transfer canal door.

11. Two Main Control Room/Emergency Switchgear Room (MCR/ESGR) Emergency Ventilation System (EVS) trains shall be OPERABLE.

    a. With one required train inoperable for reasons other than an inoperable MCR/ESGR envelope boundary, restore the inoperable train to OPERABLE status within 7 days. If the inoperable train is not returned to OPERABLE status within 7 days, comply with Specification 3.10.C.

    b. If two required trains are inoperable or one or more required trains are inoperable due to an inoperable MCR/ESGR envelope boundary, comply with Specification 3.10.C.

12. Manual actuation of the MCR/ESGR Envelope Isolation Actuation Instrumentation shall be OPERABLE as specified in TS 3.7.F.

13. Three chillers shall be OPERABLE in accordance with the power supply requirements of Specification 3.23.C. With one of the required OPERABLE chillers inoperable or not powered as required by Specification 3.23.C.1, return the inoperable chiller to OPERABLE status within 7 days or comply with Specification 3.10.C. With two of the required OPERABLE chillers inoperable or not powered as required by Specification 3.23.C.1, comply with Specification 3.10.C.

14. Eight air handling units (AHUs) shall be OPERABLE in accordance with the operability requirements of Specification 3.23.C. With two AHUs inoperable on the shutdown unit, ensure that one AHU is OPERABLE in each unit's main control room and emergency switchgear room, and restore an inoperable AHU to OPERABLE status within 7 days, or comply with Specification 3.10.C. With more than two AHUs inoperable, comply with Specification 3.10.C.

Operator Directions Handout
(TO BE READ TO APPLICANT BY EXAMINER)

Initial Conditions:

- Unit 1 is at Refueling Shutdown with the head and upper internals removed. A request from the refueling SRO has been made to authorize fuel movement (core offload) in accordance with 1-OSP-ZZ-004.

- Current conditions are as follows (items not observable from the control room):
  - It is 0800 day shift.
  - Refueling containment integrity is set and verified by the shift manager.
  - Cavity level is 26.5'.
  - RHR pump discharge and cavity boron is currently 2404 ppm (sampled 30 minutes ago).
  - The reactor was shutdown 122 hours ago.
  - Both station batteries are operable and split out.
  - Both trains of SFP cooling are available with one in service.
  - All make-up flowpaths to the SFP are available.
  - 'A' RHR pump in service to the 'A' HX. 'B' RHR pump and HX are tagged out for maintenance.
  - The Source Range Count Rate is audible in Containment.

- Headset communications between the MCR and the manipulator crane have been verified.

- The containment refueling SRO has called the control room for permission to commence core offload.

Initiating Cues

- You are to verify plant conditions support fuel movement (core offload) by reviewing 1-OSP-ZZ-004.

- If conditions do not allow fuel movement to begin, then identify ALL issues, including Tech Spec requirements, that prohibit fuel movement.

- If conditions support fuel movement then notify the examiner that fuel movement may begin.

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Initial Conditions:

- Unit 1 is at Refueling Shutdown with the head and upper internals removed. A request from the refueling SRO has been made to authorize fuel movement (core offload) in accordance with 1-OSP-ZZ-004.

- Current conditions are as follows (items not observable from the control room):
  - It is 0800 day shift.
  - Refueling containment integrity is set and verified by the shift manager.
  - Cavity level is 26.5'.
  - RHR pump discharge and cavity boron is currently 2404 ppm (sampled 30 minutes ago).
  - The reactor was shutdown 122 hours ago.
  - Both station batteries are operable and split out.
  - Both trains of SFP cooling are available with one in service.
  - All make-up flowpaths to the SFP are available.
  - 'A' RHR pump in service to the 'A' HX. 'B' RHR pump and HX are tagged out for maintenance.
  - The Source Range Count Rate is audible in Containment.

- Headset communications between the MCR and the manipulator crane have been verified.

- The containment refueling SRO has called the control room for permission to commence core offload.

Initiating Cues

- You are to verify plant conditions support fuel movement (core offload) by reviewing 1-OSP-ZZ-004.

- If conditions do not allow fuel movement to begin, then identify ALL issues, including Tech Spec requirements that prohibit fuel movement.

- If conditions support fuel movement then notify the examiner that fuel movement may begin.

U.S. Nuclear Regulatory Commission
Surry Power Station

SR10301
Administrative Job Performance Measure 2.1.20

Applicant________________________________ Start Time___________________

Examiner_______________________________

Date ___________________________________ Stop Time___________________

Title

Determine Partial Pressure following a Loss of Containment Cooling

K/A: G2.1.20 – Ability to interpret and execute procedure steps. (4.6/4.6)

Applicability	**Validation Time**	**Actual Time**
SRO(I)(U)	12 Minutes	___________

Initial Conditions

- Task is PERFORMED in the CLASSROOM.

Standards

- Obtains T_{cont2} from PCS and determines T_{cont2} is 128°F, and records this on Attachment 3.
- Utilizing the 8/25/21 PT-36 determines that T_{cont1} is 118.38, and records this on Attachment 3.
- Determines that the pre-event Containment Partial Pressure is 10.25 psia, and records this on Attachment 3.
- Determines Containment Partial Pressure, P_{air2} is 10.42 psia (allowable tolerance -.01/+.01).
- Determines that Tech Specs Figure 3.8.D.1.a is required; restore air partial pressure to within acceptable limits within 1 hour or be in at least Hot Shutdown within the next 6 hours.

Initiating Cues

- Given simulated plant conditions, perform Attachment 2 of Annunciator Response Procedure (ARP) 1B-A6, Containment Pressure -0.1 PSI Channel 1, to calculate Containment Partial Pressure and Technical Specification Compliance.

Terminating Cues

- Steps 1-7 of Attachment 2 of ARP 1B-A6 are complete.

Procedures

- Attachment 2 of procedure 1B-A6, CTMT PRESS –0.1 PSI CH 1
- Tech Spec 3.8

Tools and Equipment

- Calculator
- Tech Specs
- DRP-003
- Ruler

Safety Considerations

- None

PERFORMANCE CHECKLIST

Notes to the Evaluator.

- Task critical elements are bolded and noted by the words "Critical Step" at the end of the step.
- **START TIME: ___________**

<table>
<tr>
<td>
STEP 1:

Notes prior to Step 1 of Attachment 2:

This calculation must be performed within one hour after Partial Pressure indication is declared inoperable and hourly thereafter.
Determining partial pressure using local containment samples is required within 6 hours of declaring Partial Pressure indication inoperable and 6 hours thereafter.
Bleeding air into containment or running Containment Vacuum pumps will require Engineering or STA calculations.
Partial pressure calculated using ideal gas laws is expected to rise as Containment Weighted Average rises.
Partial pressure determined using local samples is more accurate and should be used if there is a difference in results between partial pressure determined using local samples and ideal gas law calculations.
Determining Partial Pressure (P_{Air2}) using the Ideal Gas Law is obtained from the formula $P_{air2} = (T_{cont2} / T_{cont1})\, P_{air\,1}$.

P_{air1} is the highest Containment Partial Pressure reading from the last valid 1-PT-36 reading.
T_{cont1} is the Containment Weighted Average Temperature reading from the last valid 1-PT-36 reading.
T_{cont2} is the current Containment Weighted Average Temperature.

Determinig partial pressure (P air) is obtained from the formula Ptot - Psat = Pair
Ptot is CTMT pressure from one of the following:

The highest of 1-CV-PI-101A or 1-CV-PI-101B
The highest of Unit 1 PCS points P1LM002A, P1LM003A, P1LM001A, or P1LM004A

Determining Psat relies on measurement of dew point or relative humidity, since the actual saturation temperature is a function of both dry-bulb temperature and relative humidity.

STANDARD:
(a) Acknowledges the notes.

EVALUATOR'S NOTE:

If asked, it is desired to perform this calculation now.
If asked, no containment air samples have been taken.

COMMENTS:
</td>
<td>
_______ SAT

_______ UNSAT
</td>
</tr>
</table>

STEP 2:

Step 1 of Attachment 2:

1. Record the Date and Time in the Calculation of CTMT Air Partial Pressure Using Ideal Gas Law Data Table in Attachment 3.

STANDARD:

a) Records Date of 08/25/21 and Time of 2200 in Attachment 3.

EVALUATOR NOTES:

Attachment 3 will be filled out as follows:

Date/Time	T_{cont2}	T_{cont1}	P_{air1}	P_{air2}	Initials
8/25/21:2200					

COMMENTS:

_______ **SAT**

_______ **UNSAT**

STEP 3: **CRITICAL STEP**

Step 2 of Attachment 2:

2. Obtain T_{cont2} (current Containment Weighted Average Temperature) using PCS point U0091 and record in Attachment 3.

STANDARD:

a) **Obtains T_{cont2} from PCS Attachment and determines T_{cont2} is 128°F, and records this on Attachment 3. CRITICAL STEP**

EVALUATOR NOTES:

- T_{cont2} can be determined using PCS by calling up CONT SPRAY DWG, CONT TEMP DWG, or by calling up individual point U0091.
- **Cue:** If mouse is hovered over or right click on 'CTMT Weighted Average Temp on PCS, computer point U0091 will appear.

Attachment 3 will be filled out as follows:

Date/Time	T_{cont2}	T_{cont1}	P_{air1}	P_{air2}	Initials
8/25/21:2200	**128°F**				

COMMENTS:

STEP 4: **CRITICAL STEP**

_______ **SAT**

_______ **UNSAT**

Step 3 of Attachment 2:

3. Obtain Tcont1 (pre-event Containment Weighted Average Temperature) using the last valid 1-PT-36 log reading and record in Attachment 3.

STANDARD:

a) Utilizing the PT-36 determines that Tcont1 is 118.38, and records this on Attachment 3. CRITICAL STEP

EVALUATOR NOTES:

- This information can be found on page 25 of 1-PT-36.

Attachment will be filled out as follows:

Date/Time	T_{cont2}	T_{cont1}	P_{air1}	P_{air2}	Initials
8/25/21:2200	128°F	**118.38 °F**			

COMMENTS:

STEP 5: **CRITICAL STEP**

Step 4 of Attachment 2:

4. Obtain P_{air1} (pre-event Containment Partial Pressure) using the highest Containment Partial Pressure reading from the last valid 1-PT-36 log reading and record in Attachment 3.

STANDARD:

a) Determines that the pre-event Containment Partial Pressure is 10.25 psia, and records this on Attachment 3. CRITICAL STEP.

EVALUATOR NOTES:

Attachment 3 will be filled out as follows:

Date/Time	T_{cont2}	T_{cont1}	P_{air1}	P_{air2}	Initials
8/25/21:2200	128°F	118.38 °F	**10.25**		

COMMENTS:

STEP 6: **CRITICAL STEP** Step 5 of Attachment 2 5. Determine P_{air2} (current Containment Partial Pressure) IAW the following: a) Calculate $P_{air2} = [(T_{cont2} + 459.6^oF) / (T_{cont1} + 459.6^oF)] \times P_{air1}$ **STANDARD:** **a) Determines Pair2 is 10.42 psia (allowable tolerance -.01/+.01).** $P_{air2} = [(128\,^oF + 459.6^oF) / (118.38\,^oF + 459.6^oF)] \times 10.25$ psia **EVALUATOR NOTES:** Attachment 3 will be filled out as follows (using PCS data):	_______ **SAT** _______ **UNSAT**

Date/Time	T_{cont2}	T_{cont1}	P_{air1}	P_{air2}	Initials
8/25/21:2200	128^{o}F	118.38 ^{o}F	10.25 psia	**10.42 psia**	

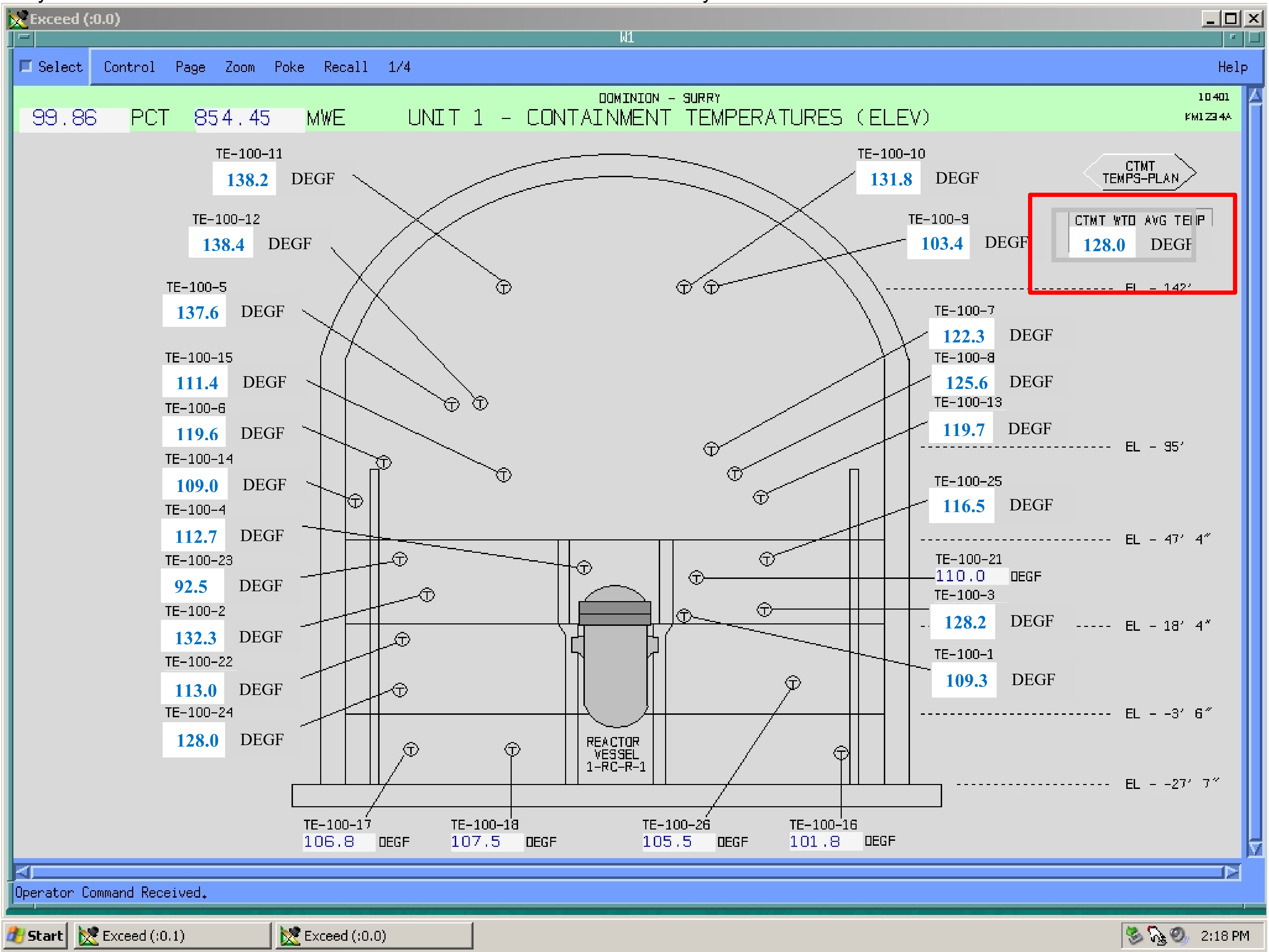
COMMENTS:

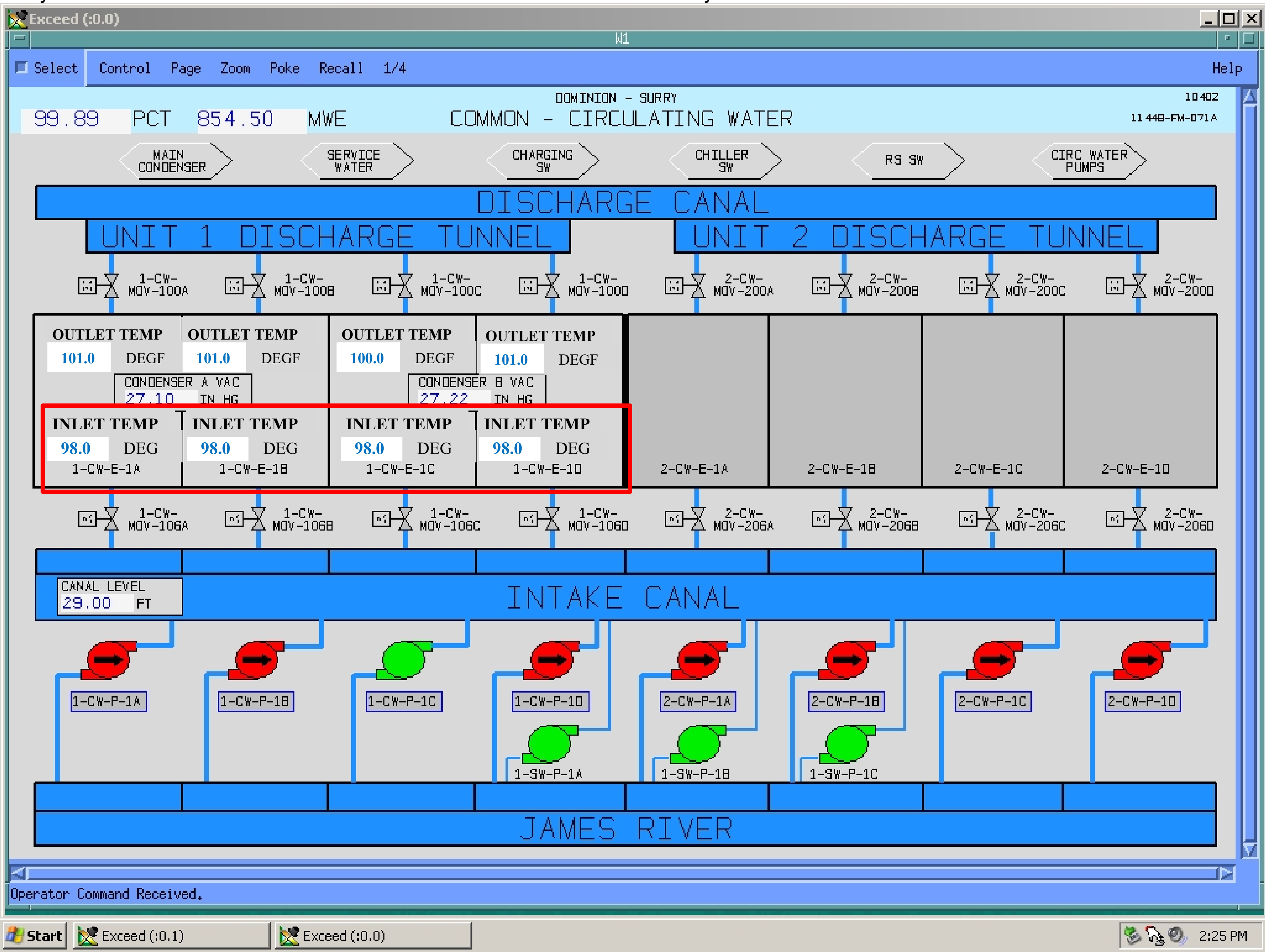
STEP 7: Step 6 of Attachment 2 6. <u>IF</u> air has been bled into Containment <u>OR</u> Containment Vacuum Pumps have been in service since the last partial pressure reading, <u>THEN</u> contact Engineering or the STA to calculate change in containment air per ETS SU 2020-0057, Containment Air Partial Pressure Calculation. STANDARD: Determines air has not been bled into containment. EVALUATOR NOTES: CUE: **If asked,** inform applicant that air has NOT been bled into containment. COMMENTS:	_______ **SAT** _______ **UNSAT**

STEP 7: **CRITICAL STEP** Step 7 of Attachment 2 7. Verify CTMT Air Partial Pressure is within Tech Spec 3.8-1 limits. STANDARD: **a) Obtains a copy of Tech Specs and refers to Figure 3.8-1 and determines that Tech Spec 3.8.D.1.a is required; restore air partial pressure to within acceptable limits within 1 hour or be in at least Hot Shutdown within the next 6 hours. CRITICAL STEP** EVALUATOR NOTES: • Given information: CW inlet temp will be 98˚F. • If report is given that partial pressure is outside of Table 3.8-1 limits, ask the applicant to determine and report applicable LCO limits and actions required. COMMENTS:	

STEP 8: Reports task is complete. **STANDARD:** **EVALUATOR'S NOTE:** • Acknowledge the completion of the task. **COMMENTS:** **END OF JPM**	_______ **SAT** _______ **UNSAT**

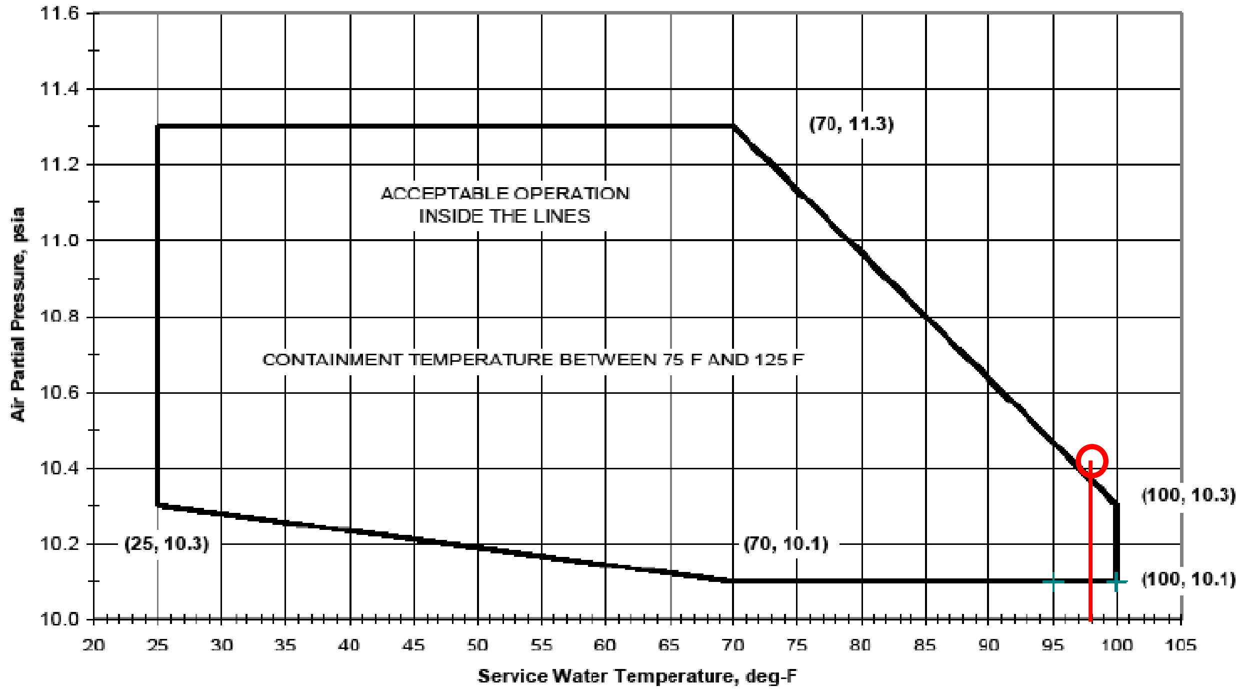
STOP TIME_____:


Exceed (:0.0)
W1
Select Control Page Zoom Poke Recall 1/4 Help
DOMINION - SURRY
99.86 PCT 854.45 MWE UNIT 1 - CONTAINMENT TEMPERATURES (ELEV)
CTMT TEMPS-PLAN
CTMT WTD AVG TEMP 128.0 DEGF
TE-100-11 138.2 DEGF
TE-100-10 131.8 DEGF
TE-100-12 138.4 DEGF
TE-100-9 103.4 DEGF
TE-100-5 137.6 DEGF
TE-100-7 122.3 DEGF
TE-100-15 111.4 DEGF
TE-100-8 125.6 DEGF
TE-100-6 119.6 DEGF
TE-100-13 119.7 DEGF
TE-100-14 109.0 DEGF
TE-100-4 112.7 DEGF
TE-100-25 116.5 DEGF
TE-100-23 92.5 DEGF
TE-100-21 110.0 DEGF
TE-100-2 132.3 DEGF
TE-100-3 128.2 DEGF
TE-100-22 113.0 DEGF
TE-100-1 109.3 DEGF
TE-100-24 128.0 DEGF
EL - 142'
EL - 95'
EL - 47' 4"
EL - 18' 4"
EL - -3' 6"
EL - -27' 7"
REACTOR VESSEL 1-RC-R-1
TE-100-17 106.8 DEGF
TE-100-18 107.5 DEGF
TE-100-26 105.5 DEGF
TE-100-16 101.8 DEGF
Operator Command Received.
Start Exceed (:0.1) Exceed (:0.0) 2:18 PM


Exceed (:0.0)
W1
Select Control Page Zoom Poke Recall 1/4 Help
DOMINION - SURRY
99.89 PCT 854.50 MWE
COMMON - CIRCULATING WATER
MAIN CONDENSER
SERVICE WATER
CHARGING SW
CHILLER SW
RS SW
CIRC WATER PUMPS
DISCHARGE CANAL
UNIT 1 DISCHARGE TUNNEL
UNIT 2 DISCHARGE TUNNEL
OUTLET TEMP 101.0 DEGF
OUTLET TEMP 101.0 DEGF
OUTLET TEMP 100.0 DEGF
OUTLET TEMP 101.0 DEGF
CONDENSER A VAC 27.10 IN HG
CONDENSER B VAC 27.22 IN HG
INLET TEMP 98.0 DEG 1-CW-E-1A
INLET TEMP 98.0 DEG 1-CW-E-1B
INLET TEMP 98.0 DEG 1-CW-E-1C
INLET TEMP 98.0 DEG 1-CW-E-1D
2-CW-E-1A
2-CW-E-1B
2-CW-E-1C
2-CW-E-1D
CANAL LEVEL 29.00 FT
INTAKE CANAL
1-CW-P-1A
1-CW-P-1B
1-CW-P-1C
1-CW-P-1D
2-CW-P-1A
2-CW-P-1B
2-CW-P-1C
2-CW-P-1D
1-SW-P-1A
1-SW-P-1B
1-SW-P-1C
JAMES RIVER
Operator Command Received.
Start Exceed (:0.1) Exceed (:0.0) 2:25 PM

Snapshot of TS FIG. 3.8-1

SURRY TECHNICAL SPECIFICATION CURVE FOR CONTAINMENT
ALLOWABLE AIR PARTIAL PRESSURE INDICATION VS. SERVICE WATER TEMPERATURE



Note: Operation on or outside the line requires entry into TS 3.8.D.1.a

Amendment Nos. 259 and 259

06-17-08

c. Isolate each affected penetration within 4 hours by use of at least one closed manual valve or blind flange, or

d. Otherwise, place the unit in HOT SHUTDOWN within the next 6 hours and COLD SHUTDOWN within the following 30 hours.

D. Internal Pressure

1. Containment air partial pressure shall be maintained within the acceptable operation range as identified in Figure 3.8-1 whenever the Reactor Coolant System temperature and pressure exceed 350°F and 450 psig, respectively.

a. With the containment air partial pressure outside the acceptable operation range, restore the air partial pressure to within acceptable limits within 1 hour or be in at least HOT SHUTDOWN within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

Operator Directions Handout
(TO BE READ TO APPLICANT BY EXAMINER)

Initial Conditions:

- Both Units are at 100% power.
- Today is 08/25/2021, 2200 and this is the 4th day in a row with ambient temperatures above 100 °F.
- Containment Cooling was being supplied by Chilled Water with Chiller 1-CD-REF-1A in operation. 1-CD-REF-1B is non-functional due to breaker maintenance.
- Approximately 30 minutes ago the operating chilled water system chiller tripped. As a result, annunciators 1B-A6 (CTMT PART PRESS -0.1 PSI CH 1) and 1B-B6 (CTMT PART PRESS -0.1 PSI CH 2) were received.
- The Containment Partial pressure indicators were declared inoperable 15 minutes ago.
- The operating team has implemented ARP-1B-A6 up to the point of implementing Attachment 2.
- Maintenance has determined that the chiller will not be returned to service until tomorrow.
- Air has NOT been bled into Containment, AND Containment Vacuum pumps have not been run in last 24 hours.
- No Containment sample has been taken.

Initiating Cue:

- Here is a copy of Attachment 2 of Annunciator Response Procedure (ARP) 1B-A6, Containment Pressure -0.1 PSI Channel 1, Attachment 3, PCS Screen shots, AND the latest PT-36 Operator Log excerpts.
- I need you to perform Attachment 2 of Annunciator Response Procedure (ARP) 1B-A6, steps 1-7, to Determine Containment Partial Pressure and Technical Specification Compliance. Write your answers on the attached Answer sheet.

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Initial Conditions:

- Both Units are at 100% power.
- Today is 08/25/2021, 2200 and this is the 4th day in a row with ambient temperatures above 100 ^{o}F.
- Containment Cooling was being supplied by Chilled Water with Chiller 1-CD-REF-1A in operation. 1-CD-REF-1B is non-functional due to breaker maintenance.
- Approximately 30 minutes ago the operating chilled water system chiller tripped. As a result, annunciators 1B-A6 (CTMT PART PRESS -0.1 PSI CH 1) and 1B-B6 (CTMT PART PRESS -0.1 PSI CH 2) were received.
- The Containment Partial pressure indicators were declared inoperable 15 minutes ago.
- The operating team has implemented ARP-1B-A6 up to the point of implementing Attachment 2.
- Maintenance has determined that the chiller will not be returned to service until tomorrow.
- Air has NOT been bled into Containment, AND Containment Vacuum pumps have not been run in last 24 hours.
- No Containment sample has been taken.

Initiating Cue:

- Here is a copy of Attachment 2 of Annunciator Response Procedure (ARP) 1B-A6, Containment Pressure -0.1 PSI Channel 1, Attachment 3, PCS Screen shots, AND the latest PT-36 Operator Log excerpts.
- I need you to perform Attachment 2 of Annunciator Response Procedure (ARP) 1B-A6, steps 1-7, to Determine Containment Partial Pressure and Technical Specification Compliance. Write your answers on the attached Answer sheet.

NAME:_________________________

Partial Pressure (P_{air2}) = ____________psia

Applicable Tech Spec Section________.

Tech Spec Required Actions (if any):

____

____

____

____

____

____

NOTE:
- This calculation must be performed within one hour after Partial Pressure indication declared inoperable and hourly thereafter.
- Determining partial pressure using local containment samples is required within 6 hours of declaring Partial Pressure indication inoperable and every 6 hours thereafter.
- Bleeding air into containment or running Containment Vacuum Pumps will require Engineering or STA support for calculations to account for the addition or subtraction of air per ETE SU 2020-0057, Containment Air Partial Pressure Calculation.
- Partial pressure calculated using the ideal gas law is expected to rise as Containment Weighted Average Temperature rises.
- Partial pressure determined using local samples is more accurate and should be used if there is a difference in results between partial pressure determined using local samples and ideal gas law calculations.
- Determining Partial Pressure (P_{air2}) using the Ideal Gas Law is obtained from the formula $P_{air2} = (T_{cont2} / T_{cont1}) P_{air1}$

  where:

  P_{air1} is the highest Containment Partial Pressure reading from the last valid 1-PT-36 log reading.

  T_{cont1} is the Containment Weighted Average Temperature reading from the last valid 1-PT-36 log reading.

  T_{cont2} is the current Containment Weighted Average Temperature.
- Determining Air partial pressure (P_{air}) using local samples is obtained from the formula $P_{tot} - P_{sat} = P_{air}$
- P_{tot} is CTMT pressure from one of the following:
  - The highest of 1-CV-PI-101A or 1-CV-PI-101B
  - The highest of Unit 1 PCS points P1LM002A, P1LM003A, P1LM001A, or P1LM004A
- Determining P_{sat} relies on measurement of dew point or relative humidity, since the actual saturation temperature is a function of both dry-bulb temperature and relative humidity.

1. ___ Record the current Date and Time in the Calculation of CTMT Air Partial Pressure Using Ideal Gas Law Data Table in Attachment 3.

2. ___ Obtain T_{cont2} (current Containment Weighted Average Temperature) using PCS point U0091 and record in Attachment 3.

3. ___ Obtain T_{cont1} (pre-event Containment Weighted Average Temperature) using the last valid 1-PT-36 log reading and record in Attachment 3.

4. ___ Obtain P_{air1} (pre-event Containment Partial Pressure) using the highest Containment Partial Pressure reading from the last valid 1-PT-36 log reading and record in Attachment 3.

5. ___ Determine P_{air2} (current Containment Partial Pressure) IAW the following:

   a) Calculate $P_{air2} = [(T_{cont2} + 459.6°F) / (T_{cont1} + 459.6°F)] \times P_{air1}$

6. ___ IF air has been bled into Containment OR Containment Vacuum Pumps have been in service since the last partial pressure reading, THEN contact Engineering or the STA to calculate change in containment air per ETE SU 2020-0057, Containment Air Partial Pressure Calculation.

7. ___ Check current CTMT Air Partial Pressure (P_{air2}) is within Tech Spec 3.8-1 limits.

NOTE: Containment Partial Pressure must be calculated using local samples every 6 hours and every 6 hours thereafter.

8. ___ IF a more accurate measurement of Containment Partial Pressure is required, THEN perform the remainder of this Attachment. Otherwise, enter N/A for Steps Step 9 through Step 17 AND GO TO Step 18.

9. ___ Record the Date, Time, and CTMT Air Partial Pressure in the P_{air} column from the last valid 1-PT-36 log reading in the first row of the CTMT Pressure Data Table in Attachment 4.

10. ___ Record the current Date and Time in the CTMT Pressure Data Table in the next available row in Attachment 4.

11. ___ Obtain P_{tot} from one of the following sources and record in the P_{tot} column in the CTMT Pressure Data Table in Attachment 4.

   - ☐ The highest of 1-CV-PI-101A or 1-CV-PI-101B
   - ☐ The highest of Unit 1 PCS points P1LM002A, P1LM003A, P1LM001A, or P1LM004A

NOTE: The Reed Model R6200 WBGT Heat Stress Meter is an approved device to measure relative humidity or dew point and meets the accuracy requirement in ETE SU 2020-0057.

12. ___ Obtain an Engineering approved instrument for measuring relative humidity or dew point.

13. ___ Request HP assistance.

14. ___ Obtain a sample of the CTMT atmosphere from CTMT entry.

15. ___ Determine the relative humidity or dew point of the CTMT atmosphere sample.

16. ___ Determine P_{sat} IAW the following:

- ☐ b) IF a measured value for CTMT air dew point (t_d) is obtained, THEN use Steam Tables to determine P_{sat} corresponding to t_d.
- ☐ c) IF measured values for CTMT relative humidity (RH) and temperature (dry-bulb) are obtained, THEN use Steam Tables to determine P_{sat} corresponding to the dry-bulb temperature.
  - Calculate P_{sat} = RH x (P_{sat} corresponding to the dry-bulb temperature)
- ☐ d) Calculate P_{air} by subtracting P_{sat} from P_{tot}.

17. ___ Check current CTMT Air Partial Pressure (P_{air}) is within Tech Spec 3.8-1 limits.

18. ___ Perform Containment Partial Pressure calculations in accordance with the following:
    - Perform ideal gas law calculation at least hourly
    - Perform calculation based on local samples at least every 6 hours.

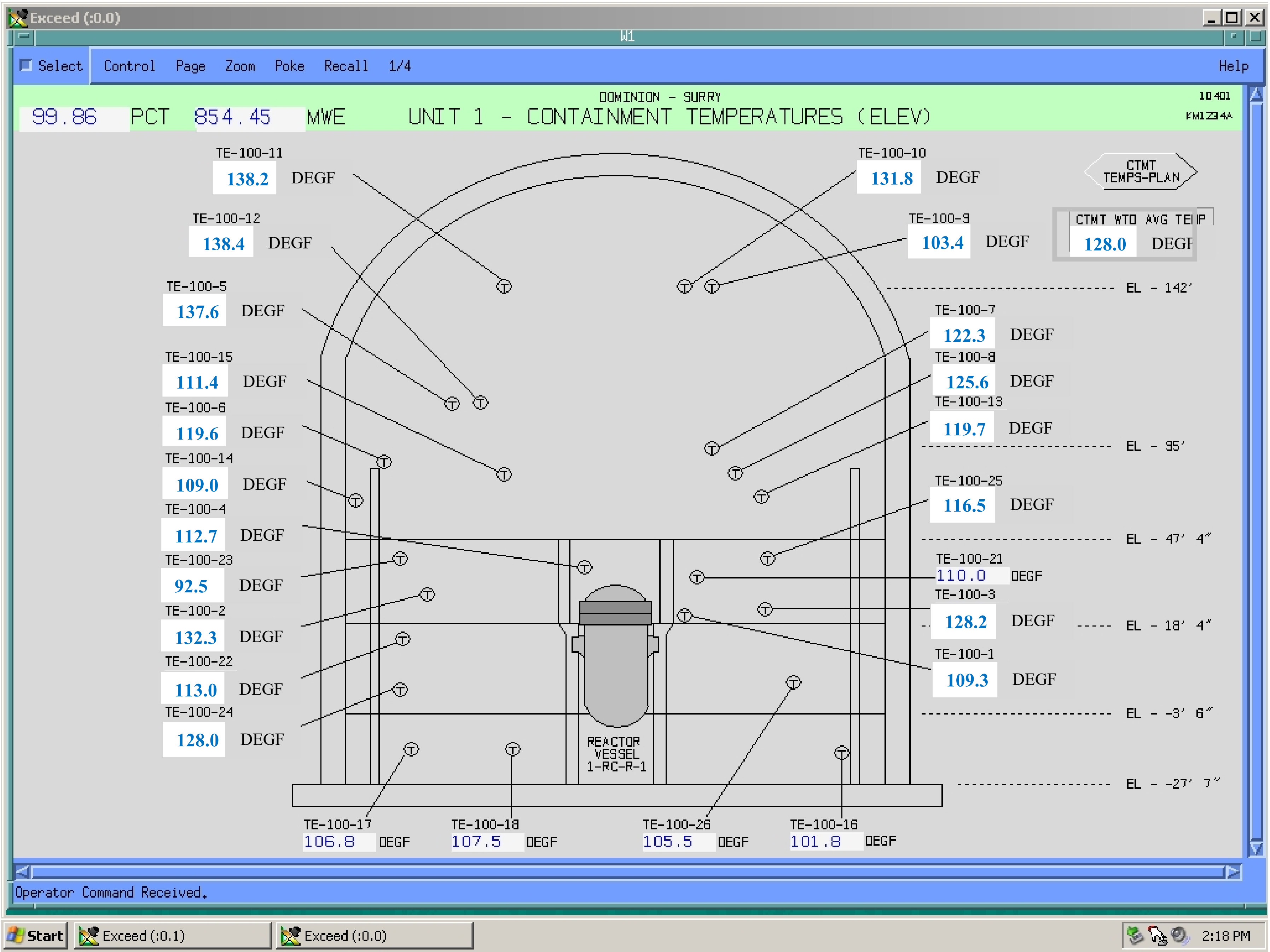
19. ___ WHEN containment partial pressure channels are operable, THEN secure from log readings in the associated attachment.

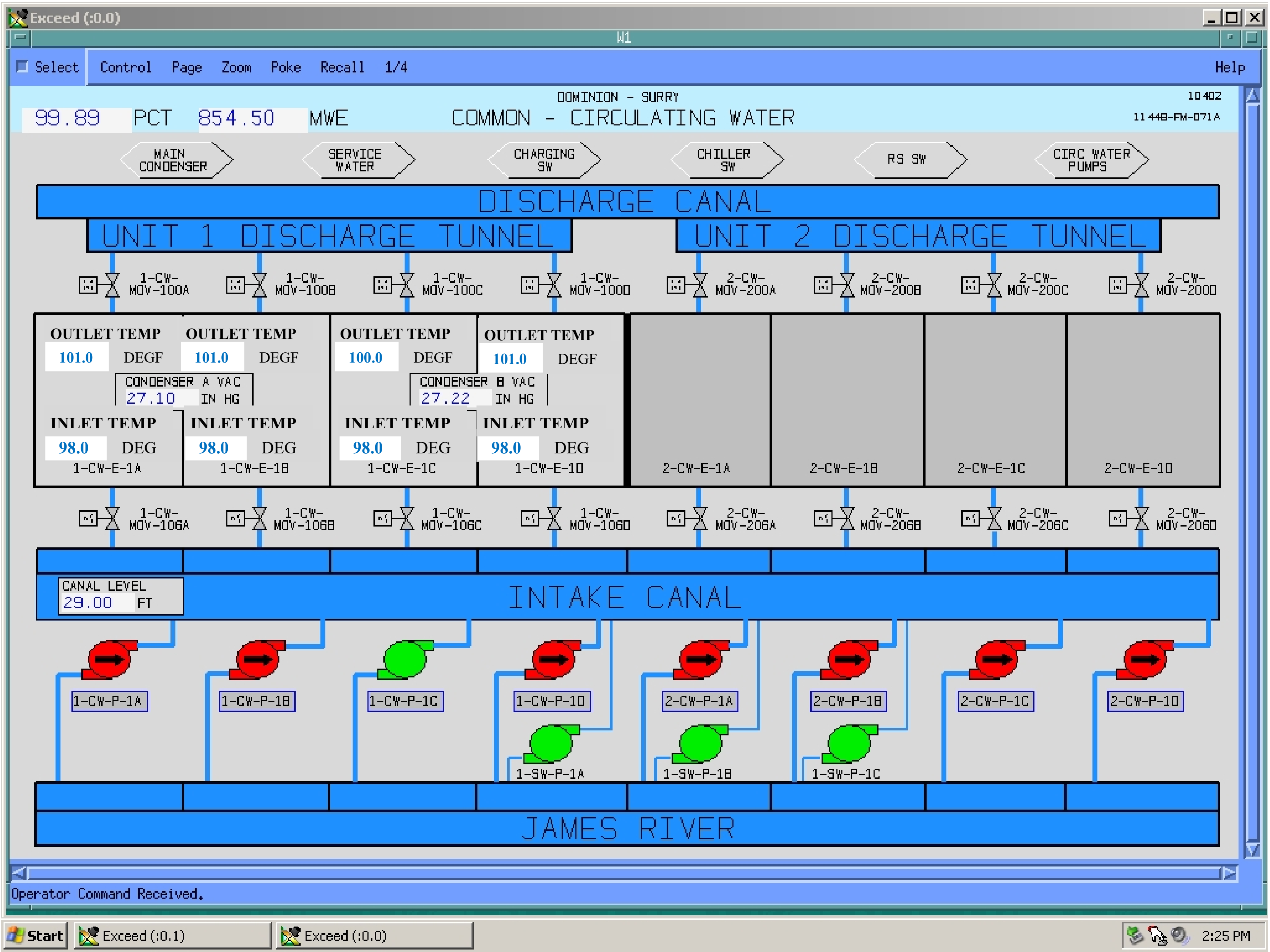
Date/Time	T_{cont2}	T_{cont1}	P_{air1}	P_{air2}	Initials

CONT PARTIAL PRESS CH1 *		
08/25/2021 21:00	10.25	Barttels, Joshua
08/25/2021 15:00	10.25	Dunlevy, James
08/25/2021 09:00	10.20	Goodman, Ian Blake
08/24/2021 03:00	10.20	Shcroth, John

CONT PARTIAL PRESS CH2 *		
08/25/2021 21:00	10.25	Barttels, Joshua
08/25/2021 15:00	10.20	Dunlevy, James
08/25/2021 09:00	10.19	Goodman, Ian Blake
08/24/2021 03:00	10.19	Shcroth, John

U0091 PCS WEIGHTED AVG CONT TEMP		
08/25/2021 21:00	118.38	Barttels, Joshua
08/25/2021 15:00	117.50	Dunlevy, James
08/25/2021 09:00	117.05	Goodman, Ian Blake
08/24/2021 03:00	116.20	Shcroth, John


Exceed (:0.0)
W1
Select
Control
Page
Zoom
Poke
Recall
1/4
Help
DOMINION - SURRY
10401
KM1234A
99.86 PCT 854.45 MWE
UNIT 1 - CONTAINMENT TEMPERATURES (ELEV)
CTMT TEMPS-PLAN
CTMT WTD AVG TEMP 128.0 DEGF
TE-100-11 138.2 DEGF
TE-100-10 131.8 DEGF
TE-100-12 138.4 DEGF
TE-100-9 103.4 DEGF
TE-100-5 137.6 DEGF
EL - 142'
TE-100-7 122.3 DEGF
TE-100-15 111.4 DEGF
TE-100-8 125.6 DEGF
TE-100-6 119.6 DEGF
TE-100-13 119.7 DEGF
EL - 95'
TE-100-14 109.0 DEGF
TE-100-25 116.5 DEGF
TE-100-4 112.7 DEGF
EL - 47' 4"
TE-100-23 92.5 DEGF
TE-100-21 110.0 DEGF
TE-100-2 132.3 DEGF
TE-100-3 128.2 DEGF
EL - 18' 4"
TE-100-22 113.0 DEGF
TE-100-1 109.3 DEGF
TE-100-24 128.0 DEGF
EL - -3' 6"
REACTOR VESSEL 1-RC-R-1
EL - -27' 7"
TE-100-17 106.8 DEGF
TE-100-18 107.5 DEGF
TE-100-26 105.5 DEGF
TE-100-16 101.8 DEGF
Operator Command Received.
Start
Exceed (:0.1)
Exceed (:0.0)
2:18 PM


Exceed (:0.0)
W1
Select
Control
Page
Zoom
Poke
Recall
1/4
Help
DOMINION - SURRY
10402
99.89
PCT
854.50
MWE
COMMON - CIRCULATING WATER
11448-FM-071A
MAIN CONDENSER
SERVICE WATER
CHARGING SW
CHILLER SW
RS SW
CIRC WATER PUMPS
DISCHARGE CANAL
UNIT 1 DISCHARGE TUNNEL
UNIT 2 DISCHARGE TUNNEL
1-CW-MOV-100A
1-CW-MOV-100B
1-CW-MOV-100C
1-CW-MOV-100D
2-CW-MOV-200A
2-CW-MOV-200B
2-CW-MOV-200C
2-CW-MOV-200D
OUTLET TEMP
101.0
DEGF
OUTLET TEMP
101.0
DEGF
OUTLET TEMP
100.0
DEGF
OUTLET TEMP
101.0
DEGF
CONDENSER A VAC
27.10
IN HG
CONDENSER B VAC
27.22
IN HG
INLET TEMP
98.0
DEG
INLET TEMP
98.0
DEG
INLET TEMP
98.0
DEG
INLET TEMP
98.0
DEG
1-CW-E-1A
1-CW-E-1B
1-CW-E-1C
1-CW-E-1D
2-CW-E-1A
2-CW-E-1B
2-CW-E-1C
2-CW-E-1D
1-CW-MOV-106A
1-CW-MOV-106B
1-CW-MOV-106C
1-CW-MOV-106D
2-CW-MOV-206A
2-CW-MOV-206B
2-CW-MOV-206C
2-CW-MOV-206D
CANAL LEVEL
29.00
FT
INTAKE CANAL
1-CW-P-1A
1-CW-P-1B
1-CW-P-1C
1-CW-P-1D
2-CW-P-1A
2-CW-P-1B
2-CW-P-1C
2-CW-P-1D
1-SW-P-1A
1-SW-P-1B
1-SW-P-1C
JAMES RIVER
Operator Command Received.
Start
Exceed (:0.1)
Exceed (:0.0)
2:25 PM

U.S. Nuclear Regulatory Commission
Surry Power Station

SR19301
Administrative Job Performance Measure G2.4.44
TIME CRITICAL

Applicant________________________________ Start Time___________________

Examiner_______________________________

Date ___________________________________ Stop Time___________________

Title

DETERMINE REQUIRED PAR ACTIONS

K/A: G2.4.44 – Knowledge of emergency plan protective action recommendations. (2.4/4.4)

Applicability	**Validation Time**	**Actual Time**
SRO ONLY	15 Minutes **(Time Critical)**	___________

Conditions

- Task is to be PERFORMED in the CLASSROOM.

Standards

- Determine PAR+ Evacuate 2 mile radious, and 2-5 miles downwind in sectors A, B, and C.
- Completes Attachment 3 correctly by including the following:
  - Check mark in Evacuate box. Fills in 2 mile radius and 2-5 miles downwind in sectors A, B, C.
  - Check mark in Recommend KI.
  - Signs for approval to transmit.

Initiating Cues

- PAR part: A GE has just been declared.

Terminating Cues

- EPIP-1.06, Step 4 Completed.

Procedures

- EPIP-1.06, Protective Action Recommendations, Revision 11.

Tools and Equipment

- SEM EP Notebooks (3)
- Digital clock.

Performance Checklist

Notes to the Evaluator.

- Task critical elements are **bolded**.
- The JPM will be read aloud to the whole group. Ask for questions, and use same start time for everyone.
- **TIME CRITICAL REQUIREMENT:**
  The PAR must be determined within 15 minutes after the applicant indicated he/she is ready.
- Use the Digital clock to record start and stop times.
- **START TIME: ______________**

STEP 1 Obtains and Initiates EPIP-1.06. (*Step 1*) **STANDARD:** a) Acknowledges NOTE before Step 1 that Attachments 4 and 5 may be used for reference. b) Initiates procedure by filling out name, date, and time. **EVALUATOR'S NOTE:** **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 2 **CRITICAL STEP** USE ATTACHMENT 1, PROTECTIVE ACTION RECOMMENDATION FLOWCHART SPS, TO DETERMINE INITIAL PAR. (*Step 2*) **STANDARD:** a) Applicant uses Attachment 1 (flowchart) to determine the initial PAR. b) *Severe Accident* = NO c) *Hostile Action* = NO d) *Dose Assessment Available* = Yes **e) PAR = Evacuate: 2 mile radius and 2-5 miles downwind miles downwind. CRITICAL STEP** **EVALUATOR'S NOTE:** **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 3 CRITICAL STEP	
IMPLEMENT ATTACHMENT 2, AFFECTED SECTOR(S) MAP. (*Step 3*) **STANDARD:** a) Acknowledges NOTE before Step 3 that Attachment 2 is used for EPIP-1.06 PARs only, not EPIP-4.07 PARs. b) Applicant implements Attachment 2 to determine affected sector(s). Applicant will round up 191.5 to 192. - Acknowledges NOTE regarding rounding of wind direction up or down. - Records time data acquired. - Records wind direction from 192°. - Records wind speed of 15 mph. - **Uses table to determine that the affected sectors are A, B, C and records on attachment. CRITICAL STEP** - Marks the affected sectors on map using pen, pencil, highlighter, etc. **EVALUATOR'S NOTE:** **COMMENTS**	_______ **SAT** _______ **UNSAT**

STEP 4 CRITICAL STEP	
COMPLETE ATACHMENT 3, REPORT OF PROTECTIVE ACTION RECOMMENDATION. (*Step 4 and Attachment 3*) **STANDARD:** **Applicant completes Attachment 3:** − Records #1 in PAR MESSAGE space. − Acknowledges NOTES to transmit PAR to Virginia EOC only using ARD, autodial, or direct dial. Only use Insta-Phone if all other methods of contacting VEOC are non-functional. − Places check mark in “Drill Message” box, or “Emergency Message for Protective Actions” box. − **Places check mark in “EVACUATE” box. Fills in (0-2) Mile radius 360° and 5 (2-5) miles downwind in the following sectors: A, B, C. CRITICAL STEP** − **Places check mark in “Recommend implementation of Potassium Iodide (KI) for general public. CRITICAL STEP** − Acknowledges NOTE in REMARKS block regarding Shelter-in-Place recommendations. − Record Notes (Optional). − **Signs for approval to transmit. CRITICAL STEP** Records current date and time. **EVALUATOR’S NOTE:** **This step must be complete within 15 minutes of start of task.** **Record STOP Time: ________** **COMMENTS**	_______ **SAT** _______ **UNSAT**

COMMENTS

____

____

____

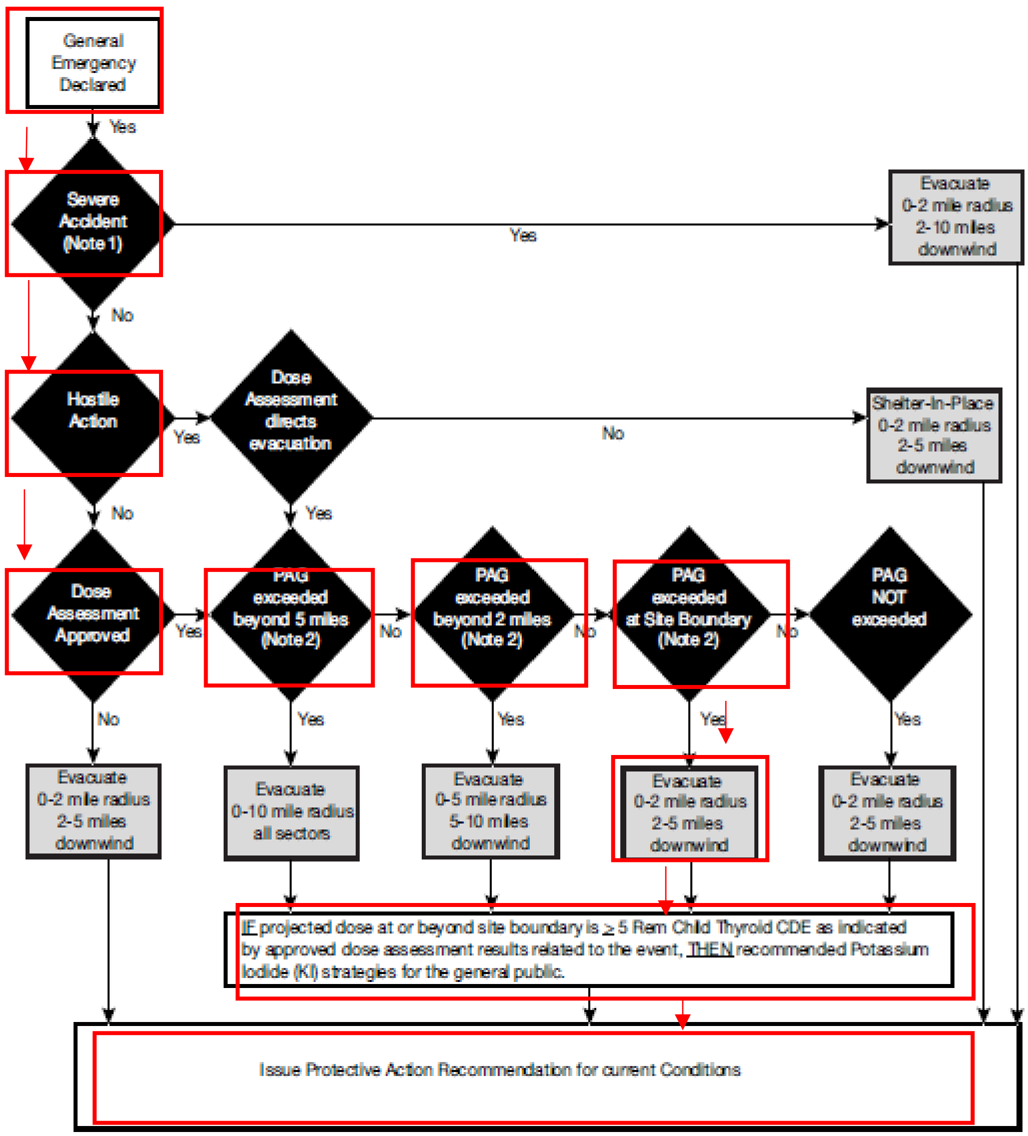
____

____

____

EXAMINER KEY

NUMBER EPIP-1.06	ATTACHMENT TITLE	ATTACHMENT 1
REVISION 14	PROTECTIVE ACTION RECOMMENDATION FLOWCHART SPS	PAGE 1 of 1



Note 1:
Severe Accident Conditions
• CSFST Core Cooling RED
AND
• Any Containment Loss Fission Product Barrier threshold met

Note 2:
EPA Protective Action Guides (PAGs)
• ≥1 Rem TEDE
OR
• ≥ 5 Rem Adult Thyroid CDE

Graphics No: MT2068C

EXAMINER KEY

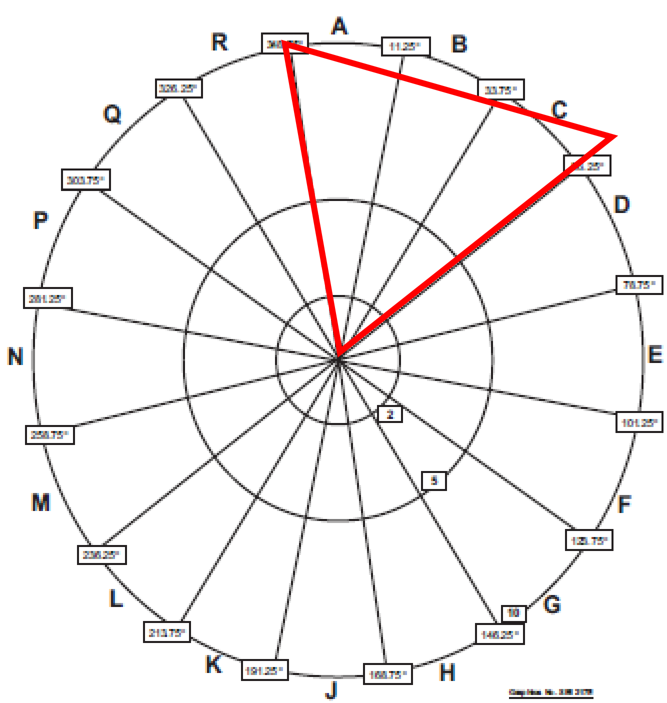
NUMBER EPIP-1.06	ATTACHMENT TITLE	ATTACHMENT 2
REVISION 14	AFFECTED SECTOR(S) MAP	PAGE 1 of 1

NOTE: Rounding shall be used when determining affected sectors using wind direction.
For example: Wind Direction (degrees from) 11.5 to 11.9 would be rounded up to 12.0.
Wind Direction (degrees from) 11.1 to 11.4 would be rounded down to 11.0.

Average Wind Direction Data:

At Time, Wind Direction From 191.5, Sectors A, B, C
(24-hr time) (degrees)

At ____________, Wind Direction From ____________, Sectors ______________
(24-hr time) (degrees)



AVERAGE WIND DIRECTION (Degrees) From	AFFECTED SECTORS
349 - 11	H, J, K
12 - 33	J, K, L
34 - 56	K, L, M
57 - 78	L, M, N
79 - 101	M, N, P
102 - 123	N, P, Q
124 - 146	P, Q, R
147 - 168	Q, R, A
169 - 191	R, A, B
192 - 213	A, B, C
214 - 236	B, C, D
237 - 258	C, D, E
259 - 281	D, E, F
282 - 303	E, F, G
304 - 326	F, G, H
327 - 348	G, H, J

EXAMINER KEY

NUMBER EPIP-1.06	ATTACHMENT TITLE REPORT OF PROTECTIVE ACTION RECOMMENDATION	ATTACHMENT 3
REVISION 14		PAGE 1 of 1

PAR MESSAGE # 1

NOTE: • Transmit to Virginia EOC only using one of the following:

- VEOC ARD
- VEOC Autodial pushbutton alternative: (804) 674-2400 or (804) 310-8868
- CERC Only - VEOC Pushbutton (direct dial - (804) 674-2400), VEOC Alternate Pushbutton (direct dial - (804) 674-2300), VEOC Cell Pushbutton (direct dial - (804) 310-8868)
- IF all means of communications with VEOC nonfunctional, THEN use **S&L ALL CALL** button

This is Surry Power Station with a(n) ☒ Drill Message ☐ Emergency Message for Protective Action Recommendation. **Use the Report of Protective Action Recommendation form to copy this message.**

(READ SLOWLY)

PROTECTIVE ACTION RECOMMENDATION:

☐ SHELTER-IN-PLACE: ____ Mile radius 360° and ____ Miles downwind in the following sectors:

____

☒ EVACUATE: 2 Mile radius 360° and 5 Miles downwind in the following sectors:
A, B, C.

☐ BEYOND 10 MILE EPZ:

☐ Evacuate Area: _____ Centerline in degrees; _____Distance in Miles; _____ Width in feet

☐ Shelter-in-place: _____ Centerline in degrees; _____Distance in Miles; _____ Width in feet

☒ POTASSIUM IODIDE:

Recommend implementation of Potassium Iodide (KI) strategies for the general public.
The projected dose at the site boundary is $\geq$ 5 Rem Child Thyroid CDE.

The time is ____________ (24-hr time).

This is ______________________________ / Emergency Communicator.

Message received by: Virginia EOC contact (name) ______________________________.

This is Surry Power Station out at ______________ (24-hr time) on ______________ (date).

REMARKS (OPTIONAL) / APPROVAL INFORMATION [DO NOT READ]

NOTE: Shelter-in-Place may be recommended as a result of evacuation impediments (e.g., Hostile Action events).

REMARKS: ______________________________

APPROVED BY: Applicant Signature / Today / Now
Station Emergency Manager or Technical Support Manager **Date** **Time**

Operator Directions Handout
(TO BE READ TO APPLICANT BY EXAMINER)

Initial Conditions

- A General Emergency has just been declared (*use current date/time*).
- CETC temperature is 580 ^oF.
- The State and Local Communicator has determined wind direction to be from 191.5° and wind speed to be 15 mph.
- On site and Off site Dose Assessment teams have been dispatched.
- The RAD reports the following dose at the Site boundary and 2 mile locations from the Dose monitoring teams:

	Site Boundary	**2 miles**
TEDE	1.05 REM	0.9 REM
Adult Thyroid CDE	3.4 REM	2.2 REM
Child Thyroid CDE	5.1 REM	3.3 REM

Initiating Cues

- **This JPM is TIME CRITICAL.**

- You are to determine the Protective Action Recommendations, by performing steps 1-4 of EPIP-1.06, Report of Protective Action Recommendations.

- **IMMEDIATELY Raise your hand** when you have completed step 4 of EPIP-1.06**.**

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Initial Conditions

- A General Emergency has just been declared (*use current date/time*).
- CETC temperature is 580 ^{o}F.
- The State and Local Communicator has determined wind direction to be from 191.5° and wind speed to be 15 mph.
- On site and Off site Dose Assessment teams have been dispatched.
- The RAD reports the following dose at the Site boundary and 2 mile locations from the Dose monitoring teams:

	Site Boundary	**2 miles**
TEDE	1.05 REM	0.9 REM
Adult Thyroid CDE	3.4 REM	2.2 REM
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Initiating Cues

- **This JPM is TIME CRITICAL.**

- You are to determine the Protective Action Recommendations, by performing steps 1-4 of EPIP-1.06, Report of Protective Action Recommendations.

- **IMMEDIATELY Raise your hand** when you have completed step 4 of EPIP-1.06.

Dominion Energy

SURRY POWER STATION

EMERGENCY PLAN IMPLEMENTING PROCEDURE

NUMBER	PROCEDURE TITLE	REVISION
EPIP-1.06	PROTECTIVE ACTION RECOMMENDATIONS (WITH 5 ATTACHMENTS)	14
		PAGE 1 of 9

PURPOSE

Give guidance to the Station Emergency Manager or Technical Support Manager regarding determination of Protective Action Recommendations.

ENTRY CONDITIONS

Any one of the following:

1) Activation by EPIP-1.05, RESPONSE TO GENERAL EMERGENCY.

2) Activation by EPIP-3.10, CERC TECHNICAL SUPPORT CONTROLLING PROCEDURE.

3) As directed by the Station Emergency Manager or Technical Support Manager.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE: ATTACHMENT 4, REFERENCE INFORMATION (SPS) and ATTACHMENT 5, SECTOR MAP may be used as applicable for reference purposes.

____ 1 INITIATE PROCEDURE:

☐ • By: ______________________________

Date: ______________________________

Time: ______________________________

* *

CAUTION: The Protective Action Recommendation (PAR) must be determined and approved by the SEM/TSM within 15 minutes of the declaration of a General Emergency.

* *

____ 2 USE ATTACHMENT 1, PROTECTIVE ACTION RECOMMENDATION FLOWCHART SPS, TO DETERMINE INITIAL PAR

____ 3 IMPLEMENT ATTACHMENT 2, AFFECTED SECTOR(S) MAP:

☐ a) Record time wind data acquired

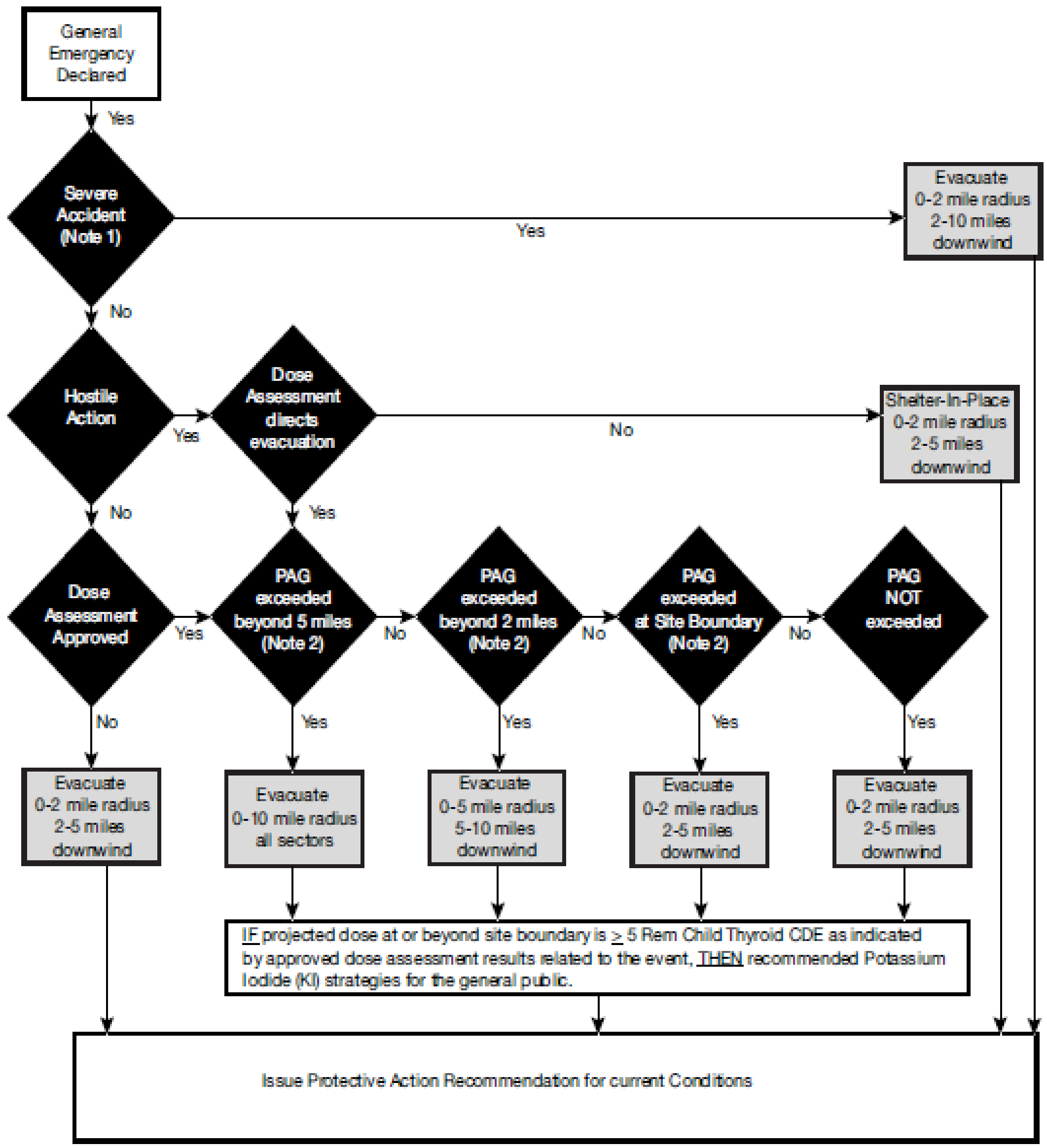
☐ b) Record average wind direction from, in degrees

☐ c) Record affected sectors

☐ d) Mark affected sectors on map (use any writing implement available, e.g., pen, pencil, highlighter, etc.)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
____ 4	COMPLETE ATTACHMENT 3, REPORT OF PROTECTIVE ACTION RECOMMENDATION:	
	a) Message number and type	
☐	1) Enter PAR message number (starts at #1 for first PAR issued and continue in numerical order for subsequent PARs) and mark message type box	
	b) Protective Action Recommendation:	
☐	1) Mark appropriate PAR box(s)	
☐	2) Record Mile radius and Miles downwind	
☐	3) Record Downwind Sectors	
	c) Child Thyroid CDE $\geq$ 5 Rem at or beyond Site Boundary:	☐ d) GO TO Step 4.d.
☐	Mark PAR box: POTASSIUM IODIDE	
	d) Remarks/Approval Information:	
☐	1) Record Remarks (optional)	
☐	2) Approve PAR (sign report)	
☐	3) Record date and time report approved	

NUMBER EPIP-1.06	ATTACHMENT TITLE	ATTACHMENT 1
REVISION 14	PROTECTIVE ACTION RECOMMENDATION FLOWCHART SPS	PAGE 1 of 1



Note 1:
Severe Accident Conditions
- CSFST Core Cooling RED
  AND
- Any Containment Loss Fission Product Barrier threshold met

Note 2:
EPA Protective Action Guides (PAGs)
- ≥1 Rem TEDE
  OR
- ≥ 5 Rem Adult Thyroid CDE

Graphics No: MT2068C

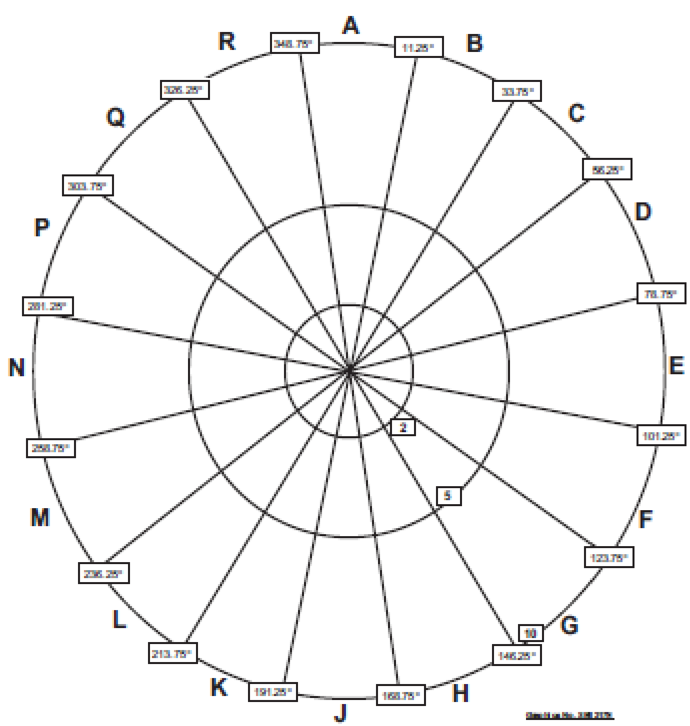
NUMBER EPIP-1.06	ATTACHMENT TITLE AFFECTED SECTOR(S) MAP	ATTACHMENT 2
REVISION 14		PAGE 1 of 1

NOTE: Rounding shall be used when determining affected sectors using wind direction.
For example: Wind Direction (degrees from) 11.5 to 11.9 would be rounded up to 12.0.
Wind Direction (degrees from) 11.1 to 11.4 would be rounded down to 11.0.

Average Wind Direction Data:

At ____________, Wind Direction From ___________, Sectors _______________
(24-hr time) (degrees)

At ____________, Wind Direction From ___________, Sectors _______________
(24-hr time) (degrees)



AVERAGE WIND DIRECTION (Degrees) From	AFFECTED SECTORS
349 - 11	H, J, K
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34 - 56	K, L, M
57 - 78	L, M, N
79 - 101	M, N, P
102 - 123	N, P, Q
124 - 146	P, Q, R
147 - 168	Q, R, A
169 - 191	R, A, B
192 - 213	A, B, C
214 - 236	B, C, D
237 - 258	C, D, E
259 - 281	D, E, F
282 - 303	E, F, G
304 - 326	F, G, H
327 - 348	G, H, J

PAR MESSAGE # ________

NOTE: • Transmit to Virginia EOC only using one of the following:
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- IF all means of communications with VEOC nonfunctional, THEN use **S&L ALL CALL** button

This is Surry Power Station with a(n) ☐ Drill Message ☐ Emergency Message for Protective Action Recommendation. **Use the Report of Protective Action Recommendation form to copy this message.**

(READ SLOWLY)

PROTECTIVE ACTION RECOMMENDATION:

☐ SHELTER-IN-PLACE: ____ Mile radius 360° and ____ Miles downwind in the following sectors:

____.

☐ EVACUATE: ____ Mile radius 360° and ____ Miles downwind in the following sectors:

____.

☐ BEYOND 10 MILE EPZ:

☐ Evacuate Area: _____ Centerline in degrees; _____Distance in Miles; _____ Width in feet

☐ Shelter-in-place: ____ Centerline in degrees; _____Distance in Miles; _____ Width in feet

☐ POTASSIUM IODIDE:

Recommend implementation of Potassium Iodide (KI) strategies for the general public.
The projected dose at the site boundary is $\geq$ 5 Rem Child Thyroid CDE.

The time is _____________ (24-hr time).

This is ____ / Emergency Communicator.

Message received by: Virginia EOC contact (name) ______________________________.

This is Surry Power Station out at ________________ (24-hr time) on ___________________ (date).

REMARKS (OPTIONAL) / APPROVAL INFORMATION [DO NOT READ]

NOTE: Shelter-in-Place may be recommended as a result of evacuation impediments (e.g., Hostile Action events).

REMARKS: ____

____

APPROVED BY: ____________________________________ _____________ / ________
Station Emergency Manager or Technical Support Manager **Date** **Time**

IMMEDIATELY RAISE YOUR HAND WHEN YOU HAVE COMPLETED ATTACHMENT 3.

KNOWN EVACUATION IMPEDIMENTS:	As reflected in Attachment 1, PROTECTIVE ACTION RECOMMENDATION FLOWCHART SPS, the only impediment Surry Power Station will consider in the development of PARs will be Hostile Actions directed at the site.
PAR NOTIFICATION TIMES:	The initial PAR must be included with the initial notification of a General Emergency, which must be made to the State within 15 minutes following declaration of the General Emergency. Notification of a revised PAR must be made to the State within 15 minutes of its development.
SECTORS/ WIND DIRECTION:	Downwind sectors may be determined from Attachment 2, AFFECTED SECTOR(S) MAP. Wind direction is always given in degrees from.
SHELTERING IN PLACE:	Sheltering-In-Place is recommended when a known condition or impediment exists which makes evacuation dangerous. A Hostile Action based event is the only known impediment to evacuation.
PREVIOUSLY ISSUED PAR:	Previously issued Protective Action Recommendations should not be reduced until the threat is fully under control and after consulting with Commonwealth of Virginia emergency response organization.
DOSE ASSESSMENT:	As reflected in Attachment 1, PROTECTIVE ACTION RECOMMENDATION FLOWCHART SPS, dose assessment may be a MIDAS "Radiological Status" report or interpretation of field survey readings (i.e., the product of the Estimated Release Duration (Hrs) x Dose Rate (Rem/hr) x TEDE/DDE Ratio to project TEDE dose, and/or the product of the Estimated Release Duration (Hrs) x Activity (µCi/mL) x 1.3E+6 (Conversion Factor) to project Adult Thyroid CDE dose) per EPIP-4.03, DOSE ASSESSMENT TEAM CONTROLLING PROCEDURE.
PROTECTIVE ACTION GUIDES (PAGs):	The projected dose commitment values to individuals in the general population that warrant protective action following a release of radioactive material, the Environmental Protection Agency (EPA) PAGs of interest are: • $\geq$ 1 Rem TEDE • $\geq$ 5 Rem Adult Thyroid CDE As reflected in Attachment 1, PROTECTIVE ACTION RECOMMENDATION FLOWCHART SPS, the dose assessment results described above are compared against PAGs to determine whether levels are exceeded at distances of interest (site boundary, 2 miles and 5 miles).

U.S. Nuclear Regulatory Commission
Surry Power Station

SR2014301
Administrative Job Performance Measure 2.3.13

Applicant_________________________________ Start Time___________________

Examiner________________________________

Date ____________________________________ Stop Time___________________

Title

Perform Containment Entry Checklist

K/A: G2.3.13 - Knowledge of radiological safety procedures pertaining to licensed operator duties, such as response to radiation monitor alarms, containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc. (3.4/3.8)

Applicability	**Estimated Time**	**Actual Time**
SRO(I)/SRO(U)	17 minutes	

Initial Conditions

- Task is PERFORMED in the CLASSROOM.

Standards

- Determines Incore detectors are not tagged out as required.
- Determines next Containment entry will exceed Tech Spec 3.8.B.1.b. limits due to exceeding 60 cumulative minutes within a year.

Initiating Cues

Given simulated plant conditions, perform Attachment 1 of VPAP-0106, Subatmospheric Containment Entry, to evaluate preparation for Containment Entry and Technical Specification Compliance.

Terminating Cues

- VPAP-0106, attachment 1 assessment complete.

Procedures

- VPAP-0106, Subatmospheric Containment Entry.
- Tech Spec 3.8

Tools and Equipment

- Laptop to access procedures
- Tech Specs

Safety Considerations

- None

Terminating Cues

- Applicant has completed the attachment, discussed results and problems with examiner, and determined the next Containment entry cannot be performed as stated.

Tools and Equipment

- VPAP-0106, Attachment 1
- Technical Specifications
- RWP 1012

Safety Considerations

- None

Notes

PERFORMANCE CHECKLIST

Notes to the Evaluator

- Task critical elements are bolded and noted by the words "Critical Step" at the end of the step.
- The Applicant is given an initiated copy of VPAP-0106 Attachment 1.
- A laptop will be Available for the Applicant.
- Task critical elements are bolded and denoted by an asterisk (*).
- **START TIME: _________________**

STEP 1: Review of Part 1 of VPAP-0106 Attachment 1. **STANDARD:** (a) Starts review of Attachment 1, starting at Part 1. (b) Identifies no discrepancies in Part 1. **EVALUATOR'S NOTE:** **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 2: CRITICAL STEP	_______ SAT
Review of Part 2 of VPAP-0106 Attachment 1.	_______ UNSAT
STANDARD: (a) Determines total Outer Door open time will be 62 minutes after the next entry. **(b) Based on the Note in the same section, determines the estimated Outer Door times for the next entry will exceed the cumulative limit of one hour per year per Tech Spec 3.8.B.1.b.**	
EVALUATOR'S NOTE: • **<u>If notified</u>** that the cumulative Outer Door open time will exceed the one hour limit, inform the Applicant that the times for the next entry are being re-evaluated, and direct them to continue the review of Attachment 1 Parts 1 through 4.	
COMMENTS:	

STEP 3: **CRITICAL STEP** Review of Parts 3 and 4 of VPAP-0106 Attachment 1. **STANDARD:** (a) Completes review of Part 3 of Attachment 1 with no discrepancies. (b) Ensures no other actions are underway or scheduled which may change containment conditions during the entry. **(c) Identifies Tag-Out of incore detectors is NOT hung in accordance with OP-AA-200, Equipment Clearance**, based on Initial conditions and the "N/A" entered for this item in Part 4. **EVALUATOR NOTES:** • **If asked:** there are no other activities underway or scheduled that may impact containment conditions. • **If asked:** inform the Applicant the tag has been removed from the Unit 2 incore detector system to support Unit 2 flux mapping. • **When notified** that the incore detectors are not properly tagged out, inform the Applicant that another SRO will pursue removal of the Temp Lift. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 17: Reports to Shift Manager that review is complete **STANDARD:** (a) Reports the Unit 2 Containment entry cannot be made at this time. (b) Submits the list of discrepancies. **EVALUATOR NOTES:** • An answer key is provided in this JPM with the list of discrepancies. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STOP TIME________________________:

____

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Dominion Energy

Containment Entry Checklist

VPAP-0106 – Attachment 1 Page 1 of 4

Part 1 - Completed by Responsible Supervisor

☐ Unit 1 ☑ Unit 2	Date [TODAY]	Estimated Time of Entry 1500	Radiation Work Permit (RWP) Number 21-0-1012-1

List personnel designated for Containment Entry Team

Note: Containment Entry Team minimum composition is two and maximum composition is fifteen people.

Name (Please Print)	Signature	DLR Number	Containment Entry Training Satisfactorily Completed
Marvin Hebb	[signature]	8421	☑ Yes ☐ No
Matthew R Davis	[signature]	16103	☑ Yes ☐ No
Martin Connelly	[signature]	12592	☑ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No

Containment Entry Team Leader (Name - Please Print)
Marvin Hebb

Permission granted by Site Vice President, Plant Manager (Nuclear), or Director Nuclear Station Safety and Licensing
(Name - Please Print) DOUG LAWRENCE

If any Containment Entry Team Member is not Trained, List Reason Why and Designate Escort ☑ N/A

Reason for Entry and Work to be Performed
Repair inner door seal on Unit 2 Containment personnel hatch

Responsible Supervisor (Signature)	Date
[signature]	[TODAY]

Dominion Energy

Containment Entry Checklist

Part 2 - Completed by Shift Manager

List personnel designated for Containment Emergency Team

Note: Containment Emergency Team members must satisfy training requirements in Step 6.2.2. Two members are required.

Name (Please Print)	Signature	DLR Number
Richard Downs	[signature]	12103
R.J. Simmons	[signature]	12644
David Day	Dave Day	2502

Permission granted by Site VP, Plant Manager (Nuclear), or Director NSS&L - Ensure ALL Crafts Have Obtained Permission
(Name - Please Print) DOUG LAWRENCE

Containment Pressure: 10.2 psia

SCBA Required? ☑ YES ☐ NO

Is personnel air lock operable? ☐ YES ☑ NO

If inner door is inoperable due to leakage, record time outer door is opened and place entry in Action Statement Log. (Surry) Mark "N/A" if not applicable.

	Entry	Exit
Outer Door Open:	minutes	minutes
Outer Door Closed:	minutes	minutes
Total Time:	minutes	minutes

Note: If entry through outer door, do not open for greater than fifteen minutes with total accumulated time remaining less than one hour per year. (Surry)

Shift Manager (Signature) | Date

Part 3 - Completed By Containment Entry Team Leader

Stay-time: Radiological Protection Evaluation 1.4E7 Minutes

Containment Entry Team Leader (Signature) [signature] | Date [TODAY]

Key: **DLR- Dosimeter of Legal Record; SCBA-Self Contained Breathing Apparatus; psia-pounds per square inch absolute; LOCA-Loss of Coolant Accident**

Dominion Energy

Containment Entry Checklist

Part 4 - Containment Pre-Entry Checklist	
Shift Manager (Initials)	Ensure no other activities are underway or scheduled which may change containment conditions during entry.
Shift Manager or Unit Supervisor (Initials)	Brief Containment Entry Team and Containment Emergency Team on work to be performed, contingency actions, condition of Personnel Air-Lock, Equipment Hatch escape lock, containment elevator, and stay-time.
Shift Manager (Initials)	Tag-Out of Incore detectors in accordance with OP-AA-200, Equipment Clearance.
Containment Entry Team Leader (Initials)	Review requirement to check respiratory equipment satisfactory (check for thirty-five percent oxygen, straps and rigging, bottle pressure, mask fit, unit operates, bypass operates).
Containment Entry Team Leader (Initials)	Stress during pre-entry briefing: ☐ Hand signal for exiting containment ☐ Self determination ☐ Buddy system ☐ Fluid replacement ☐ Work scheduling/pacing ☐ Rest requirements ☐ Use of ice vests (optional) ☐ 60 minute limit ☐ Signs of heat exhaustion: Cool, pale, clammy skin, profuse sweating, weakness, dizziness, or nausea ☐ Signs of heat stroke: Hot, dry and flushed skin, no sweating, confusion, convulsions or unconsciousness, elevated body temperature ☐ How to notify the control room if personnel must exit containment via the emergency escape lock.
Containment Entry Team Leader (Initials)	Checked out containment over-ride key and watch, if required.
Containment Entry Team Leader (Initials)	For work in, over, or adjacent to Containment Recirculation Sump or Strainer, a **HIGH RISK PLAN** is **REQUIRED** as per MA-AA-102, Foreign Material Exclusion.
Containment Entry Team Leader (Initials)	Review concerns noted on Containment Entry Debrief Status/Board.
Containment Entry Team Leader (Initials)	Containment lights on, notify Shift Manager of entry and requirement to enter Containment Hatch in the Action Statement Log.
Containment Entry Team Leader (Initials)	Ensure equipment to remain in containment has been discussed and identified. All items left in containment must have Station Engineering written approval. At North Anna, FSRC approval is also required.
Containment Entry Team Leader (Initials)	Ensure instructions have been given for prior-to-use inspection of portable ladders located in containment. Instructions should be in accordance with station inspection procedures.
RP Supervisor (Initials)	Ensure RP Supervisor, or designee, is signed on as Tag Out Holder for Incore Detector tag out.
RP Supervisor (Initials)	Brief Containment Entry Team and Containment Emergency Team on radiological conditions, use of radio communications, minimum pressure for the type of SCBA being used, and expected use/duration time for the type of SCBA being used.
RP Supervisor (Initials)	Discuss contingency plan and assigned personnel for removing disabling devices from the equipment hatch escape lock in the event this pathway must be used to exit containment in an emergency. (Cable ties at NAPS and strong backs at SPS)
RP Supervisor (Initials)	For entry inside containment "bioshield" areas or reactor cavity with reactor critical, a **HIGH RADIOLOGICAL RISK PLAN** is **REQUIRED** as per RP-AA-275, Radiological Risk Assessment Process.

Key: DLR- Dosimeter of Legal Record; SCBA-Self Contained Breathing Apparatus; psia-pounds per square inch absolute; LOCA-Loss of Coolant Accident

Dominion Energy

Containment Entry Checklist

Part 5 - Containment Exit Checklist	
Shift Manager (Initials)	Ensure the Containment Status Control Board is updated.
Shift Manager (Initials)	Tag-Out removed from incore detectors in accordance with OP-AA-200, Equipment Clearance (N/A if not required to be removed).
Containment Entry Team Leader or Unit Supervisor (Initials)	Fill in required information: **Note:** Stay-time commences when inner door is opened. Entry Time Exit Time Actual Stay-Time
Containment Entry Team Leader (Initials)	Inspect affected areas within containment for loose debris which could cause restriction of containment recirculation pump suction during LOCA conditions. Remove as necessary.
Containment Entry Team Leader (Initials)	Notify Shift Manager of containment exit.
Containment Entry Team Leader (Initials)	Return containment elevator over-ride key (N/A if not required).
Containment Entry Team Leader (Initials)	Containment lights turned off (mark N/A if other Containment Entry Team entries are in progress or planned).
Containment Entry Team Leader (Initials)	Only equipment identified during pre-job briefing has been left in containment. All other equipment taken into containment has been removed. If not, then notify Shift Supervisor and do the following at respective station: **North Anna** • Inform responsible supervisor additional equipment has been left in containment. • Submit Condition Report (CR) • Responsible supervisor obtain written approval from Station Engineering and FSRC approval for equipment to remain in containment or remove equipment from containment **Surry** • Submit Condition Report (CR) • Inform responsible supervisor no other entry is planned and have him/her obtain written approval from Station Engineering for equipment to remain in containment **OR** **Inform responsible supervisor additional entries will be made to complete task.**
RP Supervisor (Initials)	Conduct debriefing.
RP Supervisor (Initials)	Ensure equipment hatch disabling devices have been reinstalled if removed.

Part 6 - Completed By RP Supervisor or Unit Supervisor	
Completed By (Signature)	Date

Key: **DLR- Dosimeter of Legal Record; SCBA-Self Contained Breathing Apparatus; psia-pounds per square inch absolute; LOCA-Loss of Coolant Accident**

EXAMINER ANSWER KEY

Unit 2 Containment Entry IS / IS NOT permitted (circle ONE)

If containment entry cannot be performed, provide the reason(s) and/or applicable Tech Spec requirements that prohibit entry:

1. **Cumulative Outer door total accumulated open time will exceed 1 hour/year. Tech Spec 3.8.B.1.b will be exceeded if the containment entry was performed.**

2. **Incore detectors are not tagged out as required.**

Operator Directions Handout
(TO BE READ TO APPLICANT BY EXAMINER)

Initial Conditions:

- Unit 2 is at 100% power.

- The Unit 2 containment personnel hatch is inoperable due to excessive inner door seal leakage.

- Multiple U2 Containment entries have been made this week, to support investigation and repair of the Inner Door seal.

- Procedure 2-NPT-RX-002, Reactor Core Flux Maps, is in progress to satisfy a Tech Spec requirement.

- Current Unit 2 Containment personnel hatch status is as follows:
  - The last Unit 2 Containment entry was performed last shift.
  - The Outer Door has been open this week for a cumulative time of 50 minutes.

- The projected Outer door open times are as follows for the next Containment entry:
  - During Personnel Hatch entry, the Outer door will be open for 5 minutes.
  - During Personnel Hatch exit, the Outer door will be open for 7 minutes.

- The SRO who had the roles of Responsible Supervisor/Shift Manager for the next Unit 2 Containment entry had to leave the station.

Initiating Cues

- Your task is to determine whether or not Unit 2 Containment entry is permitted. Completion of VPAP-0106, Attachment 1 is NOT required.

- If you identify containment entry can be performed, then inform the examiner.

- If you identify containment entry cannot be performed, provide ALL the reason(s) that prohibit entry.

- If applicable, include any Tech Spec requirements that prohibit entry.

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Initial Conditions:

- Unit 2 is at 100% power.
- The Unit 2 containment personnel hatch is inoperable due to excessive inner door seal leakage.
- Multiple U2 Containment entries have been made this week, to support investigation and repair of the Inner Door seal.
- Procedure 2-NPT-RX-002, Reactor Core Flux Maps, is in progress to satisfy a Tech Spec requirement.
- Current Unit 2 Containment personnel hatch status is as follows:
    - The last Unit 2 Containment entry was performed last shift.
    - The Outer Door has been open this week for a cumulative time of 50 minutes.
- The projected Outer door open times are as follows for the next Containment entry:
    - During Personnel Hatch entry, the Outer door will be open for 5 minutes.
    - During Personnel Hatch exit, the Outer door will be open for 7 minutes.
- The SRO who had the roles of Responsible Supervisor/Shift Manager for the next Unit 2 Containment entry had to leave the station.

Initiating Cues

- Your task is to determine whether or not Unit 2 Containment entry is permitted. Completion of VPAP-0106, Attachment 1 is NOT required.
- If you identify containment entry can be performed, then inform the examiner.
- If you identify containment entry cannot be performed, provide ALL the reason(s) that prohibit entry.
- If applicable, include any Tech Spec requirements that prohibit entry.

Applicant name: ___________________________

Unit 2 Containment Entry   IS   /   IS NOT   permitted (circle ONE)

If containment entry cannot be performed, provide the reason(s) and/or applicable Tech Spec requirements that prohibit entry:

Dominion Energy

Containment Entry Checklist

Part 1 - Completed by Responsible Supervisor

☐ Unit 1	☑ Unit 2	Date [TODAY]	Estimated Time of Entry 1500	Radiation Work Permit (RWP) Number 21-0-1012-1

List personnel designated for Containment Entry Team

Note: Containment Entry Team minimum composition is two and maximum composition is fifteen people.

Name (Please Print)	Signature	DLR Number	Containment Entry Training Satisfactorily Completed
Marvin Hebb	[signature]	8421	☑ Yes ☐ No
Matthew R Davis	[signature]	16103	☑ Yes ☐ No
Martin Connelly	[signature]	12592	☑ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No

Containment Entry Team Leader (Name - Please Print)
Marvin Hebb

Permission granted by Site Vice President, Plant Manager (Nuclear), or Director Nuclear Station Safety and Licensing (Name - Please Print) DOUG LAWRENCE

If any Containment Entry Team Member is not Trained, List Reason Why and Designate Escort ☑ N/A

Reason for Entry and Work to be Performed
Repair inner door seal on Unit 2 Containment personnel hatch

Responsible Supervisor (Signature)	Date
[signature]	[TODAY]

Key: DLR- Dosimeter of Legal Record; SCBA-Self Contained Breathing Apparatus; psia-pounds per square inch absolute; LOCA-Loss of Coolant Accident

Dominion Energy

Containment Entry Checklist

Part 2 - Completed by Shift Manager

List personnel designated for Containment Emergency Team

Note: Containment Emergency Team members must satisfy training requirements in Step 6.2.2. Two members are required.

Name (Please Print)	Signature	DLR Number
Richard Downs	[signature]	12103
R.J. Simmons	[signature]	12644
David Day	Dave Day	2502

Permission granted by Site VP, Plant Manager (Nuclear), or Director NSS&L - Ensure ALL Crafts Have Obtained Permission
(Name - Please Print) DOUG LAWRENCE

Containment Pressure: 10.7 psia

SCBA Required? ☑ YES ☐ NO

Is personnel air lock operable? ☐ YES ☑ NO

If inner door is inoperable due to leakage, record time outer door is opened and place entry in Action Statement Log. (Surry) Mark "N/A" if not applicable.

	Entry	Exit
Outer Door Open:	minutes	minutes
Outer Door Closed:	minutes	minutes
Total Time:	minutes	minutes

Note: If entry through outer door, do not open for greater than fifteen minutes with total accumulated time remaining less than one hour per year. (Surry)

Shift Manager (Signature) | Date

Part 3 - Completed By Containment Entry Team Leader

Stay-time: Radiological Protection Evaluation 1.4E7 Minutes

Containment Entry Team Leader (Signature) [signature] | Date [TODAY]

Key: **DLR- Dosimeter of Legal Record; SCBA-Self Contained Breathing Apparatus; psia-pounds per square inch absolute; LOCA-Loss of Coolant Accident**

Dominion Energy

Containment Entry Checklist

Part 4 - Containment Pre-Entry Checklist	
Shift Manager (Initials)	Ensure no other activities are underway or scheduled which may change containment conditions during entry.
Shift Manager or Unit Supervisor (Initials)	Brief Containment Entry Team and Containment Emergency Team on work to be performed, contingency actions, condition of Personnel Air-Lock, Equipment Hatch escape lock, containment elevator, and stay-time.
Shift Manager (Initials)	Tag-Out of incore detectors in accordance with OP-AA-200, Equipment Clearance.
Containment Entry Team Leader (Initials)	Review requirement to check respiratory equipment satisfactory (check for thirty-five percent oxygen, straps and rigging, bottle pressure, mask fit, unit operates, bypass operates).
Containment Entry Team Leader (Initials)	Stress during pre-entry briefing: ☐ Hand signal for exiting containment ☐ Self determination ☐ Buddy system ☐ Fluid replacement ☐ Work scheduling/pacing ☐ Rest requirements ☐ Use of ice vests (optional) ☐ 60 minute limit ☐ Signs of heat exhaustion: Cool, pale, clammy skin, profuse sweating, weakness, dizziness, or nausea ☐ Signs of heat stroke: Hot, dry and flushed skin, no sweating, confusion, convulsions or unconsciousness, elevated body temperature ☐ How to notify the control room if personnel must exit containment via the emergency escape lock.
Containment Entry Team Leader (Initials)	Checked out containment over-ride key and watch, if required.
Containment Entry Team Leader (Initials)	For work in, over, or adjacent to Containment Recirculation Sump or Strainer, a **HIGH RISK PLAN** is **REQUIRED** as per MA-AA-102, Foreign Material Exclusion.
Containment Entry Team Leader (Initials)	Review concerns noted on Containment Entry Debrief Status/Board.
Containment Entry Team Leader (Initials)	Containment lights on, notify Shift Manager of entry and requirement to enter Containment Hatch in the Action Statement Log.
Containment Entry Team Leader (Initials)	Ensure equipment to remain in containment has been discussed and identified. All items left in containment must have Station Engineering written approval. At North Anna, FSRC approval is also required.
Containment Entry Team Leader (Initials)	Ensure instructions have been given for prior-to-use inspection of portable ladders located in containment. Instructions should be in accordance with station inspection procedures.
RP Supervisor (Initials)	Ensure RP Supervisor, or designee, is signed on as Tag Out Holder for Incore Detector tag out.
RP Supervisor (Initials)	Brief Containment Entry Team and Containment Emergency Team on radiological conditions, use of radio communications, minimum pressure for the type of SCBA being used, and expected use/duration time for the type of SCBA being used.
RP Supervisor (Initials)	Discuss contingency plan and assigned personnel for removing disabling devices from the equipment hatch escape lock in the event this pathway must be used to exit containment in an emergency. (Cable ties at NAPS and strong backs at SPS)
RP Supervisor (Initials)	For entry inside containment "bioshield" areas or reactor cavity with reactor critical, a **HIGH RADIOLOGICAL RISK PLAN** is **REQUIRED** as per RP-AA-275, Radiological Risk Assessment Process.

Key: DLR- Dosimeter of Legal Record; SCBA-Self Contained Breathing Apparatus; psia-pounds per square inch absolute; LOCA-Loss of Coolant Accident

Dominion Energy

Containment Entry Checklist

Part 5 - Containment Exit Checklist	
Shift Manager (Initials)	Ensure the Containment Status Control Board is updated.
Shift Manager (Initials)	Tag-Out removed from incore detectors in accordance with OP-AA-200, Equipment Clearance (N/A if not required to be removed).
Containment Entry Team Leader or Unit Supervisor (Initials)	Fill in required information: **Note:** Stay-time commences when inner door is opened. Entry Time Exit Time Actual Stay-Time
Containment Entry Team Leader (Initials)	Inspect affected areas within containment for loose debris which could cause restriction of containment recirculation pump suction during LOCA conditions. Remove as necessary.
Containment Entry Team Leader (Initials)	Notify Shift Manager of containment exit.
Containment Entry Team Leader (Initials)	Return containment elevator over-ride key (N/A if not required).
Containment Entry Team Leader (Initials)	Containment lights turned off (mark N/A if other Containment Entry Team entries are in progress or planned).
Containment Entry Team Leader (Initials)	Only equipment identified during pre-job briefing has been left in containment. All other equipment taken into containment has been removed. If not, then notify Shift Supervisor and do the following at respective station: **North Anna** • Inform responsible supervisor additional equipment has been left in containment. • Submit Condition Report (CR) • Responsible supervisor obtain written approval from Station Engineering and FSRC approval for equipment to remain in containment or remove equipment from containment **Surry** • Submit Condition Report (CR) • Inform responsible supervisor no other entry is planned and have him/her obtain written approval from Station Engineering for equipment to remain in containment **OR** **Inform responsible supervisor additional entries will be made to complete task.**
RP Supervisor (Initials)	Conduct debriefing.
RP Supervisor (Initials)	Ensure equipment hatch disabling devices have been reinstalled if removed.

Part 6 - Completed By RP Supervisor or Unit Supervisor	
Completed By (Signature)	Date

Key: **DLR- Dosimeter of Legal Record; SCBA-Self Contained Breathing Apparatus; psia-pounds per square inch absolute; LOCA-Loss of Coolant Accident**

U.S. Nuclear Regulatory Commission
Surry Power Station

SR21301
Administrative Job Performance Measure G2.1.7

Applicant________________________________	Start Time___________________
Examiner_______________________________	Stop Time___________________
Date ___________________________________	SAT _________ UNSAT ________

Title

Perform a Quadrant Power Tilt Calculation.

K/A: G.2.1.7 Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation. [4.4/4.7]

Applicability	**Validation Time**	**Actual Time**
RO	30 Minutes	_____ Minutes

Conditions

- Task is to be PERFORMED in the classroom.

Standards

- Calculates Tilt % for Upper channels between 7.40% – 7.50%.
- Calculates Tilt % for Lower channels between 9.35% – 9.45%.
- Reports a Tech Spec LCO (Clock) is in effect based on exceeding 2% Quadrant Power Tilt.

Initiating Cues

- A dropped rod has occurred on Unit 1.
- A Quadrant Power Tilt Calculation needs to be performed as directed by 0-AP-1.00. Rod Control System Malfunction.

Terminating Cues

- Applicant has completed the QPTR calculation.

Procedures

- 0- AP-1.00, Rod Control System Malfunction

Tools and Equipment

- Calculator and Laptop
- NI/RM Info book

Safety Considerations

- None

PERFORMANCE CHECKLIST

Notes to the Evaluator

- Task critical elements are **bolded** and denoted as a **CRITICAL STEP**.
- **START TIME_______:**

STEP 1: Step 1 NOTE: Calculations for QPTR should be carried out to four places to the right of the decimal place to provide for accuracy and consistency of results. **STANDARD:** a) Acknowledges NOTE. **EVALUATOR'S NOTE:** **COMMENTS:**	**_______ SAT** **_______ UNSAT**
STEP 2: RECORD THE FOLLOWING DATA *(Step 2)* Reactor Power___________% Date____________ Time____________ **STANDARD:** a) Enters 100% for Reactor power. b) Enters today's date. c) Enters current time. **EVALUATOR'S NOTE:** **If Asked**: Current Reactor Power is 100%. **If Asked**: Use todays date. **If Asked**: Use current time. **COMMENTS:**	**_______ SAT** **_______ UNSAT**

STEP 3: RECORD THE FOLLOWING EXCORE DETECTOR DATA. *(Step 2)* • Actual Excore Detector Readings. • Expected Excore Detector Readings. **STANDARD:** a) Places PR NI currents and Normalized Currents (from NI/RM Info book) in appropriate location on Calculation of Excore Quadrant Power Tilt Ratios. **EVALUATOR'S NOTE:** **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 4: NORMALIZE THE UPPER DETECTOR READINGS. *(Step 3)* **STANDARD:** a) Divides Upper Detector currents by Normalized currents for each detector. **EVALUATOR'S NOTE:** (See attached Calculation of Excore Quadrant Power Tilt Ratios for calculations.) . **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 5: SUM OF NORMALIZED VALUES FOR THE UPPER DETECTORS. *(Step 3)* **STANDARD:** a) Adds Upper Detector Normalized values for all Upper detectors. **EVALUATOR'S NOTE:** (See attached Calculation of Excore Quadrant Power Tilt Ratios for calculations.) **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 6: NORMALIZE THE LOWER DETECTOR READINGS. *(Step 3)* **STANDARD:** a) Divides Lower Detector currents by Normalized currents for each detector. **EVALUATOR'S NOTE:** (See attached Calculation of Excore Quadrant Power Tilt Ratios for calculations.) . **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 7: SUM OF NORMALIZED VALUES FOR THE LOWER DETECTORS. *(Step 3)* **STANDARD:** a) Adds Lower Detector Normalized values for all Lower detectors. **EVALUATOR'S NOTE:** (See attached Calculation of Excore Quadrant Power Tilt Ratios for calculations.) **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 8: RECORD THE NUMBER OF DETECTORS IN USE. *(Step 4)* **STANDARD:** a) Records "4" **EVALUATOR'S NOTE:** (See attached Calculation of Excore Quadrant Power Tilt Ratios for calculations.) **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 9: CALCULATE AVERAGE UPPER AND LOWER DETECTOR CURRENT VALUES. *(Step 5)* **STANDARD:** a) Transcribes Upper and Lower detector Sum of Normalized Values from Step 3 of Attachment 6. b) Divides each sum by the number of Detectors in use. **EVALUATOR'S NOTE:** (See attached Calculation of Excore Quadrant Power Tilt Ratios for calculations.) **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 10: RECORD THE MAXIMUM NORMALIZED UPPER AND LOWER DETECTOR CURRENTS. *(Step 6)* **STANDARD:** a) Records the Maximum Normalized Upper Detector Current from Step 3 (N42 value of 1.0135). b) Records the Maximum Normalized Lower Detector Current from Step 3 (N42 value of 1.0176). **EVALUATOR'S NOTE:** (See attached Calculation of Excore Quadrant Power Tilt Ratios for calculations.) **COMMENTS:**	**_______ SAT** **_______ UNSAT**
STEP 11: CALCULATE MAXIMUM UPPER AND LOWER EXCORE QUADRANT POWER TILT RATIOS. *(Step 7)* **STANDARD:** a) Divides Maximum Upper channel current by the Average Upper Detector currents to determine the Upper Excore Quadrant Power Tilt Ratio (1.0745). b) Divides Maximum Lower channel current by the Average Lower Detector currents to determine the Lower Excore Quadrant Power Tilt Ratio (1.0940). **EVALUATOR'S NOTE:** (See attached Calculation of Excore Quadrant Power Tilt Ratios for calculations.) **COMMENTS:**	**_______ SAT** **_______ UNSAT**

STEP 12: **CRITICAL STEP** CALCULATE TILT%. *(Step 8)* **STANDARD:** a) **Calculates Tilt % for Upper channels between 7.4% – 7.5% (7.45%). CRITICAL STEP** b) **Calculates Tilt % for Lower channels between 9.35% – 9.45% (9.40%). CRITICAL STEP** **EVALUATOR'S NOTE:** (See attached Calculation of Excore Quadrant Power Tilt Ratios for calculations.) **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 13: **CRITICAL STEP** DETERMINES IF A TECH SPEC LCO IS IN EFFECT. **STANDARD:** • Determines QPT exceeds the 2% limit in Tech Specs. • **Reports a Tech Spec LCO (Clock) is in effect based on exceeding 2% Quadrant Power Tilt. CRITICAL STEP** **EVALUATOR'S NOTE:** • **If desired,** ask the Applicant to identify which Tech Spec LCO sections require Charging Pump operability. Answer: Tech Spec section 3.12 requires Quadrant Power Tilt to be within 2%. • **If Asked**: Inform the Candidate another operator will be responsible for Step 10. **COMMENTS:**	

STEP 14: NOTIFY UNIT SUPERVISOR. *(Step 9)*	
STEP 14: NOTIFY UNIT SUPERVISOR. *(Step 9)* **STANDARD:** a) Turns in Attachment 1. **EVALUATOR'S NOTE:** **If Asked**: Inform the Candidate another operator will be responsible for Step 10. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STOP TIME:

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EXAMINER KEY

NOTE: Calculations for QPTR should be carried out to four places to the right of the decimal place to provide for accuracy and consistency of results.

1. ___ Record the following data:

Reactor Power_____100%_________% Date_[TODAY]___ Time___[NOW]_____

2. ___ Record the following Excore Detector Data:

Actual Excore Detector Readings				Expected Excore Detector Readings at 100% Power			
Upper		Lower		Upper		Lower	
N41U	94.0	N41L	89.5	$N41U_{100}$	118.8	$N41L_{100}$	119.5
N42U	120.1	N42L	121.4	$N42U_{100}$	118.5	$N42L_{100}$	119.3
N43U	115.3	N43L	114.0	$N43U_{100}$	119.1	$N43L_{100}$	119.5
N44U	118.7	N44L	119.1	$N44U_{100}$	118.7	$N44L_{100}$	119.1

3. ___ Normalize the Actual Excore Detector Readings to the expected Excore Detector readings at 100% power, and sum the normalized values for both the upper and lower detectors.

Upper Detector Fraction	Upper Detector Fraction Values	Normalized Value (I_U)	Lower Detector Fraction	Lower Detector Fraction Values	Normalized Value (I_L)
$\frac{N41U}{N41U_{100}}$	$\frac{94.0}{118.8}$ =	0.7912	$\frac{N41L}{N41L_{100}}$	$\frac{89.5}{119.5}$ =	0.7490
$\frac{N42U}{N42U_{100}}$	$\frac{120.1}{118.5}$ =	1.0135	$\frac{N42L}{N42L_{100}}$	$\frac{121.4}{119.3}$ =	1.0176
$\frac{N43U}{N43U_{100}}$	$\frac{115.3}{119.1}$ =	0.9681	$\frac{N43L}{N43L_{100}}$	$\frac{114.0}{119.5}$ =	0.9540
$\frac{N44U}{N44U_{100}}$	$\frac{118.7}{118.7}$ =	1.0000	$\frac{N44L}{N44L_{100}}$	$\frac{119.1}{119.1}$ =	1.0000
Sum of Normalized Values = ΣI_U=		3.7728	Sum of Normalized Values = ΣI_L=		3.7206

4. ___ Record N = the No. of Detectors in use = 4

5. ___ Calculate the average upper and lower detector current values.

Average $I_U = \frac{\Sigma I_U}{N} = \frac{3.7728}{4} =$ 0.9432

Average $I_L = \frac{\Sigma I_L}{N} = \frac{3.7206}{4} =$ 0.9302

6. ___ From Step 3, record the following values.

Maximum Normalized Upper Detector Current = I_{Umax} = 1.0135

Maximum Normalized Lower Detector Current = I_{Lmax} = 1.0176

7. ___ Calculate the maximum upper and lower Excore Quadrant Power Tilt Ratios.

☐ a. Upper Excore Quadrant Power Tilt Ratio = $\frac{I_{Umax}}{Average I_U}$ = 1.0745

☐ b. Lower Excore Quadrant Power Tilt Ratio = $\frac{I_{Lmax}}{Average I_L}$ = 1.0940

8. ___ Calculate tilt%:

☐ a. Subtract 1 from Step 7.a and multiply by 100 for Upper Tilt %: 7.45% (7.40-7.50%)

☐ b. Subtract 1 from Step 7.b and multiply by 100 for Lower Tilt %: 9.40% (9.35-9.45%)

9. ___ Notify Unit Supervisor.

Operator Directions Handout
(TO BE READ TO APPLICANT BY EXAMINER)

Initial Conditions:

- Unit 1 was operating at 100% power.
  - Control Rod K-4, Control Bank B, dropped and is currently indicating 0 steps.
  - The team is performing 0-AP-1.00, Rod Control Malfunction.
  - Shutdown Margin has just been verified.
- You are provided a copy of the NI/RM Info book providing Normalized Values.

Initiating Cues

- Perform the Quadrant Power Tilt (QPT) Calculation in accordance with Steps 1 through 8 of 0-AP-1.00, Attachment 6, Calculation of Excore Quadrant Power Tilt Ratios.
- The current date/time is to be used in Attachment 6 Step 1.
- When steps 1 through 8 are complete, you are to report the following:
  - The results of Step 8.
  - Based on these results, is a Tech Spec LCO in effect? (Yes/No, including the reason for your determination)
- Report your results to the examiner.

Actual current detector currents taken from the Power Range NIs:

N-41 Upper Detector Current	94.0
N-41 Lower Detector Current	89.5
N-42 Upper Detector Current	120.1
N-42 Lower Detector Current	121.4
N-43 Upper Detector Current	115.3
N-43 Lower Detector Current	114.0
N-44 Upper Detector Current	118.7
N-44 Lower Detector Current	119.1

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Initial Conditions:

- Unit 1 was operating at 100% power.
  - Control Rod K-4, Control Bank B, dropped and is currently indicating 0 steps.
  - The team is performing 0-AP-1.00, Rod Control Malfunction.
  - Shutdown Margin has just been verified.
- You are provided a copy of the NI/RM Info book providing Normalized Values.

Initiating Cues

- Perform the Quadrant Power Tilt (QPT) Calculation in accordance with Steps 1 through 8 of 0-AP-1.00, Attachment 6, Calculation of Excore Quadrant Power Tilt Ratios.
- The current date/time is to be used in Attachment 6 Step 1.
- When steps 1 through 8 are complete, you are to report the following:
  - The results of Step 8.
  - Based on these results, is a Tech Spec LCO in effect? (Yes/No, including the reason for your determination)
- Report your results to the examiner.

Actual current detector currents taken from the Power Range NIs:

N-41 Upper Detector Current	94.0
N-41 Lower Detector Current	89.5
N-42 Upper Detector Current	120.1
N-42 Lower Detector Current	121.4
N-43 Upper Detector Current	115.3
N-43 Lower Detector Current	114.0
N-44 Upper Detector Current	118.7
N-44 Lower Detector Current	119.1

NOTE: Calculations for QPTR should be carried out to four places to the right of the decimal place to provide for accuracy and consistency of results.

1. ___ Record the following data:

Reactor Power______________% Date_______________ Time_______________

2. ___ Record the following Excore Detector Data:

Actual Excore Detector Readings				Expected Excore Detector Readings at 100% Power			
Upper		Lower		Upper		Lower	
N41U		N41L		$N41U_{100}$		$N41L_{100}$	
N42U		N42L		$N42U_{100}$		$N42L_{100}$	
N43U		N43L		$N43U_{100}$		$N43L_{100}$	
N44U		N44L		$N44U_{100}$		$N44L_{100}$	

3. ___ Normalize the Actual Excore Detector Readings to the expected Excore Detector readings at 100% power, and sum the normalized values for both the upper and lower detectors.

Upper Detector Fraction	Upper Detector Fraction Values	Normalized Value (I_U)	Lower Detector Fraction	Lower Detector Fraction Values	Normalized Value (I_L)
$\frac{N41U}{N41U_{100}}$	- - - - - - - - - - - - - - - =		$\frac{N41L}{N41L_{100}}$	- - - - - - - - - - - - - - =	
$\frac{N42U}{N42U_{100}}$	- - - - - - - - - - - - - - - =		$\frac{N42L}{N42L_{100}}$	- - - - - - - - - - - - - - =	
$\frac{N43U}{N43U_{100}}$	- - - - - - - - - - - - - - =		$\frac{N43L}{N43L_{100}}$	- - - - - - - - - - - - - - - =	
$\frac{N44U}{N44U_{100}}$	- - - - - - - - - - - - - - =		$\frac{N44L}{N44L_{100}}$	- - - - - - - - - - - - - - - =	
Sum of Normalized Values = ΣI_U=			Sum of Normalized Values = ΣI_L=		

4. ___ Record N = the No. of Detectors in use = ___________________

5. ___ Calculate the average upper and lower detector current values.

Average I_U = $\frac{\Sigma I_U}{N}$ = ---------------------- = ______________________

Average I_L = $\frac{\Sigma I_L}{N}$ = ---------------------- = ______________________

6. ___ From Step 3, record the following values.

Maximum Normalized Upper Detector Current = I_{Umax} = ____________________

Maximum Normalized Lower Detector Current = I_{Lmax} = ____________________

7. ___ Calculate the maximum upper and lower Excore Quadrant Power Tilt Ratios.

☐ a. Upper Excore Quadrant Power Tilt Ratio = $\frac{I_{Umax}}{\text{Average} I_U}$ = ___________________

☐ b. Lower Excore Quadrant Power Tilt Ratio = $\frac{I_{Lmax}}{\text{Average} I_L}$ = ___________________

8. ___ Calculate tilt%:

☐ a. Subtract 1 from Step 7.a and multiply by 100 for Upper Tilt %: ____________________

☐ b. Subtract 1 from Step 7.b and multiply by 100 for Lower Tilt %: ____________________

9. ___ Notify Unit Supervisor.

10. ___ <u>IF</u> additional Quadrant Power Tilt Ratio Calculations are required, <u>THEN</u> 0-NPT-RX-011, Quadrant Power Tilt Ratio Calculations and Corrective Actions, Attachment 2, should be used.

Completed by: ____ Date: ___________

Reviewed by: ____ Date: ___________

U.S. Nuclear Regulatory Commission
Surry Power Station

SR21301
Administrative Job Performance Measure

Applicant________________________________ Start Time___________________

Examiner_______________________________ Stop Time___________________

Date ___________________________________ SAT _________ UNSAT ________

Title

Review 1-OPT-CH-001, CHARGING PUMP OPERABILITY AND PERFORMANCE TEST FOR 1-CH-P-1A

K/A: GEN2.2.37 Ability to determine operability and/or availability of safety related equipment. [3.6/4.6]

Applicability	Validation Time	Actual Time
RO/SRO(I)/SRO(U)	40 Minutes	_____ Minutes

Conditions

- Task is to be PERFORMED in the classroom.

Standards

- Identifies the open stroke test time for 1-CH-MOV-1286A exceeds the acceptable range.
- Identifies the Outboard Vibration Horizontal pt 22 exceeds the INOP range.
- Determines a Tech Spec LCO is NOT in effect, based on having an OPERABLE Charging Pump powered by each train of emergency bus power (two trains) per Technical Specifications.

Initiating Cues

- 1-OPT-CH-001 has just been performed and is ready for review before statusing as complete.
- After the OPT was performed, 1-CH-P-1C was placed back in service and 1-CH-P-1A is now secured in AUTO.

Terminating Cues

- Candidate submits list of discrepancies and determination if a Tech Clock LCO is in effect.

Procedures

- 1-OPT-CH-001
- Tech Specs

Tools and Equipment **Safety Considerations**

• Laptop	• None

PERFORMANCE CHECKLIST

Notes to the Evaluator

- Task critical elements are bolded and denoted as a **CRITICAL STEP**.
- **START TIME_______:**

STEP 1: REVIEW SECTIONS 1 THROUGH 5 **STANDARD:** a) Reviews Section 1.0 (Purpose). b) Reviews Section 2.0 (References). c) Reviews Section 3.0 (Initial Conditions) and verifies all steps are initialed. d) Reviews Section 4.0 (Precautions and Limitations) and verifies all steps are initialed. e) Reviews Section 5.0 (Special Tools and Equipment). **EVALUATOR'S NOTE:** **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 2: REVIEWS WORK PREPARATION. *(Section 6.1)* **STANDARD:** a) Verifies proper place keeping on all steps, notes, and cautions. b) Verifies associated information has been entered in Attachment 1. c) Verifies by the table in step 6.1.4 that Subsections 6.6 and 6.7 were the correct ones to be performed. **EVALUATOR'S NOTE:** **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 3: VERIFIES SECTIONS 6.2 THROUGH 6.5 NOT PERFORMED. **STANDARD:** a) Verifies all steps of subsections 6.2, 6.3, 6.4, and 6.5 are entered "N/A". **EVALUATOR'S NOTE:** **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 4: **CRITICAL STEP** DISCHARGE CHECK VALVE TEST, MOV TIMING, LUBE OIL TCV TIMING AND STARTING 1-CH-P-1A. *(Section 6.6)* **STANDARD:** a) Verifies proper place keeping on all steps, notes, and cautions. b) Verifies all associated data recorded in Attachments 1 and 4. c) Per step 6.6.1.f.3, **identifies the open stroke test time (recorded in Attachment 4) for 1-CH-MOV-1286A exceeds the acceptable range. (CRITICAL STEP)** **EVALUATOR'S NOTE:** • **Note:** The Candidate may identify the unacceptable stroke time during performance of step 7.1.1. • **If the Candidate reports the stroke time for 1-CH-MOV-1286A,** direct the Candidate to complete the review of 1-OPT-CH-001 and inform you of their results afterward. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 5: **CRITICAL TASK** 1-CH-P-1A PERFORMANCE TEST. *(Section 6.7)* **STANDARD:** a) Verifies proper place keeping on all steps, notes, and cautions. b) Verifies all associated data is recorded in Attachment 1. c) Verifies Attachment 2 used to record operating pump data. d) Per step 6.7.14, **identifies the Outboard Vibration Horizontal pt 22 (recorded in Attachment 2) exceeds the INOP range. (CRITICAL STEP)** **EVALUATOR'S NOTE:** • **Note:** The Candidate may identify the INOP pt 22 vibration during performance of step 7.1.1. • **If the Candidate reports the INOP vibration for pt 22,** direct the Candidate to complete the review of 1-OPT-CH-001 and inform you of their results afterward. **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 6: VERIFIES SECTIONS 6.8 AND 6.9 NOT PERFORMED. **STANDARD:** a) Verifies all steps of subsections 6.8 and 6.9 are entered "N/A". **EVALUATOR'S NOTE:** **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 7: OBTAINING OIL SAMPLES. *(Section 6.10)* **STANDARD:** a) Verifies proper place keeping on all steps, notes, and cautions. b) Verifies steps performed for 1-CH-P-1C. **EVALUATOR'S NOTE:** **COMMENTS:**	**_______ SAT** **_______ UNSAT**
STEP 8: VERIFIES SECTION 6.11 NOT PERFORMED. **STANDARD:** a) Verifies all steps of subsections 6.11 are entered "N/A". **EVALUATOR'S NOTE:** **COMMENTS:**	

STEP 9: EVALUATES ACCEPTANCE CRITERIA. *(Step 7.1.1)* **STANDARD:** a) Determines the following acceptance criteria are MET: a. 1-CH-258 check valve open and closed tests. b. 1-CH-256 open test. c. 1-CH-230 open test. d. 1-CH-MOV-1275A open and closed travel times. e. 1-CH-MOV-1287A open and closed travel times. f. 1-SW-TCV-108A test position and stroke time. g. 1-SW-TCV-108A lube oil temperature below 160°F. b) Places a check (√) at each of the substeps listed above. c) Enters "N/A" at the substep for 1-CH-P-1C ALT FEED breaker interlock test. **EVALUATOR'S NOTE:** **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 10: **CRITICAL TASK** EVALUATES ACCEPTANCE CRITERIA. *(Step 7.1.1, continued)* **STANDARD:** a) **Identifies on Attachment 2 that the value recorded for Outboard Vibration Horizontal (pt 22) is in the INOP range. (CRITICAL TASK)** b) Determines the acceptance criteria substep for Charging Pump Vibration is NOT MET. c) **Identifies on Attachment 4 that the value recorded for 1-CH-MOV-1286A Open stroke time exceeds the Acceptable Range Time. (CRITICAL TASK)** d) Determines the acceptance criteria substep for 1-CH-MOV-1286A open stroke time is NOT MET. **EVALUATOR'S NOTE:** • **Note:** The Candidate may identify the INOP pt 22 vibration during review of step 6.7.14. • **Note:** The Candidate may identify the 1-CH-MOV-1286A stroke time during review of step 6.6.1.f.3. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

STEP 11: DOCUMENTS TEST RESULTS. *(Step 7.1.2)* **STANDARD:** a) Places a check (√) at "Unsatisfactory" to document the test results. b) Places a check (√) at each of the substeps listed above. c) Enters "N/A" at the substep for 1-CH-P-1C ALT FEED breaker interlock test. **EVALUATOR'S NOTE:** **COMMENTS:**	_______ **SAT** _______ **UNSAT**
STEP 12: **CRITICAL TASK** EVALUATES ACCEPTANCE CRITERIA. *(Step 7.1.1, continued)* **STANDARD:** a) **Identifies on Attachment 2 that the value recorded for Outboard Vibration Horizontal (pt 22) is in the INOP range. (CRITICAL TASK)** b) Determines the acceptance criteria substep for Charging Pump Vibration is NOT MET. c) **Identifies on Attachment 4 that the value recorded for 1-CH-MOV-1286A Open stroke time exceeds the Acceptable Range Time. (CRITICAL TASK)** d) Determines the acceptance criteria substep for 1-CH-MOV-1286A open stroke time is NOT MET. **EVALUATOR'S NOTE:** • **Note:** The Candidate may identify the INOP pt 22 vibration during review of step 6.7.14. • **Note:** The Candidate may identify the 1-CH-MOV-1286A stroke time during review of step 6.6.1.f.3. **COMMENTS:**	_______ **SAT** _______ **UNSAT**

<table>
<tr><td>

STEP 13:

REPORTS TO SHIFT MANAGER. *(Step 7.2.1)*

STANDARD:

a) Informs Shift Manager that 1-OPT-CH-001 result is UNSAT.
b) Evaluates Tech Specs for applicability.

EVALUATOR'S NOTE:

- **If the Candidate only reports the status of 1-OPT-CH-001,** direct the Candidate to review Tech Specs for applicability and record their result, along with the reason a Tech Spec LCO is/is not applicable, in the Comments section of Section 7.3.

COMMENTS:

</td><td>

_______ **SAT**

_______ **UNSAT**

</td></tr>
<tr><td>

STEP 14: **CRITICAL TASK**

REVIEWS TECH SPECS FOR APPLICABILITY.

STANDARD:

a) Determines the "B" and "C" Charging pumps are operable, with each Charging Pump aligned to one of the two emergency buses (i.e. two trains operable).
b) Determines a Tech Spec LCO is NOT in effect, based on having an OPERABLE Charging Pump powered by each train of emergency bus power (two trains) per Technical Specifications. (CRITICAL TASK)
c) Records their Tech Spec determination in the Comments section of Section 7.3.

EVALUATOR'S NOTE:

- **If desired,** ask the Applicant to identify which Tech Spec LCO sections require Charging Pump operability. Answer: Tech Spec sections 3.2 and 3.3 require Charging Pump operability.

COMMENTS:

</td><td>

_______ **SAT**

_______ **UNSAT**

</td></tr>
</table>

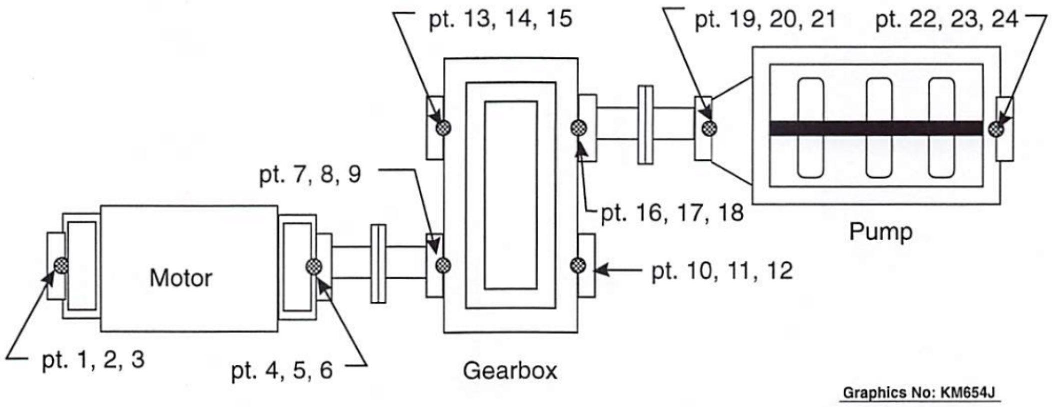
STOP TIME:

EXAMINER KEY

(Page 1 of 1)

Attachment 2

1-CH-P-1A VIBRATION, FLOW AND ΔP DATA TABLE (> 350°F)



NOTE: ⊗ Represents the Horizontal, Vertical, and Axial Accelerometer Pads Mounted on the Bearing Housing and Indicated in Yellow on the Pump/Driver Assembly.

VIBRATION TESTING POINTS

Parameters in ALERT range are considered SATISFACTORY. Parameters in INOP are UNSATISFACTORY.

PARAMETER	REF VALUE	TEST VALUE	ACCEPT RANGE	ALERT RANGE	INOP RANGE	STATUS SAT, INOP, ALERT
Δ P Step 6.7.12 (Ref. 2.3.29)	psid 2469	2518.5	2435 to 2641	NONE	< 2435 OR > 2641	SAT
Inboard Vibration Horizontal (pt 19) Vertical (pt 20) Axial (pt 21)	in/sec 0.1430 0.0593 0.0726	 0.144 0.070 0.102	 ≤ 0.325 ≤ 0.148 ≤ 0.181	 > 0.325 to ≤ 0.700 > 0.148 to ≤ 0.355 > 0.181 to ≤ 0.435	 > 0.700 > 0.355 > 0.435	SAT
Outboard Vibration Horizontal (pt 22) Vertical (pt 23) Axial (pt 24)	in/sec 0.1913 0.0909 0.0801	 0.739 0.049 0.086	 ≤ 0.325 ≤ 0.227 ≤ 0.200	 > 0.325 to ≤ 0.700 > 0.227 to ≤ 0.545 > 0.200 to ≤ 0.480	 > 0.700 > 0.545 > 0.480	SAT
Recirc Flow Rate Step 6.7.15	43 gpm	46	≥ 35 to ≤ 80 gpm	N/A	< 35 or > 80 gpm	SAT

EXAMINER KEY

(Page 1 of 1)

Attachment 4

MOV AND LUBE OIL TCV STROKE TIME DATA TABLE

Stroke Test - Closed

Step	Valve	Stroke Position	Reference Time	Acceptable Range Time	Actual Time
6.6.1.d/6.9.3.a	1-CH-MOV-1286A	Closed	7.4 sec	5.6 to 9.2 sec	8.04 Seconds
6.6.1.d/6.9.3.b	1-CH-MOV-1287A	Closed	5.6 sec	4.2 to 7.0 sec	5.66 Seconds
6.6.1.d/6.9.3.c	1-CH-MOV-1275A	Closed	8.9 sec	6.7 to 11.1 sec	8.69 Seconds

Stroke Test - Open

Step	Valve	Stroke Position	Reference Time	Acceptable Range Time	Actual Time
6.6.1.f/6.9.4.a	1-CH-MOV-1286A	Open	7.0 sec	5.3 to 8.7 sec	7.12 Seconds
6.6.1.f/6.9.4.b	1-CH-MOV-1287A	Open	4.6 sec	3.5 to 5.7 sec	7.02 Seconds
6.6.1.f/6.9.4.c	1-CH-MOV-1275A	Open	9.0 sec	6.8 to 11.2 sec	8.73 Seconds

Step 6.6.5	Test Position (Substep 6.6.5.i)	Stroke Time in Seconds (Substep 6.6.5.i)	Reference Time	Maximum Time	As Left Position (Substep 6.6.5.m)
1-SW-TCV-108A	OPEN	4.59 sec	4.8 sec	30.0 sec	CLOSED

Performed by: [signature] Signature M Initial M. TAYLOE Print [TODAY]

Operator Directions Handout
(TO BE READ TO APPLICANT BY EXAMINER)

Initial Conditions

- Both Units are at 100% power.
- The Unit 1 team is performing 1-OPT-CH-001, Charging Pump Operability And Performance Test For 1-CH-P-1A.
- All applicable portions of Section 6.0, Instructions, have been performed.
- After Section 6.0 was completed, Charging Pump manipulations were made and the current lineup is as follows:
  - 1-CH-P-1C is running.
  - 1-CH-P-1A and 1-CH-P-1B are secured and in AUTO.

Initiating Cues

- You are to review the completed portions of 1-OPT-CH-001 and perform Subsection 7.1.
- If the OPT is Sat, then complete Subsection 7.1 and another operator will complete the OPT paperwork.
- If the OPT is Unsat, then determine if a Tech Spec Clock is currently in effect (YES / NO), and record this in the Subsection 7.3 comments section. Include in the comments section the reason for your determination.

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Initial Conditions

- Both Units are at 100% power.
- The Unit 1 team is performing 1-OPT-CH-001, Charging Pump Operability And Performance Test For 1-CH-P-1A.
- All applicable portions of Section 6.0, Instructions, have been performed.
- After Section 6.0 was completed, Charging Pump manipulations were made and the current lineup is as follows:
  - 1-CH-P-1C is running.
  - 1-CH-P-1A and 1-CH-P-1B are secured and in AUTO.

Initiating Cues

- You are to review the completed portions of 1-OPT-CH-001 and perform Subsection 7.1.
- If the OPT is Sat, then complete Subsection 7.1 and another operator will complete the OPT paperwork.
- If the OPT is Unsat, then determine if a Tech Spec Clock is currently in effect (YES / NO), and record this in the Subsection 7.3 comments section. Include in the comments section the reason for your determination.

Surry Power Station

1-OPT-CH-001

Scheduled PT Cover Sheet

38103484035

Work Order: 38103484035

Procedure Number: 1-OPT-CH-001

Title: 84 Day Freq. PT: CH Pump Operability & Perf. Test for 1-CH-P-1A

Notes:

Mode Change: 0

Planner: Margaret Hangach

Supervisor:

Engineering Review: JOHN178 John Rayno

LAWRE19 Lawrence Mason

Schedule Date: 10/05/2021

Drop Dead Date: 10/12/2021

These dates reflect Maximo dates on the date printed.

Dates should be verified in Maximo.

Ext. Drop Date:

Printed on 10/05/2021

Actual Start Date & Time: ____________________

Actual Finish Date & Time: ____________________

Completed by DDD in Maximo? Yes_____ No_____

Satisfactory______ Unsatisfactory______

____

Departmental Signature

Grace Entry Date: 09/12/2021

EQ: N

RWP: Y

Scaffolding: N

PMT: N

Craft: OPER

Insulation: N

TAG: N

ASME: N

Dominion Energy **SURRY POWER STATION**	PROCEDURE NO: **1-OPT-CH-001**
	REVISION NO: **61**
PROCEDURE TYPE: **OPERATIONS PERIODIC TEST**	UNIT NO: **1**

PROCEDURE TITLE:

CHARGING PUMP OPERABILITY AND PERFORMANCE TEST FOR 1-CH-P-1A

IST	PMT	PSA	REACT MGT			

REVISION SUMMARY:

Revised to incorporate OPFB-2019-CA7509144:

- Added Technical Reference 2.3.33.
- Modified items in Special Tools and Equipment.
- Modified Steps in 6.10.1 and 6.10.2 to enhance lube oil sampling.

Revised in response to Operations Feedback, OP FB 2018-01702:

- Changed Predictive Analysis Group to Systems Engineering.

Revised to incorporate OP FB 14-0238:

- Changed increase to more frequently.

Revised to incorporate OP FB 2019-011801:

- Deleted IVs for Steps 6.3.2, 6.4.2, 6.5.8, 6.6.1.c, and 6.8.21.

CONTINUOUS USE

TABLE OF CONTENTS

TABLE OF CONTENTS

1.0 PURPOSE

1.1 To demonstrate and document satisfactory performance of 1-CH-P-1A, CHARGING PUMP, once each quarter. **(Ref. 2.4.6)**

1.2 To demonstrate and document satisfactory performance of 1-CH-P-1A, CHARGING PUMP, for Return To Service after maintenance.

1.3 To document that the System External Leakage is within limits once each quarter.

1.4 To test 1-CH-258, Charging Pump Discharge Check Valve, in the closed and open position once each quarter, or to determine backleakage as required.

1.5 To test 1-CH-256, Charging Pump Miniflow Recirc Check Valve, in the open position once each quarter, or to determine backleakage as required.

1.6 To test 1-CH-230, VCT Supply Discharge Check Valve, in the open position once each quarter.

1.7 To demonstrate and document satisfactory performance of 1-CH-P-1C, ALT FEED, damper / breaker interlocks once each year.

1.8 To demonstrate and document satisfactory stroke once each quarter of:

- 1-CH-MOV-1286A, CHG PUMP A DISCH NORM
- 1-CH-MOV-1275A, CHG PUMP MINIFLOW RECIRC VALVES PUMP A
- 1-CH-MOV-1287A, CHG PUMP A DISCH ALT

1.9 To demonstrate and document satisfactory stroke of 1-SW-TCV-108A once each quarter.

1.10 Performance of this procedure satisfies the requirements of Technical Specifications listed in Subsection 2.2 and the Inservice Testing Program Plan for Pumps and Valves.

2.0 REFERENCES

2.1 Source Documents

2.1.1 UFSAR Section 9.1, Chemical and Volume Control System

2.1.2 UFSAR Section 6.2, Safety Injection System

2.2 Technical Specifications Surry Power Station Units 1 and 2

2.2.1 Technical Specifications, Section 3.2.B.1.a.2, Charging Pump Operability

2.2.2 Technical Specifications, Section 3.2.B.1.b.2, Charging Pump Operability

2.2.3 Technical Specifications, Section 3.2.B.2, Unit 2 Charging Pump Availability

2.2.4 Technical Specifications, Section 3.3.A.3.a, Safety Injection Subsystem Operability

2.2.5 Technical Specification 6.4.I, Inservice Testing Program

2.2.6 Technical Specification, 4.11.C.2

2.2.7 Technical Specifications, Section 6.4.K, Systems Integrity

2.3 Technical References

2.3.1 Inservice Testing Program Plan for Pumps and Valves

2.3.2 EWR 93-064, MI Pumps Acceptance Criteria OMa-1988 Part 6 Code

2.3.3 1-NPT-ZZ-001, Quantification of External System Leakage

2.3.4 11448-FM-088B, Chemical and Volume Control System

2.3.5 11448-FM-71B, Sheet 1 and 2, Circulating and Service Water System

2.3.6 11448-FM-075C, Sheet 1, Compressed Air System

2.3.7 Deviation Report S-92-0948, 2-SW-124 Blockage

2.3.8 DCP 88-037-1, ASME Section XI Instruments

2.3.9 EWR 89-442, Evaluate CH Pump Lube Oil System

2.3.10 1-OPT-CH-002, Charging Pump Operability and Performance Test for 1-CH-P-1B

2.3.11 1-OPT-CH-003, Charging Pump Operability and Performance Test for 1-CH-P-1C

2.3.12 DCP 92-064, Charging Pump Logic Modifications

2.3.13 EWR 94-013, CH Pumps Acceptance Criteria during Shutdown

2.3.14 EWR 94-015, IST Valves Acceptance Criteria Stroke Time

2.3.15 DCP 92-27-3, Installation of new Instrument Air valve for stroke timing 1-SW-TCV-108A

2.3.16 Deviation Report S-95-1877, Charging Pump 2C recirc flow rate

2.3.17 Memo from BW/IP International, Inc to Terri Stahl, Virginia Electric Power Co., June 30, 1988.

2.3.18 DCP 95-006, Charging Pump Service Water Pipe Replacement

2.3.19 Engineering Transmittal (ET) No. S-96-0263, Rev. 0, Stroke Time Acceptance Criteria for 1-SW-TCV-108A, B, C and 2-SW-TCV-208A, B, C.

2.3.20 Engineering Transmittal (ET) No. S-97-0271, CH Pump IST Reference Value Change

2.3.21 Engineering Transmittal (ET) No. S-97-0280, CH Pump IST Reference Value Change

2.3.22 ET S-01-0167, New IST Reference Vibration for I-CH-P-1A

2.3.23 DCP 01-008, Instrument and Controls Upgrade Project, Unit 1

2.3.24 DCP 01-011, ERF Computer System Replacement/Surry/Unit 1 & 2

2.3.25 ET S-04-0068, Effect of Starting an Idle Charging Pump on RCS Boron Concentration

2.3.26 ET S-05-0016, IST Acceptance Criteria for Charging Pump 1-CH-P-1A

2.3.27 ASME OM Code, Section IST, Rules for Inservice Testing of Light-Water Reactor Nuclear Power Plants

2.3.28 ET-CME-07-0012, Evaluation of CH Pump Discharge Check Valve Backleakage

2.3.29 Calculation ME-0771, Rev. 3, Minimum Delivered HHSI Flow for LOCA and MSLB Analyses and CH/HHSI Pump Flow Test Acceptance Criteria, Surry 1 & 2

2.3.30 DC SU-10-00005, Charging Pump Recirculation MOV Manual Isolation Valve Modification

2.3.31 ETE-CME-2012-0004, Implementation of ME-0771, Rev. 3, Addendum C Results for Permissible HHSI / LHSI Check Valve Backleakage

2.3.32 Reference stroke time change for 1-CH-MOV-1286A 0-NSP-VE-001 dated February 2017

2.3.33 CR1114014, Potential trend identified with oil samples

2.4 Commitment Documents

2.4.1 Station Commitment Action Request Form (SCARF) 88-5188, Hydrogen Buildup in a Confined Area

2.4.2 CTS 1317, Charging Pump Operation

2.4.3 CTS 1801, Charging Pump Temperature Control Valve

2.4.4 CTS 635, Verify damper operation and testing

2.4.5 Safety Evaluation 91-238

2.4.6 CTS 1809, CH Pump Configuration Outside Design Basis

2.4.7 Station Deviation S-92-1515

2.4.8 CTS 2646, Technical Specification Amendment #199

2.4.9 CTS 3368, Revise procedures that quantify external loop leakage to add 7-day Administrative Clock in the event of unsatisfactory leakage levels

2.4.10 Station Deviation S-96-0803

2.4.11 DR S-97-0049, Self Assessment of In Service Testing Program

2.4.12 CTS 4675, Maintenance activity performed with no prior PSA evaluation

2.4.13 DR S-2000-0532, External Leakage Quantification

2.4.14 PI S-2001-0466, Maintenance activity performed with no prior PSA evaluation

2.4.15 PI S-2002-0044, Add OPs requirement for oil sampling

2.4.16 PI S-2002-3606, Procedural inconsistencies with venting CHG pumps

2.4.17 PI S-2003-0707, Wrong Oil Sample Volume

2.4.18 PI-S-2003-2106, Pumps in PTL When Sampling Oil

2.4.19 PI S-2004-1773, No oil flow to pump bearings

2.4.20 PI S-2004-0495 (OE 17609), Reactivity Excursion when starting CHG Pump

2.4.21 PI S-2005-4176, ITC-SA-05-18 In-Service Testing (IST) Program for Pumps

2.4.22 CR 9110, Evaluate Charging Pump Discharge Check Valve Criteria

2.4.23 ACE356, Determining Recirc Check Valve Backleakage

2.4.24 CR010705, High Aux Lube Oil Pump Discharge Pressure

2.4.25 CR507671, Procedure Difference for Drops to cc Conversion

2.4.26 CA 3047264, Evaluate Operator Log Specification for Charging Pump Aux Lube Oil Pump Output Pressure Range

Init Verif

3.0 INITIAL CONDITIONS

γ ____ 3.1 This procedure has PSA significance. IF this procedure is being performed on a day other than its POD scheduled date, THEN notify Shift Supervision that a PSA evaluation is required for the performance of this procedure. (**Ref. 2.4.14**)

γ ____ 3.2 Unit 1 is at stable conditions and no power changes are anticipated.

γ ____ 3.3 The Volume Control Tank (VCT) pressure is within the normal operating band (greater than 15 psig). Enter N/A if filling Charging Pump from RWST.

γ ____ 3.4 With the Reactor critical, at least two boron injection subsystems shall be operable for performance of this procedure IAW Technical Specification 3.2. Performance with less than two pumps operable may result in entry into a six hour LCO IAW Technical Specification 3.0.1 and will require FSRC approval before a procedure change is implemented.

4.0 PRECAUTIONS AND LIMITATIONS

γ ____ 4.1 No more than one Charging Pump may be tested at a time.

γ ____ 4.2 This procedure assumes at least two Charging Pumps are operable when the Reactor is critical. Other conditions may require re-evaluation of applicable LCOs to determine the most Limiting Condition.

γ ____ 4.3 The Charging Pump Miniflow Recirc Valves, 1-CH-MOV-1275A and 1-CH-MOV-1373, must remain open during pump operation to prevent pump damage during the performance of this test.

γ ____ 4.4 To prevent damage to the pump, a Charging Pump should not be operated more than three hours with both discharge valves closed.

γ 4.5 The Charging Pump should be shut down as soon as possible if any of the following temperature limits are exceeded:

- Oil Cooler outlet oil temperature upper operating limit is 160°F.
- Oil Cooler outlet oil temperature lower operating limit is 28°F. Oil misting has been observed with temperature less than 60°F. Misting is expected to stop as lube oil temperature rises. Routine pump starts should be avoided until the temperature is above 60°F and preferably in the normal operating band between 80°F and 120°F.
- The upper administrative limit for the Charging Pump bearings is 180°F.

γ 4.6 The under voltage trip of Charging Pump A is automatically enabled when Charging Pump C, NORM FEED, is Racked In and Charging Pump C, NORM FEED, breaker is closed. The under voltage trip of Charging Pump A is automatically disabled when Charging Pump C, NORM FEED, is Racked Out or Charging Pump C, NORM FEED, breaker is open.

γ 4.7 Simultaneous operation of two Charging Pumps below 350°F shall be limited to the time required to swap from one Charging Pump to another.

γ 4.8 Shifting of Charging Pumps shall not be performed when the RCS is solid.

γ 4.9 This OPT may be performed with either RHR in service or the Unit at normal RCS operating pressure with approximately 105 gpm letdown.

γ γ γ γ γ γ γ γ γ γ γ

4.10 The following Charging Pump Motor starting limitations must be observed to prevent motor damage:

- With the motor cold, TWO consecutive starts are allowed.
- With the motor hot, ONE stop and an immediate restart is allowed.

After either of the above conditions has occurred:

- Subsequent motor stop/start cycles may NOT be performed until the motor has been run for at least 15 minutes.

OR

- If the motor is stopped before the 15 minute run is complete, the motor shall stand idle for at least 60 minutes.

4.11 Shift Supervision shall be notified immediately if any malfunctions or abnormal conditions occur.

4.12 A dedicated Operator will be required to obtain oil samples in Subsection 6.10.

4.13 If the difference between RCS boron and Charging pump boron is greater than 360 ppm, the pump must be flushed before it is started to equalize boron concentration. This requirement ensures that the change in RCS temperature will be less than 0.2°F when the Charging pump is started. **(Ref. 2.4.20)**

4.14 The initials identification block in Subsection 7.3 must be completed before the procedure is closed out.

4.15 A Charging Pump may be started if Aux Lube Oil Pump discharge pressure is greater than 12 psig. In this case, a Condition Report shall be submitted. **(Ref. 2.4.24)**

4.16 Charging Pump breakers cannot be closed from the MCR while racked to the TEST position.

4.17 Subsections not required to be performed may be discarded.

5.0 SPECIAL TOOLS AND EQUIPMENT

5.1 Microlog Data Collector for vibration

5.2 Stopwatch, for leakage collection timing and stroke timing of MOVs and Lube Oil TCV

5.3 AirCet connection test fitting (only required if 1-SW-TCV-108A will be stroke tested)

5.4 HP approved catch container (for venting 1-CH-FT-1181)

5.5 Three 120 ml oil sample bottles and one flushing bottle

5.6 Two 120 ml bottles of motor replacement oil

5.7 One clean container of approximately 500 mls to purge drain line oil sample

Init **Verif**

6.0 INSTRUCTIONS

6.1 Work Preparation

NOTE: Charging pump discharge check valve data is found on the Surry Engineering Systems & Components webpage under System Monitoring Trends (CH).

γ ____ 6.1.1 IF check valve backleakage testing in Subsection 6.6 or 6.11 required, THEN obtain the most recent backleakage (ΔP) test results for 1-CH-267 (1-CH-P-1B) and 1-CH-276 (1-CH-P-1C).

1-CH-267 Backleakage 0,000 psid Date of Test 08/08/2021

1-CH-276 Backleakage 1.000 psid Date of Test 07/25/2021

γ ____ 6.1.2 Record the SQC Number and Cal Due Date for the Instrumentation and Test Equipment to be used on Attachment 1.

NOTE: This test may be performed at normal RCS operating pressure or with RHR in operation.

γ ____ 6.1.3 Check the RCS/RHR status on Attachment 1. Enter N/A if filling Charging Pump from RWST.

γ
______ 6.1.4 Check Plant Conditions with Shift Supervision and perform all the associated actions. (✓) Enter N/A for actions not taken.

Status (✓)		Action to be Performed
N/A γ	• 1-CH-P-1A needs to be filled and vented OR Maintenance has been performed	Perform Subsection 6.2
	• Stop 1-CH-P-1A and start 1-CH-P-1B (so 1-CH-P-1A may be stopped for testing)	Perform Subsection 6.3
	• Stop 1-CH-P-1A and start 1-CH-P-1C, NORM FEED (so 1-CH-P-1A may be stopped for testing)	Perform Subsection 6.4
	• Stop 1-CH-P-1A and start 1-CH-P-1C, ALT FEED (so 1-CH-P-1A may be stopped for testing) (Not applicable if ≥ 350°F and 450 psig)	Perform Subsection 6.5
	• Check Valve test or Stroke test MOVs and Lube Oil TCV (1-CH-P-1A must be stopped)	Perform Subsection 6.6 or Subsection 6.9 (MOV stroke only)
	• Performance test of 1-CH-P-1A only (1-CH-P-1A already running)	Perform Subsection 6.7
✓	• 1-CH-P-1A needs the Quarterly Test (1-CH-P-1A must be stopped)	Perform Subsections 6.6 and 6.7
N/A γ	• If Quarterly Test performed for the first time for the year then perform 1-CH-P-1C, ALT FEED, breaker damper logic test	Perform Subsection 6.8
	• Check backleakage on non-running Charging Pump discharge check valve (Not required for Normal Quarterly test)	Perform Subsection 6.11

6.2 Fill, Vent, and Return to Service Valve Alignment for 1-CH-P-1A

N/A

6.2.1 Have the Mechanics remove the blank flange and install the pump vent rig on the Charging Pump A casing vent flange. IF pump casing was NOT drained, THEN enter N/A for Steps 6.2.1 through 6.2.31.

6.2.2 Close or check closed 1-CH-ICV-3514, CH Pump 1A Suct PI-1187 Vent.

____ IV 6.2.3 Close 1-CH-244, Chg Pump A Disch Casing Drain.

____ IV 6.2.4 Close 1-CH-245, Chg Pump A Suct Casing Drain.

____ IV 6.2.5 Close 1-CH-401, Chg Pump A Casing Common Drain.

6.2.6 Check closed 1-CH-252, Chg Pump A Disch Casing Vent.

6.2.7 Check closed 1-CH-253, Chg Pump A Suct Casing Vent.

6.2.8 Check that the pump vent rig is installed.

NOTE: The Aux Lube Oil Pump may be started without SW aligned to allow pump shaft rotation during venting.

6.2.9 Check that the Charging Pump A gearbox oil level is in the operating range. (Gearbox oil level should be greater than $\frac{1}{4}$).

____ IV 6.2.10 Check closed or close 1-EP-BKR-1H1-2N, Bkr 1D, 1-CH-P-110A, Aux Lube Oil Pump.

6.2.11 Check or place Aux Lube Oil Pump in AUTO.

6.2.12 Check that 1-CH-PI-110A, Aux Lube Oil Pump Discharge Pressure, is between 4 psig and 12 psig. Record Lube Oil Pressure. Submit a Condition Report if Lube Oil Pressure is greater than 12 psig.

Lube Oil Pressure __________ psig

NOTE: A Charging Pump may be started if oil flow can not be checked to bearing(s). Contingency actions for monitoring bearing temperature are in place as a compensatory measure if pump will be started without oil flow to bearing(s).

N/A ___ 6.2.13 Check oil flow to the pump bearings. Enter N/A if flow can not be checked to bearing(s).

WARNING

- Explosion or fire could result if hydrogen from venting is allowed to build up in a Confined Area. (**Ref. 2.4.1**)
- Radioactive gases present during venting will not be removed by the vent rig. Pump venting must be done slowly to prevent a buildup of high radioactive gas concentrations.

___ 6.2.14 Notify Health Physics that Charging Pump venting will be performed.

___ 6.2.15 IF 0-MCM-0109-01 will be used to fill and vent the CHG pump, THEN enter N/A for Steps 6.2.16 through 6.2.27. Otherwise, enter N/A for this step.

6.2.16 Align Charging Pump suction source:

a. IF filling from VCT, THEN check open or open the following MOVs. Otherwise, enter N/A.

___ • 1-CH-MOV-1115C, CHG PUMP SUCTION FROM VCT

___ • 1-CH-MOV-1115E, CHG PUMP SUCTION FROM VCT

b. IF filling from RWST, THEN check open or open the following MOVs. Otherwise, enter N/A.

___ • 1-CH-MOV-1115B, CHG PUMP SUCTION FROM RWST

___ • 1-CH-MOV-1115D, CHG PUMP SUCTION FROM RWST

6.2.17 Check open or open 1-EP-BKR-1H1-2S, Bkr 7A, 1-CH-MOV-1267A, CHG PUMP A SUCT NORM.

NOTE: Continuous communication shall be established with the Control Room during the performance of the following three steps to prevent the loss of VCT level.

6.2.18 Manually throttle open (ten turns) 1-CH-MOV-1267A, CHG PUMP A SUCT NORM.

NOTE: If the Charging Pump seal was replaced while the pump was out of service, some seal leakage may occur until the seal becomes seated. A small amount of leakage should be considered normal.

6.2.19 Check the pump shaft seals and other valve and piping boundaries for leakage. IF leakage is identified, THEN isolate the leak, if possible, AND notify Shift Supervision.

NOTE: Be prepared to vent 1-CH-PI-1187 as soon as the casing has been vented.

6.2.20 Vent the Charging Pump A casing by performing the following:

a. Vent the Charging Pump A casing by slowly opening the vents until water issues from the vent.

1. 1-CH-252
2. 1-CH-253

b. WHEN water issues from the vent, THEN close the vent valves.

IV 1. 1-CH-252
IV 2. 1-CH-253

6.2.21 Vent 1-CH-PI-1187 by throttling open 1-CH-ICV-3514.
WHEN 1-CH-ICV-3514 is air free, THEN close 1-CH-ICV-3514.

N/A

6.2.22 Check closed or close 1-EP-BKR-1H1-2S, Bkr 7A, 1-CH-MOV-1267A, CHG PUMP A SUCT NORM.

6.2.23 Check closed or close 1-EP-BKR-1H1-2S, Bkr 8B, 1-CH-MOV-1267B, CHG PUMP A SUCT ALT.

6.2.24 Electrically open 1-CH-MOV-1267A.

6.2.25 Electrically open 1-CH-MOV-1267B.

6.2.26 Check electrical operability of 1-CH-MOV-1267A by cycling suction valve twice.

a. Stroke 1-CH-MOV-1267A closed and return to OPEN.

b. Stroke 1-CH-MOV-1267A closed and return to OPEN.

NOTE: Be prepared to vent 1-CH-PI-1187 as soon as the casing has been vented.

6.2.27 Vent the Charging Pump A casing by performing the following:

a. Vent the Charging Pump A casing by slowly opening the vents until water issues from the vent.

1. 1-CH-252

2. 1-CH-253

b. WHEN water issues from the vent, THEN close the vent valves.

1. 1-CH-252 ______ IV

2. 1-CH-253 ______ IV

6.2.28 IF 0-MCM-0109-01 was used to fill and vent CHG pump, THEN check that the Mechanics have completed fill and vent. Otherwise, enter N/A.

N/A ____ ____ IV

6.2.29 Vent 1-CH-PI-1187 by throttling open 1-CH-ICV-3514.
WHEN 1-CH-ICV-3514 is air free, THEN close 1-CH-ICV-3514 AND install vent cap.

____

6.2.30 Have the Mechanics remove the pump vent rig and install the blank flange on the Charging Pump A casing vent flange.

____

6.2.31 Have the Mechanics do Attachment 7 for venting of Charging Pump seals.
IF Mechanical Maintenance determines that seal venting is NOT required, THEN enter N/A for this step and have Mechanical Maintenance sign below, indicating concurrence that seal venting is NOT required.

Mechanical Maintenance	Date

6.2.32 Perform the following breaker manipulations.

____ ____ IV

a. Check closed or close 1-EP-BKR-1H1-2S, Bkr 7A, 1-CH-MOV-1267A, CHG PUMP A SUCT NORM.

____ ____ IV

b. Check closed or close 1-EP-BKR-1H1-2S, Bkr 8B, 1-CH-MOV-1267B, CHG PUMP A SUCT ALT.

____ ____ IV

c. Check closed or close 1-EP-BKR-1H1-2S, Bkr 5A, 1-CH-MOV-1286A, CHG PUMP A DISCH NORM.

____ ____ IV

d. Check closed or close 1-EP-BKR-1H1-2S, Bkr 5C, 1-CH-MOV-1287A, CHG PUMP A DISCH ALT.

____ ____ IV

e. Check closed or close 1-EP-BKR-1H1-2N, Bkr 2B, 1-CH-MOV-1275A, CHG PUMP MINIFLOW RECIRC VALVES PUMP A.

____ ____ IV

6.2.33 Check closed or close 1-EP-BKR-1H1-2N, Bkr 1D, 1-CH-P-110A, Aux Lube Oil Pump. Enter N/A if Aux Lube Oil Pump already running.

N/A ɣ ____ 6.2.34 Perform the following:

____ a. Check open or open 1-CH-MOV-1267A.

____ b. Check open or open 1-CH-MOV-1267B.

____ c. Check open or open 1-CH-MOV-1286A.

____ d. Check open or open 1-CH-MOV-1287A.

____ e. Check open or open 1-CH-MOV-1275A.

____ ____ IV 6.2.35 Check closed or close 1-SW-188, Chg Pump LO Clr 5A SW Outlet Drain. IF pump Service Water was NOT tagged out, THEN enter N/A for Steps 6.2.35 through Step 6.2.42.

____ 6.2.36 Check removed or remove the hose from 1-SW-188.

____ ____ IV 6.2.37 Check closed or close 1-SW-166, Chg Pump LO Clr 5A SW Inlet Vent.

____ ____ IV 6.2.38 Check closed or close 1-SW-187, Chg Pump LO Clr 5A SW Inlet Drain.

____ ____ IV 6.2.39 Check closed or close 1-SW-164, Chg Pump LO Clr 5A SW Outlet Vent.

____ ____ IV 6.2.40 Check open or open 1-SW-121, Chg Pump LO Clr 5A SW Inlet.

____ 6.2.41 Vent air from the LO Clr Service Water System by opening vent valve 1-SW-166 until water issues from the vent and then close the vent. IF Service Water Cooling Water was not drained, THEN enter N/A.

____ ____ IV 6.2.42 Check open or open 1-SW-895, Chg Pump LO Clr 5A SW Outlet.

N/A ______ ______ IV

6.2.43 Check open or open 1-CC-765, Chg Pump A Seal Clr CC Inlet.

______ ______ IV

6.2.44 Check open or open 1-CC-997, Chg Pump A Flow Meter Inlet.

______ ______ IV

6.2.45 Throttle 1-CC-770, Chg Pump A Seal Clr CC Flowmeter Outlet, to greater than or equal to 7.5 gpm. (Charging Pump CC flow should be throttled to balance total flow approximately equally between pumps.)

______ ______ IV

6.2.46 Check locked open or lock open on backseat 1-CH-758, 1-CH-MOV-1275A Manual Isolation Valve.

______ ______ IV

6.2.47 Check open or open 1-CH-254, Chg Pump A Disch Hdr Sample Isol.

______

6.2.48 Check that the Charging Pump A gearbox oil level is in the operating range. (Gearbox oil level should be greater than $\frac{1}{4}$). Enter N/A for Steps 6.2.48 through 6.2.51 if Aux Lube Oil Pump already running.

______

6.2.49 Check or place Aux Lube Oil Pump in AUTO.

______

6.2.50 Check that 1-CH-PI-110A, Aux Lube Oil Pump Discharge Pressure, is between 4 psig and 12 psig. Record Lube Oil Pressure. Submit a Condition Report if Lube Oil Pressure is greater than 12 psig.

Lube Oil Pressure ___________ psig

NOTE: A Charging Pump may be started if oil flow can not be checked to bearing(s). Contingency actions for monitoring bearing temperature are in place as a compensatory measure if pump will be started without oil flow to bearing(s).

______

6.2.51 Check oil flow to the pump bearings. Enter N/A if flow can not be checked to bearing(s).

N/A ____ 6.2.52 IF 1-CH-P-1A is already connected to the Bus, THEN enter N/A for Steps 6.2.53 and 6.2.54. Otherwise, enter N/A for this step.

____ 6.2.53 Check or place 1-CH-P-1A in PTL.

6.2.54 Rack 1-EP-BKR-15H5, 1-CH-P-1A, CHARGING PUMP, to the CONNECT position by performing the following:

____ ____ IV a. Check that the ground straps for 1-EP-BKR-15H5 have been removed.

____ ____ IV b. Check that the charging spring motor toggle switch for 1-EP-BKR-15H5 is ON.

N/A ____ ____ IV c. Rack 1-EP-BKR-15H5, 1-CH-P-1A, to CONNECT.

6.3 Placing 1-CH-P-1B in Service and Stopping 1-CH-P-1A

6.3.1 Check that the following isolation valves are OPEN:

N/A ______ IV

a. 1-CH-MOV-1269A, CHG PUMP B SUCT NORM

______ ______ IV

b. 1-CH-MOV-1269B, CHG PUMP B SUCT ALT

______ ______ IV

c. 1-CH-MOV-1286B, CHG PUMP B DISCH NORM

______ ______ IV

d. 1-CH-MOV-1287B, CHG PUMP B DISCH ALT

______ ______ IV

e. 1-CH-MOV-1275B, CHG PUMP MINIFLOW RECIRC VALVES PUMP B

______ ______ IV

f. 1-CH-MOV-1373, CHG MINIFLOW RECIRC

______

6.3.2 Check locked open and on backseat 1-CH-759, 1-CH-MOV-1275B Manual Isolation Valve.

______

6.3.3 Check proper gear box and motor oil levels. (Oil levels should be greater than $\frac{1}{4}$).

______

6.3.4 IF the difference between RCS boron and Charging pump boron is greater than 360 ppm, OR it is desired to flush to further reduce boron differential, THEN initiate Attachment 8. Otherwise, enter N/A. **(Ref. 2.4.20)**

N/A ____ 6.3.5 Check that Aux Lube Oil Pump Discharge Pressure is between 4 psig and 12 psig as indicated on 1-CH-PI-110B. Record Lube Oil Pressure. Submit a Condition Report if Lube Oil Pressure is greater than 12 psig.

Lube Oil Pressure __________ psig

NOTE: A Charging Pump may be started if oil flow can not be checked to bearing(s). Contingency actions for monitoring bearing temperature are in place as a compensatory measure if pump will be started without oil flow to bearing(s).

____ 6.3.6 Check oil flow to the pump bearings. Enter N/A if flow can not be checked to bearing(s).

____ 6.3.7 Record Lube Oil Temperature from 1-CH-TI-110B. Submit a Condition Report if Lube Oil Temperature is less than 60°F or greater than 120°F.

Lube Oil Temperature ____________________ °F

____ 6.3.8 Check that the Auxiliary Building Operator has determined that 1-CH-P-1B is ready to start and that all personnel are clear of the shaft.

CAUTION

- To ensure Tech Spec compliance, simultaneous operation of two Charging Pumps below 350°F shall be limited to the time required to swap from one Charging Pump to another. **(Ref. 2.4.2)**
- To prevent bearing damage, if pump bearing oil flow can NOT be checked, bearing temperature must be monitored closely upon pump start. If temperature rise greater than 30°F is observed during first minute of pump operation, the pump must be secured immediately.

____ 6.3.9 Start 1-CH-P-1B.

____ 6.3.10 Check Chg Pump AMPS stabilize between 50 amps and 65 amps.

N/A ___ 6.3.11 IF pump started with no bearing oil flow observed prior to start, THEN do the following. Otherwise, enter N/A.

- Immediately after pump start, have Aux Building operator check oil flow. IF no oil flow observed, THEN immediately secure 1-CH-P-1B.

- Monitor temperature of pump bearing with no observable oil flow on PCS. IF temperature rises greater than 30°F during first minute of pump operation, THEN immediately secure 1-CH-P-1B.

___ 6.3.12 Check that 1-VS-MOD-101B, Charging Pump Ventilation Suction Motor Operated Damper, is open.

___ 6.3.13 Stop 1-CH-P-1A. IF less than 350°F and 450 psig, THEN place the Control Switch in PTL.

___ 6.3.14 Monitor Charging Pump B bearing temperatures on the Plant computer.

___ 6.3.15 IF either of the following temperature limits is exceeded when the Charging Pump is operating, THEN monitor the pump for degradation as soon as possible by performance of 1-OPT-CH-002, Charging Pump Operability and Performance Test for 1-CH-P-1B.

- Oil Cooler outlet oil temperature - 160°F

- Charging Pump bearing temperature - 180°F

___ 6.3.16 Check that the Aux Lube Oil Pump is stopped.

___ 6.3.17 Check that Lube Oil Pump Discharge Pressure is between 8 psig and 35 psig as indicated on 1-CH-PI-110B. Record Lube Oil Pressure.

Lube Oil Pressure __________ psig

___ 6.3.18 WHEN Charging Pump Lube Oil temperatures have stabilized, THEN check that the TCV is controlling Lube Oil temperature between 100°F and 120°F. **(Ref. 2.4.3)**

N/A 6.3.19 Check that the Aux Lube Oil Pump for 1-CH-P-1A is running with a Lube Oil Pump Discharge Pressure between 4 psig and 12 psig. Record Lube Oil Pressure. Submit a Condition Report if Lube Oil Pressure is greater than 12 psig.

Lube Oil Pressure __________ psig (1-CH-PI-110A)

____ 6.3.20 Check that 1-VS-MOD-101A, 1-CH-P-1A Charging Pump Ventilation Suction Motor Operated Damper, is closed.

6.4 Placing 1-CH-P-1C, NORM FEED, in Service and Stopping 1-CH-P-1A

N/A

6.4.1 Check that the following isolation valves are open:

_____ _____ IV a. 1-CH-MOV-1270A, CHG PUMP C SUCT NORM

_____ _____ IV b. 1-CH-MOV-1270B, CHG PUMP C SUCT ALT

_____ _____ IV c. 1-CH-MOV-1286C, CHG PUMP C DISCH NORM

_____ _____ IV d. 1-CH-MOV-1287C, CHG PUMP C DISCH ALT

_____ _____ IV e. 1-CH-MOV-1275C, CHG PUMP MINIFLOW RECIRC VALVES PUMP C

_____ _____ IV f. 1-CH-MOV-1373, CHG MINIFLOW RECIRC

_____ 6.4.2 Check locked open and on backseat 1-CH-760, 1-CH-MOV-1275C Manual Isolation Valve.

_____ 6.4.3 Check proper gear box and motor oil levels. (Oil levels should be greater than $\frac{1}{4}$).

_____ 6.4.4 IF the difference between RCS boron and Charging pump boron is greater than 360 ppm, OR it is desired to flush to further reduce boron differential, THEN initiate Attachment 8. Otherwise, enter N/A. **(Ref. 2.4.20)**

_____ 6.4.5 Check that Aux Lube Oil Pump Discharge Pressure is between 4 psig and 12 psig is indicated on 1-CH-PI-110C. Record Lube Oil Pressure. Submit a Condition Report if Lube Oil Pressure is greater than 12 psig.

Lube Oil Pressure _________ psig (1-CH-PI-110C)

NOTE: A Charging Pump may be started if oil flow can not be checked to bearing(s). Contingency actions for monitoring bearing temperature are in place as a compensatory measure if pump will be started without oil flow to bearing(s).

N/A ______ 6.4.6 Check oil flow to the pump bearings. Enter N/A if flow can not be checked to bearing(s).

______ 6.4.7 Record Lube Oil Temperature from 1-CH-TI-110C. Submit a Condition Report if Lube Oil Temperature is less than 60°F or greater than 120°F.

Lube Oil Temperature ____________________ °F

______ 6.4.8 Check that the Auxiliary Building Operator has determined that Charging Pump C is ready to start and that all personnel are clear of the shaft.

______ 6.4.9 IF the RCS is equal to or greater than 350°F and 450 psig, THEN check that 1-CH-P-1B is NOT in PTL.

CAUTION

- To ensure Tech Spec compliance, simultaneous operation of two Charging Pumps below 350°F shall be limited to the time required to swap from one Charging Pump to another. **(Ref. 2.4.2)**
- To prevent bearing damage, if pump bearing oil flow can NOT be checked, bearing temperature must be monitored closely upon pump start. If temperature rise greater than 30°F is observed during first minute of pump operation, the pump must be secured immediately.

______ 6.4.10 Start 1-CH-P-1C, NORM FEED.

______ 6.4.11 Check Chg Pump AMPS stabilize between 50 amps and 65 amps.

N/A ______ 6.4.12 IF pump started with no bearing oil flow observed prior to start, THEN do the following. Otherwise, enter N/A.

- Immediately after pump start, have Aux Building operator check oil flow. IF no oil flow observed, THEN immediately secure 1-CH-P-1C.
- Monitor temperature of pump bearing with no observable oil flow on PCS. IF temperature rises greater than 30°F during first minute of pump operation, THEN immediately secure 1-CH-P-1C.

______ 6.4.13 Check that 1-VS-MOD-101C, Charging Pump Ventilation Suction Motor Operated Damper, is open.

______ 6.4.14 Stop 1-CH-P-1A. IF less than 350°F and 450 psig, THEN place the Control Switch in PTL.

______ 6.4.15 Monitor Charging Pump C bearing temperatures on the Plant computer.

______ 6.4.16 IF either of the following temperature limits is exceeded when the Charging Pump is operating, THEN monitor the pump for degradation as soon as possible by performance of 1-OPT-CH-003, Charging Pump Operability and Performance Test for 1-CH-P-1C.

- Oil Cooler outlet oil temperature - 160°F
- Charging Pump bearing temperature - 180°F

______ 6.4.17 Check that the Aux Lube Oil Pump for 1-CH-P-1C is stopped.

______ 6.4.18 Check that Lube Oil Pump discharge pressure is between 8 psig and 25 psig as indicated on 1-CH-PI-110C. Record Lube Oil Pressure.

Lube Oil Pressure __________ psig

______ 6.4.19 WHEN Charging Pump Lube Oil temperatures have stabilized, THEN check that the TCV is controlling Lube Oil temperature between 100°F and 120°F. **(Ref. 2.4.3)**

N/A

6.4.20 Check that the Aux Lube Oil Pump for 1-CH-P-1A is running with a Lube Oil Pump Discharge Pressure between 4 psig and 12 psig. Record Lube Oil Pressure. Submit a Condition Report if Lube Oil Pressure is greater than 12 psig.

Lube Oil Pressure__________ psig (1-CH-PI-110A)

6.4.21 Check that 1-VS-MOD-101A, 1-CH-P-1A Charging Pump Ventilation Suction Motor Operated Damper, is closed.

6.5 Placing 1-CH-P-1C, ALT FEED, in Service and Stopping 1-CH-P-1A

CAUTION

To ensure Tech Spec compliance, simultaneous operation of two Charging Pumps below 350°F shall be limited to the time required to swap from one Charging Pump to another. **(Ref. 2.4.2)**

N/A ____ 6.5.1 Check the RCS is less than 350°F and 450 psig.

6.5.2 Check or place the following Charging Pump Control Switches in PTL:

____ a. 1-CH-P-1B, CHARGING PUMP B

____ b. 1-CH-P-1C, CHARGING PUMP C NORM FEED

____ c. 1-CH-P-1C, CHARGING PUMP C ALT FEED

____ 6.5.3 Check the following pump and damper checks:

Pump	Aux LO Pump Running	Aux LO Pump Pressure (psig)	Ventilation Damper Closed	Initials
1-CH-P-1C	Yes	4 psig to 12 psig ______ psig	Closed	
1-CH-P-1B	Yes	4 psig to 12 psig ______ psig	Closed	

6.5.4 Rack 1-EP-BKR-15J5, 1-CH-P-1B CHARGING PUMP, to DISCONNECT as follows:

____ ____ IV a. Check that the mechanical position indicator for 1-EP-BKR-15J5 indicates OPEN with a green flag.

____ ____ IV b. Rack 1-EP-BKR-15J5, 1-CH-P-1B CHARGING PUMP, to DISCONNECT.

6.5.5 Rack 1-EP-BKR-15H6, 1-CH-P-1C CHARGING PUMP C NORM FEED, to DISCONNECT as follows:

N/A ______ IV a. Check that the mechanical position indicator for 1-EP-BKR-15H6 indicates OPEN with a green flag.

______ ______ IV b. Rack 1-EP-BKR-15H6, 1-CH-P-1C NORM FEED, to DISCONNECT.

CAUTION

Racking in Breaker 15J2 (1-CH-P-1C ALT FEED) will trip/lockout Breaker 15H6 (1-CH-P-1C NORM FEED) and Breaker 15J5 (1-CH-P-1B).

6.5.6 Rack 1-EP-BKR-15J2, 1-CH-P-1C CHARGING PUMP C ALT FEED, to CONNECT as follows:

______ ______ IV a. Check that the ground straps for 1-EP-BKR-15J2 have been removed.

______ ______ IV b. Check that the charging spring motor toggle switch for 1-EP-BKR-15J2 is ON.

______ ______ IV c. Rack 1-EP-BKR-15J2, 1-CH-P-1C ALT FEED, to CONNECT.

______ d. Check annunciators 1D-F6, CHG PP 1B 15J5 LOCKOUT and 1D-G6, CHG PP 1C 15H6 LOCKOUT received.

N/A

6.5.7 Check that the following isolation valves are open:

_____ _____ IV
a. 1-CH-MOV-1270A, CHG PUMP C SUCT NORM

_____ _____ IV
b. 1-CH-MOV-1270B, CHG PUMP C SUCT ALT

_____ _____ IV
c. 1-CH-MOV-1286C, CHG PUMP C DISCH NORM

_____ _____ IV
d. 1-CH-MOV-1287C, CHG PUMP C DISCH ALT

_____ _____ IV
e. 1-CH-MOV-1275C, CHG PUMP MINIFLOW RECIRC VALVES

_____ _____ IV
f. 1-CH-MOV-1373, CHG MINIFLOW RECIRC

_____ 6.5.8 Check locked open and on backseat 1-CH-760, 1-CH-MOV-1275C Manual Isolation Valve.

_____ 6.5.9 Check proper gear box and motor oil levels. (Oil levels should be greater than $\frac{1}{4}$).

_____ 6.5.10 IF the difference between RCS boron and Charging pump boron is greater than 360 ppm, OR it is desired to flush to further reduce boron differential, THEN initiate Attachment 8. Otherwise, enter N/A. **(Ref. 2.4.20)**

_____ 6.5.11 Check that Aux Lube Oil Pump Discharge Pressure is between 4 psig and 12 psig as indicated on 1-CH-PI-110C. Record Lube Oil Pressure. Submit a Condition Report if Lube Oil Pressure is greater than 12 psig.

Lube Oil Pressure__________ psig

NOTE: A Charging Pump may be started if oil flow can not be checked to bearing(s). Contingency actions for monitoring bearing temperature are in place as a compensatory measure if pump will be started without oil flow to bearing(s).

N/A ____ 6.5.12 Check oil flow to the pump bearings. Enter N/A if flow can not be checked to bearing(s).

____ 6.5.13 Record Lube Oil Temperature from 1-CH-TI-110C. Submit a Condition Report if Lube Oil Temperature is less than 60°F or greater than 120°F.

Lube Oil Temperature ____________________ °F

____ 6.5.14 Check that the Auxiliary Building Operator has determined that Charging Pump C is ready to start and that all personnel are clear of the shaft.

CAUTION

To prevent bearing damage, if pump bearing oil flow can NOT be checked, bearing temperature must be monitored closely upon pump start. If temperature rise greater than 30°F is observed during first minute of pump operation, the pump must be secured immediately.

____ 6.5.15 Start 1-CH-P-1C ALT FEED.

____ 6.5.16 Check Chg Pump AMPS stabilize between 50 amps and 65 amps.

6.5.17 IF pump started with no bearing oil flow observed prior to start, THEN do the following. Otherwise, enter N/A.

____ • Immediately after pump start, have Aux Building operator check oil flow. IF no oil flow observed, THEN immediately secure 1-CH-P-1C.

____ • Monitor temperature of pump bearing with no observable oil flow on PCS. IF temperature rises greater than 30°F during first minute of pump operation, THEN immediately secure 1-CH-P-1C.

N/A ____ 6.5.18 Check that 1-VS-MOD-101C, Charging Pump Ventilation Suction Motor Operated Damper, is open.

____ 6.5.19 Stop 1-CH-P-1A and return switch to PTL.

____ a. Check that the Aux Lube Oil Pump for 1-CH-P-1A is running with a Lube Oil Pump Discharge Pressure between 4 psig and 12 psig. Record Lube Oil Pressure. Submit a Condition Report if Lube Oil Pressure is greater than 12 psig.

Lube Oil Pressure _______ psig (1-CH-PI-110A)

____ b. Check that 1-VS-MOD-101A, 1-CH-P-1A Charging Pump Ventilation Suction Motor Operated Damper, is closed.

____ 6.5.20 Monitor Charging Pump C bearing temperatures on the Plant computer.

____ 6.5.21 IF either of the following temperature limits is exceeded when the Charging Pump is operating, THEN monitor the pump for degradation as soon as possible by performance of 1-OPT-CH-003, Charging Pump Operability and Performance Test for 1-CH-P-1C.

- Oil Cooler outlet oil temperature - 160°F
- Charging Pump bearing temperature - 180°F

____ 6.5.22 Check that the 1-CH-P-1C Aux Lube Oil Pump is stopped.

____ 6.5.23 Check that Lube Oil Pump discharge pressure is between 8 psig and 25 psig as observed on 1-CH-PI-110C. Record Lube Oil Pressure.

Lube Oil Pressure __________ psig

____ 6.5.24 Check the system for leaks. IF leakage is found, THEN isolate the leak, if possible, AND notify Shift Supervision.

____ 6.5.25 WHEN Charging Pump Lube Oil temperatures have stabilized, THEN check that the TCV is controlling Lube Oil temperature between 100°F and 110°F. (**Ref.** 2.3.16) (**Ref. 2.4.3**)

6.6 Discharge Check Valve Test, MOV Timing, Lube Oil TCV Timing and Starting 1-CH-P-1A

NOTE: Steps 6.6.1 through 6.6.9 may be performed simultaneously.

γ ____ 6.6.1 Test the charging pump discharge check valve, the stroke time of MOVs and Lube Oil TCV by performing the following. IF Check Valve testing, MOV stroke time testing, and Lube Oil TCV stroke time testing do NOT have to be performed, THEN enter N/A for steps in this subsection.

NOTE:
- If individual MOV(s) being returned to service, Subsection 6.9 may be used, if desired.
- If only one other Charging Pump is operable, the performance of the following substep will result in the entry into a Tech Spec LCO clock due to operating with less than the minimum number of operable Charging Pumps.

γ ____ a. Check 1-CH-P-1A stopped and place pump in PTL.

b. Check open the following isolation valves:

γ ____ β ____ IV 1. 1-CH-MOV-1267A, CHG PUMP A SUCT NORM

γ ____ β ____ IV 2. 1-CH-MOV-1267B, CHG PUMP A SUCT ALT

γ ____ β ____ IV 3. 1-CH-MOV-1286A, CHG PUMP A DISCH NORM

γ ____ β ____ IV 4. 1-CH-MOV-1287A, CHG PUMP A DISCH ALT

γ ____ β ____ IV 5. 1-CH-MOV-1275A, CHG PUMP MINIFLOW RECIRC VALVES PUMP A

γ ____ 6. 1-CH-MOV-1373, CHG MINIFLOW RECIRC

6.6.1 (continued)

μ ____ c. Check locked open or lock open on backseat 1-CH-758, 1-CH-MOV-1275A Manual Isolation Valve.

NOTE: Full stroke time is defined as the interval from initiation of the actuating signal (initiation of manual actuation of the control panel switch) to the end of the actuating cycle (final control panel light extinguished).

d. From the Control Room, close the following. Using Control Room indication, check each valve travels from full open to full closed. Record time required for each valve to travel closed on Attachment 4.

γ ____ 1. Close and time 1-CH-MOV-1286A, CHG PUMP A DISCH NORM.

γ ____ 2. Close and time 1-CH-MOV-1287A, CHG PUMP A DISCH ALT.

γ ____ 3. Close and time 1-CH-MOV-1275A, CHG PUMP MINIFLOW RECIRC VALVES PUMP A.

γ ____ 4. Close 1-CH-MOV-1267A, CHG PUMP A SUCT NORM. (Valve exercise only. Do not record the stroke time on Attachment 4.)

γ ____ e. Record discharge pressure of running Charging pump from Plant Computer Point P0142A, Chg Pump Discharge Header Press or the normal discharge gauge on Attachment 1.

f. From the Control Room, open the following. Using Control Room indication, check each valve travels from full closed to full open. Record time required for each valve to travel open on Attachment 4.

γ ____ 1. Open 1-CH-MOV-1267A, CHG PUMP A SUCT NORM. (Valve exercise only. Do not record the stroke time on Attachment 4.)

γ ____ 2. Open and time 1-CH-MOV-1275A, CHG PUMP MINIFLOW RECIRC VALVES PUMP A.

6.6.1.f (continued)

3. Open and time 1-CH-MOV-1286A, CHG PUMP A DISCH NORM. <u>WHEN</u> 1-CH-MOV-1286A is opened, <u>THEN</u> check the following parameters indicate no charging pump discharge check valve leakage: (✓)

   ✓ Record discharge pressure of running pump on Attachment 1 using the instrument used in Substep 6.6.1.e.

NOTE: The following are additional parameters to assist the System Engineer in determining the magnitude of check valve leakage, however the acceptance criteria is not based on these parameters.

   ✓ 1D-E5, CHRG PP TO REGEN HX HI-LO FLOW <u>NOT</u> <u>LIT</u>.

   ✓ 1D-F5, CHRG PP TO REGEN HX LO PRESS <u>NOT</u> <u>LIT</u>.

   ✓ CHG PUMP AMPS do not rise.

   ✓ <u>IF</u> Plant Computer point F0128A, Charging Header Flow, is being trended, <u>THEN</u> check that charging flow does not lower.

4. Open and time 1-CH-MOV-1287A, CHG PUMP A DISCH ALT.

NOTE: Values less than 5.4 psid include ANY negative values.

g. Calculate the Discharge Pressure Differential on Attachment 1. (If the differential is less than or equal to 5.4 psid, the close test for 1-CH-258, Charging Pump A Discharge Check Valve, is satisfactory, and 1-CH-256 backleakage is acceptable)

N/A

h. <u>IF</u> the differential is greater than 5.4 psid, <u>THEN</u> add the HIGHEST backleakage (ΔP) value recorded in Step 6.1.1 to backleakage from Step 6.6.1.g and calculate on Attachment 1. (If the total differential is less than or equal to 10.8 psid, the close test for 1-CH-258, Charging Pump A Discharge Check Valve, is satisfactory, and 1-CH-256 backleakage is acceptable). Otherwise, enter N/A.

M

6.6.2 Check 1-CH-P-110A, Auxiliary Oil Pump, is running with pressure on 1-CH-PI-110A, Aux Lube Oil Pump Discharge Pressure, between 4 psig and 12 psig. IF Lube Oil Pressure is greater than 12 psig, THEN submit a Condition Report.

M

6.6.3 Record Lube Oil Temperature from 1-CH-TI-110A, CHG Pump 1A Gearbox LO Sup Temp Ind. IF Lube Oil Temperature is less than 60°F or greater than 120°F, THEN submit a condition report.

Lube Oil Temperature 91 °F

NOTE: For a Charging Pump which has just been shut down, the respective TCV will normally remain open or throttled until the oil temperature has been reduced below the operating range of 100°F to 120°F.

6.6.4 Evaluate status of 1-SW-TCV-108A and perform the corresponding actions. (✓) Enter N/A for actions not taken.

Status	Criteria	Actions	Initials
✓	1-SW-TCV-108A Closed	Continue with Step 6.6.5.	M
N/A Y	1-SW-TCV-108A Not full closed	a) IF 1-CH-P-1A was recently shut down AND 1-SW-TCV-108A remains partially open, THEN wait until 1-SW-TCV-108A goes full closed AND continue with Step 6.6.5.	N/A M
		b) IF 1-CH-P-1A was NOT recently shut down, THEN adjust controller until 1-SW-TCV-108A closes AND continue with Step 6.6.5.	
		c) IF 1-SW-TCV-108A can NOT be closed by adjusting controller, THEN write a Condition Report AND do NOT continue until 1-SW-TCV-108A is operational.	

6.6.5 Stroke test 1-SW-TCV-108A by performing the following:

M a. Obtain the AirCet test fitting.

M b. Check 1-CH-P-1A stopped.

M c. Close or check closed the valve on the AirCet test fitting.

6.6.5 (continued)

NOTE: The test fitting must be connected at the proper disconnect fitting. If the AirCet test fitting is connected to the wrong disconnect, then the valve will open, however, the stroke time will be significantly longer. (Ref. **2.4.10**)

M d. Connect the AirCet test fitting to the quick disconnect fitting on the air supply tubing leading to 1-SW-TCV-108A actuator dome.

M e. Check closed 1-SW-TCV-108A.

M f. Station an operator to track the stroke time of 1-SW-TCV-108A.

M g. Close 1-IA-1600, Chg Pump A 1-SW-TCV-108A Positioner IA Isol.

NOTE: Stroke time is defined as the time required for the valve local position indicator to travel to the opposite extreme. Stroke timing will start when stem starts to move.

M h. Quickly open the isolation valve on the AirCet test fitting and begin timing.

NOTE: The TCV is open at greater than or equal to 87.5%. (14/16 on position indicator)

M i. Check 1-SW-TCV-108A opens, as indicated on the local position indicator. Record the stroke time and Test position on Attachment 4.

M j. Close the isolation valve on the AirCet test fitting.

M k. Remove the AirCet test fitting from 1-SW-TCV-108A.

M M
IV

l. Open 1-IA-1600.

6.6.5 (continued)

M m. Check 1-SW-TCV-108A strokes fully closed and record the As Left position on Attachment 4. IF 1-SW-TCV-108A does NOT fully close, THEN initiate a Condition Report to check the operation of the controller.

N/A M 6.6.6 IF the controller for 1-SW-TCV-108A was adjusted in Step 6.6.4, THEN perform 1-IPM-SW-TCV-108A to adjust controller setpoint. Otherwise, enter N/A.

M 6.6.7 Check that the Charging Pump gearbox oil level is in the operating range.

M 6.6.8 Check oil flow to the pump bearings. Enter N/A if flow can not be observed to bearing(s).

6.6.9 Check the following before starting 1-CH-P-1A:

N/A 8 a. IF the difference between RCS boron and Charging pump boron is greater than 360 ppm, OR it is desired to flush to further reduce boron differential, THEN initiate Attachment 8. Otherwise, enter N/A. **(Ref. 2.4.20)**

M b. Check that 1-CH-PI-110A, Aux Lube Oil Pump Discharge Pressure, is between 4 psig and 12 psig. Submit a Condition Report if Lube Oil Pressure is greater than 12 psig.

M c. Check that LO temperature is greater than 28°F and preferably in the normal operating band between 80°F and 120°F.

M d. Record Lube Oil Temperature from 1-CH-TI-110A. Submit a Condition Report if Lube Oil Temperature is less than 60°F or greater than 120°F.

Lube Oil Temperature 89 °F

M e. Check that 1-VS-MOD-101A, Charging Pump Ventilation Suction Damper, is closed by noting no significant airflow through the duct.

NOTE: If any of the following temperature limits are exceeded on the Charging Pump being tested, the pump should be immediately shutdown:

- Oil Cooler outlet oil temperature upper operating limit is 160°F.
- Oil Cooler outlet oil temperature lower operating limit is 28°F.
- The upper administrative limit for the Charging Pump bearings is 180°F.

N/A ४ 6.6.10 IF only valve stroke timing is to be performed, THEN place 1-CH-P-1A in AUTO and enter N/A for the remaining steps in Subsection 6.6.

CAUTION

To prevent bearing damage, if pump bearing oil flow can NOT be checked, bearing temperature must be monitored closely upon pump start. If temperature rise greater than 30°F is observed during first minute of pump operation, the pump must be secured immediately.

NOTE:
- Performance of the next step may remove the Unit from the LCO clock entered in Substep 6.6.1.a.
- If a Return to Service test of 1-CH-P-1A is being performed, the next step may place Unit 1 in a LCO clock (because Charging Pump A UV trip will be disabled when Charging Pump C is secured) until Charging Pump A is declared operable, placed in PTL, or the UV trip is enabled. **(Ref. 2.4.6)**

४ 6.6.11 Start 1-CH-P-1A.

४ 6.6.12 Check Chg Pump AMPS stabilize between 50 amps and 65 amps.

N/A γ — 6.6.13 IF pump started with no bearing oil flow observed prior to start, THEN do the following. Otherwise, enter N/A.

- Immediately after pump start, have Aux Building operator check oil flow. IF no oil flow observed, THEN immediately secure 1-CH-P-1A.
- Monitor temperature of pump bearing with no observable oil flow on PCS. IF temperature rises greater than 30°F during first minute of pump operation, THEN immediately secure 1-CH-P-1A.

γ — 6.6.14 Check 1-VS-MOD-101A is open by noting airflow through the duct. **(Ref. 2.4.4)**

γ — 6.6.15 IF the RCS is equal to or greater than 350°F and 450 psig, THEN check plant status AND perform one of the associated actions below. (✓) Enter N/A for actions not taken.

NOTE: Subsection 6.10 should be performed as soon as possible after pump stop.

Status		Actions	Initials
N/A γ	1-CH-P-1B is to be STOPPED and placed in AUTO	a) Stop 1-CH-P-1B and place in AUTO. b) Continue with Step 6.6.17. c) Perform Subsection 6.10	N/A γ
✓	1-CH-P-1C, NORM FEED, is to be STOPPED and placed in AUTO	a) Stop 1-CH-P-1C, NORM FEED, and place in AUTO. b) Continue with Step 6.6.17. c) Perform Subsection 6.10	γ γ γ
N/A γ	1-CH-P-1C, ALT FEED, is to be STOPPED and placed in AUTO	a) Check 1-CH-P-1A is declared operable. b) Stop 1-CH-P-1C, ALT FEED, and place in AUTO. This places the Unit in a LCO clock if Critical. c) Continue with Step 6.6.17. d) Perform Subsection 6.10	N/A γ

N/A γ — 6.6.16 IF the RCS is less than 350°F and 450 psig, THEN place the operating pump (1-CH-P-1B or 1-CH-P-1C) in PTL. Otherwise, enter N/A.

γ — 6.6.17 Monitor Charging Pump A bearing temperatures on the Plant computer.

γ ____ 6.6.18 Check that the Aux Lube Oil Pump is stopped.

γ ____ 6.6.19 Check that Lube Oil Pump Discharge Pressure is between 8 psig and 25 psig as indicated on 1-CH-PI-110A. Record Lube Oil Pressure.

Lube Oil Pressure 20 psig

CAUTION
To prevent bearing damage, oil temperatures MUST NOT be allowed to exceed 160°F.

NOTE: Setpoint adjustments to 1-SW-TCV-108A MUST NOT be made during a pump start.

N/A γ 6.6.20 Monitor oil pressure and temperature. IF it is anticipated that Lube Oil Pump Discharge Pressure will drop below 8 psig OR Lube Oil temperature will reach 160°F, THEN start the operable standby pump AND secure 1-CH-P-1A. Otherwise, enter N/A.

NOTE: During hot weather a TCV may be full open with temperature above 120°F.

γ ____ 6.6.21 WHEN Charging Pump Lube Oil temperatures have stabilized, THEN check that the TCV is controlling Lube Oil temperature between 100°F and 120°F. **(Ref. 2.4.3)**

- IF oil temperature is greater than 120°F, AND the TCV is full open, THEN submit a Condition Report and inform System Engineering.
- IF oil temperature is greater than 120°F, AND the TCV is not full open, THEN write a Condition Report for I & C to adjust the setpoint.
- IF oil temperature is less than 100°F, THEN write a CR for I & C to adjust the setpoint.

γ 6.6.22 Check the following pump and damper checks:

Pump	Aux LO Pump Running	Aux LO Pump Pressure (psig)	Ventilation Damper Closed	Initials
1-CH-P-1B	Yes	4 psig to 12 psig 7 psig	Closed	γ
1-CH-P-1C	Yes	4 psig to 12 psig 8 psig	Closed	γ

6.7 1-CH-P-1A Performance Test

NOTE: Charging flow may require manual adjustment to maintain Przr level at normal operating level.

γ ____ 6.7.1 Check Pressurizer level is at the desired Program band level and stable.

NOTE: When Charging flow is adjusted, Pressurizer level may deviate from program level. RCS pressure should be closely monitored.

γ ____ 6.7.2 Close 1-CH-MOV-1267B, CHG PUMP A SUCT ALT.

N/A γ ____ 6.7.3 IF the RCS is less than 350°F and 450 psig, THEN adjust the total Charging Flow to 131 gpm. Otherwise, enter N/A.

____ a. Check or place 1-CH-FC-1122C, CHG FLOW CNTRL, in MANUAL.

____ b. Using 1-CH-FC-1122C and 1-RH-HCV-1142, RHR LETDOWN FLOW, adjust the flow through the Charging Pump until 1-CH-FI-1181, 1-CH-P-1A Suction Flow, indicates between 129 gpm and 133 gpm. (Target Flow 131 gpm)

γ ____ 6.7.4 IF the RCS is greater than 350°F and 450 psig, THEN check or place 1-CH-FC-1122C, CHG FLOW CNTRL, in AUTO. Otherwise, enter N/A.

CAUTION

Adjustment of charging flow will affect Przr level, letdown temperature, and letdown pressure. These parameters must be continuously monitored to prevent flashing in the letdown line, relief valve lifting, and excessive temperature changes to the letdown flowstream.

6.7.5 Record the following indications:

γ
- Przr Level 54 %

γ
- VCT Level 51 %

γ
- LTDN Relief Line Temperature (1-CH-TI-1141) 106 °F

γ
- Non-Regen Hx Temperature (1-CH-TI-1144) 97 °F

γ
- Letdown Line Pressure (1-CH-PI-1145) 311 psi

γ 6.7.6 Record charging flow. (1-CH-FT-1122) PCS point F0128A 84.2 gpm

γ 6.7.7 Record suction flow. (1-CH-FI-1181 from local indicator) 158.1 gpm. If suction flow is oscillating excessively, vent 1-CH-FT-1181 in accordance with Attachment 6.

NOTE:
- Pump performance test takes approximately 20 minutes. Przr Level Program band should be maintained.
- In order to remain within the Przr level program band of +/- 5% for the duration of the test, adjustment must <u>not</u> exceed 7 gpm. Inability to obtain the required target flowrate with a +/- 7 gpm adjustment does not affect pump operability.

γ 6.7.8 Check or place 1-CH-LC-1459G, PRZR LEVEL CNTRL, in Manual.

γ 6.7.9 Check or place 1-CH-FC-1122C, CHG FLOW CONTROL, in Manual.

Y

6.7.10 Adjust total charging flow:

a. Adjust 1-CH-FC-1122C until 1-CH-FI-1181 indicates a target range of between 147.3 and 162.7 gpm.

N/A Y

b. IF required adjustment exceeds +/- 7 gpm of the flow recorded in Step 6.7.7, THEN adjust to not more than +/- 7 gpm AND note in Operator Comments, Subsection 7.3. Otherwise, enter N/A.

NOTE: 1-CH-P-1A must run for at least 2 minutes to stabilize parameters before recording data.

Y

6.7.11 Record the following information on Attachment 1, 1-CH-P-1A Performance Test Data Sheet:

- VCT Level
- VCT Pressure
- RCP A Seal Flow (1-CH-FT-1130) Plant Computer Point U0983)
- RCP B Seal Flow (1-CH-FT-1127) Plant Computer Point U0982)
- RCP C Seal Flow (1-CH-FT-1124) Plant Computer Point U0981)
- 1-CH-P-1A Discharge Pressure (1-CH-PI-1151)
- 1-CH-P-1A Suction Pressure (1-CH-PI-1187)
- 1-CH-P-1A Suction Flow (1-CH-FI-1181) from Local Indicator
- Charging Flow (1-CH-FT-1122) Plant Computer Point F0128A)

NOTE: Attachment 2 is to be used for plant conditions greater than 350°F and Attachment 3 for plant conditions less than 350°F.

Y

6.7.12 Calculate the Pump Differential Pressure (ΔP) on Attachment 1 and record the calculated value on Attachment 2 or Attachment 3. (If the ΔP is in the acceptable range, the partially open test for 1-CH-258 is satisfactory.)

Y ____ 6.7.13 Check 1-CH-PI-110A, Lube Oil Pump Discharge Pressure, and record Lube Oil Pressure on Attachment 1. (Reference pressure range is 8 psig to 25 psig.)

NOTE:
- Points measured but not recorded on Attachment 2 or Attachment 3 will be used by Engineering.
- The specified flow rate must be maintained while suction pressure, discharge pressure, and vibration points 19 through 24 are recorded. Flow adjustments may be made after these data points are collected.

Y ____ 6.7.14 Using the Microlog Data Collector, measure the bearing vibration of the pump, driver, and speed increaser at points 1 through 24 of Attachment 2 or Attachment 3. Record the measured data for points 19 through 24 on Attachment 2 or Attachment 3.

Y ____ 6.7.15 Calculate the Charging Pump Miniflow Recirc flow rate on Attachment 1 and record the calculated value on Attachment 2 or Attachment 3. (If the flow rate is in acceptable range, the open test for 1-CH-256, Charging Pump Miniflow Check Valve, and 1-CH-230, VCT Supply Discharge Check Valve, is satisfactory.)

Y ____ 6.7.16 Call up the 1-CH-P-1A Inboard, Outboard, and Thrust Bearing temperatures on the Plant Computer and record on Attachment 1.

N/A Y ____ 6.7.17 IF any bearing temperature is above 170°F, THEN notify System Engineering within 24 hours AND record name of person notified on Attachment 1. Monitor bearing temperature closely while the pump is operating. IF bearing temperatures are below 170°F, THEN enter N/A.

N/A Y ____ 6.7.18 IF the RCS is less than 350°F and 450 psig, THEN, using 1-CH-FC-1122C and 1-RH-HCV-1142, return the RHR Letdown Flow to a value specified by Shift Supervision. Otherwise, enter N/A.

Y ____ 6.7.19 IF the RCS is greater than 350°F and 450 psig, THEN, using 1-CH-FC-1122C, adjust charging flow AND establish Przr level to within Program band. Otherwise, enter N/A.

____	6.7.20	Place 1-CH-FC-1122C in Auto.
____	6.7.21	<u>WHEN</u> Przr level is at the desired level <u>AND</u> stable, <u>THEN</u> place 1-CH-LC-1459G in Auto.
	6.7.22	Record the following indications. Enter N/A if RCS is less than 350°F and 450 psig.

- Przr Level ____53.4____ %
- VCT Level ____50.4____ %
- LTDN Relief Line Temperature (1-CH-TI-1141)____107____ °F
- Non-Regen Hx Temperature (1-CH-TI-1144)____97____ °F
- Letdown Line Pressure (1-CH-PI-1145)____311____ psi

____	6.7.23	Open 1-CH-MOV-1267B.
____	6.7.24	Check that 1-CH-P-1A operating parameters are normal.
____	6.7.25	Inspect all piping outlined on Attachment 5. Collect any leakage found for a two minute period. Record the leak location and the quantity collected on Attachment 1 (10 drops = 1 cc). **(Ref. 2.4.25)**
N/A	6.7.26	Record Condition Report number on Attachment 1 for each leak found.

CAUTION

To prevent bearing damage, if pump bearing oil flow can NOT be checked, bearing temperature must be monitored closely upon pump start. If temperature rise greater than 30°F is observed during first minute of pump operation, the pump must be secured immediately.

NOTE: The performance of the next step may allow the Unit to exit a LCO clock.

N/A

6.7.27 IF 1-CH-P-1C, ALT FEED, is the only other operable pump, THEN perform the following. Otherwise, enter N/A.

a. IF the difference between RCS boron and Charging pump boron is greater than 360 ppm, OR it is desired to flush to further reduce boron differential, THEN initiate Attachment 8. Otherwise, enter N/A. **(Ref. 2.4.20)**

b. Start 1-CH-P-1C, ALT FEED.

c. Check Chg Pump AMPS stabilize between 50 amps and 65 amps.

d. IF pump started with no bearing oil flow observed prior to start, THEN do the following. Otherwise, enter N/A.

- Immediately after pump start, have Aux Building operator check oil flow. IF no oil flow observed, THEN immediately secure 1-CH-P-1C.
- Monitor temperature of pump bearing with no observable oil flow on PCS. IF temperature rises greater than 30°F during first minute of pump operation, THEN immediately secure 1-CH-P-1C.

e. Check that 1-VS-MOD-101C, Charging Pump Ventilation Suction Motor Operated Damper, is open. **(Ref. 2.4.4)**

f. Stop 1-CH-P-1A and place in AUTO.

g. Monitor Charging Pump C bearing temperatures on the Plant computer.

6.7.27 (continued)

N/A 8

h. IF either of the following temperature limits is exceeded when the Charging Pump is operating, THEN monitor the pump for degradation as soon as possible by performance of 1-OPT-CH-003, Charging Pump Operability and Performance Test for 1-CH-P-1C.

- Oil Cooler outlet oil temperature - 160°F
- Charging Pump bearing temperature - 180°F

i. Check that the Aux Lube Oil Pump for 1-CH-P-1C is stopped.

j. Check that Lube Oil Pump, discharge pressure is between 8 psig and 25 psig as indicated on 1-CH-PI-110C. Record Lube Oil Pressure.

Lube Oil Pressure _______ psig

k. WHEN Charging Pump Lube Oil temperatures have stabilized, THEN check that the TCV is controlling Lube Oil temperature between 100°F and 120°F. **(Ref. 2.4.3)**

l. Check that the Aux Lube Oil Pump for 1-CH-P-1A is running with a Lube Oil Pump Discharge Pressure between 4 psig and 12 psig. Record Lube Oil Pressure. Submit a Condition Report if Lube Oil Pressure is greater than 12 psig.

Lube Oil Pressure _______ psig (1-CH-PI-110A)

m. Check that 1-VS-MOD-101A, 1-CH-P-1A Charging Pump Ventilation Suction Motor Operated Damper, is closed.

6.8 1-CH-P-1C, ALT FEED, Breaker Damper Logic

NOTE: If Unit 1 is critical, 1-CH-P-1A must be operable prior to performing this section. **(Ref. 2.4.6)**

N/A ___ 6.8.1 IF either Subsection 6.5 or Step 6.7.27 has been performed, THEN enter N/A for Subsection 6.8. Otherwise, continue with Step 6.8.2. **(Ref. 2.4.4)**

___ 6.8.2 Check 1-CH-P-1A is running.

6.8.3 Check or place the following Charging Pump Control Switches in PTL. IF the Reactor is critical, THEN the performance of this step will place the Unit in a LCO clock.

___ a. 1-CH-P-1B, CHARGING PUMP B

___ b. 1-CH-P-1C, CHARGING PUMP C NORM FEED

___ c. 1-CH-P-1C, CHARGING PUMP C ALT FEED

___ 6.8.4 Check the following pump and damper checks:

Pump	Aux LO Pump Running	Aux LO Pump Pressure (psig)	Ventilation Damper Closed	Initials
1-CH-P-1C	Yes	4 psig to 12 psig _____ psig	Closed	______
1-CH-P-1B	Yes	4 psig to 12 psig _____ psig	Closed	______

6.8.5 Rack 1-EP-BKR-15H6, 1-CH-P-1C NORM FEED, to DISCONNECT as follows:

___ ___ IV a. Check that the mechanical position indicator for 1-EP-BKR-15H6 indicates OPEN with a green flag.

___ ___ IV b. Rack 1-EP-BKR-15H6, 1-CH-P-1C NORM FEED, to DISCONNECT.

CAUTION

Racking in Breaker 15J2 (1-CH-P-1C ALT FEED) will trip/lockout Breaker 15H6 (1-CH-P-1C NORM FEED) and Breaker 15J5 (1-CH-P-1B).

6.8.6 Rack 1-EP-BKR-15J2, 1-CH-P-1C CHARGING PUMP C ALT FEED, to TEST as follows:

N/A 8 ______ IV

a. Check that the ground straps for 1-EP-BKR-15J2 have been removed.

______ ______ IV

b. Check the charging spring motor toggle switch for 1-EP-BKR-15J2 is ON.

______ ______ IV

c. Rack 1-EP-BKR-15J2, 1-CH-P-1C ALT FEED, to TEST.

______ 6.8.7 Place Control Room switch for 1-CH-P-1C, ALT FEED, to AUTO.

______ 6.8.8 Locally place 1-CH-P-1C, ALT FEED, to CLOSE and return to AUTO.

______ 6.8.9 Check that 1-VS-MOD-101C, Charging Pump Ventilation Suction Motor Operated Damper, is open.

______ 6.8.10 Locally place 1-CH-P-1C, ALT FEED, to TRIP and return to AUTO.

______ 6.8.11 Check that 1-VS-MOD-101C, Charging Pump Ventilation Suction Motor Operated Damper, is closed.

______ 6.8.12 Place Control Room switch for 1-CH-P-1C, ALT FEED, to PTL.

6.8.13 Rack 1-EP-BKR-15J2, 1-CH-P-1C CHARGING PUMP C ALT FEED, to DISCONNECT.

N/A ____ IV

a. Check that the mechanical position indicator for 1-EP-BKR-15J2 indicates OPEN with a green flag.

____ ____ IV

b. Rack 1-EP-BKR-15J2, 1-CH-P-1C CHARGING PUMP C ALT FEED, to DISCONNECT.

6.8.14 Check that the following isolation valves are OPEN:

____ ____ IV

a. 1-CH-MOV-1269A, CHG PUMP B SUCT NORM

____ ____ IV

b. 1-CH-MOV-1269B, CHG PUMP B SUCT ALT

____ ____ IV

c. 1-CH-MOV-1286B, CHG PUMP B DISCH NORM

____ ____ IV

d. 1-CH-MOV-1287B, CHG PUMP B DISCH ALT

____ ____ IV

e. 1-CH-MOV-1275B, CHG PUMP MINIFLOW RECIRC VALVES PUMP B

____ ____ IV

f. 1-CH-MOV-1373, CHG MINIFLOW RECIRC

____

6.8.15 Check that Aux Lube Oil Pump Discharge Pressure for 1-CH-P-1B is between 4 psig and 12 psig as indicated on 1-CH-PI-110B. Record Lube Oil Pressure. Submit a Condition Report if Lube Oil Pressure is greater than 12 psig.

Lube Oil Pressure ________ psig

NOTE: A Charging Pump may be started if oil flow can not be checked to bearing(s). Contingency actions for monitoring bearing temperature are in place as a compensatory measure if pump will be started without oil flow to bearing(s).

N/A ______ 6.8.16 Check oil flow to the pump bearings. Enter N/A if flow can not be checked to bearing(s).

______ 6.8.17 Record Lube Oil Temperature from 1-CH-TI-110B. Submit a Condition Report if Lube Oil Temperature is less than 60°F or greater than 120°F.

Lube Oil Temperature ____________________ °F

______ 6.8.18 Place 1-CH-P-1B in AUTO and exit the LCO clock.

CAUTION

Racking in Breaker 15H6 (1-CH-P-1C NORM FEED) will trip/lockout Breaker 15J2 (1-CH-P-1C ALT FEED).

6.8.19 Rack 1-EP-BKR-15H6, 1-CH-P-1C NORM FEED, to CONNECT. <u>IF</u> Shift Supervision desires to leave breaker racked out, <u>THEN</u> enter N/A for this step.

______ ______ IV a. Check that the ground straps for 1-EP-BKR-15H6 have been removed.

______ ______ IV b. Check the charging spring motor toggle switch for 1-EP-BKR-15H6 is ON.

______ ______ IV c. Rack 1-EP-BKR-15H6, 1-CH-P-1C NORM FEED, to CONNECT.

N/A ______ IV

6.8.20 Check that the following isolation valves are open:

______ ______ IV a. 1-CH-MOV-1270A, CHG PUMP C SUCT NORM

______ ______ IV b. 1-CH-MOV-1270B, CHG PUMP C SUCT ALT

______ ______ IV c. 1-CH-MOV-1286C, CHG PUMP C DISCH NORM

______ ______ IV d. 1-CH-MOV-1287C, CHG PUMP C DISCH ALT

______ ______ IV e. 1-CH-MOV-1275C, CHG PUMP MINIFLOW RECIRC VALVES

______ ______ IV f. 1-CH-MOV-1373, CHG MINIFLOW RECIRC

______ 6.8.21 Check locked open and on backseat 1-CH-760, 1-CH-MOV-1275C Manual Isolation Valve.

______ 6.8.22 Check that Aux Lube Oil Pump Discharge Pressure for 1-CH-P-1C is between 4 psig and 12 psig as indicated on 1-CH-PI-110C.
Record Lube Oil Pressure. Submit a Condition Report if Lube Oil Pressure is greater than 12 psig.

Lube Oil Pressure __________ psig

NOTE: A Charging Pump may be started if oil flow can not be checked to bearing(s). Contingency actions for monitoring bearing temperature are in place as a compensatory measure if pump will be started without oil flow to bearing(s).

______ 6.8.23 Check oil flow to the pump bearings. Enter N/A if flow can not be checked to bearing(s).

N/A

6.8.24 Record Lube Oil Temperature from 1-CH-TI-110C. Submit a Condition Report if Lube Oil Temperature is less than 60°F or greater than 120°F.

Lube Oil Temperature ____________________ °F

6.8.25 Place 1-CH-P-1C NORM FEED in AUTO.

6.9 Testing of Charging Pump MOVs

NOTE: This section allows testing of MOVs individually following Maintenance. If return to service testing of a Charging Pump is required, refer to Step 6.1.4 for required actions.

N/A ____ 6.9.1 Check all Maintenance has been completed on MOV(s) being tested.

____ 6.9.2 Notify Maintenance Personnel if required.

NOTE: Full stroke time is defined as the interval from initiation of the actuating signal (initiation of manual actuation of the control panel switch) to the end of the actuating cycle (final control panel light extinguished).

6.9.3 From the Control Room, close the following MOV(s). Using Control Room indication, check each valve travels from full open to full closed. Record time required for each valve to travel closed on Attachment 4. Enter N/A for valve(s) not being stroked.

____ a. Close and time 1-CH-MOV-1286A, CHG PUMP A DISCH NORM.

____ b. Close and time 1-CH-MOV-1287A, CHG PUMP A DISCH ALT.

____ c. Close and time 1-CH-MOV-1275A, CHG PUMP MINIFLOW RECIRC VALVES PUMP A.

____ d. Close 1-CH-MOV-1267A, CHG PUMP A SUCT NORM. (Valve exercise only. Do not record stroke time on Attachment 4.)

6.9.4 From the Control Room, open the following MOV(s). Using Control Room indication, check each valve travels from full closed to full open. Record time required for each valve to travel open on Attachment 4. Enter N/A for valve(s) not being stroked.

N/A ______ a. Open and time 1-CH-MOV-1286A, CHG PUMP A DISCH NORM.

______ b. Open and time 1-CH-MOV-1287A, CHG PUMP A DISCH ALT.

______ c. Open and time 1-CH-MOV-1275A, CHG PUMP MINIFLOW RECIRC VALVES PUMP A.

______ d. Open 1-CH-MOV-1267A, CHG PUMP A SUCT NORM. (Valve exercise only. Do not record stroke time on Attachment 4.)

✓ ______ 6.9.5 Continue with Pump / valve maintenance or return to service, whichever applies.

6.10 **Obtaining Oil Samples**

NOTE:
- This procedure may continue while oil samples are taken.
- Oil samples should be taken as soon as possible after stopping pump, but may be delayed per Shift Supervision until 1-CH-P-1A is returned to service.

6.10.1 Obtain oil samples for 1-CH-P-1B IAW the following steps. Enter N/A if sampling 1-CH-P-1C.

N/A ______ a. Check that 1-CH-P-1A is fully operable prior to performing Step 6.10.1.c.

______ b. Review T.S Section 3.2. B, Charging Pump Operability, and T.S. Section 3.3.A, Safety Injection System Operability, to determine if any actions are required before placing 1-CH-P-1B in PTL.

______ c. Enter any required T.S. clock for placing 1-CH-P-1B in PTL.

______ d. Place 1-CH-P-1B in PTL.

e. Obtain reservoir oil sample IAW the following steps:

______ 1. Check auxiliary oil pump running.

______ 2. Remove downstream pipe cap from 1-CH-496, CHG Pump B LO Sample Isol.

3. Perform the following steps:

______ (a) Open 1-CH-496 and drain approximately 500 mls to clean container.

______ (b) Obtain reservoir oil sample of 120 mls. (completely fill bottle)

______ (c) Close 1-CH-496.

______ 4. Replace downstream pipe cap at 1-CH-496.

6.10.1.e (continued)

N/A

5. Remove the speed increaser fill cap and carefully pour the 500 mls flush sample into the speed increaser.

6. Check the oil reservoir level and replenish as necessary.

7. Replace speed increaser fill cap.

f. Obtain motor inboard bearing oil sample IAW the following steps:

1. Remove the inboard bearing chicken feeder.

2. Remove the inboard bearing drain valve cap.

3. Open inboard bearing drain valve to flush approximately 60 ml into flush bottle, THEN close the drain valve.

4. Open inboard bearing drain valve to obtain one 120 ml inboard bearing oil sample in a clean bottle, THEN close the drain valve. (completely fill bottle)

5. Replace inboard bearing drain valve cap.

6. Pour the flush sample plus 120 mls of the approved oil through the chicken feeder base.

7. Replace the inboard bearing chicken feeder.

g. Obtain motor outboard bearing oil sample IAW the following steps:

1. Remove the outboard bearing chicken feeder.

2. Remove the outboard bearing drain valve cap.

3. Open outboard bearing drain valve to flush approximately 60 ml into flush bottle, THEN close the drain valve.

N/A

6.10.1.g (continued)

4. Open outboard bearing drain valve to obtain one 120 ml outboard bearing oil sample in a clean bottle, THEN close the drain valve. (completely fill bottle)

5. Replace outboard bearing drain valve cap.

6. Pour the flush sample plus 120 mls of the approved oil through the chicken feeder base.

7. Replace the outboard bearing chicken feeder.

h. Place 1-CH-P-1B in AUTO.

IV

i. Exit any clock entered in Step 6.10.1.c.

j. Label the oil samples with the following information:

- Equipment Location
- Name of sample
- Date and time of sample
- Name and initials of person taking sample

k. Deliver the oil samples to Count Room window.

6.10.2 Obtain oil samples for 1-CH-P-1C IAW the following steps. Enter N/A if sampling 1-CH-P-1B.

a. Review T.S Section 3.2. B, Charging Pump Operability, and T.S. Section 3.3.A, Safety Injection System Operability, to determine if any actions are required before placing 1-CH-P-1C in PTL.

b. Enter any required T.S. clock for placing 1-CH-P-1C in PTL.

c. Place 1-CH-P-1C in PTL.

d. Obtain reservoir oil sample IAW the following steps:

1. Check auxiliary oil pump running.

2. Remove downstream pipe cap from 1-CH-497, CHG Pump C LO Sample Isol.

3. Perform the following steps:

(a) Open 1-CH-497 and drain approximately 500 mls to clean container.

(b) Obtain reservoir oil sample of 120 mls. (completely fill bottle)

(c) Close 1-CH-497.

4. Replace downstream pipe cap at 1-CH-497.

5. Remove the speed increaser fill cap and carefully pour the 500 mls flush sample into the speed increaser.

6. Check the oil reservoir level and replenish as necessary.

7. Replace speed increaser fill cap.

e. Obtain motor inboard bearing oil sample IAW the following steps:

1. Remove the inboard bearing chicken feeder.

2. Remove the inboard bearing drain valve cap.

3. Open inboard bearing drain valve to flush approximately 60 ml into flush bottle, THEN close the drain valve.

6.10.2.e (continued)

4. Open inboard bearing drain valve to obtain one 120 ml inboard bearing oil sample in a clean bottle, THEN close the drain valve. (completely fill bottle)

5. Replace inboard bearing drain valve cap.

6. Pour the flush sample plus 120 mls of the approved oil through the chicken feeder base.

7. Replace the inboard bearing chicken feeder.

f. Obtain motor outboard bearing oil sample IAW the following steps:

1. Remove the outboard bearing chicken feeder.

2. Remove the outboard bearing drain valve cap.

3. Open outboard bearing drain valve to flush approximately 60 ml into flush bottle, THEN close the drain valve.

4. Open outboard bearing drain valve to obtain one 120 ml outboard bearing oil sample in a clean bottle, THEN close the drain valve. (completely fill bottle)

5. Replace outboard bearing drain valve cap.

6. Pour the flush sample plus 120 mls of the approved oil through the chicken feeder base.

7. Replace the outboard bearing chicken feeder.

g. Place 1-CH-P-1C in AUTO.

IV

h. Exit any clock entered in Step 6.10.2.b.

i. Label the oil samples with the following information:

- Equipment Location
- Name of sample
- Date and time of sample
- Name and initials of person taking sample

j. Deliver the oil samples to Count Room window.

6.11 Discharge Check Valve Backleakage Test on Non-running Charging Pump

NOTE:
- This Subsection is not required during the normal quarterly Charging Pump run. This Subsection is to be used as required for augmented monitoring of a suspected leaking discharge check valve.
- If only one other Charging Pump is operable, the performance of this Subsection will result in the entry into a Tech Spec LCO due to operating with less than the minimum number of operable Charging Pumps.

N/A 8

6.11.1 Check 1-CH-P-1A secured and place pump in PTL.

6.11.2 From the Control Room, close the following MOV(s):

a. 1-CH-MOV-1286A, CHG PUMP A DISCH NORM

b. 1-CH-MOV-1287A, CHG PUMP A DISCH ALT

c. 1-CH-MOV-1275A, CHG PUMP MINIFLOW RECIRC VALVES PUMP A

6.11.3 Record discharge pressure of running Charging pump from Plant Computer Point P0142A, Chg Pump Discharge Header Press or the normal discharge gauge.

_______________ psig

6.11.4 From the Control Room, open the following MOV(s):

a. 1-CH-MOV-1286A, CHG PUMP A DISCH NORM

b. 1-CH-MOV-1287A, CHG PUMP A DISCH ALT

c. 1-CH-MOV-1275A, CHG PUMP MINIFLOW RECIRC VALVES PUMP A

N/A

6.11.5 Record discharge pressure of running Charging pump from Plant Computer Point P0142A, Chg Pump Discharge Header Press or the normal discharge gauge.

__________________ psig

6.11.6 Place 1-CH-P-1A in Automatic and stop any clock previously started.

NOTE: Values less than 5.4 psid include ANY negative values.

6.11.7 Calculate the discharge pressure differential. (Reference - less than or equal to 5.4 psid)

__________________ - __________________ = ____________ psid
(Step 6.11.3) (Step 6.11.5)

6.11.8 IF the difference calculated in Step 6.11.7 is greater than 5.4 psid, THEN perform Step 6.11.9. Otherwise, enter N/A for Steps 6.11.8 and 6.11.9.

NOTE: If the total differential is less than or equal to 10.8 psid, the close test for 1-CH-258, Charging Pump A Discharge Check Valve, is satisfactory, and 1-CH-256 backleakage is acceptable.

6.11.9 IF the differential is greater than 5.4 psid, THEN add the highest backleakage (ΔP) value recorded in Step 6.1.1 to backleakage from Step 6.11.7.

__________________ + __________________ = ____________ psid
(Step 6.1.1) (Step 6.11.7)

7.0 FOLLOW-ON

7.1 Acceptance Criteria

_____ 7.1.1 Evaluate the test results by reviewing the Acceptance Criteria for the components tested. (✓) Enter N/A for components not tested.

- ___ 1-CH-258, Charging Pump Discharge Check Valve, operated in the partially open direction as evidenced by an acceptable pump differential pressure. (Attachment 2 or Attachment 3, Step 6.7.12)

NOTE: Values less than 5.4 psid include ANY negative values.

- ___ 1-CH-258, Charging Pump Discharge Check Valve, operated in the fully closed direction as evidenced by a discharge pressure differential for the running charging pump of less than or equal to 5.4 psid. (Attachment 1, Step 6.6.1.g), OR the total differential is less than or equal to 10.8 psid (Attachment 1, Step 6.6.1.h)
- ___ 1-CH-256, Charging Pump Miniflow Recirc Header Check Valve, operated in the open direction as evidenced by an acceptable recirculation flow rate. (Attachment 2 or Attachment 3, Step 6.7.15)
- ___ 1-CH-230, VCT Supply Discharge Check Valve, operated in the open direction as evidenced by an acceptable recirculation flow rate. (Attachment 2 or Attachment 3, Step 6.7.15)
- ___ Charging Pump ΔP and Vibration status determinations are not INOP. (Attachment 2 or Attachment 3)
- ___ 1-CH-P-1C ALT FEED breaker is interlocked with the 1-CH-P-1C damper. Enter N/A if not performed.
- ___ 1-CH-MOV-1286A, CHG PUMP A DISCH NORM, traveled full open and closed within the acceptable range. (Attachment 4)
- ___ 1-CH-MOV-1275A, CHG PUMP MINIFLOW RECIRC VALVES PUMP A, traveled full stroke open and closed within the acceptable range. (Attachment 4)

7.1.1 (continued)

- ___ 1-CH-MOV-1287A, CHG PUMP A DISCH ALT, traveled full stroke open and closed within the acceptable range. (Attachment 4)
- 1-SW-TCV-108A recorded data is as follows. (Attachment 4) (✓)

  ____ Test position - OPEN

  ____ Stroke Time - Less than Maximum Time
- ___ 1-SW-TCV-108A opens and controls charging pump lube oil temperature out of the cooler below 160°F.

______ 7.1.2 Document the test results. (✓)

___ Satisfactory ___ Unsatisfactory

7.2 **Follow-On Tasks**

7.2.1 IF the test was unsatisfactory, THEN perform the following: Otherwise, enter N/A.

______ a. Notify Shift Supervision.

______ b. Initiate a Condition Report, and record the CR Number.

CR No. ______________________________

______ c. Notify the IST and System Engineer of the unsatisfactory condition and record the names of the personnel notified.

______________________________ IST Engineer ________ Date

______________________________ System Engineer ________ Date

______ 7.2.2 IF the test results, and the PMT requirements are satisfactory, THEN the LCO entered in Step 6.6.11 may be exited. Otherwise, enter N/A.

______ 7.2.3 Notify STA to compare new Total System External Leakage as determined by Attachment 1 to maximum allowed by 1-NPT-ZZ-001. IF leakage is greater than limit, THEN perform the following substeps. Otherwise, enter N/A.

______ a. Notify the System Engineer of the unsatisfactory condition and record the name of the person notified.

System Engineer	Date

______ b. Initiate a Condition Report and record the CR Number.

CR No. ______________________________

______ c. Start a 7-day Administrative Clock to reduce the SI external loop leakage to within satisfactory values. **(Ref. 2.4.9)**

______ 7.2.4 IF a partial operability test was performed, THEN document the reason for the partial test in Operator Comments, Subsection 7.3. Otherwise, enter N/A.

7.2.5 IF the test or partial test was satisfactory but in ALERT, THEN perform the following. Otherwise, enter N/A.

______ a. Notify Shift Supervision.

______ b. Notify the IST and System Engineer of the ALERT condition and record the names of the personnel notified.

IST Engineer	Date

System Engineer	Date

______ 7.2.6 Make or check an entry in the M & TE Usage Log for each SQC device used during this test.

7.2.7 IF test flow could not be achieved, THEN perform the following:

_____ a. Notify Shift Supervision.

_____ b. Notify the IST Engineer and record name of person notified.

____________________________________ __________
IST Engineer Date

_____ c. Initiate a Condition Report and record CR number.
(Failure to achieve flow within range DOES NOT, by itself, make this test UNSAT.)

Condition Report No. ____________________________________

7.2.8 IF Charging Pump discharge check valve backleakage recorded in Attachment 1 Step 6.6.1.g was greater than 2.5 psid, THEN perform the following. Otherwise, enter N/A.

_____ a. Notify Shift Supervision.

_____ b. Initiate a Condition Report and record the CR Number.

Condition Report No. ____________________________________

_____ c. Notify the IST and System Engineer of the condition so that a more frequent performance can be evaluated. Record the names of the personnel notified.

____________________________________ __________
IST Engineer Date

____________________________________ __________
System Engineer Date

______ 7.3 **Notification, Documentation, and Procedure Closeout**

______ 7.3.1 Notify Shift Supervision that the test is complete.

The Initials in this procedure will be identified by the Printed Name.

Initials	Printed Name
γ	G. GERSHWIN
M	M. TAYLOE
α	Al Smith
β	Brad Burcher
η	NICHOLAS SMITH

Comments: ____________________

Completed by: ____________________ Date: ________

7.4 **Review**

Comments: ____

____

____

____

____

Reviewed by: ______________________________ Date: __________
Shift Supervision

Forward original procedure to Engineering Testing.

______
IST Eng

7.4.1 Make IDDEAL Data entry. **(Ref. 2.4.21)**

______
Sys Eng

7.4.2 Check IDDEAL Data entry. **(Ref. 2.4.21)**

Comments: ____

____

____

____

Reviewed by: ______________________________ Date: __________
IST Engineer

Comments: ____

____

____

____

1-NPT-ZZ-001 Updated __________Yes __________No __________ N/A

Reviewed by: ______________________________ Date: __________
System Engineer

Attachment 1

1-CH-P-1A PERFORMANCE TEST DATA SHEET

Step 6.1.2

	SQC Number	Cal Due Date
Vibration detector	7820	1/4/2022
Stopwatch	7690	4/8/2022
Stopwatch	7691	3/20/2022
Stopwatch		

Step 6.1.3 ✓ RCS at normal operating pressure OR ___ RHR in service (✓one.)

Step 6.6.1.e Discharge Pressure (Plant Computer Pt P0142A, 1-CH-PI-1152 or 1-CH-PI-1153) 2488.8 psig

Step 6.6.1.f Discharge Pressure (Plant Computer Pt P0142A, 1-CH-PI-1152 or 1-CH-PI-1153) 2488.3 psig

NOTE: Values less than 5.4 psid include ANY negative values.

Step 6.6.1.g Discharge Pressure differential (Reference - less than or equal to 5.4 psid)

2488.8 (Step 6.6.1.e) – 2488.3 (Step 6.6.1.f) = 0.5 psid

Step 6.6.1.h Total Discharge Pressure differential (Reference - less than or equal to 10.8 psid)

N/A 8 (Step 6.6.1.g) + N/A 8 (Step 6.1.1) = N/A 8 ≤ 10.8 psid

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Attachment 1

1-CH-P-1A PERFORMANCE TEST DATA SHEET

Step 6.7.11 VCT Level 61.7 %

VCT Pressure 24 psig

Discharge Pressure (1-CH-PI-1151) 2550 psig

Suction Pressure (1-CH-PI-1187) 31.5 psig

Suction Flow (1-CH-FI-1181) 157.3 gpm (from local indicator)

Charging Flow (1-CH-FT-1122) 84 gpm (Plant Computer Pt F0128A)

RCP A Seal Flow (1-CH-FT-1130) 9.2 gpm (Plant Computer Pt U0983)

RCP B Seal Flow (1-CH-FT-1127) 9.0 gpm (Plant Computer Pt U0982)

RCP C Seal Flow (1-CH-FT-1124) 9.1 gpm (Plant Computer Pt U0981)

Step 6.7.12 Pump Differential Pressure

2550 (1-CH-PI-1151) – 31.5 (1-CH-PI-1187) = 2518.5 psid

Step 6.7.13 Lube Oil Pressure 15 psig

Step 6.7.15 Mini-flow Recirculation Flow Rate

157.3 (FI-1181) – 9.2 (FT-1130) – 9.0 (FT-1127) – 9.1 (FT-1124) – 84 (FT-1122) = 46 gpm

Step 6.7.16

- Inboard Bearing Plant Computer Pt T0106A 132.6 °F (Reference 120°F)
- Outboard Bearing Plant Computer Pt T0107A 147.9 °F (Reference 130°F)
- Thrust Bearing Plant Computer Pt T0108A 119.1 °F (Reference 130°F)

(Page 3 of 3)

Attachment 1

1-CH-P-1A PERFORMANCE TEST DATA SHEET

Step 6.7.17 Name of System Engineer Notified N/A

Step 6.7.25 Record locations of any leakage found.

NONE

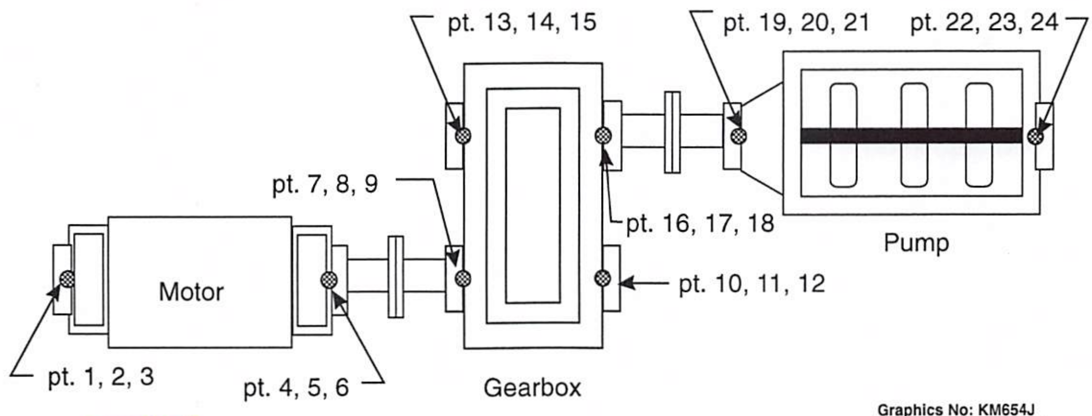
Step 6.7.26 Condition Report numbers

NONE

Performed by: _______ _______ G. GERSHWIN [TODAY]
Signature Initial Print

Attachment 2

1-CH-P-1A VIBRATION, FLOW AND ΔP DATA TABLE (> 350°F)



~~NOTE~~: ● Represents the Horizontal, Vertical, and Axial Accelerometer Pads Mounted on the Bearing Housing and Indicated in Yellow on the Pump/Driver Assembly.

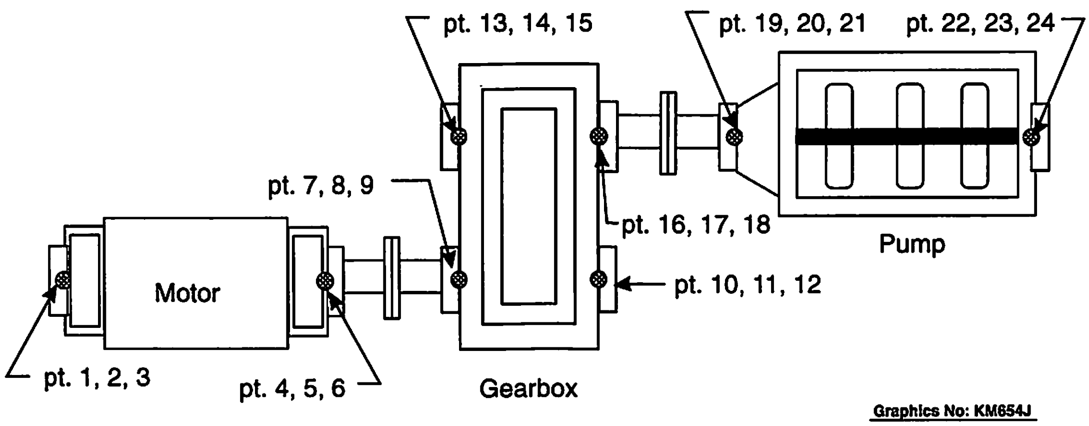
VIBRATION TESTING POINTS

Parameters in ALERT range are considered SATISFACTORY. Parameters in INOP are UNSATISFACTORY.

PARAMETER	REF VALUE	TEST VALUE	ACCEPT RANGE	ALERT RANGE	INOP RANGE	STATUS SAT, INOP, ALERT
Δ P Step 6.7.12 (Ref. 2.3.29)	psid 2469	2518.5	2435 to 2641	NONE	< 2435 OR > 2641	SAT
Inboard Vibration Horizontal (pt 19) Vertical (pt 20) Axial (pt 21)	in/sec 0.1430 0.0593 0.0726	0.144 0.070 0.102	≤ 0.325 ≤ 0.148 ≤ 0.181	> 0.325 to ≤ 0.700 > 0.148 to ≤ 0.355 > 0.181 to ≤ 0.435	> 0.700 > 0.355 > 0.435	SAT
Outboard Vibration Horizontal (pt 22) Vertical (pt 23) Axial (pt 24)	in/sec 0.1913 0.0909 0.0801	0.739 0.049 0.086	≤ 0.325 ≤ 0.227 ≤ 0.200	> 0.325 to ≤ 0.700 > 0.227 to ≤ 0.545 > 0.200 to ≤ 0.480	> 0.700 > 0.545 > 0.480	SAT
Recirc Flow Rate Step 6.7.15	43 gpm	46	≥ 35 to ≤ 80 gpm	N/A	< 35 or > 80 gpm	SAT

Attachment 3

1-CH-P-1A VIBRATION, FLOW AND ΔP DATA TABLE (< 350°F)



NOTE: ⊛ Represents the Horizontal, Vertical, and Axial Accelerometer Pads Mounted on the Bearing Housing and Indicated in Yellow on the Pump/Driver Assembly.

VIBRATION TESTING POINTS

Parameters in ALERT range are considered SATISFACTORY. Parameters in INOP are UNSATISFACTORY.

PARAMETER	REF VALUE	TEST VALUE	ACCEPT RANGE	ALERT RANGE	INOP RANGE	STATUS SAT, INOP, ALERT
ΔP Step 6.7.12 (Ref. 2.3.29)	psid 2469	____	2460 to 2735	NONE	< 2460 OR > 2735	____
Inboard Vibration Horizontal (pt 19) Vertical (pt 20) Axial (pt 21)	in/sec 0.169 0.057 0.064	____ ____ ____	≤ 0.325 ≤ 0.142 ≤ 0.160	> 0.325 to ≤ 0.700 > 0.142 to ≤ 0.342 > 0.160 to ≤ 0.384	> 0.700 > 0.342 > 0.384	____
Outboard Vibration Horizontal (pt 22) Vertical (pt 23) Axial (pt 24)	in/sec 0.208 0.126 0.099	____ ____ ____	≤ 0.325 ≤ 0.315 ≤ 0.248	> 0.325 to ≤ 0.700 > 0.315 to ≤ 0.700 > 0.248 to ≤ 0.594	> 0.700 > 0.700 > 0.594	____
Recirc Flow Rate Step 6.7.15	40gpm	____	≥ 35 to ≤ 80 gpm	N/A	< 35 or > 80 gpm	____

Attachment 4
MOV AND LUBE OIL TCV STROKE TIME DATA TABLE

Stroke Test - Closed

Step	Valve	Stroke Position	Reference Time	Acceptable Range Time	Actual Time
6.6.1.d/6.9.3.a	1-CH-MOV-1286A	Closed	7.4 sec	5.6 to 9.2 sec	8.04 Seconds
6.6.1.d/6.9.3.b	1-CH-MOV-1287A	Closed	5.6 sec	4.2 to 7.0 sec	5.66 Seconds
6.6.1.d/6.9.3.c	1-CH-MOV-1275A	Closed	8.9 sec	6.7 to 11.1 sec	8.69 Seconds

Stroke Test - Open

Step	Valve	Stroke Position	Reference Time	Acceptable Range Time	Actual Time
6.6.1.f/6.9.4.a	1-CH-MOV-1286A	Open	7.0 sec	5.3 to 8.7 sec	9.12 Seconds
6.6.1.f/6.9.4.b	1-CH-MOV-1287A	Open	4.6 sec	3.5 to 5.7 sec	5.02 Seconds
6.6.1.f/6.9.4.c	1-CH-MOV-1275A	Open	9.0 sec	6.8 to 11.2 sec	8.73 Seconds

Step 6.6.5	Test Position (Substep 6.6.5.i)	Stroke Time in Seconds (Substep 6.6.5.i)	Reference Time	Maximum Time	As Left Position (Substep 6.6.5.m)
1-SW-TCV-108A	OPEN	4.59	4.8 sec	30.0 sec	CLOSED

Performed by: [signature] Signature   M Initial   M. TAYLOE Print   [TODAY]

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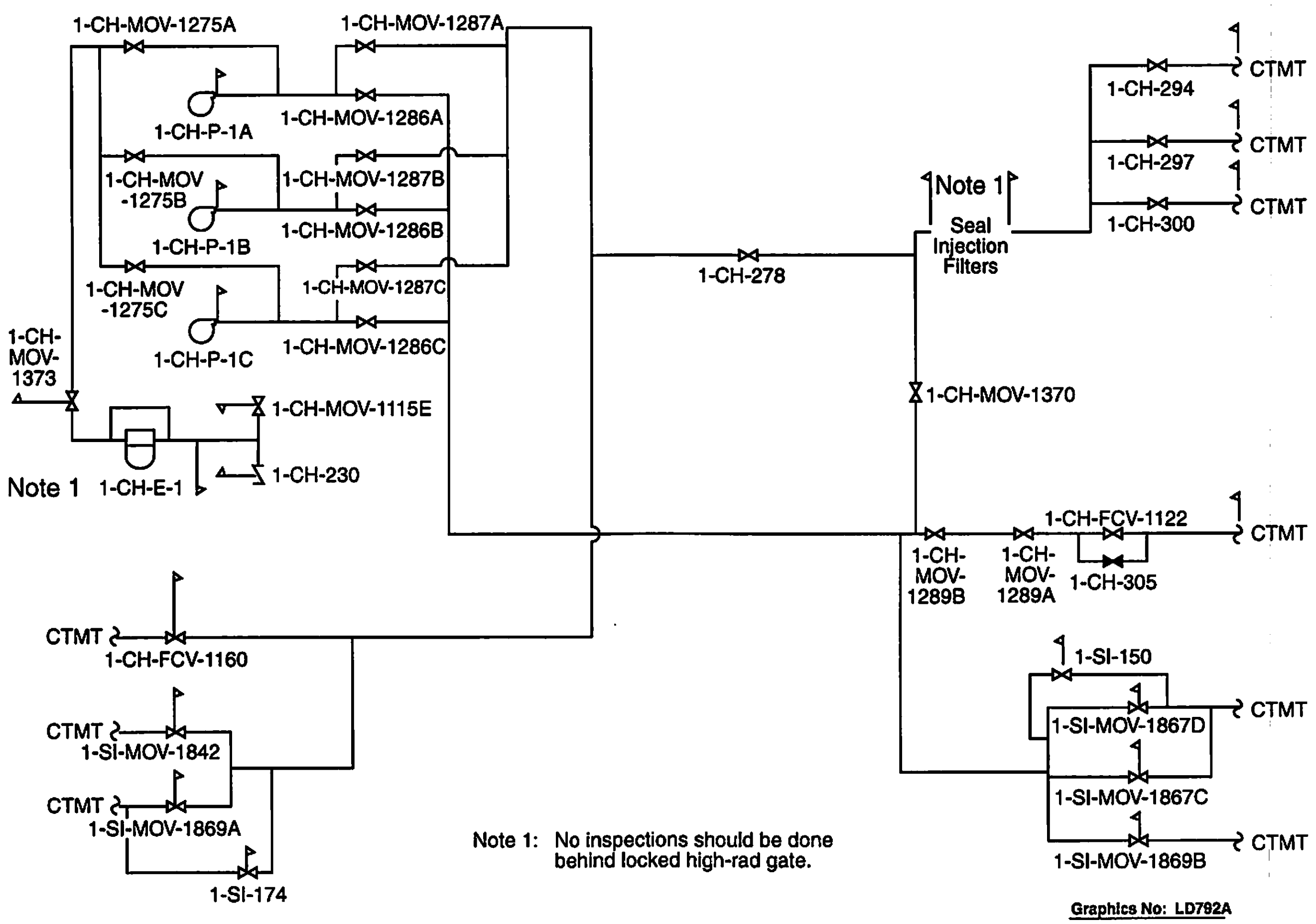
Attachment 5

CHARGING SYSTEM EXTERNAL LEAK INSPECTION DIAGRAM



Attachment 6
VENTING 1-CH-FT-1181

NOTE: The water and gas vented is potentially contaminated. Appropriate HP precautions shall be taken to prevent the spread of contamination.

NOTE: An HP approved catch container shall be used to collect any water that is vented.

______ 1. Open 1-CH-ICV-3528, CH Pump 1A Suct FT-1181 Equalizing Valve.

______ 2. Uncap and open 1-CH-ICV-3526, CH Pump 1A Suct FT-1181 (L) Test Isol.

______ ______ IV 3. WHEN a solid stream of water is obtained, THEN close and cap 1-CH-ICV-3526.

______ 4. Uncap and open 1-CH-ICV-3527, CH Pump 1A Suct FT-1181 (H) Test Isol.

______ ______ IV 5. WHEN a solid stream of water is obtained, THEN close and cap 1-CH-ICV-3527.

______ ______ IV 6. Close 1-CH-ICV-3528, CH Pump 1A Suct FT-1181 Equalizing Valve.

______ 7. IF additional venting is required to stabilize 1-CH-P-1A suction flow, THEN perform Steps 8 through 18. IF additional venting NOT required, THEN enter N/A for Steps 8 through 18.

______ 8. Open 1-CH-ICV-3528, CH Pump 1A Suct FT-1181 Equalizing Valve.

______ 9. Uncap and open 1-CH-ICV-3530, CH Pump 1A Suct FT - 1181 (L) Vent.

______ ______ IV 10. WHEN a solid stream of water is obtained, THEN close and cap 1-CH-ICV-3530.

______ 11. Uncap and open 1-CH-ICV-3529, CH Pump 1A Suct FT - 1181 (H) Vent.

______ ______ IV 12. WHEN a solid stream of water is obtained, THEN close and cap 1-CH-ICV-3529.

______ 13. Uncap and open 1-CH-ICV-3534, CH Pump 1A Suct FT - 1181 (L) Vent.

Attachment 6
VENTING 1-CH-FT-1181

______ ______ IV 14. WHEN a solid stream of water is obtained, THEN close and cap 1-CH-ICV-3534.

______ 15. Uncap and open 1-CH-ICV-3533, CH Pump 1A Suct FT - 1181 (H) Vent.

______ ______ IV 16. WHEN a solid stream of water is obtained, THEN close and cap 1-CH-ICV-3533.

______ ______ IV 17. Close 1-CH-ICV-3528, CH Pump 1A Suct FT-1181 Equalizing Valve.

______ 18. IF additional venting is required to stabilize 1-CH-P-1A suction flow, THEN repeat Step 1 through Step 18 as necessary.

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Attachment 7
VENTING OF CHARGING PUMP SEALS

_____ MECH 1. Manually rotate pump shaft.

_____ MECH 2. Vent the inboard seal by breaking loose the high point tubing connection.

_____ MECH 3. Vent the outboard seal by breaking loose the high point tubing connection.

_____ MECH 4. Tighten tubing connections.

_____ MECH 5. Remove the pump vent rig and install the blank flange on the CHG Pump casing vent flange.

Attachment 8

FLUSHING CHARGING PUMP TO REDUCE BORON DIFFERENTIAL

NOTE: A Charging Pump contains approximately 30 gallons.

______ 1. Notify Chemistry that pump will be flushed and to standby to take sample for boron.

______ 2. Check or place Auxiliary Building General ventilation system in service IAW 0-OP-VS-002, Auxiliary Building Ventilation System.

3. Check open or open sample isolation valve for pump to be started. (✓)

   ____ 1-CH-254, Chg Pump A Disch Sample Isol

   ____ 1-CH-263, Chg Pump B Disch Sample Isol

   ____ 1-CH-272, Chg Pump C Disch Sample Isol

4. Open sample HCV for pump to be started. (✓).

   ____ 1-SS-HCV-103A, Chg Pump 1A Disch Sample Isol

   ____ 1-SS-HCV-103B, Chg Pump 1B Disch Sample Isol

   ____ 1-SS-HCV-103C, Chg Pump 1C Disch Sample Isol

______ 5. Open 1-SS-14, Chg Pump Disch Sample Isol.

______ 6. Open 1-SS-13, Chg Pump Disch Sample Throttle Valve.

______ 7. Check flow to Sample Sink.

______ 8. <u>WHEN</u> approximately ten gallons have been flushed, <u>THEN</u> notify Chemistry to obtain sample.

______ 9. Continue flushing pump and obtaining samples until difference between Charging Pump Boron and RCS Boron is less than 360 ppm. <u>IF</u> the difference between RCS boron and pump boron is less than 360 ppm <u>AND</u> it is desired to flush to further reduce boron differential, <u>THEN</u> continue to flush IAW Shift Supervision direction.

(Page 2 of 2)

Attachment 8

FLUSHING CHARGING PUMP TO REDUCE BORON DIFFERENTIAL

10. WHEN ready to secure flush, THEN do the following:

_____ _____ IV a. Close 1-SS-13, Chg Pump Disch Sample Throttle Valve.

_____ _____ IV b. Close 1-SS-14, Chg Pump Disch Sample Isol.

_____ _____ IV c. Close sample HCV opened in Step 4.