

## SCENARIO #2 SETUP

j. 2 Dropped CEAs (35 and 37)  
CEDS012\_35 and \_37 on F6 and F7

k. 12 SG Tube Rupture  
MS002\_02 (1 tube) on F8

6. Enter Panel Overrides

a. 1C13 - INSTR AIR COMPR(S) Annunciator (K-25) to ON.

b. 1C07 - VCT Outlet MOV Handswitch, CVC-501, in CLOSE on Event Trigger for MOV CVC-501 in close.

c. 1C09 - Annunciators (2) for 13 HPSI Pp tagout- OFF.

d. 1C13 - Annunciators (2) for 13 CCW Pp tagout - OFF.

7. Enter Remote Functions / Administrative

a. Danger tag 13 CCW Pump.

b. Danger tag 13 HPSI Pump.

c. Place off-normal tags on the CCW Head Tank due to Makeup CV

d. Remote Functions to rackout 13 HPSI Pp.

e. Remote Functions to rackout 13 CCW Pp.

8. Set simulator time to real time, then place simulator in CONTINUE.

9. Give crew briefing.

a. Present plant conditions: 100% power - MOC/10,200 MWD/MTU. Unit 2 is in Mode 5. RCS Boron - 900 PPM.

b. Power history: 100% for previous 68 days.

c. Equipment out of service: 13 CCW Pump out of service due to a broken shaft. Estimated return to service is tomorrow-noon.

13 HPSI Pump out of service due motor bearing failure during the STP 24 hours ago. Estimated return to service in 30 hours. IAS 3.5.2.

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- d. Abnormal conditions: 11 CCW Head Tank Makeup CV is isolated due to leakby.  
Alarm K-25 (INSTR AIR COMPR(S) is hanging, air compressors check out ok, alarm card swapped out but still in alarm. I&C is working up a troubleshooting plan.
- e. Surveillances due: STP-029 (CEA Movement Test) due by end of shift. SM will discuss with CRS shortly after turnover.
- f. Instructions for shift: Maintain 100% power.

\_\_\_\_ 10. Allow crew 3-5 minutes to acclimate themselves with their positions.

\_\_\_\_ 11. Instructions for the Booth Operator.

- a. Activate malfunctions **F1-F5** when each is cued by the lead evaluator.
- b. Activate the next malfunction (**F6**) after about a 5% power move and with the Lead Examiner's concurrence, then about 30 seconds activate **F7**.
- c. When Vital Auxiliaries is complete activate **F8**.

## SCENARIO #2 SETUP

### RESPONSES TO CREW REQUEST

If a request and response is not listed, delay response until reviewed with the examiner. Responses to routine requests, which have no effect the scenario, do not require examiner clearance.

REQUEST	RESPONSE
1. OWC/E&C investigate failure of the Hotwell Level Controller (4405).	Acknowledge request.
2. OWC coordinate investigation of failure of 11 CW Pump.	Acknowledge request. After 5 minutes the electricians report the breaker is tripped on over current.
3. TBO close CAR-101 and Inlet MOV-5225 and secure 11A amertap.	Acknowledge each request. Three minutes after each request report the action complete.
4. OWC/E&C investigate failure of VCT Level Transmitter.	Acknowledge request.
5. OWC/GS-NPO contacted regarding PORV 402 leakage.	Acknowledge report.
6. TBO/Chemistry investigate Turbine Plant sample alarm and SG Sample Panel alarm	Acknowledge report. After 2 minutes report as Chemistry, there is a bad tube leak in 12B waterbox. 45 ppb Na and Conductivity of 18 micro seimens.
7. TBO close CAR-104 and 12B Inlet MOV and secure 12B amertap.	Acknowledge each request. Three minutes after each request report the action complete.
8. OSO ensure all demins ready to be placed in service.	Acknowledge report. After three minutes report all demins ready to be placed in service.
9. Chemistry contacted for additional info.	Report secondary chemistry is in Action Level 2.
10. Chemistry contacted to sample SGs.	After about 15 minutes report quantitative samples show significant activity in 12 SG.
11. Directs TBO to align 12 ADV to 1C43 with zero percent output.	After three minutes operate as directed.

## SCENARIO #2 SETUP

### SHIFT TURNOVER

- |       |                                    |  |
|-------|------------------------------------|--|
| I.    | Present Plant Conditions           | 100%   |
| II.   | Burnup:                            | 10200 MWD/MTU (MOC)  |
| III.  | Power History                      | 100% for previous 68 days.   |
| IV.   | Equipment out of Service:          | <p>13 CCW Pump out of service due to a broken shaft. Estimated return to service is tomorrow-noon.</p> <p>13 HPSI Pump out of service due motor bearing failure during the STP 24 hours ago. Estimated return to service in 30 hours. IAS 3.5.2.</p> |
| V.    | Abnormal Conditions:               | <p>11 CCW Head Tank Makeup CV is isolated due to leakby.</p> <p>Alarm K-25 (INSTR AIR COMPR(S) is hanging, air compressors check out ok, alarm card swapped out but still in alarm. I&amp;C is working up a troubleshooting plan.</p>                |
| VI.   | Surveillances Due:                 | STP-029 (CEA Movement Test) due by end of shift. SM will discuss with CRS shortly after turnover.  |
| VII.  | Instructions for Shift             | Maintain 100% power.   |
| VIII. | U2 Status and Major Equipment OOS: | Mode 5 – no CW Pps and 23AFW Pp is OOS.  |

Simulation Facility Calvert Cliffs

Scenario No.: 3

Op Test No.:

1

Examiners: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Operators: \_\_\_\_\_ SRO  
\_\_\_\_\_ RO  
\_\_\_\_\_ CRO

Objectives: To evaluate the applicant's ability to conduct a unit power reduction, to implement the ARMs, OIs, AOPs, as appropriate, for malfunctioning systems and/or controls including a failure of PRZR level control channel (110X) which causes a broken shaft on 12 Charging Pp, a failed FRV Controller (1121) and a SGFP oil leak causing a rapid power reduction. A loss of 11 BA Pp occurs at the start of the downpower. The crew will be forced to trip the unit when the running SGFP trips. Two stuck CEAs require boration to meet reactivity but a loss of 11 4KV Bus will force the crew to EOP-8 for reactivity not being met. In EOP-8, boration will be restored via HPSI injection and 11 AFW Pp will trip resulting in a loss of feed. The crew can restore AFW by aligning 12 AFW Pp.

Initial Conditions: The plant is at 67% Power, MOC (IC-17)

11 Chg Pp is OOS

12 SGFP Pp is OOS.

11 CCW Head Tank Makeup CV is isolated due to leakby.

INSTR AIR COMPR(S) alarm (K-25) hanging.

Turnover: Present plant conditions: 67% power, MOC; Unit 2 is in MODE 5 – no CW Pps and 23 AFW Pp unavailable.

Power history: 67% power for previous 4 days.

Equipment out of service:

- 1) 11 Chg Pp packing replacement. Expected to be returned to service in 6 hours. All Chg. Pumps have been repacked, currently running in the packing on 13.
- 2) 12 SGFP Pp to repair steam leak on LP poppets. It is disassembled, expected to be returned to service tomorrow
- 3) 11 CCW Head Tank Makeup CV is isolated due to leakby.
- 4) Alarm K-25 INSTR AIR COMPR(S) is hanging. No problems with the compressors, I & C is investigating, alarm card has been swapped out.

Surveillances due: 1B DG STP-O-8 due today. SM will bring STP to CR when ready.

Instructions for shift:

- 1) Maintain current power level. Perform 1B DG STP-O-8 when directed by SM.

Event No.	Malf. No.	Event Type*		Event Description
Preload	FW004_02 CEDS010_28 CEDS010_42 Remote Func PNL OVR (K-25)			12 SGFP OOS. 2 stuck CEAs.  11 CHG Pp OOS. (bkr rackout) INSTR AIR COMPR(S) alarm hanging.
1	RCS026_01 (low)	I	RO	About 3 minutes after the crew has taken the watch, PRZR level contr. (110X) fails low. The RO should acknowledge the alarm, inform the CRS and refer to the ARM. Level control should be shifted to channel Y and the OWC notified. T.S. 3.3.10 should be entered.
2	CVCS003_02	C	RO	12 Chg. Pp shaft breaks on start following 110X failure, however, the pump stops again when channel Y is selected. It is unlikely the crew will notice the failure here, but probably later during the downpower or boration to meet reactivity control in EOP-0. When discovered the crew is expected to attempt to ensure boration via another means and to contact the OWC for assistance.
3	FW018_02 (LO)	I	CRO	Next, 12 SG FRV Controller (1121) fails. The CRO should acknowledge the alarm and inform the CRS. The CRS should direct the CRO to maintain SG level and implement AOP-3G. The CRS should direct the CRO to place the controller switch in the Main Fail position. The CRS should direct the OWC to contact the System Engineer for assistance.
4	PNL OVR (Conditioner level low alarm) CVCS014_01 FW004_01	C R C N	CRO RO RO CRO	The CRO acknowledges the SGFP Conditioner Level Low Alarm, informs the CRS and dispatches the TBO. Following the TBO report, a rapid downpower will be initiated to take 11 SGFP off. (The crew may notice the charging pump malfunction at this time.) The OWC should be contacted for assistance and notifications. As the power reduction to take 11 SGFP off is begun, 11 BA Pp trips off when started. The RO will either use 12 BA Pp or gravity feed from the BASTs. At ~50% power, 11 SGFP trips. The CRS should order the unit tripped due to loss of feed. EOP-0 is implemented, the RO notes 2 stuck CEAs and commences boration.
5	4KV001_01	M	ALL	After the RO reports on Pressure and Inventory, a loss of 11 4KV Bus occurs (may refer to AOP-7I). The CRS orders a reassessment of safety functions. The RO should determine reactivity is no longer being met due to no charging and direct the TBO to align 13 Chg. Pp to 14 bus. With the TBO being unsuccessful the CRS will enter EOP-8 for failure to meet reactivity.
6	AFW001_01	M	ALL	EOP-8 is entered and the selected Success Paths begun. Boration is restored via HPSI injection. While working to establish boration, 11 AFW Pp trips the CRS or CRO should direct the TBO to investigate and align 12 AFW Pp. After AFW has been restored and boration established, the scenario can be terminated.

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

### SCENARIO 3 OVERVIEW

The candidates will take the shift at  $\approx 67\%$  power.

About 3 minutes after the crew has taken the watch, PRZR level contr. (110X) fails low. The RO should acknowledge the alarm, inform the CRS and refer to the ARM. Level control should be shifted to channel Y and the OWC notified. T.S. 3.3.10 should be entered.

12 Chg. Pp shaft breaks on start following 110X failure, however, the pump stops again when channel Y is selected. It is unlikely the crew will notice the failure here, but probably later in the scenario during the downpower or boration to meet reactivity control in EOP-0. When discovered the crew is expected to attempt to ensure boration via another means and to contact the OWC for assistance.

Next, 12 SG FRV Controller (1121) fails. The CRO should acknowledge the alarm and inform the CRS. The CRS should direct the CRO to maintain SG level and implement AOP-3G. The CRS should direct the CRO to place the controller switch in the Main Fail position. The CRO will control level via the PDI. The CRS should direct the OWC to contact the System Engineer for assistance.

The CRO acknowledges the SGFP Status Panel alarm and determines the alarm to be a SGFP Conditioner Level Low Alarm, informs the CRS and dispatches the TBO. Following the TBO report of a bad oil leak on 11 SGFP pump, a rapid downpower will be initiated to take 11 SGFP off. (The crew may notice the charging pump malfunction at this time.) The OWC should be contacted for assistance and notifications. As the power reduction to take 11 SGFP off is begun, 11 BA Pp trips off when started for the initial boration. The RO will either use 12 BA Pp or gravity feed from the BASTs to borate. At  $\approx 50\%$  power, 11 SGFP trips. The CRS should order the unit tripped due to loss of feed. EOP-0 is implemented, the RO notes 2 stuck CEAs and commences boration.

After the RO reports the status of RCS Pressure and Inventory, a loss of 11 4KV Bus occurs (may refer to AOP-7I). The CRS should order a reassessment of safety functions. The RO should determine reactivity is no longer being met due to no charging flow and direct the TBO to align 13 Chg. Pp to 14 bus. The TBO's attempts to realign the 13 Charging Pump will initially be unsuccessful. The CRS will enter EOP-8 for failure to meet Reactivity Control.

EOP-8 is entered and the selected Success Paths begun. Boration is restored via HPSI injection. While working to establish boration, 11 AFW Pp trips the CRS or CRO should direct the TBO to investigate and align 12 AFW Pp. After AFW has been restored and boration established, the scenario can be terminated.

Scenario No: 3		Event No. 1		Page 4 of 11
Event Description:		PZR level Control channel 110X fails Low.		
Time	Position	Applicant's Actions or Behavior		
	CUE	Annunciator E-33 - PZR CH. X LVL alarms. E-35 - PZR HTR CUTOUT All Charging pumps start.		
	RO	<ul style="list-style-type: none"> <li>• Acknowledges alarm, identifies and reports LT-110X has failed low.</li> <li>• Refers to the ARM</li> </ul>		
	SRO	<ul style="list-style-type: none"> <li>• Acknowledges report and directs RO to: <ul style="list-style-type: none"> <li>• Shift PZR level control to channel Y</li> <li>• Shift PZR heater cutout to channel Y</li> <li>• Resets Proportional Heaters</li> </ul> </li> </ul>		
	RO	<ul style="list-style-type: none"> <li>• Perform actions as directed by SRO</li> </ul>		
	SRO	<ul style="list-style-type: none"> <li>• Refers to T.S. 3.3.10</li> </ul>		
	SRO	<ul style="list-style-type: none"> <li>• Contacts OWC/I&amp;C to investigate failure of 1-LT-110X.</li> </ul>		



Scenario No: 3		Event No. 2	Page 5 of 11
Event Description:		12 Chg. Pp Shaft Failure	
Time	Position	Applicant's Actions or Behavior	
	CUE:	Low amps on 12 Chg. Pp Low charging flow for running pump combination (Note it is unlikely this failure will be noticed here, it is expected that it will be picked up either on the rapid downpower or the fast boration for 2 stuck CEAs)	
	RO	<ul style="list-style-type: none"> <li>Identifies and reports 12 Chg. Pp appears to be degraded</li> </ul>	
	SRO	<ul style="list-style-type: none"> <li>Acknowledges report and directs RO to:               <ul style="list-style-type: none"> <li>Ensure charging flow via 13 Chg. Pp</li> <li>Align 13 Chg. Pp to 14 Bus, (if necessary)</li> </ul> </li> </ul>	
	RO	<ul style="list-style-type: none"> <li>Perform actions as directed by SRO               <ul style="list-style-type: none"> <li>Directs TBO to shift 13 Chg. Pp to 14 Bus (in EOP-0)</li> <li>Dispatches ABO to investigate 12 Chg. Pp</li> </ul> </li> </ul>	
	SRO	<ul style="list-style-type: none"> <li>Contacts OWC/I&amp;C to investigate failure of 12 Chg. Pp and assist in getting 13 Chg. Pp aligned to 14 Bus</li> </ul>	

Scenario No:	3	Event No.	3	Page <u>6</u> of <u>11</u>
Event Description:		Failure of FRV Controller (1121)		
Time	Position	Applicant's Actions or Behavior		
	CUE:	SG level deviation alarm (computer alarm) Big "F" on face of FRV Controller 1121		
	CRO	<ul style="list-style-type: none"> <li>• Acknowledges alarm, checks SG levels, notes FRV control has shifted to the PDI</li> <li>• Informs SRO</li> </ul>		
	SRO	<ul style="list-style-type: none"> <li>• Acknowledges report</li> <li>• Implements AOP-3G</li> <li>• Directs CRO to: <ul style="list-style-type: none"> <li>• Place the 1121 FRV Controller in MAIN FAIL</li> <li>• Adjust the PDI CONTR to maintain zero inches SG level</li> <li>• Determines BYP OVERRIDE is not available</li> </ul> </li> </ul>		
	CRO	<ul style="list-style-type: none"> <li>• Performs actions as directed by the CRS.</li> </ul>		
	SRO	<ul style="list-style-type: none"> <li>• Directs OWC to investigate FIC-1121 and to contact the system engineer.</li> </ul>		

Scenario No: 3		Event No. 4	Page 7 of 11
Event Description:		Oil Leak on 11 SGFP (Rapid Downpower)	
Time	Position	Applicant's Actions or Behavior	
	CUE:	SGFP Conditioner Level Low Alarm on SGFP Status Panel	
	CRO	<ul style="list-style-type: none"> <li>Acknowledges Alarm, informs SRO and Dispatches TBO to 11 SGFP to investigate</li> <li>Refers to ARM</li> </ul>	
	SRO	<ul style="list-style-type: none"> <li>Acknowledges report from CRO</li> <li>When TBO reports control oil leak on 11 SGFP, directs the crew to commence a rapid downpower to take the unit offline per OP-3: <ul style="list-style-type: none"> <li>Directs RO to initiate equalizing boron and commence downpower</li> <li>Directs CRO reduce turbine load to maintain Tc on program</li> <li>Directs the CRO to maintain SG level due to failed FRV Controller</li> <li>May direct TBO to fill 11 SGFP oil reservoir</li> </ul> </li> </ul>	
	RO	<ul style="list-style-type: none"> <li>Initiates PZR spray flow to equalize RCS Boron: <ul style="list-style-type: none"> <li>Energizes all PZR backup heater banks</li> <li>Adjusts PZR Pressure Controller setpoint to maintain 2250 psia</li> </ul> </li> <li>Commences boration from the BASTs followed by shifting suction to the RWT: <ul style="list-style-type: none"> <li>Opens BA direct makeup valve</li> <li>Verifies two charging pumps running (may notice 12 Chg. Pp failure here (Event 2))</li> <li>Notes 11 BA Pp trips on start, informs SRO and uses 12 BA Pp</li> <li>Runs 12 BA Pp for 30 seconds (BAST gravity feed may be used instead)</li> <li>After 12 BA Pp is secured, shuts BA direct makeup valve</li> <li>Verifies open RWT outlet valve</li> <li>Verifies Shut VCT outlet</li> </ul> </li> <li>Inserts CEAs, if necessary, and maintains ASI within the limits of the COLR</li> <li>Requests Peer checks for reactivity manipulations</li> </ul>	
	CRO	<ul style="list-style-type: none"> <li>Reduces turbine load to maintain Tc within 5°F of program</li> <li>Monitors turbine parameters not to exceed <ul style="list-style-type: none"> <li>150°F/hr rate of change of 1<sup>st</sup> stage shell inner metal temperature (Point 6 on TR-4404)</li> <li>75°F 1<sup>st</sup> stage shell metal temperature differential (Diff between Points 6 &amp; 7 on TR-4404)</li> <li>Unloading rate of 10% step change or 5%/min</li> </ul> </li> </ul>	
	SRO	<ul style="list-style-type: none"> <li>Coordinates power reduction between RO and CRO</li> </ul>	
	SRO	<ul style="list-style-type: none"> <li>Contacts OWC for support for oil leak for 11 SGFP</li> </ul>	
	CRO	<ul style="list-style-type: none"> <li>Recognizes 11 SGFP has tripped, informs the SRO</li> </ul>	
	SRO	<ul style="list-style-type: none"> <li>Recognizes a total loss of feed has occurred:</li> <li>Directs RO to trip the reactor and for RO and CRO to implement EOP-0, <u>POST-TRIP IMMEDIATE ACTIONS</u></li> </ul>	

Scenario No: 3		Event No. 5	Page 8 of 11
Event Description:		11 SGFP Trip/Reactor Trip	
Time	Position	Applicant's Actions or Behavior	
	CUE:	Manual Reactor Trip initiated	
	RO	<p>Perform Post-Trip Immediate Actions:</p> <ul style="list-style-type: none"> <li>Depresses ONE set of Manual RX TRIP buttons</li> <li>Checks reactor tripped <ul style="list-style-type: none"> <li>Prompt drop in NI power</li> <li>Negative SUR</li> </ul> </li> <li>Determines 2 CEAs are stuck out and commences boration to 2300 PPM <ul style="list-style-type: none"> <li>Shuts CVC-512, VCT M/U Valve</li> <li>Opens BA DIRECT M/U valve, CVC-514</li> <li>Opens BAST Gravity Feed Valves, CVC-508 and 509</li> <li>Verifies M/U MODE SEL SW is in manual</li> <li>Starts a BA Pump</li> <li>Shuts VCT OUT valve, CVC-501</li> <li>Starts all available Charging Pumps (may notice 12 Chg. Pp failure, EVENT 2)</li> </ul> </li> <li>Verifies demin water makeup to RCS is secured <ul style="list-style-type: none"> <li>11 &amp; 12 RCMU pumps secured</li> <li>VCT M/U valve 1-CVC-512-CV is shut</li> <li>If RCS M/U is in DIRECT LINEUP, RWT CHG PP SUCT Valve 1-CVC-504-MOV is shut</li> </ul> </li> </ul> <p>Informs SRO Reactivity Safety Function is complete</p>	
	CRO	<ul style="list-style-type: none"> <li>Checks reactor has tripped</li> <li>Ensures turbine has tripped: <ul style="list-style-type: none"> <li>Depresses Turbine TRIP button</li> <li>Checks the Turbine MAIN STOP VALVES shut</li> <li>Checks Turbine SPEED drops</li> <li>Verifies turbine generator output breakers open: <ul style="list-style-type: none"> <li>11 GEN BUS BKR, 0-CS-552-22</li> <li>11 GEN TIE BKR, 0-CS-552-23</li> </ul> </li> <li>Verifies 11 GEN and EXCITER FIELD BKR's 1-CS-41 and 1-CS-41E are open</li> <li>Ensure both MSR 2<sup>nd</sup> STG STM SOURCE MOVs are shut: <ul style="list-style-type: none"> <li>1-MS-4025-MOV (11MSR)</li> <li>1-MS-4026-MOV (12 MSR)</li> </ul> </li> </ul> </li> </ul> <p>Informs SRO the Turbine is Tripped</p>	
	CRO	<ul style="list-style-type: none"> <li>Checks 11 OR 14 4KV Vital Bus energized</li> <li>Checks 125 VDC and 120 VAC busses energized</li> <li>Verifies CCW flow to RCPs</li> </ul> <p>Informs SRO Vital Auxiliaries Safety Function is complete.</p>	

Scenario No: 3		Event No. 5		Page 9 of 11
Event Description:		11 SGFP Trip/Reactor Trip		
Time	Position	Applicant's Actions or Behavior		
	RO	<ul style="list-style-type: none"> <li>Ensures PZR pressure stabilizes between 1850 psia and 2300 psia and is trending to 2250 psia</li> <li>Determines PZR level is stabilizing between 80 and 180 inches or trending to 160 inches</li> <li>Ensures RCS subcooling GREATER THAN 30°F</li> </ul> <p>Informs SRO RCS Pressure and Inventory Safety Function can is complete</p>		
	CREW	<ul style="list-style-type: none"> <li>Notes loss of 11 4KV Bus</li> <li>SRO directs reverification of Safety Functions</li> </ul>		
	RO	<ul style="list-style-type: none"> <li>Notes boration is no longer in progress, informs the SRO</li> <li>Directs TBO to shift 13 Chg. Pp to 14 Bus</li> </ul> <p>Reports Reactivity cannot be met due to two stuck CEAs and no boration in progress</p>		
	CRO	Reverifies and reports Turbine is Tripped		
	CRO	<ul style="list-style-type: none"> <li>Reverifies Vital Auxiliaries <ul style="list-style-type: none"> <li>Starts 0C DG</li> <li>Verifies Switchgear Ventilation in service per OI-22H</li> <li>Establishes CCW flow to RCPs</li> </ul> </li> </ul> <p>Reports Vital Auxiliaries are complete</p>		
	RO	Reverifies RCS Pressure and Inventory and reports is complete (may report not met due to lowering PZR level with no Chg. Pps running)		
	CRO	<ul style="list-style-type: none"> <li>Verifies Turbine Bypass Valves or ADVs operating to maintain: <ul style="list-style-type: none"> <li>SG pressures between 850 and 920 psia</li> <li>Tcold between 525° and 535°F <ul style="list-style-type: none"> <li>Directs ABO to operate ADVs locally to maintain RCS temperature</li> </ul> </li> </ul> </li> <li>Checks at least one SG available for controlled heat removal <ul style="list-style-type: none"> <li>SG level between -170 and +30 inches</li> <li>Initiates Aux Feedwater to maintain S/G level</li> <li>Tc &gt; 525°F</li> </ul> </li> <li>Checks at least one RCP operating in a loop with a SG available for heat removal</li> <li>Checks loop delta T is &lt; 10°F</li> </ul> <p>Informs SRO Core and RCS Heat Removal Safety Function is complete</p>		

Scenario No: 3		Event No. 5	Page 10 of 11
Event Description:		11 SGFP Trip/Reactor Trip	
Time	Position	Applicant's Actions or Behavior	
	SRO	<ul style="list-style-type: none"> <li>• May refer to AOP-7I</li> <li>• Directs OWC/TBO to tie 1Y09 and 1Y10 with 1Y10 supplying</li> </ul>	
	CREW	<ul style="list-style-type: none"> <li>• Checks Containment pressure is &lt;0.7 psig</li> <li>• Checks Containment temperature is &lt;120°F.</li> <li>• Checks containment radiation monitor alarms CLEAR with NO unexplained trends</li> <li>• Checks RMS alarms CLEAR with NO unexplained trends: <ul style="list-style-type: none"> <li>• 1-RIC-5415 U-1 wide range noble gas</li> <li>• 1-RI-1752 Condenser Offgas</li> <li>• 1-RI-4014 Unit 1 SG Blowdown</li> <li>• 1-RI-5415 Unit 1 Main Vent Gaseous</li> </ul> </li> </ul> <p>Informs SRO CNMNT Environment and Rad Levels External to CNMNT are complete</p>	
	SRO	<ul style="list-style-type: none"> <li>• Conducts EOP-0 mid-brief and directs operators to reverify Safety Function</li> </ul>	
	Crew	<ul style="list-style-type: none"> <li>• Reverifies Safety Functions</li> </ul>	
	SRO	<ul style="list-style-type: none"> <li>• Determines Recovery Procedure per Diagnostic Flowchart:</li> <li>• All Safety Functions met - NO</li> <li>• Event Diagnosis – Reactivity NOT MET</li> <li>• Directs transition to EOP-8</li> </ul>	

Scenario No: 3		Event No. 6		Page 11 of 11
Event Description:		EOP-8, Functional Recovery Procedure/Loss of Feed		
Time	Position	Applicant's Actions or Behavior		
	SRO	<ul style="list-style-type: none"> <li>Briefs crew prior to EOP-8 implementation</li> <li>Directs actions per EOP-8</li> </ul>		
	RO	<ul style="list-style-type: none"> <li>Performs RCP Trip strategy (determines RCPs not required to be tripped at this time)</li> </ul>		
	SRO	<ul style="list-style-type: none"> <li>Contacts Chemistry for SG samples and to place the Hydrogen analyzers in service</li> </ul>		
	SRO	<ul style="list-style-type: none"> <li>Directs operators to select success paths for all safety functions.</li> <li>Verifies selected success paths [RC-3(or 1), VA-1, PIC-4, HR-1, CE-1, RLEC-1]</li> <li>Determines sequence of success path performance [PIC, RC, VA, HR, CE, RLEC] (all met except PIC-4)</li> <li>Directs operators to implement success paths (PIC and RC)</li> </ul>		
	RO	<ul style="list-style-type: none"> <li>Commences RC-3               <ul style="list-style-type: none"> <li>Verifies power <math>&lt;10^{-4}\%</math></li> <li>Verifies SUR is negative</li> </ul> </li> </ul>		
	CRO	<ul style="list-style-type: none"> <li>Commences PIC-4               <ul style="list-style-type: none"> <li>Coordinates with RO to Establish RCS Pressure and Inventory Control using SIS</li> </ul> </li> </ul>		
	RO	<ul style="list-style-type: none"> <li>Establishes boration using HPSI injection               <ul style="list-style-type: none"> <li>Aligns SI system for HPSI injection</li> <li>Commences RCS depressurization to allow SI flow                   <ul style="list-style-type: none"> <li>Depressurizes using main spray</li> </ul> </li> <li>Continues to monitor RCS temperature and reactor power</li> </ul> </li> <li>Informs SRO boration has been established</li> </ul>		
	SRO	<ul style="list-style-type: none"> <li>With Reactivity Control established, directs RO to Commence next Success Path (VA-1) or RO to take over PIC from CRO and assign VA-1, HR-1 to CRO</li> </ul>		
	CREW	<ul style="list-style-type: none"> <li>Notes loss of 11 AFW Pp               <ul style="list-style-type: none"> <li>Directs TBO to investigate 11 AFW Pp and attempt to reset</li> <li>Directs TBO to align 12 AFW Pp</li> </ul> </li> <li>Informs SRO 11 AFW Pp has tripped and all feed has been lost</li> <li>Upon report of 12 AFW pump aligned, establishes AFW flow using 12 AFW Pp</li> </ul>		
		When boration is established and secondary heat sink restored, the scenario may be terminated		

## SCENARIO #3 SETUP

### OVERVIEW/OBJECTIVES

To evaluate the applicant's ability to conduct a unit power reduction, to implement the ARMs, OIs, AOPs, as appropriate, for malfunctioning systems and/or controls including a failure of PRZR level control channel (110X) which causes a broken shaft on 12 Charging Pp, a failed FRV Controller (1121) and a SGFP oil leak causing a rapid power reduction. A loss of 11 BA Pp occurs at the start of the downpower. The crew will be forced to trip the unit when the running SGFP trips. Two stuck CEAs require boration to meet reactivity but a loss of 11 4KV Bus will force the crew to EOP-8 for reactivity not being met. In EOP-8, boration will be restored via HPSI injection and 11 AFW Pp will trip resulting in a loss of feed. The crew can restore AFW by aligning 12 AFW Pp.

### INSTRUCTOR SCENARIO INFORMATION

- |       |    |  |                   |
|-------|----|--|-------------------|
| _____ | 1. | Reset to IC-17.  | Draft Spin #0202  |
| _____ | 2. | Perform switch check.  | Spin # Used _____ |
| _____ | 3. | Place simulator in CONTINUE, advance charts and clear alarm display. |                   |
| _____ | 4. | Place simulator in FREEZE.   |                   |
| _____ | 5. | Enter Malfunctions   |                   |
| _____ | a. | 12 SGFP Trip<br>FW004_02 at time zero                                |                   |
|       | b. | 2 Stuck CEAs (Untrippable)<br>CEDS010_28 and _42 at time zero        |                   |
|       | c. | PZR Level Controller (110X) Fails Low<br>RCS026_01 (Low) on F1       |                   |
| _____ | d. | 12 Chg. PP Shaft Breaks<br>CVCS003_02 on F2                          |                   |
|       | e. | 12 SG FRV Controller Fails Low<br>FW018_02 (Low) on F3               |                   |
| _____ | f. | 11 BA Pp Trips<br>CVCS014_01 on F4                                   |                   |
| _____ | g. | 11 SGFP Trips<br>FW004_01 on F5                                      |                   |
|       | h. | Loss of 11 4KV Bus<br>4KV001_01 F6                                   |                   |
|       | i. | Trip of 11 AFW Pp<br>AFW001_01 on F7                                 |                   |
-



### SCENARIO #3 SETUP

- \_\_\_ 6. Enter Panel Overrides
  - a. 1C13 - INSTR AIR COMPR(S) Annunciator (K-25) to ON.
  - b. 1C09 - Annunciators (2) for 11 Chg. Pp tagout- OFF.
- \_\_\_ 7. Enter Remote Functions / Administrative
  - a. Danger tag 11 Chg. Pp
  - b. Danger tag 12 SGFP Pp.
  - c. Place off-normal tags on the CCW Head Tank due to Makeup CV
  - d. Remote Functions to rackout 11 Chg. Pp.
- \_\_\_ 8. Set simulator time to real time, then place simulator in CONTINUE.
- \_\_\_ 9. Give crew briefing.
  - a. Present plant conditions: 67% power - MOC/10,200 MWD/MTU. Unit 2 is in Mode 5. RCS Boron - 980 PPM.
  - b. Power history: 67% for previous 4 days.
  - c. Equipment out of service:
    - 11 Chg. Pp out of service for packing replacement. Expected to be returned to service in 6 hours. All Chg. Pps have been repacked, currently running in packing in 13.
    - 12 SGFP out of service to repair steam leak on LP poppets. It is disassembled, expected to be returned to service tomorrow.
  - d. Abnormal conditions:
    - 11 CCW Head Tank Makeup CV is isolated due to leakby.
    - Alarm K-25 (INSTR AIR COMPR(S) is hanging, air compressors check out ok, alarm card swapped out but still in alarm. I&C is working up a troubleshooting plan.
  - e. Surveillances due: 1B DG STP-O-8 due today. SM will bring to CR when ready.
  - f. Instructions for shift: Maintain current power level. Perform 1B DG STP-O-8 when directed by SM.
- \_\_\_ 10. Allow crew 3-5 minutes to acclimate themselves with their positions.

### SCENARIO #3 SETUP

11. Instructions for the Booth Operator.

- a. Activate malfunction F1 when cued by the lead examiner then immediately activate F2.
- b. Activate the next malfunction (F3) when cued by the lead examiner.
- c. When cued by the lead examiner, insert SGFP Status Panel "**Conditioner Level Low**" alarm and immediately after Panel Override Annunciator C-69 ON (SGFP Status Panel).
- d. As the rapid downpower is commenced, when the RO starts 11 BA Pp, immediately activate F4.
- e. After power has been reduced at least 5%, and with the lead examiner's concurrence activate F5.
- f. After the unit is tripped, remove Panel override for annunciator C-69.
- g. After the RO reports RCS Pressure and Inventory status, activate F6.
- h. In EOP-8, while the RO is working to establish boration, activate F7.

## SCENARIO #3 SETUP

### RESPONSES TO CREW REQUEST

If a request and response is not listed, delay response until reviewed with the examiner. Responses to routine requests, which have no effect the scenario, do not require examiner clearance.

REQUEST	RESPONSE
1. OWC/E&C investigate failure of the PRZR Level Controller, 1-LT-110X.	Acknowledge request.
2. OWC/E&C investigate failure of the 12 SG FRV Controller, 1121.	Acknowledge request.
3. TBO investigate SGFP Conditioner Level Low alarm.	Acknowledge request. After Two minutes, report a large control oil leak on 11 SGFP and recommend the SGFP be removed from service as soon as possible.
4. ABO investigate trip of 11 BA Pp.	Acknowledge request. After 3 minutes, report 11 BA Pp tripped on overcurrent.
5. ABO investigate 12 Chg. Pp low flow.	Acknowledge report. After three minutes, report 12 Chg. Pp has a broken shaft.
6. TBO/OWC/Electricians shift 13 CHG. Pp to 14 Bus.	Acknowledge report. After 2 minutes report as TBO unable to get it to shift, seems to be hung up. As additional assistance is rendered continue to give report of unable to get it shifted to 14 Bus.
7. TBO investigate trip of 11 AFW Pp and align 12 AFW Pp for service.	Acknowledge request. After three minutes, align 12 AFW Pp for operation.

## SCENARIO #3 SETUP

### SHIFT TURNOVER

- |       |                                    |  |
|-------|------------------------------------|--|
| I.    | Present Plant Conditions           | 67%  |
| II.   | Burnup:                            | 10200 MWD/MTU (MOC)  |
| III.  | Power History                      | 67% for previous 4 days.   |
| IV.   | Equipment out of Service:          | <p>11 Chg. Pp out of service for packing replacement. Expected to be returned to service in 6 hours. All Chg. Pps have been repacked, currently running in packing in 13.</p> <p>12 SGFP out of service to repair steam leak on LP poppets. It is disassembled, expected to be returned to service tomorrow.</p> |
| V.    | Abnormal Conditions:               | <p>11 CCW Head Tank Makeup CV is isolated due to leakby.</p> <p>Alarm K-25 (INSTR AIR COMPR(S)) is hanging, air compressors check out ok, alarm card swapped out but still in alarm. I&amp;C is working up a troubleshooting plan.</p>   |
| VI.   | Surveillances Due:                 | 1B DG STP-O-8 due today. SM will bring to CR when ready.   |
| VII.  | Instructions for Shift             | Maintain current power level. Perform 1B DG STP-O-8 when directed by SM.   |
| VIII. | U2 Status and Major Equipment OOS: | Mode 5 – no CW Pps and 23AFW Pp is OOS.  |
-

Simulation Facility Calvert Cliffs Scenario No.: 4 (Spare) Op Test No.: 1

Examiners: \_\_\_\_\_ Operators: \_\_\_\_\_ SRO  
\_\_\_\_\_ RO  
\_\_\_\_\_ CRO

Objectives: To evaluate the applicant's ability to conduct a unit power increase, to implement the ARMs, OIs, AOPs, as appropriate, for malfunctioning systems and/or controls including raising power, a failure of the SRW Controller for the Main Generator H2 Cooler, a failure of the letdown backpressure regulator and a dropped CEA. When the CEA drops, the crew will implement AOP-1B. As the dropped CEA is being recovered a loss of 14 4KV Bus occurs. The crew will shift charging suction back to the VCT, stabilize the unit and implement AOP-7I. Next, a loss of offsite power occurs and the Main Turbine does not Trip. The crew should determine a manual reactor trip is required, trip the unit and implement EOP-0. The 1A DG does not start and the 0C DG Tie Bus is faulted resulting in a Station Blackout. The crew will implement EOP-7. As actions for EOP-7 are being performed, 11 AFW Pp will trip. The crew will be able to restore AFW using 12 AFW Pump allowing them to remain in the optimal procedure.

Initial Conditions: The plant is at 75% Power, MOC (IC-18)  
  
13 CCW Pp is OOS  
  
12 Charging Pp is OOS  
  
INSTR AIR COMPR(S) alarm (K-25) hanging.

Turnover: Present plant conditions: 75% power, MOC; Unit 2 is in MODE 5 – no CW Pps and 23 AFW Pp unavailable.  
  
Power history: 100% power for previous 190 days. Then reduced to ≈68% 3 days ago for 12 SGFP repairs.

Equipment out of service:

- 1) 13 CCW Pp has a broken shaft, expected repair tomorrow-noon.
- 2) Alarm K-25 INSTR AIR COMPR(S) is hanging. No problems with the compressors, I & C is investigating, alarm card has been swapped out.
- 3) 12 Charging Pp is OOS due to severe packing leakage. The packing is being replaced. Expected to be ready for PMT in about 4 hours.

Surveillances due: None.

Instructions for shift:

- 1) Unit 1 had been at ≈68% power the previous 3 days to repair a steam leak on 12 SGFP. Both SGFPs are operating in parallel. Continue raising power to 100% per OP-3.
- 2) Perform PMT on 12 Charging Pump when returned to service.

Event No.	Malf. No.	Event Type*		Event Description
Preload	DG0C004 DG002_02 CCW002_03 TG002 Remote Func PNL OVR (K-25)			0C DG tie bus faulted. 1A DG start failure. 13 CCW Pp OOS Turbine fails to trip. 12 Chg Pp OOS INSTR AIR COMPR(S) alarm hanging.
1	N/A	R N	RO CRO	After the crew takes the watch, the CRS should brief the crew on the power increase to 100% per OP-3. After the brief the RO and CRO should coordinate to raise power while maintaining plant parameters within acceptable limits and Tc on program.
2	TG030_01 (closed)	I	CRO	After power has been raised at least 5%, the SRW controller for the Main Generator H <sub>2</sub> cooler fails the valve shut. When the high temperature alarm is received, the CRO should acknowledge the alarm, inform the CRS and refer to the ARM. The CRO should determine TIC-1608 has failed low causing the CV to go shut, take manual control and restore H <sub>2</sub> temperature. The OWC should be contacted for assistance.
3	CVCS005	I	RO	Next, Letdown backpressure transmitter PT-201 fails low. The RO acknowledges the alarm, informs the CRS and refers to the ARM. The CRS should direct the RO to take manual control and restore letdown flow. The OWC should be contacted for support.
4	CEDS012_34	C	RO	After the PT-201 failure CEA 34 drops. The RO should acknowledge the alarms, inform the CRS and refer to the ARM. The CRS should implement AOP-1B and address T.S. 3.1.4. The primary will be stabilized and realignment time determined. After notifying maintenance and correcting the cause, realignment will be commenced.
5	4KV001_04	C	CRO	As the CEA is being withdrawn, 14 4KV Bus is lost. The crew should stop CEA withdrawal, diagnose the bus loss, shift Charging Pump suction back to the VCT and stabilize the unit. The CRS should implement AOP-7I. The CRO will perform APO-7I actions as directed by the CRS. The OWC should be contacted for support.
6	SWYD002	M	ALL	About 5 minutes after the bus loss, a loss of offsite power occurs. 1A DG does not start and 14 4KV bus is locked out. The 0C Diesel will not energize the 0C Tie Bus due to a fault. The Main Turbine will not trip automatically. The crew should recognize a reactor trip is required and trip the unit manually. The crew will implement EOP-0 and diagnose a station blackout exists.
7	AFW001_01	C	ALL	In EOP-7, 11 AFW Pp will trip but they can restore AFW using 12 AFW Pump. 1A DG will become available and the 11 4KV Bus energized. After the bus is energized the scenario can be terminated.

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

## SCENARIO 4 OVERVIEW

The candidates will take the shift at  $\approx 75\%$  power with instructions to raise power to 100% per OP-3.

After the crew takes the watch, the CRS should brief the crew on the power increase to 100% per OP-3. After the brief the RO and CRO should coordinate to raise power while maintaining plant parameters within acceptable limits and Tc on program.

After power has been raised at least 5%, the SRW controller for the Main Generator H<sub>2</sub> cooler fails the SRW valve closed. When the generator H<sub>2</sub> high temperature alarm is received, the CRO should acknowledge the alarm, inform the CRS and refer to the ARM. The CRO should determine TIC-1608 has failed low causing the CV to go shut, take manual control and restore H<sub>2</sub> temperature. The OWC should be contacted for assistance.

Next, Letdown backpressure transmitter PT-201 fails low. The RO acknowledges the alarm, informs the CRS and refers to the ARM. The CRS should direct the RO to take manual control and restore letdown flow. The OWC should be contacted for support.

After the PT-201 failure CEA 34 drops. The RO should acknowledge the alarms, inform the CRS and refer to the ARM. The CRS directs the CRO to reduce turbine load as necessary to maintain Tc on program, implement AOP-1B and address T.S. 3.1.4. The primary will be stabilized and realignment time determined. After notifying maintenance and correcting the cause, realignment will be commenced.

As the CEA is being withdrawn 14 4KV Bus is lost. The crew should stop CEA withdrawal, diagnose the bus loss, shift Charging Pump suction back to the VCT and stabilize the unit. The CRS should implement AOP-7I. The CRO will perform AOP-7I actions as directed by the CRS. The OWC should be contacted for support.

About 5 minutes after the bus loss, a loss of offsite power occurs. 1A DG does not start and 14 4KV Bus is locked out. The 0C Diesel will not energize the 0C Tie Bus due to a fault. The Main Turbine will not trip automatically. The crew should recognize a reactor trip is required and trip the unit manually. The crew will implement EOP-0 and diagnose a station blackout exists.

In EOP-7 11 AFW Pp will trip but they can restore AFW using 12 AFW Pump. 1A DG will become available and the 11 4KV Bus energized. After the bus is energized the scenario can be terminated.

Scenario No:	4	Event No.	1	Page 4 of 12
Event Description:	Power increase to 100%			
Time	Position	Applicant's Actions or Behavior		
	CUE	Turnover directs the crew to raise power to 100%		
	SRO	<ul style="list-style-type: none"> <li>• Performs brief of power escalation per OP-3</li> <li>• Notifies the System Operator power is being raised to 100%</li> <li>• Directs crew to begin a power escalation per OP-3 <ul style="list-style-type: none"> <li>• Verifies boration flow paths for going &gt;80% power</li> </ul> </li> </ul>		
	RO	<ul style="list-style-type: none"> <li>• Withdraws CEAs</li> <li>• Commences dilution</li> <li>• Monitors reactor power, RCS temperatures during power increase</li> <li>• Requests Peer checks for reactivity manipulations</li> </ul>		
	CRO	<ul style="list-style-type: none"> <li>• Raises turbine load to maintain Tc within 2°F of program</li> <li>• Monitors feedstation to verify S/G levels are being maintained approximately 0 inches</li> </ul>		
	SRO	<ul style="list-style-type: none"> <li>• Coordinates power escalation between RO and CRO</li> </ul>		



Scenario No: 4		Event No. 2	Page 5 of 12
Event Description:		SRW Controller to Main Generator H2 Cooler Fails shut	
Time	Position	Applicant's Actions or Behavior	
	CUE:	Annunciator alarms 1C02 – B21 – GEN MON STATUS PANEL	
	CRO	<ul style="list-style-type: none"> <li>• Acknowledges alarm, identifies and reports alarm is due to high generator H2 temperature</li> <li>• Refers to the ARM</li> <li>• Determines 1-TIC-1608 has failed</li> </ul>	
	SRO	<ul style="list-style-type: none"> <li>• Acknowledges report and directs CRO to: <ul style="list-style-type: none"> <li>• Shift 1-TIC-1608 to manual</li> <li>• Restore H2 temperature</li> <li>• Dispatches TBO to check out the TCV locally</li> </ul> </li> </ul>	
	CRO	<ul style="list-style-type: none"> <li>• Perform actions as directed by SRO</li> </ul>	
	SRO	<ul style="list-style-type: none"> <li>• Contacts OWC/I&amp;C to investigate failure of 1-TIC-1608</li> </ul>	

Scenario No:	4	Event No.	3	Page 6 of 12
Event Description:	Letdown Backpressure Transmitter, PT-201, Fails Low			
Time	Position	Applicant's Actions or Behavior		
	CUE	Annunciator F-09 - L/D PRESS F-17 - RAD MON FLOW LO		
	RO	<ul style="list-style-type: none"> <li>• Acknowledges alarm, notes lowering letdown flow, informs CRS</li> <li>• Refers to the ARM</li> <li>• Determines backpressure regulator, PT-201 has failed low (may think letdown relief has lifted and with SRO concurrence isolate letdown instead)</li> </ul>		
	SRO	<ul style="list-style-type: none"> <li>• Acknowledges report and: <ul style="list-style-type: none"> <li>• Directs RO to take manual control of PT-201</li> <li>• Reestablish letdown flow</li> <li>• Check for indication of L/D RV lift</li> </ul> </li> </ul>		
	RO	<ul style="list-style-type: none"> <li>• Takes PT-201 to manual</li> <li>• Reestablishes letdown flow</li> <li>• Verifies L/D reliefs have reseated, if lifted</li> </ul>		
	SRO	<ul style="list-style-type: none"> <li>• Directs OWC to investigate the failure of PT-201</li> </ul>		

Scenario No:	4	Event No.	4	Page <u>7</u> of <u>12</u>
Event Description:		Dropped CEA		
Time	Position	Applicant's Actions or Behavior		
	CUE:	Annunciator alarms 1C05 - D-31 SECONDARY CEA POSITION DEVIATION +/- 4" D-32 CEA MOTION INHIBIT Dropping Rx power, RCS temp. and press.		
	RO	<ul style="list-style-type: none"> <li>Acknowledges alarms, identifies CEA #34 has dropped and informs SRO</li> <li>Refers to the ARM</li> </ul>		
	SRO	<ul style="list-style-type: none"> <li>Acknowledges report</li> <li>Directs CRO to reduce turbine load to restore Tc to program</li> <li>Implements AOP-1B</li> </ul>		
	CRO	<ul style="list-style-type: none"> <li>Coordinates with RO and reduces turbine load to restore Tc to program</li> </ul>		
	SRO	<ul style="list-style-type: none"> <li>Determines CEA realignment time</li> <li>Contacts OWC to obtain support</li> <li>Directs RO to attempt CEA realignment (FrT is 1.56, realignment time ≈42 minutes)</li> <li>Directs RO and CRO to NOT allow reactor power to rise above the power the unit was stabilized at while the CEA is being aligned</li> </ul>		
	RO	<ul style="list-style-type: none"> <li>Attempts CEA realignment using 5.25 inch pull and 15 second wait method</li> <li>Monitors reactor power, SUR, temp. etc.</li> <li>Borates to maintain power at less than stabilized value</li> </ul>		
	SRO	<ul style="list-style-type: none"> <li>Refers to T.S. 3.1.4</li> </ul>		

Scenario No:	4	Event No.	5	Page 8 of 12
Event Description:		Loss of 14 4KV Bus		
Time	Position	Applicant's Actions or Behavior		
	CUE:	Annunciator alarm – Numerous Loss of CEA position indication Loss of various control board indications 1-CVC-504-MOV RWT CHG PP SUCT valve open light lit 1-CVC-501-MOV VCT OUT valve closed light lit		
	CREW	<ul style="list-style-type: none"> <li>• Determines a loss of power has occurred and a reactor trip is not required</li> <li>• Directs the RO to monitor the primary</li> <li>• Diagnoses the power loss to be loss of 14 4KV Bus and that the bus is locked out due to a fault</li> </ul>		
	SRO	<ul style="list-style-type: none"> <li>• Directs the RO to place all Charging Pps in Pull-To-Lock and shift Charging Pp suction back to the VCT</li> <li>• Directs the CRO to reduce turbine load as necessary to maintain Tc on program</li> <li>• Directs CRO to monitor Main Generator temperatures</li> <li>• Implements AOP-7I, <u>LOSS OF 4KV, 480 VOLT OR 208/120 VOLT INSTRUMENT BUS POWER</u></li> <li>• Reviews preliminary section and transitions to Section XXIII, 14 4KV Bus <ul style="list-style-type: none"> <li>• Directs RO to maintain PZR level within 15 inches of program not to exceed 225 inches</li> <li>• Directs CRO to have plant operator tie 1Y10 to 1Y09</li> </ul> </li> </ul>		
	RO/CRO	<ul style="list-style-type: none"> <li>• Perform actions directed by the SRO</li> </ul>		
	SRO	<ul style="list-style-type: none"> <li>• Directs 13 Chg. Pp, 13 SRW Pp and 13 SW Pp be aligned to 11 4KV Bus (13 Chg. Pp is normally aligned to 11 bus)</li> <li>• Directs monitoring of CNMNT temperatures</li> <li>• Directs 1B DG be shutdown and starting air isolated</li> </ul>		
	SRO	<ul style="list-style-type: none"> <li>• When power supplies have been realigned, directs starting of 13 SW and SRW Pps to restore SW and SRW flow to 11 headers</li> <li>• Directs restoration of various plant loads</li> <li>• Directs 1B DG be shutdown by locally tripping the fuel racks</li> </ul>		
	RO/CRO	<ul style="list-style-type: none"> <li>• Perform actions directed by the SRO</li> </ul>		
	SRO	<ul style="list-style-type: none"> <li>• After 1Y10 is reenergized: <ul style="list-style-type: none"> <li>• Directs RO to restore charging and letdown per OI-2A, <u>Chemical and Volume Control System</u></li> <li>• Directs RO to return VCT Outlet and RWT Outlet valves to auto</li> </ul> </li> </ul>		
	RO/CRO	<ul style="list-style-type: none"> <li>• Perform actions directed by SRO</li> </ul>		
	SRO	<ul style="list-style-type: none"> <li>• Reviews T.S. for loss of Bus (3.8.1 and 3.8.9). Note - this is not required prior to proceeding to the next event</li> </ul>		
	SRO	<ul style="list-style-type: none"> <li>• Contact OWC or electricians to investigate Loss of 14 4KV Bus</li> </ul>		

Scenario No: 4		Event No. 6		Page 9 of 12
Event Description:		Loss of Offsite Power/EOP-0		
Time	Position	Applicant's Actions or Behavior		
	CUE:	Various annunciators associated with loss of offsite power/reactor trip.		
	SRO	<ul style="list-style-type: none"> <li>Directs Unit 1 Reactor Trip and directs operators to implement EOP-0.</li> </ul>		
	RO	<p>Perform Post-Trip Immediate Actions:</p> <ul style="list-style-type: none"> <li>Depresses ONE set of Manual RX TRIP buttons</li> <li>Checks reactor tripped               <ul style="list-style-type: none"> <li>Prompt drop in NI power</li> <li>Negative SUR</li> </ul> </li> <li>Checks ALL CEAs fully inserted (not able to verify due to loss of power effects)</li> <li>Verifies demin water makeup to RCS is secured               <ul style="list-style-type: none"> <li>11 &amp; 12 RCMU pumps secured</li> <li>VCT M/U valve 1-CVC-512-CV is shut</li> <li>If RCS M/U is in DIRECT LINEUP, RWT CHG PP SUCT valve 1-CVC-504-MOV is shut (1-CVC-501-MOV must be opened first)</li> </ul> </li> </ul> <p>Informs SRO Reactivity Safety Function is complete. (may report not met due to inability to assess due to loss of power)</p>		
	CRO	<ul style="list-style-type: none"> <li>Checks reactor has tripped</li> <li>Ensures Turbine has tripped:               <ul style="list-style-type: none"> <li>Notes the Main Turbine has failed to trip, Depresses Turbine TRIP button and informs the SRO</li> <li>Checks the Turbine MAIN STOP VALVES shut (may not be able to assess due to power loss).</li> <li>Checks Turbine SPEED drops. (may not be able to assess due to power loss)</li> <li>Verifies turbine generator output breakers open:                   <ul style="list-style-type: none"> <li>11 GEN BUS BKR, 0-CS-552-22</li> <li>11 GEN TIE BKR, 0-CS-552-23</li> </ul> </li> <li>Verifies 11 GEN and EXCITER FIELD BKR 1-CS-41 and 1-CS-41E are open</li> <li>Ensures both MSR 2<sup>nd</sup> STG STM SOURCE MOVs are shut:                   <ul style="list-style-type: none"> <li>1-MS-4025-MOV (11MSR)</li> <li>1-MS-4026-MOV (12 MSR)</li> </ul> </li> </ul> </li> </ul> <p>Informs SRO the Turbine is Tripped (may report unable to assess).</p>		

Scenario No: 4		Event No. 6	Page 10 of 12
Event Description:		Loss of Offsite Power/EOP-0	
Time	Position	Applicant's Actions or Behavior	
	CRO	<ul style="list-style-type: none"> <li>Notes 11 and 14 4KV Vital Buses deenergized               <ul style="list-style-type: none"> <li>Starts the 0C DG</li> <li>Verifies 1A DG running,                   <ul style="list-style-type: none"> <li>Notes 1A DG is not running,</li> <li>Attempts to start the 1A DG</li> <li>Since 1A DG did not start, dispatches OSO to 1A DG</li> <li>Dispatches TBO to close 0C DG 11 4KV Bus disconnect, 189-1106</li> </ul> </li> </ul> </li> <li>Checks 125 VDC and 120 VAC busses energized</li> <li>Determines 1Y09 and 1Y10 are deenergized</li> </ul> <p>Informs SRO Vital Auxiliaries cannot be met due to no vital 4KV Buses and no 120 Volt instrument buses and the 1A DG did not start</p>	
	RO	<ul style="list-style-type: none"> <li>Ensures PZR pressure stabilizes between 1850 psia and 2300 psia and is trending to 2250 psia</li> <li>Determines PZR level is not stabilizing between 80 and 180 inches or trending to 160 inches</li> <li>Ensures RCS subcooling GREATER THAN 30°F</li> </ul> <p>Informs SRO RCS Pressure and Inventory Safety Function can NOT be met due to low PZR pressure and PZR level</p>	
	CRO	<ul style="list-style-type: none"> <li>Verifies Turbine Bypass Valves or ADVs operating to maintain: (only ADVs are available locally)               <ul style="list-style-type: none"> <li>SG pressures between 850 and 920 psia</li> <li>Tcold between 525° and 535°F</li> <li>Directs ABO to locally open ADVs several turns</li> </ul> </li> <li>Checks at least one SG available for controlled heat removal               <ul style="list-style-type: none"> <li>SG level between -170 and +30 inches</li> <li>Initiates Aux Feedwater to maintain S/G level</li> </ul> </li> </ul> <p>Informs SRO Core and RCS Heat Removal Safety Function cannot be met due to no RCPs</p>	
	SRO	<ul style="list-style-type: none"> <li>Directs PWS/PPO/OSO investigate start failure of 1A DG and to attempt to return to service</li> </ul>	

Scenario No:	4	Event No.	6	Page 11 of 12
Event Description:	Loss of Offsite Power/EOP-0			
Time	Position	Applicant's Actions or Behavior		
	CREW	<ul style="list-style-type: none"> <li>• Checks Containment pressure less than 0.7 psig</li> <li>• Checks Containment temperature less than 120°F</li> <li>• Checks containment radiation monitor alarms CLEAR with NO unexplained trends</li> <li>• Checks RMS alarms CLEAR with NO unexplained trends: <ul style="list-style-type: none"> <li>• 1-RIC-5415 U-1 wide range noble gas</li> <li>• 1-RI-1752 Condenser Offgas</li> <li>• 1-RI-4014 Unit 1 SG Blowdown</li> <li>• 1-RI-5415 Unit 1 Main Vent Gaseous</li> </ul> </li> </ul> <p>Informs SRO CNMNT environment cannot be met and Rad Levels External to CNMNT can not be met due loss of power (unable to assess)</p>		
	SRO	<ul style="list-style-type: none"> <li>• Conducts EOP-0 mid-brief and directs operators to reverify Safety Functions</li> </ul>		
	CRO	<ul style="list-style-type: none"> <li>• When the TBO has reported closing disconnect 189-1106: <ul style="list-style-type: none"> <li>• CRO attempts to close 07 4KV Bus Tie Bkr, 152-0701</li> <li>• Notes 152-0701 immediately trips open</li> <li>• Informs SRO</li> </ul> </li> </ul>		
	SRO	<ul style="list-style-type: none"> <li>• Determines Recovery Procedure per Diagnostic Flowchart:</li> <li>• All Safety Functions met - NO</li> <li>• Single Event Diagnosis – YES- EOP-7</li> <li>• Directs transition to EOP-7</li> </ul>		

Scenario No: 4		Event No. 7		Page 12 of 12
Event Description:		EOP-7, Station Blackout/Loss of AFW Pump		
Time	Position	Applicant's Actions or Behavior		
	SRO	<ul style="list-style-type: none"> <li>Briefs crew prior to EOP-7 implementation</li> <li>Directs actions per EOP-7</li> </ul>		
	SRO	<ul style="list-style-type: none"> <li>Contacts System Operator to determine status of offsite power</li> <li>Contacts OWC for support in DG restoration</li> </ul>		
	CRO	<ul style="list-style-type: none"> <li>Protects the condenser from overpressure and minimizes S/G inventory loss <ul style="list-style-type: none"> <li>Shuts both MSIVs</li> <li>Isolates S/G B/D</li> </ul> </li> </ul>		
	RO	<ul style="list-style-type: none"> <li>Minimizes RCS inventory loss <ul style="list-style-type: none"> <li>Isolates letdown (already isolated)</li> <li>Maintains RCP bleedoff flowpath</li> <li>Shuts RCS sample valve</li> <li>Verifies RX and PZR vent valves are shut</li> </ul> </li> </ul>		
	RO	<ul style="list-style-type: none"> <li>Establishes RCS heat Sink</li> <li>Operates ADVs locally to control RCS temp. between 525° and 535°F</li> <li>Ensures AFW flow established</li> <li>Secures Main Feed System</li> </ul>		
	CRO	<ul style="list-style-type: none"> <li>Aligns electrical system for power restoration <ul style="list-style-type: none"> <li>Aligns 13KV and 4KV breakers</li> <li>Places 4KV Bus LOCI Sequencer keyswitches to ON</li> <li>Shuts CC CNMNT supply valve</li> </ul> </li> </ul>		
	RO	<ul style="list-style-type: none"> <li>Verifies turbine and SGFP emergency oil pumps running</li> </ul>		
	CREW	<ul style="list-style-type: none"> <li>Notes failure of 11 AFW Pp</li> <li>Informs SRO</li> </ul>		
	SRO	<ul style="list-style-type: none"> <li>Directs TBO to align 12 AFW</li> <li>May implement EOP-8 although this is not expected or required</li> </ul>		
	RO	<ul style="list-style-type: none"> <li>Monitors SG levels</li> <li>After 12 AFW Pp is aligned, verifies AFW flow to both SGs</li> </ul>		
	CRO	<ul style="list-style-type: none"> <li>Attempts to restore power to at least one 4KV Bus <ul style="list-style-type: none"> <li>When word is received 1A DG is available: <ul style="list-style-type: none"> <li>Directs low oil pressure trip be reset</li> <li>Verifies 1A DG starts and loads on 11 4KV Bus</li> <li>Verifies Shutdown sequencer loads are operating</li> </ul> </li> <li>Restores CCW flow</li> </ul> </li> </ul>		
	RO	<ul style="list-style-type: none"> <li>Verifies Natural Circulation</li> <li>Maintains RCS subcooling</li> </ul>		
		When AFW has been established and Power restored to 11 4KV Bus the scenario can be terminated.		



## SCENARIO #4 SETUP

### OVERVIEW/OBJECTIVES

To evaluate the applicant's ability to conduct a unit power increase, to implement the ARMs, OIs, AOPs, as appropriate, for malfunctioning systems and/or controls including raising power, a failure of the SRW Controller for the Main Generator H2 Cooler, a failure of the letdown backpressure regulator and a dropped CEA. When the CEA drops, the crew will implement AOP-1B. As the dropped CEA is being recovered a loss of 14 4KV Bus occurs. The crew will shift charging suction back to the VCT, stabilize the unit and implement AOP-7I. Next, a loss of offsite power occurs and the Main Turbine does not Trip. The crew should determine a manual reactor trip is required, trip the unit and implement EOP-0. The 1A DG does not start and the 0C DG Tie Bus is faulted resulting in a Station Blackout. The crew will implement EOP-7. As actions for EOP-7 are being performed, 11 AFW Pp will trip. The crew will be able to restore AFW using 12 AFW Pump allowing them to remain in the optimal procedure.

### INSTRUCTOR SCENARIO INFORMATION

- |     |    |  |                  |
|-----|----|--|------------------|
| ___ | 1. | Reset to IC-18.  | Draft Spin #0202 |
| ___ | 2. | Perform switch check.  | Spin # Used ___  |
| ___ | 3. | Place simulator in CONTINUE, advance charts and clear alarm display.                   |                  |
| ___ | 4. | Place simulator in FREEZE.   |                  |
| ___ | 5. | Enter Malfunctions   |                  |
| ___ | a. | 13 CCW Pp Trip<br>CCW002_03 at time zero   |                  |
|     | b. | 0C DG Tie Bus Fault<br>DG0C004 at time zero  |                  |
|     | c. | 1A DG Start Failure<br>DG002_02 at time zero   |                  |
| ___ | d. | Main Turbine Fails to Trip Automatically<br>TG002 at time zero                         |                  |
|     | e. | Main Generator Hydrogen cooler SRW Control Valve Fails Shut<br>TG030_01 (closed) on F1 |                  |
|     | f. | Letdown Backpressure Regulator Fails Low (PT-201)<br>CVCS005 on F2                     |                  |
| ___ | g. | CEA 34 Drops<br>CEDS012_34 on F3   |                  |
| ___ | h. | Loss of 14 4KV Bus<br>4KV001_04 on F4  |                  |
-

## SCENARIO #4 SETUP

- i. Loss of Offsite  
SWYD002 on F5
- j. Trip of 11 AFW Pp  
AFW001\_01 on F6

6. Enter Panel Overrides

- a. 1C13 - INSTR AIR COMPR(S) Annunciator (K-25) to ON.
- b. 1C07 - Annunciators (2) for 12 Chg. Pp tagout- OFF.
- c. 1C13 - Annunciators (2) for 13 CCW Pp tagout- OFF.

7. Enter Remote Functions / Administrative

- a. Danger tag 12 Chg. Pp
- b. Danger tag 13 CCW Pp.
- c. Remote Functions to rackout 13 CCW Pp.
- d. Remote Functions to rackout 12 Chg. Pp.

8. Set simulator time to real time, then place simulator in CONTINUE.

9. Give crew briefing.

- a. Present plant conditions: 75% power - MOC/10,200 MWD/MTU. Unit 2 is in Mode 5. RCS Boron - 954 PPM.
- b. Power history: 68% for previous 3 days due to 12 SGFP repairs, Raising power to 100% @ 30% per hour.
- c. Equipment out of service: 12 Chg. Pp out of service for packing replacement. Expected to be ready for PMT in about 4 hours.  
13 CCW Pump out of service due to a broken shaft. Estimated return to service is tomorrow-noon.
- d. Abnormal conditions: Alarm K-25 (INSTR AIR COMPR(S)) is hanging, air compressors check out ok, alarm card swapped out but still in alarm. I&C is working up a troubleshooting plan.
- e. Surveillances due: None.
- f. Instructions for shift: Continue to raise power to 100% per OP-3.  
Perform PMT on 12 Charging Pump when returned to service.

#### SCENARIO #4 SETUP

- \_\_\_\_ 10. Allow crew 3-5 minutes to acclimate themselves with their positions.
  - \_\_\_\_ 11. Instructions for the Booth Operator.
    - a. After power has been raised at least 5%, and with the lead examiner's concurrence activate **F1**.
    - b. Activate the malfunctions **F2-F4** when cued by the lead examiner.
    - c. About 5 minutes after **F4**, with lead examiner's concurrence, activate **F5**.
    - d. Several minutes after the crew enters **EOP-7** activate **F6**.
-

## SCENARIO #4 SETUP

### RESPONSES TO CREW REQUEST

If a request and response is not listed, delay response until reviewed with the examiner. Responses to routine requests, which have no effect the scenario, do not require examiner clearance.

REQUEST	RESPONSE
1. OWC/E&C investigate failure Main Generator H <sub>2</sub> SRW Controller, TIC-1608.	Acknowledge request.
2. OWC/E&C investigate failure Letdown backpressure regulator, PT-201.	Acknowledge request.
3. Electricians investigate dropped CEA.	Acknowledge request. After eight minutes, report a blown holding coil fuse. Fuse can be replaced in two minutes if requested.
4. OWC/Fuels Group informed of dropped CEA and request latest FrT and FxyT.	Acknowledge report. Report latest FrT is 1.56 and FxyT is 1.62 and are 3 days old.
5. OWC/electricians contacted for support for loss of 14 4KV Bus.	Acknowledge request. After ten minutes, report 14 4KV Bus lost due to ground fault and will require further investigation
6. OWC/PPO tie 1Y09 and 1Y10, 1Y09 supplying.	Acknowledge request. After 3 minutes tie 1Y10 to 1Y09 and report.
7. System Operator contacted regarding power availability.	Acknowledge request. Report a major disturbance on the grid, no estimate of time for power restoration.
8. OSO/PWS investigate start failure of 1A DG.	Acknowledge request. When the crew enters EOP-7, report 1A DG shut down on low lube oil pressure. No oil leaks present, think pressure switch may be faulty. Several minutes later report the pressure switch is isolated.
9. OWC/electricians investigate failure of 0C Tie Bus Bkr 152-0701 failure to close.	Acknowledge request. After 5 minutes report the breaker is tripped on overcurrent.
10. OSO/PWS unisolate 1A DG lube oil pressure switch and start the 1A DG.	After two minutes unisolate the pressure switch and report the engine is running normally.
11. Take local control of the ADVs.	Operate the ADVs as directed by the Control Room.
12. Locally shut MFW isolation FW-128 and 131.	After eight minutes report they are shut.

#### SCENARIO #4 SETUP

- |     |   |  |
|-----|---|--|
| 13. | Align N <sub>2</sub> to AFW control valves and control FW discharge pressure locally. | Report as complete 2-3 minutes after task is requested.                  |
| 14. | Cross tie MCC-104 to MCC-114.   | After 3 minutes tie the MCCs.  |
| 15. | Shut 1-CC-284 (CCW supply to Containment manual isolation).                           | After 3 minutes shut the valve.  |
| 16. | TBO investigate trip of 11 AFW Pp and align 12 AFW Pp for service.                    | Acknowledge request. After three minutes, align 12 AFW Pp for operation. |
-

## SCENARIO #4 SETUP

### SHIFT TURNOVER

- |       |                                    |  |
|-------|------------------------------------|--|
| I.    | Present Plant Conditions           | 75%  |
| II.   | Burnup:                            | 10200 MWD/MTU (MOC)  |
| III.  | Power History                      | 68% for previous 3 days due to 12 SGFP repairs, Raising power to 100% @ 30% per hour.  |
| IV.   | Equipment out of Service:          | 12 Chg. Pp out of service for packing replacement. Expected to be ready for PMT in about 4 hours.<br><br>13 CCW Pump out of service due to a broken shaft. Estimated return to service is tomorrow-noon. |
| V.    | Abnormal Conditions:               | Alarm K-25 (INSTR AIR COMPR(S) is hanging, air compressors check out ok, alarm card swapped out but still in alarm. I&C is working up a troubleshooting plan.  |
| VI.   | Surveillances Due:                 | 1B DG STP-O-8 due today. SM will bring to CR when ready.   |
| VII.  | Instructions for Shift             | Continue power increase per OP-3.<br><br>Perform PMT on 12 Charging Pump when returned to service.   |
| VIII. | U2 Status and Major Equipment OOS: | Mode 5 – no CW Pps and 23AFW Pp is OOS.  |
-

Simulation Facility	<u>Calvert Cliffs</u>	Scenario No.: 1 (Spare)	Op Test No.:	1
Examiners:	_____	Operators:	_____	<u>SRO</u>
	_____		_____	<u>RO</u>
	_____		_____	<u>CRO</u>
Objectives:	<p>To evaluate the applicant's ability to conduct a unit power increase, to implement the ARMs, OIs, AOPs, as appropriate, for malfunctioning systems and/or controls including failure of 11 CCW Pp, the PZR pressure control channel and selector switch, an RCP seal and the ADV controller. After the ADV controller fails the remaining seals fail on the affected RCP resulting in an RCS leak. After EOP-0 is entered, the RCS leak causes a SIAS actuation. SIAS 'A' fails to actuate requiring 11 or 12 HPSI Pump to be started manually to establish HPSI flow. As EOP-0 progresses, a steam leak begins in CNMNT from 12 SG requiring EOP-8 be implemented. The ADV Controller will not operate from the Control Room, the crew will have to operate the ADVs locally.</p>			
Initial Conditions:	<p>The plant is at 100% Power, EOC</p> <p>12 Main CPU is failed for 12 SG DFWCS</p> <p>11 CCW Head Tank Makeup CV is isolated due to leakby.</p> <p>13 HPSI Pp is OOS.</p> <p>13 CCW Pp is OOS</p> <p>INSTR AIR COMPR(S) alarm (K-25) hanging.</p>			
Turnover:	<p>Present plant conditions: 100% power, MOC; Unit 2 is in MODE 5 -- no CW Pps and 23 AFW Pp unavailable.</p> <p>Power history: 100% power for previous 68 days.</p> <p>Equipment out of service:</p> <ol style="list-style-type: none"> <li>1) 12 Main CPU is failed for 12 SG DFWCS. System engineer is investigating.</li> <li>2) 13 HPSI Pp motor bearing failure during STP. It is disassembled, expected to be returned to service in 2 days. T.S. 3.5.2 Action Statement entered 6 hours ago.</li> <li>3) 11 CCW Head Tank Makeup CV is isolated due to leakby.</li> <li>4) 13 CCW Pp has a broken shaft, expected repair tomorrow-noon.</li> <li>5) Alarm K-25 INSTR AIR COMPR(S) is hanging. No problems with the compressors, I &amp; C is investigating, alarm card has been swapped out.</li> </ol> <p>Surveillances due: STP-0-29 (CEA Movement Test) due by end of shift. SM will discuss with CRS shortly after turnover.</p> <p>Instructions for shift:</p> <ol style="list-style-type: none"> <li>1) Maintain 100% power.</li> </ol>			

Event No.	Malf. No.	Event Type*	Event Description
Preload	FW001_03 ESFA002_01 ESFA001_01 SI 002_03 CCW002_03 PNL OVD PNL OVR K-25		12 Main CPU on 12 SG DFWCS OOS. SIAS 'A' fails to actuate automatically and manually.  13 HPSI Pp OOS. 13 CCW Pp OOS. Pressurizer Press Controller Selector Switch in channel X. INSTR AIR COMPR(S) alarm hanging.
1	CCW002_01	C CRO	About 3 minutes after the crew takes the watch, 11 CCW Pp trips. The CRO will acknowledge the alarms, inform the CRS and refer to the ARM. The crew will check for common mode failure and the CRS will direct the CRO to start 12 CCW Pp. The CRS should refer to AOP-7C and T.S. 3.7.5. The CRS contacts the OWC for assistance.
2	RCS023_01 (high)	I RO	PRZR Press Channel 100X fails high. The RO should acknowledge the alarms, inform the CRS and refer to the ARM. The RO should note the lowering RCS pressure and the open spray valves. Pressure control should be shifted to channel Y and the spray valves verified shut. The RO should note the spray valves did not shut. The CRS should direct the spray controller be taken to manual and the spray valves closed. The CRS should contact the OWC for assistance.
3	RCS011_01 (0-100% over 3 min)	C RO	Next, the lower seal (first stage) fails on 11A RCP. The RO should note the alarm, inform the CRS and refer to the ARM. The crew should determine the lower seal on 11A RCP has failed. The OWC and system engineer should be contacted.
4	MS015 (high)	I CRO	Two minutes after the notifications have been made the ADV controller fails high causing the ADVs to open. The CRO will inform the CRS. The CRS should direct the CRO to take manual control of the ADVs and shut them. The RO should maintain reactor power less than 100%. The CRS should refer to AOP-7K. The CRS should contact the OWC for assistance.
5	RCS012_01 (0-100% over 2 min)	R RO N CRO	After the CRS has referenced AOP-7K, the 11A RCP middle seal fails. The crew should implement ARM guidance and begin an expeditious shutdown. The CRS should refer to OP-3 for guidance on for the shutdown.
6	RCS013_01 (over 2 min) RCS003 (50 gpm over 5 min) RCS014_01 (over 4 min)	M All	After power has been reduced at least 5%, the 11A upper seal begins to fail followed shortly thereafter by the failure of the vapor seal. With all the seals failed RCS leakage begins via the seals. The CRS will trip the unit based on high RCP seal temperature and EOP-0 implemented. When SIAS actuates, train A fails to automatically and manually initiate. To establish HPSI flow 11 or 12 HPSI must be started manually.
7	MS010_02 (0-25% over 3 min)  Panel Override ADV's closed	M All	After the first pass through the safety functions is complete, a steam break in CNMNT begins. When the crew attempts to operate the ADVs, they will not operate from the Control Room. To establish heat removal via 11 SG, the ADV will have to be operated locally. The CRS should recognize two events are taking place and implement EOP-8. After the Success Paths have been selected and 12 SG isolated, the scenario can be terminated.

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



## SCENARIO 1 OVERVIEW

The candidates will take the shift at 100% power with instructions to maintain power.

After the crew has taken the shift, 11 CCW Pp trips. The CRO will acknowledge the alarms, inform the CRS and refer to the ARM. The crew will check for common mode failure and the CRS will direct the CRO to start 12 CCW Pp. The CRS should refer to AOP-7C and T.S. 3.7.5. The CRS contacts the OWC for assistance.

Several minutes later, PRZR Press Channel 100X fails high. The RO should acknowledge the alarms, inform the CRS and refer to the ARM. The RO should note the lowering RCS pressure and the open spray valves. Pressure control should be shifted to channel Y and the spray valves verified shut. The RO should note the spray valves did not shut. The CRS should direct the spray controller be taken to manual and the spray valves closed. Once the spray valves are closed, the RO should stabilize RCS pressure. The CRS should contact the OWC for assistance.

About 3 minutes after the crew has regained RCS pressure control, the lower seal (first stage) fails on 11A RCP. The RO should note the alarm, inform the CRS and refer to the ARM. The crew should determine the lower seal on 11A RCP has failed and monitor RCP parameters. The OWC and system engineer should be contacted.

Two minutes after the notifications have been made the ADV controller fails high causing the ADVs to open. The CRO diagnoses the open ADVs and inform the CRS. The CRS should direct the CRO to take manual control of the ADVs and shut them. The RO should maintain reactor power less than 100%. The CRS should refer to AOP-7K. The CRS contacts the OWC for assistance.

After the CRS has referenced AOP-7K, the 11A RCP middle seal fails. The crew should implement ARM guidance and begin an expeditious shutdown in accordance with OP-3. The CRS should refer to OP-3 and direct the unit shutdown at a rate less than 30%/hour. The appropriate notifications should be made.

After power has been reduced at least 5%, the 11A RCP upper seal begins to fail followed shortly thereafter by the failure of the vapor seal. With all the seals failed RCS leakage begins via the seals. The CRS will trip the unit based on high RCP Controlled Bleed Off temperature and EOP-0 implemented. When SIAS actuates, train 'A' fails to initiate automatically and manually. To establish HPSI flow 11 or 12 HPSI must be started manually.

After the first pass through the safety functions is complete, a steam break in CNMNT begins. When the crew attempts to operate the ADVs, they will not operate from the Control Room. To establish heat removal via 11 SG, the ADV will have to be operated locally. The CRS should recognize two events are taking place and implement EOP-8. After the Success Paths have been selected and 12 SG isolated, the scenario can be terminated.

Scenario No:	1	Event No.	1	Page <u>4</u> of <u>13</u>
Event Description:		11 CCW Pp Trips.		
Time	Position	Applicant's Actions or Behavior		
	CUE	<p>After the crew takes the watch, the following alarms occur:  Annunciator Alarm - 1C13 – K-09 - CC PP DISCH PRESS LO  RCP Status Panel Alarms  CCW pressure indicates zero</p>		
	CRO	<ul style="list-style-type: none"> <li>Acknowledges alarms, notes 11 CCW Pp has tripped, informs the SRO</li> <li>Refers to the ARM</li> </ul>		
	SRO	<ul style="list-style-type: none"> <li>Acknowledges report and directs CRO to check for common mode failure (head tank level, motor overload alarm)</li> <li>Directs CRO to start 12 CCW Pp</li> <li>Implements AOP-7C, <u>LOSS OF COMPONENT COOLING WATER</u></li> </ul>		
	RO	<ul style="list-style-type: none"> <li>Monitors RCP temperatures</li> </ul>		
	CRO	<ul style="list-style-type: none"> <li>Performs actions as directed by the SRO</li> <li>Verifies 12 CCW Pp is running normally with normal system parameters</li> </ul>		
	SRO	<ul style="list-style-type: none"> <li>Refers to T.S. 3.7.5. and exits AOP-7C</li> <li>Contacts OWC for assistance</li> </ul>		

Scenario No: 1		Event No. 2	Page 5 of 13
Event Description: PZR Press. Control Channel 100X Fails High			
Time	Position	Applicant's Actions or Behavior	
	CUE:	Annunciator alarm 1C06 - E-29 PZR CH 100 PRESS Both PZR Spray valves come full open Lowering RCS pressure	
	RO	<ul style="list-style-type: none"> <li>Acknowledges alarm, identifies and reports PT-100X has failed high</li> <li>Refers to the ARM</li> <li>Notes both PZR spray valves are open</li> </ul>	
	SRO	<ul style="list-style-type: none"> <li>Acknowledges report and directs RO to: <ul style="list-style-type: none"> <li>Shift PZR pressure control to channel Y</li> <li>Verify the PZR spray valves go closed</li> <li>Restore RCS pressure to normal</li> </ul> </li> </ul>	
	RO	<ul style="list-style-type: none"> <li>Perform actions as directed by SRO</li> <li>Notes the spray valves failed to go closed, RCS pressure is continuing to lower and informs the SRO</li> <li>Informs SRO in T.S. action for DNB if RCS pressure goes less than 2200 psia</li> </ul>	
	SRO	<ul style="list-style-type: none"> <li>Directs RO to take 1-HIC-100 to manual and close the spray valves</li> </ul>	
	RO	<ul style="list-style-type: none"> <li>Takes HIC 100 to manual and demand to minimum</li> <li>Verifies Spray Valves go closed and RCS pressure restoring to normal</li> <li>Informs SRO</li> </ul>	
	SRO	<ul style="list-style-type: none"> <li>Contacts OWC/I&amp;C to investigate failure of 1-PT-100X and failure of spray valves to close</li> </ul>	

Scenario No: 1		Event No. 3	Page <u>6</u> of <u>13</u>
Event Description: 1st Stage (Lower) Seal Fails on 11A RCP.			
Time	Position	Applicant's Actions or Behavior	
	CUE:	Annunciator E-55 – 11A RCP SEAL - TEMP HI - PRESS	
	RO	<ul style="list-style-type: none"> <li>• Acknowledges alarm, checks RCP parameters, reports suspected seal failure on 11A RCP</li> <li>• Refers to the ARM</li> </ul>	
	SRO	<ul style="list-style-type: none"> <li>• Identifies/acknowledges report of 11A RCP seal failure</li> <li>• Determines along with RO 11A RCP the lower seal has failed</li> <li>• Directs RO to monitor parameters</li> <li>• Contacts System Engineer</li> <li>• Notes if a second seal fails on 11A RCP the unit will have to be shutdown</li> </ul>	
	RO	<ul style="list-style-type: none"> <li>• Monitors RCP parameters (bleedoff flow, pressures, temperatures)</li> </ul>	
	SRO	<ul style="list-style-type: none"> <li>• Contacts OWC/GS and System Engineer regarding 11A RCP seal failure</li> </ul>	

Scenario No: 1		Event No. 4	Page 7 of 13
Event Description: Atmospheric Dump Valves Fail Open.			
Time	Position	Applicant's Actions or Behavior	
	CUE:	Audible steam dump to atmosphere occurring Open indication of both ADVs Changing RCS parameters, temperature and pressure lowering	
	CRO	<ul style="list-style-type: none"> <li>Identify and report both ADVs have gone full open, recommends taking to manual and closing</li> </ul>	
	SRO	<ul style="list-style-type: none"> <li>Identifies/acknowledges report of open ADVs</li> <li>Directs CRO to take ADV controller to manual and shut ADVs</li> <li>Implements AOP-7K, <u>OVER COOLING EVENT IN MODE ONE OR TWO</u> <ul style="list-style-type: none"> <li>Determines a reactor trip is not required</li> <li>Monitors reactor power: <ul style="list-style-type: none"> <li>Directs RO to insert CEAs or borates (if necessary)</li> <li>Directs CRO to reduce/adjust turbine load as necessary to restore/maintain Tc on program (if necessary)</li> </ul> </li> </ul> </li> </ul>	
	RO	<ul style="list-style-type: none"> <li>Monitors reactor power and borates or inserts CEAs if necessary to maintain power</li> </ul>	
	CRO	<ul style="list-style-type: none"> <li>Takes ADV controller to manual and verifies both ADVs go closed</li> <li>Adjusts turbine load as necessary to maintain Tc on program</li> </ul>	
	SRO	<ul style="list-style-type: none"> <li>Contacts OWC to investigate failure of ADV Controller</li> </ul>	