

## Final Scenario 1

Facility: **VOGTLE**Scenario No.: **1**Op-Test No.: **2014-301**

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

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Snap 228

Initial Conditions: 100% Power BOL.Equipment OOS: CCW Pump 5, Air Compressor 3Turnover: INFO LCO 3.7.7 CCW Train A, Containment mini-purge in service, 'B' MFP vibration monitoring in progress in the field, 'A' CCP caution tagged "Run only in emergency."**Preloaded Malfunctions:****RC 10B – RCS Loop 2 NR Tc RTD TE-421B fails high (Trigger 2)****NS 02E – NSCW Pump #4 locked rotor (Trigger 3)****NS 07F – NSCW Pump #6 Handswitch auto contact failure (Trigger 3)****CV 07 - NCP trip (Trigger 4)****HS2650 REACTOR CAVITY COOLING FAN-1 Override to STOP (Trigger 5)****HV-LO\_HS2650\_Y 1HS-2650 YELLOW A534P29-B5 – ON (Trigger 5)****ALB52-E9 CNMT CVTY F-A1 LO AIR FLOW (Trigger 5)****ALB33-C3 480V SWGR 1NB01 TROUBLE (Trigger 5)****RC-16 – Vessel Head Leak @ .001% (Trigger 6)****RD 16 – RCCA H-8 ejected (Trigger 7)****HS9382 HS-9382 AIR COMPRESSOR #3 RECIPROCATING – STOP****A-LO\_HS9382\_G 1HS-9382 GREEN A531P30-A6 - OFF****ES 01 – Failure of Automatic Reactor Trip****ES 08 – Train "A" Auto SI Failure****SI 06A – SIP "A" Auto Start Failure****SI 03B – SIP "B" Trips on Start****CV 16A – CCP Train "A" Auto Start Failure****CV 06B – CCP Train "B" Trip****AF 05A – MDAFW Pump Train "A" Auto Actuation Failure****AF 05B – MDAFW Pump Train "B" Auto Actuation Failure****AF 05C – TDAFW Pump Auto Actuation Failure**

Event No.	Malf. No.	Event Type*	Event Description
1	RC-10B	I -OATC I -SS TS -SS	RCS LOOP 2 NR Tcold RTD TE-421B Fails High 18001-C Section B for Failure of RCS Loop Narrow Range Temperature Instrumentation LCO 3.3.1, RTS Instrumentation, FU 6,7, Condition E, and LCO 3.3.2, ESFAS Instrumentation, Fu 5b, Condition I <b>(Trigger 2)</b>
2	NS02E NS07F	C -UO C -SS	NSCW Pump #4 trips with standby failing to start in automatic. 18021-C for Loss of Nuclear Service Cooling Water System <b>(Trigger 3)</b>
3	CV-07	C -OATC C -SS	Normal Charging Pump (NCP) TRIPS 18007-C, Section B for CVCS Malfunction (Loss of Charging Flow) <b>(Trigger 4)</b>

4	N/A	N -OATC N -SS	Return Charging and Letdown to Service 13006-C, Section 4.4.2
5	Override HS-2650 To STOP	C-UO C -SS	Reactor Cavity Cooling Fan #1 trip ARP 17052 for ALB52-E09 <b>(Trigger 5) (May need to remove overrides on light and ALBs if HS taken to PTL)</b>
6	RC-16	C -OATC C -SS TS -SS	RCS leak from the vessel head 18004-C, Section A for RCS Leakage LCO 3.4.13, RCS Operational Leakage <b>(Trigger 6) (~2.5 to 3 minutes to alarm after trigger)</b>
7	RD-16	M-ALL	Ejected Rod H-8 19000-C for Reactor Trip or Safety Injection <b>(Trigger 7)</b>
8	ES-01	C-OATC	Failure of Automatic Reactor Trip Manually trip the reactor with both handswitches per 19000-C, Step 1 RNO.
9	ES-08 SI-06A SI-03B CV-16A CV-06B	C-OATC C-SS	Train "A" auto SI failure with SIP "A" Auto Start Failure and Trip of SIP "B". CCP "A" auto start failure, with CCP "B" trip on Start. Manually actuate SI, manually start pumps per 19000-C Initial Actions.
10	AF05A, B,C	C-UO C-SS	AFW Pumps Auto Actuation Failure (all 3 pumps) With Manual Starts Available Manually start required number AFW pumps per 19000-C Initial Actions.
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

**Scenario Objective:**

Normal plant operation, narrow range temperature instrument failure, trip of one NSCW pump (standby pump fails to start, trip of NCP, restoration of charging and letdown, leak in the vessel head leading to a rod ejection LOCA with an ATWT, accompanied by SI equipment actuation failures. The crew is expected to respond to various component and instrument malfunctions per AOP and ARP guidance, and recognize and respond to major plant events per the EOP network.

**Event 1**

RCS Loop 2 NR Tcold RDT TE-421B Fails High.

Verifiable actions:**SS**

Enter 18001-C, "Systems Instrumentation Malfunction," Section B

**OATC**

Place Rods in manual (Immediate Operator Action)

Restore TAVG to program band

Defeat TAVG inputs to control circuit

Defeat  $\Delta T$  inputs to control circuit

Return Control Rods to full out position

Return Control Rods to Automatic

Technical specifications:

LCO 3.3.1, RTS Instrumentation, Fu 6, 7, Condition E, and LCO 3.3.2, ESFAS Instrumentation, Fu 5b, Condition I

**Event 2**

NSCW Pump #4 trips. Standby pump fails to start in automatic.

Verifiable actions:**SS**

Enter 18021-C, "Loss of NSCW System"

**UO**

Manually start NSCW Pump #6.

Technical specifications:

LCO 3.7.8, NSCW System (Function not required for operability)

**Event 3**

Normal Charging Pump (NCP) TRIPS

Verifiable actions:**SS**

Enter 18007-C, "CVCS Malfunction," Section B

**OATC**

Close letdown orifice isolation valves

Close letdown isolation valves

Technical specifications:

NONE

**Event 4**

Return Normal Charging and Letdown to Service by initiating 13006-1, "CVCS System," as directed by 18007-C, Steps B.8 and B.9.

**OATC**

Start Charging Pump

Adjust charging flow

Open Letdown isolation valves LV-0459 and LV-0460

Open desired CVCS Letdown Orifice valve HV-8149A/B/C

Adjust PV-0131, 'CVCS Letdown Pressure Control Valve,' and return to automatic

Adjust TV-0130, 'CVCS Letdown Heat Exchanger Temperature Control Valve,' and return to automatic

**Event 5**

ALB52-E09 CNMT CVTY F-1 LO AIR FLOW is received (Reactor Cavity Cooling Fan #1 trip)

**UO**

Start fan 1-1511-B7-002-M01 using 1-HS-2651 (C37) on QHVC.

Technical Specifications:

NONE

**Event 6**

RCS leak from the vessel head. (Crew might take action to isolate Mini Purge during this event.)

Verifiable actions:**SS**

Enter 18004-C, "Reactor Coolant System Leakage," Section A

**OATC**

Adjust charging flow to maintain Pressurizer level

Isolate CVCS Letdown flow

Manually start additional Charging Pump

Verify CVCS makeup correct for plant conditions

Monitor Containment conditions

**UO**

Stabilize Main Turbine load

Technical Specifications:

LCO 3.4.13, RCS Operational Leakage

**Event 7 and 8**

Rod H8 ejects from the Core (Primary LOCA) with Reactor failing to auto trip.

Verifiable actions:**SS**

Enter 19000-C, "Reactor Trip or Safety Injection" after IOAs are complete.

**OATC**

Manually trip the reactor by placing one or both reactor trip hand switches to the trip position.

**Event 9**

Train "A" Auto SI Actuation Failure  
SI Pump "A" Auto Start Failure  
SI Pump "B" trips during SI loading sequence

Verifiable actions:**OATC**

Manually actuate Safety Injection  
Manually start SI Pump "A" and CCP "A".  
Manually trip RCPs no later than step 11 in 19000-C.

**Event 10**

AFW pump auto actuation failures (all 3 pumps) with manual starts available.

Verifiable actions:**UO**


Manually start both MDAFW pumps (and TDAFW pump if required or desired) per UO Initial Actions of 19000-C.

Scenario is complete when the crew transitions from 19010-C, "Loss of Primary or Secondary Coolant," or at the discretion of the Chief Examiner.

**CRITICAL TASKS:**

- 1) **Manually start CCP 'A' during performance of OATC Initial Actions of 19000-C to provide high head ECCS injection flow prior to the completion of the OATC Initial Actions.**  
**OR**  
**Manually start SIP 'A' during performance of OATC Initial Actions of 19000-C to provide intermediate head ECCS injection flow prior to the completion of the OATC Initial Actions.**  
Per the WOG Critical Task guidelines, ECCS injection flow is required to provide break flow when RCPs are stopped in response to RCP trip criteria. Tripping the RCPs prior to establishing injection flow constitutes task failure.
- 2) **Trip all RCPs due to 19000-C Foldout Page RCP trip criteria being met (after Foldout Page is initiated).**  
**OR**  
**Trip all RCPs due to RCP trip criteria being met at Step 11 of 19000-C.**  
Per the EOP WOG Background document, RCPs are tripped when pressure is less than 1375 psig to prevent damage to the RCPs so that they can be used later to mitigate the accident. Failure to recognize trip criteria and then trip the RCPs constitutes task failure.
- 3) **Manually start AFW per the UO Initial Actions of 19000-C.**  
Per the EOP WOG Background document, AFW flow is required to prevent a loss of heat sink following a reactor trip and Safety Injection. Entry into 19231-C after CSFST monitoring is initiated constitutes task failure.
- 4) **Manually trip the reactor within 1.5 minutes of recognition of the ejected rod (first out annunciator is received).**  
Per the WOG Critical Task guidelines, tripping the reactor ensures core heat production does not exceed the design capability of the safeguards heat removal systems, which is limited to core decay heat plus RCP heat. Manually tripping the reactor greater than 1.5 minutes from recognition of the first out annunciator constitutes task failure.

Target Quantitative Attributes (Per Scenario; See Section D.5.d)		Actual Attributes
1.	Total malfunctions (5–8)	8
2.	Malfunctions after EOP entry (1–2)	3
3.	Abnormal events (2–4)	4
4.	Major transients (1–2)	1
5.	EOPs entered/requiring substantive actions (1–2)	2
6.	EOP contingencies requiring substantive actions (0–2)	0
7.	Critical tasks (2–3)	4

	<p align="center">NUCLEAR SAFETY FOCUS TARGET ZERO</p>	
<p><b><u>Protected Train:</u></b></p> <p><input type="checkbox"/> Alpha</p> <p><input checked="" type="checkbox"/> Bravo</p>	<p><b>EOOS:</b></p>	<p><input checked="" type="checkbox"/> Green</p> <p><input type="checkbox"/> Yellow</p> <p><input type="checkbox"/> Orange</p> <p><input type="checkbox"/> Red</p>
<p><b>Plant Conditions:</b></p>	<p>100% RTP BOL</p>	
<p><b>Major Activities:</b></p>	<p>Maintain 100% RTP Conditions</p>	
<p><b>Active LCOs:</b></p>	<p><input type="checkbox"/> INFO LCO 3.7.7 CCW Train A</p>	
<p><b>OOS/ Degraded CR Instruments:</b></p>	<p><input type="checkbox"/> None</p>	
<p><b>Narrative Status:</b></p>	<p><input type="checkbox"/> Containment mini-purge is in service for a planned Containment Entry on next shift.</p> <p><input type="checkbox"/> CCW Pump #5 Danger Tagged for corrective maintenance on the motor bearing. No forecast return to service time is available on this emergent work item.</p> <p><input type="checkbox"/> Air Compressor #3 Danger Tagged for PM's for the next 24 hours.</p> <p><input type="checkbox"/> CCP A Caution Tagged. Pump is operable but is to be run only in emergency due to minor bearing oil leakage when operating. Repair plan is being developed.</p> <p><input type="checkbox"/> MFPT B vibration monitoring is in progress in the field (Vogtle engineering and vendors). Elevated vibrations have been observed in the last several days. Investigation continues.</p>	



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Event No.: 1

**Event Description:** RCS NR Temperature Instrument TE-421B Fails High (Tcold) on loop # 2. This will require the OATC to perform IOAs by placing rods in MANUAL.

The crew will then enter AOP 18001-C section B "Failure of RCS Narrow Range Temperature Instrumentation" to complete the corrective actions for this failure.

Time	Position	Applicant's Action or Behavior
	OATC	<p>Diagnose NR Temperature Instrument Failure:</p> <p>(Loop 2 T<sub>COLD</sub> TE-421B fails high)</p> <p>Symptoms / alarms:</p> <p>ALB10-C03 OVERPOWER ΔT ROD BLOCK AND RUNBACK ALERT ALB12-A03 RC LOOP ΔT/AUCT ΔT HI-LO-DEV ALB12-A04 RC LOOP TAVG/AUCT TAVG HI-LO DEV ALB12-A05 TAVG TREF DEVIATION ALB12-A06 OVERTEMP ΔT ALERT ALB12-B04 AUCT TAVG HIGH ALB11-D01 PRZR LO LEVEL DEVIATION ALB10-E03 OVERTEMP ΔT ROD BLOCK AND RUNBACK ALERT</p> <p>Indications:</p> <ul style="list-style-type: none"><li>• Loop 2 Tavg / Delta T indications deviating from other loops.</li><li>• 1FIC-0121 Charging Flow Controller rising to maximum demand.</li></ul>
	OATC	<p><b><i>18001-C Section B</i></b></p> <p><b><u>IMMEDIATE OPERATOR ACTION</u></b></p> <p>B1. Place ROD BANK SELECTOR SWITCH in MAN position.</p> <p>Verifies immediate operator action step B1 with OATC</p>

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The crew will then enter AOP 18001-C section B "Failure of RCS Narrow Range Temperature Instrumentation" to complete the corrective actions for this failure.

Time	Position	Applicant's Action or Behavior
	SS	Enters AOP 18001-C, Section B. (Crew Update)
	OATC	<p><b><u>Subsequent Actions</u></b></p> <p>B2. Restore TAVG to program band.</p>
	OATC	<p>B3. Check NR Temp failed LOW.</p> <p><b>NO</b></p> <p><b><u>3 RNO</u></b></p> <p><u>IF</u> NR Temp has failed HIGH <u>THEN</u>:</p> <p>a. Place FIC-121 in MANUAL.</p> <p>b. Control charging flow to maintain Pressurizer Level at Program Level.</p>
	OATC	<p>B4. Select affected loop on TS-412T TAVG DEFEAT SEL</p> <p><input type="checkbox"/> <b>Defeats 422</b></p>

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The crew will then enter AOP 18001-C section B "Failure of RCS Narrow Range Temperature Instrumentation" to complete the corrective actions for this failure.

Time	Position	Applicant's Action or Behavior
	OATC	<p>B5. Select affected loop on TS-411F DELTA T DEFEAT SEL.</p> <p><input type="checkbox"/> Defeats 421</p>
	OATC	<p>B6. Check FIC-121 in AUTO. (May take time to return to AUTO, depends on how far from program)</p> <p><i>Per NMP-OS-007-001, when a system or component has been placed in manual due to a transient caused by an automatic control malfunction, SM permission is required prior to returning the system or component to automatic control following stabilization from the transient and correction of the malfunction.</i></p> <p><input type="checkbox"/> In AUTO</p>
	OATC	<p>B7. Place ROD BANK SELECTOR SWITCH in AUTO position, if desired. (Should occur after rods returned to ARO position)</p> <p><i>Per NMP-OS-007-001, when a system or component has been placed in manual due to a transient caused by an automatic control malfunction, SM permission is required prior to returning the system or component to automatic control following stabilization from the transient and correction of the malfunction.</i></p> <p><b>NOTE: The OATC will place rods back in AUTO.</b></p>

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**Event Description:** RCS NR Temperature Instrument TE-421B Fails High (Tcold) on loop # 2. This will require the OATC to perform IOAs by placing rods in MANUAL.

The crew will then enter AOP 18001-C section B "Failure of RCS Narrow Range Temperature Instrumentation" to complete the corrective actions for this failure.

Time	Position	Applicant's Action or Behavior
	SS	B8. Notify I & C to initiate repairs.  Calls SSS to perform the following:
	SS	<ul style="list-style-type: none"><li>• Notify Operations Duty of AOP entry</li><li>• Write a Condition Report</li><li>• Notify Maintenance of the failure</li></ul>
	SS	B9. Bypass the affected instrument channel using 13509-C, BYPASS TEST INSTRUMENTATION (BTI) PANEL OPERATION, if desired.  <b>NOTE: <u>DO NOT</u> expect the SS to bypass the channel.</b>
	SS	B10. Trip the affected channel bistables and place the associated MASTER TEST switches in TEST position per TABLE B1 within 72 hours. (TS 3.3.1 & 3.3.2)  <b>NOTE: The SS is expected to leave bistables untripped during the allowed out of service time to facilitate I&amp;C trouble shooting of the failed channel.</b>

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Event No.: 1

**Event Description:** RCS NR Temperature Instrument TE-421B Fails High (Tcold) on loop # 2. This will require the OATC to perform IOAs by placing rods in MANUAL.

The crew will then enter AOP 18001-C section B "Failure of RCS Narrow Range Temperature Instrumentation" to complete the corrective actions for this failure.

Time	Position	Applicant's Action or Behavior		
	SS	B11. Initiate the applicable actions of: <ul style="list-style-type: none"> <li>TS 3.3.1</li> <li>TS 3.3.2</li> </ul>		
	SS	LCO 3.3.1    Function 6, 7    Condition E    OTΔT Trip, OPΔT		
	SS	<u>CONDITION</u> E. One channel Inoperable.	<u>REQUIRED ACTION</u> E.1 Place channel in trip. <u>OR</u> E.2 Be in MODE 3.	<u>COMPLETION TIME</u> 72 hours  78 hours
		LCO 3.3.2    Function 5b.    Condition I    FWI		
		<u>CONDITION</u> I. One channel Inoperable.	<u>REQUIRED ACTION</u> I.1 Place channel in trip. <u>OR</u> I.2 Be in MODE 3.	<u>COMPLETION TIME</u> 72 hours  78 hours
	OATC / UO	B12. Initiate the Continuous Actions Page		

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**Event Description:** RCS NR Temperature Instrument TE-421B Fails High (Tcold) on loop # 2. This will require the OATC to perform IOAs by placing rods in MANUAL.

The crew will then enter AOP 18001-C section B "Failure of RCS Narrow Range Temperature Instrumentation" to complete the corrective actions for this failure.

Time	Position	Applicant's Action or Behavior
	SS	<p>*B13. Check repairs and surveillances COMPLETE. <b>(NO)</b></p> <p>RNO</p> <p>*B13. Perform the following:</p> <ol style="list-style-type: none"><li>WHEN repairs and surveillances are complete, THEN perform Step B14.</li><li>Return to procedure and step in effect.</li></ol>
<p><b>END OF EVENT 2. PROCEED TO NEXT EVENT AT THE DISCRETION OF THE CHIEF EXAMINER.</b></p>		

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Event No.: 2

**Event Description:** Trip of 'B' train NSCW pump #4 with pump #6 failing to start in automatic. This will require the crew to enter 18021-C "Loss of NSCW" and carry out the corrective actions for this failure.

Time	Position	Applicant's Action or Behavior
	OATC or UO  SS	<p>Diagnose degraded NSCW conditions by noting trip of NSCW pump #4 and abnormal system conditions:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> ALB03 B01 NSCW TRAIN B LO HDR PRESS alarm</li> <li><input type="checkbox"/> ALB03 D02 NSCW TRAIN B CNMT CLR 3 &amp; 4 LO FLOW</li> <li><input type="checkbox"/> ALB03 E02 NSCW TRAIN B CNMT CLR 7 &amp; 8 LO FLOW</li> <li><input type="checkbox"/> ALB03 F02 NSCW TRAIN B RX CVTY CLG COIL LO FLOW</li> <li><input type="checkbox"/> ALB03 C03 NSCW TRAIN B DG CLR LO FLOW</li> <li><input type="checkbox"/> ALB03 C04 NSCW TRAIN B RHR PMP &amp; MTR CLR LO FLOW</li> <li><input type="checkbox"/> ALB37-A01 4160 SWGR 1BA03 TROUBLE</li> <li><input type="checkbox"/> Degraded flow (~12000 GPM) and pressure (~55PSIG) indications on QMCB</li> </ul>
	SS	Enter AOP 18021-C, Loss of Nuclear Service Cooling Water. (Crew update)
	SS  UO	<p>Initiate AOP 18021:</p> <ol style="list-style-type: none"> <li>1. Directs UO to check if catastrophic leakage from the NSCW system exists.</li> </ol> <p><i>Compare NSCW 'B' train supply and return flows – should be matched at about 12000 gpm.</i></p> <p><b>CATASTROPHIC LEAKAGE DOES <u>NOT</u> EXIST.</b></p> <p>1 RNO. Go to Step 6.</p>

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Event No.: 2

**Event Description:** Trip of 'B' train NSCW pump #4 with pump #6 failing to start in automatic. This will require the crew to enter 18021-C "Loss of NSCW" and carry out the corrective actions for this failure.

Time	Position	Applicant's Action or Behavior
	UO	<p>6. Verify two or more NSCW pumps on the affected train are operating properly by checking the following parameters exist:</p> <p><input type="checkbox"/> Supply header pressure greater than 70 psig. Train B: PI-1637</p> <p>Supply header flow approximately 17,000 gpm.</p> <p><input type="checkbox"/> Train B: FI-1641B</p> <p>UO should start standby pump #6 to "verify" two or more pumps operating in the affected loop.</p>
	UO	<p>7. Check the following on the affected train:</p> <p>NSCW pumps – THREE RUNNING.</p> <p>-AND-</p> <p>Low header pressure annunciator – EXTINGUISHED.</p> <p><b><u>NO</u></b></p> <p>7 RNO.</p> <p>Go to Step 9.</p>
	UO	<p>9. Verify the following on the affected NSCW train:</p> <p><input type="checkbox"/> Supply header pressure - GREATER THAN 70 PSIG: Train B: PI-1637</p> <p><input type="checkbox"/> Supply header temperature computer indication - LESS THAN 90°F: Train B: TE-1643</p> <p><input type="checkbox"/> Supply header flow - APPROXIMATELY 17,000 GPM: Train B: FI-1641B</p>



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Event No.: 2

**Event Description:** Trip of 'B' train NSCW pump #4 with pump #6 failing to start in automatic. This will require the crew to enter 18021-C "Loss of NSCW" and carry out the corrective actions for this failure.

Time	Position	Applicant's Action or Behavior
	UO	10. Check NSCW cooling tower basin levels on affected NSCW train - GREATER THAN 73%: <b><u>(Expect &gt; 73%)</u></b> <input type="checkbox"/> Train B: LI-1607
	UO	11. Check proper operation of affected NSCW train: <input type="checkbox"/> Two pumps running. <input type="checkbox"/> Supply header pressure - GREATER THAN 70 PSIG: Train B: PI-1637 <b><u>(Expect ~110 psig)</u></b> <input type="checkbox"/> Supply header temperature computer indication - LESS THAN 90°F: <b><u>(Expect ~ 80F)</u></b> Train B: TE-1643 <input type="checkbox"/> Supply header flow - APPROXIMATELY 17,000 GPM: Train B: FI-1641B
	UO	12. Go to Step 22.
	UO	22. Check NSCW return temperature on affected train – LESS THAN 95°F: <input type="checkbox"/> Train B: TI-1677A <b><u>(Expect ~ 88F)</u></b>
	SS	23. Return to procedure and step in effect.
<p align="center"><b>END OF EVENT 3. PROCEED TO NEXT EVENT AT THE DISCRETION OF THE CHIEF EXAMINER.</b></p>		

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Event No.: 3

**Event Description:** Normal Charging Pump (NCP) trips. This will require the crew to perform the Immediate Operator Actions of 18007-C Section B.

Time	Position	Applicant's Action or Behavior
	OATC	<p>Diagnose NCP trip:</p> <p><u>Indications:</u></p> <p>NCP breaker trips: Red – OFF Green – ON Amber – ON Charging line flow (FI-121) drops to 0 GPM RCP seal injection flows drop to 0 GPM</p> <p><u>Alarms:</u></p> <p>ALB07-A05 REGEN HX LTDN HI TEMP ALB07-B06 CHARGING LINE HI/LO FLOW ALB07-C06 CHARGING PUMP OVERLOAD TRIP ALB08-F06 RCP SEAL WATER INJ LO FLOW ALB33-A05 4160V SWGR 1NA05 TROUBLE</p>
	OATC	<p><b><u>18007-C IMMEDIATE OPERATOR ACTIONS</u></b></p> <p>B1. Isolate letdown:</p> <p>a. Close letdown orifice isolation valves:</p> <ul style="list-style-type: none"><li>• HV-8149A</li><li>• HV-8149B</li><li>• HV-8149C</li></ul> <p>b. Close letdown isolation valves:</p> <ul style="list-style-type: none"><li>• LV-459</li><li>• LV-460</li></ul> <p><b>NOTE: ALB07 E01 “CSFST TROUBLE” will annunciate when CVCS Letdown is isolated, because UQ-1118 Reactor Total Thermal Power turns magenta “BAD” on isolation of letdown.</b></p>

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Event No.: 3

**Event Description:** Normal Charging Pump (NCP) trips. This will require the crew to perform the Immediate Operator Actions of 18007-C Section B.

Time	Position	Applicant's Action or Behavior																																				
	SS	<p>Enters 18007-C, Section B (Crew update)</p> <p>Verifies Immediate Operator Actions B1 With OATC</p>																																				
	OATC/UO	B2. Initiate the Continuous Actions Page.																																				
	OATC/UO	*B3 Trend RCP Seal Parameters listed in ATTACHMENT A.																																				
		<table border="1"> <thead> <tr> <th>PARAMETER</th><th>IPC POINT</th><th>GENERAL GUIDANCE</th></tr> </thead> <tbody> <tr> <td>RCP 1 Seal injection flow</td><td>F0131</td><td>Maintain 8 to 13 GPM</td></tr> <tr> <td>RCP 2 Seal injection flow</td><td>F0129</td><td></td></tr> <tr> <td>RCP 3 Seal injection flow</td><td>F0127</td><td></td></tr> <tr> <td>RCP 4 Seal injection flow</td><td>F0125</td><td></td></tr> <tr> <td>RCP Seal Injection Temp:</td><td>T0140</td><td>Check less than 135°F (Measured at VCT Outlet when seal injection is in service.)</td></tr> <tr> <td>RCP 1 Number 1 Seal <u>Leakoff</u></td><td>F0161</td><td rowspan="4">Check within operating range (0.8-5.5 GPM) per 13003, REACTOR COOLANT PUMP OPERATION.</td></tr> <tr> <td>RCP 2 Number 1 Seal <u>Leakoff</u></td><td>F0160</td></tr> <tr> <td>RCP 3 Number 1 Seal <u>Leakoff</u></td><td>F0159</td></tr> <tr> <td>RCP 4 Number 1 Seal <u>Leakoff</u></td><td>F0158</td></tr> <tr> <td>RCP 1 Number 1 Seal Inlet Temp</td><td>T0417 T0181</td><td rowspan="4">Maintain less than 230 degrees or remove RCP from service per 13003, REACTOR COOLANT PUMP OPERATION.</td></tr> <tr> <td>RCP 2 Number 1 Seal Inlet Temp</td><td>T0182 T0437</td></tr> <tr> <td>RCP 3 Number 1 Seal Inlet Temp</td><td>T0183 T0457</td></tr> <tr> <td>RCP 4 Number 1 Seal Inlet Temp</td><td>T0184 T0477</td></tr> </tbody> </table>	PARAMETER	IPC POINT	GENERAL GUIDANCE	RCP 1 Seal injection flow	F0131	Maintain 8 to 13 GPM	RCP 2 Seal injection flow	F0129		RCP 3 Seal injection flow	F0127		RCP 4 Seal injection flow	F0125		RCP Seal Injection Temp:	T0140	Check less than 135°F (Measured at VCT Outlet when seal injection is in service.)	RCP 1 Number 1 Seal <u>Leakoff</u>	F0161	Check within operating range (0.8-5.5 GPM) per 13003, REACTOR COOLANT PUMP OPERATION.	RCP 2 Number 1 Seal <u>Leakoff</u>	F0160	RCP 3 Number 1 Seal <u>Leakoff</u>	F0159	RCP 4 Number 1 Seal <u>Leakoff</u>	F0158	RCP 1 Number 1 Seal Inlet Temp	T0417 T0181	Maintain less than 230 degrees or remove RCP from service per 13003, REACTOR COOLANT PUMP OPERATION.	RCP 2 Number 1 Seal Inlet Temp	T0182 T0437	RCP 3 Number 1 Seal Inlet Temp	T0183 T0457	RCP 4 Number 1 Seal Inlet Temp	T0184 T0477
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Event No.: 3

**Event Description:** Normal Charging Pump (NCP) trips. This will require the crew to perform the Immediate Operator Actions of 18007-C Section B.

Time	Position	Applicant's Action or Behavior
	OATC	<p>B4. Check charging pump(s) - OPERATING NORMALLY:</p> <ul style="list-style-type: none"> <li>• Discharge flow trend – STABLE.</li> <li>• Discharge pressure trend – STABLE.</li> <li>• VCT level - IN NORMAL BAND.</li> <li>• Bus current – STABLE.</li> <li>• Suction pressure – STABLE</li> </ul> <p><b><u>SO will report after dispatched for the NCP and its breaker:</u></b> NCP pump bearings hot and over current relays tripped for breaker 1NA05-08.</p>
	OATC	<p><b><i>The crew may perform this RNO</i></b></p> <p>RNO</p> <p>B4. Perform the following:</p> <ol style="list-style-type: none"> <li>Stop charging pumps.</li> <li>Determine and correct cause of charging pump abnormal operations.</li> <li>IF loss of suction to charging pumps has occurred, <u>THEN</u> do <u>NOT</u> start charging pumps until the cause of the loss of suction is understood and all affected piping and components are vented.</li> <li><u>IF</u> gas binding of charging pumps occurred, <u>THEN</u> do <u>NOT</u> start charging pumps until the cause of the gas binding is understood and all affected piping and components are vented.</li> </ol>
	OATC	<p>B5. Locate and isolate any charging system leakage.</p>

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Event No.: 3

**Event Description:** Normal Charging Pump (NCP) trips. This will require the crew to perform the Immediate Operator Actions of 18007-C Section B.

Time	Position	Applicant's Action or Behavior
	OATC/UO	B6. Check ACCW system - IN SERVICE.
	OATC	B7. Check normal charging valves - OPEN: <ul style="list-style-type: none"> <li>• HV-8105</li> <li>• HV-8106</li> <li>• HV-8146</li> <li>• HV-8485A and B</li> <li>• FV-121</li> <li>• HV-0182</li> </ul>
	OATC	*B8. Check normal charging flow – ESTABLISHED.  RNO  *B8. Perform the following: <ul style="list-style-type: none"> <li>a) <u>WHEN</u> normal charging flowpath can be established, <u>THEN</u> place normal charging and letdown in service by initiating 13006, CHEMICAL AND VOLUME CONTROL SYSTEM, Section 4.4.13.</li> </ul> <p><b><u>Go To Event 5 for returning charging and letdown to service, then return to this step of Event 4 Procedure section may or may not be provided to the operator by the SS.</u></b></p> <ul style="list-style-type: none"> <li>b) Go to Step B10.</li> </ul>
	OATC	B10. Establish Seal Injection flow to all RCPs - 8 TO 13 GPM.
	OATC	B11. Check RCP seal injection flow – ESTABLISHED.

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Event No.: 3

**Event Description:** Normal Charging Pump (NCP) trips. This will require the crew to perform the Immediate Operator Actions of 18007-C Section B.

Time	Position	Applicant's Action or Behavior
	SS	<div>NOTE</div> <p>Operation of the excess letdown flowpath will bypass the CVCS demineralizers. This may impact RCS chemistry control.</p>
	OATC	
		*B12. Control PRZR level - IN PROGRAM BAND.
	SS	B13. Initiate the following Technical Specifications and/or Technical Requirements as necessary:  <b>NOTE: ( NO TECH SPECS APPLY FOR INOPERABLE NCP)</b>
	OATC	B14. Check normal charging flow – ESTABLISHED.
	SS	B15. Return to procedure and step in effect.
<b>END OF EVENTS 3 and 4. PROCEED TO EVENT 5 AT THE DISCRETION OF THE CHIEF EXAMINER.</b>		

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Event No.: 4

Event Description: Return Normal Charging and Letdown to Service per 13006-C, Section 4.4.13.

Time	Position	Applicant's Action or Behavior
	SS OATC	<p><b><u>NOTE to Examiner:</u> Student may go to Section 4.4.2 first, but it will send him to the following section with no Charging Pump running.</b></p> <p><b>13006-1, CVCS Section 4.4.13, Restart of CCP or NCP following Loss of a Charging Pump.</b></p> <p style="text-align: center;"><b>CAUTIONS</b></p> <p>At BOL, while borating to maintain Tavg, the calculated delta boron concentration between the RCS and the last time the CCP/NCP was placed in service may be incorrect. Experience has shown that high concentrations of borated water tend to collect in the suction piping of the idle pumps, resulting in a higher boron concentration in the CCP/NCP than the RCS. This may cause an unexpected boration and temperature reduction, when the pump is placed in service or tested.</p> <p>Restart of a charging pump should not be delayed in order to flush the pump prior to start.</p>
	SS OATC	4.4.13.1 <u>PRIOR</u> to starting the pump and based on the conditions described in the first caution above, a slight boration should be anticipated and a briefing on compensatory actions to offset the boration should be conducted.
	SS OATC	<p style="text-align: center;"><b>CAUTION</b></p> <p>A determination should be made that loss of the Charging Pump was not due to air/gas binding before starting the same or another pump.  <b>(Operator can determine no gas binding by steady pump discharge pressure prior to trip using IPC indication.)</b></p>
	OATC	4.4.13.2 Dispatch an Operator to perform pump pre-start checks.
	OATC	4.4.13.3 Verify VCT LEVEL 1LI-185 indicates between 30 and 80%.

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Event No.: 4

Event Description: Return Normal Charging and Letdown to Service per 13006-C, Section 4.4.13.

Time	Position	Applicant's Action or Behavior
	OATC	4.4.13.4 Verify OPEN VCT OUTLET ISOLATION Valves:  1-LV-0112B 1-LV-0112C
	OATC	4.4.13.5 Verify OPEN CCP-A & B COMMON MINIFLOW 1-HV-8110.
	OATC	<p>4.4.13.6 <u>IF</u> starting a CCP perform the following:</p> <p><u>IF</u> starting CCP-A:</p> <ol style="list-style-type: none"> <li>Open CCP-A SUCTION 1-HV-8471A.</li> <li>Open CCP-A MINIFLOW 1-HV-8111A.</li> <li>Verify OPEN CCP-A &amp; B COMMON MINIFLOW 1-HV-8110.</li> <li>Close CCP-A SAFETY GRADE CHG 1-HV-0190A.</li> <li>Open CCP-A DISCHARGE ISOLATION 1-HV-8485A.</li> </ol> <p><u>IF</u> starting CCP-B:</p> <ol style="list-style-type: none"> <li>Open CCP-B SUCTION 1-HV-8471B.</li> <li>Open CCP-B MINIFLOW 1-HV-8111B.</li> <li>Verify OPEN CCP-A &amp; B COMMON MINIFLOW 1-HV-8110.</li> <li>Close CCP-B SAFETY GRADE CHG 1-HV-0190B.</li> <li>Open CCP-B DISCHARGE ISOLATION 1-HV-8485B.</li> <li>Open CCP DISCHARGE HEADER CROSSCONNECT 1-HV-8438.</li> </ol> <p><b><u>Expect the crew to start CCP 'B' due to Caution Tag on CCP 'A'.</u></b></p>
		NOTE and step 4.4.13.7 are N/A
	OATC	4.4.13.8 Set 1HC-182 for Maximum Seal Flow (0% demand).
	OATC	4.4.13.9 Verify Charging Flow Control 1FIC-121 in MAN and set to minimum.



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Event No.: 4

Event Description: Return Normal Charging and Letdown to Service per 13006-C, Section 4.4.13.

Time	Position	Applicant's Action or Behavior
	OATC	<p>NOTE</p> <p>Normal and Alternate charging paths should be alternated over plant life to equalize thermal stress. The transfer should be performed at cold shutdown conditions to avoid thermal transients. Normal charging should be in service during even-numbered fuel cycles. Alternate charging should be in service during odd-numbered fuel cycles. Swapping nozzles at NOPT should be avoided.</p> <p><i>Charging path should remain the same for the current cycle.</i></p>
	OATC	<p>4.4.13.10 Verify OPEN one of the following:</p> <p>NORMAL CHARGING TO LOOP 1 1-HV-8146</p> <p><u>OR</u></p> <p>ALTERNATE CHARGING TO LOOP 4 1-HV-8147</p> <p><b><u>The normal charging isolation valve will remain open when the NCP trips. The normal charging isolation valve 1HV-8146 should be verified open when restoring charging flow.</u></b></p>
	OATC	<p>4.4.13.11 Verify OPEN CHARGING TO RCS ISOLATION Valves:</p> <p><input type="checkbox"/> 1-HV-8105</p> <p><input type="checkbox"/> 1-HV-8105</p>
	OATC	<p>4.4.13.12 Verify the ALOP of the CCP to be started is running as indicated by the QMCB red indicating lamp lit.</p>
	OATC	<p>4.4.13.13 Start the desired CCP or NCP:</p> <p><input type="checkbox"/> 'CCP-A' 1HS-273A</p> <p><u>OR</u></p> <p><input type="checkbox"/> 'CCP-B' 1HS-274A</p>

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Event No.: 4

Event Description: Return Normal Charging and Letdown to Service per 13006-C, Section 4.4.13.

Time	Position	Applicant's Action or Behavior
	OATC	<p>4.4.13.14 <u>IF</u> a CCP was started, verify the selected CCP ALOP red indicating lamp goes off (on QMCB) shortly after the pump is started.</p> <p>4.4.13.15 is N/A</p>
	OATC	<p>4.4.13.16 Simultaneously perform the following:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Adjust Seal Flow Control 1HC-182 to obtain between 8 and 13 gpm to each RCP.</li> <li><input type="checkbox"/> Adjust Charging Flow Control 1FIC-121 to obtain the desired charging flow.</li> </ul>
	OATC	4.4.13.17 Return To Section 4.4.2 to establish Normal Letdown and Charging.
	OATC	13006-1, CVCS Section 4.4.2 Returning Normal Charging and Letdown to Service.
	OATC	4.4.2.1 <u>IF</u> a Charging Pump is <u>NOT</u> in service, Go To Section 4.4.13 to start the NCP <u>OR</u> an available Centrifugal Charging Pump, <u>THEN</u> Return To this section.
	OATC	<p style="text-align: center;">NOTES</p> <p>This section also applies to returning normal charging and letdown to service following termination of safety injection.</p> <p>Letdown is to be established as soon as possible after initiating flow through a Charging Nozzle.</p>
	OATC	4.4.2.2 <u>IF</u> NCP is in service, verify NCP MINIFLOW 1-HV-8109 is open. <b>(N/A)</b>

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Event No.: 4

Event Description: Return Normal Charging and Letdown to Service per 13006-C, Section 4.4.13.

Time	Position	Applicant's Action or Behavior
	OATC	<p>4.4.2.3 Perform the following:</p> <ul style="list-style-type: none"> <li>a. Close LETDOWN ORIFICE Isolation Valves: 1-HV-8149A 1-HV-8149A 1-HV-8149A</li> <li>b. Close LETDOWN ISOLATION VLV UPSTREAM <u>AND</u> DOWNSTREAM Valves: 1-LV-460 1-LV-459</li> <li>c. Close PZR AUX SPRAY VALVE 1-HV-8145.</li> <li>d. Open CVCS LETDOWN PIPE BREAK PROT ISOLATION 1-HV-15214.</li> <li>e. Open RCS LETDOWN LINE ISO VLV IRC 1-HV-8160.</li> <li>f. Open RCS LETDOWN LINE ISO VLV ORC 1-HV-8152.</li> <li>g. Place Letdown Pressure Controller 1PIC-131 in MAN and adjust output to between 50% and 75%.</li> <li>h. Place LETDOWN HX OUTLET TEMP 1TIC-130 in MAN and adjust output to the most current position as recorded on the Control Room Rounds Sheets.</li> <li>i. Verify PRESSURIZER LEVEL 1LR-459 greater than 17%.</li> </ul>
	OATC	<p style="text-align: center;">NOTE</p> <p>If Normal Charging and Letdown are being returned to service as directed from Section 4.4.15, one of the valves in Substep j. and both valves in Step 4.4.2.4 will already be open.</p>
	OATC	<ul style="list-style-type: none"> <li>j. Verify one of the following are OPEN: NORMAL CHARGING TO LOOP 1 1-HV-8146 (even-numbered fuel cycle)</li> <li><u>OR</u></li> <li>ALTERNATE CHARGING TO LOOP 4 1-HV-8147 (odd-numbered fuel cycle)</li> </ul>
	OATC	<p>4.4.2.4 Verify CHARGING TO RCS ISOLATION Valves are OPEN:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> 1-HV-8106</li> <li><input type="checkbox"/> 1-HV-8105</li> </ul>

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Event No.: 4

Event Description: Return Normal Charging and Letdown to Service per 13006-C, Section 4.4.13.

Time	Position	Applicant's Action or Behavior
	OATC	<p>4.4.2.5 Simultaneously perform the following:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Adjust 1HC-182 output to maintain between 8 and 13 gpm to each RCP.</li> <li><input type="checkbox"/> Adjust 1FIC-121 to raise CHG FLOW 1FI-121A to between 80 and 90 gpm.</li> </ul>
	OATC	<p>4.4.2.6 Open LETDOWN ISOLATION VLV UPSTREAM <u>AND</u> DOWNSTREAM Valves by holding their handswitches in OPEN <u>UNTIL</u> the valves are fully open:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> 1-LV-460                      1HS-460</li> <li><input type="checkbox"/> 1-LV-459                      1HS-459</li> </ul>
	OATC	<p>4.4.2.7 Establish Letdown flow:</p> <p>a. Simultaneously open a Letdown Orifice and maintain pressure by performing the following:</p> <p>Open one LETDOWN ORIFICE Isolation Valve by holding its handswitch in the OPEN position until fully open:</p> <p>1HS-8149B (75 gpm - odd fuel cycles)</p> <p><u>OR</u></p> <p>1HS-8149C (75 gpm – even fuel cycles)</p> <p><u>OR</u></p> <p>1HS-8149A (45 gpm)</p> <p>Adjust 1PIC-131A to maintain LETDOWN PRESS 1PI-131A between 360 and 380 psig.</p> <p>b. Record the letdown orifice that was placed in service in the Unit Control Log.</p>

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Event No.: 4

Event Description: Return Normal Charging and Letdown to Service per 13006-C, Section 4.4.13.

Time	Position	Applicant's Action or Behavior
	OATC	4.4.2.8 <u>WHEN</u> LETDOWN PRESS 1PI-131A stabilizes between 360 and 380 psig, place 1PIC-131 in AUTO
	OATC	4.4.2.9 Place LETDOWN HX OUTLET TEMP 1TIC-130 in AUTO and verify it maintains temperature less than or equal to 115°F.
	OATC	4.4.2.10 Verify LETDOWN REGEN HX OUT 1TI-127 indicates less than 380°F.
	OATC	4.4.2.11 Monitor 1LR-459 Pressurizer Level and Pressurizer Level Setpoint.
	OATC	4.4.2.12 Maintain Pressurizer Level within 1% of Level Setpoint using 1FIC-121.
	OATC	4.4.2.13 Place Pressurizer Level Control in automatic <u>UNLESS</u> it is to remain in Manual under Tagout or Caution tag: <ul style="list-style-type: none"> <li>a. Verify PRZR Level Controller 1LIC-459 in AUTO.</li> <li>b. <u>AFTER</u> level has been stable within 1% of setpoint for approximately 3 minutes, place 1FIC-121 in AUTO.</li> </ul>
	OATC	4.4.2.14 <u>IF</u> this section was performed to restore normal charging and letdown to service following termination of Safety Injection, Return To 19011-C, "ES-1.1 SI Termination". <b>(N/A)</b>
<b>END OF EVENT 4. Return to Event 4, Step B10 of 18007-C.</b>		

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Event No.: 5

**Event Description:** Reactor Cavity Cooling Fan #1 trips. This will require the crew to respond per ARP-17052. The ARP will direct the UO to start Reactor Cavity Cooling Fan #2.

Time	Position	Applicant's Action or Behavior
	CREW	Recognize alarm on QHVAC Panel. (back panel)  <input type="checkbox"/> ALB52-E09 'CNMT CVTY F-1 LO AIR FLOW' <input type="checkbox"/> ALB33-C03 480V SWGR 1NB01 TROUBLE <input type="checkbox"/> ALB52-F08 RX CAVITIES AIR PASSAGE TEMP ALARM <i><u>(Will alarm shortly after the fan trips.)</u></i>
	UO	Acknowledge alarm and enter ARP-17052 for annunciator ALB52-E09 'CNMT CVTY F-1 LO AIR FLOW'. Identify that Reactor Cavity Cooling Fan #1 has tripped.  <input type="checkbox"/> Probable cause fan failure.
	UO	Report to SS that Reactor Cavity Cooling Fan #1 has tripped.  <input type="checkbox"/> Dispatch operator and maintenance to investigate tripped breaker.
	UO	<input type="checkbox"/> Start fan 1-1511-B7-002-M01 using 1-HS-2651 (C37) on QHVC.
	UO	Report to the SS that Reactor Cavity Cooling Fan #2 is running.
<b>END OF EVENT 5. PROCEED TO NEXT EVENT AT THE DISCRETION OF THE CHIEF EXAMINER.</b>		

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Event No.: 6

**Event Description:** Small RCS pressure boundary leak develops which is approximately 0.5 gpm, requiring a unit shutdown to comply with TS 3.4.13, RCS Operational Leakage action requirements.

Time	Position	Applicant's Action or Behavior
	All	<p>Diagnoses loss of reactor coolant to CNMT atmosphere:</p> <p>Alarms:</p> <ul style="list-style-type: none"> <li>Intermediate radiation alarm</li> <li>High radiation alarm</li> </ul> <p>Indications:</p> <ul style="list-style-type: none"> <li>PZR level deviation below program level without Tave reduction</li> <li>Increased charging flow to maintain PZR level</li> <li>CNMT radiation increasing on process monitor RE-2562C</li> </ul>
	SS	<p>Enters AOP 18004-C section A for RCS leakage, section A. (Crew Update)</p> <p>Mini Purge may be isolated at this point or shortly after. The following manipulations are required:</p> <p>SUPPLY:</p> <ol style="list-style-type: none"> <li>Stop the CTB MINI-PURGE SPLY FAN using 1-HS-2630B. (B32)</li> <li><b>Close</b> CTB NORM PURGE SPLY ORC ISO VLV-MINI 1-HV-2627B using 1-HS -2627B (D32).</li> <li><b>Close</b> CTB NORM PURGE SPLY IRC ISO VLV-MINI 1-HV-2626B using 1-HS -2626B (C32).</li> </ol> <p>EXHAUST:</p> <ol style="list-style-type: none"> <li><b>Stop</b> the CTB MINI-PURGE EXH FAN using 1-HS-2631B. (D34)</li> <li><b>Close</b> CTB MINI PURGE EXH ORC ISO VLV-MINI 1-HV-2629B using 1-HS -2629B (B34).</li> <li><b>Close</b> CTB NORM PURGE EXH IRC ISO VLV-MINI 1-HV-2628B using 1-HS -2628B (A34).</li> <li><b>Place</b> CTB MINI-PURGE EXH DMPR 1-HV-12592 in CLOSE using 1-HS -12592 (C34).</li> </ol>
	SS	<p>A1. Check plant conditions:</p> <p><input type="checkbox"/> In Mode 1 or 2.</p> <p>-OR-</p> <p><input type="checkbox"/> In Mode 3 with RCS pressure greater than 1000 psig.</p>

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Event No.: 6

**Event Description:** Small RCS pressure boundary leak develops which is approximately 0.5 gpm, requiring a unit shutdown to comply with TS 3.4.13, RCS Operational Leakage action requirements.

Time	Position	Applicant's Action or Behavior
	SS OATC UO	A2. Initiate the Continuous Actions Page.
	OATC	<p>*A3. Maintain PRZR level:</p> <ul style="list-style-type: none"> <li>a. Adjust charging flow as necessary to maintain program level.</li> <li>b. Check PRZR level – STABLE OR RISING.</li> </ul>
	OATC	<p>A3.b. RNO:</p> <ul style="list-style-type: none"> <li>b. Perform the following:               <ul style="list-style-type: none"> <li>1) Isolate letdown by closing:                   <ul style="list-style-type: none"> <li>a. Letdown Orifice Valves.</li> <li>b. Letdown Isolation Valves.</li> <li>c. Excess Letdown Valves.</li> </ul> </li> <li>2) Start an additional Charging Pump as necessary.</li> <li>3) IF PRZR level can NOT be maintained greater than 9%, THEN perform the following:                   <ul style="list-style-type: none"> <li>a) Trip the Reactor.</li> <li>b) WHEN Reactor trip verified, THEN actuate SI.</li> <li>c) Go to 19000 C, E 0 REACTOR TRIP OR SAFETY INJECTION.</li> </ul> </li> </ul> </li> </ul>
	SS	<p>CAUTION</p> <p>The NCP will not have miniflow when the CCP normal miniflow valves are closed.</p>
	OATC	*A4. Maintain VCT level using automatic or manual makeup control.



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Event No.: 6

**Event Description:** Small RCS pressure boundary leak develops which is approximately 0.5 gpm, requiring a unit shutdown to comply with TS 3.4.13, RCS Operational Leakage action requirements.

Time	Position	Applicant's Action or Behavior
	OATC	<p>*A4. RNO:</p> <p>*A4. Shift charging suction to the RWST and initiate unit shutdown:</p> <ul style="list-style-type: none"> <li>a. Open RWST TO CCP A&amp;B SUCTION VALVES: <ul style="list-style-type: none"> <li><input type="checkbox"/> LV-0112D &amp; LV-0112E</li> </ul> </li> <li>b. Shut VCT OUTLET ISOLATION valves: <ul style="list-style-type: none"> <li><input type="checkbox"/> LV-0112B &amp; LV-0112C</li> </ul> </li> <li>c. Align RV TO RWST ISOLATION valves: <ul style="list-style-type: none"> <li><input type="checkbox"/> HV-8508A CCP-A - ENABLE PTL</li> <li><input type="checkbox"/> HV-8508B CCP-B - ENABLE PTL</li> </ul> </li> <li>d. Shut CCP normal mini flow valves: <ul style="list-style-type: none"> <li><input type="checkbox"/> HV-8110 CCP-A&amp;B COMMON MINIFLOW</li> <li><input type="checkbox"/> HV-8111A CCP-A MINIFLOW</li> <li><input type="checkbox"/> HV-8111B CCP-B MINIFLOW</li> </ul> </li> <li>e. Trip the reactor.</li> <li>f. Initiate 19000 C, E 0 REACTOR TRIP OR SAFETY INJECTION.</li> </ul>
	SS	A5. Initiate NMP EP 110, EMERGENCY CLASSIFICATION DETERMINATION AND INITIAL ACTION.
	OATC	A6. Verify PRZR PORVs - CLOSED.
	OATC	A7. Check PRZR Safety Valves - CLOSED.
	UO	A8. Stop any load changes in progress.
	OATC	A9. Check PRZR pressure - TRENDING TO PROGRAM.

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Event No.: 6

**Event Description:** Small RCS pressure boundary leak develops which is approximately 0.5 gpm, requiring a unit shutdown to comply with TS 3.4.13, RCS Operational Leakage action requirements.

Time	Position	Applicant's Action or Behavior
	OATC	*A10. Monitor CNMT pressure: <input type="checkbox"/> Less than 3.8 psig. <input type="checkbox"/> Stable.
	OATC UO	*A10. RNO:  *A10. Perform the following: a. Verify Containment Cooling Units: 1) NSCW Cooler isolation valves open. 2) All running in low speed. (Back Panel) b. IF pressure is rising and approaching 3.8 psig, THEN perform the following: 1) Trip the reactor. 2) WHEN Reactor trip verified, THEN actuate SI. 3) Go to 19000 C, E 0 REACTOR TRIP OR SAFETY INJECTION.
	SS	A11. Initiate 14905, RCS LEAKAGE CALCULATION (INVENTORY BALANCE) to verify TS 3.4.13 compliance. (SS call to C&T to assign extra)
	SS	CAUTION Non-essential personnel should be evacuated from containment if conditions warrant. However, a containment entry may be necessary to identify the source of the leakage, if conditions permit. <b><u>(Note: No personnel in containment)</u></b>
	SS OATC	A12. Locate the source of leakage using ATTACHMENT A.  <b><u>Note to examiners: Source will not be identified, so with concurrence, proceed.</u></b>

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Event No.: 6

**Event Description:** Small RCS pressure boundary leak develops which is approximately 0.5 gpm, requiring a unit shutdown to comply with TS 3.4.13, RCS Operational Leakage action requirements.

Time	Position	Applicant's Action or Behavior
	OATC UO	<p>ATTACHMENT A.</p> <p>Leak from pressurizer steam space:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> System pressure degraded with pressurizer level normal and relatively stable.</li> <li><input type="checkbox"/> Rising temperature, pressure or level in PRT.</li> <li><input type="checkbox"/> ALB12 E01 PRZR RELIEF DISCH HI TEMP.</li> <li><input type="checkbox"/> ALB12 F01 PRZR SAFETY RELIEF DISCH HI TEMP.</li> <li><input type="checkbox"/> ALB12 E02 PRZR REL TANK HI PRESS.</li> <li><input type="checkbox"/> ALB12 F02 PRZR REL TANK HI/LO LEVEL.</li> <li><input type="checkbox"/> ALB12 E03 PRZR REL TANK HI TEMP.</li> <li><input type="checkbox"/> A pressurizer level/pressure instrument reference leg leak will display the following symptoms: <ul style="list-style-type: none"> <li>o Affected pressure channel failing low and affected level channel failing high.</li> <li>o Unaffected pressure channels lowering and unaffected level channels normal and relatively stable.</li> <li>o ALB11 C01 PRZR CONTROL HI LEVEL DEV AND HEATERS ON.</li> <li>o ALB11 E01 PRZR HI LEVEL ALARM.</li> <li>o ALB11 F01 PRZR HI LEVEL CHANNEL ALERT.</li> </ul> </li> </ul> <p>Leak past reactor vessel head flange:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> ALB12 F03 RV FLG LKOF HI TEMP.</li> </ul> <p>Leak into auxiliary component cooling water:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> ALB 04 A05 (B05, C05, D05) ACCW RCP 1(2,3, 4) THERM BARRIER HX HI FLOW.</li> <li><input type="checkbox"/> ALB04 B06 ACCW RCP THRM BARRIER HI PRESS.</li> <li><input type="checkbox"/> ALB04 A01 ACCW SURGE TK HI/LO LVL.</li> <li><input type="checkbox"/> RE-1950 Auxiliary component cooling water process monitor rising or alarm.</li> <li><input type="checkbox"/> ACCW outlet from seal water heat exchanger local TI 2075.</li> <li><input type="checkbox"/> ALB04 C02 ACCW EXCESS LTDN HX LO FLOW extinguished.</li> <li><input type="checkbox"/> Low or no letdown flow indicated on FI 0132A/C with normal charging temperature indicated on TI 0126 (Letdown heat exchanger tube leak).</li> </ul> <p>Reactor coolant pump seal package:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> ALB08 A03(B03,C03,D03) RCP1 (2,3,4) STANDPIPE HI LEVEL.</li> <li><input type="checkbox"/> ALB08 A05(B05,C05,D05) RCP1 (2,3,4) CONTROLLED LKG HI/LO FLOW.</li> <li><input type="checkbox"/> ALB08 A04(B04,C04,D04) RCP1 (2,3,4) NO.2 SEAL LKOF HI FLOW.</li> <li><input type="checkbox"/> Abnormally high seal return flow indicated on FI 0160 or FI 0158..</li> </ul>
	OATC UO	

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Event No.: 6

**Event Description:** Small RCS pressure boundary leak develops which is approximately 0.5 gpm, requiring a unit shutdown to comply with TS 3.4.13, RCS Operational Leakage action requirements.

Time	Position	Applicant's Action or Behavior
	OATC UO	<input type="checkbox"/> Low differential pressure across No. 1 seal for any reactor coolant pump Safety injection system accumulators: <input type="checkbox"/> ALB06 A03(B03,C03,D03) ACCUM TANK 1 (2,3,4) HI/LO LEVEL. <input type="checkbox"/> Rising water level indication for any accumulator. <input type="checkbox"/> Rising pressure indication for any accumulator.
	OATC UO	Chemical and volume control system: <input type="checkbox"/> Abnormal temperatures in letdown or charging flow. <input type="checkbox"/> Abnormal pressure in letdown or charging flow. <input type="checkbox"/> Abnormal flows in letdown or charging flow. <input type="checkbox"/> ALB51 B04 (ALB52 B01) CVCS TRAIN A(B) PMP RM HI TEMP. <input type="checkbox"/> Pressurizer relief tank level, temperature or pressure rising from CVCS letdown line relief valve PSV 8117. <input type="checkbox"/> Seal return line relief valve PSV 8121 lifting. <input type="checkbox"/> ALB63 E01 CVCS PIPE BREAK RM PROT ACTUATION.
		Excess letdown line: <input type="checkbox"/> Rising temperature at Excess Letdown Heat Exchanger Outlet TI 0122. <input type="checkbox"/> Rising pressure at Excess Letdown Heat Exchanger Outlet PI 0124.
		Reactor vessel head vent line: <input type="checkbox"/> Rising temperature on Head Vent Line TI 0400. <input type="checkbox"/> Rising flow on Head Vent Line FI 0406A or FI 0407A. <input type="checkbox"/> Rising level, temperature, or pressure in the pressurizer relief tank.
		RHR system: <input type="checkbox"/> Lifting of relief valves PSV-8708A or 8708B as indicated by rising PRT level, pressure or temperature. <input type="checkbox"/> ALB02(03) B05 CCW TRAIN A(B) SURGE TK HI/LO LVL <input type="checkbox"/> CCW process RAD RE-0017A(B) rising or alarm.
		Safety injection system, RHR subsystem: <input type="checkbox"/> Lifting of relief valves PSV 8842, 8856A or 8856B as indicated by rising boron recycle holdup tank levels.
		Safety injection system, SI pumps: <input type="checkbox"/> Lifting of relief valves PSV 8851, 8853A or 8853B as indicated by rising boron recycle holdup tank levels.
		Intersystem LOCA: <input type="checkbox"/> RWST level rising. <input type="checkbox"/> Any abnormal rise in inventory of a system connected to the RCS.
		Steam Generator Tube Leakage: <input type="checkbox"/> SG sample results indicate greater than minimum detectable activity. <input type="checkbox"/> Secondary radiation monitors indicate increasing leakage based on historical data.

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Event No.: 6

**Event Description:** Small RCS pressure boundary leak develops which is approximately 0.5 gpm, requiring a unit shutdown to comply with TS 3.4.13, RCS Operational Leakage action requirements.

Time	Position	Applicant's Action or Behavior
	SS	A13. Isolate the leak.
	SS	A13. RNO:  A13. Perform the following: a. Initiate applicable ACTION Item of TS 3.4.13, RCS Operational Leakage. b. IF an unidentified leak greater than 1 gpm or any pressure boundary leak, THEN place the unit in cold shutdown as soon as possible within limits of applicable UOP. c. IF SG tube leakage is detected by secondary radiation levels, THEN Go to 18009 C, STEAM GENERATOR TUBE LEAK.
	SS	A14. Restore normal charging and letdown, if possible by initiating 13006, CHEMICAL AND VOLUME CONTROL SYSTEM.
	ALL	A15. Check continued operation allowed per Operations Management.  <u>(If asked, continue operation)</u>
	SS	A16. Return to procedure and step in effect.
<b>END OF EVENT 6. PROCEED TO NEXT EVENT AT THE DISCRETION OF THE CHIEF EXAMINER.</b>		

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Event No.: 8, 9, 10, and 11

**Event Description:** Rod H8 Ejects From The Core (Primary LOCA) with failure of Reactor to auto trip. Train "A" Auto SI Actuation Failure, SI Pump "A" Auto Start Failure and SI Pump "B" trips during SI loading sequence. AFW pumps auto actuation failure (all 3 pumps) with manual starts available.

Time	Position	Applicant's Action or Behavior
	CREW	Diagnoses LOCA (Ejected Rod) with an ATWT
	CREW SS	Performs Immediate Operator Actions Per E-0, 19000-C, REACTOR TRIP OR SAFETY INJECTION. SS Makes Page Announcement of Reactor Trip.
	CREW  OATC  <b>CRITICAL TASK</b>  UO  UO  OATC  SS	<p><b>IMMEDIATE ACTIONS of 19000-C, Reactor Trip or Safety Injection</b></p> <p>1. Check Reactor Trip</p> <ul style="list-style-type: none"> <li>Rod Bottom Lights – LIT <b>(NO)</b></li> <li>Reactor Trip and Bypass Breakers – OPEN <b>(NO)</b></li> <li>Neutron Flux – LOWERING <b>(NO)</b></li> </ul> <p><b>RNO</b></p> <p><b>1. Trip Reactor using both Reactor trip handswitches. IF Reactor NOT tripped, THEN go to 19211-C, FR-S.1 RESPONSE TO NUCLEAR POWER GENERATION / ATWT.</b></p> <p><b><u>Note to examiner: 19211 entry is NOT required.</u></b></p> <p>2. Check Turbine Trip:</p> <ul style="list-style-type: none"> <li>All Turbine Stop Valves – CLOSED <b>(YES)</b></li> </ul> <p>3. Check Power to AC Emergency Buses:</p> <ol style="list-style-type: none"> <li>AC Emergency Busses – AT LEAST ONE ENERGIZED. <b>(YES)</b> <ul style="list-style-type: none"> <li>4160V AC 1E Busses</li> </ul> </li> <li>AC Emergency Buses – ALL ENERGIZED: <b>(YES)</b> <ul style="list-style-type: none"> <li>4160V AC 1E Busses</li> <li>480V AC 1E Busses</li> </ul> </li> </ol> <p>4. Check if SI is actuated:</p> <ul style="list-style-type: none"> <li>Any SI annunciator – LIT <b>(YES)</b></li> <li>SI ACTUATED BPLP window – LIT <b>(YES)</b></li> </ul> <p>— Go to Step 6</p>

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Event No.: 8, 9, 10, and 11

**Event Description:** Rod H8 Ejects From The Core (Primary LOCA) with failure of Reactor to auto trip. Train "A" Auto SI Actuation Failure, SI Pump "A" Auto Start Failure and SI Pump "B" trips during SI loading sequence. AFW pumps auto actuation failure (all 3 pumps) with manual starts available.

Time	Position	Applicant's Action or Behavior
	SS / CREW  OATC  <b>CRITICAL TASK</b>	<p>6. Initiate the Foldout Page.</p> <p><b>RCP TRIP CRITERIA:</b>  <b>Trip all RCPs if BOTH conditions listed below occur:</b>  a. CCPs or SI pumps – AT LEAST ONE RUNNING.  b. RCP Trip Parameter – RCS PRESSURE LESS THAN 1375 PSIG.</p> <p><b>Recognizes RCP TRIP CRITERIA met per foldout page and trips ALL RCPs within 10 minutes of initiating event.</b></p>
	OATC  UO  SS	<p>7. Perform the following:</p> <ul style="list-style-type: none"> <li>OATC Initial Actions Page</li> <li>UO Initial Actions Page</li> </ul> <p><b>NOTE: SS Initiates Step 8 After OATC/UO Initial Actions Completed.</b></p> <p><b>NOTE: Crew Update Announced when Adverse Containment recognized.</b></p>
	OATC	<p><b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b></p> <p>Step 1. Check both Trains of ECCS equipment-ALIGNING FOR INJECTION PHASE</p> <ul style="list-style-type: none"> <li>MLB indication.</li> </ul> <p><b><u>NOTE TO EXAMINER:</u> SI Train A Fails to Auto Actuate</b></p> <p>RNO</p> <p>Step 1. Actuate SI.</p>
	OATC	<p><b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b></p> <p>Step 2. Check Containment Isolation Phase A – ACTUATED</p> <ul style="list-style-type: none"> <li>CIA MLB indication</li> </ul>

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**Event Description:** Rod H8 Ejects From The Core (Primary LOCA) with failure of Reactor to auto trip. Train "A" Auto SI Actuation Failure, SI Pump "A" Auto Start Failure and SI Pump "B" trips during SI loading sequence. AFW pumps auto actuation failure (all 3 pumps) with manual starts available.

Time	Position	Applicant's Action or Behavior
	OATC	<p><b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b></p> <p>Step 3. Check ECCS Pumps and NCP status:</p> <ul style="list-style-type: none"> <li>a. CCPs – RUNNING.</li> <li>b. SI Pumps – RUNNING.</li> </ul> <p><b>NOTE TO EXAMINER:</b> <i>SI Pump A / CCP A Fails to Auto Start. SI Pump B / CCP B Trip on start.</i></p> <p><b>RNO</b></p> <p><b>Step 3a. Perform the following for available CCP(s):</b></p> <ul style="list-style-type: none"> <li>1) Place alternate miniflow valve Handswitch in <b>ENABLE PTL:</b> <b>HS-8508 A</b></li> <li>2) Start CCP "A".</li> </ul> <p><b>Step 3b. Start SI Pump "A".</b></p> <ul style="list-style-type: none"> <li>c. RHR Pumps – RUNNING.</li> <li>d. NCP – TRIPPED.</li> </ul>
	OATC	<p><b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b></p> <p>Step 4. Verify CCW Pumps – ONLY TWO RUNNING PER TRAIN.</p>
	OATC	<p><b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b></p> <p>Step 5. Verify proper NSCW system operation:</p> <ul style="list-style-type: none"> <li>a. NSCW Pumps - ONLY TWO RUNNING PER TRAIN.</li> <li>b. NSCW TOWER RTN HDR BYPASS BASIN handswitches – IN AUTO: <ul style="list-style-type: none"> <li>• HS-1668A</li> <li>• HS-1669A</li> </ul> </li> </ul>



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Event No.: 8, 9, 10, and 11

**Event Description:** Rod H8 Ejects From The Core (Primary LOCA) with failure of Reactor to auto trip. Train "A" Auto SI Actuation Failure, SI Pump "A" Auto Start Failure and SI Pump "B" trips during SI loading sequence. AFW pumps auto actuation failure (all 3 pumps) with manual starts available.

Time	Position	Applicant's Action or Behavior
	OATC	<b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b>  Step 6. Verify Containment Cooling Units: <ul style="list-style-type: none"> <li>a. ALL RUNNING IN LOW SPEED               <ul style="list-style-type: none"> <li>• MLB indication</li> </ul> </li> <li>b. NSCW Cooler isolation valves – OPEN:               <ul style="list-style-type: none"> <li>• MLB indication</li> </ul> </li> </ul>
	OATC	<b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b>  Step 7. Check Containment Ventilation Isolation: <ul style="list-style-type: none"> <li>a. Dampers and Valves - CLOSED               <ul style="list-style-type: none"> <li>• CVI MLB indication</li> </ul> </li> </ul>
	OATC	<b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b>  Step 8. Check Containment pressure REMAINED LESS THAN 21.5 PSIG.
	OATC	<b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b>  Step 9. Check ECCS flows: <ul style="list-style-type: none"> <li>a. BIT Flow.</li> <li>b. RCS pressure – LESS THAN 1625 PSIG.</li> <li>c. SI Pump flow.</li> <li>d. RCS pressure – LESS THAN 300 PSIG</li> </ul> RNO  Step 9d. Go to Step 10.
	OATC	<b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b>  Step 10. Check ECCS Valve alignment – PROPER INJECTION LINEUP INDICATED ON MLBs.

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**Event Description:** Rod H8 Ejects From The Core (Primary LOCA) with failure of Reactor to auto trip. Train "A" Auto SI Actuation Failure, SI Pump "A" Auto Start Failure and SI Pump "B" trips during SI loading sequence. AFW pumps auto actuation failure (all 3 pumps) with manual starts available.

Time	Position	Applicant's Action or Behavior
	OATC	<p><b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b></p> <p>Step 11. Check ACCW Pumps – AT LEAST ONE RUNNING</p>
	OATC	<p><b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b></p> <p>Step 12. Adjust Seal Injection flow to RCPs – 8 to 13 GPM.  <b><i>NOTE TO EXAMINER: END OF OATC INITIAL ACTIONS OF E-0. RETURNS TO MAIN BODY OF E-0 CONTINUING AT STEP 8</i></b></p>
	UO <b>CRITICAL TASK</b>	<p><b>PERFORMS UO INITIAL ACTIONS OF E- 0.</b></p> <p>Step 1. Check AFW Pumps – RUNNING</p> <ul style="list-style-type: none"> <li>• MDAFW Pumps</li> <li>• TDAFW Pump, if required</li> </ul> <p>RNO</p> <ul style="list-style-type: none"> <li>• Start MDAFW Pumps.</li> <li>• Open Steam Supply valve HV-5106 to TDAFW Pump</li> </ul>
	UO	<p><b>PERFORMS UO INITIAL ACTIONS OF E- 0.</b></p> <p>Step 2. Check NR level in at least one SG – GREATER THAN 10% [32% ADVERSE]</p>
		<p><b>PERFORMS UO INITIAL ACTIONS OF E- 0.</b></p> <p>Step 3. Check if main steamlines should be isolated:</p> <p>a. Check for one or more of the following conditions:</p> <ul style="list-style-type: none"> <li>– Any steamline pressure – LESS THAN <u>OR</u> EQUAL TO 585 PSIG.</li> <li>– Containment pressure – GREATER THAN 14.5 PSIG.</li> </ul>

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**Event Description:** Rod H8 Ejects From The Core (Primary LOCA) with failure of Reactor to auto trip. Train "A" Auto SI Actuation Failure, SI Pump "A" Auto Start Failure and SI Pump "B" trips during SI loading sequence. AFW pumps auto actuation failure (all 3 pumps) with manual starts available.

Time	Position	Applicant's Action or Behavior
	UO	<p>– Low Steam Pressure SI/SLI – BLOCKED <u>AND</u> High Steam Pressure Rate – <u>ONTWO OR MORE</u> CHANNELS OF ANY STEAMLIN.</p> <p>RNO</p> <p>Step 3a. Go to Step 4</p>
	UO	<p><b>PERFORMS UO INITIAL ACTIONS OF E- 0.</b></p> <p>Step 4. Verify FW Isolation Valves closed:</p> <ul style="list-style-type: none"> <li>• MFIVs</li> <li>• BFIVs</li> <li>• MFRVs</li> <li>• BFRVs</li> </ul>
	UO	<p><b>PERFORMS UO INITIAL ACTIONS OF E- 0.</b></p> <p>Step 5. Verify SG Blowdown isolated:</p> <ul style="list-style-type: none"> <li>• Place SG Blowdown Isolation Valve handswitches HS-7603A, B, C, and D in the CLOSE position.</li> <li>• SG Sample Isolation Valves – CLOSED.</li> </ul>
	UO	<p><b>PERFORMS UO INITIAL ACTIONS OF E- 0.</b></p> <p>Step 6. Verify Diesel Generators – RUNNING.</p>

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**Event Description:** Rod H8 Ejects From The Core (Primary LOCA) with failure of Reactor to auto trip. Train "A" Auto SI Actuation Failure, SI Pump "A" Auto Start Failure and SI Pump "B" trips during SI loading sequence. AFW pumps auto actuation failure (all 3 pumps) with manual starts available.

Time	Position	Applicant's Action or Behavior
	UO	<b>PERFORMS UO INITIAL ACTIONS OF E- 0.</b>  Step 7. Throttle total AFW flow as necessary to maintain SG NR levels between 10% [32% ADVERSE] and 65%.
	UO	<b>PERFORMS UO INITIAL ACTIONS OF E- 0.</b>  Step 8. Verify both MFPs – TRIPPED.
	UO          CREW	<b>PERFORMS UO INITIAL ACTIONS OF E- 0.</b>  Step 9. Check Main Generator Output Breakers – OPEN.  <b>NOTE TO EXAMINER: END OF UO INITIAL ACTIONS OF E-0.</b>  <b>RETURNS TO MAIN BODY OF E-0 CONTINUING AT STEP 8.</b>
	OATC / UO	8. Initiate the Continuous Actions Page
	SS  OATC	*9. Check RCS temperature stable at or trending to 557°F:  ___ With RCP(s) running – RCS AVERAGE TEMPERATURE  -OR-  ___ Without RCP(s) running – RCS WR COLD LEG TEMPERATURES

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**Event Description:** Rod H8 Ejects From The Core (Primary LOCA) with failure of Reactor to auto trip. Train "A" Auto SI Actuation Failure, SI Pump "A" Auto Start Failure and SI Pump "B" trips during SI loading sequence. AFW pumps auto actuation failure (all 3 pumps) with manual starts available.

Time	Position	Applicant's Action or Behavior
	UO	<p>RNO Step *9 <u>IF</u> temperature is less than 557°F and lowering, <u>THEN</u> perform the following as necessary: √</p> <ul style="list-style-type: none"> <li>a. Stop dumping steam.</li> <li>b. Perform the following as appropriate: <ul style="list-style-type: none"> <li>___ <u>IF</u> at least one SG NR level greater than 10% [32% ADVERSE], <u>THEN</u> lower total feed flow.</li> <li>-OR-</li> <li>___ <u>IF</u> all SG NR levels less than 10% [32% ADVERSE], <u>THEN</u> lower total feed flow to NOT less than 570 GPM.</li> </ul> </li> <li>c. <u>IF</u> cooldown continues <u>THEN</u> close MSIVs and BSIVs.</li> <li>d. <u>IF</u> temperature greater than 557°F and rising <u>THEN</u> dump steam.</li> </ul>
	SS  OATC	<p>10. Check PRZR PORVs, Block Valves, and Spray Valves:</p> <ul style="list-style-type: none"> <li>a. PRZR PORVs – CLOSED AND IN AUTO.</li> <li>b. Normal PRZR Spray Valves – CLOSED.</li> <li>c. Power available to at least one Block Valve – AVAILABLE.</li> <li>*d. PRZR PORV Block Valves – AT LEAST ONE OPEN</li> </ul> <p>RNO</p> <p>Step 10*d. Verify open at least one PRZR PORV Block Valve when PRZR pressure is greater than 2185 psig.</p>
	SS  OATC  <b>CRITICAL TASK</b>	<p>11. Check if RCPs should be stopped:</p> <ul style="list-style-type: none"> <li>a. ECCS Pumps – AT LEAST ONE RUNNING. <ul style="list-style-type: none"> <li>• CCP or SI Pump.</li> </ul> </li> <li>b. RCS pressure – LESS THAN 1375 PSIG.</li> <li><b>c. Stop all RCPs.</b></li> </ul>

**Event No.: 8, 9, 10, and 11**

**Event Description:** Rod H8 Ejects From The Core (Primary LOCA) with failure of Reactor to auto trip. Train “A” Auto SI Actuation Failure, SI Pump “A” Auto Start Failure and SI Pump “B” trips during SI loading sequence. AFW pumps auto actuation failure (all 3 pumps) with manual starts available.

Time	Position	Applicant's Action or Behavior
	SS	12. Check SGs secondary pressure boundaries:
	UO	a. SG Pressures: — Any lowering in an uncontrolled manner. -OR- — Any completely depressurized.
	RNO	
	SS	Step 12a. Go to Step 13.
	SS	13. Check SG Tubes intact:
	UO	a. Direct Chemistry to take periodic activity samples of all SGs one at a time.
		b. Secondary radiation NORMAL:
		• MAIN STM LINE MONITORS:
		• RE-13120 (SG1)
		• RE-13121 (SG2)
		• RE-13122 (SG3)
		• RE-13119 (SG4)
		• CNDSR AIR EJCTR/STM RAD MONITORS:
		• RE-12839C
		• RE-12838D (if on scale)
		• RE-12839E (if on scale)
		• STM GEN LIQ PROCESS RAD:
		• RE-0019 (Sample)
		• RE-0021 (Blowdown)
		• SG sample radiation.
	SS	c. Check SG levels – ANY RISING IN AN UNCONTROLLED MANNER
	RNO	
		Step 13c. Go to Step 14.

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Event No.: 8, 9, 10, and 11

**Event Description:** Rod H8 Ejects From The Core (Primary LOCA) with failure of Reactor to auto trip. Train "A" Auto SI Actuation Failure, SI Pump "A" Auto Start Failure and SI Pump "B" trips during SI loading sequence. AFW pumps auto actuation failure (all 3 pumps) with manual starts available.

Time	Position	Applicant's Action or Behavior
	OATC	14. Check if RCS is intact inside Containment: <ul style="list-style-type: none"> <li>Containment radiation – NORMAL.</li> <li>Containment pressure – NORMAL</li> <li>Containment Emergency Recirculation Sump levels – NORMAL</li> </ul> RNO  Step 14. Go to 19010-C, E-1 LOSS OF REACTOR OR SECONDARY COOLANT
	SS	Transitions to 19010-C, E-1 LOSS OF REACTOR OR SECONDARY COOLANT (Crew Update)
	SS  OATC/UO  OATC	<b>19010-C, E-1 LOSS OF REACTOR OR SECONDARY COOLANT</b> 1. Initiate the following: <ul style="list-style-type: none"> <li>Continuous Actions and Foldout Page.</li> <li>Critical Safety Function Status Trees per 19200-C, F-0 CRITICAL SAFETY FUNCTION STATUS TREE.</li> </ul>
<b>END OF EVENT 10. PROCEED TO NEXT EVENT AT THE DISCRETION OF THE CHIEF EXAMINER.</b>		

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Scenario No.: 1

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Event No.: 12

Event Description: 19010-C actions if examiner elects to continue.

Time	Position	Applicant's Action or Behavior
	CREW	<p><b>19010-C</b>, LOSS OF REACTOR OR SECONDARY COOLANT is entered from 19000-C step 14</p> <p>14. Check if RCS is intact inside Containment:</p> <ul style="list-style-type: none"> <li>• Containment radiation - NORMAL.</li> <li>• Containment pressure - NORMAL.</li> <li>• Containment Emergency Recirculation Sump levels - NORMAL.</li> </ul>
	CREW	<p>1. Initiate the following:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Continuous Actions and Foldout Page.</li> <li><input type="checkbox"/> Critical Safety Function Status Trees per 19200 C, F O CRITICAL SAFETY FUNCTION STATUS TREE.</li> </ul>
	SS	2. Initiate NMP EP 110, EMERGENCY CLASSIFICATION DETERMINATION AND INITIAL ACTION.
	OATC	*3. Maintain Seal Injection flow to all RCPs - 8 TO 13 GPM.
	SS OATC	<p>4. Check if RCPs should be stopped:</p> <ul style="list-style-type: none"> <li>a. ECCS Pumps AT LEAST ONE RUNNING: <ul style="list-style-type: none"> <li><input type="checkbox"/> CCP or SI Pump</li> </ul> </li> <li>b. RCS pressure LESS THAN 1375 PSIG.</li> <li>c. Stop all RCPs.</li> </ul>
	OATC	5. Check ACCW Pumps - AT LEAST ONE RUNNING.



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Scenario No.: 1

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Event No.: 12

Event Description: 19010-C actions if examiner elects to continue.

Time	Position	Applicant's Action or Behavior
	UO	6. Place Containment Hydrogen Monitors in service by initiating 13130, POST -ACCIDENT HYDROGEN CONTROL. (If not needed for credit, SS may direct extra operator to perform)
	UO	<p>7. Check SGs secondary pressure boundaries:</p> <p>a. Identify faulted SG(s): ANY SG PRESSURE LOWERING IN AN UNCONTROLLED MANNER. -OR- ANY SG COMPLETELY DEPRESSURIZED.</p> <p>b. Faulted SG(s) ISOLATED:</p> <ul style="list-style-type: none"> <li>• Steamlines</li> <li>• MSIVs</li> <li>• BSIVs</li> <li>• TDAFW supplies</li> <li>• SG ARVs</li> <li>• Feedlines</li> <li>• MFIVs</li> <li>• BFIVs</li> <li>• MFRVs</li> <li>• BFRVs</li> <li>• AFW valves</li> <li>• SG blowdown valves</li> <li>• SG sample valves</li> </ul>
	UO	<p>*8. Check intact SG levels:</p> <p>a. NR level AT LEAST ONE GREATER THAN 10% [32% ADVERSE].</p> <p>b. Maintain NR levels between 10% [32% ADVERSE] and 65%.</p> <p>c. NR level ANY RISING IN AN UNCONTROLLED MANNER.</p> <p>d. Go to 19030 C, E 3 STEAM GENERATOR TUBE RUPTURE.</p>
		9. Check SG Tubes intact:

**Event No.: 12**

**Event Description:** 19010-C actions if examiner elects to continue.

Time	Position	Applicant's Action or Behavior
	<p>UO</p> <p>UO</p>	<p>a. Direct Chemistry to take periodic activity samples of all SGs one at a time.</p> <p>b. Secondary radiation NORMAL:</p> <ul style="list-style-type: none"> <li>• MAIN STM LINE MONITORS:</li> <li>• RE 13120 (SG 1)</li> <li>• RE 13121 (SG 2)</li> <li>• RE 13122 (SG 3)</li> <li>• RE 13119 (SG 4)</li> <li>• CNDSR AIR EJCTR/STM RAD MONITORS:</li> <li>• RE 12839C</li> <li>• RE 12839D (if on scale)</li> <li>• RE 12839E (if on scale)</li> <li>• STM GEN LIQ PROCESS RAD:</li> <li>• RE 0019 (Sample)</li> <li>• RE 0021 (Blowdown</li> <li>• SG sample radiation.</li> </ul> <p>c. Check SG levels ANY RISING IN AN UNCONTROLLED MANNER.</p> <p>d. Go to 19030 C, E 3 STEAM GENERATOR TUBE RUPTURE.</p>
	OATC	<p>*10. Check PRZR PORVs and Block Valves:</p> <p>a. Power to PRZR PORV Block Valves AVAILABLE.</p> <p>b. PRZR PORVs CLOSED.</p> <p>c. PRZR PORV Block Valves AT LEAST ONE OPEN.</p> <p>10c RNO IF NOT closed to isolate an excessively leaking or open PRZR PORV, AND WHEN PRZR pressure is greater than 2185 psig, THEN verify open at least one PRZR PORV Block Valve.</p> <p>d. Any RCS WR CL temperature LESS THAN 220°F.</p> <p>e. Arm COPS.</p>
		<p>*11. Check if ECCS flow should be reduced: <b><u>(NO, go to Step 12)</u></b></p> <p>a. RCS Subcooling GREATER THAN 24°F [38°F ADVERSE].</p>

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Scenario No.: 1

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Event No.: 12

Event Description: 19010-C actions if examiner elects to continue.

Time	Position	Applicant's Action or Behavior
	SS OATC UO	b. Secondary Heat Sink: Total feed flow to intact SG(s) GREATER THAN 570 GPM. -OR- NR level in at least one intact SG GREATER THAN 10% [32% ADVERSE]. c. RCS pressure STABLE OR RISING. d. PRZR level GREATER THAN 9% [37% ADVERSE]. e. Go to 19011 C, ES 1.1 SI TERMINATION.
	OATC       OATC	*12. Check if Containment Spray should be stopped: a. CS Pumps RUNNING. b. Containment pressure LESS THAN 15 PSIG. <b><u>(NO, go to Step 12)</u></b> c. Any Containment radiation levels INDICATE HIGH DUE TO PRIMARY LOCA: RE 002 RE 003 RE 005 RE 006 d. Operate CS Pumps: Minimum of 2 hours. At least 1.5 hours in recirculation mode.
	SS OATC UO	CAUTIONS If offsite power is lost after SI reset, action is required to restart the following ESF equipment if plant conditions require their operation: <ul style="list-style-type: none"> <li>• RHR Pumps</li> <li>• SI Pumps</li> <li>• Post LOCA Cavity Purge Units</li> <li>• Containment Coolers in low speed (Started in high speed on a UV signal).</li> <li>• ESF Chilled Water Pumps (If CRI is reset).</li> </ul>
		13. Check if RHR Pumps should be stopped: a. RHR Pumps ANY RUNNING WITH SUCTION ALIGNED TO RWST. b. RCS pressure:

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Scenario No.: 1

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Event No.: 12

Event Description: 19010-C actions if examiner elects to continue.

Time	Position	Applicant's Action or Behavior								
	OATC	1) Greater than 300 psig. <b><u>(NO, go to Step 15)</u></b> <del>2) Stable or rising.</del> <del>c. Reset SI.</del> <del>d. Stop RHR Pumps.</del>								
	SS OATC UO	15. Check RCS and SG pressures: • Pressure in all SGs STABLE OR RISING. • RCS pressure STABLE OR LOWERING.								
	SS OATC UO	16. Check if DGs should be stopped: a. AC Emergency Busses ENERGIZED BY OFFSITE POWER. b. Reset SI, if necessary. c. Stop any unloaded DG and place in standby by initiating 13145, DIESEL GENERATORS. d. Check Stub Busses ENERGIZED: • NB01 • NB10								
	UO	16d. RNO d. Energize Stub Busses by performing the following as necessary: <table border="1"><thead><tr><th>NB01</th><th>NB10</th></tr></thead><tbody><tr><td>1) Open breaker NB01-01</td><td>1) Open breaker NB10-01</td></tr><tr><td>2) Close breaker AA02-22</td><td>2) Close breaker BA03-18</td></tr><tr><td>3) Close breaker NB01-01</td><td>3) Close breaker NB10-01</td></tr></tbody></table>	NB01	NB10	1) Open breaker NB01-01	1) Open breaker NB10-01	2) Close breaker AA02-22	2) Close breaker BA03-18	3) Close breaker NB01-01	3) Close breaker NB10-01
NB01	NB10									
1) Open breaker NB01-01	1) Open breaker NB10-01									
2) Close breaker AA02-22	2) Close breaker BA03-18									
3) Close breaker NB01-01	3) Close breaker NB10-01									
		17. Check Cold Leg recirculation capability: a. Power available to: Train A components: • HV 8811A CNMT SUMP TO RHR PMP A SUCTION								

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Scenario No.: 1

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Event No.: 12

Event Description: 19010-C actions if examiner elects to continue.

Time	Position	Applicant's Action or Behavior
	OATC	<ul style="list-style-type: none"> <li>• RHR Pump A OPERABLE</li> <li>• HV 8809A RHR PMP A TO COLD LEG 1&amp;2 ISO VLV</li> <li>• RHR Heat Exchanger A OPERABLE</li> <li>-OR-</li> </ul> <p>Train B components:</p> <ul style="list-style-type: none"> <li>• HV 8811B CNMT SUMP TO RHR PMP B SUCTION</li> <li>• RHR Pump B OPERABLE</li> <li>• HV 8809B RHR PMP B TO COLD LEG 3&amp;4 ISO VLV</li> <li>• RHR Heat Exchanger B OPERABLE</li> </ul>
	UO	<p>18. Check Auxiliary Building leak detection systems:</p> <p>a. PLANT VENT Radiation Monitors NORMAL:</p> <ul style="list-style-type: none"> <li>• RE 12442A EFFL PART</li> <li>• RE 12442B EFFL IODINE</li> <li>• RE 12442C EFFL RAD</li> <li>• RE 12444C RADIOGAS RAD</li> </ul> <p>b. Auxiliary Building break detection system on QPCP ALL LEAK DETECTION STATUS LIGHTS NOT LIT.</p>
	SS	<p>19. Direct Chemistry to obtain samples:</p> <ul style="list-style-type: none"> <li>• For boron, pH, and radioactivity:</li> <li>• RCS</li> <li>• Both Containment Emergency Sumps (if cold leg recirculation has been established.)</li> </ul>
	SS	<ul style="list-style-type: none"> <li>• For radioactivity, hydrogen and oxygen concentrations:</li> <li>• Containment atmosphere</li> </ul>
		<p>20. Evaluate plant equipment:</p> <p>a. Secure unnecessary plant equipment.</p> <p>b. Within 8 hours of SI actuation, isolate NSCW Corrosion</p> <p>Monitor Racks:</p>

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Scenario No.: 1

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Event No.: 12

Event Description: 19010-C actions if examiner elects to continue.

Time	Position	Applicant's Action or Behavior
	SS	<ul style="list-style-type: none"> <li>• Close 1202 U4 179</li> <li>• Close 1202 U4 180 (located in NSCTs on NSCW return header)</li> <li>c. Repair or make available inoperable equipment which may be required.</li> <li>d. Consult TSC for additional equipment to be started or actions to be taken to assist in recovery including:               <ul style="list-style-type: none"> <li>• H2 Monitors</li> <li>• CRDM Fans</li> <li>• Within 5 days, initiate Containment inspection / cleanup if Containment Spray actuated and was terminated prior to recirculation.</li> </ul> </li> </ul>
	SS	<p>21. In the event of a Design Basis Accident, the following apply concerning conservation of Ultimate Heat Sink inventory:</p> <ul style="list-style-type: none"> <li>• IF a DBA LOCA coincident with a LOSP has occurred, <b><u>(NO)</u></b>  <del>THEN secure one train of NSCW within 24 hours of the initiating event per 13150, NUCLEAR SERVICE COOLING WATER SYSTEM.</del></li> <li>• IF a DBA LOCA without an LOSP has occurred and normal NSCW makeup is lost, <b><u>(NO)</u></b>  <del>THEN secure one train of NSCW within 24 hours of the loss of makeup capability per 13150, NUCLEAR SERVICE COOLING WATER SYSTEM.</del></li> </ul>
	SS	<ul style="list-style-type: none"> <li>• Initiate periodic monitoring of NSCW Basin level to ensure adequate inventory is maintained for continued operation of NSCW Basin makeup.</li> <li>• Consult TSC as necessary for alternate sources of NSCW Basin makeup.</li> </ul>
	SS OATC	<p>22. Check if RCS cooldown and depressurization is required:</p> <ul style="list-style-type: none"> <li>a. RCS pressure GREATER THAN 300 PSIG. <b><u>(YES)</u></b></li> <li>b. Go to 19012 C, ES 1.2 POST LOCA COOLDOWN AND DEPRESSURIZATION.</li> </ul>

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Event No.: 12

Event Description: 19010-C actions if examiner elects to continue.

Time	Position	Applicant's Action or Behavior
END OF SCENARIO. PROCEED AT THE DISCRETION OF THE CHIEF EXAMINER.		

Final, as-given scenario 2



Facility: Vogtle Scenario No.: 2 Op-Test No.: 2014-301

Examiners:

Operators:

Snap 229

Initial Conditions: 100% Power, BOL.

Equipment OOS: CCW pump 5, Air Compressor 3

Turnover: INFO LCO 3.7.7 CCW Train A, Containment mini-purge is in service, 'B' MFP vibration monitoring in progress in the field, 'A' CCP caution tagged "Run only in emergency."

**Preloaded Malfunctions:**

**MS 03D – PV-3030 Loop #4 ARV fails open (Trigger 1 w/30 second ramp)**

**CC 01B – CCW pump 3 trip (Trigger 2)**

**CV 05 @ 30% - Letdown HX tube rupture (Trigger 3)**

**AC 06 – ACCW to letdown HX isolation (Trigger 4)**

**FW 20B – MFP B Vibrations w/final value 2.7 (Trigger 5)**

**EL 07A – Loss of 1AA02 (Trigger 7)**

**RC 03D – Loop #4 cold leg rupture (Trigger 8)**

**SF01 – SFP Cooling Train A – OOS (Trigger 15)**

**SF02 – SFP Cooling Train B – In Service (Trigger 15 on 35 second delay)**

**EL32 – Control Room Light Transfer switch (Trigger 16)**

**EL33 – Select Charger for 1ND1 (Trigger 17)**

**EL35 – Select Charger for 1ND3A (Trigger 18)**

**EL22 – BUS 1NYR Power Source Selection (Trigger 19)**

**EL24 - BUS 1NYRS Power Source Selection (Trigger 20)**

**HS9382 HS-9382 AIR COMPRESSOR #3 RECIPROCATING – STOP**

**A-LO\_HS9382\_G 1HS-9382 GREEN A531P30-A6 - OFF**

**ES 01 – Failure of AUTO Reactor Trip**

**RH04B – Block Auto Start on RHR B**

**ES 25A and ES 25B - CNMT Mini-purge dampers HV-2628B and HV-2629B fail to auto close**

**CS 01B Block Auto Start on containment Spray Pump B**

Event No.	Malf. No.	Event Type*	Event Description
1	MS03D (100% on 30 second ramp)	I-UO I-SS	Atmospheric Relief Valve, PV-3030, fails open on Loop # 4 18008-C for Secondary Leakage TS 3.7.4, ARVs and TS 3.3.4, Remote Shutdown, INFO LCOs (manual control is allowed per bases) <b>(Trigger 1)</b>
2	CC01B	C- UO C- SS TS-SS	Loss of CCW due to pump 3 trip with CCW pump 5 tagged out. 18020-C for Loss of CCW LCO 3.7.7, Component Cooling Water <b>(Trigger 2)</b>

3	CV05 @ 30%  AC06	C-OATC C-SS  -----	CVCS LTDN HX tube leak @ 30 gpm 18007-C for CVCS Malfunction, 17100-1 for High Rad alarm, 17004-1 for high surge tank level <b>(Trigger 3)</b> <b>Remote Function AC06 will isolate ACCW to the letdown HX.</b> <b>(Trigger 4 - wait 5 minutes after local isolation is requested)</b>
4	N/A	N-OATC N-SS	Place Excess Letdown in Service Using 13008-1, "CVCS Excess Letdown."
5	Override ALB15 D05 on	R-OATC R-SS N-UO	ALB15 WINDOW D05 MFPT B HI VIB Annunciates. ARP 17015 for ALB15-D05 Promptly initiate power reduction to less than 70% RTP per 12004-C, "Power Operation (Mode 1)," to trip MFPT "B" due to high vibrations. <b>(Trigger 5) (Order originates from OPS Director for completion w/in 1 hour, using 12004-C)</b>
6	EL07A  RFs: EL 22,24, 32,33,35	C-UO C-SS TS-SS	Loss of 1AA02 due to fault on bus 18031-C, Section A LCO 3.8.1, AC Sources-Operating, LCO 3.7.5, Auxiliary Feedwater System, and LCO 3.8.9 <b>(Trigger 7)</b> <b>Remote functions will restore power to 1NYR, 1NYRS, 1ND1, 1ND3A, and control room lighting from alternate sources (set up on triggers – wait 5 minutes after operations are requested).</b>
7	RC03D	M-ALL	<del>Large</del> <del>DBA</del> LOCA 19000-C to 19010-C <b>(Trigger 8)</b>
8	ES 01	C-OATC	AUTO REACTOR TRIP FAILURE
9	RH04B	C-OATC C- SS	RHR Pump B auto start failure
10	ES 25A ES 25B	C-UO C-SS	CVI dampers HV-2628B & HV-2629B fail to auto close (mini purge).
11	CS01B	C-OATC C-SS	CS Pump B auto start failure.
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

**Scenario Objective:**

Normal plant operation, SG ARV fails open, loss of CCW, letdown HX tube leak, place excess letdown in service, LOSP with diesel powering bus, DBA LOCA with an automatic reactor trip failure and CIA and CVI actuation failures, followed by an orange path condition on containment pressure. The crew is expected to respond to various component and instrument malfunctions per AOP and ARP guidance, and recognize and respond to major plant events per the EOP network.

**Event 1:**

Atmospheric Relief Valve, PV-3030, fails open on Loop 4

Verifiable Actions:**SS**

Enter 18008-C, "Secondary Leakage"

**OATC**

Monitor power to ensure power remains less than 100% by all indications.

**UO**

Place PV-3030 in manual and close the Atmospheric Relief Valve (ARV)

Technical Specifications:

3.7.4, Atmospheric Relief Valves (ARVs) (INFO)

3.3.4, Remote Shutdown System (INFO)

**Event 2:**

CCW Train 'A' Pump #3 trips. CCW Pump #5 cannot be started due to Danger tag.

Verifiable Actions:**SS**

Enters 18020, "Loss of CCW"

**UO**

Place ALL Train 'A' pumps in PTL.

Start CCW Train 'B' per 13715-1

Verify SFP Cooling in service

Technical Specifications:

3.7.7, Component Cooling Water (CCW), Condition A - 72 hours to restore.

**Events 3 & 4:**

CVCS letdown HX tube leak at 30 gpm

Verifiable Actions:**SS**

Enter 18007-C, "CVCS Malfunction"

Enter 17100-1 for high radiation on RE-1950

Enter 17004-1 for high surge tank level

**OATC**

Isolate letdown HX from RCS using the following valves per 17100-1 for RE-1950.

- Bypass CVCS demins by placing HS-0129 to the VCT position.
- Divert Letdown to the HUT by placing HS-0112A to the HUT position.
- Verify closed letdown orifice isolation valves HV-8149A, B, C.
- Verify closed letdown isolation valves LV-459 and LV-460.
- Verify closed letdown containment penetration valves HV-8152 and HV-8160.
- Set PV-0131 to maximum pressure.
- Set TV-0130 to maximum temperature.
- Close letdown HX manual valves. (**Trigger 4** about 5 minutes after operator is dispatched.)

Place excess letdown in service per 13008-1, "Chemical and Volume Control system Excess Letdown."

- Open HV-8153 and HV-8154 Excess Letdown Isolations.
- Open HC-0123 to control Excess Letdown temperature and pressure within procedural limits.
- Adjust charging and seal injection using FIC-0121 and HC-0182 to control pressurizer level.

**Event 5:**

ALB15 D05 MFPT B HI VIB. Main Feedwater Pump Train 'B' high vibration alarm. Field reports that pump end vibration is 5.6 mils and steady. Crew enters 12004-C, "Power Operation (Mode 1)," for power reduction to trip MFP 'B'.

Verifiable Actions:**SS**

Brief the power descent  
Maintain oversight function  
Authorize reactivity manipulations

**OATC**

Borate and insert rods as necessary to maintain  $T_{AVG}$  and AFD within limits of 12004-C.  
Perform Emergency Boration if ROD BANK LO-LO LIMIT alarm is received.  
Energize Pressurizer heaters

**UO**

Reduce turbine load using Load Limit Pot or Load Decrease pushbutton to reduce reactor power to less than 70% RTP to trip MFPT 'B'.

**Event 6:**

Fault on 1E switchgear results in loss of power to 1AA02.

Verifiable Actions:**SS**

Enter 18031-C, "Loss of Class 1E Electrical Systems"

**OATC**

Monitor reactor power.

**UO**

Emergency trip DG-1A  
Reduce TDAFWP flow  
Reduce turbine load as necessary (should not be required)  
Verify Containment Coolers running  
Verify 2 CRDM Fans running  
Verify Cavity Cooling Fan running  
Verify SFP Cooling in service

Technical Specifications:

3.8.1, AC Electrical Sources - Operating, Conditions A, B, and E  
3.8.9, Distribution Systems - Operating, Condition A  
3.7.5, Auxiliary Feedwater System, Condition C  
1 hour action to perform offsite source verification  
1 hour action to verify SAT energized

**Events 7, 8, 9, 10, and 11:**

DBA LOCA, crew responds per 19000-C, "Reactor Trip or Safety Injection," and 19010-C, "Loss of Primary or Secondary Coolant." Crew may transition to 19241-C, "Response to Imminent Pressurized Thermal Shock Condition," on orange and/or red path.

**Verifiable Actions:****OATC**

Manually perform reactor trip  
Manually start RHR Pump B  
Perform OATC Initial Actions per 19000-C  
Manually start Containment Spray pump B

**UO**


Manually close CVI dampers and valves  
Perform UO Initial Actions per 19000-C

Scenario is complete at the discretion of the Chief Examiner, or when the crew verifies cold leg recirc capability is available in 19010-C, Step 17.

**CRITICAL TASKS:**

- 1) **Manually trip the reactor within 1.5 minutes of recognition of the DBA LOCA (first out annunciator is received).**  
Per the WOG Critical Task guidelines, tripping the reactor ensures core heat production does not exceed the design capability of the safeguards heat removal systems, which is limited to core decay heat plus RCP heat. Manually tripping the reactor greater than 1.5 minutes from recognition of the first out annunciator constitutes task failure.
- 2) **Manually close 1HV-2629B in the Containment Mini-Purge flow path to preclude a radioactive release to the environment during a DBA LOCA.**  
Isolate the Containment Mini-Purge flow path to prevent release of radioactivity to the environment. Isolation of the Containment Mini-Purge flow path is required to occur within 15 minutes of the initiating event to preclude an upgrade to the Emergency Classification. Not closing 1HV-2629B within 15 minutes of the LOCA constitutes task failure.
- 3) **Manually start Containment Spray Pump 'B' during performance of OATC Initial Actions or per the Foldout Page.**  
**OR**  
**Manually start Containment Spray Pump 'B' in Step 5 of 19251-C, "Response to High Containment Pressure."**  
Per the FSAR, operation of containment spray is required for iodine scrubbing of the containment atmosphere and wash down of acid from containment surfaces to limit corrosion. Failing to start a containment spray pump before exiting 19251-C will constitute task failure.
- 4) **Manually start RHR Pump 'B' during performance of OATC Initial Actions.**  
Critical because improper operation or incorrect performance will lead to a degraded emergency core cooling system (ECCS). Per the EOP WOG background document, RHR is required to establish long-term cooling to the core. Failure to start RHR Pump 'B' during the performance of the OATC Initial Actions will constitute task failure.

Target Quantitative Attributes (Per Scenario; See Section D.5.d)		Actual Attributes
1.	Total malfunctions (5–8)	8
2.	Malfunctions after EOP entry (1–2)	4
3.	Abnormal events (2–4)	5
4.	Major transients (1–2)	1
5.	EOPs entered/requiring substantive actions (1–2)	2
6.	EOP contingencies requiring substantive actions (0–2)	0
7.	Critical tasks (2–3)	4

	<p align="center"><b>NUCLEAR SAFETY FOCUS</b></p> <p align="center"><b>TARGET ZERO</b></p>			
<table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <p><b><u>Protected Train:</u></b></p> <p><input type="checkbox"/> Alpha</p> <p><input checked="" type="checkbox"/> Bravo</p> </td> <td style="width: 50%; vertical-align: top;"> <p><b>EOOS:</b></p> <p><input checked="" type="checkbox"/> Green</p> <p><input type="checkbox"/> Yellow</p> <p><input type="checkbox"/> Orange</p> <p><input type="checkbox"/> Red</p> </td> </tr> </table>			<p><b><u>Protected Train:</u></b></p> <p><input type="checkbox"/> Alpha</p> <p><input checked="" type="checkbox"/> Bravo</p>	<p><b>EOOS:</b></p> <p><input checked="" type="checkbox"/> Green</p> <p><input type="checkbox"/> Yellow</p> <p><input type="checkbox"/> Orange</p> <p><input type="checkbox"/> Red</p>
<p><b><u>Protected Train:</u></b></p> <p><input type="checkbox"/> Alpha</p> <p><input checked="" type="checkbox"/> Bravo</p>	<p><b>EOOS:</b></p> <p><input checked="" type="checkbox"/> Green</p> <p><input type="checkbox"/> Yellow</p> <p><input type="checkbox"/> Orange</p> <p><input type="checkbox"/> Red</p>			
<p><b>Plant Conditions:</b></p>	<p>100% RTP BOL</p>			
<p><b>Major Activities:</b></p>	<p>Maintain 100% power.</p>			
<p><b>Active LCOs:</b></p>	<p><input type="checkbox"/> INFO LCO 3.7.7 CCW Train A</p>			
<p><b>OOS/ Degraded CR Instruments:</b></p>	<p><input type="checkbox"/> None</p>			
<p><b>Narrative Status:</b></p>	<p><input type="checkbox"/> Containment mini-purge is in service for a planned Containment Entry on next shift.</p> <p><input type="checkbox"/> CCW Pump #5 Danger Tagged for corrective maintenance on the motor bearing. No forecast return to service time is available on this emergent work item.</p> <p><input type="checkbox"/> Air Compressor #3 Danger Tagged for PM's for the next 24 hours.</p> <p><input type="checkbox"/> CCP A Caution Tagged. Pump is operable but is to be run only in emergency due to minor bearing oil leakage when operating. Repair plan is being developed.</p> <p><input type="checkbox"/> MFPT B vibration monitoring is in progress in the field (Vogtle engineering and vendors). Elevated vibrations have been observed in the last several days. Investigation continues.</p>			

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Event No.: 1

**Event Description** PV-3030 SG # 4 ARV Pressure Transmitter Fails High resulting in a fully opened ARV. The crew will respond by performing the actions of AOP 18008-C, "Secondary Coolant Leakage". The UO will be able to isolate the leak by placing the ARV controller in manual by depressing the down arrow and closing the ARV.

Time	Position	Applicant's Action or Behavior
	CREW	<p>Diagnoses opening of SG #4 ARV by the following indications:</p> <ul style="list-style-type: none"> <li>• MN STM SFTY VLVS LEAKING</li> <li>• TAVG/TREF DEVIATION</li> <li>• TAVG LO-LO ALERT</li> <li>• TERR (TAVG-TREF) LO</li> <li>• High ARV tailpipe temperature (back panel indication)</li> <li>• SG 4 ARV position indicating lights Red – ON, Green - OFF</li> <li>• Lowering RCS temperature</li> <li>• Rising reactor power</li> <li>• SG #4 ARV controller indication (RED UP ARROW LIT)</li> </ul>
	SS	Enters AOP 18008-C, Secondary Coolant Leakage, (Crew Update)
	OATC UO	<p>Step 1. Perform the following as necessary:</p> <ul style="list-style-type: none"> <li>• Reduce Turbine load if any of the following indications exceed 100% power: <ul style="list-style-type: none"> <li>___ UQ1118 (Greater Than 100% MWT for the applicable unit)</li> <li>___ NI's</li> <li>___ ΔTs</li> </ul> </li> <li>___ • Isolate the leak. <b><u>(UO closes ARV to isolate)</u></b></li> <li>• IF leakage is such that significant hazard to personnel or equipment exists OR leakage rate is unstable and is worsening, THEN: <ul style="list-style-type: none"> <li>___ 1) Trip the reactor.</li> <li>___ 2) WHEN reactor trip is verified, THEN close MSIVs and BSIVs.</li> <li>___ 3) Go to 19000-C, E 0 REACTOR TRIP OR SAFETY INJECTION.</li> </ul> </li> </ul>



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Event No.: 1

**Event Description** PV-3030 SG # 4 ARV Pressure Transmitter Fails High resulting in a fully opened ARV. The crew will respond by performing the actions of AOP 18008-C, "Secondary Coolant Leakage". The UO will be able to isolate the leak by placing the ARV controller in manual by depressing the down arrow and closing the ARV.

Time	Position	Applicant's Action or Behavior
	OATC/UO	Step 2. Initiate the Continuous Actions Page.
	UO	Step *3. Monitor steam leakage characteristics: <ul style="list-style-type: none"> <li>___ • Small in magnitude such that no significant hazard to personnel or equipment exists.</li> <li>___ • Leakage rate is relatively stable and is not rapidly worsening.</li> </ul>
	OATC UO	Step 4. Check the following: <ul style="list-style-type: none"> <li>___ a. Tavg - MATCHED WITH TREF</li> <li>___ b. PRZR level - IN PROGRAM BAND</li> <li>___ c. PRZR pressure - BETWEEN 2220 AND 2250 PSIG</li> <li>___ d. SG levels - IN PROGRAM BAND</li> </ul>
	UO	Step 5. Check containment conditions - NORMAL: <ul style="list-style-type: none"> <li>___ • Pressure</li> <li>___ • Temperature</li> <li>___ • Moisture</li> <li>___ • Sump level</li> </ul>
	UO	Step 6. Close SG blowdown isolation valves if the source of leakage is unknown.
		<p style="text-align: center;"><b><u>NOTE</u></b></p> Main condenser hotwell makeup is drawn equally from both condensate storage tanks
		<p style="text-align: center;"><b><u>CAUTION</u></b></p> Vacuum drag capability is lost and loss of condenser vacuum may occur if CST levels fall below 70%.

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Event No.: 1

**Event Description** PV-3030 SG # 4 ARV Pressure Transmitter Fails High resulting in a fully opened ARV. The crew will respond by performing the actions of AOP 18008-C, "Secondary Coolant Leakage". The UO will be able to isolate the leak by placing the ARV controller in manual by depressing the down arrow and closing the ARV.

Time	Position	Applicant's Action or Behavior
	UO	Step *7. Check CSTs level - GREATER THAN 80%.
	UO	Step *8. Monitor hotwell makeup rate - SUFFICIENT TO MAINTAIN LEVEL.
	SS	Step 9. Review applicable Technical Specification requirements.  LCO 3.3.4 Remote Shutdown System – INFO ONLY LCO 3.7.4 ARV's – INFO ONLY
	SS	Step 10. Perform one of the following:  ___ Continue plant operation. <b>-OR-</b> ___ Commence a unit shutdown by initiating 12004 C, POWER OPERATION (MODE 1).
<b>END OF EVENT 1. PROCEED TO NEXT EVENT AT THE DISCRETION OF THE CHIEF EXAMINER.</b>		

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Event No.: 2

**Event Description:** A trip of running CCW pump # 3 will occur with CCW pump # 5 tagged out. The crew will enter AOP-18020-C for Loss of CCW. The procedure will direct placing the unaffected train in service after securing Train "A" CCW Pump #1. Spent Fuel Pool Cooling will be swapped from Train "A" to Train "B".

Time	Position	Applicant's Action or Behavior
	CREW	<p>Diagnose loss of CCW Train A by any of the following indications:</p> <p>Symptoms / Alarms:</p> <ul style="list-style-type: none"> <li>• ALB02-A06 CCW TRAIN A LO HDR PRESS alarm</li> <li>• ALB02-B06 CCW TRAIN A LO FLOW alarm</li> <li>• ALB02-D06 CCW TRAIN A RHR HX LO FLOW</li> <li>• ALB02-E05 CCW TRAIN A RHR PMP SEAL LO FLOW alarm</li> <li>• ALB36-A01 4160V SWGR 1AA02 TROUBLE</li> </ul> <p>Indications:</p> <ul style="list-style-type: none"> <li>• CCW pump # 3 green and amber lights lit on hand switch.</li> <li>• CCW system flows and pressures low.</li> </ul>
	SS	Enters AOP-18020-C for Loss of CCW. (Crew Update)
	UO	<p>1. Check CCW pumps in affected train – Two Running (<b>NO</b>)</p> <p>RNO:</p> <p>1. Start two CCW pumps in the affected train. (<b>only one available</b>)</p>
	UO	<p>2. Check CCW Train "A" operating parameters.</p> <ul style="list-style-type: none"> <li>• Flow – approximately 9000 gpm – (<b>NO, ~ 6500 gpm</b>)</li> <li>• Pressure – approximately 90 psig – (<b>NO, ~ 55 psig</b>)</li> </ul> <p>RNO</p> <p>2a. Stop the CCW pumps in the affected train.</p> <ul style="list-style-type: none"> <li>• ALB61-A01 NSCW CCW ACCW TEMP ALARM illuminates.</li> </ul> <p><b>NOTE: IF CCW PUMP #1 IS PLACED IN STOP AND NOT IN PTL, CCW PUMP #1 WILL AUTO START.</b></p>

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Event No.: 2

**Event Description:** A trip of running CCW pump # 3 will occur with CCW pump # 5 tagged out. The crew will enter AOP-18020-C for Loss of CCW. The procedure will direct placing the unaffected train in service after securing Train "A" CCW Pump #1. Spent Fuel Pool Cooling will be swapped from Train "A" to Train "B".

Time	Position	Applicant's Action or Behavior
	UO	<p>2b. Place the UNAFFECTED train in service by initiating 13715B-1, COMPONENT COOLING WATER SYSTEM.</p> <ul style="list-style-type: none"> <li>ALB03-C06 CCW TRAIN B RNR HX HI FLOW illuminates then clears.</li> </ul> <p><b>NOTE: IF CCW PUMP #1 IS PLACED IN STOP AND NOT IN PTL, CCW PUMP #1 WILL AUTO START.</b></p>
	UO	SOP 13715B-1 Section 4.1, CCW Train B Startup from Standby.
	UO	Step 4.1.2.2. Marks steps 4.1.2.3, 4.1.2.5, 4.1.2.9 and 4.1.2.10 <b>N/A</b> .
	UO	<p>Step 4.1.2.4. Simultaneously start two (2) Train B CCW Pumps.</p> <ul style="list-style-type: none"> <li>CCW Pump 2: 1-HS-1853A</li> <li>CCW Pump 4: 1-HS-1855A</li> <li>CCW Pump 6: 1-HS-1857A</li> </ul>
	UO	Step 4.1.2.6: Check CCW Pump Discharge Header Train B 1-PI-1875 rises to about 90 psig.
	UO	Step 4.1.2.7: Check CCW Pump Discharge Header Train B 1-FI-1877 rises to about 9000 gpm.
	UO	Step 4.1.2.8. Notify Chemistry of CCW Train B startup so chemicals may be added if needed and proper operation of radiation monitor may be verified.
	SS/UO	Returns to 18020-C, RNO Step 2d. Go to Step 4.

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Event No.: 2

**Event Description:** A trip of running CCW pump # 3 will occur with CCW pump # 5 tagged out. The crew will enter AOP-18020-C for Loss of CCW. The procedure will direct placing the unaffected train in service after securing Train "A" CCW Pump #1. Spent Fuel Pool Cooling will be swapped from Train "A" to Train "B".

Time	Position	Applicant's Action or Behavior
	SS / UO	<b><u>18020-C</u></b> 4. Verify NSCW supply header flow FI-1640B (1641B) – APPROXIMATELY 17000 GPM. (17,500 indicated)
	SS / OATC	5. Check RHR – REQUIRED FOR SHUTDOWN COOLING RNO 5. Go to Step 9.
	UO	9. Check affected train RHR pump – INJECTING IN COLD LEG INJECTION MODE. RNO 9. Stop affected train RHR pump if running. ( <b>Not Running</b> ).
	UO	10. Check the following: — Both extinguished: <ul style="list-style-type: none"> <li>• ALB02-A05 CCW TRAIN A SURGE TK LO-LO LEVEL</li> <li>• ALB03-A05 CCW TRAIN B SURGE TK LO-LO LEVEL</li> <li>• ALB02-B05 CCW TRAIN A SURGE TK HI/LO LEVEL</li> <li>• ALB03-B05 CCW TRAIN B SURGE TK HI/LO LEVEL.</li> </ul>
	CREW	11. Check Affected CCW Train – NO ABNORMAL LEAKAGE.
	SS	12. Restore the affected CCW loop to service by initiating 13715A-1. RNO: 12. Initiate applicable ACTION items for: TS: LCO 3.7.7 Condition A – Restore train to OPERABLE status. (72 hours)

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Event No.: 2

**Event Description:** A trip of running CCW pump # 3 will occur with CCW pump # 5 tagged out. The crew will enter AOP-18020-C for Loss of CCW. The procedure will direct placing the unaffected train in service after securing Train "A" CCW Pump #1. Spent Fuel Pool Cooling will be swapped from Train "A" to Train "B".

Time	Position	Applicant's Action or Behavior
	SS / UO	13. Verify Spent Fuel Pool Cooling aligned to in-service train.
	UO	14. Verify Fuel Handling Building Normal HVAC units – IN OPERATION: <ul style="list-style-type: none"><li>• 1541-A7-001 (002)</li><li>-AND-</li><li>• 1541-N7-001 (002)</li></ul>
	SS	15. Return to procedure and step in effect. (UOP-12004)
<b>END OF EVENT 2. PROCEED TO NEXT EVENT AT THE DISCRETION OF THE CHIEF EXAMINER.</b>		

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Event No.: 3-4

**Event Description:** A 30 gpm leak develops in the CVCS LTDN HX tubes that is within the capacity of normal charging. CVCS letdown flow on FI-121A will indicate lower letdown flow and an Intermediate Alarm and High Radiation (within 2 minutes) on 1-RE-1950 will annunciate.

Time	Position	Applicant's Action or Behavior
	CREW	<p>Indications:</p> <ul style="list-style-type: none"> <li>Intermediate and High Radiation Alarms Annunciate.</li> <li>1RE-1950 ACCW System showing alarm condition on IPC and will trend upward.</li> </ul>
	OATC / UO	<p>References ARP 17005-1, Window B03 "INTMD RADIATION ALARM"</p> <p><b><u>AUTOMATIC ACTIONS</u></b></p> <p>NONE</p> <p>INITIAL OPERATOR ACTIONS</p> <p>NONE</p> <p>SUBSEQUENT OPERATOR ACTIONS</p> <ol style="list-style-type: none"> <li>1. Check the Safety Related Display Console (QRM2), the RMS Communications Console (QRM1) and the Plant Computer to determine the monitor in alarm and Go To 17100-1, "Annunciator Response Procedure For The Process And Effluent Radiation Monitor System (RMS)" or 17102-1, "Annunciator Response Procedure For The Safety Related Display Control QRM2" as appropriate,</li> </ol> <p><b>NOTE: CREW Determines 1RE1950 In HIGH Alarm.</b></p> <ol style="list-style-type: none"> <li>2. IF alarm is for 1-RE-2562A or C, refer to response for High Alarm in 17102-1. <b>(N/A)</b></li> <li>3. Initiate a CR documenting Alarm condition.</li> </ol>
	UO	References ARP 17100-1, "Annunciator Response Procedure For The Process And Effluent Radiation Monitor System (RMS)" for 1RE-1950.
	SS / UO	<p>ARP 17100-1, 1RE-1950 Actions:</p> <p>Step 1. Request Chemistry to sample and analyze the ACCW.</p>
	SS / UO	Step 2. Notify Health Physics of the alarm,

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Event No.: 3-4

**Event Description:** A 30 gpm leak develops in the CVCS LTDN HX tubes that is within the capacity of normal charging. CVCS letdown flow on FI-121A will indicate lower letdown flow and an Intermediate Alarm and High Radiation (within 2 minutes) on 1-RE-1950 will annunciate.

Time	Position	Applicant's Action or Behavior
	CREW	<p>Step 3. Locate the source of the in-leakage.</p> <p>a. Check IPC points T0145, P0135, and F0134 (IPC Group 21) for changes, in an attempt to determine if a Letdown HX tube leak. <b>(YES)</b></p> <p><b>NOTE: Identifies changes and DIAGNOSES Letdown HX tube leakage.</b></p> <p>b. Check IPC points T2714, T2716, T2718, and T2720 (IPC Group 242) for changes, in an attempt to determine if leakage is from RCP thermal barrier. <b>(NO)</b></p>
	SS	<p>Step 4. Isolate the source if possible.</p>
	OATC	<p>Step 5. <u>IF</u> 1-RE-1950 is reading high due to LTDN HX tube leakage:</p> <p><b>NOTE: SS May Hand Off ARP 17100 To Either OATC or UO To Perform ARP Actions.</b></p> <p>a. Place LETDOWN TO DEMIN/VCT 1-TV-0129 to the VCT position using 1-HS-0129. <b>(CV required.)</b></p> <p>(1) Verify 1-TV-0129 aligns to the VCT. <b>(CV required.)</b></p> <p>b. Place VCT HUT LETDOWN DIVERT 1-LV-0112A to the HUT position using 1-HS-0112A. <b>(CV required.)</b></p> <p>(1) Verify 1-LV-0112A aligns to the RHUT. <b>(CV required.)</b></p> <p>c. Isolate letdown. Verify closed: <b>(CV required)</b></p> <p>(1) 1-HV-8149A, B, C.</p> <p>(2) 1-LV-0459.</p> <p>(3) 1-LV-0460.</p> <p>(4) 1-HV-8152.</p> <p>(5) 1-HV-8160.</p> <p>(6) 1-PV-0131, set to max pressure.</p> <p>(7) 1-TV-0130, set to max temperature.</p>



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Event No.: 3-4

**Event Description:** A 30 gpm leak develops in the CVCS LTDN HX tubes that is within the capacity of normal charging. CVCS letdown flow on FI-121A will indicate lower letdown flow and an Intermediate Alarm and High Radiation (within 2 minutes) on 1-RE-1950 will annunciate.

Time	Position	Applicant's Action or Behavior
	OATC	Step 5. Cont.
		d. Shut Letdown Heat Exchanger manual valves:
		(1) (AB-A08) 1-1208-U6-041.
		(2) (AB-A17) 1-1217-U4-126.
		(3) (AB-108) 1-1217-U4-129.
	SS / UO	e. Notify Chemistry.
	SS	f. Initiate 18007-C, "CVCS MALFUNCTION" to deal with the loss of letdown.
		<b>NOTE: SS Should Have UO Complete Steps In ARP While He Transitions To 18007-C.</b>
	UO	Step 6. Obtain detector trend from the IPC computer
	UO	Step 7. Monitor the channel for further changes.
	UO	Step 8, Step 9 and Step 10 are N/A.
	SS	Initiates AOP 18007-C, "CVCS MALFUNCTION" per Step 5f. above

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Event No.: 3-4

**Event Description:** A 30 gpm leak develops in the CVCS LTDN HX tubes that is within the capacity of normal charging. CVCS letdown flow on FI-121A will indicate lower letdown flow and an Intermediate Alarm and High Radiation (within 2 minutes) on 1-RE-1950 will annunciate.

Time	Position	Applicant's Action or Behavior
	OATC	<p>18007-C, "CVCS MALFUNCTION" Section A, TOTAL LOSS OF LETDOWN FLOW.</p> <p>A1. Isolate letdown relief flowpath by performing the following:</p> <ol style="list-style-type: none"> <li>Close letdown orifice isolation valves: <ul style="list-style-type: none"> <li>HV-8149A</li> <li>HV-8149B</li> <li>HV-8149C</li> </ul> </li> <li>Close letdown isolation valves: <ul style="list-style-type: none"> <li>LV-459</li> <li>LV-460</li> </ul> </li> </ol> <p><b>NOTE: A1a. and b. Previously performed in ARP 17100-1</b></p>
	OATC	<p>A2. Adjust HC-182 and FIC-121 as necessary to establish the following:</p> <ul style="list-style-type: none"> <li>Seal injection flow to all RCPs – 8 TO 13 GPM.</li> <li>-AND-</li> <li>Charging flow – APPROXIMATELY 10 GPM GREATER THAN TOTAL SEAL INJECTION FLOW.</li> </ul>
		<p>A3. Check pipe break protection valves - OPEN:</p> <ul style="list-style-type: none"> <li>HV-15214</li> <li>HV-8160</li> </ul>
		A4. Check instrument air to containment – ESTABLISHED.
		<p>A5. Check CVCS letdown to BTRS flowpath:</p> <ol style="list-style-type: none"> <li>Check TV-0381B BTRS Demin Inlet Temperature Control – OPEN. (HS-10351 DILUTE or OFF lights lit.)</li> <li>Check HV-8115 LETDOWN DIVERT TO BTRS – OPEN.</li> </ol>

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Event No.: 3-4

**Event Description:** A 30 gpm leak develops in the CVCS LTDN HX tubes that is within the capacity of normal charging. CVCS letdown flow on FI-121A will indicate lower letdown flow and an Intermediate Alarm and High Radiation (within 2 minutes) on 1-RE-1950 will annunciate.

Time	Position	Applicant's Action or Behavior
		<p>A6. Identify and correct cause for loss of letdown.</p> <ol style="list-style-type: none"> <li>Check for letdown path valve failures or mispositions.</li> <li>Check instrumentation</li> <li>Check PIC-131. <ul style="list-style-type: none"> <li>PI-131A</li> <li>TI-130</li> </ul> </li> <li>Check HV-8152 OPEN.</li> <li>Check for other causes.</li> </ol> <p><b>NOTE: Identified as CVCS LTDN HX tube leak earlier.</b></p>
	SS / OATC	<p>A7. Check normal letdown – AVAILABLE. RNO</p> <p>A7. Perform the following:</p> <ol style="list-style-type: none"> <li>Establish Excess Letdown by initiating 13008, CHEMICAL AND VOLUME CONTROL SYSTEM EXCESS LETDOWN.</li> <li>Go to Step A9.</li> </ol>
	OATC	INITIATES SOP 13008-1. Section 4.1 "EXCESS LETDOWN TO SEAL RETURN HEADER."

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Event No.: 3-4

**Event Description:** A 30 gpm leak develops in the CVCS LTDN HX tubes that is within the capacity of normal charging. CVCS letdown flow on FI-121A will indicate lower letdown flow and an Intermediate Alarm and High Radiation (within 2 minutes) on 1-RE-1950 will annunciate.

Time	Position	Applicant's Action or Behavior
	OATC	<div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>NOTE</p> <p>Independent Verifications performed within Section 4.1 are documented on Checklist 1.</p> </div> <p>4.1 <b>EXCESS LETDOWN TO SEAL RETURN HEADER</b></p>
	OATC / UO	4.1.1 <b>Verify</b> Reactor power is maintained $\leq 3622.6$ MWT while Excess Letdown is in service and LEFM is in service. <u>IF</u> LEFM is <u>NOT</u> in service, <b>maintain</b> power $\leq 3562$ MWT per guidance of 12004-C.
	OATC	4.1.2 Verify that a Charging Pump is running.
	OATC	4.1.3 Verify CLOSED RX HEAD VENT TO EXCESS LETDOWN ISOLATION 1-HV-8098.
	OATC	4.1.4 Verify flow controller EXCESS LETDOWN, 1HC-123 is set to closed (0% demand)
	OATC	4.1.5 Verify OPEN RCPs Seal Leakoff Isolation valves: <ul style="list-style-type: none"> <li>• 1-HV-8100 RCPS SEAL LEAKOFF ORC ISOLATION.</li> <li>• 1-HV-8112 RCPS SEAL LEAKOFF IRC ISOLATION.</li> </ul>
	OATC	4.1.6 Verify EXCESS LETDOWN TO VCT, 1-HS-8143 is in the OPEN VCT position.
	OATC	4.1.7 Verify Reactor power is maintained $\leq 3622.6$ MWT while Excess Letdown is in service and LEFM is in service. <u>IF</u> LEFM is <u>NOT</u> in service, maintain power $\leq 3562$ MWT per guidance of 12004-C.

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Event No.: 3-4

**Event Description:** A 30 gpm leak develops in the CVCS LTDN HX tubes that is within the capacity of normal charging. CVCS letdown flow on FI-121A will indicate lower letdown flow and an Intermediate Alarm and High Radiation (within 2 minutes) on 1-RE-1950 will annunciate.

Time	Position	Applicant's Action or Behavior
	OATC	4.1.8 Open EXCESS LETDOWN LINE Isolation Valves: <ul style="list-style-type: none"> <li>• 1-HV-8153 EXCESS LETDOWN LINE ISO VLV.</li> <li>• 1-HV-8154 EXCESS LETDOWN LINE ISO VLV.</li> </ul>
	OATC	4.1.9 Record the following: <ul style="list-style-type: none"> <li>• Pressure on indicator EXCESS LETDOWN HX OUTLET, 1PI-124.</li> <li>• Temperature on indicator EXCESS LETDOWN HX OUTLET, 1TI-122.</li> </ul>
	OATC	4.1.10 <u>WHILE</u> establishing excess letdown, perform the following: <ul style="list-style-type: none"> <li>• Monitor pressure rise on pressure indicator EXCESS LETDOWN HX OUTLET, 1PI-124 and verify it remains less than 50 pounds above pressure recorded in Step 4.1.8.</li> <li>• <b>Monitor</b> temperature rise on temperature indicator EXCESS LETDOWN HX OUTLET, 1TI-122 and verify it remains less than 165 degrees.</li> </ul>
	OATC	4.1.11 Slowly adjust output flow controller EXCESS LETDOWN 1HC-123 to establish maximum allowable flow (estimated to be approximately 30 gpm). <b>(CV Required)</b> <ul style="list-style-type: none"> <li>• ALB63-A06 FILTERS BACKFLUSH PANEL ALARM illuminates.</li> </ul>
	OATC	4.1.12 Perform the following as required to maintain desired pressurizer level: <ul style="list-style-type: none"> <li>• Adjust charging using CHARGING LINE CONTROL, 1FIC-121.</li> <li>• Adjust seal injection using SEAL FLOW CONTROL, 1HC-182.</li> </ul>
	SS / OATC	4.1.13 <u>IF</u> normal letdown is isolated, align the outlet of the Seal Water Heat Exchanger to the Volume Control Tank spray nozzle as follows: (IV REQUIRED) (N/A if previously performed): <ul style="list-style-type: none"> <li>• Unlock and open CVCS SEALS SEAL WATER HX OUTLET TO VCT, 1-1208-U6-104 (KEY 10P2-281). (RA-26)</li> <li>• Close CVCS SEALS SEAL WATER HX OUTLET TO NCP SUCTION, 1-1208-U6-106. (RA-26)</li> </ul>

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Event No.: 3-4

**Event Description:** A 30 gpm leak develops in the CVCS LTDN HX tubes that is within the capacity of normal charging. CVCS letdown flow on FI-121A will indicate lower letdown flow and an Intermediate Alarm and High Radiation (within 2 minutes) on 1-RE-1950 will annunciate.

Time	Position	Applicant's Action or Behavior
	OATC	4.1.14 <u>IF</u> directed by SS to transfer excess letdown to the RCDT, perform the following:  <b>NOTE TO EXAMINER: SS WILL NOT DIRECT EXCESS LTDN TO RCDT.</b>
	SS	<b>CONTINUES WITH 18007-C, "CVCS MALFUNCTION"</b>  A7.b. RNO <u>Go to Step A9.</u>
	OATC / UO	A9. Initiate Continuous Actions Page.
	OATC	*A10. Verify PRZR level – TRENDING TO PROGRAM.
	SS / OATC	*A11 Check normal letdown flow – ESTABLISHED.  RNO  *A11. Perform the following: a. <u>WHEN</u> normal letdown capability is restored, <u>THEN</u> restore normal letdown by initiating 13006, CHEMICAL AND VOLUME CONTROL SYSTEM. b. Evaluate the impact of continued power operation with normal letdown out of service.
	SS	Return to procedure and step in effect. (12004-C)
<b>END OF EVENTS 3 AND 4. PROCEED TO NEXT EVENT AT THE DISCRETION OF THE CHIEF EXAMINER.</b>		

**Event Description:** Annunciator ALB15 D05 “MFPT B HI VIB” requires the crew to enter ARP 17015 and investigate the cause of the alarm.

Vibration measurements between 5.5 and 6 mils on the PUMP end bearings will require power reduction to less than 70% RTP per 12004-C “Power Operation (Mode 1)”, and shutdown of the affected MFP.

Time	Position	Applicant's Action or Behavior
	SS / UO	Respond to MFPT B HI VIB Annunciator ALB15-D05 by referencing ARP 17015-1 Window D05 “MFPT B HI VIB”
	SS/UO	<p>1. <b>Dispatch</b> an operator to MFPT B to investigate. (Per turnover personnel are on station monitoring pump)</p> <p><b><u>When the operator is dispatched to the field to investigate, about 1 minute later inform the control room that the Ops Director has ordered a power reduction to less than 70% within 1 hour to facilitate taking ‘B’ MFP off-line. He has also directed the use of 12004-C to perform the power reduction.</u></b></p>
	UO	<p>2. On the Plant Computer, <b>perform</b> the following:</p> <p>a. <b>Select</b> the ATSI CRT Trend Display and <b>print out</b> a trend of the desired current Turbine parameters to determine the alarm condition.</p> <div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p style="text-align: center;">NOTES</p> <ul style="list-style-type: none"> <li>Elevated or fluctuating bearing drain temperatures may be an indication of bearing loading and can indicate a bearing is failing.</li> <li>Engineering and Maintenance should be promptly notified if any bearing drain temperatures are elevated.</li> <li>Bearing oil temperatures should be maintained between 110°F and 125°F.</li> </ul> </div> <p>b. <b>Monitor</b> lube oil and bearing oil temperatures of pump and turbine.</p>
	SS/UO	<p>3. <u>IF MFP TURBINE</u> bearing vibration rises to 5 mils or greater, immediately <b>reduce</b> power and <b>trip</b> MFPT B per the following:</p> <ul style="list-style-type: none"> <li>18013-C “Rapid Power Reduction.”</li> <li>18016-C, “Condensate And Feedwater Malfuction.”</li> </ul> <p><b>Note to examiner: Vibrations are on the PUMP end. This step is NA.</b></p>

**Event Description:** Annunciator ALB15 D05 “MFPT B HI VIB” requires the crew to enter ARP 17015 and investigate the cause of the alarm.

Vibration measurements between 5.5 and 6 mils on the PUMP end bearings will require power reduction to less than 70% RTP per 12004-C “Power Operation (Mode 1)”, and shutdown of the affected MFP.

Time	Position	Applicant's Action or Behavior
	SS/UO	4. IF MFP PUMP bearing vibration rises to 5 mils or greater, <b>request</b> Engineering and Maintenance to initiate local vibration monitoring and recommended compensatory actions identified in Step 7.
	SS/UO	5. IF MFP PUMP bearing vibration rises to 5.5 mils or greater, <b>reduce</b> power and <b>stop</b> MFPT B per 12004-C, "Power Operation (Mode 1)."  <i>Note to examiner: Based on the vibration that will be simulated, expect the SS to go to 12004-C and commence downpower. The remaining actions of the ARP <u>may</u> or <u>may not</u> be handed off to the UO for completion.</i>
<i>Note to examiner: The following steps are from 12004-C, Section 4.2, Power Descent. The remaining steps from ARP 17015 for ALB15 D05 follow on page 7 of this section, if required. A crew briefing will probably be conducted at this time</i>		
	SS	4.2.1 IF power descent is for a planned power reduction, <b>verify</b> that the Reactivity Management Plan has been approved when required by NMP-OS-001, “Reactivity Management”, and that it has been reviewed by the control room crew.  <i><u>Note to examiner: Reactivity Management Plan is N/A for this downpower.</u></i>
	SS	4.2.2 IF at any time during power descent, conditions requiring shutdown have been corrected and shutdown is no longer required,  a. Obtain Management concurrence to discontinue shutdown and stabilize power,  b. Per directions from SM go to step 4.1.21 and perform applicable steps to raise reactor power.  <i><u>Note to examiner: The following tab has the procedure steps for aligning for frequent borations.</u></i>



**Event Description:** Annunciator ALB15 D05 “MFPT B HI VIB” requires the crew to enter ARP 17015 and investigate the cause of the alarm.

Vibration measurements between 5.5 and 6 mils on the PUMP end bearings will require power reduction to less than 70% RTP per 12004-C “Power Operation (Mode 1)”, and shutdown of the affected MFP.

Time	Position	Applicant's Action or Behavior
	SS	<p>4.2.3 IF unit shutdown/cooldown is anticipated and with Chemistry Department concurrence, <b>initiate</b> RCS and Pressurizer Gaseous Activity Degassing by performing the following:</p> <ul style="list-style-type: none"> <li>a. <b>Direct</b> Chemistry to sample the RCS to obtain baseline data per 31110-C “Collection of Data for Shutdown Primary Chemistry Calculations.”</li> <li>b. <b>Place</b> Pressurizer Steam Space Sample Line in service.</li> <li>c. <b>Notify</b> Chemistry to <b>adjust</b> the pressurizer steam space sample flow rate to maximum.</li> <li>d. <b>Energize</b> the Pressurizer Backup Heaters to <b>enhance</b> RCS degassing.</li> </ul> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p style="text-align: center;">NOTE</p> <p>Dissolved Hydrogen must remain greater than 25 cc/kg until 24 hours prior to shutdown and above 15 cc/kg while the reactor is critical</p> </div> <ul style="list-style-type: none"> <li>e. <b>Initiate</b> lowering RCS dissolved Hydrogen by performing the following:               <ul style="list-style-type: none"> <li>(1) <b>Adjust</b> VCT pressure to minimum allowed (18 psig) to allow hydrogen concentration to slowly fall.</li> <li>(2) <b>Raise</b> VCT gas purge flow rate to the Gaseous Waste Processing System to approximately 1.2 scfm <b>using</b> HIC-1094, as limited by the Waste Gas Recombiner.</li> </ul> </li> </ul> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p style="text-align: center;">NOTE</p> <p>Max L/D flow of 120 gpm should be maintained to ensure maximum Lithium removal rate.</p> </div>
	UO	
	OATC	
	UO/OATC	
	OATC	
	SS	
	OATC	<ul style="list-style-type: none"> <li>f. <b>Maximize</b> CVCS letdown purification flow rate, per 13006, “Chemical Volume and Control System.”</li> </ul>
	SS/OATC	<ul style="list-style-type: none"> <li>g. Per Chemistry direction, <b>place</b> cation bed in service for Lithium removal.</li> </ul>

**Event Description:** Annunciator ALB15 D05 "MFPT B HI VIB" requires the crew to enter ARP 17015 and investigate the cause of the alarm.

Vibration measurements between 5.5 and 6 mils on the PUMP end bearings will require power reduction to less than 70% RTP per 12004-C "Power Operation (Mode 1)", and shutdown of the affected MFP.

Time	Position	Applicant's Action or Behavior
	SS/UO	h. <b>Consult</b> with Chemistry, and <u>IF</u> required for containment atmosphere cleanup, <b>start</b> one or both Containment Pre-access Filter Units per 13125, "Containment Purge System."
	SS	i. <b>Consult</b> with Chemistry, and if not already in progress, <b>initiate</b> 16035, "Chemistry/Operations Interface For RCS Chemistry Control During Scheduled Plant Shutdowns", for degassing the RCS.
	SS	<div style="border: 1px solid black; padding: 5px; text-align: center;">NOTE</div> <p>ALB10 D06 "ROD DEV" alarm may come in during ARO reset and will be cleared after Computer constants have been reset per 87046-C.</p> <p><b><u>Note to examiner: Full shutdown is not anticipated while in this procedure. This step is N/A.</u></b></p> <p>4.2.4 IF it is anticipated that the reactor shutdown will be performed by manually inserting the control and shutdown banks, AND IF the All Rods Out (ARO) setpoint is above or below 228 steps:</p> <p>a. Reposition rods to an ARO position of 228 steps per 13502, "Control Rod Drive and Position Indication System."</p> <div style="border: 1px solid black; padding: 5px; text-align: center;">NOTE</div> <p>IPC setpoints adjustments may be performed later.</p> <p>b. <b>Notify</b> Reactor Engineering to <b>adjust</b> IPC setpoints to <b>restore</b> the ROD DEVIATION alarm, (ALB010D06), to operable. (Compensatory action is described in 17010, "ARP for ALB10 on Panel 1C1 on MCB.")</p>
	SS/OATC	<p>4.2.5 <b>Control</b> Tav<sub>g</sub> within 2°F of T<sub>ref</sub> during the power reduction by performing the following. (1985303667)</p> <p>a. <b>Place</b> the Rod Control System in MANUAL.</p>

**Event Description:** Annunciator ALB15 D05 "MFPT B HI VIB" requires the crew to enter ARP 17015 and investigate the cause of the alarm.

Vibration measurements between 5.5 and 6 mils on the PUMP end bearings will require power reduction to less than 70% RTP per 12004-C "Power Operation (Mode 1)", and shutdown of the affected MFP.

Time	Position	Applicant's Action or Behavior
	OATC	b. <u>WHILE</u> reducing turbine load, <b>adjust</b> control rods/boron as necessary to <b>maintain</b> AFD within limits per the AFD control strategy and guidelines of Section 4.3.2.
	OATC	c. <u>IF</u> it is intended to continue power operation at a reduced power plateau, <u>THEN</u> AFD should be <b>trended</b> and <b>maintained</b> at or near the AFD target value.
	OATC	<div style="border: 1px solid black; padding: 10px; margin-bottom: 10px;"> <p style="text-align: center;">NOTE</p> <p>Aux. Steam should not be placed in service from the other unit if that unit's power is below 25%.</p> </div> <p><b><u>Note to examiner: Full shutdown is not anticipated while in this procedure. This step is N/A.</u></b></p> <p>4.2.6 <u>IF</u> the auxiliary steam will be required following unit shutdown, <b>initiate</b> the following:</p> <p>a. <b>Pressurize</b> the Auxiliary Steam Header from the opposite unit per 13761, "Auxiliary Steam System."</p> <p>b. <b>Start</b> the second Steam Jet Air Ejector on auxiliary steam per 13620, "Condenser Air Ejection System."</p> <p>c. <b>Transfer</b> Turbine Steam Seal supply to the Auxiliary Steam Supply per 13825, "Turbine Steam Seal System."</p>
	SS	4.2.7 <b>Notify</b> System Operator at the Power Control Center (PCC) of upcoming power decrease (8-257-6301).
	UO	<p>4.2.8 <b>Reduce</b> turbine load as required per 13800, "Main Turbine Operation."</p> <p>a. Each time reactor power change exceeds 15% in a one hour period, <b>notify</b> Chemistry to <b>perform</b> the following samples: (1988314683, 1988315234)</p>

**Event Description:** Annunciator ALB15 D05 "MFPT B HI VIB" requires the crew to enter ARP 17015 and investigate the cause of the alarm.

Vibration measurements between 5.5 and 6 mils on the PUMP end bearings will require power reduction to less than 70% RTP per 12004-C "Power Operation (Mode 1)", and shutdown of the affected MFP.

Time	Position	Applicant's Action or Behavior
		<ul style="list-style-type: none"> <li>(1) RCS iodine sample per TS SR 3.4.16.2. (Required between 2 and 6 hours after reactor power changes greater than or equal to 15% in a one hour period)</li> <li>(2) Gaseous release path samples per ODCM Table 3-3.</li> <li>(3) <b>Record</b> the time of the change and the person contacted in the Control Room Log.</li> </ul>
	UO	<p>4.2.9 During the power descent, per 13605, <b>control</b> Steam Generator Blowdown Condensate Cooling return temperature by adjusting the setpoints on the Steam Generator Blowdown Temperature Control Valves Controllers TIC-1191, 1192, 1193, and 1194.</p>
		<p>4.2.10 BETWEEN 65% and 30% Turbine Power, remove one Main Feed Pump from service per 13615, "Condensate and Feed Water System."</p> <ul style="list-style-type: none"> <li>a. IF power descent was for the purpose of performing emergent work on support equipment, <b>maintain</b> reactor power within the capacity of the operating Feed Pump.</li> <li>b. When emergent work is complete and ready to be returned to service, <b>go</b> to Section 4.1 and <b>perform</b> applicable steps for power ascent, <u>OR</u> <b>continue</b> power descent.</li> </ul>
<p><b>Note to examiner: The extent of power reduction is at the discretion of the Chief Examiner. Proceed to the next event when the examiners are satisfied that control of the reactor has been adequately demonstrated in this event.</b></p>		

**Event Description:** Annunciator ALB15 D05 “MFPT B HI VIB” requires the crew to enter ARP 17015 and investigate the cause of the alarm.

Vibration measurements between 5.5 and 6 mils on the PUMP end bearings will require power reduction to less than 70% RTP per 12004-C “Power Operation (Mode 1)”, and shutdown of the affected MFP.

Time	Position	Applicant's Action or Behavior
<p><i>Note to examiner: The following steps are from ARP 17015 for ALB15 D05 “MFPT B HI VIB”, if required.</i></p>		
	SS/UO	<p>6. IF MFP <u>PUMP</u> bearing vibration rises to 6 mils or greater, rapidly <b>reduce</b> power and <b>stop</b> MFP B per 18013-C “Rapid Power Reduction.”</p>
	SS/UO	<p>7. IF MFP Turbine/Pump vibrations are elevated and with Engineering concurrence, <b>perform</b> the following to reduce vibrations:</p> <p>a. <b>Monitor</b> lube oil and bearing oil temperatures on Plant Computer and <b>maintain</b> bearing oil temperatures between 110°F and 125°F by adjusting cooling water flow.</p> <div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p style="text-align: center;"><b>CAUTIONS</b></p> <ul style="list-style-type: none"> <li>• Raising the speed of MFP A will lower the speed on the MFP B. MFP A should not exceed 5900 rpm and MFP B speed should not drop below 5100 rpm.</li> <li>• A bias potentiometer setpoint should not be lowered to less than 5.0. Having a setpoint of less than 5.0 will lower the maximum speed of the affected MFP.</li> </ul> </div> <p>b. <b>Reduce</b> speed of MFP B by increasing MFP A speed as follows:</p> <p>(1) Slowly <b>increase</b> speed on MFP A by increasing the bias potentiometer on 1SIC-509B (if in auto) or by increasing speed demand on 1SIC-509B (if in manual). Allow speed on MFP B to decrease (if 1SIC-509C is in auto) or decrease speed demand (if 1SIC-509C is in manual).</p> <p>(2) <b>Continue to lower</b> speed on MFP B until the vibration alarm clears or 5100 rpm is reached.</p>

**Event Description:** Annunciator ALB15 D05 “MFPT B HI VIB” requires the crew to enter ARP 17015 and investigate the cause of the alarm.

Vibration measurements between 5.5 and 6 mils on the PUMP end bearings will require power reduction to less than 70% RTP per 12004-C “Power Operation (Mode 1)”, and shutdown of the affected MFP.

Time	Position	Applicant's Action or Behavior
		<div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p style="text-align: center;">NOTES</p> <ul style="list-style-type: none"> <li>Operational experience shows that pumps usually run with less vibration at higher seal water temperatures.</li> <li>Optimal seal water temperatures are between 140°F and 160°F with Inboard/Outboard temperature difference less than 5°F.</li> <li>Maintenance I&amp;C support may be required for adjustment of MFP seal water temperature controls.</li> </ul> </div> <p>c. <b>Adjust</b> the MFP B seal water controls to <b>reduce</b> vibrations as follows:</p> <p style="margin-left: 40px;">(1) <b>Establish</b> constant communications with Control Room.</p> <p style="margin-left: 40px;">(2) <b>Select</b> the setpoint display screen on 1-TIC-5237A and 1-TIC-5237B.</p> <div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p style="text-align: center;"><b>CAUTION</b></p> <p>Setpoint changes should be made in increments no greater than 0.4 degrees.</p> </div> <p style="margin-left: 40px;">3) <b>Use</b> the up and down arrows to select the required temperature setpoint.</p> <p style="margin-left: 40px;">(4) <b>Press</b> setpoint key on 1-TIC-5237A and 1-TIC-5237B <u>W</u> temperature adjustment is completed.</p> <p style="margin-left: 40px;">(5) <b>Monitor</b> SGFP Turbine and Pump vibrations.</p>

**Event Description:** Annunciator ALB15 D05 “MFPT B HI VIB” requires the crew to enter ARP 17015 and investigate the cause of the alarm.

Vibration measurements between 5.5 and 6 mils on the PUMP end bearings will require power reduction to less than 70% RTP per 12004-C “Power Operation (Mode 1)”, and shutdown of the affected MFP.

Time	Position	Applicant's Action or Behavior																								
		<div style="border: 1px solid black; padding: 10px; margin: 10px;"> <p style="text-align: center;">NOTE</p> <p>Turbine and pump bearing vibration may be monitored at the Bentley Nevada cabinet near MFP B or on the following Plant Computer points: <span style="float: right;">□</span></p> <div style="display: flex; justify-content: space-between;"> <span><u>IPC</u></span> <span><u>Bentley Nevada</u></span> </div> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 40%;">1B MFPT H.P. Bearing Vibration:</td> <td style="width: 30%;">“X”: X0221</td> <td style="width: 30%;">“X”: 1XIS-5310X</td> </tr> <tr> <td></td> <td>“Y”: X0251</td> <td>“Y”: 1XIS-5310Y</td> </tr> <tr> <td>1B MFPT L.P. Bearing Vibration:</td> <td>“X”: X0222</td> <td>“X”: 1XIS-5311X</td> </tr> <tr> <td></td> <td>“Y”: X0252</td> <td>“Y”: 1XIS-5311Y</td> </tr> <tr> <td>1B MFP INBD Bearing Vibration:</td> <td>“X”: X0259</td> <td>“X”: 1XIS-4922X</td> </tr> <tr> <td></td> <td>“Y”: X0260</td> <td>“Y”: 1XIS-4922Y</td> </tr> <tr> <td>1B MFP OUTBD Bearing Vibration:</td> <td>“X”: X0261</td> <td>“X”: 1XIS-4923X</td> </tr> <tr> <td></td> <td>“Y”: X0262</td> <td>“Y”: 1XIS-4923Y</td> </tr> </table> <p>(6) IF further temperature adjustment is required to reduce vibration, <b>repeat</b> steps 2 through 5.</p> <p>(7) <u>WHEN</u> temperature adjustment is no longer required, <b>ensure</b> 1-T-V5237A and 1-TV-5237B are controlling as required.</p> <p>d. <b>Adjust</b> MFPT B Seal Water Supply Bypass 1-1305-U4-628 and 1-1305-U4-629 IF required.</p> <p>(1) <b>Install</b> caution tags on valves stating the following or equivalent:</p> <p><b>“MFP seal water bypass valves throttled to reduce vibration on MFP B”</b></p> </div>	1B MFPT H.P. Bearing Vibration:	“X”: X0221	“X”: 1XIS-5310X		“Y”: X0251	“Y”: 1XIS-5310Y	1B MFPT L.P. Bearing Vibration:	“X”: X0222	“X”: 1XIS-5311X		“Y”: X0252	“Y”: 1XIS-5311Y	1B MFP INBD Bearing Vibration:	“X”: X0259	“X”: 1XIS-4922X		“Y”: X0260	“Y”: 1XIS-4922Y	1B MFP OUTBD Bearing Vibration:	“X”: X0261	“X”: 1XIS-4923X		“Y”: X0262	“Y”: 1XIS-4923Y
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1B MFP OUTBD Bearing Vibration:	“X”: X0261	“X”: 1XIS-4923X																								
	“Y”: X0262	“Y”: 1XIS-4923Y																								
		<p>8. <b>Scan</b> ALB15 and ALB16 for associated alarms and take appropriate actions.</p>																								
<b>END OF EVENT 5. PROCEED TO NEXT EVENT AT THE DISCRETION OF THE CHIEF EXAMINER.</b>																										

Event No.: 5a

Event Description: Alignment for frequent borations to support down-power.

Time	Position	Applicant's Action or Behavior
	OATC	<p><b>4.8.1 Determine</b> the amount of boric acid necessary for desired change in boron concentration using PTDB Tab 2.3 and <b>correct</b> the obtained value using PTDB Tab 2.1 or use instructions provided by Reactor Engineering.</p> <p><i>Per the Reactivity Briefing Sheet, the required boration for a 30% power change is about 580 gallons. For a 10% power change, the required boration is about 190 gallons. The operator may elect to align for frequent boration and inject a percentage of the required acid in several batches. The batch size may vary from 50 to 100 gallons, or larger.</i></p>
	OATC	<b>4.8.2 Verify</b> the Reactor Makeup System is aligned for automatic operation.
	OATC	<b>4.8.3 Place</b> VCT MAKEUP CONTROL 1-HS-40001B in STOP.
	OATC	<b>4.8.4 Place</b> VCT MAKEUP MODE SELECT 1-HS-40001A in BOR.
	OATC	4.8.5 <u>IF</u> desired, <u>AND</u> with SS concurrence, Boric Acid flow may be adjusted to desired flow using 1-FIC-0110.
	OATC	4.8.6 <u>IF</u> desired, <u>AND</u> with SS concurrence, <b>lower</b> pot setting on 1-LIC-0185, to limit VCT pressure increase.
	OATC	<div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p><b>CAUTION</b></p> <p>Digital counters and thumbwheel settings on BORIC ACID TO BLENDER Integrator 1-FQI-0110 read in tenth-gallon increments.</p> </div> <p><b>4.8.7 Set</b> BORIC ACID TO BLENDER integrator 1-FQI-0110 for the desired amount of boric acid.</p>
	OATC	<b>4.8.8 Place</b> VCT MAKEUP CONTROL 1-HS-40001B in START, and <b>verify</b> flow is indicated on 1-FI-0110A.



Event No.: 5a

Event Description: Alignment for frequent borations to support down-power.

Time	Position	Applicant's Action or Behavior
	OATC	<p>4.8.9 <u>WHEN</u> BORIC ACID TO BLENDER integrator 1-FQI-0110 reaches its setpoint, <b>verify</b> boration stops and the following valves close:</p> <p>1-FV-0110A, BORIC ACID TO BLENDER 1-FV-0110B, BLENDER OUTLET TO CHARGING PUMPS SUCT</p>
	OATC	<p><b>4.8.10 Operate</b> the Pressurizer Back-up Heaters as necessary to equalize <math>C_b</math> between the RCS and the Pressurizer.</p>
	OATC	<p><b>4.8.11 Monitor</b> RCS temperature, Control Bank position, or power levels as applicable.</p>
	OATC	<p><b>4.8.12 Repeat</b> Steps 4.8.7 through 4.8.11 to borate as necessary to continue power change and/or compensate for Xenon.</p>
	OATC	<p><b>4.8.13</b> <u>WHEN</u> frequent borations are no longer required, <b>flush</b> approximately 15 gallons of Reactor Makeup Water through 1-FV-0110B by performing the following:</p> <ol style="list-style-type: none"> <li><b>Place</b> VCT MAKEUP MODE SELECT 1-HS-40001A to ALT DIL.</li> <li><b>Set</b> TOTAL MAKEUP Integrator 1-FQI-0111 for 13 to 15 gallons.</li> <li><b>Place</b> BLENDER OUTLET TO VCT 1-HS-0111B in CLOSE.</li> <li><b>Place</b> VCT MAKEUP CONTROL 1-HS-40001B in START.</li> <li><b>Verify</b> flow is indicated on 1-FI-0110B.</li> <li><u>WHEN</u> TOTAL MAKEUP integrator 1-FQI-0111 reaches the desired setpoint, <b>verify</b> the following valves close: <ul style="list-style-type: none"> <li>1-FV-0111A, RX MU WTR TO BA BLENDER</li> <li>1-FV-0110B, BLENDER OUTLET TO CHARGING PUMPS SUCT</li> </ul> </li> </ol>
	OATC	<p><b>4.8.14</b> <u>IF</u> Boric Acid flow controller 1-FIC-0110 was adjusted in Step 4.8.5, <b>reset</b> to Initial Pot Setting.</p>
	OATC	<p><b>4.8.15 Align</b> RX M/U CONTROL System for automatic makeup per Section 4.1.</p>
	OATC	<p><b>4.8.16</b> <u>IF</u> VCT level controller 1-LIC-0185 pot setting was lowered, <b>restore</b> to initial setting recorded in Step 4.8.6 and <b>record</b> in Unit Control Log.</p>
<b>END OF EVENT 5a. RETURN TO EVENT 5 TO CONTINUE DOWNPOWER.</b>		

Op-Test No.: 2014-301

Scenario No.: 2

Page 1 of 14

Event No.: 6

**Event Description:** Supply breaker to 1AA02 from RAT "A" (1NXRA) will trip open due to a fault on the bus. DG-1A will start, but will not re-energize 1AA02 due to the bus fault. This will require the crew to enter and complete the actions of AOP 18031-C, "Loss of Class 1E Electrical Systems". Corrective actions include reducing AFW flow to return reactor power to less than 100%, shifting electrical loads to Train "B" 1E bus 1BA03, as well as implementing tech specs for the loss of AC power.

Time	Position	Applicant's Action or Behavior
	CREW	Diagnose loss of power to 1AA02: <u>Alarms:</u> DG1A EMERGENCY START 4160V SWGR 1AA02 TROUBLE <u>Indications:</u> Electric fault on 1AA02 Control room lighting dims due to loss of ½ of the lights 1AA02 white bus potential lights go out DG-1A starts
	SS	Enters AOP 18031-C, "Loss of Class 1E Electrical Systems" (Crew Update)
	OATC	*1. Check power to 1E 4160V Emergency busses –AT LEAST ONE ENERGIZED: <ul style="list-style-type: none"> <li>4160V AC 1E Busses.</li> </ul>
	OATC	*2. Check Reactor power - LESS THAN 100%: <ul style="list-style-type: none"> <li>UQ1118 - LESS THAN OR EQUAL TO 100% MWT for the applicable unit.</li> <li>NIs - LESS THAN OR EQUAL TO 100%.</li> <li>ΔT - LESS THAN OR EQUAL TO 100%.</li> </ul> RNO
	UO	*2. Perform the following: a. Reduce TDAFW pump speed to not less than 1535 rpm. b. Throttle affected MDAFW pump discharge valves.  <b>NOTE: MDAFW "A" WILL BE DE-ENERGIZED &amp; NOT RUNNING</b> IF Reactor power is still greater than 100%, THEN reduce turbine load at approximately 10 megawatt increments to maintain Reactor power

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Event No.: 6

**Event Description:** Supply breaker to 1AA02 from RAT "A" (1NXRA) will trip open due to a fault on the bus. DG-1A will start, but will not re-energize 1AA02 due to the bus fault. This will require the crew to enter and complete the actions of AOP 18031-C, "Loss of Class 1E Electrical Systems". Corrective actions include reducing AFW flow to return reactor power to less than 100%, shifting electrical loads to Train "B" 1E bus 1BA03, as well as implementing tech specs for the loss of AC power.

Time	Position	Applicant's Action or Behavior
		less than 100%.
	UO	3. Check affected train Diesel Generator (RUNNING.)
	UO	4. Check NSCW status on affected train: a. PUMPS – TWO RUNNING ( <b>None are running.</b> )  RNO 4. Perform the following 1) Trip affected DG by depressing both EMERGENCY STOP pushbuttons. 2) Go to Section A. LOSS OF POWER WITH DG FAILING TO TIE TO BUS.
	UO	<b>18031-C, SECTION A: LOSS OF POWER WITH DG FAILING TO TIE TO BUS</b> A1. Verify NSCW pumps on unaffected train (B) (TWO RUNNING.)
	OATC	A2. Verify charging pump 幸 RUNNING : __ NCP. -OR- __ Unaffected train CCP.
	UO	A3. Verify CCW pumps on unaffected train (TWO RUNNING.)

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**Event Description:** Supply breaker to 1AA02 from RAT "A" (1NXRA) will trip open due to a fault on the bus. DG-1A will start, but will not re-energize 1AA02 due to the bus fault. This will require the crew to enter and complete the actions of AOP 18031-C, "Loss of Class 1E Electrical Systems". Corrective actions include reducing AFW flow to return reactor power to less than 100%, shifting electrical loads to Train "B" 1E bus 1BA03, as well as implementing tech specs for the loss of AC power.

Time	Position	Applicant's Action or Behavior
	SS / OATC	A4. Check RHR status: a. Check RHR - REQUIRED FOR SHUTDOWN COOLING. RNO A4. Go to Step A5.
	OATC / UO	A5. Initiate the Continuous Actions Page.
	UO	*A6. Check AFW status: a. Check AFW system - NEEDED TO MAINTAIN SG LEVELS. <b>(NO)</b>
	UO  SS	RNO a. <b>Perform the following:</b> 1) Reduce TDAFW pump speed to not less than 1535 rpm. 2) Go to Step A7. <b>NOTE: TDAFW PUMP SPEED MAY HAVE BEEN LOWERED IN STEP 2 MAIN BODY OF 18031-C.</b>
	UO	A7. Verify ACCW pump on unaffected train (RUNNING.)
	UO	A8. Verify four CNMT cooling units on unaffected train running in high speed using 13120, CONTAINMENT BUILDING COOLING SYSTEM. <b>NOTE: Will start Train B CNMT Coolers 3,4,7,8 on high speed using step 4.2.3 or 4.8.5 of SOP 13120-1:</b>  <b>Fan 3, 1 HS 12583D      Fan 7, 1 HS 12585D</b>  <b>Fan 4, 1 HS 2583D      Fan 8, 1 HS 2585D</b>

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**Event Description:** Supply breaker to 1AA02 from RAT "A" (1NXRA) will trip open due to a fault on the bus. DG-1A will start, but will not re-energize 1AA02 due to the bus fault. This will require the crew to enter and complete the actions of AOP 18031-C, "Loss of Class 1E Electrical Systems". Corrective actions include reducing AFW flow to return reactor power to less than 100%, shifting electrical loads to Train "B" 1E bus 1BA03, as well as implementing tech specs for the loss of AC power.

Time	Position	Applicant's Action or Behavior
	UO	<p>A8. Verify CRDM fans on unaffected train (TWO RUNNING.)</p> <p><b>NOTE: STARTS CRDM FAN #4 by placing 1HS-12276A to Start.</b></p>
	UO	<p>A8. Verify reactor cavity cooling unit on unaffected train (ONE RUNNING.)</p> <p><b>NOTE: STARTS REACTOR CAVITY COOLING Fan #2 by placing 1HS-2651 to Start.</b></p>
	UO	<p>A9. Verify SFP cooling pump on unaffected train running using 13719, SPENT FUEL POOL COOLING AND PURIFICATION SYSTEM</p> <p>IPC Points:</p> <p>ZD3405 ZD3411</p> <p><b>NOTE: UNAFFECTED TRAIN WAS STARTED IN EVENT #2.</b></p>
	UO	<p>A10. Verify the following unaffected train Class 1E 480V load centers - ENERGIZED:</p> <p><u>Train B</u></p> <ul style="list-style-type: none"> <li>• BB06</li> <li>• BB07</li> <li>• BB16</li> <li>• NB10</li> </ul>
	UO	<p>A11. Verify unaffected MCCs energized by observing - NO TROUBLE ALARMS.</p>
	SS	<p>A12. Open doors that have installed door stops in the following <u>AFFECTED</u> Control Building rooms:</p> <p>UNIT 1</p> <ul style="list-style-type: none"> <li>• TR A B52, B55, B76</li> </ul> <p><b>NOTE: Phones SSS to dispatch CBO to open Doors.</b></p>

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**Event Description:** Supply breaker to 1AA02 from RAT "A" (1NXRA) will trip open due to a fault on the bus. DG-1A will start, but will not re-energize 1AA02 due to the bus fault. This will require the crew to enter and complete the actions of AOP 18031-C, "Loss of Class 1E Electrical Systems". Corrective actions include reducing AFW flow to return reactor power to less than 100%, shifting electrical loads to Train "B" 1E bus 1BA03, as well as implementing tech specs for the loss of AC power.

Time	Position	Applicant's Action or Behavior
	SS	<p>A13. Initiate the following:</p> <ul style="list-style-type: none"> <li>a. 14230, OFFSITE AC CIRCUIT VERIFICATION AND CAPACITY / CAPABILITY EVALUATION.</li> <li>b. Verify SAT energized using 13418-A(B), STANDBY AUXILIARY TRANSFORMER UNIT 1(2) TRAIN A(B) OPERATIONS</li> </ul> <p><b>NOTE: THIS STEP PERFORMS THE 1 HOUR ACTIONS FOR LCO 3.8.1 FOR OFF-SITE SOURCES AND THE SAT.</b></p>
	OATC	A14. Verify DRPI - ENERGIZED.
	UO	<p>*A15. Check DC bus loads:</p> <ul style="list-style-type: none"> <li>a. Verify 125V DC battery loads - LESS THAN THE FOLLOWING LIMITS: <ul style="list-style-type: none"> <li>• AD1B 300 AMPS – expect <b>200 amps</b></li> <li>• BD1B 300 AMPS – expect 0 amps</li> <li>• CD1B 100 AMPS – expect <b>90 amps</b></li> <li>• DD1B 80 AMPS – expect 0 amps</li> </ul> </li> <li>b. Monitor all 1E battery bus voltages - REMAIN GREATER THAN 105V DC.</li> </ul>
	UO / OATC	<p>A16. Check Reactor Makeup System:</p> <ul style="list-style-type: none"> <li>a. Unaffected boric acid transfer pump AUTO.</li> </ul> <p>RNO</p> <ul style="list-style-type: none"> <li>a. Manually start unaffected boric acid transfer pump as necessary.</li> </ul> <p>-OR-</p> <p>— Place unaffected pump handswitch in AUTO</p> <p><i>Places 1HS-277A in AUTO.</i></p>
	UO	<p>*A17. Verify battery charger in service for non-1E batteries:</p> <ul style="list-style-type: none"> <li>• <b>ND1 (OOS)</b></li> </ul>

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**Event Description:** Supply breaker to 1AA02 from RAT "A" (1NXRA) will trip open due to a fault on the bus. DG-1A will start, but will not re-energize 1AA02 due to the bus fault. This will require the crew to enter and complete the actions of AOP 18031-C, "Loss of Class 1E Electrical Systems". Corrective actions include reducing AFW flow to return reactor power to less than 100%, shifting electrical loads to Train "B" 1E bus 1BA03, as well as implementing tech specs for the loss of AC power.

Time	Position	Applicant's Action or Behavior
		<ul style="list-style-type: none"><li>• ND2</li><li>• <b>ND3A (OOS)</b></li><li>• ND3B</li></ul> <p><b>NOTE: WILL DIRECT CONTROL BUILDING OPERATOR TO PLACE BATTERY CHARGERS IN SERVICE FOR 1ND1 AND 1ND3A USING 13406-1, "125V DC NON 1E ELECTRICAL DISTRIBUTION SYSTEM" USING SECTION 4.1.3</b></p>
	UO	<p>A18. Transfer any de-energized NYS, <b>NYRS</b>, and <b>NYR</b> busses to alternate sources by initiating 13432, 120V AC NON 1E INSTRUMENT DISTRIBUTION SYSTEM.</p> <p><b>NOTE: 1NYRS AND 1NYR WILL NEED TO BE TRANSFERRED TO ALTERNATE POWER SOURCES.</b></p> <p><b>NOTE: MAIN FEED PUMP B SPEED CONTROL WILL BE LOCKED UP DUE TO LOSS OF POWER TO THE CONTROL SYSTEM RELAY. THE UO WILL USE ARP 17015-1 WINDOW C05 TO RESTORE NORMAL SPEED CONTROL AFTER POWER IS RESTORED.</b></p>

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Time	Position	Applicant's Action or Behavior
	UO	<p><b><u>REFERENCES: ARP 17015-1 WINDOW C05</u></b>  <b><u>["MFPT LOSS OF FW SIGNAL"]</u></b></p> <p><b>1.0 <u>PROBABLE CAUSE</u></b></p> <p>Failure of automatic control signal supplied to the Main Feedwater Pump Turbine (MFPT) Controllers.</p> <p><b>2.0 <u>AUTOMATIC ACTIONS</u></b></p> <p>NONE</p> <p><b>3.0 <u>INITIAL OPERATOR ACTIONS</u></b></p> <p>Check which pump is locked up on Signal Memory Function (SMF) at the MFPT cabinet in the North side of the Control Room.</p> <p><b>4.0 <u>SUBSEQUENT OPERATOR ACTIONS</u></b></p> <div style="border: 1px solid black; padding: 10px; margin-top: 10px;"> <p style="text-align: center;">NOTES</p> <ul style="list-style-type: none"> <li>MFPT speed will be maintained at the last speed reference signal received by the SMF from the Process Control System speed reference signal.</li> </ul> </div>
	UO	<p>1. <u>IF</u> the automatic control signal is lost, <b>enter</b> 18016-C Section E, Failure of MFP Speed Control.</p>
	SS	<p>May enter 18016-C section E CONDENSATE AND FEEDWATER MALFUNCTION, (Crew update)</p>



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Time	Position	Applicant's Action or Behavior
	UO	18016-C E1. Check steam and feed flows - MATCHED ON ALL SGs.
	SS	18016-C E2. Initiate the Continuous Actions Page.
	UO	18016-C E3. Maintain SG NR levels - GREATER THAN 41% and LESS THAN 79%.
	UO	18016-C E4. Check MFPT SPEED CONTROLS - OPERATING PROPERLY: <ul style="list-style-type: none"> <li>• ALB15-C05 MFPT LOSS OF FW SIGNAL - EXTINGUISHED.</li> <li>• Controller(s) maintaining stable MFPT speed.</li> <li>• MFP(s) adequately feeding forward to control SG levels.</li> </ul>
	UO	18016-C E4. RNO E4. Perform one of the following: Adjust MFPT speed as necessary to match Feedflow with Steam flow. -OR- Transfer control to the GE Pot by performing the following: <ol style="list-style-type: none"> <li>a. Adjust SC-3151(3152) MFPT-A (B) SPEED CHANGER to obtain zero deviation on SI 3153 (3154).</li> <li>b. Transfer control by placing MFPT-A (B) MOTOR SPEED CHANGER HS-3151(3152) in MANUAL.</li> <li>c. Adjust MFPT speed as necessary to match Feedflow with Steam flow.</li> </ol>
	UO	18016-C E5. Check PT-507 - OPERATING PROPERLY.
	SS	18016-C E6. Notify I&C to initiate repairs.

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Time	Position	Applicant's Action or Behavior		
	UO	18016-C E7. Return feed flow controls to AUTO as necessary.		
	SS	18016-C Check repairs and surveillances - COMPLETE. (SS should return to 18031-C)		
	SS	<b><u>18031-C</u></b> A19. Check Control Room Emergency Lighting: <ul style="list-style-type: none"> <li>a. Check bus loss of power expected duration - GREATER THAN 90 MINUTES. <b>(YES)</b></li> <li>b. Transfer emergency lighting to the unaffected unit by placing MAIN CONTROL ROOM LIGHTING LOSEP TRANSFER SWITCH on AFFECTED unit to LOSEP position:</li> </ul> <b>NOTE: STEP A21.b. IS PERFORMED LOCALLY.</b>		
	SS	A20. Initiate applicable Technical Specification requirements listed in ATTACHMENT A.  <b>NOTE: THE FOLLOWING TS APPLY FROM ATTACHMENT A (page 14 &amp; 15).</b>  <b>EXAMINER MAY PROCEED TO NEXT EVENT DUE TO TIME REQUIREMENTS FOR IDENTIFYING ALL REQUIRED TECHNICAL SPECIFICATIONS FOR THIS FAILURE AND HAVE EXAMINEE IDENTIFY TS LATER.</b>		
	SS	<b>LCO 3.7.5 CONDITION C AFW</b>		
		<u>CONDITION</u> C. Two AFW trains inoperable	<u>REQUIRED ACTION</u> C.1 Be in MODE 3  <u>AND</u> C.2 Be in MODE 4.	<u>COMPLETION TIME</u> 6 hours  12 hours
		<b>LCO 3.8.1 CONDITIONS A, B, and E AC Sources</b>		
	SS	<u>CONDITION</u> A. One required offsite circuit inoperable	<u>REQUIRED ACTION</u> A.1 Perform SR 3.8.1.1 for required OPERABLE offsite circuit.	<u>COMPLETION TIME</u> 1 hour  <u>AND</u>

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**Event Description:** Supply breaker to 1AA02 from RAT "A" (1NXRA) will trip open due to a fault on the bus. DG-1A will start, but will not re-energize 1AA02 due to the bus fault. This will require the crew to enter and complete the actions of AOP 18031-C, "Loss of Class 1E Electrical Systems". Corrective actions include reducing AFW flow to return reactor power to less than 100%, shifting electrical loads to Train "B" 1E bus 1BA03, as well as implementing tech specs for the loss of AC power.

Time	Position	Applicant's Action or Behavior		
			<p><u>AND</u></p> <p>A.2 Declare required feature(s) with no offsite power available inoperable when its redundant required feature(s) is inoperable.</p> <p><u>AND</u></p> <p>A.3 Restore required offsite circuit to OPERABLE status.</p>	<p>Once per 8 hours thereafter</p> <p>24 hours from discovery of no offsite power to one train concurrent with inoperability of redundant required feature(s)</p> <p>72 hours <u>AND</u> 14 days from discovery of failure to meet LCO</p>
		<p><u>CONDITION</u></p> <p>B. One DG inoperable</p>	<p><u>REQUIRED ACTION</u></p> <p>B.1 Perform SR 3.8.1.1 for the required offsite circuit(s).</p> <p><u>AND</u></p> <p>B.2 Verify SAT available.</p> <p><u>AND</u></p> <p>B.3 Declare required feature(s) supported by the inoperable DG inoperable when its required redundant feature(s) is inoperable.</p> <p><u>AND</u></p> <p>B.4.1 Determine OPERABLE DG is not inoperable due to common cause failure.</p> <p><u>OR</u></p> <p>B.4.2 Perform SR 3.8.1.2 for OPERABLE DG.</p> <p><u>AND</u></p> <p>-----NOTE----- Required Action B.5.1 is only applicable if the combined reliability</p>	

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**Event Description:** Supply breaker to 1AA02 from RAT "A" (1NXRA) will trip open due to a fault on the bus. DG-1A will start, but will not re-energize 1AA02 due to the bus fault. This will require the crew to enter and complete the actions of AOP 18031-C, "Loss of Class 1E Electrical Systems". Corrective actions include reducing AFW flow to return reactor power to less than 100%, shifting electrical loads to Train "B" 1E bus 1BA03, as well as implementing tech specs for the loss of AC power.

Time	Position	Applicant's Action or Behavior		
			<p>of the enhanced black-start combustion turbine generators (CTG) and the black-start diesel generator is <math>\geq</math> 95%. Otherwise, Required Action B.5.2 applies.</p> <p>-----</p> <p>B.5.1 Verify an enhanced blackstart CTG is functional by verifying the CTG and the black-start diesel generator starts and achieves steady state voltage and frequency.</p>	
		<p><u>CONDITION</u></p> <p>B. One DG inoperable (continuation)</p>	<p><u>REQUIRED ACTION</u></p> <p><u>OR</u></p> <p>B.5.2 Start and run at least one CTG while in Condition B.</p> <p><u>AND</u></p> <p>B.6 Restore DG to OPERABLE status.</p>	<p><u>COMPLETION TIME</u></p> <p>72 hours</p> <p><u>OR</u></p> <p>Prior to entry into Condition B for preplanned maintenance</p> <p>14 days from discovery of failure to meet LCO</p>
		<p>E. One required offsite circuit inoperable</p> <p><u>AND</u></p> <p>One DG inoperable</p>	<p>-----NOTE-----</p> <p>Enter applicable Conditions and Required Actions of LCO 3.8.9, "Distribution Systems - Operating," when Condition E is entered with no AC power source to one or more trains.</p> <p>-----</p> <p>E.1 Restore required offsite circuit to OPERABLE status.</p> <p><u>OR</u></p> <p>E.2 Restore DG to OPERABLE status.</p>	<p>12 hours</p> <p>12 hours</p>

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**Event Description:** Supply breaker to 1AA02 from RAT "A" (1NXRA) will trip open due to a fault on the bus. DG-1A will start, but will not re-energize 1AA02 due to the bus fault. This will require the crew to enter and complete the actions of AOP 18031-C, "Loss of Class 1E Electrical Systems". Corrective actions include reducing AFW flow to return reactor power to less than 100%, shifting electrical loads to Train "B" 1E bus 1BA03, as well as implementing tech specs for the loss of AC power.

Time	Position	Applicant's Action or Behavior		
	SS	LCO 3.8.9 CONDITIONS A Distribution Systems		
		<u>CONDITION</u>  A. One or more AC electrical power distribution subsystems inoperable	<u>REQUIRED ACTION</u>  A.1 Restore AC electrical power distribution subsystems to OPERABLE status.	<u>COMPLETION TIME</u>  8 hours  <u>AND</u>  16 hours from discovery of failure to meet LCO
		<b>NOTE: NO LOSS OF SAFETY FUNCTION (LOSF) EXISTS.</b>		
		A21. Check the fault condition cleared.  RNO  A23. Return to Step A1.		
<b>END OF EVENT 6. PROCEED TO NEXT EVENT AT THE DISCRETION OF THE CHIEF EXAMINER.</b>				

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**Event Description:** Supply breaker to 1AA02 from RAT "A" (1NXRA) will trip open due to a fault on the bus. DG-1A will start, but will not re-energize 1AA02 due to the bus fault. This will require the crew to enter and complete the actions of AOP 18031-C, "Loss of Class 1E Electrical Systems". Corrective actions include reducing AFW flow to return reactor power to less than 100%, shifting electrical loads to Train "B" 1E bus 1BA03, as well as implementing tech specs for the loss of AC power.

**ATTACHMENT A****Potential Applicable LCOs & TRs Requiring Short Term Response**

<u>LCO/TR</u>	<u>Mode</u>	<u>Limiting Condition</u>	<u>Required Actions</u>
3.1.7	1-2	Lost Rod Pos Ind	Immediately enter TS 3.0.3
3.4.15	1-4	All RCS leak detection instrumentation inop	Immediately enter TS 3.0.3
3.7.10 3.7.11 3.7.12	All	Both CREFS trains in one unit inop	Immediately place other unit trains in emergency mode
3.4.6 3.4.7 3.4.8	4 5 5	Required RCS loops and/or RHR trains	Immediately restore req'd loops/trains to service
3.5.3	4	Required ECCS train inop	Immediately initiate restoration
3.8.2	5,6	Loss of required AC Source	Immediately declare required systems w/o offsite power inop or suspend fuel movement
3.8.5	5,6	Loss of required DC Sources	Immediately declare affected features inop or suspend fuel movement activities
3.9.5 3.9.6	6	RHR train requirements are not met for refueling	Immediately stop fuel movement and dilutions and restore required trains and/or water level
13.9.5	All	One or both FHB HVAC trains inop	Immediately verify remaining train operable or suspend fuel movement activities
13.1.8 13.1.9	3-5	Lost required DRPI	Immediately open RTBs
13.1.2 13.1.4	5,6	Required boric acid injection source and/or pump inop	Immediately suspend fuel movement and/or reactivity changes
3.6.3	1-4	Both CNMT pen iso valves are inop	1 hr: Isolate affected penetrations
3.8.1	1-4	Loss of offsite source Loss of DG	1 hr: Complete 14230 1 hr: Verify SAT Operable 4 hr: Determine redundant safety features operable
3.4.5	3	Required RCS loops inop with RTBs closed	1 hr: Restore loop or open RTBs
3.8.4	1-4	Loss of DC source due to other than inop battery	2 hrs: Restore all 4 DC sources to operable

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**Event Description:** Supply breaker to 1AA02 from RAT "A" (1NXRA) will trip open due to a fault on the bus. DG-1A will start, but will not re-energize 1AA02 due to the bus fault. This will require the crew to enter and complete the actions of AOP 18031-C, "Loss of Class 1E Electrical Systems". Corrective actions include reducing AFW flow to return reactor power to less than 100%, shifting electrical loads to Train "B" 1E bus 1BA03, as well as implementing tech specs for the loss of AC power.

The above Technical Specifications and the following additional Specifications should be referenced for long term required actions:

3.3.2	1-2	ESFAS instrumentation	FU 6d: Loss of AFWAS from trip of both MFPs
3.3.3	1-3	PAMS instrumentation	FU 19: Loss of CNMT H2 monitor heat tracing. (Note cross train relationship; Train A heat tracing fed from Train B power. Train B heat tracing fed from Train A power.
3.3.4	1-3	Remote shutdown system	
3.4.9	1-3	Pressurizer	2 heater groups each with 150 kw capacity and capable of being powered from emergency source
3.4.16	All	RCS activity	Chemistry notified if power changed more than 15% in one hour (SR 3.4.16.2)
3.5.2	1-3	ECCS	
3.6.6	1-4	CNMT spray and CNMT clrs	
3.7.4	1-3	SG ARVs	Also affects 3.3.4
3.7.5	1-3	AFW pumps & disch vlvs	2 or more trains may be inop
3.7.7	1-4	CCW system	
3.7.8	1-4	NSCW system	
3.7.9	1-4	Ultimate heat sink	
3.7.13	1-4	Piping pen units	
3.7.14	1-4	ESF chillers	
3.8.9	1-4	Distribution Systems - OPERATING	Condition A 8 hours
13.1.3	1-4	Boration flow paths	
13.1.5	1-4	Charging pumps - operating	
13.7.4	All	Thermal barriers	
3.4.12	4-6	COPS	
ODCM	All	RE-12444, RE-12442, RE-2565, RE-2562 are affected by loss of heat tracing for sample lines.	

Event No.: 7, 8, 9, 10, 11

**Event Description:** The loop 4 cold leg will rupture, resulting in a large LOCA. The reactor will fail to Auto Trip on the actuation signal. RHR pump B and CS pump B will both fail to auto start, requiring the OATC to manually start them. In addition, CVI dampers HV-2628B and HV-2629B (Mini Purge dampers) will fail to auto close on the CVI signal, requiring manual isolation. The crew will respond by entering 19000-C, then transition to 19010-C. The crew will transition to 19241-C, "Response to Imminent Pressurized Thermal Shock Condition," on an orange and/or red path.

Time	Position	Applicant's Action or Behavior
	CREW	<p>Diagnose a PRI LOCA.</p> <p>Indications:</p> <ul style="list-style-type: none"> <li>• PRZR pressure less than 1870 psig.</li> <li>• PRZR level lowering.</li> <li>• Containment pressure rising.</li> <li>• SI annunciator(s) lit.</li> <li>• SI ACTUATED BPLB window lit.</li> </ul>
	CREW	Performs Immediate Operator Actions for EOP 19000-C, E-0 "REACTOR TRIP OR SAFETY INJECTION"
	SS	Enters EOP 19000-C, E-0 REACTOR TRIP OR SAFETY INJECTION (Crew Update)
	OATC IOA  <b>CRITICAL TASK</b>	<p>1. Check Reactor trip:</p> <ul style="list-style-type: none"> <li>• Rod Bottom Lights – LIT (Lights are NOT LIT)</li> <li>• Reactor Trip and Bypass Breakers – OPEN (RTBs are CLOSED)</li> <li>• Neutron Flux – LOWERING</li> </ul> <p>RNO</p> <p>1. Trip Reactor using both Reactor Trip handswitches.</p> <p><b>NOTE: REACTOR MANUALLY TRIPS FROM HANDSWITCH.</b></p>
	UO IOA	<p>2. Check Turbine trip:</p> <ul style="list-style-type: none"> <li>• All Turbine Stop Valves – CLOSED.</li> </ul>



Event No.: 7, 8, 9, 10, 11

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Time	Position	Applicant's Action or Behavior
	OATC IOA	3. Checks power to the AC Emergency Busses: <ul style="list-style-type: none"> <li>a. AC Emergency Busses – AT LEAST ONE ENERGIZED.</li> <li>b. AC Emergency Busses – ALL ENERGIZED: <b>(NO)</b> <ul style="list-style-type: none"> <li>• 4160 V AC 1E Busses</li> <li>• 480V AC 1E Busses</li> </ul> </li> </ul> RNO b. Try to restore power to de-energized AC Emergency Bus while continuing with Step 4. (Bus fault still present.)
	OATC IOA	4. Check if SI is actuated. <ul style="list-style-type: none"> <li>• Any SI annunciator – LIT. <b>(YES)</b></li> <li>• SI ACTUATED BPLB window – LIT. <b>(YES)</b></li> <li>• Go to Step 6.</li> </ul>
	OATC UO	7. Perform the following: <ul style="list-style-type: none"> <li>• OATC Initial Actions Page.</li> <li>• UO Initial Actions Page.</li> </ul>
	OATC	<b>PERFORMS OATC INITIAL ACTIONS OF E-0.</b>  Step 1. Check both Trains of ECCS equipment-ALIGNING FOR INJECTION PHASE <ul style="list-style-type: none"> <li>• MLB indication. <b>(TRAIN A NO POWER)</b></li> </ul> RNO Step 1. Actuate SI. <b>(Cannot actuate Train A.)</b>
	OATC	<b>PERFORMS OATC INITIAL ACTIONS OF E-0.</b>  Step 2. Check Containment Isolation Phase A – ACTUATED: <ul style="list-style-type: none"> <li>• CIA MLB indication. <b>(TRAIN A NO POWER)</b></li> </ul> RNO Step 2. Actuate CIA

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Time	Position	Applicant's Action or Behavior
	OATC <b>CRITICAL TASK</b>	<p><b>PERFORMS OATC INITIAL ACTIONS OF E-0.</b></p> <p>Step 3. Check ECCS Pumps and NCP status:</p> <ul style="list-style-type: none"> <li>a. CCPs – RUNNING.</li> <li>b. SI Pumps – RUNNING.</li> <li>c. RHR Pumps – <b>NOT RUNNING.</b> RNO – Start RHR Pump 'B'</li> <li>d. NCP – TRIPPED.</li> </ul> <p><b><u>NOTE: 'B' Train only is energized.</u></b></p>
	OATC	<p><b>PERFORMS OATC INITIAL ACTIONS OF E-0.</b></p> <p>Step 4. Verify CCW Pumps – ONLY TWO RUNNING PER TRAIN.</p> <p><b><u>NOTE: 'B' Train only is energized.</u></b></p>
	OATC	<p><b>PERFORMS OATC INITIAL ACTIONS OF E-0.</b></p> <p>Step 5. Verify proper NSCW system operation:</p> <ul style="list-style-type: none"> <li>a. NSCW Pumps - ONLY TWO RUNNING PER TRAIN</li> <li>b. NSCW TOWER RTN HDR BYPASS BASIN handswitches – IN AUTO: <ul style="list-style-type: none"> <li>• HS-1668A</li> <li>• HS-1669A</li> </ul> </li> </ul>
	OATC	<p><b>PERFORMS OATC INITIAL ACTIONS OF E-0.</b></p> <p>Step 6. Verify Containment Cooling Units:</p> <ul style="list-style-type: none"> <li>a. ALL RUNNING IN LOW SPEED <ul style="list-style-type: none"> <li>• MLB indication</li> </ul> </li> <li>b. NSCW Cooler isolation valves – OPEN: <ul style="list-style-type: none"> <li>• MLB indication</li> </ul> </li> </ul> <p><b><u>NOTE: 'B' Train only is energized.</u></b></p>

**Event No.: 7 , 8 , 9, 10, 11**

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Time	Position	Applicant's Action or Behavior
	<p>OATC</p> <p>UO</p> <p><b>CRITICAL TASK</b></p>	<p><b>PERFORMS OATC INITIAL ACTIONS OF E-0.</b></p> <p>Step 7. Check Containment Ventilation Isolation:</p> <ul style="list-style-type: none"> <li>a. Dampers and Valves – CLOSED <ul style="list-style-type: none"> <li>• CVI MLB indication</li> </ul> </li> </ul> <p><b>NOTE: HV-2629B FAILS TO AUTO CLOSE</b></p> <p>RNO</p> <p>a. Perform the following:</p> <ul style="list-style-type: none"> <li>1) <b>Close Dampers and Valves. (Closes HV-2629B)</b></li> <li>2) Start Piping Pen Units. (<b>Train "B" Only</b>) <i>Places HS-2543 to Start.</i></li> </ul>
	<p>OATC</p> <p><b>CRITICAL TASK</b></p>	<p><b>PERFORMS OATC INITIAL ACTIONS OF E-0.</b></p> <p>Step 8. Check Containment pressure REMAINED LESS THAN 21.5 PSIG. <b>(NO)</b></p> <p>RNO</p> <p>Step 8 Verify the following:</p> <ul style="list-style-type: none"> <li>a. Containment Spray Actuated. <b>(YES)</b></li> <li>b. Containment Spray Pump discharge valves open. <b>(YES)</b></li> <li>c. <b>Containment Spray Pumps running. (NO, manually start Containment Spray Pump 'B')</b></li> </ul> <p><b>NOTE TO EXAMINER:</b> <b>TRAIN "A" NO POWER, TRAIN "B" FAILS TO AUTO START.</b></p>

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Time	Position	Applicant's Action or Behavior
	OATC	<p><b>PERFORMS OATC INITIAL ACTIONS OF E-0.</b></p> <p>Step 9. Check ECCS flows:</p> <ul style="list-style-type: none"> <li>a. BIT Flow. <b>(YES)</b></li> <li>b. RCS pressure – LESS THAN 1625 PSIG. <b>(YES)</b></li> <li>c. SI Pump flow. <b>(YES)</b></li> <li>d. RCS pressure – LESS THAN 300 PSIG <b>(YES)</b></li> <li>e. RHR Pump Flow <b>(YES)</b></li> </ul>
	OATC	<p><b>PERFORMS OATC INITIAL ACTIONS OF E-0.</b></p> <p>Step 10. Check ECCS Valve alignment – PROPER INJECTION LINEUP INDICATED ON MLBs.</p>
	OATC	<p><b>PERFORMS OATC INITIAL ACTIONS OF E-0.</b></p> <p>Step 11. Check ACCW Pumps – AT LEAST ONE RUNNING</p>
	OATC	<p><b>PERFORMS OATC INITIAL ACTIONS OF E-0.</b></p> <p>Step 12. Adjust Seal Injection flow to RCPs – 8 to 13 GPM.</p>
		<p><b>PERFORMS OATC INITIAL ACTIONS OF E-0.</b></p> <p>Step 13. Dispatch Operator to ensure one train of SPENT FUEL POOL COOLING in service per 13719, SPENT FUEL POOL COOLING AND PURIFICATION SYSTEM.</p> <p><b><u>NOTE TO EXAMINER:</u> END OF OATC INITIAL ACTIONS OF E-0.</b></p>

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Time	Position	Applicant's Action or Behavior
	UO	<b>PERFORMS UO INITIAL ACTIONS OF E-0.</b>  Step 1. Check AFW Pumps – RUNNING <ul style="list-style-type: none"> <li>• MDAFW Pumps</li> <li>• TDAFW Pump, if required</li> </ul>
	UO	<b>PERFORMS UO INITIAL ACTIONS OF E-0.</b>  Step 2. Check NR level in at least one SG – GREATER THAN 10% [32% ADVERSE]
	UO	<b>PERFORMS UO INITIAL ACTIONS OF E-0.</b>  Step 3. Check if main steamlines should be isolated: <ol style="list-style-type: none"> <li>Check for one or more of the following conditions:               <ul style="list-style-type: none"> <li>– Any steamline pressure – LESS THAN <u>OR</u> EQUAL TO 585 PSIG.</li> <li>– Containment pressure – GREATER THAN 14.5 PSIG.</li> <li>– Low Steam Pressure SI/SLI – BLOCKED <u>AND</u> High Steam Pressure Rate – ON TWO <u>OR</u> MORE CHANNELS OF ANY STEAMLINE.</li> </ul> </li> <li>Verify Main Steamline Isolation and Bypass Valves (CLOSED.)</li> </ol>
	UO	<b>PERFORMS UO INITIAL ACTIONS OF E-0.</b>  Step 4. Verify FW Isolation Valves closed: <ul style="list-style-type: none"> <li>• MFIVs</li> <li>• BFIVs</li> <li>• MFRVs</li> <li>• BFRVs</li> </ul>

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Time	Position	Applicant's Action or Behavior
	UO	<b>PERFORMS UO INITIAL ACTIONS OF E-0.</b>  Step 5. Verify SG Blowdown isolated: <ul style="list-style-type: none"> <li>Place SG Blowdown Isolation Valve handswitches HS-7603A, B, C, and D in the CLOSE position.</li> <li>SG Sample Isolation Valves – CLOSED.</li> </ul>
	UO	<b>PERFORMS UO INITIAL ACTIONS OF E-0.</b>  Step 6. Verify Diesel Generators – RUNNING. ( <i><b>TRAIN B ONLY</b></i> )
	UO	<b>PERFORMS UO INITIAL ACTIONS OF E-0.</b>  Step 7. Throttle total AFW flow as necessary to maintain SG NR levels between 10% [32% ADVERSE] and 65%.
	UO	<b>PERFORMS UO INITIAL ACTIONS OF E-0.</b>  Step 8. Verify both MFPs – TRIPPED.
	UO	<b>PERFORMS UO INITIAL ACTIONS OF E-0.</b>  Step 9. Check Main Generator Output Breakers – OPEN.  <b>NOTE TO EXAMINER: END OF UO INITIAL ACTIONS OF E-0.</b>

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[illegible]

Event No.: 7, 8, 9, 10, 11

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Time	Position	Applicant's Action or Behavior
	SS	<div style="border: 1px solid black; padding: 5px;"> <b>CAUTION</b>   A PRZR PORV Block Valve which was closed to isolate an excessively leaking or open PRZR PORV should not be opened unless used to prevent challenging the PRZR Safeties. </div>
	OATC	10. Check PRZR PORVs, Block Valves, and Spray Valves: <ol style="list-style-type: none"> <li>PRZR PORVs – CLOSED AND IN AUTO.</li> <li>Normal PRZR Spray Valves – CLOSED.</li> <li>Power to at least one Block Valve – AVAILABLE.</li> <li>PRZR PORV Block Valves – AT LEAST ONE OPEN.</li> </ol> RNO  *10d. Verify open at least one PRZR PORV Block Valve when PRZR pressure is greater than 2185 psig.
	OATC	11. Check if RCPs should be stopped. <ol style="list-style-type: none"> <li>ECCS Pumps – AT LEAST ONE RUNNING. <ul style="list-style-type: none"> <li>CCP or SI Pump</li> </ul> </li> <li>RCS pressure – LESS THAN 1375 psig. √</li> <li>STOP all RCPs.</li> </ol>
	SS / UO	12. Check SGs secondary pressure boundaries: <ol style="list-style-type: none"> <li>SG Pressures: <ul style="list-style-type: none"> <li>Any lowering in an uncontrolled manner.</li> <li>-OR-</li> <li>Any completely depressurized.</li> </ul> </li> </ol> RNO  a. Go to Step 13



Event No.: 7, 8, 9, 10, 11

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Time	Position	Applicant's Action or Behavior
	SS / UO	13. Check SG Tubes intact: <ul style="list-style-type: none"> <li>a. Direct Chemistry to take periodic activity samples of all SGs one at a time.</li> <li>b. Secondary radiation NORMAL:               <ul style="list-style-type: none"> <li>• MAIN STM LINE MONITORS:                   <ul style="list-style-type: none"> <li>• RE-13120 (SG1)</li> <li>• RE-13121 (SG2)</li> <li>• RE-13122 (SG3)</li> <li>• RE-13119 (SG4)</li> </ul> </li> <li>• CNDSR AIR EJCTR/STM RAD MONITORS:                   <ul style="list-style-type: none"> <li>• RE-12839C</li> <li>• RE-12838D (if on scale)</li> <li>• RE-12839E (if on scale)</li> </ul> </li> <li>• STM GEN LIQ PROCESS RAD:                   <ul style="list-style-type: none"> <li>• RE-0019 (Sample)</li> <li>• RE-0021 (Blowdown)</li> </ul> </li> <li>• SG sample radiation</li> </ul> </li> </ul>
	UO	
	SS	13cont. <ul style="list-style-type: none"> <li>c. Check SG levels - ANY RISING IN AN UNCONTROLLED MANNER</li> </ul> RNO <ul style="list-style-type: none"> <li>c. Go to Step 14</li> </ul>
	OATC	14. Check if RCS is intact inside Containment: <ul style="list-style-type: none"> <li>• Containment radiation – NORMAL.</li> <li>• Containment pressure – NORMAL</li> <li>• Containment Emergency Recirculation Sump levels – NORMAL</li> </ul> RNO
	SS	14. Go to 19010-C, E-1 LOSS OF REACTOR OR SECONDARY COOLANT

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Time	Position	Applicant's Action or Behavior
	SS	Transition to 19010-C, E-1 LOSS OF REACTOR OR SECONDARY COOLANT (Crew Update)
	CREW OATC/UO OATC	<p><b><u>19010-C</u></b></p> <p>1. Initiate the following:</p> <ul style="list-style-type: none"> <li>Continuous Actions and Foldout Page.</li> <li>Critical Safety Function Status Trees per 19200-C, F-0 CRITICAL SAFETY FUNCTION STATUS TREE.</li> </ul>
	SS	Transition to 19241-C, "RESPONSE TO IMMINENT PRESSURIZED THERMAL SHOCK CONDITION due to ORANGE PATH. (Crew Update)
	SS  SS OATC / UO SS	<p><b><u>19241-C</u></b></p> <div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p><b><u>CAUTION</u></b></p> <p>19231-C, FR-H.1 RESPONSE TO LOSS OF SECONDARY HEAT SINK should be implemented only if a total feed flow capability of 570 gpm is <u>NOT</u> available at any time during this procedure.</p> </div> <p>1. Initiate the following:</p> <ul style="list-style-type: none"> <li>Continuous Actions Page.</li> <li>NMP-EP-110, EMERGENCY CLASSIFICATION DETERMINATION AND INITIAL ACTION</li> </ul>

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Time	Position	Applicant's Action or Behavior
	OATC	*2. Check RWST level – GREATER THAN 29%.
	UO	*3. Check CST level – GREATER THAN 15%.
	OATC	4. Check RCS WR pressure – GREATER THAN 300 PSIG.  RNO  4. IF RHR injection flow greater than 500 gpm, THEN return to procedure and step in effect.
<b>END OF EVENT 7. PROCEED AT THE DISCRETION OF THE CHIEF EXAMINER. STEPS FOR 19010-C ARE IN THE FOLLOWING SECTION.</b>		

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Scenario No.: 2

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Event No.: 12

Event Description: 19010-C actions if examiner elects to continue.

Time	Position	Applicant's Action or Behavior
	CREW	<p><b>19010-C</b>, LOSS OF REACTOR OR SECONDARY COOLANT is entered from 19000-C step 14</p> <p>14. Check if RCS is intact inside Containment:</p> <ul style="list-style-type: none"> <li>• Containment radiation - NORMAL.</li> <li>• Containment pressure - NORMAL.</li> <li>• Containment Emergency Recirculation Sump levels - NORMAL.</li> </ul>
	CREW	<p>1. Initiate the following:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Continuous Actions and Foldout Page.</li> <li><input type="checkbox"/> Critical Safety Function Status Trees per 19200 C, F O CRITICAL SAFETY FUNCTION STATUS TREE.</li> </ul>
	SS	2. Initiate NMP EP 110, EMERGENCY CLASSIFICATION DETERMINATION AND INITIAL ACTION.
	OATC	Maintain Seal Injection flow to all RCPs - 8 TO 13 GPM.
	SS OATC	<p>1. Check if RCPs should be stopped:</p> <p>a. ECCS Pumps AT LEAST ONE RUNNING:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> CCP or SI Pump</li> </ul> <p>b. RCS pressure LESS THAN 1375 PSIG. <input type="checkbox"/> c. Stop all RCPs.</p>
	OATC	5. Check ACCW Pumps - AT LEAST ONE RUNNING.
	UO	6. Place Containment Hydrogen Monitors in service by initiating 13130, POST -ACCIDENT HYDROGEN CONTROL. (If not needed for credit, SS may direct extra operator to perform)

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Event No.: 12

Event Description: 19010-C actions if examiner elects to continue.

Time	Position	Applicant's Action or Behavior
	UO	<p>7. Check SGs secondary pressure boundaries:</p> <p>a. Identify faulted SG(s): ANY SG PRESSURE LOWERING IN AN UNCONTROLLED MANNER. -OR- ANY SG COMPLETELY DEPRESSURIZED.</p> <p>b. Faulted SG(s) ISOLATED:</p> <ul style="list-style-type: none"> <li>• Steamlines</li> <li>• MSIVs</li> <li>• BSIVs</li> <li>• TDAFW supplies</li> <li>• SG ARVs</li> <li>• Feedlines</li> <li>• MFIVs</li> <li>• BFIVs</li> <li>• MFRVs</li> <li>• BFRVs</li> <li>• AFW valves</li> <li>• SG blowdown valves</li> <li>• SG sample valves</li> </ul>
	UO	<p>*8. Check intact SG levels:</p> <p>a. NR level AT LEAST ONE GREATER THAN 10% [32% ADVERSE].</p> <p>b. Maintain NR levels between 10% [32% ADVERSE] and 65%.</p> <p>c. NR level ANY RISING IN AN UNCONTROLLED MANNER.</p> <p>d. Go to 19030 C, E 3 STEAM GENERATOR TUBE RUPTURE.</p>
		<p>9. Check SG Tubes intact:</p> <p>a. Direct Chemistry to take periodic activity samples of all SGs one at a</p>

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Scenario No.: 2

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Event No.: 12

Event Description: 19010-C actions if examiner elects to continue.

Time	Position	Applicant's Action or Behavior
	UO	<p>time.</p> <p>b. Secondary radiation NORMAL:</p> <ul style="list-style-type: none"> <li>• MAIN STM LINE MONITORS:</li> <li>• RE 13120 (SG 1)</li> <li>• RE 13121 (SG 2)</li> <li>• RE 13122 (SG 3)</li> <li>• RE 13119 (SG 4)</li> <li>• CNDSR AIR EJCTR/STM RAD MONITORS:</li> <li>• RE 12839C</li> <li>• RE 12839D (if on scale)</li> <li>• RE 12839E (if on scale)</li> <li>• STM GEN LIQ PROCESS RAD:</li> <li>• RE 0019 (Sample)</li> <li>• RE 0021 (Blowdown)</li> <li>• SG sample radiation.</li> </ul> <p>c. Check SG levels ANY RISING IN AN UNCONTROLLED MANNER.</p> <p>d. Go to 19030 C, E 3 STEAM GENERATOR TUBE RUPTURE.</p>
	OATC	<p>*10. Check PRZR PORVs and Block Valves:</p> <ul style="list-style-type: none"> <li>a. Power to PRZR PORV Block Valves AVAILABLE.</li> <li>b. PRZR PORVs CLOSED.</li> <li>c. PRZR PORV Block Valves AT LEAST ONE OPEN.</li> <li>d. Any RCS WR CL temperature LESS THAN 220°F.</li> <li>e. Arm COPS.</li> </ul>
	OATC	<p>10C. RNO</p> <p>c. IF NOT closed to isolate an excessively leaking or open PRZR PORV, AND WHEN PRZR pressure is greater than 2185 psig, THEN verify open at least one PRZR PORV Block Valve.</p>
		<p>*11. Check if ECCS flow should be reduced:</p> <ul style="list-style-type: none"> <li>a. RCS Subcooling GREATER THAN 24°F [38°F ADVERSE].</li> <li>b. Secondary Heat Sink:</li> </ul>

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Event No.: 12

Event Description: 19010-C actions if examiner elects to continue.

Time	Position	Applicant's Action or Behavior
	SS OATC UO	<p>Total feed flow to intact SG(s) GREATER THAN 570 GPM.</p> <p>-OR-</p> <p>NR level in at least one intact SG GREATER THAN 10% [32% ADVERSE].</p> <p>c. RCS pressure STABLE OR RISING.</p> <p>d. PRZR level GREATER THAN 9% [37% ADVERSE].</p> <p>e. Go to 19011 C, ES 1.1 SI TERMINATION.</p>
	OATC       OATC	<p>*12. Check if Containment Spray should be stopped:</p> <p>a. CS Pumps RUNNING.</p> <p>b. Containment pressure LESS THAN 15 PSIG.</p> <p>c. Any Containment radiation levels INDICATE HIGH DUE TO PRIMARY LOCA:</p> <p>RE 002</p> <p>RE 003</p> <p>RE 005</p> <p>RE 006</p> <p>d. Operate CS Pumps:</p> <p>Minimum of 2 hours.</p> <p>At least 1.5 hours in recirculation mode.</p>
	SS OATC UO	<p>CAUTIONS</p> <p>If offsite power is lost after SI reset, action is required to restart the following ESF equipment if plant conditions require their operation:</p> <ul style="list-style-type: none"> <li>• RHR Pumps</li> <li>• SI Pumps</li> <li>• Post LOCA Cavity Purge Units</li> <li>• Containment Coolers in low speed (Started in high speed on a UV signal).</li> <li>• ESF Chilled Water Pumps (If CRI is reset).</li> </ul>
		<p>13. Check if RHR Pumps should be stopped:</p> <p>a. RHR Pumps ANY RUNNING WITH SUCTION ALIGNED TO RWST.</p> <p>b. RCS pressure:</p>

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Event No.: 12

Event Description: 19010-C actions if examiner elects to continue.

Time	Position	Applicant's Action or Behavior
	OATC	1) Greater than 300 psig. 2) Stable or rising. c. Reset SI. d. Stop RHR Pumps.
	OATC	14. IF RCS pressure lowers in an uncontrolled manner to less than 300 psig, THEN restart RHR Pumps.
	SS OATC UO	15. Check RCS and SG pressures: • Pressure in all SGs STABLE OR RISING. • RCS pressure STABLE OR LOWERING.
	SS OATC UO	16. Check if DGs should be stopped: a. AC Emergency Busses ENERGIZED BY OFFSITE POWER. b. Reset SI, if necessary. c. Stop any unloaded DG and place in standby by initiating 13145, DIESEL GENERATORS. d. Check Stub Busses ENERGIZED: • NB01 • NB10
		16d. RNO d. Energize Stub Busses by performing the following as necessary:



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Event No.: 12

Event Description: 19010-C actions if examiner elects to continue.

Time	Position	Applicant's Action or Behavior								
	UO	<table><tr><th>NB01</th><th>NB10</th></tr><tr><td>1) Open breaker NB01-01</td><td>1) Open breaker NB10-01</td></tr><tr><td>2) Close breaker AA02-22</td><td>2) Close breaker BA03-18</td></tr><tr><td>3) Close breaker NB01-01</td><td>3) Close breaker NB10-01</td></tr></table>	NB01	NB10	1) Open breaker NB01-01	1) Open breaker NB10-01	2) Close breaker AA02-22	2) Close breaker BA03-18	3) Close breaker NB01-01	3) Close breaker NB10-01
NB01	NB10									
1) Open breaker NB01-01	1) Open breaker NB10-01									
2) Close breaker AA02-22	2) Close breaker BA03-18									
3) Close breaker NB01-01	3) Close breaker NB10-01									
	OATC	<p>17. Check Cold Leg recirculation capability:</p> <p>a. Power available to:</p> <p>Train A components:</p> <ul style="list-style-type: none"><li>• HV 8811A CNMT SUMP TO RHR PMP A SUCTION</li><li>• RHR Pump A OPERABLE</li><li>• HV 8809A RHR PMP A TO COLD LEG 1&amp;2 ISO VLV</li><li>• RHR Heat Exchanger A OPERABLE</li></ul> <p>-OR-</p> <p>Train B components:</p> <ul style="list-style-type: none"><li>• HV 8811B CNMT SUMP TO RHR PMP B SUCTION</li><li>• RHR Pump B OPERABLE</li><li>• HV 8809B RHR PMP B TO COLD LEG 3&amp;4 ISO VLV</li><li>• RHR Heat Exchanger B OPERABLE</li></ul>								
	UO	<p>18. Check Auxiliary Building leak detection systems:</p> <p>a. PLANT VENT Radiation Monitors NORMAL:</p> <ul style="list-style-type: none"><li>• RE 12442A EFFL PART</li><li>• RE 12442B EFFL IODINE</li></ul>								

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Scenario No.: 2

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Event No.: 12

Event Description: 19010-C actions if examiner elects to continue.

Time	Position	Applicant's Action or Behavior
		<ul style="list-style-type: none"> <li>• RE 12442C EFFL RAD</li> <li>• RE 12444C RADIOGAS RAD</li> </ul> <p>b. Auxiliary Building break detection system on QPCP ALL LEAK DETECTION STATUS LIGHTS NOT LIT.</p>
	SS	<p>19. Direct Chemistry to obtain samples:</p> <ul style="list-style-type: none"> <li>• For boron, pH, and radioactivity:</li> <li>• RCS</li> <li>• Both Containment Emergency Sumps (if cold leg recirculation has been established.)</li> <li>• For radioactivity, hydrogen and oxygen concentrations:</li> <li>• Containment atmosphere</li> </ul>
	SS	<p>20. Evaluate plant equipment:</p> <p>a. Secure unnecessary plant equipment.</p> <p>b. Within 8 hours of SI actuation, isolate NSCW Corrosion Monitor Racks:</p> <ul style="list-style-type: none"> <li>• Close 1202 U4 179</li> <li>• Close 1202 U4 180 (located in NSCTs on NSCW return header)</li> </ul> <p>c. Repair or make available inoperable equipment which may be required.</p> <p>d. Consult TSC for additional equipment to be started or actions to be taken to assist in recovery including:</p> <ul style="list-style-type: none"> <li>• H2 Monitors</li> <li>• CRDM Fans</li> <li>• Within 5 days, initiate Containment inspection / cleanup if Containment Spray actuated and was terminated prior to recirculation.</li> </ul>
	SS	<p>21. In the event of a Design Basis Accident, the following apply concerning conservation of Ultimate Heat Sink inventory:</p> <ul style="list-style-type: none"> <li>• IF a DBA LOCA coincident with a LOSP has occurred, THEN secure one train of NSCW within 24 hours of the initiating event</li> </ul>

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Scenario No.: 2

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Event No.: 12

Event Description: 19010-C actions if examiner elects to continue.

Time	Position	Applicant's Action or Behavior
	SS	<p>per 13150, NUCLEAR SERVICE COOLING WATER SYSTEM.</p> <ul style="list-style-type: none"><li>• IF a DBA LOCA without an LOSP has occurred and normal NSCW makeup is lost, THEN secure one train of NSCW within 24 hours of the loss of makeup capability per 13150, NUCLEAR SERVICE COOLING WATER SYSTEM.</li><li>• Initiate periodic monitoring of NSCW Basin level to ensure adequate inventory is maintained for continued operation of NSCW Basin makeup.</li><li>• Consult TSC as necessary for alternate sources of NSCW Basin makeup.</li></ul>
	SS OATC	<p>22. Check if RCS cooldown and depressurization is required:</p> <ul style="list-style-type: none"><li>a. RCS pressure GREATER THAN 300 PSIG.</li><li>b. Go to 19012 C, ES 1.2 POST LOCA COOLDOWN AND DEPRESSURIZATION.</li></ul>
<b>END OF SCENARIO. PROCEED AT THE DISCRETION OF THE CHIEF EXAMINER.</b>		

## Final Scenario 3

Facility: VogtleScenario No.: 3Op-Test No.: 2014-301

Examiners:

Operators:

Snap 230

Initial Conditions: 100% Power BOL.Equipment OOS: CCW pump 5, Air Compressor 3Turnover: INFO LCO 3.7.7 CCW Train A, Containment Mini-purge is in service, 'B' MFP vibration monitoring in progress in the field, 'A' CCP caution tagged "Run only in emergency."**Preloaded Malfunctions:****HS19338 Air Compressor 1 Rotary trip (Trigger 1)****A-LO\_HS19338\_Y 1HS-19338 YELLOW A531P27-B15 ac #1 Amber light – ON (Trigger 1)****ALB33 A06 480V SWGR 1NB03 TROUBLE (Trigger 1)****PR 02B – PT-456 PZR pressure transmitter fails low (Trigger 2)****TU 11 – EHC pump train "A" trip (Trigger 3)****CV 15 - Room A09 Temp Detector Failure (Trigger 4)****SG 01A (3%) – SGTL on SG#1 of ~30 gpm (Trigger 5)****SG 01A (ramp to 45%/60 sec) – SGTR on SG#1****HS9382 HS-9382 AIR COMPRESSOR #3 RECIPROCATING – STOP****A-LO\_HS9382\_G 1HS-9382 GREEN A531P30-A6 - OFF****IA 09b – Air compressor #2 auto start failure****IA 09d – Air compressor #4 auto start failure****TU 10B – EHC pump "B" auto start failure****Override 1HS-3009 to OPEN.****MS 12A – MSIVs on Loop #1 fail open****ES 22A HV-8801A Auto Actuation Failure – Train A****ES 22B HV-8801B Auto Actuation Failure – Train B**

Event No.	Malf. No.	Event Type*	Event Description
1	AC 1 Trip (On trigger)	C-UO C-SS	Air Compressor #1 trips. Standby compressor fails to start in auto. ARP 17001-1 for ALB01-C06 or 18028-C for Loss of Instrument Air <b>(Trigger 1)</b>
2	PR02B 100%	TS-SS	Pressurizer Pressure channel, PT-456, fails low. 18001-C for Instrumentation Malfunction, Section C LCO 3.3.1, RTS Instrumentation, Fu 6, Fu 8a, and 8b, & 3.3.2, ESFAS Instrumentation, Fu 1d and Fu 8b (1 hour action) <b>(Trigger 2)</b>

3	TU11 TU10B	C-UO C-SS	EHC Pump Train "A" Trips with auto start failure of Standby Pump. ARP 17020-1, for ALB20-D05 <b>(Trigger 3)</b> 1NB02 Trouble alarm will reflash when auto start of standby pump does not start
4	CV15	I-OATC I-SS	Room A09 Temp Detector Failure (HV-15214 closes - Loss of Letdown) Enter 18007-C for Loss of Letdown TRM 13.3.4, only one channel required. Normal Letdown cannot be restored until failed detector is repaired. <b>(Trigger 4)</b>
5	N/A	N-OATC N-SS	Place excess letdown in service per 13008-1, "Chemical and Volume Control System Excess Letdown"
6	SG01A 3% No Ramp	C-OATC C-SS TS-SS	SGTL on SG # 1 of ~ 30 gpm 18009-C for SG Tube Leak LCO 3.4.13, RCS Operational Leakage <b>(Trigger 5)</b>
7	N/A	R-OATC R-SS N-UO	Lower power per 18013-C, "Rapid Down Power"
8	SG01A Ramp 3% to 45% 60 sec.	M-ALL	SGTR on SG #1 19000-C for Reactor Trip or Safety Injection Manually adjust severity of SG01A to 45% with a 60 second ramp.
9	MS12A	C-UO C-SS	Main Steam Isolation valves 1HV-3006A and 1HV-3006B fail open.
10	ES22A ES22B	C-OATC C-SS	CVCS BIT isolation valves 1HV-8801A and 1HV-8801B auto actuation failure.
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

**Scenario Objective:**

Normal plant operations, loss of letdown, place excess letdown in service, SGTL requiring power reduction, followed by a SGTR. The crew is expected to respond to various component and instrument malfunctions per AOP and ARP guidance, and recognize and respond to major plant events per the EOP network.

**Event 1:**

Air compressor #1 trips. Standby compressor does not start in automatic.

**Verifiable Actions:****SS**

Enter 18028-C, "Loss of Instrument Air"

OR

Start per ALB01-C06 ARP response

**UO**

Respond to the lowering air pressure

Start standby air compressor 2 or 4 manually to maintain service and instrument air pressure

If Air Compressor HS is taken to PTL, the 1NB03 annunciator will have to be cleared.

**Event 2:**

Pressurizer Pressure transmitter, PT-456, fails low

**Verifiable Actions:****SS**

Enter 18001-C, "Systems Instrumentation Malfunction," Section C

**OATC**

Perform IOA to close pressurizer spray valves, if required.

Check controlling channel operating properly (YES)

Energize, as necessary, pressurizer heaters to raise pressurizer pressure (NA)

Swap pressurizer pressure control to an unaffected channel (455 / 458)

Adjust Pressurizer Master Controller to 25% demand and place in auto (NA)

Place PORV 1PV-455A, pressurizer spray controllers, and pressurizer heaters in auto (NA)

**Technical Specifications:**

LCO 3.3.1, Reactor Trip Instrumentation, Fu 6, Fu 8a, and Fu 8b

LCO 3.3.2, ESFAS Instrumentation, Fu 1d and Fu 8b

**Event 3:**

EHC Pump A trips with AUTO Start failure of Standby Pump as indicated by annunciator ALB033-B07 1NB02 TROUBLE alarm. Shortly afterward ALB020-D05 HYD FLUID LO PRESS will alarm.

**Verifiable Actions:****UO**

Manually start EHC Pump "B" using 1HS-6540 while referencing ARP 17020-1.

**Event 4:**

Room A09 Temperature Detector Failure (CVCS Pipe Break Protection Valve 1HV-15214 closes, which results in loss of letdown)

Verifiable Actions:**SS**

Enter 18007 "CVCS Malfunction," is entered

**OATC**

Close 1HV-8149A/B/C letdown orifice valves

Close 1LV-459 letdown isolation valves

Close 1LV-460 letdown isolation valves

Adjust 1HC-182 and 1FIC-121 to reduce charging to minimum

**UO**

Investigate and acknowledge ALB63-E01 CVCS PIPE BREAK RM PROT ACTUATION alarm.

Technical Specifications:

TRM 13.3.4, Info LCO

**Event 5:**

Place excess letdown in service

Verifiable Actions:**OATC**

Per 13008-C, "Chemical and Volume Control System Excess Letdown," place Excess Letdown in service:

- Open 1HV-8153 and 1HV-8154 Excess Letdown Isolations.
- Open 1HC-0123 to control Excess Letdown temperature and pressure within procedural limits.
- Adjust charging and seal injection using 1FIC-0121 and 1HC-0182 to control pressurizer level.
- 

**Event 6:**

Small SGTL of ~ 30 gpm on Steam Generator #1

Verifiable Actions:**SS**

Enter 18009-C, "Steam Generator Tube Leak"

**OATC**

Adjust charging using FV-0121, Charging Controller

Adjust RCP seal injection flow using HIC-0182, Seal Controller

Determine an approximate leakage rate

Technical Specifications:

LCO 3.4.13, RCS Identified Leakage, Condition A, for SGTL in excess of limits



**Event 7:**

Power reduction per 18013, "Rapid Power Reduction," due to SGTL > 5 gpm

**Verifiable Actions:****SS**

Brief the down power per 18013-C  
Maintain oversight function  
Authorize reactivity manipulations

**OATC**

Borate as required, verify proper operation of control rods.

**UO**

Manually reduce turbine load using Load Set Potentiometer or Load Decrease Pushbutton.

**Event 8:**

SGTR on Steam Generator #1

**Verifiable Actions:****SS**

Enter 18004-C, "Reactor Coolant System Leakage," then transition to 19000-C, "Reactor Trip or Safety Injection," when pressurizer level cannot be maintained. Transition to 19030-C, "Steam Generator Tube Rupture."

**OATC**

Raise charging flow to maintain pressurizer level  
Isolate CVCS letdown flow path  
Start additional charging pump  
Manually trip the reactor in response to inability to control pressurizer level.  
Manually actuate Safety Injection

**Event 9:**

MSIVs fail to close on ruptured SG #1 requiring alternate steps to isolate the ruptured Steam Generator.

**Verifiable Actions:****UO**

Manually trip TDAFW pump using Trip & Throttle valve due to 1HV-3009 failing to close.  
Manually close MSIV and Bypasses on Steam Generators 2, 3, and 4 due to MSIV loop 1 will not close.  
Place SJAE #2 handswitch to the OFF position.  
Manually adjust ARV for Loop 1 to 7.73 on potentiometer and control SG #1 pressure ~ 1160 psig.  
Manually isolate MDAFW and TDAFW flow to SG #1 after verifying NR level > 10%.

**Event 10:**

CVCS BIT Isolation valves, 1HV-8801A and 1HV-8801B, fail to auto open on Safety Injection signal.

Verifiable Actions:**OATC**

Manually open BIT isolation valve 1HV-8801A and /or 1HV-8801B while performing OATC Initial Actions of 19000-C or while determining RCP Trip Criteria from Foldout Page of 19000-C.

Scenario is complete after ruptured SG #1 is isolated and RCS cool down is performed OR at chief examiner discretion.


**CRITICAL TASKS:**

- 1) Manually trip the TDAFW pump using the Trip & Throttle Valve due to failure of 1HV-3009 to close while performing 19030-C SG isolation steps.**  
Isolating steam to the TDAFW pump is required to prevent an unmonitored release of radioactive steam directly to the environment through its turbine exhaust. Failing to isolate steam to the TDAFW pump constitutes task failure.
- 2) Manually close MSIVs and BSIVs on Steam Generators #2, 3, and 4 due to the failure of loop 1 MSIVs to close while performing 19030-C Steam Generator isolation steps.**  
Isolating the ruptured steam generator from the intact generators to establish a pressure differential between the ruptured and intact steam generators is a necessary step toward terminating primary to secondary leakage. Per the WOG Critical Task guidelines, a lack of action that results in an overfill condition in the SG (NR level at 100%) constitutes a task failure.
- 3) Manually isolate MDAFW and TDAFW flow to Steam Generator #1 once NR level is > 10% during 19030-C Steam Generator isolation steps.**  
Isolating all feedwater to the ruptured steam generator reduces the possibility of overfilling and sending water into the steam lines. Per the WOG Critical Task guidelines, a lack of action that results in an overfill condition in the SG (NR level at 100%) constitutes task failure.
- 4) Stop RCS depressurization following refill of pressurizer during response to steam generator tube rupture.**  
Per the EOP WOG background document, stopping the RCS depressurization prior to overfilling the pressurizer is critical because it prevents the loss of pressurizer pressure control, which would complicate recovery actions. Failure to stop the RCS depressurization prior to the hot calibrated pressurizer level instruments reaching 100% level constitutes task failure.
- 5) Manually start Air Compressor #2 when Air Compressor #1 trips.**  
Starting Air Compressor #2 is critical because with only one air compressor running, air header pressure will lower until feedwater valves will close, which leads to an automatic reactor trip. Not manually starting the standby Air Compressor before the reactor automatically trips constitutes task failure.
- 6) Manually start EHC Pump when the running EHC pump trips and the standby pump fails to automatically start.**  
Starting the standby EHC is required because with no EHC pump in service, the main turbine will automatically trip with lowering EHC pressure. With power above the P-9 setpoint, the reactor will also automatically trip. Not manually starting the standby EHC pump before the turbine automatically trips constitutes task failure.

7) **Place excess letdown in service and lower pressurizer level following a loss of CVCS letdown flow.**

Placing excess letdown in service to lower pressurizer level is required to support pressurizer level control. The reactor will automatically trip if pressurizer level reaches 92%. If excess letdown is not placed in service to lower pressurizer level before pressurizer level reaches 92%, the task is failed.

Target Quantitative Attributes (Per Scenario; See Section D.5.d)		Actual Attributes
1.	Total malfunctions (5–8)	6
2.	Malfunctions after EOP entry (1–2)	2
3.	Abnormal events (2–4)	5
4.	Major transients (1–2)	1
5.	EOPs entered/requiring substantive actions (1–2)	2
6.	EOP contingencies requiring substantive actions (0–2)	0
7.	Critical tasks (2–3)	7

	<p align="center"><b>NUCLEAR SAFETY FOCUS</b></p> <p align="center"><b>TARGET ZERO</b></p>			
<table border="0"> <tr> <td> <p><b><u>Protected Train:</u></b></p> <p><input type="checkbox"/> Alpha</p> <p><input checked="" type="checkbox"/> Bravo</p> </td> <td> <p><b>EOOS:</b></p> <p><input checked="" type="checkbox"/> Green</p> <p><input type="checkbox"/> Yellow</p> <p><input type="checkbox"/> Orange</p> <p><input type="checkbox"/> Red</p> </td> </tr> </table>			<p><b><u>Protected Train:</u></b></p> <p><input type="checkbox"/> Alpha</p> <p><input checked="" type="checkbox"/> Bravo</p>	<p><b>EOOS:</b></p> <p><input checked="" type="checkbox"/> Green</p> <p><input type="checkbox"/> Yellow</p> <p><input type="checkbox"/> Orange</p> <p><input type="checkbox"/> Red</p>
<p><b><u>Protected Train:</u></b></p> <p><input type="checkbox"/> Alpha</p> <p><input checked="" type="checkbox"/> Bravo</p>	<p><b>EOOS:</b></p> <p><input checked="" type="checkbox"/> Green</p> <p><input type="checkbox"/> Yellow</p> <p><input type="checkbox"/> Orange</p> <p><input type="checkbox"/> Red</p>			
<p><b>Plant Conditions:</b></p>	<p>100% RTP BOL</p>			
<p><b>Major Activities:</b></p>	<p>Maintain 100% power.</p>			
<p><b>Active LCOs:</b></p>	<p><input type="checkbox"/> INFO LCO 3.7.7 CCW Train A</p>			
<p><b>OOS/ Degraded CR Instruments:</b></p>	<p><input type="checkbox"/> None</p>			
<p><b>Narrative Status:</b></p>	<p><input type="checkbox"/> Containment mini-purge is in service for a planned Containment Entry on next shift.</p> <p><input type="checkbox"/> CCW Pump #5 Danger Tagged for corrective maintenance on the motor bearing. No forecast return to service time is available on this emergent work item.</p> <p><input type="checkbox"/> Air Compressor #3 Danger Tagged for PM's for the next 24 hours.</p> <p><input type="checkbox"/> CCP A Caution Tagged. Pump is operable but is to be run only in emergency due to minor bearing oil leakage when operating. Repair plan is being developed.</p> <p><input type="checkbox"/> MFPT B vibration monitoring is in progress in the field (Vogtle engineering and vendors). Elevated vibrations have been observed in the last several days. Investigation continues.</p>			

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Scenario No.: 3

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Event No.: 1

**Event Description:** Trip of Air Compressor #1 with auto start failure of the standby air compressor. The crew may respond initially per ARP 17033 for annunciator ALB33 A06, "480V SWGR 1NB03 TROUBLE". When the loss of AC#1 is recognized the SS should enter AOP 18028-C, "Loss of Instrument Air." The crew will then take action to correct the malfunction per the guidance of the AOP.

Time	Position	Applicant's Action or Behavior
	CREW	<p>Diagnose trip of Air Compressor #1:</p> <p>Symptoms / alarms:</p> <p>ALB33-A06 480V SWGR 1NB03 TROUBLE</p> <p>Indications:</p> <ul style="list-style-type: none"> <li>Amber light lit on 1HS-19338 hand switch for AC #1. <i>Trip of running air compressor with failure of standby to start is entry criteria for 18028-C.</i></li> <li>Lowering Instrument Air pressure.</li> </ul>
	UO	Enter ARP 17033-1 for annunciator ALB33 A06, "480V SWGR 1NB03 TROUBLE" (Crew update)
	UO	<p><b><u>17033-1</u></b></p> <p>1. Check for associated alarms and indications.</p> <p><b><i>Note to examiner: Operator should recognize the trip of Air Compressor, and the SS should enter AOP 18028-C, "Loss of Instrument Air."</i></b></p> <p><b><i>If the crew anticipates the low pressure condition and starts the standby air compressor, AOP entry may not be required.</i></b></p>
	UO	<p><b><u>18028-C</u></b></p> <p>1. Check proper operation of all available air compressors on affected unit:</p> <p>a. All air compressors – RUNNING. <b><u>NO</u></b> Go to 1a. RNO.</p> <p>b. All air compressors - PROPERLY LOADING <u>AND</u> UNLOADING. <b><i>Operator will be dispatched to investigate.</i></b></p>

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Scenario No.: 3

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Event No.: 1

**Event Description:** Trip of Air Compressor #1 with auto start failure of the standby air compressor. The crew may respond initially per ARP 17033 for annunciator ALB33 A06, "480V SWGR 1NB03 TROUBLE". When the loss of AC#1 is recognized the SS should enter AOP 18028-C, "Loss of Instrument Air." The crew will then take action to correct the malfunction per the guidance of the AOP.

Time	Position	Applicant's Action or Behavior
	UO <b>CRITICAL TASK</b>	1a. RNO  Start all available air compressors on affected unit.
	UO	2. Verify proper operation of Instrument Air dryers. <i>Operator will be dispatched to investigate.</i>
	UO	3. Verify proper operation of Service Air dryers. <i>Operator will be dispatched to investigate.</i>
	SS UO	4. Initiate the Continuous Actions Page.
	SS	<div style="border: 1px solid black; padding: 10px; text-align: center;"> <p><b><u>CAUTION</u></b></p> <p>Loss of Turbine Building instrument air will cause all extraction steam stop valves to close. MFP miniflow valves and feedwater heater and drain tank hi-level dump valves will fail open.</p> </div>
	UO	5. Check Instrument Air header pressure – LOWERING. <i>No – Instrument Air Pressure should be rising since the standby air compressor has been started.</i>  Step 5 RNO – Go to Step 17.
	SS	17. Identify source of leakage and isolate if possible.

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Scenario No.: 3

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Event No.: 1

**Event Description:** Trip of Air Compressor #1 with auto start failure of the standby air compressor. The crew may respond initially per ARP 17033 for annunciator ALB33 A06, "480V SWGR 1NB03 TROUBLE". When the loss of AC#1 is recognized the SS should enter AOP 18028-C, "Loss of Instrument Air." The crew will then take action to correct the malfunction per the guidance of the AOP.

Time	Position	Applicant's Action or Behavior
	SS	18. Check affected Unit Mode - MODES 1 <u>OR</u> 2.
	UO	19. Check Instrument Air header pressure - REMAINS GREATER THAN 70 PSIG.
	UO	20. Check header pressure – STABLE <u>OR</u> RISING.
	UO	21. Check Instrument Air header pressure on PI-9361 - GREATER THAN 100 PSIG.
	UO	22. Check PV-9375 Service Air System Trip Valve – OPEN.
	UO	23. Verify SFP gate seals available: <ul style="list-style-type: none"> <li>a. Service air pressure:               <ul style="list-style-type: none"> <li>- Approximately 100 psig:                   <ul style="list-style-type: none"> <li>- 1-PI-10637</li> <li>-AND-</li> <li>- 2-PI-10637</li> </ul> </li> <li>- Greater than regulator setting of backup nitrogen bottles.</li> </ul> </li> <li>b. Greater than 500 psig in backup nitrogen bottles.</li> </ul>

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Event No.: 1

**Event Description:** Trip of Air Compressor #1 with auto start failure of the standby air compressor. The crew may respond initially per ARP 17033 for annunciator ALB33 A06, "480V SWGR 1NB03 TROUBLE". When the loss of AC#1 is recognized the SS should enter AOP 18028-C, "Loss of Instrument Air." The crew will then take action to correct the malfunction per the guidance of the AOP.

Time	Position	Applicant's Action or Behavior
	SS	<div><p><u>NOTE</u></p><p>Total loss of instrument air pressure will preclude continued unit operation.</p></div> <p>24. Determine continued unit operation - ALLOWED UNDER UOP IN EFFECT.</p>
	SS	25. <b>Check cause of loss of Instrument Air – CORRECTED.</b>
	SS UO	26. Restore air systems to normal by initiating 13710, SERVICE AIR SYSTEM and 13711, INSTRUMENT AIR SYSTEM.
	SS	27. Return to procedure and step in effect
<b>END OF EVENT 1. PROCEED TO NEXT EVENT AT THE DISCRETION OF THE CHIEF EXAMINER.</b>		



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Event No.: 2

**Event Description:** Crew will respond to the low failure of a PRZR pressure secondary controlling channel (PT-456). Immediate Operator Actions are required per 18001-C, Section C. The crew will continue in 18001-C to correct the malfunction.

Time	Position	Applicant's Action or Behavior
	CREW	<p>Diagnose failure of the PRZR pressure channel PI-456.</p> <p>Symptoms / alarms:</p> <ul style="list-style-type: none"> <li>• ALB10-E03 OVERTEMP <math>\Delta T</math> ROD BLOCK AND RUNBACK ALERT</li> <li>• ALB11-A02 PRZR LO PRESS SI ALERT</li> <li>• ALB11-B02 PRZR LO PRESS ALERT</li> <li>• ALB12-A06 PRZR PRESS LO PORV BLOCK</li> </ul> <p>Indications:</p> <ul style="list-style-type: none"> <li>• 1PI-456 at bottom of scale.</li> </ul>
	OATC	<p><b><u>18001- C, SECTION C, IMMEDIATE OPERATOR ACTIONS</u></b></p> <p>C1. Check RCS pressure – STABLE OR RISING. <b>(STABLE)</b></p> <p><b><i>No further action required.</i></b></p>
	SS	<p>Verifies immediate operator actions performed with OATC.</p> <p>Enters AOP 18001-C, Section C. (Crew Update)</p>
	SS	<p><b><u>18001-C SECTION C SUBSEQUENT OPERATOR ACTIONS</u></b></p> <div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p style="text-align: center;"><b><u>CAUTION</u></b></p> <p>Failure of the controlling channel may saturate the Master Pressure Controller and cause inadvertent operation of the spray valves during recovery</p> </div>
	OATC	<p>C2. Check Controlling channel – OPERATING PROPERLY. <b>(YES)</b></p>

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Event No.: 2

**Event Description:** Crew will respond to the low failure of a PRZR pressure secondary controlling channel (PT-456). Immediate Operator Actions are required per 18001-C, Section C. The crew will continue in 18001-C to correct the malfunction.

Time	Position	Applicant's Action or Behavior
	OATC / UO	C3. Initiate the Continuous Actions page.
	OATC	*C4. Control PRZR pressure using heaters <u>and</u> sprays – BETWEEN 2220 AND 2250 PSIG.
	OATC	C5. Check PIC-455A Pressurizer Master Pressure Controller IN – AUTO WITH OUTPUT SIGNAL APPROXIMATELY 25%.
	OATC	C6. Check affected channel selected on PS-455F PRZR PRESS CNTL SELECT. <b>(YES)</b>
	OATC	C7. Select unaffected channels on PS-455F: <ul style="list-style-type: none"><li>• Select channel 455 / 458 for control since PT-456 failed low.</li></ul>
	OATC	C8. Perform the following: <ul style="list-style-type: none"><li>a. Check PRZR pressure – STABLE AT APPROXIMATELY 2235 PSIG</li><li>b. Place PRZR heaters in AUTO.</li><li>c. Place PRZR spray valve controllers in AUTO.</li></ul>

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Event No.: 2

**Event Description:** Crew will respond to the low failure of a PRZR pressure secondary controlling channel (PT-456). Immediate Operator Actions are required per 18001-C, Section C. The crew will continue in 18001-C to correct the malfunction.

Time	Position	Applicant's Action or Behavior
	OATC	C9. Places PORV-455 in AUTO using 1HS-455A and verify proper operation.
	OATC	C10. Returns PRZR pressure Master controller PIC-455A to AUTO. <i>(Already in AUTO.)</i>
	OATC	C11. Selects same channel on PS-455G PRZR PRESS REC SEL as selected on PS-455F. <i>(Already selected.)</i>
	OATC / SS	C12. Check P-11 status light on BPLP indicates correctly for plant condition within one hour. <i>(Not Lit)</i>
	SS	C13. Notify I & C to initiate repairs. Calls SS C & T to perform the following: <ul style="list-style-type: none"><li>• Notify Operations Duty of AOP entry.</li><li>• Write a Condition Report.</li><li>• Notify Maintenance of the failure.</li></ul>

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Event No.: 2

**Event Description:** Crew will respond to the low failure of a PRZR pressure secondary controlling channel (PT-456). Immediate Operator Actions are required per 18001-C, Section C. The crew will continue in 18001-C to correct the malfunction.

Time	Position	Applicant's Action or Behavior		
	SS	C14. Bypass the affected channel per 13509-C, BYPASS TEST INSTRUMENTATION (BTI) PANEL OPERATION if desired. <b>NOTE: It is not expected the SS will desire to bypass the channel.</b>		
	SS	C15. Trip the affected channel bistables and place the associated MASTER TEST switches in TEST position per TABLE C1 within 72 hours. (TS 3.3.1 & 3.3.2). <b>NOTE: It is not expected the SS will trip affected channel bistables</b>		
	SS	C16. Initiate the applicable actions of: <ul style="list-style-type: none"> <li>• TS: 3.3.1 FU 6 Condition E OTΔT RX TRIP</li> <li>• TS: 3.3.1 FU 8a Condition M PZR LO PRESS RX TRIP</li> <li>• TS: 3.3.1 FU 8b Condition E PZR HI PRESS RX TRIP</li> <li>• TS: 3.3.2 FU 1d Condition D LOW PZR PRESS SI</li> <li>• TS: 3.3.2 FU 8b Condition L PZR PRESSURE, P-11</li> </ul>		
	TS	<b>LCO 3.3.1 FU 6 CONDITION E OTΔT RX TRIP</b> <b>LCO 3.3.1 FU 8b CONDITION E PZR HI PRESS RX TRIP</b>		
		<u>CONDITION</u> E. One channel Inoperable	<u>REQUIRED ACTION</u> E.1 Place channel in trip. <u>OR</u> E.2 Be in MODE 3.	<u>COMPLETION TIME</u> 72 hours  78 hours

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Event No.: 2

**Event Description:** Crew will respond to the low failure of a PRZR pressure secondary controlling channel (PT-456). Immediate Operator Actions are required per 18001-C, Section C. The crew will continue in 18001-C to correct the malfunction.

Time	Position	Applicant's Action or Behavior		
	TS	<b>LCO 3.3.1 FU 8a CONDITION M PZR LO PRESS RX TRIP</b>		
		<u>CONDITION</u> M. One channel inoperable	<u>REQUIRED ACTION</u> M.1 Place channel in trip. <u>OR</u> M.2 Reduce THERMAL POWER to < P-7.	<u>COMPLETION TIME</u> 72 hours 78 hours
	TS	<b>LCO 3.3.2 FU 1d CONDITION D LOW PZR PRESS SI</b>		
		<u>CONDITION</u> D. One channel inoperable	<u>REQUIRED ACTION</u> D.1 Place channel in trip. <u>OR</u> D.2.1 Be in MODE 3. <u>AND</u> D.2.2 Be in MODE 4.	<u>COMPLETION TIME</u> 72 hours 78 hours 84 hours
	TS	<b>LCO 3.3.2 FU 8b CONDITION L PZR PRESSURE, P-11</b>		
		<u>CONDITION</u> L. One or more Pressurizer Pressure, P-11 channels inoperable	<u>REQUIRED ACTION</u> L.1 Verify interlock is in required state for existing unit condition. <u>OR</u> L.2.1 Be in MODE 3. <u>AND</u> L.2.2 Be in MODE 4.	<u>COMPLETION TIME</u> 1 hour 7 hours 13 hours

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Event No.: 2

**Event Description:** Crew will respond to the low failure of a PRZR pressure secondary controlling channel (PT-456). Immediate Operator Actions are required per 18001-C, Section C. The crew will continue in 18001-C to correct the malfunction.

Time	Position	Applicant's Action or Behavior
		<p>*C17. Check repairs and surveillances – COMPLETE.</p> <p>RNO</p> <p>*C17. Perform the following:</p> <ol style="list-style-type: none"><li>WHEN repairs and surveillances are complete, THEN perform step C18.</li><li>Return to procedure and step in effect.</li></ol>
<p><b>END OF EVENT 2. PROCEED TO NEXT EVENT AT THE DISCRETION OF THE CHIEF EXAMINER.</b></p>		

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Event No.: 3

**Event Description:** The crew will respond to an EHC Pump Train A trip with failure of the standby EHC pump to Auto Start. Annunciators ALB33 B07 "1NB02 TROUBLE" will alarm along with ALB ALB20 D05 "HYD FLUID LO PRESS". The crew response will be IAW ARP 17020-1. Expect the crew to manually start the standby EHC pump.

Time	Position	Applicant's Action or Behavior
	UO	Identifies Annunciators ALB33-B07 and ALB20-D05 in alarm and communicates annunciators to SS. References Annunciator Response Procedure 17020-1 Window D05 and ARP 17033-1 Window B07.
	UO	<p><b><u>17020-1 D05</u></b></p> <p>1.0 <u>PROBABLE CAUSE</u></p> <ol style="list-style-type: none"> <li>1. Failure of Electrohydraulic Control (EHC) Fluid Pumps.</li> <li>2. Clogged strainers and filters in pump suction or discharge.</li> <li>3. EHC Fluid System leak.</li> </ol>
	UO	<p>2.0 <u>AUTOMATIC ACTIONS</u></p> <ol style="list-style-type: none"> <li>1. If pressure drops below 1400 psig, the standby EHC Fluid Pump will start. (<b>Auto start failure, requires UO to manually start pump</b>)</li> <li>2. If pressure continues to drop to 1100 psig, the Turbine will trip.</li> </ol>
	UO  <b>CRITICAL TASK</b>	<p>3.0 <u>INITIAL OPERATOR ACTIONS</u></p> <ol style="list-style-type: none"> <li>1. <u>IF</u> a reactor trip occurs, Go To 19000-C, "E-0 Reactor Trip Or Safety Injection."</li> <li>2. <b>Verify standby EHC Fluid Pump is on, if needed</b> <b>Start STBY EHC Pump by placing 1HS-6540 to start</b> Verify Annunciator ALB20 B05 "STBY HYD FLUID PMP RUNNING" Annunciates.</li> </ol>
	UO  SS	<p>4.0 <u>SUBSEQUENT OPERATOR ACTIONS</u></p> <ol style="list-style-type: none"> <li>1. <u>IF</u> a reactor trip occurs, <b>Go To</b> 19000-C, "E-0 Reactor Trip Or Safety Injection."</li> </ol>

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Event No.: 3

**Event Description:** The crew will respond to an EHC Pump Train A trip with failure of the standby EHC pump to Auto Start. Annunciators ALB33 B07 “1NB02 TROUBLE” will alarm along with ALB ALB20 D05 “HYD FLUID LO PRESS”. The crew response will be IAW ARP 17020-1. Expect the crew to manually start the standby EHC pump.

Time	Position	Applicant's Action or Behavior
	SS	2. <u>I</u> F equipment failure is indicated, <b>initiate</b> maintenance as required.
<b>END OF EVENT 3. PROCEED TO NEXT EVENT AT THE DISCRETION OF THE CHIEF EXAMINER.</b>		



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Event No.: 4

**Event Description:** HELB valve on CVCS Letdown line will close on a failed temperature instrument in Room A09. Letdown will isolate with HV-15214 closing. Crew will enter 18007-C, CVCS malfunction on the loss of letdown.

Time	Position	Applicant's Action or Behavior
	UO OATC	<p>Alarms/Indications:</p> <p>ALB63-E01 CVCS PIPE BREAK RM PROT ACTUATION (QPCP)</p> <p>ALB07-C05 LP LTDN RELIEF HI TEMP</p> <p>FI-132 Ltdn Flow indicating 0 gpm</p> <p>TI-125 Ltdn Relief Discharge Temp 220 °F</p> <p>ALB12-E02 PRZR REL TANK HI PRESS (Subsequently)</p>
	UO	<p>References ARP 17063-1, Window E01</p> <p><b><u>PROBABLE CAUSE</u></b></p> <p>High ambient temperature caused by Chemical and Volume Control System (CVCS) pipe break or leakage from the CVCS.</p> <p>Insufficient cooling in rooms.</p> <p><b><u>AUTOMATIC ACTIONS</u></b></p> <p style="text-align: center;">NOTE</p> <p>When the room temperatures rise to 135°F, CVCS Letdown Isolation occurs.</p> <p>1-HV-15214 closes on signal from 1-TE-15214 A, B, or C,</p> <p>1-HV-8160 closes on signal from 1-TE-15215 A, B, or C.</p> <p><b>INITIAL OPERATOR ACTIONS</b></p> <p>NONE</p>

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Event No.: 4

**Event Description:** HELB valve on CVCS Letdown line will close on a failed temperature instrument in Room A09. Letdown will isolate with HV-15214 closing. Crew will enter 18007-C, CVCS malfunction on the loss of letdown.

Time	Position	Applicant's Action or Behavior																
	UO	<p><b>SUBSEQUENT OPERATOR ACTIONS</b></p> <p>1. <b>Verify</b> pressurizer level and pressure are being maintained within program.</p> <p>2. <b>Identify</b> location of temperature element causing the alarm using switches 1-HS-15214B and 1-HS-15215B and Temperature Indicators 1-TI-15214 and 1-TI-15215, respectively, as per the following table:</p> <p style="text-align: center;">NOTE</p> <p>Switches and Temperature Indicators are located on the Miscellaneous systems and Equipment Panel (QPCP).</p> <table><tr><th>Switch Pos.</th><th>HS-15214B</th><th>HS-15215B</th><th>Room</th></tr><tr><td>2 (LTDN HX RM)</td><td>TE-15214A</td><td>TE-15215A</td><td>R-A07</td></tr><tr><td>3 (LTDN VLV GLRY)</td><td>TE-15214B</td><td>TE-15215B</td><td>R-A08</td></tr><tr><td>4 (PP PEN RM)</td><td>TE-15214C</td><td>TE-15215C</td><td>R-A09</td></tr></table> <p><b>RA09 Room temperature indicator will be offscale high.</b></p> <p>3. <b>Align</b> both switches, 1-HS-15214B and 1-HS-15215B, to the alarmed position and <b>verify</b> agreement between both temperature elements located in the same room.</p> <p>4. <b>Monitor</b> Aux building and Plant vent Radiation monitors for indication of leaks.</p> <p>5. <b>Dispatch</b> an operator to the identified location to investigate.</p> <p>6. <b>Isolate</b> the pipe break or leakage to prevent further damage.</p> <p>7. <b>Return</b> switches 1-HS-15214B and 1-HS-15215B to position as instructed by the Shift Supervisor.</p> <p>8. <b>Restore</b> letdown flow in accordance with 18007-C, "Chemical And Volume Control System Malfunction."</p> <p>9. <b>Refer</b> to Technical Requirement Manual TR 13.3.4.</p>	Switch Pos.	HS-15214B	HS-15215B	Room	2 (LTDN HX RM)	TE-15214A	TE-15215A	R-A07	3 (LTDN VLV GLRY)	TE-15214B	TE-15215B	R-A08	4 (PP PEN RM)	TE-15214C	TE-15215C	R-A09
Switch Pos.	HS-15214B	HS-15215B	Room															
2 (LTDN HX RM)	TE-15214A	TE-15215A	R-A07															
3 (LTDN VLV GLRY)	TE-15214B	TE-15215B	R-A08															
4 (PP PEN RM)	TE-15214C	TE-15215C	R-A09															

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Event No.: 4

**Event Description:** HELB valve on CVCS Letdown line will close on a failed temperature instrument in Room A09. Letdown will isolate with HV-15214 closing. Crew will enter 18007-C, CVCS malfunction on the loss of letdown.

Time	Position	Applicant's Action or Behavior
	OATC	References ARP 17007-1, Window C05, LP LTDN RELIEF HI TEMP
	OATC	<p><u>PROBABLE CAUSE</u></p> <p>Low Pressure Letdown Relief Valve 1-PSV-8117 lifted or leaking (Relief Valve set at 600 psig).</p> <p><u>AUTOMATIC ACTIONS</u></p> <p>NONE</p>
	OATC	<p><u>INITIAL OPERATOR ACTIONS</u></p> <ol style="list-style-type: none"><li>1. Monitor relief line temperature using 1-TI-0125 and letdown pressure using 1-PI-0131A on the QMCB.</li><li>2. <u>IF</u> letdown is lost, initiate 18007-C, "Chemical And Volume Control System Malfunction."</li></ol>
	OATC	<p><u>SUBSEQUENT OPERATOR ACTIONS</u></p> <ol style="list-style-type: none"><li>1. <u>IF</u> temperature continues to rise, indicating a lifted or leaking Relief Valve, evaluate the effect of continued operation with a malfunctioning Relief Valve.</li><li>2. Monitor Pressurizer Relief Tank level and pressure using 1-LI-0470 and 1-PI-0469 on the QMCB.</li></ol>

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Event No.: 4

**Event Description:** HELB valve on CVCS Letdown line will close on a failed temperature instrument in Room A09. Letdown will isolate with HV-15214 closing. Crew will enter 18007-C, CVCS malfunction on the loss of letdown.

Time	Position	Applicant's Action or Behavior
	OATC	<p><u>SUBSEQUENT OPERATOR ACTIONS</u> (cont.)</p> <p>3. IF PRT pressure increases due to CVCS Letdown Relief Valve being open or leaking, THEN evaluate the possible need to isolate letdown and initiate 18007-C "Chemical And Volume Control System Malfunction."</p> <p>4. IF equipment failure is indicated, initiate maintenance as required.</p>
	SS	18007-C, "CVCS MALFUNCTION" Section A, TOTAL LOSS OF LETDOWN FLOW (Crew update)
	OATC	<p>A1. Isolate letdown relief flowpath by performing the following:</p> <p>a. Close letdown orifice isolation valves:</p> <ul style="list-style-type: none"> <li>HV-8149A</li> <li>HV-8149B</li> <li>HV-8149C</li> </ul> <p>b. Close letdown isolation valves:</p> <ul style="list-style-type: none"> <li>LV-459</li> <li>LV-460</li> </ul>
	OATC	<p>A2. Adjust HC-182 and FIC-121 as necessary to establish the following:</p> <ul style="list-style-type: none"> <li>Seal injection flow to all RCPs – 8 TO 13 GPM. -AND-</li> <li>Charging flow – APPROXIMATELY 10 GPM GREATER THAN TOTAL SEAL INJECTION FLOW.</li> </ul>

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Event No.: 4

**Event Description:** HELB valve on CVCS Letdown line will close on a failed temperature instrument in Room A09. Letdown will isolate with HV-15214 closing. Crew will enter 18007-C, CVCS malfunction on the loss of letdown.

Time	Position	Applicant's Action or Behavior
	OATC	<p>A3. Check pipe break protection valves - OPEN:</p> <p>HV-15214 HV-8160</p> <p>A3 RNO</p> <p>Perform the following:</p> <p>a. Check affected unit room temperatures:</p> <p><u>UNIT 1</u> R-A07 R-A08 R-A09 (<b><i>RA09 Room temperature indicator will be offscale high.</i></b>)</p> <p>b. <u>IF</u> affected room temperatures are greater than 135°F, <u>THEN</u> investigate reason for high temperature in rooms before opening affected valves and restoring letdown.</p>
	OATC	A4. Check instrument air to containment – ESTABLISHED.
	OATC	<p>A5. Check CVCS letdown to BTRS flowpath:</p> <p>a. Check TV-0381B BTRS Demin Inlet Temperature Control – OPEN. (HS-10351 DILUTE or OFF lights lit.)</p> <p>b. Check HV-8115 LETDOWN DIVERT TO BTRS – OPEN.</p>

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Event No.: 4

**Event Description:** HELB valve on CVCS Letdown line will close on a failed temperature instrument in Room A09. Letdown will isolate with HV-15214 closing. Crew will enter 18007-C, CVCS malfunction on the loss of letdown.

Time	Position	Applicant's Action or Behavior
	SS / OATC	A6. Identify and correct cause for loss of letdown.
	SS / OATC	A7. Check normal letdown – AVAILABLE.  RNO  A7. Perform the following:  a. Establish Excess Letdown by initiating 13008, CHEMICAL AND VOLUME CONTROL SYSTEM EXCESS LETDOWN.  b. Go to Step A9.
	OATC	INITIATES SOP 13008-1. Section 4.1 "EXCESS LETDOWN TO SEAL RETURN HEADER."  <i>Note to examiner: The steps for establishing Excess Letdown are contained in Event 5.</i>
<b>END OF EVENT 4. PROCEED TO EVENT 5 TO ESTABLISH EXCESS LETDOWN.</b>		

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Event No.: 5

**Event Description:** Establish Excess Letdown per 13008-1, Section 4.1. This overall task is critical. Step A10 is annotated as critical to ensure control of pressurizer level to prevent overfill.

Time	Position	Applicant's Action or Behavior
		<div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>NOTE</p> <p>Independent Verifications performed within Section 4.1 are documented on Checklist 1.</p> </div>
	OATC	<b>4.1 EXCESS LETDOWN TO SEAL RETURN HEADER</b>
	OATC	4.1.1 Verify that a Charging Pump is running.
	OATC	4.1.2 Verify CLOSED RX HEAD VENT TO EXCESS LETDOWN ISOLATION 1-HV-8098.
	OATC	4.1.3 Verify flow controller EXCESS LETDOWN, 1HC-123 is set to closed (0% demand)
	OATC	4.1.4 Verify OPEN RCPs Seal Leakoff Isolation valves: <ul style="list-style-type: none"> <li>• 1-HV-8100 RCPS SEAL LEAKOFF ORC ISOLATION.</li> <li>• 1-HV-8112 RCPS SEAL LEAKOFF IRC ISOLATION.</li> </ul>
	OATC	4.1.5 Verify EXCESS LETDOWN TO VCT, 1-HS-8143 is in the OPEN VCT position.

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Event No.: 5

**Event Description:** Establish Excess Letdown per 13008-1, Section 4.1. This overall task is critical. Step A10 is annotated as critical to ensure control of pressurizer level to prevent overfill.

Time	Position	Applicant's Action or Behavior
	OATC	4.1.6 Verify Reactor power is maintained $\leq 3622.6$ MWT while Excess Letdown is in service and LEFM is in service. <u>IF</u> LEFM is <u>NOT</u> in service, maintain power $\leq 3562$ MWT per guidance of 12004-C.
	OATC	4.1.7 Open EXCESS LETDOWN LINE Isolation Valves: <ul style="list-style-type: none"> <li>1-HV-8153 EXCESS LETDOWN LINE ISO VLV.</li> <li>1-HV-8154 EXCESS LETDOWN LINE ISO VLV.</li> </ul>
	OATC	4.1.8 Record the following: <ul style="list-style-type: none"> <li>Pressure on indicator EXCESS LETDOWN HX OUTLET, 1PI-124.</li> <li>Temperature on indicator EXCESS LETDOWN HX OUTLET, 1TI-122.</li> </ul>
	OATC	4.1.9 <u>WHILE</u> establishing excess letdown, perform the following: <ul style="list-style-type: none"> <li>Monitor pressure rise on pressure indicator EXCESS LETDOWN HX OUTLET, 1PI-124 and verify it remains less than 50 pounds above pressure recorded in Step 4.1.8.</li> <li><b>Monitor</b> temperature rise on temperature indicator EXCESS LETDOWN HX OUTLET, 1TI-122 and verify it remains less than 165 degrees.</li> </ul>
	OATC	4.1.10 Slowly adjust output flow controller EXCESS LETDOWN 1HC-123 to establish maximum allowable flow (estimated to be approximately 30 gpm). <b>(CV Required)</b> <ul style="list-style-type: none"> <li>ALB63-A06 FILTERS BACKFLUSH PANEL ALARM illuminates.</li> </ul>
	OATC	4.1.11 Perform the following as required to maintain desired pressurizer level: <ul style="list-style-type: none"> <li>Adjust charging using CHARGING LINE CONTROL, 1FIC-121.</li> <li>Adjust seal injection using SEAL FLOW CONTROL, 1HC-182.</li> </ul>



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Event No.: 5

**Event Description:** Establish Excess Letdown per 13008-1, Section 4.1. This overall task is critical. Step A10 is annotated as critical to ensure control of pressurizer level to prevent overfill.

Time	Position	Applicant's Action or Behavior
	SS / OATC	<p>4.1.12 <u>IF</u> normal letdown is isolated, align the outlet of the Seal Water Heat Exchanger to the Volume Control Tank spray nozzle as follows: (IV REQUIRED) (N/A if previously performed):</p> <ul style="list-style-type: none"> <li>• Unlock and open CVCS SEALS SEAL WATER HX OUTLET TO VCT, 1-1208-U6-104 (KEY 10P2-281). (RA-26)</li> <li>• Close CVCS SEALS SEAL WATER HX OUTLET TO NCP SUCTION, 1-1208-U6-106. (RA-26)</li> </ul>
	OATC	<p>4.1.13 <u>IF</u> directed by SS to transfer excess letdown to the RCDT, perform the following:</p> <p><b>NOTE TO EXAMINER: SS WILL NOT DIRECT EXCESS LTDN TO RCDT.</b></p>
	OATC	<p>4.1.14 <u>IF</u> the Seal Water Heat Exchanger Outlet was aligned to the Volume Control Tank, restore normal alignment as follows:</p>
	SS	<p><b>CONTINUES WITH 18007-C, "CVCS MALFUNCTION"</b></p> <p>A7.b. RNO <u>Go to Step A9.</u></p>
	OATC / UO	<p>A9. Initiate Continuous Actions Page.</p>

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Event No.: 5

**Event Description:** Establish Excess Letdown per 13008-1, Section 4.1. This overall task is critical. Step A10 is annotated as critical to ensure control of pressurizer level to prevent overfill.

Time	Position	Applicant's Action or Behavior
	OATC <b>CRITICAL TASK</b>	*A10. Verify PRZR level – TRENDING TO PROGRAM.
	SS / OATC	*A11 Check normal letdown flow – ESTABLISHED.  RNO  *A11. Perform the following: a. <u>WHEN</u> normal letdown capability is restored, <u>THEN</u> restore normal letdown by initiating 13006, CHEMICAL AND VOLUME CONTROL SYSTEM. b. Evaluate the impact of continued power operation with normal letdown out of service.
	SS	Return to procedure and step in effect. (12004-C)
<b>END OF EVENT 5. PROCEED TO NEXT EVENT AT THE DISCRETION OF THE CHIEF EXAMINER.</b>		

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Event No.: 6-7

**Event Description:** SG 1 develops a 30 GPM tube leak requiring entry into AOP 18009-C. With SGTL greater than 5 gpm a rapid shutdown using AOP 18013-C is required. This event will be used for the required reactivity manipulation.

Time	Position	Applicant's Action or Behavior
	CREW	<p>Diagnose SG Tube Leakage:</p> <p><u>ALARMS:</u></p> <p>ALB05-B03 INTMD RADIATION ALARM</p> <p>ALB05-C03 HIGH RADIATION</p> <p>-RE-0724 – Primary to secondary leakage monitor</p> <p>-RE-0810 – SJAE low range monitor</p> <p>-RE-12839C – SJAE monitor</p> <p><u>INDICATIONS:</u></p> <p>Charging flow increases if in auto (expect manual control)</p> <p>PRZR level slowly lowers</p>
	SS	Enters AOP 18009-C, Steam Generator Tube Leak. (Crew Update)
	OATC / UO	<p><b><u>18009-C</u></b></p> <p>1. Initiate continuous actions page</p>
	OATC	<p>*2. Maintain PRZR level:</p> <p>a. Adjusting charging flow</p> <p>b. Check PRZR level stable or rising</p> <p>RNO</p> <p>*2b. Perform the following:</p> <p>1) Isolate letdown by closing:</p> <p>a) Letdown Orifice Valves</p> <p>b) Letdown Isolation Valves</p> <p>c) Excess Letdown Valves</p> <p>2) Start an additional Charging Pump as necessary.</p> <p>3) <u>IF</u> PRZR level can NOT be maintained greater than 9%, <u>THEN</u> perform the following:</p> <p>a) Trip the Reactor</p> <p>b) <u>WHEN</u> Reactor trip verified, <u>THEN</u> actuate SI.</p> <p>c) Go to 19000-C, E-0 REACTOR TRIP OR SAFETY INJECTION</p>

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Event No.: 6-7

**Event Description:** SG 1 develops a 30 GPM tube leak requiring entry into AOP 18009-C. With SGTL greater than 5 gpm a rapid shutdown using AOP 18013-C is required. This event will be used for the required reactivity manipulation.

Time	Position	Applicant's Action or Behavior
	SS  UO	<p>*3. Try to identify affected SG:</p> <p>a. Direct Chemistry attempt to identify the leaking SG by initiating 31120-C, CHEMISTRY STEAM GENERATOR TUBE LEAK ACTIONS.</p> <p>b. Check SG level indications stable or rising with relatively lower feed flow rate (may not be able to tell)</p>
	OATC	<p><b>18009-C</b></p> <div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p style="text-align: center;"><b>CAUTION</b></p> <p>The NCP will NOT have miniflow when the CCP normal miniflow valves are closed.</p> </div> <p>*4. Verify VCT level maintained with automatic makeup control.</p>
	OATC          SS	<p>5. Check leak rate less than 5 GPM as determined by [charging – (letdown + seal leakoff)] mismatch.</p> <p><b>NOTE: (Leak rate will be ~ 30 GPM)</b></p> <p>RNO</p> <p>5. Perform the following:</p> <p>a. Initiate 18013-C, RAPID POWER REDUCTION.</p> <p>b. Be in mode 3 within 1 hour.</p> <p>c. Go to step 11.</p> <p><b>NOTE: May give procedure 18009-C to UO to complete procedure beginning at step 12.</b></p>

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Event No.: 6-7

**Event Description:** SG 1 develops a 30 GPM tube leak requiring entry into AOP 18009-C. With SGTL greater than 5 gpm a rapid shutdown using AOP 18013-C is required. This event will be used for the required reactivity manipulation.

Time	Position	Applicant's Action or Behavior			
	SS	LCO 3.4.13 CONDITION B RCS OPERATIONAL LEAKAGE			
		<u>CONDITION</u> B. Required Action and associated Completion Time of Condition A not met. <u>OR</u> Pressure boundary LEAKAGE exists. <u>OR</u> Primary to secondary LEAKAGE not within limit.	<u>REQUIRED ACTION</u> B.1 Be in MODE 3. <u>AND</u> B.2 Be in MODE 5.	<u>COMPLETION TIME</u>  6 hours  36 hours	
	SS	Initiates AOP-18013-C, "Rapid Down Power". (Crew Update)			
		<u>Entry</u>	<u>Condition</u>	<u>Target</u>	<u>Approx. Time @ 3-5%/min</u>
		17015-D05 17015-E01	MFPT High Vibrations	<70% RTP	5-8 minutes
		17019-B04 18025-C	Condenser Low Vacuum or Circ Water Pump Trip or Loss of Utility Water	Vacuum >22.42" Hg and STABLE or RISING	
		18009-C	SG Tube Leak (≥75 gpd with an ROC ≥30 gpd/hr)	<50% RTP within 1 hour	10-17 minutes
		18009-C	SG Tube Leak (≥ 5 gpm)	20% RTP within 1 hour & trip reactor	16-27 minutes
		18039-C	Confirmed Loose Part	20% RTP quickly	16-27 minutes
			SS determination based on plant conditions	As determined by the SS	
<u>SHUTDOWN BRIEFING</u>					
<u>METHOD</u>					
<ul style="list-style-type: none"><li>Auto rod control should be used.</li><li>Reduce Turbine Load at approximately 3% RTP per minute (approx 36 MW<sub>e</sub>) up to 5% RTP (approx 60 MW<sub>e</sub>).</li><li>Borate considering the calculations from the reactivity briefing sheet and BEACON.</li><li>Maintain AFD within the doghouse.</li></ul>					

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Event No.: 6-7

**Event Description:** SG 1 develops a 30 GPM tube leak requiring entry into AOP 18009-C. With SGTL greater than 5 gpm a rapid shutdown using AOP 18013-C is required. This event will be used for the required reactivity manipulation.

Time	Position	Applicant's Action or Behavior
<ul style="list-style-type: none"> <li>SS (or SRO designee) - Maintain supervisory oversight.</li> <li><u>All</u> rod <u>withdrawals</u> will be approved by the SS.</li> <li>Approval for each reactivity manipulation is not necessary as long as manipulations are made within the boundaries established in this briefing (i.e. turbine load adjustment up to 60 MW<sub>e</sub>, etc.).</li> <li>A crew update should be performed at approximately every 100 MW<sub>e</sub> power change.</li> <li>If manpower is available, peer checks should be used for all reactivity changes.</li> </ul>		
<p><b><u>OPERATIONAL LIMITS</u></b></p> <ul style="list-style-type: none"> <li>Maintain T<sub>AVG</sub> within ±6°F of T<sub>REF</sub>. <b>If T<sub>AVG</sub>/T<sub>REF</sub> mismatch &gt;6°F and <i>not</i> trending toward a matched condition <u>or</u> if T<sub>AVG</sub> ≤551°F, then trip the reactor.</b></li> <li><i>If load reduction due to a loss of vacuum</i>, every effort should be made to maintain the steam dumps closed (Permissive C-9 ≥ 24.92" Hg).</li> </ul> <p><b><u>INDUSTRY OE</u></b></p> <ul style="list-style-type: none"> <li>Shift supervision must maintain <b>effective oversight</b> and exercise <b>conservative decision making</b>.</li> <li>Correction of significant RCS T<sub>AVG</sub> deviations should only be via secondary plant control manipulations and <u>not</u> primary plant control manipulations (i.e., do <u>not</u> withdraw control rods or dilute).</li> </ul>		

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Event No.: 6-7

**Event Description:** SG 1 develops a 30 GPM tube leak requiring entry into AOP 18009-C. With SGTL greater than 5 gpm a rapid shutdown using AOP 18013-C is required. This event will be used for the required reactivity manipulation.

Time	Position	Applicant's Action or Behavior
	OATC	2. Verify rods in AUTO.
	UO	3. Reduce Turbine Load at the desired rate up to 5%/min (60 MWE/min).
	OATC	4. Borate as necessary by initiating 13009, CVCS REACTOR MAKEUP CONTROL SYSTEM. <b>Note to examiner: See Event 7a Normal Boration alignment or Event 7b for Emergency Boration alignment.</b>
	OATC / UO	5. Initiate the Continuous Actions Page.
	OATC / UO	*6. Check desired ramp rate - LESS THAN <u>OR</u> EQUAL TO 5%/MIN.  RNO *6. <u>IF</u> conditions warrant a turbine load rate greater than 5%/min, <u>THEN</u> perform the following: a. Trip the reactor. b. Go to 19000-C, E-0 REACTOR TRIP OR SAFETY INJECTION.
	OATC	*7. Maintain Tavg within 6°F of Tref: a. Monitor Tavg/Tref deviation (UT-0495). b. Verify rods inserting as required. c. Energize Pressurizer back-up heaters as necessary.  RNO *7b. Manual rod control should be used with insertions of up to 5 steps at a time.

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Event No.: 6-7

**Event Description:** SG 1 develops a 30 GPM tube leak requiring entry into AOP 18009-C. With SGTL greater than 5 gpm a rapid shutdown using AOP 18013-C is required. This event will be used for the required reactivity manipulation.

Time	Position	Applicant's Action or Behavior
	OATC / UO	*8. Maintain reactor power and turbine power – MATCHED.  a. Balance reactor power with secondary power reduction using boration and control rods.  b. Check rate of reactor power reduction – ADEQUATE FOR PLANT CONDITIONS.  c. Check RCS Tavg GREATER THAN 551°F (TS 3.4.2).  d. Check RCS Tavg - WITHIN 6°F OF TREF.
	OATC	*9. Maintain PRZR Pressure – AT 2235 PSIG.
	OATC	*10. Maintain PRZR Level – AT PROGRAM.
	UO	*11. Maintain SG Level – BETWEEN 60% AND 70%.
	SS	12. Notify the System Operator that a load reduction is in progress.
<b>END OF EVENT 7. PROCEED TO NEXT EVENT AT THE DISCRETION OF THE CHIEF EXAMINER.</b>		



Event No.: 7a, RCS Boration

Event Description: Perform normal RCS boration for 18013 Rapid Downpower.

Time	Position	Applicant's Action or Behavior
	OATC	4.2.1 <b>Determine</b> the existing RCS boron concentration from Boron Meter 1-AI-40134 Or by sample analysis.
	OATC	4.2.2 Determine the number of gallons of boric acid required to borate the RCS.
	OATC	4.2.3 <b>Place</b> VCT MAKEUP CONTROL 1-HS-40001B in STOP.
	OATC	4.2.4 <b>Place</b> VCT MAKEUP MODE SELECT 1-HS-40001A in BOR.
	OATC	<div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p style="text-align: center;">NOTE</p> <p>If necessary, boric acid flow may be adjusted using 1-FIC-0110 with SS concurrence. Changes to pot setting should be logged in the Control Room Log and restored at completion of activity. □</p> </div> <p>4.2.5 <b>Adjust</b> potentiometer on Boric Acid Blender Flow Controller 1-FIC-0110 as desired and <b>verify</b> in AUTO.</p>
	OATC	<div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p style="text-align: center;">CAUTION</p> <p>Digital counter setting on BORIC ACID TO BLENDER integrator 1-FQI-0110 reads in tenth-gallon increments.</p> </div> <p>4.2.6 <b>Set</b> BORIC ACID TO BLENDER integrator 1-FQI-0110 to the desired amount of Boric Acid.</p>
	OATC	<p>4.2.7 <b>Verify</b> the following:</p> <ul style="list-style-type: none"> <li>• BA TO BLENDER 1-HS-0110A is in AUTO.</li> <li>• BLENDER OUTLET TO CHARGING PUMPS SUCT 1-HS-0110B is in AUTO.</li> <li>• One Boric Acid Transfer Pump in AUTO or START.</li> <li>• RX MU WTR TO BA BLENDER 1-FV-0111A is closed with 1HS-0111A in AUTO.</li> <li>• BLENDER OUTLET TO VCT 1-FV-0111B is closed with 1HS-0111B in AUTO.</li> </ul>

Event No.: 7a, RCS Boration

Event Description: Perform normal RCS boration for 18013 Rapid Downpower.

Time	Position	Applicant's Action or Behavior
	OATC	<p style="text-align: center;">NOTES</p> <ul style="list-style-type: none"> <li>Boration can be manually stopped at any time by placing 1-HS-40001B in STOP.</li> <li>VCT Pressure, 1-PI-115 should be maintained between 20 and 45 psig.</li> </ul> <p>4.2.8 <b>Place</b> VCT MAKEUP CONTROL 1-HS-40001B in START and perform the following:</p> <ul style="list-style-type: none"> <li><b>Verify</b> Boric Acid Transfer Pump is running.</li> <li><b>Verify</b> 1-FV-0110B is open.</li> <li><b>Verify</b> 1-FV-0110A throttles open to provide desired flow on 1-FI-0110A.</li> <li><b>Monitor</b> BORIC ACID TO BLENDER integrator 1-FQI-0110.</li> </ul>
	OATC	<p>4.2.9 <u>WHEN</u> 1-FQI-0110 BORIC ACID TO BLENDER integrator reaches its setpoint, <b>verify</b> boration stops and the following valves close:</p> <ul style="list-style-type: none"> <li>1-FV-0110A, BA TO BLENDER</li> <li>1-FV-0110B, BLENDER OUTLET TO CHARGING PUMPS SUCT</li> </ul>
	OATC	<p>4.2.10 <b>Flush</b> approximately 15 gallons of Reactor Makeup Water through 1-FV-0110B by performing the following:</p> <ul style="list-style-type: none"> <li><b>Place</b> VCT MAKEUP MODE SELECT 1-HS-40001A to ALT DIL.</li> <li><b>Set</b> TOTAL MAKEUP integrator 1-FQI-0111 for 13 to 15 gallons.</li> <li><b>Place</b> BLENDER OUTLET TO VCT 1-HS-0111B in CLOSE.</li> <li><b>Place</b> VCT MAKEUP CONTROL 1-HS-40001B in START.</li> <li><b>Verify</b> flow is indicated on 1-FI-0110B.</li> <li><u>WHEN</u> TOTAL MAKEUP integrator 1-FQI-0111 reaches the desired setpoint, <b>verify</b> the following valves close:</li> <li>1-FV-0111A, RX MU WTR TO BA BLENDER</li> <li>1-FV-0110B, BLENDER OUTLET TO CHARGING PUMPS SUCT</li> </ul>
	OATC	<p>4.2.11 <b>Verify</b> 1-FIC-0110 potentiometer is set to setting recorded prior to boration (or as directed by SS)</p>

Event No.: 7a, RCS Boration

Event Description: Perform normal RCS boration for 18013 Rapid Downpower.

Time	Position	Applicant's Action or Behavior												
	OATC	<p>4.2.12 <b>Align</b> Reactor Makeup Control system for automatic operation as follows:</p> <table> <tr> <th><u>COMPONENT</u></th><th><u>NAME</u></th><th><u>POSITION</u></th></tr> <tr> <td>a.1-HS-0111B</td><td>BLENDER OUTLET TO VCT</td><td>AUTO</td></tr> <tr> <td>b.1-HS-40001A</td><td>VCT MAKEUP MODE SELECT</td><td>AUTO</td></tr> <tr> <td>c.1-HS-40001B</td><td>VCT MAKEUP CONTROL</td><td>START</td></tr> </table>	<u>COMPONENT</u>	<u>NAME</u>	<u>POSITION</u>	a.1-HS-0111B	BLENDER OUTLET TO VCT	AUTO	b.1-HS-40001A	VCT MAKEUP MODE SELECT	AUTO	c.1-HS-40001B	VCT MAKEUP CONTROL	START
<u>COMPONENT</u>	<u>NAME</u>	<u>POSITION</u>												
a.1-HS-0111B	BLENDER OUTLET TO VCT	AUTO												
b.1-HS-40001A	VCT MAKEUP MODE SELECT	AUTO												
c.1-HS-40001B	VCT MAKEUP CONTROL	START												
	OATC	4.2.13 <u>IF</u> BA TRANSFER PUMP was placed in START at Step 4.2.7, return to AUTO or as directed by SS.												
	OATC	4.2.14 <b>Monitor</b> RCS Tavg, source range count rate, and Reactor Power as applicable.												
	OATC	4.2.15 <b>Operate</b> the Pressurizer Back-up Heaters as necessary to equalize boron concentration between the RCS and the Pressurizer.												
	OATC	4.2.16 <b>Verify</b> desired boration through sample analysis or from Boron Concentration Meter 1-1208-T6-006 (1-AI-40134).												
END OF EVENT 7A. RETURN TO POWER REDUCTION IN PREVIOUS SECTION.														

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**Event No.: 7b, Emergency Boration through HV-8104**

**Event Description:** The OATC may use SOP 13009-1, Section 4.9 to emergency borate the RCS through HV-8104.

Time	Position	Applicant's Action or Behavior
	OATC	4.9.1 Emergency Boration Through 1HV-8104
	OATC	4.9.1.1 Start one (1) Boric Acid Transfer Pump.
	OATC	4.9.1.2 Verify a Charging Pump is running.
	OATC	4.9.1.3 Open EMERGENCY BORATE valve 1-HV-8104.
		<div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p style="text-align: center;">NOTE</p> <p>The following step assumes that with 12 gpm of seal return, 30 gpm will be supplied to the RCS.</p> </div> <p>4.9.1.4 <b>Place</b> 1-FIC-0121 in MANUAL.</p>
		4.9.1.5 <b>Adjust</b> 1-FIC-0121 to maintain flow greater than 42 gpm.
		<div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p style="text-align: center;">NOTES</p> <ul style="list-style-type: none"> <li>• IPC computer point for Boric Acid flow Rate is F0183 (GPM).</li> <li>• Computer point for Boric Acid Totalized Flow is UF0183 (Gallons).</li> </ul> </div> <p>4.9.1.6 <b>Verify</b> Emergency Boration flow 1-FI-0183A greater than 30 gpm.</p>
		4.9.1.7 <u>I</u> F flow is less than 30 gpm, <b>start</b> the second Boric Acid Transfer Pump.

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**Event No.: 7b, Emergency Boration through HV-8104**

**Event Description:** The OATC may use SOP 13009-1, Section 4.9 to emergency borate the RCS through HV-8104.

Time	Position	Applicant's Action or Behavior
		4.9.1.8 <b>Operate</b> the Pressurizer Backup Heaters as necessary to equalize boron concentration between the RCS and the Pressurizer.
		4.9.1.9 <b>Check</b> plant conditions are consistent with the boration of the RCS:  RCS Tavg may be dropping. NIS may be dropping.
		4.9.1.10 <b>Determine</b> the amount of boric acid required to allow termination of Emergency Boration.
		<div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>NOTE</p> <p>Monitor Boric Acid Flow Rate computer point F0183. After flow has started the totalized flow should be reset by selecting "Reset Boric Acid Flow Totalizer" from the IPC System Menu.</p> </div>
		4.9.1.11 <b>WHEN</b> the determined amount of boric acid has been added to the RCS, <b>close</b> 1-HV-8104.
		4.9.1.12 <b>Return</b> the Boric Acid Transfer Pumps to the desired system configuration.
		4.9.1.13 <b>Restore</b> 1-FIC-0121 to the AUTO position.
		4.9.1.14 <b>Direct</b> Chemistry to sample and report the RCS boron concentration, or <b>monitor</b> the Boron Meter 1-AI-40134 if available.
<b>END OF EVENT 7b. RETURN TO POWER REDUCTION IN PREVIOUS SECTION.</b>		

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Event No.: 8, 9, and 10

**Event Description:** SGTL occurring on loop #1 develops into a DBA SGTR. The OATC will be unable to maintain PRZR level and will manually perform a Reactor Trip, verify Reactor Trip and actuate Safety Injection. The crew will enter the EOP network and transition to 19030-C, SGTR. MSIV on ruptured SG #1 will fail to close requiring isolation of all other SG MSIVs.

Time	Position	Applicant's Action or Behavior
	SS	<i><b>Directs OATC actions per Continuous Action From AOP 18009-C, Step 2 RNO.</b></i>
	OATC	<p>*2. Maintain PRZR Level:</p> <ul style="list-style-type: none"> <li>a. Adjust charging flow as necessary to maintain program level.</li> <li>b. Check PRZR level – STABLE OR RISING.</li> </ul> <p>RNO</p> <p>*2b. Perform the following:</p> <ul style="list-style-type: none"> <li>1) Isolate letdown by closing: <ul style="list-style-type: none"> <li>a) Letdown Orifice Valves. <b>(HS-8149 A,B,C)</b></li> <li>b) Letdown Isolation Valves. <b>(LV-459 and LV-460)</b></li> <li>c) Excess Letdown Valves. <b>(HS-8153 and HS-8154)</b></li> </ul> </li> <li>2) Start an additional Charging Pump as necessary.</li> <li>3) <u>IF</u> PRZR level can <u>NOT</u> be maintained greater than 9%, <u>THEN</u> perform the following: <ul style="list-style-type: none"> <li>a) Trip the Reactor.</li> <li>b) <u>When</u> Reactor trip verified, <u>THEN</u> actuate SI.</li> <li>c) Go to 19000-C, E-0 REACTOR TRIP OR SAFETY INJECTION.</li> </ul> </li> </ul> <p><i><b>Note to examiner: Violation of the RCS DNB TS limit of <math>\geq 2199</math> psig may be recognized by the shift crew. It is unlikely that specific action will be taken based solely on plant pressure being less than the TS DNB limit.</b></i></p>
	SS / OATC	

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Event No.: 8, 9, and 10

**Event Description:** SGTL occurring on loop #1 develops into a DBA SGTR. The OATC will be unable to maintain PRZR level and will manually perform a Reactor Trip, verify Reactor Trip and actuate Safety Injection. The crew will enter the EOP network and transition to 19030-C, SGTR. MSIV on ruptured SG #1 will fail to close requiring isolation of all other SG MSIVs.

Time	Position	Applicant's Action or Behavior
	SS	Directs OATC / UO to perform IMMEDIATE OPERATOR ACTIONS FOR EOP 19000-C, REACTOR TRIP OR SAFETY INJECTION.
	CREW	<b>IMMEDIATE OPERATOR ACTIONS of 19000-C, Reactor Trip or Safety Injection</b>
	OATC	1. Check Reactor Trip <ul style="list-style-type: none"> <li>Rod Bottom Lights - LIT</li> <li>Reactor Trip and Bypass Breakers - OPEN</li> <li>Neutron Flux – LOWERING</li> </ul>
	UO	2. Check Turbine Trip: <ul style="list-style-type: none"> <li>All Turbine Stop Valves – CLOSED</li> </ul>
	UO	3. Check Power to AC Emergency Buses: <ol style="list-style-type: none"> <li>AC Emergency Busses – AT LEAST ONE ENERGIZED. <ul style="list-style-type: none"> <li>4160V AC 1E Busses</li> </ul> </li> <li>AC Emergency Buses – ALL ENERGIZED: <ul style="list-style-type: none"> <li>4160V AC 1E Busses</li> <li>480V AC 1E Busses</li> </ul> </li> </ol>
	OATC	4. Check if SI is actuated: <ul style="list-style-type: none"> <li>Any SI annunciator – LIT</li> <li>SI ACTUATED BPLP window – LIT</li> </ul>
	SS	— Go to Step 6
		<b>Note to examiner: Per 10020-C, EOP and AOP Rules of Usage, following completion of IOA's of 19000-C and with SS permission, early action may be taken to isolate AFW flow to a ruptured SG.</b>

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Event No.: 8, 9, and 10

**Event Description:** SGTL occurring on loop #1 develops into a DBA SGTR. The OATC will be unable to maintain PRZR level and will manually perform a Reactor Trip, verify Reactor Trip and actuate Safety Injection. The crew will enter the EOP network and transition to 19030-C, SGTR. MSIV on ruptured SG #1 will fail to close requiring isolation of all other SG MSIVs.

Time	Position	Applicant's Action or Behavior
	SS / CREW	6. Initiate the Foldout Page.
	SS / CREW	7. Perform the following: <ul style="list-style-type: none"> <li>OATC Initial Actions Page</li> <li>UO Initial Actions Page</li> </ul>
	OATC	<b>OATC INITIAL ACTIONS</b> Step 1. Check both Trains of ECCS equipment-ALIGNING FOR INJECTION PHASE <ul style="list-style-type: none"> <li>MLB indication.</li> </ul>
	OATC	<b>OATC INITIAL ACTIONS</b> Step 2. Check Containment Isolation Phase A – ACTUATED <ul style="list-style-type: none"> <li>CIA MLB indication</li> </ul>
	OATC	<b>OATC INITIAL ACTIONS</b> Step 3. Check ECCS Pumps and NCP status: <ol style="list-style-type: none"> <li>CCPs – RUNNING.</li> <li>SI Pumps – RUNNING.</li> <li>RHR Pumps – RUNNING</li> <li>NCP – TRIPPED</li> </ol>



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Event No.: 8, 9, and 10

**Event Description:** SGTL occurring on loop #1 develops into a DBA SGTR. The OATC will be unable to maintain PRZR level and will manually perform a Reactor Trip, verify Reactor Trip and actuate Safety Injection. The crew will enter the EOP network and transition to 19030-C, SGTR. MSIV on ruptured SG #1 will fail to close requiring isolation of all other SG MSIVs.

Time	Position	Applicant's Action or Behavior
	OATC	<b>OATC INITIAL ACTIONS</b>  Step 4. Verify CCW Pumps – ONLY TWO RUNNING PER TRAIN.
	OATC	<b>OATC INITIAL ACTIONS</b>  Step 5. Verify proper NSCW system operation: <ul style="list-style-type: none"> <li>a. NSCW Pumps - ONLY TWO RUNNING PER TRAIN.</li> <li>b. NSCW TOWER RTN HDR BYPASS BASIN handswitches – IN AUTO:               <ul style="list-style-type: none"> <li>• HS-1668A</li> <li>• HS-1669A</li> </ul> </li> </ul>
	OATC	<b>OATC INITIAL ACTIONS</b>  Step 6. Verify Containment Cooling Units: <ul style="list-style-type: none"> <li>a. ALL RUNNING IN LOW SPEED               <ul style="list-style-type: none"> <li>• MLB indication</li> </ul> </li> <li>b. NSCW Cooler isolation valves – OPEN:               <ul style="list-style-type: none"> <li>• MLB indication</li> </ul> </li> </ul>
	OATC	<b>OATC INITIAL ACTIONS</b>  Step 7. Check Containment Ventilation Isolation: <ul style="list-style-type: none"> <li>a. Dampers and Valves - CLOSED               <ul style="list-style-type: none"> <li>• CVI MLB indication</li> </ul> </li> </ul>

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Event No.: 8, 9, and 10

**Event Description:** SGTL occurring on loop #1 develops into a DBA SGTR. The OATC will be unable to maintain PRZR level and will manually perform a Reactor Trip, verify Reactor Trip and actuate Safety Injection. The crew will enter the EOP network and transition to 19030-C, SGTR. MSIV on ruptured SG #1 will fail to close requiring isolation of all other SG MSIVs.

Time	Position	Applicant's Action or Behavior
	OATC	<b>OATC INITIAL ACTIONS</b>  Step 8. Check Containment pressure REMAINED LESS THAN 21.5 PSIG.
	OATC	<b>OATC INITIAL ACTIONS</b>  <b>Step 9. Check ECCS flows:</b>  a. BIT Flow. <b>Step 9a RNO</b> <b>Align Valves using ATTACHMENT B. (BIT Valves)</b> b. RCS pressure – LESS THAN 1625 PSIG.  RNO Step 9b. Go to Step 10.
	OATC	<b>OATC INITIAL ACTIONS</b>  Step 10. Check ECCS Valve alignment – PROPER INJECTION LINEUP INDICATED ON MLBs.  RNO Step 10. Align valves using ATTACHMENT B, ATTACHMENT C and ATTACHMENT D as necessary.

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Event No.: 8, 9, and 10

**Event Description:** SGTL occurring on loop #1 develops into a DBA SGTR. The OATC will be unable to maintain PRZR level and will manually perform a Reactor Trip, verify Reactor Trip and actuate Safety Injection. The crew will enter the EOP network and transition to 19030-C, SGTR. MSIV on ruptured SG #1 will fail to close requiring isolation of all other SG MSIVs.

Time	Position	Applicant's Action or Behavior
	OATC	<b>OATC INITIAL ACTIONS</b>  Step 11. Check ACCW Pumps – AT LEAST ONE RUNNING
	OATC	<b>OATC INITIAL ACTIONS</b>  Step 12. Adjust Seal Injection flow to RCPs – 8 to 13 GPM.
		<b>OATC INITIAL ACTIONS</b>  Step 13. Dispatch Operator to ensure one train of SPENT FUEL POOL COOLING in service per 13719, SPENT FUEL POOL COOLING AND PURIFICATION SYSTEM.  <b><u>NOTE TO EXAMINER:</u> END OF OATC INITIAL ACTIONS OF E-0.</b>  <b>RETURNS TO MAIN BODY OF E-0 CONTINUING AT STEP 8</b>
	UO	<b>UO INITIAL ACTIONS</b>  Step 1. Check AFW Pumps – RUNNING <ul style="list-style-type: none"> <li>• MDAFW Pumps</li> <li>• TDAFW Pump, if required</li> </ul>

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Event No.: 8, 9, and 10

**Event Description:** SGTL occurring on loop #1 develops into a DBA SGTR. The OATC will be unable to maintain PRZR level and will manually perform a Reactor Trip, verify Reactor Trip and actuate Safety Injection. The crew will enter the EOP network and transition to 19030-C, SGTR. MSIV on ruptured SG #1 will fail to close requiring isolation of all other SG MSIVs.

Time	Position	Applicant's Action or Behavior
	UO	<b>UO INITIAL ACTIONS</b>  Step 2. Check NR level in at least one SG – GREATER THAN 10% [32% ADVERSE]
	UO	<b>UO INITIAL ACTIONS</b>  Step 3. Check if main steamlines should be isolated: a. Check for one or more of the following conditions: <ul style="list-style-type: none"> <li>– Any steamline pressure – LESS THAN <u>OR</u> EQUAL TO 585 PSIG.</li> <li>– Containment pressure – GREATER THAN 14.5 PSIG.</li> <li>– Low Steam Pressure SI/SLI – BLOCKED <u>AND</u> High Steam Pressure Rate – <u>ONTWO OR MORE</u> CHANNELS OF ANY STEAMLINE.</li> </ul> RNO  Step 3a. Go to Step 4
	UO	<b>UO INITIAL ACTIONS</b>  Step 4. Verify FW Isolation Valves closed: <ul style="list-style-type: none"> <li>• MFIVs</li> <li>• BFIVs</li> <li>• MFRVs</li> <li>• BFRVs</li> </ul>

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Event No.: 8, 9, and 10

**Event Description:** SGTL occurring on loop #1 develops into a DBA SGTR. The OATC will be unable to maintain PRZR level and will manually perform a Reactor Trip, verify Reactor Trip and actuate Safety Injection. The crew will enter the EOP network and transition to 19030-C, SGTR. MSIV on ruptured SG #1 will fail to close requiring isolation of all other SG MSIVs.

Time	Position	Applicant's Action or Behavior
	UO	<b>UO INITIAL ACTIONS</b>  Step 5. Verify SG Blowdown isolated: <ul style="list-style-type: none"><li>Place SG Blowdown Isolation Valve handswitches HS-7603A, B, C, and D in the CLOSE position.</li><li>SG Sample Isolation Valves – CLOSED.</li></ul>
	UO	<b>UO INITIAL ACTIONS</b>  Step 6. Verify Diesel Generators – RUNNING.
	UO	<b>UO INITIAL ACTIONS</b>  Step 7. Throttle total AFW flow as necessary to maintain SG NR levels between 10% [32% ADVERSE] and 65%.
	UO	<b>UO INITIAL ACTIONS</b>  Step 8. Verify both MFPs – TRIPPED.

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Event No.: 8, 9, and 10

**Event Description:** SGTL occurring on loop #1 develops into a DBA SGTR. The OATC will be unable to maintain PRZR level and will manually perform a Reactor Trip, verify Reactor Trip and actuate Safety Injection. The crew will enter the EOP network and transition to 19030-C, SGTR. MSIV on ruptured SG #1 will fail to close requiring isolation of all other SG MSIVs.

Time	Position	Applicant's Action or Behavior
	UO	<b>UO INITIAL ACTIONS</b>
	CREW	Step 9. Check Main Generator Output Breakers – OPEN. <b>NOTE TO EXAMINER: END OF UO INITIAL ACTIONS OF E-0.</b>  <b>RETURNS TO MAIN BODY OF E-0 CONTINUING AT STEP 8.</b>
	SS	Returns to Step 8 E-0 after completion of BOTH OATC & UO Initial Actions.
	OATC / UO	8. Initiate the Continuous Actions Page
	SS	*9. Check RCS temperature stable at or trending to 557° F:
	OATC	___ With RCP(s) running – RCS AVERAGE TEMPERATURE  -OR-  ___ Without RCP(s) running – RCS WR COLD LEG TEMPERATURES
	SS	10. Check PRZR PORVs, Block Valves, and Spray Valves:
	OATC	a. PRZR PORVs – CLOSED AND IN AUTO. b. Normal PRZR Spray Valves – CLOSED. c. Power to at least one Block Valve – AVAILABLE. *d. PRZR PORV Block Valves – AT LEAST ONE OPEN  RNO Step 10*d. Verify open at least one PRZR PORV Block Valve when PRZR pressure is greater than 2185 psig.

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Event No.: 8, 9, and 10

**Event Description:** SGTL occurring on loop #1 develops into a DBA SGTR. The OATC will be unable to maintain PRZR level and will manually perform a Reactor Trip, verify Reactor Trip and actuate Safety Injection. The crew will enter the EOP network and transition to 19030-C, SGTR. MSIV on ruptured SG #1 will fail to close requiring isolation of all other SG MSIVs.

Time	Position	Applicant's Action or Behavior
	SS  OATC	11. Check if RCPs should be stopped: <ul style="list-style-type: none"> <li>a. ECCS Pumps – AT LEAST ONE RUNNING.               <ul style="list-style-type: none"> <li>• CCP or SI Pump.</li> </ul> </li> <li>b. RCS pressure – LESS THAN 1375 PSIG. (no)</li> </ul> RNO 11b. Go to Step 12.
	SS  UO  SS	12. Check SGs secondary pressure boundaries: <ul style="list-style-type: none"> <li>a. SG Pressures:               <ul style="list-style-type: none"> <li>— Any lowering in an uncontrolled manner.</li> <li>-OR-</li> <li>— Any completely depressurized.</li> </ul> </li> </ul> RNO Step 12a. Go to Step 13.
	SS  UO	13. Check SG Tubes intact: <ul style="list-style-type: none"> <li>a. Direct Chemistry to take periodic activity samples of all SGs one at a time.</li> <li>b. Secondary radiation NORMAL:               <ul style="list-style-type: none"> <li>• MAIN STM LINE MONITORS:                   <ul style="list-style-type: none"> <li>• RE-13120 (SG1)</li> <li>• RE-13121 (SG2)</li> <li>• RE-13122 (SG3)</li> <li>• RE-13119 (SG4)</li> </ul> </li> </ul> </li> </ul>

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Event No.: 8, 9, and 10

**Event Description:** SGTL occurring on loop #1 develops into a DBA SGTR. The OATC will be unable to maintain PRZR level and will manually perform a Reactor Trip, verify Reactor Trip and actuate Safety Injection. The crew will enter the EOP network and transition to 19030-C, SGTR. MSIV on ruptured SG #1 will fail to close requiring isolation of all other SG MSIVs.

Time	Position	Applicant's Action or Behavior
	UO	<p>13.Cont. • CNDSR AIR EJCTR/STM RAD MONITORS:</p> <ul style="list-style-type: none"> <li>• <b>RE-12839C</b></li> <li>• RE-12838D (if on scale)</li> <li>• RE-12839E (if on scale)</li> </ul> <p>• STM GEN LIQ PROCESS RAD:</p> <ul style="list-style-type: none"> <li>• RE-0019 (Sample)</li> <li>• RE-0021 (Blowdown)</li> <li>• SG sample radiation.</li> </ul> <p>c. Check SG levels – ANY RISING IN AN UNCONTROLLED MANNER</p> <p>RNO</p> <p>13b/c. Go to 19030-C, E-3 STEAM GENERATOR TUBE RUPTURE.</p> <p><b>NOTE: Radiation will exist on rad monitors RE-12839-C, RE-0724, RE-0810. Also will see an uncontrolled level rise SG # 1.</b></p>
	SS	Transitions to 19030-C, E-3 STEAM GENERATOR TUBE RUPTURE (Crew Update)
	<p>CREW</p> <p>OATC/UO</p> <p>OATC</p>	<p><b>19030-C, E-3 STEAM GENERATOR TUBE RUPTURE</b></p> <p>1. Initiate the following:</p> <ul style="list-style-type: none"> <li>• Continuous Actions and Foldout Page.</li> <li>• Critical Safety Function Status Trees per 19200-C, F-0 CRITICAL SAFETY FUNCTION STATUS TREE.</li> </ul>



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Event No.: 8, 9, and 10

**Event Description:** SGTL occurring on loop #1 develops into a DBA SGTR. The OATC will be unable to maintain PRZR level and will manually perform a Reactor Trip, verify Reactor Trip and actuate Safety Injection. The crew will enter the EOP network and transition to 19030-C, SGTR. MSIV on ruptured SG #1 will fail to close requiring isolation of all other SG MSIVs.

Time	Position	Applicant's Action or Behavior
	SS	2. Initiate NMP-EP-110, EMERGENCY CLASSIFICATION DETERMINATION AND INITIAL ACTION.
	OATC	*3. Maintain Seal Injection flow to all RCPs – 8 TO 13 GPM.
	OATC	<p>4. Check if RCPs should be stopped:</p> <p>a. ECCS Pumps - AT LEAST ONE RUNNING:</p> <ul style="list-style-type: none"> <li>• CCP or SI Pump</li> </ul> <p>b. RCS pressure - LESS THAN 1375 PSIG (no)</p> <p>RNO</p> <p>4b. <u>IF</u> RCS pressure lowers to less than 1375 psig prior to initiation of RCS cooldown in Step 17, <u>THEN</u> stop all RCPs and return to Step in affect.</p>
	UO	<p>*5. Identify Ruptured SG(s) by any of the following conditions:</p> <ul style="list-style-type: none"> <li>• <b>Unexpected rise in any SG NR level. (SG #1)</b></li> <li>• High radiation from any SG sample.</li> <li>• High radiation from any SG steamline.</li> <li>• High radiation from any SG blowdown line.</li> </ul>

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Event No.: 8, 9, and 10

**Event Description:** SGTL occurring on loop #1 develops into a DBA SGTR. The OATC will be unable to maintain PRZR level and will manually perform a Reactor Trip, verify Reactor Trip and actuate Safety Injection. The crew will enter the EOP network and transition to 19030-C, SGTR. MSIV on ruptured SG #1 will fail to close requiring isolation of all other SG MSIVs.

Time	Position	Applicant's Action or Behavior
	UO	<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>CAUTION</b>            At least one SG should be maintained available for RCS cooldown.         </div> <p><b>*6. Isolate Ruptured SG(s):</b></p> <p><b>a. Adjusts ruptured SG ARV(s) controller setpoint to 1160 psig (pot setting 7.73)</b></p>
	UO  <b>CRITICAL TASK</b>	<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>CAUTION</b>            If TDAFW Pump is the only available AFW Pump by closing PV-15129 using HS-15111.         </div> <p><b>7. Close affected TDAFW Pump Steam Supply Valve(s):</b></p> <p>___ HV-3009 (SG 1) LP -1 MS SUPPLY TO AUX FW TD PMP-1</p> <p><b>RNO</b></p> <p><b>7. IF at least one MDAFW Pump running, THEN trip TDAFW Pump by closing PV-15129 using HS-15111.</b></p>
	UO	<p><b>8. Verify SG Blowdown Isolation Valves – CLOSED WITH HANDSWITCHES IN CLOSE POSITION.</b></p>

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**Event Description:** SGTL occurring on loop #1 develops into a DBA SGTR. The OATC will be unable to maintain PRZR level and will manually perform a Reactor Trip, verify Reactor Trip and actuate Safety Injection. The crew will enter the EOP network and transition to 19030-C, SGTR. MSIV on ruptured SG #1 will fail to close requiring isolation of all other SG MSIVs.

Time	Position	Applicant's Action or Behavior
	UO  <b>CRITICAL TASK</b>	<p>9. Isolate flow from the ruptured SG(s) by closing its Main Steamline Isolation and Bypass Valves</p> <p><b>RNO</b></p> <p><b>9. Perform the following:</b></p> <p><b>a. Close all remaining Main Steamline Isolation and Bypass Valves.( SGs 2, 3 and 4)</b></p> <p><i>Note to examiner: The operator may close the Main Steam Line Isolation Valves and Bypass Valves with the individual handswitches, OR with the Steam Line Isolation handswitches.</i></p>
	UO	<p>9. Cont. RNO</p> <p>9b. Verify the following valves are closed:</p> <ul style="list-style-type: none"> <li>• Steam Dump valves: <ul style="list-style-type: none"> <li>• Status lightboard ZLB-2</li> </ul> </li> <li>• AUX <u>AND</u> MAIN STEAM SPARGERS valve: <ul style="list-style-type: none"> <li>• HV-6194A.</li> </ul> </li> <li>• Steam Jet Air Ejector valves: <ul style="list-style-type: none"> <li>• HV-4084B, SJAЕ-1 MN &amp; AUX STM SPLY VLV.</li> <li>• HV-4085B, SJAЕ-2 MN &amp; AUX STM SPLY VLV.</li> </ul> </li> <li>• MSR steam supply: <ul style="list-style-type: none"> <li>▪ HV-6030, MSR A&amp;C REHEAT STEAM SOURCE STOP VALVES.</li> <li>• HV-6015, MSR B&amp;D REHEAT STEAM SOURCE STOP VALVES.</li> </ul> </li> </ul> <p>RNO</p> <p>9c. Use intact SG ARV(s) for dumping steam</p>

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Event No.: 8, 9, and 10

**Event Description:** SGTL occurring on loop #1 develops into a DBA SGTR. The OATC will be unable to maintain PRZR level and will manually perform a Reactor Trip, verify Reactor Trip and actuate Safety Injection. The crew will enter the EOP network and transition to 19030-C, SGTR. MSIV on ruptured SG #1 will fail to close requiring isolation of all other SG MSIVs.

Time	Position	Applicant's Action or Behavior
	CREW	<div style="border: 1px solid black; padding: 10px; margin: 10px auto; width: 80%;"> <p style="text-align: center;"><b><u>CAUTIONS</u></b></p> <ul style="list-style-type: none"> <li>This procedure should be performed in a timely manner to assure that break flow in the ruptured SG(s) is terminated before water enters the SGs main steam piping.</li> <li>Any ruptured SG that is also faulted, should remain isolated during subsequent recovery actions unless needed for RCS cooldown or SG activity sample.</li> </ul> </div>
	UO <b>CRITICAL TASK</b>	<p>*10. Check ruptured SG(s) level:</p> <p>a. SG NR level - GREATER THAN 10% [32% ADVERSE]</p> <p><b>b. Stop feed flow to ruptured SG(s).</b></p> <p><i>(Verify MFIV's and BFIV's are closed by ZLB indication, close HV-5139 and HV-5122)</i></p>
	UO	<p>11. Check ruptured SG(s) pressure GREATER THAN 290 PSIG.</p>
	UO	<div style="border: 1px solid black; padding: 10px; margin: 10px auto; width: 80%;"> <p style="text-align: center;"><b>NOTE</b></p> <p>When the low steamline pressure SI/SLI signal is blocked, main steamline isolation will occur if the high steam pressure rate setpoint is exceeded.</p> </div> <p>12. Check if low steamline pressure SI / SLI should be blocked:</p> <p>a. STEAM DUMPS – AVAILABLE</p>

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**Event Description:** SGTL occurring on loop #1 develops into a DBA SGTR. The OATC will be unable to maintain PRZR level and will manually perform a Reactor Trip, verify Reactor Trip and actuate Safety Injection. The crew will enter the EOP network and transition to 19030-C, SGTR. MSIV on ruptured SG #1 will fail to close requiring isolation of all other SG MSIVs.

Time	Position	Applicant's Action or Behavior
	UO	RNO 12a. Go to Step 14.
	UO	14. Raise intact SG levels prior to maximum rate cooldown.  <b>NOTE: Throttles Open MDAFW to raise SG levels prior to cooldown.</b>
	UO	15. Checks at least one RCP – RUNNING

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**Event Description:** SGTL occurring on loop #1 develops into a DBA SGTR. The OATC will be unable to maintain PRZR level and will manually perform a Reactor Trip, verify Reactor Trip and actuate Safety Injection. The crew will enter the EOP network and transition to 19030-C, SGTR. MSIV on ruptured SG #1 will fail to close requiring isolation of all other SG MSIVs.

Time	Position	Applicant's Action or Behavior																								
	CREW	<div>16. Determines required core exit temperature for cooldown:</div> <table><thead><tr><th>Lowest Ruptured SG Pressure (psig)</th><th>Core Exit Temperature (°F)</th></tr></thead><tbody><tr><td>1200 and greater</td><td>530</td></tr><tr><td>1100 to 1199</td><td>518</td></tr><tr><td>1000 to 1099</td><td>506</td></tr><tr><td>900 to 999</td><td>493</td></tr><tr><td>800 to 899</td><td>479</td></tr><tr><td>700 to 799</td><td>463</td></tr><tr><td>600 to 699</td><td>445</td></tr><tr><td>500 to 599</td><td>424</td></tr><tr><td>400 to 499</td><td>399</td></tr><tr><td>300 to 399</td><td>366</td></tr><tr><td>290 to 299</td><td>350</td></tr></tbody></table> <div>NOTE: RCP TRIP CRITERIA NO LONGER APPLIES AFTER COOLDOWN INITIATED.</div>	Lowest Ruptured SG Pressure (psig)	Core Exit Temperature (°F)	1200 and greater	530	1100 to 1199	518	1000 to 1099	506	900 to 999	493	800 to 899	479	700 to 799	463	600 to 699	445	500 to 599	424	400 to 499	399	300 to 399	366	290 to 299	350
Lowest Ruptured SG Pressure (psig)	Core Exit Temperature (°F)																									
1200 and greater	530																									
1100 to 1199	518																									
1000 to 1099	506																									
900 to 999	493																									
800 to 899	479																									
700 to 799	463																									
600 to 699	445																									
500 to 599	424																									
400 to 499	399																									
300 to 399	366																									
290 to 299	350																									
	UO	<div>17. Initiates RCS cooldown:</div> <div>a. Dump steam to Condenser from intact SG(s) at maximum rate using Steam Dumps by slowly raising demand on PIC-507.</div> <div>RNO</div> <div>17a. Dump steam at maximum rate from intact SG ARV(s).</div> <div>NOTE: Opens Loop 2, 3, &amp; 4 ARVS PV-3010, PV-3020, PV-3030</div>																								

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**Event Description:** SGTL occurring on loop #1 develops into a DBA SGTR. The OATC will be unable to maintain PRZR level and will manually perform a Reactor Trip, verify Reactor Trip and actuate Safety Injection. The crew will enter the EOP network and transition to 19030-C, SGTR. MSIV on ruptured SG #1 will fail to close requiring isolation of all other SG MSIVs.

Time	Position	Applicant's Action or Behavior
	UO	<p>*18. Check if RCS Cooldown should be stopped:</p> <ul style="list-style-type: none"> <li>a. Core Exit TCs LESS THAN REQUIRED TEMPERATURE.</li> </ul> <p>RNO *18a. <u>WHEN</u> Core Exits are less than required, <u>THEN</u> perform Steps 18b and 18c.</p> <ul style="list-style-type: none"> <li>b. Stop RCS cooldown</li> <li>c. Maintain core exit TCs – LESS THAN REQUIRED TEMPERATURE.</li> </ul>
	UO	<p>*19. Check intact SG levels:</p> <ul style="list-style-type: none"> <li>a. NR level - AT LEAST ONE GREATER THAN 10% [32% ADVERSE].</li> <li>b. Maintain NR levels between 10% [32% ADVERSE] and 65%.</li> <li>d. NR level – ANY RISING IN AN UNCONTROLLED MANNER.</li> </ul> <p>RNO</p> <p>*19c. Go to Step 20</p>
	OATC	<p>20. Check PRZR PORVs and Block valves:</p> <ul style="list-style-type: none"> <li>a. Power to PRZR PORV Block Valves – AVAILABLE.</li> <li>b. PRZR PORVs – CLOSED.</li> <li>c. PRZR PORV Block Valves - AT LEAST ONE OPEN.</li> </ul>

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**Event Description:** SGTL occurring on loop #1 develops into a DBA SGTR. The OATC will be unable to maintain PRZR level and will manually perform a Reactor Trip, verify Reactor Trip and actuate Safety Injection. The crew will enter the EOP network and transition to 19030-C, SGTR. MSIV on ruptured SG #1 will fail to close requiring isolation of all other SG MSIVs.

Time	Position	Applicant's Action or Behavior
	SS	<div style="border: 1px solid black; padding: 10px; margin: 10px;"> <p style="text-align: center;"><b><u>CAUTIONS</u></b></p> <p>If offsite power is lost after SI reset, action is required to restart the following ESF equipment if plant conditions require their operation:</p> <ul style="list-style-type: none"> <li>• RHR Pumps</li> <li>• SI pumps</li> <li>• Post-LOCA Cavity Purge Units</li> <li>• Containment Coolers in low speed (Started in high speed on a UV signal).</li> <li>• ESF Chilled Water Pumps (If CRI is reset).</li> </ul> </div>
	OATC	21. Reset SI
	SS	<div style="border: 1px solid black; padding: 10px; margin: 10px;"> <p style="text-align: center;"><b><u>CAUTION</u></b></p> <p>Repositioning Phase A Isolation Valves may cause radiation problems throughout plant</p> </div> <p>22. Reset Containment Isolation Phase A</p>



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Event No.: 8, 9, and 10

**Event Description:** SGTL occurring on loop #1 develops into a DBA SGTR. The OATC will be unable to maintain PRZR level and will manually perform a Reactor Trip, verify Reactor Trip and actuate Safety Injection. The crew will enter the EOP network and transition to 19030-C, SGTR. MSIV on ruptured SG #1 will fail to close requiring isolation of all other SG MSIVs.

Time	Position	Applicant's Action or Behavior
	OATC	<p>23. Establish Instrument Air to Containment:</p> <ul style="list-style-type: none"> <li>a. Instrument air pressure – GREATER THAN 100 PSIG.</li> <li>b. Open INSTR AIR CNMT ISO VLV HV-9378.</li> </ul> <p><b><i>Note to examiner: Two solenoid handswitches are operated to open HV-9378.</i></b></p> <ul style="list-style-type: none"> <li>c. Verify PRZR Spray Valves operating as required</li> </ul>
	UO  ATC	<p>24. Check if RHR pumps should be stopped:</p> <ul style="list-style-type: none"> <li>a. RHR Pumps – ANY RUNNING WITH SUCTION ALIGNED TO RWST.</li> <li>b. RCS pressure – GREATER THAN 300 PSIG ↗</li> <li>c. Stop RHR Pumps</li> </ul>
	OATC	<p>*25. IF RCS pressure lowers in an uncontrolled manner to less than 300 psig, <u>THEN</u> restart RHR Pumps.</p>
	OATC / UO  UO  UO	<p>*26. Check if RCS cooldown should be stopped:</p> <ul style="list-style-type: none"> <li>a. Core Exit TCs - LESS THAN REQUIRED TEMPERATURE.</li> </ul> <p>RNO</p> <ul style="list-style-type: none"> <li>*26a. Do <u>NOT</u> proceed until core exit TCs less than required temperature.</li> <li>b. Stop RCS cooldown.</li> <li>c. Maintain Core Exit TCs – LESS THAN REQUIRED TEMPERATURE.</li> </ul>

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Scenario No.: 3

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Event No.: 8, 9, and 10

**Event Description:** SGTL occurring on loop #1 develops into a DBA SGTR. The OATC will be unable to maintain PRZR level and will manually perform a Reactor Trip, verify Reactor Trip and actuate Safety Injection. The crew will enter the EOP network and transition to 19030-C, SGTR. MSIV on ruptured SG #1 will fail to close requiring isolation of all other SG MSIVs.

Time	Position	Applicant's Action or Behavior
	SS	<div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>CAUTION</p> <p>Ruptured SG pressure and RCS subcooling should begin to rise as RCS pressure recovers after the cooldown is stopped.</p> </div>
	UO	27. Check ruptured SG(s) pressure – STABLE <u>OR</u> RISING.
	OATC	28. Check RCS Subcooling - GREATER THAN 44°F [58°F ADVERSE].
	OATC	29. Check all of the following:  RCS pressure - GREATER THAN RUPTURED SG(s) PRESSURE. PRZR level - LESS THAN 75% [52% ADVERSE].
	OATC	30. Check Normal PRZR Spray - AVAILABLE.
	OATC	31. Depressurize RCS using Normal PRZR Spray to refill PRZR:  a) Spray PRZR with maximum available spray. b) Normal PRZR Spray - EFFECTIVE AT REDUCING RCS PRESSURE. <b>(YES)</b> c) Go to Step 37.

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Event No.: 8, 9, and 10

**Event Description:** SGTL occurring on loop #1 develops into a DBA SGTR. The OATC will be unable to maintain PRZR level and will manually perform a Reactor Trip, verify Reactor Trip and actuate Safety Injection. The crew will enter the EOP network and transition to 19030-C, SGTR. MSIV on ruptured SG #1 will fail to close requiring isolation of all other SG MSIVs.

Time	Position	Applicant's Action or Behavior
	OATC	<p>37. Check if <u>ANY</u> of the following conditions are satisfied:</p> <p><u>BOTH</u> of the following:</p> <p>1)RCS pressure - LESS THAN RUPTURED SG(s) PRESSURE. 2)PRZR level - GREATER THAN 9% [37% ADVERSE].</p> <p>-OR-</p> <p>RCS Subcooling - LESS THAN 24°F [38°F ADVERSE].</p> <p>-OR-</p> <p>PRZR level - GREATER THAN 75% [52% ADVERSE].</p>
	OATC <b>CRITICAL TASK</b>	<p><b>38. Terminate RCS depressurization:</b></p> <p>a) Verify Normal PRZR Spray valve(s) - CLOSED. b) Verify PRZR PORV(s) - CLOSED. c) Block COPS. d) Check Auxiliary Spray - IN SERVICE. (NO)</p> <p><b>RNO</b></p> <p>d) Go to Step 39.</p>
	OATC	<p>39. Check RCS pressure - RISING.</p>

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Scenario No.: 3

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Event No.: 8, 9, and 10

**Event Description:** SGTL occurring on loop #1 develops into a DBA SGTR. The OATC will be unable to maintain PRZR level and will manually perform a Reactor Trip, verify Reactor Trip and actuate Safety Injection. The crew will enter the EOP network and transition to 19030-C, SGTR. MSIV on ruptured SG #1 will fail to close requiring isolation of all other SG MSIVs.

Time	Position	Applicant's Action or Behavior
	OATC	<p><b>*40. Check if ECCS flow should be terminated:</b></p> <ul style="list-style-type: none"><li>a. RCS Subcooling - GREATER THAN 24°F [38°F ADVERSE].</li><li>b. Secondary Heat Sink: Total feed flow to SGs - GREATER THAN 570 GPM AVAILABLE. -OR- NR level in at least one intact SG - GREATER THAN 10% [32% ADVERSE].</li><li>c. RCS pressure - STABLE <u>OR</u> RISING.</li><li>d. PRZR level - GREATER THAN 9% [37% ADVERSE].</li></ul>
	OATC	<p>41. Stop ECCS Pumps and place in standby:</p> <ul style="list-style-type: none"><li>• SI Pumps</li><li>• All but one CCP</li></ul>
<b>END OF SCENARIO. PROCEED AT THE DISCRETION OF THE CHIEF EXAMINER.</b>		

Final Scenario 4, as-given: Crew 1

Facility: Vogtle Scenario No.: 4 (Low Power) Op-Test No.: 2014-301

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

Snap 233

Initial Conditions: 3.5% power, maintaining Tavg at 557F (+/- 2° F) with steam dumps in steam pressure mode (auto), control rods in manual, letdown flow at 75 gpm.

Equipment OOS: CCW pump #5, Air Compressor #3.

Turnover: INFO LCO 3.7.7, CCW Train 'A', Containment Mini-purge is in service, 'A' CCP caution tagged "Run only in emergency."

AFW secured and in standby alignment except for MDAFW pump 'A'. Continue raising power to Mode 1. Mode 1 signoffs complete except for AFW in Standby readiness.

**Preloaded Malfunctions:**

**A-TIC-130 – Loss of cooling to letdown heat exchanger (Trigger 1)**

**CV-12 – VCT Level Transmitter LT-185 fails high (Trigger 2)**

**HS1AA0205 HS-1AA0205 TRIP (Trigger 3)**

**EAB-LO\_HS1AA0205\_Y 1HS-AA0205 YELLOW A533P29-B12 – ON (Trigger 3)**

**ALB36-A01 4160 SWGR 1AA02 TROUBLE – ON (Trigger 3)**

**FW 18 - Local control of BFRV LV-5242 (Trigger 4)**

**FW 19 - BFRV LV-5242 Position (Trigger 4)**

**RD 10 L, N, F - Stuck RCCA K6 (CC), G13 (SDB), E13 (SDD) (Trigger 5, tied to Rx trip)**

**MS 02B - Main steam line #2 rupture outside containment (Trigger 6)**

**EL 07B - Loss of 1BA03 (Trigger 7)**

**EL 01A – DG1A Overspeed trip (Trigger 7)**

**HS9382 HS-9382 AIR COMPRESSOR #3 RECIPROCATING – STOP**

**A-LO\_HS9382\_G 1HS-9382 GREEN A531P30-A6 - OFF**

**NS 07 A, C, E - NSCW Pump handswitch auto contact failure**

**Override HV-8104 Closed**

**AF 05C - TDAFWP Auto start failure**

**SF01 Spent Fuel Pool Cooling Train 'A' OOS (trigger 10)**

**SF02 Spent Fuel Pool Cooling Train 'B' in service (Trigger 10 w/ 35 second delay)**

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N-UO N-SS	Place MDAFW Pump 'A' in standby per 13610-1 checklist After MDAFW 'A' is in standby, booth operator will tell SS to raise power to Mode 1.
2	Power Ramp	R-OATC R-SS	Raise power from 3.5% to Mode 1 per 12004-C, Steps 4.1.18 thru 4.1.22 Mode 1 signoffs complete except for AFW in Standby readiness

3	A-TIC-130 POT	I-OATC I-SS	TV-130 temperature element failure results in high letdown heat exchanger outlet temperatures. 17007-C for ALB07 F04 LTDN HX HI TEMP DEMIN DIVERT <b>(Trigger 1)</b>
4	CV-12	C-OATC C-SS	LT-185 VCT Level Transmitter fails high 17007-1 for ALB07 E05 VCT HI/LO LEVEL <b>(Trigger 2)</b>
5	SG03B2	I-UO I-SS TS-SS	SG Pressure Instrument PI-525A fails low 18001-C, "Systems Instrumentation Malfunction 3.3.2, ESFAS Instrumentation, 3.3.3, Post Accident Monitoring Instrumentation, (INFO) 3.3.4, Remote Shutdown System <b>(Trigger 15)</b>
6	Trigger 3 NS07A, C,E	C-UO C-SS TS-SS	Loss of 1AA02, NSCW Train "A" fails to start. 18031-C for Loss of NSCW LCO 3.7.5, Auxiliary Feedwater System, Condition B, and LCO 3.8.1, AC Sources – Operating, Condition A <b>(Trigger 3)</b>
7	FW-18 FW-19	C-UO C-SS	Loop #4 BFRV fails <del>to control in automatic</del> <b>closed</b> 18016-C for Condensate and Feedwater Malfunction  Insert using file M:/opensim/monitor/ovationtesting.uvl Set first variable = 1, second variable = 0.
8	MS02B	M-ALL	Reactor trip due to Loop #4 BFRV failure. (reactor trip and 3 rods fail to fully insert) 19000-C for Reactor Trip, then transition to 19001-C <b>(Trigger 4)</b>
9	N/A	C-OATC C-SS	Emergency Boration of RCS with HV-8104 failed closed 13009-1 for Emergency Boration due to 3 stuck rods
10	MS02B	M-ALL	SG #2 faulted outside containment 19000-C <b>(Trigger 6)</b>
11	EL07B EL01A	M-ALL	Loss of all AC / TDAFW auto start failure 19100-C for Loss of all AC <b>(Trigger 7)</b>
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

**Scenario Objective:**

Normal plant operations, raising reactor power to Mode 1, loss of 1AA02, loss of control of one BFRV finally resulting in a reactor trip with 3 stuck rods, one SG faulted outside containment with a loss of all AC and TDAFW auto start failure. The crew is expected to respond to various component and instrument malfunctions per AOP and ARP guidance, and recognize and respond to major plant events per the EOP network.

**Event 1**

Place MDAFW pump 'A' in standby per 12004-C, Section 4.1.10 and per 13610-1, "Auxiliary Feedwater System," checklist

**Verifiable Actions:****SS**

Direct UO to place AFW in standby readiness per 13610-1, "Auxiliary Feedwater System"

**UO**

Align AFW to standby readiness per 13610-1

- Stop MDAFW Pump 'A' and place in Automatic
- Open HS-5139A
- Open HS-5137A

**Event 2**

Raise power to Mode 1 per 12004-C, "Power Operation (Mode 1)," Steps 4.1.18 through 4.1.22. Mode 1 signoffs are complete with exception of AFW in standby readiness.

**Verifiable actions:****SS**

Direct OATC and UO to raise power to Mode 1 from current power level

**OATC**

Withdraw control rods  
Dilute RCS

**UO**

Monitor and control RCS temperature by adjusting steam dumps as necessary

**Event 3**

TV-130 failure resulting in high letdown heat exchanger outlet temperatures

**Verifiable Actions:****SS**

Direct OATC to manually control TV-0130. May enter 17007-C for ALB07 F04 LTDN HX HI TEMP DEMIN DIVERT.

**OATC**

Verify TV-0129 diverts letdown flow to VCT to bypass demins (ALB07-D03)  
Adjust TV-0130 as necessary to control letdown temperature (VCT temperature)  
Return TV-0129 to VCT position



**Event 4**

LT-185 VCT Level Transmitter fails high

**Verifiable Actions:****SS**

Enter AOP 18007-C, Section C for loss of makeup flow and direct OATC action

**OATC**

Align LV-112A to the VCT

**Event 5**

SG Pressure Instrument PI-525A fails low

**SS**

Enter 18001-C, "Systems Instrumentation Malfunction," Section F.

**Verifiable Action:****UO**

Check steam and feed flows matched on all SGs

At the OWS bypass the affected channel using the signal bypass button on the affected loop's graphical display.

**Technical Specifications:**

3.3.2, ESFAS Instrumentation, fu 1.e, Cond. D.

3.3.3, Post Accident Monitoring Instrumentation, fu 8, Cond. B, G, H, I. (INFO)

3.3.4, Remote Shutdown System, fu 13, Cond A.

3.3.2, Fu 4d(1), Cond. D

**Event 6**

Loss of 1AA02 with NSCW train 'A' failing to start

**SS**

Enter 18031-C, "Loss of Class 1E Electrical Systems"

Initiate 1 hour actions for LCO 3.8.1 (verify off-site circuits)

Initiate 1 hour actions for LCO 3.8.1 (verify SAT energized)

**Verifiable Actions:****OATC**

Stop CCP 'A' or NCP

**UO**

Manually start NSCW Train 'A' pumps and verify proper operation

Stop MDAFW Pump 'A'

Stop ACCW Pump

Verify only 4 Containment Coolers running

Verify 2 CRDM fans running

Verify Cavity Cooling Fan running

Verify SFP Cooling in service

Technical Specifications:

3.7.5, AFW System, Cond B, C.  
3.7.8, NSCW System, Cond. A  
3.8.1, AC Sources-Operating, Cond. A  
3.8.9, Distribution Systems – Operating, Cond. A

**Event 7**

The Loop #4 BFRV fails closed. The crew will respond per guidance of 18016-C, “Condensate and Feedwater Malfunction.” Manual control will allow continued operation.

**SS**

Enter 18016-C, “Condensate and Feedwater Malfunction,” Section D.

Verifiable Action:**UO**

Manual control of BFRV or MFRV to control SG water level between 60 and 70%

**Event 8**

The Loop #4 BFRV will fail open, requiring a manual reactor trip due to high SG level. 3 rods will fail to fully insert, requiring emergency boration.

Verifiable Actions:**OATC**

Manually trip the reactor (may trip automatically if condition is not recognized).  
Initiate emergency boration and verify correct boric acid flow.

**Event 9****SS**

Direct OATC to emergency borate the RCS per 13009-1, “CVCS Reactor Makeup Control”

**OATC**

Starts BAT Pump  
Verifies Charging Pump running  
Attempts to open HV-8104  
Opens FV-0110A  
Open FV-0110B  
Places FIC-0121 in manual and adjusts flow to 42 gpm  
Verifies Emergency boration flow greater than 30 gpm (FI-0110A)

OR

Open LV-0112D and/or LV-0112E  
Closes LV0112B and/or LV-0112C  
Divert LV-0112A  
FIC-0121 in manual with flow greater than 100 gpm  
Adjust RCP seal flow within normal range

OR

Open LV-0112D and/or LV-0112E  
Closes LV0112B and/or LV-0112C  
Divert LV-0112A  
Open HV-8801A/B  
Adjust RCP seal flow within normal range

**EVENT 10**

The crew will respond to a faulted Steam Generator #2 outside reactor containment, which will result in SI. Initiate after step 8 of 19001-C of previous event (step 8 is initiation of emergency boration).

**Verifiable Actions:****SS**

Re-enter 19000-C, "Reactor Trip or Safety Injection"

**OATC**

Carry out IOAs and Initial Actions of 19000-C.

**UO**

Carry out IOAs and Initial Actions of 19000-C.

**EVENT 11**

Loss of All AC with the TDAFW pump failing to start automatically (ground fault on 1BA03 and overspeed trip of DG1A). Initiate at Step 8 of 19000-C during previous event (IOAs completed). Intent is to isolate the faulted steam generator in Step 21 of 19100-C. 1AA02 power may be restored by aligning the alternate incoming source to the bus AFTER the faulted SG is isolated.

When operators and maintenance are dispatched to investigate the buses, do not report the status of any buses until the SG is isolated in step 21 in 19100-C.

**Verifiable Actions:****SS**

Enter 19100-C, "Loss of All AC Power"

**OATC**

Close HV-8149A/B/C

Close LV-0459

Close LV-0460

Trip RCPs

Trip NCP

**UO**

Manually start the TDAFW pump.

Close MSIV and bypass valves

Close SGBD Valves

Close SGBD Sample Valves

Isolate Faulted Steam Generator

Close HV-5125

Close HV-3019

Dispatch SO to locally close HV-5132

Close RAT 'B' Breaker to 1AA02

**OATC/UO**

place the following in PTL:

- CCPs
- RHR Pumps
- SI Pumps
- Containment Spray Pumps
- CCW Pumps
- ACCW Pumps
- MDAFW Pumps
- Containment Coolers
- ESF Chillers (STOP position)

Scenario is complete when the faulted steam generator is isolated in 19100-C and power has been restored to the RAT, or at Chief Examiner discretion.

**CRITICAL TASKS:****1) Manually start Train “A” NSCW pumps.**

At least two Train “A” NSCW pumps must be started before EDG trip is required due to high temperature from no cooling water flow. Annunciator ALB35-C04 will alarm in about 4.5 minutes with no NSCW flow. An automatic trip of the EDG due to lack of cooling water flow constitutes task failure.

**2) Initiate emergency boration due to three stuck rods.**

Per Tech Spec Bases for LCO 3.1.1, Emergency Boration to verify shutdown margin must be initiated promptly. Initiating emergency boration within 15 minutes of recognizing the stuck rods is adequate. Failing to initiate emergency boration within 15 minutes of recognition of three stuck rods in 19001-C constitutes a task failure.


**3) Manually start the TDAFW pump following Loss of All AC.**

Per the FSAR and WOG Critical Task guidelines, AFW pumps must be started manually before SGs boil dry. From a procedure transition standpoint, if a transition to 19231-C, “Response to Loss of Secondary Heat Sink,” is made and action is taken in 19231-C beyond Step 1, the critical task is failed.

**4) Manually control Steam Generator #4 level when BFRV fails to control in automatic.**

Due to the failure of the automatic function, the steam generator BFRV will fail closed. Without taking manual control of the BFRV, feedwater flow to the steam generator will lower, and at 38% NR level, the reactor will automatically trip. An automatic reactor trip on low steam generator level constitutes task failure.

Target Quantitative Attributes (Per Scenario; See Section D.5.d)		Actual Attributes
1.	Total malfunctions (5–8)	6
2.	Malfunctions after EOP entry (1–2)	1
3.	Abnormal events (2–4)	4
4.	Major transients (1–2)	3
5.	EOPs entered/requiring substantive actions (1–2)	3
6.	EOP contingencies requiring substantive actions (0–2)	1
7.	Critical tasks (2–3)	4

	<p style="text-align: center;">NUCLEAR SAFETY FOCUS TARGET ZERO</p>	
<p><b><u>Protected Train:</u></b></p> <p><input type="checkbox"/> Alpha</p> <p><input checked="" type="checkbox"/> Bravo</p>	<p><b>EOOS:</b></p>	<p><input checked="" type="checkbox"/> Green</p> <p><input type="checkbox"/> Yellow</p> <p><input type="checkbox"/> Orange</p> <p><input type="checkbox"/> Red</p>
<p><b>Plant Conditions:</b></p>	<p>~3.5% RTP BOL, maintaining Tave at 557°F (+/- 2°F) with steam dumps in steam pressure mode (auto), control rods in manual, Letdown flow at 75 gpm.</p>	
<p><b>Major Activities:</b></p>	<p>Continue raising power to Mode 1.</p>	
<p><b>Active LCOs:</b></p>	<p><input type="checkbox"/> INFO LCO 3.7.7 CCW Train A</p>	
<p><b>OOS/ Degraded CR Instruments:</b></p>	<p><input type="checkbox"/> None</p>	
<p><b>Narrative Status:</b></p>	<p><input type="checkbox"/> Containment mini-purge is in service for a planned Containment Entry on next shift.</p> <p><input type="checkbox"/> CCW Pump #5 Danger Tagged for corrective maintenance on the motor bearing. No forecast return to service time is available on this emergent work item.</p> <p><input type="checkbox"/> Air Compressor #3 Danger Tagged for PM's for the next 24 hours.</p> <p><input type="checkbox"/> MFPT B vibration monitoring equipment installed in the field. Inform Vogtle engineering one hour prior to anticipated MFP B startup. Elevated vibrations were observed prior to the outage. Pump was worked during the outage. Investigation continues.</p> <p><input type="checkbox"/> CCP A Caution Tagged. Pump is operable but is to be run only in emergency due to minor bearing oil leakage when operating. Repair plan is being developed.</p> <p><input type="checkbox"/> AFW secured and in standby alignment except for MDAFW pump 'A'. Secure per 13610-1 section 4.3.1.1 and place in standby.</p> <p><input type="checkbox"/> Mode 1 signoffs complete except for AFW in Standby readiness.</p>	

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Scenario No.: 4

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Event No.: 1

**Event Description:** With Reactor Power at about 3.5%, the UO has been directed to place 'A' MDAFW Pump in standby alignment per 13610-1 checklist.

Time	Position	Applicant's Action or Behavior
	SS	<p><b><u>12004-C</u></b></p> <p>4.1.10.b - Stop MDAFW pump "A" and place in standby per 13610-1, "Auxiliary Feedwater System."</p>
	UO	<p><b><u>13610-1</u></b></p> <p>4.3.1.1.1.a - <u>IF</u> required, <b>verify</b> the following SG FROM MDAFW PMP-A Isolation Valves are at least partially open:</p> <ul style="list-style-type: none"> <li>- 1-HV-5139</li> <li>- 1-HV-5137</li> </ul>
	UO	<p>4.3.1.1.1.b - <b>Shut down</b> MDAFW-A 1-1302-P4-003 using 1HS-5131A.</p>
	UO	<p>4.3.1.1.1.c - <b><u>Check FV-5155, AFW P-3 Mini Flow Valve indication lit and valve OPEN (ZLB-4).</u></b></p>
		<div style="border: 1px solid black; padding: 10px; margin: 10px auto; width: 80%;"> <p style="text-align: center;">NOTE</p> <p>Leaving the SG FROM MDAFW PMP Isolation Valves open in MODES 4, 5, and 6 may inadvertently cause the CST to gravity drain to the steam generators.</p> </div> <p>4.3.1.1.2 - Align the MDAFW Pump A for standby readiness per Checklist 2, Section I.</p>

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Scenario No.: 4

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Event No.: 1

**Event Description:** With Reactor Power at about 3.5%, the UO has been directed to place 'A' MDAFW Pump in standby alignment per 13610-1 checklist.

Time	Position	Applicant's Action or Behavior
	UO	<p>4.3.1.1.3 – Monitors AFW system for back-leakage from SGs.</p> <ul style="list-style-type: none"><li>• 4.3.1.1.3.a – Displays discharge temperatures on IPC computer.</li><li>• 4.3.1.1.3.b – Monitor the discharge temperatures for 1 hour.</li><li>• 4.3.1.1.3.c – IF discharge temperatures rise, reseats check valves per section 4.4.4</li></ul>
<p><b>END OF EVENT 1. PROCEED TO NEXT EVENT AT THE DISCRETION OF THE CHIEF EXAMINER.</b></p>		

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Scenario No.: 4

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Event No.: 2

**Event Description:** The crew will initiate a power ramp from 3.5% power to > 5% for Mode 1 entry. All entry requirements for Mode 1 will have been met according to shift turnover.

Time	Position	Applicant's Action or Behavior
	SS	<p>Co-ordinate the following with chemistry if not already performed during the swap over from AFW to MFW.</p> <ul style="list-style-type: none"> <li>• Notifies chemistry that feeding via MFW has commenced.</li> <li>• Verifies that PRZR Steam space sample is in service.</li> <li>• Initiates actions to place N-16 radiation monitor RE-0724 in service.</li> <li>• Ensures SGBD is in service.</li> <li>• Directs ABO to adjust SGBD condensate return temperatures.</li> </ul>
	OATC	Energizes at least one bank of PRZR heaters until power > 30%.
	SS	All admin requirements of step 4.1.12, step 4.1.13 will have been performed according to the shift turnover.
	SS	Verifies AFW in standby readiness prior to exceeding 5% power.
	OATC	Initiates raising reactor power to between 16% and 20%.
	OATC/ UO	<p>Maintains plant conditions during power increase as follows:</p> <ul style="list-style-type: none"> <li>• Tave within 2 F of program Tave using steam dumps in the Steam Pressure Mode.</li> <li>• Steam Generator levels between 60% and 70% NR.</li> <li>• PRZR Pressure 2235 + plus or – 15 psig.</li> <li>• PRZR level within 5% of program with normal charging and letdown in service.</li> <li>• Monitors Tave/Tref Deviation Alarm during remainder of startup.</li> </ul>



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Scenario No.: 4

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Event No.: 2

**Event Description:** The crew will initiate a power ramp from 3.5% power to > 5% for Mode 1 entry. All entry requirements for Mode 1 will have been met according to shift turnover.

Time	Position	Applicant's Action or Behavior
	SS	<p>When power reaches 5% as determined by higher of Average PR NIS or Average Loop Delta T.</p> <ul style="list-style-type: none"><li>• Logs Mode 1 entry into the Unit Control Logbook.</li><li>• Notifies Chemistry of the Mode Change.</li></ul> <p>NOTE: After adequate power change, proceed to Event # 5.</p>
<p><b>END OF EVENT 2. PROCEED TO NEXT EVENT AT THE DISCRETION OF THE CHIEF EXAMINER WHEN ADEQUATE REACTIVITY CONTROL HAS BEEN DEMONSTRATED.</b></p>		

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Event No.: 3

**Event Description:** TIC-130 temperature element will fail low, resulting in high letdown temperature and causing letdown to divert to the VCT. The crew will respond to the failure based on ARP 17007, for ALB07-F04 LTDN HX HI TEMP DEMIN DIVERT. The crew may also respond based on AOP 18022-C as specified in the ARP.

Time	Position	Applicant's Action or Behavior
	OATC	<p>Diagnose TIC-0130 controller has failed low. (Indicator will still function)</p> <p>Symptoms / alarms:</p> <p>ALB07-D04 BTRS DEMIN INLET HI TEMP</p> <p>ALB07-F04 LTDN HX HI TEMP DEMIN DIVERT</p> <p>ALB07-B04 (VOLUME CONTROL TANK OUTLET TEMP HI (delayed, or may not come in)</p> <p>Indications:</p> <ul style="list-style-type: none"> <li>• TIC-0130 red UP arrow – LIT.</li> <li>• Amber light on 1HS-129 LETDOWN TO DEMIN / VCT – LIT.</li> </ul>
	OATC	<p><b>ALB07-D04 response actions:</b></p> <p><b><u>AUTOMATIC ACTIONS:</u></b></p> <p>NONE</p> <p><b><u>INITIAL OPERATOR ACTIONS:</u></b></p> <p>NONE</p>
	OATC	<p><b><u>SUBSEQUENT OPERATOR ACTIONS</u></b></p> <ol style="list-style-type: none"> <li>1. <b>Determine</b> actual Boron Thermal Regeneration System (BTRS) Demineralizer inlet temperature using I-TI-0381 on the QMCB.</li> <li>2. <b>Take manual control</b> of 1-TV-0381A, and attempt to <b>reduce</b> the temperature by closing the valve using 1-TIC-0381A on the QMCB.</li> </ol> <div style="border: 1px solid black; padding: 10px; margin-top: 10px;"> <p style="text-align: center;">NOTE</p> <p>If BTRS Demineralizer inlet temperature reaches 168.5°F on 1TISH-0382, letdown flow will divert to the VCT.</p> </div>
		<ol style="list-style-type: none"> <li>3. <u>IF</u> temperature <u>CANNOT</u> be reduced, <b>place</b> 1-HS-10351 in OFF.</li> <li>4. <b>Determine</b> cause and if equipment failure is indicated, <b>initiate</b> maintenance</li> </ol>

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Event No.: 3

**Event Description:** TIC-130 temperature element will fail low, resulting in high letdown temperature and causing letdown to divert to the VCT. The crew will respond to the failure based on ARP 17007, for ALB07-F04 LTDN HX HI TEMP DEMIN DIVERT. The crew may also respond based on AOP 18022-C as specified in the ARP.

Time	Position	Applicant's Action or Behavior
		as required.
	OATC	<b>ALB07-F04 response actions:</b>  <b><u>AUTOMATIC ACTIONS:</u></b> Letdown flow is diverted away from the Mixed Bed Demineralizers directly to the Reactor Coolant Filter.
	OATC	<b><u>INITIAL OPERATOR ACTIONS</u></b>  1. Check letdown temperature on 1-TI-0130 on the QMCB reading high. 2. IF necessary, initiate 18007-C, "Chemical Volume Control System Malfunction". ( <b>not necessary, letdown is not lost</b> ) 3. Check for ACCW normal operation. ( <b>TV-0130 not normal</b> )
	OATC	<b><u>SUBSEQUENT OPERATOR ACTION</u></b>  1. Attempt to balance charging and letdown flow.  2. WHEN letdown temperature is restored, return 1-TV-0129 to the DEMIN position.
	OATC	3. IF instrument or equipment failure has occurred, initiate maintenance as required.  <b><u>COMPENSATORY OPERATOR ACTIONS</u></b> NONE  <b><u>Note to examiner: The OATC can control cooling flow to the VCT using TV-0130. For 120 gpm letdown flow, this is normally set to 51% (note dry erase board on podium). It is expected the OATC will take manual control of TV-0130 to control cooling flow.</u></b>

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Event No.: 3

**Event Description:** TIC-130 temperature element will fail low, resulting in high letdown temperature and causing letdown to divert to the VCT. The crew will respond to the failure based on ARP 17007, for ALB07-F04 LTDN HX HI TEMP DEMIN DIVERT. The crew may also respond based on AOP 18022-C as specified in the ARP.

Time	Position	Applicant's Action or Behavior
		End of 17007-F04 actions.
	OATC	<p><b>ALB07-B04 actions (LTDN HX HI TEMP DEMIN DIVERT)</b></p> <p><b><u>PROBABLE CAUSE</u></b></p> <ol style="list-style-type: none"><li>1. Low Auxiliary Component Cooling Water (ACCW) flow through the Letdown Heat Exchanger.</li><li>2. Low ACCW flow through the Excess Letdown Heat Exchanger or Seal Water Heat Exchanger if aligned to the Volume Control Tank (VCT).</li></ol>
	OATC	<p><b><u>AUTOMATIC ACTIONS</u></b></p> <p>NONE</p> <p><b><u>INITIAL OPERATOR ACTIONS</u></b></p> <p>Check normal operation of ACCW and, if necessary, initiate 18022-C, "Loss of Auxiliary Component Cooling Water".</p>

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Event No.: 3

**Event Description:** TIC-130 temperature element will fail low, resulting in high letdown temperature and causing letdown to divert to the VCT. The crew will respond to the failure based on ARP 17007, for ALB07-F04 LTDN HX HI TEMP DEMIN DIVERT. The crew may also respond based on AOP 18022-C as specified in the ARP.

Time	Position	Applicant's Action or Behavior
	OATC	<p><b><u>SUBSEQUENT OPERATOR ACTIONS</u></b></p> <p>NOTE</p> <p>Seal water injection flow to the Reactor Coolant Pumps (RCPs) should be maintained less than 130°F.</p> <ol style="list-style-type: none"> <li>1. Monitor VCT outlet temperature using 1-TI-0116 on the QMCB.</li> <li>2. Check letdown flow using 1-FI-0132 and temperature using 1-TI-0130 on the QMCB.</li> <li>3. Adjust the charging or letdown flow if necessary to reduce the letdown temperature.</li> <li>4. Return to normal operation as soon as possible per 13006-1, "CVCS Startup and Normal Operation."</li> <li>5. IF equipment failure is indicated, initiate maintenance as required.</li> </ol> <p><b><u>COMPENSATORY OPERATOR ACTIONS</u></b></p> <p>NONE – End of 17007-B04 actions.</p>
	SS	<p><b>AOP-18022-C, LOSS OF AUXILIARY COMPONENT COOLING WATER symptoms and steps.</b></p> <p>Symptoms / alarms:</p> <ul style="list-style-type: none"> <li>• High temperature on any heat exchanger serviced by ACCW.</li> </ul>

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Event No.: 3

**Event Description:** TIC-130 temperature element will fail low, resulting in high letdown temperature and causing letdown to divert to the VCT. The crew will respond to the failure based on ARP 17007, for ALB07-F04 LTDN HX HI TEMP DEMIN DIVERT. The crew may also respond based on AOP 18022-C as specified in the ARP.

Time	Position	Applicant's Action or Behavior
		<u><i>Note to examiner: The SS may look at 18022-C due to the reference from ALB07-B04 (if received).</i></u>
	OATC	<p style="text-align: center;"><u>NOTES</u></p> <ul style="list-style-type: none"> <li>• ACCW pumps are removed from the 4.16KV Class 1E buses following simultaneous loss of offsite power and safety injection.</li> <li>• ACCW flow to the Seal Water Heat Exchanger is not required if RCS temperature is less than 150°F and Seal Water Heat Exchanger Return Temperature remains less than 135°F.</li> </ul>
	OATC	<ol style="list-style-type: none"> <li>1. Check ACCW pumps – AT LEAST ONE RUNNING. <b>(YES)</b></li> <li>2. Check ACCW SPLY HDR PRESS PI-1977 – GREATER THAN 135 PSIG. <b>(YES)</b></li> <li>3. Check if ACCW flow exists through the letdown heat exchanger. <b>(YES)</b> <ul style="list-style-type: none"> <li>• TV-0130 OPEN.</li> <li>• ALB07-D03 LTDN HX OUT HI TEMP – EXTINGUISHED.</li> </ul> </li> </ol>
	OATC UO	4. Initiate the Continuous Actions Page.
	OATC	5. Check ACCW Surge Tank Level (IPC L2700) – GREATER THAN 20% AND STABLE OR RISING. <b>(YES)</b>

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**Event Description:** TIC-130 temperature element will fail low, resulting in high letdown temperature and causing letdown to divert to the VCT. The crew will respond to the failure based on ARP 17007, for ALB07-F04 LTDN HX HI TEMP DEMIN DIVERT. The crew may also respond based on AOP 18022-C as specified in the ARP.

Time	Position	Applicant's Action or Behavior
	OATC	<p>6. Check if RCPs should be stopped:</p> <p>a. Check the following RCP parameters (using plant computer):</p> <ul style="list-style-type: none"> <li>• Motor bearing (upper or lower radial or thrust) – GREATER THAN 195°F.</li> <li>• Motor stator winding – GREATER THAN 311°F.</li> </ul>
	OATC	<p>6. (Cont)</p> <ul style="list-style-type: none"> <li>• Seal water inlet – GREATER THAN 230°F.</li> <li>• Loss of ACCW – GREATER THAN 10 MINUTES.</li> </ul> <p><b><u>Note to examiner: All parameters listed are met, the RCPs are NOT required to be tripped.</u></b></p> <p>a. Perform the following.</p> <ol style="list-style-type: none"> <li>1) IF any parameter limit is exceeded, THEN perform step 6.b.</li> <li>2) Go to Step 7.</li> </ol>
	OATC	<p>7. Check RCP thermal barrier outlet valves – OPEN. <b>(YES)</b></p> <ul style="list-style-type: none"> <li>• HV-19051 ACCW RCP-1 THERMAL BARRIER RTN VLV</li> <li>• HV-19053 ACCW RCP-2 THERMAL BARRIER RTN VLV</li> <li>• HV-19055 ACCW RCP-3 THERMAL BARRIER RTN VLV</li> <li>• HV-19057 ACCW RCP-4 THERMAL BARRIER RTN VLV</li> </ul>

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**Event Description:** TIC-130 temperature element will fail low, resulting in high letdown temperature and causing letdown to divert to the VCT. The crew will respond to the failure based on ARP 17007, for ALB07-F04 LTDN HX HI TEMP DEMIN DIVERT. The crew may also respond based on AOP 18022-C as specified in the ARP.

Time	Position	Applicant's Action or Behavior
		<ul style="list-style-type: none"> <li>HV-2041 ACCW RCPS THERMAL BARRIER RTN VLV</li> </ul> <p><b><u>Note to examiner: All the above listed valves are open as required.</u></b></p>
	OATC	8. Check ACCW heat exchangers outlet temperature (IPC T2701) - LESS THAN 120°F. <b>(YES)</b>
	OATC	9. Check ACCW containment isolation valves – OPEN. <b>(YES)</b> <ul style="list-style-type: none"> <li>HV-1979 ACCW SPLY HDR ORC ISO VLV</li> <li>HV-1978 ACCW SPLY HDR IRC ISOL VLV</li> <li>HV-1974 ACCW RTN HDR IRC ISO VLV</li> <li>HV-1975 ACCW RTN HDR ORC ISO VLV</li> </ul> <p><b><u>Note to examiner: All the above listed valves are open as required.</u></b></p>
	OATC	10. Check if ACCW is restored to service.
	SS	a. Components cooled by ACCW – TEMPERATURES RETURNING TO NORMAL. <b>(YES)</b> b. Restore charging and letdown using 13006, CHEMICAL AND VOLUME CONTROL SYSTEM. <b>(N/A)</b> c. Return to procedure and step in effect.



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Event No.: 3

**Event Description:** TIC-130 temperature element will fail low, resulting in high letdown temperature and causing letdown to divert to the VCT. The crew will respond to the failure based on ARP 17007, for ALB07-F04 LTDN HX HI TEMP DEMIN DIVERT. The crew may also respond based on AOP 18022-C as specified in the ARP.

Time	Position	Applicant's Action or Behavior
END OF EVENT 3. PROCEED TO NEXT EVENT AT THE DISCRETION OF THE CHIEF EXAMINER.		

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Event No.: 4

**Event Description:** VCT LT-185 fails high (CV12) causing CVCS letdown to divert from the VCT to the RHUT. Automatic swap over to the RWST is not available with LT-185 failed high.

Time	Position	Applicant's Action or Behavior
	CREW	<p>Diagnoses VCT makeup problems:</p> <p><u>Alarms:</u></p> <p>ALB07 E05 VCT HI/LO LEVEL</p> <p><u>Indications:</u></p> <p>VCT level (LT-185) at 100%  VCT level (LT-112) &lt; 50% and lowering  LV-112A in the RHUT position (Amber light – ON)  100 gpm automatic makeup occurs at 30% VCT level</p>
	OATC / SS	Refer to ARP 17007-1 for VCT HI/LO LEVEL
	SS	Directs OATC action using AOP 18007-C, Section C for loss of VCT makeup.
	OATC	<p>C1. Stabilize plant conditions:</p> <ul style="list-style-type: none"> <li>• Reactor power</li> <li>• RCS temperature</li> <li>• PRZR pressure</li> </ul>
	OATC	<p>C2. Check the following:</p> <ul style="list-style-type: none"> <li>a. At least one boric acid transfer pump running</li> <li>b. At least one reactor makeup water pump running</li> <li>c. VCT makeup valve alignment correct for selected mode</li> <li>d. letdown divert valve LV-112A aligned to the VCT (NOT)</li> </ul> <p>RNO d. Align LV-112A to VCT</p>

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Event No.: 4

**Event Description:** VCT LT-185 fails high (CV12) causing CVCS letdown to divert from the VCT to the RHUT. Automatic swap over to the RWST is not available with LT-185 failed high.

Time	Position	Applicant's Action or Behavior
	OATC / UO	C3. Initiate continuous action page
	OATC	C4. Checks VCT makeup flow restored
	SS	C5. Return to procedure and step in effect
	SS	Has SSS perform following: <ul style="list-style-type: none"><li>• Write a condition report</li><li>• Notify I&amp;C to repair</li><li>• Notify OPS duty manager of AOP entry</li></ul>
<b>END OF EVENT 4. PROCEED TO NEXT EVENT AT THE DISCRETION OF THE CHIEF EXAMINER.</b>		

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Event No.: 5

Event Description: Failure of Steam Generator # 2 Pressure Instrument PI-525A downscale low requiring entry into AOP-18001-C, section F for failure of SG Pressure Instrumentation.

Time	Position	Applicant's Action or Behavior
	UO	<p>Identify failure of SG # 2 Pressure Instrument PI-525:</p> <p>Alarms:</p> <ul style="list-style-type: none"> <li>• ALB14-B02 STM GEN 2 HI STM PRESS RATE ALERT</li> <li>• ALB13-F01 HI STM PRESS RATE</li> <li>• ALB13-B04 STM GEN 2 LO STEAMLINE PRESS ALERT</li> </ul> <p>Indications:</p> <ul style="list-style-type: none"> <li>• Steam Pressure Indicator PI-525A down scale low.</li> </ul>
	UO  IOA	<p>Step # F1</p> <p>Perform IOAs to check steam and feed flows – MATCHED ON ALL SGs (they will be) and perform RNO for Step # F1 (IF REQUIRED).</p> <ul style="list-style-type: none"> <li>• Takes manual control of MFRV # 1 and raises FW flow.</li> <li>• Takes manual control of MFPTs speed and raises MFPT speed.</li> <li>• Controls SG levels between 60 and 70%.</li> </ul>
	SS	Enter AOP-18001-C section F for Failure of Steam Generator Pressure Instrumentation. Verify IOAs are complete.
	UO	<p>Step # F2</p> <ul style="list-style-type: none"> <li>• Bypass the affected channel at the Operator Work Station (OWS).</li> </ul>
	SS/ UO	<p>Step # F3</p> <ul style="list-style-type: none"> <li>• Initiate the Continuous Actions Page.</li> </ul>
	SS	<p>Step # *F4</p> <p>Check SG level control maintains NR level - AT 65%.</p>

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Event No.: 5

Event Description: Failure of Steam Generator # 2 Pressure Instrument PI-525A downscale low requiring entry into AOP-18001-C, section F for failure of SG Pressure Instrumentation.

Time	Position	Applicant's Action or Behavior
	SS / UO	<p>Step # F5</p> <ul style="list-style-type: none"> <li>Notify I &amp; C for repairs, notifies Operations Duty of the AOP entry.</li> </ul>
	SS	<p>Step # F6</p> <ul style="list-style-type: none"> <li>Bypass affected channel using 13509-C, Bypass Test Instrumentation (BTI) Panel Operation, if desired.</li> <li></li> </ul> <p><b>NOTE: It is NOT expected the SS will bypass or trip the channel.</b></p> <p>Step # F7</p> <ul style="list-style-type: none"> <li>Determine Bistables need to be tripped within 72 hours with MASTER TEST SWITCH in TEST.</li> </ul> <p>Step # F8</p> <ul style="list-style-type: none"> <li>Reference Tech Specs for ESFAS Instrumentation, PAMS Instrumentation, and Remote Shutdown Instrumentation.</li> <li>LCO 3.3.2, FU 1e, Condition D</li> <li>LCO 3.3.2, FU 4d(1), Condition D</li> <li><del>LCO 3.3.2, FU 4d(2), Condition D</del></li> <li>LCO 3.3.3, FU 8, Condition B</li> <li>LCO 3.3.4 FU 13, Condition A</li> </ul> <p>Step # *F9</p> <p>Check repairs and surveillances - COMPLETE. <b><u>(NO)</u></b></p> <p>*F9 RNO.</p> <ol style="list-style-type: none"> <li><u>WHEN</u> repairs and surveillances are complete, <u>THEN</u> perform Step F10.</li> <li>Return to procedure and step in effect.</li> </ol>
<p align="center"><b>END OF EVENT 5. PROCEED TO NEXT EVENT AT THE DISCRETION OF THE LEAD EXAMINER</b></p>		

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Event No.: 6

**Event Description:** The RAT supply breaker to 1AA02 will trip due to a breaker fault. DG-1A will start, close its output breaker, and begin sequencing UV loads. During the load sequence, the Train "A" NSCW pumps will fail to start, requiring manual start. This event will require the crew to complete the actions of AOP 18031-C, "Loss of Class 1E Electrical Systems". Corrective actions include reducing AFW flow to return reactor power < 100%, shifting electrical loads to the B train 1E bus, as well as implementing tech specs for loss of AC power.

Time	Position	Applicant's Action or Behavior
	UO OATC SS	<p>Diagnose loss of power to 1AA02:</p> <p><u>Alarms:</u></p> <p>RESV AUX XFMR 1NXRA HI SIDE PHOC LOR TRIP            DG1A TRIP OVERSPEED            DG1A DISABLED NONRESET OF EMERGENCY TRIP            DG1A EMERGENCY START            DG1A LOW PRESS STARTING AIR            4160V SWGR 1AA02 TROUBLE</p> <p><u>Indications:</u></p> <p>Control room lighting dims            1AA02 white bus potential lights go out            DG-1A starts and its output breaker shuts            DG-1A trips and its output breaker opens</p>
	SS	<p>Enters AOP 18031-C, "Loss of Class 1E Electrical Systems"            (Crew Update)</p>
	UO	<p><b><u>18031-C</u></b></p> <ol style="list-style-type: none"> <li>1. Check power to 1E 4160V Emergency busses – AT LEAST ONE ENERGIZED:               <ol style="list-style-type: none"> <li>a. 4160V AC 1E Busses</li> </ol> </li> </ol>

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Event No.: 6

**Event Description:** The RAT supply breaker to 1AA02 will trip due to a breaker fault. DG-1A will start, close its output breaker, and begin sequencing UV loads. During the load sequence, the Train "A" NSCW pumps will fail to start, requiring manual start. This event will require the crew to complete the actions of AOP 18031-C, "Loss of Class 1E Electrical Systems". Corrective actions include reducing AFW flow to return reactor power < 100%, shifting electrical loads to the B train 1E bus, as well as implementing tech specs for loss of AC power.

Time	Position	Applicant's Action or Behavior
	OATC	<p>*2. Check Reactor power - LESS THAN 100%:</p> <ul style="list-style-type: none"> <li>• UQ1118 - LESS THAN OR EQUAL TO 100% MWT for the applicable unit.</li> <li>• NIs - LESS THAN OR EQUAL TO 100%.</li> <li>• ΔT - LESS THAN OR EQUAL TO 100%.</li> </ul>
	UO	3. Check affected train Diesel Generator - RUNNING. <b>(YES)</b>
	UO <b>Critical Task</b>	<p>4. Verify NSCW status on affected train:</p> <p>a. Pumps - TWO RUNNING. <b>(UO will manually start pumps)</b></p> <p>i. Discharge valves - OPEN.</p> <p>ii. Supply and return flows - NORMAL.</p> <p><b>(Valves will open 45 seconds after pumps are manually started and flows will be normal.)</b></p>
	SS	5. Go to Section B. LOSS OF POWER WITH DG TYING TO BUS.

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Event No.: 6

**Event Description:** The RAT supply breaker to 1AA02 will trip due to a breaker fault. DG-1A will start, close its output breaker, and begin sequencing UV loads. During the load sequence, the Train "A" NSCW pumps will fail to start, requiring manual start. This event will require the crew to complete the actions of AOP 18031-C, "Loss of Class 1E Electrical Systems". Corrective actions include reducing AFW flow to return reactor power < 100%, shifting electrical loads to the B train 1E bus, as well as implementing tech specs for loss of AC power.

Time	Position	Applicant's Action or Behavior
	SS	<p><b><u>Section B</u></b></p> <p>B1. Dispatch an operator to the Diesel Generator to perform 13145A/B section for "Diesel Generator Operation Under Emergency Conditions."</p>
	UO	<p>B2. Perform the following for the affected bus:</p> <ul style="list-style-type: none"> <li>a. Verify bus frequency - AT 60 HZ.</li> <li>b. Verify bus voltage - AT 4160V AC.</li> </ul>
	OATC	<p>B3. Check charging pumps - ONLY ONE OPERATING.</p>
	OATC	<p><b><u>B3 RNO.</u></b></p> <p>B3. Perform the following:</p> <ul style="list-style-type: none"> <li>a. Start or stop pumps as necessary to establish one running charging pump.</li> <li>b. <u>IF</u> charging pump can <u>NOT</u> be started, <u>THEN</u> perform the following: <ul style="list-style-type: none"> <li>i. Isolate normal letdown.</li> <li>ii. Initiate 18007-C, CHEMICAL AND VOLUME CONTROL SYSTEM MALFUNCTION.</li> </ul> </li> </ul>



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Event No.: 6

**Event Description:** The RAT supply breaker to 1AA02 will trip due to a breaker fault. DG-1A will start, close its output breaker, and begin sequencing UV loads. During the load sequence, the Train "A" NSCW pumps will fail to start, requiring manual start. This event will require the crew to complete the actions of AOP 18031-C, "Loss of Class 1E Electrical Systems". Corrective actions include reducing AFW flow to return reactor power < 100%, shifting electrical loads to the B train 1E bus, as well as implementing tech specs for loss of AC power.

Time	Position	Applicant's Action or Behavior
	UO	B4. Check CCW pumps on affected train - TWO RUNNING. <u>(YES)</u>
	OATC	B5. Check RHR status: a. Check RHR - REQUIRED FOR SHUTDOWN COOLING. <u>(NO)</u> <del>b. Start RHR pumps aligned for shutdown cooling as needed. N/A</del>
	SS	B6. Initiate the Continuous Actions Page.
	UO	B7. Check AFW status: a. Check AFW system - NEEDED TO MAINTAIN SG LEVELS. <u>(NO)</u>
	UO	<u><b>B7. RNO</b></u> a. Perform the following: i. Shutdown running AFW pumps and align for standby readiness by initiating 13610, AUXILIARY FEEDWATER SYSTEM. ii. Go to Step B8.
	UO	B8. Check ACCW pumps - ONLY ONE RUNNING.

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Event No.: 6

**Event Description:** The RAT supply breaker to 1AA02 will trip due to a breaker fault. DG-1A will start, close its output breaker, and begin sequencing UV loads. During the load sequence, the Train "A" NSCW pumps will fail to start, requiring manual start. This event will require the crew to complete the actions of AOP 18031-C, "Loss of Class 1E Electrical Systems". Corrective actions include reducing AFW flow to return reactor power < 100%, shifting electrical loads to the B train 1E bus, as well as implementing tech specs for loss of AC power.

Time	Position	Applicant's Action or Behavior
	UO	B9. At QHVC perform the following: <ol style="list-style-type: none"> <li>Verify only four containment cooling units running in fast speed using 13120, CONTAINMENT BUILDING COOLING SYSTEM</li> <li>Check CRDM cooling fans - TWO RUNNING.</li> <li>Verify reactor cavity cooling unit - ONE RUNNING.</li> </ol>
	UO	B10. Verify SFP pump running and aligned to in service SFP heat exchanger. <u>IPC Points</u> ZD3405 ZD3411
	UO	B11. Dispatch operators to determine cause for loss of power.
	SS	B12. Initiate the following: <ol style="list-style-type: none"> <li>14230, OFFSITE AC CIRCUIT VERIFICATION AND CAPACITY / CAPABILITY EVALUATION.</li> <li>Verify SAT energized using 13418-A(B), STANDBY AUXILIARY TRANSFORMER UNIT 1(2) TRAIN A(B) OPERATIONS.</li> </ol>
	SS	B13. Review the following Technical Specification requirements: <ul style="list-style-type: none"> <li>AC electrical power sources - LCO 3.8.1 or 3.8.2.</li> <li>AFW - LCO 3.7.5.</li> <li>RCS Specific Activity - SR 3.4.16.2 if &gt;15% power transient has occurred.</li> </ul>

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Event No.: 6

**Event Description:** The RAT supply breaker to 1AA02 will trip due to a breaker fault. DG-1A will start, close its output breaker, and begin sequencing UV loads. During the load sequence, the Train "A" NSCW pumps will fail to start, requiring manual start. This event will require the crew to complete the actions of AOP 18031-C, "Loss of Class 1E Electrical Systems". Corrective actions include reducing AFW flow to return reactor power < 100%, shifting electrical loads to the B train 1E bus, as well as implementing tech specs for loss of AC power.

Time	Position	Applicant's Action or Behavior
		<p>B14. Restore normal power by initiating 13427A/B, 4160V AC BUS AA02/BA03 1E ELECTRICAL DISTRIBUTION SYSTEM section for "Paralleling Normal Incoming Source (RAT or SAT) To 4160V AC Bus Being Supplied From Diesel Generator."</p> <p><b><u>B14. RNO</u></b> Restore power from an alternate source, if desired, by initiating 13427A/B, 4160V AC BUS AA02/BA03 1E ELECTRICAL DISTRIBUTION SYSTEM section for "Paralleling Alternate Incoming Source To 4160V AC Bus Being Supplied From Diesel Generator."</p>
		<p>B15. Check normal or alternate power to bus - RESTORED.</p> <p><b><u>B15. RNO</u></b> Return to Step 14.</p>
	UO SS	B16. Align affected DG for automatic starting by initiating 13145, DIESEL GENERATORS.
	SS	B17. Restore affected components as required by current plant conditions.
	SS	B18. Return to procedure and step in effect.
END OF EVENT 5. PROCEED TO NEXT EVENT AT THE DISCRETION OF THE CHIEF EXAMINER.		

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Event No.: 7, 8

**Event Description:** The Loop #4 BFRV fails closed, requiring the crew to respond per guidance of 18016-C, "Condensate and Feedwater Malfunction". The UO will be able to maintain level, and operation can continue. After a short delay, the Loop #4 BFRV will fail open, which will require a reactor trip. When the reactor trips, 3 control rods will fail to bottom, requiring emergency boration.

Time	Position	Applicant's Action or Behavior
	CREW	<p>Diagnose the closure of the Loop #4 BFRV</p> <p><u>Alarms:</u></p> <p>ALB13 D01 STM GEN 4 FLOW MISMATCH</p> <p>ALB13 D03 STM GEN 4 LO LEVEL</p> <p>ALB13 F06 STM GEN 4 DIGITAL FW SYS TROUBLE</p> <p><b><u>Note to examiner: Annunciators may not alarm before diagnosis of the failure.</u></b></p> <p><u>Indications:</u></p> <p>M/A station valve position indication going closed</p> <p>Steam flow and feed flow not matched in SG #4</p> <p>Lowering level in SG #4</p>
	SS	Enters 18016-C Section D.
	OATC	<p><b><u>CRITICAL TASK</u></b></p> <p><u>IOA's</u></p> <p>D1. Check proper operation of MFRVs and BFRVs. <b><u>(NO)</u></b></p> <p>D1 RNO:</p> <p>a. Take manual control of affected SG MFRVs and/or BFRVs to match steam and feed flows:</p> <ul style="list-style-type: none"> <li>• Loop #4 BFRV</li> <li>• Control SG levels between 60% and 70%.</li> <li>• IF SG levels cannot be maintained greater than 41%</li> </ul> <p>-OR-</p> <ul style="list-style-type: none"> <li>• Less than 79% <u>THEN</u> perform the following:</li> </ul> <ol style="list-style-type: none"> <li>1. Trip the reactor</li> <li>2. Go to 19000-C, E-0 REACTOR TRIP OR SAFETY</li> </ol> <p><b><u>Operator will be able to maintain level using manual control of BFRV.</u></b></p>

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Event No.: 7, 8

**Event Description:** The Loop #4 BFRV fails closed, requiring the crew to respond per guidance of 18016-C, "Condensate and Feedwater Malfunction". The UO will be able to maintain level, and operation can continue. After a short delay, the Loop #4 BFRV will fail open, which will require a reactor trip. When the reactor trips, 3 control rods will fail to bottom, requiring emergency boration.

Time	Position	Applicant's Action or Behavior
	UO	<p><b><u>IOA's</u></b></p> <p>D2. Verify feedwater isolation valves open:</p> <ul style="list-style-type: none"> <li>a. BFIVs (YES)</li> <li>b. MFIVs (NO)</li> </ul> <p>D2b. RNO</p> <p>Perform the following:</p> <ul style="list-style-type: none"> <li>• IF MFIV will <u>NOT</u> open, <u>THEN</u> take manual control of affected SG MFRVs and/or BFRVs to match steam and feed flows.</li> <li>• Control SG levels between 60% and 70%.</li> <li>• IF SG levels cannot be maintained greater than 41% <u>OR</u> Less than 79% <u>THEN</u> perform the following: <ul style="list-style-type: none"> <li>a) Trip the reactor.</li> <li>b) Go to 1900-C, REACTOR TRIP OR SAFETY INJECTION.</li> </ul> </li> </ul>
	SS	<p><b><u>Subsequent Actions</u></b></p> <p>D3. Initiate Continuous Actions.</p>
		<p>D4. Perform channel check of instrumentation - NORMAL:</p> <ul style="list-style-type: none"> <li>• SG levels</li> <li>• SG pressures</li> <li>• SG Steam Flows</li> <li>• SG Feed Flows</li> </ul>

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Event No.: 7, 8

**Event Description:** The Loop #4 BFRV fails closed, requiring the crew to respond per guidance of 18016-C, "Condensate and Feedwater Malfunction". The UO will be able to maintain level, and operation can continue. After a short delay, the Loop #4 BFRV will fail open, which will require a reactor trip. When the reactor trips, 3 control rods will fail to bottom, requiring emergency boration.

Time	Position	Applicant's Action or Behavior
	UO	D5. Check Rated Thermal Power - NOT BEING EXCEEDED:
	UO	<ul style="list-style-type: none"> <li>• <math>\Delta T \leq 100\%</math></li> <li>• NIs <math>\leq 100\%</math></li> <li>• UQ1118 <math>\leq 100\%</math> MWt</li> </ul> <p>D5 RNO.</p> <p>Reduce turbine load as required to maintain Reactor Power less than or equal to Rated Thermal Power.</p>
	SS	<p>*D6. Check SGs NR levels - AT 65%.</p> <p>D6 RNO:</p> <p>Take manual control of affected SG MFRVs and/or BFRVs to Control SGs levels between 60% and 70%.</p>
	SS	<p>D7. Refer to Technical Specification 3.7.3 for required action.</p> <p><b><u>Note to examiner: Intent is to initiate the additional BFRV failure after the SS has evaluated the TS implications. The additional BFRV failure will lead to the reactor trip.</u></b></p>
	SS	D8. Notify Maintenance to initiate repairs.
	SS	D9. Return to procedure and step in effect. (Crew may remain in procedure)

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Event No.: **7, 8**

**Event Description:** The Loop #4 BFRV fails closed, requiring the crew to respond per guidance of 18016-C, "Condensate and Feedwater Malfunction". The UO will be able to maintain level, and operation can continue. After a short delay, the Loop #4 BFRV will fail open, which will require a reactor trip. When the reactor trips, 3 control rods will fail to bottom, requiring emergency boration.

Time	Position	Applicant's Action or Behavior
	CREW	<p>Diagnose the opening of the Loop #4 BFRV.</p> <p><u>Alarms:</u></p> <p>ALB13 D01 STM GEN 4 FLOW MISMATCH  ALB14 D01 STM GEN 4 HI-HI LEVEL ALERT  ALB13 F06 STM GEN 4 DIGITAL FW SYS TROUBLE</p> <p><b><u>Note to examiner: Annunciators may not alarm before diagnosis of the failure.</u></b></p> <p><u>Indications:</u></p> <p>M/A station valve position indication going open.  Steam flow and feed flow not matched in SG #4.  Rising level in SG #4.</p>
	SS	Re-enter 18016 Section-C D. <b>(Crew may use *D6 to try to establish control)</b>
	UO	<p><b><u>IOA's</u></b></p> <p>D1. Check proper operation of MFRVs and BFRVs. <b><u>(NO)</u></b></p> <p>D1 RNO:</p> <p>b. Take manual control of affected SG MFRVs and/or BFRVs to match steam and feed flows:</p> <ul style="list-style-type: none"> <li>• Loop #4 BFRV</li> <li>• Control SG levels between 60% and 70%.</li> <li>• <u>IF</u> SG levels cannot be maintained greater than 41%</li> </ul> <p>-OR-</p> <ul style="list-style-type: none"> <li>• Less than 79% <u>THEN</u> perform the following:</li> </ul> <ol style="list-style-type: none"> <li>1. Trip the reactor</li> <li>2. Go to 19000-C, E-0 REACTOR TRIP OR SAFETY</li> </ol> <p><b><u>Operator will NOT be able to maintain level using manual control of BFRV.</u></b></p>

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Event No.: 7, 8

**Event Description:** The Loop #4 BFRV fails closed, requiring the crew to respond per guidance of 18016-C, "Condensate and Feedwater Malfunction". The UO will be able to maintain level, and operation can continue. After a short delay, the Loop #4 BFRV will fail open, which will require a reactor trip. When the reactor trips, 3 control rods will fail to bottom, requiring emergency boration.

Time	Position	Applicant's Action or Behavior
	SS	<p>Direct the OATC to trip the reactor.</p> <p><b><u>Note to examiner: The OATC may take this action prior to SS direction based on the Immediate Operator Action response.</u></b></p>
	CREW	Perform Immediate Operator Actions of 19000-C, "E-0 REACTOR TRIP OR SAFETY INJECTION."
	OATC	<p><b><u>19000-C IOAs</u></b></p> <ol style="list-style-type: none"> <li>Check Reactor trip: <ul style="list-style-type: none"> <li>Rod Bottom Lights – LIT (Three lights are NOT LIT)</li> <li>Reactor Trip and Bypass Breakers – OPEN (RTBs are OPEN)</li> <li>Neutron Flux – LOWERING</li> </ul> </li> <li>RNO Trip Reactor using both Reactor trip handswitches. <u>IF</u> Reactor <u>NOT</u> tripped, <u>THEN</u> go to 19211-C, FR-S.1 RESPONSE TO NUCLEAR POWER GENERATION / ATWT.</li> </ol>
	UO	<p><b><u>IOAs</u></b></p> <ol style="list-style-type: none"> <li>Check Turbine trip: <ul style="list-style-type: none"> <li>All Turbine Stop Valves – CLOSED.</li> </ul> </li> </ol>



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Event No.: 7, 8

**Event Description:** The Loop #4 BFRV fails closed, requiring the crew to respond per guidance of 18016-C, "Condensate and Feedwater Malfunction". The UO will be able to maintain level, and operation can continue. After a short delay, the Loop #4 BFRV will fail open, which will require a reactor trip. When the reactor trips, 3 control rods will fail to bottom, requiring emergency boration.

Time	Position	Applicant's Action or Behavior
	UO	<p><u>IOAs</u></p> <p>3. Checks power to the AC Emergency Busses:</p> <ul style="list-style-type: none"> <li>a. AC Emergency Busses – AT LEAST ONE ENERGIZED.</li> <li>b. AC Emergency Busses – ALL ENERGIZED: <b>(YES)</b> <ul style="list-style-type: none"> <li>• 4160 V AC 1E Busses</li> <li>• 480V AC 1E Busses</li> </ul> </li> </ul>
	OATC	<p><u>IOAs</u></p> <p>4. Check if SI is actuated.</p> <ul style="list-style-type: none"> <li>• Any SI annunciator – LIT. <b>(NO)</b></li> <li>• SI ACTUATED BPLB window – LIT. <b>(NO)</b></li> </ul>
	OATC	<p><u>IOAs</u></p> <p>4. RNO</p> <p>Check if SI is required:</p> <p><u>IF</u> one or more of the following conditions has occurred:</p> <ul style="list-style-type: none"> <li>• PRZR pressure less than or equal to 1870 psig.</li> <li>• Steam line pressure less than or equal to 585 psig</li> <li>• Containment pressure greater than or equal to 3.8 psig.</li> <li>• Automatic alignment of ECCS equipment to injection phase.</li> </ul> <p><u>THEN</u> actuate SI and go to Step 6. <b>(SI is NOT required)</b></p>

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Event No.: 7, 8

**Event Description:** The Loop #4 BFRV fails closed, requiring the crew to respond per guidance of 18016-C, "Condensate and Feedwater Malfunction". The UO will be able to maintain level, and operation can continue. After a short delay, the Loop #4 BFRV will fail open, which will require a reactor trip. When the reactor trips, 3 control rods will fail to bottom, requiring emergency boration.

Time	Position	Applicant's Action or Behavior
	SS UO	5. Perform the following to limit RCS cooldown:  a. Check NR level in at least one SG greater than 10%. b. Reduce AFW flow. c. Go to 19001-C, ES-0.1 REACTOR TRIP RESPONSE..
<b>END OF EVENT 6. PROCEED TO REACTOR TRIP RESPONSE, 19001-C.</b>		

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Event No.: 8, Reactor Trip Response 19001-C

Event Description: Reactor Trip Response

Time	Position	Applicant's Action or Behavior
	SS	Enter 19001-C, "ES-0.1 REACTOR TRIP RESPONSE."
	SS	1. Initiate the following: <ul style="list-style-type: none"> <li>Continuous Actions and Foldout Page.</li> <li>Critical Safety Function Status Trees per 19200-C, F-O CRITICAL SAFETY FUNCTION STATUS TREE.</li> </ul>
	SS	2. Initiate NMP-EP-110, EMERGENCY CLASSIFICATION DETERMINATION AND INITIAL ACTION.
	CREW	3. IF SI actuation occurs during this procedure, <u>THEN</u> go to 19000-C, E-0 REACTOR TRIP OR SAFETY INJECTION.
	UO	4. Limit RCS cooldown: <ol style="list-style-type: none"> <li>Verify AFW flow to SGs. (<b><i>Manually start AFW pumps.</i></b>)</li> <li>Trip both MFPs.</li> <li>Check SGs NR level - AT LEAST ONE GREATER THAN 10%.</li> <li>Throttle total AFW flow as necessary.</li> <li>Verify SG Blowdown Isolation Valves - CLOSED WITH HANDSWITCHES IN CLOSE.</li> </ol>
	OATC	5. Check RCS temperature stable at or trending to 557°F.  With RCP(s) running - RCS AVERAGE TEMPERATURE. -OR- Without RCP(s) running - RCS WR COLD LEG TEMPERATURES.

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Event No.: 8, Reactor Trip Response 19001-C

Event Description: Reactor Trip Response

Time	Position	Applicant's Action or Behavior
	UO	<p>6. Check FW status:</p> <p>a. Average RCS temperature - LESS THAN 564°F.</p> <p>b. Verify FW isolation valves closed:</p> <ul style="list-style-type: none"> <li>• MFIVs</li> <li>• BFIVs</li> <li>• MFRVs</li> <li>• BFRVs</li> </ul>
	UO	<p>7. Check total feed flow capability to SGs - GREATER THAN 570 GPM AVAILABLE.</p>
	OATC  <b>Critical Task</b>	<p>8. Check all Rods - FULLY INSERTED. <b><u>(NO)</u></b></p> <p><b>8. RNO</b></p> <p>IF two or more Rods NOT fully inserted, THEN EMERGENCY BORATE 154 ppm for each Rod not fully inserted by initiating 13009, CVCS REACTOR MAKUP CONTROL SYSTEM.</p> <p>Verify adequate shutdown margin as required by Technical Specification SR 3.1.1.1.</p> <p><i>Expected boration for 3 stuck rods is approximately 4800 gallons.</i></p> <p><b><u>Note to examiner: ES-D-2 form for Event 8 contains the actions for the emergency boration. Intent is to initiate Event 9 after the Emergency Boration is started.</u></b></p>
	UO	<p>9. Check Main Generator Output Breakers – OPEN.</p>
	UO	<p>10. Perform the following:</p> <p>a. Check 18009-C, STEAM GENERATOR TUBE LEAK - IN EFFECT. <b><u>(NO)</u></b></p>

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Event No.: 8, Reactor Trip Response 19001-C

Event Description: Reactor Trip Response

Time	Position	Applicant's Action or Behavior
	SS	<p>10a. RNO</p> <p>Go to Step d.</p> <p>d. Check other AOPs - IN EFFECT. <u>(NO)</u></p> <p>Go to Step 11.</p>
	OATC	<p>11. Check PRZR level control:</p> <p>a. Instrument Air - AVAILABLE. <u>(YES)</u></p> <p>b. PRZR Level - GREATER THAN 17%. <u>(YES)</u></p> <p>c. Charging and letdown - IN SERVICE. <u>(YES)</u></p> <p>d. Maintain PRZR level at 25%. <u>(YES)</u></p>
	OATC	<p>12. Check PRZR pressure:</p> <p>a. Pressure - GREATER THAN 1870 PSIG.</p> <p>b. Pressure - STABLE AT <u>OR</u> TRENDING TO 2235 PSIG.</p>
	UO	<p>13. Check SG levels:</p> <p>a. NR level - AT LEAST ONE GREATER THAN 10%. <u>(YES)</u></p> <p>b. Maintain NR level between 10% <u>AND</u> 65%.</p> <p>c. NR level - ANY RISING IN AN UNCONTROLLED MANNER. <u>(NO)</u></p> <p>13.c. RNO</p> <p>c. Go to Step 14.</p>

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Event No.: 8, Reactor Trip Response 19001-C

Event Description: Reactor Trip Response

Time	Position	Applicant's Action or Behavior
	UO	<p>14. Check AC Busses:</p> <p>a. Emergency Buses - ENERGIZED BY OFFSITE POWER. <b><u>(NO)</u></b>  14a.RNO  Verify applicable Diesel Generator(s) have assumed the following train related loads:</p> <ul style="list-style-type: none"> <li>○ 2 NSCW pumps</li> <li>○ 2 CCW pumps</li> <li>○ 1 CCP</li> <li>○ 1 ACCW pump</li> <li>○ 1 MDAFW pump</li> <li>○ 4 Containment Coolers</li> <li>○ <u>480V AC Switchgear</u>: <ul style="list-style-type: none"> <li>○ AB04</li> <li>○ AB05</li> <li>○ AB15</li> <li>○ NB01</li> <li>○ BB06</li> <li>○ BB07</li> <li>○ BB16</li> <li>○ NB10</li> </ul> </li> </ul> <p><u>IF</u> two ACCW Pumps started, <u>THEN</u> stop one ACCW Pump.  Try to restore offsite power to AC Emergency Busses by initiating 13427A/B, 4160V AC AA02/BA03 ELECTRICAL DISTRIBUTION SYSTEM.  Restart ESF Chillers by initiating 13744, ESSENTIAL CHILLED WATER SYSTEM, or Normal Chillers by initiating 13743-C, NORMAL CHILLED WATER SYSTEM, to restore ESF Room Cooling.</p> <p>b. All Non-1E 13.8/4160/480V Busses - ENERGIZED BY OFFSITE POWER. <b><u>(YES)</u></b></p>
	UO	<p>15. Transfer Steam Dumps to STEAM PRESSURE mode:</p> <p>a. Check Condenser - AVAILABLE.  b. Place PIC-507 in Manual.  c. Match demand on SG header pressure controller PIC-507 and SD demand meter UI-500.  d. Transfer Steam Dumps to STM PRESS mode.  e. Control Tavg:  Manual control  -OR-  Auto control</p>

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Event No.: 8, Reactor Trip Response 19001-C

Event Description: Reactor Trip Response

Time	Position	Applicant's Action or Behavior
	OATC	<p>16. Check RCP status:</p> <p>a. RCPs - ALL STOPPED. (NO)</p> <p>16.a. RNO</p> <p>Go to Step 17.</p>
	OATC	<p>17. Check PRZR Spray status:</p> <p>a. RCP 4 or RCP 1 – RUNNING.</p> <p>b. Close PRZR Spray Valve(s) for stopped RCP(s):</p> <p>RCP 1: PIC-0455C</p> <p>RCP 4: PIC-0455B</p> <p>c. Open RCP breakers for RCP(s) <u>NOT</u> running.</p>
	OATC	<p>18. Check NI indication:</p> <p>a. IR flux - LESS THAN 7E -4%.</p> <p>b. SR - INDICATING CORRECTLY ON NR-45.</p>
	SS	19. Secure unnecessary plant equipment.
	SS	<p>20. Maintain stable plant conditions:</p> <ul style="list-style-type: none"> <li>• PRZR pressure - AT 2235 PSIG.</li> <li>• PRZR level - AT 25%.</li> <li>• SG NR levels - BETWEEN 10% <u>AND</u> 65%.</li> <li>• RCS temperature: <ul style="list-style-type: none"> <li>With RCP(s) running - RCS AVERAGE TEMPERATURE AT 557°F.</li> <li>-OR-</li> <li>Without RCP(s) running - RCS WR COLD LEG TEMPERATURES AT 557°F.</li> </ul> </li> </ul>

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Event No.: 8, Reactor Trip Response 19001-C

Event Description: Reactor Trip Response

Time	Position	Applicant's Action or Behavior
	SS	21. Check if natural circulation cooldown is required: a. Any RCP – RUNNING. b. Go to 12006-C, RCS COOLDOWN TO COLD SHUTDOWN.
<b>END OF 19001-C ACTIONS. PROCEED AT THE DISCRETION OF THE CHIEF EXAMINER.</b>		



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**Event No.: 9, Emergency Boration**

**Event Description:** The OATC will use SOP 13009-1, Section 4.9 to emergency borate the RCS due to 3 control rods not fully inserted. 1HV-8104 is failed closed.

Time	Position	Applicant's Action or Behavior
	SS	Direct Emergency Boration of 154 ppm for EACH control rod NOT FULLY INSERTED per 13009-1, "CVCS REACTOR MAKEUP CONTROL SYSTEM."
	OATC	4.9.1 Emergency Boration Through 1HV-8104
	OATC	4.9.1.1 Start one (1) Boric Acid Transfer Pump.
	OATC	4.9.1.2 Verify a Charging Pump is running.
	OATC	4.9.1.3 Open EMERGENCY BORATE valve 1-HV-8104.  <b><u>Note to examiner: 1HV-8104 is failed closed.</u></b>
	OATC	<b>4.9.2 Emergency Boration Through The Normal Charging Flow Path</b>
	OATC	4.9.2.1 Start one (1) Boric Acid Transfer Pump.
	OATC	4.9.2.2 Verify a Charging Pump is running.
	OATC	4.9.2.3 Open the following valves: <ul style="list-style-type: none"> <li>○ 1 FV 0110A, BA TO BLENDER</li> <li>○ 1 FV 0110B, BLENDER OUTLET TO CHARGING PUMPS SUCT</li> </ul>

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**Event No.: 9, Emergency Boration**

**Event Description:** The OATC will use SOP 13009-1, Section 4.9 to emergency borate the RCS due to 3 control rods not fully inserted. 1HV-8104 is failed closed.

Time	Position	Applicant's Action or Behavior
	OATC	NOTE The following step assumes that with 12 gpm of seal return, 30 gpm will be supplied to the RCS.
	OATC	4.9.2.4 Place 1-FIC-0121 in MANUAL.
	OATC	4.9.2.5 Adjust 1-FIC-0121 to maintain flow greater than 42 gpm.
	OATC	4.9.2.6 Verify Emergency Boration flow 1-FI-0110A is greater than 30 gpm.
	OATC	4.9.2.7 IF flow is less than 30 gpm, start the second Boric Acid Transfer Pump.
	OATC	4.9.2.8 Operate the Pressurizer Backup Heaters as necessary to equalize boron concentration between the RCS and the Pressurizer.
	OATC	4.9.2.9 <b>Check</b> plant conditions are consistent with RCS boration: <ul style="list-style-type: none"> <li>○ RCS Tavg may be dropping.</li> <li>○ NIS may be dropping.</li> </ul>
	OATC	4.9.2.10 Determine the amount of boric acid required to allow termination of Emergency Boration.
	OATC	4.9.2.11 WHEN the determined amount of boric acid has been added to the RCS, close the following valves: <ul style="list-style-type: none"> <li>○ 1 FV 0110A</li> <li>○ 1 FV 0110B</li> </ul>
	OATC	4.9.2.12 Establish automatic makeup per Section 4.1.

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Event No.: 9, Emergency Boration

**Event Description:** The OATC will use SOP 13009-1, Section 4.9 to emergency borate the RCS due to 3 control rods not fully inserted. 1HV-8104 is failed closed.

Time	Position	Applicant's Action or Behavior
	OATC	4.9.2.13 Restore 1-FIC-0121 to the AUTO position.
	OATC	4.9.2.14 Direct Chemistry to sample and report the RCS boron concentration, or monitor the Boron Meter 1-AI-40134 if available.
END OF EVENT 8. PROCEED TO NEXT EVENT AT THE DISCRETION OF THE CHIEF EXAMINER.		

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Event No.: 10

**Event Description:** A fault will occur on SG #2 outside reactor containment, resulting in a Safety Injection (SI) which will require re-entry into 19000-C, "Reactor Trip or Safety Injection." The crew will carry out the Immediate Operator Actions and Initial Actions of 19000-C. After OATC and UO actions are completed in 19000-C, Event #10 loss of all AC will occur.

Time	Position	Applicant's Action or Behavior
	CREW	Enters 19000-C Reactor Trip or Safety Injection. (Crew Update)
	CREW SS	Performs Immediate Operator Actions Per 19000-C, REACTOR TRIP OR SAFETY INJECTION. SS Makes Page Announcement of Reactor Trip.
	CREW OATC  UO  UO OATC	<b>IMMEDIATE ACTIONS of 19000-C, Reactor Trip or Safety Injection</b> <ol style="list-style-type: none"> <li>1. Check Reactor Trip <ul style="list-style-type: none"> <li>• Rod Bottom Lights - LIT</li> <li>• Reactor Trip and Bypass Breakers - OPEN</li> <li>• Neutron Flux – LOWERING</li> </ul> </li> <li>2. Check Turbine Trip: <ul style="list-style-type: none"> <li>• All Turbine Stop Valves – CLOSED</li> </ul> </li> <li>3. Check Power to AC Emergency Buses: <ol style="list-style-type: none"> <li>a. AC Emergency Busses – AT LEAST ONE ENERGIZED. <ul style="list-style-type: none"> <li>• 4160V AC 1E Busses</li> </ul> </li> <li>b. AC Emergency Buses – ALL ENERGIZED: <ul style="list-style-type: none"> <li>• 4160V AC 1E Busses</li> <li>• 480V AC 1E Busses</li> </ul> </li> </ol> </li> </ol>
	SS	<ol style="list-style-type: none"> <li>4. Check if SI is actuated: <ul style="list-style-type: none"> <li>• Any SI annunciator – LIT</li> <li>• SI ACTUATED BPLP window – LIT</li> </ul> <p>___ Go to Step 6</p> </li> </ol>

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Event No.: 10

**Event Description:** A fault will occur on SG #2 outside reactor containment, resulting in a Safety Injection (SI) which will require re-entry into 19000-C, "Reactor Trip or Safety Injection." The crew will carry out the Immediate Operator Actions and Initial Actions of 19000-C. After OATC and UO actions are completed in 19000-C, Event #10 loss of all AC will occur.

Time	Position	Applicant's Action or Behavior
	SS / CREW  OATC	<p>6. Initiate the Foldout Page.</p> <p><b>RCP TRIP CRITERIA:</b>  <b>Trip all RCPs if BOTH conditions listed below occur:</b></p> <ul style="list-style-type: none"> <li>a. CCPs or SI pumps – AT LEAST ONE RUNNING.</li> <li>b. RCP Trip Parameter – RCS PRESSURE LESS THAN 1375 PSIG.</li> </ul>
	OATC UO SS	<p>7. Perform the following:</p> <ul style="list-style-type: none"> <li>• OATC Initial Actions Page</li> <li>• UO Initial Actions Page</li> </ul> <p><b>NOTE: SS Initiates Step 8 After OATC/UO Initial Actions Completed.</b></p>
	OATC	<p><b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b></p> <p>Step 1. Check both Trains of ECCS equipment-ALIGNING FOR INJECTION PHASE</p> <ul style="list-style-type: none"> <li>• MLB indication.</li> </ul>
	OATC	<p><b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b></p> <p>Step 2. Check Containment Isolation Phase A – ACTUATED</p> <ul style="list-style-type: none"> <li>• CIA MLB indication</li> </ul>

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Event No.: 10

**Event Description:** A fault will occur on SG #2 outside reactor containment, resulting in a Safety Injection (SI) which will require re-entry into 19000-C, "Reactor Trip or Safety Injection." The crew will carry out the Immediate Operator Actions and Initial Actions of 19000-C. After OATC and UO actions are completed in 19000-C, Event #10 loss of all AC will occur.

Time	Position	Applicant's Action or Behavior
	OATC	<p><b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b></p> <p>Step 3. Check ECCS Pumps and NCP status:</p> <ul style="list-style-type: none"> <li>a. CCPs – RUNNING.</li> <li>b. SI Pumps – RUNNING.</li> <li>c. RHR Pumps – RUNNING.</li> <li>d. NCP – TRIPPED.</li> </ul>
	OATC	<p><b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b></p> <p>Step 4. Verify CCW Pumps – ONLY TWO RUNNING PER TRAIN.</p>
	OATC	<p><b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b></p> <p>Step 5. Verify proper NSCW system operation:</p> <ul style="list-style-type: none"> <li>a. NSCW Pumps - ONLY TWO RUNNING PER TRAIN.</li> <li>b. NSCW TOWER RTN HDR BYPASS BASIN handswitches – IN</li> </ul> <p>AUTO:</p> <ul style="list-style-type: none"> <li>• HS-1668A</li> <li>• HS-1669A</li> </ul>

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Event No.: 10

**Event Description:** A fault will occur on SG #2 outside reactor containment, resulting in a Safety Injection (SI) which will require re-entry into 19000-C, "Reactor Trip or Safety Injection." The crew will carry out the Immediate Operator Actions and Initial Actions of 19000-C. After OATC and UO actions are completed in 19000-C, Event #10 loss of all AC will occur.

Time	Position	Applicant's Action or Behavior
	OATC	<b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b> Step 6. Verify Containment Cooling Units: <ol style="list-style-type: none"> <li>ALL RUNNING IN LOW SPEED               <ul style="list-style-type: none"> <li>MLB indication</li> </ul> </li> <li>NSCW Cooler isolation valves – OPEN:               <ul style="list-style-type: none"> <li>MLB indication</li> </ul> </li> </ol>
	OATC	<b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b> Step 7. Check Containment Ventilation Isolation: <ol style="list-style-type: none"> <li>Dampers and Valves - CLOSED               <ul style="list-style-type: none"> <li>CVI MLB indication</li> </ul> </li> </ol>
	OATC	<b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b> Step 8. Check Containment pressure REMAINED LESS THAN 21.5 PSIG.
	OATC	<b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b> Step 9. Check ECCS flows: <ol style="list-style-type: none"> <li>BIT Flow.</li> <li>RCS pressure – LESS THAN 1625 PSIG.</li> <li>SI Pump flow.</li> <li>RCS pressure – LESS THAN 300 PSIG</li> </ol> RNO Step 9d. Go to Step 10.

**Event No.: 10**

**Event Description:** A fault will occur on SG #2 outside reactor containment, resulting in a Safety Injection (SI) which will require re-entry into 19000-C, "Reactor Trip or Safety Injection." The crew will carry out the Immediate Operator Actions and Initial Actions of 19000-C. After OATC and UO actions are completed in 19000-C, Event #10 loss of all AC will occur.

Time	Position	Applicant's Action or Behavior
	OATC	<p><b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b></p> <p>Step 10. Check ECCS Valve alignment – PROPER INJECTION LINEUP INDICATED ON MLBs.</p>
	OATC	<p><b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b></p> <p>Step 11. Check ACCW Pumps – AT LEAST ONE RUNNING</p>
	OATC	<p><b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b></p> <p>Step 12. Adjust Seal Injection flow to RCPs – 8 to 13 GPM.  <b><u>NOTE TO EXAMINER:</u> END OF OATC INITIAL ACTIONS OF E-0.</b>  <b>RETURNS TO MAIN BODY OF E-0 CONTINUING AT STEP 8</b></p>
	<p>UO</p> <p>UO</p>	<p><b>PERFORMS UO INITIAL ACTIONS OF E- 0.</b></p> <p>Step 1. Check AFW Pumps – RUNNING</p> <ul style="list-style-type: none"> <li>• MDAFW Pumps</li> <li>• TDAFW Pump, if required</li> </ul> <p>RNO</p> <ul style="list-style-type: none"> <li>• Start MDAFW Pumps.</li> <li>• Open Steam Supply valve HV-5106 to TDAFW Pump</li> </ul>



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Event No.: 10

**Event Description:** A fault will occur on SG #2 outside reactor containment, resulting in a Safety Injection (SI) which will require re-entry into 19000-C, "Reactor Trip or Safety Injection." The crew will carry out the Immediate Operator Actions and Initial Actions of 19000-C. After OATC and UO actions are completed in 19000-C, Event #10 loss of all AC will occur.

Time	Position	Applicant's Action or Behavior
	UO	<p><b>PERFORMS UO INITIAL ACTIONS OF E- 0.</b></p> <p>Step 2. Check NR level in at least one SG – GREATER THAN 10% [32% ADVERSE]</p>
	UO	<p><b>PERFORMS UO INITIAL ACTIONS OF E- 0.</b></p> <p>Step 3. Check if main steamlines should be isolated:</p> <p>a. Check for one or more of the following conditions:</p> <ul style="list-style-type: none"> <li>– Any steamline pressure – LESS THAN <u>OR</u> EQUAL TO 585 PSIG.</li> <li>– Containment pressure – GREATER THAN 14.5 PSIG.</li> <li>– Low Steam Pressure SI/SLI – BLOCKED <u>AND</u> High Steam Pressure Rate – <u>ONTWO OR MORE</u> CHANNELS OF ANY STEAMLINE.</li> </ul> <p>RNO</p> <p>Step 3a. Go to Step 4</p>

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Event No.: 10

**Event Description:** A fault will occur on SG #2 outside reactor containment, resulting in a Safety Injection (SI) which will require re-entry into 19000-C, "Reactor Trip or Safety Injection." The crew will carry out the Immediate Operator Actions and Initial Actions of 19000-C. After OATC and UO actions are completed in 19000-C, Event #10 loss of all AC will occur.

Time	Position	Applicant's Action or Behavior
	UO	<b>PERFORMS UO INITIAL ACTIONS OF E- 0.</b>  Step 4. Verify FW Isolation Valves closed: <ul style="list-style-type: none"><li>• MFIVs</li><li>• BFIVs</li><li>• MFRVs</li><li>• BFRVs</li></ul>
	UO	<b>PERFORMS UO INITIAL ACTIONS OF E- 0.</b>  Step 5. Verify SG Blowdown isolated: <ul style="list-style-type: none"><li>• Place SG Blowdown Isolation Valve handswitches HS-7603A, B, C, and D in the CLOSE position.</li><li>• SG Sample Isolation Valves – CLOSED.</li></ul>
	UO	<b>PERFORMS UO INITIAL ACTIONS OF E- 0.</b>  Step 6. Verify Diesel Generators – RUNNING.
	UO	<b>PERFORMS UO INITIAL ACTIONS OF E- 0.</b>  Step 7. Throttle total AFW flow as necessary to maintain SG NR levels between 10% [32% ADVERSE] and 65%.

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Event No.: 10

**Event Description:** A fault will occur on SG #2 outside reactor containment, resulting in a Safety Injection (SI) which will require re-entry into 19000-C, "Reactor Trip or Safety Injection." The crew will carry out the Immediate Operator Actions and Initial Actions of 19000-C. After OATC and UO actions are completed in 19000-C, Event #10 loss of all AC will occur.

Time	Position	Applicant's Action or Behavior
	UO	<b>PERFORMS UO INITIAL ACTIONS OF E- 0.</b>  Step 8.     Verify both MFPs – TRIPPED.
	UO	<b>PERFORMS UO INITIAL ACTIONS OF E- 0.</b>  Step 9.     Check Main Generator Output Breakers – OPEN.  <i><b>NOTE TO EXAMINER: END OF UO INITIAL ACTIONS OF E-0.</b></i>
	CREW	<i><b>RETURNS TO MAIN BODY OF E-0 CONTINUING AT STEP 8.</b></i>
	OATC / UO	8.     Initiate the Continuous Actions Page
		Initiate Event 10 (Loss of All AC) when the OATC and UO Initial Actions are complete.
<b>END OF EVENT 9. PROCEED TO NEXT EVENT FOR SCENARIO CONTINUITY.</b>		

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Event No.: 11

**Event Description:** A ground fault on 1BA03 and overspeed trip of EDG "A" will result in a Loss of All AC with the TDAFW pump failing to start automatically. This event will be initiated after completion of Step 8 of 19000-C following the fault of SG #2. Intent is to isolate the faulted steam generator in step 21 of 19100-C. 1AA02 power may be restored by aligning the alternate incoming source to the bus, AFTER a report that the bus is not damaged. Bus status will **NOT** be reported to the crew until the SG is isolated.

Time	Position	Applicant's Action or Behavior
	CREW	<p>Diagnose Loss of All AC:</p> <p><u>Alarms:</u>            DG1A TRIP OVERSPEED            DG1A DISABLED NONRESET OF EMERGENCY TRIP            DG1B EMERGENCY START            DG1B LOW PRESS STARTING AIR</p> <p><u>Indications:</u>            Loss of Control Room lighting            1AA02 white bus potential lights go out            1BA03 white bus potential lights go out            DG-1B starts and its output breaker does not shut</p>
	SS	Enter 19100-C, "ECA-0.0 Loss of All AC Power."
	OATC	<p>1. Verify Reactor trip:</p> <p>a. Reactor Trip and Bypass Breakers - OPEN.</p> <p>b. Neutron Flux - LOWERING.</p>
	UO	<p>2. Verify Turbine trip:</p> <p>a. All Turbine Stop Valves - CLOSED.</p>

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Event No.: 11

**Event Description:** A ground fault on 1BA03 and overspeed trip of EDG "A" will result in a Loss of All AC with the TDAFW pump failing to start automatically. This event will be initiated after completion of Step 8 of 19000-C following the fault of SG #2. Intent is to isolate the faulted steam generator in step 21 of 19100-C. 1AA02 power may be restored by aligning the alternate incoming source to the bus, AFTER a report that the bus is not damaged. Bus status will **NOT** be reported to the crew until the SG is isolated.

Time	Position	Applicant's Action or Behavior
	OATC	<p>3. Check if RCS is isolated:</p> <p>a. PRZR PORVs - CLOSED.</p> <p>b. Letdown Orifice Isolation Valves - CLOSED:</p> <ul style="list-style-type: none"> <li>• HV-8149A - LETDOWN ORIFICE 45 GPM</li> <li>• HV-8149B - LETDOWN ORIFICE 75 GPM</li> <li>• HV-8149C - LETDOWN ORIFICE 75 GPM</li> </ul> <p>c. Letdown Isolation Valves - CLOSED:</p> <ul style="list-style-type: none"> <li>• LV-0459 - LETDOWN ISOLATION VLV DOWNSTREAM</li> <li>• LV-0460 - LETDOWN ISOLATION VLV UPSTREAM</li> </ul> <p>d. Excess Letdown Isolation Valves - CLOSED:</p> <ul style="list-style-type: none"> <li>• HV-8153 - EXCESS LETDOWN LINE ISO VLV</li> <li>• HV-8154 - EXCESS LETDOWN LINE ISO VLV</li> </ul> <p>e. Reactor Vessel Head Vent Isolation Valves - CLOSED:</p> <ul style="list-style-type: none"> <li>• HV-8095A - RX HEAD VENT TO LETDOWN ISOLATION VLV</li> <li>• HV-8095B - RX HEAD VENT TO LETDOWN ISOLATION VLV</li> <li>• HV-8096A - RX HEAD VENT TO LETDOWN ISOLATION VLV</li> <li>• HV-8096B - RX HEAD VENT TO LETDOWN ISOLATION VLV</li> </ul>
	UO	<p>4. Verify AFW flow - GREATER THAN 570 GPM.  <b><u>(May have started TDFW pump earlier; if not running, manually start TDAFW pump.)</u></b></p>

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Event No.: 11

**Event Description:** A ground fault on 1BA03 and overspeed trip of EDG "A" will result in a Loss of All AC with the TDAFW pump failing to start automatically. This event will be initiated after completion of Step 8 of 19000-C following the fault of SG #2. Intent is to isolate the faulted steam generator in step 21 of 19100-C. 1AA02 power may be restored by aligning the alternate incoming source to the bus, AFTER a report that the bus is not damaged. Bus status will **NOT** be reported to the crew until the SG is isolated.

Time	Position	Applicant's Action or Behavior
	UO <b>Critical Task</b>	<p>4 RNO. Perform the following:</p> <p>a. Verify TDAFW Pump is running:</p> <ul style="list-style-type: none"> <li>• PDIC-5180 - INCREASED/ MAX DEMAND</li> <li>• HV-5106 TDAFW – OPEN</li> <li>• HV-3009 LP-1 MS SPLY TO AUX FW TD PMP-1 – OPEN</li> </ul> <p>-OR-</p> <ul style="list-style-type: none"> <li>• HV-3019 LP-2 MS SPLY TO AUX FW TD PMP-1 - OPEN</li> </ul> <p><b><u>Note to examiner: 1HV-5125 may re-open if an AFW actuation signal is present.</u></b></p>
	OATC	5. Trip all RCPs.
	OATC	6. Trip the NCP.
	SS	<p>7. Initiate the following:</p> <ul style="list-style-type: none"> <li>• Continuous Action Page.</li> <li>• NMP-EP-110, EMERGENCY CLASSIFICATION DETERMINATION AND INITIAL ACTION</li> </ul>
	UO	8. Check Main Generator Output Breakers - OPEN.

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**Event Description:** A ground fault on 1BA03 and overspeed trip of EDG "A" will result in a Loss of All AC with the TDAFW pump failing to start automatically. This event will be initiated after completion of Step 8 of 19000-C following the fault of SG #2. Intent is to isolate the faulted steam generator in step 21 of 19100-C. 1AA02 power may be restored by aligning the alternate incoming source to the bus, AFTER a report that the bus is not damaged. Bus status will **NOT** be reported to the crew until the SG is isolated.

Time	Position	Applicant's Action or Behavior
	UO	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p><u>NOTE</u></p> <p>The battery capacity for DG field flashing may only support 5 Diesel Generator start attempts.</p> </div> <p>9. Try to restore power to any AC Emergency Bus from its associated DG:</p> <p style="padding-left: 40px;">a. Start DG(s).</p> <p><b><u>Note to examiner: DG's are not available due to trip of "A" EDG and fault on 1BA03 preventing "B" EDG output breaker from closing.</u></b></p> <p style="padding-left: 40px;">b. Check AC Emergency Bus of started DG(s) automatically energized: <b><u>(NO)</u></b></p> <p>9.b RNO</p> <ul style="list-style-type: none"> <li>• Adjust frequency as necessary to maintain 60 Hz.</li> <li>• <u>IF</u> bus can <b><u>NOT</u></b> be energized, <b><u>THEN</u></b> trip DG and go to Step 10.</li> </ul>

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Event No.: 11

**Event Description:** A ground fault on 1BA03 and overspeed trip of EDG "A" will result in a Loss of All AC with the TDAFW pump failing to start automatically. This event will be initiated after completion of Step 8 of 19000-C following the fault of SG #2. Intent is to isolate the faulted steam generator in step 21 of 19100-C. 1AA02 power may be restored by aligning the alternate incoming source to the bus, AFTER a report that the bus is not damaged. Bus status will **NOT** be reported to the crew until the SG is isolated.

Time	Position	Applicant's Action or Behavior
		<p><u>NOTES</u></p> <ul style="list-style-type: none"> <li>Train A 1E Stub Bus supplies Emergency Seal Oil Pump Battery Charger 1(2)ND1CA.</li> <li>Train B 1E Stub Bus supplies Main Turbine Emergency Bearing Oil Pump Battery Charger 1(2)ND2CA.</li> </ul>
		<p><u>CAUTION</u></p> <p>IF it is expected that 1(2)NB01 Stub Bus cannot be energized before batteries supplying Charger 1(2)ND1CA have expended (approximately 2 hours), THEN action should be promptly initiated to degas and flush generator with CO2 per 13810, GENERATOR GAS SYSTEM</p>
	UO	<p>9. c. Check AC Emergency Buses - AT LEAST ONE ENERGIZED.</p> <p>9.c RNO Go to Step 10.</p>



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Event No.: 11

**Event Description:** A ground fault on 1BA03 and overspeed trip of EDG "A" will result in a Loss of All AC with the TDAFW pump failing to start automatically. This event will be initiated after completion of Step 8 of 19000-C following the fault of SG #2. Intent is to isolate the faulted steam generator in step 21 of 19100-C. 1AA02 power may be restored by aligning the alternate incoming source to the bus, AFTER a report that the bus is not damaged. Bus status will **NOT** be reported to the crew until the SG is isolated.

Time	Position	Applicant's Action or Behavior
	UO	<p>10. Initiate 13427A/B, 4160V AC BUS AA02/BA03 1E ELECTRICAL DISTRIBUTION SYSTEM to energize at least one AC Emergency Bus using any available power supply:</p> <p><u>IF</u> offsite power available to either RAT, <u>THEN</u> use normal or emergency incoming feeder breaker.</p> <p><b><u>Note to examiner: Licensee expects the crew to use the first option to restore power to 1AA02 from the alternate incoming source.</u></b></p> <p>-OR-</p> <p><u>IF</u> power available to SAT, <u>THEN</u> initiate 13418-A(B), STANDBY AUXILIARY TRANSFORMER UNIT 1(2) TRAIN A(B) OPERATIONS.</p> <p>-OR-</p> <p><u>IF</u> a Diesel Generator extended AOT is in progress <u>AND</u> a Wilson Black Start is necessary, <u>THEN</u> initiate 13419-C, DIESEL GENERATOR EXTENDED AOT Step 4.3.6.</p>
	OATC	<p>11. Check for SI:</p> <p>a. SI signal - ACTUATED. <b><u>(YES)</u></b></p> <p>b. Reset SI.</p>
	SS	<p>12. *Check AC Emergency Bus status: (Continuous action)</p>

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**Event Description:** A ground fault on 1BA03 and overspeed trip of EDG "A" will result in a Loss of All AC with the TDAFW pump failing to start automatically. This event will be initiated after completion of Step 8 of 19000-C following the fault of SG #2. Intent is to isolate the faulted steam generator in step 21 of 19100-C. 1AA02 power may be restored by aligning the alternate incoming source to the bus, AFTER a report that the bus is not damaged. Bus status will NOT be reported to the crew until the SG is isolated.

Time	Position	Applicant's Action or Behavior
		a. At least one energized. <u>(NO)</u>
	SS	<p>12.*RNO (Continuous action)</p> <p><u>WHEN</u> power is restored to any AC Emergency Bus, <u>THEN</u> initiate recovery actions starting with Step 43.</p> <p>Go to Step 13.</p>
	UO	13. Verify at least two NSCW Pumps per train - HANDSWITCHES IN AUTO.
	OATC	<p>14. Place the following equipment handswitches in the PULL-TO-LOCK position:</p> <ul style="list-style-type: none"> <li>• CCPs</li> <li>• RHR Pumps</li> <li>• SI Pumps</li> <li>• Containment Spray Pumps</li> <li>• CCW Pumps</li> <li>• ACCW Pumps</li> <li>• MDAFW Pumps</li> <li>• Containment Coolers</li> <li>• ESF Chillers (STOP position)</li> </ul>
	SS UO	<p>15. Check if AC Emergency Busses should be energized locally:</p> <p>a. At least one 4160V AC Emergency Bus - CAN BE ENERGIZED</p>

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**Event Description:** A ground fault on 1BA03 and overspeed trip of EDG "A" will result in a Loss of All AC with the TDAFW pump failing to start automatically. This event will be initiated after completion of Step 8 of 19000-C following the fault of SG #2. Intent is to isolate the faulted steam generator in step 21 of 19100-C. 1AA02 power may be restored by aligning the alternate incoming source to the bus, AFTER a report that the bus is not damaged. Bus status will **NOT** be reported to the crew until the SG is isolated.

Time	Position	Applicant's Action or Behavior
		FROM CONTROL ROOM.
	UO	<p>15.a RNO</p> <p>Dispatch personnel to restore AC Emergency Bus(s) using 13427A/B, 4160V AC BUS AA02/BA03 1E ELECTRICAL DISTRIBUTION SYSTEM.</p> <p>Go to Step 16.</p>
	SS UO	16. Dispatch Operator to initiate ATTACHMENT 5.
	SS UO	<p>17. Dispatch Operator to check Hotwell level valves - CLOSED:</p> <p>a. COND MAKEUP LV-4415B</p> <p>b. COND DUMP LV-4415A</p>
	SS UO	18. Dispatch Operators to prepare for local operation of SG ARVs using ATTACHMENT 7.
	UO	<p>19. Check SG status:</p> <p>a. Main Steamline and Bypass Valves - CLOSED.</p> <p>b. MFIVs and BFIVs - CLOSED.</p> <p>c. Blowdown Isolation Valves - CLOSED.</p>

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**Event Description:** A ground fault on 1BA03 and overspeed trip of EDG "A" will result in a Loss of All AC with the TDAFW pump failing to start automatically. This event will be initiated after completion of Step 8 of 19000-C following the fault of SG #2. Intent is to isolate the faulted steam generator in step 21 of 19100-C. 1AA02 power may be restored by aligning the alternate incoming source to the bus, AFTER a report that the bus is not damaged. Bus status will **NOT** be reported to the crew until the SG is isolated.

Time	Position	Applicant's Action or Behavior
		d. SG Sample Isolation Valves - CLOSED.
	UO	<p>20. Check for faulted SG(s):</p> <p>ANY SG PRESSURE LOWERING IN AN UNCONTROLLED MANNER.</p> <p>-OR-</p> <p>ANY SG PRESSURE COMPLETELY DEPRESSURIZED</p>
	UO	<p>21. Isolate faulted SG(s):</p> <p>a. Close the TDAFW Throttle Valves on affected SG(s) one at a time:</p> <p>HV-5122 (SG 1)</p> <p>HV-5125 (SG 2)</p> <p>HV-5127 (SG 3)</p> <p>HV-5120 (SG 4)</p> <p>b. Close only one TDAFW Pump Steam Supply Valve from affected SG(s):</p> <p>HV-3009 (SG 1)</p> <p>-OR-</p> <p>HV-3019 (SG 2)</p> <p>c. Verify affected SG ARV(s) closed:</p>

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**Event Description:** A ground fault on 1BA03 and overspeed trip of EDG "A" will result in a Loss of All AC with the TDAFW pump failing to start automatically. This event will be initiated after completion of Step 8 of 19000-C following the fault of SG #2. Intent is to isolate the faulted steam generator in step 21 of 19100-C. 1AA02 power may be restored by aligning the alternate incoming source to the bus, AFTER a report that the bus is not damaged. Bus status will **NOT** be reported to the crew until the SG is isolated.

Time	Position	Applicant's Action or Behavior
		PV-3000 (SG 1) PV-3010 (SG 2) PV-3020 (SG 3) PV-3030 (SG 4)
	UO	21.(Cont.) d. Locally close the MDAFW Throttle Valves on affected SG(s) using ATTACHMENT F.  <b><u>Note to examiner: When the faulted SG is isolated, the booth operator will report to the SS that 1AA02 bus is undamaged and can be energized. Go to step 43 when the bus is energized.</u></b>
	UO	22. Verify faulted SG(s) remains isolated during subsequent recovery actions unless needed for RCS cooldown or SG activity sampling.
	UO	23. Check for ruptured SG(s): <b><u>(No SG is ruptured)</u></b>  a. Direct Chemistry to take periodic activity samples of all SGs one at a time.  b. Secondary radiation - NOT NORMAL: <ul style="list-style-type: none"> <li>• MAIN STM LINE MONITORS:               <ul style="list-style-type: none"> <li>• RE-13120 (SG 1)</li> <li>• RE-13121 (SG 2)</li> <li>• RE-13122 (SG 3)</li> <li>• RE-13119 (SG 4)</li> </ul> </li> <li>• CNDSR AIR EJCTR/STM RAD MONITOR RE-12839C.</li> <li>• STM GEN LIQ PROCESS RAD:</li> </ul>

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**Event Description:** A ground fault on 1BA03 and overspeed trip of EDG "A" will result in a Loss of All AC with the TDAFW pump failing to start automatically. This event will be initiated after completion of Step 8 of 19000-C following the fault of SG #2. Intent is to isolate the faulted steam generator in step 21 of 19100-C. 1AA02 power may be restored by aligning the alternate incoming source to the bus, AFTER a report that the bus is not damaged. Bus status will **NOT** be reported to the crew until the SG is isolated.

Time	Position	Applicant's Action or Behavior
		<ul style="list-style-type: none"> <li>• RE-0019 (SAMPLE)</li> <li>• RE-0021 (BLOWDOWN)</li> <li>• SG sample radiation.</li> </ul> <p>23.RNO Go to Step 25.</p>
	UO	25. Check CST level - GREATER THAN 15%.
	UO	<p>26. Check intact SG levels:</p> <ul style="list-style-type: none"> <li>a. NR level - AT LEAST ONE GREATER THAN 10% [32% ADVERSE].</li> <li>b. Maintain NR level between 10% [32% ADVERSE] and 65%.</li> <li>c. NR level - ANY RISING IN AN UNCONTROLLED MANNER. <b><u>(NO)</u></b></li> <li>c. RNO Go to Step 27.</li> </ul>
	SS UO	<div style="border: 1px solid black; padding: 10px;"> <p><b>CAUTIONS</b></p> <p>Equipment failures and loss of control power may occur if doors are not opened within 30 minutes of onset of loss of AC power. Room B76 on Unit 1 and room B04 on Unit 2 have two doors with installed door stops.</p> </div> <p>27. Open all doors that have installed door stops in the following affected unit's Control Building electrical equipment rooms:</p> <p style="text-align: center;"><u>UNIT 1</u></p>

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**Event Description:** A ground fault on 1BA03 and overspeed trip of EDG "A" will result in a Loss of All AC with the TDAFW pump failing to start automatically. This event will be initiated after completion of Step 8 of 19000-C following the fault of SG #2. Intent is to isolate the faulted steam generator in step 21 of 19100-C. 1AA02 power may be restored by aligning the alternate incoming source to the bus, AFTER a report that the bus is not damaged. Bus status will **NOT** be reported to the crew until the SG is isolated.

Time	Position	Applicant's Action or Behavior
		B47, B48, B52, B55, B61, B76, B63
	UO	<p>28. Check DC Bus loads:</p> <ul style="list-style-type: none"> <li>a. Monitor all 1E Battery Bus voltages - GREATER THAN 105V DC.</li> <li>b. As time permits, perform the following:</li> </ul>
	UO	<p>28. (Cont)</p> <ul style="list-style-type: none"> <li>• Evaluate securing unnecessary battery loads using ATTACHMENT A.</li> <li>• Initiate 18032, LOSS OF 120 VOLT AC INSTRUMENT POWER and 18034, LOSS OF CLASS 1E 125V DC POWER if the following criteria is met: <ul style="list-style-type: none"> <li>• Any Inverter must be shut down.</li> <li>-OR-</li> <li>• Any battery breaker must be opened due to battery overload or low DC Bus voltage.</li> </ul> </li> </ul>
	SS UO	<p>29. Depressurize intact SGs to 300 psig:</p> <ul style="list-style-type: none"> <li>a. Check SG NR levels - GREATER THAN 10% [32% ADVERSE] IN AT LEAST ONE SG.</li> <li>b. Locally dump steam using SG ARVs at maximum rate: <ul style="list-style-type: none"> <li>• PV-3000 (South Main Steam Valve Room)</li> <li>• PV-3010 (North Main Steam Valve Room)</li> <li>• PV-3020 (North Main Steam Valve Room)</li> <li>• PV-3030 (South Main Steam Valve Room)</li> </ul> </li> <li>c. Maintain the following during depressurization: <ul style="list-style-type: none"> <li>• SG pressures - GREATER THAN 200 PSIG</li> </ul> </li> </ul>

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**Event Description:** A ground fault on 1BA03 and overspeed trip of EDG "A" will result in a Loss of All AC with the TDAFW pump failing to start automatically. This event will be initiated after completion of Step 8 of 19000-C following the fault of SG #2. Intent is to isolate the faulted steam generator in step 21 of 19100-C. 1AA02 power may be restored by aligning the alternate incoming source to the bus, AFTER a report that the bus is not damaged. Bus status will **NOT** be reported to the crew until the SG is isolated.

Time	Position	Applicant's Action or Behavior
		<ul style="list-style-type: none"> <li>SG NR level - GREATER THAN 10% [32% ADVERSE] IN AT LEAST ONE INTACT SG</li> </ul>
	OATC	30. Check RCS WR cold leg temperatures - GREATER THAN 280°F [295°F ADVERSE].
	UO	31. Check SG pressure - LESS THAN 300 PSIG.
	SS UO	32. Locally control SG ARVs to maintain SG pressures at 300 psig.
	OATC	33. Check Reactor - SUBCRITICAL: <ul style="list-style-type: none"> <li>IR channels - ZERO <u>OR</u> NEGATIVE STARTUP RATE</li> <li>SR channels - ZERO <u>OR</u> NEGATIVE STARTUP RATE</li> </ul>
	OATC	34. Check SI signal status:



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**Event Description:** A ground fault on 1BA03 and overspeed trip of EDG "A" will result in a Loss of All AC with the TDAFW pump failing to start automatically. This event will be initiated after completion of Step 8 of 19000-C following the fault of SG #2. Intent is to isolate the faulted steam generator in step 21 of 19100-C. 1AA02 power may be restored by aligning the alternate incoming source to the bus, AFTER a report that the bus is not damaged. Bus status will NOT be reported to the crew until the SG is isolated.

Time	Position	Applicant's Action or Behavior	
	OATC	<p>a. SI - ACTUATED.</p> <p>b. Reset SI.</p>	<p>a. <u>IF</u> SI actuates during SG depressurization, <u>THEN</u> reset SI. <u>IF</u> SI will <u>NOT</u> reset, <u>THEN</u> initiate ATTACHMENT I.</p> <p>Go to Step 0.</p> <p>b. <u>IF</u> SI will <u>NOT</u> reset, <u>THEN</u> initiate ATTACHMENT I.</p>
	OATC UO	<p>35. Check Containment Isolation Phase A using ATTACHMENT B.: Computer Points</p> <p>-OR-</p> <p>Handswitch Indication</p>	<p><u>IF</u> valves do <u>NOT</u> close, <u>THEN</u> locally close at least one valve at each penetration.</p> <p>Locally close any open valve as time permits.</p>
	OATC UO	<p>36. Check Containment Ventilation Isolation using ATTACHMENT C.</p>	<p>36. Close dampers and valves.</p>

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**Event Description:** A ground fault on 1BA03 and overspeed trip of EDG "A" will result in a Loss of All AC with the TDAFW pump failing to start automatically. This event will be initiated after completion of Step 8 of 19000-C following the fault of SG #2. Intent is to isolate the faulted steam generator in step 21 of 19100-C. 1AA02 power may be restored by aligning the alternate incoming source to the bus, AFTER a report that the bus is not damaged. Bus status will NOT be reported to the crew until the SG is isolated.

Time	Position	Applicant's Action or Behavior
		<p>Computer Points                      IF dampers and valves can <u>NOT</u> be closed,  <u>THEN</u> locally close.</p> <p>-OR-</p> <p>Handswitch Indication</p>
	UO	37. Check Containment radiation - LESS THAN $10^5$ mR/HR.
	UO	<p>38. Initiate Spent Fuel Pool Monitoring of Level and Temperature every 2 hours:</p> <ul style="list-style-type: none"> <li>• Dispatch Operator to locally check level &gt; 217 ft., reference figure 1 of 18030-C, LOSS OF SPENT FUEL POOL LEVEL OR COOLING,</li> <li>• Locally check temperature with handheld dip thermometer or infrared to develop baseline temp monitoring for establishing repetitive checks of level and temperature every two hours</li> <li>• Check SFPC temperature &lt;130°F</li> </ul>

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**Event Description:** A ground fault on 1BA03 and overspeed trip of EDG "A" will result in a Loss of All AC with the TDAFW pump failing to start automatically. This event will be initiated after completion of Step 8 of 19000-C following the fault of SG #2. Intent is to isolate the faulted steam generator in step 21 of 19100-C. 1AA02 power may be restored by aligning the alternate incoming source to the bus, AFTER a report that the bus is not damaged. Bus status will **NOT** be reported to the crew until the SG is isolated.

Time	Position	Applicant's Action or Behavior
		<ul style="list-style-type: none"> <li>Using PTDB TAB 26, determine time to restore power is &lt; time to reach 200°F in Spent Fuel Pool.</li> </ul>
	OATC	39. Check Core Exit TCs - LESS THAN 1200°F.
	UO	40. Check if AC emergency power is restored: <ol style="list-style-type: none"> <li>AC Emergency Busses - AT LEAST ONE ENERGIZED.</li> <li>Go to Step 43.</li> </ol>
	UO	43. Check if resetting LOP Sequencer - REQUIRED: <ol style="list-style-type: none"> <li>LOP Sequencer - INITIATED.</li> <li>Power restored to AC Emergency Bus from offsite source.</li> <li>Reset LOP Sequencer by initiating ATTACHMENT H.</li> </ol>

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**Event Description:** A ground fault on 1BA03 and overspeed trip of EDG "A" will result in a Loss of All AC with the TDAFW pump failing to start automatically. This event will be initiated after completion of Step 8 of 19000-C following the fault of SG #2. Intent is to isolate the faulted steam generator in step 21 of 19100-C. 1AA02 power may be restored by aligning the alternate incoming source to the bus, AFTER a report that the bus is not damaged. Bus status will **NOT** be reported to the crew until the SG is isolated.

Time	Position	Applicant's Action or Behavior
	UO	<p>44. Verify following equipment loaded on energized AC Emergency Bus(s):</p> <ul style="list-style-type: none"> <li>• 480V AC switchgear: <ul style="list-style-type: none"> <li><u>TRAIN A</u></li> <li>AB04</li> <li>AB05</li> <li>AB15</li> <li>NB01</li> </ul> </li> <li>• Essential 480V AC loads: <ul style="list-style-type: none"> <li>• Battery Chargers</li> <li>• Instrumentation and Control</li> <li>• Emergency Lighting</li> <li>• Communications</li> <li>• Battery Room Fans</li> </ul> </li> </ul>
	UO	<p>45. Check proper NSCW operation for energized AC Emergency Bus(s):</p> <p>a. Verify proper NSCW Pump and return header valve operation:</p> <ol style="list-style-type: none"> <li>1. NSCW Pumps - TWO RUNNING EACH TRAIN</li> <li>2. NSCW TOWER RTN HDR BYPASS BASIN handswitches - IN AUTO: <ul style="list-style-type: none"> <li>HS-1668A</li> <li>HS-1669A</li> </ul> </li> </ol> <p>b. Verify the following valves - OPEN: <u>TRAIN A</u></p>

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Event No.: 11

**Event Description:** A ground fault on 1BA03 and overspeed trip of EDG "A" will result in a Loss of All AC with the TDAFW pump failing to start automatically. This event will be initiated after completion of Step 8 of 19000-C following the fault of SG #2. Intent is to isolate the faulted steam generator in step 21 of 19100-C. 1AA02 power may be restored by aligning the alternate incoming source to the bus, AFTER a report that the bus is not damaged. Bus status will **NOT** be reported to the crew until the SG is isolated.

Time	Position	Applicant's Action or Behavior
		HV-1806 - NSCW CNMT CLR 1&2 SPLY VLV HV-1808 - NSCW CNMT CLR 5&6 SPLY VLV HV-1822 - NSCW CNMT CLR 1&2 RTN VLV HV-1830 - NSCW CNMT CLR 5&6 RTN VLV
	UO	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <b>CAUTION</b>             If temperature has exceeded 130°F TSC should be consulted prior to restoring Spent Fuel Pool Cooling to service.         </div> 46. Perform the following: <ol style="list-style-type: none"> <li>a. Verify two CCW PUMPS of available train in service</li> <li>b. Start available train of SPENT FUEL POOL COOLING</li> </ol>
	SS UO	47. Restore DC loads: <ol style="list-style-type: none"> <li>a. Startup any de-energized Inverters per 13431, 120V AC 1E VITAL INSTRUMENT DISTRIBUTION SYSTEM.</li> <li>b. Restore remaining DC loads shed in previous actions.</li> </ol>
	UO	48. Stabilize SG pressures: <ul style="list-style-type: none"> <li>• Control SG ARVs in MANUAL.</li> </ul>
		<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <b><u>NOTE</u></b>             If RCP cooling was previously isolated, further cooling of the RCP Seals will be         </div>

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Event No.: 11

**Event Description:** A ground fault on 1BA03 and overspeed trip of EDG "A" will result in a Loss of All AC with the TDAFW pump failing to start automatically. This event will be initiated after completion of Step 8 of 19000-C following the fault of SG #2. Intent is to isolate the faulted steam generator in step 21 of 19100-C. 1AA02 power may be restored by aligning the alternate incoming source to the bus, AFTER a report that the bus is not damaged. Bus status will **NOT** be reported to the crew until the SG is isolated.

Time	Position	Applicant's Action or Behavior
	CREW	<div>established by natural circulation cooldown as directed in subsequent procedures.</div> <div>49. Select recovery procedure:<div><div>a. Check RCS subcooling - GREATER THAN 24°F [38°F ADVERSE].</div><div>b. Check PRZR level - GREATER THAN 9% [37% ADVERSE].</div><div>c. Check BIT DISCH ISOLATION valves - CLOSED:<div><div>• HV-8801A</div><div>• HV-8801B</div></div></div></div><div>If ALL of the above criteria are met, go to 19101-C ECA-0.1 LOSS OF ALL AC POWER RECOVERY WITHOUT SI REQUIRED.</div><div>IF ANY of the above criteria are NOT met, go to 19102-C, ECA-0.2 LOSS OF ALL AC RECOVERY WITH SI REQUIRED.</div></div>
END OF SCENARIO. PROCEED AT THE DISCRETION OF THE CHIEF EXAMINER.		

Event No.: Event 11b, SOP 13427A-1

Event Description: Energize 4160V Bus 1AA02 from alternate incoming source.

Time	Position	Applicant's Action or Behavior
		<div>NOTES</div> <ul style="list-style-type: none"> <li>• <u>IF</u> in Modes 1, 2, 3, or 4, Section 4.4.1 of this procedure may only be performed <u>IF</u> the Normal Incoming Source, Emergency DG 1A, <u>AND</u> the redundant 1E 4160V AC bus 1BA03 are all lost simultaneously.</li> <li>• <u>IF</u> in Modes 5 or 6, Section 4.4.1 may be performed with the other power sources available <u>WHEN</u> authorized by the SM.</li> </ul> <p>4.4.1.1 <b>Obtain</b> authorization from the SM to energize the 4160V AC Bus 1AA02 from the Alternate Incoming Source.</p>
		4.4.1.2 <b>Check</b> Alternate Incoming Source voltage is available.
		4.4.1.3 <u>IF</u> in MODE 5 OR 6, <del>(NO) perform the following Steps:</del> <u>OTHERWISE</u> , <b>Go To Step 4.4.1.8.</b>
		<p>4.4.1.4 <b>Verify</b> an Alternate Incoming Source is properly aligned.</p> <p>a. <u>IF</u> 1AA02 will be energized from RAT 1NXRB, <b>verify</b> applicable sections of 13415-1, "Reserve Auxiliary Transformers," have been performed prior to performing this section.</p>
		4.4.1.5 <u>IF</u> the Non-Class 1E 4160V AC Buses associated with RAT 1NXRB are energized from the UATs by backfeed, <b>place</b> handswitch 1HS-1NA0401 Alternate Incoming Breaker in the PULL-TO-LOCK position and <b>Caution Tag</b> .

Event No.: Event 11b, SOP 13427A-1

Event Description: Energize 4160V Bus 1AA02 from alternate incoming source.

Time	Position	Applicant's Action or Behavior
		<p>4.4.1.6 <u>IF</u> RAT 1NXRB is in service <u>AND</u> will be connected to 1AA02, <b>verify</b> the following:</p> <ul style="list-style-type: none"> <li>The sum total load of 1AA02 and 1BA03 is less than 1350 amps.</li> <li>With <u>NO</u> UAT backfeed of the non-1E 4160V AC in progress, the total load of 1NA04 is less than 1000 amps.</li> </ul>
		<p>4.4.1.7 <u>IF</u> the SAT is in service for RAT 1NXRB <u>AND</u> will be connected to 1BA03 <u>AND</u> 1AA02, perform the following:</p> <ol style="list-style-type: none"> <li><b>Check</b> total load on 1AA02 and 1BA03 will be less than 1735 amps.</li> <li><b>Place</b> handswitch 1HS-1NA0401 in PULL-TO-LOCK and <b>install</b> a Caution Tag.</li> <li><b>Place</b> one train of SSPS in test per 13503A-1, "Reactor Control Solid State Protection System," and <b>Caution Tag</b>.</li> </ol>
		<p>4.4.1.8 <b>Verify</b> BRKR 1AA0205 SYNCHRONIZING SWITCH and BRKR 1AA0219 SYNCHRONIZING SWITCH are <u>BOTH</u> in OFF:</p> <ul style="list-style-type: none"> <li>1AA0205 SYNCHRONIZING SWITCH OFF</li> <li>1AA0219 SYNCHRONIZING SWITCH OFF</li> </ul>
		<p>4.4.1.9 <b>Place</b> the BRKR 1AA0201 SYNCHRONIZING SWITCH to ON.</p>
		<p>4.4.1.10 <b>Close</b> ALTERNATE INCOMING BRKR 1AA0201 using handswitch 1HS-1AA0201.</p>
		<p>4.4.1.11 <b>Check</b> white potential lights lit for Bus 1AA02.</p>



Event No.: Event 11b, SOP 13427A-1

Event Description: Energize 4160V Bus 1AA02 from alternate incoming source.

Time	Position	Applicant's Action or Behavior
		4.4.1.12 <b>Check</b> Bus 1AA02 voltage across all three phases to be 4160V AC (4025V AC to 4326V AC) on BUS 1AA02 Voltmeter.
		4.4.1.13 <b>Place</b> BRKR 1AA0201 SYNCHRONIZING SWITCH to OFF.
		<p>4.4.1.14 <b>Verify</b> Train A 480V AC 1E Switchgears energized by performing the following:</p> <ol style="list-style-type: none"> <li><b>Check</b> that white potential lights are lit for: <ul style="list-style-type: none"> <li>1AB04</li> <li>1AB05</li> <li>1AB15</li> <li>1NB01</li> </ul> </li> <li><u>IF</u> any Train A 480V AC 1E Switchgear <u>NOT</u> energized, <b>obtain</b> SM permission and <b>energize</b> per 13429-1, "480V AC 1E Electrical Distribution System."</li> <li><u>IF</u> Train A 480V AC Non 1E Switchgear 1NB01 <u>NOT</u> energized, <b>obtain</b> SM permission and <b>energize</b> per 13430-1, "480V AC Non 1E Electrical Distribution System."</li> </ol>
		<p>4.4.1.15 <b>Check</b> Train A 480V AC Motor Control Centers energized by checking <u>NO</u> MCC TROUBLE alarms on QEAB Annunciator Panel ALB36.</p> <ol style="list-style-type: none"> <li><u>IF</u> any Train A 480V AC 1E Motor Control Center <u>NOT</u> energized, <b>obtain</b> SM permission and <b>energize</b> per 13429-1, "480V AC 1E Electrical Distribution System."</li> <li><u>IF</u> any Train A 480V AC Non 1E Motor Control Center <u>NOT</u> energized, <b>obtain</b> SM permission and <b>energize</b> per 13430-1, "480V AC Non 1E Electrical Distribution System."</li> </ol>

Event No.: Event 11b, SOP 13427A-1

Event Description: Energize 4160V Bus 1AA02 from alternate incoming source.

Time	Position	Applicant's Action or Behavior
		4.4.1.16 <b>Notify</b> SM that loads listed in Table 1 may be restored.
		4.4.1.17 At 1AA02, <b>reset</b> relay targets that are dropped.
		4.4.1.18 <b>Generate</b> caution tags to alert personnel that Bus 1AA02 is energized from its alternate incoming source.
		4.4.1.19 <b>Perform</b> the following steps only if in MODE 5 <u>OR</u> 6, <u>OTHERWISE</u> , <b>exit</b> this procedure.
<p><b>END OF SCENARIO. PROCEED AT THE DISCRETION OF THE CHIEF EXAMINER.</b></p>		

Final Scenario 4, as-given: Crew 2

Facility: Vogtle Scenario No.: 4 (Low Power) Op-Test No.: 2014-301

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

Snap 233

Initial Conditions: 3.5% power, maintaining Tavg at 557F (+/- 2° F) with steam dumps in steam pressure mode (auto), control rods in manual, letdown flow at 75 gpm.

Equipment OOS: CCW pump #5, Air Compressor #3.

Turnover: INFO LCO 3.7.7, CCW Train 'A', Containment Mini-purge is in service, 'A' CCP caution tagged "Run only in emergency."

AFW secured and in standby alignment except for MDAFW pump 'A'. Continue raising power to Mode 1. Mode 1 signoffs complete except for AFW in Standby readiness.

**Preloaded Malfunctions:**

**A-TIC-130 – Loss of cooling to letdown heat exchanger (Trigger 1)**

**CV-12 – VCT Level Transmitter LT-185 fails high (Trigger 2)**

**HS1AA0205 HS-1AA0205 TRIP (Trigger 3)**

**EAB-LO\_HS1AA0205\_Y 1HS-AA0205 YELLOW A533P29-B12 – ON (Trigger 3)**

**ALB36-A01 4160 SWGR 1AA02 TROUBLE – ON (Trigger 3)**

**FW 18 - Local control of BFRV LV-5242 (Trigger 4)**

**FW 19 - BFRV LV-5242 Position (Trigger 4)**

**RD 10 L, N, F - Stuck RCCA K6 (CC), G13 (SDB), E13 (SDD) (Trigger 5, tied to Rx trip)**

**MS 02B - Main steam line #2 rupture outside containment (Trigger 6)**

**EL 07B - Loss of 1BA03 (Trigger 7)**

**EL 01A – DG1A Overspeed trip (Trigger 7)**

**HS9382 HS-9382 AIR COMPRESSOR #3 RECIPROCATING – STOP**

**A-LO\_HS9382\_G 1HS-9382 GREEN A531P30-A6 - OFF**

**NS 07 A, C, E - NSCW Pump handswitch auto contact failure**

**Override HV-8104 Closed**

**AF 05C - TDAFWP Auto start failure**

**SF01 Spent Fuel Pool Cooling Train 'A' OOS (trigger 10)**

**SF02 Spent Fuel Pool Cooling Train 'B' in service (Trigger 10 w/ 35 second delay)**

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	<del>N-UO</del> <del>N-SS</del>	<del>Place MDAFW Pump 'A' in standby per 13610-1 checklist</del> <del>After MDAFW 'A' is in standby, booth operator will tell SS to raise power to Mode 1.</del>
2	Power Ramp	R-OATC R-SS	Raise power from 3.5% to Mode 1 per 12004-C, Steps 4.1.18 thru 4.1.22 Mode 1 signoffs complete except for AFW in Standby readiness

3	A-TIC-130 POT	I-OATC I-SS	TV-130 temperature element failure results in high letdown heat exchanger outlet temperatures. 17007-C for ALB07 F04 LTDN HX HI TEMP DEMIN DIVERT <b>(Trigger 1)</b>
4	CV-12	C-OATC C-SS	LT-185 VCT Level Transmitter fails high 17007-1 for ALB07 E05 VCT HI/LO LEVEL <b>(Trigger 2)</b>
5	SG03B2	I-UO I-SS TS-SS	SG Pressure Instrument PI-525A fails low 18001-C, "Systems Instrumentation Malfunction 3.3.2, ESFAS Instrumentation, 3.3.3, Post Accident Monitoring Instrumentation, (INFO) 3.3.4, Remote Shutdown System <b>(Trigger 15)</b>
6	Trigger 3 NS07A, C,E	C-UO C-SS TS-SS	Loss of 1AA02, NSCW Train "A" fails to start. 18031-C for Loss of NSCW LCO 3.7.5, Auxiliary Feedwater System, Condition B, and LCO 3.8.1, AC Sources – Operating, Condition A <b>(Trigger 3)</b>
<del>7</del>	<del>FW-18 FW-19</del>	<del>C-UO C-SS</del>	<del>Loop #4 BFRV fails to control in automatic 18016-C for Condensate and Feedwater Malfunction  Insert using file M:/opensim/monitor/ovationtesting.uvl Set first variable = 1, second variable = 0.</del>
8	MS02B	M-ALL	<b>MSIV malfunction</b> <del>Reactor trip due to Loop #4 BFRV failure.</del> (reactor trip and 3 rods fail to fully insert) 19000-C for Reactor Trip, then transition to 19001-C <b>(Trigger 4)</b>
9	N/A	C-OATC C-SS	Emergency Boration of RCS with HV-8104 failed closed 13009-1 for Emergency Boration due to 3 stuck rods
10	MS02B	M-ALL	SG #2 faulted outside containment 19000-C <b>(Trigger 6)</b>
11	EL07B EL01A	M-ALL	Loss of all AC / TDAFW auto start failure 19100-C for Loss of all AC <b>(Trigger 7)</b>
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

**Scenario Objective:**

Normal plant operations, raising reactor power to Mode 1, loss of 1AA02, loss of control of one BFRV finally resulting in a reactor trip with 3 stuck rods, one SG faulted outside containment with a loss of all AC and TDAFW auto start failure. The crew is expected to respond to various component and instrument malfunctions per AOP and ARP guidance, and recognize and respond to major plant events per the EOP network.

**Event 1**

~~Place MDAFW pump 'A' in standby per 12004-C, Section 4.1.10 and per 13610-1, "Auxiliary Feedwater System," checklist~~

**Verifiable Actions:****~~SS~~**

~~Direct UO to place AFW in standby readiness per 13610-1, "Auxiliary Feedwater System"~~

**~~UO~~**

~~Align AFW to standby readiness per 13610-1~~

- ~~- Stop MDAFW Pump 'A' and place in Automatic~~
- ~~- Open HS 5139A~~
- ~~- Open HS 5137A~~

**Event 2**

Raise power to Mode 1 per 12004-C, "Power Operation (Mode 1)," Steps 4.1.18 through 4.1.22. Mode 1 signoffs are complete with exception of AFW in standby readiness.

**Verifiable actions:****SS**

Direct OATC and UO to raise power to Mode 1 from current power level

**OATC**

Withdraw control rods  
Dilute RCS

**UO**

Monitor and control RCS temperature by adjusting steam dumps as necessary

**Event 3**

TV-130 failure resulting in high letdown heat exchanger outlet temperatures

**Verifiable Actions:****SS**

Direct OATC to manually control TV-0130. May enter 17007-C for ALB07 F04 LTDN HX HI TEMP DEMIN DIVERT.

**OATC**

Verify TV-0129 diverts letdown flow to VCT to bypass demins (ALB07-D03)  
Adjust TV-0130 as necessary to control letdown temperature (VCT temperature)  
Return TV-0129 to VCT position

**Event 4**

LT-185 VCT Level Transmitter fails high

**Verifiable Actions:****SS**

Enter AOP 18007-C, Section C for loss of makeup flow and direct OATC action

**OATC**

Align LV-112A to the VCT

**Event 5**

SG Pressure Instrument PI-525A fails low

**SS**

Enter 18001-C, "Systems Instrumentation Malfunction," Section F.

**Verifiable Action:****UO**

Check steam and feed flows matched on all SGs

At the OWS bypass the affected channel using the signal bypass button on the affected loop's graphical display.

**Technical Specifications:**

3.3.2, ESFAS Instrumentation, fu 1.e, Cond. D.

3.3.3, Post Accident Monitoring Instrumentation, fu 8, Cond. B, G, H, I. (INFO)

3.3.4, Remote Shutdown System, fu 13, Cond A.

3.3.2, Fu 4d(1), Cond. D

**Event 6**

Loss of 1AA02 with NSCW train 'A' failing to start

**SS**

Enter 18031-C, "Loss of Class 1E Electrical Systems"

Initiate 1 hour actions for LCO 3.8.1 (verify off-site circuits)

Initiate 1 hour actions for LCO 3.8.1 (verify SAT energized)

**Verifiable Actions:****OATC**

Stop CCP 'A' or NCP

**UO**

Manually start NSCW Train 'A' pumps and verify proper operation

Stop MDAFW Pump 'A'

Stop ACCW Pump

Verify only 4 Containment Coolers running

Verify 2 CRDM fans running

Verify Cavity Cooling Fan running

Verify SFP Cooling in service

Technical Specifications:

- 3.7.5, AFW System, Cond B, C.
- 3.7.8, NSCW System, Cond. A
- 3.8.1, AC Sources-Operating, Cond. A
- 3.8.9, Distribution Systems – Operating, Cond. A

**Event 7**

~~The Loop #4 BFRV fails closed. The crew will respond per guidance of 18016 C, "Condensate and Feedwater Malfunction." Manual control will allow continued operation.~~

**SS**

~~Enter 18016 C, "Condensate and Feedwater Malfunction," Section D.~~

Verifiable Action:

simulator anomaly resulting in MSIV's travelling closed. Manual reactor trip required.

**UO**

~~Manual control of BFRV or MFRV to control SG water level between 60 and 70%~~

**Event 8**

~~The Loop #4 BFRV will fail open, requiring a manual reactor trip due to high SG level. 3 rods will fail to fully insert, requiring emergency boration.~~

Verifiable Actions:**OATC**

Manually trip the reactor (may trip automatically if condition is not recognized).  
Initiate emergency boration and verify correct boric acid flow.

**Event 9****SS**

Direct OATC to emergency borate the RCS per 13009-1, "CVCS Reactor Makeup Control"

**OATC**

Starts BAT Pump  
Verifies Charging Pump running  
Attempts to open HV-8104  
Opens FV-0110A  
Open FV-0110B  
Places FIC-0121 in manual and adjusts flow to 42 gpm  
Verifies Emergency boration flow greater than 30 gpm (FI-0110A)

OR

Open LV-0112D and/or LV-0112E  
Closes LV0112B and/or LV-0112C  
Divert LV-0112A  
FIC-0121 in manual with flow greater than 100 gpm  
Adjust RCP seal flow within normal range

OR

Open LV-0112D and/or LV-0112E  
Closes LV0112B and/or LV-0112C  
Divert LV-0112A  
Open HV-8801A/B  
Adjust RCP seal flow within normal range



**EVENT 10**

The crew will respond to a faulted Steam Generator #2 outside reactor containment, which will result in SI. Initiate after step 8 of 19001-C of previous event (step 8 is initiation of emergency boration).

**Verifiable Actions:****SS**

Re-enter 19000-C, "Reactor Trip or Safety Injection"

**OATC**

Carry out IOAs and Initial Actions of 19000-C.

**UO**

Carry out IOAs and Initial Actions of 19000-C.

**EVENT 11**

Loss of All AC with the TDAFW pump failing to start automatically (ground fault on 1BA03 and overspeed trip of DG1A). Initiate at Step 8 of 19000-C during previous event (IOAs completed). Intent is to isolate the faulted steam generator in Step 21 of 19100-C. 1AA02 power may be restored by aligning the alternate incoming source to the bus AFTER the faulted SG is isolated.

When operators and maintenance are dispatched to investigate the buses, do not report the status of any buses until the SG is isolated in step 21 in 19100-C.

**Verifiable Actions:****SS**

Enter 19100-C, "Loss of All AC Power"

**OATC**

Close HV-8149A/B/C

Close LV-0459

Close LV-0460

Trip RCPs

Trip NCP

**UO**

Manually start the TDAFW pump.

Close MSIV and bypass valves

Close SGBD Valves

Close SGBD Sample Valves

Isolate Faulted Steam Generator

Close HV-5125

Close HV-3019

Dispatch SO to locally close HV-5132

Close RAT 'B' Breaker to 1AA02

**OATC/UO**

place the following in PTL:

- CCPs
- RHR Pumps
- SI Pumps
- Containment Spray Pumps
- CCW Pumps
- ACCW Pumps
- MDAFW Pumps
- Containment Coolers
- ESF Chillers (STOP position)

Scenario is complete when the faulted steam generator is isolated in 19100-C and power has been restored to the RAT, or at Chief Examiner discretion.

**CRITICAL TASKS:****1) Manually start Train “A” NSCW pumps.**

At least two Train “A” NSCW pumps must be started before EDG trip is required due to high temperature from no cooling water flow. Annunciator ALB35-C04 will alarm in about 4.5 minutes with no NSCW flow. An automatic trip of the EDG due to lack of cooling water flow constitutes task failure.

**2) Initiate emergency boration due to three stuck rods.**

Per Tech Spec Bases for LCO 3.1.1, Emergency Boration to verify shutdown margin must be initiated promptly. Initiating emergency boration within 15 minutes of recognizing the stuck rods is adequate. Failing to initiate emergency boration within 15 minutes of recognition of three stuck rods in 19001-C constitutes a task failure.


**3) Manually start the TDAFW pump following Loss of All AC.**

Per the FSAR and WOG Critical Task guidelines, AFW pumps must be started manually before SGs boil dry. From a procedure transition standpoint, if a transition to 19231-C, “Response to Loss of Secondary Heat Sink,” is made and action is taken in 19231-C beyond Step 1, the critical task is failed.

**4) Manually control Steam Generator #4 level when BFRV fails to control in automatic.**

Due to the failure of the automatic function, the steam generator BFRV will fail closed. Without taking manual control of the BFRV, feedwater flow to the steam generator will lower, and at 38% NR level, the reactor will automatically trip. An automatic reactor trip on low steam generator level constitutes task failure.

Target Quantitative Attributes (Per Scenario; See Section D.5.d)		Actual Attributes
1.	Total malfunctions (5–8)	6
2.	Malfunctions after EOP entry (1–2)	1
3.	Abnormal events (2–4)	4
4.	Major transients (1–2)	3
5.	EOPs entered/requiring substantive actions (1–2)	3
6.	EOP contingencies requiring substantive actions (0–2)	1
7.	Critical tasks (2–3)	4

	<p style="text-align: center;">NUCLEAR SAFETY FOCUS TARGET ZERO</p>	
<p><b><u>Protected Train:</u></b></p> <p><input type="checkbox"/> Alpha</p> <p><input checked="" type="checkbox"/> Bravo</p>	<p><b>EOOS:</b></p>	<p><input checked="" type="checkbox"/> Green</p> <p><input type="checkbox"/> Yellow</p> <p><input type="checkbox"/> Orange</p> <p><input type="checkbox"/> Red</p>
<p><b>Plant Conditions:</b></p>	<p>~3.5% RTP BOL, maintaining Tave at 557°F (+/- 2°F) with steam dumps in steam pressure mode (auto), control rods in manual, Letdown flow at 75 gpm.</p>	
<p><b>Major Activities:</b></p>	<p>Continue raising power to Mode 1.</p>	
<p><b>Active LCOs:</b></p>	<p><input type="checkbox"/> INFO LCO 3.7.7 CCW Train A</p>	
<p><b>OOS/ Degraded CR Instruments:</b></p>	<p><input type="checkbox"/> None</p>	
<p><b>Narrative Status:</b></p>	<p><input type="checkbox"/> Containment mini-purge is in service for a planned Containment Entry on next shift.</p> <p><input type="checkbox"/> CCW Pump #5 Danger Tagged for corrective maintenance on the motor bearing. No forecast return to service time is available on this emergent work item.</p> <p><input type="checkbox"/> Air Compressor #3 Danger Tagged for PM's for the next 24 hours.</p> <p><input type="checkbox"/> MFPT B vibration monitoring equipment installed in the field. Inform Vogtle engineering one hour prior to anticipated MFP B startup. Elevated vibrations were observed prior to the outage. Pump was worked during the outage. Investigation continues.</p> <p><input type="checkbox"/> CCP A Caution Tagged. Pump is operable but is to be run only in emergency due to minor bearing oil leakage when operating. Repair plan is being developed.</p> <p><input type="checkbox"/> AFW secured and in standby alignment except for MDAFW pump 'A'. Secure per 13610-1 section 4.3.1.1 and place in standby.</p> <p><input type="checkbox"/> Mode 1 signoffs complete except for AFW in Standby readiness.</p>	

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Event No.: 1

**Event Description:** With Reactor Power at about 3.5%, the UO has been directed to place 'A' MDAFW Pump in standby alignment per 13610-1 checklist.

Time	Position	Applicant's Action or Behavior
	SS	<p><b><u>12004-C</u></b></p> <p>4.1.10.b - Stop MDAFW pump "A" and place in standby per 13610-1, "Auxiliary Feedwater System."</p>
	UO	<p><b><u>13610-1</u></b></p> <p>4.3.1.1.1.a - <u>IF</u> required, <b>verify</b> the following SG FROM MDAFW PMP-A Isolation Valves are at least partially open:</p> <ul style="list-style-type: none"> <li>- 1-HV-5139</li> <li>- 1-HV-5137</li> </ul>
	UO	<p>4.3.1.1.1.b - <b>Shut down</b> MDAFW-A 1-1302-P4-003 using 1HS-5131A.</p>
	UO	<p>4.3.1.1.1.c - <u>Check FV-5155, AFW P-3 Mini Flow Valve indication lit and valve OPEN (ZLB-4).</u></p>
		<div style="border: 1px solid black; padding: 10px; margin: 10px auto; width: fit-content;"> <p style="text-align: center;">NOTE</p> <p>Leaving the SG FROM MDAFW PMP Isolation Valves open in MODES 4, 5, and 6 may inadvertently cause the CST to gravity drain to the steam generators.</p> </div> <p>4.3.1.1.2 - Align the MDAFW Pump A for standby readiness per Checklist 2, Section I.</p>

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Event No.: 1

**Event Description:** With Reactor Power at about 3.5%, the UO has been directed to place 'A' MDAFW Pump in standby alignment per 13610-1 checklist.

Time	Position	Applicant's Action or Behavior
	UO	<p>4.3.1.1.3 – Monitors AFW system for back-leakage from SGs.</p> <ul style="list-style-type: none"><li>• 4.3.1.1.3.a – Displays discharge temperatures on IPC computer.</li><li>• 4.3.1.1.3.b – Monitor the discharge temperatures for 1 hour.</li><li>• 4.3.1.1.3.c – IF discharge temperatures rise, reseats check valves per section 4.4.4</li></ul>
<p><b>END OF EVENT 1. PROCEED TO NEXT EVENT AT THE DISCRETION OF THE CHIEF EXAMINER.</b></p>		

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Event No.: 2

**Event Description:** The crew will initiate a power ramp from 3.5% power to > 5% for Mode 1 entry. All entry requirements for Mode 1 will have been met according to shift turnover.

Time	Position	Applicant's Action or Behavior
	SS	<p>Co-ordinate the following with chemistry if not already performed during the swap over from AFW to MFW.</p> <ul style="list-style-type: none"> <li>• Notifies chemistry that feeding via MFW has commenced.</li> <li>• Verifies that PRZR Steam space sample is in service.</li> <li>• Initiates actions to place N-16 radiation monitor RE-0724 in service.</li> <li>• Ensures SGBD is in service.</li> <li>• Directs ABO to adjust SGBD condensate return temperatures.</li> </ul>
	OATC	Energizes at least one bank of PRZR heaters until power > 30%.
	SS	All admin requirements of step 4.1.12, step 4.1.13 will have been performed according to the shift turnover.
	SS	Verifies AFW in standby readiness prior to exceeding 5% power.
	OATC	Initiates raising reactor power to between 16% and 20%.
	OATC/ UO	<p>Maintains plant conditions during power increase as follows:</p> <ul style="list-style-type: none"> <li>• Tave within 2 F of program Tave using steam dumps in the Steam Pressure Mode.</li> <li>• Steam Generator levels between 60% and 70% NR.</li> <li>• PRZR Pressure 2235 + plus or – 15 psig.</li> <li>• PRZR level within 5% of program with normal charging and letdown in service.</li> <li>• Monitors Tave/Tref Deviation Alarm during remainder of startup.</li> </ul>

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Event No.: 2

**Event Description:** The crew will initiate a power ramp from 3.5% power to > 5% for Mode 1 entry. All entry requirements for Mode 1 will have been met according to shift turnover.

Time	Position	Applicant's Action or Behavior
	SS	<p>When power reaches 5% as determined by higher of Average PR NIS or Average Loop Delta T.</p> <ul style="list-style-type: none"><li>• Logs Mode 1 entry into the Unit Control Logbook.</li><li>• Notifies Chemistry of the Mode Change.</li></ul> <p>NOTE: After adequate power change, proceed to Event # 5.</p>
<p><b>END OF EVENT 2. PROCEED TO NEXT EVENT AT THE DISCRETION OF THE CHIEF EXAMINER WHEN ADEQUATE REACTIVITY CONTROL HAS BEEN DEMONSTRATED.</b></p>		

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Event No.: 3

**Event Description:** TIC-130 temperature element will fail low, resulting in high letdown temperature and causing letdown to divert to the VCT. The crew will respond to the failure based on ARP 17007, for ALB07-F04 LTDN HX HI TEMP DEMIN DIVERT. The crew may also respond based on AOP 18022-C as specified in the ARP.

Time	Position	Applicant's Action or Behavior
	OATC	<p>Diagnose TIC-0130 controller has failed low. (Indicator will still function)</p> <p>Symptoms / alarms:</p> <p>ALB07-D04 BTRS DEMIN INLET HI TEMP</p> <p>ALB07-F04 LTDN HX HI TEMP DEMIN DIVERT</p> <p>ALB07-B04 (VOLUME CONTROL TANK OUTLET TEMP HI (delayed, or may not come in)</p> <p>Indications:</p> <ul style="list-style-type: none"> <li>• TIC-0130 red UP arrow – LIT.</li> <li>• Amber light on 1HS-129 LETDOWN TO DEMIN / VCT – LIT.</li> </ul>
	OATC	<p><b>ALB07-D04 response actions:</b></p> <p><b><u>AUTOMATIC ACTIONS:</u></b></p> <p>NONE</p> <p><b><u>INITIAL OPERATOR ACTIONS:</u></b></p> <p>NONE</p>
	OATC	<p><b><u>SUBSEQUENT OPERATOR ACTIONS</u></b></p> <ol style="list-style-type: none"> <li>1. <b>Determine</b> actual Boron Thermal Regeneration System (BTRS) Demineralizer inlet temperature using I-TI-0381 on the QMCB.</li> <li>2. <b>Take manual control</b> of 1-TV-0381A, and attempt to <b>reduce</b> the temperature by closing the valve using 1-TIC-0381A on the QMCB.</li> </ol> <div style="border: 1px solid black; padding: 10px; margin-top: 10px;"> <p style="text-align: center;"><b>NOTE</b></p> <p>If BTRS Demineralizer inlet temperature reaches 168.5°F on 1TISH-0382, letdown flow will divert to the VCT.</p> </div>
		<ol style="list-style-type: none"> <li>3. <u>IF</u> temperature <u>CANNOT</u> be reduced, <b>place</b> 1-HS-10351 in OFF.</li> <li>4. <b>Determine</b> cause and if equipment failure is indicated, <b>initiate</b> maintenance</li> </ol>



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Event No.: 3

**Event Description:** TIC-130 temperature element will fail low, resulting in high letdown temperature and causing letdown to divert to the VCT. The crew will respond to the failure based on ARP 17007, for ALB07-F04 LTDN HX HI TEMP DEMIN DIVERT. The crew may also respond based on AOP 18022-C as specified in the ARP.

Time	Position	Applicant's Action or Behavior
		as required.
	OATC	<b>ALB07-F04 response actions:</b>  <b><u>AUTOMATIC ACTIONS:</u></b> Letdown flow is diverted away from the Mixed Bed Demineralizers directly to the Reactor Coolant Filter.
	OATC	<b><u>INITIAL OPERATOR ACTIONS</u></b>  1. Check letdown temperature on 1-TI-0130 on the QMCB reading high. 2. IF necessary, initiate 18007-C, "Chemical Volume Control System Malfunction". ( <b>not necessary, letdown is not lost</b> ) 3. Check for ACCW normal operation. ( <b>TV-0130 not normal</b> )
	OATC	<b><u>SUBSEQUENT OPERATOR ACTION</u></b>  1. Attempt to balance charging and letdown flow.  2. WHEN letdown temperature is restored, return 1-TV-0129 to the DEMIN position.
	OATC	3. IF instrument or equipment failure has occurred, initiate maintenance as required.  <b><u>COMPENSATORY OPERATOR ACTIONS</u></b> NONE  <b><u>Note to examiner: The OATC can control cooling flow to the VCT using TV-0130. For 120 gpm letdown flow, this is normally set to 51% (note dry erase board on podium). It is expected the OATC will take manual control of TV-0130 to control cooling flow.</u></b>

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Event No.: 3

**Event Description:** TIC-130 temperature element will fail low, resulting in high letdown temperature and causing letdown to divert to the VCT. The crew will respond to the failure based on ARP 17007, for ALB07-F04 LTDN HX HI TEMP DEMIN DIVERT. The crew may also respond based on AOP 18022-C as specified in the ARP.

Time	Position	Applicant's Action or Behavior
		End of 17007-F04 actions.
	OATC	<p><b>ALB07-B04 actions (LTDN HX HI TEMP DEMIN DIVERT)</b></p> <p><b><u>PROBABLE CAUSE</u></b></p> <ol style="list-style-type: none"><li>1. Low Auxiliary Component Cooling Water (ACCW) flow through the Letdown Heat Exchanger.</li><li>2. Low ACCW flow through the Excess Letdown Heat Exchanger or Seal Water Heat Exchanger if aligned to the Volume Control Tank (VCT).</li></ol>
	OATC	<p><b><u>AUTOMATIC ACTIONS</u></b></p> <p>NONE</p> <p><b><u>INITIAL OPERATOR ACTIONS</u></b></p> <p>Check normal operation of ACCW and, if necessary, initiate 18022-C, "Loss of Auxiliary Component Cooling Water".</p>

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Event No.: 3

**Event Description:** TIC-130 temperature element will fail low, resulting in high letdown temperature and causing letdown to divert to the VCT. The crew will respond to the failure based on ARP 17007, for ALB07-F04 LTDN HX HI TEMP DEMIN DIVERT. The crew may also respond based on AOP 18022-C as specified in the ARP.

Time	Position	Applicant's Action or Behavior
	OATC	<p><b><u>SUBSEQUENT OPERATOR ACTIONS</u></b></p> <p>NOTE</p> <p>Seal water injection flow to the Reactor Coolant Pumps (RCPs) should be maintained less than 130°F.</p> <ol style="list-style-type: none"> <li>1. Monitor VCT outlet temperature using 1-TI-0116 on the QMCB.</li> <li>2. Check letdown flow using 1-FI-0132 and temperature using 1-TI-0130 on the QMCB.</li> <li>3. Adjust the charging or letdown flow if necessary to reduce the letdown temperature.</li> <li>4. Return to normal operation as soon as possible per 13006-1, "CVCS Startup and Normal Operation."</li> <li>5. IF equipment failure is indicated, initiate maintenance as required.</li> </ol> <p><b><u>COMPENSATORY OPERATOR ACTIONS</u></b></p> <p>NONE – End of 17007-B04 actions.</p>
	SS	<p><b>AOP-18022-C, LOSS OF AUXILIARY COMPONENT COOLING WATER symptoms and steps.</b></p> <p>Symptoms / alarms:</p> <ul style="list-style-type: none"> <li>• High temperature on any heat exchanger serviced by ACCW.</li> </ul>

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**Event Description:** TIC-130 temperature element will fail low, resulting in high letdown temperature and causing letdown to divert to the VCT. The crew will respond to the failure based on ARP 17007, for ALB07-F04 LTDN HX HI TEMP DEMIN DIVERT. The crew may also respond based on AOP 18022-C as specified in the ARP.

Time	Position	Applicant's Action or Behavior
		<u><i>Note to examiner: The SS may look at 18022-C due to the reference from ALB07-B04 (if received).</i></u>
	OATC	<p style="text-align: center;"><u>NOTES</u></p> <ul style="list-style-type: none"> <li>• ACCW pumps are removed from the 4.16KV Class 1E buses following simultaneous loss of offsite power and safety injection.</li> <li>• ACCW flow to the Seal Water Heat Exchanger is not required if RCS temperature is less than 150°F and Seal Water Heat Exchanger Return Temperature remains less than 135°F.</li> </ul>
	OATC	<ol style="list-style-type: none"> <li>1. Check ACCW pumps – AT LEAST ONE RUNNING. <b>(YES)</b></li> <li>2. Check ACCW SPLY HDR PRESS PI-1977 – GREATER THAN 135 PSIG. <b>(YES)</b></li> <li>3. Check if ACCW flow exists through the letdown heat exchanger. <b>(YES)</b> <ul style="list-style-type: none"> <li>• TV-0130 OPEN.</li> <li>• ALB07-D03 LTDN HX OUT HI TEMP – EXTINGUISHED.</li> </ul> </li> </ol>
	OATC UO	4. Initiate the Continuous Actions Page.
	OATC	5. Check ACCW Surge Tank Level (IPC L2700) – GREATER THAN 20% AND STABLE OR RISING. <b>(YES)</b>

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Event No.: 3

**Event Description:** TIC-130 temperature element will fail low, resulting in high letdown temperature and causing letdown to divert to the VCT. The crew will respond to the failure based on ARP 17007, for ALB07-F04 LTDN HX HI TEMP DEMIN DIVERT. The crew may also respond based on AOP 18022-C as specified in the ARP.

Time	Position	Applicant's Action or Behavior
	OATC	<p>6. Check if RCPs should be stopped:</p> <p>a. Check the following RCP parameters (using plant computer):</p> <ul style="list-style-type: none"> <li>• Motor bearing (upper or lower radial or thrust) – GREATER THAN 195°F.</li> <li>• Motor stator winding – GREATER THAN 311°F.</li> </ul>
	OATC	<p>6. (Cont)</p> <ul style="list-style-type: none"> <li>• Seal water inlet – GREATER THAN 230°F.</li> <li>• Loss of ACCW – GREATER THAN 10 MINUTES.</li> </ul> <p><b><u>Note to examiner: All parameters listed are met, the RCPs are NOT required to be tripped.</u></b></p> <p>a. Perform the following.</p> <ol style="list-style-type: none"> <li>1) IF any parameter limit is exceeded, THEN perform step 6.b.</li> <li>2) Go to Step 7.</li> </ol>
	OATC	<p>7. Check RCP thermal barrier outlet valves – OPEN. <b>(YES)</b></p> <ul style="list-style-type: none"> <li>• HV-19051 ACCW RCP-1 THERMAL BARRIER RTN VLV</li> <li>• HV-19053 ACCW RCP-2 THERMAL BARRIER RTN VLV</li> <li>• HV-19055 ACCW RCP-3 THERMAL BARRIER RTN VLV</li> <li>• HV-19057 ACCW RCP-4 THERMAL BARRIER RTN VLV</li> </ul>

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Event No.: 3

**Event Description:** TIC-130 temperature element will fail low, resulting in high letdown temperature and causing letdown to divert to the VCT. The crew will respond to the failure based on ARP 17007, for ALB07-F04 LTDN HX HI TEMP DEMIN DIVERT. The crew may also respond based on AOP 18022-C as specified in the ARP.

Time	Position	Applicant's Action or Behavior
		<ul style="list-style-type: none"> <li>HV-2041 ACCW RCPS THERMAL BARRIER RTN VLV</li> </ul> <p><b><u>Note to examiner: All the above listed valves are open as required.</u></b></p>
	OATC	8. Check ACCW heat exchangers outlet temperature (IPC T2701) - LESS THAN 120°F. <b>(YES)</b>
	OATC	9. Check ACCW containment isolation valves – OPEN. <b>(YES)</b> <ul style="list-style-type: none"> <li>HV-1979 ACCW SPLY HDR ORC ISO VLV</li> <li>HV-1978 ACCW SPLY HDR IRC ISOL VLV</li> <li>HV-1974 ACCW RTN HDR IRC ISO VLV</li> <li>HV-1975 ACCW RTN HDR ORC ISO VLV</li> </ul> <p><b><u>Note to examiner: All the above listed valves are open as required.</u></b></p>
	OATC	10. Check if ACCW is restored to service.
	SS	a. Components cooled by ACCW – TEMPERATURES RETURNING TO NORMAL. <b>(YES)</b> b. Restore charging and letdown using 13006, CHEMICAL AND VOLUME CONTROL SYSTEM. <b>(N/A)</b> c. Return to procedure and step in effect.

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Event No.: 3

**Event Description:** TIC-130 temperature element will fail low, resulting in high letdown temperature and causing letdown to divert to the VCT. The crew will respond to the failure based on ARP 17007, for ALB07-F04 LTDN HX HI TEMP DEMIN DIVERT. The crew may also respond based on AOP 18022-C as specified in the ARP.

Time	Position	Applicant's Action or Behavior
END OF EVENT 3. PROCEED TO NEXT EVENT AT THE DISCRETION OF THE CHIEF EXAMINER.		

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Event No.: 4

**Event Description:** VCT LT-185 fails high (CV12) causing CVCS letdown to divert from the VCT to the RHUT. Automatic swap over to the RWST is not available with LT-185 failed high.

Time	Position	Applicant's Action or Behavior
	CREW	<p>Diagnoses VCT makeup problems:</p> <p><u>Alarms:</u></p> <p>ALB07 E05 VCT HI/LO LEVEL</p> <p><u>Indications:</u></p> <p>VCT level (LT-185) at 100%  VCT level (LT-112) &lt; 50% and lowering  LV-112A in the RHUT position (Amber light – ON)  100 gpm automatic makeup occurs at 30% VCT level</p>
	OATC / SS	Refer to ARP 17007-1 for VCT HI/LO LEVEL
	SS	Directs OATC action using AOP 18007-C, Section C for loss of VCT makeup.
	OATC	<p>C1. Stabilize plant conditions:</p> <ul style="list-style-type: none"> <li>• Reactor power</li> <li>• RCS temperature</li> <li>• PRZR pressure</li> </ul>
	OATC	<p>C2. Check the following:</p> <ol style="list-style-type: none"> <li>a. At least one boric acid transfer pump running</li> <li>b. At least one reactor makeup water pump running</li> <li>c. VCT makeup valve alignment correct for selected mode</li> <li>d. letdown divert valve LV-112A aligned to the VCT (NOT)</li> </ol> <p>RNO d. Align LV-112A to VCT</p>



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Event No.: 4

**Event Description:** VCT LT-185 fails high (CV12) causing CVCS letdown to divert from the VCT to the RHUT. Automatic swap over to the RWST is not available with LT-185 failed high.

Time	Position	Applicant's Action or Behavior
	OATC / UO	C3. Initiate continuous action page
	OATC	C4. Checks VCT makeup flow restored
	SS	C5. Return to procedure and step in effect
	SS	Has SSS perform following: <ul style="list-style-type: none"><li>• Write a condition report</li><li>• Notify I&amp;C to repair</li><li>• Notify OPS duty manager of AOP entry</li></ul>
<b>END OF EVENT 4. PROCEED TO NEXT EVENT AT THE DISCRETION OF THE CHIEF EXAMINER.</b>		

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Scenario No.: 1

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Event No.: 5

Event Description: Failure of Steam Generator # 2 Pressure Instrument PI-525A downscale low requiring entry into AOP-18001-C, section F for failure of SG Pressure Instrumentation.

Time	Position	Applicant's Action or Behavior
	UO	<p>Identify failure of SG # 2 Pressure Instrument PI-525:</p> <p>Alarms:</p> <ul style="list-style-type: none"> <li>• ALB14-B02 STM GEN 2 HI STM PRESS RATE ALERT</li> <li>• ALB13-F01 HI STM PRESS RATE</li> <li>• ALB13-B04 STM GEN 2 LO STEAMLINE PRESS ALERT</li> </ul> <p>Indications:</p> <ul style="list-style-type: none"> <li>• Steam Pressure Indicator PI-525A down scale low.</li> </ul>
	UO IOA	<p>Step # F1</p> <p>Perform IOAs to check steam and feed flows – MATCHED ON ALL SGs (they will be) and perform RNO for Step # F1 (IF REQUIRED).</p> <ul style="list-style-type: none"> <li>• Takes manual control of MFRV # 1 and raises FW flow.</li> <li>• Takes manual control of MFPTs speed and raises MFPT speed.</li> <li>• Controls SG levels between 60 and 70%.</li> </ul>
	SS	Enter AOP-18001-C section F for Failure of Steam Generator Pressure Instrumentation. Verify IOAs are complete.
	UO	<p>Step # F2</p> <ul style="list-style-type: none"> <li>• Bypass the affected channel at the Operator Work Station (OWS).</li> </ul>
	SS/ UO	<p>Step # F3</p> <ul style="list-style-type: none"> <li>• Initiate the Continuous Actions Page.</li> </ul>
	SS	<p>Step # *F4</p> <p>Check SG level control maintains NR level - AT 65%.</p>

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Event No.: 5

Event Description: Failure of Steam Generator # 2 Pressure Instrument PI-525A downscale low requiring entry into AOP-18001-C, section F for failure of SG Pressure Instrumentation.

Time	Position	Applicant's Action or Behavior
	SS / UO	<p>Step # F5</p> <ul style="list-style-type: none"> <li>Notify I &amp; C for repairs, notifies Operations Duty of the AOP entry.</li> </ul>
	SS	<p>Step # F6</p> <ul style="list-style-type: none"> <li>Bypass affected channel using 13509-C, Bypass Test Instrumentation (BTI) Panel Operation, if desired.</li> <li></li> </ul> <p><b>NOTE: It is NOT expected the SS will bypass or trip the channel.</b></p> <p>Step # F7</p> <ul style="list-style-type: none"> <li>Determine Bistables need to be tripped within 72 hours with MASTER TEST SWITCH in TEST.</li> </ul> <p>Step # F8</p> <ul style="list-style-type: none"> <li>Reference Tech Specs for ESFAS Instrumentation, PAMS Instrumentation, and Remote Shutdown Instrumentation.</li> <li>LCO 3.3.2, FU 1e, Condition D</li> <li>LCO 3.3.2, FU 4d(1), Condition D</li> <li><del>LCO 3.3.2, FU 4d(2), Condition D</del></li> <li>LCO 3.3.3, FU 8, Condition B</li> <li>LCO 3.3.4 FU 13, Condition A</li> </ul> <p>Step # *F9</p> <p>Check repairs and surveillances - COMPLETE. <b><u>(NO)</u></b></p> <p>*F9 RNO.</p> <ol style="list-style-type: none"> <li><u>WHEN</u> repairs and surveillances are complete, <u>THEN</u> perform Step F10.</li> <li>Return to procedure and step in effect.</li> </ol>
<p align="center"><b>END OF EVENT 5. PROCEED TO NEXT EVENT AT THE DISCRETION OF THE LEAD EXAMINER</b></p>		

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Scenario No.: 4

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Event No.: 6

**Event Description:** The RAT supply breaker to 1AA02 will trip due to a breaker fault. DG-1A will start, close its output breaker, and begin sequencing UV loads. During the load sequence, the Train "A" NSCW pumps will fail to start, requiring manual start. This event will require the crew to complete the actions of AOP 18031-C, "Loss of Class 1E Electrical Systems". Corrective actions include reducing AFW flow to return reactor power < 100%, shifting electrical loads to the B train 1E bus, as well as implementing tech specs for loss of AC power.

Time	Position	Applicant's Action or Behavior
	UO OATC SS	<p>Diagnose loss of power to 1AA02:</p> <p><u>Alarms:</u></p> <p>RESV AUX XFMR 1NXRA HI SIDE PHOC LOR TRIP            DG1A TRIP OVERSPEED            DG1A DISABLED NONRESET OF EMERGENCY TRIP            DG1A EMERGENCY START            DG1A LOW PRESS STARTING AIR            4160V SWGR 1AA02 TROUBLE</p> <p><u>Indications:</u></p> <p>Control room lighting dims            1AA02 white bus potential lights go out            DG-1A starts and its output breaker shuts            DG-1A trips and its output breaker opens</p>
	SS	<p>Enters AOP 18031-C, "Loss of Class 1E Electrical Systems"            (Crew Update)</p>
	UO	<p><b><u>18031-C</u></b></p> <ol style="list-style-type: none"> <li>1. Check power to 1E 4160V Emergency busses – AT LEAST ONE ENERGIZED:               <ol style="list-style-type: none"> <li>a. 4160V AC 1E Busses</li> </ol> </li> </ol>

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Event No.: 6

**Event Description:** The RAT supply breaker to 1AA02 will trip due to a breaker fault. DG-1A will start, close its output breaker, and begin sequencing UV loads. During the load sequence, the Train "A" NSCW pumps will fail to start, requiring manual start. This event will require the crew to complete the actions of AOP 18031-C, "Loss of Class 1E Electrical Systems". Corrective actions include reducing AFW flow to return reactor power < 100%, shifting electrical loads to the B train 1E bus, as well as implementing tech specs for loss of AC power.

Time	Position	Applicant's Action or Behavior
	OATC	<p>*2. Check Reactor power - LESS THAN 100%:</p> <ul style="list-style-type: none"> <li>UQ1118 - LESS THAN OR EQUAL TO 100% MWT for the applicable unit.</li> <li>NIs - LESS THAN OR EQUAL TO 100%.</li> <li>ΔT - LESS THAN OR EQUAL TO 100%.</li> </ul>
	UO	3. Check affected train Diesel Generator - RUNNING. <b>(YES)</b>
	UO <b>Critical Task</b>	<p>4. Verify NSCW status on affected train:</p> <p>a. Pumps - TWO RUNNING. <b>(UO will manually start pumps)</b></p> <p>i. Discharge valves - OPEN.</p> <p>ii. Supply and return flows - NORMAL.</p> <p><b>(Valves will open 45 seconds after pumps are manually started and flows will be normal.)</b></p>
	SS	5. Go to Section B. LOSS OF POWER WITH DG TYING TO BUS.

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Event No.: 6

**Event Description:** The RAT supply breaker to 1AA02 will trip due to a breaker fault. DG-1A will start, close its output breaker, and begin sequencing UV loads. During the load sequence, the Train "A" NSCW pumps will fail to start, requiring manual start. This event will require the crew to complete the actions of AOP 18031-C, "Loss of Class 1E Electrical Systems". Corrective actions include reducing AFW flow to return reactor power < 100%, shifting electrical loads to the B train 1E bus, as well as implementing tech specs for loss of AC power.

Time	Position	Applicant's Action or Behavior
	SS	<p><b><u>Section B</u></b></p> <p>B1. Dispatch an operator to the Diesel Generator to perform 13145A/B section for "Diesel Generator Operation Under Emergency Conditions."</p>
	UO	<p>B2. Perform the following for the affected bus:</p> <ul style="list-style-type: none"> <li>a. Verify bus frequency - AT 60 HZ.</li> <li>b. Verify bus voltage - AT 4160V AC.</li> </ul>
	OATC	<p>B3. Check charging pumps - ONLY ONE OPERATING.</p>
	OATC	<p><b><u>B3 RNO.</u></b></p> <p>B3. Perform the following:</p> <ul style="list-style-type: none"> <li>a. Start or stop pumps as necessary to establish one running charging pump.</li> <li>b. <u>IF</u> charging pump can <u>NOT</u> be started, <u>THEN</u> perform the following: <ul style="list-style-type: none"> <li>i. Isolate normal letdown.</li> <li>ii. Initiate 18007-C, CHEMICAL AND VOLUME CONTROL SYSTEM MALFUNCTION.</li> </ul> </li> </ul>

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Event No.: 6

**Event Description:** The RAT supply breaker to 1AA02 will trip due to a breaker fault. DG-1A will start, close its output breaker, and begin sequencing UV loads. During the load sequence, the Train "A" NSCW pumps will fail to start, requiring manual start. This event will require the crew to complete the actions of AOP 18031-C, "Loss of Class 1E Electrical Systems". Corrective actions include reducing AFW flow to return reactor power < 100%, shifting electrical loads to the B train 1E bus, as well as implementing tech specs for loss of AC power.

Time	Position	Applicant's Action or Behavior
	UO	B4. Check CCW pumps on affected train - TWO RUNNING. <u>(YES)</u>
	OATC	B5. Check RHR status: a. Check RHR - REQUIRED FOR SHUTDOWN COOLING. <u>(NO)</u> <del>b. Start RHR pumps aligned for shutdown cooling as needed. N/A</del>
	SS	B6. Initiate the Continuous Actions Page.
	UO	B7. Check AFW status: a. Check AFW system - NEEDED TO MAINTAIN SG LEVELS. <u>(NO)</u>
	UO	<u><b>B7. RNO</b></u> a. Perform the following: i. Shutdown running AFW pumps and align for standby readiness by initiating 13610, AUXILIARY FEEDWATER SYSTEM. ii. Go to Step B8.
	UO	B8. Check ACCW pumps - ONLY ONE RUNNING.

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Event No.: 6

**Event Description:** The RAT supply breaker to 1AA02 will trip due to a breaker fault. DG-1A will start, close its output breaker, and begin sequencing UV loads. During the load sequence, the Train "A" NSCW pumps will fail to start, requiring manual start. This event will require the crew to complete the actions of AOP 18031-C, "Loss of Class 1E Electrical Systems". Corrective actions include reducing AFW flow to return reactor power < 100%, shifting electrical loads to the B train 1E bus, as well as implementing tech specs for loss of AC power.

Time	Position	Applicant's Action or Behavior
	UO	B9. At QHVC perform the following: <ol style="list-style-type: none"> <li>Verify only four containment cooling units running in fast speed using 13120, CONTAINMENT BUILDING COOLING SYSTEM</li> <li>Check CRDM cooling fans - TWO RUNNING.</li> <li>Verify reactor cavity cooling unit - ONE RUNNING.</li> </ol>
	UO	B10. Verify SFP pump running and aligned to in service SFP heat exchanger. <u>IPC Points</u> ZD3405 ZD3411
	UO	B11. Dispatch operators to determine cause for loss of power.
	SS	B12. Initiate the following: <ol style="list-style-type: none"> <li>14230, OFFSITE AC CIRCUIT VERIFICATION AND CAPACITY / CAPABILITY EVALUATION.</li> <li>Verify SAT energized using 13418-A(B), STANDBY AUXILIARY TRANSFORMER UNIT 1(2) TRAIN A(B) OPERATIONS.</li> </ol>
	SS	B13. Review the following Technical Specification requirements: <ul style="list-style-type: none"> <li>AC electrical power sources - LCO 3.8.1 or 3.8.2.</li> <li>AFW - LCO 3.7.5.</li> <li>RCS Specific Activity - SR 3.4.16.2 if &gt;15% power transient has occurred.</li> </ul>



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Event No.: 6

**Event Description:** The RAT supply breaker to 1AA02 will trip due to a breaker fault. DG-1A will start, close its output breaker, and begin sequencing UV loads. During the load sequence, the Train "A" NSCW pumps will fail to start, requiring manual start. This event will require the crew to complete the actions of AOP 18031-C, "Loss of Class 1E Electrical Systems". Corrective actions include reducing AFW flow to return reactor power < 100%, shifting electrical loads to the B train 1E bus, as well as implementing tech specs for loss of AC power.

Time	Position	Applicant's Action or Behavior
		<p>B14. Restore normal power by initiating 13427A/B, 4160V AC BUS AA02/BA03 1E ELECTRICAL DISTRIBUTION SYSTEM section for "Paralleling Normal Incoming Source (RAT or SAT) To 4160V AC Bus Being Supplied From Diesel Generator."</p> <p><b><u>B14. RNO</u></b> Restore power from an alternate source, if desired, by initiating 13427A/B, 4160V AC BUS AA02/BA03 1E ELECTRICAL DISTRIBUTION SYSTEM section for "Paralleling Alternate Incoming Source To 4160V AC Bus Being Supplied From Diesel Generator."</p>
		<p>B15. Check normal or alternate power to bus - RESTORED.</p> <p><b><u>B15. RNO</u></b> Return to Step 14.</p>
	UO SS	B16. Align affected DG for automatic starting by initiating 13145, DIESEL GENERATORS.
	SS	B17. Restore affected components as required by current plant conditions.
	SS	B18. Return to procedure and step in effect.
END OF EVENT 5. PROCEED TO NEXT EVENT AT THE DISCRETION OF THE CHIEF EXAMINER.		

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Scenario No.: 4

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Event No.: 7, 8

~~Event Description: The Loop #4 BFRV fails closed, requiring the crew to respond per guidance of 18016-C, "Condensate and Feedwater Malfunction". The UO will be able to maintain level, and operation can continue. After a short delay, the Loop #4 BFRV will fail open, which will require a reactor trip. When the reactor trips, 3 control rods will fail to bottom, requiring emergency boration.~~

Time	Position	Applicant's Action or Behavior
	CREW	<p>Diagnose the closure of the Loop #4 BFRV</p> <p><u>Alarms:</u></p> <p>ALB13 D01 STM GEN 4 FLOW MISMATCH</p> <p>ALB13 D03 STM GEN 4 LO LEVEL</p> <p>ALB13 F06 STM GEN 4 DIGITAL FW SYS TROUBLE</p> <p><b><u>Note to examiner: Annunciators may not alarm before diagnosis of the failure.</u></b></p> <p><u>Indications:</u></p> <p>M/A station valve position indication going closed</p> <p>Steam flow and feed flow not matched in SG #4</p> <p>Lowering level in SG #4</p>
	SS	Enters 18016-C Section D.
	OATC	<p><b><u>CRITICAL TASK</u></b></p> <p><u>IOA's</u></p> <p>D1. Check proper operation of MFRVs and BFRVs. <b><u>(NO)</u></b></p> <p>D1 RNO:</p> <p>a. Take manual control of affected SG MFRVs and/or BFRVs to match steam and feed flows:</p> <ul style="list-style-type: none"> <li>• Loop #4 BFRV</li> <li>• Control SG levels between 60% and 70%.</li> <li>• IF SG levels cannot be maintained greater than 41%</li> </ul> <p>-OR-</p> <ul style="list-style-type: none"> <li>• Less than 79% <u>THEN</u> perform the following:</li> </ul> <ol style="list-style-type: none"> <li>1. Trip the reactor</li> <li>2. Go to 19000-C, E-0 REACTOR TRIP OR SAFETY</li> </ol> <p><b><u>Operator will be able to maintain level using manual control of BFRV.</u></b></p>

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Event No.: 7, 8

**Event Description:** ~~The Loop #4 BFRV fails closed, requiring the crew to respond per guidance of 18016-C, "Condensate and Feedwater Malfunction". The UO will be able to maintain level, and operation can continue. After a short delay, the Loop #4 BFRV will fail open, which will require a reactor trip. When the reactor trips, 3 control rods will fail to bottom, requiring emergency boration.~~

Time	Position	Applicant's Action or Behavior
	UO	<p><u><b>IOA's</b></u></p> <p>D2. Verify feedwater isolation valves open:</p> <ul style="list-style-type: none"> <li>a. BFIVs (YES)</li> <li>b. MFIVs (NO)</li> </ul> <p>D2b. RNO</p> <p>Perform the following:</p> <ul style="list-style-type: none"> <li>• IF MFIV will <u>NOT</u> open, <u>THEN</u> take manual control of affected SG MFRVs and/or BFRVs to match steam and feed flows.</li> <li>• Control SG levels between 60% and 70%.</li> <li>• IF SG levels cannot be maintained greater than 41% OR Less than 79% <u>THEN</u> perform the following: <ul style="list-style-type: none"> <li>a) Trip the reactor.</li> <li>b) Go to 1900-C, REACTOR TRIP OR SAFETY INJECTION.</li> </ul> </li> </ul>
	SS	<p><u><b>Subsequent Actions</b></u></p> <p>D3. Initiate Continuous Actions.</p>
		<p>D4. Perform channel check of instrumentation - NORMAL:</p> <ul style="list-style-type: none"> <li>• SG levels</li> <li>• SG pressures</li> <li>• SG Steam Flows</li> <li>• SG Feed Flows</li> </ul>

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Event No.: 7, 8

**Event Description:** ~~The Loop #4 BFRV fails closed, requiring the crew to respond per guidance of 18016 C, "Condensate and Feedwater Malfunction". The UO will be able to maintain level, and operation can continue. After a short delay, the Loop #4 BFRV will fail open, which will require a reactor trip. When the reactor trips, 3 control rods will fail to bottom, requiring emergency boration.~~

Time	Position	Applicant's Action or Behavior
	UO	D5. Check Rated Thermal Power - NOT BEING EXCEEDED:
		<ul style="list-style-type: none"> <li>• <math>\Delta T \leq 100\%</math></li> <li>• NIs <math>\leq 100\%</math></li> <li>• UQ1118 <math>\leq 100\%</math> MWt</li> </ul>
	UO	D5 RNO.  Reduce turbine load as required to maintain Reactor Power less than or equal to Rated Thermal Power.
	SS	*D6. Check SGs NR levels - AT 65%.  D6 RNO: Take manual control of affected SG MFRVs and/or BFRVs to Control SG levels between 60% and 70%.
	SS	D7. Refer to Technical Specification 3.7.3 for required action.  <b><u>Note to examiner: Intent is to initiate the additional BFRV failure after the SS has evaluated the TS implications. The additional BFRV failure will lead to the reactor trip.</u></b>
	SS	D8. Notify Maintenance to initiate repairs.
	SS	D9. Return to procedure and step in effect. (Crew may remain in procedure)

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Event No.: 7, 8

**Event Description:** ~~The Loop #4 BFRV fails closed, requiring the crew to respond per guidance of 18016-C, "Condensate and Feedwater Malfunction". The UO will be able to maintain level, and operation can continue. After a short delay, the Loop #4 BFRV will fail open, which will require a reactor trip. When the reactor trips, 3 control rods will fail to bottom, requiring emergency boration.~~

Time	Position	Applicant's Action or Behavior
	CREW	<p>Diagnose the opening of the Loop #4 BFRV.</p> <p><u>Alarms:</u></p> <p>ALB13 D01 STM GEN 4 FLOW MISMATCH  ALB14 D01 STM GEN 4 HI-HI LEVEL ALERT  ALB13 F06 STM GEN 4 DIGITAL FW SYS TROUBLE</p> <p><b><u>Note to examiner: Annunciators may not alarm before diagnosis of the failure.</u></b></p> <p><u>Indications:</u></p> <p>M/A station valve position indication going open.  Steam flow and feed flow not matched in SG #4.  Rising level in SG #4.</p>
	SS	Re-enter 18016 Section-C D. <b>(Crew may use *D6 to try to establish control)</b>
	UO	<p><b><u>IOA's</u></b></p> <p>D1. Check proper operation of MFRVs and BFRVs. <b><u>(NO)</u></b></p> <p>D1 RNO:</p> <p>b. Take manual control of affected SG MFRVs and/or BFRVs to match steam and feed flows:</p> <ul style="list-style-type: none"> <li>• Loop #4 BFRV</li> <li>• Control SG levels between 60% and 70%.</li> <li>• <u>IF</u> SG levels cannot be maintained greater than 41%</li> </ul> <p>-OR-</p> <ul style="list-style-type: none"> <li>• Less than 79% <u>THEN</u> perform the following:</li> </ul> <ol style="list-style-type: none"> <li>1. Trip the reactor</li> <li>2. Go to 19000-C, E-0 REACTOR TRIP OR SAFETY</li> </ol> <p><b><u>Operator will NOT be able to maintain level using manual control of BFRV.</u></b></p>

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Event No.: 7, 8

**Event Description:** ~~The Loop #4 BFRV fails closed, requiring the crew to respond per guidance of 18016-C, "Condensate and Feedwater Malfunction". The UO will be able to maintain level, and operation can continue. After a short delay, the Loop #4 BFRV will fail open, which will require a reactor trip. When the reactor trips, 3 control rods will fail to bottom, requiring emergency boration.~~

Time	Position	Applicant's Action or Behavior
	SS	<p>Direct the OATC to trip the reactor.</p> <p><b><u>Note to examiner: The OATC may take this action prior to SS direction based on the Immediate Operator Action response.</u></b></p>
	CREW	Perform Immediate Operator Actions of 19000-C, "E-0 REACTOR TRIP OR SAFETY INJECTION."
	OATC	<p><b><u>19000-C IOAs</u></b></p> <ol style="list-style-type: none"> <li>Check Reactor trip: <ul style="list-style-type: none"> <li>Rod Bottom Lights – LIT (Three lights are NOT LIT)</li> <li>Reactor Trip and Bypass Breakers – OPEN (RTBs are OPEN)</li> <li>Neutron Flux – LOWERING</li> </ul> </li> <li>RNO Trip Reactor using both Reactor trip handswitches. <u>IF</u> Reactor <u>NOT</u> tripped, <u>THEN</u> go to 19211-C, FR-S.1 RESPONSE TO NUCLEAR POWER GENERATION / ATWT.</li> </ol>
	UO	<p><b><u>IOAs</u></b></p> <ol style="list-style-type: none"> <li>Check Turbine trip: <ul style="list-style-type: none"> <li>All Turbine Stop Valves – CLOSED.</li> </ul> </li> </ol>

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Event No.: 7, 8

**Event Description:** The Loop #4 BFRV fails closed, requiring the crew to respond per guidance of 18016-C, "Condensate and Feedwater Malfunction". The UO will be able to maintain level, and operation can continue. After a short delay, the Loop #4 BFRV will fail open, which will require a reactor trip. When the reactor trips, 3 control rods will fail to bottom, requiring emergency boration.

Time	Position	Applicant's Action or Behavior
	UO	<p><u>IOAs</u></p> <p>3. Checks power to the AC Emergency Busses:</p> <ul style="list-style-type: none"> <li>a. AC Emergency Busses – AT LEAST ONE ENERGIZED.</li> <li>b. AC Emergency Busses – ALL ENERGIZED: <b>(YES)</b> <ul style="list-style-type: none"> <li>• 4160 V AC 1E Busses</li> <li>• 480V AC 1E Busses</li> </ul> </li> </ul>
	OATC	<p><u>IOAs</u></p> <p>4. Check if SI is actuated.</p> <ul style="list-style-type: none"> <li>• Any SI annunciator – LIT. <b>(NO)</b></li> <li>• SI ACTUATED BPLB window – LIT. <b>(NO)</b></li> </ul>
	OATC	<p><u>IOAs</u></p> <p>4. RNO</p> <p>Check if SI is required:</p> <p><u>IF</u> one or more of the following conditions has occurred:</p> <ul style="list-style-type: none"> <li>• PRZR pressure less than or equal to 1870 psig.</li> <li>• Steam line pressure less than or equal to 585 psig</li> <li>• Containment pressure greater than or equal to 3.8 psig.</li> <li>• Automatic alignment of ECCS equipment to injection phase.</li> </ul> <p><u>THEN</u> actuate SI and go to Step 6. <b><u>(SI is NOT required)</u></b></p>

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Event No.: 7, 8

**Event Description:** The Loop #4 BFRV fails closed, requiring the crew to respond per guidance of 18016-C, "Condensate and Feedwater Malfunction". The UO will be able to maintain level, and operation can continue. After a short delay, the Loop #4 BFRV will fail open, which will require a reactor trip. When the reactor trips, 3 control rods will fail to bottom, requiring emergency boration.

Time	Position	Applicant's Action or Behavior
	SS UO	5. Perform the following to limit RCS cooldown:  a. Check NR level in at least one SG greater than 10%. b. Reduce AFW flow. c. Go to 19001-C, ES-0.1 REACTOR TRIP RESPONSE..
<b>END OF EVENT 6. PROCEED TO REACTOR TRIP RESPONSE, 19001-C.</b>		



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Event No.: 8, Reactor Trip Response 19001-C

Event Description: Reactor Trip Response

Time	Position	Applicant's Action or Behavior
	SS	Enter 19001-C, "ES-0.1 REACTOR TRIP RESPONSE."
	SS	1. Initiate the following: <ul style="list-style-type: none"> <li>Continuous Actions and Foldout Page.</li> <li>Critical Safety Function Status Trees per 19200-C, F-O CRITICAL SAFETY FUNCTION STATUS TREE.</li> </ul>
	SS	2. Initiate NMP-EP-110, EMERGENCY CLASSIFICATION DETERMINATION AND INITIAL ACTION.
	CREW	3. IF SI actuation occurs during this procedure, <u>THEN</u> go to 19000-C, E-0 REACTOR TRIP OR SAFETY INJECTION.
	UO	4. Limit RCS cooldown: <ol style="list-style-type: none"> <li>Verify AFW flow to SGs. (<b><i>Manually start AFW pumps.</i></b>)</li> <li>Trip both MFPs.</li> <li>Check SGs NR level - AT LEAST ONE GREATER THAN 10%.</li> <li>Throttle total AFW flow as necessary.</li> <li>Verify SG Blowdown Isolation Valves - CLOSED WITH HANDSWITCHES IN CLOSE.</li> </ol>
	OATC	5. Check RCS temperature stable at or trending to 557°F.  With RCP(s) running - RCS AVERAGE TEMPERATURE. -OR- Without RCP(s) running - RCS WR COLD LEG TEMPERATURES.

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Event No.: 8, Reactor Trip Response 19001-C

Event Description: Reactor Trip Response

Time	Position	Applicant's Action or Behavior
	UO	<p>6. Check FW status:</p> <p>a. Average RCS temperature - LESS THAN 564°F.</p> <p>b. Verify FW isolation valves closed:</p> <ul style="list-style-type: none"> <li>• MFIVs</li> <li>• BFIVs</li> <li>• MFRVs</li> <li>• BFRVs</li> </ul>
	UO	<p>7. Check total feed flow capability to SGs - GREATER THAN 570 GPM AVAILABLE.</p>
	OATC  <b>Critical Task</b>	<p>8. Check all Rods - FULLY INSERTED. <b><u>(NO)</u></b></p> <p><b>8. RNO</b></p> <p>IF two or more Rods NOT fully inserted, THEN EMERGENCY BORATE 154 ppm for each Rod not fully inserted by initiating 13009, CVCS REACTOR MAKUP CONTROL SYSTEM.</p> <p>Verify adequate shutdown margin as required by Technical Specification SR 3.1.1.1.</p> <p><i>Expected boration for 3 stuck rods is approximately 4800 gallons.</i></p> <p><b><u>Note to examiner: ES-D-2 form for Event 8 contains the actions for the emergency boration. Intent is to initiate Event 9 after the Emergency Boration is started.</u></b></p>
	UO	<p>9. Check Main Generator Output Breakers – OPEN.</p>
	UO	<p>10. Perform the following:</p> <p>a. Check 18009-C, STEAM GENERATOR TUBE LEAK - IN EFFECT. <b><u>(NO)</u></b></p>

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Event No.: 8, Reactor Trip Response 19001-C

Event Description: Reactor Trip Response

Time	Position	Applicant's Action or Behavior
	SS	<p>10a. RNO</p> <p>Go to Step d.</p> <p>d. Check other AOPs - IN EFFECT. <u>(NO)</u></p> <p>Go to Step 11.</p>
	OATC	<p>11. Check PRZR level control:</p> <p>a. Instrument Air - AVAILABLE. <u>(YES)</u></p> <p>b. PRZR Level - GREATER THAN 17%. <u>(YES)</u></p> <p>c. Charging and letdown - IN SERVICE. <u>(YES)</u></p> <p>d. Maintain PRZR level at 25%. <u>(YES)</u></p>
	OATC	<p>12. Check PRZR pressure:</p> <p>a. Pressure - GREATER THAN 1870 PSIG.</p> <p>b. Pressure - STABLE AT <u>OR</u> TRENDING TO 2235 PSIG.</p>
	UO	<p>13. Check SG levels:</p> <p>a. NR level - AT LEAST ONE GREATER THAN 10%. <u>(YES)</u></p> <p>b. Maintain NR level between 10% <u>AND</u> 65%.</p> <p>c. NR level - ANY RISING IN AN UNCONTROLLED MANNER. <u>(NO)</u></p> <p>13.c. RNO</p> <p>c. Go to Step 14.</p>

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Event No.: 8, Reactor Trip Response 19001-C

Event Description: Reactor Trip Response

Time	Position	Applicant's Action or Behavior
	UO	<p>14. Check AC Busses:</p> <p>a. Emergency Buses - ENERGIZED BY OFFSITE POWER. <b><u>(NO)</u></b></p> <p>14a.RNO Verify applicable Diesel Generator(s) have assumed the following train related loads:</p> <ul style="list-style-type: none"> <li>○ 2 NSCW pumps</li> <li>○ 2 CCW pumps</li> <li>○ 1 CCP</li> <li>○ 1 ACCW pump</li> <li>○ 1 MDAFW pump</li> <li>○ 4 Containment Coolers</li> <li>○ <u>480V AC Switchgear</u>: <ul style="list-style-type: none"> <li>○ AB04</li> <li>○ AB05</li> <li>○ AB15</li> <li>○ NB01</li> <li>○ BB06</li> <li>○ BB07</li> <li>○ BB16</li> <li>○ NB10</li> </ul> </li> </ul> <p><u>IF</u> two ACCW Pumps started, <u>THEN</u> stop one ACCW Pump. Try to restore offsite power to AC Emergency Busses by initiating 13427A/B, 4160V AC AA02/BA03 ELECTRICAL DISTRIBUTION SYSTEM. Restart ESF Chillers by initiating 13744, ESSENTIAL CHILLED WATER SYSTEM, or Normal Chillers by initiating 13743-C, NORMAL CHILLED WATER SYSTEM, to restore ESF Room Cooling.</p> <p>b. All Non-1E 13.8/4160/480V Busses - ENERGIZED BY OFFSITE POWER. <b><u>(YES)</u></b></p>
	UO	<p>15. Transfer Steam Dumps to STEAM PRESSURE mode:</p> <p>a. Check Condenser - AVAILABLE.</p> <p>b. Place PIC-507 in Manual.</p> <p>c. Match demand on SG header pressure controller PIC-507 and SD demand meter UI-500.</p> <p>d. Transfer Steam Dumps to STM PRESS mode.</p> <p>e. Control Tavg: Manual control -OR- Auto control</p>

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Event No.: 8, Reactor Trip Response 19001-C

Event Description: Reactor Trip Response

Time	Position	Applicant's Action or Behavior
	OATC	<p>16. Check RCP status:</p> <p>a. RCPs - ALL STOPPED. (NO)</p> <p>16.a. RNO</p> <p>Go to Step 17.</p>
	OATC	<p>17. Check PRZR Spray status:</p> <p>a. RCP 4 or RCP 1 – RUNNING.</p> <p>b. Close PRZR Spray Valve(s) for stopped RCP(s):</p> <p>RCP 1: PIC-0455C</p> <p>RCP 4: PIC-0455B</p> <p>c. Open RCP breakers for RCP(s) <u>NOT</u> running.</p>
	OATC	<p>18. Check NI indication:</p> <p>a. IR flux - LESS THAN 7E -4%.</p> <p>b. SR - INDICATING CORRECTLY ON NR-45.</p>
	SS	19. Secure unnecessary plant equipment.
	SS	<p>20. Maintain stable plant conditions:</p> <ul style="list-style-type: none"> <li>• PRZR pressure - AT 2235 PSIG.</li> <li>• PRZR level - AT 25%.</li> <li>• SG NR levels - BETWEEN 10% <u>AND</u> 65%.</li> <li>• RCS temperature: <ul style="list-style-type: none"> <li>With RCP(s) running - RCS AVERAGE TEMPERATURE AT 557°F.</li> <li>-OR-</li> <li>Without RCP(s) running - RCS WR COLD LEG TEMPERATURES AT 557°F.</li> </ul> </li> </ul>

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Event No.: 8, Reactor Trip Response 19001-C

Event Description: Reactor Trip Response

Time	Position	Applicant's Action or Behavior
	SS	21. Check if natural circulation cooldown is required: a. Any RCP – RUNNING. b. Go to 12006-C, RCS COOLDOWN TO COLD SHUTDOWN.
<b>END OF 19001-C ACTIONS. PROCEED AT THE DISCRETION OF THE CHIEF EXAMINER.</b>		

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**Event No.: 9, Emergency Boration**

**Event Description:** The OATC will use SOP 13009-1, Section 4.9 to emergency borate the RCS due to 3 control rods not fully inserted. 1HV-8104 is failed closed.

Time	Position	Applicant's Action or Behavior
	SS	Direct Emergency Boration of 154 ppm for EACH control rod NOT FULLY INSERTED per 13009-1, "CVCS REACTOR MAKEUP CONTROL SYSTEM."
	OATC	4.9.1 Emergency Boration Through 1HV-8104
	OATC	4.9.1.1 Start one (1) Boric Acid Transfer Pump.
	OATC	4.9.1.2 Verify a Charging Pump is running.
	OATC	4.9.1.3 Open EMERGENCY BORATE valve 1-HV-8104.  <b><u>Note to examiner: 1HV-8104 is failed closed.</u></b>
	OATC	<b>4.9.2 Emergency Boration Through The Normal Charging Flow Path</b>
	OATC	4.9.2.1 Start one (1) Boric Acid Transfer Pump.
	OATC	4.9.2.2 Verify a Charging Pump is running.
	OATC	4.9.2.3 Open the following valves: <ul style="list-style-type: none"> <li>○ 1 FV 0110A, BA TO BLENDER</li> <li>○ 1 FV 0110B, BLENDER OUTLET TO CHARGING PUMPS SUCT</li> </ul>

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**Event No.: 9, Emergency Boration**

**Event Description:** The OATC will use SOP 13009-1, Section 4.9 to emergency borate the RCS due to 3 control rods not fully inserted. 1HV-8104 is failed closed.

Time	Position	Applicant's Action or Behavior
	OATC	NOTE The following step assumes that with 12 gpm of seal return, 30 gpm will be supplied to the RCS.
	OATC	4.9.2.4 Place 1-FIC-0121 in MANUAL.
	OATC	4.9.2.5 Adjust 1-FIC-0121 to maintain flow greater than 42 gpm.
	OATC	4.9.2.6 Verify Emergency Boration flow 1-FI-0110A is greater than 30 gpm.
	OATC	4.9.2.7 IF flow is less than 30 gpm, start the second Boric Acid Transfer Pump.
	OATC	4.9.2.8 Operate the Pressurizer Backup Heaters as necessary to equalize boron concentration between the RCS and the Pressurizer.
	OATC	4.9.2.9 <b>Check</b> plant conditions are consistent with RCS boration: <ul style="list-style-type: none"> <li>○ RCS Tavg may be dropping.</li> <li>○ NIS may be dropping.</li> </ul>
	OATC	4.9.2.10 Determine the amount of boric acid required to allow termination of Emergency Boration.
	OATC	4.9.2.11 WHEN the determined amount of boric acid has been added to the RCS, close the following valves: <ul style="list-style-type: none"> <li>○ 1 FV 0110A</li> <li>○ 1 FV 0110B</li> </ul>
	OATC	4.9.2.12 Establish automatic makeup per Section 4.1.



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Event No.: 9, Emergency Boration

**Event Description:** The OATC will use SOP 13009-1, Section 4.9 to emergency borate the RCS due to 3 control rods not fully inserted. 1HV-8104 is failed closed.

Time	Position	Applicant's Action or Behavior
	OATC	4.9.2.13 Restore 1-FIC-0121 to the AUTO position.
	OATC	4.9.2.14 Direct Chemistry to sample and report the RCS boron concentration, or monitor the Boron Meter 1-AI-40134 if available.
END OF EVENT 8. PROCEED TO NEXT EVENT AT THE DISCRETION OF THE CHIEF EXAMINER.		

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Event No.: 10

**Event Description:** A fault will occur on SG #2 outside reactor containment, resulting in a Safety Injection (SI) which will require re-entry into 19000-C, "Reactor Trip or Safety Injection." The crew will carry out the Immediate Operator Actions and Initial Actions of 19000-C. After OATC and UO actions are completed in 19000-C, Event #10 loss of all AC will occur.

Time	Position	Applicant's Action or Behavior
	CREW	Enters 19000-C Reactor Trip or Safety Injection. (Crew Update)
	CREW SS	Performs Immediate Operator Actions Per 19000-C, REACTOR TRIP OR SAFETY INJECTION. SS Makes Page Announcement of Reactor Trip.
	CREW OATC  UO  UO OATC	<b>IMMEDIATE ACTIONS of 19000-C, Reactor Trip or Safety Injection</b> <ol style="list-style-type: none"> <li>Check Reactor Trip <ul style="list-style-type: none"> <li>Rod Bottom Lights - LIT</li> <li>Reactor Trip and Bypass Breakers - OPEN</li> <li>Neutron Flux – LOWERING</li> </ul> </li> <li>Check Turbine Trip: <ul style="list-style-type: none"> <li>All Turbine Stop Valves – CLOSED</li> </ul> </li> <li>Check Power to AC Emergency Buses: <ol style="list-style-type: none"> <li>AC Emergency Busses – AT LEAST ONE ENERGIZED. <ul style="list-style-type: none"> <li>4160V AC 1E Busses</li> </ul> </li> <li>AC Emergency Buses – ALL ENERGIZED: <ul style="list-style-type: none"> <li>4160V AC 1E Busses</li> <li>480V AC 1E Busses</li> </ul> </li> </ol> </li> </ol>
	SS	<ol style="list-style-type: none"> <li>Check if SI is actuated: <ul style="list-style-type: none"> <li>Any SI annunciator – LIT</li> <li>SI ACTUATED BPLP window – LIT</li> </ul> <p>___ Go to Step 6</p> </li> </ol>

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Event No.: 10

**Event Description:** A fault will occur on SG #2 outside reactor containment, resulting in a Safety Injection (SI) which will require re-entry into 19000-C, "Reactor Trip or Safety Injection." The crew will carry out the Immediate Operator Actions and Initial Actions of 19000-C. After OATC and UO actions are completed in 19000-C, Event #10 loss of all AC will occur.

Time	Position	Applicant's Action or Behavior
	SS / CREW  OATC	<p>6. Initiate the Foldout Page.</p> <p><b>RCP TRIP CRITERIA:</b>  <b>Trip all RCPs if BOTH conditions listed below occur:</b></p> <ul style="list-style-type: none"> <li>a. CCPs or SI pumps – AT LEAST ONE RUNNING.</li> <li>b. RCP Trip Parameter – RCS PRESSURE LESS THAN 1375 PSIG.</li> </ul>
	OATC UO SS	<p>7. Perform the following:</p> <ul style="list-style-type: none"> <li>• OATC Initial Actions Page</li> <li>• UO Initial Actions Page</li> </ul> <p><b>NOTE: SS Initiates Step 8 After OATC/UO Initial Actions Completed.</b></p>
	OATC	<p><b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b></p> <p>Step 1. Check both Trains of ECCS equipment-ALIGNING FOR INJECTION PHASE</p> <ul style="list-style-type: none"> <li>• MLB indication.</li> </ul>
	OATC	<p><b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b></p> <p>Step 2. Check Containment Isolation Phase A – ACTUATED</p> <ul style="list-style-type: none"> <li>• CIA MLB indication</li> </ul>

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Event No.: 10

**Event Description:** A fault will occur on SG #2 outside reactor containment, resulting in a Safety Injection (SI) which will require re-entry into 19000-C, "Reactor Trip or Safety Injection." The crew will carry out the Immediate Operator Actions and Initial Actions of 19000-C. After OATC and UO actions are completed in 19000-C, Event #10 loss of all AC will occur.

Time	Position	Applicant's Action or Behavior
	OATC	<p><b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b></p> <p>Step 3. Check ECCS Pumps and NCP status:</p> <ul style="list-style-type: none"><li>a. CCPs – RUNNING.</li><li>b. SI Pumps – RUNNING.</li><li>c. RHR Pumps – RUNNING.</li><li>d. NCP – TRIPPED.</li></ul>
	OATC	<p><b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b></p> <p>Step 4. Verify CCW Pumps – ONLY TWO RUNNING PER TRAIN.</p>
	OATC	<p><b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b></p> <p>Step 5. Verify proper NSCW system operation:</p> <ul style="list-style-type: none"><li>a. NSCW Pumps - ONLY TWO RUNNING PER TRAIN.</li><li>b. NSCW TOWER RTN HDR BYPASS BASIN handswitches – IN</li></ul> <p>AUTO:</p> <ul style="list-style-type: none"><li>• HS-1668A</li><li>• HS-1669A</li></ul>

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Event No.: 10

**Event Description:** A fault will occur on SG #2 outside reactor containment, resulting in a Safety Injection (SI) which will require re-entry into 19000-C, "Reactor Trip or Safety Injection." The crew will carry out the Immediate Operator Actions and Initial Actions of 19000-C. After OATC and UO actions are completed in 19000-C, Event #10 loss of all AC will occur.

Time	Position	Applicant's Action or Behavior
	OATC	<b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b> Step 6. Verify Containment Cooling Units: <ol style="list-style-type: none"> <li>ALL RUNNING IN LOW SPEED               <ul style="list-style-type: none"> <li>MLB indication</li> </ul> </li> <li>NSCW Cooler isolation valves – OPEN:               <ul style="list-style-type: none"> <li>MLB indication</li> </ul> </li> </ol>
	OATC	<b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b> Step 7. Check Containment Ventilation Isolation: <ol style="list-style-type: none"> <li>Dampers and Valves - CLOSED               <ul style="list-style-type: none"> <li>CVI MLB indication</li> </ul> </li> </ol>
	OATC	<b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b> Step 8. Check Containment pressure REMAINED LESS THAN 21.5 PSIG.
	OATC	<b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b> Step 9. Check ECCS flows: <ol style="list-style-type: none"> <li>BIT Flow.</li> <li>RCS pressure – LESS THAN 1625 PSIG.</li> <li>SI Pump flow.</li> <li>RCS pressure – LESS THAN 300 PSIG</li> </ol> RNO Step 9d. Go to Step 10.

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Event No.: 10

**Event Description:** A fault will occur on SG #2 outside reactor containment, resulting in a Safety Injection (SI) which will require re-entry into 19000-C, "Reactor Trip or Safety Injection." The crew will carry out the Immediate Operator Actions and Initial Actions of 19000-C. After OATC and UO actions are completed in 19000-C, Event #10 loss of all AC will occur.

Time	Position	Applicant's Action or Behavior
	OATC	<p><b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b></p> <p>Step 10. Check ECCS Valve alignment – PROPER INJECTION LINEUP INDICATED ON MLBs.</p>
	OATC	<p><b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b></p> <p>Step 11. Check ACCW Pumps – AT LEAST ONE RUNNING</p>
	OATC	<p><b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b></p> <p>Step 12. Adjust Seal Injection flow to RCPs – 8 to 13 GPM.  <b><u>NOTE TO EXAMINER:</u> END OF OATC INITIAL ACTIONS OF E-0.</b>  <b>RETURNS TO MAIN BODY OF E-0 CONTINUING AT STEP 8</b></p>
	UO	<p><b>PERFORMS UO INITIAL ACTIONS OF E- 0.</b></p> <p>Step 1. Check AFW Pumps – RUNNING</p> <ul style="list-style-type: none"> <li>• MDAFW Pumps</li> <li>• TDAFW Pump, if required</li> </ul>
	UO	<p>RNO</p> <ul style="list-style-type: none"> <li>• Start MDAFW Pumps.</li> <li>• Open Steam Supply valve HV-5106 to TDAFW Pump</li> </ul>

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Event No.: 10

**Event Description:** A fault will occur on SG #2 outside reactor containment, resulting in a Safety Injection (SI) which will require re-entry into 19000-C, "Reactor Trip or Safety Injection." The crew will carry out the Immediate Operator Actions and Initial Actions of 19000-C. After OATC and UO actions are completed in 19000-C, Event #10 loss of all AC will occur.

Time	Position	Applicant's Action or Behavior
	UO	<p><b>PERFORMS UO INITIAL ACTIONS OF E- 0.</b></p> <p>Step 2. Check NR level in at least one SG – GREATER THAN 10% [32% ADVERSE]</p>
	UO	<p><b>PERFORMS UO INITIAL ACTIONS OF E- 0.</b></p> <p>Step 3. Check if main steamlines should be isolated:</p> <p>a. Check for one or more of the following conditions:</p> <ul style="list-style-type: none"> <li>– Any steamline pressure – LESS THAN <u>OR</u> EQUAL TO 585 PSIG.</li> <li>– Containment pressure – GREATER THAN 14.5 PSIG.</li> <li>– Low Steam Pressure SI/SLI – BLOCKED <u>AND</u> High Steam Pressure Rate – <u>ONTWO OR MORE</u> CHANNELS OF ANY STEAMLINE.</li> </ul> <p>RNO</p> <p>Step 3a. Go to Step 4</p>

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Event No.: 10

**Event Description:** A fault will occur on SG #2 outside reactor containment, resulting in a Safety Injection (SI) which will require re-entry into 19000-C, "Reactor Trip or Safety Injection." The crew will carry out the Immediate Operator Actions and Initial Actions of 19000-C. After OATC and UO actions are completed in 19000-C, Event #10 loss of all AC will occur.

Time	Position	Applicant's Action or Behavior
	UO	<b>PERFORMS UO INITIAL ACTIONS OF E- 0.</b>  Step 4. Verify FW Isolation Valves closed: <ul style="list-style-type: none"><li>• MFIVs</li><li>• BFIVs</li><li>• MFRVs</li><li>• BFRVs</li></ul>
	UO	<b>PERFORMS UO INITIAL ACTIONS OF E- 0.</b>  Step 5. Verify SG Blowdown isolated: <ul style="list-style-type: none"><li>• Place SG Blowdown Isolation Valve handswitches HS-7603A, B, C, and D in the CLOSE position.</li><li>• SG Sample Isolation Valves – CLOSED.</li></ul>
	UO	<b>PERFORMS UO INITIAL ACTIONS OF E- 0.</b>  Step 6. Verify Diesel Generators – RUNNING.
	UO	<b>PERFORMS UO INITIAL ACTIONS OF E- 0.</b>  Step 7. Throttle total AFW flow as necessary to maintain SG NR levels between 10% [32% ADVERSE] and 65%.



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Event No.: 10

**Event Description:** A fault will occur on SG #2 outside reactor containment, resulting in a Safety Injection (SI) which will require re-entry into 19000-C, "Reactor Trip or Safety Injection." The crew will carry out the Immediate Operator Actions and Initial Actions of 19000-C. After OATC and UO actions are completed in 19000-C, Event #10 loss of all AC will occur.

Time	Position	Applicant's Action or Behavior
	UO	<b>PERFORMS UO INITIAL ACTIONS OF E- 0.</b>  Step 8.     Verify both MFPs – TRIPPED.
	UO	<b>PERFORMS UO INITIAL ACTIONS OF E- 0.</b>  Step 9.     Check Main Generator Output Breakers – OPEN.  <i><b>NOTE TO EXAMINER: END OF UO INITIAL ACTIONS OF E-0.</b></i>
	CREW	<i><b>RETURNS TO MAIN BODY OF E-0 CONTINUING AT STEP 8.</b></i>
	OATC / UO	8.     Initiate the Continuous Actions Page
		Initiate Event 10 (Loss of All AC) when the OATC and UO Initial Actions are complete.
<b>END OF EVENT 9. PROCEED TO NEXT EVENT FOR SCENARIO CONTINUITY.</b>		

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Time	Position	Applicant's Action or Behavior
	CREW	<p>Diagnose Loss of All AC:</p> <p><u>Alarms:</u>            DG1A TRIP OVERSPEED            DG1A DISABLED NONRESET OF EMERGENCY TRIP            DG1B EMERGENCY START            DG1B LOW PRESS STARTING AIR</p> <p><u>Indications:</u>            Loss of Control Room lighting            1AA02 white bus potential lights go out            1BA03 white bus potential lights go out            DG-1B starts and its output breaker does not shut</p>
	SS	Enter 19100-C, "ECA-0.0 Loss of All AC Power."
	OATC	<p>1. Verify Reactor trip:</p> <p>a. Reactor Trip and Bypass Breakers - OPEN.</p> <p>b. Neutron Flux - LOWERING.</p>
	UO	<p>2. Verify Turbine trip:</p> <p>a. All Turbine Stop Valves - CLOSED.</p>

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Time	Position	Applicant's Action or Behavior
	OATC	<p>3. Check if RCS is isolated:</p> <p>a. PRZR PORVs - CLOSED.</p> <p>b. Letdown Orifice Isolation Valves - CLOSED:</p> <ul style="list-style-type: none"> <li>• HV-8149A - LETDOWN ORIFICE 45 GPM</li> <li>• HV-8149B - LETDOWN ORIFICE 75 GPM</li> <li>• HV-8149C - LETDOWN ORIFICE 75 GPM</li> </ul> <p>c. Letdown Isolation Valves - CLOSED:</p> <ul style="list-style-type: none"> <li>• LV-0459 - LETDOWN ISOLATION VLV DOWNSTREAM</li> <li>• LV-0460 - LETDOWN ISOLATION VLV UPSTREAM</li> </ul> <p>d. Excess Letdown Isolation Valves - CLOSED:</p> <ul style="list-style-type: none"> <li>• HV-8153 - EXCESS LETDOWN LINE ISO VLV</li> <li>• HV-8154 - EXCESS LETDOWN LINE ISO VLV</li> </ul> <p>e. Reactor Vessel Head Vent Isolation Valves - CLOSED:</p> <ul style="list-style-type: none"> <li>• HV-8095A - RX HEAD VENT TO LETDOWN ISOLATION VLV</li> <li>• HV-8095B - RX HEAD VENT TO LETDOWN ISOLATION VLV</li> <li>• HV-8096A - RX HEAD VENT TO LETDOWN ISOLATION VLV</li> <li>• HV-8096B - RX HEAD VENT TO LETDOWN ISOLATION VLV</li> </ul>
	UO	<p>4. Verify AFW flow - GREATER THAN 570 GPM.  <b><u>(May have started TDFW pump earlier; if not running, manually start TDAFW pump.)</u></b></p>

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Time	Position	Applicant's Action or Behavior
	UO <b>Critical Task</b>	<p>4 RNO. Perform the following:</p> <p>a. Verify TDAFW Pump is running:</p> <ul style="list-style-type: none"> <li>• PDIC-5180 - INCREASED/ MAX DEMAND</li> <li>• HV-5106 TDAFW – OPEN</li> <li>• HV-3009 LP-1 MS SPLY TO AUX FW TD PMP-1 – OPEN</li> </ul> <p>-OR-</p> <ul style="list-style-type: none"> <li>• HV-3019 LP-2 MS SPLY TO AUX FW TD PMP-1 - OPEN</li> </ul> <p><b><u>Note to examiner: 1HV-5125 may re-open if an AFW actuation signal is present.</u></b></p>
	OATC	5. Trip all RCPs.
	OATC	6. Trip the NCP.
	SS	<p>7. Initiate the following:</p> <ul style="list-style-type: none"> <li>• Continuous Action Page.</li> <li>• NMP-EP-110, EMERGENCY CLASSIFICATION DETERMINATION AND INITIAL ACTION</li> </ul>
	UO	8. Check Main Generator Output Breakers - OPEN.

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Time	Position	Applicant's Action or Behavior
	UO	<div><p><u>NOTE</u></p><p>The battery capacity for DG field flashing may only support 5 Diesel Generator start attempts.</p></div> <p>9. Try to restore power to any AC Emergency Bus from its associated DG:</p> <p>a. Start DG(s).</p> <p><b><u>Note to examiner: DG's are not available due to trip of "A" EDG and fault on 1BA03 preventing "B" EDG output breaker from closing.</u></b></p> <p>b. Check AC Emergency Bus of started DG(s) automatically energized: <b><u>(NO)</u></b></p> <p>9.b RNO</p> <ul style="list-style-type: none"><li>Adjust frequency as necessary to maintain 60 Hz.</li><li><u>IF</u> bus can <b><u>NOT</u></b> be energized, <u>THEN</u> trip DG and go to Step 10.</li></ul>

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Time	Position	Applicant's Action or Behavior
		<p><u>NOTES</u></p> <ul style="list-style-type: none"> <li>Train A 1E Stub Bus supplies Emergency Seal Oil Pump Battery Charger 1(2)ND1CA.</li> <li>Train B 1E Stub Bus supplies Main Turbine Emergency Bearing Oil Pump Battery Charger 1(2)ND2CA.</li> </ul>
		<p><u>CAUTION</u></p> <p>IF it is expected that 1(2)NB01 Stub Bus cannot be energized before batteries supplying Charger 1(2)ND1CA have expended (approximately 2 hours), THEN action should be promptly initiated to degas and flush generator with CO2 per 13810, GENERATOR GAS SYSTEM</p>
	UO	<p>9. c. Check AC Emergency Buses - AT LEAST ONE ENERGIZED.</p> <p>9.c RNO Go to Step 10.</p>

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Time	Position	Applicant's Action or Behavior
	UO	<p>10. Initiate 13427A/B, 4160V AC BUS AA02/BA03 1E ELECTRICAL DISTRIBUTION SYSTEM to energize at least one AC Emergency Bus using any available power supply:</p> <p><u>IF</u> offsite power available to either RAT, <u>THEN</u> use normal or emergency incoming feeder breaker.</p> <p><b><u>Note to examiner: Licensee expects the crew to use the first option to restore power to 1AA02 from the alternate incoming source.</u></b></p> <p>-OR-</p> <p><u>IF</u> power available to SAT, <u>THEN</u> initiate 13418-A(B), STANDBY AUXILIARY TRANSFORMER UNIT 1(2) TRAIN A(B) OPERATIONS.</p> <p>-OR-</p> <p><u>IF</u> a Diesel Generator extended AOT is in progress <u>AND</u> a Wilson Black Start is necessary, <u>THEN</u> initiate 13419-C, DIESEL GENERATOR EXTENDED AOT Step 4.3.6.</p>
	OATC	<p>11. Check for SI:</p> <p>a. SI signal - ACTUATED. <b><u>(YES)</u></b></p> <p>b. Reset SI.</p>
	SS	<p>12. *Check AC Emergency Bus status: (Continuous action)</p>

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Time	Position	Applicant's Action or Behavior
		a. At least one energized. <u>(NO)</u>
	SS	<p>12.*RNO (Continuous action)</p> <p><u>WHEN</u> power is restored to any AC Emergency Bus, <u>THEN</u> initiate recovery actions starting with Step 43.</p> <p>Go to Step 13.</p>
	UO	13. Verify at least two NSCW Pumps per train - HANDSWITCHES IN AUTO.
	OATC	<p>14. Place the following equipment handswitches in the PULL-TO-LOCK position:</p> <ul style="list-style-type: none"> <li>• CCPs</li> <li>• RHR Pumps</li> <li>• SI Pumps</li> <li>• Containment Spray Pumps</li> <li>• CCW Pumps</li> <li>• ACCW Pumps</li> <li>• MDAFW Pumps</li> <li>• Containment Coolers</li> <li>• ESF Chillers (STOP position)</li> </ul>
	SS UO	<p>15. Check if AC Emergency Busses should be energized locally:</p> <p>a. At least one 4160V AC Emergency Bus - CAN BE ENERGIZED</p>



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Time	Position	Applicant's Action or Behavior
		FROM CONTROL ROOM.
	UO	<p>15.a RNO</p> <p>Dispatch personnel to restore AC Emergency Bus(s) using 13427A/B, 4160V AC BUS AA02/BA03 1E ELECTRICAL DISTRIBUTION SYSTEM.</p> <p>Go to Step 16.</p>
	SS UO	16. Dispatch Operator to initiate ATTACHMENT 5.
	SS UO	<p>17. Dispatch Operator to check Hotwell level valves - CLOSED:</p> <p>a. COND MAKEUP LV-4415B</p> <p>b. COND DUMP LV-4415A</p>
	SS UO	18. Dispatch Operators to prepare for local operation of SG ARVs using ATTACHMENT 7.
	UO	<p>19. Check SG status:</p> <p>a. Main Steamline and Bypass Valves - CLOSED.</p> <p>b. MFIVs and BFIVs - CLOSED.</p> <p>c. Blowdown Isolation Valves - CLOSED.</p>

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Time	Position	Applicant's Action or Behavior
		d. SG Sample Isolation Valves - CLOSED.
	UO	<p>20. Check for faulted SG(s):</p> <p>ANY SG PRESSURE LOWERING IN AN UNCONTROLLED MANNER.</p> <p>-OR-</p> <p>ANY SG PRESSURE COMPLETELY DEPRESSURIZED</p>
	UO	<p>21. Isolate faulted SG(s):</p> <p>a. Close the TDAFW Throttle Valves on affected SG(s) one at a time:</p> <p>HV-5122 (SG 1)</p> <p>HV-5125 (SG 2)</p> <p>HV-5127 (SG 3)</p> <p>HV-5120 (SG 4)</p> <p>b. Close only one TDAFW Pump Steam Supply Valve from affected SG(s):</p> <p>HV-3009 (SG 1)</p> <p>-OR-</p> <p>HV-3019 (SG 2)</p> <p>c. Verify affected SG ARV(s) closed:</p>

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Time	Position	Applicant's Action or Behavior
		PV-3000 (SG 1) PV-3010 (SG 2) PV-3020 (SG 3) PV-3030 (SG 4)
	UO	21.(Cont.) d. Locally close the MDAFW Throttle Valves on affected SG(s) using ATTACHMENT F.  <b><u>Note to examiner: When the faulted SG is isolated, the booth operator will report to the SS that 1AA02 bus is undamaged and can be energized. Go to step 43 when the bus is energized.</u></b>
	UO	22. Verify faulted SG(s) remains isolated during subsequent recovery actions unless needed for RCS cooldown or SG activity sampling.
	UO	23. Check for ruptured SG(s): <b><u>(No SG is ruptured)</u></b>  a. Direct Chemistry to take periodic activity samples of all SGs one at a time.  b. Secondary radiation - NOT NORMAL: <ul style="list-style-type: none"> <li>• MAIN STM LINE MONITORS:               <ul style="list-style-type: none"> <li>• RE-13120 (SG 1)</li> <li>• RE-13121 (SG 2)</li> <li>• RE-13122 (SG 3)</li> <li>• RE-13119 (SG 4)</li> </ul> </li> <li>• CNDSR AIR EJCTR/STM RAD MONITOR RE-12839C.</li> <li>• STM GEN LIQ PROCESS RAD:</li> </ul>

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Time	Position	Applicant's Action or Behavior
		<ul style="list-style-type: none"> <li>RE-0019 (SAMPLE)</li> <li>RE-0021 (BLOWDOWN)</li> <li>SG sample radiation.</li> </ul> <p>23.RNO Go to Step 25.</p>
	UO	25. Check CST level - GREATER THAN 15%.
	UO	<p>26. Check intact SG levels:</p> <ul style="list-style-type: none"> <li>a. NR level - AT LEAST ONE GREATER THAN 10% [32% ADVERSE].</li> <li>b. Maintain NR level between 10% [32% ADVERSE] and 65%.</li> <li>c. NR level - ANY RISING IN AN UNCONTROLLED MANNER. <b><u>(NO)</u></b></li> <li>c. RNO Go to Step 27.</li> </ul>
	SS UO	<div style="border: 1px solid black; padding: 10px;"> <p><b>CAUTIONS</b></p> <p>Equipment failures and loss of control power may occur if doors are not opened within 30 minutes of onset of loss of AC power. Room B76 on Unit 1 and room B04 on Unit 2 have two doors with installed door stops.</p> </div> <p>27. Open all doors that have installed door stops in the following affected unit's Control Building electrical equipment rooms:</p> <p style="text-align: center;"><u>UNIT 1</u></p>

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Time	Position	Applicant's Action or Behavior
		B47, B48, B52, B55, B61, B76, B63
	UO	<p>28. Check DC Bus loads:</p> <ul style="list-style-type: none"> <li>a. Monitor all 1E Battery Bus voltages - GREATER THAN 105V DC.</li> <li>b. As time permits, perform the following:</li> </ul>
	UO	<p>28. (Cont)</p> <ul style="list-style-type: none"> <li>• Evaluate securing unnecessary battery loads using ATTACHMENT A.</li> <li>• Initiate 18032, LOSS OF 120 VOLT AC INSTRUMENT POWER and 18034, LOSS OF CLASS 1E 125V DC POWER if the following criteria is met: <ul style="list-style-type: none"> <li>• Any Inverter must be shut down.</li> <li>-OR-</li> <li>• Any battery breaker must be opened due to battery overload or low DC Bus voltage.</li> </ul> </li> </ul>
	SS UO	<p>29. Depressurize intact SGs to 300 psig:</p> <ul style="list-style-type: none"> <li>a. Check SG NR levels - GREATER THAN 10% [32% ADVERSE] IN AT LEAST ONE SG.</li> <li>b. Locally dump steam using SG ARVs at maximum rate: <ul style="list-style-type: none"> <li>• PV-3000 (South Main Steam Valve Room)</li> <li>• PV-3010 (North Main Steam Valve Room)</li> <li>• PV-3020 (North Main Steam Valve Room)</li> <li>• PV-3030 (South Main Steam Valve Room)</li> </ul> </li> <li>c. Maintain the following during depressurization: <ul style="list-style-type: none"> <li>• SG pressures - GREATER THAN 200 PSIG</li> </ul> </li> </ul>

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Time	Position	Applicant's Action or Behavior
		<ul style="list-style-type: none"> <li>SG NR level - GREATER THAN 10% [32% ADVERSE] IN AT LEAST ONE INTACT SG</li> </ul>
	OATC	30. Check RCS WR cold leg temperatures - GREATER THAN 280°F [295°F ADVERSE].
	UO	31. Check SG pressure - LESS THAN 300 PSIG.
	SS UO	32. Locally control SG ARVs to maintain SG pressures at 300 psig.
	OATC	33. Check Reactor - SUBCRITICAL: <ul style="list-style-type: none"> <li>IR channels - ZERO <u>OR</u> NEGATIVE STARTUP RATE</li> <li>SR channels - ZERO <u>OR</u> NEGATIVE STARTUP RATE</li> </ul>
	OATC	34. Check SI signal status:

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Time	Position	Applicant's Action or Behavior	
	OATC	<p>a. SI - ACTUATED.</p> <p>b. Reset SI.</p>	<p>a. <u>IF</u> SI actuates during SG depressurization, <u>THEN</u> reset SI. <u>IF</u> SI will <u>NOT</u> reset, <u>THEN</u> initiate ATTACHMENT I.</p> <p>Go to Step 0.</p> <p>b. <u>IF</u> SI will <u>NOT</u> reset, <u>THEN</u> initiate ATTACHMENT I.</p>
	OATC UO	<p>35. Check Containment Isolation Phase A using ATTACHMENT B.: Computer Points</p> <p>-OR-</p> <p>Handswitch Indication</p>	<p><u>IF</u> valves do <u>NOT</u> close, <u>THEN</u> locally close at least one valve at each penetration.</p> <p>Locally close any open valve as time permits.</p>
	OATC UO	<p>36. Check Containment Ventilation Isolation using ATTACHMENT C.</p>	<p>36. Close dampers and valves.</p>

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Time	Position	Applicant's Action or Behavior
		<p>Computer Points                      IF dampers and valves can <u>NOT</u> be closed,  <u>THEN</u> locally close.</p> <p>-OR-</p> <p>Handswitch Indication</p>
	UO	37. Check Containment radiation - LESS THAN $10^5$ mR/HR.
	UO	<p>38. Initiate Spent Fuel Pool Monitoring of Level and Temperature every 2 hours:</p> <ul style="list-style-type: none"> <li>• Dispatch Operator to locally check level &gt; 217 ft., reference figure 1 of 18030-C, LOSS OF SPENT FUEL POOL LEVEL OR COOLING,</li> <li>• Locally check temperature with handheld dip thermometer or infrared to develop baseline temp monitoring for establishing repetitive checks of level and temperature every two hours</li> <li>• Check SFPC temperature &lt;130°F</li> </ul>



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Time	Position	Applicant's Action or Behavior
		<ul style="list-style-type: none"> <li>Using PTDB TAB 26, determine time to restore power is &lt; time to reach 200°F in Spent Fuel Pool.</li> </ul>
	OATC	39. Check Core Exit TCs - LESS THAN 1200°F.
	UO	40. Check if AC emergency power is restored: <ol style="list-style-type: none"> <li>AC Emergency Busses - AT LEAST ONE ENERGIZED.</li> <li>Go to Step 43.</li> </ol>
	UO	43. Check if resetting LOP Sequencer - REQUIRED: <ol style="list-style-type: none"> <li>LOP Sequencer - INITIATED.</li> <li>Power restored to AC Emergency Bus from offsite source.</li> <li>Reset LOP Sequencer by initiating ATTACHMENT H.</li> </ol>

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**Event Description:** A ground fault on 1BA03 and overspeed trip of EDG "A" will result in a Loss of All AC with the TDAFW pump failing to start automatically. This event will be initiated after completion of Step 8 of 19000-C following the fault of SG #2. Intent is to isolate the faulted steam generator in step 21 of 19100-C. 1AA02 power may be restored by aligning the alternate incoming source to the bus, AFTER a report that the bus is not damaged. Bus status will **NOT** be reported to the crew until the SG is isolated.

Time	Position	Applicant's Action or Behavior
	UO	<p>44. Verify following equipment loaded on energized AC Emergency Bus(s):</p> <ul style="list-style-type: none"> <li>• 480V AC switchgear: <ul style="list-style-type: none"> <li><u>TRAIN A</u></li> <li>AB04</li> <li>AB05</li> <li>AB15</li> <li>NB01</li> </ul> </li> <li>• Essential 480V AC loads: <ul style="list-style-type: none"> <li>• Battery Chargers</li> <li>• Instrumentation and Control</li> <li>• Emergency Lighting</li> <li>• Communications</li> <li>• Battery Room Fans</li> </ul> </li> </ul>
	UO	<p>45. Check proper NSCW operation for energized AC Emergency Bus(s):</p> <p>a. Verify proper NSCW Pump and return header valve operation:</p> <ol style="list-style-type: none"> <li>1. NSCW Pumps - TWO RUNNING EACH TRAIN</li> <li>2. NSCW TOWER RTN HDR BYPASS BASIN handswitches - IN AUTO: <ul style="list-style-type: none"> <li>HS-1668A</li> <li>HS-1669A</li> </ul> </li> </ol> <p>b. Verify the following valves - OPEN: <u>TRAIN A</u></p>

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Scenario No.: 4

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Event No.: 11

**Event Description:** A ground fault on 1BA03 and overspeed trip of EDG "A" will result in a Loss of All AC with the TDAFW pump failing to start automatically. This event will be initiated after completion of Step 8 of 19000-C following the fault of SG #2. Intent is to isolate the faulted steam generator in step 21 of 19100-C. 1AA02 power may be restored by aligning the alternate incoming source to the bus, AFTER a report that the bus is not damaged. Bus status will **NOT** be reported to the crew until the SG is isolated.

Time	Position	Applicant's Action or Behavior
		HV-1806 - NSCW CNMT CLR 1&2 SPLY VLV HV-1808 - NSCW CNMT CLR 5&6 SPLY VLV HV-1822 - NSCW CNMT CLR 1&2 RTN VLV HV-1830 - NSCW CNMT CLR 5&6 RTN VLV
	UO	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <b>CAUTION</b>             If temperature has exceeded 130°F TSC should be consulted prior to restoring Spent Fuel Pool Cooling to service.         </div> 46. Perform the following: <ol style="list-style-type: none"> <li>a. Verify two CCW PUMPS of available train in service</li> <li>b. Start available train of SPENT FUEL POOL COOLING</li> </ol>
	SS UO	47. Restore DC loads: <ol style="list-style-type: none"> <li>a. Startup any de-energized Inverters per 13431, 120V AC 1E VITAL INSTRUMENT DISTRIBUTION SYSTEM.</li> <li>b. Restore remaining DC loads shed in previous actions.</li> </ol>
	UO	48. Stabilize SG pressures: <ul style="list-style-type: none"> <li>• Control SG ARVs in MANUAL.</li> </ul>
		<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <b><u>NOTE</u></b>             If RCP cooling was previously isolated, further cooling of the RCP Seals will be         </div>

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Scenario No.: 4

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Event No.: 11

**Event Description:** A ground fault on 1BA03 and overspeed trip of EDG "A" will result in a Loss of All AC with the TDAFW pump failing to start automatically. This event will be initiated after completion of Step 8 of 19000-C following the fault of SG #2. Intent is to isolate the faulted steam generator in step 21 of 19100-C. 1AA02 power may be restored by aligning the alternate incoming source to the bus, AFTER a report that the bus is not damaged. Bus status will **NOT** be reported to the crew until the SG is isolated.

Time	Position	Applicant's Action or Behavior
	CREW	<div>established by natural circulation cooldown as directed in subsequent procedures.</div> <div>49. Select recovery procedure:<div><div>a. Check RCS subcooling - GREATER THAN 24°F [38°F ADVERSE].</div><div>b. Check PRZR level - GREATER THAN 9% [37% ADVERSE].</div><div>c. Check BIT DISCH ISOLATION valves - CLOSED:<div><div>• HV-8801A</div><div>• HV-8801B</div></div></div></div><div>If ALL of the above criteria are met, go to 19101-C ECA-0.1 LOSS OF ALL AC POWER RECOVERY WITHOUT SI REQUIRED.</div><div>IF ANY of the above criteria are NOT met, go to 19102-C, ECA-0.2 LOSS OF ALL AC RECOVERY WITH SI REQUIRED.</div></div>
END OF SCENARIO. PROCEED AT THE DISCRETION OF THE CHIEF EXAMINER.		

Event No.: Event 11b, SOP 13427A-1

Event Description: Energize 4160V Bus 1AA02 from alternate incoming source.

Time	Position	Applicant's Action or Behavior
		<p style="text-align: center;">NOTES</p> <ul style="list-style-type: none"> <li>• <u>IF</u> in Modes 1, 2, 3, or 4, Section 4.4.1 of this procedure may only be performed <u>IF</u> the Normal Incoming Source, Emergency DG 1A, <u>AND</u> the redundant 1E 4160V AC bus 1BA03 are all lost simultaneously.</li> <li>• <u>IF</u> in Modes 5 or 6, Section 4.4.1 may be performed with the other power sources available <u>WHEN</u> authorized by the SM.</li> </ul> <p>4.4.1.1 <b>Obtain</b> authorization from the SM to energize the 4160V AC Bus 1AA02 from the Alternate Incoming Source.</p>
		4.4.1.2 <b>Check</b> Alternate Incoming Source voltage is available.
		4.4.1.3 <u>IF</u> in MODE 5 OR 6, <del>(NO) perform the following Steps:</del> <u>OTHERWISE</u> , <b>Go To Step 4.4.1.8.</b>
		<p>4.4.1.4 <b>Verify</b> an Alternate Incoming Source is properly aligned.</p> <p>a. <u>IF</u> 1AA02 will be energized from RAT 1NXRB, <b>verify</b> applicable sections of 13415-1, "Reserve Auxiliary Transformers," have been performed prior to performing this section.</p>
		4.4.1.5 <u>IF</u> the Non-Class 1E 4160V AC Buses associated with RAT 1NXRB are energized from the UATs by backfeed, <b>place</b> handswitch 1HS-1NA0401 Alternate Incoming Breaker in the PULL-TO-LOCK position and <b>Caution Tag</b> .

Event No.: Event 11b, SOP 13427A-1

Event Description: Energize 4160V Bus 1AA02 from alternate incoming source.

Time	Position	Applicant's Action or Behavior
		<p>4.4.1.6 <u>IF</u> RAT 1NXRB is in service <u>AND</u> will be connected to 1AA02, <b>verify</b> the following:</p> <ul style="list-style-type: none"> <li>The sum total load of 1AA02 and 1BA03 is less than 1350 amps.</li> <li>With <u>NO</u> UAT backfeed of the non-1E 4160V AC in progress, the total load of 1NA04 is less than 1000 amps.</li> </ul>
		<p>4.4.1.7 <u>IF</u> the SAT is in service for RAT 1NXRB <u>AND</u> will be connected to 1BA03 <u>AND</u> 1AA02, perform the following:</p> <ol style="list-style-type: none"> <li><b>Check</b> total load on 1AA02 and 1BA03 will be less than 1735 amps.</li> <li><b>Place</b> handswitch 1HS-1NA0401 in PULL-TO-LOCK and <b>install</b> a Caution Tag.</li> <li><b>Place</b> one train of SSPS in test per 13503A-1, "Reactor Control Solid State Protection System," and <b>Caution Tag</b>.</li> </ol>
		<p>4.4.1.8 <b>Verify</b> BRKR 1AA0205 SYNCHRONIZING SWITCH and BRKR 1AA0219 SYNCHRONIZING SWITCH are <u>BOTH</u> in OFF:</p> <ul style="list-style-type: none"> <li>1AA0205 SYNCHRONIZING SWITCH OFF</li> <li>1AA0219 SYNCHRONIZING SWITCH OFF</li> </ul>
		<p>4.4.1.9 <b>Place</b> the BRKR 1AA0201 SYNCHRONIZING SWITCH to ON.</p>
		<p>4.4.1.10 <b>Close</b> ALTERNATE INCOMING BRKR 1AA0201 using handswitch 1HS-1AA0201.</p>
		<p>4.4.1.11 <b>Check</b> white potential lights lit for Bus 1AA02.</p>

Event No.: Event 11b, SOP 13427A-1

Event Description: Energize 4160V Bus 1AA02 from alternate incoming source.

Time	Position	Applicant's Action or Behavior
		4.4.1.12 <b>Check</b> Bus 1AA02 voltage across all three phases to be 4160V AC (4025V AC to 4326V AC) on BUS 1AA02 Voltmeter.
		4.4.1.13 <b>Place</b> BRKR 1AA0201 SYNCHRONIZING SWITCH to OFF.
		<p>4.4.1.14 <b>Verify</b> Train A 480V AC 1E Switchgears energized by performing the following:</p> <ol style="list-style-type: none"> <li><b>Check</b> that white potential lights are lit for: <ul style="list-style-type: none"> <li>1AB04</li> <li>1AB05</li> <li>1AB15</li> <li>1NB01</li> </ul> </li> <li><u>IF</u> any Train A 480V AC 1E Switchgear <u>NOT</u> energized, <b>obtain</b> SM permission and <b>energize</b> per 13429-1, "480V AC 1E Electrical Distribution System."</li> <li><u>IF</u> Train A 480V AC Non 1E Switchgear 1NB01 <u>NOT</u> energized, <b>obtain</b> SM permission and <b>energize</b> per 13430-1, "480V AC Non 1E Electrical Distribution System."</li> </ol>
		<p>4.4.1.15 <b>Check</b> Train A 480V AC Motor Control Centers energized by checking <u>NO</u> MCC TROUBLE alarms on QEAB Annunciator Panel ALB36.</p> <ol style="list-style-type: none"> <li><u>IF</u> any Train A 480V AC 1E Motor Control Center <u>NOT</u> energized, <b>obtain</b> SM permission and <b>energize</b> per 13429-1, "480V AC 1E Electrical Distribution System."</li> <li><u>IF</u> any Train A 480V AC Non 1E Motor Control Center <u>NOT</u> energized, <b>obtain</b> SM permission and <b>energize</b> per 13430-1, "480V AC Non 1E Electrical Distribution System."</li> </ol>

Event No.: Event 11b, SOP 13427A-1

Event Description: Energize 4160V Bus 1AA02 from alternate incoming source.

Time	Position	Applicant's Action or Behavior
		4.4.1.16 <b>Notify</b> SM that loads listed in Table 1 may be restored.
		4.4.1.17 At 1AA02, <b>reset</b> relay targets that are dropped.
		4.4.1.18 <b>Generate</b> caution tags to alert personnel that Bus 1AA02 is energized from its alternate incoming source.
		4.4.1.19 <b>Perform</b> the following steps only if in MODE 5 <u>OR</u> 6, <u>OTHERWISE</u> , <b>exit</b> this procedure.
<b>END OF SCENARIO. PROCEED AT THE DISCRETION OF THE CHIEF EXAMINER.</b>		



Final Scenario 4, as-given: Crew 3

Facility: Vogtle Scenario No.: 4 (Low Power) Op-Test No.: 2014-301

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

Snap 233

Initial Conditions: 3.5% power, maintaining Tavg at 557F (+/- 2° F) with steam dumps in steam pressure mode (auto), control rods in manual, letdown flow at 75 gpm.

Equipment OOS: CCW pump #5, Air Compressor #3.

Turnover: INFO LCO 3.7.7, CCW Train 'A', Containment Mini-purge is in service, 'A' CCP caution tagged "Run only in emergency."

AFW secured and in standby alignment except for MDAFW pump 'A'. Continue raising power to Mode 1. Mode 1 signoffs complete except for AFW in Standby readiness.

**Preloaded Malfunctions:**

**A-TIC-130 – Loss of cooling to letdown heat exchanger (Trigger 1)**

**CV-12 – VCT Level Transmitter LT-185 fails high (Trigger 2)**

**HS1AA0205 HS-1AA0205 TRIP (Trigger 3)**

**EAB-LO\_HS1AA0205\_Y 1HS-AA0205 YELLOW A533P29-B12 – ON (Trigger 3)**

**ALB36-A01 4160 SWGR 1AA02 TROUBLE – ON (Trigger 3)**

**FW 18 - Local control of BFRV LV-5242 (Trigger 4)**

**FW 19 - BFRV LV-5242 Position (Trigger 4)**

**RD 10 L, N, F - Stuck RCCA K6 (CC), G13 (SDB), E13 (SDD) (Trigger 5, tied to Rx trip)**

**MS 02B - Main steam line #2 rupture outside containment (Trigger 6)**

**EL 07B - Loss of 1BA03 (Trigger 7)**

**EL 01A – DG1A Overspeed trip (Trigger 7)**

**HS9382 HS-9382 AIR COMPRESSOR #3 RECIPROCATING – STOP**

**A-LO\_HS9382\_G 1HS-9382 GREEN A531P30-A6 - OFF**

**NS 07 A, C, E - NSCW Pump handswitch auto contact failure**

**Override HV-8104 Closed**

**AF 05C - TDAFWP Auto start failure**

**SF01 Spent Fuel Pool Cooling Train 'A' OOS (trigger 10)**

**SF02 Spent Fuel Pool Cooling Train 'B' in service (Trigger 10 w/ 35 second delay)**

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	<del>N-UO</del> <del>N-SS</del>	<del>Place MDAFW Pump 'A' in standby per 13610-1 checklist</del> <del>After MDAFW 'A' is in standby, booth operator will tell SS to raise power to Mode 1.</del>
2	Power Ramp	R-OATC R-SS	Raise power from 3.5% to Mode 1 per 12004-C, Steps 4.1.18 thru 4.1.22 Mode 1 signoffs complete except for AFW in Standby readiness

3	A-TIC-130 POT	I-OATC I-SS	TV-130 temperature element failure results in high letdown heat exchanger outlet temperatures. 17007-C for ALB07 F04 LTDN HX HI TEMP DEMIN DIVERT <b>(Trigger 1)</b>
4	CV-12	C-OATC C-SS	LT-185 VCT Level Transmitter fails high 17007-1 for ALB07 E05 VCT HI/LO LEVEL <b>(Trigger 2)</b>
5	SG03B2	I-UO I-SS TS-SS	SG Pressure Instrument PI-525A fails low 18001-C, "Systems Instrumentation Malfunction 3.3.2, ESFAS Instrumentation, 3.3.3, Post Accident Monitoring Instrumentation, (INFO) 3.3.4, Remote Shutdown System <b>(Trigger 15)</b>
6	Trigger 3 NS07A, C,E	C-UO C-SS TS-SS	Loss of 1AA02, NSCW Train "A" fails to start. 18031-C for Loss of NSCW LCO 3.7.5, Auxiliary Feedwater System, Condition B, and LCO 3.8.1, AC Sources – Operating, Condition A <b>(Trigger 3)</b>
7	FW-18 FW-19	C-UO C-SS	Loop #4 BFRV fails <del>to control in automatic</del> <b>closed</b> 18016-C for Condensate and Feedwater Malfunction  Insert using file M:/opensim/monitor/ovationtesting.uvl Set first variable = 1, second variable = 0.
8	MS02B	M-ALL	Reactor trip due to Loop #4 BFRV failure. (reactor trip and 3 rods fail to fully insert) 19000-C for Reactor Trip, then transition to 19001-C <b>(Trigger 4)</b>
9	N/A	C-OATC C-SS	Emergency Boration of RCS with HV-8104 failed closed 13009-1 for Emergency Boration due to 3 stuck rods
10	MS02B	M-ALL	SG #2 faulted outside containment 19000-C <b>(Trigger 6)</b>
11	EL07B EL01A	M-ALL	Loss of all AC / TDAFW auto start failure 19100-C for Loss of all AC <b>(Trigger 7)</b>
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

**Scenario Objective:**

Normal plant operations, raising reactor power to Mode 1, loss of 1AA02, loss of control of one BFRV finally resulting in a reactor trip with 3 stuck rods, one SG faulted outside containment with a loss of all AC and TDAFW auto start failure. The crew is expected to respond to various component and instrument malfunctions per AOP and ARP guidance, and recognize and respond to major plant events per the EOP network.

**Event 1**

~~Place MDAFW pump 'A' in standby per 12004-C, Section 4.1.10 and per 13610-1, "Auxiliary Feedwater System," checklist~~

**Verifiable Actions:****~~SS~~**

~~Direct UO to place AFW in standby readiness per 13610-1, "Auxiliary Feedwater System"~~

**~~UO~~**

~~Align AFW to standby readiness per 13610-1~~

- ~~- Stop MDAFW Pump 'A' and place in Automatic~~
- ~~- Open HS 5139A~~
- ~~- Open HS 5137A~~

**Event 2**

Raise power to Mode 1 per 12004-C, "Power Operation (Mode 1)," Steps 4.1.18 through 4.1.22. Mode 1 signoffs are complete with exception of AFW in standby readiness.

**Verifiable actions:****SS**

Direct OATC and UO to raise power to Mode 1 from current power level

**OATC**

Withdraw control rods  
Dilute RCS

**UO**

Monitor and control RCS temperature by adjusting steam dumps as necessary

**Event 3**

TV-130 failure resulting in high letdown heat exchanger outlet temperatures

**Verifiable Actions:****SS**

Direct OATC to manually control TV-0130. May enter 17007-C for ALB07 F04 LTDN HX HI TEMP DEMIN DIVERT.

**OATC**

Verify TV-0129 diverts letdown flow to VCT to bypass demins (ALB07-D03)  
Adjust TV-0130 as necessary to control letdown temperature (VCT temperature)  
Return TV-0129 to VCT position

**Event 4**

LT-185 VCT Level Transmitter fails high

**Verifiable Actions:****SS**

Enter AOP 18007-C, Section C for loss of makeup flow and direct OATC action

**OATC**

Align LV-112A to the VCT

**Event 5**

SG Pressure Instrument PI-525A fails low

**SS**

Enter 18001-C, "Systems Instrumentation Malfunction," Section F.

**Verifiable Action:****UO**

Check steam and feed flows matched on all SGs

At the OWS bypass the affected channel using the signal bypass button on the affected loop's graphical display.

**Technical Specifications:**

3.3.2, ESFAS Instrumentation, fu 1.e, Cond. D.

3.3.3, Post Accident Monitoring Instrumentation, fu 8, Cond. B, G, H, I. (INFO)

3.3.4, Remote Shutdown System, fu 13, Cond A.

3.3.2, Fu 4d(1), Cond. D

**Event 6**

Loss of 1AA02 with NSCW train 'A' failing to start

**SS**

Enter 18031-C, "Loss of Class 1E Electrical Systems"

Initiate 1 hour actions for LCO 3.8.1 (verify off-site circuits)

Initiate 1 hour actions for LCO 3.8.1 (verify SAT energized)

**Verifiable Actions:****OATC**

Stop CCP 'A' or NCP

**UO**

Manually start NSCW Train 'A' pumps and verify proper operation

Stop MDAFW Pump 'A'

Stop ACCW Pump

Verify only 4 Containment Coolers running

Verify 2 CRDM fans running

Verify Cavity Cooling Fan running

Verify SFP Cooling in service

Technical Specifications:

3.7.5, AFW System, Cond B, C.  
3.7.8, NSCW System, Cond. A  
3.8.1, AC Sources-Operating, Cond. A  
3.8.9, Distribution Systems – Operating, Cond. A

**Event 7**

The Loop #4 BFRV fails closed. The crew will respond per guidance of 18016-C, “Condensate and Feedwater Malfunction.” Manual control will allow continued operation.

**SS**

Enter 18016-C, “Condensate and Feedwater Malfunction,” Section D.

Verifiable Action:**UO**

Manual control of BFRV or MFRV to control SG water level between 60 and 70%

**Event 8**

The Loop #4 BFRV will fail open, requiring a manual reactor trip due to high SG level. 3 rods will fail to fully insert, requiring emergency boration.

Verifiable Actions:**OATC**

Manually trip the reactor (may trip automatically if condition is not recognized).  
Initiate emergency boration and verify correct boric acid flow.

**Event 9****SS**

Direct OATC to emergency borate the RCS per 13009-1, “CVCS Reactor Makeup Control”

**OATC**

Starts BAT Pump  
Verifies Charging Pump running  
Attempts to open HV-8104  
Opens FV-0110A  
Open FV-0110B  
Places FIC-0121 in manual and adjusts flow to 42 gpm  
Verifies Emergency boration flow greater than 30 gpm (FI-0110A)

OR

Open LV-0112D and/or LV-0112E  
Closes LV0112B and/or LV-0112C  
Divert LV-0112A  
FIC-0121 in manual with flow greater than 100 gpm  
Adjust RCP seal flow within normal range

OR

Open LV-0112D and/or LV-0112E  
Closes LV0112B and/or LV-0112C  
Divert LV-0112A  
Open HV-8801A/B  
Adjust RCP seal flow within normal range

**EVENT 10**

The crew will respond to a faulted Steam Generator #2 outside reactor containment, which will result in SI. Initiate after step 8 of 19001-C of previous event (step 8 is initiation of emergency boration).

**Verifiable Actions:****SS**

Re-enter 19000-C, "Reactor Trip or Safety Injection"

**OATC**

Carry out IOAs and Initial Actions of 19000-C.

**UO**

Carry out IOAs and Initial Actions of 19000-C.

**EVENT 11**

Loss of All AC with the TDAFW pump failing to start automatically (ground fault on 1BA03 and overspeed trip of DG1A). Initiate at Step 8 of 19000-C during previous event (IOAs completed). Intent is to isolate the faulted steam generator in Step 21 of 19100-C. 1AA02 power may be restored by aligning the alternate incoming source to the bus AFTER the faulted SG is isolated.

When operators and maintenance are dispatched to investigate the buses, do not report the status of any buses until the SG is isolated in step 21 in 19100-C.

**Verifiable Actions:****SS**

Enter 19100-C, "Loss of All AC Power"

**OATC**

Close HV-8149A/B/C

Close LV-0459

Close LV-0460

Trip RCPs

Trip NCP

**UO**

Manually start the TDAFW pump.

Close MSIV and bypass valves

Close SGBD Valves

Close SGBD Sample Valves

Isolate Faulted Steam Generator

Close HV-5125

Close HV-3019

Dispatch SO to locally close HV-5132

Close RAT 'B' Breaker to 1AA02

**OATC/UO**

place the following in PTL:

- CCPs
- RHR Pumps
- SI Pumps
- Containment Spray Pumps
- CCW Pumps
- ACCW Pumps
- MDAFW Pumps
- Containment Coolers
- ESF Chillers (STOP position)

Scenario is complete when the faulted steam generator is isolated in 19100-C and power has been restored to the RAT, or at Chief Examiner discretion.

**CRITICAL TASKS:****1) Manually start Train “A” NSCW pumps.**

At least two Train “A” NSCW pumps must be started before EDG trip is required due to high temperature from no cooling water flow. Annunciator ALB35-C04 will alarm in about 4.5 minutes with no NSCW flow. An automatic trip of the EDG due to lack of cooling water flow constitutes task failure.

**2) Initiate emergency boration due to three stuck rods.**

Per Tech Spec Bases for LCO 3.1.1, Emergency Boration to verify shutdown margin must be initiated promptly. Initiating emergency boration within 15 minutes of recognizing the stuck rods is adequate. Failing to initiate emergency boration within 15 minutes of recognition of three stuck rods in 19001-C constitutes a task failure.

**3) Manually start the TDAFW pump following Loss of All AC.**


Per the FSAR and WOG Critical Task guidelines, AFW pumps must be started manually before SGs boil dry. From a procedure transition standpoint, if a transition to 19231-C, “Response to Loss of Secondary Heat Sink,” is made and action is taken in 19231-C beyond Step 1, the critical task is failed.

**4) Manually control Steam Generator #4 level when BFRV fails to control in automatic.**

Due to the failure of the automatic function, the steam generator BFRV will fail closed. Without taking manual control of the BFRV, feedwater flow to the steam generator will lower, and at 38% NR level, the reactor will automatically trip. An automatic reactor trip on low steam generator level constitutes task failure.

Target Quantitative Attributes (Per Scenario; See Section D.5.d)		Actual Attributes
1.	Total malfunctions (5–8)	6
2.	Malfunctions after EOP entry (1–2)	1
3.	Abnormal events (2–4)	4
4.	Major transients (1–2)	3
5.	EOPs entered/requiring substantive actions (1–2)	3
6.	EOP contingencies requiring substantive actions (0–2)	1
7.	Critical tasks (2–3)	4



	<p style="text-align: center;">NUCLEAR SAFETY FOCUS TARGET ZERO</p>			
<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <p><b><u>Protected Train:</u></b></p> <p><input type="checkbox"/> Alpha</p> <p><input checked="" type="checkbox"/> Bravo</p> </td> <td style="width: 50%; vertical-align: top;"> <p><b>EOOS:</b></p> <p><input checked="" type="checkbox"/> Green</p> <p><input type="checkbox"/> Yellow</p> <p><input type="checkbox"/> Orange</p> <p><input type="checkbox"/> Red</p> </td> </tr> </table>			<p><b><u>Protected Train:</u></b></p> <p><input type="checkbox"/> Alpha</p> <p><input checked="" type="checkbox"/> Bravo</p>	<p><b>EOOS:</b></p> <p><input checked="" type="checkbox"/> Green</p> <p><input type="checkbox"/> Yellow</p> <p><input type="checkbox"/> Orange</p> <p><input type="checkbox"/> Red</p>
<p><b><u>Protected Train:</u></b></p> <p><input type="checkbox"/> Alpha</p> <p><input checked="" type="checkbox"/> Bravo</p>	<p><b>EOOS:</b></p> <p><input checked="" type="checkbox"/> Green</p> <p><input type="checkbox"/> Yellow</p> <p><input type="checkbox"/> Orange</p> <p><input type="checkbox"/> Red</p>			
<p><b>Plant Conditions:</b></p>	<p>~3.5% RTP BOL, maintaining Tave at 557°F (+/- 2°F) with steam dumps in steam pressure mode (auto), control rods in manual, Letdown flow at 75 gpm.</p>			
<p><b>Major Activities:</b></p>	<p>Continue raising power to Mode 1.</p>			
<p><b>Active LCOs:</b></p>	<p><input type="checkbox"/> INFO LCO 3.7.7 CCW Train A</p>			
<p><b>OOS/ Degraded CR Instruments:</b></p>	<p><input type="checkbox"/> None</p>			
<p><b>Narrative Status:</b></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Containment mini-purge is in service for a planned Containment Entry on next shift.</li> <li><input type="checkbox"/> CCW Pump #5 Danger Tagged for corrective maintenance on the motor bearing. No forecast return to service time is available on this emergent work item.</li> <li><input type="checkbox"/> Air Compressor #3 Danger Tagged for PM's for the next 24 hours.</li> <li><input type="checkbox"/> MFPT B vibration monitoring equipment installed in the field. Inform Vogtle engineering one hour prior to anticipated MFP B startup. Elevated vibrations were observed prior to the outage. Pump was worked during the outage. Investigation continues.</li> <li><input type="checkbox"/> CCP A Caution Tagged. Pump is operable but is to be run only in emergency due to minor bearing oil leakage when operating. Repair plan is being developed.</li> <li><input type="checkbox"/> AFW secured and in standby alignment except for MDAFW pump 'A'. Secure per 13610-1 section 4.3.1.1 and place in standby.</li> <li><input type="checkbox"/> Mode 1 signoffs complete except for AFW in Standby readiness.</li> </ul>			

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Event No.: 1

**Event Description:** With Reactor Power at about 3.5%, the UO has been directed to place 'A' MDAFW Pump in standby alignment per 13610-1 checklist.

Time	Position	Applicant's Action or Behavior
	SS	<p><b><u>12004-C</u></b></p> <p>4.1.10.b - Stop MDAFW pump "A" and place in standby per 13610-1, "Auxiliary Feedwater System."</p>
	UO	<p><b><u>13610-1</u></b></p> <p>4.3.1.1.1.a - <u>IF</u> required, <b>verify</b> the following SG FROM MDAFW PMP-A Isolation Valves are at least partially open:</p> <ul style="list-style-type: none"> <li>- 1-HV-5139</li> <li>- 1-HV-5137</li> </ul>
	UO	<p>4.3.1.1.1.b - <b>Shut down</b> MDAFW-A 1-1302-P4-003 using 1HS-5121A.</p>
	UO	<p>4.3.1.1.1.c - <u>Check FV-5155, AFW P-3 Mini Flow Valve indication lit and valve OPEN (ZLB-4).</u></p>
		<div style="border: 1px solid black; padding: 10px; margin: 10px auto; width: 80%;"> <p style="text-align: center;">NOTE</p> <p>Leaving the SG FROM MDAFW PMP Isolation Valves open in MODES 4, 5, and 6 may inadvertently cause the CST to gravity drain to the steam generators.</p> </div> <p>4.3.1.1.2 - Align the MDAFW Pump A for standby readiness per Checklist 2, Section I.</p>

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Event No.: 1

**Event Description:** With Reactor Power at about 3.5%, the UO has been directed to place 'A' MDAFW Pump in standby alignment per 13610-1 checklist.

Time	Position	Applicant's Action or Behavior
	UO	<p>4.3.1.1.3 – Monitors AFW system for back-leakage from SGs.</p> <ul style="list-style-type: none"><li>• 4.3.1.1.3.a – Displays discharge temperatures on IPC computer.</li><li>• 4.3.1.1.3.b – Monitor the discharge temperatures for 1 hour.</li><li>• 4.3.1.1.3.c – IF discharge temperatures rise, reseats check valves per section 4.4.4</li></ul>
<p><b>END OF EVENT 1. PROCEED TO NEXT EVENT AT THE DISCRETION OF THE CHIEF EXAMINER.</b></p>		

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Event No.: 2

**Event Description:** The crew will initiate a power ramp from 3.5% power to > 5% for Mode 1 entry. All entry requirements for Mode 1 will have been met according to shift turnover.

Time	Position	Applicant's Action or Behavior
	SS	<p>Co-ordinate the following with chemistry if not already performed during the swap over from AFW to MFW.</p> <ul style="list-style-type: none"> <li>• Notifies chemistry that feeding via MFW has commenced.</li> <li>• Verifies that PRZR Steam space sample is in service.</li> <li>• Initiates actions to place N-16 radiation monitor RE-0724 in service.</li> <li>• Ensures SGBD is in service.</li> <li>• Directs ABO to adjust SGBD condensate return temperatures.</li> </ul>
	OATC	Energizes at least one bank of PRZR heaters until power > 30%.
	SS	All admin requirements of step 4.1.12, step 4.1.13 will have been performed according to the shift turnover.
	SS	Verifies AFW in standby readiness prior to exceeding 5% power.
	OATC	Initiates raising reactor power to between 16% and 20%.
	OATC/ UO	<p>Maintains plant conditions during power increase as follows:</p> <ul style="list-style-type: none"> <li>• Tave within 2 F of program Tave using steam dumps in the Steam Pressure Mode.</li> <li>• Steam Generator levels between 60% and 70% NR.</li> <li>• PRZR Pressure 2235 + plus or – 15 psig.</li> <li>• PRZR level within 5% of program with normal charging and letdown in service.</li> <li>• Monitors Tave/Tref Deviation Alarm during remainder of startup.</li> </ul>

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Event No.: 2

**Event Description:** The crew will initiate a power ramp from 3.5% power to > 5% for Mode 1 entry. All entry requirements for Mode 1 will have been met according to shift turnover.

Time	Position	Applicant's Action or Behavior
	SS	<p>When power reaches 5% as determined by higher of Average PR NIS or Average Loop Delta T.</p> <ul style="list-style-type: none"><li>• Logs Mode 1 entry into the Unit Control Logbook.</li><li>• Notifies Chemistry of the Mode Change.</li></ul> <p>NOTE: After adequate power change, proceed to Event # 5.</p>
<p><b>END OF EVENT 2. PROCEED TO NEXT EVENT AT THE DISCRETION OF THE CHIEF EXAMINER WHEN ADEQUATE REACTIVITY CONTROL HAS BEEN DEMONSTRATED.</b></p>		

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Event No.: 3

**Event Description:** TIC-130 temperature element will fail low, resulting in high letdown temperature and causing letdown to divert to the VCT. The crew will respond to the failure based on ARP 17007, for ALB07-F04 LTDN HX HI TEMP DEMIN DIVERT. The crew may also respond based on AOP 18022-C as specified in the ARP.

Time	Position	Applicant's Action or Behavior
	OATC	<p>Diagnose TIC-0130 controller has failed low. (Indicator will still function)</p> <p>Symptoms / alarms:</p> <p>ALB07-D04 BTRS DEMIN INLET HI TEMP</p> <p>ALB07-F04 LTDN HX HI TEMP DEMIN DIVERT</p> <p>ALB07-B04 (VOLUME CONTROL TANK OUTLET TEMP HI (delayed, or may not come in)</p> <p>Indications:</p> <ul style="list-style-type: none"> <li>• TIC-0130 red UP arrow – LIT.</li> <li>• Amber light on 1HS-129 LETDOWN TO DEMIN / VCT – LIT.</li> </ul>
	OATC	<p><b>ALB07-D04 response actions:</b></p> <p><b><u>AUTOMATIC ACTIONS:</u></b></p> <p>NONE</p> <p><b><u>INITIAL OPERATOR ACTIONS:</u></b></p> <p>NONE</p>
	OATC	<p><b><u>SUBSEQUENT OPERATOR ACTIONS</u></b></p> <ol style="list-style-type: none"> <li>1. <b>Determine</b> actual Boron Thermal Regeneration System (BTRS) Demineralizer inlet temperature using I-TI-0381 on the QMCB.</li> <li>2. <b>Take manual control</b> of 1-TV-0381A, and attempt to <b>reduce</b> the temperature by closing the valve using 1-TIC-0381A on the QMCB.</li> </ol> <div style="border: 1px solid black; padding: 10px; margin-top: 10px;"> <p style="text-align: center;">NOTE</p> <p>If BTRS Demineralizer inlet temperature reaches 168.5°F on 1TISH-0382, letdown flow will divert to the VCT.</p> </div>
		<ol style="list-style-type: none"> <li>3. <u>IF</u> temperature <u>CANNOT</u> be reduced, <b>place</b> 1-HS-10351 in OFF.</li> <li>4. <b>Determine</b> cause and if equipment failure is indicated, <b>initiate</b> maintenance</li> </ol>

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Event No.: 3

**Event Description:** TIC-130 temperature element will fail low, resulting in high letdown temperature and causing letdown to divert to the VCT. The crew will respond to the failure based on ARP 17007, for ALB07-F04 LTDN HX HI TEMP DEMIN DIVERT. The crew may also respond based on AOP 18022-C as specified in the ARP.

Time	Position	Applicant's Action or Behavior
		as required.
	OATC	<b>ALB07-F04 response actions:</b>  <b><u>AUTOMATIC ACTIONS:</u></b> Letdown flow is diverted away from the Mixed Bed Demineralizers directly to the Reactor Coolant Filter.
	OATC	<b><u>INITIAL OPERATOR ACTIONS</u></b>  1. Check letdown temperature on 1-TI-0130 on the QMCB reading high. 2. IF necessary, initiate 18007-C, "Chemical Volume Control System Malfunction". ( <b>not necessary, letdown is not lost</b> ) 3. Check for ACCW normal operation. ( <b>TV-0130 not normal</b> )
	OATC	<b><u>SUBSEQUENT OPERATOR ACTION</u></b>  1. Attempt to balance charging and letdown flow.  2. WHEN letdown temperature is restored, return 1-TV-0129 to the DEMIN position.
	OATC	3. IF instrument or equipment failure has occurred, initiate maintenance as required.  <b><u>COMPENSATORY OPERATOR ACTIONS</u></b> NONE  <b><u>Note to examiner: The OATC can control cooling flow to the VCT using TV-0130. For 120 gpm letdown flow, this is normally set to 51% (note dry erase board on podium). It is expected the OATC will take manual control of TV-0130 to control cooling flow.</u></b>

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Event No.: 3

**Event Description:** TIC-130 temperature element will fail low, resulting in high letdown temperature and causing letdown to divert to the VCT. The crew will respond to the failure based on ARP 17007, for ALB07-F04 LTDN HX HI TEMP DEMIN DIVERT. The crew may also respond based on AOP 18022-C as specified in the ARP.

Time	Position	Applicant's Action or Behavior
		End of 17007-F04 actions.
	OATC	<p><b>ALB07-B04 actions (LTDN HX HI TEMP DEMIN DIVERT)</b></p> <p><b><u>PROBABLE CAUSE</u></b></p> <ol style="list-style-type: none"><li>1. Low Auxiliary Component Cooling Water (ACCW) flow through the Letdown Heat Exchanger.</li><li>2. Low ACCW flow through the Excess Letdown Heat Exchanger or Seal Water Heat Exchanger if aligned to the Volume Control Tank (VCT).</li></ol>
	OATC	<p><b><u>AUTOMATIC ACTIONS</u></b></p> <p>NONE</p> <p><b><u>INITIAL OPERATOR ACTIONS</u></b></p> <p>Check normal operation of ACCW and, if necessary, initiate 18022-C, "Loss of Auxiliary Component Cooling Water".</p>



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Event No.: 3

**Event Description:** TIC-130 temperature element will fail low, resulting in high letdown temperature and causing letdown to divert to the VCT. The crew will respond to the failure based on ARP 17007, for ALB07-F04 LTDN HX HI TEMP DEMIN DIVERT. The crew may also respond based on AOP 18022-C as specified in the ARP.

Time	Position	Applicant's Action or Behavior
	OATC	<p><b><u>SUBSEQUENT OPERATOR ACTIONS</u></b></p> <p>NOTE</p> <p>Seal water injection flow to the Reactor Coolant Pumps (RCPs) should be maintained less than 130°F.</p> <ol style="list-style-type: none"> <li>1. Monitor VCT outlet temperature using 1-TI-0116 on the QMCB.</li> <li>2. Check letdown flow using 1-FI-0132 and temperature using 1-TI-0130 on the QMCB.</li> <li>3. Adjust the charging or letdown flow if necessary to reduce the letdown temperature.</li> <li>4. Return to normal operation as soon as possible per 13006-1, "CVCS Startup and Normal Operation."</li> <li>5. IF equipment failure is indicated, initiate maintenance as required.</li> </ol> <p><b><u>COMPENSATORY OPERATOR ACTIONS</u></b></p> <p>NONE – End of 17007-B04 actions.</p>
	SS	<p><b>AOP-18022-C, LOSS OF AUXILIARY COMPONENT COOLING WATER symptoms and steps.</b></p> <p>Symptoms / alarms:</p> <ul style="list-style-type: none"> <li>• High temperature on any heat exchanger serviced by ACCW.</li> </ul>

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Event No.: 3

**Event Description:** TIC-130 temperature element will fail low, resulting in high letdown temperature and causing letdown to divert to the VCT. The crew will respond to the failure based on ARP 17007, for ALB07-F04 LTDN HX HI TEMP DEMIN DIVERT. The crew may also respond based on AOP 18022-C as specified in the ARP.

Time	Position	Applicant's Action or Behavior
		<u><i>Note to examiner: The SS may look at 18022-C due to the reference from ALB07-B04 (if received).</i></u>
	OATC	<p style="text-align: center;"><u>NOTES</u></p> <ul style="list-style-type: none"> <li>• ACCW pumps are removed from the 4.16KV Class 1E buses following simultaneous loss of offsite power and safety injection.</li> <li>• ACCW flow to the Seal Water Heat Exchanger is not required if RCS temperature is less than 150°F and Seal Water Heat Exchanger Return Temperature remains less than 135°F.</li> </ul>
	OATC	<ol style="list-style-type: none"> <li>1. Check ACCW pumps – AT LEAST ONE RUNNING. <b>(YES)</b></li> <li>2. Check ACCW SPLY HDR PRESS PI-1977 – GREATER THAN 135 PSIG. <b>(YES)</b></li> <li>3. Check if ACCW flow exists through the letdown heat exchanger. <b>(YES)</b> <ul style="list-style-type: none"> <li>• TV-0130 OPEN.</li> <li>• ALB07-D03 LTDN HX OUT HI TEMP – EXTINGUISHED.</li> </ul> </li> </ol>
	OATC UO	4. Initiate the Continuous Actions Page.
	OATC	5. Check ACCW Surge Tank Level (IPC L2700) – GREATER THAN 20% AND STABLE OR RISING. <b>(YES)</b>

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Event No.: 3

**Event Description:** TIC-130 temperature element will fail low, resulting in high letdown temperature and causing letdown to divert to the VCT. The crew will respond to the failure based on ARP 17007, for ALB07-F04 LTDN HX HI TEMP DEMIN DIVERT. The crew may also respond based on AOP 18022-C as specified in the ARP.

Time	Position	Applicant's Action or Behavior
	OATC	<p>6. Check if RCPs should be stopped:</p> <p>a. Check the following RCP parameters (using plant computer):</p> <ul style="list-style-type: none"> <li>• Motor bearing (upper or lower radial or thrust) – GREATER THAN 195°F.</li> <li>• Motor stator winding – GREATER THAN 311°F.</li> </ul>
	OATC	<p>6. (Cont)</p> <ul style="list-style-type: none"> <li>• Seal water inlet – GREATER THAN 230°F.</li> <li>• Loss of ACCW – GREATER THAN 10 MINUTES.</li> </ul> <p><b><u>Note to examiner: All parameters listed are met, the RCPs are NOT required to be tripped.</u></b></p> <p>a. Perform the following.</p> <ol style="list-style-type: none"> <li>1) IF any parameter limit is exceeded, THEN perform step 6.b.</li> <li>2) Go to Step 7.</li> </ol>
	OATC	<p>7. Check RCP thermal barrier outlet valves – OPEN. <b>(YES)</b></p> <ul style="list-style-type: none"> <li>• HV-19051 ACCW RCP-1 THERMAL BARRIER RTN VLV</li> <li>• HV-19053 ACCW RCP-2 THERMAL BARRIER RTN VLV</li> <li>• HV-19055 ACCW RCP-3 THERMAL BARRIER RTN VLV</li> <li>• HV-19057 ACCW RCP-4 THERMAL BARRIER RTN VLV</li> </ul>

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Event No.: 3

**Event Description:** TIC-130 temperature element will fail low, resulting in high letdown temperature and causing letdown to divert to the VCT. The crew will respond to the failure based on ARP 17007, for ALB07-F04 LTDN HX HI TEMP DEMIN DIVERT. The crew may also respond based on AOP 18022-C as specified in the ARP.

Time	Position	Applicant's Action or Behavior
		<ul style="list-style-type: none"> <li>HV-2041 ACCW RCPS THERMAL BARRIER RTN VLV</li> </ul> <p><b><u>Note to examiner: All the above listed valves are open as required.</u></b></p>
	OATC	8. Check ACCW heat exchangers outlet temperature (IPC T2701) - LESS THAN 120°F. <b>(YES)</b>
	OATC	9. Check ACCW containment isolation valves – OPEN. <b>(YES)</b> <ul style="list-style-type: none"> <li>HV-1979 ACCW SPLY HDR ORC ISO VLV</li> <li>HV-1978 ACCW SPLY HDR IRC ISOL VLV</li> <li>HV-1974 ACCW RTN HDR IRC ISO VLV</li> <li>HV-1975 ACCW RTN HDR ORC ISO VLV</li> </ul> <p><b><u>Note to examiner: All the above listed valves are open as required.</u></b></p>
	OATC	10. Check if ACCW is restored to service.
	SS	a. Components cooled by ACCW – TEMPERATURES RETURNING TO NORMAL. <b>(YES)</b> b. Restore charging and letdown using 13006, CHEMICAL AND VOLUME CONTROL SYSTEM. <b>(N/A)</b> c. Return to procedure and step in effect.

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Event No.: 3

**Event Description:** TIC-130 temperature element will fail low, resulting in high letdown temperature and causing letdown to divert to the VCT. The crew will respond to the failure based on ARP 17007, for ALB07-F04 LTDN HX HI TEMP DEMIN DIVERT. The crew may also respond based on AOP 18022-C as specified in the ARP.

Time	Position	Applicant's Action or Behavior
END OF EVENT 3. PROCEED TO NEXT EVENT AT THE DISCRETION OF THE CHIEF EXAMINER.		

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Event No.: 4

**Event Description:** VCT LT-185 fails high (CV12) causing CVCS letdown to divert from the VCT to the RHUT. Automatic swap over to the RWST is not available with LT-185 failed high.

Time	Position	Applicant's Action or Behavior
	CREW	<p>Diagnoses VCT makeup problems:</p> <p><u>Alarms:</u></p> <p>ALB07 E05 VCT HI/LO LEVEL</p> <p><u>Indications:</u></p> <p>VCT level (LT-185) at 100%  VCT level (LT-112) &lt; 50% and lowering  LV-112A in the RHUT position (Amber light – ON)  100 gpm automatic makeup occurs at 30% VCT level</p>
	OATC / SS	Refer to ARP 17007-1 for VCT HI/LO LEVEL
	SS	Directs OATC action using AOP 18007-C, Section C for loss of VCT makeup.
	OATC	<p>C1. Stabilize plant conditions:</p> <ul style="list-style-type: none"> <li>• Reactor power</li> <li>• RCS temperature</li> <li>• PRZR pressure</li> </ul>
	OATC	<p>C2. Check the following:</p> <ul style="list-style-type: none"> <li>a. At least one boric acid transfer pump running</li> <li>b. At least one reactor makeup water pump running</li> <li>c. VCT makeup valve alignment correct for selected mode</li> <li>d. letdown divert valve LV-112A aligned to the VCT (NOT)</li> </ul> <p>RNO d. Align LV-112A to VCT</p>

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Event No.: 4

**Event Description:** VCT LT-185 fails high (CV12) causing CVCS letdown to divert from the VCT to the RHUT. Automatic swap over to the RWST is not available with LT-185 failed high.

Time	Position	Applicant's Action or Behavior
	OATC / UO	C3. Initiate continuous action page
	OATC	C4. Checks VCT makeup flow restored
	SS	C5. Return to procedure and step in effect
	SS	Has SSS perform following: <ul style="list-style-type: none"><li>• Write a condition report</li><li>• Notify I&amp;C to repair</li><li>• Notify OPS duty manager of AOP entry</li></ul>
<b>END OF EVENT 4. PROCEED TO NEXT EVENT AT THE DISCRETION OF THE CHIEF EXAMINER.</b>		

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Scenario No.: 1

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Event No.: 5

Event Description: Failure of Steam Generator # 2 Pressure Instrument PI-525A downscale low requiring entry into AOP-18001-C, section F for failure of SG Pressure Instrumentation.

Time	Position	Applicant's Action or Behavior
	UO	<p>Identify failure of SG # 2 Pressure Instrument PI-525:</p> <p>Alarms:</p> <ul style="list-style-type: none"> <li>• ALB14-B02 STM GEN 2 HI STM PRESS RATE ALERT</li> <li>• ALB13-F01 HI STM PRESS RATE</li> <li>• ALB13-B04 STM GEN 2 LO STEAMLINE PRESS ALERT</li> </ul> <p>Indications:</p> <ul style="list-style-type: none"> <li>• Steam Pressure Indicator PI-525A down scale low.</li> </ul>
	UO  IOA	<p>Step # F1</p> <p>Perform IOAs to check steam and feed flows – MATCHED ON ALL SGs (they will be) and perform RNO for Step # F1 (IF REQUIRED).</p> <ul style="list-style-type: none"> <li>• Takes manual control of MFRV # 1 and raises FW flow.</li> <li>• Takes manual control of MFPTs speed and raises MFPT speed.</li> <li>• Controls SG levels between 60 and 70%.</li> </ul>
	SS	Enter AOP-18001-C section F for Failure of Steam Generator Pressure Instrumentation. Verify IOAs are complete.
	UO	<p>Step # F2</p> <ul style="list-style-type: none"> <li>• Bypass the affected channel at the Operator Work Station (OWS).</li> </ul>
	SS/ UO	<p>Step # F3</p> <ul style="list-style-type: none"> <li>• Initiate the Continuous Actions Page.</li> </ul>
	SS	<p>Step # *F4</p> <p>Check SG level control maintains NR level - AT 65%.</p>



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Event No.: 5

Event Description: Failure of Steam Generator # 2 Pressure Instrument PI-525A downscale low requiring entry into AOP-18001-C, section F for failure of SG Pressure Instrumentation.

Time	Position	Applicant's Action or Behavior
	SS / UO	<p>Step # F5</p> <ul style="list-style-type: none"> <li>Notify I &amp; C for repairs, notifies Operations Duty of the AOP entry.</li> </ul>
	SS	<p>Step # F6</p> <ul style="list-style-type: none"> <li>Bypass affected channel using 13509-C, Bypass Test Instrumentation (BTI) Panel Operation, if desired.</li> <li></li> </ul> <p><b>NOTE: It is NOT expected the SS will bypass or trip the channel.</b></p> <p>Step # F7</p> <ul style="list-style-type: none"> <li>Determine Bistables need to be tripped within 72 hours with MASTER TEST SWITCH in TEST.</li> </ul> <p>Step # F8</p> <ul style="list-style-type: none"> <li>Reference Tech Specs for ESFAS Instrumentation, PAMS Instrumentation, and Remote Shutdown Instrumentation.</li> <li>LCO 3.3.2, FU 1e, Condition D</li> <li>LCO 3.3.2, FU 4d(1), Condition D</li> <li><del>LCO 3.3.2, FU 4d(2), Condition D</del></li> <li>LCO 3.3.3, FU 8, Condition B</li> <li>LCO 3.3.4 FU 13, Condition A</li> </ul> <p>Step # *F9</p> <p>Check repairs and surveillances - COMPLETE. <b><u>(NO)</u></b></p> <p>*F9 RNO.</p> <ol style="list-style-type: none"> <li><u>WHEN</u> repairs and surveillances are complete, <u>THEN</u> perform Step F10.</li> <li>Return to procedure and step in effect.</li> </ol>
<p align="center"><b>END OF EVENT 5. PROCEED TO NEXT EVENT AT THE DISCRETION OF THE LEAD EXAMINER</b></p>		

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Event No.: 6

**Event Description:** The RAT supply breaker to 1AA02 will trip due to a breaker fault. DG-1A will start, close its output breaker, and begin sequencing UV loads. During the load sequence, the Train “A” NSCW pumps will fail to start, requiring manual start. This event will require the crew to complete the actions of AOP 18031-C, “Loss of Class 1E Electrical Systems”. Corrective actions include reducing AFW flow to return reactor power < 100%, shifting electrical loads to the B train 1E bus, as well as implementing tech specs for loss of AC power.

Time	Position	Applicant's Action or Behavior
	UO OATC SS	<p>Diagnose loss of power to 1AA02:</p> <p><u>Alarms:</u></p> <p>RESV AUX XFMR 1NXRA HI SIDE PHOC LOR TRIP            DG1A TRIP OVERSPEED            DG1A DISABLED NONRESET OF EMERGENCY TRIP            DG1A EMERGENCY START            DG1A LOW PRESS STARTING AIR            4160V SWGR 1AA02 TROUBLE</p> <p><u>Indications:</u></p> <p>Control room lighting dims            1AA02 white bus potential lights go out            DG-1A starts and its output breaker shuts            DG-1A trips and its output breaker opens</p>
	SS	<p>Enters AOP 18031-C, “Loss of Class 1E Electrical Systems”            (Crew Update)</p>
	UO	<p><b><u>18031-C</u></b></p> <ol style="list-style-type: none"> <li>1. Check power to 1E 4160V Emergency busses – AT LEAST ONE ENERGIZED:               <ol style="list-style-type: none"> <li>a. 4160V AC 1E Busses</li> </ol> </li> </ol>

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Event No.: 6

**Event Description:** The RAT supply breaker to 1AA02 will trip due to a breaker fault. DG-1A will start, close its output breaker, and begin sequencing UV loads. During the load sequence, the Train "A" NSCW pumps will fail to start, requiring manual start. This event will require the crew to complete the actions of AOP 18031-C, "Loss of Class 1E Electrical Systems". Corrective actions include reducing AFW flow to return reactor power < 100%, shifting electrical loads to the B train 1E bus, as well as implementing tech specs for loss of AC power.

Time	Position	Applicant's Action or Behavior
	OATC	*2. <b>Check Reactor power - LESS THAN 100%:</b> <ul style="list-style-type: none"> <li>UQ1118 - LESS THAN OR EQUAL TO 100% MWT for the applicable unit.</li> <li>NIs - LESS THAN OR EQUAL TO 100%.</li> <li>ΔT - LESS THAN OR EQUAL TO 100%.</li> </ul>
	UO	3. Check affected train Diesel Generator - RUNNING. <b>(YES)</b>
	UO <b>Critical Task</b>	4. Verify NSCW status on affected train: <ul style="list-style-type: none"> <li>a. Pumps - TWO RUNNING. <b>(UO will manually start pumps)</b> <ul style="list-style-type: none"> <li>i. Discharge valves - OPEN.</li> <li>ii. Supply and return flows - NORMAL.</li> </ul> </li> </ul> <p><b>(Valves will open 45 seconds after pumps are manually started and flows will be normal.)</b></p>
	SS	5. Go to Section B. LOSS OF POWER WITH DG TYING TO BUS.

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Event No.: 6

**Event Description:** The RAT supply breaker to 1AA02 will trip due to a breaker fault. DG-1A will start, close its output breaker, and begin sequencing UV loads. During the load sequence, the Train "A" NSCW pumps will fail to start, requiring manual start. This event will require the crew to complete the actions of AOP 18031-C, "Loss of Class 1E Electrical Systems". Corrective actions include reducing AFW flow to return reactor power < 100%, shifting electrical loads to the B train 1E bus, as well as implementing tech specs for loss of AC power.

Time	Position	Applicant's Action or Behavior
	SS	<p><b><u>Section B</u></b></p> <p>B1. Dispatch an operator to the Diesel Generator to perform 13145A/B section for "Diesel Generator Operation Under Emergency Conditions."</p>
	UO	<p>B2. Perform the following for the affected bus:</p> <ul style="list-style-type: none"> <li>a. Verify bus frequency - AT 60 HZ.</li> <li>b. Verify bus voltage - AT 4160V AC.</li> </ul>
	OATC	<p>B3. Check charging pumps - ONLY ONE OPERATING.</p>
	OATC	<p><b><u>B3 RNO.</u></b></p> <p>B3. Perform the following:</p> <ul style="list-style-type: none"> <li>a. Start or stop pumps as necessary to establish one running charging pump.</li> <li>b. <u>IF</u> charging pump can <u>NOT</u> be started, <u>THEN</u> perform the following: <ul style="list-style-type: none"> <li>i. Isolate normal letdown.</li> <li>ii. Initiate 18007-C, CHEMICAL AND VOLUME CONTROL SYSTEM MALFUNCTION.</li> </ul> </li> </ul>

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Event No.: 6

**Event Description:** The RAT supply breaker to 1AA02 will trip due to a breaker fault. DG-1A will start, close its output breaker, and begin sequencing UV loads. During the load sequence, the Train "A" NSCW pumps will fail to start, requiring manual start. This event will require the crew to complete the actions of AOP 18031-C, "Loss of Class 1E Electrical Systems". Corrective actions include reducing AFW flow to return reactor power < 100%, shifting electrical loads to the B train 1E bus, as well as implementing tech specs for loss of AC power.

Time	Position	Applicant's Action or Behavior
	UO	B4. Check CCW pumps on affected train - TWO RUNNING. <u>(YES)</u>
	OATC	B5. Check RHR status: a. Check RHR - REQUIRED FOR SHUTDOWN COOLING. <u>(NO)</u> <del>b. Start RHR pumps aligned for shutdown cooling as needed. N/A</del>
	SS	B6. Initiate the Continuous Actions Page.
	UO	B7. Check AFW status: a. Check AFW system - NEEDED TO MAINTAIN SG LEVELS. <u>(NO)</u>
	UO	<u><b>B7. RNO</b></u> a. Perform the following: i. Shutdown running AFW pumps and align for standby readiness by initiating 13610, AUXILIARY FEEDWATER SYSTEM. ii. Go to Step B8.
	UO	B8. Check ACCW pumps - ONLY ONE RUNNING.

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Event No.: 6

**Event Description:** The RAT supply breaker to 1AA02 will trip due to a breaker fault. DG-1A will start, close its output breaker, and begin sequencing UV loads. During the load sequence, the Train "A" NSCW pumps will fail to start, requiring manual start. This event will require the crew to complete the actions of AOP 18031-C, "Loss of Class 1E Electrical Systems". Corrective actions include reducing AFW flow to return reactor power < 100%, shifting electrical loads to the B train 1E bus, as well as implementing tech specs for loss of AC power.

Time	Position	Applicant's Action or Behavior
	UO	B9. At QHVC perform the following: <ol style="list-style-type: none"> <li>Verify only four containment cooling units running in fast speed using 13120, CONTAINMENT BUILDING COOLING SYSTEM</li> <li>Check CRDM cooling fans - TWO RUNNING.</li> <li>Verify reactor cavity cooling unit - ONE RUNNING.</li> </ol>
	UO	B10. Verify SFP pump running and aligned to in service SFP heat exchanger. <u>IPC Points</u> ZD3405 ZD3411
	UO	B11. Dispatch operators to determine cause for loss of power.
	SS	B12. Initiate the following: <ol style="list-style-type: none"> <li>14230, OFFSITE AC CIRCUIT VERIFICATION AND CAPACITY / CAPABILITY EVALUATION.</li> <li>Verify SAT energized using 13418-A(B), STANDBY AUXILIARY TRANSFORMER UNIT 1(2) TRAIN A(B) OPERATIONS.</li> </ol>
	SS	B13. Review the following Technical Specification requirements: <ul style="list-style-type: none"> <li>AC electrical power sources - LCO 3.8.1 or 3.8.2.</li> <li>AFW - LCO 3.7.5.</li> <li>RCS Specific Activity - SR 3.4.16.2 if &gt;15% power transient has occurred.</li> </ul>

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Event No.: 6

**Event Description:** The RAT supply breaker to 1AA02 will trip due to a breaker fault. DG-1A will start, close its output breaker, and begin sequencing UV loads. During the load sequence, the Train "A" NSCW pumps will fail to start, requiring manual start. This event will require the crew to complete the actions of AOP 18031-C, "Loss of Class 1E Electrical Systems". Corrective actions include reducing AFW flow to return reactor power < 100%, shifting electrical loads to the B train 1E bus, as well as implementing tech specs for loss of AC power.

Time	Position	Applicant's Action or Behavior
		<p>B14. Restore normal power by initiating 13427A/B, 4160V AC BUS AA02/BA03 1E ELECTRICAL DISTRIBUTION SYSTEM section for "Paralleling Normal Incoming Source (RAT or SAT) To 4160V AC Bus Being Supplied From Diesel Generator."</p> <p><b><u>B14. RNO</u></b> Restore power from an alternate source, if desired, by initiating 13427A/B, 4160V AC BUS AA02/BA03 1E ELECTRICAL DISTRIBUTION SYSTEM section for "Paralleling Alternate Incoming Source To 4160V AC Bus Being Supplied From Diesel Generator."</p>
		<p>B15. Check normal or alternate power to bus - RESTORED.</p> <p><b><u>B15. RNO</u></b> Return to Step 14.</p>
	UO SS	B16. Align affected DG for automatic starting by initiating 13145, DIESEL GENERATORS.
	SS	B17. Restore affected components as required by current plant conditions.
	SS	B18. Return to procedure and step in effect.
END OF EVENT 5. PROCEED TO NEXT EVENT AT THE DISCRETION OF THE CHIEF EXAMINER.		

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Event No.: 7, 8

**Event Description:** The Loop #4 BFRV fails closed, requiring the crew to respond per guidance of 18016-C, "Condensate and Feedwater Malfunction". The UO will be able to maintain level, and operation can continue. After a short delay, the Loop #4 BFRV will fail open, which will require a reactor trip. When the reactor trips, 3 control rods will fail to bottom, requiring emergency boration.

Time	Position	Applicant's Action or Behavior
	CREW	<p>Diagnose the closure of the Loop #4 BFRV</p> <p><u>Alarms:</u></p> <p>ALB13 D01 STM GEN 4 FLOW MISMATCH</p> <p>ALB13 D03 STM GEN 4 LO LEVEL</p> <p>ALB13 F06 STM GEN 4 DIGITAL FW SYS TROUBLE</p> <p><b><u>Note to examiner: Annunciators may not alarm before diagnosis of the failure.</u></b></p> <p><u>Indications:</u></p> <p>M/A station valve position indication going closed</p> <p>Steam flow and feed flow not matched in SG #4</p> <p>Lowering level in SG #4</p>
	SS	Enters 18016-C Section D.
	OATC	<p><b><u>CRITICAL TASK</u></b></p> <p><b><u>IOA's</u></b></p> <p>D1. Check proper operation of MFRVs and BFRVs. <b><u>(NO)</u></b></p> <p>D1 RNO:</p> <p>a. Take manual control of affected SG MFRVs and/or BFRVs to match steam and feed flows:</p> <ul style="list-style-type: none"> <li>• Loop #4 BFRV</li> <li>• Control SG levels between 60% and 70%.</li> <li>• IF SG levels cannot be maintained greater than 41%</li> </ul> <p>-OR-</p> <ul style="list-style-type: none"> <li>• Less than 79% <u>THEN</u> perform the following:</li> </ul> <ol style="list-style-type: none"> <li>1. Trip the reactor</li> <li>2. Go to 19000-C, E-0 REACTOR TRIP OR SAFETY</li> </ol> <p><b><u>Operator will be able to maintain level using manual control of BFRV.</u></b></p>



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Event No.: 7, 8

**Event Description:** The Loop #4 BFRV fails closed, requiring the crew to respond per guidance of 18016-C, "Condensate and Feedwater Malfunction". The UO will be able to maintain level, and operation can continue. After a short delay, the Loop #4 BFRV will fail open, which will require a reactor trip. When the reactor trips, 3 control rods will fail to bottom, requiring emergency boration.

Time	Position	Applicant's Action or Behavior
	UO	<p><b><u>IOA's</u></b></p> <p>D2. Verify feedwater isolation valves open:</p> <ul style="list-style-type: none"> <li>a. BFIVs (YES)</li> <li>b. MFIVs (NO)</li> </ul> <p>D2b. RNO</p> <p>Perform the following:</p> <ul style="list-style-type: none"> <li>• IF MFIV will <u>NOT</u> open, <u>THEN</u> take manual control of affected SG MFRVs and/or BFRVs to match steam and feed flows.</li> <li>• Control SG levels between 60% and 70%.</li> <li>• IF SG levels cannot be maintained greater than 41% <u>OR</u> Less than 79% <u>THEN</u> perform the following: <ul style="list-style-type: none"> <li>a) Trip the reactor.</li> <li>b) Go to 1900-C, REACTOR TRIP OR SAFETY INJECTION.</li> </ul> </li> </ul>
	SS	<p><b><u>Subsequent Actions</u></b></p> <p>D3. Initiate Continuous Actions.</p>
		<p>D4. Perform channel check of instrumentation - NORMAL:</p> <ul style="list-style-type: none"> <li>• SG levels</li> <li>• SG pressures</li> <li>• SG Steam Flows</li> <li>• SG Feed Flows</li> </ul>

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Event No.: 7, 8

**Event Description:** The Loop #4 BFRV fails closed, requiring the crew to respond per guidance of 18016-C, "Condensate and Feedwater Malfunction". The UO will be able to maintain level, and operation can continue. After a short delay, the Loop #4 BFRV will fail open, which will require a reactor trip. When the reactor trips, 3 control rods will fail to bottom, requiring emergency boration.

Time	Position	Applicant's Action or Behavior
	UO	D5. Check Rated Thermal Power - NOT BEING EXCEEDED:
	UO	<ul style="list-style-type: none"> <li>• <math>\Delta T \leq 100\%</math></li> <li>• NIs <math>\leq 100\%</math></li> <li>• UQ1118 <math>\leq 100\%</math> MWt</li> </ul> <p>D5 RNO.</p> <p>Reduce turbine load as required to maintain Reactor Power less than or equal to Rated Thermal Power.</p>
	SS	<p>*D6. Check SGs NR levels - AT 65%.</p> <p>D6 RNO:</p> <p>Take manual control of affected SG MFRVs and/or BFRVs to Control SGs levels between 60% and 70%.</p>
	SS	<p>D7. Refer to Technical Specification 3.7.3 for required action.</p> <p><b><u>Note to examiner: Intent is to initiate the additional BFRV failure after the SS has evaluated the TS implications. The additional BFRV failure will lead to the reactor trip.</u></b></p>
	SS	D8. Notify Maintenance to initiate repairs.
	SS	D9. Return to procedure and step in effect. (Crew may remain in procedure)

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Event No.: 7, 8

**Event Description:** The Loop #4 BFRV fails closed, requiring the crew to respond per guidance of 18016-C, "Condensate and Feedwater Malfunction". The UO will be able to maintain level, and operation can continue. After a short delay, the Loop #4 BFRV will fail open, which will require a reactor trip. When the reactor trips, 3 control rods will fail to bottom, requiring emergency boration.

Time	Position	Applicant's Action or Behavior
	CREW	<p>Diagnose the opening of the Loop #4 BFRV.</p> <p><u>Alarms:</u></p> <p>ALB13 D01 STM GEN 4 FLOW MISMATCH  ALB14 D01 STM GEN 4 HI-HI LEVEL ALERT  ALB13 F06 STM GEN 4 DIGITAL FW SYS TROUBLE</p> <p><b><u>Note to examiner: Annunciators may not alarm before diagnosis of the failure.</u></b></p> <p><u>Indications:</u></p> <p>M/A station valve position indication going open.  Steam flow and feed flow not matched in SG #4.  Rising level in SG #4.</p>
	SS	Re-enter 18016 Section-C D. <b>(Crew may use *D6 to try to establish control)</b>
	UO	<p><b><u>IOA's</u></b></p> <p>D1. Check proper operation of MFRVs and BFRVs. <b><u>(NO)</u></b></p> <p>D1 RNO:</p> <p>b. Take manual control of affected SG MFRVs and/or BFRVs to match steam and feed flows:</p> <ul style="list-style-type: none"> <li>• Loop #4 BFRV</li> <li>• Control SG levels between 60% and 70%.</li> <li>• <u>IF</u> SG levels cannot be maintained greater than 41%</li> </ul> <p>-OR-</p> <ul style="list-style-type: none"> <li>• Less than 79% <u>THEN</u> perform the following:</li> </ul> <ol style="list-style-type: none"> <li>1. Trip the reactor</li> <li>2. Go to 19000-C, E-0 REACTOR TRIP OR SAFETY</li> </ol> <p><b><u>Operator will NOT be able to maintain level using manual control of BFRV.</u></b></p>

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Event No.: 7, 8

**Event Description:** The Loop #4 BFRV fails closed, requiring the crew to respond per guidance of 18016-C, "Condensate and Feedwater Malfunction". The UO will be able to maintain level, and operation can continue. After a short delay, the Loop #4 BFRV will fail open, which will require a reactor trip. When the reactor trips, 3 control rods will fail to bottom, requiring emergency boration.

Time	Position	Applicant's Action or Behavior
	SS	<p>Direct the OATC to trip the reactor.</p> <p><b><u>Note to examiner: The OATC may take this action prior to SS direction based on the Immediate Operator Action response.</u></b></p>
	CREW	Perform Immediate Operator Actions of 19000-C, "E-0 REACTOR TRIP OR SAFETY INJECTION."
	OATC	<p><b><u>19000-C IOAs</u></b></p> <ol style="list-style-type: none"> <li>Check Reactor trip: <ul style="list-style-type: none"> <li>Rod Bottom Lights – LIT (Three lights are NOT LIT)</li> <li>Reactor Trip and Bypass Breakers – OPEN (RTBs are OPEN)</li> <li>Neutron Flux – LOWERING</li> </ul> </li> <li>RNO Trip Reactor using both Reactor trip handswitches. <u>IF</u> Reactor <u>NOT</u> tripped, <u>THEN</u> go to 19211-C, FR-S.1 RESPONSE TO NUCLEAR POWER GENERATION / ATWT.</li> </ol>
	UO	<p><b><u>IOAs</u></b></p> <ol style="list-style-type: none"> <li>Check Turbine trip: <ul style="list-style-type: none"> <li>All Turbine Stop Valves – CLOSED.</li> </ul> </li> </ol>

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**Event Description:** The Loop #4 BFRV fails closed, requiring the crew to respond per guidance of 18016-C, "Condensate and Feedwater Malfunction". The UO will be able to maintain level, and operation can continue. After a short delay, the Loop #4 BFRV will fail open, which will require a reactor trip. When the reactor trips, 3 control rods will fail to bottom, requiring emergency boration.

Time	Position	Applicant's Action or Behavior
	UO	<p><u>IOAs</u></p> <p>3. Checks power to the AC Emergency Busses:</p> <ul style="list-style-type: none"> <li>a. AC Emergency Busses – AT LEAST ONE ENERGIZED.</li> <li>b. AC Emergency Busses – ALL ENERGIZED: <b>(YES)</b> <ul style="list-style-type: none"> <li>• 4160 V AC 1E Busses</li> <li>• 480V AC 1E Busses</li> </ul> </li> </ul>
	OATC	<p><u>IOAs</u></p> <p>4. Check if SI is actuated.</p> <ul style="list-style-type: none"> <li>• Any SI annunciator – LIT. <b>(NO)</b></li> <li>• SI ACTUATED BPLB window – LIT. <b>(NO)</b></li> </ul>
	OATC	<p><u>IOAs</u></p> <p>4. RNO</p> <p>Check if SI is required:</p> <p><u>IF</u> one or more of the following conditions has occurred:</p> <ul style="list-style-type: none"> <li>• PRZR pressure less than or equal to 1870 psig.</li> <li>• Steam line pressure less than or equal to 585 psig</li> <li>• Containment pressure greater than or equal to 3.8 psig.</li> <li>• Automatic alignment of ECCS equipment to injection phase.</li> </ul> <p><u>THEN</u> actuate SI and go to Step 6. <b><u>(SI is NOT required)</u></b></p>

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**Event Description:** The Loop #4 BFRV fails closed, requiring the crew to respond per guidance of 18016-C, "Condensate and Feedwater Malfunction". The UO will be able to maintain level, and operation can continue. After a short delay, the Loop #4 BFRV will fail open, which will require a reactor trip. When the reactor trips, 3 control rods will fail to bottom, requiring emergency boration.

Time	Position	Applicant's Action or Behavior
	SS UO	5. Perform the following to limit RCS cooldown:  a. Check NR level in at least one SG greater than 10%. b. Reduce AFW flow. c. Go to 19001-C, ES-0.1 REACTOR TRIP RESPONSE..
<b>END OF EVENT 6. PROCEED TO REACTOR TRIP RESPONSE, 19001-C.</b>		

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Event No.: 8, Reactor Trip Response 19001-C

Event Description: Reactor Trip Response

Time	Position	Applicant's Action or Behavior
	SS	Enter 19001-C, "ES-0.1 REACTOR TRIP RESPONSE."
	SS	1. Initiate the following: <ul style="list-style-type: none"> <li>Continuous Actions and Foldout Page.</li> <li>Critical Safety Function Status Trees per 19200-C, F-O CRITICAL SAFETY FUNCTION STATUS TREE.</li> </ul>
	SS	2. Initiate NMP-EP-110, EMERGENCY CLASSIFICATION DETERMINATION AND INITIAL ACTION.
	CREW	3. IF SI actuation occurs during this procedure, <u>THEN</u> go to 19000-C, E-0 REACTOR TRIP OR SAFETY INJECTION.
	UO	4. Limit RCS cooldown: <ol style="list-style-type: none"> <li>Verify AFW flow to SGs. (<b>Manually start AFW pumps.</b>)</li> <li>Trip both MFPs.</li> <li>Check SGs NR level - AT LEAST ONE GREATER THAN 10%.</li> <li>Throttle total AFW flow as necessary.</li> <li>Verify SG Blowdown Isolation Valves - CLOSED WITH HANDSWITCHES IN CLOSE.</li> </ol>
	OATC	5. Check RCS temperature stable at or trending to 557°F.  With RCP(s) running - RCS AVERAGE TEMPERATURE. -OR- Without RCP(s) running - RCS WR COLD LEG TEMPERATURES.

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Event No.: 8, Reactor Trip Response 19001-C

Event Description: Reactor Trip Response

Time	Position	Applicant's Action or Behavior
	UO	<p>6. Check FW status:</p> <p>a. Average RCS temperature - LESS THAN 564°F.</p> <p>b. Verify FW isolation valves closed:</p> <ul style="list-style-type: none"> <li>• MFIVs</li> <li>• BFIVs</li> <li>• MFRVs</li> <li>• BFRVs</li> </ul>
	UO	<p>7. Check total feed flow capability to SGs - GREATER THAN 570 GPM AVAILABLE.</p>
	OATC  <b>Critical Task</b>	<p>8. Check all Rods - FULLY INSERTED. <b><u>(NO)</u></b></p> <p><b>8. RNO</b></p> <p>IF two or more Rods NOT fully inserted, THEN EMERGENCY BORATE 154 ppm for each Rod not fully inserted by initiating 13009, CVCS REACTOR MAKUP CONTROL SYSTEM.</p> <p>Verify adequate shutdown margin as required by Technical Specification SR 3.1.1.1.</p> <p><i>Expected boration for 3 stuck rods is approximately 4800 gallons.</i></p> <p><b><u>Note to examiner: ES-D-2 form for Event 8 contains the actions for the emergency boration. Intent is to initiate Event 9 after the Emergency Boration is started.</u></b></p>
	UO	<p>9. Check Main Generator Output Breakers – OPEN.</p>
	UO	<p>10. Perform the following:</p> <p>a. Check 18009-C, STEAM GENERATOR TUBE LEAK - IN EFFECT. <b><u>(NO)</u></b></p>



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Event No.: 8, Reactor Trip Response 19001-C

Event Description: Reactor Trip Response

Time	Position	Applicant's Action or Behavior
	SS	<p>10a. RNO</p> <p>Go to Step d.</p> <p>d. Check other AOPs - IN EFFECT. <u>(NO)</u></p> <p>Go to Step 11.</p>
	OATC	<p>11. Check PRZR level control:</p> <p>a. Instrument Air - AVAILABLE. <u>(YES)</u></p> <p>b. PRZR Level - GREATER THAN 17%. <u>(YES)</u></p> <p>c. Charging and letdown - IN SERVICE. <u>(YES)</u></p> <p>d. Maintain PRZR level at 25%. <u>(YES)</u></p>
	OATC	<p>12. Check PRZR pressure:</p> <p>a. Pressure - GREATER THAN 1870 PSIG.</p> <p>b. Pressure - STABLE AT <u>OR</u> TRENDING TO 2235 PSIG.</p>
	UO	<p>13. Check SG levels:</p> <p>a. NR level - AT LEAST ONE GREATER THAN 10%. <u>(YES)</u></p> <p>b. Maintain NR level between 10% <u>AND</u> 65%.</p> <p>c. NR level - ANY RISING IN AN UNCONTROLLED MANNER. <u>(NO)</u></p> <p>13.c. RNO</p> <p>c. Go to Step 14.</p>

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Event No.: 8, Reactor Trip Response 19001-C

Event Description: Reactor Trip Response

Time	Position	Applicant's Action or Behavior
	UO	<p>14. Check AC Busses:</p> <p>a. Emergency Buses - ENERGIZED BY OFFSITE POWER. <b><u>(NO)</u></b>  14a.RNO  Verify applicable Diesel Generator(s) have assumed the following train related loads:</p> <ul style="list-style-type: none"> <li>○ 2 NSCW pumps</li> <li>○ 2 CCW pumps</li> <li>○ 1 CCP</li> <li>○ 1 ACCW pump</li> <li>○ 1 MDAFW pump</li> <li>○ 4 Containment Coolers</li> <li>○ <u>480V AC Switchgear</u>: <ul style="list-style-type: none"> <li>○ AB04</li> <li>○ AB05</li> <li>○ AB15</li> <li>○ NB01</li> <li>○ BB06</li> <li>○ BB07</li> <li>○ BB16</li> <li>○ NB10</li> </ul> </li> </ul> <p><u>IF</u> two ACCW Pumps started, <u>THEN</u> stop one ACCW Pump.  Try to restore offsite power to AC Emergency Busses by initiating 13427A/B, 4160V AC AA02/BA03 ELECTRICAL DISTRIBUTION SYSTEM.  Restart ESF Chillers by initiating 13744, ESSENTIAL CHILLED WATER SYSTEM, or Normal Chillers by initiating 13743-C, NORMAL CHILLED WATER SYSTEM, to restore ESF Room Cooling.</p> <p>b. All Non-1E 13.8/4160/480V Busses - ENERGIZED BY OFFSITE POWER. <b><u>(YES)</u></b></p>
	UO	<p>15. Transfer Steam Dumps to STEAM PRESSURE mode:</p> <p>a. Check Condenser - AVAILABLE.  b. Place PIC-507 in Manual.  c. Match demand on SG header pressure controller PIC-507 and SD demand meter UI-500.  d. Transfer Steam Dumps to STM PRESS mode.  e. Control Tavg:  Manual control  -OR-  Auto control</p>

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Event No.: 8, Reactor Trip Response 19001-C

Event Description: Reactor Trip Response

Time	Position	Applicant's Action or Behavior
	OATC	16. Check RCP status: a. RCPs - ALL STOPPED. (NO)  16.a. RNO  Go to Step 17.
	OATC	17. Check PRZR Spray status:  a. RCP 4 or RCP 1 – RUNNING. b. Close PRZR Spray Valve(s) for stopped RCP(s):  RCP 1: PIC-0455C RCP 4: PIC-0455B c. Open RCP breakers for RCP(s) <u>NOT</u> running.
	OATC	18. Check NI indication:  a. IR flux - LESS THAN 7E -4%. b. SR - INDICATING CORRECTLY ON NR-45.
	SS	19. Secure unnecessary plant equipment.
	SS	20. Maintain stable plant conditions: <ul style="list-style-type: none"> <li>• PRZR pressure - AT 2235 PSIG.</li> <li>• PRZR level - AT 25%.</li> <li>• SG NR levels - BETWEEN 10% <u>AND</u> 65%.</li> <li>• RCS temperature:                With RCP(s) running - RCS AVERAGE TEMPERATURE AT 557°F.                -OR-                Without RCP(s) running - RCS WR COLD LEG TEMPERATURES AT 557°F.             </li> </ul>

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Event No.: 8, Reactor Trip Response 19001-C

Event Description: Reactor Trip Response

Time	Position	Applicant's Action or Behavior
	SS	21. Check if natural circulation cooldown is required: a. Any RCP – RUNNING. b. Go to 12006-C, RCS COOLDOWN TO COLD SHUTDOWN.
<b>END OF 19001-C ACTIONS. PROCEED AT THE DISCRETION OF THE CHIEF EXAMINER.</b>		

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**Event No.: 9, Emergency Boration**

**Event Description:** The OATC will use SOP 13009-1, Section 4.9 to emergency borate the RCS due to 3 control rods not fully inserted. 1HV-8104 is failed closed.

Time	Position	Applicant's Action or Behavior
	SS	Direct Emergency Boration of 154 ppm for EACH control rod NOT FULLY INSERTED per 13009-1, "CVCS REACTOR MAKEUP CONTROL SYSTEM."
	OATC	4.9.1 Emergency Boration Through 1HV-8104
	OATC	4.9.1.1 Start one (1) Boric Acid Transfer Pump.
	OATC	4.9.1.2 Verify a Charging Pump is running.
	OATC	4.9.1.3 Open EMERGENCY BORATE valve 1-HV-8104.  <b><u>Note to examiner: 1HV-8104 is failed closed.</u></b>
	OATC	<b>4.9.2 Emergency Boration Through The Normal Charging Flow Path</b>
	OATC	4.9.2.1 Start one (1) Boric Acid Transfer Pump.
	OATC	4.9.2.2 Verify a Charging Pump is running.
	OATC	4.9.2.3 Open the following valves: <ul style="list-style-type: none"> <li>○ 1 FV 0110A, BA TO BLENDER</li> <li>○ 1 FV 0110B, BLENDER OUTLET TO CHARGING PUMPS SUCT</li> </ul>

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**Event No.: 9, Emergency Boration**

**Event Description:** The OATC will use SOP 13009-1, Section 4.9 to emergency borate the RCS due to 3 control rods not fully inserted. 1HV-8104 is failed closed.

Time	Position	Applicant's Action or Behavior
	OATC	NOTE The following step assumes that with 12 gpm of seal return, 30 gpm will be supplied to the RCS.
	OATC	4.9.2.4 Place 1-FIC-0121 in MANUAL.
	OATC	4.9.2.5 Adjust 1-FIC-0121 to maintain flow greater than 42 gpm.
	OATC	4.9.2.6 Verify Emergency Boration flow 1-FI-0110A is greater than 30 gpm.
	OATC	4.9.2.7 IF flow is less than 30 gpm, start the second Boric Acid Transfer Pump.
	OATC	4.9.2.8 Operate the Pressurizer Backup Heaters as necessary to equalize boron concentration between the RCS and the Pressurizer.
	OATC	4.9.2.9 <b>Check</b> plant conditions are consistent with RCS boration: <ul style="list-style-type: none"> <li>○ RCS Tavg may be dropping.</li> <li>○ NIS may be dropping.</li> </ul>
	OATC	4.9.2.10 Determine the amount of boric acid required to allow termination of Emergency Boration.
	OATC	4.9.2.11 WHEN the determined amount of boric acid has been added to the RCS, close the following valves: <ul style="list-style-type: none"> <li>○ 1 FV 0110A</li> <li>○ 1 FV 0110B</li> </ul>
	OATC	4.9.2.12 Establish automatic makeup per Section 4.1.

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Event No.: 9, Emergency Boration

**Event Description:** The OATC will use SOP 13009-1, Section 4.9 to emergency borate the RCS due to 3 control rods not fully inserted. 1HV-8104 is failed closed.

Time	Position	Applicant's Action or Behavior
	OATC	4.9.2.13 Restore 1-FIC-0121 to the AUTO position.
	OATC	4.9.2.14 Direct Chemistry to sample and report the RCS boron concentration, or monitor the Boron Meter 1-AI-40134 if available.
END OF EVENT 8. PROCEED TO NEXT EVENT AT THE DISCRETION OF THE CHIEF EXAMINER.		

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Event No.: 10

**Event Description:** A fault will occur on SG #2 outside reactor containment, resulting in a Safety Injection (SI) which will require re-entry into 19000-C, "Reactor Trip or Safety Injection." The crew will carry out the Immediate Operator Actions and Initial Actions of 19000-C. After OATC and UO actions are completed in 19000-C, Event #10 loss of all AC will occur.

Time	Position	Applicant's Action or Behavior
	CREW	Enters 19000-C Reactor Trip or Safety Injection. (Crew Update)
	CREW SS	Performs Immediate Operator Actions Per 19000-C, REACTOR TRIP OR SAFETY INJECTION. SS Makes Page Announcement of Reactor Trip.
	CREW OATC  UO  UO OATC	<b>IMMEDIATE ACTIONS of 19000-C, Reactor Trip or Safety Injection</b> <ol style="list-style-type: none"> <li>1. Check Reactor Trip <ul style="list-style-type: none"> <li>• Rod Bottom Lights - LIT</li> <li>• Reactor Trip and Bypass Breakers - OPEN</li> <li>• Neutron Flux – LOWERING</li> </ul> </li> <li>2. Check Turbine Trip: <ul style="list-style-type: none"> <li>• All Turbine Stop Valves – CLOSED</li> </ul> </li> <li>3. Check Power to AC Emergency Buses: <ol style="list-style-type: none"> <li>a. AC Emergency Busses – AT LEAST ONE ENERGIZED. <ul style="list-style-type: none"> <li>• 4160V AC 1E Busses</li> </ul> </li> <li>b. AC Emergency Buses – ALL ENERGIZED: <ul style="list-style-type: none"> <li>• 4160V AC 1E Busses</li> <li>• 480V AC 1E Busses</li> </ul> </li> </ol> </li> </ol>
	SS	<ol style="list-style-type: none"> <li>4. Check if SI is actuated: <ul style="list-style-type: none"> <li>• Any SI annunciator – LIT</li> <li>• SI ACTUATED BPLP window – LIT</li> </ul> <p>___ Go to Step 6</p> </li> </ol>



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Event No.: 10

**Event Description:** A fault will occur on SG #2 outside reactor containment, resulting in a Safety Injection (SI) which will require re-entry into 19000-C, "Reactor Trip or Safety Injection." The crew will carry out the Immediate Operator Actions and Initial Actions of 19000-C. After OATC and UO actions are completed in 19000-C, Event #10 loss of all AC will occur.

Time	Position	Applicant's Action or Behavior
	SS / CREW  OATC	<p>6. Initiate the Foldout Page.</p> <p><b>RCP TRIP CRITERIA:</b>  <b>Trip all RCPs if BOTH conditions listed below occur:</b></p> <ul style="list-style-type: none"> <li>a. CCPs or SI pumps – AT LEAST ONE RUNNING.</li> <li>b. RCP Trip Parameter – RCS PRESSURE LESS THAN 1375 PSIG.</li> </ul>
	OATC UO SS	<p>7. Perform the following:</p> <ul style="list-style-type: none"> <li>• OATC Initial Actions Page</li> <li>• UO Initial Actions Page</li> </ul> <p><b>NOTE: SS Initiates Step 8 After OATC/UO Initial Actions Completed.</b></p>
	OATC	<p><b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b></p> <p>Step 1. Check both Trains of ECCS equipment-ALIGNING FOR INJECTION PHASE</p> <ul style="list-style-type: none"> <li>• MLB indication.</li> </ul>
	OATC	<p><b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b></p> <p>Step 2. Check Containment Isolation Phase A – ACTUATED</p> <ul style="list-style-type: none"> <li>• CIA MLB indication</li> </ul>

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Event No.: 10

**Event Description:** A fault will occur on SG #2 outside reactor containment, resulting in a Safety Injection (SI) which will require re-entry into 19000-C, "Reactor Trip or Safety Injection." The crew will carry out the Immediate Operator Actions and Initial Actions of 19000-C. After OATC and UO actions are completed in 19000-C, Event #10 loss of all AC will occur.

Time	Position	Applicant's Action or Behavior
	OATC	<p><b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b></p> <p>Step 3. Check ECCS Pumps and NCP status:</p> <ul style="list-style-type: none"> <li>a. CCPs – RUNNING.</li> <li>b. SI Pumps – RUNNING.</li> <li>c. RHR Pumps – RUNNING.</li> <li>d. NCP – TRIPPED.</li> </ul>
	OATC	<p><b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b></p> <p>Step 4. Verify CCW Pumps – ONLY TWO RUNNING PER TRAIN.</p>
	OATC	<p><b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b></p> <p>Step 5. Verify proper NSCW system operation:</p> <ul style="list-style-type: none"> <li>a. NSCW Pumps - ONLY TWO RUNNING PER TRAIN.</li> <li>b. NSCW TOWER RTN HDR BYPASS BASIN handswitches – IN</li> </ul> <p>AUTO:</p> <ul style="list-style-type: none"> <li>• HS-1668A</li> <li>• HS-1669A</li> </ul>

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Event No.: 10

**Event Description:** A fault will occur on SG #2 outside reactor containment, resulting in a Safety Injection (SI) which will require re-entry into 19000-C, "Reactor Trip or Safety Injection." The crew will carry out the Immediate Operator Actions and Initial Actions of 19000-C. After OATC and UO actions are completed in 19000-C, Event #10 loss of all AC will occur.

Time	Position	Applicant's Action or Behavior
	OATC	<b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b> Step 6. Verify Containment Cooling Units: <ol style="list-style-type: none"> <li>ALL RUNNING IN LOW SPEED               <ul style="list-style-type: none"> <li>MLB indication</li> </ul> </li> <li>NSCW Cooler isolation valves – OPEN:               <ul style="list-style-type: none"> <li>MLB indication</li> </ul> </li> </ol>
	OATC	<b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b> Step 7. Check Containment Ventilation Isolation: <ol style="list-style-type: none"> <li>Dampers and Valves - CLOSED               <ul style="list-style-type: none"> <li>CVI MLB indication</li> </ul> </li> </ol>
	OATC	<b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b> Step 8. Check Containment pressure REMAINED LESS THAN 21.5 PSIG.
	OATC	<b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b> Step 9. Check ECCS flows: <ol style="list-style-type: none"> <li>BIT Flow.</li> <li>RCS pressure – LESS THAN 1625 PSIG.</li> <li>SI Pump flow.</li> <li>RCS pressure – LESS THAN 300 PSIG</li> </ol> RNO Step 9d. Go to Step 10.

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Event No.: 10

**Event Description:** A fault will occur on SG #2 outside reactor containment, resulting in a Safety Injection (SI) which will require re-entry into 19000-C, "Reactor Trip or Safety Injection." The crew will carry out the Immediate Operator Actions and Initial Actions of 19000-C. After OATC and UO actions are completed in 19000-C, Event #10 loss of all AC will occur.

Time	Position	Applicant's Action or Behavior
	OATC	<p><b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b></p> <p>Step 10. Check ECCS Valve alignment – PROPER INJECTION LINEUP INDICATED ON MLBs.</p>
	OATC	<p><b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b></p> <p>Step 11. Check ACCW Pumps – AT LEAST ONE RUNNING</p>
	OATC	<p><b>PERFORMS OATC INITIAL ACTIONS OF E- 0.</b></p> <p>Step 12. Adjust Seal Injection flow to RCPs – 8 to 13 GPM.  <b><u>NOTE TO EXAMINER:</u> END OF OATC INITIAL ACTIONS OF E-0.</b>  <b>RETURNS TO MAIN BODY OF E-0 CONTINUING AT STEP 8</b></p>
	UO	<p><b>PERFORMS UO INITIAL ACTIONS OF E- 0.</b></p> <p>Step 1. Check AFW Pumps – RUNNING</p> <ul style="list-style-type: none"> <li>• MDAFW Pumps</li> <li>• TDAFW Pump, if required</li> </ul>
	UO	<p>RNO</p> <ul style="list-style-type: none"> <li>• Start MDAFW Pumps.</li> <li>• Open Steam Supply valve HV-5106 to TDAFW Pump</li> </ul>

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Event No.: 10

**Event Description:** A fault will occur on SG #2 outside reactor containment, resulting in a Safety Injection (SI) which will require re-entry into 19000-C, "Reactor Trip or Safety Injection." The crew will carry out the Immediate Operator Actions and Initial Actions of 19000-C. After OATC and UO actions are completed in 19000-C, Event #10 loss of all AC will occur.

Time	Position	Applicant's Action or Behavior
	UO	<p><b>PERFORMS UO INITIAL ACTIONS OF E- 0.</b></p> <p>Step 2. Check NR level in at least one SG – GREATER THAN 10% [32% ADVERSE]</p>
	UO	<p><b>PERFORMS UO INITIAL ACTIONS OF E- 0.</b></p> <p>Step 3. Check if main steamlines should be isolated:</p> <p>a. Check for one or more of the following conditions:</p> <ul style="list-style-type: none"> <li>– Any steamline pressure – LESS THAN <u>OR</u> EQUAL TO 585 PSIG.</li> <li>– Containment pressure – GREATER THAN 14.5 PSIG.</li> <li>– Low Steam Pressure SI/SLI – BLOCKED <u>AND</u> High Steam Pressure Rate – <u>ONTWO OR MORE</u> CHANNELS OF ANY STEAMLINE.</li> </ul> <p>RNO</p> <p>Step 3a. Go to Step 4</p>

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Event No.: 10

**Event Description:** A fault will occur on SG #2 outside reactor containment, resulting in a Safety Injection (SI) which will require re-entry into 19000-C, "Reactor Trip or Safety Injection." The crew will carry out the Immediate Operator Actions and Initial Actions of 19000-C. After OATC and UO actions are completed in 19000-C, Event #10 loss of all AC will occur.

Time	Position	Applicant's Action or Behavior
	UO	<p><b>PERFORMS UO INITIAL ACTIONS OF E- 0.</b></p> <p>Step 4. Verify FW Isolation Valves closed:</p> <ul style="list-style-type: none"><li>• MFIVs</li><li>• BFIVs</li><li>• MFRVs</li><li>• BFRVs</li></ul>
	UO	<p><b>PERFORMS UO INITIAL ACTIONS OF E- 0.</b></p> <p>Step 5. Verify SG Blowdown isolated:</p> <ul style="list-style-type: none"><li>• Place SG Blowdown Isolation Valve handswitches HS-7603A, B, C, and D in the CLOSE position.</li><li>• SG Sample Isolation Valves – CLOSED.</li></ul>
	UO	<p><b>PERFORMS UO INITIAL ACTIONS OF E- 0.</b></p> <p>Step 6. Verify Diesel Generators – RUNNING.</p>
	UO	<p><b>PERFORMS UO INITIAL ACTIONS OF E- 0.</b></p> <p>Step 7. Throttle total AFW flow as necessary to maintain SG NR levels between 10% [32% ADVERSE] and 65%.</p>

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Event No.: 10

**Event Description:** A fault will occur on SG #2 outside reactor containment, resulting in a Safety Injection (SI) which will require re-entry into 19000-C, "Reactor Trip or Safety Injection." The crew will carry out the Immediate Operator Actions and Initial Actions of 19000-C. After OATC and UO actions are completed in 19000-C, Event #10 loss of all AC will occur.

Time	Position	Applicant's Action or Behavior
	UO	<b>PERFORMS UO INITIAL ACTIONS OF E- 0.</b>  Step 8.     Verify both MFPs – TRIPPED.
	UO	<b>PERFORMS UO INITIAL ACTIONS OF E- 0.</b>  Step 9.     Check Main Generator Output Breakers – OPEN.  <i><b>NOTE TO EXAMINER: END OF UO INITIAL ACTIONS OF E-0.</b></i>
	CREW	<i><b>RETURNS TO MAIN BODY OF E-0 CONTINUING AT STEP 8.</b></i>
	OATC / UO	8.     Initiate the Continuous Actions Page
		Initiate Event 10 (Loss of All AC) when the OATC and UO Initial Actions are complete.
<b>END OF EVENT 9. PROCEED TO NEXT EVENT FOR SCENARIO CONTINUITY.</b>		

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Event No.: 11

**Event Description:** A ground fault on 1BA03 and overspeed trip of EDG "A" will result in a Loss of All AC with the TDAFW pump failing to start automatically. This event will be initiated after completion of Step 8 of 19000-C following the fault of SG #2. Intent is to isolate the faulted steam generator in step 21 of 19100-C. 1AA02 power may be restored by aligning the alternate incoming source to the bus, AFTER a report that the bus is not damaged. Bus status will **NOT** be reported to the crew until the SG is isolated.

Time	Position	Applicant's Action or Behavior
	CREW	Diagnose Loss of All AC:  <u>Alarms:</u> DG1A TRIP OVERSPEED DG1A DISABLED NONRESET OF EMERGENCY TRIP DG1B EMERGENCY START DG1B LOW PRESS STARTING AIR  <u>Indications:</u> Loss of Control Room lighting 1AA02 white bus potential lights go out 1BA03 white bus potential lights go out DG-1B starts and its output breaker does not shut
	SS	Enter 19100-C, "ECA-0.0 Loss of All AC Power."
	OATC	1. Verify Reactor trip:  a. Reactor Trip and Bypass Breakers - OPEN.  b. Neutron Flux - LOWERING.
	UO	2. Verify Turbine trip:  a. All Turbine Stop Valves - CLOSED.



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Event No.: 11

**Event Description:** A ground fault on 1BA03 and overspeed trip of EDG "A" will result in a Loss of All AC with the TDAFW pump failing to start automatically. This event will be initiated after completion of Step 8 of 19000-C following the fault of SG #2. Intent is to isolate the faulted steam generator in step 21 of 19100-C. 1AA02 power may be restored by aligning the alternate incoming source to the bus, AFTER a report that the bus is not damaged. Bus status will **NOT** be reported to the crew until the SG is isolated.

Time	Position	Applicant's Action or Behavior
	OATC	<p>3. Check if RCS is isolated:</p> <p>a. PRZR PORVs - CLOSED.</p> <p>b. Letdown Orifice Isolation Valves - CLOSED:</p> <ul style="list-style-type: none"> <li>• HV-8149A - LETDOWN ORIFICE 45 GPM</li> <li>• HV-8149B - LETDOWN ORIFICE 75 GPM</li> <li>• HV-8149C - LETDOWN ORIFICE 75 GPM</li> </ul> <p>c. Letdown Isolation Valves - CLOSED:</p> <ul style="list-style-type: none"> <li>• LV-0459 - LETDOWN ISOLATION VLV DOWNSTREAM</li> <li>• LV-0460 - LETDOWN ISOLATION VLV UPSTREAM</li> </ul> <p>d. Excess Letdown Isolation Valves - CLOSED:</p> <ul style="list-style-type: none"> <li>• HV-8153 - EXCESS LETDOWN LINE ISO VLV</li> <li>• HV-8154 - EXCESS LETDOWN LINE ISO VLV</li> </ul> <p>e. Reactor Vessel Head Vent Isolation Valves - CLOSED:</p> <ul style="list-style-type: none"> <li>• HV-8095A - RX HEAD VENT TO LETDOWN ISOLATION VLV</li> <li>• HV-8095B - RX HEAD VENT TO LETDOWN ISOLATION VLV</li> <li>• HV-8096A - RX HEAD VENT TO LETDOWN ISOLATION VLV</li> <li>• HV-8096B - RX HEAD VENT TO LETDOWN ISOLATION VLV</li> </ul>
	UO	<p>4. Verify AFW flow - GREATER THAN 570 GPM.  <b><u>(May have started TDFW pump earlier; if not running, manually start TDAFW pump.)</u></b></p>

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Event No.: 11

**Event Description:** A ground fault on 1BA03 and overspeed trip of EDG "A" will result in a Loss of All AC with the TDAFW pump failing to start automatically. This event will be initiated after completion of Step 8 of 19000-C following the fault of SG #2. Intent is to isolate the faulted steam generator in step 21 of 19100-C. 1AA02 power may be restored by aligning the alternate incoming source to the bus, AFTER a report that the bus is not damaged. Bus status will **NOT** be reported to the crew until the SG is isolated.

Time	Position	Applicant's Action or Behavior
	UO <b>Critical Task</b>	<p>4 RNO. Perform the following:</p> <p>a. Verify TDAFW Pump is running:</p> <ul style="list-style-type: none"> <li>• PDIC-5180 - INCREASED/ MAX DEMAND</li> <li>• HV-5106 TDAFW – OPEN</li> <li>• HV-3009 LP-1 MS SPLY TO AUX FW TD PMP-1 – OPEN</li> </ul> <p>-OR-</p> <ul style="list-style-type: none"> <li>• HV-3019 LP-2 MS SPLY TO AUX FW TD PMP-1 - OPEN</li> </ul> <p><b><u>Note to examiner: 1HV-5125 may re-open if an AFW actuation signal is present.</u></b></p>
	OATC	5. Trip all RCPs.
	OATC	6. Trip the NCP.
	SS	<p>7. Initiate the following:</p> <ul style="list-style-type: none"> <li>• Continuous Action Page.</li> <li>• NMP-EP-110, EMERGENCY CLASSIFICATION DETERMINATION AND INITIAL ACTION</li> </ul>
	UO	8. Check Main Generator Output Breakers - OPEN.

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Event No.: 11

**Event Description:** A ground fault on 1BA03 and overspeed trip of EDG "A" will result in a Loss of All AC with the TDAFW pump failing to start automatically. This event will be initiated after completion of Step 8 of 19000-C following the fault of SG #2. Intent is to isolate the faulted steam generator in step 21 of 19100-C. 1AA02 power may be restored by aligning the alternate incoming source to the bus, AFTER a report that the bus is not damaged. Bus status will **NOT** be reported to the crew until the SG is isolated.

Time	Position	Applicant's Action or Behavior
	UO	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p><u>NOTE</u></p> <p>The battery capacity for DG field flashing may only support 5 Diesel Generator start attempts.</p> </div> <p>9. Try to restore power to any AC Emergency Bus from its associated DG:</p> <p style="padding-left: 40px;">a. Start DG(s).</p> <p><b><u>Note to examiner: DG's are not available due to trip of "A" EDG and fault on 1BA03 preventing "B" EDG output breaker from closing.</u></b></p> <p style="padding-left: 40px;">b. Check AC Emergency Bus of started DG(s) automatically energized: <b><u>(NO)</u></b></p> <p>9.b RNO</p> <ul style="list-style-type: none"> <li>• Adjust frequency as necessary to maintain 60 Hz.</li> <li>• <u>IF</u> bus can <b><u>NOT</u></b> be energized, <u>THEN</u> trip DG and go to Step 10.</li> </ul>

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Event No.: 11

**Event Description:** A ground fault on 1BA03 and overspeed trip of EDG "A" will result in a Loss of All AC with the TDAFW pump failing to start automatically. This event will be initiated after completion of Step 8 of 19000-C following the fault of SG #2. Intent is to isolate the faulted steam generator in step 21 of 19100-C. 1AA02 power may be restored by aligning the alternate incoming source to the bus, AFTER a report that the bus is not damaged. Bus status will **NOT** be reported to the crew until the SG is isolated.

Time	Position	Applicant's Action or Behavior
		<p><u>NOTES</u></p> <ul style="list-style-type: none"> <li>Train A 1E Stub Bus supplies Emergency Seal Oil Pump Battery Charger 1(2)ND1CA.</li> <li>Train B 1E Stub Bus supplies Main Turbine Emergency Bearing Oil Pump Battery Charger 1(2)ND2CA.</li> </ul>
		<p><u>CAUTION</u></p> <p>IF it is expected that 1(2)NB01 Stub Bus cannot be energized before batteries supplying Charger 1(2)ND1CA have expended (approximately 2 hours), THEN action should be promptly initiated to degas and flush generator with CO2 per 13810, GENERATOR GAS SYSTEM</p>
	UO	<p>9. c. Check AC Emergency Buses - AT LEAST ONE ENERGIZED.</p> <p>9.c RNO Go to Step 10.</p>

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Event No.: 11

**Event Description:** A ground fault on 1BA03 and overspeed trip of EDG "A" will result in a Loss of All AC with the TDAFW pump failing to start automatically. This event will be initiated after completion of Step 8 of 19000-C following the fault of SG #2. Intent is to isolate the faulted steam generator in step 21 of 19100-C. 1AA02 power may be restored by aligning the alternate incoming source to the bus, AFTER a report that the bus is not damaged. Bus status will **NOT** be reported to the crew until the SG is isolated.

Time	Position	Applicant's Action or Behavior
	UO	<p>10. Initiate 13427A/B, 4160V AC BUS AA02/BA03 1E ELECTRICAL DISTRIBUTION SYSTEM to energize at least one AC Emergency Bus using any available power supply:</p> <p><u>IF</u> offsite power available to either RAT, <u>THEN</u> use normal or emergency incoming feeder breaker.</p> <p><b><u>Note to examiner: Licensee expects the crew to use the first option to restore power to 1AA02 from the alternate incoming source.</u></b></p> <p>-OR-</p> <p><u>IF</u> power available to SAT, <u>THEN</u> initiate 13418-A(B), STANDBY AUXILIARY TRANSFORMER UNIT 1(2) TRAIN A(B) OPERATIONS.</p> <p>-OR-</p> <p><u>IF</u> a Diesel Generator extended AOT is in progress <u>AND</u> a Wilson Black Start is necessary, <u>THEN</u> initiate 13419-C, DIESEL GENERATOR EXTENDED AOT Step 4.3.6.</p>
	OATC	<p>11. Check for SI:</p> <p>a. SI signal - ACTUATED. <b><u>(YES)</u></b></p> <p>b. Reset SI.</p>
	SS	<p>12. *Check AC Emergency Bus status: (Continuous action)</p>

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Time	Position	Applicant's Action or Behavior
		a. At least one energized. <u>(NO)</u>
	SS	<p>12.*RNO (Continuous action)</p> <p><u>WHEN</u> power is restored to any AC Emergency Bus, <u>THEN</u> initiate recovery actions starting with Step 43.</p> <p>Go to Step 13.</p>
	UO	13. Verify at least two NSCW Pumps per train - HANDSWITCHES IN AUTO.
	OATC	<p>14. Place the following equipment handswitches in the PULL-TO-LOCK position:</p> <ul style="list-style-type: none"> <li>• CCPs</li> <li>• RHR Pumps</li> <li>• SI Pumps</li> <li>• Containment Spray Pumps</li> <li>• CCW Pumps</li> <li>• ACCW Pumps</li> <li>• MDAFW Pumps</li> <li>• Containment Coolers</li> <li>• ESF Chillers (STOP position)</li> </ul>
	SS UO	<p>15. Check if AC Emergency Busses should be energized locally:</p> <p>a. At least one 4160V AC Emergency Bus - CAN BE ENERGIZED</p>

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Time	Position	Applicant's Action or Behavior
		FROM CONTROL ROOM.
	UO	<p>15.a RNO</p> <p>Dispatch personnel to restore AC Emergency Bus(s) using 13427A/B, 4160V AC BUS AA02/BA03 1E ELECTRICAL DISTRIBUTION SYSTEM.</p> <p>Go to Step 16.</p>
	SS UO	16. Dispatch Operator to initiate ATTACHMENT 5.
	SS UO	<p>17. Dispatch Operator to check Hotwell level valves - CLOSED:</p> <p>a. COND MAKEUP LV-4415B</p> <p>b. COND DUMP LV-4415A</p>
	SS UO	18. Dispatch Operators to prepare for local operation of SG ARVs using ATTACHMENT 7.
	UO	<p>19. Check SG status:</p> <p>a. Main Steamline and Bypass Valves - CLOSED.</p> <p>b. MFIVs and BFIVs - CLOSED.</p> <p>c. Blowdown Isolation Valves - CLOSED.</p>

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Time	Position	Applicant's Action or Behavior
		d. SG Sample Isolation Valves - CLOSED.
	UO	<p>20. Check for faulted SG(s):</p> <p>ANY SG PRESSURE LOWERING IN AN UNCONTROLLED MANNER.</p> <p>-OR-</p> <p>ANY SG PRESSURE COMPLETELY DEPRESSURIZED</p>
	UO	<p>21. Isolate faulted SG(s):</p> <p>a. Close the TDAFW Throttle Valves on affected SG(s) one at a time:</p> <p>HV-5122 (SG 1)</p> <p>HV-5125 (SG 2)</p> <p>HV-5127 (SG 3)</p> <p>HV-5120 (SG 4)</p> <p>b. Close only one TDAFW Pump Steam Supply Valve from affected SG(s):</p> <p>HV-3009 (SG 1)</p> <p>-OR-</p> <p>HV-3019 (SG 2)</p> <p>c. Verify affected SG ARV(s) closed:</p>



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Time	Position	Applicant's Action or Behavior
		PV-3000 (SG 1) PV-3010 (SG 2) PV-3020 (SG 3) PV-3030 (SG 4)
	UO	21.(Cont.) d. Locally close the MDAFW Throttle Valves on affected SG(s) using ATTACHMENT F.  <b><u>Note to examiner: When the faulted SG is isolated, the booth operator will report to the SS that 1AA02 bus is undamaged and can be energized. Go to step 43 when the bus is energized.</u></b>
	UO	22. Verify faulted SG(s) remains isolated during subsequent recovery actions unless needed for RCS cooldown or SG activity sampling.
	UO	23. Check for ruptured SG(s): <b><u>(No SG is ruptured)</u></b>  a. Direct Chemistry to take periodic activity samples of all SGs one at a time.  b. Secondary radiation - NOT NORMAL: <ul style="list-style-type: none"> <li>• MAIN STM LINE MONITORS:               <ul style="list-style-type: none"> <li>• RE-13120 (SG 1)</li> <li>• RE-13121 (SG 2)</li> <li>• RE-13122 (SG 3)</li> <li>• RE-13119 (SG 4)</li> </ul> </li> <li>• CNDSR AIR EJCTR/STM RAD MONITOR RE-12839C.</li> <li>• STM GEN LIQ PROCESS RAD:</li> </ul>

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Time	Position	Applicant's Action or Behavior
		<ul style="list-style-type: none"> <li>RE-0019 (SAMPLE)</li> <li>RE-0021 (BLOWDOWN)</li> <li>SG sample radiation.</li> </ul> <p>23.RNO Go to Step 25.</p>
	UO	25. Check CST level - GREATER THAN 15%.
	UO	<p>26. Check intact SG levels:</p> <ul style="list-style-type: none"> <li>a. NR level - AT LEAST ONE GREATER THAN 10% [32% ADVERSE].</li> <li>b. Maintain NR level between 10% [32% ADVERSE] and 65%.</li> <li>c. NR level - ANY RISING IN AN UNCONTROLLED MANNER. <b><u>(NO)</u></b></li> <li>c. RNO Go to Step 27.</li> </ul>
	SS UO	<div style="border: 1px solid black; padding: 10px;"> <p><b>CAUTIONS</b></p> <p>Equipment failures and loss of control power may occur if doors are not opened within 30 minutes of onset of loss of AC power. Room B76 on Unit 1 and room B04 on Unit 2 have two doors with installed door stops.</p> </div> <p>27. Open all doors that have installed door stops in the following affected unit's Control Building electrical equipment rooms:</p> <p style="text-align: center;"><u>UNIT 1</u></p>

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Time	Position	Applicant's Action or Behavior
		B47, B48, B52, B55, B61, B76, B63
	UO	<p>28. Check DC Bus loads:</p> <ul style="list-style-type: none"> <li>a. Monitor all 1E Battery Bus voltages - GREATER THAN 105V DC.</li> <li>b. As time permits, perform the following:</li> </ul>
	UO	<p>28. (Cont)</p> <ul style="list-style-type: none"> <li>• Evaluate securing unnecessary battery loads using ATTACHMENT A.</li> <li>• Initiate 18032, LOSS OF 120 VOLT AC INSTRUMENT POWER and 18034, LOSS OF CLASS 1E 125V DC POWER if the following criteria is met: <ul style="list-style-type: none"> <li>• Any Inverter must be shut down.</li> <li>-OR-</li> <li>• Any battery breaker must be opened due to battery overload or low DC Bus voltage.</li> </ul> </li> </ul>
	SS UO	<p>29. Depressurize intact SGs to 300 psig:</p> <ul style="list-style-type: none"> <li>a. Check SG NR levels - GREATER THAN 10% [32% ADVERSE] IN AT LEAST ONE SG.</li> <li>b. Locally dump steam using SG ARVs at maximum rate: <ul style="list-style-type: none"> <li>• PV-3000 (South Main Steam Valve Room)</li> <li>• PV-3010 (North Main Steam Valve Room)</li> <li>• PV-3020 (North Main Steam Valve Room)</li> <li>• PV-3030 (South Main Steam Valve Room)</li> </ul> </li> <li>c. Maintain the following during depressurization: <ul style="list-style-type: none"> <li>• SG pressures - GREATER THAN 200 PSIG</li> </ul> </li> </ul>

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Time	Position	Applicant's Action or Behavior
		<ul style="list-style-type: none"> <li>SG NR level - GREATER THAN 10% [32% ADVERSE] IN AT LEAST ONE INTACT SG</li> </ul>
	OATC	30. Check RCS WR cold leg temperatures - GREATER THAN 280°F [295°F ADVERSE].
	UO	31. Check SG pressure - LESS THAN 300 PSIG.
	SS UO	32. Locally control SG ARVs to maintain SG pressures at 300 psig.
	OATC	33. Check Reactor - SUBCRITICAL: <ul style="list-style-type: none"> <li>IR channels - ZERO <u>OR</u> NEGATIVE STARTUP RATE</li> <li>SR channels - ZERO <u>OR</u> NEGATIVE STARTUP RATE</li> </ul>
	OATC	34. Check SI signal status:

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Time	Position	Applicant's Action or Behavior
	OATC	<p>a. SI - ACTUATED.</p> <p>a. <u>IF</u> SI actuates during SG depressurization, <u>THEN</u> reset SI.</p> <p><u>IF</u> SI will <u>NOT</u> reset, <u>THEN</u> initiate ATTACHMENT I.</p> <p>Go to Step 0.</p> <p>b. Reset SI.</p> <p>b. <u>IF</u> SI will <u>NOT</u> reset, <u>THEN</u> initiate ATTACHMENT I.</p>
	OATC UO	<p>35. Check Containment Isolation Phase A using ATTACHMENT B.:</p> <p>Computer Points</p> <p><u>IF</u> valves do <u>NOT</u> close, <u>THEN</u> locally close at least one valve at each penetration.</p> <p>-OR-</p> <p>Handswitch Indication</p> <p>Locally close any open valve as time permits.</p>
	OATC UO	<p>36. Check Containment Ventilation Isolation using ATTACHMENT C.</p> <p>36. Close dampers and valves.</p>

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Time	Position	Applicant's Action or Behavior
		<p>Computer Points                      IF dampers and valves can <u>NOT</u> be closed,  <u>THEN</u> locally close.</p> <p>-OR-</p> <p>Handswitch Indication</p>
	UO	37. Check Containment radiation - LESS THAN $10^5$ mR/HR.
	UO	<p>38. Initiate Spent Fuel Pool Monitoring of Level and Temperature every 2 hours:</p> <ul style="list-style-type: none"> <li>• Dispatch Operator to locally check level &gt; 217 ft., reference figure 1 of 18030-C, LOSS OF SPENT FUEL POOL LEVEL OR COOLING,</li> <li>• Locally check temperature with handheld dip thermometer or infrared to develop baseline temp monitoring for establishing repetitive checks of level and temperature every two hours</li> <li>• Check SFPC temperature &lt;130°F</li> </ul>

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Time	Position	Applicant's Action or Behavior
		<ul style="list-style-type: none"><li>Using PTDB TAB 26, determine time to restore power is &lt; time to reach 200°F in Spent Fuel Pool.</li></ul>
	OATC	39. Check Core Exit TCs - LESS THAN 1200°F.
	UO	40. Check if AC emergency power is restored: <ul style="list-style-type: none"><li>a. AC Emergency Busses - AT LEAST ONE ENERGIZED.</li><li>b. Go to Step 43.</li></ul>
	UO	43. Check if resetting LOP Sequencer - REQUIRED: <ul style="list-style-type: none"><li>a. LOP Sequencer - INITIATED.</li><li>b. Power restored to AC Emergency Bus from offsite source.</li><li>c. Reset LOP Sequencer by initiating ATTACHMENT H.</li></ul>

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Time	Position	Applicant's Action or Behavior
	UO	<p>44. Verify following equipment loaded on energized AC Emergency Bus(s):</p> <ul style="list-style-type: none"> <li>• 480V AC switchgear: <ul style="list-style-type: none"> <li><u>TRAIN A</u></li> <li>AB04</li> <li>AB05</li> <li>AB15</li> <li>NB01</li> </ul> </li> <li>• Essential 480V AC loads: <ul style="list-style-type: none"> <li>• Battery Chargers</li> <li>• Instrumentation and Control</li> <li>• Emergency Lighting</li> <li>• Communications</li> <li>• Battery Room Fans</li> </ul> </li> </ul>
	UO	<p>45. Check proper NSCW operation for energized AC Emergency Bus(s):</p> <p>a. Verify proper NSCW Pump and return header valve operation:</p> <ol style="list-style-type: none"> <li>1. NSCW Pumps - TWO RUNNING EACH TRAIN</li> <li>2. NSCW TOWER RTN HDR BYPASS BASIN handswitches - IN AUTO: <ul style="list-style-type: none"> <li>HS-1668A</li> <li>HS-1669A</li> </ul> </li> </ol> <p>b. Verify the following valves - OPEN: <u>TRAIN A</u></p>



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Time	Position	Applicant's Action or Behavior
		HV-1806 - NSCW CNMT CLR 1&2 SPLY VLV HV-1808 - NSCW CNMT CLR 5&6 SPLY VLV HV-1822 - NSCW CNMT CLR 1&2 RTN VLV HV-1830 - NSCW CNMT CLR 5&6 RTN VLV
	UO	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <b>CAUTION</b>             If temperature has exceeded 130°F TSC should be consulted prior to restoring Spent Fuel Pool Cooling to service.         </div> 46. Perform the following: <ol style="list-style-type: none"> <li>a. Verify two CCW PUMPS of available train in service</li> <li>b. Start available train of SPENT FUEL POOL COOLING</li> </ol>
	SS UO	47. Restore DC loads: <ol style="list-style-type: none"> <li>a. Startup any de-energized Inverters per 13431, 120V AC 1E VITAL INSTRUMENT DISTRIBUTION SYSTEM.</li> <li>b. Restore remaining DC loads shed in previous actions.</li> </ol>
	UO	48. Stabilize SG pressures: <ul style="list-style-type: none"> <li>• Control SG ARVs in MANUAL.</li> </ul>
		<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <b>NOTE</b>             If RCP cooling was previously isolated, further cooling of the RCP Seals will be         </div>

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Time	Position	Applicant's Action or Behavior
	CREW	<div>established by natural circulation cooldown as directed in subsequent procedures.</div> <div>49. Select recovery procedure:<div>a. Check RCS subcooling - GREATER THAN 24°F [38°F ADVERSE]. b. Check PRZR level - GREATER THAN 9% [37% ADVERSE]. c. Check BIT DISCH ISOLATION valves - CLOSED:<ul style="list-style-type: none"><li>HV-8801A</li><li>HV-8801B</li></ul></div><div>If ALL of the above criteria are met, go to 19101-C ECA-0.1 LOSS OF ALL AC POWER RECOVERY WITHOUT SI REQUIRED.</div><div>IF ANY of the above criteria are NOT met, go to 19102-C, ECA-0.2 LOSS OF ALL AC RECOVERY WITH SI REQUIRED.</div></div>
END OF SCENARIO. PROCEED AT THE DISCRETION OF THE CHIEF EXAMINER.		

Event No.: Event 11b, SOP 13427A-1

Event Description: Energize 4160V Bus 1AA02 from alternate incoming source.

Time	Position	Applicant's Action or Behavior
		<p style="text-align: center;">NOTES</p> <ul style="list-style-type: none"> <li>• <u>IF</u> in Modes 1, 2, 3, or 4, Section 4.4.1 of this procedure may only be performed <u>IF</u> the Normal Incoming Source, Emergency DG 1A, <u>AND</u> the redundant 1E 4160V AC bus 1BA03 are all lost simultaneously.</li> <li>• <u>IF</u> in Modes 5 or 6, Section 4.4.1 may be performed with the other power sources available <u>WHEN</u> authorized by the SM.</li> </ul> <p>4.4.1.1 <b>Obtain</b> authorization from the SM to energize the 4160V AC Bus 1AA02 from the Alternate Incoming Source.</p>
		4.4.1.2 <b>Check</b> Alternate Incoming Source voltage is available.
		4.4.1.3 <u>IF</u> in MODE 5 OR 6, <del>(NO) perform the following Steps:</del> <u>OTHERWISE</u> , <b>Go To Step 4.4.1.8.</b>
		<p>4.4.1.4 <b>Verify</b> an Alternate Incoming Source is properly aligned.</p> <p>a. <u>IF</u> 1AA02 will be energized from RAT 1NXRB, <b>verify</b> applicable sections of 13415-1, "Reserve Auxiliary Transformers," have been performed prior to performing this section.</p>
		4.4.1.5 <u>IF</u> the Non-Class 1E 4160V AC Buses associated with RAT 1NXRB are energized from the UATs by backfeed, <b>place</b> handswitch 1HS-1NA0401 Alternate Incoming Breaker in the PULL-TO-LOCK position and <b>Caution Tag</b> .

Event No.: Event 11b, SOP 13427A-1

Event Description: Energize 4160V Bus 1AA02 from alternate incoming source.

Time	Position	Applicant's Action or Behavior
		<p>4.4.1.6 <u>IF</u> RAT 1NXRB is in service <u>AND</u> will be connected to 1AA02, <b>verify</b> the following:</p> <ul style="list-style-type: none"> <li>• The sum total load of 1AA02 and 1BA03 is less than 1350 amps.</li> <li>• With <u>NO</u> UAT backfeed of the non-1E 4160V AC in progress, the total load of 1NA04 is less than 1000 amps.</li> </ul>
		<p>4.4.1.7 <u>IF</u> the SAT is in service for RAT 1NXRB <u>AND</u> will be connected to 1BA03 <u>AND</u> 1AA02, perform the following:</p> <ol style="list-style-type: none"> <li>a. <b>Check</b> total load on 1AA02 and 1BA03 will be less than 1735 amps.</li> <li>b. <b>Place</b> handswitch 1HS-1NA0401 in PULL-TO-LOCK and <b>install</b> a Caution Tag.</li> <li>c. <b>Place</b> one train of SSPS in test per 13503A-1, "Reactor Control Solid State Protection System," and <b>Caution Tag</b>.</li> </ol>
		<p>4.4.1.8 <b>Verify</b> BRKR 1AA0205 SYNCHRONIZING SWITCH and BRKR 1AA0219 SYNCHRONIZING SWITCH are <u>BOTH</u> in OFF:</p> <ul style="list-style-type: none"> <li>• 1AA0205 SYNCHRONIZING SWITCH OFF</li> <li>• 1AA0219 SYNCHRONIZING SWITCH OFF</li> </ul>
		<p>4.4.1.9 <b>Place</b> the BRKR 1AA0201 SYNCHRONIZING SWITCH to ON.</p>
		<p>4.4.1.10 <b>Close</b> ALTERNATE INCOMING BRKR 1AA0201 using handswitch 1HS-1AA0201.</p>
		<p>4.4.1.11 <b>Check</b> white potential lights lit for Bus 1AA02.</p>

Event No.: Event 11b, SOP 13427A-1

Event Description: Energize 4160V Bus 1AA02 from alternate incoming source.

Time	Position	Applicant's Action or Behavior
		4.4.1.12 <b>Check</b> Bus 1AA02 voltage across all three phases to be 4160V AC (4025V AC to 4326V AC) on BUS 1AA02 Voltmeter.
		4.4.1.13 <b>Place</b> BRKR 1AA0201 SYNCHRONIZING SWITCH to OFF.
		<p>4.4.1.14 <b>Verify</b> Train A 480V AC 1E Switchgears energized by performing the following:</p> <ol style="list-style-type: none"> <li><b>Check</b> that white potential lights are lit for: <ul style="list-style-type: none"> <li>1AB04</li> <li>1AB05</li> <li>1AB15</li> <li>1NB01</li> </ul> </li> <li><u>IF</u> any Train A 480V AC 1E Switchgear <u>NOT</u> energized, <b>obtain</b> SM permission and <b>energize</b> per 13429-1, "480V AC 1E Electrical Distribution System."</li> <li><u>IF</u> Train A 480V AC Non 1E Switchgear 1NB01 <u>NOT</u> energized, <b>obtain</b> SM permission and <b>energize</b> per 13430-1, "480V AC Non 1E Electrical Distribution System."</li> </ol>
		<p>4.4.1.15 <b>Check</b> Train A 480V AC Motor Control Centers energized by checking <u>NO</u> MCC TROUBLE alarms on QEAB Annunciator Panel ALB36.</p> <ol style="list-style-type: none"> <li><u>IF</u> any Train A 480V AC 1E Motor Control Center <u>NOT</u> energized, <b>obtain</b> SM permission and <b>energize</b> per 13429-1, "480V AC 1E Electrical Distribution System."</li> <li><u>IF</u> any Train A 480V AC Non 1E Motor Control Center <u>NOT</u> energized, <b>obtain</b> SM permission and <b>energize</b> per 13430-1, "480V AC Non 1E Electrical Distribution System."</li> </ol>

Event No.: Event 11b, SOP 13427A-1

Event Description: Energize 4160V Bus 1AA02 from alternate incoming source.

Time	Position	Applicant's Action or Behavior
		4.4.1.16 <b>Notify</b> SM that loads listed in Table 1 may be restored.
		4.4.1.17 At 1AA02, <b>reset</b> relay targets that are dropped.
		4.4.1.18 <b>Generate</b> caution tags to alert personnel that Bus 1AA02 is energized from its alternate incoming source.
		4.4.1.19 <b>Perform</b> the following steps only if in MODE 5 <u>OR</u> 6, <u>OTHERWISE</u> , <b>exit</b> this procedure.
<b>END OF SCENARIO. PROCEED AT THE DISCRETION OF THE CHIEF EXAMINER.</b>		