

Final Submittal
VOGTLE MAY 2005 EXAM
50-424, 425/2005-301

MAY 17 - 25, 2005
MAY 27, 2005 (WRITTEN)

1. As Given Simulator Scenario Operator Actions ES-D-2

Facility:	Vogtle	Scenario No.:	1	Op-Test No.:	2005-301
Examiners:	RSBaldwin (Chief Examiner)	Operators:			
	MABates				
	SDRose				
Initial Conditions: Plant has been at 100% Power for five months following a refueling outage.					
Turnover: Storms are approaching from the West and high winds are possible within the hour. (Severe Weather Checklist 11889-C)					
SI Pump 'A' was tagged out yesterday at 0800 hours and is scheduled to be returned to service in 12 hours (TS 3.5.2 Condition A)					
Normal Charging Pump is tagged out and expected to be returned to service at 1200 hours tomorrow. The 'B' CCP is operating. (TR 13.1.3 & 13.1.5)					
NSCW Pump #3 running but is inoperable due to a failed IST. Maintenance is troubleshooting. (INFO LCO 3.7.8)					
Steam Generator #1 has a 30 gallon / day tube leak. 18009-C section B in effect, action level 1 monitoring is in progress. TS 3.4.13 INFO LCO on identified RCS Leakage					
Event No.	Malf. No. / Position	Event Type*	Event Description		
1	BOP	I	Main Feedwater Pump discharge Pressure Transmitter (PT-508) fails high		
2	RO SRO (TS)	C	'A' Train Centrifugal Charging Pump (CCP) Discharge Header Pipe Break.		
3	RO SRO (TS)	I	Pressurizer Pressure Transmitter (PT-455) fails high and PORV 455A sticks 50% open		
4	BOP	I	Steam Generator # 2 Level Transmitter (LT-529) fails high.		
5	RO	C	Loss of VCT M/U and failure of CCP suction to swap to RWST.		
6	BOP / RO SRO (TS)	C	Small RCS Leak (sized to require TS directed shutdown)		
6A	BOP / RO SRO	N	Shutdown due to large boration from RWST and required by TS		
7	ALL	M	Small Break LOCA with automatic RPS trip failed and concurrent loss of Electrical Bus 1BA03. Break worsens to a medium break LOCA.		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor					

Vogtle 2005-301 Scenario #1

Event 1

Main Feedwater Pump discharge pressure transmitter fails high causing overfeeding of all 4 steam generators. If action not taken this will result in a Hi-Hi steam generator level automatic reactor trip.

Verifiable Action: (BOP) Manual control of main feedwater pumps speed.

Event 2

The 'A' train CCP discharge pipe break will cause a loss of RCS water to the charging pump room in the auxiliary building. The 'A' CCP is not running, but the leak will continue until the suction valve is closed.

Verifiable Action: (RO) Close CCP suction valve to isolate leak.

Technical Specifications: LCO 3.5.2

Event 3

The pressurizer PT failing high will cause the heaters to de-energize and sprays to open and PORV-455 to open. PORV 455 will stick 50% open. This will require the RO to select out the failed channel, and require closing of the PORV block valve.

Verifiable Action: (RO) Control pressurizer pressure and select out failed channel.

Technical Specifications: LCO 3.3.1, LCO 3.3.2, LCO 3.4.12

Event 4

The 'B' SG LT fails high, which caused the actual level to drop. The BOP will need to take manual control of the 'B' MFRV to restore SG level and then select out the failed channel.

Verifiable Action: (BOP) Manual control of SG level and select out failed channel.

Technical Specifications: LCO 3.3.1 and LCO 3.3.2

Event 5

The loss of VCT makeup and failure to auto swap will become evident when RCS inventory begins to decrease due to the RCS leak and subsequent SBLOCA.

Verifiable Action: (RO) Swap CCP suction to RWST to prevent damage to pump.

Event 6 and 6A

RCS leak will be large enough to require a TS directed shutdown.

Verifiable Action: (ALL) Power reduction. BOP will operate turbine and RO will operate control rods and boration controls.

Technical Specifications: LCO 3.4.13

Event 7

The leak develops into a SBLOCA, requiring a reactor trip. The RPS auto trip will be failed, which will require the RO to manually trip the reactor. Concurrent with the trip, electrical bus BA03 will develop a fault to ground, which will remain for the duration of the scenario. The SBLOCA, combined with no high and intermediate head safety injection, will require that the crew to depressurize to dump accumulators and get low head safety injection to discharge to the vessel. RCPs must not be stopped if ECCS pumps are not available for injection into the core.

Verifiable Action: (ALL) Manual reactor trip. Cool the RCS and depressurize to allow accumulators and low head safety injection to discharge to the reactor vessel.

Critical Task: Manual reactor trip.

Critical Task: Cool the RCS and depressurize to dump accumulators and allow for injection via low head safety injection pumps.

SIMULATOR OPERATOR GUIDE

HL-13 NRC EXAM - SCENARIO 1

Initial Conditions: IC 14 The Unit has been at 100% power for five months following a refueling outage.

Pre-load malfunctions:

- ES01 - Failure of Automatic Reactor Trip
- Override LV-112D and LV-112E -Shut
- Insert remote function ES46 for P-14 setpoint

Equipment Status/ Procedures/ Alignments/ Data Sheets/ etc.:

- Start CCP B, and Tag Out NCP and HV 8109
- SI Pump 'A' Tagged Out
- Swap DRPI to Train A power (RD 01 remote function)
- Secondary aligned per 18009-C, Section B. C. Tag #1 ARV, LIC4415, SJAE's, Steam Seals, TDAFW
- Remote function: Aux Steam from Unit 2
- O/R TDAFWP trouble alarm off
- IPC Mode & trends
- Reactivity Briefing and Shift Manning Sheets
- (86%) Sticker on panel to cover new P-14 setpoint
- Caution Tag NSCW Pump #3

Turnover: Maintain full power operation.

The Severe Weather checklist is in progress due to thunderstorms approaching from the West. High winds are possible within the hour. (11889-C)

Steam Generator #1 has a 30 gallon / day tube leak. 18009-C section B is in effect, Action Level 1 monitoring is in progress, TS 3.4.13 INFO LCO on identified RCS leakage.

Normal Charging Pump is tagged out and expected to be returned to service at 1200 hours tomorrow. The 'B' CCP is operating. (TR 13.1.3 & 13.1.5)

SI Pump 'A' Tagged Out yesterday at 0800, and should be cleared in 12 hrs. (LCO 3.5.2 Condition A)

NSCW Pump #3 running but is inoperable due to a failed IST. Maintenance is troubleshooting. (INFO LCO 3..7.8)

Event	Malf. #'s	Severity	Instructor Notes and Required Feedback
1	FW14	100%	MFP Discharge pressure transmitter (PT-508) fails high
2	CV18A	100%	'A' Train Centrifugal Charging Pump (CCP) Discharge Header Pipe Break. ABO – reports water spraying into the room on the discharge side of the pump with about 1 foot of water on the floor Override room drain ZLB 15-A3 & A4, ALB61E06 to OFF when leak isolated and directed to initiate room draining by SS.
3	PR02A PR05	100% 50%	Pressurizer Pressure Transmitter (PT-455) fails high and PORV 455A sticks 50% open. Remote Function: PR03 – remove power to HV-8000A when requested
4	SG02F	100%	Steam Generator #2 Level Transmitter (LT-529) fails high.
5	CV11	N/A	Loss of VCT M/U and failure of CCP suction to swap to RWST. DELETE OVERRIDES on LV-112D & E when RO manually opens valves
6	RC05A	Ramp to 0.1% in 200 sec	Small RCS leak requiring Tech Spec Directed Shutdown (30 GPM) Adjust size of leak as necessary to require TS shutdown, but not exceed charging pump capacity
6A			Tech Spec required Shutdown due to RCS Leakage

SIMULATOR OPERATOR GUIDE

HL-13 NRC EXAM - SCENARIO 1

7	RC05A After IMA's: RC05A EL07B	Ramp 0.2-1.0% 200 sec Ramp to 40% in 200 sec	<p>Small Break LOCA with automatic RPS trip failed and loss of Electrical Bus BA03 following E-0 IMAs. Leak then worsens to medium break LOCA.</p> <p>If dispatched, locally close Accumulator isolation valve MOV breakers:</p> <p>Remote Functions: SI 01 through SI 04</p>
END			After crew establishes RCS cooldown per 19222.

SHIFT TURNOVER INFORMATION

OPERATING PLAN:

- The Unit has been at 100% power for five months following a refueling outage. Maintain full power operation per 12004-C.
- Normal Charging Pump is tagged out and expected to be returned to service at 1200 hours tomorrow. The 'B' CCP is operating. TR 13.1.3 & TR 13.1.5 (INFO)
- SI Pump 'A' Tagged Out due to bearing failure. It has been out of service since yesterday at 0800, and should be returned to service in 12 hrs. LCO 3.5.2 Condition A is in effect.
- NCSW Pump #3 is functional but has been declared inoperable due problems identified in the last IST. The pump is running for troubleshooting. INFO LCO 3.7.8 has been written.
- The Severe Weather checklist (11889-C) is in progress due to thunderstorms approaching from the West. High winds are possible within the hour.
- Steam Generator #1 has a 30 gallon / day tube leak.
- The required actions of 18009-C, section B, "Operation with a Minor SGTL" have been initiated. Action Level 1 monitoring is in progress.
- TS 3.4.13 INFO LCO on Identified RCS leakage (SGTL)

Op-Test No.: Vogtle 2005 Scenario No.: 1 Event No.: 1

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Event Description:

Main Feedwater Pump discharge pressure transmitter PT-508 fails high resulting in reduced feedwater flow to all SGs requiring manual control of feedpumps speed

Time	Position	Applicant's Action or Behavior
	BOP	<p>Diagnoses failure of PT-508 high failure with the following indications:</p> <p>Alarms:</p> <ul style="list-style-type: none"> • SG Hi/Lo Level deviation – all 4 SG's (ALB13 A6/B6/C6/D6) • SG Steam/Feed flow mismatch – all 4 SG's (ALB13 A1/B1/C1/D1) • STM GEN BLOWDOWN PNL ALARM (ALB14 F5) <p>Indications:</p> <ul style="list-style-type: none"> • Feedwater flow lowering below steam flows • SG levels all decreasing • MFPTs speeds decreasing • MFPs discharge (PT-508) pressure reading 1500 psig • MFPs individual discharge pressures reading normal <p><i>(If reactor trip occurs freeze simulator/backtrack and stabilize plant then continue scenario)</i></p>
	SS	Enters AOP 18016-C section A for MFP malfunction
	BOP	Manually controls MFPTs speed using master controller SIC-509A
	BOP	Raises feedwater flows and restores SG levels to 65% NR using manual control MFPTs speed to prevent reactor trip on Lo-Lo SG levels and verifies reactor power < 100%
	BOP	Performs channel check of MFP control instrumentation and identifies failure was due to PT-508
	SS	Contacts SSS for initiation of condition report, generation of work order, contact maintenance, and to notify OPS duty manager of AOP entry.
	BOP	Manually controls MFPs speed through remainder of scenario & dispatches Aux. Building Operator to address SGBD panel local alarm.

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Event Description:

Standby 'A' Train Centrifugal Charging Pump (CCP) discharge header pipe break requiring manual isolation of CCP-1A and entry into LCO 3.5.2

Time	Position	Applicant's Action or Behavior
	TEAM	Identifies pipe break associated with CCP-1A due to the following indications: Alarms: <ul style="list-style-type: none">• Level C leak detected (ALB61 E6)• ZLBs 15 A3 & A4 for CCP-1A room hi sump level and flooding Indications: <ul style="list-style-type: none">• VCT level starts lowering
	SS	Enters ARP 17061 for alarm window ALB61 E6 Dispatches Auxiliary Building Operator (ABO) to investigate alarms
	TEAM	Determines that leak can be isolated by shutting CCP suction and discharge valves after receiving report of leak location from ABO
	RO	Isolates leak by: <ul style="list-style-type: none">• Placing CCP-1A in pull-to-lock (PTL) to prevent all automatic starts• Shuts CCP-1A discharge and suction MOVs to isolate leak• Verifies leak isolated by report from ABO and VCT level response

Op-Test No.: Vogtle 2005 Scenario No.: 1 Event No.: 2

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Event Description:

Standby 'A' Train Centrifugal Charging Pump (CCP) discharge header pipe break requiring manual isolation of CCP-1A and entry into LCO 3.5.2

	SS	Determines that this is also an impact of LCO 3.5.2 and condition A still applies due to having 100% ECCS flow capacity equal to a single train of ECCS. TR 13.1.3 Condition A and TR 13.1.5 Condition A now apply. Directs Auxiliary Building Operator (ABO) to drain CCP-1A room
	SS	Notifies SSS to initiate corrective actions including: <ul style="list-style-type: none">• CR• Work order• Contact maintenance• Notify OPS duty manager of equipment failure

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Event Description:

Pressurizer Pressure Transmitter (PT-455) fails high requiring the RO to manually control PORV and Sprays to prevent reactor trip and safety injection. PRZR PORV 455A will stick 50% open on the transient.

Time	Position	Applicant's Action or Behavior
	RO	<p>Diagnoses the failure with the following indications:</p> <p>Alarms:</p> <ul style="list-style-type: none"> • PRZR HI PRESS (ALB11 B3) • PRZR HI PRESS CHANNEL ALERT (ALB11 C3) • PV-455A OPEN SIGNAL (ALB12 E4) • PRZR PRESS LO PORV BLOCK (ALB12 D3) • PRZR RELIEF DISCHARGE HI TEMP (ALB12 E1) <p>Indications:</p> <ul style="list-style-type: none"> • PI-455 offscale high • PORV-455 opens and remains open until lo Press PORV block interlock occurs @ 2185 psig • PZR sprays open • PZR heaters turn off if on • Actual PZR pressure decreases
	RO	<p>Performs immediate operator actions of AOP 18000-C, PRZR Spray, Safety, or Relief Valve Malfunction, for the stuck open PORV AND AOP 18001-C section C for the failed PRZR pressure Instrument:</p> <ul style="list-style-type: none"> • Close spray valves • Attempts to close affected PRZR PORV (455) • Operate PRZR heaters as necessary
	SS	<p>Enters AOP 18000-C, PRZR Spray, Safety, or Relief Valve Malfunction</p> <p><i>(Note SS may enter both AOP 18000-C and 18001-C section C in parallel)</i></p>
	RO	<p>Check PRZR Safety Valves Closed (uses valve position indications on IPC or PSMS, may also use tailpipe temperature indications)</p>

Op-Test No.: Vogtle 2005 Scenario No.: 1 Event No.: 3

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Event Description:

Pressurizer Pressure Transmitter (PT-455) fails high requiring the RO to manually control PORV and Sprays to prevent reactor trip and safety injection. PRZR PORV 455A will stick 50% open on the transient.

	RO	Places PORV 455A Block Valve HV-8000A in Close due to PORV being stuck open. Checks associated instrumentation and identifies PT-455 has failed high
	RO	Checks RCS leakage to PRT stopped by: PRT level – stable PRT Temperature – stable or lowering PRZR Tailpipe Temperature – stable or lowering
	SS	Contacts Maintenance about the failed PORV PV-455A
	SS	Reviews Technical Specifications: <ul style="list-style-type: none"> • LCO 3.4.1 DNB - Condition A • LCO 3.4.10 PRZR Safeties – Not Applicable • LCO 3.4.11 PORVs – Condition B <ul style="list-style-type: none"> ◦ Close block valve (HV-8000A) in 1 hour, and ◦ Remove power from block valve in 1 hour • LCO 3.4.12 Cold Overpressure Protection – INFO ONLY • LCO 3.4.13 RCS Leakage – Condition A while PORV open <p>Contacts SSS to have power removed from PORV BLOCK Valve HV-8000A.</p> <p><i>(Simulator Operator will remove power if requested)</i> <i>Remote Function – PR03</i></p>
	SS	Initiates AOP 18001-C section C for instrument channel 455 failure
	RO	Places PRZR master controller in manual @ 25% demand

Op-Test No.: Vogtle 2005 Scenario No.: 1 Event No.: 3

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Event Description:

Pressurizer Pressure Transmitter (PT-455) fails high requiring the RO to manually control PORV and Sprays to prevent reactor trip and safety injection. PRZR PORV 455A will stick 50% open on the transient.

	RO	Selects unaffected channels for control (P457/456)
	RO	Returns sprays, heaters, and master controller to automatic and verifies proper pressure control.
	RO	Selects controlling channel on recorder (457)
	RO	Verifies P-11 in proper state for plant conditions within 1 hour: <ul style="list-style-type: none">• P-11 BPLB lit
	SS	Initiates corrective actions for failed channel: <ul style="list-style-type: none">• CR• Work Order• I&C• OPS duty manager for AOP entry• Bypass failed channel if desired
	SS	Determines applicable Technical Specifications: <ul style="list-style-type: none">• LCO 3.3.1 Functional Unit 6 (OTDT) condition E• LCO 3.3.1 Functional Unit 8a (low PZR press) condition M• LCO 3.3.1 Functional Unit 8b (hi PZR press) condition E• LCO 3.3.2 Functional Unit 1d (low PZR press) condition D• LCO 3.3.2 Functional Unit 8b (P-11) condition L

Op-Test No.: Vogtle 2005 Scenario No.: 1 Event No.: 4

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Event Description:

#2 Steam Generator Level Transmitter (LT-529) fails high requiring manual control of feed regulating valve to prevent reactor trip on lo-lo SG level.

Time	Position	Applicant's Action or Behavior
	BOP	<p>Diagnoses high failure of controlling level transmitter for Steam Generator #2:</p> <p>Alarms:</p> <ul style="list-style-type: none"> • STM GEN 2 HI/LO LVL DEVIATION (ALB13 B6) • STM GEN 2 HI-HI LEVEL ALERT (ALB14 B1) <p>Indications:</p> <ul style="list-style-type: none"> • SG #2 level lowering • SG #2 feed flow < steam flow • SG #2 channel 529 offscale high
	BOP	Immediately takes manual control of SG #2 main feed regulating valve to restore narrow range level between 60% and 70%
	SS	Enters AOP 18001-C section E due failed SG level channel
	BOP	<p>Selects an unaffected control channel</p> <p>Returns feed flow to AUTO</p> <p>Verifies that SG level control maintains level at 65%</p>
	SS	<p>Initiates corrective actions with SSS for failed instrument:</p> <ul style="list-style-type: none"> • CR • Work Order • Bypass channel if desired • OPS Duty Manager notified of AOP entry

Op-Test No.: Vogtle 2005 Scenario No.: 1 Event No.: 4

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Event Description:

#2 Steam Generator Level Transmitter (LT-529) fails high requiring manual control of feed regulating valve to prevent reactor trip on lo-lo SG level.

	SS	<p>Determines applicable Technical Specifications:</p> <ul style="list-style-type: none">• LCO 3.3.1 Functional Unit 13 (reactor trip) condition E• LCO 3.3.2 Functional Unit 5c (turbine trip & FWI) condition I• LCO 3.3.2 Functional Unit 6b (AFW) condition D• LCO 3.3.3 Functional Unit 5 (PAM) no condition - Information only
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Op-Test No.: Vogtle 2005 Scenario No.: 1 Event No.: 5

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Event Description:

Loss of Volume Control Tank makeup and failure of charging pump automatic swap to RWST requiring manual action to open RWST suction valves to prevent pump damage

Time	Position	Applicant's Action or Behavior
	RO	<p>NOTE: Actions of this event may occur in Event 6</p> <p>Diagnose loss of VCT automatic and Manual makeup capabilities when VCT level drops to 30% due to use of water for RCS leak in event 6</p> <p>Alarms:</p> <ul style="list-style-type: none"> • VCT HI / LO LEVEL (ALB7 E5) • AUTO MAKE-UP START SIGNAL BLOCKED (ALB7 D5) <p>Indications:</p> <ul style="list-style-type: none"> • VCT < 30% without any makeup • VCT < 5.7% and RWST suction valves remain shut • Loss of power to VCT Makeup Control handswitch HS-40001B
	SS	Enter procedure for loss of VCT makeup AOP 18007-C section C
	RO	OPERATE PRZR heaters and sprays as required to stabilize RCS pressure and temperature.
	RO	<p>Starts one Boric Acid Transfer Pump</p> <p>Starts one Reactor Makeup Water Pump</p> <p>Attempts to perform manual makeup to VCT using procedure 13009-1 but will be unsuccessful.</p>
	RO	<p>AOP 18007-C Step C8 RNO:</p> <p>Manually opens RWST suction valves when VCT level drops below 5.7%</p> <ul style="list-style-type: none"> • LV-112D • LV-112E • Initiates unit shutdown due to boration from RWST <p>(Note: Simulator Operator – Remove Overrides on valves when RO manually opens LV-112D and LV-112E)</p>

Op-Test No.: Vogtle 2005 Scenario No.: 1 Event No.: 5

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Event Description:

Loss of Volume Control Tank makeup and failure of charging pump automatic swap to RWST requiring manual action to open RWST suction valves to prevent pump damage

	SS	Contacts SSS to initiate corrective actions: <ul style="list-style-type: none">• CR• Work Order• I&C• OPS duty manager – AOP entry
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Op-Test No.: Vogtle 2005 Scenario No.: 1 Event No.: 6

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Event Description:

Small RCS leak (30 GPM) develops which is greater than allowable leakage limits requiring a unit shutdown to comply with technical specification action requirements.

Time	Position	Applicant's Action or Behavior
	Ail	<p>NOTE: Actions of Event 5 may occur during this event</p> <p>Diagnoses loss of reactor coolant to CNMT atmosphere:</p> <p>Alarms:</p> <ul style="list-style-type: none">• Intermediate radiation alarm (ALB5 B3)• High radiation alarm (ALB5 C3) <p>Indications:</p> <ul style="list-style-type: none">• PZR level deviation below program level without Tave reduction• Increased charging flow to maintain PZR level• CNMT radiation increasing on process monitor RE-2562C
	RO	<p>Immediately controls CVCS charging to maintain PZR level. May also reduce CVCS letdown to 45 GPM if necessary:</p> <ul style="list-style-type: none">• Manually control letdown pressure• Simultaneously open 45 GPM orifice and close 75 GPM orifice.
	SS	Enters AOP 18004-C section A for RCS leakage
	RO	Verifies PZR PORVs and spray valves are shut
	BOP	Stops any turbine load changes that may be in progress

Op-Test No.: Vogtle 2005 Scenario No.: 1 Event No.: 6

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Event Description:

Small RCS leak (30 GPM) develops which is greater than allowable leakage limits requiring a unit shutdown to comply with technical specification action requirements.

	RO	<p>NOTE: Actions of Event 5 may occur here</p> <p>AOP 18004-C Step A8 RNO:</p> <p>Shift charging suction to the RWST and initiate unit shutdown:</p> <p>Open RWST TO CCP A&B SUCTION VALVES:</p> <ul style="list-style-type: none"> • LV-0112D & LV-0112E <p>Shut VCT OUTLET ISOLATION valves:</p> <ul style="list-style-type: none"> • LV-0112B & LV-0112C <p>Align RV TO RWST ISOLATION valves:</p> <ul style="list-style-type: none"> • HV-8508A CCP-A - ENABLE PTL • HV-8508B CCP-B - ENABLE PTL <p>Shut CCP normal mini flow valves:</p> <ul style="list-style-type: none"> • HV-8110 CCP-A&B COMMON MINIFLOW • HV-8111A CCP-A MINIFLOW • HV-8111B CCP-B MINIFLOW
	SS	Notifies Shift Manager to implement Emergency Plan
	SS	<p>Identify source of leak using 18004-C Table 1:</p> <p>Containment atmosphere:</p> <p>Rising temperature or moisture indication.(IPC)</p> <p>CNMT HI TEMP annunciator alarm.(ALB1 E6)</p> <p>CNMT HI MSTR annunciator alarm.(ALB1 F6)</p> <p>RX CVTY DRN SUMP HI-HI LVL annunciator alarm (ALB-61 A3).</p> <p>CNMT DRN SUMP SOUTH (NORTH) AREA HI-HI LEVEL annunciator alarm (ALB-61 B3/C3).</p> <p>CNMT HI-1 PRESS ALERT ADVERSE CNMT annunciator alarm. (ALB6 A6)</p> <p>RE-0002, RE-0003 CONTAINMENT LOW RANGE AREA MONITOR alarm or rising.</p> <p>RE-0005, RE-0006 CONTAINMENT HIGH RANGE AREA MONITOR alarm or rising.</p> <p>RE-2562A CONTAINMENT ATMOSPHERE PROCESS AIR PARTICULATE MONITOR alarm or rising.</p> <p>RE-2562C CONTAINMENT ATMOSPHERE PROCESS RADIOGAS MONITOR alarm or rising.</p> <p>CNMT CLR COND LEAK annunciator alarm (ALB-62)</p>

Op-Test No.: Vogtle 2005 Scenario No.: 1 Event No.: 6

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Event Description:

Small RCS leak (30 GPM) develops which is greater than allowable leakage limits requiring a unit shutdown to comply with technical specification action requirements.

	SS	Applies LCO 3.4.13 after verifying UNIDENTIFIED leakage > 1gpm Condition A
	ALL	Initiate unit shutdown

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Event Description:

Unit shutdown due to large RCS boration from RWST and to meet Technical Specification action requirements for RCS Leakage.

Time	Position	Applicant's Action or Behavior
	SS	Implements AOP 18013-C, Rapid Power Reduction due to large RCS boration from RWST and to meet Tech Spec action requirements for RCS leakage.
	SS	<p>CAUTIONS:</p> <p>Load reductions more rapid than 5% RTP/ minute ramp change or a 10% step change when between 15-100% RTP may result in a condition warranting a reactor trip.</p> <p>If this procedure has been entered due to a problem with the condenser, every effort should be made to keep the steam dumps closed.</p> <p>If at any time during this procedure conditions warrant tripping the reactor: Manually trip the reactor, -AND- Go to 19000-C, E-0 REACTOR TRIP OR SAFETY INJECTION</p>
	BOP	Reduce Turbine load at desired rate up to 5%/minute (60 MWe/minute)
	RO	<p>Initiate boration as necessary to maintain Tavg within 3 degrees F of Tref.</p> <p>(NOTE: Since a large boration will be occurring from the RWST the BOP will lower turbine load as necessary to keep Tave within 3 degrees of Tref.)</p>
	RO	<p>Energizes all PRZR backup heaters</p> <p>Monitors Tave/Tref deviation using IPC point UT-0495</p>
	SS	<p>NOTE:</p> <p>Perform notifications of steps 3 and 4 as soon as possible in parallel with the actions in the remainder of this procedure</p>
	SS	Notify System Operator that a load reduction is commencing

Op-Test No.: Vogtle 2005 Scenario No.: 1 Event No.: 6A

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Event Description:

Unit shutdown due to large RCS boration from RWST and to meet Technical Specification action requirements for RCS Leakage.

	SS	<p>Notify SM to make the following notifications as appropriate concurrent with the remainder of this procedure:</p> <ul style="list-style-type: none"> • Plant Management Notifications per 10000-C, Conduct of Operations • Emergency Classification and implementing Instructions per 91001-C • Federal and State Reporting Requirements per 00152-C • Chemistry Tech Spec sampling for load reductions > 15% per 35110-C, Chemistry Control of the Reactor System • QC to perform a NOPT inspection per 84008-C if the reactor is to be shutdown
	RO & BOP	<p>Verify reactor and turbine power are maintained matched:</p> <p>Balance reactor power with secondary power using boration and control rods</p> <p>RNO:</p> <p>If this rate of power reduction is too slow for plant conditions, then trip the reactor and go to 19000-C, E-0 Reactor Trip or Safety Injection</p>
	RO & BOP	<p>Verify reactor and turbine power are maintained matched:</p> <p>RCS Tavg within 3 degrees F of Tref and > 551 degrees F</p> <p>RNO:</p> <p>If Tavg /Tref mismatch exceeds 6 degrees F for an extended period and is not trending toward a matched condition OR if Tavg is < 551 degrees F then Trip reactor and go to 19000-C, E-0 Reactor Trip or Safety Injection</p>

Op-Test No.: Vogtle 2005 Scenario No.: 1 Event No.: 6A

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Event Description:

Unit shutdown due to large RCS boration from RWST and to meet Technical Specification action requirements for RCS Leakage.

	RO & BOP	Monitor the following parameters and maintain them in program bands: <ul style="list-style-type: none">• PRZR pressure• PRZR Level• SG Levels
	SS	NOTE: Steam Dumps may arm during the load reduction
	SS	Directs Auxiliary Building Operator to lower SGBD condensate cooling return temperature controller setpoints to 80 degrees F
	RO & BOP	Monitor Steam Dumps for proper operation: If dumps open then lower Tavg with rods or boration When dumps closed reset C-7
	RO	<i>(Note: perform this step when time and manpower permit)</i> Maximize letdown as appropriate for current plant conditions per 13006-C: <ul style="list-style-type: none">• Raise charging flow to 120 to 130 GPM using FIC-121 while maintaining 8-13 GPM RCP seal injection flow with HC-182• REGEN HX outlet Temperature (TI-127) verified < 290 degrees F• Place Letdown pressure controller (PIC-131) in manual and lower pressure to 100 to 120 psig• Open selected CVCS orifice isolation valve (HV-8149A/B/C)• Return letdown pressure to 360 to 380 psig and place PIC-131 in automatic

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Event Description:

Unit shutdown due to large RCS boration from RWST and to meet Technical Specification action requirements for RCS Leakage.

	BOP	<p>(Note: perform this step when time and manpower permit)</p> <p>If lowering load to < 30% power then:</p> <p>Transfer 13.8 Kv busses and 4160V AC non-1E busses from UATs to the RATs using 13420-1 and 13425-1</p> <ul style="list-style-type: none">• Verify alternate incoming and bus voltages matched• Place synchronizing switch to ON• Close Alternate Incoming Breaker• Verify Normal Incoming breaker trips• Match flag with normal incoming breaker position• Verify bus voltage adequate• Place synchronizing switch to OFF
	BOP	<p>When < 65% power remove a Main Feedwater Pump from service per 13615-C, Condensate and Feedwater System:</p> <ul style="list-style-type: none">• Lower pump speed manually to minimum (SIC-509B or SIC-509C) and verify other pump picks up load• Transfer control to the GE controller after nulling speed deviation• Lower speed to 1200 RPM• Open Main Feed Pump Turbine drain valves (5)• Trip the Main Feed Pump
	BOP	At approximately 40% power stop the heater drain pumps
	CREW	At 20% power trip reactor and go to 19000-C, E-0 Reactor Trip or Safety Injection

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Event Description:

Small break LOCA develops requiring a reactor trip. RO must manually trip reactor due to failure of automatic reactor trip. Loss of power to B train ESF electrical busses will result in no high head or intermediate head SI. This will lead to an orange path on core cooling, requiring the crew to cooldown and depressurize the RCS below ECCS accumulator and low head SI pumps injection pressures to restore core cooling.

Time	Position	Applicant's Action or Behavior
	RO	Determines that PZR level cannot be maintained with available charging pump flow. May reduce CVCS LTDN flow to 45 GPM.
	SS	Directs manual trip of the reactor and manual SI following reactor trip verification when RO reports unable to maintain PZR level
	SS	Implements Reactor Trip and Safety Injection procedure E-0 / 19000-C
	SS	E-0 Foldout page continuously monitored and applicable actions taken.
	RO CRITICAL TASK	<i>Manually trips the reactor and verifies reactor is tripped: (IMA)</i> <ul style="list-style-type: none"> <i>All rod bottom lights lit</i> <i>Reactor trip & bypass breakers open</i> <i>Neutron flux lowering</i>
	BOP	Verifies turbine is tripped – all stop valves shut (IMA)
	CREW	Verifies electrical power available to only the Train A emergency electrical busses (IMA)
	RO	Manually actuates SI and CHECKS if SI is actuated: (IMA) <ul style="list-style-type: none"> Any SI annunciator - LIT. SI ACTUATED BPLB window LIT
	BOP	Verifies feedwater isolation valves shut: <ul style="list-style-type: none"> MFIV's BFIV's MFRV's BFRV's

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Event Description:

Small break LOCA develops requiring a reactor trip. RO must manually trip reactor due to failure of automatic reactor trip. Loss of power to B train ESF electrical busses will result in no high head or intermediate head SI. This will lead to an orange path on core cooling, requiring the crew to cooldown and depressurize the RCS below ECCS accumulator and low head SI pumps injection pressures to restore core cooling.

	RO	Verifies ECCS equipment aligning on the MLB's
	RO	Verifies CNMT Isolation Phase A Actuated – CIA MLB's indicators correct
	BOP	Verifies proper AFW system operation: <ul style="list-style-type: none"> • MDAFW pumps – running • SGBD isolation Handswitches – place in hard close • SG sample isolations - shut • TDAFW pump running if lo-lo level on 2 SGs or blackout
	RO	Verifies ECCS pumps running: <ul style="list-style-type: none"> • CCP's • SI Pumps • RHR Pumps Verifies NCP – NOT running
	BOP	Verifies 2 CCW pumps in each train - running
	BOP	Check for proper NSCW system operation: <ul style="list-style-type: none"> • 2 pumps in each train – running • NSCW TOWER RTN HDR BYPASS BASIN handswitches - in AUTO: <div style="margin-left: 40px;">HS-1668A</div> <div style="margin-left: 40px;">HS-1669A</div>
	RO	Verifies CNMT Cooling Units: <ul style="list-style-type: none"> • Fans running in low speed – MLB indicators • NSCW cooler isolation valves open – MLB indicators
	RO	Verifies CNMT Ventilation Isolation – dampers & valves shut (MLB indicators)

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Event Description:

Small break LOCA develops requiring a reactor trip. RO must manually trip reactor due to failure of automatic reactor trip. Loss of power to B train ESF electrical busses will result in no high head or intermediate head SI. This will lead to an orange path on core cooling, requiring the crew to cooldown and depressurize the RCS below ECCS accumulator and low head SI pumps injection pressures to restore core cooling.

	RO / BOP	Checks if SLI should be actuated: <ul style="list-style-type: none"> Any Steamline pressure < 585 psig CNMT pressure by recording > 14.5 psig High steam pressure rate if SI/SLI blocked
	RO	Check CNMT spray is actuated if CNMT pressure by recording > 21.5 psig
	BOP	Verify both diesel generators running – Note: 'B' train DG does not have cooling water and possibly high jacket water temperature alarms. BOP should note this and SS should direct BOP to trip the 'B' Train DG.
	SS	Directs BOP to emergency stop DG -1B
	SS	Caution - Non-essential personnel should be evacuated from containment if conditions warrant.
	RO	Verify BIT flow - notes NO flow and refers to Attachment B to verify valve alignment
	RO	Checks RCS pressure < 1625 psig & notes no SI pump flow – refers to Attachment C for proper valve alignment
	RO	Checks RCS pressure > 300 psig
	BOP	Verifies generator output breakers trip open 30 seconds after turbine trip
	BOP	(continuous action) Verifies total AFW flow > 570 GPM or controls flow to maintain SG NR levels > 10% (32%)

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Event Description:

Small break LOCA develops requiring a reactor trip. RO must manually trip reactor due to failure of automatic reactor trip. Loss of power to B train ESF electrical busses will result in no high head or intermediate head SI. This will lead to an orange path on core cooling, requiring the crew to cooldown and depressurize the RCS below ECCS accumulator and low head SI pumps injection pressures to restore core cooling.

	RO	Verifies ECCS valve alignment proper on MLB indicators: Notes no power to Train B – may refer to attachments B, C, D
	BOP	(Continuous action) Controls RCS temperature at 557 F by controlling: <ul style="list-style-type: none"> • steam dump • AFW flows • Tripping MFP's if necessary • Shutting MSIV's & BSIV's if necessary
	SS / RO	CAUTIONS: PRZR PORV block valve which was shut to isolate an excessively leaking or open PRZR PORV should not be opened unless used to prevent challenging the PRZR safeties. When PRZR pressure is greater than 2260 psig, PRZR spray is required. Spray valves should be shut if the associated RCP 4 or RCP 1 is not running to prevent loss of spray effectiveness.
	RO	Verifies: <ul style="list-style-type: none"> • PZR PORV's –shut in auto • Normal PZR Spray valves – shut • Power available to at least one PORV block valve & it opens > 2185 psig RCS pressure
	RO	(Continuous action) Maintain RCP seal injection flow 8-13 GPM per RCP – will not be able to do this without any charging pumps
	SS / RO	Check RCP trip criteria: NOT met due to lack of SI pumps and CCPs

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Event Description:

Small break LOCA develops requiring a reactor trip. RO must manually trip reactor due to failure of automatic reactor trip. Loss of power to B train ESF electrical busses will result in no high head or intermediate head SI. This will lead to an orange path on core cooling, requiring the crew to cooldown and depressurize the RCS below ECCS accumulator and low head SI pumps injection pressures to restore core cooling.

	RO	(Continuous Action) Verifies one ACCW pump running
	BOP	Places CNMT hydrogen monitors in service using SOP 13130-1: <ul style="list-style-type: none">• Open supply and return isolation valves• Place mode switch in Analyze• Verify Function Selector Switch in Sample position
	BOP	Checks SG secondary pressure boundaries: <ul style="list-style-type: none">• No SG pressure lowering in an uncontrolled manner• No SG completely depressurized
	SS	CAUTION: Transition to 19030-C, E-3 STEAM GENERATOR TUBE RUPTURE should not be made solely on a high reading on RE-724 or RE-810.

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Event Description:

Small break LOCA develops requiring a reactor trip. RO must manually trip reactor due to failure of automatic reactor trip. Loss of power to B train ESF electrical busses will result in no high head or intermediate head SI. This will lead to an orange path on core cooling, requiring the crew to cooldown and depressurize the RCS below ECCS accumulator and low head SI pumps injection pressures to restore core cooling.

	<p>BOP</p>	<p>Checks SG tubes intact:</p> <p>a. Secondary radiation normal:</p> <p>1) MAIN STM LINE MONITORS:</p> <ul style="list-style-type: none">• RE-13120 (SG 1)• RE-13121 (SG 2)• RE-13122 (SG 3)• RE-13119 (SG 4) <p>2) CNDSR AIR EJCTR/STM RAD MONITORS:</p> <ul style="list-style-type: none">• RE-12839C• RE-12839D*• RE-12839E* <p>(* - if onscale)</p> <p>3) STM GEN LIQ PROCESS RAD:</p> <ul style="list-style-type: none">• RE-0019 (Sample)• RE-0021 (Blowdown) <p>4) SG sample radiation.</p> <p>5) SG tube leakage monitors:</p> <ul style="list-style-type: none">• RE-724 or RE-810 and SG level rising in an uncontrolled manner <p>b. CHECK SG levels - none rising in an uncontrolled manner.</p> <p>c. OPEN SG sample valves and direct chemistry to take periodic activity samples of all SGs: (open one at a time)</p> <table><tr><td>SG</td><td>SAMPLE VALVE</td></tr><tr><td>1</td><td>HV-9451</td></tr><tr><td>2</td><td>HV-9452</td></tr><tr><td>3</td><td>HV-9453</td></tr><tr><td>4</td><td>HV-9454</td></tr></table>	SG	SAMPLE VALVE	1	HV-9451	2	HV-9452	3	HV-9453	4	HV-9454
SG	SAMPLE VALVE											
1	HV-9451											
2	HV-9452											
3	HV-9453											
4	HV-9454											

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Event Description:

Small break LOCA develops requiring a reactor trip. RO must manually trip reactor due to failure of automatic reactor trip. Loss of power to B train ESF electrical busses will result in no high head or intermediate head SI. This will lead to an orange path on core cooling, requiring the crew to cooldown and depressurize the RCS below ECCS accumulator and low head SI pumps injection pressures to restore core cooling.

	RO	CHECK if RCS is intact inside containment: <ul style="list-style-type: none"> • Containment radiation - ABNORMAL. • Containment pressure - ABNORMAL. • Containment emergency recirculation sump levels - ABNORMAL.
	SS	Transitions to 19010-C, E-1 LOSS OF REACTOR OR SECONDARY COOLANT.
	SS	<p>NOTES:</p> <p>Foldout page should be continuously monitored and applicable actions taken.</p> <p>Critical Safety Function Status Tree monitoring should be initiated at this time.</p> <p>(Crew will transition to FRP for degraded core cooling 19222-C when RVLIS dynamic range indication drops to 44%)</p> <p>Seal injection flow should be maintained to all RCPs.</p> <p>91001-C, EMERGENCY CLASSIFICATION AND IMPLEMENTING PROCEDURE should be implemented at this time.</p>
	SS / RO	Check RCP trip criteria: NOT met due to lack of SI pumps and CCPs
	RO	Verifies one ACCW pump running
	BOP	<p>Places CNMT hydrogen monitors in service using SOP 13130-1:</p> <ul style="list-style-type: none"> • Open supply and return isolation valves • Place mode switch in Analyze • Verify Function Selector Switch in Sample position

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Event Description:

Small break LOCA develops requiring a reactor trip. RO must manually trip reactor due to failure of automatic reactor trip. Loss of power to B train ESF electrical busses will result in no high head or intermediate head SI. This will lead to an orange path on core cooling, requiring the crew to cooldown and depressurize the RCS below ECCS accumulator and low head SI pumps injection pressures to restore core cooling.

	BOP	Checks SG secondary pressure boundaries: <ul style="list-style-type: none">No SG pressure lowering in an uncontrolled mannerNo SG completely depressurized
	BOP	Check Intact SG's levels: <ul style="list-style-type: none">Control AFW flow > 570 GPM or maintain level > 10% (32%) NR and < 65%No SG level rising in an uncontrolled manner
	BOP	(Continuous Action) Check Secondary radiation normal: a. OPEN SG sample valves and direct chemistry to take periodic activity samples of all SGs: (open one at a time) SG SAMPLE VALVE 1 HV-9451 2 HV-9452 3 HV-9453 4 HV-9454 b. Check Secondary radiation normal: 1) MAIN STM LINE MONITORS: <ul style="list-style-type: none">RE-13120 (SG 1)RE-13121 (SG 2)RE-13122 (SG 3)RE-13119 (SG 4) 2) CNDSR AIR EJCTR/STM RAD MONITOR: <ul style="list-style-type: none">RE-12839C 3) STM GEN LIQ PROCESS RAD: <ul style="list-style-type: none">RE-0019 (Sample)RE-0021 (Blowdown) 4) SG sample radiation.

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Event Description:

Small break LOCA develops requiring a reactor trip. RO must manually trip reactor due to failure of automatic reactor trip. Loss of power to B train ESF electrical busses will result in no high head or intermediate head SI. This will lead to an orange path on core cooling, requiring the crew to cooldown and depressurize the RCS below ECCS accumulator and low head SI pumps injection pressures to restore core cooling.

	SS	CAUTION: If any PRZR PORV is open because of high PRZR pressure, Check PORV shut when pressure lowers to less than 2315 psig.
	RO	(Continuous Action) Checks: <ul style="list-style-type: none"> • PZR PORV's –shut • Power available to at least one PORV block valve & it opens > 2185 psig RCS pressure • WHEN RCS WR CL temperatures less than 350°F, THEN arm COPS.
	SS	Note: COPS may be disarmed when temperature rises to greater than 350°F and has remained greater than 295°F (green integrity CSFST)
	CREW	(Continuous Action) Check if ECCS flow should be reduced: RCS subcooling - GREATER THAN 24°F [38°F]. (This will not be met)
	SS	NOTE: If Containment Spray is actuated and a primary LOCA is indicated by high containment radiation levels, continuous spray for a minimum duration of 2 hours is required. This should include or be followed by operation in the recirculation mode for a minimum of 1.5 hours per 19013-C, ES-1.3 TRANSFER TO COLD LEG RECIRCULATION, step 8.

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Event Description:

Small break LOCA develops requiring a reactor trip. RO must manually trip reactor due to failure of automatic reactor trip. Loss of power to B train ESF electrical busses will result in no high head or intermediate head SI. This will lead to an orange path on core cooling, requiring the crew to cooldown and depressurize the RCS below ECCS accumulator and low head SI pumps injection pressures to restore core cooling.

	RO	<p>Check if CNMT Spray should be stopped:</p> <ul style="list-style-type: none"> • Pumps running • CNMT pressure < 15 psig • CNMT radiation normal – or - pumps have operated as indicated in note above <p>If true then:</p> <ul style="list-style-type: none"> • Reset CS signal • Stop CS pumps • Shut CS discharge valves
	SS	<p>CAUTION:</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"> • RHR pumps • SI pumps • Post-LOCA cavity purge units • Containment Coolers in low speed (Started in high speed on a UV signal) • ESF Chilled Water Pumps (If CRI has been reset) <p>RCS pressure should be monitored. If RCS pressure lowers in an uncontrolled manner to less than 300 psig, the RHR Pumps should be restarted to supply water to the RCS.</p>
	RO	<p>Check if RHR pumps should be stopped:</p> <ul style="list-style-type: none"> • Any RHR pump running with suction aligned to the RWST • RCS pressure > 300 psig • RCS pressure stable or rising – NO <p>Reset SI</p>
	CREW	<p>Check RCS and SG pressures:</p> <ul style="list-style-type: none"> • Check pressure in all SGs - STABLE OR RISING. • Check RCS pressure -STABLE OR LOWERING.

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Event Description:

Small break LOCA develops requiring a reactor trip. RO must manually trip reactor due to failure of automatic reactor trip. Loss of power to B train ESF electrical busses will result in no high head or intermediate head SI. This will lead to an orange path on core cooling, requiring the crew to cooldown and depressurize the RCS below ECCS accumulator and low head SI pumps injection pressures to restore core cooling.

	BOP	Check if DGs should be stopped: <ul style="list-style-type: none">• AC emergency busses energized by offsite power• Reset SI, if necessary.• Stop any unloaded DG and place in standby by initiating 13145, DIESEL GENERATORS.• Energize 480V switchgear 1NB01 & 1NB10.
	SS	CAUTION: Level in the containment emergency sump and RWST should be monitored to ensure inventory for RHR pump(s) suction.

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Event Description:

Small break LOCA develops requiring a reactor trip. RO must manually trip reactor due to failure of automatic reactor trip. Loss of power to B train ESF electrical busses will result in no high head or intermediate head SI. This will lead to an orange path on core cooling, requiring the crew to cooldown and depressurize the RCS below ECCS accumulator and low head SI pumps injection pressures to restore core cooling.

	CREW	<p>Initiate evaluation of plant status:</p> <p>a. Verify cold leg recirculation capability from at least one flow path: Power available to:</p> <ul style="list-style-type: none"> • HV-8811A - CNMT SUMP TO RHR PMP-A • RHR Pump A -OPERABLE. • HV-8809A – RHR PMP-A TO COLD LEG 1&2 ISO VLV. • RHR heat exchanger A - OPERABLE. <p>b. Check Auxiliary Leak Detection Systems:</p> <ol style="list-style-type: none"> 1. Plant vent radiation monitors - Normal: <ul style="list-style-type: none"> • RE-12442A EFFL PART • RE-12442B EFFL IODINE • RE-12442C EFFL RAD • RE-12444C RADIOGAS RAD 2. Check Auxiliary Building break detection system on QPCP - NO LEAK DETECTION STATUS LIGHT LIT. <p>c. Obtain samples: For boron, pH, and radioactivity:</p> <ul style="list-style-type: none"> • RCS • Both containment emergency sumps (if cold leg recirculation has been established.) <p>For radioactivity, hydrogen and oxygen concentrations:</p> <ul style="list-style-type: none"> • Containment atmosphere <p>d. Evaluate plant equipment:</p> <ol style="list-style-type: none"> 1) Secure unnecessary plant equipment. 2) Review inoperable equipment which may be required. Repair or make available, as possible. <p>e. Consult TSC for additional equipment to be started to assist in recovery including:</p> <ul style="list-style-type: none"> • H2 analyzers • CRDM fans
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Event Description:

Small break LOCA develops requiring a reactor trip. RO must manually trip reactor due to failure of automatic reactor trip. Loss of power to B train ESF electrical busses will result in no high head or intermediate head SI. This will lead to an orange path on core cooling, requiring the crew to cooldown and depressurize the RCS below ECCS accumulator and low head SI pumps injection pressures to restore core cooling.

	RO / SS	<p>Check if RCS cooldown and depressurization is required:</p> <ul style="list-style-type: none"> a. Check RCS pressure GREATER THAN 300 PSIG. b. Go to 19012-C, ES-1.2 POST-LOCA COOLDOWN AND DEPRESSURIZATION.
	CREW	<p>Validates ORANGE path on CORE Cooling CSFST with the following parameters:</p> <p>Core exit Thermal Couples < 1200 F RCS Subcooling < 24 F (38 F) RCP's Running and RVLIS Dynamic Range < 44%</p>
	CREW	Transitions to 19222-C, FR-C.2 RESPONSE TO DEGRADED CORE COOLING
	SS	<p>CAUTION:</p> <p>If RWST level lowers to less than 39%, the ECCS should be aligned for cold leg recirculation by initiating 19013-C, ES-1.3 TRANSFER TO COLD LEG RECIRCULATION.</p> <p>NOTE:</p> <p>91001-C EMERGENCY CLASSIFICATION AND IMPLEMENTING INSTRUCTIONS should be implemented at this time.</p> <p>Normal conditions for running RCPs are desired, but RCPs should not be tripped if normal conditions cannot be established or maintained.</p>
	RO	<p>(Continuous Action)</p> <p>Verify ECCS valve alignment - proper injection lineup indicated by MLB's</p>

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Event Description:

Small break LOCA develops requiring a reactor trip. RO must manually trip reactor due to failure of automatic reactor trip. Loss of power to B train ESF electrical busses will result in no high head or intermediate head SI. This will lead to an orange path on core cooling, requiring the crew to cooldown and depressurize the RCS below ECCS accumulator and low head SI pumps injection pressures to restore core cooling.

	RO	<p>Check for BIT flow, use attachment A as necessary to start pumps & align valves. If CCP flow not verified, then:</p> <ul style="list-style-type: none"> • Reset SI, if necessary, • Start the NCP <p>Check SI pumps for flow. Start pumps and align valves as necessary using Attachment B.</p> <p>Check RCS pressure < 300 psig – (It will be above this value)</p>
	RO	<p>(Continuous Action)</p> <p>Check RCS vent paths: - PZR PORV block have power, PZR PORV's shut, PZR PORV block valves open > 2185 psig RCS pressure</p>
	SS	<p>Note:</p> <p>COPS may be disarmed when temperature rises to greater than 350°F and has remained greater than 295°F (green integrity CSFST)</p>
	RO	<p>Check other RCS Vent paths - SHUT:</p> <p>RX Head vent to letdown isolation valves:</p> <ul style="list-style-type: none"> • HV-8095-A • HV-8095-B • HV-8096-A • HV-8096-B <p>CVCS letdown isolation valves:</p> <ul style="list-style-type: none"> • Orifice isolation valves: HV-8149A/B/C • LV-459 & LV-460 <p>Excess Letdown Line Isolation Valves:</p> <ul style="list-style-type: none"> • HV-8153 & HV-8154

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Event Description:

Small break LOCA develops requiring a reactor trip. RO must manually trip reactor due to failure of automatic reactor trip. Loss of power to B train ESF electrical busses will result in no high head or intermediate head SI. This will lead to an orange path on core cooling, requiring the crew to cooldown and depressurize the RCS below ECCS accumulator and low head SI pumps injection pressures to restore core cooling.

	BOP	Check RCS sample isolation valves SHUT: <ul style="list-style-type: none"> • HV-3548 RC HOT LEG-1&3 SAMPLE-IRC • HV-3502 RC HOT LEG-1&3 SAMPLE-ORC • HV-3513 PRZR STM SAMPLE-IRC • HV-3514 PRZR STM SAMPLE-ORC • HV-3507 PRZR LIQUID SAMPLE-IRC • HV-3508 PRZR LIQUID SAMPLE-ORC
	RO/BOP	Check at least One RCP running and try to establish support conditions using Attachment D if not met
	RO	Check RVLIS dynamic head indication: It will be less than the following: 44% -4 RCPs 30% -3 RCPs 20%-2 RCPs 13%-1 RCP
	RO	Check All RCPs running and then stop RCP 4
	RO	Check SI accumulator isolation valves OPEN: <ul style="list-style-type: none"> • HV-8808A • HV-8808B • HV-8808C • HV-8808D
	BOP	Control intact SG levels between 10% (32%) and 65%. Maintain at least 570 GPM total feed flow if all SG levels < 10% (32%)

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Event Description:

Small break LOCA develops requiring a reactor trip. RO must manually trip reactor due to failure of automatic reactor trip. Loss of power to B train ESF electrical busses will result in no high head or intermediate head SI. This will lead to an orange path on core cooling, requiring the crew to cooldown and depressurize the RCS below ECCS accumulator and low head SI pumps injection pressures to restore core cooling.

	SS	<p>CAUTION:</p> <p>The following step will cause accumulator injection which may cause red path condition in F-0.4, INTEGRITY CSFST. This procedure should be completed before transition to 19241-C, FR-P.1 RESPONSE TO IMMINENT PRESSURIZED THERMAL SHOCK CONDITION.</p> <p>NOTE:</p> <p>After the low steamline pressure SI is blocked, main steamline isolation will occur if the high steam pressure rate setpoint is exceeded.</p> <p>COPS should be armed when RCS WR cold leg temperature is less than 350°F.</p>
	<p>BOP</p> <p>CRITICAL TASK</p>	<p><i>Depressurize all intact SGs to 200 psig. Maintain cooldown rate in RCS cold legs < 100 F/Hr. Use either steam dumps or ARVs</i></p> <p>Block low steamline pressure SI/SLI when RCS pressure < 2000 psig and high steam pressure rate alarms are clear using:</p> <ul style="list-style-type: none"> • HS-40068 • HS-40069
	BOP	Stop SG depressurization when at least 2 RCS hot leg temperatures are < 380 F.
	SS	<p>CAUTION:</p> <p>RHR pumps should be NOT be run longer than 30 minutes without CCW to the RHR heat exchangers</p>
	RO	Check RHR Pumps running

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Event Description:

Small break LOCA develops requiring a reactor trip. RO must manually trip reactor due to failure of automatic reactor trip. Loss of power to B train ESF electrical busses will result in no high head or intermediate head SI. This will lead to an orange path on core cooling, requiring the crew to cooldown and depressurize the RCS below ECCS accumulator and low head SI pumps injection pressures to restore core cooling.

	RO	<p>Isolate SI accumulators if at least 2 RCS WR temperatures < 380 F:</p> <p>Reset SI, if necessary</p> <p>Dispatch an operator to close accumulator isolation valve MOV breakers:</p> <table><tr><td><u>Valve</u></td><td><u>Breaker</u></td></tr><tr><td>HV-8808A</td><td>1ABE-19</td></tr><tr><td>HV-8808B</td><td>1BBC-19</td></tr><tr><td>HV-8808C</td><td>1ABC-19</td></tr><tr><td>HV-8808D</td><td>1BBE-19</td></tr></table> <p>Shut SI Accumulator isolation valves:</p> <p>HV-8808A HV-8808B HV-8808C HV-8808D</p> <p>Open accumulator isolation valve MOV breakers</p>	<u>Valve</u>	<u>Breaker</u>	HV-8808A	1ABE-19	HV-8808B	1BBC-19	HV-8808C	1ABC-19	HV-8808D	1BBE-19
<u>Valve</u>	<u>Breaker</u>											
HV-8808A	1ABE-19											
HV-8808B	1BBC-19											
HV-8808C	1ABC-19											
HV-8808D	1BBE-19											
	SS	<p>CAUTION:</p> <p>F-0.2 Core Cooling CSFST should be closely monitored during the subsequent steps.</p>										
	RO	<p>Stop all RCPs</p>										
	<p>BOP</p> <p>CRITICAL TASK</p>	<p><i>Depressurize all intact SGs to atmospheric pressure. Maintain cooldown rate in RCS cold legs < 100 F/Hr.</i></p> <p><i>Dump steam to condenser or use SG ARVs</i></p>										

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Event Description:

Small break LOCA develops requiring a reactor trip. RO must manually trip reactor due to failure of automatic reactor trip. Loss of power to B train ESF electrical busses will result in no high head or intermediate head SI. This will lead to an orange path on core cooling, requiring the crew to cooldown and depressurize the RCS below ECCS accumulator and low head SI pumps injection pressures to restore core cooling.

	RO	Verify ECCS flow: <ul style="list-style-type: none">• BIT flow• SI pump flow• RHR pump flow
	SS	Note: COPS should be armed when RCS WR cold leg temperature is less than 350 F.
	RO	Check core cooling: <ul style="list-style-type: none">• RVLIS full range > 62%• At least 2 RCS WR hot leg temperatures < 350 F
	SS	Go to 19010-C, E-1 LOSS OF REACTOR OR SECONDARY COOLANT, Step 13.

Facility: <u>Vogtle</u>	Scenario No.: <u>2</u>	Op-Test No.: <u>2005-301</u>	
Examiners: <u>RSBaldwin (Chief Examiner)</u>	Operators: _____		
<u>MABates</u>	_____		
<u>SDRose</u>	_____		
Initial Conditions: The Unit is at 0% power in Mode 2 with a MOL reactor startup in progress.			
Turnover: The previous crew has initiated the reactor startup per UOP 12003-C. Source range counts are stable and Control bank 'C' is presently at 70 steps. 1/M data now projects criticality at 65 steps on Control bank 'D'. Continue with the reactor startup beginning with step 4.2.21 of 12003-C , and stabilize reactor power between 1-3%.			
The Severe Weather checklist is in progress due to thunderstorms approaching from the West. High winds are possible within the hour. (11889-C)			
Steam Generator #1 has a 30 gallon / day tube leak. 18009-C section B in effect, action level 1 monitoring is in progress. TS 3.4.13 INFO LCO on identified RCS Leakage			
NSCW Pump #3 running but is inoperable due to a failed IST. Maintenance is troubleshooting. (INFO LCO 3..7.8)			
Event No.	Malf. No. / Position	Event Type*	Event Description
1	RO	R	Pull control rods to establish critical reactor.
2	BOP SRO (TS)	C	Train 'A' NSCW Pump #1 trips and standby pump fails to automatically start.
3	RO	I	Controlling channel Pressurizer Level Transmitter (LT-459) fails low.
4	BOP	N	Re-establish letdown.
5	BOP	I	Steam Generator #4 ARV Pressure Transmitter fails high.
6	BOP / RO SRO (TS)	C	Letdown line break inside Containment
7	RO	C	RCP #2 High Vibration.
8	ALL	M	Steam Generator #3 double-ended guillotine break of main steam line in Containment.
9	BOP or RO	C	Safety injection Train A fails to actuate and 'B' IHSI fails to automatically start when safety injection is manually initiated. The reactor fails to automatically trip. Automatic steamline isolation fails on both trains.
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Vogtle 2005-301 Scenario #2

Event 1

The initial conditions should place the reactor approximately 3 rod pulls away from being critical. The RO will need to pull control rods and the RO and SRO will need to identify when the reactor is critical.

Verifiable Action: (RO) Pulling control rods.

Event 2

NSCW Pump #1 trips and standby pump fails to start. This will require action by the BOP to manually start the standby pump. This will allow the SRO to get another TS call for this scenario.

Verifiable Action: (BOP) Start standby NSCW pump.

Technical Specifications: LCO 3.7.8

Event 3

The controlling channel of pressurizer level will fail low, which will isolate letdown and raise charging flow. The RO must recognize the controlling channel of Pressurizer Level has failed low and take corrective actions to either manually control charging to maintain pressurizer level and/or select out the failed channel.

Verifiable Action: (RO) Manual control of pressurizer level and/or select out failed channel.

Technical Specifications: LCO 3.3.1

Event 4

The BOP will need to re-establish letdown.

Verifiable Action: (BOP) Re-establish letdown.

Event 5

After the crew stabilizes following criticality, a Steam Generator ARV will fail open due to its controlling pressure transmitter failing high. The BOP will need to take action to control the ARV to limit the power excursion.

Verifiable Action: (BOP) Close SG ARV.

Event 6

After the BOP re-establishes letdown, a letdown leak inside containment develops. The success path will be for the crew to isolate letdown, which will isolate the leak.

Verifiable Action: (BOP or RO) Isolate letdown.

Technical Specifications: LCO 3.4.13

Event 7

RO will need to recognize the high vibration and secure the RCP.

Verifiable Action: (RO) Trip RCP.

Event 8

Steam Generator #3 main steam line break inside containment. The leak is the largest possible steam leak, with a large amount of mass in the steam generator. The crew will need to respond to the excess steam demand event. The reactor will fail to automatically trip and automatic steamline isolation will fail. The crew will need to manually trip the reactor and to manually actuate steamline isolation to mitigate the event. It is also important to mitigate a re-pressurization of the reactor vessel after a large temperature drop of the reactor vessel.

Verifiable Actions: Manually actuate steamline isolation, stop feeding faulted Steam Generator

Critical Tasks: Manually actuate steamline isolation

Event 9

An automatic reactor trip will fail to occur. An automatic safety injection will fail to occur on Train A, requiring the crew to recognize and manually initiate the safety injection. The 'B' SI pump must be manually started.

Verifiable Action: RO Manual reactor trip

Critical Task: Manual reactor trip.

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Initial Conditions: IC 255 The Unit is at 0% power in Mode 2, a MOL reactor startup is in progress.

Pre-load malfunctions:

- ES01 – Failure of automatic reactor trip
- ES08 - SI 'A' Train Auto Actuation Failure
- ES10 – Failure of Train A Steamline Isolation
- ES11 – Failure of Train B Steamline Isolation
- SI06B - SI Pump 'B' Failure to Auto Start
- NS07E - NSCW pump #5 Failure to Auto Start
- RF: ES46 - P14 Setpoint Adjustment to 86%
- Override TDAFWP trouble alarm off

Ensure all required procedures and data sheets are provided:

- 12003-C Datasheet 2 RCS Temperature Verification
- 12003-C Datasheet 1 1/m data & plots
- Ensure Audio CR channel in service.
- 14940-1 (ECC)
- Ensure Shutdown Monitor set up for 1/M Mode of Operation
- IPC Mode & trends
- Reactivity Briefing Sheet & Shift Manning Sheet
- Caution Tag NSCW Pump #3
- Secondary aligned per 18009-C, Section B. C. Tag #1 ARV, LIC4415, SJAE's, Steam Seals, TDAFW
- Remote function: Aux Steam from Unit 2
- O/R TDAFWP trouble alarm off
- (86%) Sticker on panel to cover new P-14 setpoint

Turnover: The previous crew has initiated the reactor startup per UOP 12003-C. Source range counts are stable and Control bank 'C' is presently at 70 steps. 1/M data now projects criticality at 65 steps on Control bank 'D'. Continue with the reactor startup beginning with **step 4.2.21 of 12003-C**, and stabilize reactor power between 1-3%.

The Severe Weather checklist is in progress due to thunderstorms approaching from the West. High winds are possible within the hour. (11889-C)

Steam Generator #1 has a 30 gallon / day tube leak. 18009-C section B is in effect, Action Level 1 monitoring is in progress, TS 3.4.13 INFO LCO on Identified RCS leakage.

NSCW Pump #3 running but is inoperable due to a failed IST. Maintenance is troubleshooting. (INFO LCO 3..7.8)

Reactor Engineer is recording & plotting 1/m data for SS review

Time	Mal. #'s	Severity	Instructor Notes and Required Feedback
1	N/A	N/A	Pull control rods to establish critical reactor
2	NS02A	N/A	Train 'A' NSCW Pump #1 trips and standby pump fails to automatically start. If dispatched, report Overcurrent trip on NSCW pump #1 breaker. OAO reports scorched smell near the motor.
3	PR03A	0%	Controlling channel Pressurizer Level Transmitter (LT-459) fails low.
4	N/A	N/A	Re-establish CVCS letdown
5	MS03D	100%	Steam Generator #4 ARV Pressure Transmitter fails high.

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6	CV02	25%	Letdown line break inside Containment <i>NOTE: If crew elects to send a person into CNMT to visually locate the source of the leak then simulator operator will report unable to enter CNMT due to steam / adverse environment</i>
7	O/R ALB 08 ANNUN	E4,E3 F4, F3	RCP #2 Increasing Vibration. Insert E4 - Wait 120 sec. - insert E3 (Crew should dispatch CBO to RCP VMP) Wait 5 min. - insert F4 - Wait 120 sec. – insert F3 If dispatched, report RCP #2 indicates <u>5.5 mils on frame & 23 mils on shaft.</u>
8	MS04C	100%	Steam Generator #3 double-ended guillotine break of main steam line in Containment.
END			When crew transitions to 19011-C

OPERATING PLAN:

- The previous crew has initiated the reactor startup per UOP 12003-C.
- Source range counts are stable at 1110 CPS
- Control bank 'C' is presently at 70 steps.
- 1/M data now projects criticality at 65 steps on Control bank 'D'.
 - +750 pcm is All Rods Out
 - -750 pcm control rod position is 78 steps on Control bank 'C'
 - ECC is 75 steps on Control Bank D
- The Reactor Engineer is recording and plotting 1/M data to support the reactor start up.
- After reviewing and briefing on completed steps in **12003-C**, continue with the reactor startup beginning with step **4.2.21**, and stabilize reactor power between 1-3%.
- The Severe Weather checklist (11889-C) is in progress due to thunderstorms approaching from the West. High winds are possible within the hour.
- NCSW Pump #3 is functional but has been declared inoperable due problems identified in the last IST. The pump is running for troubleshooting. INFO LCO 3.7.8 has been written.
- Steam Generator #1 has a 30 gallon / day tube leak.
- The required actions of 18009-C, section B, "Operation with a Minor SGT" have been initiated. Action Level 1 monitoring is in progress.
- TS 3.4.13 INFO LCO on Identified RCS leakage.

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Event No.: 1

Event Description: Crew will perform actions necessary to continue the in-progress reactor startup until criticality is achieved and identified. The RO will need to withdraw control rods, and both the RO and SRO will need to identify when the reactor is critical.

Time	Position	Applicant's Action or Behavior
	RO	Crew continues reactor start up with step 4.2.21 of procedure 12003-C: Pull control rods 50 steps to 120 steps on Control bank C / 5 steps on D When Control Bank C reaches 115 steps, VERIFY Control Bank D begins withdrawing. (TS SR 3.1.6.3) Verifies counts stabilize
	SS	Reports to Reactor Engineer counts are stable for 1/M data & plot Reviews 1/M data and plot and determines reactor start up may continue Authorizes RO to pull rods 50 steps to 170 steps on control bank C / 55 steps on D
	RO	Pulls rods 50 steps to 170 steps control bank C/ 55 Steps on D Verifies counts stabilize
	SS	Reports to Reactor Engineer counts are stable for 1/M data & plot Reviews 1/M data and plot and determines reactor start up may continue Authorizes RO to pull rods 50 steps to 105 steps on control Bank D or reactor critical, whichever occurs first.
	RO	VERIFY IR indication comes on scale as source range count rate rises. <ul style="list-style-type: none">• Ensure proper overlap between SR and IR channels.

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Event No.: 1

Event Description: Crew will perform actions necessary to continue the in-progress reactor startup until criticality is achieved and identified. The RO will need to withdraw control rods, and both the RO and SRO will need to identify when the reactor is critical.

	RO	At an IR indication of approximately $2 \times 10^{-5}\%$, PERFORM the following: <ul style="list-style-type: none">• VERIFY proper indications for P-6 permissive (status lights lit),• BLOCK the source range hi flux reactor trip by placing both SR BLOCK/ RESET A/B switches HS-40030/HS-40031 to the BLOCK position,• VERIFY SR Hi flux trip blocked (BPLB lights lit)
	RO SRO	Recognize indications of criticality by identifying steadily increasing counts and a constant positive SUR on SR and IR NI's.
	RO	Raises power to $2 \times 10^{-3}\%$ in the Intermediate Range by adjusting control rods as necessary to establish a SUR of approximately 0.5 DPM to take Critical Data.

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Event No.: 2

Event Description: Trip of 'A' train NSCW pump #1 with pump #5 failing to automatically start.

Time	Position	Applicant's Action or Behavior
	RO / BOP SRO	Diagnose degraded NSCW conditions by noting trip of NSCW pump #1 and abnormal system conditions: <ul style="list-style-type: none">• NSCW TRAIN A LO HDR PRESS alarm (ALB2 B1)• NSCW TRAIN A LO FLOW alarms (ALB2 C3/C4/D2/D3/E2/F2)• Degraded flow (FI-1640A/1640B) and pressure (PI-1636) indications on QMCB:
	RO / BOP	Informs SS of auto-start failure of NSCW pump #5, and manually starts standby 'A' train NSCW pump #5.
	SRO	Initiates AOP 18021: Directs BOP to verify proper operation of AFFECTED NSCW train by checking for normal system pressure, flows, and basin level.
	SRO	Initiates repair activities: <ul style="list-style-type: none">• CR & WO generated• Duty Manager of AOP entry• Maintenance notified for support
	SRO	Initiates review of Tech Specs. <ul style="list-style-type: none">• T.S. LCO 3.7.8 Condition A

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Event No.: 3

Event Description: Controlling Pressurizer level channel (LT-459) fails low.

Time	Position	Applicant's Action or Behavior
	RO SRO	Diagnose controlling Pressurizer level channel failure: <ul style="list-style-type: none"> • Letdown flow isolates (LV-459 & orifice isolation) • LI-459 indication reads 0% • Pressurizer heaters trip off • PRZR PROPORTIONAL HTR TROUBLE (ALB11 A1) • PRZR LO LEVEL HTR CNTL OFF LTDN SECURED (ALB11 B1) • PRZR LO LEVEL DEVIATION (ALB11 D1)
	SRO	Initiates AOP 18001-C, Section D to direct crew actions.
	RO	Takes manual control of charging to: <ul style="list-style-type: none"> • limit Pressurizer level rise, • minimize thermal cycle on charging nozzle, and • maintain RCP seal injection between 8-13 GPM
	RO	Selects an unaffected channel (461/460) for Pressurizer level control.
	SRO	Directs BOP to reestablish letdown flow per SOP 13006. Note: Letdown restoration listed as next event.
	RO	Restores Pressurizer heaters to service.
	RO	Returns Pressurizer level control to Auto, and monitors parameters to verify proper system response: <ul style="list-style-type: none"> • Charging and letdown flows • Pressurizer level trending to program • Proper heater operation
	SRO	Initiates repair activities: <ul style="list-style-type: none"> • CR & WO generated • Duty Manager of AOP entry • Maintenance notified for support

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Event No.: 3

Event Description: Controlling Pressurizer level channel (LT-459) fails low.

	SRO	<p>Initiates review of Tech Specs:</p> <ul style="list-style-type: none">• T.S. LCO 3.3.4 Remote S/D - Functional Unit 8 - Condition A• T.S. Info LCO 3.3.1 RX Trip hi PZR level - Functional Unit 9 INFO ONLY• T.S. Info LCO 3.3.3 PAM - Functional Unit 6 – INFO ONLY
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Event No.: 4

Event Description: BOP reestablishes letdown flow per 13006-1.

Time	Position	Applicant's Action or Behavior
	BOP	Initiates section 4.4.2 of 13006. Note: With letdown isolated and charging still in service, an Auto-makeup will occur to ensure VCT level is maintained. The RO and/or BOP should verify proper makeup flow rates per the Reactivity Briefing Sheet.
	BOP	Performs initial alignment of CVCS letdown: <ul style="list-style-type: none"> • Letdown orifice isolations closed (HV-8149A/B/C) • Letdown isolations closed (LV-459/LV-460) • PRZR Aux Spray Valve Closed (HV-8145) • LETDOWN PIPE BREAK PROT ISOLATION Open (HV-15214) • LETDOWN LINE ISO VLV IRC Open (HV-8160) • LETDOWN LINE ISO VLV ORC Open (HV-8152)
	BOP	Manually adjusts Letdown Pressure Controller PIC-131 to 50-75%.
	BOP	Manually adjusts Letdown HX Outlet Temperature Controller TIC-130 to approximately 50%.
	BOP	Verifies: <ul style="list-style-type: none"> • PRZR level > 17% • Normal or Alternate Charging valve Open (HV-8146/HV-8147) • Both Charging line isolation valves open (HV-8105/HV-8106)
	BOP	Ensures charging flow approximately 90 GPM and RCP seal injection flow between 8-13 GPM.
	BOP	Opens Letdown isolation valves LV-459 & LV-460.
	BOP	Opens selected orifice isolation valve HV-8149 B or C.
	SRO	Logs/notes which orifice isolation valve utilized in control log.

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Event No.: 4

Event Description: BOP reestablishes letdown flow per 13006-1.

	BOP	Adjusts Letdown Pressure Controller, PIC-131, to between 360-380 psig, and returns controller to automatic.
	BOP	Ensures Letdown HX Outlet Temperature Controller, TIC-130, is less than 115 F, and returns controller to automatic.
	BOP	Monitors plant parameters to ensure proper controller response: <ul style="list-style-type: none">• Pressurizer level• Charging and letdown flows• Letdown temperature
	RO	Returns charging flow control to automatic, if desired.

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Event No.: 5

Event Description: SG #4 ARV Pressure Transmitter Fails High

Time	Position	Applicant's Action or Behavior
	BOP SRO	<p>Diagnose opening of SG ARV by any of the following indications:</p> <ul style="list-style-type: none"> • ALB 15 F01 MS Safety Valve Leaking alarm • ARV tailpipe temperature monitoring panel alarm on QPCP • Lowering RCS temperature • Rising reactor power • SG #4 ARV controller indication
	BOP	Manually shuts SG ARV #4.
	SRO	<p>Implements available ARP and/or AOP guidance for ARV failure.</p> <p>Note: Crew actions to close the ARV will probably occur before ARP/AOP reference is made per the guidance of Ops Admin procedure 10020. ARP will direct use of AOP 18008 for secondary coolant leakage if ARV opening not planned. This AOP however primarily addresses secondary leaks that can not be located and/or isolated.</p>
	RO	Insert control rods as necessary to limit unplanned power transient.
	BOP	<p>Reduce steam demand and raise RCS temperature to match T_{avg} and T_{ref} by:</p> <ul style="list-style-type: none"> • Closing SG #4 ARV • Reducing steam dump demand
	RO	Control charging and letdown flow to maintain Pressurizer level in program band.
	RO	Operate heaters and sprays as required to maintain Pressurizer pressure in program band.
	BOP	Adjust AFW flow, if necessary, to restore SG #2 level to program.
	SRO	<p>Reviews Tech Specs for applicability:</p> <p>LCO 3.3.4 (Remote S/D) – INFO ONLY LCO 3.7.4 (ARVs) – INFO ONLY</p>

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Event No.: 7

Event Description: Letdown line break inside Containment.

Time	Position	Applicant's Action or Behavior
	RO SRO	<p>Diagnose loss of RCS/CVCS inventory by any of the following indications:</p> <ul style="list-style-type: none"> • CNMT moisture alarm (ALB1 F6) • CNMT activity rising on radiation monitors (RE-2652/RE-002/RE-003) • CNMT sump levels rising: <ul style="list-style-type: none"> ○ Reactor Cavity ○ North Sump ○ South Sump • CNMT radiation monitors alarming (RE-2652/RE-002/RE-003) • PRZR level lowering
	SRO	<p>Implements ARP and AOP guidance for leakage inside Containment:</p> <ul style="list-style-type: none"> • 17102 guidance for: <ul style="list-style-type: none"> ○ RE-2562 CNMT Atmosphere Process ○ RE-002 and RE-003 CNMT Area Low Range in alarm condition • 18004 for response to RCS leakage indications
	RO	<p>Controls charging and letdown flows to maintain Pressurizer level in program band by performing the following, as necessary:</p> <ul style="list-style-type: none"> • Raising charging flow • Starting an additional charging pump • Reducing letdown flow
	RO	Verifies Pressurizer PORV's and spray valves shut.
	RO	<p>Verifies that Pressurizer level is trending to program.</p> <p>Note: Crew should not be required to perform a Reactor trip and SI based on the leak size.</p>

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Event No.: 7

Event Description: Letdown line break inside Containment.

	RO	<p>Ensure VCT level is maintained.</p> <p>Swap charging pump suction to the RWST, if required.</p> <ul style="list-style-type: none"> • LV-112B & C are the VCT supply isolation valves • LV-112D & E are the RWST supply isolation valves
	SRO	<p>Notify Shift Manager/Ops Duty Manager for support for the following:</p> <ul style="list-style-type: none"> • Evacuation of Containment, when/if necessary • Implementation of 91001-C (EPIP's) • Notification to plant management of AOP entry
	ALL	<p>Locate source of leakage per Table 1 of 18004-C.</p> <p>NOTE: If crew elects to send a person into CNMT to visually locate the source of the leak then simulator operator will report unable to enter CNMT due to steam / adverse environment</p> <p>Crew may use control room Tech Spec rounds parameters on the Integrated Plant Computer (IPC) to help locate the leak.</p> <p>Note: Leak is on the high energy portion of the letdown line. Containment temperature and pressure will begin to steadily increase, so a Containment entry for leakage identification would not be advisable due to personnel safety concerns. The leak can be isolated if letdown is removed from service. No discernible changes in charging and letdown parameters will be present however due to the leak size and location. Control room indications and AOP 18004-C will point crew toward responding to RCS leakage inside Containment.</p> <p>SYMPTOMS LISTED IN TABLE 1 OF 18004-C</p> <p><u>Chemical and volume control system:</u></p> <ul style="list-style-type: none"> • Abnormal temperatures in letdown or charging flow. • Abnormal pressure in letdown or charging flow. • Abnormal flows in letdown or charging flow. • CVCS TRAIN A (B) PMP RM HI TEMP alarm (ALB-51). • Pressurizer relief tank level, temperature or pressure rising from CVCS Letdown Line Relief Valve PSV-8117. • Seal Return Line Relief Valve PSV-8121 lifting. • CVCS PIPE BREAK RM PROT ACTUATION alarm (ALB-63).

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Event No.: 7

Event Description: Letdown line break inside Containment.

		<p>SYMPTOMS LISTED IN TABLE 1 OF 18004-C</p> <p><u>Containment atmosphere:</u></p> <ul style="list-style-type: none"> • Rising temperature or moisture indication. • CNMT HI TEMP alarm. • CNMT HI MSTR alarm. • RX CVTY DRN SUMP HI-HI LVL alarm (ALB-61). • CNMT DRN SUMP HI-HI LEVEL alarm (ALB-61). • CNMT HI-1 PRESS ALERT ADVERSE CNMT alarm. • RE-0002, -0003 CONTAINMENT LOW RANGE AREA MONITOR alarm or rising. • RE-0005, RE-0006 CONTAINMENT HIGH RANGE AREA MONITOR alarm or rising. • RE-2562A CONTAINMENT ATMOSPHERE PROCESS AIR PARTICULATE MONITOR alarm or rising. • RE-2562C CONTAINMENT ATMOSPHERE PROCESS RADIOGAS MONITOR alarm or rising. • CNMT CLR COND LEAK alarm (ALB-62).
	ALL	<p>isolate the leak</p> <p>Since no indications are present that would identify CVCS letdown as the source of the leakage, the crew may not decide to isolate letdown.</p>
	SRO	<p>If not isolated, the crew will be required to initiate a shutdown to comply with the Tech Spec leakage required actions of LCO 3.4.13.</p> <p>SS will likely call Shift Manager or OPS duty Manager to provide notification of plant condition and the Tech Spec required shutdown.</p>

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Event No.: 7

Event Description: Letdown line break inside Containment.

Time	Position	Applicant's Action or Behavior
	RO SRO	<p>Per RCP High Vibration Alert alarms ARP 17008 E3 & E4, DISPATCH an operator to the Vibration Monitoring Panel 1-1201-P5-VMP to:</p> <ul style="list-style-type: none"> IDENTIFY the Reactor Coolant Pump (RCP) causing the alarm. CHECK both vibration channels and alarm setpoints for shaft and frame of each RCP (32 points in all) to verify no obvious vibration monitoring equipment problems exist. ATTEMPT to reset alarm using COMMON RESET toggle switch.
	RO SRO	<p>REFER to 13003-1, "Reactor Coolant Pump Operation" and note Limitations section for RCP Trip Criteria:</p> <p><u>An RCP shall be stopped if any of the following conditions exist.</u></p> <ul style="list-style-type: none"> Motor bearing temperature exceeds 195°F. Motor stator winding temperature exceeds 311°F. Seal water inlet temperature exceeds 230°F Total loss of ACCW for a duration of 10 minutes. RCP shaft vibration of 20 mils or greater. RCP frame vibration of 5 mils or greater. Differential pressure across the no.1 seal of < 200 psid <p>CUE: If dispatched, report RCP #2 indicates <u>5.5 mils on frame & 23 mils on shaft.</u></p>
	ALL	<p>When RCP High Vibration alarms ALB 08 F03 & F04 are received and the Control Building operator reports high vibration readings on the RCP Vibration Monitoring Panel, the crew should trip RCP #2 per 13003-1 guidance.</p> <ul style="list-style-type: none"> Start RCP #2 oil lift Pump Stop RCP #2 Observe reverse flow in loop #2 Stop RCP #2 oil lift pump

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Event No.: 8 and 9

Event Description:

A large steamline break on loop #3 inside containment occurs. The accident condition will cause an automatic Reactor Trip and Safety Injection signal within seconds. The Reactor will not automatically trip, and train 'A' SI will not automatically actuate. The crew will have to manually trip the reactor, manually actuate SI, and will have to manually start the 'B' train SI pump. The crew will respond per 19000, and then implement 19020 to isolate the faulted SG.

Time	Position	Applicant's Action or Behavior
	SRO	Implements Reactor Trip and Safety Injection procedure 19000-C in response to SLB IRC.
	RO Critical Task	Manually trips reactor prior to reaching the 25% power high flux trip setpoint.
	SRO	E-0 Foldout page continuously monitored and applicable actions taken.
	RO IOA	Verifies Reactor is tripped: <ul style="list-style-type: none"> • All rod bottom lights lit • Reactor trip & bypass breakers open • Neutron flux lowering
	BOP IOA	Verifies turbine is tripped <ul style="list-style-type: none"> • All stop valves shut
	CREW IOA	Verifies electrical power available to all of the emergency electrical busses
	RO	CHECKS if SI is actuated: <ul style="list-style-type: none"> • SI annunciators - LIT • SI ACTUATED BPLB window will be LIT

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Scenario No.: 2

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Event No.: 8 and 9

Event Description:

A large steamline break on loop #3 inside containment occurs. The accident condition will cause an automatic Reactor Trip and Safety Injection signal within seconds. The Reactor will not automatically trip, and train 'A' SI will not automatically actuate. The crew will have to manually trip the reactor, manually actuate SI, and will have to manually start the 'B' train SI pump. The crew will respond per 19000, and then implement 19020 to isolate the faulted SG.

	BOP	Verifies feedwater isolation valves shut: <ul style="list-style-type: none"> • MFIV's • BFIV's • MFRV's • BFRV's
	RO	Verifies ECCS equipment aligning on the MLB's. <i>This step will direct a manual actuation of SI since Train 'A' ECCS equipment is not properly aligning per Control Board MLB indication.</i>
	RO	Verifies CNMT Isolation Phase A Actuated <ul style="list-style-type: none"> • CIA MLB's indicators correct
	BOP	Verifies proper AFW system operation: <ul style="list-style-type: none"> • MDAFW pumps – running • SGBD isolation Handswitches – place in hard close • SG sample isolations - shut • TDAFW pump running if lo-lo level on 2 SGs or blackout
	RO	Verifies ECCS pumps running: <ul style="list-style-type: none"> • CCP's • SI Pumps (SI Pump 'B' will have to be manually started) • RHR Pumps Verifies NCP – NOT running
	BOP	Verifies 2 CCW pumps in each train – running

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Event No.: 8 and 9

Event Description:

A large steamline break on loop #3 inside containment occurs. The accident condition will cause an automatic Reactor Trip and Safety Injection signal within seconds. The Reactor will not automatically trip, and train 'A' SI will not automatically actuate. The crew will have to manually trip the reactor, manually actuate SI, and will have to manually start the 'B' train SI pump. The crew will respond per 19000, and then implement 19020 to isolate the faulted SG.

	RO	Check for proper NSCW system operation: <ul style="list-style-type: none"> • 2 pumps in each train – running • NSCW TOWER RTN HDR BYPASS BASIN handswitches - in AUTO: <div style="margin-left: 40px;"> HS-1668A HS-1669A </div>
	RO	Verifies CNMT Cooling Units: <ul style="list-style-type: none"> • Fans running in low speed – MLB indicators • NSCW cooler isolation valves open – MLB indicators
	RO	Verifies CNMT Ventilation Isolation – dampers & valves shut (MLB indicators)
	RO / BOP Critical Task	Checks if SLI should be actuated: <ul style="list-style-type: none"> • Any Steamline pressure < 585 psig • CNMT pressure by recording > 14.5 psig • High steam pressure rate if SI/SLI blocked <p>NOTE: Automatic Steamline Isolation will fail on both trains, the crew will be required to manually actuate Steamline Isolation prior to leaving this step.</p>
	RO	Check CNMT spray is actuated if CNMT pressure by recording > 21.5 psig
	BOP	Verify both diesel generators running
	RO	Verify BIT flow on FI-917A
	RO	Checks RCS pressure < 1625 psig

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Event No.: 8 and 9

Event Description:

A large steamline break on loop #3 inside containment occurs. The accident condition will cause an automatic Reactor Trip and Safety Injection signal within seconds. The Reactor will not automatically trip, and train 'A' SI will not automatically actuate. The crew will have to manually trip the reactor, manually actuate SI, and will have to manually start the 'B' train SI pump. The crew will respond per 19000, and then implement 19020 to isolate the faulted SG.

	RO	Checks RCS pressure > 300 psig
	BOP	Verifies generator output breakers trip open 30 seconds after turbine trip
	BOP	Continuous Action Verifies total AFW flow > 570 GPM or controls flow to maintain SG NR levels > 10% (32%)
	RO	Verifies ECCS valve alignment proper on MLB indicators
	RO BOP	Continuous action Checks RCS temperature stable at or trending to 557. Note: The main steamlines will have automatically isolated due to the SLB. If the faulted SG has been isolated and is completely depressurized, then RCS temperature will begin to increase. The crew will be expected to limit the rate of temperature increase by dumping steam from the intact SG's via the ARV's.
	RO	Verifies: <ul style="list-style-type: none"> • PZR PORV's –shut in auto • Normal PZR Spray valves – shut • Power available to at least one PORV block valve & it opens > 2185 psig RCS pressure
	RO	Continuous action Maintain RCP seal injection flow 8-13 GPM per RCP by adjusting FV-121, as necessary.
	SS / RO	Check RCP trip criteria

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Event No.: 8 and 9

Event Description:

A large steamline break on loop #3 inside containment occurs. The accident condition will cause an automatic Reactor Trip and Safety Injection signal within seconds. The Reactor will not automatically trip, and train 'A' SI will not automatically actuate. The crew will have to manually trip the reactor, manually actuate SI, and will have to manually start the 'B' train SI pump. The crew will respond per 19000, and then implement 19020 to isolate the faulted SG.

	RO	Verifies one ACCW pump running (Continuous Action)
	BOP	Places CNMT hydrogen monitors in service on QPCP using SOP 13130
	BOP	<p>Checks SG secondary pressure boundaries:</p> <ul style="list-style-type: none"> • No SG pressure lowering in an uncontrolled manner • No SG completely depressurized <p>NOTE: The crew should identify the E-2 transition criteria and implement 19020-C to verify proper isolation of the faulted SG. The BOP may have initiated isolation of the faulted SG prior to this transition based on the guidance of 10020-C for equipment and personnel protection. It is expected that the SS will be notified of this action, if taken.</p>
	SRO	<p>Implements 19020-C to complete faulted SG isolation:</p> <ul style="list-style-type: none"> • At least one SG should be maintained available for RCS cooldown. • Any faulted SG or secondary break should remain isolated during subsequent recovery actions unless needed for RCS cooldown. • CSFST monitoring assigned/initiated • Shift Manager notified to implement 91001-C (EPIP's)
	BOP	Verifies main steamlines isolated.
	BOP	Verifies an intact SG is available.

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Event No.: 8 and 9

Event Description:

A large steamline break on loop #3 inside containment occurs. The accident condition will cause an automatic Reactor Trip and Safety Injection signal within seconds. The Reactor will not automatically trip, and train 'A' SI will not automatically actuate. The crew will have to manually trip the reactor, manually actuate SI, and will have to manually start the 'B' train SI pump. The crew will respond per 19000, and then implement 19020 to isolate the faulted SG.

	ALL	Verifies ECCS termination criteria met: <ul style="list-style-type: none">• RCS subcooling - GREATER THAN 24°F (38°F ADVERSE)• Secondary heat sink: · Total feed flow to intact SGs-GREATER THAN 570 GPM OR Narrow range level in at least one intact SG GREATER THAN 10% [32% ADVERSE.]• RCS pressure - STABLE or RISING.• PRZR level - GREATER THAN 9% [37% ADVERSE.]
	SRO	Transitions to 19011-C to terminate ECCS injection.

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Event 1

The 'B' steam generator flow transmitter (FT-520) fails low. The effects include lowering feed pump speed, throttling of main feed regulating valves. The BOP will need to take manual control of steam generator levels.

Verifiable Action: (BOP) Manual control of feed pump speed controller and main feed regulating valves.

Event 2

The NI failure will cause control rods to insert due to the rate function of the rod control system. RO has an immediate operator action to take rods to manual mode. The RO has subsequent actions to match Tave with Tref.

Verifiable Action: (RO) Place control rods in manual and match Tave and Tref.

Technical Specifications: LCO 3.3.1

Event 3

One MSSV fails open far enough to cause a cooldown, but not so far as to not give crew a chance to respond prior to reactor trip. The valve will not fully reseal and will act as an additional steam load which will require a power reduction. This will require the crew to reduce power to < 71% per TS 3.7.1 (wording of TS is confusing).

Verifiable Action: (BOP) Reduce turbine load.

Technical Specifications: TS 3.7.1

Event 4

RO will perform a reactivity manipulation by adding negative reactivity.

Verifiable Action: (RO) Manipulate control rods and CVCS to control reactivity.

Event 5

BOP will need to recognize the 'A' ACCW pump trip and failure of standby pump to start. The BOP will need to manually start the standby pump.

Verifiable Action: (BOP) Manually start the 'A' ACCW pump.

Event 6

The letdown heat exchanger tube rupture will create in-leakage to the ACCW system. Letdown pressure and flow will decrease.

Verifiable Action: (RO). Stop leakage by isolating letdown. (Component failure must be designed to ensure verifiable action).

Event 6A

The RO will place excess letdown in service to control PRZR level as a result of the previous event.

Verifiable Action: (RO) Places excess letdown in service

Event 7

The LBLOCA will occur and auto and manual reactor trips will fail. The RO will need to attempt manual reactor trip and send an operator to open reactor trip breakers and manually insert rods (rods will not insert automatically). The LBLOCA will require the crew to perform normal strategy of mitigating a LOCA. Securing RCPs will be a CT.

Verifiable Action: (RO) Attempt to manually trip reactor and dispatch an operator to open reactor trip breakers; (ALL) Cool RCS and secure RCPs when conditions are met.

Critical Task: Cool RCS.

Event 8

The failure of the sump outlet valves to open will place the crew into a loss of emergency coolant recirculation procedure. The crew will need to take actions in ECA-1.1, Loss of Emergency Recirculation, to makeup to the RWST and they will need to initiate actions to get the sump outlet valves open. If they have initiated actions in accordance with their procedures to maintain the core covered with water and if they dispatch personnel to attempt to get the outlet valves open, then the scenario can be terminated. Keeping the core covered will be a CT.

Verifiable Action: (ALL) Take actions to make-up to the RWST and address getting the sump outlet valves open by contacting work groups outside of the control room.

Critical Task: Keep the fuel covered. (RVLIS Full Range 62% is top of core).

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Initial Conditions: IC 14 The Unit has been at 100% power for five months following a refueling outage.

Pre-load malfunctions:

- ES01 - Auto Reactor Trip Failure
- ES02 - Manual Reactor Trip Failure
- ES03 - RTB 'B' Fails to Open
- AC03B - ACCW pump #2 Failure to Auto Start
- O/R HV-8811A & B CLOSE
- RF: ES46 - P14 Setpoint Adjustment to 86%
- RF: Aux Steam on Unit 2
- Override TDAFWP trouble alarm off

Equipment Status/ Procedures/ Alignments/ Data Sheets/ etc.:

- NCP & miniflow Tagged Out (CCP 'B' running) – expected back tomorrow by 1200.
- SI Pump 'A' Tagged Out –OOS yesterday at 0800, and should be cleared in 12 hrs. LCO 3.5.2 (Cond. A)
- NSCW Pump #3 Caution Tagged
- Secondary aligned per 18009-C, Section B. C. Tag #1 ARV, LIC4415, SJAE's, Steam Seals, TDAFW
- Remote function: Aux Steam from Unit 2
- IPC Mode & trends
- Reactivity Briefing and Shift Manning Sheets
- Sticker over new P-14 setpoint on QMCB

Turnover: Maintain full power operation.

NSCW Pump #3 running but is inoperable due to a failed IST. Maintenance is troubleshooting. (INFO LCO 3..7.8)

NCP is tagged out and expected to be returned to service at 1200 hours tomorrow. The 'B' CCP is operating.

SI Pump 'A' was tagged out yesterday at 0800 hours and is scheduled to be returned to service in 12 hours (TS 3.5.2). Condition A

The Severe Weather checklist is in progress due to thunderstorms approaching from the West. High winds are possible within the hour. (11889-C)

Steam Generator #1 has a 30 gallon / day tube leak. 18009-C section B is in effect, Action Level 1 monitoring is in progress, TS 3.4.13 INFO LCO on Identified RCS leakage.

Time	Malif. #'s	Severity	Instructor Notes and Required Feedback
1	FW02B	0%	SG #2 controlling feed flow transmitter (FT-520) fails low.
2	NI10D	N/A	Power Range NI channel 44 fails high.
3	MS06A	50%	SG #1 MS safety valve fails partially open. TS required power reduction. If Maintenance requested to gag safety closed remove malfunction
4	N/A	N/A	Crew reduces power for Tech Spec actions from failed MS safety valve
5	AC02A	N/A	Trip of running ACCW pump #1 with pump #2 failing to auto start.
6	CV05	100	Letdown heat exchanger tube leak. If dispatched, perform local isolations of Letdown HX using RF AC 06
6A	N/A	N/A	Place Excess Letdown in service

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7	RD07	N/A	Rods will fail to insert automatically during the next event. Manual insertion required during ATWT response.
8	RC05A	5-50% in 200 sec	<p>RCS leak that leads to ATWT.</p> <p>After crew requests local opening of RTBs and crew is past step 4 of 19211-C then remove Malfunction ES01 then ES03</p> <p>After crew performs step 17 of 19000, <u>remove RC05A</u> and replace with <u>RC03A</u> (DBA)</p> <p>Use RF CV01 to align RWST makeup from blender when requested by crew to align local valves per 13701-1</p> <p>Use Remote Function SI01 through SI04 to power SI Accumulator Isolation Valves</p>
	RF TK02 1500 sec	95-39%	<i>This ramp rate ensures adequate CNMT sump level will be available for the transitions to 19013-C, Cold Leg Recirculation.</i>
END			After crew initiates actions of 19111-C to keep core covered and initiates emergency work to get sump isolation valves open.

OPERATING PLAN:

- The Unit has been at 100% power for five months following a refueling outage. Maintain full power operation per 12004-C.
- NCP Tagged Out due to high vibration. It is expected back tomorrow by 1200.
- SI Pump 'A' Tagged Out due to bearing failure. It has been out of service since yesterday at 0800, and should be returned to service in 12 hrs. LCO 3.5.2 (Condition A) is in effect.
- The Severe Weather checklist (11889-C) is in progress due to thunderstorms approaching from the West. High winds are possible within the hour.
- NCSW Pump #3 is functional but has been declared inoperable due problems identified in the last IST. The pump is running for troubleshooting. INFO LCO 3.7.8 has been written.
- Steam Generator #1 has a 30 gallon / day tube leak.
- The required actions of 18009-C, section B, "Operation with a Minor SGTL" have been initiated. Action Level 1 monitoring is in progress.
- TS 3.4.13 INFO LCO on Identified RCS leakage.

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Event No.: 1

Event Description: Controlling feed flow channel (FT-520) on SG #2 fails low.

Time	Position	Applicant's Action or Behavior
	BOP SRO	Diagnose controlling SG #2 feed flow channel (FT-520) failure: <ul style="list-style-type: none">• STM GEN 2 FLOW MISMATCH alarm (ALB13 B1)• Steam/Feed flow mismatch on indicators
	BOP IOA	Take manual control of affected SG feed flow and MFP(s) speed to restore NR level between 60% and 70% and reduces feedwater flow
	SRO	Initiates AOP 18001-C, Section G to direct crew actions.
	BOP	Selects unaffected channel (F521) for SG level control.
	BOP	Returns SG level and MFP control speed to Auto, and monitors parameters to verify proper system response: <ul style="list-style-type: none">• steam and feed flows• SG levels• MFP speed
	SRO	Initiates repair activities: <ul style="list-style-type: none">• CR & WO generated• Duty Manager of AOP entry• Maintenance notified for support

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Event No.: 2

Event Description: Power Range NI channel 44 lower detector fails high.

Time	Position	Applicant's Action or Behavior
	RO SRO	Diagnose PR NI channel failure: <ul style="list-style-type: none"> • PWR RANGE CHANNEL DEVIATION alarm (ALB10 C2) • PWR RANGE UP/LWR DET HI FLX DEV alarm (5 min delay) (ALB10 D2 AND E2) • PWR RANGE HI NEUTRON FLX HI SETPOINT ALERT alarm (ALB10 A3) • OVERPOWER ROD STOP alarm. (ALB10 D3) • POWER RANGE HI NEUTRON FLX RATE ALERT. (ALB10 F2) • Power Range Trip status lights illuminated. • Rapid inward motion of control rods in automatic rod control.
	RO IOA	Takes manual control of control rods to stop rapid insertion.
	SRO	Initiates AOP 18002-C, Section B to direct crew actions.
	BOP	Ensures no load changes in progress.
	BOP	Bypasses PR NI channel 44 on: <ul style="list-style-type: none"> • ROD STOP BYPASS switch • COMPARATOR CHANNEL DEFEAT switch • POWER MISMATCH BYPASS switch • UPPER SECTION switch • LOWER SECTION switch
	BOP	Resets rate trip
	RO	Restores RCS Tav _g to program by initiating rod withdrawal.

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Event No.: 2

Event Description: Power Range NI channel 44 lower detector fails high.

	RO	Returns rod control to auto, if desired.
	SRO	initiates repair activities: <ul style="list-style-type: none"> • CR & WO generated • Duty Manager of AOP entry • Calls I&C maintenance for support
	SRO	Verifies Tech Spec 1-hour Actions: Within one hour, verify interlock is in required state for existing unit conditions, as required by Technical Specifications 3.3.1-1 function 16c, d, e. (P8, P9, P10 and input to P7)
	RO	Verifies BPLB status lights correct for existing plant conditions: <ul style="list-style-type: none"> • P8 (OFF) • P9 (OFF) • P10 (ON) & input to P7 (OFF)
	SRO	Initiates review of Tech Specs: Evaluates need to pull fuses and/or trip affected bistables within 72 hours. <ul style="list-style-type: none"> • TS LCO 3.3.1: <ul style="list-style-type: none"> ○ Functional Unit 2A (high flux hi setpoint) - Condition D ○ Functional Unit 3 (high rate) - Condition E ○ Functional Unit 6 (OTAT) – Condition E
	SRO	Notifies Reactor Engineering to initiate 88015-C, QPTR CONFIRMATION per Tech Spec SR 3.2.4.2.
	SRO	Identifies need to initiate 14915, SPECIAL CONDITIONS SURVEILLANCE LOGS, DATA SHEET 7 for QPTR monitoring

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Event No.: 3

Event Description: SG #1 Main Steam Safety Valve Fails 50% Open

Time	Position	Applicant's Action or Behavior
	BOP SRO	<p>Diagnose opening of SG Safety Valve by any of the following indications:</p> <ul style="list-style-type: none"> • ALB 15 F01 MS Safety Valve Leaking alarm • Tailpipe temperature monitoring panel alarm on QPCP • Lowering RCS temperature • Rising reactor power • SG #1 steam flow indication <p>Enters AOP 18008-C, Secondary Coolant Leakage</p>
	SRO	Directs crew to lower power to keep all power indications below 100%.
	BOP	Lowers turbine power to limit reactor power rise and restore RCS Tavg.
	SRO	<p>Implements available ARP 17015-1 (for window F01 MN STM SFTY VLVS LEAKING) and / or AOP 18008-C, Secondary Coolant Leakage guidance for Main Steam safety valve failure.</p> <p>Notifies Chemistry / HP that safety valve on SG with 30 GPD tube leak (#1) is lifting resulting in a release radioactive material.</p> <p>Dispatches outside area operator to verify SG code safety is lifting.</p>
	RO	If necessary, control charging and letdown flow to maintain Pressurizer level in program band.
	RO	If necessary, operate heaters and sprays as required to maintain Pressurizer pressure in program band.
	BOP	Ensures hotwell level being adequately maintained.
	RO	Verifies CNMT pressure indications are normal.

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Event No.: 3

Event Description: SG #1 Main Steam Safety Valve Fails 50% Open

	SRO	<p>Reviews Tech Specs for applicability.</p> <ul style="list-style-type: none">• Reduce power and adjust the High Flux Trip Setpoints to less than or equal to 71% per TS LCO 3.7.1, Table 3.7.1-1.
	SRO	<p>Initiates repair activities and informs plant management of required power reduction:</p> <ul style="list-style-type: none">• CR & WO generated• Duty Manager of AOP and Tech Spec entries• Maintenance notified for support <p>May ask maintenance to manually gag SG safety valve shut to stop steam release</p>

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Event No.: 4

Event Description: Power reduction to < 71% due to failed SG safety Valve to comply with Tech Specs actions.

Time	Position	Applicant's Action or Behavior														
	SS	Enters Unit Operating Procedure 12004-C, Power Operation, Section 4.2 for power decent. Establishes power level and time targets to comply with TS action requirements. (Tech Spec action requires power reduction to target in 4 hours)														
	RO	Places rod control in manual and controls Tavg within 2 degrees F of Tref during power reduction Uses rods / boration as necessary to maintain AFD within limits														
	SS	Notifies System Operator of power decrease														
	BOP	Reduces turbine load per RO directions														
	SS	Notifies chemistry if reactor power change > 15% in 1 hour to sample for: <ul style="list-style-type: none">• RCS iodine per TS SR 3.4.16.2• Gaseous release path samples per Offsite Dose Calculation Manual (ODCM) Table 3-3														
	SS / BOP	Directs Auxilliary Building Operator to control SGBD condensate cooling return temperature during the power decent using procedure 13605-1 using the following table as target temperatures: <table><tr><td><u>% Turbine Power</u></td><td><u>Temperature °F</u></td></tr><tr><td>0%</td><td>80°F</td></tr><tr><td>20%</td><td>265°F</td></tr><tr><td>40%</td><td>285°F</td></tr><tr><td>60%</td><td>310°F</td></tr><tr><td>80%</td><td>330°F</td></tr><tr><td>100%</td><td>350°F</td></tr></table>	<u>% Turbine Power</u>	<u>Temperature °F</u>	0%	80°F	20%	265°F	40%	285°F	60%	310°F	80%	330°F	100%	350°F
<u>% Turbine Power</u>	<u>Temperature °F</u>															
0%	80°F															
20%	265°F															
40%	285°F															
60%	310°F															
80%	330°F															
100%	350°F															

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Event No.: 5

Event Description: Trip of ACCW pump #1 with pump #2 failing to automatically start.

Time	Position	Applicant's Action or Behavior
	SRO BOP RO	<p>Diagnose degraded ACCW conditions by noting trip of ACCW pump #1 and abnormal system conditions:</p> <ul style="list-style-type: none"> • ACCW LO HDR PRESS annunciator. (ALB4 A2) • ACCW RCP 1 (2) (3) (4) CLR LOW FLOW annunciator. (ALB4 A3/B3/C3/D3) • ACCW RCP 1 (2) (3) (4) CLR OUTLET HI TEMP annunciator. (ALB4 A4/B4/C4/D4) • ACCW RX COOLANT DRN TK HX LO FLOW annunciator. (ALB4 B2) • ACCW EXCESS LTDN HX LO FLOW annunciator. (ALB4 C2) • ACCW RTN HDR FROM RCP LO FLOW annunciator. (ALB4 D2) • Low ACCW header pressure indication (PI-1977) <p>May also get alarms listed below depending on timing of standby ACCW pump start:</p> <ul style="list-style-type: none"> • Letdown HX Outlet Hi Temp (ALB7 D3) • Letdown HX Hi Temp Demin Divert (ALB7 F4) <p>NOTE: ARP 17007-1 will direct RO to return CVCS Demin Divert Valve (TV-129) back to the Demin position after ACCW flow and temperatures are restored to normal.</p>
	SRO	<p>Initiates AOP 18022:</p> <ul style="list-style-type: none"> • Directs RO to start at least one ACCW pump

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Event No.: 5

Event Description: Trip of ACCW pump #1 with pump #2 failing to automatically start.

	BOP	<p>Informs SS of auto-start failure of ACCW pump #2, and manually starts standby ACCW pump.</p> <p>Note: This action may occur before AOP is initiated</p>
	BOP	<p>Verifies proper operation of ACCW by checking for:</p> <ul style="list-style-type: none">• At least 135 psig ACCW header pressure (PI-1977)• Adequate ACCW surge tank level on IPC (> 20%)• Thermal barrier isolation valves open• Return temperature less than 120°F
	BOP	<p>Verifies ACCW Containment isolation valves open:</p> <ul style="list-style-type: none">• ACCW SPLY HDR ORC ISO VLV - HV-1979• ACCW SPLY HDR IRC ISO VLV- HV-1978• ACCW RTN HDR IRC ISO VLV -HV-1974• ACCW RTN HDR ORC ISO VLV -HV-1975
	RO Continuous	<p>Recognizes RCP Trip Criteria NOT present</p>
	SRO	<p>Initiates repair activities:</p> <ul style="list-style-type: none">• CR & WO generated• Duty Manager of AOP entry• Maintenance notified for support

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Event No.: 6

Event Description: Letdown heat exchanger tube rupture.

Time	Position	Applicant's Action or Behavior
	RO SRO	Diagnose loss of RCS/CVCS inventory by any of the following indications: <ul style="list-style-type: none"> • Radiation alarms on RE-1950 • Lowering letdown flow
	SRO	Implements ARP guidance for high radiation on RE-1950: <ul style="list-style-type: none"> • REQUEST Chemistry to sample and analyze the ACCW. • NOTIFY Health Physics of the alarm. • LOCATE the source of inleakage. • ISOLATE the source if possible.
	RO	PLACE LETDOWN TO DEMIN/VCT 1-TV-0129 to the VCT position using 1-HS-0129, and VERIFY 1-TV-0129 aligns to the VCT.
	RO	PLACE VCT HUT LETDOWN DIVERT 1-LV-0112A to the HUT position using 1-HS-0112A, VERIFY 1-LV-0112A aligns to the RHUT.
	RO	ISOLATE letdown. ENSURE closed: <ul style="list-style-type: none"> • 1-HV-8149A, B, C (Orifice Isolations) • 1-LV-0459 (LTDN Isolation) • 1-LV-0460 (LTDN Isolation) • 1-HV-8152 (LTDN Isolation IRC) • 1-HV-8160 (LTDN Isolation ORC) • 1-PV-0131 (LTDN Pressure Controller) • 1-TV-0130 (LTDN HX Outlet Temp Controller)

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Event No.: 6

Event Description: Letdown heat exchanger tube rupture.

	SRO RO	Dispatch System Operator to SHUT Letdown Heat Exchanger manual valves: <ul style="list-style-type: none"> • (AB-A08) 1-1208-U6-041 • (AB-A17) 1-1217-U4-126 • (AB-108) 1-1217-U4-129 <p>NOTE: Simulator Operator use Remote Function AC06 to close these valves.</p>
	SRO	NOTIFY Chemistry of letdown isolation.
	SRO	Initiate AOP 18007, Section A, to address the loss of letdown flow.
	RO	Reduce charging flow to 10 GPM > total Seal Injection flow
	RO BOP	Place Excess Letdown in service per 13008-1 NOTE: This is covered under Event 6A
	RO	Verify the ability to control Pressurizer level. If Pressurizer level can not be controlled, then the normal charging flow path will be isolated. All of charging would be routed through the RCP seals.
	SRO	Evaluate long term operation without normal charging and letdown in service
	SRO	Notify Shift Manager/Ops Duty Manager for support for the following: <ul style="list-style-type: none"> • Notification to plant management of AOP entry • Maintenance on the letdown system

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Event No.: 6A

Event Description: Place Excess Letdown in service.

Time	Position	Applicant's Action or Behavior
	RO	Uses Section 4.1 of System Operating Procedure (SOP) 13008-1, Excess Letdown, to place in service to the seal return header.
	RO	Ensures a charging pump is running
	RO	Ensures closed reactor head vent to excess letdown isolation (HV-8098).
	RO	Ensures Excess letdown HX discharge (HC-123) closed (set to 0% demand)
	RO	Ensures open RCPs seal leakoff isolations: <ul style="list-style-type: none"> • HV-8100 • HV-8112
	RO	Ensures Excess Letdown to VCT handswitch (HS-8143) is in the Open VCT position.
	RO	Ensures reactor power maintained ≤ 3562 MWt while excess letdown in service
	RO	Opens Excess Letdown Isolations: <ul style="list-style-type: none"> • HV-8153 • HV-8154
	RO	Notes Excess Letdown HX pressure (PI-124) Notes Excess Letdown HX Discharge Temperature (TI-122)
	RO	Slowly raises output on excess letdown flow controller (HC-123) while maintaining the following limits: <ul style="list-style-type: none"> • < 165 °F excess letdown HX outlet temperature (TI-122) • < 50 psig rise in excess letdown HX outlet pressure (PI-124)

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Event No.: 6A

Event Description: Place Excess Letdown in service.

	RO	Maintains desired PRZR level by adjusting: <ul style="list-style-type: none">• Charging using FIC-121, charging line control• Seal injection using HC-182, seal flow control
	RO	Aligns outlet of seal water HX to VCT spray nozzle by Auxiliary Building Operator: (Independent Verification required) <ul style="list-style-type: none">• Unlock & Open Seal Water Return HX outlet to VCT (1-1208-U6-104) (KEY 1OP2-281)• Close Seal water Return HX Outlet to NCP suction header (1-1208-U6-106)
	BOP	Establishing Excess Letdown may cause an alarm on the QPCP: <ul style="list-style-type: none">• Backflushable Filter Panel alarm Operator would be dispatched to acknowledge and investigate. NOTE: Return to Event 6

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Event No.: 7

Event Description:

A medium LOCA develops inside Containment on loop #1. The accident condition will force the crew to attempt a manual Reactor Trip. The Reactor will not manually or automatically trip. The crew will implement 19211 for an ATWT condition. The control rods will not automatically insert. This will force manual insertion of control rods by the RO. The Reactor will be tripped locally. After transitioning back to 19000, RCP trip criteria will become applicable. After the RCP's are tripped, a DBA LOCA will develop.

Time	Position	Applicant's Action or Behavior
	ALL	<p>Recognizes degrading plant conditions:</p> <ul style="list-style-type: none"> • High radiation alarms in Containment • Lowering Pressurizer level and pressure indications and alarms • High Containment moisture and temperature alarms <p>NOTE: RCS break is on loop #1</p>
	SRO	<p>Directs RO to manually trip the Reactor.</p> <p>Note: As pressure rapidly lowers, an Automatic Rx Trip signal will be generated by the calculated OTDT Rx Trip prior to receiving the Low Pressure Rx Trip.</p>
	RO IOA Critical Task	<p>Attempts to trip the Reactor with manual handswitches.</p> <p>When Reactor can not be tripped, begins manually inserting control rods in manual.</p>
	BOP IOA	<p>Manually trips turbine and verifies turbine is tripped</p> <ul style="list-style-type: none"> • All stop valves shut
	SRO	<p>Dispatches an operator to locally trip the Reactor.</p>
	SRO	<p>implements 19211 for the ATWT condition.</p> <p>NOTE: RCP trip criteria does not apply during this procedure. RCP's should not be tripped while in this procedure.</p>
	BOP	<p>Ensures that Generator output breakers have opened.</p>

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Event No.: 7

Event Description:

A medium LOCA develops inside Containment on loop #1. The accident condition will force the crew to attempt a manual Reactor Trip. The Reactor will not manually or automatically trip. The crew will implement 19211 for an ATWT condition. The control rods will not automatically insert. This will force manual insertion of control rods by the RO. The Reactor will be tripped locally. After transitioning back to 19000, RCP trip criteria will become applicable. After the RCP's are tripped, a DBA LOCA will develop.

	BOP	Verifies AFW pumps are running
	RO	<p>Checks Reactor for subcritical indications:</p> <ul style="list-style-type: none"> • Power < 5% • No positive SUR • Reactor trip and bypass breakers open <p>Note: These indications won't be met. The crew will have to complete 19211.</p>
	SRO	<p>Emergency Borate the RCS and verify RCS pressure less than 2335 psig.</p> <p>Note: SI will have automatically actuated and RCS pressure will be rapidly lowering due to the large LOCA.</p> <p>NOTE: Simulator Operator Trips reactor at this step if crew has dispatched operator to locally open the RTBs. Remove Malfunction ES01 then ES03.</p>
	RO	Verifies CVI has occurred by checking MLB indications
	ALL	<p>Verify Rx and Turbine trips have occurred.</p> <p>Note: The crew will initiate a verification of the first 16 steps of 19000 while continuing on with 19211.</p>
	BOP	Control SG levels between 32-65% by maintaining 1260 GPM AFW flow
	RO SRO	<p>Verifies dilution paths isolated:</p> <ul style="list-style-type: none"> • FV-111A shut • Operator dispatched to 1-1208-U4-183 to verify shut

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Event No.: 7

Event Description:

A medium LOCA develops inside Containment on loop #1. The accident condition will force the crew to attempt a manual Reactor Trip. The Reactor will not manually or automatically trip. The crew will implement 19211 for an ATWT condition. The control rods will not automatically insert. This will force manual insertion of control rods by the RO. The Reactor will be tripped locally. After transitioning back to 19000, RCP trip criteria will become applicable. After the RCP's are tripped, a DBA LOCA will develop.

	ALL	Verify RCS cooldown stopped. Note: Depending on the timing and completion of prior actions, a cooldown will probably be present at this time. This would require the crew to lower AFW flow to 570 GPM, and isolate the Main Steamlines.
	RO	Verifies Reactor is subcritical: <ul style="list-style-type: none">• PR channels < 5%• IR channels – Negative SUR
	SRO	Transitions to 19000-C, E-0 Reactor Trip or Safety Injection. <ul style="list-style-type: none">• Short crew transition briefing would be expected at this point.
	RO	Verifies Reactor tripped.
	BOP	Verifies Turbine tripped.
	BOP	Verifies power to all emergency busses.
	RO	Verifies SI is actuated: <ul style="list-style-type: none">• SI annunciator - LIT• SI ACTUATED BPLB window LIT

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Event No.: 7

Event Description:

A medium LOCA develops inside Containment on loop #1. The accident condition will force the crew to attempt a manual Reactor Trip. The Reactor will not manually or automatically trip. The crew will implement 19211 for an ATWT condition. The control rods will not automatically insert. This will force manual insertion of control rods by the RO. The Reactor will be tripped locally. After transitioning back to 19000, RCP trip criteria will become applicable. After the RCP's are tripped, a DBA LOCA will develop.

	BOP	Verifies feedwater isolation valves shut: <ul style="list-style-type: none"> • MFIV's • BFIV's • MFRV's • BFRV's
	RO	Verifies ECCS equipment aligning on the MLB's.
	RO	Verifies CNMT Isolation Phase A Actuated <ul style="list-style-type: none"> • CIA MLB's indicators correct
	BOP	Verifies proper AFW system operation: <ul style="list-style-type: none"> • MDAFW pumps – running • SGBD isolation Handswitches – place in hard close • SG sample isolations - shut • TDAFW pump running if lo-lo level on 2 SGs or blackout
	RO	Verifies ECCS pumps running: <ul style="list-style-type: none"> • CCP's • SI Pumps • RHR Pumps Verifies NCP – NOT running
	BOP	Verifies 2 CCW pumps in each train – running
	RO	Check for proper NSCW system operation: <ul style="list-style-type: none"> • 2 pumps in each train – running • NSCW TOWER RTN HDR BYPASS BASIN handswitches <ul style="list-style-type: none"> - in AUTO: <div>HS-1668A</div> <div>HS-1669A</div>

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Event No.: 7

Event Description:

A medium LOCA develops inside Containment on loop #1. The accident condition will force the crew to attempt a manual Reactor Trip. The Reactor will not manually or automatically trip. The crew will implement 19211 for an ATWT condition. The control rods will not automatically insert. This will force manual insertion of control rods by the RO. The Reactor will be tripped locally. After transitioning back to 19000, RCP trip criteria will become applicable. After the RCP's are tripped, a DBA LOCA will develop.

	RO	Verifies CNMT Cooling Units: <ul style="list-style-type: none"> Fans running in low speed – MLB indicators NSCW cooler isolation valves open – MLB indicators
	RO	Verifies CNMT Ventilation Isolation – dampers & valves shut (MLB indicators)
	RO / BOP	Checks if SLi should be actuated: <ul style="list-style-type: none"> Any Steamline pressure < 585 psig CNMT pressure by recording > 14.5 psig High steam pressure rate if SI/SLI blocked
	RO	Check CNMT spray is actuated if CNMT pressure by recording > 21.5 psig
	BOP	Verify both diesel generators running
	RO	Verify BIT flow on FI-917A
	RO	Checks RCS pressure < 1625 psig
	RO	Checks RCS pressure > 300 psig NOTE: This is step 17 of E-0 break size will increase to DBA LOCA at this point.
	BOP	Verifies generator output breakers trip open 30 seconds after turbine trip

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Event No.: 7

Event Description:

A medium LOCA develops inside Containment on loop #1. The accident condition will force the crew to attempt a manual Reactor Trip. The Reactor will not manually or automatically trip. The crew will implement 19211 for an ATWT condition. The control rods will not automatically insert. This will force manual insertion of control rods by the RO. The Reactor will be tripped locally. After transitioning back to 19000, RCP trip criteria will become applicable. After the RCP's are tripped, a DBA LOCA will develop.

	BOP	Continuous action Verifies total AFW flow > 570 GPM or controls flow to maintain SG NR levels > 10% (32%)
	RO	Verifies ECCS valve alignment proper on MLB indicators
	RO BOP	Checks RCS temperature stable at or trending to 557.
	RO	Verifies: <ul style="list-style-type: none">• PZR PORV's –shut in auto• Normal PZR Spray valves – shut• Power available to at least one PORV block valve & it opens > 2185 psig RCS pressure
	RO	Continuous action Maintain RCP seal injection flow 8-13 GPM per RCP by adjusting FV-121, as necessary. NOTE: HC-182 does not work during SI conditions

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Event No.: 7

Event Description:

A medium LOCA develops inside Containment on loop #1. The accident condition will force the crew to attempt a manual Reactor Trip. The Reactor will not manually or automatically trip. The crew will implement 19211 for an ATWT condition. The control rods will not automatically insert. This will force manual insertion of control rods by the RO. The Reactor will be tripped locally. After transitioning back to 19000, RCP trip criteria will become applicable. After the RCP's are tripped, a DBA LOCA will develop.

	SS / RO	<p>Check RCP trip criteria</p> <p>Note: This is Foldout Page item and would be applicable when 19000 is re-entered from 19211.</p> <p>Note: At this point, or after the RCP's are stopped, the LOCA will become a DBA. This will cause a momentary Orange path to come in and out on the Core Cooling CSFST as the RCS depressurizes. If the crew validates this indication, a transition to 19222 should not be required. The RCS Integrity CSFST will turn RED due to the large cooldown. The crew should transition to 19241-C, to determine that the Integrity FRP does not need to be completed due to RCS pressure and RHR flow, and should transition back out at step 1.</p>
	RO	<p>Continuous Action</p> <p>Verifies one ACCW pump running</p>
	BOP	<p>Places CNMT hydrogen monitors in service on QPCP using SOP 13130-1:</p> <ul style="list-style-type: none">• Open supply and return isolation valves• Place mode switch in Analyze• Verify Function Selector Switch in Sample position

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Event No.: 7

Event Description:

A medium LOCA develops inside Containment on loop #1. The accident condition will force the crew to attempt a manual Reactor Trip. The Reactor will not manually or automatically trip. The crew will implement 19211 for an ATWT condition. The control rods will not automatically insert. This will force manual insertion of control rods by the RO. The Reactor will be tripped locally. After transitioning back to 19000, RCP trip criteria will become applicable. After the RCP's are tripped, a DBA LOCA will develop.

	BOP	<p>Verifies SG secondary pressure boundaries intact:</p> <ul style="list-style-type: none"> • No SG pressure lowering in an uncontrolled manner • No SG completely depressurized <p>NOTE: If crew did not gag failed SG safety valve from event 3 the crew will transition to 19020-C, E-2 Faulted Steam Generator Isolation at this point. Actions would include:</p> <ul style="list-style-type: none"> • Verify MSIVs & bypass isolations shut • ID faulted SG • Isolate faulted SG • Stop feeding faulted SG • Check for secondary radiation • Check if ECCS flow can be reduced (will not met this) • Transition to 19010-C, E-1 Loss of reactor or secondary coolant
	BOP	<p>Verifies SG tubes intact:</p> <ul style="list-style-type: none"> • No change in secondary radiation indications • No abnormal/changing sample results from Chemistry • No uncontrolled level rise in any SG • Initiates post-accident sampling of SG's for activity
	SRO RO	<p>Verifies RCS NOT intact inside Containment:</p> <ul style="list-style-type: none"> • Containment radiation -ABNORMAL. • Containment pressure -ABNORMAL. • Containment emergency recirculation sump levels - ABNORMAL.

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Event No.: 7

Event Description:

A medium LOCA develops inside Containment on loop #1. The accident condition will force the crew to attempt a manual Reactor Trip. The Reactor will not manually or automatically trip. The crew will implement 19211 for an ATWT condition. The control rods will not automatically insert. This will force manual insertion of control rods by the RO. The Reactor will be tripped locally. After transitioning back to 19000, RCP trip criteria will become applicable. After the RCP's are tripped, a DBA LOCA will develop.

	SRO	<p><i>Implements 19010-C, E-1 Loss of Reactor or Secondary Coolant, to respond to RCS LOCA inside Containment.</i></p> <ul style="list-style-type: none"> • CSFST and Foldout Page monitoring assigned/initiated • Shift Manager notified to implement 91001-C (EPIP's) • Seal injection flow maintained to RCP's.
	RO	<p>Check RCP Trip Criteria: (Continuous action)</p> <ul style="list-style-type: none"> • RCS pressure < 1375 psig • CCP or SIP available
	RO	<p>Verify at least one ACCW pump in service</p>
	BOP	<p>Place Containment Hydrogen Monitors in service per procedure 13130-1:</p> <ul style="list-style-type: none"> • Open supply and return isolation valves • Place mode switch in Analyze • Verify Function Selector Switch in Sample position
	BOP	<p>Verify no faulted SG exists:</p> <ul style="list-style-type: none"> • No uncontrolled depressurization • No complete depressurization
	BOP	<p>Continuous Action</p> <p>Throttle AFW flows to maintain intact SG levels in program band</p> <ul style="list-style-type: none"> • 32-65% for adverse CNMT

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Event No.: 7

Event Description:

A medium LOCA develops inside Containment on loop #1. The accident condition will force the crew to attempt a manual Reactor Trip. The Reactor will not manually or automatically trip. The crew will implement 19211 for an ATWT condition. The control rods will not automatically insert. This will force manual insertion of control rods by the RO. The Reactor will be tripped locally. After transitioning back to 19000, RCP trip criteria will become applicable. After the RCP's are tripped, a DBA LOCA will develop.

	BOP	<p>Continuous action</p> <p>Verify no SGTR indications exist:</p> <ul style="list-style-type: none"> • No abnormal secondary radiation • No uncontrolled level rise • Open SG sample valves one at a time
	RO	<p>Continuous action</p> <p>Verify proper operation of PORV's and PORV block valves</p> <ul style="list-style-type: none"> • Power to PORV Block Valves • PORVs shut • At least one PORV block valve open pressure > 2185 psig <p>Arm COPS when RCS WR Cold Temperatures < 350 °F</p> <p>(NOTE: COPS may be disarmed when temperature rises > 350 °F and has remained > 295 ° F, green integrity CSFST)</p>
	ALL	<p>Verifies ECCS termination criteria met:</p> <ul style="list-style-type: none"> • RCS subcooling - GREATER THAN 24°F (38°F ADVERSE) • Secondary heat sink: - Total feed flow to intact SGs-GREATER THAN 570 GPM OR Narrow range level in at least one intact SG GREATER THAN 10% [32% ADVERSE.] • RCS pressure - STABLE or RISING. • PRZR level - GREATER THAN 9% [37% ADVERSE.]

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Event No.: 7

Event Description:

A medium LOCA develops inside Containment on loop #1. The accident condition will force the crew to attempt a manual Reactor Trip. The Reactor will not manually or automatically trip. The crew will implement 19211 for an ATWT condition. The control rods will not automatically insert. This will force manual insertion of control rods by the RO. The Reactor will be tripped locally. After transitioning back to 19000, RCP trip criteria will become applicable. After the RCP's are tripped, a DBA LOCA will develop.

	SS	<p>NOTE:</p> <p>If CNMT Spray actuated with primary LOCA indicated by high CNMT radiation levels, continuous spray for a minimum duration of 2 hours is required. This should include or be followed by operation in the recirculation mode for a minimum of 1.5 hours per 19013-C, ES-1.3 Transfer to Cold Leg Recirculation , step 8.</p>
	RO	<p>Check if CNMT spray should be stopped:</p> <ul style="list-style-type: none"> • CS pumps running • CNMT pressure < 15 psig • CNMT radiation levels returned to normal (will not be)
	SS	<p>CAUTION:</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"> • RHR pumps • SI pumps • Post-LOCA cavity purge units • CNMT coolers in low speed • ESF chilled water pumps <p>RCS pressure should be monitored. If RCS pressure lowers in an uncontrolled manner to < 300 psig, the RHR pumps should be restarted to supply water to the RCS.</p>
	RO	<p>Check if RHR pumps should be stopped:</p> <ul style="list-style-type: none"> • RHR pump(s) running with suction aligned to RWST • RCS pressure > 300 psig and stable or rising <p>Note: Will not met these criteria</p>

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Event No.: 7

Event Description:

A medium LOCA develops inside Containment on loop #1. The accident condition will force the crew to attempt a manual Reactor Trip. The Reactor will not manually or automatically trip. The crew will implement 19211 for an ATWT condition. The control rods will not automatically insert. This will force manual insertion of control rods by the RO. The Reactor will be tripped locally. After transitioning back to 19000, RCP trip criteria will become applicable. After the RCP's are tripped, a DBA LOCA will develop.

	BOP	<p>Check if DGs should be stopped:</p> <ul style="list-style-type: none"> • AC emergency busses energized by offsite power • Reset SI, if necessary • Stop unloaded DGs and place in standby by initiating 13145-1, Diesel Generators (Will dispatch Outside Operator to perform above action) • Energize 1NB01 and 1NB10
	SS	<p>CAUTION:</p> <p>Level in the CNMT emergency sump and RWST should be monitored to ensure inventory for RHR pump(s) suction.</p>
	RO	<p>Continuous Action</p> <p>Verify Cold Leg Recirculation capability from at least one flowpath:</p> <p>Power available to:</p> <ul style="list-style-type: none"> • HV-8811A CNMT sump suction to RHR pump A • RHR pump A operable • HV-8809A RHR pump A to cold leg 1 & 2 isolation • RHR HX A operable <p style="text-align: center;">- OR -</p> <p>Power available to:</p> <ul style="list-style-type: none"> • HV-8811B CNMT sump suction to RHR pump B • RHR pump B operable • HV-8809B RHR pump A to cold leg 3 & 4 isolation • RHR HX B operable <p>NOTE: Will met this step if RWST level > 39%</p>

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Event No.: 7

Event Description:

A medium LOCA develops inside Containment on loop #1. The accident condition will force the crew to attempt a manual Reactor Trip. The Reactor will not manually or automatically trip. The crew will implement 19211 for an ATWT condition. The control rods will not automatically insert. This will force manual insertion of control rods by the RO. The Reactor will be tripped locally. After transitioning back to 19000, RCP trip criteria will become applicable. After the RCP's are tripped, a DBA LOCA will develop.

		<p>Continuous Action</p> <p>Check Aux Building leak detection systems:</p> <ol style="list-style-type: none"> 1. Plant Vent radiation monitors Normal: <ul style="list-style-type: none"> • RE-12442A Effluent Particulate • RE-12442B Effluent Iodine • RE-12442C Effluent Radiogas • RE-12444C Effluent Radiogas high range 2. Check Aux Building break detection system status on QPCP No leak detection status light lit
	SS	<p>Continuous Action</p> <p>Contacts chemistry to sample for:</p> <ul style="list-style-type: none"> • Boron, pH, radioactivity in: <ul style="list-style-type: none"> • <ul style="list-style-type: none"> ○ RCS ○ Both CNMT emergency sumps (if cold leg recirculation has been established) ○ • Radioactivity, H₂, O₂ in CNMT atmosphere
	SS	<p>NOTE:</p> <p>Isolate NSCW corrosion monitor racks within 8 hours of an SI by shutting 1202-U4-179 and 1202-U4-180 in the NSCTs on the NSCW return headers</p>
	SS	<p>Secure unnecessary plant equipment</p> <p>Review inoperable equipment which may be required. Repair or make available as possible.</p>

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Event No.: 7

Event Description:

A medium LOCA develops inside Containment on loop #1. The accident condition will force the crew to attempt a manual Reactor Trip. The Reactor will not manually or automatically trip. The crew will implement 19211 for an ATWT condition. The control rods will not automatically insert. This will force manual insertion of control rods by the RO. The Reactor will be tripped locally. After transitioning back to 19000, RCP trip criteria will become applicable. After the RCP's are tripped, a DBA LOCA will develop.

	SS	Consult with TSC for additional equipment to be started to assist in recovery including: <ul style="list-style-type: none">• H₂ Analyzers• CRDM fans
	RO	Check if RCS Cooldown and depressurization is required: RCS pressure > 300 psig (will not meet) If RHR pump flow rate > 500 GPM continue with step 15 of E-1
	SRO	Transitions to 19013-C, ES-1.3 Transfer to Cold Leg Recirculation, when RWST level lowers to 39%. Otherwise will loop back to step 11 which checks RCS and SG pressures until RWST level is < 39%

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Event No.: 8

Event Description:

While performing 19013-C, ECCS for Cold Leg Recirculation, the crew will discover that the Emergency Sump supplies to ECCS (HV-8811A & B) can not be opened. This will force the crew to transfer to 19111-C, Loss of Emergency Coolant Recirculation.

Time	Position	Applicant's Action or Behavior
	SRO	Initiates 19013-C, ES-1.3 Transfer to Cold Leg Recirculation, to initiate Cold Leg Recirculation alignment:
	SRO	Plant personnel notified of Cold Leg Recirc alignment: <ul style="list-style-type: none">• Health Physics• Page announcement performed
	SRO	Reviews initial notes and cautions of 19013 with crew: <ul style="list-style-type: none">• Actions required to restart ESF equipment if offsite power lost after SI reset• FRP's not to be performed until after cold leg recirculation alignment completed (steps 3 -10 of 19013-C)• Need for haste. Minimum of 14 minutes until potential loss of suction to ECCS pumps
	RO	Resets SI
	RO	Verifies cooling water systems available to support CL Recirc: <ul style="list-style-type: none">• CCW system operation normal• NSCW system operation normal
	RO	Continuous Action Monitors level in the containment emergency sumps and RWST to ensure inventory for RHR pump(s) suction.

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Event No.: 8

Event Description:

While performing 19013-C, ECCS for Cold Leg Recirculation, the crew will discover that the Emergency Sump supplies to ECCS (HV-8811A & B) can not be opened. This will force the crew to transfer to 19111-C, Loss of Emergency Coolant Recirculation.

	RO	<p>Checks CNMT emergency Sump levels > 13.5 inches (LI-764 and LI-765)</p> <p>RHR Pumps A & B running</p> <p>Verifies flow path NOT available for RHR pumps:</p> <ul style="list-style-type: none"> HV-8811A and HV-8811B can not be opened <p>Note: Crew will be directed to stop RHR pumps to attempt manual realignment, but this will be unsuccessful. Since neither sump suction can be opened, the crew will be directed to 19111-C.</p>
	SRO	Initiates 19111-C, ECA-1.1 Loss of Emergency Coolant Recirculation
	SRO	<p>Reviews initial notes and cautions of 19111 with crew:</p> <ul style="list-style-type: none"> If recirculation capability is restored at any time, return to procedure and step in effect Stop any ECCS or CS pump that loses suction
	<p>SRO RO</p> <p>Critical Task</p>	<p>Continuous Action</p> <p>Check if Emergency Coolant Recirculation capability is available:</p> <ul style="list-style-type: none"> Power available Flowpath Operable CNMT emergency Sump levels <p>Continue attempts to restore at least one train recirculation.</p> <p>SS needs to contact Maintenance/SS/SM/TSC to have personnel start working on valves the failed to open (HV-8811A and HV-8811B) for this step to be satisfactory.</p>
	RO	Verifies SI reset

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Event No.: 8

Event Description:

While performing 19013-C, ECCS for Cold Leg Recirculation, the crew will discover that the Emergency Sump supplies to ECCS (HV-8811A & B) can not be opened. This will force the crew to transfer to 19111-C, Loss of Emergency Coolant Recirculation.

	BOP	Verifies CNMT Cooling Units running in Low speed
	RO	Checks RWST level > 10%
	SRO RO	<p>Determine minimum CS requirements based on:</p> <ul style="list-style-type: none"> • RWST level • Containment pressure • Containment Cooling Units running <p>NOTE: Table is utilized to determine the number of CS pumps required.</p> <p>With RWST level between 10% and 39%, and CNMT pressure < 21.5 psig no CNMT Spray pumps are required.</p>
	RO	<p>Continuous Action</p> <p>Align CS pumps for recirculation, if necessary.</p> <p>Should not be necessary if CNMT Spray pumps secured in previous step.</p>
	SRO RO Critical Task	<p>Initiate Makeup to the RWST:</p> <ul style="list-style-type: none"> • Initiate 13701, BORIC ACID SYSTEM OR • Initiate ATTACHMENT A, Makeup From Spent Fuel Pool. (all actions are local at Spent Fuel Pool) <p>Note: Both of these choices will involve dispatching operators to perform local actions. Initiating either will be considered SAT.</p>

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Event No.: 8

Event Description:

While performing 19013-C, ECCS for Cold Leg Recirculation, the crew will discover that the Emergency Sump supplies to ECCS (HV-8811A & B) can not be opened. This will force the crew to transfer to 19111-C, Loss of Emergency Coolant Recirculation.

	<p>RO</p> <p>Critical Task</p>	<p>13701-1 Section 4.4.2 Makeup to RWST:</p> <p>Place VCT MAKEUP CONTROL 1-HS-40001B to STOP.</p> <p>Place VCT MAKEUP MODE SELECT 1-HS-40001A in OFF.</p> <p>Ensure 1-HS-0111A RX MU WTR TO BA BLENDER is in AUTO with valve closed.</p> <p>Ensure 1-HS-0110A BA TO BLENDER is in AUTO with valve closed.</p> <p>Place 1-HS-0111B BLENDER OUTLET TO VCT in close.</p> <p>Place 1-HS-0110B BLENDER OUTLET TO CHARGING PUMPS SUCT in close.</p> <p>Ensure closed EMERGENCY BORATE Valve 1-HV-8104.</p> <p>Open CVCS DISCH BA BLEND TO BRS AND RWST 1-1208-U4-171. (Local Action)</p> <p>Open CVCS SPLY TO RWST FROM BA BLENDER 1-1208-U4-173. (Local Action)</p> <p>Ensure one Boric Acid Transfer Pump running or in AUTO.</p> <p>Ensure one Reactor Makeup Water Pump running or in AUTO.</p> <p>Determine the desired total makeup flowrate and adjust Total Makeup Controller 1-FIC-0111 setpoint to this value.</p> <p>Determine the Boric Acid Flowrate</p> <p>Determine the Boric Acid Blender Controller 1-FIC-0110 flow setpoint by using the Boric Acid Flowrate calculated in Step 4.4.2.15.c(3).</p> <p>NOTE: RO will most likely adjust setpoint to 8.6 on the potentiometer to ensure makeup boric acid concentration is > RWST</p> <p>Adjust Boric Acid Blender Controller 1-FIC-0110 setpoint to the value determined in Step 4.4.2.15.c(4) and place the controller in AUTO.</p>
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Event No.: 8

Event Description:

While performing 19013-C, ECCS for Cold Leg Recirculation, the crew will discover that the Emergency Sump supplies to ECCS (HV-8811A & B) can not be opened. This will force the crew to transfer to 19111-C, Loss of Emergency Coolant Recirculation.

		<p>Place Total Makeup Controller 1-FIC-0111 in AUTO.</p> <p>Determine the amount of RWST makeup required using the Plant Technical Data Book.</p> <p>Reset the Boric Acid Blend Control Integrator 1-FQI-0111 and adjust 1-FQI-0111 to the required blended RWST makeup volume.</p> <p>Determine the amount of boric acid solution from the BAST required to provide the proper blended RWST makeup volume:</p> <p>Reset Boric Acid Blend Control Integrator 1-FQI-0110 and adjust it to the volume determined above.</p> <p>Place Boric Acid to Blender 1-HS-0110A in AUTO.</p> <p>Place Reactor Makeup Water To Blender 1-HS-0111A in AUTO.</p> <p>Place VCT Makeup Mode Select 1-HS-40001A in MAN.</p> <p>Place VCT Makeup Control 1-HS-40001B to START.</p> <p>Observe proper blender operation:</p> <ul style="list-style-type: none"> Boric Acid To Blender 1-FV-0110A throttles open to provide the correct flow of boric acid Reactor Makeup Water To Blender 1-FV-0111A throttles open to provide the correct total flow. <p>note Makeup can be stopped at any time by placing VCT Makeup Control Switch 1-HS-40001B to STOP.</p> <p>Monitor Boric Acid Blend Control Integrators 1-FQI-0110 and 1-FQI-0111.</p> <p>When either integrator reaches its setpoint, place VCT Makeup Control Switch 1-HS-40001B to STOP</p> <p>Ensure the following:</p> <ul style="list-style-type: none"> Reactor Makeup Water to Blender 1-FV-0111A closed Boric Acid Tank to Blender 1-FV-0110A closed.
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Event No.: 8

Event Description:

While performing 19013-C, ECCS for Cold Leg Recirculation, the crew will discover that the Emergency Sump supplies to ECCS (HV-8811A & B) can not be opened. This will force the crew to transfer to 19111-C, Loss of Emergency Coolant Recirculation.

	BOP	Maintain intact SG's in program band. (32% to 65% NR)
	ALL	Initiate RCS cooldown. @ 100 F / hour Won't be required due to RCS conditions
	RO	Checks ECCS is in service: <ul style="list-style-type: none">• Any CCP running• BIT not isolated• Any RHR pump running in injection mode
	RO	Establish one train of ECCS: <ul style="list-style-type: none">• CCP• SI Pump• RHR Pump if RCS pressure < 300 psig <p>Note: If RHR pumps are not running (due to previous guidance), then the crew should re-open HV-8812A or B and start a RHR pump at this point.</p>
	RO	Verify no backflow from RWST to CNMT emergency sumps: <ul style="list-style-type: none">• HV-8811A & HV-8811B Shut
	RO	Check if a RCP can be started. Cannot due to low subcooling value (< 38 F)

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Event No.: 8

Event Description:

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	<p>SRO RO</p> <p>Critical Task</p>	<p>Check if ECCS can be terminated:</p> <ul style="list-style-type: none"> • Full range RVLIS > 62% • RCS subcooling > 88 degrees F <p>Note: Due to crew actions taken for the failure of both RHR sump suction valves and the timing of crew response, any of the conditions listed below may be present. The conditions are listed from most likely to be present to least likely to be present. Sat performance of this task will depend upon the crew taking the appropriate action for the plant condition present at the time this step is reached:</p> <ul style="list-style-type: none"> ○ <u>If Full range RVLIS is below 62%, then the crew will go to step 20 and must start available ECCS pumps as necessary to raise RVLIS indication above 62%.</u> ○ <u>If RVLIS is >62%, but subcooling is < 88 F, then the crew will be required to reduce ECCS injection flow per Figure 1 of 19111.</u> <p><u>If both conditions are satisfied, then 19111 will provide guidance to terminate ECCS and establish normal charging flow.</u></p> <p>Most likely procedure flowpath shown below</p>
	RO	<p>Checks RVLIS < 62%</p> <p>Raise charging / ECCS flow to maintain RVLIS indication as necessary</p>
	RO	Check core exit TCs stable or lowering
	RO	Check Subcooling > 48 F (will not meet this)

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Event No.: 8

Event Description:

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	SS	<p>Check if RHR system can be placed in service:</p> <ul style="list-style-type: none"> • RCS WR hot leg temperatures < 350 F • RCS pressure < 350 psig <p>Consult with TSC to determine if RHR system should be placed in service.</p> <p>NOTE: TSC will recommend NOT to place RHR in service since RCS hot legs will be voided with RVLIS full range < 62%</p>
	RO / SS	<p>Check if SI accumulators should be isolated:</p> <ul style="list-style-type: none"> • At least 2 RCS WR hot leg temperatures < 380 F • Dispatch operator to close accumulator isolation valve MOV breakers <p>NOTE: Simulator Operator will use remote functions SI01 through SI04 to close MOV breakers</p> <ul style="list-style-type: none"> • Close Accumulator Isolation Valves: <ul style="list-style-type: none"> ○ HV-8808A/B/C/D • Open Accumulator Isolation Valve MOV breakers
	RO	Check RCS WR Hot Leg Temperature > 200 F
	RO	<p>Check RWST level < 10%:</p> <p>If < 10% then stop pumps taking suction from RWST and place in pull-to-lock positions:</p> <ul style="list-style-type: none"> ○ RHR Pumps ○ SI Pumps ○ CCPs ○ CS Pumps
	RO	Initiate RCS charging from CVCS makeup control

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	SRO	If applicable, determine minimum required ECCS flow per Figure 1: <ul style="list-style-type: none">• Time since Reactor Trip• Core Exit TC indications
	Freeze	Terminate scenario when: <ul style="list-style-type: none">• RWST makeup has been initiated• Maintenance dispatched for HV-8811A&B• Lead Examiner request