

Facility: Vogtle Scenario No.: 1 Op-Test No.: 2009-301

Examiners: Lea Operators: _____

NEW

Initial Conditions: 100% power, CNMT Mini-Purge in service, HV-3009 shut tagged for repairs (emergent work), SG ARV #3 tagged for repairs, BATP #2 tagged for repairs, I&C recording lift coil currents in rod control for baseline PM data.

Turnover: New system peak record expected due to extremely hot weather. System loads at maximum due to unexpected unit trip. LCO 3.7.5 Condition A (HV-3009). INFO LCO 3.7.4 (ARV) INFO TR 13.1.3 (BATP).

Event No.	Malf. No.	Event Type*	Event Description
1	PR05 @ 20%	C-SS C-OATC TS-SS	PORV-455 fails partially open. AOP 18000-C entry required. PORV block valve shut to stop leak. LCO 3.4.11 / 3.4.1
2	EL13A & ALB34 E02-ON	I-ALL TS-SS	Loss of 1AY1A AOP 18032-C loss of 120 Vital AC due to inverter failure – power restored from regulated transformer LCO 3.3.1 / 3.3.2 / 3.8.7 / 3.8.9
3	N/A	N-OATC N-SS	Restore CVCS letdown to service
4	SG03D2 @ 0%	I-SS I-UO TS-SS	SG Pressure instrument PT-545 fails low (after power restored) LCO 3.3.2 / 3.3.3
5	SG01B @ 2%	R-ALL TS-SS	SG # 2 develops 20 gpm tube leak. AOP 18009-C LCO 3.4.13 Rapid power reduction per AOP 18013-C
6	SG01B @ 45% OR HV- 9387 SHUT	M-ALL	SGTL degrades to SGTR – EOP 19000 to 19030. Air to CNMT isolation (HV-9378) valve sticks closed. Depressurize RCS with PORV.
7	MS03B @ 100%	C-SS C-UO	SG #2 ARV fully opens due to failed pressure transmitter. Occurs after 19030-C transition.
8	ES22A ES22B	C-SS C-OATC	BIT isolation valves fail to auto open, and charging line isolation valves fail to auto close.

	ES23A ES23B		
9	AF05C	C-SS C-UO	TDAFWP fails to auto start.
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Event 1:

PORV-455 fails partially open requiring the crew to enter AOP 18000-C. The PORV block valve is shut to stop the RCS leakage.

Verifiable action:

OATC - Immediately verifies PRZR spray valves closed. Closes the affected PORV block valve. Checks PRZR safety valves closed. Verifies PRZR pressure control instrumentation operating properly.

Technical Specifications:

LCO 3.4.11 PORVs - Condition B – Close associated block valve in 1 hour and remove power from associated block valve in 1 hour. Restore PORV within 72 hours or be in mode 3 within the next 6 hours and mode 4 in 12 hours.

LCO 3.4.1 DNB parameters – Condition A – Restore within 2 hours

Event 2:

Loss of 120 VAC vital instrumentation bus 1AY1A due to inverter failure. This requires entry into AOP 18032-1 Section A.

Verifiable action:

OATC - Immediate actions: checks power > 10% and places rods to manual.

Reduces charging flow to 10 gpm > RCP seal injection flow, maintains seal injection flow 8-13 gpm, controls PZR pressure with manual sprays / heaters, defeats loop 1 Tave & delta T inputs into control circuits, restores rods to ARO

UO - places all MFRVs and MFPTs speed control in manual, matches steam and feed flows to maintain SG levels at 65%. Bypasses PRNI 41 rod stop, transfer steam dumps to steam pressure mode.

OATC & UO select unaffected channels and place control systems back to automatic.

Technical specifications:

LCO 3.3.1 - Functions 16a through f (P-6, P-7, P-8, P-9, P-10, and P-13) – verify correct status in 1 hour

LCO 3.3.2 – Function 8b (P-11) – verify correct status in 1 hour

LCO 3.8.7 Condition A (1 inverter inoperable) - restore inverter within 24 hours and enter LCO 3.8.9 with any vital bus de-energized.

LCO 3.8.9 condition B (vital AC bus) – restore vital bus from regulated transformer within 2 hours

Event 3:

Restore CVCS Letdown to service using SOP 13006-1

Verifiable Actions:

OATC – Align letdown flowpath, establish 80-90 gpm charging flow and 8-13 gpm RCP seal injection flow, establish 75 gpm letdown flow, raise letdown flow 120 gpm, place letdown controls in automatic.

Event 4:

Controlling SG pressure instrument fails low requiring entry into AOP 18001-C section F.

Verifiable action:

UO - Immediately takes manual control of affected SG MFRV and MFPs speed to restore levels to 65% with steam & feed flows matched. Unaffected channel selected, controls returned to automatic.

Technical specifications:

LCO 3.3.2 ESFAS - Functions 1e (SI), 4d(1) and 4d(2) (SLI)- action D – trip channel in 72 hours

LCO 3.3.3 PAMS – Function 8 (SL pressure) – Action B – restore in 30 days

Event 5:

A 20 gpm SGTL develops on SG # 2. AOP entry is required for the SGTL into AOP 18009-C. The AOP will require a rapid shutdown using AOP 18013-C in conjunction with the SGTL AOP (18009-C).

Verifiable actions:

OATC – Maintain PRZR level with charging & letdown, maintain Tave matched with Tref during S/D.
Maintain rods above RIL with borations.

UO – reduce turbine power for S/D.

Technical Specifications:

LCO 3.4.13 – RCS Operational Leakage – Action B - mode 3 within 6 hours.

Events 6, 7, 8, and 9:

SGTL degrades to SGTR. OATC is unable to maintain PRZR level with normal charging. This requires tripping the reactor and actuating SI. A transition to 19030-C, E-3 for the SGTR is required to stop the primary to secondary leakage.

Verifiable actions:

OATC- recognize not able to maintain PRZR level with 2 charging pumps and no CVCS letdown. Manually trips reactor and actuates Safety Injection. Manually open BIT isolations and close charging line isolations. RCS depressurization following rapid cooldown. Use PORV to depressurize RCS. Terminate ECCS injection & establish normal charging.

UO – Identify & isolate ruptured SG. Rapid RCS cooldown to target temperature and maintain that temperature with SG ARVs. Manually close stuck open SG#2 ARV. Manually start TDAFW pump.

CRITICAL STEPS:

1. Manually restore ECCS HHSI flow paths to maintain RCS inventory
2. Stop offsite emergency release from SG #2 ARV.

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Event No.: 1

Event Description: PORV-455 will fail to an intermediate position causing PRZR pressure to lower to 2185 psig. The crew will enter AOP 18000-C for this failure and isolate the malfunctioning PORV and restore PRZR pressure to normal and address the technical specifications.

Time	Position	Applicant's Action or Behavior
	CREW	Diagnoses failure of PORV 455: <u>Alarms:</u> PRZR RELIEF DISCH HI TEMP PRZR CONTROL LO PRESS AND HEATERS ON PRZR PRESS LO PORV BLOCK <u>Indications:</u> Intermediate valve position for PV-455 PRZR pressure lowering PORV tailpipe temperature indication (TI-449) rising ~ 200°F Both PORV Block Valves shut @ 2185 psig PRZR pressure
	SS	Enters AOP 18000-C, Pressurizer Spray, Safety, or Relief Valve Malfunction
	OATC	<u>Immediate Action:</u> Verifies PRZR spray valves closed
	OATC	Energizes PRZR heaters as necessary to maintain 2235 psig

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Event No.: 1

Event Description: PORV-455 will fail to an intermediate position causing PRZR pressure to lower to 2185 psig. The crew will enter AOP 18000-C for this failure and isolate the malfunctioning PORV and restore PRZR pressure to normal and address the technical specifications.

Time	Position	Applicant's Action or Behavior
	OATC	Verifies PORV 455 is shut: (Not) <ul style="list-style-type: none"> • Places handswitch for PORV-455 block valve in close • Dispatches CBO to open PORV breaker 1AD1M-04
	OATC	Checks PRZR Safety Valves closed: <ul style="list-style-type: none"> • IPC or PSMS valve position indication • PRZR Safety tailpipe temperature indications
	OATC	Checks master controller PIC-455A operating properly using figure 1 of AOP 18000-C
	OATC	Checks PRZR pressure instruments reading properly

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Event No.: 1

Event Description: PORV-455 will fail to an intermediate position causing PRZR pressure to lower to 2185 psig. The crew will enter AOP 18000-C for this failure and isolate the malfunctioning PORV and restore PRZR pressure to normal and address the technical specifications.

Time	Position	Applicant's Action or Behavior
	SS	Complies with Technical Specifications: <ul style="list-style-type: none"> • 3.4.11 PORVs – Condition B: <ul style="list-style-type: none"> ○ Close associated PORV block valve in 1 hour, and ○ Remove power from the associated block valve in 1 hour <ul style="list-style-type: none"> ▪ 1ABE-13 ○ Restore PORV to operable status in 72 hours • 3.4.1 DNB Parameters – Condition A – Restore within 2 hours
	SS	Contacts SSS to perform following actions: <ul style="list-style-type: none"> • Remove power from PORV block valve in 1 hour • Initiate condition report • Contact maintenance • Notify OPS Duty Manager of AOP entry

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Event No.: 2

Event Description: A loss 120 VAC vital instrument bus 1AY1A occurs. The crew will diagnose the failure and take immediate actions to stabilize the affected control systems and then enter AOP 180032-C. This failure will be due to an inverter failure, the bus will be re-energized from the alternate power source, the regulated transformer.

Time	Position	Applicant's Action or Behavior
	CREW	Diagnoses loss of power to vital bus 1AY1A: <u>Indications:</u> <ul style="list-style-type: none"> • Several channel I trip status lights are lit • Simultaneous loss of SR, IR, and PR NIS channels N-31/35/41 <u>Alarms:</u> <ul style="list-style-type: none"> • 120V AC PANELS 1AY1A 1AY2A TROUBLE • INVERTERS 1AD1I1 1AD1I11 TROUBLE • Several other alarms resulting from loss of channel I vital AC power
	OATC	IMMEDIATE ACTIONS: <ul style="list-style-type: none"> • Check reactor power > P-10 setpoint • Verify control rods in manual
	UO	IMMEDIATE ACTIONS: Control SG NR levels 60%-70%: <ul style="list-style-type: none"> • Place MFRVs in manual • MFPT SPEED CONTROL MASTER in manual

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Event No.: 2

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Time	Position	Applicant's Action or Behavior
	SS	Enters AOP 18032-C, Loss of 120V AC Instrument Power, section A (Crew Update)
	OATC / UO	Verify immediate actions with SS Initiate continuous actions page
	OATC	Maintain seal injection flow to all RCP's 8 to 13 GPM Reduce charging flow to ~ 10 GPM greater than total seal injection flow
	OATC	Restore PRZR level control: <ul style="list-style-type: none"> • Checks failed channel selected for control • Select control to channels 461/460 • Restore Control Heaters by placing control switch to ON • Reset Backup Heaters – Handswitches to OFF then AUTO • Operate heaters / sprays to maintain 2220-2250 psig • Select channel 461 on chart recorder

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Event No.: 2

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Time	Position	Applicant's Action or Behavior
	OATC	Check Letdown in service – (not) Restore letdown by initiating SOP 13006-1, Chemical and Volume Control System (go to Event 3)
	OATC	Select alternate PRZR pressure control channel: <ul style="list-style-type: none"> • Place PORV 455 handswitch in close • Place spray controllers in manual • Set master controller to 25% • Select channels 457 / 456 for control • Select channel 457 for the chart recorder
	OATC	Restore automatic PRZR pressure control: <ul style="list-style-type: none"> • Check pressure 2220-2250 psig • Place PORV 455 HS in auto <ul style="list-style-type: none"> ○ (should remain in manual close due to event 1 failure) • Check PORV 455 remains closed • Place PRZR heaters in AUTO • Place PRR spray valve controllers in AUTO • Verify RCS pressure – stable or rising • Return PRZR master pressure controller to AUTO

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Event No.: 2

Event Description: A loss 120 VAC vital instrument bus 1AY1A occurs. The crew will diagnose the failure and take immediate actions to stabilize the affected control systems and then enter AOP 180032-C. This failure will be due to an inverter failure, the bus will be re-energized from the alternate power source, the regulated transformer.

Time	Position	Applicant's Action or Behavior
	UO	Select channel II SG control instruments by placing selector switches to the right (May ask for peer check)
	UO	Restore SG levels to 65% and then return MFRVs and MFP master controllers to automatic
	OATC	Defeat loop 1 Tavg and ΔT inputs into the temperature control circuits
	OATC	Determine Tref using figure 1 of AOP 18032-C
	UO	Place ROD STOP BYPASS switch to BYPASS PRN41 position This will clear alarm ALB10D03 – Overpower Rod Stop

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Event No.: 2

Event Description: A loss 120 VAC vital instrument bus 1AY1A occurs. The crew will diagnose the failure and take immediate actions to stabilize the affected control systems and then enter AOP 180032-C. This failure will be due to an inverter failure, the bus will be re-energized from the alternate power source, the regulated transformer.

Time	Position	Applicant's Action or Behavior
	OATC	Restore Tave to Tref with control rods
	UO	Transfer Steam Dumps to Steam Pressure mode: <ul style="list-style-type: none"> • Check Condenser available • Verify PIC507 steam dump control set to auto at 1092 psig (7.28 on potentiometer) and zero demand • Place steam dumps in steam pressure mode
	OATC / UO	Maintain stable plant conditions: <ul style="list-style-type: none"> • Tavg within 1 F of Tref • PRZR level within 5% of program • PRZR pressure 2220-2250 psig • SG NR levels 60-70%

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Event No.: 2

Event Description: A loss 120 VAC vital instrument bus 1AY1A occurs. The crew will diagnose the failure and take immediate actions to stabilize the affected control systems and then enter AOP 180032-C. This failure will be due to an inverter failure, the bus will be re-energized from the alternate power source, the regulated transformer.

Time	Position	Applicant's Action or Behavior
	SS / OATC	Verify interlocks in required state for existing conditions: (This is a Tech Spec required 1 hour action) <ul style="list-style-type: none"> • P6 • P7 • P8 • P9 • P10 and input to P7 • P13 • P11
	SS	Dispatch operator to transfer 1AY1A to alternate supply (SOP 13431-1)
	OATC	Check ACCW system status due to loss of power: <ul style="list-style-type: none"> • ACCW pump 1 started • Proper operation of ACCW pump 1 • Shutdown ACCW pump 2 • Verify thermal barrier header return isolation valve (HV-2041) open

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Event No.: 2

Event Description: A loss 120 VAC vital instrument bus 1AY1A occurs. The crew will diagnose the failure and take immediate actions to stabilize the affected control systems and then enter AOP 180032-C. This failure will be due to an inverter failure, the bus will be re-energized from the alternate power source, the regulated transformer.

Time	Position	Applicant's Action or Behavior
	SS	<p>Check 1AY1A restored from alternate or normal power</p> <p>Note: do not expect path below to be taken, power will be restored from the regulated transformer.</p> <p>If 1AY1A cannot be re-energized in a timely manner:</p> <ul style="list-style-type: none"> • Place standby NSCW and CCW pumps that started in PTL • Initiate 18002-C, NIS malfunction AOP • Refer to Attachment A, Table 1 to determine affected instruments • Refer to Attachment A, Table 2 and 3 to determine additional equipment affected • Refer to technical specifications and complete any applicable actions
	UO	<p>Check NSCW and CCW train A in service</p> <p>Shutdown and place in AUTO any standby NSCW or CCW pump which started due to loss of 1AY1A</p> <p>NOTE: CCW pump will auto restart if handswitch is not held in stop for several seconds to let discharge pressure stabilize.</p>

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Event Description: A loss 120 VAC vital instrument bus 1AY1A occurs. The crew will diagnose the failure and take immediate actions to stabilize the affected control systems and then enter AOP 180032-C. This failure will be due to an inverter failure, the bus will be re-energized from the alternate power source, the regulated transformer.

Time	Position	Applicant's Action or Behavior
	SS	Check loss of 1AY1A due to inverter 1AD111 failure Check 1AY1A restored to inverter supply (Not) Return to procedure and step in effect
	SS	Determine Technical Specifications impacted by failure: <ul style="list-style-type: none"> • LCO 3.3.1 - Functions 16a through f (P-6, P-7, P-8, P-9, P-10, and P-13) – verify correct status in 1 hour • LCO 3.3.2 – Function 8b (P-11) – verify correct status in 1 hour • LCO 3.8.7 Condition A (1 inverter inoperable) - restore inverter within 24 hours and enter LCO 3.8.9 with any vital bus de-energized. • LCO 3.8.9 Condition B (vital AC bus) – restore vital bus from regulated transformer within 2 hours

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Event No.: 2

Event Description: A loss 120 VAC vital instrument bus 1AY1A occurs. The crew will diagnose the failure and take immediate actions to stabilize the affected control systems and then enter AOP 180032-C. This failure will be due to an inverter failure, the bus will be re-energized from the alternate power source, the regulated transformer.

Time	Position	Applicant's Action or Behavior
	SS	Contact SSS to perform following: <ul style="list-style-type: none">• Notify OPS Duty Manager of AOP entry• Initiate Condition Report
		<u>GO TO EVENT 4</u>

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Event No.: 3

Event Description: OATC returns CVCS letdown to service using SOP 13006-1 following loss of vital instrument bus 1AY1A

Time	Position	Applicant's Action or Behavior
	OATC	<p><u>SOP 13006-1, Section 4.4.2</u></p> <p>Verifies NCP miniflow (HV-8109) is open</p> <p>Aligns letdown flow path for start up:</p> <ul style="list-style-type: none"> • LTDN Orifice isolations(HV-8149A/B/C) – CLOSED • LTDN isolations (LV-459/460) – CLOSED • PZR aux Spray(HV-8145) – CLOSED • Pipe Break protection (HV-15214) – OPEN • LTDN CNMT isolations (HV-8160 & HV-8152) – OPEN • LTDN pressure controller (PV-131) –Manual 50%-75% • LTDN HX outlet (TIC-130) – Manual to most recent position on rounds sheets
	OATC	Verify PZR level > 17%
	OATC	<p>Verify charging aligned:</p> <ul style="list-style-type: none"> • Charging line isolations(HV-8105 & HV-8106) –OPEN • Charging to RCS loop isolation –either one OPEN

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Event No.: 3

Event Description: OATC returns CVCS letdown to service using SOP 13006-1 following loss of vital instrument bus 1AY1A

Time	Position	Applicant's Action or Behavior
	OATC	Raises charging flow to 80-90 GPM while maintaining RCP seal injection flow between 8-13 GPM
	OATC	Establishes Letdown flow: <ul style="list-style-type: none"> • Opens LTDN isolations and LTDN Orifice Isolation to establish 75 gpm letdown flow • Adjusts LTDN pressure between 360-380 psig, then places controller in automatic • Places LTDN HX temperature controller in automatic • Verify LTDN REGEN HX outlet temperature (TI-127) < 380 °F. NOTE: The crew may opt to increase letdown flow to 120 GPM after placing a 75 GPM orifice in service.
		RETURN TO EVENT 2

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Event No.: 4

Event Description: *After 1AY1A is re-energized* SG # 4 controlling pressure channel fails low. The UO will take immediate actions to restore SG # 4 level and manually control the speed of both MFPs. The crew will complete the corrective actions using AOP 18001-C, Section F.

Time	Position	Applicant's Action or Behavior
	CREW	Diagnose failure of controlling SG # 4 pressure channel: <u>Alarms:</u> STM GEN 4 HI STM PRESS RATE ALERT STM GEN 4 LO STEAMLINE PRESS ALERT STM GEN 4 FLOW MISMATCH STM GEN 4 HI/LO LVL DEVIATION <u>Indications:</u> SG # 4 pressure channel II (PT-545) drops to 0 psig SG # 4 controlling steam flow channel drops to 0 MPPH Both main feed pumps speed starts lowering SGs 1, 2, and 3 feed flows start to lower
	UO	IMMEDIATE ACTIONS: Check steam & feed flows not matched on loop 4 Takes manual control of SG 4 MFRV and both MFPs speed Restores SG NR levels to 60-70%
	SS	Enters AOP 18001-C, Section F, Failure of SG Pressure Instrumentation (Crew Update) Verifies completion of immediate actions.

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Event No.: 4

Event Description: *After 1AY1A is re-energized* SG # 4 controlling pressure channel fails low. The UO will take immediate actions to restore SG # 4 level and manually control the speed of both MFPs. The crew will complete the corrective actions using AOP 18001-C, Section F.

Time	Position	Applicant's Action or Behavior
	UO	Checks controlling steam flow channel affected by pressure channel failure
	UO	Selects unaffected channel for SG 4 steam flow NOTE: This will place SG #4 controls back to channel I which is on an alternate power supply without a battery backup.
	UO	Return MFPs speed controls to automatic Returns SG 4 MFRV to automatic
	OATC / UO	Initiate continuous actions page
	UO	Checks SG level control maintains NR level at 65%

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Event No.: 4

Event Description: *After 1AY1A is re-energized* SG # 4 controlling pressure channel fails low. The UO will take immediate actions to restore SG # 4 level and manually control the speed of both MFPs. The crew will complete the corrective actions using AOP 18001-C, Section F.

Time	Position	Applicant's Action or Behavior
	SS	Has SSS perform following: Notifies I & C to initiate repairs Initiate Condition Report Notify OPS Duty Manager of AOP entry
	SS	Bypasses affected channel if desired (do not expect this to be implemented)
	SS	Applies Technical Specifications: <ul style="list-style-type: none"> • LCO 3.3.2 ESFAS - Functions 1e (SI), 4d(1) and 4d(2) (SLI)- action D – trip channel in 72 hours except 4d(2) is an INFO LCO • LCO 3.3.3 PAMS – Function 8 (SL pressure) – INFO LCO
	SS	Returns to procedure and step in effect

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Event No.: 5

Event Description: SG 2 develops a 20 GPM tube leak requiring entry into AOP 18009-C. With SGTL > 5 gpm a rapid shutdown using AOP 18013-C is required. This event will be used for the required reactivity manipulation.

Time	Position	Applicant's Action or Behavior
	CREW	Diagnose SG Tube Leakage: <u>ALARMS:</u> INTMD RADIATION ALARM HIGH RADIATION RE-0724 – Primary to secondary leakage monitor RE-0810 – SJAE low range monitor RE-12839C – SJAE monitor <u>INDICATIONS:</u> Charging flow increases if in auto (expect manual control) PRZR level slowly lowers
	SS	Enters AOP 18009-C, Steam Generator Tube Leak (Crew Update)
	OATC / UO	Initiate continuous actions page
	OATC	Maintains PRZR level by: <ul style="list-style-type: none"> • Adjusting charging flow • Isolating letdown (only necessary if at 120 GPM letdown) • Start additional charging pump (will not be necessary)

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Event No.: 5

Event Description: SG 2 develops a 20 GPM tube leak requiring entry into AOP 18009-C. With SGTL > 5 gpm a rapid shutdown using AOP 18013-C is required. This event will be used for the required reactivity manipulation.

Time	Position	Applicant's Action or Behavior
	SS	Direct Chemistry attempt to identify the leaking SG by initiating 31120-C
	UO	Try to identify leaking SG by changes to level and / or feed flow rate
	OATC	Verifies VCT level maintained with automatic makeup control
	OATC / SS	Check leak rate < 5 GPM as determined by CVCS flow balance [charging – (letdown + seal leak off)] Leak rate will be ~ 20 GPM
	SS	Initiates 18013-C, Rapid Power Reduction to be in mode 3 within 1 hour. Also continues with AOP 18009-C step 11

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Event No.: 5

Event Description: SG 2 develops a 20 GPM tube leak requiring entry into AOP 18009-C. With SGTL > 5 gpm a rapid shutdown using AOP 18013-C is required. This event will be used for the required reactivity manipulation.

Time	Position	Applicant's Action or Behavior
	SS	Notify: <ul style="list-style-type: none"> • Shift Manager to Implement EIPs • HP to initiate 43028-C • SSS to implement Attachment B of 18009-C (local actions to minimize secondary contamination)
	UO	Minimize Secondary contamination: <ul style="list-style-type: none"> • Place hotwell level control in manual @ 50% • Initiate swapping steam loads to auxiliary steam
	SS	Initiates a unit shutdown per AOP-18013-C, Rapid Down Power <ul style="list-style-type: none"> • Performs SHUTDOWN BRIEFING • Initiates the Continuous Actions page.

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Event No.: 5

Event Description: SG 2 develops a 20 GPM tube leak requiring entry into AOP 18009-C. With SGTL > 5 gpm a rapid shutdown using AOP 18013-C is required. This event will be used for the required reactivity manipulation.

Time	Position	Applicant's Action or Behavior
	OATC / UO	<ul style="list-style-type: none"> • Reduce Turbine load at a rate up to 5% minute: • Maintains Tave within 6 degrees F of Tref using rods in auto and boration as necessary. • Maintains reactor and turbine power matched. • PRZR level and pressure maintained on program. • SG levels maintained on program.
	SS	Notifies System Operator that a load reduction is in progress.
	NOTE	Event will continue until adequate power maneuver completed.

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Event No.: 6 through 9

Event Description: The SGTL degrades into a SGTR with additional failures. The OATC will not be able to maintain PRZR level and will manually actuate Safety Injection. The crew will enter the EOP network and transition to 19030-C, SGTR. The OATC will have to manually establish HHSI flow through the BIT. The UO will have recognize and stop a release from the ruptured SG via a failed ARV. The UO will also have to manually start the TDAFW pump.

Time	Position	Applicant's Action or Behavior
	OATC	Try to maintain PRZR level: (Continuous action from SGTL AOP) <ul style="list-style-type: none"> • Maximize charging line flow • Start a second charging pump • Isolate letdown if not previously performed
	OATC	Report to SS unable to maintain PRZR level through the normal charging path.
	SS	Directs OATC: (18009-C step 2 RNO actions) <ul style="list-style-type: none"> • Trip the reactor • Verify Reactor Trip • Then actuate SI
	SS	Enters EOP 19000-C, Reactor Trip or Safety Injection

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Event No.: 6 through 9

Event Description: The SGTL degrades into a SGTR with additional failures. The OATC will not be able to maintain PRZR level and will manually actuate Safety Injection. The crew will enter the EOP network and transition to 19030-C, SGTR. The OATC will have to manually establish HHSI flow through the BIT. The UO will have recognize and stop a release from the ruptured SG via a failed ARV. The UO will also have to manually start the TDAFW pump.

Time	Position	Applicant's Action or Behavior
	CREW	<p>Performs IOAs of 19000</p> <p>Step # 1 - Verifies Reactor Trip</p> <ul style="list-style-type: none"> • Rod Bottom Lights lit • Reactor Trip and Bypass Breakers - Open • Neutron Flux Lowering <p>Step # 2 – Verifies Turbine Trip</p> <ul style="list-style-type: none"> • All Turbine Stop Valves – Closed <p>Step # 3 – Checks Power to AC Emergency Buses</p> <ul style="list-style-type: none"> • 3a, at least 1 4160 1E bus energized • 3b, all AC Emergency buses energized -4160 and 480V <p>Step # 4 Checks if SI / Actuated</p> <ul style="list-style-type: none"> • Any SI annunciator lit • SI BPLP status light lit

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Event No.: 6 through 9

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Time	Position	Applicant's Action or Behavior
	SS / TEAM	<p>Step # 5 - Initiates Foldout Page</p> <p>Step # 6 - Initiates OATC Initial Actions pages and UO Initial Actions Pages.</p> <p>Step # 7 – Initiates Continuous Actions pages.</p>
	OATC	<p>Performs OATC Initial Operator Actions of E-0.</p> <p>Step # 1 - Checks both Trains of ECCS aligning per MLBs.</p> <p>Step # 2 - Checks CIA – actuated per MLBs</p>
	OATC	<p>Performs OATC Initial Operator Actions of E-0.</p> <p>Step # 3 Checks ECCS pumps and NCP status.</p> <ul style="list-style-type: none"> • 3a, CCPs – running • 3b, SI Pumps – running • 3c, RHR pumps – running • 3d, NCP – tripped

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Event No.: 6 through 9

Event Description: The SGTL degrades into a SGTR with additional failures. The OATC will not be able to maintain PRZR level and will manually actuate Safety Injection. The crew will enter the EOP network and transition to 19030-C, SGTR. The OATC will have to manually establish HHSI flow through the BIT. The UO will have recognize and stop a release from the ruptured SG via a failed ARV. The UO will also have to manually start the TDAFW pump.

Time	Position	Applicant's Action or Behavior
	OATC	Performs OATC Initial Operator Actions of E-0. Step # 4 - CCW pumps – only two running per train Step # 5a - NSCW pumps – only two running per train Step # 5b - NSCW tower return bypass valves – in auto Step # 6a - Containment coolers running in LOW speed Step # 6b - NSCW cooler isolation valves open Step # 7 – CVI dampers and valves shut per MLBs Step # 8 - Containment pressure remained < 21.5
	OATC CRITICAL	Performs OATC Initial Operator Actions of E-0. Step # 9 - Checks ECCS flows: <ul style="list-style-type: none"> • BIT Flow – None • Notifies SS of no BIT flow, then aligns valves using Attachment B • RCS pressure > 1625 psig • RCS pressure > 300 psig

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Event No.: 6 through 9

Event Description: The SGTL degrades into a SGTR with additional failures. The OATC will not be able to maintain PRZR level and will manually actuate Safety Injection. The crew will enter the EOP network and transition to 19030-C, SGTR. The OATC will have to manually establish HHSI flow through the BIT. The UO will have recognize and stop a release from the ruptured SG via a failed ARV. The UO will also have to manually start the TDAFW pump.

Time	Position	Applicant's Action or Behavior
	OATC	Performs OATC Initial Operator Actions of E-0. Step # 10 - Checks ECCS valve alignment proper on MLBs Step # 11 - Checks at least one ACCW pump running Step # 12 - Adjusts seal injection flow to RCPs 8 to 13 gpm.

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Event No.: 6 through 9

Event Description: The SGTL degrades into a SGTR with additional failures. The OATC will not be able to maintain PRZR level and will manually actuate Safety Injection. The crew will enter the EOP network and transition to 19030-C, SGTR. The OATC will have to manually establish HHSI flow through the BIT. The UO will have recognize and stop a release from the ruptured SG via a failed ARV. The UO will also have to manually start the TDAFW pump.

Time	Position	Applicant's Action or Behavior
	UO	<p>Performs UO Initial Operator Actions of E-0</p> <p>Step # 1 - Checks MDAFW and TDAFW pumps are running.</p> <p style="padding-left: 40px;">Notifies SS the TDAFW pump failed to start, then opens steam supply valve HV-5106</p> <p>Step # 2 - Checks NR SG levels - one > 10%, If not ensures at least 570 GPM flow</p> <p>Step # 3 - Checks if SLI is required</p> <ul style="list-style-type: none"> • Any SL Pressure < 585 psig • CNMT Pressure > 14.5 psig • High rate bistables lit with low pressure SI/SLI blocked • If any above met then verify MSIVs & BSIVs closed <p>Step # 4 - Verifies FWI (MFRV, BFRV, MFIV, BFIVs all shut)</p> <p>Step # 5 - Verifies SGBD isolated</p> <ul style="list-style-type: none"> • places hand switches for SGBD isolation valves to close • verify SGBD sample isolations closed. <p>Step # 6 - Verify Diesel Generators running.</p> <p>Step # 7 - Throttle AFW flow to control SG levels 10 – 65% NR</p> <p>Step # 8 - Verify both MFPs tripped.</p> <p>Step # 9 - Check Main Generator Output breakers open.</p>

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Event No.: 6 through 9

Event Description: The SGTL degrades into a SGTR with additional failures. The OATC will not be able to maintain PRZR level and will manually actuate Safety Injection. The crew will enter the EOP network and transition to 19030-C, SGTR. The OATC will have to manually establish HHSI flow through the BIT. The UO will have recognize and stop a release from the ruptured SG via a failed ARV. The UO will also have to manually start the TDAFW pump.

Time	Position	Applicant's Action or Behavior
	OATC	Checks RCS temperature stable at or trending to 557 degrees F using RCS Tavg.
	UO	<p>If necessary, takes actions of RNO step 8 to control RCS temperature.</p> <ul style="list-style-type: none"> • Stop dumping steam. • Reduces AFW flow (not < 570 gpm if SG NR levels < 10% NR). • If cooldown continues shuts MSIVs and BSIVs • If temperature > 557 F & rising then dump steam
	OATC	<p>Step # 9 - Checks PORVs, Block Valves, & Spray Valves</p> <ul style="list-style-type: none"> • 9a, PORVs closed and in AUTO • 9b, Normal spray valves closed • 9c, Power available to at least one block valve • 9d, At least one block valve open (NOT) • 9d RNO, verify open at least one block valve when RCS pressure > 2185 psig.

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Event No.: 6 through 9

Event Description: The SGTL degrades into a SGTR with additional failures. The OATC will not be able to maintain PRZR level and will manually actuate Safety Injection. The crew will enter the EOP network and transition to 19030-C, SGTR. The OATC will have to manually establish HHSI flow through the BIT. The UO will have recognize and stop a release from the ruptured SG via a failed ARV. The UO will also have to manually start the TDAFW pump.

Time	Position	Applicant's Action or Behavior
	OATC	Step # 10 - Checks if RCPs should be stopped <ul style="list-style-type: none"> • 10a, CCP or SIP running • 10b, RCS pressure < 1375 psig • If yes then stop all RCPs if no then go to step # 11
	UO / SS	Step # 11 - Checks for faulted SG and transition to E-2 <ul style="list-style-type: none"> • SG pressures: <ul style="list-style-type: none"> ○ Any lowering in an uncontrolled manner, or ○ Completely depressurized • If yes then go to 19020-C, E-2 • If no then go to step # 12
	SS / UO	Step # 12 - Checks for SG tubes intact. <ul style="list-style-type: none"> • Directs chemistry to sample all SG one at a time for activity. • Checks secondary radiation normal: <ul style="list-style-type: none"> ○ Main Steam Line Rad Monitors ○ Condenser Air Ejector Rad Monitors ○ Steam Generator Liquid Process Rad Monitors ○ SG sample radiation • Any SG level rising in an uncontrolled manner • If rad monitors abnormal or SG level rising uncontrollably, then go to 19030-C, E-3

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Event No.: 6 through 9

Event Description: The SGTL degrades into a SGTR with additional failures. The OATC will not be able to maintain PRZR level and will manually actuate Safety Injection. The crew will enter the EOP network and transition to 19030-C, SGTR. The OATC will have to manually establish HHSI flow through the BIT. The UO will have recognize and stop a release from the ruptured SG via a failed ARV. The UO will also have to manually start the TDAFW pump.

Time	Position	Applicant's Action or Behavior
	SS	Enters EOP 19030-C, Steam Generator Tube Rupture (Crew Update)
	OATC / UO	Initiate Continuous Actions and Foldout Pages Monitor CSFSTs per 19200-C
	SS	Directs SM to implement EIPs
	OATC	Maintain RCP seal injection flow 8 to 13 GPM
	OATC	Checks if RCPs should be stopped: <ul style="list-style-type: none"> • At least one CCP or SI pump running • RCS pressure < 1375 psig (not) • If pressure lowers < 1375 psig prior to initiation of RCS cooldown then stop all RCPs

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Event No.: 6 through 9

Event Description: The SGTL degrades into a SGTR with additional failures. The OATC will not be able to maintain PRZR level and will manually actuate Safety Injection. The crew will enter the EOP network and transition to 19030-C, SGTR. The OATC will have to manually establish HHSI flow through the BIT. The UO will have recognize and stop a release from the ruptured SG via a failed ARV. The UO will also have to manually start the TDAFW pump.

Time	Position	Applicant's Action or Behavior
	UO	Identifies Ruptured SG: <ul style="list-style-type: none"> • Unexpected rise in SG # 2 narrow range level, or • Report for chemistry
	UO CRITICAL	Isolate Ruptured SG ARV: <ul style="list-style-type: none"> • Adjusts SG 2 ARV controller to 1160 psig (7.7.3 pot setting) • Notes SG 2 ARV fully open • Verifies SG 2 pressure < 1160 psig with ARV open • Manually closes SG 2 ARV to stop off site emergency release • NOTE: This will require manual operation of the ARV later to prevent lifting a code safety valve.
	UO	Checks at least one MDAFW pump running & capable of feeding SG(s) needed for RCS cooldown
	UO	Closes SG 2 supply to TDAFW pump HV-3019 NOTE: This will result in no steam to the TDAFW pump.

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Event No.: 6 through 9

Event Description: The SGTL degrades into a SGTR with additional failures. The OATC will not be able to maintain PRZR level and will manually actuate Safety Injection. The crew will enter the EOP network and transition to 19030-C, SGTR. The OATC will have to manually establish HHSI flow through the BIT. The UO will have recognize and stop a release from the ruptured SG via a failed ARV. The UO will also have to manually start the TDAFW pump.

Time	Position	Applicant's Action or Behavior
	UO	Verifies SGBD isolation valves & handswitches in close
	UO	Closes loop 2 MSIVs & BSIV's to isolate ruptured SG from intact SGs
	SS	<p style="text-align: center;">CAUTION:</p> <p>Procedure should be performed in a timely manner to assure break flow in the ruptured SG is terminated before wate enters the SGs main steam piping.</p>
	UO	Maintains ruptured SG that is also faulted isolated unless needed for RCS cooldown or SG activity sample
	UO	<p>Checks SG 2 isolated from intact SGs:</p> <ul style="list-style-type: none"> • MSIVs & BSIVs on loop 2 shut • Steam supply to TDAFW pump (HV-3019) shut
	UO	<p>Controls ruptured SG level:</p> <ul style="list-style-type: none"> • Maintains feed flow until NR level > 10%, then isolates feed flow

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Event No.: 6 through 9

Event Description: The SGTL degrades into a SGTR with additional failures. The OATC will not be able to maintain PRZR level and will manually actuate Safety Injection. The crew will enter the EOP network and transition to 19030-C, SGTR. The OATC will have to manually establish HHSI flow through the BIT. The UO will have recognize and stop a release from the ruptured SG via a failed ARV. The UO will also have to manually start the TDAFW pump.

Time	Position	Applicant's Action or Behavior																								
	UO	Checks ruptured SG pressure > 290 psig																								
	CREW	Blocks low steamline pressure SI/SLI when RCS pressure < 2000 psig and SG high steam pressure rate alarms are clear.																								
	UO	Bypasses steam dump interlock when RCS temperature < 550 F																								
	UO	Raises intact SG levels prior to maximum rate cooldown																								
	OATC	Checks at least one RCP running																								
	CREW	Determines required core exit temperature for cooldown: <table border="1"> <thead> <tr> <th>Ruptured SG Pressure (psig)</th> <th>Core Exit Temperature (°F)</th> </tr> </thead> <tbody> <tr> <td>> 1200</td> <td>530</td> </tr> <tr> <td>1100 to 1199</td> <td>518</td> </tr> <tr> <td>1000 to 1099</td> <td>506</td> </tr> <tr> <td>900 to 999</td> <td>493</td> </tr> <tr> <td>800 to 899</td> <td>479</td> </tr> <tr> <td>700 to 799</td> <td>463</td> </tr> <tr> <td>600 to 699</td> <td>445</td> </tr> <tr> <td>500 to 599</td> <td>424</td> </tr> <tr> <td>400 to 499</td> <td>399</td> </tr> <tr> <td>300 to 399</td> <td>366</td> </tr> <tr> <td>290 to 299</td> <td>350</td> </tr> </tbody> </table>	Ruptured SG Pressure (psig)	Core Exit Temperature (°F)	> 1200	530	1100 to 1199	518	1000 to 1099	506	900 to 999	493	800 to 899	479	700 to 799	463	600 to 699	445	500 to 599	424	400 to 499	399	300 to 399	366	290 to 299	350
Ruptured SG Pressure (psig)	Core Exit Temperature (°F)																									
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Event No.: 6 through 9

Event Description: The SGTL degrades into a SGTR with additional failures. The OATC will not be able to maintain PRZR level and will manually actuate Safety Injection. The crew will enter the EOP network and transition to 19030-C, SGTR. The OATC will have to manually establish HHSI flow through the BIT. The UO will have recognize and stop a release from the ruptured SG via a failed ARV. The UO will also have to manually start the TDAFW pump.

Time	Position	Applicant's Action or Behavior
	UO	Initiates RCS cooldown at maximum rate using steam dumps
	UO	Stops Cooldown when temperature < required NOTE: should continues with other EOP steps while rapid cooldown is in progress
	UO	Controls intact SG NR levels 10% to 65%.
	OATC	Checks PRZR PORVs and Block valves closed
	SS	Reads LOSP caution to crew
	OATC	Resets SI & CIA
	UO	Attempts to open Instrument Air to CNMT (HV-9378) after verifying air pressure > 100 psig. Valve will not open due HS failure.
	SS	Ensures HP and / or plant personnel aware of possible changes in radiation levels throughout plant as a result of resetting CIA

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Event No.: 6 through 9

Event Description: The SGTL degrades into a SGTR with additional failures. The OATC will not be able to maintain PRZR level and will manually actuate Safety Injection. The crew will enter the EOP network and transition to 19030-C, SGTR. The OATC will have to manually establish HHSI flow through the BIT. The UO will have recognize and stop a release from the ruptured SG via a failed ARV. The UO will also have to manually start the TDAFW pump.

Time	Position	Applicant's Action or Behavior
	OATC	Verifies PRZR spray valves operating as required
	OATC	Stops RHR pumps if RCS pressure > 300 psig & stable or rising Restarts RHR pumps if RCS pressure drops below 300 psig
	CREW	DOES NOT PROCEED BEYOND THIS POINT UNTIL RCS COOLDOWN IS COMPLETED
	SS	Reads caution concerning expected response of ruptured SG pressure and RCS subcooling after cooldown is stopped
	UO	Checks ruptured SG pressure stable or rising
	OATC / UO	Checks RCS subcooling > 44 F
	OATC	Checks if RCS depressurization termination criteria met: <ul style="list-style-type: none"> • RCS pressure < ruptured SG pressure <u>AND</u> PRZR level > 9% <p style="text-align: center;">-- OR --</p> <ul style="list-style-type: none"> • RCS subcooling < 24 F <p style="text-align: center;">-- OR --</p> <ul style="list-style-type: none"> • PRZR level > 75%
	OATC	Check normal Spray is not available due to no air to containment
	OATC	Checks PRZR PORV & Block Valve available

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Event No.: 6 through 9

Event Description: The SGTL degrades into a SGTR with additional failures. The OATC will not be able to maintain PRZR level and will manually actuate Safety Injection. The crew will enter the EOP network and transition to 19030-C, SGTR. The OATC will have to manually establish HHSI flow through the BIT. The UO will have recognize and stop a release from the ruptured SG via a failed ARV. The UO will also have to manually start the TDAFW pump.

Time	Position	Applicant's Action or Behavior
	SS	Reads cautions to crew: Possible PRT rupture while using PORV causing abnormal containment conditions Cycling of PRZR PORV should be minimized
	OATC	Depressurizes RCS using PORV to refill PRZR, must arm one train of COPS prior opening PORV
	OATC	Checks RCS depressurization termination criteria met: <ul style="list-style-type: none"> • RCS pressure < ruptured SG pressure <u>AND</u> PRZR level > 9% <p style="text-align: center;">-- OR --</p> <ul style="list-style-type: none"> • RCS subcooling < 24 F <p style="text-align: center;">-- OR --</p> <ul style="list-style-type: none"> • PRZR level > 75% <p style="text-align: center;">REMAINS ON THIS STEP UNTIL TERMINATION CRITERIA MET</p>

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Event No.: 6 through 9

Event Description: The SGTL degrades into a SGTR with additional failures. The OATC will not be able to maintain PRZR level and will manually actuate Safety Injection. The crew will enter the EOP network and transition to 19030-C, SGTR. The OATC will have to manually establish HHSI flow through the BIT. The UO will have recognize and stop a release from the ruptured SG via a failed ARV. The UO will also have to manually start the TDAFW pump.

Time	Position	Applicant's Action or Behavior
	OATC	Closes PRZR PORV & Blocks COPS
	OATC	Checks RCS pressure rising
	CREW	Checks if ECCS termination criteria met: (SHOULD BE MET) <ul style="list-style-type: none"> • RCS subcooling > 24 F, and • SG NR level in one intact SG > 10%, or • > 570 GPM flow to SGs, and • RCS pressure stable or rising, and • PRZR level > 9%
	OATC	Stops both SI pumps and one CCP
		END OF SCENARIO

Facility: Vogtle Scenario No.: 2 Op-Test No.: 2009-301

Examiners: Lea Operators: _____

NEW

Initial Conditions: 100% power, CNMT Mini-Purge in service, HV-3009 shut tagged for repairs (emergent work), SG ARV #3 tagged for repairs, BATP #2 tagged for repairs, I&C recording lift coil currents in rod control for baseline PM data.

Turnover: New system peak record expected due to extremely hot weather. System loads at maximum due to unexpected unit trip. LCO 3.7.5 Condition A (HV-3009), INFO LCO 3.7.4 (ARV) INFO TR 13.1.3 (BATP).

Event No.	Malf. No.	Event Type*	Event Description
1	PR02A @ 100%	I-SS I-OATC TS-SS	PZR pressure control channel failure (AOP 18001-C) LCO 3.3.1 / 3.3.2 / 3.4.1
2	CO01 @ 100%	R-ALL	Condenser low vacuum (ARP 17019 & AOP 18013-C) (Set malfunction severity to 65% after low vacuum alarm to prevent unit trip)
3	RH02A @50%	C-SS C-OATC TS-SS	RCS leakage into PRT (AOP 18004-C) (15-20 gpm) LCO 3.4.13 for RCS leakage
4	MS11A @ 0%	I-SS I-UO	PT-507 fails low (AOP 18001-C)
5	RH02A @ 95%	M-ALL	LOCA Outside CNMT (EOPs 19000 to 19112 to 19111) (Set malfunction to 80-85% after SI to ensure RCS pressure lowering)
6	FW17	I-SS I-UO	FWI failure
7	RH01A	C-SS C-OATC	RHR pump trips due to water in room NOTE: When SO sent to investigate – report RHR pump room full of water & steam cannot enter.
8	ES16	I-SS I-OATC	SSPS train B fails to auto actuate

9	ALB35 C06, C07 C04, C03, C05	C-SS C-UO	DG-1A Jacket Water Pump failure Enter C06 & C07 first Then enter C04, C03, C05 in that order with 15 second time delays.
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Event 1:

Controlling PRZR pressure control channel fails high, AOP 18001-C section C entry is required.

Verifiable Actions:

OATC- Immediately closes both PRZR spray valves, affected PORV and operates PRZR heaters as necessary. Control PRZR pressure using heaters & sprays. Select unaffected channel for control and return controls to automatic.

Technical Specifications:

3.3.1 - Reactor Trip:

Function 6 – OTΔT- Condition E Action - trip channel in 72 hours

Function 8a - PRZR low pressure – Condition M Action – trip channel in 72 hours

Function 8b – PRZR high pressure – Condition E action – trip channel in 72 hours

3.3.2 – ESFAS

Function 1d – SI low PRZR pressure – Condition D – Action trip channel in 72 hours

Function 8b – Interlock P11 – Condition L - Action verify status in 1 hour

3.4.1 – DNB Condition A Action – restore DNB parameters in 2 hours.

Event 2:

Low condenser vacuum due to air in leakage. Use ARP 17019 to operate condenser air removal equipment. Crew will have to rapidly lower load using AOP 18013-C to stabilize condenser vacuum.

Verifiable Actions:

UO – start mechanical vacuum pumps, start standby SJAE, reduce turbine load until vacuum stabilizes.

OATC – maintain Tave / Tref matched with rods and / or boration, and maintain SDM with boration during rapid load reduction.

Event 3:

Loss of RCS inventory to PRT will require AOP 18004-C entry for RCS Leakage. Leakage will be greater than TS limit (10 gpm identified).

Verifiable Actions:

OATC – maintain PRZR level with CVCS charging & letdown controls. Verify proper VCT automatic make up flows. Determines leakage is into PRT. Maintains Tave & Tref matched during power reduction.

UO - lowers turbine load as directed by SS/OATC

Technical Specifications:

LCO 3.4.13 condition A - identified leakage > 10 gpm.

Required actions – reduce leakage within limits in 4 hours or Unit must be in mode 3 in 6 hours and mode 5 in 36 hours.

Event 4:

Steamline pressure transmitter PT-507 fails high causing MFP speeds to lower. This requires entry into AOP 18001-C Section I.

Verifiable Actions:

UO – Immediately place MFPs in manual control to match SG feed and steam flows. Verify steam dumps in Tave mode of operation

Events 5, 6, 7, and 8:

RHR HL suction valves fail resulting in failure of RHR suction piping causing a LOCA outside CNMT and loss of emergency coolant recirculation. Crew enters 19000 and then transitions to 19112 (LOCA outside CNMT) and 19111 (Loss of Emergency Coolant Recirculation).

Verifiable Actions:

OATC- Manually actuates SI. Isolate and restore ECCS flow from each of the RHR and SI pumps discharge lines to attempt isolation of the leak. Minimize ECCS flow, make up to the RWST

UO – Initiates a 100 F/hr RCS cooldown, Manually isolates feedwater to all SGs

Event 9:

DG-1A Jacket Water Pump fails causing low pressure and high temperature alarms. DG will not trip due to emergency start. ARP 17035-1 will require DG shutdown if it is not needed for current plant conditions.

Verifiable Actions:

The UO will have to pull the annunciator response procedure and determine that DG should be shutdown to protect the equipment.

Critical actions:

1. Manually actuate SI due to failure of train B SSPS to ensure full ECCS flow during LOCA
2. Minimizing ECCS flow to conserve RWST inventory during LOCA outside CNMT
3. Manually isolating Feedwater to all SGs on reactor trip to prevent excessive RCS cooldown

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Scenario No.: 2

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Event No.: 1

Event Description: The controlling PRZR pressure channel will fail high, causing one PORV and both spray valves to fully open. The OATC will take immediate actions to stabilize PRZR pressure and prevent a reactor trip / SI. The crew will then enter AOP 18001-C, Section C to complete the corrective actions to mitigate this event.

Time	Position	Applicant's Action or Behavior
	CREW	Diagnose high failure of PRZR pressure channel: <u>Alarms:</u> PRZR HI PRESS PRZR HI PRESS CHANNEL ALERT PV-455A OPEN SIGNAL PRZR LO PORV BLOCK <u>Indications:</u> PRZR pressure channel 455 off scale high Other PRZR pressure channel < 2235 psig and lowering Both PRZR Spray valves fully open PRZR PORV 455 fully open PRZR PORV 455 & associated block valve close @ 2185 psig PORV-455 discharge temperature increasing
	OATC	IMMEDIATE ACTIONS: <ul style="list-style-type: none"> • Check RCS Pressure Stable or Rising (NOT) • Close spray valves • Close affected PRZR PORV • Operate PRZR heaters as necessary
	SS	Enters AOP 18001-C, Section C, Failure of PRZR Pressure Instrumentation (Crew Update) Verifies immediate actions properly completed

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Scenario No.: 2

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Event No.: 1

Event Description: The controlling PRZR pressure channel will fail high, causing one PORV and both spray valves to fully open. The OATC will take immediate actions to stabilize PRZR pressure and prevent a reactor trip / SI. The crew will then enter AOP 18001-C, Section C to complete the corrective actions to mitigate this event.

Time	Position	Applicant's Action or Behavior
	SS	Reads caution to OATC concerning saturation of PRZR pressure master controller
	OATC	Checks controlling channel not operating properly and verifies PORV closed and spray valves in manual
	OATC / UO	Initiate continuous actions page
	OATC	Manually controls PRZR pressure with heaters & sprays between 2220-2250 psig
	OATC	Adjusts PRZR pressure master controller output to 25% in manual
	OATC	Selects channel 457 / 456 for control
	OATC	Checks PRZR pressure stable ~ 2235 psig
	OATC	Returns PRZR heaters and spray valve controllers to automatic

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Event No.: 1

Event Description: The controlling PRZR pressure channel will fail high, causing one PORV and both spray valves to fully open. The OATC will take immediate actions to stabilize PRZR pressure and prevent a reactor trip / SI. The crew will then enter AOP 18001-C, Section C to complete the corrective actions to mitigate this event.

Time	Position	Applicant's Action or Behavior
	OATC	Places PORV-455 in automatic & verifies proper operation
	OATC	Places PRZR pressure master controller in automatic
	OATC	Selects channel 457 for the chart recorder
	OATC	Checks P-11 status light on BPLB correct for conditions
	SS	Contacts SSS to perform following: <ul style="list-style-type: none"> • Notify I&C to initiate repairs • Write Condition Report • Contact OPS Duty Manager for AOP entry
	SS	Elects not to bypass or trip failed channel (expected action)

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Scenario No.: 2

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Event No.: 1

Event Description: The controlling PRZR pressure channel will fail high, causing one PORV and both spray valves to fully open. The OATC will take immediate actions to stabilize PRZR pressure and prevent a reactor trip / SI. The crew will then enter AOP 18001-C, Section C to complete the corrective actions to mitigate this event.

Time	Position	Applicant's Action or Behavior
	SS	Initiates Technical Specification actions: 3.3.1 - Reactor Trip: Function 6 – OTΔT- Condition E - trip in 72 hours Function 8a - PRZR low pressure – Condition M – trip in 72 hours Function 8b – PRZR high pressure – Condition E -trip in 72 hours 3.3.2 – ESFAS: Function 1d – SI low PRZR pressure – Condition D – trip in 72 hours Function 8b – Interlock P11 – Condition L - verify status in 1 hour 3.4.1 – DNB Condition A Action – restore DNB parameters in 2 hours.
	SS	Returns to procedure & step in effect

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Event No.: 2

Event Description: Loss of condenser vacuum will occur requiring the UO to start mechanical vacuum pumps and the standby SJAE. The crew will have to implement AOP 18013-C, Rapid Power Reduction, and lower power to keep condenser vacuum above the turbine trip setpoint. This event will be the required reactivity manipulation.

Time	Position	Applicant's Action or Behavior
	CREW	Diagnose loss of main condenser vacuum: <u>Alarms:</u> TURB CNDSR LO VAC <u>Indications:</u> Main condenser vacuum < 28 " and lowering Main Generator MWe lowering
	UO	Refers to ARP 17019-1 window B04
	UO	Starts both mechanical vacuum pumps Starts standby SJAE Dispatches TBO to look for leaks Verifies Sealing steam pressure 3-5 psig Verifies Circulating Water Pumps are operating
	SS	Initiates power reduction per AOP-18013-C, Rapid Down Power <ul style="list-style-type: none"> • Performs BRIEFING • Initiates the Continuous Actions page.

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Event No.: 2

Event Description: Loss of condenser vacuum will occur requiring the UO to start mechanical vacuum pumps and the standby SJAE. The crew will have to implement AOP 18013-C, Rapid Power Reduction, and lower power to keep condenser vacuum above the turbine trip setpoint. This event will be the required reactivity manipulation.

Time	Position	Applicant's Action or Behavior
	OATC / UO	<ul style="list-style-type: none"> • Reduce Turbine load at a rate up to 5% minute: • Maintains Tave within 6 degrees F of Tref using rods in auto and boration as necessary. • Maintains reactor and turbine power matched. • PRZR level and pressure maintained on program. • SG levels maintained on program.
	SS	Notifies System Operator that a load reduction is in progress.
		10% POWER REDUCTION RESTORES VACUUM

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Event No.: 3

Event Description: This event will cause 15-20 GPM RCS leakage into the PRT via the train A RHR hot leg suction piping and the suction relief to the PRT. The crew will enter AOP 18004-C, RCS leakage after realizing charging flow is higher than normal and PRZR level is lowering.

Time	Position	Applicant's Action or Behavior
	CREW	Diagnose loss of Reactor Coolant inventory: <u>Alarms:</u> NONE <u>Indications:</u> Charging flow control valve FV-121 @100% PRZR level lowering PRT level & pressure slowly increasing RHR discharge pressure increased
	SS	Enters AOP 18004-C, Section A, for RCS Leakage (Crew Update)
	SS	Verifies unit in mode 1
	OATC / UO	Initiate continuous actions page
	OATC	Maintains PRZR level: <ul style="list-style-type: none"> • Adjust charging flow • Isolate letdown • Start standby charging pump (not necessary)

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Event No.: 3

Event Description: This event will cause 15-20 GPM RCS leakage into the PRT via the train A RHR hot leg suction piping and the suction relief to the PRT. The crew will enter AOP 18004-C, RCS leakage after realizing charging flow is higher than normal and PRZR level is lowering.

Time	Position	Applicant's Action or Behavior
	OATC	Maintains VCT level using automatic control
	SS	Contacts SM to implement EIPs
	OATC	Verifies PORVs and Sprays closed
	UO	Ensures no load changes in progress
	OATC	Check PRZR pressure trending to 2235 psig
	OATC	Verifies CNMT conditions normal
	CREW	Initiates RCS Leak rate calculation
	CREW	Determines leakage is into PRT using 18004-C, Attachment A
	SS	Determines leak cannot be isolated
	SS	Applies Technical Specifications: LCO 3.4.13 Condition A for identified leakage > 10 GPM Reduce leakage within 4 hours or place unit in mode 3 in 6 hours
	SS	Begins unit shutdown to comply with Technical Specifications

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Event No.: 4

Event Description: Steam pressure controlling MFPs speed will fail low causing MFPs speed to decrease. SG levels will start to lower due to the under feed situation. The UO will take immediate action to manually control MFP speeds and restore feed flow to prevent a reactor trip on Lo-Lo SG levels. The crew will then enter AOP 18001-C to complete the actions to mitigate this event.

Time	Position	Applicant's Action or Behavior
	CREW	<p>Diagnose failure of main steam pressure failure:</p> <p><u>Alarms:</u></p> <p>SG LVL DEVIATION (all 4 loops)</p> <p><u>Indications:</u></p> <ul style="list-style-type: none"> • All 4 SG levels lowering • All 4 SG feed rates below steam rates • Both MFP speeds decreasing • MFP discharge pressure lowering
	UO	<p>IMMEDIATE ACTIONS:</p> <p>Checks steam & feed flows NOT matched on ALL SGs</p> <p>Manually controls MFP master controller and MFRVs as necessary to restore SG levels</p>
	SS	<p>Enters AOP 18001-C, Section I, Failure of MFP Control Instrumentation (Crew Update)</p> <p>Verifies proper completion of immediate actions</p>
	OATC / UO	Initiates Continuous actions page
	UO	Maintains SG NR levels > 40% or trips the reactor and goes to 19000-C

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Event No.: 4

Event Description: Steam pressure controlling MFPs speed will fail low causing MFPs speed to decrease. SG levels will start to lower due to the under feed situation. The UO will take immediate action to manually control MFP speeds and restore feed flow to prevent a reactor trip on Lo-Lo SG levels. The crew will then enter AOP 18001-C to complete the actions to mitigate this event.

Time	Position	Applicant's Action or Behavior
	UO	Verifies manual MFP speed control has stabilized MFP speeds and adjusts manual controls to keep D/P 100 to 225 psi
	UO	Checks PT-507 has failed low
	UO	Places steam dumps in Tave mode of operation using SOP 13601-1
	UO	Returns feed flow controls to AUTO as necessary
	SS	Contacts SSS to perform the following: <ul style="list-style-type: none"> • Notify I&C to initiate repairs • Write a Condition Report • Notify OPS Duty Manager of AOP entry
	SS	Returns to procedure and step in effect

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Scenario No.: 2

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Event No.: 5 - 9

Event Description: The RCS leakage into the PRT will increase above the capacity of the RHR suction relief, resulting in failure of the RHR suction piping. This will result in a LOCA outside containment. Leakage to the PRT will stop at this point. The OATC will not be able to maintain PRZR level. The crew will actuate SI and enter the EOPs. Additional failures include a trip of the RHR in the room with the LOCA and a failure of FWI.

Time	Position	Applicant's Action or Behavior
	CREW	<p>Diagnoses deterioration of RCS leakage:</p> <p><u>Alarms:</u></p> <p>PRZR LO LEVEL DEVIATION PRZR CONTROL LO PRESS AND HEATERS ON PRZR PRESS LO PORV BLOCK</p> <p>OVERTEMP ΔT ROD BLOCK AND RUNBACK ALERT</p> <p>RHR PMP 1 DISCH HI PRESS</p> <p>LVL D LEAK DETECTED (Back Panel)</p> <p><u>Indications:</u></p> <p>PRZR level lowering with maximum charging flow & letdown isolated</p>
	OATC	<p>Notifies SS of inability to maintain PRZR level</p> <p>Trips reactor & verified trip, then actuates SI</p>
	SS	<p>Enters EOP 19000-C, Reactor Trip or Safety Injection</p>

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Event No.: 5 - 9

Event Description: The RCS leakage into the PRT will increase above the capacity of the RHR suction relief, resulting in failure of the RHR suction piping. This will result in a LOCA outside containment. Leakage to the PRT will stop at this point. The OATC will not be able to maintain PRZR level. The crew will actuate SI and enter the EOPs. Additional failures include a trip of the RHR in the room with the LOCA and a failure of FWI.

Time	Position	Applicant's Action or Behavior
	CREW	<p>Performs IOAs of E-0</p> <p>Step # 1 - Verifies Reactor Trip</p> <ul style="list-style-type: none"> • Rod Bottom Lights lit • Reactor Trip and Bypass Breakers - Open • Neutron Flux Lowering <p>Step # 2 – Verifies Turbine Trip</p> <ul style="list-style-type: none"> • All Turbine Stop Valves – Closed <p>Step # 3 – Checks Power to AC Emergency Buses</p> <ul style="list-style-type: none"> • 3a, at least 1 4160 1E bus energized • 3b, all AC Emergency buses energized -4160 and 480V <p>Step # 4 Checks if SI / Actuated</p> <ul style="list-style-type: none"> • Any SI annunciator lit • SI BPLP status light lit
	SS / TEAM	<p>Step # 5 - Initiates Foldout Page</p> <p>NOTE: Expect RCP trip criteria to eventually be met</p> <p>Step # 6 - Initiates OATC Initial Actions pages and UO Initial Actions Pages.</p> <p>Step # 7 – Initiates Continuous Actions pages.</p>

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Event No.: 5 - 9

Event Description: The RCS leakage into the PRT will increase above the capacity of the RHR suction relief, resulting in failure of the RHR suction piping. This will result in a LOCA outside containment. Leakage to the PRT will stop at this point. The OATC will not be able to maintain PRZR level. The crew will actuate SI and enter the EOPs. Additional failures include a trip of the RHR in the room with the LOCA and a failure of FWI.

Time	Position	Applicant's Action or Behavior
	OATC	<p>Performs OATC Initial Operator Actions of E-0.</p> <p>Step # 1 - Checks both Trains of ECCS aligning per MLBs.</p> <p>If not previously manually actuated notes that SI train B not aligning. Notifies SS and then manually actuates SI.</p> <p>Step # 2 - Checks CIA – actuated per MLBs</p>
	OATC	<p>Performs OATC Initial Operator Actions of E-0.</p> <p>Step # 3 Checks ECCS pumps and NCP status.</p> <ul style="list-style-type: none"> • 3a, CCPs – running • 3b, SI Pumps – running • 3c, RHR pumps – Notifies SS that RHR pump 1 is tripped • 3d, NCP – tripped

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Event No.: 5 - 9

Event Description: The RCS leakage into the PRT will increase above the capacity of the RHR suction relief, resulting in failure of the RHR suction piping. This will result in a LOCA outside containment. Leakage to the PRT will stop at this point. The OATC will not be able to maintain PRZR level. The crew will actuate SI and enter the EOPs. Additional failures include a trip of the RHR in the room with the LOCA and a failure of FWI.

Time	Position	Applicant's Action or Behavior
	OATC	Performs OATC Initial Operator Actions of E-0. Step # 4 - CCW pumps – only two running per train Step # 5a - NSCW pumps – only two running per train Step # 5b - NSCW tower return bypass valves – in auto Step # 6a - Containment coolers running in LOW speed Step # 6b - NSCW cooler isolation valves open Step # 7 – CVI dampers and valves shut per MLBs Step # 8 - Containment pressure remained < 21.5
	OATC	Performs OATC Initial Operator Actions of E-0. Step # 9 - Checks ECCS flows: <ul style="list-style-type: none"> • BIT Flow • RCS pressure < 1625 psig • SI pump flow • RCS pressure > 300 psig

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Event No.: 5 - 9

Event Description: The RCS leakage into the PRT will increase above the capacity of the RHR suction relief, resulting in failure of the RHR suction piping. This will result in a LOCA outside containment. Leakage to the PRT will stop at this point. The OATC will not be able to maintain PRZR level. The crew will actuate SI and enter the EOPs. Additional failures include a trip of the RHR in the room with the LOCA and a failure of FWI.

Time	Position	Applicant's Action or Behavior
	OATC	Performs OATC Initial Operator Actions of E-0. Step # 10 - Checks ECCS valve alignment proper on MLBs Step # 11 - Checks at least one ACCW pump running Step # 12 - Adjusts seal injection flow to RCPs 8 to 13 gpm.

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Event No.: 5 - 9

Event Description: The RCS leakage into the PRT will increase above the capacity of the RHR suction relief, resulting in failure of the RHR suction piping. This will result in a LOCA outside containment. Leakage to the PRT will stop at this point. The OATC will not be able to maintain PRZR level. The crew will actuate SI and enter the EOPs. Additional failures include a trip of the RHR in the room with the LOCA and a failure of FWI.

Time	Position	Applicant's Action or Behavior
	UO	<p>Performs UO Initial Operator Actions of E-0</p> <p>Step # 1 - Checks MDAFW and TDAFW pumps are running.</p> <p>Step # 2 - Checks NR SG levels one > 10%</p> <p>Step # 3 - Checks if SLI is required</p> <ul style="list-style-type: none"> • Any SL Pressure < 585 psig • CNMT Pressure > 14.5 psig • High rate bistables lit with low pressure SI/SLI blocked • If any above met then verify MSIVs & BSIVs closed <p>Step # 4 - Verifies FWI (MFRV, BFRV, MFIV, BFIVs all shut)</p> <p>FWI will fail UO will have manually close all valves to achieve FWI and stop potential overfeeding of SG's</p> <p>Step # 5 - Verifies SGBD isolated</p> <ul style="list-style-type: none"> • places hand switches for SGBD isolation valves to close • verify SGBD sample isolations closed. <p>Step # 6 - Verify Diesel Generators running.</p> <p>Step # 7 - Throttle AFW flow to control SG levels 10 – 65% NR</p> <p>Step # 8 - Verify both MFPs tripped.</p> <p>Step # 9 - Check Main Generator Output breakers open.</p>

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Event No.: 5 - 9

Event Description: The RCS leakage into the PRT will increase above the capacity of the RHR suction relief, resulting in failure of the RHR suction piping. This will result in a LOCA outside containment. Leakage to the PRT will stop at this point. The OATC will not be able to maintain PRZR level. The crew will actuate SI and enter the EOPs. Additional failures include a trip of the RHR in the room with the LOCA and a failure of FWI.

Time	Position	Applicant's Action or Behavior
	OATC	Checks RCS temperature stable at or trending to 557 degrees F using RCS Tavg. Or RCS WR Cold leg temperatures without RCPs running.
	UO	Takes actions of RNO step 8 to control RCS temperature. <ul style="list-style-type: none"> • Stop dumping steam. • Reduces AFW flow (not < 570 gpm if SG NR levels < 10% NR). • If cooldown continues shuts MSIVs and BSIVs • If temperature > 557 F & rising then dump steam
	OATC	Step # 9 - Checks PORVs, Block Valves, & Spray Valves <ul style="list-style-type: none"> • 9a, PORVs closed and in AUTO • 9b, Normal spray valves closed • 9c, Power available to at least one block valve • 9d, At least one block valve open • 9d RNO, verify open at least one block valve when RCS pressure > 2185 psig.

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Event No.: 5 - 9

Event Description: The RCS leakage into the PRT will increase above the capacity of the RHR suction relief, resulting in failure of the RHR suction piping. This will result in a LOCA outside containment. Leakage to the PRT will stop at this point. The OATC will not be able to maintain PRZR level. The crew will actuate SI and enter the EOPs. Additional failures include a trip of the RHR in the room with the LOCA and a failure of FWI.

Time	Position	Applicant's Action or Behavior
	OATC	Step # 10 - Checks if RCPs should be stopped <ul style="list-style-type: none"> • 10a, CCP or SIP running • 10b, RCS pressure < 1375 psig • If yes then stop all RCPs if no then go to step # 11
	UO / SS	Step # 11 - Checks for faulted SG and transition to E-2 <ul style="list-style-type: none"> • SG pressures: <ul style="list-style-type: none"> ○ Any lowering in an uncontrolled manner, or ○ Completely depressurized • go to step # 12
	SS / UO	Step # 12 - Checks for SG Tubes intact. <ul style="list-style-type: none"> • Directs chemistry to sample all SG one at a time for activity. • Checks secondary radiation normal: <ul style="list-style-type: none"> ○ Main Steam Line Rad Monitors ○ Condenser Air Ejector Rad Monitors ○ Steam Generator Liquid Process Rad Monitors ○ SG sample radiation • Any SG level rising in an uncontrolled manner

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Event No.: 5 - 9

Event Description: The RCS leakage into the PRT will increase above the capacity of the RHR suction relief, resulting in failure of the RHR suction piping. This will result in a LOCA outside containment. Leakage to the PRT will stop at this point. The OATC will not be able to maintain PRZR level. The crew will actuate SI and enter the EOPs. Additional failures include a trip of the RHR in the room with the LOCA and a failure of FWI.

Time	Position	Applicant's Action or Behavior
	OATC	Step # 13 - Check if RCS intact inside CNMT: <ul style="list-style-type: none"> • CNMT Radiation - Normal • CNMT Pressure - Normal • CNMT Emergency Recirculation Sump levels – Normal
	OATC/UO	Step # 14 - Check if ECCS flow should be reduced: <ul style="list-style-type: none"> a. RCS Subcooling - > 24 F b. Secondary Heat sink available: <ul style="list-style-type: none"> o Total AFW flow > 570 gpm, or o NR level in at least one SG > 10% c. RCS pressure stable or rising <p style="margin-left: 40px;">If any of above not met go to step 22 (this will be the case)</p> <ul style="list-style-type: none"> d. PRZR level - > 9% <p style="margin-left: 40px;">If not met try to stabilize RCS pressure with normal PRZR spray. Return to step 14a.</p>
	OATC/UO	Step # 22 – Initiate CSFSTs per 19200-C, F-0

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Event No.: 5 - 9

Event Description: The RCS leakage into the PRT will increase above the capacity of the RHR suction relief, resulting in failure of the RHR suction piping. This will result in a LOCA outside containment. Leakage to the PRT will stop at this point. The OATC will not be able to maintain PRZR level. The crew will actuate SI and enter the EOPs. Additional failures include a trip of the RHR in the room with the LOCA and a failure of FWI.

Time	Position	Applicant's Action or Behavior
	SS	Step # 23 - Initiate 91001-C, E-Plan Classification & Implementing instructions
	UO	Step # 24 – Check intact SG levels: <ul style="list-style-type: none"> a. NR level – at least one > 10% [32% adverse] b. Maintain NR levels 10%-65%
	UO	Step # 25 – Check Auxiliary Building leak detection systems: <ul style="list-style-type: none"> a. Plant Vent Radiation Monitors – Normal <ul style="list-style-type: none"> • RE-12442A, B, C • RE-12444C b. Aux. Bldg break detection system on QPCP – all leak detection status lights <u>NOT</u> lit <p>The RHR pump 1 room leak detection light will be lit and the level D leak detected annunciator will be alarming (these are back panel indications)</p> <p>If any above abnormal and cause is loss of RCS inventory, then go to 19112-C, ECA 1.2</p> <p>NOTE: If SO sent to investigate, he will report RHR pump room is full of water & steam</p> <p>NOTE: Crew may transition to 19010-C based on abnormal PRT conditions. If they do they should then transition at step 18 of 19010 to the LOCA outside CNMT EOP (19112-C)</p>

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Event No.: 5 - 9

Event Description: The RCS leakage into the PRT will increase above the capacity of the RHR suction relief, resulting in failure of the RHR suction piping. This will result in a LOCA outside containment. Leakage to the PRT will stop at this point. The OATC will not be able to maintain PRZR level. The crew will actuate SI and enter the EOPs. Additional failures include a trip of the RHR in the room with the LOCA and a failure of FWI.

Time	Position	Applicant's Action or Behavior
	SS	Enters EOP 19112-C, LOCA Outside Containment (Crew Update)
	OATC	Verifies proper RHR & SI systems alignment: <ul style="list-style-type: none"> • HL suction (HV-8701A/8701B/8702A/8702B) – Closed • HL injection valve (HV-8840) - Closed • SI HL injection valves (HV-8802A/8802B) – Closed
	OATC	Tries to identify and isolate RHR cold leg injection break: <ul style="list-style-type: none"> • Close cold injection valve (HV-8809A) • Check for rising RCS pressure – It will be lowering • Reopen cold injection valve • Repeat process for Train B

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Event No.: 5 - 9

Event Description: The RCS leakage into the PRT will increase above the capacity of the RHR suction relief, resulting in failure of the RHR suction piping. This will result in a LOCA outside containment. Leakage to the PRT will stop at this point. The OATC will not be able to maintain PRZR level. The crew will actuate SI and enter the EOPs. Additional failures include a trip of the RHR in the room with the LOCA and a failure of FWI.

Time	Position	Applicant's Action or Behavior
	OATC	Tries to identify and isolate SI cold leg injection line break: <ul style="list-style-type: none"> • Close cold leg injection valve (HV-8821A) • Check for rising RCS pressure – it will be lowering • Reopen cold leg injection valve • Repeat process for Train B • Close common cold leg injection valve (HV-8835) • Check for rising RCS pressure – it will be lowering • Reopen HV-8835
	OATC	Check RCS pressure rising – it will be lowering
	SS	Transitions to EOP 19111-C, Loss of Emergency Coolant Recirculation (Crew Update)
	SS	Reads caution to stop ECCS or CS pumps if suction source is lost to crew

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Event No.: 5 - 9

Event Description: The RCS leakage into the PRT will increase above the capacity of the RHR suction relief, resulting in failure of the RHR suction piping. This will result in a LOCA outside containment. Leakage to the PRT will stop at this point. The OATC will not be able to maintain PRZR level. The crew will actuate SI and enter the EOPs. Additional failures include a trip of the RHR in the room with the LOCA and a failure of FWI.

Time	Position	Applicant's Action or Behavior
	OATC	Check emergency coolant recirculation capability restored <ul style="list-style-type: none"> • CNMT sump levels will not recover – recirculation capability will not be restored in this scenario.
	OATC	Monitors RHR pump B suction condition: Stable parameters- amps/flow/pressure
	SS	Reads caution to crew concerning restarting SI equipment following SI reset on an LOSP
	OATC	Reset SI if not reset
	CREW	Determines CNMT Spray pump and CNMT coolers – Not needed
	UO	Notes DG-1A JW low pressure and high temperature alarms Refers to ARP 17035-1

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Event No.: 5 - 9

Event Description: The RCS leakage into the PRT will increase above the capacity of the RHR suction relief, resulting in failure of the RHR suction piping. This will result in a LOCA outside containment. Leakage to the PRT will stop at this point. The OATC will not be able to maintain PRZR level. The crew will actuate SI and enter the EOPs. Additional failures include a trip of the RHR in the room with the LOCA and a failure of FWI.

Time	Position	Applicant's Action or Behavior
	SS/ UO	Determine DG-1B not needed for current plant conditions and emergency stops the DG to protect the equipment from further damage.
	OATC	Check RWST level > 8% (this is a continuous action) If level falls below 8% the crew will stop all ECCS and CS pumps taking suction from the RWST
	SS / OATC	Determines no CNMT spray pumps are required and none are running
	SS	Determines CNMT spray will not have to be aligned for recirculation
	SS / OATC CRITICAL	Initiates makeup to the RWST: <ul style="list-style-type: none"> • SOP 13701-1, Boric Acid System -- OR -- • Attachment A, RWST MAKEUP FROM THE SPENT FUEL POOL

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Event No.: 5 - 9

Event Description: The RCS leakage into the PRT will increase above the capacity of the RHR suction relief, resulting in failure of the RHR suction piping. This will result in a LOCA outside containment. Leakage to the PRT will stop at this point. The OATC will not be able to maintain PRZR level. The crew will actuate SI and enter the EOPs. Additional failures include a trip of the RHR in the room with the LOCA and a failure of FWI.

Time	Position	Applicant's Action or Behavior
	UO	Controls SG NR levels 10% to 65% Checks CST level > 15%
	UO	Initiate RCS cooldown to cold shutdown: <ul style="list-style-type: none"> • Monitor SDM (Will be assigned to SSS) • Cooldown rate in cold legs < 100 F/hr
	OATC / UO	Block Low Steamline pressure SI/SLI when PRZR pressure < 2000 psig and high steam pressure rate alarms are clear
	OATC CRITICAL	<i>Reduces ECCS flow to a single train to conserve RWST inventory while still cooling core</i>

Event No.: 5 - 9

Event Description: The RCS leakage into the PRT will increase above the capacity of the RHR suction relief, resulting in failure of the RHR suction piping. This will result in a LOCA outside containment. Leakage to the PRT will stop at this point. The OATC will not be able to maintain PRZR level. The crew will actuate SI and enter the EOPs. Additional failures include a trip of the RHR in the room with the LOCA and a failure of FWI.

Time	Position	Applicant's Action or Behavior												
	OATC	Verifies CNMT Sump Suction valves (HV-8811A/8811B) closed to prevent backflow from RWST to CNMT sumps												
	OATC	Ensures only RCP 4 is running												
	OATC	<p>Checks alternate ECCS termination criteria:</p> <ul style="list-style-type: none"> • RVLIS indication: <table border="1"> <thead> <tr> <th>RCP(s) running</th> <th>Required Indication</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Full Range greater than 62%</td> </tr> <tr> <td>1</td> <td>Dynamic Range greater than 25%</td> </tr> <tr> <td>2</td> <td>Dynamic Range greater than 34%</td> </tr> <tr> <td>3</td> <td>Dynamic Range greater than 50%</td> </tr> <tr> <td>4</td> <td>Dynamic Range greater than 72%</td> </tr> </tbody> </table> <p>RCS Subcooling > 74 F – Probably not met</p>	RCP(s) running	Required Indication	0	Full Range greater than 62%	1	Dynamic Range greater than 25%	2	Dynamic Range greater than 34%	3	Dynamic Range greater than 50%	4	Dynamic Range greater than 72%
RCP(s) running	Required Indication													
0	Full Range greater than 62%													
1	Dynamic Range greater than 25%													
2	Dynamic Range greater than 34%													
3	Dynamic Range greater than 50%													
4	Dynamic Range greater than 72%													

Op-Test No.: 2009-301

Scenario No.: 2

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Event No.: 5 - 9

Event Description: The RCS leakage into the PRT will increase above the capacity of the RHR suction relief, resulting in failure of the RHR suction piping. This will result in a LOCA outside containment. Leakage to the PRT will stop at this point. The OATC will not be able to maintain PRZR level. The crew will actuate SI and enter the EOPs. Additional failures include a trip of the RHR in the room with the LOCA and a failure of FWI.

Time	Position	Applicant's Action or Behavior																		
	OATC / SS	Determines minimum ECCS flow using Figure 1: <div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <table border="1" style="display: none;"> <caption>Data points for Figure 1</caption> <thead> <tr> <th>Time Since Reactor Trip (Minutes)</th> <th>ECCS Flow (GPM)</th> </tr> </thead> <tbody> <tr><td>10</td><td>620</td></tr> <tr><td>20</td><td>500</td></tr> <tr><td>50</td><td>350</td></tr> <tr><td>100</td><td>250</td></tr> <tr><td>200</td><td>180</td></tr> <tr><td>500</td><td>120</td></tr> <tr><td>1000</td><td>80</td></tr> <tr><td>10000</td><td>100</td></tr> </tbody> </table> </div>	Time Since Reactor Trip (Minutes)	ECCS Flow (GPM)	10	620	20	500	50	350	100	250	200	180	500	120	1000	80	10000	100
Time Since Reactor Trip (Minutes)	ECCS Flow (GPM)																			
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Time	Position	Applicant's Action or Behavior												
	OATC	Throttles ECCS flow to minimum value												
	SS / OATC	<p>Checks for adequate ECCS flow:</p> <p>Applicable RVLIS indication:</p> <table border="1"> <thead> <tr> <th>RCP(s) running</th> <th>Required Indication</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Full Range greater than 62%</td> </tr> <tr> <td>1</td> <td>Dynamic Range greater than 25%</td> </tr> <tr> <td>2</td> <td>Dynamic Range greater than 34%</td> </tr> <tr> <td>3</td> <td>Dynamic Range greater than 50%</td> </tr> <tr> <td>4</td> <td>Dynamic Range greater than 72%</td> </tr> </tbody> </table> <ul style="list-style-type: none"> <li>• Core Exit TC's – Stable or lowering <p>If either condition not met then raise ECCS flow</p>	RCP(s) running	Required Indication	0	Full Range greater than 62%	1	Dynamic Range greater than 25%	2	Dynamic Range greater than 34%	3	Dynamic Range greater than 50%	4	Dynamic Range greater than 72%
RCP(s) running	Required Indication													
0	Full Range greater than 62%													
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4	Dynamic Range greater than 72%													

Op-Test No.: 2009-301

Scenario No.: 2

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Event No.: 5 - 9

Event Description: The RCS leakage into the PRT will increase above the capacity of the RHR suction relief, resulting in failure of the RHR suction piping. This will result in a LOCA outside containment. Leakage to the PRT will stop at this point. The OATC will not be able to maintain PRZR level. The crew will actuate SI and enter the EOPs. Additional failures include a trip of the RHR in the room with the LOCA and a failure of FWI.

Time	Position	Applicant's Action or Behavior
	OATC	Depressurize RCS to reduce RCS subcooling: <ul style="list-style-type: none">• 24 to 34 F -- OR --• PRZR level > 75%
		END OF SCENARIO

Facility:	Vogtle	Scenario No.:	3	Op-Test No.:	2009-301
Examiners:	Lea	Operators:			
MODIFIED					
Initial Conditions: (IC06) Plant is at 3.5% power with power ascension in progress at BOL. Ready to swap SG 4 to BFRV.					
Pre load the following: auto reactor trip failure (ES01), SI train "A" auto actuation failure (ES08)					
Turnover:					
BOL – power ascent in progress after an outage with reactor power approximately 3.5%. MFPT "A" has been placed in service, AFW flow 250 gpm to SG 4. Crew is completing Step 4.1.8 of UOP 12004-C. Swap from AFW to the Bypass Feed Regulation Valve (BFRV) for SG 4 then continue power increase.					
Event No.	Malf. No.	Event Type*	Event Description		
1	N/A	N-UO N-SS	UO will perform a swap from AFW to the BFRV on SG 4. The OATC will control reactor power stable (or as SS directs) during the swap.		
2	N/A	R-ALL	Power ramp from 3.5% until plant is in Mode 1.		
3	SG02G @ 0%	I-SS I-UO TS-SS	Controlling SG Level Transmitter for Loop # 3 fails low. 18002-C section E for Failure of Steam Generator Level Instrumentation. TS 3.3.1 (Reactor Trip), 3.3.2 (ESFAS), 3.3.3 (PAMS)		
4	PR03A @ 100%	I-SS I-OATC TS-SS	Controlling PRZR level instrument LT-459 fails high. 18001-C, Section D Failure of PRZR Level Instrumentation TS 3.3.1 (Rx. Trip) TS 3.3.3 (PAMS) INFO TS 3.3.4 Remote S/D		
5	CC03A @ 100%	C-SS C-UO TS-SS	Loss of CCW Train A (pipe break at discharge header). 18020-C Loss of Component Cooling Water. TS 3.7.7 Component Cooling Water		
6	EL13B ES01	C-ALL	Loss of 120V AC 1E Vital Bus 1BY1B (results in ATWT with manual Rx. trip) Crew will enter E-0 after the OATC performs a manual reactor trip and transition to ES-0.1 to stabilize the plant. Proceed to next event after AFW flow is throttled in ES-0.1		
7	PR01B @ 50% ES08	M-ALL I-OATC	PRZR Code Safety fails open resulting in LOCA to the PRT. Crew will re-enter E-0 after manually actuating safety injection. Train B components will have to be manually aligned due to loss of BY1B.		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor					

Event 1:

Perform swap of AFW to Main Feed water. AFW flow will be swapped to the BFRV in accordance with UOP-12004 step 4.1.8.

Verifiable Action:

UO Swaps from AFW to BFRV while controlling SG level.

OATC Maintains reactor power stable during BFRV swap by manipulation of control rods or boration.

Event 2:

Perform power ramp from 3.5% to greater than 5% (Mode 1 entry). Crew will perform steps of UOP-12004 section for Power Ascent.

Verifiable Actions:

OATC - Power increase. Operate control rods and the CVCS boration controls while the

UO - Initiates actions to prepare for Turbine startup.

Event 3:

Controlling PRZR level channel LT-459 will fail high resulting in an automatic reduction of charging flow via FV-0121. This will require entry into AOP-18001-C, section D for Failure of PRZR level instrumentation.

Verifiable Actions:

OATC - Takes manual control of charging flow control valve FV-0121 to restore charging flow to normal or isolate letdown. Selects an unaffected channel for control and restores letdown if initially isolated.

Technical Specifications:

3.3.1 - Reactor Trip – Function 9 – Condition M – trip bistables within 72 hours

3.3.3 - PAMS – Function 6 – INFO only

3.3.4 – Remote S/D – Function 8 - Condition B – restore within 30 days

Event 4:

Controlling Steam Generator # 3 Level Transmitter will fail low causing the BFRV to fully open requiring the BOP to take manual control. This will require entry into AOP-18001, section E for failure of Steam Generator Level Instrumentation.

Verifiable Actions:

UO Performs IOA to take manual control of MFRV # 3 to control SG # 3 level.

Technical Specifications:

3.3.1 – Reactor Trip – Function 13 – Condition E – trip bistables within 72 hours

3.3.2 – ESFAS:

Function 5c – P14 – Condition I – trip bistables within 72 hours

Function 6c – AFW – Condition D – trip bistables within 72 hours

3.3.3 – PAMS – Function 5 – INFO Only

Event 5:

CCW train A discharge header will fail requiring entry into AOP-18020 for Loss of CCW.

Verifiable Actions:

UO Place Train A CCW Pumps in PTL, Close demin water makeup valve, Start up train B CCW.

Technical Specifications:

3.7.7 Component Cooling Water (CCW) – Condition A – restore within 72 hours

3.4.6 RCS Loops Mode 4 – INFO only

Event 6:

Loss of 120V AC 1E Vital Bus 1BY1B will occur. This will result in an ATWT condition due to NI35 loss and 2/4 coincidence made up on SG Lo-Lo Level bistables. The OATC will manually trip the reactor and the crew will enter E-0 and transition to ES-0.1 to stabilize the plant.

Verifiable Actions:

OATC Performs manual reactor trip when ATWT condition recognized.

Event 7:

Shortly after the reactor trip, PRZR code safety valve will slowly fail open over several minutes resulting in a LOCA to the PRT. The crew will have to manually actuate SI Train "A" and manually align SI Train "B" components due to the loss of 1BY1B.

Verifiable Actions:

OATC Manual SI actuation due to RCS pressure lowering uncontrolled. Perform manual alignment of Train "B" ECCS / SI components.

UO Performs manual start of DG "B". Performs manual alignment of Train "B" CIA / CVI valves and dampers.

Critical Tasks:

1. Manual reactor trip.
2. Manual Safety Injection actuation.

Draft

Facility:	Vogtle	Scenario No.:	3	Op-Test No.:	2007-301
Examiners:	_____	Operators:	_____	_____	_____
Initial Conditions: Plant is at 3.5% power with power ascension in progress at BOL. Ready to swap to BFRV.					
Pre load the following: auto reactor trip failure (ES01), SI train "A" auto actuation failure (ES08), CCW pump # 5 auto start failure (CC04E)					
Turnover: Storms are approaching from the Southwest and high winds are possible within the hour.					
BOL – power ascent in progress after an outage with reactor power approximately 3.5%. MFPT "A" has been placed in service, AFW flow currently about 250 gpm per SG. Step 4.1.8 of UOP 12004-C is the next step to be performed. Swap from AFW to the Bypass Feed Regulation Valves (BFRV) and continue the power ascent.					
Event No.	Malf. No. / Position	Event Type*	Event Description		
1	AFW swap to BFRV BOP / RO	N	BOP will perform a swap from AFW to the BFRV on all 4 SG one at a time. The RO will control reactor power stable (or as SS directs) during the swaps.		
2	RC11C @ 0% SRO (TS)	I	Loop # 3 RCS Flow Instrument Fails Low 18001-C, section A for Failure of RCS Loop Flow Instrumentation TS 3.3.1 (Reactor Trip)		
3	SG02G @ 0% BOP SRO (TS)	I	Controlling SG Level Transmitter for Loop # 3 fails low 18002-C section E for Failure of Steam Generator Level Instrumentation TS 3.3.1 (Reactor Trip), 3.3.2 (ESFAS), 3.3.3 (PAMS)		
4	Power Ramp RO	R	Power ramp from 3.5% until plant is in Mode 1.		
5	CC01A BOP SRO (TS)	C	CCW pump # 1 trip with CCW pump # 5 fails to start. 18020-C Loss of Component Cooling Water TS 3.7.7 Component Cooling Water		
6	EL13B RO	C	Loss of 120V AC 1E Vital Bus 1BY1B (results in ATWT with manual Rx. trip) Crew will enter E-0 after the RO performs a manual reactor trip and transition to ES-0.1 to stabilize the plant.		
7	PR01B @ 50% ALL	M	PRZR Code Safety fails open resulting in LOCA to the PRT. Crew will re-enter E-0 after manually actuating safety injection. Train B components will have to be manually aligned due to loss of BY1B.		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor					

Vogtle 2007-301 Scenario # 6 (low power-backup) (Low Power Ops / 3.5% on AFW)

Event 1

Perform swap of AFW to Main Feed water. AFW flow will be swapped to the BFRV in accordance with UOP-12004 step 4.1.8.

Verifiable Action: (BOP) Swaps from AFW to BFRV one at a time while controlling SG levels.

Verifiable Action: (RO) Maintains reactor power stable during BFRV swaps by manipulation of control rods or boration.

Event 2

RCS loop flow transmitter fails low on loop # 3. This will require entry into AOP-18001 section A for Failure of RCS Loop Flow Instrumentation.

Technical Specifications: LCO 3.3.1

Event 3

Controlling Steam Generator # 3 Level Transmitter will fail low causing the BFRV to fully open requiring the BOP to take manual control. This will require entry into AOP-18001, section E for failure of Steam Generator Level Instrumentation.

Verifiable Action: (BOP) Performs IOA to take manual control of MFRV # 3 to control SG # 3 level.

Technical Specifications: LCO 3.3.1, LCO 3.3.2, and LCO 3.3.3

Event 4

Perform power ramp from 3.5% to greater than 5% (Mode 1 entry). Crew will perform steps of UOP-12004 section for Power Ascent.

Verifiable Action: (RO) Power increase. RO will operate control rods and the CVCS boration controls while the BOP initiates actions to prepare for Turbine startup.

Event 5

Once Mode 1 is entered, CCW pump # 1 will trip with failure of CCW pump # 5 to automatically start. This will require a manual start of CCW pump # 5 and entry into AOP-18020 for Loss of CCW.

Verifiable Action: (BOP). BOP will manually start CCW pump # 5.

Technical Specifications: 3.7.7 for Component Cooling Water (CCW)

Event 6

Loss of 120V AC 1E Vital Bus 1BY1B will occur. This will result in an ATWT condition due to NI35 loss and 2/4 coincidence made up on SG Lo-Lo Level bistables. The RO will manually trip the reactor and the crew will enter E-0 and transition to ES-0.1 to stabilize the plant.

Verifiable Action: (RO) Performs manual reactor trip when ATWT condition recognized.

Critical Task: Manual reactor trip.

Event 7

Shortly after the reactor trip, PRZR code safety valve will slowly fail open over several minutes resulting in a LOCA to the PRT. The crew will have to manually actuate SI Train "A" and manually align SI Train "B" components due to the loss of 1BY1B.

Verifiable Action: (RO) Manual SI actuation due to RCS pressure lowering uncontrolled.

Verifiable Action: (RO) Performs manual alignment of Train "B" ECCS / SI components.

Verifiable Action: (BOP) Performs manual start of DG "B".

Verifiable Action: (BOP) Performs manual alignment of Train "B" CIA / CVI valves and dampers.

Critical task: Manual Safety Injection actuation.

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(low power)

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Event No.: 1

Event Description: The scenario will start with the crew at 3.5% power while performing the steps of UOP-12004 for Power Ascent. MFPT "A" has been placed into service. The crew will initiate a swap from AFW to the BFRV for loop 4.

Time	Position	Applicant's Action or Behavior
	UO	Transfers from Auxiliary Feed Water to Bypass Feed Water, by performing the following: <ul style="list-style-type: none"> • Verifies MFPT Delta P maintained between 100 – 150 psid. • Stabilizes SG NR level between 60% and 70% and note total feed flow. • Slowly open the BFRV and verify slight increase in feed water flow. • Close the Auxiliary Feed Water Supply valve. • Adjust the BFRV to re-establish total feed flow as noted in previous step b. • Stabilize SG level and place the BFRV in automatic.
	UO	Stops MD AFW pumps and places in standby per 13610-1, AFW. <ul style="list-style-type: none"> • Partially opens MDAFW pump throttle valves • Stops MDAFW pump • Fully Opens AFW throttle valves

Op-Test No.: 2009-301Scenario No.: 3
(low power)

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Event No.: 2

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

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

Op-Test No.: 2009-301

Scenario No.: 3
(low power)

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Event No.: 2

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

	SS	<p>When power reaches 5% as determined by higher of Average PR NIS or Average Loop Delta T.</p> <ul style="list-style-type: none">• Logs Mode 1 entry into the Unit Control Logbook.• Notifies Chemistry of the Mode Change. <p>NOTE: After adequate power change, proceed to Event # 3.</p>

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(low power)

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Event No.: 3

Event Description: Controlling SG Level transmitter for Loop # 3 fails LOW. This will require the crew to enter AOP-18001 section E for Failure of SG NR Level Instrumentation. The BFRV for loop # 3 will open requiring the BOP to perform IOAs and take manual control of the valve to prevent FWI on Hi-Hi SG level.

Time	Position	Applicant's Action or Behavior
	UO	Diagnoses the low failure of SG # 3 NR level instrument: Symptoms / alarms / indications: <ul style="list-style-type: none"> • STM GEN 3 HI / LO LVL DEVIATION • STM GEN 3 LO LEVEL • STM GEN 3 LO / LO LVL ALERT • Steam generator # 3 controlling level channel reading down scale low. • BFRV for loop # 3 SG throttling open. • MFW flow to SG # 3 increasing. • Other 3 level channels on SG # 3 rising.
	UO	Performs IOAs of AOP-18001 section E <ul style="list-style-type: none"> • Checks steam and feed flows matched on all SGs (not loop # 3) • Takes manual control of SG # 3 BFRV to restore SG # 3 level between 60% and 70%.
	SS	Enters AOP-18001-C, section E for Failure of SG NR Level Instrumentation.

Op-Test No.: 2009-301Scenario No.: 3
(low power)

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Event No.: 3

Event Description: Controlling SG Level transmitter for Loop # 3 fails LOW. This will require the crew to enter AOP-18001 section E for Failure of SG NR Level Instrumentation. The BFRV for loop # 3 will open requiring the BOP to perform IOAs and take manual control of the valve to prevent FWI on Hi-Hi SG level.

	UO	Selects an unaffected control channel.
	UO	Returns feed flow control to automatic.
	SS/ CREW	Initiates the Continuous Actions Page.
	UO	Checks SG level control maintains NR level at 65%.
	SS	Notifies I & C to initiate repairs, informs Operation Duty of the AOP entry.

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(low power)

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Event No.: 3

Event Description: Controlling SG Level transmitter for Loop # 3 fails LOW. This will require the crew to enter AOP-18001 section E for Failure of SG NR Level Instrumentation. The BFRV for loop # 3 will open requiring the BOP to perform IOAs and take manual control of the valve to prevent FWI on Hi-Hi SG level.

Time	Position	Applicant's Action or Behavior
	SS	Identifies requirement to trip the affected bistables listed in Table B1 of 18001-C within 72 hours of the channel failure to comply with the following requirements Tech Specs. 3.3.1 – Reactor Trip – Function 13 – Condition E 3.3.2 – ESFAS: Function 5c – P14 – Condition I Function 6b – AFW – Condition D 3.3.3 – PAMS – Function 5 – INFO Only

Op-Test No.: 2009-301Scenario No.: 3
(low power)

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Event No.: 4

Event Description: Controlling PZR level channel fails high causing a reduction of charging flow. This will require the crew to enter AOP 18001-C, Section D, Failure of PRZR Level Instrumentation.

Time	Position	Applicant's Action or Behavior
	OATC	Diagnoses that PZR level channel 459 has failed high and informs SS of the failure: <u>Indications:</u> PZR level channel I (459) goes to 100% Charging flow lowers from 132 gpm Possible flashing in CVCS letdown line (flow oscillations) <u>Alarms:</u> PRZR CONTROL HI LEVEL DEV AND HEATERS ON PRZR HI LEVEL CHANNEL ALERT REGEN HX LTDN HI TEMP NC PUMP LO FLOW CHARGING LINE HI/LO FLOW RCP SEAL WATER INJ LO FLOW
	SS	Enters AOP 18001-C, Section D Crew update on AOP entry
	OATC	Checks PRZR level not trending to program: <ul style="list-style-type: none"> • Adjusts charging to prevent letdown from flashing –OR– • Isolate letdown
	OATC	Maintains seal injection flow to all RCPs 8 to 13 gpm
	OATC	Selects unaffected channel for control and chart recorder

Op-Test No.: 2009-301Scenario No.: 3
(low power)

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Event No.: 4

Event Description: Controlling PZR level channel fails high causing a reduction of charging flow. This will require the crew to enter AOP 18001-C, Section D, Failure of PRZR Level Instrumentation.

	OATC	Restores letdown flow per SOP 13006-1 if required
	OATC	Returns PRZR level control to automatic
	SS	Notify I&C to initiate repairs, Duty manager of AOP entry, SSS to generate CR.
	SS	Determines Tech Spec impact: 3.3.1 Reactor Trip-Function 9-INFO only 3.3.3 PAMS - Function 6 - INFO only 3.3.4 Remote S/D - Function 8 - Condition B - restore within 30 days

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(low power)

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Event No.: 5

Event Description: CCW train A discharge header will fail requiring entry into AOP-18020 for Loss of CCW

Time	Position	Applicant's Action or Behavior
	CREW	Diagnoses failure of the train A CCW pump discharge header: <u>Indications:</u> CCW Train A pumps trip after short delay Rapid CCW surge tank level decrease <u>Alarms:</u> LVL A LEAK DETECTED (QPCP – BACK PANEL) CCW surge tank lo level alarms (M/U, Lo, Lo-Lo) – within 20 seconds
	UO	Checks QPCP Light Boxes ZLB-11, ZLB-13 and ZLB-14 to determine where on level A the leak alarm originated.
	SS	Enters AOP 18020-C, Loss of CCW crew update for AOP entry
	UO	Stops CCW pumps in Train A – will place pumps in PTL
	UO	Places CCW train B in service per SOP 13715B-1
	UO	Verifies NSCW supply header flow ~ 17000 GPM

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(low power)

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Event No.: 5

Event Description: CCW train A discharge header will fail requiring entry into AOP-18020 for Loss of CCW

	UO	Isolates makeup water to train A CCW surge tank
	SS	Investigates location of leak to determine how to isolate fault.
	SS	Determines Tech Spec impact: 3.7.7 Component Cooling Water (CCW) – Condition A - restore within 72 hours 3.4.6 RCS Loops Mode 4 – INFO only
	UO	Verifies FHB normal HVAC units in operation
	SS	Notifications: OPS duty manager of AOP entry SSS- CR / maintenance

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(low power)

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Event No.: 6 and 7

Event Description:

A loss of 120V AC Vital Bus 1BY1B will occur resulting in an ATWT condition. Two first outs will alert the crew to the ATWT. SG Lo-Lo level due to earlier instrument failure and IR NIS Hi Flux Reactor Trip. The crew will trip the reactor manually and perform the actions of E-0 and transition to 19001-C, Reactor Trip Response to stabilize the plant. Shortly after the trip while in ES-0.1, A PRZR Safety will fail open requiring a manual SI. Train B equipment will have to be aligned due to the 1BY1B failure.

Time	Position	Applicant's Action or Behavior
	CREW	Recognizes Loss of 1BY1B – ATWT event has occurred by the following symptoms / alarms / indications: <ul style="list-style-type: none"> • 120V AC PANEL 1BY1B 1BY2B TROUBLE alarm. • INVERTERS 1BD1I2 1BD1I12 TROUBLE alarm. • All channel II trip status lights (except IR P-6, CNMT HI-3 PRESS, and RWST LO-LO LEVEL) lit. • Simultaneous loss of SR N-32, IR N-36, and PR N-42. • First out annunciator for SG LOOP 3 LO-LO LVL RX TRIP • First out annunciator for NIS HI FLUX IR REACTOR TRIP
	OATC CRITICAL STEP	Performs IOAs of 18032 and performs a manual reactor trip.
	SS	Enters E-0, Reactor Trip or Safety Injection.

Op-Test No.: 2009-301Scenario No.: 3
(low power)

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Event No.: 6 and 7

Event Description:

A loss of 120V AC Vital Bus 1BY1B will occur resulting in an ATWT condition. Two first outs will alert the crew to the ATWT. SG Lo-Lo level due to earlier instrument failure and IR NIS Hi Flux Reactor Trip. The crew will trip the reactor manually and perform the actions of E-0 and transition to 19001-C, Reactor Trip Response to stabilize the plant. Shortly after the trip while in ES-0.1, A PRZR Safety will fail open requiring a manual SI. Train B equipment will have to be aligned due to the 1BY1B failure.

Time	Position	Applicant's Action or Behavior
	OATC / UO	Performs IOAs of E-0 <ul style="list-style-type: none"> • Verifies Reactor Trip (OATC) • Verifies Turbine Trip (UO) • Verifies Power to AC Emergency Buses (UO) • Checks if SI actuated or required (OATC)
	SS	Transitions to 19001, ES-0.1 Reactor Trip Response (Crew update)
	SS	Initiates the following: <ul style="list-style-type: none"> • Continuous Actions and Foldout Page • CSFST monitoring • Reviews step for SI actuation to transition back to E-0

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Event No.: 6 and 7

Event Description:

A loss of 120V AC Vital Bus 1BY1B will occur resulting in an ATWT condition. Two first outs will alert the crew to the ATWT. SG Lo-Lo level due to earlier instrument failure and IR NIS Hi Flux Reactor Trip. The crew will trip the reactor manually and perform the actions of E-0 and transition to 19001-C, Reactor Trip Response to stabilize the plant. Shortly after the trip while in ES-0.1, A PRZR Safety will fail open requiring a manual SI. Train B equipment will have to be aligned due to the 1BY1B failure.

Time	Position	Applicant's Action or Behavior
	UO	Performs actions to limit RCS cool down: <ul style="list-style-type: none"> • Verifies AFW flow to the SGs. • Trips both MFPs. • Checks SG NR levels – at least one > 10%. • Throttles AFW flow as necessary. • Verifies SGBD isolation valves & hand switches in closed position.
	OATC	Checks RCS temperature stable at or trending to 557 using Tavg with RCPs running.
	UO	Checks FW status: <ul style="list-style-type: none"> • RCS average temperature < 564 degrees F • Verifies MFIVs, BFIVs, MFRVs, BFRVs all shut.

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Event No.: 6 and 7

Event Description:

A loss of 120V AC Vital Bus 1BY1B will occur resulting in an ATWT condition. Two first outs will alert the crew to the ATWT. SG Lo-Lo level due to earlier instrument failure and IR NIS Hi Flux Reactor Trip. The crew will trip the reactor manually and perform the actions of E-0 and transition to 19001-C, Reactor Trip Response to stabilize the plant. Shortly after the trip while in ES-0.1, A PRZR Safety will fail open requiring a manual SI. Train B equipment will have to be aligned due to the 1BY1B failure.

Time	Position	Applicant's Action or Behavior
	UO	Checks total feed flow capability to SGs – greater than 570 gpm available.
	CREW START OF EVENT # 7	AFTER AFW FLOW IS THROTTLED IN 19001-C Recognizes degrading plant conditions: <ul style="list-style-type: none"> • Lowering Pressurizer level and pressure indications and alarms • PRZR SAFETY RELIEF DISCH HI TEMP alarm • Open Safety Valve indication on IPC or PSMS screens.
	OATC	Raises charging flow to attempt to maintain PRZR level and pressure.
	OATC CRITICAL STEP	Manually actuates safety injection.

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(low power)

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Event No.: 6 and 7

Event Description:

A loss of 120V AC Vital Bus 1BY1B will occur resulting in an ATWT condition. Two first outs will alert the crew to the ATWT. SG Lo-Lo level due to earlier instrument failure and IR NIS Hi Flux Reactor Trip. The crew will trip the reactor manually and perform the actions of E-0 and transition to 19001-C, Reactor Trip Response to stabilize the plant. Shortly after the trip while in ES-0.1, A PRZR Safety will fail open requiring a manual SI. Train B equipment will have to be aligned due to the 1BY1B failure.

Time	Position	Applicant's Action or Behavior
	SS	Transitions back to E-0, Reactor Trip or Safety Injection.
	OATC / UO	Performs IOAs of E-0 <ul style="list-style-type: none"> • Verifies Reactor Trip (OATC) • Verifies Turbine Trip (UO) • Verifies AC Power to the Emergency Buses (UO) • Checks SI actuated (OATC)
	SS / TEAM	Initiates Foldout Page, Continuous Actions Page and RO and BOP Initial Actions Pages.
	OATC	Performs Initial Operator Actions of E-0. <ul style="list-style-type: none"> • Checks both trains of ECCS aligning per MLBs. If not performed previously – actuates SI. • Checks CIA actuated per MLBs (it won't be for Train B). • Informs SS and manually actuates CIA. • Informs SS of CIA failure for Train B and initiates manual alignment.

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Event No.: 6 and 7

Event Description:

A loss of 120V AC Vital Bus 1BY1B will occur resulting in an ATWT condition. Two first outs will alert the crew to the ATWT. SG Lo-Lo level due to earlier instrument failure and IR NIS Hi Flux Reactor Trip. The crew will trip the reactor manually and perform the actions of E-0 and transition to 19001-C, Reactor Trip Response to stabilize the plant. Shortly after the trip while in ES-0.1, A PRZR Safety will fail open requiring a manual SI. Train B equipment will have to be aligned due to the 1BY1B failure.

Time	Position	Applicant's Action or Behavior
	OATC	Performs Initial Operator Actions of E-0. Checks ECCS pumps and NCP status. <ul style="list-style-type: none"> • CCPs – both running • Informs SS and starts CCP "B" • SI Pumps – running (SI "B" tagged out) • RHR pumps – both running. • Informs SS and starts RHR pump "B" • NCP – tripped.
	OATC	Performs Initial Operator Actions of E-0. <ul style="list-style-type: none"> • CCW pumps – two running per train. • Informs SS and starts two Train B CCW pumps • NSCW pumps – two running per train. • NSCW tower return bypass valves – in auto. • Containment coolers running in SLOW speed with cooler isolation valves open. • Informs SS that CNMT coolers for Train B need to be started in SLOW speed (SS will direct UO to align)

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(low power)

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Event No.: 6 and 7

Event Description:

A loss of 120V AC Vital Bus 1BY1B will occur resulting in an ATWT condition. Two first outs will alert the crew to the ATWT. SG Lo-Lo level due to earlier instrument failure and IR NIS Hi Flux Reactor Trip. The crew will trip the reactor manually and perform the actions of E-0 and transition to 19001-C, Reactor Trip Response to stabilize the plant. Shortly after the trip while in ES-0.1, A PRZR Safety will fail open requiring a manual SI. Train B equipment will have to be aligned due to the 1BY1B failure.

Time	Position	Applicant's Action or Behavior
	OATC	Performs Initial Operator Actions of E-0. <ul style="list-style-type: none"> • CVI valves and dampers closed per MLBs. • Informs SS and initiates manual closure of valves and dampers. (SS will direct UO to align back panel dampers and valves)
	OATC	Performs Initial Operator Actions of E-0. <ul style="list-style-type: none"> • Checks containment pressure has remained < 21.5 psig.
	OATC	Performs Initial Operator Actions of E-0. Checks ECCS flows: <ul style="list-style-type: none"> • BIT Flow • RCS pressure < 1625 psig. • SI pump flow • RCS pressure > 300 psig

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Event No.: 6 and 7

Event Description:

A loss of 120V AC Vital Bus 1BY1B will occur resulting in an ATWT condition. Two first outs will alert the crew to the ATWT. SG Lo-Lo level due to earlier instrument failure and IR NIS Hi Flux Reactor Trip. The crew will trip the reactor manually and perform the actions of E-0 and transition to 19001-C, Reactor Trip Response to stabilize the plant. Shortly after the trip while in ES-0.1, A PRZR Safety will fail open requiring a manual SI. Train B equipment will have to be aligned due to the 1BY1B failure.

Time	Position	Applicant's Action or Behavior
	OATC	Performs Initial Operator Actions of E-0. Checks ECCS valve alignment proper per MLBs. Informs SS and aligns Train B valves per attachments A, B, C as necessary.
	OATC	Performs Initial Operator Actions of E-0. Checks ACCW pumps – at least one running.
	OATC	Performs Initial Operator Actions of E-0. Adjusts RCP seal injection to all RCPs 8 to 13 gpm.

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(low power)

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Event No.: 6 and 7

Event Description:

A loss of 120V AC Vital Bus 1BY1B will occur resulting in an ATWT condition. Two first outs will alert the crew to the ATWT. SG Lo-Lo level due to earlier instrument failure and IR NIS Hi Flux Reactor Trip. The crew will trip the reactor manually and perform the actions of E-0 and transition to 19001-C, Reactor Trip Response to stabilize the plant. Shortly after the trip while in ES-0.1, A PRZR Safety will fail open requiring a manual SI. Train B equipment will have to be aligned due to the 1BY1B failure.

Time	Position	Applicant's Action or Behavior
	UO	Performs UO Initial Operator Actions of E-0 <ul style="list-style-type: none"> • Checks MDAFW and TDAFW pumps are running. • Informs SS and starts MDAFW pump "B" • Checks NR SG levels > 10%, controls AFW flows. • Checks if SLI is required and ensures MSIVs and Bypasses are closed. • Verifies FWI (MFRV, BFRV, MFIV, BFIVs all shut) • Verifies SGBD isolated and places hand switches for SGBD isolation valves to close. • Verifies SGBD sample isolations closed. • Verifies Diesel Generators running. • Informs SS and starts DG1B • Throttles AFW flow to control SG levels 10 – 65% NR. • Verifies both MFPs tripped. • Checks Main Generator Output breakers open.
	UO	Performs UO Initial Operator Actions of E-0 <ul style="list-style-type: none"> • Assists OATC with alignment of CIA and CVI valves and dampers located on the back panels, starts CTMT coolers SLOW speed.

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(low power)

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Event No.: 6 and 7

Event Description:

A loss of 120V AC Vital Bus 1BY1B will occur resulting in an ATWT condition. Two first outs will alert the crew to the ATWT. SG Lo-Lo level due to earlier instrument failure and IR NIS Hi Flux Reactor Trip. The crew will trip the reactor manually and perform the actions of E-0 and transition to 19001-C, Reactor Trip Response to stabilize the plant. Shortly after the trip while in ES-0.1, A PRZR Safety will fail open requiring a manual SI. Train B equipment will have to be aligned due to the 1BY1B failure.

Time	Position	Applicant's Action or Behavior
	OATC	Checks RCS temperature stable at or trending to 557 degrees F using RCS Tavg. NOTE: Will have to use WR RCS HOT LEG Temps if RCPs are tripped due to loss of train A instrument power affecting WR COLD LEG temperature indication.
	CREW	Takes actions of RNO step 8 to control RCS temperature.
	OATC	Checks PORVs, Block Valves, and Spray Valves all Closed.
	OATC	Checks if RCPs should be stopped. <ul style="list-style-type: none"> • Checks at least one CCP or SIP running. • RCS pressure < 1375 psig. • Stops RCPs
	UO / SS	Checks for faulted SG and transition to E-2 (not met)

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Event No.: 6 and 7

Event Description:

A loss of 120V AC Vital Bus 1BY1B will occur resulting in an ATWT condition. Two first outs will alert the crew to the ATWT. SG Lo-Lo level due to earlier instrument failure and IR NIS Hi Flux Reactor Trip. The crew will trip the reactor manually and perform the actions of E-0 and transition to 19001-C, Reactor Trip Response to stabilize the plant. Shortly after the trip while in ES-0.1, A PRZR Safety will fail open requiring a manual SI. Train B equipment will have to be aligned due to the 1BY1B failure.

Time	Position	Applicant's Action or Behavior
	SS / UO	<p>Checks for SG Tubes intact.</p> <ul style="list-style-type: none"> • Directs chemistry to sample all SG one at a time for activity. <p>Checks secondary radiation normal:</p> <ul style="list-style-type: none"> • Main Steam Line Rad Monitors • Condenser Air Ejector Rad Monitors • Steam Generator Liquid Process Rad Monitors • Any SG level rising in an uncontrolled manner. <p>E-3 SGTR transition criteria (not met)</p>
	SS / OATC	<p>Checks for RCS intact inside containment.</p> <ul style="list-style-type: none"> • Containment radiation normal (it is) • Containment pressure normal (it is) • Containment Emergency Sump level normal (it is) <p>NOTE: If slow during scenario to this point, PRT may rupture and a transition to 19010-C would be appropriate at this point. If not, continue with E-0 will eventually transition you to 19010-C later in the procedure.</p>

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Event No.: 6 and 7

Event Description:

A loss of 120V AC Vital Bus 1BY1B will occur resulting in an ATWT condition. Two first outs will alert the crew to the ATWT. SG Lo-Lo level due to earlier instrument failure and IR NIS Hi Flux Reactor Trip. The crew will trip the reactor manually and perform the actions of E-0 and transition to 19001-C, Reactor Trip Response to stabilize the plant. Shortly after the trip while in ES-0.1, A PRZR Safety will fail open requiring a manual SI. Train B equipment will have to be aligned due to the 1BY1B failure.

Time	Position	Applicant's Action or Behavior
	OATC	Checks if ECCS flow should be reduced. <ul style="list-style-type: none"> RCS subcooling > 24 degrees F (not met)
	SS	Initiates CSFST monitoring and implements EPIP procedures.
	UO	Checks intact SG levels. <ul style="list-style-type: none"> NR level in at least one SG > 10% (32% Adverse) Maintains NR levels between 10% (32% Adverse) and 65%. No NR level rising in an uncontrolled manner.
	UO	Checks Auxiliary Building Leak Detection Normal <ul style="list-style-type: none"> Plant vent radiation monitors normal. Auxiliary Building Leak Detection status lights NOT LIT.

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Event No.: 6 and 7

Event Description:

A loss of 120V AC Vital Bus 1BY1B will occur resulting in an ATWT condition. Two first outs will alert the crew to the ATWT. SG Lo-Lo level due to earlier instrument failure and IR NIS Hi Flux Reactor Trip. The crew will trip the reactor manually and perform the actions of E-0 and transition to 19001-C, Reactor Trip Response to stabilize the plant. Shortly after the trip while in ES-0.1, A PRZR Safety will fail open requiring a manual SI. Train B equipment will have to be aligned due to the 1BY1B failure.

Time	Position	Applicant's Action or Behavior
	OATC	Checks if PRT conditions NORMAL. <ul style="list-style-type: none"> • PRZR PORV and Safety tailpipe temperatures < 190 F • PRT temperature < 115 F • PRT level between 57% and 88% • PRT pressure between 3 PSIG and 8 PSIG
	SS	Transitions to 19010-C, Loss of Reactor or Secondary Coolant. (Crew Update)
	SS	Initiates the Continuous Actions and Foldout Pages.
	SS	Initiates CSFST monitoring and implements EPIPs.
	OATC	Maintains seal injection to RCPs 8 to 13 gpm.

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(low power)

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Event No.: 6 and 7

Event Description:

A loss of 120V AC Vital Bus 1BY1B will occur resulting in an ATWT condition. Two first outs will alert the crew to the ATWT. SG Lo-Lo level due to earlier instrument failure and IR NIS Hi Flux Reactor Trip. The crew will trip the reactor manually and perform the actions of E-0 and transition to 19001-C, Reactor Trip Response to stabilize the plant. Shortly after the trip while in ES-0.1, A PRZR Safety will fail open requiring a manual SI. Train B equipment will have to be aligned due to the 1BY1B failure.

Time	Position	Applicant's Action or Behavior
	OATC	Checks RCPs stopped and at least one ACCW pump is running.
	UO	Places Containment Hydrogen Monitors in service per SOP-13130.
	UO	Checks SG secondary pressure boundaries intact.
	UO	Checks intact SG levels 10 – 65% NR, controls AFW, and checks for any ruptured SG.
	UO	Checks SG Tubes Intact – No secondary side radiation (steam lines, SJAE, SGBD, samples)

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Event No.: 6 and 7

Event Description:

A loss of 120V AC Vital Bus 1BY1B will occur resulting in an ATWT condition. Two first outs will alert the crew to the ATWT. SG Lo-Lo level due to earlier instrument failure and IR NIS Hi Flux Reactor Trip. The crew will trip the reactor manually and perform the actions of E-0 and transition to 19001-C, Reactor Trip Response to stabilize the plant. Shortly after the trip while in ES-0.1, A PRZR Safety will fail open requiring a manual SI. Train B equipment will have to be aligned due to the 1BY1B failure.

Time	Position	Applicant's Action or Behavior
	OATC	Checks PORV and Block valve status, checks CL temperatures. NOTE: will have to use HL temperatures due to loss of power to CL temperature indications
	OATC	Checks ECCS termination criteria (not met) NOTE: will have to calculate RCS sub-cooling.
	OATC	Checks if containment spray should be stopped (not met)
	TEAM	Reviews step addressing LOSP after SI reset to restart equipment.
	OATC	Stops RHR pumps if RCS pressure > 300 psig & stable or rising Restarts RHR pumps if pressure drops < 300 psig
	OATC	Checks RCS & SG pressure trends: <ul style="list-style-type: none"> • SG pressures – all stable or rising, and • RCS pressure – stable or lowering

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Event No.: 6 and 7

Event Description:

A loss of 120V AC Vital Bus 1BY1B will occur resulting in an ATWT condition. Two first outs will alert the crew to the ATWT. SG Lo-Lo level due to earlier instrument failure and IR NIS Hi Flux Reactor Trip. The crew will trip the reactor manually and perform the actions of E-0 and transition to 19001-C, Reactor Trip Response to stabilize the plant. Shortly after the trip while in ES-0.1, A PRZR Safety will fail open requiring a manual SI. Train B equipment will have to be aligned due to the 1BY1B failure.

Time	Position	Applicant's Action or Behavior
	UO	Checks if DGs should be stopped, directs OAO operator to shutdown the DGs per 13145-1, Diesel Generators, checks stub busses energized (NB01 & NB10).
	OATC	Checks Cold Leg recirculation capability. <ul style="list-style-type: none"> • Power to both HV-8811A and HV-8811B • Power to RHR pumps A and B • Power to HV-8809A and HV-8809B • RHR HX A and B OPERABLE
	UO	Checks auxiliary building leak detection alarms and plant vent radiogas.
	TEAM	Directs Chemistry to obtain samples for boron, pH, radioactivity from the RCS and both Containment Emergency Sumps, etc.

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Event No.: 6 and 7

Event Description:

A loss of 120V AC Vital Bus 1BY1B will occur resulting in an ATWT condition. Two first outs will alert the crew to the ATWT. SG Lo-Lo level due to earlier instrument failure and IR NIS Hi Flux Reactor Trip. The crew will trip the reactor manually and perform the actions of E-0 and transition to 19001-C, Reactor Trip Response to stabilize the plant. Shortly after the trip while in ES-0.1, A PRZR Safety will fail open requiring a manual SI. Train B equipment will have to be aligned due to the 1BY1B failure.

Time	Position	Applicant's Action or Behavior
	TEAM	Evaluate plant status. <ul style="list-style-type: none"> • Secure unnecessary equipment. • Isolate NSCW corrosion monitor racks after 8 hours. • Consult TSC for additional actions and to repair additional equipment required to mitigate the event.
	SS / TEAM	Checks for transition criteria met for 19012-C, Post LOCA Cool down and Depressurization. (met)
	SS	Transitions to 19012-C, Post LOCA Cool down and Depressurization. (Crew Update)
	The End	This is the end point of the scenario

Facility:	Vogtle	Scenario No.:	4	Op-Test No.:	2009-301
Examiners:	Lea	Operators:			
MODIFIED					
Initial Conditions: <u>100% power. CNMT Mini-Purge in service, HV-3009 tagged shut for repairs (emergent work). SG ARV #3 tagged for repairs, BATP #2 tagged for repairs, I&C recording lift coil currents in rod control for baseline PM data.</u>					
Pre load the following: Auto reactor trip failure (ES01,) Trains "A" & "B" SI Auto failures (ES08, ES16), CIA fails to actuate in auto or manual (ES20A, ES20B), NSCW Train A pumps fail to auto start (NS07A, NS07C, NS07E).					
Turnover:					
<u>New system peak record expected due to extremely hot weather. System loads at maximum due to unexpected unit trip. LCO 3.7.5 Condition A (HV-3009). INFO LCO 3.7.4 (ARV) INFO TR 13.1.3 (BATP).</u>					
Event No.	Malf. No.	Event Type*	Event Description		
1	RC08C @ 100%	I-SS I-OATC TS-SS	NR Temperature Instrument Fails High (T-hot) AOP-18001, section B for Failure of RCS Narrow Range Temperature Instr. LCO 3.3.1, LCO 3.3.2		
2	SG05B @ 0%	I-SS I-UO	Steam Generator # 2 Steam Flow Instrument Fail Low. 18001-C section G for Failure of Steam Generator Flow Instrument		
3	CV18A	C-SS C-OATC TS-SS	Train "A" Centrifugal Charging Pump Discharge line leak. 17061-1, window F06 for Level C Leak Detected LCO 3.5.2 (ECCS), TRM 13.1.3 INFO (BA Flow Paths), TRM 13.1.5 INFO (Charging Pumps)		
4	N/A	R-ALL	Lower power for shutdown due to CCP discharge pipe break.		
5	RP06D @ 20% 30 sec ramp	C-SS C-OATC	#1 seal on RCP 4 will fail resulting in a need to immediately trip reactor and stop RCP 4.		
6	RP06D @100% RP07D @100%	M-ALL	Small RCS LOCA through RCP seals requiring manual SI actuation, manual CIA valve alignment. Crew will enter E-0 after SI actuation, transition to E-1 RCS LOCA.		
7	ES01 ES08 & 16 ES20A&20B	I-OATC/SS I-OATC/SS I-ALL	Automatic Reactor Trip Failure Automatic SI Failure CIA automatic & manual actuation failure		
8	EL03 EL02 EL07B NS07A/C/E	C-SS C-UO	LOSP after SI reset on 1AA02 / 1BA03. Train A NSCW fails to auto start. Crew should manually start NSCW train A after recognizing failure to start.		

Event 1:

RCS Narrow Range That instrument fails high resulting in inward rod motion. The OATC will place control rods in manual.

Verifiable Actions:

OATC - Performs IOA and places control rods in manual. Selects out the failed channel on the Tav_g / Delta T defeat switches. Restores Tave to program value, returns rod control back to automatic.

Technical Specifications:

3.3.1 – Reactor Trip:

Function 6 – OTΔT – Condition E – trip channel within 72 hours

Function 7 – OPΔT – Condition E – trip channel within 72 hours

3.3.2 – ESFAS – Function 5a – Lo Tave FWI – Condition I – trip channel within 72 hours

Event 2:

Steam Generator # 2 Steam Flow will fail low requiring the BOP to take manual control of the MFRV # 2 and MFPT Master Speed Controller. An entry into 18001-C, section G for Steam Generator Flow Instrument Failure will be required.

Verifiable Actions:

UO - Performs IOA to take MFRV # 2 to manual and MFPT Master Speed Controller to manual and control SG levels. Defeats the failed channel and selects an operable channel using the Steam Flow Selector switch.

Event 3:

CCP "A" discharge line leak, this will be found by leak detection annunciators for Auxiliary Building Level C. The Emergency Boration flow path through HV-8104 will not be available.

Verifiable Actions:

UO - Informs crew of CCP "A" leak detection ZLBs illuminated.

OATC -Manually isolate CCP "A" to stop the leakage and place CCP "A" in PTL.

Technical Specifications:

LCO 3.5.2 – ECCS – Condition A – restore within 72 hours

TR 13.1.3 – Boric Acid Flow paths (Operating) – INFO Only

TR 13.1.5 – Charging Pumps (Operating) – INFO Only

Event 4:

The crew will perform a power ramp of approximately 10% from 100% power to 90%.

Verifiable Actions:

ALL - Power reduction. UO will operate the main turbine and OATC will operate control rods and the CVCS boration controls to control reactor power.

Event 5:

The crew will perform a manual reactor trip of RCP # 4 after seal #1 leak off flow increases to > 5.5 gpm. This requires immediate shutdown of the RCP per 13003-C. Observation of seal leak off flow alarms will alert the crew to the increasing seal leak off flow. The crew will enter E-0, trip RCP # 4, shut PRZR spray valve from loop # 4, and shut RCP # 4 seal leak off isolation valve. As the RCP seal failure degrades into a small LOCA eventually SI actuation criteria will be reached.

Verifiable Actions:

OATC - Perform a manual reactor trip. Starts RCP # 4 oil lift pump, stops RCP # 4. Shut PRZR spray valve for loop # 4. Isolates RCP # 4 seal leak off valve HV-8141D.

Event 6 and 7:

While in ES-0.1, Reactor Trip Response, a small size LOCA will develop due to multiple RCP seal failures. The crew will manually actuate SI and return to E-0. While in E-0, it will be discovered CIA has failed to manually actuate. The QMCB hand switches will also fail to actuate CIA, and require manual alignment of valves and dampers by the OATC / UO.

Verifiable Actions:

OATC - Manual actuation of SI in response to lowering PRZR level and RCS / PRZR pressure.

OATC / UO - Manual alignment of CIA valves and dampers which fail to align automatically or with hand switch actuation.

Event 8:

While in 19010-C, Response to Loss of Reactor or Secondary Coolant, Offsite Power will be lost to 4160 1E bus AA02 and BA03 with the DG1A re-energizing the bus. However, NSCW cooling water pumps will fail to auto start requiring a manual start by the crew.

Train B bus BA03 will fail to re-energize during the event. This will leave only the Train A ECCS pumps injecting into the core.

Verifiable Actions:

OATC – Restart SI pumps

UO - Manual start of Train A NSCW pumps which failed to auto start. Shift CNMT coolers to low speed, restart Post LOCA cavity purge fans

Critical Tasks:

- 1. Close at least one CIA valve in each penetration flow path from containment.**
- 2. Manual start of Train A NSCW pumps to maintain cooling water supply to the Train A DG and to the Train A ECCS cooling water pumps.**

Final

Facility:	Vogtle	Scenario No.:	4	Op-Test No.:	2007-301
Examiners:	_____	Operators:	_____	_____	_____
Initial Conditions: Plant has been at 100% Power for three months following a refueling outage.					
Pre load the following: Auto reactor trip failure (ES01,) Trains "A" & "B" SI Auto failures (ES08, ES16), CIA fails to actuate in auto or manual (ES20A, ES20B), NSCW Train A pumps fail to auto start (NS07A, NS07C, NS07E).					
Place SIP "B" in PTL and place a red hold tag on the hand switch. Place SI Train "B" SSMP hand switch to "Bypass".					
Turnover: Storms are approaching from the Southwest and high winds are possible within the hour.					
SI Pump "B" was tagged out yesterday at 1200 hours and is scheduled to be returned to service in 24 hours (TS 3.5.2).					
Heater Drain Pump # 1 is experiencing high vibrations, the system engineer, maintenance, and operations management are in the field evaluating the pump at this time.					
Event No.	Malf. No. / Position	Event Type*	Event Description		
1	CV18A RO SRO (TS)	C	Train "A" Centrifugal Charging Pump Discharge line leak. 17061-1, window F06 for Level C Leak Detected LCO 3.5.2 (ECCS), TRM 13.1.3 INFO (BA Flow Paths), TRM 13.1.5 INFO (Charging Pumps)		
2	RC08C@ 100% RO SRO (TS)	I	NR Temperature Instrument Fails High (Thot) AOP-18001, section B for Failure of RCS Narrow Range Temperature Instr. LCO 3.3.1, LCO 3.3.2		
3	SG05B @ 0% BOP	I	Steam Generator # 2 Steam Flow Instrument Fail Low. 18001-C section G for Failure of Steam Generator Flow Instrument		
4	RP06D @ 14% 30 sec ramp RO	C	RCP # 1 seal on RCP # 4 fails to 5.2 gpm (abnormal range per SOP) 13003-1, Reactor Coolant Pumps section 4.2.1 Operation with seal abnormal. Crew will determine that management and engineering need to be consulted for the RCP seal problem.		
5	Power Ramp ALL	R	Power ramp from 100% to approximately 95% per management direction to shutdown RCP # 4 within 1 hour using AOP-18013-C, Rapid Down Power.		
6	RP06D 15 -17.5% 30 sec ramp RO	C	RCP # 1 seal on RCP # 4 fails to > 5.5 gpm (immediate shutdown per SOP) 13003-1, Reactor Coolant Pumps section 4.2.1 Operation with seal abnormal. Crew will determine RCP # 4 requires immediate shutdown and trip the plant. Stop RCP # 4, shuts spray valve from loop # 4, shuts RCP seal leak off valve, perform actions of E-0.		

Event No.	Malf. No. / Position	Event Type*	Event Description
7	RC05D ramp from 0 to 7% ALL	M	Medium size RCS LOCA requiring manual SI actuation, manual CIA valve alignment. Crew will enter E-0 after SI actuation, transition to E-1.0 RCS LOCA.
8	EL03 EL02 EL07B BOP	C	LOSP after SI reset on 1AA02 / 1BA03. Train A NSCW fails to auto start. Crew should manually start NSCW train A after recognizing failure to start.

Vogtle 2007-301 Scenario # 4 (RCS LOCA / Post LOCA CD & Depressurization)

Event 1

CCP "A" discharge line leak, this will be found by leak detection annunciators for Auxiliary Building Level C. The Emergency Boration flow path through HV-8104 will not be available.

Verifiable Action: (BOP) Informs crew of CCP "A" leak detection ZLBs illuminated.

Verifiable Action: (RO) The RO will manually isolate CCP "A" to stop the leakage and place CCP "A" in PTL.

Technical Specifications: LCO 3.5.2, TRM INFO LCO 13.1.3, TRM INFO LCO 13.1.5

Event 2

RCS Narrow Range Thot instrument fails high resulting in inward rod motion. The RO will place control rods in manual.

Verifiable Action: (RO) Performs IOA and places control rods in manual.

Verifiable Action: (RO) Selects out the failed channel on the Tavg / Delta T defeat switches.

Technical Specifications: LCO 3.3.1, LCO 3.3.2

Event 3

Steam Generator # 2 Steam Flow will fail low requiring the BOP to take manual control of the MFRV # 2 and MFPT Master Speed Controller. An entry into 18001-C, section G for Steam Generator Flow Instrument Failure will be required.

Verifiable Action: (BOP) Performs IOA to take MFRV # 2 to manual and MFPT Master Speed Controller to manual and control SG levels.

Verifiable Action: (BOP) Defeats the failed channel and selects an operable channel using the Steam Flow Selector switch.

Event 4

Reactor Coolant Pump # 4 seal leak off increases to abnormal range. The crew will enter SOP-13003 section 4.2.1 for Operation with a Seal Abnormality and evaluate continued RCP operation via a decision tree. The decision tree will require consultation of management and engineering regarding RCP operation.

Event 5

The crew will perform a power ramp of approximately 5% from 100% power to 95% after receiving direction from management to use AOP-18013-C and take the plant off line and shutdown RCP # 4 within 1 hour.

Verifiable Action: (ALL) Power reduction. BOP will operate the main turbine and RO will operate control rods and the CVCS boration controls to control reactor power.

Event 6

The crew will perform a manual reactor trip of RCP # 4 after seal leak off flow increases to > 5.5 gpm. This requires immediate shutdown of the RCP per 13003-C. Observation of seal leak off flow rising and RCP shaft vibrations will alert the crew to the increasing seal leak off flow. The crew will enter E-0, trip RCP # 4, shut PRZR spray valve from loop # 4, and shut RCP # 4 seal leak off isolation valve.

Verifiable Action: (RO) Perform a manual reactor trip.

Verifiable Action: (RO) Starts RCP # 4 oil lift pump, stops RCP # 4.

Verifiable Action: (RO) Shut PRZR spray valve for loop # 4.

Verifiable Action: (RO) Isolates RCP # 4 seal leak off valve HV-8141D.

Event 7

While in ES-0.1, Reactor Trip Response, a medium size LOCA (1000 gpm) will ramp in over 120 seconds. The crew will manually actuate SI and return to E-0. While in E-0, it will be discovered CIA has failed to manually actuate. The QMCB hand switches will also fail to actuate CIA, and require manual alignment of valves and dampers by the RO / BOP.

Verifiable Action: (RO) Manual actuation of SI in response to lowering PRZR level and RCS / PRZR pressure.

Verifiable Action: (RO / BOP) Manual alignment of CIA valves and dampers which fail to align automatically or with hand switch actuation.

Critical Task: Close at least one CIA valve in each penetration flow path from containment.

Event 8

While in 19010-C, Response to Loss of Reactor or Secondary Coolant, Offsite Power will be lost to 4160 1E bus AA02 and BA03 with the DG1A re-energizing the bus. However, NSCW cooling water pumps will fail to auto start requiring a manual start by the crew.

Train B bus BA03 will fail to re-energize during the event. This will leave only the Train A ECCS pumps injecting into the core.

Verifiable Action: (BOP) Manual start of Train A NSCW pumps which failed to auto start.

Critical Task: Manual start of Train A NSCW pumps to maintain cooling water supply to the Train A DG and to the Train A ECCS cooling water pumps.

BANK

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Event No.: 1

Event Description: RCS NR Temperature Instrument Fails High (Thot) on loop # 3. This will require the OATC to perform IOAs to stop inward control rod motion by placing rods in MANUAL. The crew will be required to enter AOP-18001 section B for Failure of RCS Narrow Range Temperature Instrumentation.

Time	Position	Applicant's Action or Behavior
	OATC	Diagnose NR Temperature Instrument Failure: Symptoms / alarms: <ul style="list-style-type: none"> • RC LOOP DELTA T / AUCT DELTA T HI-LO DEV • RC LOOP TAVG / AUCT TAVG HI-LO DEV • TAVG TREF DEVIATION • AUCT TAVG HIGH Indications: <ul style="list-style-type: none"> • Rapid inward control rod motion. • Loop 3 Tavg / Delta T indication deviating from other loops.
	OATC IOA	Step # B1 - Takes manual control of control rods to stop rapid insertion.
	SS	Initiates AOP 18001-C, Section B to direct crew actions. (Crew Update)
	OATC	Step # B2 - Restores Tavg to program, if required.

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Event No.: 1

Event Description: RCS NR Temperature Instrument Fails High (Thot) on loop # 3. This will require the OATC to perform IOAs to stop inward control rod motion by placing rods in MANUAL. The crew will be required to enter AOP-18001 section B for Failure of RCS Narrow Range Temperature Instrumentation.

Time	Position	Applicant's Action or Behavior
	OATC	Selects out the failed channel: <ul style="list-style-type: none"> • Step # B3 - Selects affected loop 3 on TS-412T Tavg Defeat switch to defeat 432. • Step # B4 - Selects affected loop on TS-411F Delta T Defeat switch to defeat 431.
	OATC	Step # B5 - Places control rod bank selector back in AUTO if desired.
	SS	Step # B6 - Notifies I & C to initiate repairs, notifies Operations Duty of AOP entry.
	SS	Step # B7 - Bypass the failed instrument channel using 13509-C, Bypass Test Instrumentation (BTI) Panel Operation NOTE: It is NOT expected the SS will bypass the channel at this time.

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Event No.: 1

Event Description: RCS NR Temperature Instrument Fails High (Thot) on loop # 3. This will require the OATC to perform IOAs to stop inward control rod motion by placing rods in MANUAL. The crew will be required to enter AOP-18001 section B for Failure of RCS Narrow Range Temperature Instrumentation.

Time	Position	Applicant's Action or Behavior
	SS	<p>Step # B8 - Identifies Tech Spec requirements to trip the affected bistables listed in table B1 within 72 hours of the channel failure.</p> <p>Step # B9 – Initiates applicable Tech Spec actions of the following:</p> <ul style="list-style-type: none">• TS 3.3.1, FU 6, Condition E• TS 3.3.1, FU 7, Condition E• TS 3.3.2, FU 5b, Condition I
	SS	<p>Step # B10 - Initiates the Continuous Actions Pages.</p>

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Event No.: 2

Event Description: Steam Generator # 2 Controlling Steam Flow instrument fails LOW (FI-522A). This will require entry into AOP-18001 section G for Failure of SG Flow Instrument and selection of an unaffected SG flow channel. The UO will have IOAs to take manual control of MFRV # 2 and MFPT speed control.

Time	Position	Applicant's Action or Behavior
	UO	Diagnose failure of SG Steam Flow instrument: Symptoms / alarms / indications: <ul style="list-style-type: none"> • STM GEN 1 (2, 3, 4) FLOW MISMATCH • Any unexplained steam / feed flow mismatch indication
	UO IOA	Step # G1 - Performs IOA of 18001 section G for Steam Flow Instrument Failure (FI-522A): <ul style="list-style-type: none"> • Checks steam and feed flows matched on all SGs (they aren't) • Take manual control of MFRV # 2 to raise FW flow. • Take manual control of MFPT(s) speed control to raise speed.
	SS	Enters AOP-18001 section G for Steam Flow Instrument Failure. (Crew Update)
	UO	Step # G2 - Selects an unaffected channel for control.

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Event No.: 2

Event Description: Steam Generator # 2 Controlling Steam Flow instrument fails LOW (FI-522A). This will require entry into AOP-18001 section G for Failure of SG Flow Instrument and selection of an unaffected SG flow channel. The UO will have IOAs to take manual control of MFRV # 2 and MFPT speed control.

Time	Position	Applicant's Action or Behavior
	UO	Step # G3 - Returns MFP(s) speed controls to AUTO
	UO	Step # G4 - Returns SG feed flow valve to automatic
	SS / CREW	Step # G5 - Initiates the Continuous Actions Page.
	UO	Step # G6 - Checks SG level control maintains NR level at 65% in AUTO.
	SS	Step # G7 - Notifies I & C to initiate repairs, notifies Operation Duty of AOP entry.

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Event No.: 3

Event Description: Train "A" CCP discharge line break. This will require the crew to isolate the suction and discharge to CCP "A" to stop the leak. The QPCP leak detection annunciators will alert the crew to the leak and direct isolation of the leak. This will render CCP "A" inoperable for ECCS (opposite train from SIP "B") requiring Tech Spec entry into 3.5.2 for ECCS and TRM for Borated Water Source Flow Paths and Charging Pumps.

Time	Position	Applicant's Action or Behavior
	UO	Diagnoses leak in CCP "A" pump room: Symptoms / alarms: <ul style="list-style-type: none"> • LEVEL C LEAK DETECTION alarm on QPCP (ALB61, E06) Indications/Actions: <ul style="list-style-type: none"> • Dispatches operator to investigate per the ARP guidance. • CCP "A" leak detection status light lit. • Operator reports back from field that "CCP "A" has leak in the pump room between the pump & the discharge isolation valve HV-8485A".
	OATC / SS	Isolates leak on CCP "A" per ARP-17061, window E06 step # 4. <ul style="list-style-type: none"> • Place CCP "A" in Pull-to-lock • Closes CCP "A" suction isolation valve. • Closes CCP "A" discharge isolation valve. • Observe leak stops (VCT level best indication) NOTE: The Crew may opt to use guidance in AOP 18004-C, RCS leakage in response to this failure and isolate the leak.
	SS	Initiates Technical Specifications for inoperable CCP. <ul style="list-style-type: none"> • LCO 3.5.2 condition A for ECCS • TRM 13.1.3 Borated Water Source Flow Paths – Operating, (INFO LCO) • TRM 13.1.5 Charging Pumps – Operating, (INFO LCO)

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Event No.: 4

Event Description: CCP 1A discharge pipe break will result in a 72 hour LCO. Repair crew will report 7 days to fix and test. Crew will begin a TS required shutdown at Management based on this information.

Time	Position	Applicant's Action or Behavior
	SS	Initiates a unit shutdown per UOP 12004-C, Power Operations. (Crew Update)
	OATC / UO	<ul style="list-style-type: none">• Energize PRZR backup heaters• Places rods in manual control• Reduces turbine load• Maintains Tave within 2 degrees F of Tref using rods in manual and / or boration as necessary.• Maintains AFD within limits
	SS	Notifies System Operator that a load reduction is in progress.
	NOTE	Event will continue until adequate power maneuver completed for the examiners to evaluate.

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Event No.: 5

Event Description: Failure of RCP # 1 seal on RCP # 4 to > 5.5 gpm. The RCP seal decision tree (Figure # 1 or SOP-13003) will direct the crew to immediately shutdown the RCP.

Time	Position	Applicant's Action or Behavior
	CREW	<p>Diagnose failure of RCP # 4 (seal # 1):</p> <p>Symptoms / alarms:</p> <ul style="list-style-type: none"> • RCP 4 CONTROLLED LKG HI/LO FLOW • RCP 4 NO. 2 SEAL LKOF HI FLOW <p>Indications:</p> <ul style="list-style-type: none"> • RCP 4 seal leak off high range reading > 5.5 gpm • Excess letdown temperature rising (possibly) • Changes in VCT level or pressure • RCP 4 operating parameters changing (temperatures)
	CREW	<p>Enters SOP-13003-1, "RCP Operation" section 4.2.1 for Operation With A Seal Abnormality".</p> <p>Step # 4.2.1.1 Trends RCP computer data points listed in Table 2 on the IPC computer.</p> <p>NOTE: The candidate may call this up using the "RCP" button on the IPC computer to display all RCP parameters. Many of the Table 2 indications are located on the QMCB.</p> <p>The following indications are computer point only and are displayed on the IPC with the RCP button.</p> <ul style="list-style-type: none"> • Number 1 Seal Inlet Temperature • Number 1 Seal Inlet Temperature • Motor Lower Radial Bearing Temperature • Motor Upper Radial Bearing Temperature • Motor Thrust Bearing UPPER Shoe Temperature • Motor Thrust Bearing Lower Shoe Temperature • Motor Stator Winding Temperature <p>Step # 4.2.1.2 should be N/A as the IPC computer will be available.</p>

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Event No.: 5

Event Description: Failure of RCP # 1 seal on RCP # 4 to > 5.5 gpm. The RCP seal decision tree (Figure # 1 or SOP-13003) will direct the crew to immediately shutdown the RCP.

Time	Position	Applicant's Action or Behavior
	OATC / SS	<p>Step # 4.2.1.3 - Evaluates monitored indications on Figure 1, "RCP Seal Abnormalities Tree". Below is projected flow path through the tree.</p> <ul style="list-style-type: none"> • Seal injection > 8 gpm (yes) • Seal injection < 135 degrees F (yes) • NO. 1 seal leak off within figure 2 Normal delta P range (no) • NO. 1 seal leak off > 5.5 gpm (yes) • Immediately stop RCP per step 4.2.1.4
	OATC	<p>Step 4.2.1.4 – Immediately stops RCP # 4.</p> <ul style="list-style-type: none"> • 4.2.1.4a – starts RCP # 4 oil lift pump. • 4.2.1.4b(1) – Trips reactor and initiates E-0 • Performs IOAs of E-0 (OATC and UO) • 4.2.1.4b(2) – goes to step 4.2.1.4d after E-0 IOAs complete. • 4.2.1.4.d – Stops RCP # 4 using HS-498B and HS-498A • 4.2.1.4.e – Closes spray valve loop 4 using PIC-455B • 4.2.1.4.f – Closes seal leak off valve after RCP stops and reverse flow is indicated using HS-8141D • 4.2.1.4.g – Stops RCP # 4 Oil Lift Pump

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Event No.: 6 and 7

Event Description:

A LOCA through the RCP #4 seals develops due to failure of seal #2 in addition to the existing #1 seal failure. PRZR level and pressure will begin to lower faster than the capacity of the normal charging system. The OATC will be required to manually actuate SI as auto SI will not work. In addition, CIA will fail to auto or manual actuate. This will require manual closure of CIA valves and dampers. The crew will return to E-0, transition eventually to 19010-C, E-1.0 Loss of Primary or Secondary Coolant.

Time	Position	Applicant's Action or Behavior
	CREW	Recognizes degrading plant conditions: <ul style="list-style-type: none"> • Multiple RCP seal failure alarms • Lowering Pressurizer level and pressure indications and alarms • Containment high radiation alarms • The crew may briefly reference AOP-18004 for RCS Leakage.
	OATC	Raises charging flow to attempt to maintain PRZR level and pressure.
	OATC	Manually actuates SI when unable to maintain PRZR level or pressure.
	SS	Transitions back to E-0 to perform actions for Safety Injection.

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Event No.: 6 and 7

Event Description:

A LOCA through the RCP #4 seals develops due to failure of seal #2 in addition to the existing #1 seal failure. PRZR level and pressure will begin to lower faster than the capacity of the normal charging system. The OATC will be required to manually actuate SI as auto SI will not work. In addition, CIA will fail to auto or manual actuate. This will require manual closure of CIA valves and dampers. The crew will return to E-0, transition eventually to 19010-C, E-1.0 Loss of Primary or Secondary Coolant.

Time	Position	Applicant's Action or Behavior
	OATC / UO	<p>Performs IOAs of E-0</p> <p>Step # 1 - Verifies Reactor Trip (OATC)</p> <ul style="list-style-type: none"> • Rod Bottom Lights lit • Reactor Trip and Bypass Breakers – Open • Neutron Flux Lowering <p>Step # 2 – Verifies Turbine Trip (UO)</p> <ul style="list-style-type: none"> • All Turbine Stop Valves – Closed.(yes) <p>Step # 3 – Checks Power to AC Emergency Buses (UO)</p> <ul style="list-style-type: none"> • 3a, at least 1 4160 1E bus energized. (yes) • 3b, all AC Emergency buses energized -4160 and 480V (yes). <p>Step # 4 Checks if SI / Actuated (OATC)</p> <ul style="list-style-type: none"> • Any SI annunciator lit (yes) • SI BPLP status light lit (yes).
	SS/CREW	<p>Step # 5 - Initiates Foldout Page.</p> <p>Step # 6 – Initiates the RO and BOP Initial Actions Pages.</p> <p>Step # 7 – Initiates the Continuous Actions Page.</p>

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Event No.: 6 and 7

Event Description:

A LOCA through the RCP #4 seals develops due to failure of seal #2 in addition to the existing #1 seal failure. PRZR level and pressure will begin to lower faster than the capacity of the normal charging system. The OATC will be required to manually actuate SI as auto SI will not work. In addition, CIA will fail to auto or manual actuate. This will require manual closure of CIA valves and dampers. The crew will return to E-0, transition eventually to 19010-C, E-1.0 Loss of Primary or Secondary Coolant.

Time	Position	Applicant's Action or Behavior
	OATC	Performs OATC Initial Operator Actions of E-0. Step # 4 - CCW pumps – two running per train. Step # 5a - NSCW pumps – two running per train. Step # 5b - NSCW tower return bypass valves – in auto. Step # 6a - Containment coolers running in LOW speed Step # 6b - NSCW cooler isolation valves open.
	OATC	Performs OATC Initial Operator Actions of E-0. Step # 7 – Verifies CVI dampers and valves closed (yes)
	OATC	Performs OATC Initial Operator Actions of E-0. Step # 8 - Checks containment pressure has remained < 21.5 psig (yes)

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Event No.: 6 and 7

Event Description:

A LOCA through the RCP #4 seals develops due to failure of seal #2 in addition to the existing #1 seal failure. PRZR level and pressure will begin to lower faster than the capacity of the normal charging system. The OATC will be required to manually actuate SI as auto SI will not work. In addition, CIA will fail to auto or manual actuate. This will require manual closure of CIA valves and dampers. The crew will return to E-0, transition eventually to 19010-C, E-1.0 Loss of Primary or Secondary Coolant.

Time	Position	Applicant's Action or Behavior
	OATC	Performs OATC Initial Operator Actions of E-0. Step # 9 - Checks ECCS flows: <ul style="list-style-type: none"> • 9a, BIT Flow (yes) • 9b, RCS pressure < 1625 psig (yes, unless crew too fast) • 9c, SI pump flow (yes, unless crew too fast) • 9d, RCS pressure < 300 psig (no)
	OATC	Performs OATC Initial Operator Actions of E-0. Step # 10 - Checks ECCS valve alignment proper per MLBs (yes)
	OATC	Performs OATC Initial Operator Actions of E-0. Step # 11 - Checks ACCW pumps – at least one running (yes)

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Event No.: 6 and 7

Event Description:

A LOCA through the RCP #4 seals develops due to failure of seal #2 in addition to the existing #1 seal failure. PRZR level and pressure will begin to lower faster than the capacity of the normal charging system. The OATC will be required to manually actuate SI as auto SI will not work. In addition, CIA will fail to auto or manual actuate. This will require manual closure of CIA valves and dampers. The crew will return to E-0, transition eventually to 19010-C, E-1.0 Loss of Primary or Secondary Coolant.

Time	Position	Applicant's Action or Behavior
	OATC	Performs OATC Initial Operator Actions of E-0. Step # 12 - Adjusts RCP seal injection to all RCPs 8 to 13 gpm.
	UO	Performs UO Initial Operator Actions of E-0 <ul style="list-style-type: none"> • Step # 1 - Checks MDAFW and TDAFW pumps are running. • Step # 2 - Checks NR SG levels > 10%, controls AFW flows. • Step # 3 - Checks if SLI is required and ensures MSIVs and Bypasses are closed (no) • Step # 4 - Verifies FWI (MFRV, BFRV, MFIV, BFIVs all shut) • Step # 5 - Verifies SGBD isolated and places hand switches for SGBD isolation valves to close and verifies SGBD sample isolations closed. • Step # 6 - Verifies Diesel Generators running. • Step # 7 - Throttles AFW flow to control SG levels 10 – 65% NR. • Step # 8 - Verifies both MFPs tripped. • Step # 9 - Checks Main Generator Output breakers open.

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Event No.: 6 and 7

Event Description:

A LOCA through the RCP #4 seals develops due to failure of seal #2 in addition to the existing #1 seal failure. PRZR level and pressure will begin to lower faster than the capacity of the normal charging system. The OATC will be required to manually actuate SI as auto SI will not work. In addition, CIA will fail to auto or manual actuate. This will require manual closure of CIA valves and dampers. The crew will return to E-0, transition eventually to 19010-C, E-1.0 Loss of Primary or Secondary Coolant.

Time	Position	Applicant's Action or Behavior
	UO CRITICAL STEP	Performs UO Initial Operator Actions of E-0 <ul style="list-style-type: none"> • Assists OATC with alignment of CIA valves and dampers located on the back panels.
	OATC	Step # 8 - Checks RCS temperature stable at or trending to 557 degrees F using RCS Tavg.
	CREW	Takes actions of RNO step 8 to control RCS temperature. <ul style="list-style-type: none"> • Stops dumping steam. • Checks SG NR levels > 10% and throttles AFW flow. • Shuts MSIVs and BSIVs (not required)

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Event No.: 6 and 7

Event Description:

A LOCA through the RCP #4 seals develops due to failure of seal #2 in addition to the existing #1 seal failure. PRZR level and pressure will begin to lower faster than the capacity of the normal charging system. The OATC will be required to manually actuate SI as auto SI will not work. In addition, CIA will fail to auto or manual actuate. This will require manual closure of CIA valves and dampers. The crew will return to E-0, transition eventually to 19010-C, E-1.0 Loss of Primary or Secondary Coolant.

Time	Position	Applicant's Action or Behavior
	OATC	Step # 9 - Checks PORVs, Block Valves, and Spray Valves all Closed. <ul style="list-style-type: none"> • 9a, PORVs shut and in AUTO. (yes) • 9b, Normal spray valves closed. (yes) • 9c, Power available to at least one block valve. (yes) • 9d, At least one block valve open (no) • 9d RNO, verify block valves open when RCS > 2185 psig.
	OATC	Step # 10 - Checks if RCPs should be stopped. <ul style="list-style-type: none"> • 10a, Checks at least one CCP or SIP running (yes) • 10b, RCS pressure < 1375 psig (not expected)
	UO / SS	Step # 11- Checks for faulted SG and transition to E-2 (not met) <ul style="list-style-type: none"> • Goes to step # 12

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Event No.: 6 and 7

Event Description:

A LOCA through the RCP #4 seals develops due to failure of seal #2 in addition to the existing #1 seal failure. PRZR level and pressure will begin to lower faster than the capacity of the normal charging system. The OATC will be required to manually actuate SI as auto SI will not work. In addition, CIA will fail to auto or manual actuate. This will require manual closure of CIA valves and dampers. The crew will return to E-0, transition eventually to 19010-C, E-1.0 Loss of Primary or Secondary Coolant.

Time	Position	Applicant's Action or Behavior
	SS / UO	Step # 12 - Checks for SG Tubes intact (E-3 transition not met) <ul style="list-style-type: none"> • Directs chemistry to sample all SG one at a time for activity. Checks secondary radiation normal: <ul style="list-style-type: none"> • Main Steam Line Rad Monitors • Condenser Air Ejector Rad Monitors • Steam Generator Liquid Process Rad Monitors • Any SG level rising in an uncontrolled manner.
	SS / OATC	Step # 13 - Checks for RCS intact inside containment. <ul style="list-style-type: none"> • Containment radiation normal (it is not) • Containment pressure normal (it is not) • Containment Emergency Sump level normal (it is not)
	SS	Transitions to 19010-C, Loss of Reactor or Secondary Coolant (Crew Update)

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Event No.: 6 and 7

Event Description:

A LOCA through the RCP #4 seals develops due to failure of seal #2 in addition to the existing #1 seal failure. PRZR level and pressure will begin to lower faster than the capacity of the normal charging system. The OATC will be required to manually actuate SI as auto SI will not work. In addition, CIA will fail to auto or manual actuate. This will require manual closure of CIA valves and dampers. The crew will return to E-0, transition eventually to 19010-C, E-1.0 Loss of Primary or Secondary Coolant.

Time	Position	Applicant's Action or Behavior
	SS	Step # 1, Initiates the Continuous Actions and Foldout Pages and Initiates CSFST monitoring.
	SS	Step # 2 - Implements EPIPs.
	OATC	Step # 3 - Maintains seal injection to RCPs 8 to 13 gpm.
	OATC	Step # 4 - Checks if RCPs should be stopped. <ul style="list-style-type: none"> • 4a, Checks at least one CCP or SIP running (yes) • 4b, RCS pressure < 1375 psig (not expected) Step # 5 - Checks at least one ACCW pump is running. (yes)

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Event No.: 6 and 7

Event Description:

A LOCA through the RCP #4 seals develops due to failure of seal #2 in addition to the existing #1 seal failure. PRZR level and pressure will begin to lower faster than the capacity of the normal charging system. The OATC will be required to manually actuate SI as auto SI will not work. In addition, CIA will fail to auto or manual actuate. This will require manual closure of CIA valves and dampers. The crew will return to E-0, transition eventually to 19010-C, E-1.0 Loss of Primary or Secondary Coolant.

Time	Position	Applicant's Action or Behavior
	SS	Step # 6 - Assigns personnel to place Containment hydrogen monitors in service per SOP-13130, Post Accident Hydrogen Control. NOTE: - SS may call for an extra operator to perform this.
	UO	Step # 7 - Checks SG secondary pressure boundaries intact. (yes)
	UO	Step # 8 - Checks intact SG levels 32 – 65% NR, controls AFW, and checks for any ruptured SG.
	UO	Step # 9 - Checks for any ruptured SG. (no radiation present on SGs)

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Event No.: 6 and 7

Event Description:

A LOCA through the RCP #4 seals develops due to failure of seal #2 in addition to the existing #1 seal failure. PRZR level and pressure will begin to lower faster than the capacity of the normal charging system. The OATC will be required to manually actuate SI as auto SI will not work. In addition, CIA will fail to auto or manual actuate. This will require manual closure of CIA valves and dampers. The crew will return to E-0, transition eventually to 19010-C, E-1.0 Loss of Primary or Secondary Coolant.

Time	Position	Applicant's Action or Behavior
	OATC	Step # 10a – Checks PORV block valves power available (yes) Step # 10b – Checks PORVs closed (yes) Step # 10c – Checks at least one block valve open (yes) Step # 10d – checks CL temps < 220 F, does NOT arm COPS per RNO.
	OATC	Step # 11 - Checks ECCS termination criteria (not met) <ul style="list-style-type: none"> • 11a – RCS subcooling > 24 F or 38 F (no)
	OATC	Step # 12 - Checks if containment spray should be stopped (not met) <ul style="list-style-type: none"> • Step # 12a, spray pumps running (no)
	TEAM	Reviews CAUTION addressing LOSP after SI reset to restart equipment.

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Scenario No.: 4

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Event No.: 6 and 7

Event Description:

A LOCA through the RCP #4 seals develops due to failure of seal #2 in addition to the existing #1 seal failure. PRZR level and pressure will begin to lower faster than the capacity of the normal charging system. The OATC will be required to manually actuate SI as auto SI will not work. In addition, CIA will fail to auto or manual actuate. This will require manual closure of CIA valves and dampers. The crew will return to E-0, transition eventually to 19010-C, E-1.0 Loss of Primary or Secondary Coolant.

Time	Position	Applicant's Action or Behavior
	OATC	Step # 13 – Checks if RHR pumps should be stopped (no) <ul style="list-style-type: none"> • 14a, running with suction aligned to RWST (yes) • 14b, RCS > 300 psig & stable or rising (yes) • Reset SI • Stop RHR pumps
	OATC	Step # 14 – Restart RHR pumps if RCS pressure drops < 300 psig (no)
	OATC	Step # 15 – Checks RCS and SG pressures. <ul style="list-style-type: none"> • 16a, stable or rising SG pressures (yes) • 16b, RCS pressure stable or lowering (yes)

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Scenario No.: 4

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Event No.: 6 and 7

Event Description:

A LOCA through the RCP #4 seals develops due to failure of seal #2 in addition to the existing #1 seal failure. PRZR level and pressure will begin to lower faster than the capacity of the normal charging system. The OATC will be required to manually actuate SI as auto SI will not work. In addition, CIA will fail to auto or manual actuate. This will require manual closure of CIA valves and dampers. The crew will return to E-0, transition eventually to 19010-C, E-1.0 Loss of Primary or Secondary Coolant.

Time	Position	Applicant's Action or Behavior
	UO	Step # 16 - Checks if DGs should be stopped <ul style="list-style-type: none">• 16a, AC emergency busses energized by offsite power (yes)• 16b, Resets SI• 16c, directs OSA operator to stop DGs per SOP-13145.• 16d, checks and energizes stub busses per RNO.
	UO	Step # 17 - Checks Cold Leg recirculation capability. NOTE: At this time simulator operator will insert Loss of Offsite Power (Loss of Both RATs). Proceed to Event # 8.

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Scenario No.: 4

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Event No.: 8

Event Description:

A Loss of RAT 1A and 1B will occur resulting in an LOSP to 4160 1E busses 1AA02 and 1BA03. The DG-1A will re-energize 1AA02, 1BA03 will fail to re-energize. Train A NSCW pumps will fail to auto start requiring a manual start by the crew to prevent losing cooling water to the DG and Train A safety related ECCS pumps required for the LOCA. Once the crew has re-started the NSCW pumps manually, the scenario will end.

Time	Position	Applicant's Action or Behavior
	CREW	Diagnoses loss of RAT 1A feed to 1AA02: Indications / alarms / symptoms: <ul style="list-style-type: none"> • Various electrical distribution alarms. • Control room lights go dim and then re-energize. • DG1A output breaker closing and LOSP sequence running.
	RO	Step # 13 Continuous Actions <ul style="list-style-type: none"> • Restarts RHR pump "A" (not critical as RCS pressure is higher)
	BOP / CREW	Diagnoses failure of NSCW Train "A" pumps to auto start: Indications / alarms / symptoms: <ul style="list-style-type: none"> • NSCW pump green lights illuminated on Train "A" • ZLBs for NSCW Train "A" discharge valves indicate closed (pump start interlock met) • NSCW flows and discharge pressure reading 0 (zero) • DG high temperature alarms if NSCW not started promptly.

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Scenario No.: 4

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Event No.: 8

Event Description:

A Loss of RAT 1A and 1B will occur resulting in an LOSP to 4160 1E busses 1AA02 and 1BA03. The DG-1A will re-energize 1AA02, 1BA03 will fail to re-energize. Train A NSCW pumps will fail to auto start requiring a manual start by the crew to prevent losing cooling water to the DG and Train A safety related ECCS pumps required for the LOCA. Once the crew has re-started the NSCW pumps manually, the scenario will end.

Time	Position	Applicant's Action or Behavior
	BOP CRITICAL STEP	Starts two Train "A" NSCW pumps and verifies proper operation. <ul style="list-style-type: none">• NSCW discharge pressure, supply and return flows normal.
	END	This is the end of the scenario!

Facility:	Vogtle	Scenario No.:	5	Op-Test No.:	2009-301
Examiners:	Lea	Operators:			
MODIFIED					
Initial Conditions: 100% power. CNMT Mini-Purge in service, HV-3009 tagged shut for repairs (emergent work). SG ARV #3 tagged for repairs, B ATP #2 tagged for repairs, I&C recording lift coil currents in rod control for baseline PM data.					
Pre load the following: Failure of automatic SLI (ES10, ES11), failure of automatic and manual SI (ES16, ES17) MD AFW pump "B" trip AF02C.					
Turnover:					
New system peak record expected due to extremely hot weather. System loads at maximum due to unexpected unit trip. LCO 3.7.5 Condition A (HV-3009). INFO LCO 3.7.4 (ARV) INFO TR 13.1.3 (B ATP).					
Event No.	Malf. No.	Event Type*	Event Description		
1	CV07	C-SS C-OATC TS-SS	NCP trip, entry into AOP 18007-C section B for loss of charging. TR 13.1.3 Boric Acid Flow Path (Operating) – INFO only TR 13.1.5 Charging Pumps (Operating) – INFO only		
2	N/A	N-OATC N-SS	Restore CVCS charging & letdown to service.		
3	EL02 EL01A	C-ALL TS-SS	Loss of RAT 1A (Offsite Power) with DG1A tripping on over speed. AOP-18031, section A for Loss of 4160 1E Bus with DG Failing to Tie TS 3.8.1 (AC Sources), 3.8.9 (Distribution), and 3.8.4 (DC Sources)		
4	N/A	R-ALL	Power ramp from 100% to 90% to remove HDP # 1 from service.		
5	FW02D @ 100%	I-SS I-UO	Controlling FW Flow Channel on Loop # 4 SG fails high 18001-C section G for Failure of Steam Generator Flow Instrumentation		
6	FW06A @ 0-25% ramp 50s	M-ALL	Feed water Line Break on SG # 1 IRC. Crew will enter E-0 after manually tripping the reactor and SI will actuate on Low PRZR pressure. The crew will transition to E-2 to isolate the faulted SG.		
7	ES10&11 ES16&17 AF02C	I-UO I-OATC C-UO	Steam Line Isolation actuation failure (automatic & manual) Safety Injection actuation failure (automatic & manual) MDAFW pump B trip		

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

Event 1:

The Normal Charging Pump trips resulting in flashing of the CVCS normal letdown flowpath. Crew enters AOP 18007-C section B for loss of charging flow.

Verifiable Actions:

OATC – Immediately isolates letdown flowpath. Trends RCP seal parameters on IPC. Determines that NCP did not have a loss of suction prior to starting either CCP. Verifies normal charging flowpath is correct.

Technical Requirements:

13.1.3 & 13.1.5 – both INFO only for charging pumps and boration flowpaths operating.

Event 2:

Place CVCS charging & letdown in service using SOP 13006-1.

Verifiable Actions:

OATC – Starts CCP and establishes 80-90 gpm charging flow. Establishes 75 gpm letdown flow.

Event 3:

Loss of RAT "A" the offsite source to 1E 4160 bus AA02. DG1A will briefly start and trip on over speed resulting in a complete loss of power to the bus. This will require entry into AOP-18031-1 section A for Loss of 4160 1E Emergency Bus will DG Failing to Tie.

Verifiable Actions:

ALL - Restore reactor power to < 100%.
UO - Throttle TDAFW pump to control SG levels and reactor power.

Technical Specifications:

3.8.1 – AC Sources (Operating) – Condition E – Restore in 12 hours and apply LCO 3.8.9
3.8.9 – Distribution Systems (Operating) – Condition A – Restore in 8 hours
3.8.4 – DC Sources (Operating) – Condition C – Restore in 2 hours

Event 4:

Power descent to 90% to remove HDP # 1 from service.

Verifiable Actions:

ALL - Power reduction. UO will operate the main turbine and OATC will operate control rods and the CVCS boration controls.

Event 5:

Controlling feed water flow channel fails high. This will result in underfeed of affected SG and also affects MFPT Master Speed Controller. This will require entry into AOP-18001 section G for Failure of Steam Generator Flow Instrumentation.

Verifiable Actions:

UO - Takes manual control of MFPT Master Speed Controller and SG # 4 MFRV to control SG levels. Select out the failed channel.

Events 6 and 7:

Feed water line break IRC on SG # 1. This will result in either a manual reactor trip by the crew or an automatic reactor trip on SG # 1 Lo-Lo level. On the reactor trip, an SI actuation signal will soon be received on Hi-1 containment pressure of 3.8 psig. However, automatic SI and manual SI will not actuate. This will require the crew to manually start ECCS pumps and align ECCS valves. CIA / CVI will actuate if the crew uses the actuation hand switches. Automatic isolation of the main steam lines will also fail to actuate requiring manual actions by the crew.

Verifiable Action:

OATC - Performs a manual reactor trip as SG levels lower. Manual start of Train B ECCS pumps and aligns valves. Manual start of two (2) Train B CCW pumps. Manual actuation of CIA / CVI.

UO - Manual steam line isolation actuation. Isolation of Faulted SG. Raises TDAFW speed or opens isolation valves to establish auxiliary feed water flow.

Critical Tasks:

- 1. Manual SLI to limit blow down to one SG to prevent challenge to Containment Barrier.**
- 2. Manual isolation of faulted SG # 1. This includes direction to plant personnel to locally isolate de-energized AFW valve to SG # 1.**

Scenario Event Description Vogtle-2007-301

Draft

Facility:	Vogtle	Scenario No.:	5	Op-Test No.:	2007-301																												
Examiners:	_____	Operators:	_____	_____	_____																												
Initial Conditions: Plant has been at 100% Power for three months following a refueling outage.																																	
Pre load the following: Failure of automatic SLI (ES10, ES11), failure of automatic and manual SI (ES16, ES17) MD AFW pump "B" shaft shear AF02B.																																	
Place SIP "B" in PTL, place a red hold tag on the hand switch. Place SI Train "B" SSMP hand switch to "Bypass".																																	
Turnover: Storms are approaching from the Southwest and high winds are possible within the hour.																																	
SI Pump "B" was tagged out yesterday at 1200 hours and is scheduled to be returned to service in 24 hours (TS 3.5.2).																																	
Heater Drain Pump # 1 is experiencing high vibrations. The system engineer, maintenance, and operations management are in the field evaluating the pump at this time.																																	
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">Event No.</th> <th style="width: 15%;">Malf. No. / Position</th> <th style="width: 10%;">Event Type*</th> <th style="width: 65%;">Event Description</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td>Fill SI Accum BOP SRO (TS)</td> <td style="text-align: center;">N</td> <td>Fill Safety Injection Accumulator # 3, level low due to sample valve left open. SOP-13150-1, Safety Injection System section 4.2.1 for Filling Accumulator at Normal RCS Pressure. TS 3.5.1 (ECCS - Accumulators) is cleared during this evolution.</td> </tr> <tr> <td style="text-align: center;">2</td> <td>PR03A @ 100% RO SRO (TS)</td> <td style="text-align: center;">I</td> <td>Controlling PRZR level instrument LT-459 fails high. 18001-C, Section D Failure of PRZR Level Instrumentation TS 3.3.1 (Rx. Trip)</td> </tr> <tr> <td style="text-align: center;">3</td> <td>EL02 EL01A RO / BOP SRO (TS)</td> <td style="text-align: center;">C</td> <td>Loss of RAT 1A (Offsite Power) with DG1A tripping on over speed. AOP-18031, section A for Loss of 4160 1E Bus with DG Failing to Tie TS 3.8.1 (AC Sources)</td> </tr> <tr> <td style="text-align: center;">4</td> <td>FW02D @ 100% BOP</td> <td style="text-align: center;">I</td> <td>Controlling FW Flow Channel on Loop # 4 SG fails high 18001-C section G for Failure of Steam Generator Flow Instrumentation</td> </tr> <tr> <td style="text-align: center;">5</td> <td>Power Ramp ALL</td> <td style="text-align: center;">R</td> <td>Power ramp from 100% to 90% to remove HDP # 1 from service. AOP-18013-C, Rapid Power Reduction.</td> </tr> <tr> <td style="text-align: center;">6</td> <td>FW06A @ 0-25% over 50 seconds ALL</td> <td style="text-align: center;">M</td> <td>Feed water Line Break on SG # 1 ORC outside FWI valves. Crew will enter E-0 after manually tripping the reactor and SI will actuate on Low PRZR pressure. The crew will transition to E-2 to isolate the faulted SG.</td> </tr> </tbody> </table>						Event No.	Malf. No. / Position	Event Type*	Event Description	1	Fill SI Accum BOP SRO (TS)	N	Fill Safety Injection Accumulator # 3, level low due to sample valve left open. SOP-13150-1, Safety Injection System section 4.2.1 for Filling Accumulator at Normal RCS Pressure. TS 3.5.1 (ECCS - Accumulators) is cleared during this evolution.	2	PR03A @ 100% RO SRO (TS)	I	Controlling PRZR level instrument LT-459 fails high. 18001-C, Section D Failure of PRZR Level Instrumentation TS 3.3.1 (Rx. Trip)	3	EL02 EL01A RO / BOP SRO (TS)	C	Loss of RAT 1A (Offsite Power) with DG1A tripping on over speed. AOP-18031, section A for Loss of 4160 1E Bus with DG Failing to Tie TS 3.8.1 (AC Sources)	4	FW02D @ 100% BOP	I	Controlling FW Flow Channel on Loop # 4 SG fails high 18001-C section G for Failure of Steam Generator Flow Instrumentation	5	Power Ramp ALL	R	Power ramp from 100% to 90% to remove HDP # 1 from service. AOP-18013-C, Rapid Power Reduction.	6	FW06A @ 0-25% over 50 seconds ALL	M	Feed water Line Break on SG # 1 ORC outside FWI valves. Crew will enter E-0 after manually tripping the reactor and SI will actuate on Low PRZR pressure. The crew will transition to E-2 to isolate the faulted SG.
Event No.	Malf. No. / Position	Event Type*	Event Description																														
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2	PR03A @ 100% RO SRO (TS)	I	Controlling PRZR level instrument LT-459 fails high. 18001-C, Section D Failure of PRZR Level Instrumentation TS 3.3.1 (Rx. Trip)																														
3	EL02 EL01A RO / BOP SRO (TS)	C	Loss of RAT 1A (Offsite Power) with DG1A tripping on over speed. AOP-18031, section A for Loss of 4160 1E Bus with DG Failing to Tie TS 3.8.1 (AC Sources)																														
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6	FW06A @ 0-25% over 50 seconds ALL	M	Feed water Line Break on SG # 1 ORC outside FWI valves. Crew will enter E-0 after manually tripping the reactor and SI will actuate on Low PRZR pressure. The crew will transition to E-2 to isolate the faulted SG.																														

Scenario Event Description Vogtle-2007-301

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7	AC02B RO	C	<p>ACCW Pump # 2 trips resulting in a loss of RCP cooling.</p> <p>Crew trips RCP before 10 minutes elapse or after exceeding RCP trip limits.</p>
(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Vogtle 2007-301 Scenario #5 (Feed Water Line Break IRC / Loss of ACCW)

Event 1

Crew assumes shift with SI Accumulator # 3 pressure of < 617 psig (Tech Spec limit). Pressure low due to Chemistry inadvertently left sample valve open causing level to lower along with pressure. This happened just prior to turnover, direct crew to restore accumulator # 3's pressure to normal. Crew will restore using SOP-13105-1 SI system.

Verifiable Action: (BOP) Manual start of SIP "A" and manipulate appropriate SI system valves to restore Accumulator # 3 pressure to greater than the Tech Spec limit.

Technical Specifications: LCO 3.5.1 to be cleared.

Event 2

Controlling PRZR level channel LT-459 will fail high resulting in an automatic reduction of charging flow via FV-0121. This will require entry into AOP-18001-C, section D for Failure of PRZR level instrumentation.

Verifiable Action: (RO) Takes manual control of charging flow control valve FV-0121 to restore charging flow to normal.

Verifiable Action: (RO) Selects out the failed channel.

Technical Specifications: LCO 3.3.1

Event 3

Loss of RAT "A" the offsite source to 1E 4160 bus AA02. DG1A will briefly start and trip on over speed resulting in a complete loss of power to the bus. This will require entry into AOP-18031-1 section A for Loss of 4160 1E Emergency Bus will DG Failing to Tie.

Verifiable Action: (ALL) Restore reactor power to < 100%.

Verifiable Action: (BOP) Throttle TDAFW pump to control SG levels and reactor power.

Technical Specifications: LCO 3.8.1 and list in Attachment A of 18031.

Event 4

Controlling feed water flow channel fails high. This will result in underfeed of affected SG and also affects MFPT Master Speed Controller. This will require entry into AOP-18001 section G for Failure of Steam Generator Flow Instrumentation.

Verifiable Action: (BOP). Takes manual control of MFPT Master Speed Controller and SG # 4 MFRV to control SG levels. Select out the failed channel.

Event 5

Management request rapid power descent to 90% to remove HDP # 1 from service as a safety concern.

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

Event 6

Feed water line break IRC on SG # 1. This will result in either a manual reactor trip by the crew or an automatic reactor trip on SG # 1 Lo-Lo level. On the reactor trip, an SI actuation signal will soon be received on Hi-1 containment pressure of 3.8 psig. However, automatic SI and manual SI will not actuate. This will require the crew to manual start ECCS pumps and align ECCS valves. CIA / CVI will actuate if the crew uses the actuation hand switches. Automatic isolation of the main steam lines will also fail to actuate requiring manual actions by the crew.

Verifiable Action: (RO) Performs a manual reactor trip as SG levels lower

Verifiable Action: (RO) Manual start of Train B ECCS pumps and aligns valves.

Verifiable Action: (RO) Manual start of two (2) Train B CCW pumps.

Verifiable Action: (RO) Manual actuation of CIA / CVI.

Verifiable Action: (BOP) Manual steam line isolation actuation.

Verifiable Action: (BOP) Raises TDAFW speed or opens isolation valves to establish auxiliary feed water flow.

Critical Task: Manual start of CCP "B" and opening of BIT outlet isolation HV-8801B.

Critical Task: Manual SLI to limit blow down to one SG to prevent challenge to Containment Barrier.

Event 7

ACCW pump # 2 will trip just after entry into E-2 resulting in a loss of cooling to the RCPs. The crew should trip the RCPs prior to 10 minutes or immediately (within 1 minute) of receipt of any RCP immediate trip criteria parameter. This will be a chance for the SRO to prioritize crew actions between faulted SG and ACCW pump trip.

Verifiable Action: (RO). Manually trips RCP on loss of ACCW.

Verifiable Action: (BOP) Manual isolation of faulted SG # 1.

Critical task: Manual isolation of faulted SG # 1. This includes direction to plant personnel to locally isolate the de-energized AFW valve to SG # 1.

BANK

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Scenario No.: 5

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Event No.: 1

Event Description: The NCP will trip resulting in a loss of CVCS charging flow and flashing of the CVCS letdown line. This will require entry into AOP 18007-C, section B for loss of charging.

Time	Position	Applicant's Action or Behavior
	CREW	Diagnose trip of the in service normal charging pump (NCP) <u>Alarms:</u> <ul style="list-style-type: none"> • CHARGING LINE HI/LO FLOW • NC PUMP LO FLOW • CHARGING PUMP OVERLOAD TRIP • REGEN HX LTDN HI TEMP • RCP SEAL WATER INJ LO FLOW <u>Indications:</u> <ul style="list-style-type: none"> • Charging flow – goes to 0 gpm • Letdown flow – starts wide oscillations due to flashing • RCP seal injection flows – go to 0 gpm
	OATC	Immediately isolates CVCS letdown flow: <ul style="list-style-type: none"> • Closes letdown orifice isolation valves • Closes letdown isolation valves
	SS	Enters AOP 18007-C, Section B, Loss of Charging (Crew Update)
	OATC / UO	Initiate foldout page for 18007-C, section B

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Event No.: 1

Event Description: The NCP will trip resulting in a loss of CVCS charging flow and flashing of the CVCS letdown line. This will require entry into AOP 18007-C, section B for loss of charging.

Time	Position	Applicant's Action or Behavior
	OATC	Trends RCP seal parameters (attachment A): <ul style="list-style-type: none"> • Seal injection flows • Seal injection temperatures (VCT outlet) • #1 seal leakoff flows • #1 seal inlet temperatures
	OATC	Determines cause of charging pump trip (its not gas binding): <ul style="list-style-type: none"> • NCP flow & pressure trend history • VCT level 30%-50
	OATC	Checks ACCW system is in service
	OATC	Verifies charging valves open: <ul style="list-style-type: none"> • HV-8105 • HV-8106 • HV-8146 OR HV-8147 • HV-8485A and B • FV-121

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Scenario No.: 5

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Event No.: 1

Event Description: The NCP will trip resulting in a loss of CVCS charging flow and flashing of the CVCS letdown line. This will require entry into AOP 18007-C, section B for loss of charging.

Time	Position	Applicant's Action or Behavior
	SS	Initiates Technical Requirements: TR 13.1.3 Boration Flow paths – INFO only TR 13.1.5 Charging pumps – INFO only
	OATC	Proceeds to SOP 13006-1 to restore normal charging & letdown (Event 2)

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Scenario No.: 5

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Event No.: 2

Event Description: The OATC will restore normal charging and letdown to service using SOP 13006-1 following implementation of AOP 18007-C from event 1.

Time	Position	Applicant's Action or Behavior
	OATC	<p><u>SOP 13006-1, Section 4.4.13:</u></p> <p>Dispatch ABO to perform CCP pre-start checks</p> <p>Verify VCT level between 30% & 80%</p> <p>Verify proper charging alignment:</p> <ul style="list-style-type: none"> • VCT suction – OPEN (LV-112B & LV-112C) • Pump normal miniflow isolations – OPEN (HV-8111A/8111B/8110) • Pump suction & discharge valves – OPEN (HV-8471B & HV-8485B) • Safety Grade Charging isolation – CLOSED (HV-190B) • CCP discharge header cross connect – OPEN (HV-8438) • Seal injection flow (HC-182) set for maximum flow • Charging control FIC-121 set to minimum • Charging loop isolation – OPEN (HV-8146 or HV-8147) • CCP Aux LO pump – Running
	OATC	<p>Start selected CCP (most likely will be CCP-1B):</p> <ul style="list-style-type: none"> • Verify pump aux LO pump lamp goes out • Adjust charging to desired flow • Adjust seal injection flow between 8 and 13 GPM.

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Scenario No.: 5

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Event No.: 2

Event Description: The OATC will restore normal charging and letdown to service using SOP 13006-1 following implementation of AOP 18007-C from event 1.

Time	Position	Applicant's Action or Behavior
	OATC	<p><u>SOP 13006-1, Section 4.4.2</u></p> <p>Align letdown flow path for start up:</p> <ul style="list-style-type: none"> • LTDN Orifice isolations(HV-8149A/B/C) – CLOSED • LTDN isolations (LV-459/460) – CLOSED • PZR aux Spray(HV-8145) – CLOSED • Pipe Break protection (HV-15214) – OPEN • LTDN CNMT isolations (HV-8160 & HV-8152) – OPEN • LTDN pressure controller (PV-131) –Manual 50%-75% • LTDN HX outlet (TIC-130) – Manual to most recent position on rounds sheets
	OATC	Verify PZR level > 17%
	OATC	<p>Verify charging aligned:</p> <ul style="list-style-type: none"> • Charging line isolations(HV-8105 & HV-8106) –OPEN • Charging to RCS loop isolation –either one OPEN

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Scenario No.: 5

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Event No.: 2

Event Description: The OATC will restore normal charging and letdown to service using SOP 13006-1 following implementation of AOP 18007-C from event 1.

Time	Position	Applicant's Action or Behavior
	OATC	Raises charging flow to 80-90 GPM while maintaining RCP seal injection flow between 8-13 GPM
	OATC	Establishes Letdown flow: <ul style="list-style-type: none">• Opens LTDN isolations and LTDN Orifice Isolation to establish 75 gpm letdown flow• Adjusts LTDN pressure between 360-380 psig, then places controller in automatic• Places LTDN HX temperature controller in automatic• Verify LTDN REGEN HX outlet temperature (TI-127) < 380 °F.

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Event No.: 3

Event Description: RAT 1A (offsite source) will trip with DG-1A tripping on overspeed during start. This will result in 4160 1E bus 1AA02 being de-energized. The crew will be required to enter AOP-18031 section A to address the loss of the 1E bus. Prompt action will have to be taken to address TDAFW pump start and reactor power rise due to cold FW from AFW.

Time	Position	Applicant's Action or Behavior
	CREW	Diagnoses loss of 1E electrical bus 1AA02: Symptoms / alarms / indications: <ul style="list-style-type: none"> • Various plant alarms associated with Train A • DG1A start and subsequent trip. • DG1A OVERSPEED TRIP alarm. • TDAFW pump auto start
	SS	Enters AOP-18031 Loss of Class 1E Electrical Systems (Crew Update)
	OATC	Checks reactor power – less than 100% on the following indications: <ul style="list-style-type: none"> • UQ-1118 less than or equal to 100% MWT • PR NIS less than or equal to 100% • Delta T less than or equal to 100% (not)
	UO	Performs the following actions to lower power. <ul style="list-style-type: none"> • Reduces TDAFW speed to not less than 1535 rpm. • Throttles affected MDAFW pump discharge valves. • Reduces turbine load if reactor power still > 100%

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Event No.: 3

Event Description: RAT 1A (offsite source) will trip with DG-1A tripping on overspeed during start. This will result in 4160 1E bus 1AA02 being de-energized. The crew will be required to enter AOP-18031 section A to address the loss of the 1E bus. Prompt action will have to be taken to address TDAFW pump start and reactor power rise due to cold FW from AFW.

Time	Position	Applicant's Action or Behavior
	UO	Verifies DG-1A is not running
	SS	Transitions to 18031 section A
	UO	Verifies two NSCW pumps running on Train B
	OATC	Verifies CCP-1B is running. If it is not, then isolates letdown and initiates 18007-C for loss of charging flow.
	OATC / UO	Verifies two CCW pumps running on Train B
	OATC / UO	Initiates the Continuous Actions Page
	UO	Checks AFW not needed to maintain SG levels

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Event No.: 3

Event Description: RAT 1A (offsite source) will trip with DG-1A tripping on overspeed during start. This will result in 4160 1E bus 1AA02 being de-energized. The crew will be required to enter AOP-18031 section A to address the loss of the 1E bus. Prompt action will have to be taken to address TDAFW pump start and reactor power rise due to cold FW from AFW.

Time	Position	Applicant's Action or Behavior
	OATC	Verifies ACCW pump "B" running
	UO	Verifies four containment coolers Train B running in high speed per 13120-C, Containment Building Cooling System.
	UO	Verifies two Train B CRDM fans running.
	UO	Verifies reactor cavity cooling unit Train B is running.
	CREW	Verifies SFP cooling pump on Train B running.
	UO	Verifies Train B class 1E 480V load centers energized. <ul style="list-style-type: none"> • BB06 • BB07 • BB16 • NB10

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Event No.: 3

Event Description: RAT 1A (offsite source) will trip with DG-1A tripping on overspeed during start. This will result in 4160 1E bus 1AA02 being de-energized. The crew will be required to enter AOP-18031 section A to address the loss of the 1E bus. Prompt action will have to be taken to address TDAFW pump start and reactor power rise due to cold FW from AFW.

Time	Position	Applicant's Action or Behavior
	UO	Verifies Train B MCCs – no trouble alarms present.
	SS	Directs propping open of Unit 1 Train A Control Building doors.
	SS	Initiates the following actions: <ul style="list-style-type: none"> • 14230, AC Source Verification • Verify SAT energized per 13418-C, Standby Auxiliary Transformer
	OATC	Verify DRPI – energized.
	UO	Checks DC bus loads, battery amps less than the following limits. <ul style="list-style-type: none"> • AD1B – 300 amps • BD1B – 300 amps • CD1B – 100 amps • DD1B - 80 amps Monitors all 1E battery bus voltages – remain > 105V DC.

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Event No.: 3

Event Description: RAT 1A (offsite source) will trip with DG-1A tripping on overspeed during start. This will result in 4160 1E bus 1AA02 being de-energized. The crew will be required to enter AOP-18031 section A to address the loss of the 1E bus. Prompt action will have to be taken to address TDAFW pump start and reactor power rise due to cold FW from AFW.

Time	Position	Applicant's Action or Behavior
	OATC	Checks reactor makeup water system status. <ul style="list-style-type: none"> • Train B Boric Acid Transfer Pump running or in auto. • Unaffected Reactor Makeup Water Pump running or in auto.
	UO	Verifies battery charger in service for non-1E batteries. <ul style="list-style-type: none"> • ND1 • ND2 • ND3A • ND3B
	UO	Transfers any de-energized NYS, NYRS, and NYR buses to the alternate sources per 13432-1, 120V AC NON-1E Instrumentation Electrical Distribution System
	CREW	Directs transfer of control room emergency lighting for Train A to Unit 2

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Event No.: 3

Event Description: RAT 1A (offsite source) will trip with DG-1A tripping on overspeed during start. This will result in 4160 1E bus 1AA02 being de-energized. The crew will be required to enter AOP-18031 section A to address the loss of the 1E bus. Prompt action will have to be taken to address TDAFW pump start and reactor power rise due to cold FW from AFW.

Time	Position	Applicant's Action or Behavior
	SS	Initiates applicable Technical Specification requirements listed in Attachment A. <ul style="list-style-type: none">• LCO 3.8.1 AC Sources - Condition E• LCO 3.8.9 Distribution Systems – Condition A
	SS	Initiates an investigation and repair for the loss of power. Notifies Operations Duty of the AOP entry.

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Event No.: 4

Event Description: Power ramp to 90% to remove HDP # 1 from service. The Operations Manager will direct the crew to reduce power to 90% within 15 minutes due to HDP # 1 vibration increasing and a possible personnel safety hazard. The crew will enter AOP-18013-C, Rapid Power Reduction to lower power to 90%.

Time	Position	Applicant's Action or Behavior
	SS	Initiates a unit shutdown per AOP-18013-C, Rapid Down Power at Operations Management direction. <ul style="list-style-type: none"> • Performs SHUTDOWN BRIEFING • Initiates the Continuous Actions page.
	OATC / UO	<ul style="list-style-type: none"> • Reduce Turbine load at a rate up to 5% minute: • Maintains Tave within 3 degrees F of Tref using rods in manual or boration as necessary. • Maintains reactor and turbine power matched. • PRZR level and pressure maintained on program. • SG levels maintained on program.
	SS	Notifies System Operator that a load reduction is in progress.
	NOTE	Event will continue until adequate power maneuver completed.

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Scenario No.: 5

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Event No.: 5

Event Description: Controlling feed water flow channel for SG # 4 will fail high resulting in MFRV throttling shut and underfeeding SG # 4. MFPT speed control will also be affected. The crew will be required to perform IOAs of 18001-C section G for SG Flow Instrumentation Failure.

Time	Position	Applicant's Action or Behavior
	UO	Diagnoses failure of SG # 4 controlling feed flow instrument: Symptoms / alarms / indications: <ul style="list-style-type: none"> • STM GEN 4 FLOW MISMATCH • Any unexplained steam / feed flow mismatch indication
	UO	Performs IOA of AOP-18001 section G <ul style="list-style-type: none"> • Checks steam and feed flows – matched on all SGs (not) Performs RNO of IOA. <ul style="list-style-type: none"> • Takes manual control of MFRV # 4 • Takes manual control of MFP speed
	UO	Selects an unaffected channel for control
	UO	Returns MFP(s) speed controls to automatic

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Scenario No.: 5

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Event No.: 5

Event Description: Controlling feed water flow channel for SG # 4 will fail high resulting in MFRV throttling shut and underfeeding SG # 4. MFPT speed control will also be affected. The crew will be required to perform IOAs of 18001-C section G for SG Flow Instrumentation Failure.

Time	Position	Applicant's Action or Behavior
	UO	Returns SG feed flow valve to automatic
	SS / CREW	Initiates the Continuous Actions Pages
	UO	Checks SG level control maintains NR level at 65%
	SS	Notifies I & C to initiate repairs, notifies Operations Duty of AOP entry

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Scenario No.: 5

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Event No.: 6 and 7

Event Description:

A feed water line break on SG # 1 inside CNMT will occur. The crew will enter E-0 after tripping the reactor and SI will not actuate automatically or from the manual hand switches. This will require the crew to manually start ECCS pumps and align ECCS valves. CIA and CVI actuation will not occur due to auto SI failure but can be actuated using the QMCB hand switches. SLI will not occur in auto requiring the crew to initiate a manual SLI. The crew will eventually transition to E-2 to isolate SG # 1.

Time	Position	Applicant's Action or Behavior
	CREW	Recognizes degrading plant conditions: <ul style="list-style-type: none"> • FW flow higher than steam flow with SG # 1 level lowering rapidly • Various SG # 1 feed flow, steam flow and level alarms
	OATC	Manually trips the reactor using the QMCB hand switches
	SS	Enters E-0, Reactor Trip or Safety Injection
	OATC / UO	Performs IOAs of E-0 <ul style="list-style-type: none"> • Verifies Reactor Trip (OATC) • Verifies Turbine Trip (UO) • Verifies AC Power to the Emergency Buses (UO) • Checks if SI actuated (OATC)

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Scenario No.: 5

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Event No.: 6 and 7

Event Description:

A feed water line break on SG # 1 inside CNMT will occur. The crew will enter E-0 after tripping the reactor and SI will not actuate automatically or from the manual hand switches. This will require the crew to manually start ECCS pumps and align ECCS valves. CIA and CVI actuation will not occur due to auto SI failure but can be actuated using the QMCB hand switches. SLI will not occur in auto requiring the crew to initiate a manual SLI. The crew will eventually transition to E-2 to isolate SG # 1.

Time	Position	Applicant's Action or Behavior
	<p style="text-align: center;"><i>UO</i></p> <p style="text-align: center;">CRITICAL</p>	<p><i>With SS permission performs the following actions to limit RCS cooldown and CNMT pressure rise:</i></p> <ul style="list-style-type: none"> • <i>Manual SLI</i> • <i>Isolates AFW flow to SG # 1 (faulted SG)</i> • <i>Throttles AFW flow to intact SG's (2, 3, and 4)</i> <p><i>Note this is an early action allowed by procedure 10020-C and will mostly be performed with SS concurrence shortly after reactor trip immediate actions are completed.</i></p>
	SS / TEAM	Initiates Foldout Page, Continuous Actions Page and RO and BOP Initial Actions Pages
	OATC	<p>Performs Initial Operator Actions of E-0</p> <ul style="list-style-type: none"> • Checks both trains of ECCS aligning per MLBs. If not performed previously – attempts manual SI actuation • Checks CIA actuated per MLBs (it won't be) • Informs SS and manually actuates CIA

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Scenario No.: 5

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Event No.: 6 and 7

Event Description:

A feed water line break on SG # 1 inside CNMT will occur. The crew will enter E-0 after tripping the reactor and SI will not actuate automatically or from the manual hand switches. This will require the crew to manually start ECCS pumps and align ECCS valves. CIA and CVI actuation will not occur due to auto SI failure but can be actuated using the QMCB hand switches. SLI will not occur in auto requiring the crew to initiate a manual SLI. The crew will eventually transition to E-2 to isolate SG # 1.

Time	Position	Applicant's Action or Behavior
	OATC Part of CRITICAL STEP (1st part)	Performs Initial Operator Actions of E-0 Checks ECCS pumps and NCP status <ul style="list-style-type: none"> • CCPs – NOT running, informs SS • Places alternate mini flow valve for CCP "B" to Enable PTL • Starts CCP "B" to achieve high head ECCS flow • SI Pumps – NOT running • RHR pumps – NOT running • Informs SS and starts SI & RHR pumps "B" • NCP – tripped
	OATC	Performs Initial Operator Actions of E-0 <ul style="list-style-type: none"> • CCW pumps – informs SS and starts two train B CCW pumps • NSCW pumps – two running per train • NSCW tower return bypass valves – in auto • Containment coolers running in SLOW speed with cooler isolation valves open • Informs SS Train "B" containment coolers need to be shifted to SLOW speed (UO will perform this action)

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Event No.: 6 and 7

Event Description:

A feed water line break on SG # 1 inside CNMT will occur. The crew will enter E-0 after tripping the reactor and SI will not actuate automatically or from the manual hand switches. This will require the crew to manually start ECCS pumps and align ECCS valves. CIA and CVI actuation will not occur due to auto SI failure but can be actuated using the QMCB hand switches. SLI will not occur in auto requiring the crew to initiate a manual SLI. The crew will eventually transition to E-2 to isolate SG # 1.

Time	Position	Applicant's Action or Behavior
	OATC	Performs Initial Operator Actions of E-0. <ul style="list-style-type: none"> • CVI valves and dampers closed per MLBs. Should have aligned properly after manual CIA actuation
	OATC	Performs Initial Operator Actions of E-0 <ul style="list-style-type: none"> • Checks containment pressure has remained < 21.5 psig
	OATC Part of CRITICAL STEP (2nd part)	Performs Initial Operator Actions of E-0 Checks ECCS flows: <ul style="list-style-type: none"> • BIT Flow (none as valves have not aligned) • Aligns valves per Attachment B • Opens HV-8801B to achieve BIT flow • RCS pressure < 1625 psig. • SI pump flow • RCS pressure > 300 psig

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Event No.: 6 and 7

Event Description:

A feed water line break on SG # 1 inside CNMT will occur. The crew will enter E-0 after tripping the reactor and SI will not actuate automatically or from the manual hand switches. This will require the crew to manually start ECCS pumps and align ECCS valves. CIA and CVI actuation will not occur due to auto SI failure but can be actuated using the QMCB hand switches. SLI will not occur in auto requiring the crew to initiate a manual SLI. The crew will eventually transition to E-2 to isolate SG # 1.

Time	Position	Applicant's Action or Behavior
	OATC	Performs Initial Operator Actions of E-0 Checks ECCS valve alignment proper per MLBs Manually aligns train "B" ECCS valves per Attachments B, C, D as necessary
	OATC	Performs Initial Operator Actions of E-0 Checks ACCW pumps – Train "B" running
	OATC	Performs Initial Operator Actions of E-0 Adjusts RCP seal injection to all RCPs 8 to 13 gpm

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Event No.: 6 and 7

Event Description:

A feed water line break on SG # 1 inside CNMT will occur. The crew will enter E-0 after tripping the reactor and SI will not actuate automatically or from the manual hand switches. This will require the crew to manually start ECCS pumps and align ECCS valves. CIA and CVI actuation will not occur due to auto SI failure but can be actuated using the QMCB hand switches. SLI will not occur in auto requiring the crew to initiate a manual SLI. The crew will eventually transition to E-2 to isolate SG # 1.

Time	Position	Applicant's Action or Behavior
	UO CRITICAL STEP	Performs UO Initial Operator Actions of E-0 <ul style="list-style-type: none"> • Checks MDAFW pump "B" and TDAFW pump is running • Will need to manually raise TDAFW pump speed • Checks NR SG levels > 10%, controls AFW flows • Checks if SLI is required and ensures MSIVs and Bypasses are closed • Informs SS and performs manual SLI using QMCB hand switches to limit blow down to 1 SG. • Verifies FWI (MFRV, BFRV, MFIV, BFIVs all shut) • Verifies SGBD isolated and places hand switches for SGBD isolation valves to close • Verifies SGBD sample isolations closed • Verifies Diesel Generator Train "B" running (not) • Informs SS and manually starts DG "B" • Throttles AFW flow to control SG levels 10 – 65% NR • Verifies both MFPs tripped • Checks Main generator output breakers are open
	OATC	Checks RCS temperature stable at or trending to 557 degrees F using RCS Tavg

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Event No.: 6 and 7

Event Description:

A feed water line break on SG # 1 inside CNMT will occur. The crew will enter E-0 after tripping the reactor and SI will not actuate automatically or from the manual hand switches. This will require the crew to manually start ECCS pumps and align ECCS valves. CIA and CVI actuation will not occur due to auto SI failure but can be actuated using the QMCB hand switches. SLI will not occur in auto requiring the crew to initiate a manual SLI. The crew will eventually transition to E-2 to isolate SG # 1.

Time	Position	Applicant's Action or Behavior
	CREW	Takes actions of RNO step 8 to control RCS temperature <ul style="list-style-type: none"> • Stop dumping steam • Reduce AFW flow (maintain 570 gpm if SG level < 10%[32%])
	OATC	Checks PORVs, Block Valves, and Spray Valves all Closed
	UO / SS	Checks for faulted SG and transitions to E-2, Faulted SG Isolation
	OATC	Checks if RCPs should be stopped (not expected) <ul style="list-style-type: none"> • Checks at least one CCP or SIP running • RCS pressure < 1375 psig • Stops RCPs if criteria met

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Event No.: 6 and 7

Event Description:

A feed water line break on SG # 1 inside CNMT will occur. The crew will enter E-0 after tripping the reactor and SI will not actuate automatically or from the manual hand switches. This will require the crew to manually start ECCS pumps and align ECCS valves. CIA and CVI actuation will not occur due to auto SI failure but can be actuated using the QMCB hand switches. SLI will not occur in auto requiring the crew to initiate a manual SLI. The crew will eventually transition to E-2 to isolate SG # 1.

Time	Position	Applicant's Action or Behavior
	SS	Initiates CSFST monitoring and initiates EPIP implementation.
	UO	Verifies MSIVs and Bypasses – SHUT.
	UO	Checks SG secondary pressure boundaries. <ul style="list-style-type: none"> • Any intact – SG pressure ANY stable or rising. • Identifies faulted SG # 1 pressure lowering uncontrolled or completely depressurized.
	UO	Isolates Main Feed water to SG # 1. <ul style="list-style-type: none"> • Shuts affected MFIV, HV-5227. • Shuts affected BFIV, HV-15196.

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Event No.: 6 and 7

Event Description:

A feed water line break on SG # 1 inside CNMT will occur. The crew will enter E-0 after tripping the reactor and SI will not actuate automatically or from the manual hand switches. This will require the crew to manually start ECCS pumps and align ECCS valves. CIA and CVI actuation will not occur due to auto SI failure but can be actuated using the QMCB hand switches. SLI will not occur in auto requiring the crew to initiate a manual SLI. The crew will eventually transition to E-2 to isolate SG # 1.

Time	Position	Applicant's Action or Behavior
	UO	Isolates AFW to SG # 1 <ul style="list-style-type: none"> • MDAFW pump A throttle valve (HV-5139) • TDAFW pump throttle valve (HV-5122)
	UO	Verifies MDAFW pump B running and capable of feeding SGs for RCS cooldown
	UO	Shuts SG #1 steam supply to TDAFW pump (HV-3009)
	UO	Verifies SG # 1 ARV shut
	UO	Verifies SGBD isolation valve for loop 1 closed with handswitch in close

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Event No.: 6 and 7

Event Description:

A feed water line break on SG # 1 inside CNMT will occur. The crew will enter E-0 after tripping the reactor and SI will not actuate automatically or from the manual hand switches. This will require the crew to manually start ECCS pumps and align ECCS valves. CIA and CVI actuation will not occur due to auto SI failure but can be actuated using the QMCB hand switches. SLI will not occur in auto requiring the crew to initiate a manual SLI. The crew will eventually transition to E-2 to isolate SG # 1.

Time	Position	Applicant's Action or Behavior
	UO	Verifies SG #1 sample isolation is closed
	UO	Verifies SG # 1 remains isolated during subsequent recovery actions unless needed for RCS cooldown
	UO	Checks CST level > 15%
	UO	Checks for SG tube rupture: <ul style="list-style-type: none"> • Secondary radiation trend (steamlines, SJAE, SGBD, sample, etc)

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Event No.: 6 and 7

Event Description:

A feed water line break on SG # 1 inside CNMT will occur. The crew will enter E-0 after tripping the reactor and SI will not actuate automatically or from the manual hand switches. This will require the crew to manually start ECCS pumps and align ECCS valves. CIA and CVI actuation will not occur due to auto SI failure but can be actuated using the QMCB hand switches. SLI will not occur in auto requiring the crew to initiate a manual SLI. The crew will eventually transition to E-2 to isolate SG # 1.

Time	Position	Applicant's Action or Behavior
	UO	Checks if ECCS flow can be reduced: <ul style="list-style-type: none"> • RCS subcooling > 24°F [38 °F ADVERSE] • Secondary Heat Sink – 570 gpm flow or 10% NR level intact SG • RCS pressure – stable or rising • PRZR level > 9%[37% ADVERSE]
	CREW	If ECCS termination criteria met transition to 19011-C, SI Termination. -- OR -- If ECCS termination criteria not met transition to 19010, Loss of Reactor or Secondary Coolant
		END OF SCENARIO

Facility: Vogtle Scenario No.: 6(Spare) Op-Test No.: 2009-301

Examiners: Lea Operators: _____

NEW

Initial Conditions: (IC11)

Power was 100% for previous 30 days. 50% power for last 24 hours. CNMT Mini-Purge in service, HV-3009 shut tagged for repairs (emergent work). DG-1B running for monthly surveillance (3000 KW), SG ARV #3 tagged for repairs, B ATP #2 tagged for repairs, I&C recording lift coil currents in rod control for baseline PM data.

Turnover: 50% power due to vibration issues with MFP B, maintain 50%. LCO 3.7.5 Condition A (HV-3009). INFO LCO 3.7.4 (ARV) INFO TR 13.1.3 (B ATP). Complete DG-1B surveillance procedure.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N-UO N-SS	Report from PCC that the distribution center is "one contingency away" from being unable to maintain system voltage between 230 and 242Kv. (AOP 18017-C section A). UO will shutdown EDG-1B.
2	RD13I	R-ALL TS-SS	Dropped Control Rod – (blown lift coil fuse for rod H8 due to short from test leads. Dropped rod recovery. (AOP 18003-C Section A) LCO 3.1.4 – Rod alignment limits
3	CV13	I-SS I-OATC	VCT LT-112 fails low causing continuous automatic makeup. Must manually control blender operations otherwise get continuous makeup. ARP 17007-1.
4	NS05	C-ALL TS-SS	Loss of NSCW train A – pipe break must shift components to alternate train. LCO 3.7.8 NSCW & 3.8.1 AC Sources
5	GE08 @ 0% EL02 EL03 After UV load shed	C-ALL TS-SS	Loss of Offsite AC Power (EOP 19000-C and AOP 18017-C Section B and). LCO 3.8.1 / 3.0.3 This will also result in a loss of Both RATs
6	OR 1BA03- 19 Trip OR Amber lite – on	M-ALL	DG-1B output breaker trips. Loss of All AC Power go to EOP 19100-C (ECA – 0.0)

7	RFs: EL02 EL37	N-UO N-SS	Power restored to SAT from Plant Wilson CT
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Event 1:

Power Control Center reports "one contingency away" from being unable to maintain system voltage between 230 Kv and 242 Kv. Crew enters AOP 18017-C for degraded grid conditions, section A.

Verifiable Actions:

UO - Unload and shutdown DG-1B using 14980B-1. Check 1E 4.16KV switchgear voltages between 3873 and 4326. Shift Main Turbine turning gear and turning gear oil pump to alternate power supplies.

OATC & UO – initiate 11400-C station service reduction checklist. (BATP/Rx MU water pump, RWST sludge mixing pump)

Event 2:

Control bank D rod drops due to I&C personnel error. Crew enters AOP 18003-C section A.

Verifiable Actions:

OATC – Realigns dropped rod to bank. Exercises bank. Keeps Tave /Tref Matched during dropped rod recovery actions.

UO – Open and close rod control lift coil disconnect switches to support recovery of dropped rod.

Technical Specifications:

3.1.4 – Rod Group Alignment Limits – Condition B – Verify SDM met or initiate boration within 1 hour

Event 3:

VCT local level transmitter LT-112 fails low resulting in a continuous VCT makeup. Entry into ARP 17007-1 window E05 is required to stop the makeup flow and manually control makeup flow using SOP 13009-1.

Verifiable Actions:

OATC – Place VCT makeup control in stop. Manually control VCT makeup to maintain VCT level 30% to 50%.

Event 4:

NSCW train A pipe break requiring entry into AOP 18021-C.

Verifiable Actions:

UO – Place Train A NSCW pumps in PTL to stop leak.

OATC & UO – shift pumps / systems from train A to train B.

Technical Specifications:

- 3.7.8 NSCW - condition A
- 3.8.1 AC sources operating – condition B - one DG inoperable
- 3.4.6 RCS Loops Mode 4 – INFO Only

Event 5:

Loss of offsite power requiring entry into EOP 19000-C and AOP 18017-C section B.

Verifiable Actions:

OATC & UO – Verify proper UV sequence and complete actions of E-0 due to main generator trip on loss of grid.

UO - control AFW pumps

Technical Specifications:

- 3.8.1 AC Sources – Operating Condition I – action enter LCO 3.0.3 immediately.
- 3.0.3

Events 6, and 7:

DG-1B output breaker trips, loss of all AC power, power restored to SAT from Plant Wilson CT black start.

Verifiable Actions:

UO -Emergency stop DG-1B. Complete rapid RCS cooldown. Restore power to 1BA03 from Wilson CT via SAT.

Critical actions:

1. DG-1B removed from grid to protect ESF equipment from degraded grid conditions.
2. Completion of rapid RCS cooldown to reduce RCS inventory loss during loss of all AC power.
3. Wilson power through SAT restored to 1BA03. (Note 1AA02 has no NSCW)

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Scenario No.: 6

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Event No.: 1

Event Description: PCC will report that they are "one contingency away" from being able to maintain system voltage. DG-1B is tied to the grid for testing. This will require the crew to enter AOP 18017-C, section A for degraded grid conditions. The UO will have to shutdown DG-1B to prevent damaging an emergency power source from grid problems.

Time	Position	Applicant's Action or Behavior
	CREW	Report form PCC that they are "one contingency away" from being able to maintain grid voltage within limits (230 to 242 Kv)
	SS	Enters AOP 18017-C, Section A, for Degraded Grid Conditions (Crew Update)
	UO	<p>Checks DG-1A in standby. Notes DG-1B paralleled to 1BA03.</p> <p>UO performs DG-1B unloading and shutdown per 14980B-1 starting with step 5.1.44:</p> <ul style="list-style-type: none"> • Unloads DG to 3000 Kw for 5 minutes • Unloads DG to 700 Kw and opens DG output breaker • Places DG in UNIT mode and waits for 30 secs • Verifies Blue fast start light is lit • Has OAO place LO circ pump in off • Alarm ALB38-F06 DG1B SWITCH NOT IN AUTO received • Depresses DG-1B stop push button (1HS-4572B) • Extra / OAO performs standby alignments checks
	SS	Terminates maintenance / testing activities on critical electrical distribution components

Event No.: 1

Event Description: PCC will report that they are "one contingency away" from being able to maintain system voltage. DG-1B is tied to the grid for testing. This will require the crew to enter AOP 18017-C, section A for degraded grid conditions. The UO will have to shutdown DG-1B to prevent damaging an emergency power source from grid problems.

Time	Position	Applicant's Action or Behavior
	UO	Checks Power System Stabilizer in service
	OATC / UO	Initiate AOP continuous actions page
	UO	<p>Verifies Main Generator within reactive capability curve of Figure 1</p>

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Scenario No.: 6

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Event No.: 1

Event Description: PCC will report that they are "one contingency away" from being able to maintain system voltage. DG-1B is tied to the grid for testing. This will require the crew to enter AOP 18017-C, section A for degraded grid conditions. The UO will have to shutdown DG-1B to prevent damaging an emergency power source from grid problems.

Time	Position	Applicant's Action or Behavior
	UO	Places following on alternate power supply: <ul style="list-style-type: none"> • Main Turbine Turning Gear • Turning Gear Oil Pump Actions: <ul style="list-style-type: none"> • Place TURNING GEAR MOTOR 1HS-6541 in the After Stop (green target) position • Start the MAIN TURB AUX EMERG DC OIL PMP and verify red lamp is LIT on 1HS-6545. • Place TURNING GEAR OIL PMP 1HS-6543 in the PULL TO LOCK position • Has TBO locally swap feeder breakers • Place TURNING GEAR OIL PMP 1HS-6543 in AUTO. • Place TURNING GEAR MOTOR 1HS-6541 in AUTO PTL • Stop MAIN TURB AUX EMERG DC OIL PMP using 1HS-6545
	UO	Verifies Turning Gear Oil Pump in AUTO
	SS	Informs shift personnel of degraded offsite electrical system condition and potential for loss of offsite power

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Event No.: 1

Event Description: PCC will report that they are "one contingency away" from being able to maintain system voltage. DG-1B is tied to the grid for testing. This will require the crew to enter AOP 18017-C, section A for degraded grid conditions. The UO will have to shutdown DG-1B to prevent damaging an emergency power source from grid problems.

Time	Position	Applicant's Action or Behavior
	SS	Designates individuals to monitor DGs and TDAFW pump if a loss of offsite power occurs
	SS	Verifies SAT in standby and available
	SS	Checks Plant Wilson Manned and Operating Report that normal Wilson dayshift crew is currently manning Wilson
	CREW	Initiates 11400-C, Station Service Reduction Checklist: <ul style="list-style-type: none"> • Shutdown one train of CCW • Verify BA transfer and Reactor M/U water pumps – not in run • Shut down RWST sludge mixing pump • Ensure only 2 River Water Pumps running

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Scenario No.: 6

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Event No.: 1

Event Description: PCC will report that they are "one contingency away" from being able to maintain system voltage. DG-1B is tied to the grid for testing. This will require the crew to enter AOP 18017-C, section A for degraded grid conditions. The UO will have to shutdown DG-1B to prevent damaging an emergency power source from grid problems.

Time	Position	Applicant's Action or Behavior
	SS	Checks either 4160V 1E bus energized by offsite power <i>(This is a continuous action step)</i> If a loss of offsite power to both busses occurs then: <ul style="list-style-type: none"> • Trip the reactor • Initiate EOP 19000-C, Reactor Trip or Safety Injection • Go to Section B of 18017-C, Loss of Grid
	UO	Checks 1E 4.16kV switchgear voltages 3873 to 4326V each hour

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Event No.: 2

Event Description: Control Rod H-8 will drop to the bottom of the core due to personnel error while testing lift coil currents. The crew will enter AOP 18003-C, Section A and recover the dropped rod to restore normal rod alignment and flux distributions.

Time	Position	Applicant's Action or Behavior
	CREW	Diagnose dropped control rod: Indications: Rod H-8 DRPI goes to 0 steps Reduction in RCS Tave Change in AFD / PR NI's Alarms: ROD AT BOTTOM ROD DEV TAVE/TREF DEVIATION
	SS	Enters AOP 18003-C, Section A for a dropped control rod (Crew Update)
	UO	Stops any changes in turbine load
	OATC	Checks DRPI available and only one rod has dropped
	SS	Initiates Technical Specifications: 3.1.4 – Rod Group Alignment Limits – Condition B – Verify SDM met or initiate boration within 1 hour Verifies < 75% power
	OATC / UO	Initiate continuous actions page

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Event No.: 2

Event Description: Control Rod H-8 will drop to the bottom of the core due to personnel error while testing lift coil currents. The crew will enter AOP 18003-C, Section A and recover the dropped rod to restore normal rod alignment and flux distributions.

Time	Position	Applicant's Action or Behavior
	OATC	Maintains Tavg on program by: <ul style="list-style-type: none"> • Adjusting turbine load • Dilute or Borate • Use manual rod control
	OATC	Maintain power distribution within limits when > 50% power: <ul style="list-style-type: none"> • AFD within 5% of target • QPTR \leq 1.02
	SS UO	Determines cause of dropped rod from I&C report REPORT: Shorted test leads. All testing suspended, fuse replaced. NOTE: ENSURE Malfunction RD-13I has been removed prior to rod withdrawal. Disconnects lift coil for dropped rod (H8) with maintenance concurrence
	SS	Records data in log: <ul style="list-style-type: none"> • Time of rod drop • Dropped rod number • Initial power level • Affected group step counter position
	OATC	Verifies power < 75%

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Event No.: 2

Event Description: Control Rod H-8 will drop to the bottom of the core due to personnel error while testing lift coil currents. The crew will enter AOP 18003-C, Section A and recover the dropped rod to restore normal rod alignment and flux distributions.

Time	Position	Applicant's Action or Behavior
	SS	Determines that dropped rod can be retrieved: <ul style="list-style-type: none"> • Time of dropped rod known • Direct cause known and corrected • Dropped rod withdrawal will be initiated time limits (4 hours)
	OATC / SS	Verifies power < 65% or 10% below most limiting AFD/QPTR requirement
	OATC / UO	Maintains power < 75% or AFD / QPTR limits during rod recovery
	OATC	Maintains Tavg within 3 F of Tref during recovery
	OATC	Rod select switch to Control Bank D
	OATC	Reset affected group step counter to 0
	UO	Reconnects rod H8 lift coils Disconnects all lift coils in control bank D except rod H8

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Event No.: 2

Event Description: Control Rod H-8 will drop to the bottom of the core due to personnel error while testing lift coil currents. The crew will enter AOP 18003-C, Section A and recover the dropped rod to restore normal rod alignment and flux distributions.

Time	Position	Applicant's Action or Behavior
	OATC	Determines rod is in group 2
	SS	Verifies unit power history > 75% for at least 72 hours in previous 7 days
	SS	Record affected bank group step counter positions in log
	SS	Reads Notes to crew: <ul style="list-style-type: none"> • Expect rod control urgent failure during rod withdrawal • • Per 10000-C, Conduct of Operations, 3 step rod withdrawal limit may be suspended during abnormal conditions
	SS	Suspends 3 step limit during rod H8 recovery
	OATC	Withdraws rod H8 to bank control bank D position
	SS	Records rod recovery completion time and affected bank position

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Event No.: 2

Event Description: Control Rod H-8 will drop to the bottom of the core due to personnel error while testing lift coil currents. The crew will enter AOP 18003-C, Section A and recover the dropped rod to restore normal rod alignment and flux distributions.

Time	Position	Applicant's Action or Behavior
	UO	Connects all lift coils
	OATC	Resets rod control urgent alarm with HS-40039 rod control alarm reset switch
	SS	Dispatches operator to reset master cyclor locally at rod control cabinets
	SS	Determines P/A converter needs to be reset Dispatches CBO to reset P/A converter Discontinues 14915 for rod insertion limit monitor
	OATC	Completes rod exercise per 14410-1 for the affected bank (control bank D)
	OATC	Places rods in manual or auto
	SS	Limits future power increases to 3%/hr

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Event No.: 2

Event Description: Control Rod H-8 will drop to the bottom of the core due to personnel error while testing lift coil currents. The crew will enter AOP 18003-C, Section A and recover the dropped rod to restore normal rod alignment and flux distributions.

Time	Position	Applicant's Action or Behavior
	SS	Notifies duty engineer of dropped rod recovery and that plant computer (IPC) position adjustment may be necessary Discontinues 14915 for rod deviation monitor when rod demand position input to the IPC is reset
	SS	Returns to procedure and step in effect Has SSS: <ul style="list-style-type: none">• Write a condition Report• Notify OPS Duty Manager of AOP entry

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Scenario No.: 6

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Event No.: 3

Event Description: VCT local indicator LT-112 fails low causing a continuous makeup to the VCT. The crew will refer to ARP 17007-1 manually control VCT makeup.

Time	Position	Applicant's Action or Behavior
	CREW	Diagnoses VCT makeup problems: Alarms: VCT HI/LO LEVEL <u>Indications:</u> Continuous automatic VCT makeup start with VCT level between 30-50%
	OATC / SS	Refer to ARP 17007-1 for VCT HI/LO LEVEL
	OATC	Checks VCT level using main control board indication (LT-185)
	OATC	Determines VCT level is / will be high Stops VCT makeup Diverts letdown to the RHT if necessary to restore VCT level Operates makeup per 13009-1 as necessary This failure will require the OATC to manually start / stop VCT makeup as necessary to maintain VCT 30-50%.

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Scenario No.: 6

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Event No.: 3

Event Description: VCT local indicator LT-112 fails low causing a continuous makeup to the VCT. The crew will refer to ARP 17007-1 manually control VCT makeup.

Time	Position	Applicant's Action or Behavior
	SS	Has SSS perform following: <ul style="list-style-type: none">• Write a condition report• Notify I&C to repair

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Event No.: 4

Event Description: NSCW train A discharge header will rupture causing a loss of NSCW inventory. The crew will enter AOP 18021-C, Loss of NSCW, to shutdown the affected train and stop the leakage and shift supported components to train B.

Time	Position	Applicant's Action or Behavior
	CREW	Diagnoses NSCW leakage: <u>Alarms:</u> NSCW TRAIN A LO HDR PRESS NSCW TRAIN A RHR PMP & MTR CLR LO FLOW NSCW TRAIN A CNMT CLR 1 & 2 LO FLOW NSCW TRAIN A CNMT CLR 5 & 6 LO FLOW LVL 2 LEAK DETECTED (Back Panel) <u>Indications:</u> NSCW Train A supply / return flow mismatch Auto start of 3 rd NSCW pump on low discharge header pressure
	SS	Enters AOP 18021-C, Loss of NSCW (Crew Update)
	UO	Checks that catastrophic leakage does exist on NSCW Train A
	UO	Places all 3 NSCW Train A pumps in Pull-To-Lock
	UO	Emergency stops DG-1A

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Scenario No.: 6

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Event No.: 4

Event Description: NSCW train A discharge header will rupture causing a loss of NSCW inventory. The crew will enter AOP 18021-C, Loss of NSCW, to shutdown the affected train and stop the leakage and shift supported components to train B.

Time	Position	Applicant's Action or Behavior
	UO	Verifies proper operation of NSCW Train B <ul style="list-style-type: none"> • 2 pumps running • Supply header pressure > 70 psig • Supply water temperature < 90 F • Supply header flow ~ 17,000 GPM
	UO / OATC	Verifies following equipment on Train B running if required: <ul style="list-style-type: none"> • CCP • SI Pump • CS Pump • RHR Pump • CCW Pumps (Will need to be started) • CREFS • ESF Chiller
	UO / OATC	Places Train A equipment in PTL: <ul style="list-style-type: none"> • CCP • SI Pump • CS Pump • RHR Pump • CCW Pumps • CREFS • ESF Chiller in stop

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Scenario No.: 6

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Event No.: 4

Event Description: NSCW train A discharge header will rupture causing a loss of NSCW inventory. The crew will enter AOP 18021-C, Loss of NSCW, to shutdown the affected train and stop the leakage and shift supported components to train B.

Time	Position	Applicant's Action or Behavior
	SS	Notifies SSS to have SFP cooling swapped
	SS	Dispatches operators to investigate leak
	UO	<p>Uses Attachment A to:</p> <p>Start train B components:</p> <ul style="list-style-type: none"> • CNMT coolers in high speed • CNMT Aux air cooler • Reactor Cavity Cooler <p>Stop Train A components:</p> <ul style="list-style-type: none"> • CNMT coolers in high speed • CNMT Aux air cooler • Reactor Cavity Cooler
	UO	Disables automatic operation of DG-1A using 13145A-1
	SS	<p>Has SSS:</p> <p>Initiate 14230-1 AC Source Verification Verify SAT energized using 13418-C Write a Condition Report Notify OPS Duty Manager of AOP entry</p>

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Scenario No.: 6

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Event No.: 4

Event Description: NSCW train A discharge header will rupture causing a loss of NSCW inventory. The crew will enter AOP 18021-C, Loss of NSCW, to shutdown the affected train and stop the leakage and shift supported components to train B.

Time	Position	Applicant's Action or Behavior
	SS	Determines Technical Specification impact: <ul style="list-style-type: none">• 3.7.8 NSCW - condition A• 3.8.1 AC Sources Operating – condition B - one DG inoperable• 3.4.6 RCS Loops Mode 4 – INFO Only
	UO	Checks NSCW Train A return temperature < 95 F
	SS	Returns to procedure and step in effect

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Event No.: 5

Event Description: Grid voltage will start to sag causing numerous alarms in the control room. Eventually both 1E busses will load shed and the sequencers will start a UV sequence. The crew will manually trip the reactor, initiate EOP 19000-C, and enter AOP 18017-C, Section B due to the loss of offsite power supply to both 1E 4.16 kV busses.

Time	Position	Applicant's Action or Behavior
	CREW	Diagnose loss of grid: Indications: Both 1E busses load shed and start a UV load sequence Alarms: 4160V SWGR 1AA02 TROUBLE SEQ A TROUBLE 4160V SWGR 1BA03 TROUBLE SEQ B TROUBLE Numerous related alarms as grid voltage drops
	CREW	Immediate actions of 19000-C: <ul style="list-style-type: none"> • Verify Reactor Trip • Verify Turbine Trip • Check Power to AC Emergency Busses (only 1BA03) • Check if SI is actuated or required (Not)
	UO	Possible early action to throttle AFW flow to limit RCS cooldown with SS approval.
	SS	Transitions to 19001-C, Reactor Trip Response (Crew Update)
	OATC / UO	Initiate Continuous Action and Foldout pages

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Scenario No.: 6

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Event No.: 5

Event Description: Grid voltage will start to sag causing numerous alarms in the control room. Eventually both 1E busses will load shed and the sequencers will start a UV sequence. The crew will manually trip the reactor, initiate EOP 19000-C, and enter AOP 18017-C, Section B due to the loss of offsite power supply to both 1E 4.16 kV busses.

Time	Position	Applicant's Action or Behavior
	OATC	Initiate monitoring of Critical Safety Function Status Trees
	SS	If Si actuation occurs will return to 19000-C
	UO	Limits RCS cooldown: <ul style="list-style-type: none"> • Verify AFW flow to SGs • Trip both MFPs • Checks SG NR level > 10% • Throttle AFW flow as necessary • (maintains at least 570 GPM if SG NR levels < 10%) • Verifies SGBD isolation valves and handswitches closed
	UO	Checks RCS Temperature stable at or trending to 557 F If Not, then: <ul style="list-style-type: none"> • Stop dumping steam • Throttle AFW flow • Shut MSIVs & BSIVs • Borate RCS
	UO	Checks for proper Feedwater Isolation when RCS temperature < 564 F: <ul style="list-style-type: none"> • MFIVs • BFIVs • MFRVs • BFRVs

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Scenario No.: 6

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Event No.: 5

Event Description: Grid voltage will start to sag causing numerous alarms in the control room. Eventually both 1E busses will load shed and the sequencers will start a UV sequence. The crew will manually trip the reactor, initiate EOP 19000-C, and enter AOP 18017-C, Section B due to the loss of offsite power supply to both 1E 4.16 kV busses.

Time	Position	Applicant's Action or Behavior
	UO	Checks total feed flow capability to SGs > 570 GPM
	OATC	Checks all rods fully inserted
	UO	Checks main generator output breakers open
	SS	Initiates AOP 18017-C, Section B, Loss of Grid (Crew Update)
	SS	Notifies the SM to implement EIPs
	UO	Checks both class 1E 4160V busses energized by their DG: NOTE: Only train B will have power Check DG-1B frequency at 60 Hz and Voltage 4025-4330 V
	SS	Dispatches designated personnel to monitor DG-1B

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Scenario No.: 6

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Event No.: 5

Event Description: Grid voltage will start to sag causing numerous alarms in the control room. Eventually both 1E busses will load shed and the sequencers will start a UV sequence. The crew will manually trip the reactor, initiate EOP 19000-C, and enter AOP 18017-C, Section B due to the loss of offsite power supply to both 1E 4.16 kV busses.

Time	Position	Applicant's Action or Behavior
	UO	Checks Train B 480V switchgear & MCCs energized
	UO	Checks only two Train B NSCW pumps running
	OATC	Checks only one charging pump running
	OATC	Checks two CCW pumps running train B
	OATC / UO	Initiate continuous actions page
	UO	Checks AFW pumps running and controls SG NR levels 10-65%
	OATC	Checks ACCW pump 2 running

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Event No.: 5

Event Description: Grid voltage will start to sag causing numerous alarms in the control room. Eventually both 1E busses will load shed and the sequencers will start a UV sequence. The crew will manually trip the reactor, initiate EOP 19000-C, and enter AOP 18017-C, Section B due to the loss of offsite power supply to both 1E 4.16 kV busses.

Time	Position	Applicant's Action or Behavior
	UO	Verifies four train B CNMT coolers running in fast speed
	UO	Verifies two CRDM fans and one reactor cavity fan running
	SS	Has SSS verify SFP cooling Train B running
	SS	Contacts Transmission System Operator to determine EOP to be used to restore power. Operator will select Plant Wilson black start as the procedure to use.
	SS	Has SSS dispatch personnel to switchyard / Wilson to support power recovery.

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Event No.: 5

Event Description: Grid voltage will start to sag causing numerous alarms in the control room. Eventually both 1E busses will load shed and the sequencers will start a UV sequence. The crew will manually trip the reactor, initiate EOP 19000-C, and enter AOP 18017-C, Section B due to the loss of offsite power supply to both 1E 4.16 kV busses.

Time	Position	Applicant's Action or Behavior
	UO	Checks Train B & D DC busses energized by battery chargers Checks discharge rates on Train A & C batteries < 300A & 100A Evaluates selective load stripping of Train A & C DC busses using 19100-C Attachment A. Dispatches operators to shutdown inverters and open battery breakers if 1E battery voltage drops < 105 V DC
		GO TO EVENT 6 - LOSS OF ALL AC POWER

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Scenario No.: 6

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Event No.: 6 & 7

Event Description: DG-1B output breaker will trip de-energizing 1BA03. The UO will have to manually trip DG-1B to protect the engine from damage due to loss of cooling. The crew will enter EOP 19100-C, Loss of All AC Power, after tripping DG-1B. Power will eventually be restored from Plant Wilson to the SAT.

Time	Position	Applicant's Action or Behavior
	CREW	Diagnoses loss of all AC 1E Power: Indications: DG-1B output breaker trips open Both 1AA02 & 1BA03 de-energized
	UO	Emergency stops DG-1B to protect engine from overheating due to loss of NSCW cooling. This action will be taken with SS concurrence.
	SS	Enters EOP 19100-C, Loss of all AC Power
	OATC / UO	Immediate Actions: 1. Verify Reactor Tripped <ul style="list-style-type: none"> • Reactor Trip & Bypass Breakers Open • Neutron Flux – Lowering 2. Verify Turbine Tripped – All stop valves Closed

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Scenario No.: 6

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Event No.: 6 & 7

Event Description: DG-1B output breaker will trip de-energizing 1BA03. The UO will have to manually trip DG-1B to protect the engine from damage due to loss of cooling. The crew will enter EOP 19100-C, Loss of All AC Power, after tripping DG-1B. Power will eventually be restored from Plant Wilson to the SAT.

Time	Position	Applicant's Action or Behavior
	SS	Reads NOTE: CSFSTs should be monitored for information only. FRPs should NOT be implemented.
	CREW	Verifies immediate actions completed properly with procedure
	OATC	Isolates RCS: <ul style="list-style-type: none"> • PRZR PORVs – Closed • Letdown Orifice Isolations – Closed • Letdown Isolations – Closed • Excess Letdown Isolations – Closed • RV Head Vent Isolations – Closed
	UO	Verifies AFW flow > 570 GPM
	OATC	Trips all RCPs and the NCP
	OATC / UO	Initiate Continuous Actions page
	SS	Notifies SM to implement EIPs

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Scenario No.: 6

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Event No.: 6 & 7

Event Description: DG-1B output breaker will trip de-energizing 1BA03. The UO will have to manually trip DG-1B to protect the engine from damage due to loss of cooling. The crew will enter EOP 19100-C, Loss of All AC Power, after tripping DG-1B. Power will eventually be restored from Plant Wilson to the SAT.

Time	Position	Applicant's Action or Behavior
	UO	Checks Main Generator Output Breakers Open
	SS	Dispatches operators to DG-1B to determine cause of trip. (Broken coupling between engine & generator)
	SS	Initiates action to energize at least one 4160V AC bus (1AA02 or (1BA03) from any available power supply
	OATC	Check SI signal – If actuated, reset SI signal (Continuous Action)
	CREW	When power restored to an AC emergency bus continue recovery with 19100-C, step 42
	UO	Verifies – 2 NSCW pump handswitches in auto on Train B

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Scenario No.: 6

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Event No.: 6 & 7

Event Description: DG-1B output breaker will trip de-energizing 1BA03. The UO will have to manually trip DG-1B to protect the engine from damage due to loss of cooling. The crew will enter EOP 19100-C, Loss of All AC Power, after tripping DG-1B. Power will eventually be restored from Plant Wilson to the SAT.

Time	Position	Applicant's Action or Behavior
	OATC / UO	Places equipment in PTL: <ul style="list-style-type: none"> • CCPs • RHR Pumps • SI Pumps • CNMT Spray Pumps • CCW Pumps • ACCW Pumps • MDAFW Pumps • CNMT Coolers • ESF Chillers
	SS	Determines if AC Emergency Bus can be energized from control room
	SS	Dispatches Operator to initiate isolation of RCP seals by performing Attachment E
	SS	Dispatch operator to check hotwell level control valves closed
	SS	Dispatches operators to prepare for local SG ARV operation

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Scenario No.: 6

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Event No.: 6 & 7

Event Description: DG-1B output breaker will trip de-energizing 1BA03. The UO will have to manually trip DG-1B to protect the engine from damage due to loss of cooling. The crew will enter EOP 19100-C, Loss of All AC Power, after tripping DG-1B. Power will eventually be restored from Plant Wilson to the SAT.

Time	Position	Applicant's Action or Behavior
	UO	Isolates SGs: <ul style="list-style-type: none"> • MSIVs & BSIVs • MFIVs & BFIVs • SGBD Isolations • SG Sample Isolations
	UO	Checks for faulted SG – Any SG pressure lowering in an uncontrolled manner or completely depressurized
	SS	Reads caution: Sample temperatures may be elevated due to loss of cooling water to sample coolers
	UO	Checks for Ruptured SG: <ul style="list-style-type: none"> • Direct chemistry to take periodic activity samples of all SGs one at a time • Abnormal secondary radiation: <ul style="list-style-type: none"> ○ Main Steamlines ○ Steam Jet Air Ejector ○ SGBD
	UO	Checks CST level > 15%

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Event No.: 6 & 7

Event Description: DG-1B output breaker will trip de-energizing 1BA03. The UO will have to manually trip DG-1B to protect the engine from damage due to loss of cooling. The crew will enter EOP 19100-C, Loss of All AC Power, after tripping DG-1B. Power will eventually be restored from Plant Wilson to the SAT.

Time	Position	Applicant's Action or Behavior
	UO	Controls intact SG NR levels 10-65%
	SS	CAUTION: Equipment failures & loss of control power may occur if doors are not opened within 30 minutes of loss of AC power
	SS	Directs SSS to have Unit 1 doors opened: B47, B48, B52, B55, B61, B76, B63
	UO	Monitors 1E battery bus voltages > 105 VDC If voltage < 105 VDC then shuts down inverter(s) and opens battery breaker If time permits: <ul style="list-style-type: none"> • Evaluate securing unnecessary battery loads using Attachment A • Initiating 18032-C for any inverter shutdown • Initiating 18034 for any battery breaker opened
	SS	Reads NOTE to CREW: <ul style="list-style-type: none"> • Depressurize SG at max rate within capacity of TDAFW Pump to minimize RCS inventory loss • Continue SG depressurization even if PRZR level goes off scale low or RV upper head voiding occurs

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Event No.: 6 & 7

Event Description: DG-1B output breaker will trip de-energizing 1BA03. The UO will have to manually trip DG-1B to protect the engine from damage due to loss of cooling. The crew will enter EOP 19100-C, Loss of All AC Power, after tripping DG-1B. Power will eventually be restored from Plant Wilson to the SAT.

Time	Position	Applicant's Action or Behavior
	UO / SO's	Depressurize SGs to 300 psig: <ul style="list-style-type: none"> • UO – controls at least ONE SG NR level > 10% & SG Pressure > 200 psig • SG Depressurization stopped if either criteria not met • Locally dump steam using ARVs at max rate
	UO CRITICAL	<i>Stops depressurization</i> if any RCS Cold Leg Temperature < 280 F <i>or SG pressure < 300 psig</i>
	UO / SO's	Locally operate SG ARVs to maintain SG pressures @ 300 psig
	OATC	Stops RCS cooldown if reactor does not remain subcritical: <ul style="list-style-type: none"> • IR or SR NIS SUR > 0 DPM
	SS	Informed that Wilson Black start is completed and SAT is now Energized.

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Event No.: 6 & 7

Event Description: DG-1B output breaker will trip de-energizing 1BA03. The UO will have to manually trip DG-1B to protect the engine from damage due to loss of cooling. The crew will enter EOP 19100-C, Loss of All AC Power, after tripping DG-1B. Power will eventually be restored from Plant Wilson to the SAT.

Time	Position	Applicant's Action or Behavior
	SS / UO CRITICAL	Energize <u>1BA03</u> from SAT using 13418-C and 13427B-1
	SS	Dispatches operator to reset LOP (UV) sequencer per 13427B-1
	UO	Checks for proper NSCW Train B operation: <ul style="list-style-type: none"> • 2 NSCW pumps running • Tower return/bypass handswitch in AUTO • Verify CNMT cooler isolations OPEN
	SS	Dispatches Operators to start up any de-energized Inverters and restore any DC loads previously shed
	UO / SO's	Stabilize SG pressures even if > 300 psig.
	UO	Verifies Train B 480 VAC Switchgear energized: <ul style="list-style-type: none"> • 1BB06 • 1BB07 • 1BB16 • 1NB10

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Event No.: 6 & 7

Event Description: DG-1B output breaker will trip de-energizing 1BA03. The UO will have to manually trip DG-1B to protect the engine from damage due to loss of cooling. The crew will enter EOP 19100-C, Loss of All AC Power, after tripping DG-1B. Power will eventually be restored from Plant Wilson to the SAT.

Time	Position	Applicant's Action or Behavior
	UO	Verifies Essential 480V AC loads energized: <ul style="list-style-type: none"> • Battery chargers • Control room instruments • Emergency Lighting • Communications • Battery Room Fans
	SS	NOTE: If RCP cooling was previously isolated, further cooling of the RCP seals will be established by natural circulation cooldown as directed in subsequent procedures
	SS	Selects recovery procedure based on plant conditions: <ul style="list-style-type: none"> • RCS subcooling > 24 F [38 F ADVERSE] • PRZR Level > 9% [37% ADVERSE] • BIT Isolations (HV-8801A/8801B) – Closed If all conditions met go to 19101-C, Loss of All AC Power Recovery Without SI required Otherwise, go to 19102-C, Loss of All AC Power Recovery With SI required
		END OF SCENARIO