

Facility: **Oconee** Scenario No.: **1 fnl R1** Op-Test No.: **1**

Examiners: _____ Operators: _____

Initial Conditions:

- 100% Reactor Power EOL (SNAP 210)

Turnover:

- AMSAC/DSS bypassed for I&E testing
- SASS in Manual for I&E testing
- 1B GWD Tank release in progress
- 0.3 gpm leak into the RBNS (LPSW)

Event No.	Malfunction No.	Event Type*	Event Description
0a	Pre-Insert Updater		AMSAC/DSS bypassed
0b	Pre-Insert Updater	C, OATC/BOP	1HP-24 and 1HP-25 fail closed
0c	Pre-Insert Updater		SASS in Manual
0d	MPI300		Reactor fails to trip automatically Will trip from CR
1	Override	N, BOP, SRO, TS	Pump RBNS, 1LWD-2 fails to close (TS)
2	MSS460	C, BOP, SRO	Seismic event 1A CBP Trip and 1B CBP fails to AUTO Start Turbine runback
3	MNI031 MNI081	I, OATC, SRO	Controlling NI Fails High
4	Override	C, BOP, SRO, TS	1A HPIP sheared shaft, STBY pump fails to auto start (TS)
5	MPS010	SRO, TS	1A SGTL 1 - 50 gpm over 10 minutes, (TS)
6		R, OATC, SRO	Manual Plant Shutdown
7	MSS190	C, OATC, SRO	Spurious Turbine Trip, Reactor fails to trip
8	Override MEL180	M, ALL	Blackout CT-1 Lockout KHU 2 Emergency Lockout TD EFDW Pump Fails to Start Regain power from Keowee Unit 1

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

Op-Test No.: _____ Scenario No.: 1 Event No.: 1 Page 1 of 1		
Event Description: Pump RBNS, 1LWD-2 fails to close: (N, BOP/SRO) (TS)		
Time	Position	Applicant's Actions or Behavior
	BOP/SRO	<p>Crew response: BOP uses OP/1/A/1104/007 Encl 4.1 to pump the Reactor Building Normal Sump (RBNS).</p> <p><u>OP/1/A/1104/007 Encl 4.1</u></p> <ul style="list-style-type: none"> • Verify MWHUT level adequate to receive waste volume. • Position the following: <ul style="list-style-type: none"> • Open 1LWD-1 (RB NORMAL SUMP ISOLATION) • Open 1LWD-2 (RB NORMAL SUMP ISOLATION). • Start one or both of the following: <ul style="list-style-type: none"> • 1A RB NORM SUMP PUMP • 1B RB NORM SUMP PUMP.
		<p style="text-align: center;">NOTE:</p> <p>Changes in LAWT levels may occur during pumping. RIA Alarms may be indicative of gas leakage. If RBNS level was above 14" when pumps were started a level increase following securing the RBNS pumps may occur.</p>
		<ul style="list-style-type: none"> • WHEN RBNS level is at desired level or \approx 6" (low level alarm), ensure pump(s) stopped. • Position the following: <ul style="list-style-type: none"> • Close 1LWD-1 (RB NORMAL SUMP ISOLATION) • Close 1LWD-2 (RB NORMAL SUMP ISOLATION). <p>NOTE: 1LWD-2 will fail to close</p> <p>SRO will refer to TS 3.6.3 (Containment Isolation) Condition A. De-energize 1LWD-1 within 4 hours.</p>
		The event is complete when TS 3.6.3 is referred to or when determined by the Lead Examiner.

Op-Test No.: _____	Scenario No.: 1	Event No.: 2	Page 1 of 1
Event Description: Seismic event 1A CBP Trip and 1B CBP fails to AUTO Start (Turbine Runback): (C, BOP/SRO)			
Time	Position	Applicant's Actions or Behavior	
	BOP/SRO	Plant Response: <ul style="list-style-type: none"> • 1SA2/A11 • 1SA-8/A-1 FDW SUCTION PRESSURE LOW • Unit runback at 20%/min due to C/FDW Suction Pressure Runback (should clear ~ 85% power) • Powdex Bypasses at 360 psig FDWP Suction Pressure. • 1C-61 opens bypassing the hydrogen coolers @ 235 psig (on either FDWP/ 2 out of 3 logic) FDWP Suction Pressure 	
	SRO.BOP OATC	Crew Response: <ul style="list-style-type: none"> • Crew should perform Plant Transient Response (PTR) • BOP should state: "Valid ICS runback is in progress for C/FDW suction pressure" • When the plant is stable/controllable OR as directed by ARG 1SA-8/A-1 FDW SUCTION PRESSURE LOW the team should elect to <u>manually</u> start the '1B' CBP (standby). (See attached) <ul style="list-style-type: none"> • Manual Actions <ul style="list-style-type: none"> a. Verify standby condensate booster pump has started. (Start any available CBP manually if it has NOT started.) • Reset 1C-61 when FDWP suction pressure \geq 235 psig (OP/1/A/1106/002 Condensate and Feedwater Enclosure 4.1 Normal Operation) as follows: <ul style="list-style-type: none"> • Ensure 1C-61 is in Manual • Manually open 1C-61 • Manually adjust 1C-61 to get 5-16 feet of H₂O • Adjust 1C-61 setpoint as required to match ΔP • Ensure 1C-61 to "AUTO" • Restore Powdex to service per (OP/1/A/1106/002 Condensate and Feedwater Enclosure 4.19 Placing Powdex In/Out of Service) <ul style="list-style-type: none"> • When FDWP suction pressure is > 360 psig place the powdex In Service and maintain CBP suction pressure \geq 70 psig by slowly closing 1C-14/15. <p>Cue: Simulator operator call the Control Room (4911) as security and inform the operator that tremors have been felt in the area and no damage is visible:</p>	
		The event is complete when the plant stabilizes ~ 85% power or when determined by the Lead Examiner.	

Op-Test No.: _____ Scenario No.: 1 Event No.: 3 Page 1 of 2		
Event Description: Controlling NI Fails High: (I, OATC/SRO)		
Time	Position	Applicant's Actions or Behavior
	BOP/OATC/ SRO	<p>Plant response:</p> <ul style="list-style-type: none"> • 1SA-01/A-1, RP Channel A Trip • 1SA-01/A-8, RP NI-5 High Flux Trip • NI-5 and NI-9 indicate 125% <p>Crew response:</p> <ul style="list-style-type: none"> • When the RPS Statalarms are received, the candidates should utilize the "Plant Transient Response" process to stabilize the plant. <ul style="list-style-type: none"> • Verbalize to the SRO reactor power level and direction of movement. • Place the Diamond and both FDW Masters in manual and position as necessary to stabilize the plant. Decrease FDW to pre-transient levels. • The SRO should: <ul style="list-style-type: none"> • Refer to AP/28, ICS Instrument Failures • Contact SPOC to repair controlling NI. <p>Note: The ICS will remain in manual for the remainder of the scenario.</p> <p><u>AP/28</u></p> <ul style="list-style-type: none"> • Verify entry into AP is due to an instrument or component failure. • WHEN plant conditions are stable as indicated by the following: <ul style="list-style-type: none"> • NI power change of < 2% from current NI power indication AND thermal power best ≤ pre-transient power level • Tave change of < 2°F from current Tave indication • THP/SG Outlet Press. change of < 30 psig from current THP/SG Outlet Press. • RCS pressure change of < 150 psig from current RCS pressure <p>THEN continue this procedure.</p>
	SRO	

Op-Test No.: _____ Scenario No.: 1 Event No.: 3 Page 2 of 2	
Event Description: Controlling NI Fails High: (I, OATC/SRO)	
Position	Applicant's Actions or Behavior
BOP/OATC/ SRO	<p>Crew response:</p> <p><u>AP/28</u> (Continued)</p> <ul style="list-style-type: none"> • Verify that current thermal power best is different than pre-transient thermal power best. • Notify Rx Engineering to provide Control Room with a maneuvering plan. • GO TO the applicable section per the following table: • Section 4C: Controlling NI <p><u>AP/28: Section 4C</u> (Controlling NI Failure)</p> <ul style="list-style-type: none"> • Ensure DIAMOND in MANUAL. • Ensure the following in HAND: <ul style="list-style-type: none"> • 1A FDW MASTER • 1B FDW MASTER • Notify SPOC to perform the following: <ul style="list-style-type: none"> • Select a valid NI input to ICS per AM/0/B/0326/020 (Control of Star Module Signal Selection Function). • Investigate and repair the failed NI. • PERFORM an instrumentation surveillance using applicable table in Encl 5.3 (ICS Instrument Surveillances) for the failed instrument. • TS 3.3.1 may be addressed but not entered because the 3 required channels are operable. • PT/600/001 will allow placing the RPS channel in manual bypass. This would place RPS in a 2 of 3 instead of a 1 of 3 logic. • Verify instrumentation surveillance in Encl 5.3 (ICS Instrument Surveillances) was performed satisfactorily as written. • WHEN notified by SPOC that a valid NI input has been restored to ICS, THEN GO TO Encl 5.1 (Placing ICS in AUTO).
	The event is complete when SPOC is notified or when determined by the Lead Examiner.

Op-Test No.: _____		Scenario No.: 1	Event No.: 4	Page 1 of 2
Event Description: “1A” HPI Pump sheared shaft STBY HPI pump fails to auto start: (C; BOP, SRO) (TS)				
Time	Position	Applicant's Actions or Behavior		
		<p>Plant response:</p> <p>Statalarms:</p> <ul style="list-style-type: none"> • 1SA-2/B-2 (HP RCP Seal Injection Flow High/Low) • 1SA-2/C-2 (HP Injection Pump Disch. Header Pressure High/Low) <p>Board indications:</p> <ul style="list-style-type: none"> • RC Makeup Flow = 0 gpm • 1A HPI Pump amps low • PZR level will begin to decrease and LDST level will begin to increase. <p>Crew response:</p> <ul style="list-style-type: none"> • Refer to ARG for above Statalarms • SRO should initiate AP/14 (Loss of Normal HPI Makeup and/or RCP Seal Injection) <p><u>AP/14</u></p> <ul style="list-style-type: none"> • IAAT loss of suction to operating HPI pumps is indicated: <ul style="list-style-type: none"> • Motor amps low or cycling • Discharge pressure low or cycling • Abnormal LDST level trend <p>THEN GO TO Step 3.3 (Stop <u>all</u> HPIPs)</p> <p>NOTE: Crew should recognize a sheared shaft and NOT a loss of suction.</p> <ul style="list-style-type: none"> • Verify 1A HPI pump not operating • Close 1HP-5 (Letdown Isolation) • Place 1HP-120 (RC Volume Control) in HAND and closed • Place 1HP-31 (RCP Seal Flow Control) in HAND and closed • Attempt to start standby HPI pump (1B HPI pump) • Slowly open 1HP-31 in small increments until \approx 8 gpm/RCP is achieved. • Re-establish normal makeup through 1HP120. • Reduce 1HP-7 (Letdown Control) demand to 0%. • Close 1HP-6 (Letdown Orifice Stop) 		
	OATC			
	SRO			
	BOP			

Op-Test No.: _____ Scenario No.: **1** Event No.: **5** Page 1 of 2
 Event Description: **1A SGTL 1 - 50 gpm over 10 minutes: (SRO) (TS)**

Time	Position	Applicant's Actions or Behavior
	BOP/SRO	<p>Plant response: 1SA8/E10 (N-16 RM PRIMARY TO SECONDARY TUBE LEAK) 1SA8/D10 (RM CSAE EXHAUST RADIATION HIGH) 1SA8/B9 (RM PROCESS MONITOR RADIATION HIGH) 1RIA 59 indicating 3 gpm increasing.</p> <p>NOTE: Leak rate will ramp to 50 gpm over the next 10 minutes.</p> <p>Crew response: Crew will enter <u>AP/31</u> (Primary to Secondary Leakage)</p> <ul style="list-style-type: none"> • IAAT primary to secondary leak rate is ≥ 25 gpm (36,000gpd), THEN GO TO Unit 1 EOP. • IAAT either of the following exists for 1RIA-54: <ul style="list-style-type: none"> • is in High alarm • inoperable THEN Dispatch an operator to open and white tag the following: <ul style="list-style-type: none"> • 1XD-R3C (1A TURBINE BUILDING SUMP PUMP BKR) • 1XE-R3D (1B TURBINE BUILDING SUMP PUMP BKR) • IAAT gross tube leakage is indicated by an increase in normal RC makeup flow, THEN GO TO Step 4.79. • Verify OAC primary to secondary leak rate calculation available (including 1RIA-40 operable). • Determine primary to secondary leakage rate using OAC point O1P1599 (EST TOTAL PRI TO SEC LEAKRATE).

Op-Test No.: _____ Scenario No.: 1 Event No.: 5 Page 2 of 2		
Event Description: 1A SGTL 1 - 50 gpm over 10 minutes: (SRO) (TS)		
Time	Position	Applicant's Actions or Behavior
	BOP/SRO	<p>Crew response:</p> <ol style="list-style-type: none"> 1. <u>AP/31</u> (Primary to Secondary Leakage) Continued <ul style="list-style-type: none"> • Make notifications of primary to secondary leakage per OMP 1-14 • Initiate a unit shutdown using the following as necessary to meet requirements of Encl 5.1 (Unit Shutdown Requirements): <ul style="list-style-type: none"> • OP/1/A/1102/004 (Operation at Power) • OP/1/A/1102/010 (Controlling Procedure for Unit Shutdown) • IAAT primary to secondary leakage increases, THEN modify shutdown as required by Encl 5.1 (Unit Shutdown Requirements). • Notify Radwaste to stop all liquid releases in progress until sample results assure release rates within limits. • Stop all gaseous releases in progress until sample results assure release rates within limits. • Make up to the UST only as necessary to maintain UST level > 7'.
		Event is complete when EOP entry is made or when directed by the lead examiner.

Op-Test No.: _____ Scenario No.: 1 Event No.: 6 Page 2 of 2

Event Description: **Manual Plant Shutdown: (R, OATC/SRO)**

Time	Position	Applicant's Actions or Behavior
	BOP	<p><u>Initiate Encl 5.19</u> (Control of Plant Equipment During Shutdown for SGTR).</p> <p>Monitor RIAs to identify all SGs with a tube rupture:</p> <ul style="list-style-type: none"> • 1RIA-16/17 • 1RIA-59/60 when Rx power > 40% <p>Start the TURBINE TURNING GEAR OIL PUMP, 1A through 1E TURBINE BRNG OIL LIFT PUMPs, TURBINE MOTOR SUCTION PUMP</p> <p>Transfer electrical auxiliaries</p> <p>Notify CR SRO that unit auxiliaries have been transferred.</p> <p>Start the A/B OUTSIDE AIR BOOSTER FANS (CT-27) (within 30 minutes of entry condition to the EOP for a SGTR (25 gpm leak))</p> <p>Notify Unit 3 to start the 3A/3B OUTSIDE AIR BOOSTER FANS</p> <p>Stop the 1A/1B MSRH DRN PUMPs</p> <p>Place 1FDW-53/65 in manual and close.</p> <p>Place 1HD-37/52 in DUMP.</p> <p>Place 1A/1B FDWP SEAL INJECTION PUMP switch to START.</p> <p>Start 1A/1B FDWP AUXILIARY OIL PUMP.</p> <p>WHEN Rx power is < 80%, THEN stop the 1E1/1E2 HTR DRN PUMPs</p> <p><u>SGTR Tab Cont.</u></p> <ul style="list-style-type: none"> • WHEN both of the following exist: <ul style="list-style-type: none"> • Reactor power is \approx 15% FP • Unit auxiliaries have been transferred THEN continue in this procedure. • Depress turbine TRIP pushbutton. • Verify all TURBINE STOP VALVES closed. • Open the following: <ul style="list-style-type: none"> • PCB 20 • PCB 21 • Perform the following: <ul style="list-style-type: none"> • Open the Generator Field Breaker. • Position EXCITATION switch to OFF. • Verify TBVs controlling SG pressure as expected. • Reduce Rx power to \leq 5% FP.
		<p>Event is complete when reactor power has been reduced by 5-15% or when directed by the lead examiner.</p>

Op-Test No.: _____ Scenario No.: 1 Event No.: 7 Page 1 of 1		
Event Description: Spurious Turbine Trip; Reactor fails to trip: (C, OATC, SRO)		
Time	Position	Applicant's Actions or Behavior
	OATC/SRO	<p>Plant response:</p> <ul style="list-style-type: none"> • Main Turbine trips • 1SA1/A1 (RP CHANNEL A TRIP) • 1SA1/B1 (RP CHANNEL B TRIP) • 1SA1/C1 (RP CHANNEL C TRIP) • 1SA1/D1 (RP CHANNEL D TRIP) <p>Crew response:</p> <p>Crew recognizes that the reactor should have tripped but did not. OATC to SRO "Reactor Should Have Tripped"</p> <p>SRO directs the OATC to perform Immediate Manual Actions (IMAs)</p> <ul style="list-style-type: none"> • Depress REACTOR TRIP pushbutton. (CT-24) (within 30 seconds of reactor trip conditions) <p>NOTE: Reactor will trip when the pushbutton is depressed.</p>
	BOP/SRO	<ul style="list-style-type: none"> • Verify reactor power < 5% FP and decreasing. • Depress turbine TRIP pushbutton. • Verify all turbine stop valves closed. • Verify RCP seal injection available. <p>SRO directs the BOP to perform a symptoms check:</p> <ul style="list-style-type: none"> • Verify reactor shutdown • Verify not loss of heat transfer • Verify no excessive heat transfer • Inform SRO that a SGTR does exist.
		Event is complete when the reactor has been manually tripped or when directed by the lead examiner.

Op-Test No.: _____ Scenario No.: 1 Event No.: 8 Page 3 of 7		
Event Description: Blackout: (M, ALL)		
Time	Position	Applicant's Actions or Behavior
	SRO/BOP OATC	<p>Crew response:</p> <p>SRO will transfer to the <u>BLACKOUT tab.</u> (Continued)</p> <ul style="list-style-type: none"> SRO will direct the BOP to perform Encl. 5.38 (Restoration of Power) Position the following to OFF: <ul style="list-style-type: none"> 1A MD EFDWP 1B MD EFDWP Feed and steam available SGs as necessary to stabilize RCS P/T.
		<p>NOTE:</p> <p>Feeding SGs with EFDW is desired above HPI Forced Cooling. Step 6 should be performed prior to re-performing Rule 3.</p>
	SRO	<ul style="list-style-type: none"> IAAT NO SGs are being fed, AND any source of EFDW (Unit 1 or another unit) becomes available, THEN perform the following: <ul style="list-style-type: none"> Establish 100 gpm to each intact SG. (Feeding to 240" XSUR) Perform one of the following: <ul style="list-style-type: none"> Tc > 550°F- Initiate cool down to Tc 540°F - 550°F by feeding and steaming intact SGs at a rate that prevents RCS saturation. Tc ≤ 550°F- Feed and steam intact SGs to stabilize Tc ≤ 550°F. IAAT EFDW from any source is insufficient to maintain stable RCS P/T, THEN notify SSF operator that feeding SGs with SSF ASW is required. IAAT power is restored to any of the following: <ul style="list-style-type: none"> 1TC 1TD 1TE <p>THEN Initiate AP/11 (Recovery from Loss of Power). (SEE NEXT PAGE FOR AP/11 steps) GO TO Subsequent Actions Tab</p>
	SRO	<p>SRO will transfer to the Subsequent Actions tab. SRO will transfer to the SGTR tab</p>

Op-Test No.: _____ Scenario No.: 1 Event No.: 8 Page 4 of 7

Event Description: **Blackout: (M, ALL)**

Time	Position	Applicant's Actions or Behavior
	OATC/BOP	<p>Crew response:</p> <p><u>AP/11 (Recovery from Loss of Power).</u></p> <ul style="list-style-type: none"> • Announce AP entry using the PA system. • Verify load shed has initiated • Verify load shed is complete as indicated by LOAD SHED COMPLETE on any ES Module (Channel 1 or 2). <p>Close the following breakers:</p> <ul style="list-style-type: none"> • 1TC INCOMING FDR BUS 1/2 • 1TD INCOMING FDR BUS 1/2 • 1TE INCOMING FDR BUS 1/2 <p>Verify CT-1 is energizing a MFB. (It's NOT)</p> <p>Verify a 230KV Switchyard Isolation has occurred. (It has NOT)</p> <p>Simultaneously press RESET on both of the following pushbuttons to reset Main Feeder Bus Monitor Panel Load Shed Circuitry:</p> <ul style="list-style-type: none"> • MFB UNDERVOLTAGE CHANNEL 1/2 RESET <p>Verify all condensate flow has been lost for < 25 minutes and condensate operation is desired.</p> <p>Place all HWP control switches to OFF.</p> <p>Place all CBP control switches to OFF.</p> <p>Place 1FDW-53/65 in MANUAL and close.</p> <p>Place 1C-10 FAIL SWITCH in MANUAL.</p> <p>Close 1C-10.</p> <p>Using a plant page, clear TB Basement and TB third floor of non-essential personnel.</p> <p>Start one HWP.</p>

Op-Test No.: _____ Scenario No.: 1 Event No.: 8 Page 5 of 7

Event Description: **Blackout: (M, ALL)**

Time	Position	Applicant's Actions or Behavior
	OATC/BOP	<p>Crew response: RO will perform <u>Encl. 5.38</u> (Restoration of Power) (CT-8) (Not met if Encl. 5.38 completed with power NOT restored.)</p> <ul style="list-style-type: none"> • Place 1HP-31 in HAND and reduce demand to 0. • Close 1HP-21. • Verify MFB1/2 energized (its not) • Verify both Standby Bus #1 and Standby Bus #2 are de-energized. • Emergency start Keowee units • Notify Keowee Operator to place all operating Keowee units in Oconee Control. • Ensure one of the following is closed for an operating Keowee unit: <ul style="list-style-type: none"> • UNIT 1 EMER FDR • ACB 3 • Verify CT-4 indicates ≈ 4160 volts. • Place the following transfer switches in MAN: <ul style="list-style-type: none"> • CT4 BUS 1 AUTO/MAN • CT4 BUS 2 AUTO/MAN • Place the following switches in ON: <ul style="list-style-type: none"> • STBY BUS 1 SYNCHRONIZING • STBY BUS 2 SYNCHRONIZING • Close the following breakers: <ul style="list-style-type: none"> • SK1 CT4 STBY BUS 1 FEEDER • SK2 CT4 STDY BUS 2 FEEDER • Place the following switches in OFF: <ul style="list-style-type: none"> • STBY BUS 1 SYNCHRONIZING • STBY BUS 2 SYNCHRONIZING • Verify Standby Bus #1 energized. • Place the following switches in MAN: <ul style="list-style-type: none"> • MFB1 AUTO/MAN • MFB2 AUTO/MAN • STANDBY 1 AUTO/MAN • STANDBY 2 AUTO/MAN • Open the following breakers: <ul style="list-style-type: none"> • N1₁ MFB1 NORMAL FDR • N2₁ MFB2 NORMAL FDR • E1₁ MFB1 STARTUP FDR • E2₁ MFB2 STARTUP FDR • Close the following breakers: <ul style="list-style-type: none"> • S1₁ STBY BUS 1 TO MFB1 • S2₁ STBY BUS 2 TO MFB2

Op-Test No.: _____ Scenario No.: **1** Event No.: **8** Page 6 of 7

Event Description: **Blackout: (M, ALL)**

Time	Position	Applicant's Actions or Behavior
	OATC/BOP	<p>Crew response: RO will make up to RCS per <u>Encl. 5.5</u> (Pzr and LDST Level Cont)</p> <ul style="list-style-type: none"> • Utilize the following as necessary to maintain desired Pzr level: <ul style="list-style-type: none"> • Standby HPI pump • 1HP-26 • 1HP-7 • 1HP-5 • 1HP-120 setpoint or valve demand • IAAT LDST level CANNOT be maintained, THEN open 1HP-24, open 1HP-25 and close 1HP-16. <p>NOTE: 1HP 24 and 1HP-25 fail closed.</p> <ul style="list-style-type: none"> • IF both BWST suction valves (1HP-24 and 1HP-25) are closed, THEN perform the following: (CT-30) (CT requires supplying HPI suction from LPI before HPI pumps lose suction. i.e. low/cycling amps.) <ul style="list-style-type: none"> • Start 1A LPI PUMP. • Start 1B LPI PUMP. • Open the following: <ul style="list-style-type: none"> • 1LP-15 • 1LP-16 • 1LP-9 • 1LP-10 • 1LP-6 • 1LP-7 • IF two LPI Pumps are running only to provide HPI pump suction, THEN secure one LPI pump. • Dispatch an operator to open 1HP-363 (LETDOWN LINE TO LPI PUMP SUCTION BLOCK)

Op-Test No.: _____ Scenario No.: 1 Event No.: 8 Page 7 of 7

Event Description: **Blackout: (M, ALL)**

Time	Position	Applicant's Actions or Behavior
	SRO	<p>Crew response: <u>SGTR tab</u></p> <ul style="list-style-type: none"> • Maintain Pzr level 140" - 180" • Start A and B Outside Air Booster Fan (CT-27) • Notify Unit 3 to start 3A and 3B Outside Air Booster Fans • Monitor RIAs 16 and 17 to identify all SGs with a tube rupture. • Notify RP to survey both MS lines for radiation. • Secure any unnecessary offsite release paths. (Main Vacuum Pumps, TDEFDWP, Emergency Steam Air Ejector, etc.) • Open the following: <ul style="list-style-type: none"> • 1HP-24 • 1HP-25 <p>NOTE: 1HP-24 and 1HP-25 fail closed. See previous page for step to align</p> <ul style="list-style-type: none"> • Secure makeup to LDST. • Maintain both SG pressures < 950 psig using either of the following: <ul style="list-style-type: none"> • TBVs • Dispatch two operators to perform <p>Encl 5.24 (Operation of the ADVs)</p> <ul style="list-style-type: none"> • Minimize core SCM using the following methods: (CT-7) (Will fail CT if SCM is lost due to reduction in SCM. Progress must be made in reducing SCM.) <ul style="list-style-type: none"> • De-energize all Pzr heaters • Use Pzr spray • Maintain Pzr level 140" - 180" • IAAT RCS de-pressurization methods are inadequate in minimizing core SCM, • Cycle PORV as necessary
		<p>When crew takes action to minimize SCM or when directed by the lead examiner, the event is complete.</p>

CRITICAL TASKS

1. CT-24, ATWS
2. CT-30, Control RCS Inventory
3. CT-27, Implementation of Control Room Habitability Guidance
4. CT-7, Minimize SCM
5. CT-8, Electrical Power Alignment

Facility: **Oconee** Scenario No.: **2 fnl R1** Op-Test No.: **1**

Examiners: _____ Operators: _____

Initial Conditions:

- 50% Reactor Power EOL (IC 44)

Turnover:

- AMSAC/DSS bypassed for I&E testing
- SASS in Manual for I&E testing
- Unit 2 has the AS header
- Stop 1C RBCU and start 1B RBCU

Event No.	Malfunction No.	Event Type*	Event Description
0a	Pre-Insert Updater		SASS in MANUAL
0b	Pre-Insert Updater		AMSAC/DSS bypassed
0c	Pre-insert Updater		Main Turbine fail to trip
0d	Pre-Insert Updater		1HP-26 fails CLOSED
1	Override	N, BOP, SRO, TS	Swap operating RBCUs, High Vibration (TS) (Stop 1C RBCU and start 1B RBCU)
2	MPI121	C, OATC, SRO	Pzr Level #1 fails LOW
3	MCS008	C, BOP, SRO	Failure of AS controller
4	MSS200	C, BOP, SRO	1B1 RCP upper seal failure
5	MPS249	I, OATC, SRO	ΔT_c failure upon securing 1B1 RCP
6	MPS248 MPS247 MPS400	SRO, TS	1B1 RCP all seals fail (RCS Leak) (TS) 1HP 26 will not open
7		R, OATC, SRO	Manual Reactor power decrease
8	MPS400	M, ALL	SBLOCA Turbine fail to trip 1A2 RCP will not trip

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

Op-Test No.: _____ Scenario No.: 2 Event No.: 1 Page 1 of 1		
Event Description: Swap operating RBCUs: (N, BOP/SRO) (TS)		
Time	Position	Applicant's Actions or Behavior
	BOP/SRO	<p>NOTE: Event 2 will run in parallel with Event 1.</p> <p>Crew response: <u>OP/1/A/1104/015</u> (Reactor Building Cooling system)</p> <ul style="list-style-type: none"> • Verify RB pressure within limits of PT/1/A/0600/001 (Periodic Instrument Surveillance). (- 2.45 psig - 1.2 psig) • Begin monitoring the following: <ul style="list-style-type: none"> • RB pressure • RB temperature • Place desired switch to "OFF": <ul style="list-style-type: none"> • 1C RBCU • BOP will start the B RBCU • Verify RB pressure within limits of PT/1/A/0600/001 (Periodic Instrument Surveillance). • Begin monitoring the following: <ul style="list-style-type: none"> • RB pressure • RB temperature • Place desired switch to "HIGH": <ul style="list-style-type: none"> • 1B RBCU <p>Plant response: OAC alarm "High Vibration 1B RBCU"</p> <p>Crew response:</p> <ul style="list-style-type: none"> • BOP will attempt to reset vibration alarm (Panel 1AB3) • Contact engineering
	BOP	<p>NOTE: Reactor Building Cooling System (OP/1/A/1104/015) Limit & Precaution:</p> <div style="border: 1px solid black; padding: 5px;"> <ul style="list-style-type: none"> • If RBCU vibration alarms are received after RBCU is in operation and CANNOT be promptly cleared, Immediately stop the affected RBCU. • Once selected to "OFF" RBCU must remain "OFF" for 30 minutes before restarting except in emergencies. </div>
	SRO	<ul style="list-style-type: none"> • BOP should secure the 1B RBCU • SRO should refer to TS 3.6.5 Reactor Building Spray and Cooling Trains Condition B: <p>Restore to operable within 7 days</p> <p>Note: Crew may attempt to restart 1C RBCU after 30 minutes.</p>
		<p>When the 1B RBCU has been secured and SRO has referred to TS or when directed by the lead examiner this event is completed.</p>

Op-Test No.: _____ Scenario No.: 2 Event No.: 2 Page 1 of 1		
Event Description: PZR Level #1 fails LOW: (C, OATC/SRO)		
Time	Position	Applicant's Actions or Behavior
	OATC	<p>NOTE: Event 2 will run in parallel with Event 1.</p> <p>Plant response:</p> <p>Statalarms</p> <ul style="list-style-type: none"> • 1SA-2/C-3, RC Pressurizer Level High/Low • 1SA-2/C-4, RC Pressurizer Level Emerg. High/Low <p>Front board (1UB1) indications:</p> <ul style="list-style-type: none"> • PZR Level 1 indicates 0" • 1HP-120 (RC Volume Control) throttles open • Makeup flow Increases. <p>Crew response:</p> <p><u>1SA-2/C-3:</u></p> <ul style="list-style-type: none"> • Check alternate PZR level indications (1UB1 and OAC) and determine that PZR level 1 has failed LOW. • Check for proper Makeup/Letdown flows and adjust to restore proper level. • SRO should direct the BOP to take actions to restore normal PZR level. <ul style="list-style-type: none"> ➤ May take manual control of 1HP-120 to control PZR level <p>OR</p> ➤ May wait an swap to level 3 using PT/600/001. • SRO should refer to PT/600/001 (Periodic Instrument Surveillance) SASS Manual Operation and have the BOP select an alternate PZR level channel on 1UB1.
	SRO/OATC	
		When an alternate PZR level channel has been selected or when directed by the lead evaluator this event is completed.

Op-Test No.: _____ Scenario No.: 2 Event No.: 3 Page 1 of 1		
Event Description: Failure of AS Controller: (C, BOP/SRO)		
Time	Position	Applicant's Actions or Behavior
	SRO/BOP	<p>Plant response:</p> <ul style="list-style-type: none"> 1SA06/C10, AS HDR PRESS LOW will actuate 1MS-126 & 1MS-129 MAIN STM TO SU STM PRESS controller will indicate AS pressure < 300 psig and decreasing. <p>Crew response:</p> <p><u>1SA06/C10</u></p> <ul style="list-style-type: none"> Verify proper operation of MS/AS controller on Unit supplying Auxiliary Steam Header. IF necessary, transfer AS Header to another Unit per OP/1,/A/1106/22 (Auxiliary Steam System). <u>OP/1,/A/1106/22</u> (Auxiliary Steam System) Encl 4.2. <ul style="list-style-type: none"> Notify Unit 2 to reduce setpoint on AS controller. Ensure 1MS-126 & 1MS-129 (MAIN STM TO SU STM PRESS) controller in "MANUAL". Ensure closed 1MS-126 & 1MS-129 (MAIN STM TO SU STM PRESS). <p style="text-align: center;">NOTE:</p> <p>1MS-24 is preferred source of MS to AS. 1MS-33 may be opened by R&R.</p> <ul style="list-style-type: none"> Perform one of the following: Open 1MS-24 or Open 1MS-33 per R&R. <p style="text-align: center;">NOTE:</p> <p>MS to Aux Steam flow should NOT exceed 240,000 lbm/hr on any single unit.</p> <ul style="list-style-type: none"> Manually throttle open 1MS-126 & 1MS-129 (MAIN STM TO SU STM PRESS) to increase Aux Steam Header pressure. Continue to throttle 1MS-126 & 1MS-129 (MAIN STM TO SU STM PRESS) to increase Aux Steam Header pressure to ≈ 300 psig. WHEN Aux Steam Header is ≈ 300 psig: Adjust 1MS-126 & 1MS-129 (MAIN STM TO SU STM PRESS) controller setpoint to match Aux Steam Header pressure. Place 1MS-126 & 1MS-129 (MAIN STM TO SU STM PRESS) controller to "AUTO". IF required, adjust 1MS-126 & 1MS-129 (MAIN STM TO SU STM PRESS) controller setpoint to ≈ 300 psig. Notify Unit to secure AS supply.
		When the Unit 1 AS controller is in AUTO or when directed by the lead examiner this event is completed.

Op-Test No.: _____ Scenario No.: **2** Event No.: **4** Page 1 of 2
 Event Description: **1B1 RCP Upper Seal Failure: (C, BOP/SRO)**

Time	Position	Applicant's Actions or Behavior
	<p>SRO/BOP</p> <p>SRO</p> <p>BOP</p>	<p>Plant response:</p> <ul style="list-style-type: none"> • 1SA-06/C-5, RC PUMP 1B1 CAVITY PRESS HI/LOW • 1SA-06/C-6, RC PUMP 1B1 SEAL RETURN FLOW HI/LOW <p>Crew response:</p> <p>Refer to the ARG and AP/16, Abnormal Reactor Coolant Pump Operations.</p> <p><u>Refer to AP/16:</u></p> <ul style="list-style-type: none"> • Notify OSM to request evaluation by RCP Component Engineer. • IAAT the failure is identified, THEN GO TO the applicable section: 4A Seal Failure • IAAT any of the following indicate loss of all RCP seals: <ul style="list-style-type: none"> • RB RIAs increasing or in alarm (RIA-4, 43 - 46) • RCS Tave constant with LDST level decreasing more than normal • Quench Tank level rate increasing • RB Normal Sump rate increasing THEN initiate AP/02 (Excessive RCS Leakage). • Verify the following are open: <ul style="list-style-type: none"> • 1HP-20 • 1HP-21 • Verify the following are open for the affected RCP: (Seal Return Stop RCP) <ul style="list-style-type: none"> • 1HP-232 1B1 • Calculate RCP seal ΔP for affected RCPs per the following: (Turn-on Code "RCP") <p>Lower Seal $\Delta P = \underline{\hspace{1cm}}$ psig - $\underline{\hspace{1cm}}$ psig = $\underline{\hspace{1cm}}$ psid (RCS Press) (Lower Seal Cavity Press)</p> <p>Middle Seal $\Delta P = \underline{\hspace{1cm}}$ psig - $\underline{\hspace{1cm}}$ psig = $\underline{\hspace{1cm}}$ psid (Lower Seal Cavity Press) (Upper Seal Cavity Press)</p> <p>Upper Seal $\Delta P = \underline{\hspace{1cm}}$ psig - $\underline{\hspace{1cm}}$ psig = $\underline{\hspace{1cm}}$ psid (Upper Seal Cavity Press) (RB Press)</p>
		<p>When the 1B1 RCP has been secured or when directed by the lead Examiner, the event is complete.</p>

Op-Test No.: _____ Scenario No.: **2** Event No.: **4** Page 2 of 2

Event Description: **1B1 RCP upper seal failure: (C, BOP/SRO)**

Time	Position	Applicant's Actions or Behavior
	BOP/SRO	<p>Crew response: <u>Refer to AP/16</u> Continued.</p> <ul style="list-style-type: none"> • Request Operations Duty Person and RCP Component Engineer provide the following: <ul style="list-style-type: none"> • Immediate evaluation • Additional monitoring requirements • Extended limits (per AP RCP can operate for 100 hours) <p>CUE: Notify the crew to secure the 1B1 RCP.</p> <ul style="list-style-type: none"> • IAAT shutdown of an RCP is desired, THEN perform Steps 13 - 18. • Verify four RCPs operating. • Verify Rx power is $\leq 70\%$ as indicated on all NIs. • Stop the affected RCP.
		<p>When the 1B1 RCP has been secured or when directed by the lead Examiner, the event is complete.</p>

Op-Test No.: _____ Scenario No.: **2** Event No.: **5** Page 1 of 2

Event Description: **ΔTc Failure upon securing 1B1 RCP (I, OATC, SRO)**

Time	Position	Applicant's Actions or Behavior
	OATC/SRO	<p>Plant response:</p> <p>When the 1B1 RCP is secured the ΔTC controller will fail at ~ +3.6</p> <p>Feedwater flow will continue to increase to the A SG and decrease to the B SG causing the actual ΔTc to become increasingly negative.</p> <p>Crew response:</p> <p><u>AP/16</u> (Continued)</p> <ul style="list-style-type: none"> • Verify ICS re-ratios feedwater to establish ≈ 0°F ΔTc. <p>NOTE: ΔTC controller will fail in AUTO</p> <ul style="list-style-type: none"> • Place DELTA Tc station in HAND. • Manually adjust DELTA Tc station to achieve ≈ 0° Δ Tc. <hr/> <p style="text-align: center;"><u>CAUTION:</u></p> <p>Total feedwater flow should be maintained constant to prevent changes in core reactivity.</p> <hr/> <ul style="list-style-type: none"> • IF DELTA Tc station does NOT control, THEN perform the following: <ul style="list-style-type: none"> • Place the following in HAND: <ul style="list-style-type: none"> • 1A FDW MASTER • 1B FDW MASTER • Manually adjust FDW masters to achieve ≈ 0° Δ Tc. • Initiate AP/28 (ICS Instrument Failure). • Initiate Encl 4.3 (Special Instructions for < 4 RCP Operation) of OP/1/A/1102/004 (Operation at Power). (see attached pages) <p><u>AP/28</u></p> <ul style="list-style-type: none"> • Verify entry into AP is due to an instrument or component failure. • WHEN plant conditions are stable as indicated by the following: <ul style="list-style-type: none"> • NI power change of < 2% from current NI power indication AND thermal power best ≤ pre-transient power level <ul style="list-style-type: none"> • Tave change of < 2°F from current Tave indication • THP/SG Outlet Press. change of < 30 psig from current THP/SG Outlet Press. • RCS pressure change of < 150 psig from current RCS pressure <p>THEN continue this procedure.</p>
		<p>When the plant is stable and SPOC has been notified, or when directed by the lead examiner this event is completed.</p>

Op-Test No.: _____ Scenario No.: 2 Event No.: 5 Page 2 of 2		
Event Description: ΔTc Failure upon securing 1B1 RCP (I, OATC, SRO)		
Time	Position	Applicant's Actions or Behavior
	OATC/SRO BOP	<p>Crew response: <u>AP/28</u> (Continued)</p> <ul style="list-style-type: none"> • Verify that current thermal power best is different than pre-transient thermal power best. • Notify Rx Engineering to provide Control Room with a maneuvering plan. • GO TO the applicable section per the following table: <u>4F Delta Tc</u> <ul style="list-style-type: none"> • Ensure the following in HAND: <ul style="list-style-type: none"> • 1A FDW MASTER • 1B FDW MASTER • DELTA Tc • Re-ratio feedwater flow, as required, to establish ≈ 0°F DELTA Tc while maintaining total feedwater flow constant. • Notify SPOC to perform the following: <ul style="list-style-type: none"> • Investigate and repair the failed Delta Tc controller. • WHEN notified by SPOC that Delta Tc controller has been repaired, THEN GO TO Encl 5.1 (Placing ICS in AUTO).
		When the plant is stable and SPOC has been notified, or when directed by the lead examiner this event is completed.

Op-Test No.: _____		Scenario No.: 2	Event No.: 6	Page 1 of 2
Event Description: 1B1 RCP all seals fail (RCS Leak) (TS) 1HP-26 will not open				
Time	Position	Applicant's Actions or Behavior		
	BOP/SRO	<p>Plant response:</p> <ul style="list-style-type: none"> • 1B1 RCP lower pump cavity pressure will equal upper seal cavity pressure. • LDST level will decrease as ~ 80 gpm will leak out of the RCS through the failed pump seals. • Reactor Building Normal Sump level will increase. <p>Crew response:</p> <p><u>AP16</u></p> <ul style="list-style-type: none"> • Per IAAT step 7, loss of all RCP seals, THEN initiate AP/2 (Excessive RCS Leakage). <p><u>AP2</u></p> <ul style="list-style-type: none"> • IAAT RC makeup flow is > 100 gpm, AND Pzr level is decreasing, THEN close 1HP-5. • IAAT RCS leakage > NORMAL MAKEUP CAPABILITY with letdown isolated, AND Pzr level decreasing, THEN trip Rx. • Initiate makeup to LDST using any of the following, as directed by CR SRO: <ul style="list-style-type: none"> • Encl 5.5 Pzr and LDST Level Control of U1 EOP • OP/1/A/1103/004 (Soluble Poison Control) for batch additions • Place 1HP-14 in NORMAL. • Announce AP entry using the PA system. • Initiate <u>Encl 5.1</u> (Leak Rate Determination). Calculation of RCS Volume Loss: Leak Rate = $\frac{\text{MU}}{\text{MU}} + \frac{\text{SI}}{\text{SI}} - \frac{\text{LD}}{\text{LD}} - \frac{\text{TSR}}{\text{TSR}} = \underline{\hspace{2cm}}$ Where: MU = Makeup Flow SI = Seal Inlet Hdr Flow LD = Letdown Flow TSR = Total Seal Return Flow • IAAT additional makeup flow to LDST is desired, AND 1A Bleed Transfer Pump is operating, THEN dispatch an operator to close 1CS-48 (1A BHUT RECIRC) 		
		When the OATC has reduced power ~ 10%, or when directed by the lead examiner this event is completed.		

Op-Test No.: _____	Scenario No.: 2	Event No.: 6	Page 2 of 2
Event Description: 1B1 RCP all seals fail (RCS Leak) (TS) 1HP-26 will not open			
Time	Position	Applicant's Actions or Behavior	
	BOP/SRO	<p>Crew response:</p> <p><u>AP2</u> (Continued)</p> <ul style="list-style-type: none"> • Initiate the following notifications: <ul style="list-style-type: none"> • OSM to reference the following: <ul style="list-style-type: none"> • RP/0/B/1000/001 (Emergency Classification) • OMP 1-14 (Notifications) • STA • RP • IAAT Unit shut down is desired, THEN initiate shut down by one of the following: <ul style="list-style-type: none"> • AP/29 (Rapid Unit Shutdown) • OP/1/A/1102/004 (Operation At Power) • OP/1/A/1102/010 (Controlling Procedure For Unit Shutdown). <p>NOTE: Crew will use AP/29</p> <ul style="list-style-type: none"> • Verify leakage is caused by 1HP-14 failure in BLEED position. • Monitor trend of "T6 AP02" for increases. • Dispatch NEOs to check for leaks in both Penetration Rooms. • Verify location of leak has been identified. 	
		When the OATC has reduced power ~ 10%, or when directed by the lead examiner this event is completed.	

Op-Test No.: _____ Scenario No.: 2 Event No.: 7 Page 1 of 3		
Event Description: Manual Reactor power decrease: (R, OATC, SRO)		
Time	Position	Applicant's Actions or Behavior
	OATC/SRO	<p>Crew response: AP/29 (Rapid Unit Shutdown)</p> <p style="text-align: center;">NOTE</p> <p>The CR SRO should read this procedure and it should NOT be used when EOP entry conditions exist.</p>
	BOP	<ul style="list-style-type: none"> • Initiate Encl 5.1 (Support Actions During Rapid Unit Shutdown). • Notify WCC SRO to initiate Encl 5.2 (WCC SRO Support During Rapid Unit Shutdown). • Announce AP entry using the PA system. • Verify ICS in AUTO. <p>NOTE: ICS is in MANUAL RNO: Initiate manual power reduction to desired power level.</p> <ul style="list-style-type: none"> • Verify both Main FDWPs operating. • Verify 1B FDWP to be shut down first. • Adjust the FWP bias counterclockwise to lower 1B FDWP suction • flow ~ 1×10^6 lb/hr < 1A FDWP suction flow. • IAAT any of the following statalarms are received: <ul style="list-style-type: none"> • 1SA-16/A-1 (FWP A FLOW MINIMUM) • 1SA-16/A-2 (FWP A FLOW BELOW MIN) • 1SA-16/A-3 (FWP B FLOW MINIMUM) • 1SA-16/A-4 (FWP B FLOW BELOW MIN), • AND CTP < 65% FP, THEN trip the associated FDWP. • Maintain Pzr level between 220" - 250".
		When the OATC has reduced power ~ 10%, or when directed by the lead examiner this event is completed.

Op-Test No.: _____ Scenario No.: **2** Event No.: **7** Page 2 of 3
 Event Description: **Manual Reactor power decrease: (R, OATC, SRO)**

Time	Position	Applicant's Actions or Behavior
	BOP	<p>Crew response: <u>AP/29 Encl 5.1</u></p> <ul style="list-style-type: none"> • Stop the following: {5} <ul style="list-style-type: none"> • 1A MSRH DRN PUMP • 1B MSRH DRN PUMP • Place the following in MANUAL and close: <ul style="list-style-type: none"> • 1FDW-53 • 1FDW-65 • Place the following in DUMP: {5} <ul style="list-style-type: none"> • 1HD-37 • 1HD-52 • Start the following pumps: <ul style="list-style-type: none"> • 1A FDWP SEAL INJECTION PUMP • 1A FDWP AUXILIARY OIL PUMP • 1B FDWP AUXILIARY OIL PUMP • 1B FDWP SEAL INJECTION PUMP • WHEN NI power \leq 80%, THEN stop the following pumps: <ul style="list-style-type: none"> • 1E1 HTR DRN PUMP • 1E2 HTR DRN PUMP • Verify Turbine-Generator shutdown is required. • Place the following transfer switches to MAN: <ul style="list-style-type: none"> • 1TA AUTO/MAN • 1TB AUTO/MAN • Close 1TA SU 6.9 KV FDR. • Verify 1TA NORMAL 6.9 KV FDR opens. • Close 1TB SU 6.9 KV FDR. • Verify 1TB NORMAL 6.9 KV FDR opens. <p>Place the following transfer switches to MAN:</p> <ul style="list-style-type: none"> • MFB1 AUTO/MAN • MFB2 AUTO/MAN • Close E11 MFB1 STARTUP FDR. • Verify N11 MFB1 NORMAL FDR opens. • Close E21 MFB2 STARTUP FDR. • Verify N21 MFB2 NORMAL FDR opens. • Notify CR SRO that unit auxiliaries have been transferred. • WHEN \leq 450 MWe, THEN close 1SSH-9.
		<p>When the OATC has reduced power ~ 10%, or when directed by the lead examiner this event is completed.</p>

Op-Test No.: _____ Scenario No.: **2** Event No.: **7** Page 3 of 3

Event Description: : **Manual Reactor power decrease: (R, OATC, SRO)**

Time	Position	Applicant's Actions or Behavior
	BOP/SRO	<p>Crew response:</p> <p><u>AP29 Encl 5.1 (Continued)</u></p> <ul style="list-style-type: none"> • Verify 1AS-8 open. • Verify 1C CBP operating. • Stop the following: <ul style="list-style-type: none"> • 1A CBP • 1B CBP • Place control switch for one shutdown CBP in AUTO. • Ensure CBP LOAD SHED DEFEAT switch is positioned to a running CBP. • WHEN ≤ 400 MWe, THEN stop the following pumps: <ul style="list-style-type: none"> • 1D1 HTR DRN PUMP • 1D2 HTR DRN PUMP • WHEN ≤ 325 MWe, THEN verify \leq two HWP's operating. • WHEN ≤ 225 MWe, THEN stop all but one HWP. • Place control switch for one idle HWP in AUTO. • Ensure HWP LOAD SHED DEFEAT switch is positioned to a running HWP. • WHEN CTP DEMAND is $< 20\%$, THEN close the following valves: <ul style="list-style-type: none"> • 1MS-76 • 1MS-79
		<p>When the ICS has been placed in AUTO, or when directed by the lead examiner this event is completed.</p>

Op-Test No.: _____ Scenario No.: **2** Event No.: **8** Page 2 of 6

Event Description: **SBLOCA, Turbine fail to trip, 1A2 RCP will not trip: (M, ALL)**

Time	Position	Applicant's Actions or Behavior
	OATC/BOP	<p>OATC/BOP should recognize that the RCS has saturated and obtain SRO concurrence to perform:</p> <p><u>Rule 2, Loss of SCM</u></p> <ul style="list-style-type: none"> • Stop all RCPs (CT-1) (within 2 minutes of LOSCM) 1A2 RCP will NOT trip. <p>RNO: Place 1TA/1TB AUTO/MAN switch in MAN. Open 1TA/1TB SU 6.9 KV FDR.</p> <ul style="list-style-type: none"> • Open 1HP-24/25 (1A/1B BWST Suction) • Start all available HPI pumps operating. • Open 1HP-26/27 (1A/1B HP Injection) open (1HP-26 is failed CLOSED) • Verify at least two HPI pumps are operating using two diverse indications. (i.e. pump amps and flow) • IAAT ≥ 2 HPI pumps operating AND HPI flow in any header is in the Unacceptable Region of Figure 1 (flow is NOT acceptable) then Open 1HP-410 (CT-2) (within 10 minutes of ES actuation) • Verify TBVs available • Select OFF on both Digital Channels on AFIS HEADER A&B • Verify any EFDW pump operating. <p>NOTE: EFDW will not be operating</p> <p>RNO: Place the following in MANUAL and close:</p> <ul style="list-style-type: none"> • 1FDW-315 • 1FDW-316 • Start MD EFDWPs on all intact SGs • Establish 300 gpm to each SG (feed to LOSCM Setpoint) (CT-10) (Main FDW pumps must be secured and EFW used to raise SG levels. SG levels must continue to increase until LOSCM SP is reached.)

Op-Test No.: _____ Scenario No.: 2 Event No.: 8 Page 3 of 6

Event Description: **SBLOCA, Turbine fail to trip, 1A2 RCP will not trip: (M, ALL)**

Time	Position	Applicant's Actions or Behavior	
		<p><u>Rule 2</u> (Continued)</p> <p>Note: The CT is satisfied if the SGs are being fed and SG levels are increasing.</p> <ul style="list-style-type: none"> • Place 1TD EFDWP in Pull to Lock • Trip <u>both</u> MFW pumps • Place FDW block valve switches to CLOSE for 1FDW-33,31,42 & 40 • IAAT SG press > RCS press, THEN reduce SG press to <RCS press using TBVs. • Ensure Rule 3 is in progress or complete <p><u>Rule 3</u></p> <ul style="list-style-type: none"> • Verify any EFDW operating • Verify any SCM $\leq 0^{\circ}\text{F}$ • IAAT Unit 1 EFDW is in operation, THEN initiate Encl 5.9 (Extended EFDW Operation). <p><u>Encl. 5.9</u></p> <ul style="list-style-type: none"> • Monitor EFDW parameters on EFW graphic display. • Perform the following as required to maintain UST level > 7.5': <ul style="list-style-type: none"> ➢ Makeup with demin water. ➢ Place CST pumps in AUTO. • IAAT all the following exist: <ul style="list-style-type: none"> • Rapid cooldown NOT in progress • MD EFDWP operating for each available SG • EFDW flow in each header < 600 gpm <p>THEN place 1 TD EFDW PUMP switch in PULL TO LOCK.</p> <table border="1" style="width: 100%; margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">NOTE</td> </tr> </table> <ul style="list-style-type: none"> • If the condensate system has been lost, restoring the condensate system within 25 minutes will reduce the possibility of a steam-induced water hammer when a Hotwell Pump is started. It will also aid in maintaining condenser vacuum. • If the condensate system is operating, establishing FDW recirc will aid in maintaining condenser vacuum. <ul style="list-style-type: none"> • Notify CR SRO to set priority based on the NOTE above and EOP activities. 	NOTE
NOTE			

Op-Test No.: _____ Scenario No.: **2** Event No.: **8** Page 4 of 6

Event Description: **SBLOCA, Turbine fail to trip, 1A2 RCP will not trip: (M, ALL)**

Time	Position	Applicant's Actions or Behavior
	OATC/BOP	<p>OATC will perform Enclosure 5.1 (ES actuation)</p> <p><u>Enclosure 5.1</u></p> <ul style="list-style-type: none"> • Determine all ES channels should have actuated based on RCS pressure and RB pressure. • Verify all ES digital channels associated with actuation setpoints have actuated. • Place HPI in Manual. • Verify Rule 2 in progress or complete. • Verify any RCP operating <p>RNO: GO TO Step 8</p> <ul style="list-style-type: none"> • IAAT ES Channels 3 & 4 are actuated, THEN GO TO Step 12. • Place the following in manual control: <ul style="list-style-type: none"> • 1A LPI PUMP • 1LP-17 • 1B LPI PUMP • 1LP-18 <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p style="text-align: center;"><u>CAUTION</u></p> <p>LPI pump damage may occur if operated in excess of 30 minutes against a shutoff head.</p> </div> <ul style="list-style-type: none"> • IAAT any LPI pump is operating against a shutoff head, THEN at the CR SRO's discretion, stop affected LPI pumps. (CT) (Within 30 minutes) • Start A and B OUTSIDE AIR BOOSTER FAN (CT-27) (30 minutes from the LOCA) • Notify Unit 3 to start 3A and 3B OUTSIDE AIR BOOSTER FANS • Verify the following are open: <ul style="list-style-type: none"> • 1CF-1 • 1CF-2 • Verify 1HP-410 closed. • Secure makeup to the LDST. • Verify all ES channel 1 - 4 components are in the ES position.

Op-Test No.: _____ Scenario No.: **2** Event No.: **8** Page 6 of 6

Event Description: **SBLOCA, Turbine fail to trip, 1A2 RCP will not trip: (M, ALL)**

Time	Position	Applicant's Actions or Behavior
	SRO/BOP OATC	<p><u>LOSCM tab</u> (Continued)</p> <ul style="list-style-type: none"> • Control steaming and feed rates on all intact SGs to maintain cooldown rate within Tech Spec limits: <ul style="list-style-type: none"> • Tcold > 280°F: ≤ 50°F / ½ hr • Tcold ≤ 280°F: ≤ 25°F / ½ hr • Utilize either of the following: <ul style="list-style-type: none"> • TBVs • ADVs • Close the following: <ul style="list-style-type: none"> • 1RC-4 • 1GWD-17 • 1HP-1 • 1HP-2 • 1RC-3 • Maintain SG pressure < RCS pressure utilizing either of the following: <ul style="list-style-type: none"> • TBVs • ADVs • Verify primary to secondary heat transfer exists. • Verify CETCs increasing. (will be decreasing) • Verify required RCS makeup flow within normal makeup capability. <p>NOTE: RCS makeup will NOT be within normal makeup capability.</p> <p>RNO: GO TO LOCA CD tab.</p>
		<p>When the SRO transfers to the LOCA CD tab or when directed by the lead examiner this event is completed.</p>

CRITICAL TASKS

1. CT-1, Trip ALL RCPS
2. CT-27, Implementation of Control Room Habitability Guidance
3. CT-2, Initiate HPI
4. CT-10, Establish FW Flow and Feed SGs
5. CT, Secure LPI pumps

Op-Test No.: _____ Scenario No.: **3** Event No.: **1** Page 1 of 4

Event Description: **Perform PT/600/15 (CRD Movement): (N, OATC/SRO)**

Time	Position	Applicant's Actions or Behavior
	OATC/SRO	<p>Crew response:</p> <ul style="list-style-type: none"> • <u>PT/1/A/0600/015 Encl 13.2</u> (Control Rod Movement at Power) • Place Rx Diamond/FDW Masters To Hand per OP/1/A/1102/004 A (ICS Operation) <p><u>OP/1/A/1102/004 A</u></p> <ul style="list-style-type: none"> • IF either 1SA-02 E8 "STM GEN A LEVEL LOW LIMIT" OR 1SA-02 E9 "STM GEN B LEVEL LOW LIMIT" is clear, simultaneously place FDW control to manual: <ul style="list-style-type: none"> • Place 1A FDW MASTER to "HAND" • Place 1B FDW MASTER to "HAND" • Place DIAMOND to "MANUAL". • Ensure CRD group PI panel CONTROL ON lights are on for controlling CRD group. <p><u>PT/1/A/0600/015 Encl 13.2</u></p> <ul style="list-style-type: none"> • Perform the following: (R.M.) <ul style="list-style-type: none"> • Ensure SEQ OR is ON. • Ensure SAFETY RODS OUT BYPASS is ON. • Ensure RUN is ON. • Ensure SINGLE SELECT SWITCH to ALL.

Op-Test No.: _____ Scenario No.: **3** Event No.: **1** Page 2 of 4

Event Description: **Perform PT/600/15 (CRD Movement): (N, OATC/SRO)**

Time	Position	Applicant's Actions or Behavior
	OATC/SRO	<p>Crew response: <u>PT/1/A/0600/015 Encl 13.2 (Continued)</u></p> <ul style="list-style-type: none"> • Test CRD Group 6: <ul style="list-style-type: none"> • Ensure GROUP SELECT SWITCH to 6. • Ensure Group 6 CONTROL ON lights are ON. • Perform: <ul style="list-style-type: none"> • Insert CRD Group 6. • WHEN all 100% lights OFF, stop insertion. • Begin Group 6 withdraw to 100%. <p style="text-align: center;"><u>NOTE:</u></p> <p>In RUN speed, all rod motion is inhibited 12 seconds after first rod reaches OUT LIMIT.</p> <ul style="list-style-type: none"> • WHEN OUT LIMIT is ON, maintain WITHDRAW until CRD TRAVEL "Out" light OFF. • Ensure all Group 6 100% lights are ON. • Verify expected plant parameter response. <ul style="list-style-type: none"> • Test CRD Group 7: <ul style="list-style-type: none"> • Ensure GROUP SELECT SWITCH to 7. • Ensure Group 7 CONTROL ON lights are ON. • Record CRD Group 7 initial position: _____ <p style="text-align: center;"><u>NOTE:</u></p> <p>Group 7 may cause more reactivity change than previous groups.</p> <ul style="list-style-type: none"> • Perform: <ul style="list-style-type: none"> • Insert CRD Group 7 \approx 2.5%. (~ 6 seconds) • Withdraw CRD Group 7 to desired position. • Verify expected plant parameter response. <ul style="list-style-type: none"> • Test CRD Group 8: <ul style="list-style-type: none"> • Ensure GROUP SELECT SWITCH to 8. • Ensure Group 8 CONTROL ON lights are ON. • 2.10.3 Record CRD Group 8 initial position: _____ • Perform: <ul style="list-style-type: none"> • Insert CRD Group 8 \approx 2.5% • Withdraw CRD Group 8 to desired position. • Verify expected plant parameter response.

Op-Test No.: _____ Scenario No.: 3 Event No.: 1 Page 3 of 4		
Event Description: Perform PT/600/15 (CRD Movement): (N, OATC/SRO)		
Time	Position	Applicant's Actions or Behavior
	OATC/SRO	<p>Crew response: <u>PT/1/A/0600/015 Encl 13.2 (Continued)</u></p> <ul style="list-style-type: none"> • Perform the following: <ul style="list-style-type: none"> • Ensure SEQ is ON. • Ensure GROUP SELECT SWITCH to OFF. • Ensure SAFETY RODS OUT BYPASS is OFF. • Return Rx Diamond/FDW Masters To Automatic per OP/1/A/1102/004 A (ICS Operation).
		When the ICS has been placed in AUTO, or when directed by the lead examiner this event is completed.

Op-Test No.: _____ Scenario No.: **3** Event No.: **1** Page 4 of 4

Event Description: **Perform PT/600/15 (CRD Movement): (N, OATC/SRO)**

Time	Position	Applicant's Actions or Behavior
	OATC/SRO BOP	<p>Crew response: <u>OP/1/A/1102/004 A</u> (ICS Operation).</p> <ul style="list-style-type: none"> • IF DIAMOND is in manual, perform the following: • Verify REACTOR MASTER in AUTO • Compare Tave setpoint to Tave: <ul style="list-style-type: none"> • O1E2087 (ICS TAVE SETPOINT) • O1E2086 (ICS SELECTED) • IF selected Tave (O1E2086) is different from Tave Setpoint (O1E2087) by more than + 0.3°F, on REACTOR MASTER adjust Tave Setpoint (O1E2087) to ≈ selected Tave (O1E2086). • Verify selected Tave is within + 0.3° • Place DIAMOND to "AUTO". • IF 1A or 1B FDW Master is in "HAND", perform the following: <ul style="list-style-type: none"> • Position the following: <ul style="list-style-type: none"> • Place 1A FDW MASTER to "MEAS VAR" • Place 1B FDW MASTER to "MEAS VAR". • IF either 1A or 1B FDW Master Measured Variable is NOT on the caret, notify SPOC to investigate and repair the problem. • Verify the following <ul style="list-style-type: none"> • 1A FDW MASTER Measured Variable on the caret • 1B FDW MASTER Measured Variable on the caret. • Position the following: <ul style="list-style-type: none"> • Place 1A FDW MASTER to "POS" • Place 1B FDW MASTER to "POS". • Simultaneously position the following: <ul style="list-style-type: none"> • 1A FDW MASTER to "AUTO" • 1B FDW MASTER to "AUTO".
		<p>When the ICS has been placed in AUTO, or when directed by the lead examiner this event is completed.</p>

Op-Test No.: _____ Scenario No.: **3** Event No.: **2** Page 1 of 1

Event Description: **1RIA-37 and 38 Fail to Terminate GWR: (C, BOP/SRO)**

Time	Position	Applicant's Actions or Behavior
	<p>BOP</p> <p>SRO</p> <p>BOP</p> <p>SRO</p>	<p>Plant response:</p> <ul style="list-style-type: none"> • 1SA-9/A-4, GWD DISCH RADITION INHIBIT • 1SA-8/B-9, RM PROCESS RADIATION HIGH <p>Crew response:</p> <p><u>1SA-8/B-9</u></p> <ul style="list-style-type: none"> • Verify automatic action has taken place <p>1RIA-37 AND/OR RIA-38 will close valves 1GWD-4, -5, -6, -7, GWD-206, 207 and stop the W. G. exhauster if high setpoint is received.</p> <ul style="list-style-type: none"> • Ensure automatic actions, if required, have taken place; IF NOT, perform actions manually. • Refer to OP/1-2/A/1104/018 (GWD Tank Release) • Refer to AP/1/A/1700/018 (Abnormal Release of Radioactivity) <p><u>Encl. 4.9 of OP/1-2/A/1104/018 (GWD Tank Release)</u></p> <ul style="list-style-type: none"> • Close GWR Discharge Flow Controller • Record maximum cpm of RIA-37 or 38 • Terminate release • Close GWD-99 (Tank 1B Discharge Block), GWD-100 (Decay Tanks Discharge Header Block), and GWD-5 (B GWD Tank Discharge) <p><u>AP/18, Abnormal Release of Radioactivity</u></p> <ul style="list-style-type: none"> • IAAT RIA is in High alarm, THEN verify Automatic Systems Actions in Section 2 have occurred. • SRO should refer to SLC 16.11.3 Condition I (2 samples prior to subsequent release) • Initiate manual actions to fulfill the Automatic Functions listed in Section 2 for RIAs reaching High alarm setpoint. • Close 1GWD-5 • Contact SPOC
		<p>When the GWD release is terminated or when directed by the lead Examiner this event is completed.</p>

Op-Test No.: _____ Scenario No.: **3** Event No.: **3** Page 1 of 1

Event Description: **TD EFDWP oil low: (TS, SRO)**

Time	Position	Applicant's Actions or Behavior
	SRO	<p>Simulator Operator call Control Room as a NEO and report that Unit 1 TD EFDWP oil sump is dry.</p> <p>Crew Response:</p> <ul style="list-style-type: none"> • SRO should make the decision to place TD EFDWP in “Pull to Lock”. • SRO refer to TS 3.3.14 Condition B. • Declare the affected EFWP inoperable Immediately • SRO refer to TS 3.7.5 Condition B1 Restore TD EFDWP within 72 hours <p>Cue: If asked, inform crew that the TD was on the purifier last shift.</p>
		<p>When SRO refers to TS, or when directed by the lead examiner this event is completed.</p>

Op-Test No.: _____ Scenario No.: **3** Event No.: **7** Page 1 of 1

Event Description: **1A MFWP oil leak, Manual power reduction (R, OATC/SRO)**

Time	Position	Applicant's Actions or Behavior
	<p>SRO</p> <p>SRO/OATC</p> <p>BOP</p> <p>OATC</p> <p>BOP</p>	<p>Simulator Operator call Control Room as a NEO and report that 1A Main Feedwater Pump oil sump is -2.5" decreasing at 0.5"/2 minutes (4 inches below normal) and decreasing.</p> <p>Crew Response:</p> <p>SRO should make the decision to reduce power to < 65% and secure the 1A Main Feedwater pump.</p> <p>SRO should enter AP/29 (Rapid Unit Shutdown)</p> <p><u>AP/29</u></p> <ul style="list-style-type: none"> • Initiate Encl 5.1 (Support Actions During Rapid Unit Shutdown). • Initiate manual power reduction to desired power level. • Use control rods and FDW Masters. Lead with Feedwater <p><u>AP/29 Encl 5.1</u></p> <ul style="list-style-type: none"> • Stop 1A and 1B MSRH DRN PUMP • Place 1FDW-53 and 1FDW-65 in MANUAL and close: • Place 1HD-37 and 1HD-52 in DUMP: {5} • Start the following pumps: <ul style="list-style-type: none"> • 1A FDWP SEAL INJECTION PUMP • 1A FDWP AUXILIARY OIL PUMP • 1B FDWP AUXILIARY OIL PUMP • 1B FDWP SEAL INJECTION PUMP <p>Shutdown the 1A Main FDW pump. (May use OP/1106/002B Encl. 4.8.)</p>
		<p>When power is stabilized below 65% power, or when directed by the lead examiner this event is completed.</p>

Op-Test No.: _____	Scenario No.: 3	Event No.: 8	Page 1 of 1
Event Description: Turbine oil pressure LOW / Manual Turbine Trip (C, BOP/SRO)			
Time	Position	Applicant's Actions or Behavior	
	SRO/BOP	<p>Plant Response:</p> <p>Stat alarm 1SA3/E7 (TO BRNG OIL HEADER PRESS LOW)</p> <p>OAC turbine bearing pressure reading ~ 13 psig</p> <p>Crew Response:</p> <p><u>1SA3/E7</u></p> <ul style="list-style-type: none"> • Verify Turning Gear Oil Pump has started. • Check BEARING HEADER pressure gauge at Turbine Front Standard. <p>NEO: 13 psig at front standard.</p>	
	SRO/BOP	<p style="text-align: center;"><u>NOTE:</u></p> <p>EBOP will also start on a loss of power to Turning Gear Oil Pump</p> <ul style="list-style-type: none"> • IF BEARING HEADER pressure < 15 psig, verify EBOP is on. • IF EBOP has NOT started, start EBOP. • IF BEARING HEADER pressure is still < 15 psig: <ul style="list-style-type: none"> • TRIP THE TURBINE • Place Turbine Turning Gear switch in PULL TO LOCK. <p>NOTE: The SRO should direct tripping of the reactor before tripping the turbine.</p>	
		<p>When the turbine has been tripped, or when directed by the lead examiner this event is completed.</p>	

Op-Test No.: _____ Scenario No.: **3** Event No.: **9** Page 2 of 3

Event Description: **Loss of Main and Emergency FDW, LOHT, CBP Feed (M, ALL)**

Time	Position	Applicant's Actions or Behavior
	BOP	<p>Crew Response:</p> <p><u>Rule 3</u> (Continued)</p> <ul style="list-style-type: none"> • Place Startup Block valve (1FDW-33 1FDW-42) control switch for all intact SGs in OPEN: • Simultaneously position Startup Control valves (1FDW-35 1FDW-44) 10 - 20% open on all intact SGs: Perform the following: <ul style="list-style-type: none"> • Place 1FDW-31 switch in CLOSE. • Place 1FDW-40 switch in CLOSE. • Close 1FDW-32. • Close 1FDW-41. • Lower SG pressure in available SGs to ≈ 500 psig. • Control FDW flow to stabilize RCS P/T by throttling the Startup Control valves and TBVs as necessary: • Place 1FDW-38 and 1FDW-47 switches to OPEN: • Place 1FDW-36 and 1FDW-45 switches to CLOSE: • Dispatch an operator to perform Encl 5.26 (Manual Start of TDEFDWP). • Verify cross-tie with Unit 2 is desired. • Dispatch an operator to open 2FDW-313 and 2FDW-314) • Dispatch an operator to 1FDW-313 and have them notify the CR when in position.

Op-Test No.: _____ Scenario No.: 3 Event No.: 9 Page 3 of 3		
Event Description: Loss of Main and Emergency FDW, LOHT, CBP Feed (M, ALL)		
Time	Position	Applicant's Actions or Behavior
	SRO	<p>Crew Response:</p> <p><u>Loss Of Heat Transfer Tab</u></p> <ul style="list-style-type: none"> • IAAT NO SGs can be fed with FDW (Main/CBP/Emergency), AND any of the following exist: <ul style="list-style-type: none"> • RCS pressure reaches 2300 psig OR NDT limit • Pzr level reaches 375" [340" acc] <p>THEN PERFORM Rule 4 (Initiation of HPI Forced Cooling).</p> <p>NOTE: 1A1 RCP provides the best Pzr spray.</p> <ul style="list-style-type: none"> • Reduce operating RCPs to one pump/loop. • WHEN any of the following exists: <ul style="list-style-type: none"> • Unit 1 EFDW available • EFDW aligned from another unit • Main FDW pump available AND reset <p>THEN CONTINUE</p>
		<p>When RCS temperature is stabilized on Condensate Booster Pump feed, or when directed by the lead examiner this event is completed.</p>

Op-Test No.: _____ Scenario No.: 3 Event No.: 10 Page 2 of 2		
Event Description: CBPs trip, HPI Forced Cooling, Spray Valve Fails Closed (ALL)		
Time	Position	Applicant's Actions or Behavior
	SRO	<p>Crew Response:</p> <p><u>LOHT tab</u></p> <ul style="list-style-type: none"> • PERFORM Rule 4 (Initiation of HPI Forced Cooling). • Verify all the following: <ul style="list-style-type: none"> • At least two HPI pumps operating • Acceptable HPI flow exists in both HPI headers per Rule 4 • PORV open • 1RC-4 open
	BOT/OATC	<p>NOTE: 1RC-4 is NOT Open.</p> <ul style="list-style-type: none"> • Verify SSF-ASW available. • Dispatch a licensed operator to perform Encl 5.34 (Aligning SSF-ASW for SG Feed). • Locally close the following (Unit 1 Cable Rm): <ul style="list-style-type: none"> • 1SKJ-08 (1RC-155/1RC-156) • 1SKK-08 (1RC-157/1RC-158) • 1SKL-08 (1RC-159/1RC-160) • Open RCS vents: 1RC-155, 1RC-156, 1RC-157, 1RC-158, 1RC-159, 1RC-160 • GO TO HPI CD tab. <p><u>HPI CD tab</u></p> <ul style="list-style-type: none"> • Ensure all RBCUs in low speed. • Open 1LPSW-18, 1LPSW-21 and .1LPSW-24. • Initiate Encl 5.35 (Containment Isolation) • Start A & B Outside Air Booster Fans • Notify Unit 3 to start 3A and 3B Outside Air Booster Fans
		When SRO transfers to HPI CD tab, or when directed by the lead examiner this event is completed.

CRITICAL TASKS

1. CT-10, Establish FW Flow and Feed SG(s)
2. CT-14, Initiate HPI Cooling

August, 2007

Facility: **Oconee**Scenario No.: **4 fnl R1**Op-Test No.: **1**
 Examiners: _____

 Operators: _____

Initial Conditions:

- 75% Reactor Power EOL (SNAP 222)

Turnover:

- AMSAC/DSS bypassed for I&E testing
- SASS in Manual for I&E testing
- 1B GWD Tank release in progress
- TD EFDWP OOS for maintenance
- Keowee Unit 2 OOS for unplanned reasons
- Keowee Unit 1 aligned to underground (ACB-3 Closed)
- Operability test of Keowee Unit 1 is to be performed per PT/620/009 (Keowee Hydro Operation) after turnover and before startup continues, ONS to perform remote Keowee start. Begin at Encl. 13.1 at Step 2.2

Event No.	Malfunction No.	Event Type*	Event Description
0a	Pre-Insert Updater		AMSAC/DSS bypassed
0b	Pre-Insert Updater		1C HPIP fail to start
0c	Pre-Insert Updater		1RC-4 failed open
0d	Pre-Insert MEL180		Keowee Unit 2 Emergency Lockout
1		N, BOP, SRO	Operability test Keowee Unit 1
2	Override	I, OATC, SRO	RCP "Seal Inlet HDR Flow" instrument Fails LOW
3	Updater	C, TS, BOP SRO	Operating LPSW pump trips, Standby fails to auto start (TS)
4	MCS004	I, OATC, SRO	Controlling Tave fails HIGH
5	Updater	C, BOP, SRO	HPSW Jockey pump trip, altitude valve fail CLOSED (SLC)
6	MCR021 MCR022	C, TS, OATC, SRO	Dropped Control Rod, Manual Power Reduction (TS)
7	MPI300 Override	M, ALL	2 nd dropped CR ATWS Main FDW Pumps Trip PORV fails OPEN 1RC-4 Fails OPEN

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

Op-Test No.: _____ Scenario No.: **4** Event No.: **1** Page 2 of 3

Event Description: **Operability test Keowee Unit 1 (N, BOP/SRO)**

Time	Position	Applicant's Actions or Behavior
	BOP	<p><u>PT/620/009</u> (Continued)</p> <ul style="list-style-type: none"> • Verify CT4 energized by 13.8 KV Underground Power Path: • IF both Standby Buses are NOT energized, perform the following: <ul style="list-style-type: none"> ➤ Ensure TS 3.8.1 Condition D has been entered for Underground Power Path. ➤ IF overhead powr path is inoperable, ensure TS 3.8.1 Condition I has been entered. • IF Standby Bus 1 NOT energized <ul style="list-style-type: none"> • Verify ~ 4.16 KV on CT4 Volts • Ensure CT5 BUS 1 AUTO/MAN transfer switch in MAN • Ensure CT4 BUS 1 AUTO/MAN transfer switch in MAN • Place STBY BUS 1 SYNCHRONIZING switch to ON • Close SK1 CT4 STBY BUS 1 FEEDER • Verify ~ 4.16 KV on Standby Bus 1 Volts • Open SK1 CT4 STBY BUS 1 FEEDER • Place STBY BUS 1 SYNCHRONIZING switch to OFF • Place CT4 BUS 1 AUTO/MAN transfer switch to AUTO • IF Standby Bus 2 NOT energized <ul style="list-style-type: none"> • Verify ~ 4.16 KV on CT4 Volts • Ensure CT5 BUS 2 AUTO/MAN transfer switch in MAN • Ensure CT4 BUS 2 AUTO/MAN transfer switch in MAN • Place STBY BUS 2 SYNCHRONIZING switch to ON • Close SK2 CT4 STBY BUS 2 FEEDER • Verify ~ 4.16 KV on Standby Bus 2 Volts • Open SK2 CT4 STBY BUS 2 FEEDER • Place STBY BUS 2 SYNCHRONIZING switch to OFF • Place CT4 BUS 2 AUTO/MAN transfer switch to AUTO

Op-Test No.: _____ Scenario No.: **4** Event No.: **1** Page 3 of 3

Event Description: **Operability test Keowee Unit 1 (N, BOP/SRO)**

Time	Position	Applicant's Actions or Behavior
	BOP	<p><u>PT/620/009</u> (Continued)</p> <ul style="list-style-type: none"> • IF SK breakers were cycled, perform the following as desired <ul style="list-style-type: none"> • Ensure TS 3.8.1 Condition D has been exited • IF overhead Power Path is inoperable, ensure TS 3.8.1 has been exited • IF KHU-1 was started from Oconee Control Room, perform the following:\ • Position UNIT 1 SYNC 230 KV switch to "AUTO". • Verify ACB 1 KEOWEE 1 GENERATOR BKR closed. <p>CAUTION: Do NOT lower MVARs to less than zero (0) before taking the KHU off line. This will prevent excitation current from burning the contacts on the generator breakers when KHU-1 is shut down.</p> <ul style="list-style-type: none"> • Perform the following concurrently as required: <ul style="list-style-type: none"> ➤ Adjust load to zero (0) MWs with UNIT 1 SPEED CHANGER MOTOR. ➤ Adjust MVARs to zero (0) with UNIT 1 AUTO VOLTAGE ADJUSTER. • Place UNIT 1 LOCAL MASTER switch to "STOP" AND hold in "STOP" position for ≈ five (5) seconds. <p>NOTE: Placing UNIT 1 MASTER SELECTOR to "AUTO" shuts off the AC H.P. Lift Pump and closes the Generator Cooling Water valve. This action prevents KHU-1 from creeping.</p> <ul style="list-style-type: none"> • Ensure UNIT 1 MASTER SELECTOR to "AUTO". • Verify TURBINE 1 GATE POSITION indicator is at zero (0). • Notify Keowee to place KHU-1 MASTER TRANSFER switch in "LOCAL". • Ensure UNIT 1 SYNC 230 KV selector in "AUTO". • Perform the following: <ul style="list-style-type: none"> ➤ Verify acceptance criteria met. ➤ IF acceptance Criteria NOT met, notify SRO.
		<p>Event is complete when operability test is finished, or when directed by the lead examiner.</p>

Op-Test No.: _____ Scenario No.: **4** Event No.: **2** Page 1 of 2

Event Description: **RCP “Seal Inlet HDR Flow” instrument Fails LOW: (I, OATC, SRO)**

Time	Position	Applicant's Actions or Behavior
	SRO/OATC	<p>Note: This event is run in parallel with event 1.</p> <p>Plant response:</p> <p>Stat Alarms</p> <p>1SA2/B2 (HP RCP SEA INLET HEADER FLOW HIGH/LOW)</p> <p>Seal Injection header flow decreases to 0 gpm</p> <p>1HP-31 Indicates full open</p> <p>Crew response:</p> <p>SRO directs the OATC to refer to the Alarm Response Guide <u>ARG 1SA2/B2</u></p> <ul style="list-style-type: none"> • Low Alarm <ul style="list-style-type: none"> ➤ Verify STBY HPIP starts ➤ Verify low seal flow condition with individual RCP seal flow indications. ➤ Individual RCP seal flows will be ~ 11 gpm. <p>Note: OATC/SRO should determine that high flow conditions exist and perform the action for the High alarm.</p> <ul style="list-style-type: none"> • High alarm <ul style="list-style-type: none"> ➤ Verify high seal flow conditions with individual RCP seal flow indications. ➤ 1HP-31 may have failed open/mid-position. Take manual control of 1HP-31 and throttle to maintain 32 gpm. <p><u>SRO may enter AP/14</u></p> <ul style="list-style-type: none"> • IAAT RCP seal injection flow is lost, AND Component Cooling is lost, THEN perform the following: <ul style="list-style-type: none"> ➤ Trip the Rx. ➤ Stop all RCPs. ➤ Initiate AP/25 (SSF EOP). • Announce AP entry using PA System. • Start the standby HPI pump. • Place 1HP-31 in HAND and close.

Op-Test No.: _____ Scenario No.: **4** Event No.: **2** Page 2 of 2

Event Description: **RCP "Seal Inlet HDR Flow" instrument Fails LOW: (I, OATC, SRO)**

Time	Position	Applicant's Actions or Behavior
	SRO/OATC	<p>Crew response: <u>AP/14</u> (Continued)</p> <ul style="list-style-type: none"> • Ensure proper operation of CC System. • Dispatch an operator to close RCP SEAL INJECTION THROTTLE VALVES: 1HP-64, 1HP-65, 1HP-66, 1HP-67 • Notify OSM and RCP Component Engineer to provide the following: <ul style="list-style-type: none"> ➤ Immediate evaluation ➤ Additional monitoring requirements ➤ Extended limits • WHEN RCP SEAL INJECTION THROTTLE VALVES: 1HP-64, 1HP-65, 1HP-66, 1HP-67 are closed, THEN increase 1HP-31 demand to ~ 50%. • Locally throttle open RCP SEAL INJECTION THROTTLE VALVES: 1HP-64, 1HP-65, 1HP-66, 1HP-67 to establish ≈ 8 gpm/RCP while limiting RCP seal return temperature change to an average of 1 F/min
		<p>When 8 gpm Seal Injection flow to each RCP is established, or when directed by the lead Examiner this event is completed.</p>

Op-Test No.: _____	Scenario No.: 4	Event No.: 3	Page 1 of 1
Event Description: Operating LPSW pump trips, Standby fails to auto start: (C, BOP, SRO) (TS)			
Time	Position	Applicant's Actions or Behavior	
	SRO/BOP	<p>Plant response: Statalarms:</p> <ul style="list-style-type: none"> • 1SA-9/A-9 (LPSW Header A Press Low) <p>Control board indications:</p> <ul style="list-style-type: none"> • LPSW Header A/B Pressure Low <p>Crew response:</p> <ul style="list-style-type: none"> • Refer to ARG for 1SA-9/A-9 (LPSW Header A/B Press Low) <ul style="list-style-type: none"> ➤ Refer to AP/24 (Loss of LPSW) <p><u>AP/24</u></p> <ul style="list-style-type: none"> • Open LPSW pump suction valves 1LPSW-2, 1LPSW-3, 1LPSW-1. • Verify LPSW pumps are cavitating <ul style="list-style-type: none"> ➤ Pump amps erratic ➤ LPSW header pressure fluctuating • Start all available (NOT previously cavitating) LPSW pumps. • Verify normal LPSW System operation is restored. 	
	SRO	<p style="text-align: center;"><u>NOTE:</u></p> <p>The SRO should call SPOC to troubleshoot the reason for the suction valve closing, the Auto Start failure and determine if the "A" LPSW pump was damaged due loss of suction.</p> <p>The SRO should refer to TS:</p> <ul style="list-style-type: none"> • TS 3.7.7 (Low Pressure Service Water System) Condition "A" applies. Restore required LPSW pump to operable status. 72 hours completion time. • TS 3.3.28 (LPSW pump Auto-Start Circuitry) Condition "A". Restore Auto-Start Circuitry to operable. 7 day completion time. <p>Note: Not required for an operating pump.</p>	
		<p>Event is complete when SRO has referred to TS or when directed by the Lead Examiner.</p>	

Op-Test No.: _____ Scenario No.: 4 Event No.: 4 Page 1 of 1		
Event Description: Controlling Tave failed HIGH (I, OATC, SRO)		
Time	Position	Applicant's Actions or Behavior
	SRO/OATC	<p>Plant response:</p> <ul style="list-style-type: none"> • 1SA-02/A-12, ICS Tracking, will actuate due to neutron and feedwater cross-limits. • Controlling Tave will indicate $\approx 596.4^\circ$ F. • Actual loop A & B Tave will decrease until operator stops transient. • RCS pressure and temperature will decrease. <p>Crew response:</p> <ul style="list-style-type: none"> • When the Statalarms are received, the candidates should utilize the "Plant Transient Response" process to stabilize the plant. <ul style="list-style-type: none"> • Verbalize to the SRO reactor power level and direction of movement. • Place the Diamond and both FDW Masters in manual and position as necessary to stabilize the plant. • The SRO should: <ul style="list-style-type: none"> • Refer to AP/28, ICS Instrument Failures • Contact SPOC to repair controlling Tave. <p>Note: The ICS will remain in manual for the remainder of the scenario.</p> <p>1. <u>AP/28</u></p> <ul style="list-style-type: none"> • Verify plant conditions are stable as indicated by the following: <ul style="list-style-type: none"> ➤ NI power change of < 2% from current NI power indication AND thermal power best \leq pre-transient power level ➤ Tave change of < 2°F from current Tave indication ➤ THP/SG Outlet Press. change of < 30 psig from current THP/SG Outlet Press. ➤ RCS pressure change of < 150 psig from current RCS pressure • GO TO the section 4A (RCS Temperature) • Notify SPOC • PERFORM an instrumentation surveillance using applicable table in Encl 5.3 (ICS Instrument Surveillances) for the failed instrument.
	SRO BOP/OATC	
		When the SRO reaches the WHEN step (5) in Section 4A or when directed by the lead examiner this event is completed.

Op-Test No.: _____ Scenario No.: **4** Event No.: **5** Page 1 of 2

Event Description: **HPSW Jockey pump trip, altitude valve fail closed: (C, BOP/SRO)**

Time	Position	Applicant's Actions or Behavior
	SRO BOP	<p>Plant Response: Stat Alarm 1SA9/A-8 (HPSW HEADER A/B PRESS LOW) Stat Alarm 1SA9/D-8 (HPSW JOCKEY PUMP OFF) HPSW system pressure decreasing.</p> <p>Crew Response: SRO direct BOP to refer to alarm response guide 1SA9/A-8 <u>1SA9/A-8</u></p> <ul style="list-style-type: none"> • IF HPSW Header Pressure continues to decrease AND Elevated Storage Tank Level is NOT dropping; i.e., altitude valve stuck closed and jockey pump not providing adequate supply, manually start a HPSW Pump. • Refer to OP/0/A/1104/011 (High Pressure Service Water). <p><u>OP/0/A/1104/011 Limits & Precautions</u></p> <ul style="list-style-type: none"> • HPSW Pumps A & B have a minimum flow requirement of 1450 gpm. • Normal system flow demand is approximately 200 gpm. • IF altitude valve closes while an HPSW pump is still running, pump will be deadheaded. • Do NOT operate an HPSW pump with altitude valve isolated, unless provisions have been made to ensure pump will NOT be operated below its minimum flow. • SLC 16.9.8a requires any time a Turbine Driven Emergency Feedwater Pump OR a HPI Pump is required to be operable, EWST level shall be $\geq 70,000$ gallons. • HPSW Pump(s) can operate with the Altitude Valve closed AND NO additional system flow for ≤ 15 minutes. • Open Fire Hydrant for minimum flow. <p>Note: If flow not established pump will trip in 15 minutes.</p>

Op-Test No.: _____ Scenario No.: 4 Event No.: 5 Page 2 of 2		
Event Description: HPSW Jockey pump trip, altitude valve fail closed: (C, BOP/SRO)		
Time	Position	Applicant's Actions or Behavior
	SRO	<p>Crew Response:</p> <p>SRO will refer to SLC 16.9.8a (HPSW requirements to support loss of LPSW and CCW).</p> <p>HPSW shall be available as follows:</p> <ol style="list-style-type: none"> a. HPSW shall be available to provide the backup cooling water to HPI Pump motor coolers. b. EWST level shall be \geq 70,000 gallons. c. HPSW shall be available to provide backup cooling water to the Turbine Driven Emergency Feedwater Pump bearing oil cooler <p>Condition A:</p> <ul style="list-style-type: none"> • Operations perform Risk Assessment considering equipment out of service. <p><u>AND</u></p> <ul style="list-style-type: none"> • Log unavailability duration in the Operations Log for Maintenance Rule performance monitoring.
		When it is determined that the HPSW pump has to be cycled, or when directed by the lead examiner this event is completed.

Op-Test No.: _____ Scenario No.: 4 Event No.: 6 Page 2 of 2		
Event Description: Dropped Control Rod, Manual Power Reduction (C, OATC/SRO) (TS)		
Time	Position	Applicant's Actions or Behavior
	SRO BOP/SRO	<p>Crew Response:</p> <p>SRO should refer to TS for the dropped control rod.</p> <ul style="list-style-type: none"> • Enter TS 3.1.4 (Control Rod Group Alignment Limits) Condition A: (One trippable CR inoperable or not aligned to within 6.5% of its group average height or both). <ol style="list-style-type: none"> 1. Restore Control Rod Alignment <p>OR</p> <ol style="list-style-type: none"> 2. Verify SDM <u>OR</u> Initiate Boron to restore SDM <p><u>AND</u></p> <p>Reduce Thermal Power to \leq 60% of allowable thermal power</p> <p><u>AND</u></p> <p>Reduce nuclear overpower trip setpoints (flux/flow imb) to \leq 65.5% of the allowable thermal power</p> <p><u>AND</u></p> <p>Verify the potential ejected rod worth is within assumptions of rod ejection analysis.</p> • Ensure requirements of TS 3.2.3 (Quadrant Power Tilt) are met.
		When TS 3.1.4 is entered, or when directed by the lead examiner this event is completed.

Op-Test No.: _____ Scenario No.: 4 Event No.: 7 Page 1 of 6		
Event Description: 2nd dropped CR, ATWS, Main FDW Pumps Trip, PORV fails OPEN 1RC-4 Fails OPEN (M, ALL)		
Time	Position	Applicant's Actions or Behavior
	ALL OATC	<p>Plant Response:</p> <ul style="list-style-type: none"> • Second Control Rod drops • Rod bottom lights for second dropped control rod • MFWPs trip • MD EFDWPs start • SG levels decrease and go dry • RCS Pressure decreases • Pzr level decreases initially, then increases <p>Crew Response:</p> <p>Upon recognizing the second dropped control rod, the crew manually trips the reactor.</p> <ul style="list-style-type: none"> • OATC performs IMAs and determines that the reactor did not trip and performs Rule 1 (ATWS) <p>Rule 1 (CT-24) (30 seconds to drive control rods or initiate emergency boration)</p> <ul style="list-style-type: none"> • Verify any Power Range NI \geq 5% FP. • Initiate manual control rod insertion to the IN LIMIT. • Notify CR SRO to GO TO UNPP tab. • Open the following: <ul style="list-style-type: none"> ➤ 1HP-24 ➤ 1HP-25 • Ensure only one of the following operating: <ul style="list-style-type: none"> ➤ 1A HPI PUMP ➤ 1B HPI PUMP • Start 1C HPI PUMP. NOTE: The 1C HPIP will NOT start RNO: Start the standby HPIP and open 1HP-409 • Open the following: <ul style="list-style-type: none"> ➤ 1HP-26 ➤ 1HP-27 • Dispatch one operator to open 600V CRD breakers on the following: <ul style="list-style-type: none"> ➤ 1X9-5C (U-1 CRD NORM FDR BKR) ➤ 2X1-5B (U-1 CRD ALTERNATE FDR BKR) • Verify only two HPI pumps operating • EXIT this rule.

Op-Test No.: _____ Scenario No.: 4 Event No.: 7 Page 2 of 6		
Event Description: 2nd dropped CR, ATWS, Main FDW Pumps Trip, PORV fails OPEN 1RC-4 Fails OPEN (M, ALL)		
Time	Position	Applicant's Actions or Behavior
	ALL	<p>Crew Response:</p> <p><u>UNPP tab</u></p> <ul style="list-style-type: none"> • Ensure Rule 1 (ATWS / Unanticipated Nuclear Power Production) is in progress or complete. • Verify Main FDW is operating and in AUTO. • IAAT Main FDW is NOT operating, THEN perform the following: <ul style="list-style-type: none"> • Trip the turbine-generator. • Start all available EFDW pumps. • Verify any wide range NI > 1% FP. • Open the following: <ul style="list-style-type: none"> • 1RC-4 • 1HP-5 • Maximize letdown. • Secure makeup to LDST. {8} • WHEN all wide range NIs are \leq 1% FP, AND decreasing, THEN continue. • Adjust SG pressure as necessary to stabilize RCS temperature using either of the following: <ul style="list-style-type: none"> • TBVs • Dispatch two operators to perform Encl 5.24 (Operation of the ADVs). • Throttle HPI per Rule 6 (HPI). (Should not throttle due to PORV open) • Adjust letdown flow as desired. • Verify RCP seal injection available • GO TO Subsequent Actions tab.

Op-Test No.: _____	Scenario No.: 4	Event No.: 7	Page 3 of 6
Event Description: 2nd dropped CR, ATWS, Main FDW Pumps Trip, PORV fails OPEN 1RC-4 Fails OPEN (M, ALL)			
Time	Position	Applicant's Actions or Behavior	
	BOP	<p>Crew Response:</p> <p>BOP will complete a symptom check and then perform Rule 3 (Loss of Main or Emergency Feedwater)</p> <p><u>Rule 3</u></p> <ul style="list-style-type: none"> • Verify any EFDW pump operating. • Verify any SCM ≤ 0 F. <hr style="border: 0.5px solid black;"/> <p style="text-align: center;"><u>CAUTION</u></p> <p>ATWS events may initially require throttling to prevent exceeding pump limits and additional throttling once the Rx is shutdown to prevent overcooling.</p> <ul style="list-style-type: none"> • IF overcooling, OR exceeding limits in Rule 7 (SG Feed Control), THEN throttle EFDW, as necessary. (CT-16) (Throttle less than 600 gpm / MDEFDW pump within 3 minutes.) • IAAT Unit 1 EFDW is in operation, THEN initiate Encl 5.9 (Extended EFDW Operation). <p><u>Encl 5.9</u></p> <ul style="list-style-type: none"> • Perform the following as required to maintain UST level > 7.5': <ul style="list-style-type: none"> ➤ Makeup with demin water. ➤ Place CST pumps in AUTO. 	

Op-Test No.: _____ Scenario No.: 4 Event No.: 7 Page 4 of 6		
Event Description: 2nd dropped CR, ATWS, Main FDW Pumps Trip, PORV fails OPEN 1RC-4 Fails OPEN (M, ALL)		
Time	Position	Applicant's Actions or Behavior
	SRO/BOP/ OATC	<p>Plant Response:</p> <p>With the PORV and 1RC-4 failed open and only 2 HPIPs to fill the RCS, SCM will slowly decrease to zero (saturation) while the Pzr fills. When solid, pressure will increase and SCM will be re-established</p> <p>Crew Response:</p> <p>The SRO will transfer to the Subsequent Actions tab from the UNPP tab.</p> <p><u>Subsequent Actions tab</u></p> <ul style="list-style-type: none"> • Verify all control rods fully inserted. • Verify TBVs controlling SG pressure at desired setpoint. • Dispatch an operator with Encl 5.29 (MSRV Locations) to verify all MSRVs have reseated. • Initiate Encl 5.5 (Pzr and LDST Level Control). • Open PCB 20 and PCB 21 • Perform the following: <ul style="list-style-type: none"> ➤ Open the Generator Field Breaker. ➤ Position EXCITATION switch to OFF. • Verify Aux Bldg and Turbine Bldg Instrument Air pressure ≥ 90 psig. • Verify ICS/NNI power available. <p>Note: When subcooling is lost, the OATC/BOP will perform Rule 2 (Loss of Subcooling Margin) and the SRO will transfer to the LOSCM tab.</p>

Op-Test No.: _____ Scenario No.: 4 Event No.: 7 Page 5 of 6		
Event Description: 2nd dropped CR, ATWS, Main FDW Pumps Trip, PORV fails OPEN 1RC-4 Fails OPEN (M, ALL)		
Time	Position	Applicant's Actions or Behavior
	BOP/ OATC	<p>Plant Response: Loss of Subcooling Margin</p> <p>Crew Response: The BOP/OATC will perform Rule 2 (Loss of Subcooling Margin).</p> <p><u>Rule 2</u></p> <ul style="list-style-type: none"> • IAAT all the following exist: <ul style="list-style-type: none"> • Any $SCM \leq 0 \square F$ • Rx power $\leq 1\%$ • AND either of the following exists: <ul style="list-style-type: none"> • ≤ 2 minutes elapsed since loss of SCM • RCP motor amps stable AND \approx normal • THEN Stop all RCPs. • Open 1HP-24 and 1HP-25 • Start all available HPI pumps. • Open 1HP-26 and 1HP-27. • Verify at least two HPI pumps are operating using two diverse indications. • IAAT the following limits are exceeded 1A & 1B HPI pumps operating with 1HP-409 open and Total flow of 950 gpm (incl. seal injection) THEN throttle HPI to maximize flow \leq flow limit. • Select OFF on AFIS HEADER A and B • Establish 300 gpm to 1A and 1B SGs. • IAAT any $SCM \leq 0 F$, THEN feed to the LOSCM setpoint in all intact SGs. IF $SCM > 0 F$, THEN control EFDW as required to raise level in intact SGs to proper setpoint per Rule 7 (SG Feed Control) • Place FDW block valve switches for 1FDW-33, 1FDW-31, 1FDW-42, and 1FDW-40 in CLOSE:

Op-Test No.: _____ Scenario No.: 4 Event No.: 7 Page 6 of 6		
Event Description: 2nd dropped CR, ATWS, Main FDW Pumps Trip, PORV fails OPEN (M, ALL)		
Time	Position	Applicant's Actions or Behavior
	SRO OATC/BOP	<p>Plant Response: Loss of Subcooling Margin</p> <p>Crew Response: The SRO will transfer to the LOSCM tab</p> <p><u>LOSCM tab</u></p> <ul style="list-style-type: none"> • Verify all of the following exist: <ul style="list-style-type: none"> • NO RCPs operating • HPI flow in both HPI headers • Adequate total HPI flow per Figure 1 (Total Required HPI Flow) • Open 1AS-40 while closing 1MS-47. • Perform the following: <ul style="list-style-type: none"> • Control steaming and feed rates on all intact SGs to maintain cooldown rate within Tech Spec limits: Tcold > 280°F: ≤ 50°F / ½ hr Tcold ≤ 280°F: ≤ 25°F / ½ hr Utilize either TBVs or ADVs: • Close 1RC-4. <p>NOTE: 1RC-4 will not close.</p> <ul style="list-style-type: none"> • Close 1GWD-17, 1HP-1, 1HP-2, and 1RC-3 • Maintain SG pressure < RCS pressure utilizing TBVs or ADVs • Verify primary to secondary heat transfer exists. • Initiate Encl 5.16 (SG Tube-to-Shell ΔT Control). • Verify required RCS makeup flow within normal makeup capability. (it is NOT) <p>NOTE: RCS makeup flow exceeds normal makeup capability.</p> <ul style="list-style-type: none"> • GO TO LOCA CD tab.
		When transfer to LOCA CD tab is made, or when directed by the lead examiner this event is completed.

CRITICAL TASKS

1. CT-24, ATWS
2. CT-16, FW Flow Control

Facility: **Oconee** Scenario No.: **5 fnl R1** Op-Test No.: **1**

Examiners: _____ Operators: _____

Initial Conditions:

- 0.01% below POAH (SNAP 212)

Turnover:

- Unit 1 Startup in progress
- LDST pressure low, requires H2 addition
- Startup procedure at step 2.30

Event No.	Malfunction No.	Event Type*	Event Description
0a	Override		STBY CC pump fails to Auto start
0b	Override		ES 5 fails to initiate
0c	Override		AFIS Blocked
1		R, OATC, SRO	Increase power to 3%
2	Override	C, BOP, TS, SRO	Pressurize LDST with H2, 1H-1 fails OPEN (TS)
3		TS, SRO	CRACS (Chiller trips) (TS)
4	MPS290 Override	C, BOP, SRO	1A CC pump trips and 1B CC pump fails to auto start. (Events 4 and 5 simultaneously)
5	Override	C, OATC, SRO	PZR spray valve fails OPEN
6	MPS110	C, BOP, SRO (TS)	1HP-5 fails CLOSED while restoring letdown
7	MCS012	I, OATC, SRO	1A SG Outlet Pressure fails HIGH (TBV fails OPEN)
8	Override	M, ALL	Excessive Heat Transfer
9	MSS370	M, ALL	LBLOCA ES Channel 5 fails to initiate

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

Op-Test No.: _____ Scenario No.: **5** Event No.: **1** Page 1 of 1

Event Description: **Increase reactor power to 3%: (R, OATC, SRO)**

Time	Position	Applicant's Actions or Behavior
	<p>SRO/OATC</p> <p>BOP</p>	<p>Crew response: <u>OP/1/A/1102/001</u> (Controlling Procedure for Unit Startup)</p> <p>NOTE: POAH is normally achieved from 0.05 to 0.15% power on Wide Range Indications.</p> <p>When POAH is achieved: TBVs will begin to open, 1HP-120 will begin to close, TAVE will increase, & SUR will decrease with negative Moderator Temperature Coefficient.</p> <ul style="list-style-type: none"> • Begin reactor power increase to ≈3% FP. (Manual Control Rod Withdrawal). • Begin raising 1HP-120 (RC VOLUME CONTROL) setpoint to ≈ 220" as power increases. • At ≈3% Power as indicated on NI-5, NI-6, and NI-9 (ICS median select): • Place REACTOR MASTER to "AUTO". • Place DIAMOND to "AUTO". • Ensure TURBINE MASTER Setpoint to ≈ 885 psig.
		<p>Event is complete when ICS is placed in AUTO or when directed by the lead examiner.</p>

Op-Test No.: _____ Scenario No.: **5** Event No.: **4** Page 1 of 3

Event Description: **1A CC Pump trips, 1B CC Pump Fails to Auto Start: (C; BOP, SRO)**

Time	Position	Applicant's Actions or Behavior
		<p>Note: Events 4 and 5 will occur simultaneously.</p> <p>Plant response:</p> <ul style="list-style-type: none"> • 1SA-9/B-1, CC CRD RETURN FLOW LOW • 1SA-9/C-1, CC COMP COOLING RETURN FLOW LOW • 1SA-2/C-1, LETDOWN TEMPERATURE HIGH • 1HP-5 (Letdown Isolation) will close due to high letdown temperature • CC Total Flow Low • Component Cooling Pressure Low <p>Crew Response:</p> <ul style="list-style-type: none"> • Refer to ARG 1SA-9/B-1 <ul style="list-style-type: none"> • Determine low flow is due to CC Pump failure AND Standby CC Pump did NOT start and perform the following: • Verify CC Surge Tank level > 18" • Start Standby CC Pump <p>Note: The SRO may not initiate AP/20 if the standby pump is started per the ARG.</p> <ul style="list-style-type: none"> • Initiate AP/20 (Loss of Component Cooling) <ul style="list-style-type: none"> • IAAT ≥ two CRD stator temperatures ≥ 180°F, THEN trip RX. (~ 4 minutes)
	BOP	
	SRO	
	BOP	<ul style="list-style-type: none"> • Open 1CC-7 and 1CC-8 • Verify CC Surge Tank level ≥ 12". • Manually start the Standby CC Pump • Verify CC TOTAL FLOW > 575 gpm • If Letdown > 130 °F, THEN: <ul style="list-style-type: none"> • Close 1HP-5, • Initiate AP/032 (Loss of Letdown)

Op-Test No.: _____ Scenario No.: **5** Event No.: **4** Page 2 of 3

Event Description: **1A CC Pump trips, 1B CC Pump Fails to Auto Start: (C; BOP, SRO)**

Time	Position	Applicant's Actions or Behavior
	SRO	<p>Crew Response:</p> <ul style="list-style-type: none"> • If AP/20 (Loss of Component Cooling) not entered, Statalarm 1SA-2/C-1 will direct initiating AP/32 (Loss of Letdown) <p><u>AP/32</u> (Loss of Letdown)</p>
	BOP	<ul style="list-style-type: none"> • Place 1HP-120 in HAND and reduce demand to zero. • Initiate makeup to LDST as required (Encl.5.5 or OP/1/A/1103/004. • Notify Chemistry of the following: <ul style="list-style-type: none"> • Current RCS boron sample is needed for possible unit shutdown. • Normal letdown line is isolated. • IAAT Pzr level $\geq 260''$, AND letdown CANNOT be established, THEN initiate unit shutdown at $\approx 20\%/min$ per AP/29 (Rapid Unit Shutdown). • IAAT Pzr level $\geq 375''$, THEN trip Rx. • Verify CC system in operation. • Position the standby HPI pump switch to OFF. • Throttle 1HP-31 to establish 12 - 15 gpm SEAL INLET HDR FLOW. • Verify loss of letdown is due to L/D temperature high and then GO TO Step 4.28. • WHEN letdown can be re-established, THEN ensure proper operation of the CC System. • Close 1HP-6 and 1HP-7. • Open 1HP-1, 1HP-2, 1HP-3, 1HP-4

Op-Test No.: _____ Scenario No.: **5** Event No.: **4** Page 3 of 3

Event Description: **1A CC Pump trips, 1B CC Pump Fails to Auto Start: (C; BOP, SRO)**

Time	Position	Applicant's Actions or Behavior
	<p>SRO BOP</p>	<p>Crew Response: <u>AP/32</u> (Continued)</p> <ul style="list-style-type: none"> • Verify letdown temperature < 135°F (it is not) • Open 1HP-13. • Close the following: <ul style="list-style-type: none"> • 1HP-8 • 1HP-9&11 • Select LETDOWN HI TEMP INTLK BYP switch to BYPASS. • Open 1HP-5. <p>NOTE: 1HP-5 will NOT open from the control room.</p> <ul style="list-style-type: none"> • GO TO Step 4.10 <p>NOTE: Refer to event 6.</p>
		<p>This event is complete when Seal Flow is returned to normal (32 gpm) or when directed by the lead examiner.</p>

Op-Test No.: _____ Scenario No.: 5 Event No.: 5 Page 1 of 1		
Event Description: PZR Spray Valve Fails OPEN: (C, OATC/SRO)		
Time	Position	Applicant's Actions or Behavior
	OATC/SRO	<p>Note: This event will occur during event 4.</p> <p>Plant response:</p> <ul style="list-style-type: none"> • RCS pressure will decrease • 1SA-2/D-3, RC PRESS HIGH/LOW <p>Crew response:</p> <p><u>1SA-2/D-3</u></p> <ul style="list-style-type: none"> • Ensure all pressurizer heaters are ON • Ensure pressurizer spray valve closed and/or pressurizer spray block valve closed <p>Note: If the block valve is not closed, the reactor will trip on variable low pressure and ES actuation will occur.</p> <ul style="list-style-type: none"> • Evaluate reducing or isolating letdown flow • Increase makeup flow as required <p>Note: The PZR spray valve will remain failed for the remainder of the scenario.</p>
		<p>When RCS pressure decrease has been stopped, or when directed by the lead examiner this event is completed.</p>

Op-Test No.: _____ Scenario No.: **5** Event No.: **6** Page 1 of 1

Event Description: **1HP-5 fails CLOSED while restoring letdown: (C, BOP, SRO)**

Time	Position	Applicant's Actions or Behavior
	<p>SRO BOP</p>	<p>Crew response: <u>AP/32</u></p> <ul style="list-style-type: none"> • Verify 1HP-5 closed. • Close 1HP-6. • Close 1HP-7. • Dispatch an operator in continuous communication with Control Room to manually open 1HP-5 (LETDOWN ISOLATION) <p>NOTE: 1HP-5 is a containment isolation valve (TS 3.6.3)</p> <ul style="list-style-type: none"> • WHEN 1HP-5 is open, THEN ensure CC System in operation. • Verify letdown temperature < 135°F. <p>NOTE: Letdown temperature will be greater than 135 F.</p> <ul style="list-style-type: none"> • Open 1HP-13. • Close the following: <ul style="list-style-type: none"> • 1HP-8 • 1HP-9&11 <p>Select LETDOWN HI TEMP INTLK BYP switch to BYPASS.</p> <ul style="list-style-type: none"> • Throttle open 1HP-7 to establish ≈ 20 gpm. • WHEN letdown temperature < 130°F, THEN place LETDOWN HI TEMP INTLK BYP switch in NORMAL. • Open 1HP-6. • Adjust 1HP-7 to control desired letdown flow. (75 gpm) • Re-establish normal makeup through 1HP-120. • Place IX in service per OP/1103.004 B • Re-establish normal RCP seal injection flow. • Position the standby HPI pump switch to AUTO. <p>Note: If PZR level reaches 260", TS 3.4.9 Condition A applies.</p>
		<p>When the standby HPI is placed in AUTO or when directed by the lead examiner, this event is completed</p>

Op-Test No.: _____ Scenario No.: **5** Event No.: **7** Page 1 of 1

Event Description: **1A SG outlet press fail HIGH (TBV fails OPEN)(I, OATC, SRO)**

Time	Position	Applicant's Actions or Behavior
	SRO/OATC	<p>Plant response:</p> <ul style="list-style-type: none"> • OAC alarm • 1A Turbine Bypass Valve fails open. • A Main Steam line pressure decreases • Reactor Coolant Temperature decreases causing reactor power to increase. <p>Crew response</p> <ul style="list-style-type: none"> • Crew will perform Low Power "Plant Transient Response". <ul style="list-style-type: none"> • Place ICS Diamond Panel to MAN • Place ICS Feedwater Loop Masters A&B to HAND • Insert Control Rods to reduce power to below pre-transient level • As "A" SG pressure continues to decrease, the crew should trip the reactor due to low steam pressure.
		<p>When the reactor is tripped or when directed by the lead examiner, this event is completed</p>

Op-Test No.: _____ Scenario No.: 5 Event No.: 8 Page 2 of 5	
Event Description: Excessive Heat Transfer (M, ALL)	
Position	Applicant's Actions or Behavior
BOP	<p>Crew response:</p> <p>1. <u>Rule 5</u> Continued.</p> <ul style="list-style-type: none"> • Verify 1 TD EFDW PUMP operating. • Verify 1 TD EFDW PUMP is feeding affected SGs. • Perform the following: <ul style="list-style-type: none"> • Stop 1 TD EFDW PUMP. • Close the following on affected SGs: <ul style="list-style-type: none"> • 1FDW-368 • Start 1 TD EFDW PUMP. • WHEN overcooling is stopped, THEN adjust steaming of unaffected SG to maintain CETCs constant using either of the following: <ul style="list-style-type: none"> • TBVs • Dispatch two operators to perform Encl 5.24 (Operation of the ADVs). • WHEN all the following exist: <ul style="list-style-type: none"> • Core SCM > 0 F • Rx power ≤ 1% • Pzr level <ul style="list-style-type: none"> • With PTS - Pzr level increasing • With NO PTS- Pzr level > 100" [180" acc] • THEN perform the following to stabilize RCS P/T: <ul style="list-style-type: none"> • Throttle HPI. • Reduce 1HP-120 setpoint to control at desired level. • Adjust steaming of unaffected SG as necessary to maintain CETCs constant. • Ensure Rule 3 (Loss of Main or Emergency FDW) is in progress or complete.
BOP/OATC	<p><u>Rule 3</u> (Loss of Main or Emergency Feedwater)</p> <ul style="list-style-type: none"> • IAAT NO SGs can be fed with FDW (Main/CBP/Emergency), AND any of the following exist: <ul style="list-style-type: none"> • RCS pressure reaches 2300 psig OR NDT limit • Pzr level reaches 375" [340" acc] <p>THEN PERFORM Rule 4 (Initiation of HPI Forced Cooling).</p>

Op-Test No.: _____ Scenario No.: **5** Event No.: **8** Page 3 of 5

Event Description: **Excessive Heat Transfer (M, ALL)**

Time	Position	Applicant's Actions or Behavior
	BOP/OATC	<p>Crew response:</p> <p><u>Rule 3 Continued</u></p> <ul style="list-style-type: none"> • Start EFDW pumps to feed all intact SGs. • Verify any EFDW pump operating. • Verify any SCM $\leq 0^{\circ}\text{F}$. • IAAT Unit 1 EFDW is in operation, THEN initiate Encl 5.9 (Extended EFDW Operation). <p><u>Encl. 5.9 (Extended EFDW Operation)</u></p> <ul style="list-style-type: none"> • Monitor EFDW parameters on EFW graphic display. • Perform the following as required to maintain UST level > 7.5': <ul style="list-style-type: none"> • Makeup with demin water. • Place CST pumps in AUTO. • IAAT all the following exist: <ul style="list-style-type: none"> • Rapid cooldown NOT in progress • MD EFDWP operating for each available SG • EFDW flow in each header < 600 gpm THEN place 1 TD EFDW PUMP switch in PULL TO LOCK. • Notify CR SRO to set priority based on the NOTE above and EOP activities.
	OATC/SRO	<p>Transfer to <u>Subsequent actions</u> tab then to the <u>Excessive Heat Transfer</u> tab of the EOP</p> <ul style="list-style-type: none"> • Verify any SG pressure < 550 psig. • Ensure Rule 5 (Main Steam Line Break) in progress or complete. • Place the following in HAND and decrease demand to zero on all affected SGs: <ul style="list-style-type: none"> • 1FDW-32 • 1FDW-35 • Close the following on all affected SGs: <ul style="list-style-type: none"> • 1FDW-372 • 1MS-17 • 1MS-79 • 1MS-35 • 1MS-82 • 1FDW-368

Op-Test No.: _____		Scenario No.: 5	Event No.: 8	Page 4 of 5
Event Description: Excessive Heat Transfer (M, ALL)				
Time	Position	Applicant's Actions or Behavior		
	OATC/SRO	<p>Crew response:</p> <p><u>Excessive Heat Transfer</u> tab of the EOP (Continued)</p> <ul style="list-style-type: none"> • Verify level in both SGs < 96% O.R. • IAAT core SCM is > 0°F, • THEN perform Steps 7 and 8. • Throttle HPI per Rule 6 (HPI). • Verify letdown in service. • Verify any SG has an intact secondary boundary (intact SG). • Open the following on all intact SGs: <ul style="list-style-type: none"> • 1FDW-382 • 1FDW-369 • Start MDEFDWP associated with all intact SGs: <ul style="list-style-type: none"> • 1B MDEFDWP • Feed and steam all intact SGs to stabilize RCS P/T using either of the following: <ul style="list-style-type: none"> • TBVs • Dispatch two operators to perform Encl 5.24 (Operation of the ADVs). • Verify any of the following: <ul style="list-style-type: none"> • HPI has operated in the injection mode while NO RCPs were operating • A cooldown below 400 °F at > 100 °F/hr has occurred • Verify both of the following are closed: <ul style="list-style-type: none"> • 1MS-24 • 1MS-33 • Open 1AS-8. • Close the following: <ul style="list-style-type: none"> • 1SSH-1 • 1SSH-3 • 1SSH-9 • Notify Chemistry to determine RCS boron concentration. 		
	OATC/SRO			
		<p>When chemistry notified or when directed by the lead examiner this event is completed</p>		

Op-Test No.: _____ Scenario No.: **5** Event No.: **9** Page 1 of 4
 Event Description: **LBLOCA (M, All) ES Ch 5 fails to initiate**

Time	Position	Applicant's Actions or Behavior
	OATC/BOP	<p>Plant Response: RCS pressure decreases rapidly Core and Loop Subcooling Margin indicate '0' or '-0' (flashing) ES 1-8 (except Ch 5 which has failed) initiate.</p> <p>Crew response</p> <p>NOTE: SRO may direct either RO to manually initiate ES channel 5 at any point in the procedures or either RO may initiate (OMP 1-18 memory item).</p> <p>SRO may direct the ROs to perform a symptom check:</p> <ul style="list-style-type: none"> • Perform Symptom Check <ul style="list-style-type: none"> • Power Range NIs NOT < 5% • Power Range NIs NOT decreasing • <u>Any SCM < 0°F</u> • Loss of Main and Emergency FDW (including unsuccessful manual initiation of EFDW) • Uncontrolled Main steam line(s) pressure decrease • SGTR <ul style="list-style-type: none"> • CSAE Offgas alarms • Process monitor alarms (RIA-40, 59, 60) • Area monitor alarms (RIA-16/17) • RO should recognize LOSCM and <u>perform Rule 2.</u> <ul style="list-style-type: none"> • IAAT all the following exist: <ul style="list-style-type: none"> • Any SCM ≤ 0°F • Rx power ≤ 1% • AND either of the following exists: <ul style="list-style-type: none"> • ≤ 2 minutes elapsed since loss of SCM • RCP motor amps stable AND ≈ normal • THEN perform Steps 2 and 3. <ul style="list-style-type: none"> • Stop all RCPs. • Notify CR SRO of RCP status. • Open the following: <ul style="list-style-type: none"> • 1HP-24 • 1HP-25 • Start all available HPI pumps. • Open the following: <ul style="list-style-type: none"> • 1HP-26 • 1HP-27

Op-Test No.: _____ Scenario No.: 5		Event No.: 9	Page 2 of 4
Event Description: LBLOCA (M, All) ES Ch 5 fails to initiate			
Time	Position	Applicant's Actions or Behavior	
	OATC/BOP	<p>Crew response</p> <p><u>Rule 2 (Continued)</u></p> <ul style="list-style-type: none"> • Verify at least two HPI pumps are operating using two diverse indications. • IAAT ≥ 2 HPI pumps operating, AND HPI flow in any header is in the Unacceptable Region of Figure 1 THEN perform Steps 11 - 13. • IAAT the following limits are exceeded, (CT-5) (within 10 minutes of flow > 475 gpm) <ul style="list-style-type: none"> • 1 HPI pump/hdr 475 gpm (incl. seal injection for A hdr) • 1A & 1B HPI pumps operating with 1HP-409 open Total flow of 950 gpm (incl. seal injection) • THEN throttle HPI to maximize flow \leq flow limit. • Notify CR SRO of HPI status. • IAAT either of the following exists: <ul style="list-style-type: none"> • LPI FLOW TRAIN A plus LPI FLOW TRAIN B ≥ 3400 gpm • Only one LPI header in operation with header flow ≥ 2900 gpm • THEN GO TO Step 15. • Perform the following: <ul style="list-style-type: none"> • Place 1FDW-315 in MANUAL and close. • Place 1FDW-316 in MANUAL and close. • Notify crew that performance of Rule 3 is NOT required due to LB LOCA. • WHEN directed by CR SRO, THEN EXIT this rule. 	
	SRO/BOP/ OATC	<p>SRO will <u>transfer to the LOSCM tab.</u></p> <ul style="list-style-type: none"> • Ensure Rule 2 (Loss of SCM) is in progress or complete. • Verify LOSCM caused by excessive heat transfer. • IAAT either of the following exists: <ul style="list-style-type: none"> • LPI FLOW TRAIN A plus LPI FLOW TRAIN B ≥ 3400 gpm • Only one LPI header in operation with header flow ≥ 2900 gpm • THEN GO TO LOCA CD tab. <p>SRO will <u>transfer to the LOCA CD tab.</u></p>	
		<p>When transfer to Forced Cooldown tab or when directed by the lead examiner, this event is completed</p>	

Op-Test No.: _____ Scenario No.: **5** Event No.: **9** Page 3 of 4
 Event Description: **LBLOCA (M, All) ES Ch 5 fails to initiate**

Time	Position	Applicant's Actions or Behavior
	SRO/OATC/ BOP	<p>Crew response</p> <p>The SRO may <u>transfer to the ICC tab</u> if indicated superheat (Core SCM = '-0' and flashing).</p> <p><u>Inadequate Core Cooling (ICC) tab</u></p> <ul style="list-style-type: none"> • Ensure full HPI and control per Rule 6 (HPI) • IAAT RCS pressure is ≤ 550 psig, OR RB pressure is ≥ 3 psig, THEN perform Steps 4 - 8. • Open the following: <ul style="list-style-type: none"> • 1LP-21 • 1LP-17 • Start 1A LPI Pump. • Open the following: <ul style="list-style-type: none"> • 1LP-22 • 1LP-18 • Start 1B LPI Pump. • Verify two LPI pumps operating. • IAAT all the following exist: <ul style="list-style-type: none"> • LPI required • ECCS pump suction aligned to BWST • 1A LPI Pump unavailable • 1B LPI Pump unavailable • 1C LPI Pump available AND off. • THEN open 1LP-9, 1LP-10, 1LP-6, 1LP-7, 1LP-17, 1LP-18, 1LP-21, 1LP-22 and start 1C LPI Pump. • Open the following: <ul style="list-style-type: none"> • 1CF-1 • 1CF-2 • IAAT core SCM is ≥ 0 F, THEN GO TO LOCA CD tab.
		<p>When transfer to LOCA Cooldown tab or when directed by the lead examiner, this event is completed</p>

Op-Test No.: _____ Scenario No.: 5		Event No.: 9	Page 4 of 4
Event Description: LBLOCA (M, All) ES Ch 5 fails to initiate			
Time	Position	Applicant's Actions or Behavior	
	SRO	<p>Crew response</p> <p>The SRO will direct the OATC or the BOP to perform Encl. 5.1 ES Actuation</p> <p><u>Encl 5.1</u></p>	
	OATC/BOP	<ul style="list-style-type: none"> • Verify all ES digital channels associated with actuation setpoints have actuated. • Place HPI in manual control. • Open the following: <ul style="list-style-type: none"> • 1CC-7 • 1CC-8 • 1LPSW-15 • 1LPSW-6 • Ensure 1A or 1B CC PUMP is operating. • Place the following in manual control: <ul style="list-style-type: none"> • 1A LPI PUMP • 1LP-17 • 1B LPI PUMP • 1LP-18 • Start A and B OUTSIDE AIR BOOSTER FANs (CT-27) (Within 30 minutes of ES actuation) • Notify Unit 3 to start 3A and 3B OUTSIDE AIR BOOSTER FANs • Verify the following are open: <ul style="list-style-type: none"> • 1CF-1 • 1CF-2 • Verify 1HP-410 closed. • Secure makeup to the LDST. • Close 1LPSW-139. • Place the following in FAIL OPEN: <ul style="list-style-type: none"> • 1LPSW-251 FAIL SWITCH • 1LPSW-252 FAIL SWITCH • Open the following: <ul style="list-style-type: none"> • 1LPSW-4 • 1LPSW-5 • Dispatch an operator to perform Encl 5.2 (Placing RB Hydrogen Analyzers In Service). • Select DECAY HEAT LOW FLOW ALARM SELECT switch to ON. 	
		<p>When transfer to LOCA Cooldown tab or when directed by the lead examiner, this event is completed</p>	

CRITICAL TASKS

1. CT-5, Control HPI
2. CT-17, Isolate Overcooling
3. CT- 27, Implementation of Control Room Habitability Guidance