Facility: **Oconee** Scenario No.: **1 R0 FS** Op-Test No.: **1**

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions:
- 65% Reactor Power EOL (SNAP 202)
- 1B2 RCP OOS- secured ~2 hrs ago
- Xe building up from down power maneuver

Turnover:
- AMSAC/DSS bypassed for I&E testing
- SASS in Manual for I&E testing on SG level and Pzr levels.
- 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		1HP-24 and 1HP-25 fail closed
0c	Pre-Insert Updater		SASS in Manual
0d	MPI300, AOR		Reactor fails to trip automatically Will trip from CR
1	Override	N, BOP, SRO	Pump RBNS, 1LWD-2 fails to close (TS)
2	MCS008	C, BOP, SRO	Seismic event Failure of AS Controller
3	MPI160 MPI171	I, OATC, SRO	Th Fails High
4	Override	C, BOP, SRO	1A RBCU Rupture (TS)
5	MPS110	C, OATC, SRO	1HP-5 fails closed (air line break) (TS)
6	MPS010	ALL	1A SGTL 1 - 50 gpm over 10 minutes, (TS)
7		R, OATC, SRO	Manual Plant Shutdown
8	Override	C, OATC, SRO	1A2 RCP Trips, Reactor fails to trip
9	Override MEL180	M, ALL	Blackout CT-1 Lockout KHU 2 Emergency Lockout Regain power from Keowee Unit 1 via UG

* (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	**Crew response:** BOP uses **OP/1/A/1104/007 Encl 4.1** to pump the Reactor Building Normal Sump (RBNS). OP/1/A/1104/007 Encl 4.1 • Verify MWHUT level adequate to receive waste volume. • Position the following: o Open 1LWD-1 (RB NORMAL SUMP ISOLATION) o Open 1LWD-2 (RB NORMAL SUMP ISOLATION). **Fire Timer # 1 to fail 1LWD-1 open** • Start one or both of the following: o 1A RB NORM SUMP PUMP o 1B RB NORM SUMP PUMP. **NOTE:** 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. • **WHEN** RBNS level is at desired level or ≈ 6" (low level alarm), **THEN** ensure pump(s) stopped. • Position the following: o Close 1LWD-1 (RB NORMAL SUMP ISOLATION) o Close 1LWD-2 (RB NORMAL SUMP ISOLATION). **NOTE: 1LWD-2 will fail to close** SRO will refer to **TS 3.6.3** (Containment Isolation) Condition A. De-energize 1LWD-1 within 4 hours.
		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: **Timer #2**	**Seismic event** **Failure of AS Controller: (C, BOP/SRO)**		

Time	Position	Applicant's Actions or Behavior
	BOP/SRO	**Cue: Call the Control Room (4911) as security to report a seismic event but no plant damage is visible.** **Fire Timer #2 to fail Unit 3 AS header controller** **Plant response:** • 1SA06/C-10, 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. **Crew response:** SRO may enter AP/5, Earthquake; NEOs perform inspections.
	SRO/BOP	1SA06/C-10 • Verify proper operation of MS/AS controller on Unit supplying Auxiliary Steam Header (U3). • **IF** necessary, transfer AS Header to another Unit per OP/1/A/1106/22 (Auxiliary Steam System). • **Cue: when called by Unit 1 as Unit 3, direct U1 to take control of the AS header.** **OP/1/A/1106/22 (Auxiliary Steam System) Encl 4.2** • Notify Unit 3 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). • Perform one of the following: Open 1MS-24 (or Open 1MS-33) • 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". • Notify Unit 3 to secure AS supply. **When directed by the team, Fire Timer #15 to secure Unit 3 supplying Aux Steam**
		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.: **1** Event No.: **3** Page 1 of 1

Event Description: **Th Fails HIGH (I, OATC/SRO Timer #3**

Time	Position	Applicant's Actions or Behavior
		Plant Response: • 1A Th will fail HIGH • Tave will indicate HIGH • Feedwater flow will increase • Control Rods will insert • 1SA-2/B3 (RC Hot Leg Temp High) • 1SA-2/B4 (RC Average Temperature High/Low) • 1SA-2/A12 (ICS Tracking) **Crew Response**: • When the Statalarms are received, the candidates should utilize the "Plant Transient Response" process to stabilize the plant. • Verbalize to the SRO reactor power level and direction of movement.
	OATC	• Place the Diamond and both FDW Masters in manual and position as necessary to stabilize the plant. • The SRO should: o Refer to AP/28, ICS Instrument Failures o Contact SPOC to repair the failed instrument. **Note: The ICS will remain in manual for the remainder of the scenario.**
	SRO/OATC	**AP/1/A/1700/028, ICS Instrument Failures** • Verify plant conditions are stable as indicated by the following: • 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 Pressure change of < 30 psig from current THP/SG Outlet Pressure • RCS pressure change of < 150 psig from current RCS pressure • **GO TO** the section 4A (RCS Temperature) • Notify SPOC
	BOP	• **PERFORM** an instrumentation surveillance using applicable table in Encl 5.3 (ICS Instrument Surveillances) for the failed instrument. • Verify computer readouts O1A1692 and O1A1693 agree within 3°F
		When Encl 5.3 has been performed, or when directed by the lead examiner this event is completed.

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

Event Description: **1A RBCU rupture (C, BOP/SRO) (TS)**
Timer #4

Time	Position	Applicant's Actions or Behavior
	BOP	**NOTE: Event 5 will be initiated concurrently with Event 4.** **Plant Response:** • 1SA-9/B-9, LPSW RBCU A Cooler Rupture • 1SA-9/A-6, RB Normal Sump Level High/Low • RB normal sump level will increase **Crew Response:** <u>ARG for 1SA-9/B-9</u> • Verify alarm is valid by checking RBCU 1A Inlet Flow and RBCU 1A delta flow. • Verify 1LPSW-18 (RBCU 1A Outlet) open • Verify adequate LPSW flow is available; check LPSW pump operation • Monitor RBNS Level for any unexplained increase (Notify Chemistry to sample RBNS for boron to determine if a cooler rupture has occurred. • Diagnose a Cooler Rupture is indicated and Isolate the 1A RBCU Cooler. • Enter TS for RBCU inoperable (**TS 3.6.5 Condition B**). • Close 1LPSW-16 (1A RBCU INLET) o Fire Timer 5 – To Initiate Event 5 (1HP-5 Fails Closed) • Perform TS 3.6.3 Condition C for closed containment system. • Open vent or drain. • Close 1LPSW-18 (1A RBCU OUTLET) • Refer to **SLC 16.9.12** (Additional LPSW and Siphon Seal Water System Operability Requirements)
	SRO	

Op-Test No.: _____	Scenario No.: 1	Event No.: **4**	Page 2 of 2
Event Description:	**1A RBCU rupture (C, BOP/SRO) (TS)**		

Time	Position	Applicant's Actions or Behavior
	SRO	SRO may conservatively enter AP/05, Earthquake • Dispatch operators to perform plant inspections **Note: No damage will be reported.** • *Notify SPOC to develop the Strong Motion Accelerometer tape. • *Verify NO fuel handling activities in progress. *** These items may not be completed depending on how soon the next event is started.**
	SRO	
		When the RBCU has been isolated, or at the direction of the Lead Examiner this event is completed.

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

Event Description: **1HP-5 Fails Closed (air line break) (C, OATC/SRO)**
Timer #5

Time	Position	Applicant's Actions or Behavior
	OATC	**Plant Response:** • 1HP-5 green closed light is lit • Pzr Level slowly increases • LDST Level slowly decreases
	OATC/SRO	**Crew Response:** • Enters AP/32 , Loss of Letdown • Place 1HP-120 in HAND and reduce demand to zero. • Initiate makeup to LDST as required. • Position the standby HPI pump switch to OFF. • Throttle 1HP-31 to establish 12 - 15 gpm SEAL INLET HDR FLOW. • GO TO Step 4.10 per Table in AP/32 • Close 1HP-6. • Close 1HP-7. • Open 1HP-5. • Open 1HP-5 RNO actions as follows: o Dispatch NEO in continuous communications with control room to manually open 1HP-5 ▪ NEO manually opens 1HP-5 **NOTE: This will tie up the control room phone used and one phone in the console for the rest of the scenario** o Enter TS 3.6.3 • When 1HP-5 is open, THEN continue. • Place CC system in operation. • Verify letdown temperature < 135°F. • Throttle 1HP-7 to establish ~20 gpm • Open 1HP-6 • Adjust 1HP-7 to control desired letdown flow.

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

Event Description: **1HP-5 Fails Closed (air line break) (C, OATC/SRO)**

Time	Position	Applicant's Actions or Behavior
	OATC/SRO	• Re-establish normal makeup through 1HP-120. • Notify SPOC to initiate repairs on 1HP-5. • Verify seal injection flow reduced in Step 4.7. • Re-establish normal RCP seal injection flow. • Position the standby HPI pump switch to AUTO. • **WHEN** repairs are complete on 1HP-5 (LETDOWN ISOLATION) (East Pen Rm), **THEN** perform the following: A. __ Locally turn 1HP-5 handwheel fully clockwise. B. __ **EXIT** TS 3.6.3. **NOTE: 1HP-5 will not be repaired during this scenario**
		When 1HP-5 is manually opened and NEO is stationed locally then this event is complete or when directed by Lead Examiner.

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

Event Description: **1A SGTL 1 - 50 gpm over 10 minutes: (SRO) (TS) Timer#6**

Time	Position	Applicant's Actions or Behavior
	BOP/SRO	**Plant response:** 1SA8/A9 (RM AREA MONITOR RADIATION HIGH) 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 **NOTE: Leak rate will ramp to 50 gpm over the next 10 minutes.**
	SRO	**Crew response:** Enter AP/31 (Primary to Secondary Leakage) • **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: is in High alarm or inoperable; **THEN** Dispatch an operator to open and white tag the following: 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.: **6** 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	**Crew response:** AP/31 (Primary to Secondary Leakage) …continued • 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): o AP/29 (Rapid Unit Shutdown) o OP/1/A/1102/004 (Operation at Power) o 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.: **7** Page 1 of 2

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

Time	Position	Applicant's Actions or Behavior
	BOP/SRO OATC	**Crew response:** SGTR tab of EOP • Maintain Pzr level ≥ 220″ by initiating Encl 5.5 (Pzr and LDST Level Control). o Utilize the following as necessary to maintain desired Pzr level: ▪ Standby HPI pump ▪ 1HP-26 ▪ 1HP-7 ▪ 1HP-5 ▪ 1HP-120 setpoint or valve demand o If LDST tank level cannot be maintained, Open 1HP-24/25 and close 1HP-16. • **IAAT** Pzr level decreasing with all available HPI, **AND** Rx power is > 18%, **THEN** perform the following: o Trip the Rx. o **GO TO** IMA tab. • Verify all of the following: o Rx power > 40% o 1RIA-59 operable o 1RIA-60 operable • Determine leak rate using the following: o 1RIA-59 o 1RIA-60 • Notify OSM of SGTR leakrate • Initiate manual power reduction to < 15%. o Use control rods and lead with FDW masters. • Initiate Encl. 5.19 (Control of Plant Equipment During Shutdown for SGTR). • **WHEN**, < 15% power and auxiliaries transferred, continue

Op-Test No.: _____ Scenario No.: **1** Event No.: **7** Page 2 of 2

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

Time	Position	Applicant's Actions or Behavior
	BOP	Initiate Encl 5.19 (Control of Plant Equipment During Shutdown for SGTR). • Monitor RIAs to identify all SGs with a tube rupture: o 1RIA-16/17 o 1RIA-59/60 when Rx power > 40% • Start the TURBINE TURNING GEAR OIL PUMP, 1A through 1E TURBINE BRNG OIL LIFT PUMPs, TURBINE MOTOR SUCTION PUMP • Transfer electrical auxiliaries • Notify CR SRO that unit auxiliaries have been transferred. • 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**)) • Notify Unit 3 to start the 3A/3B OUTSIDE AIR BOOSTER FANs • Stop the 1A/1B MSRH DRN PUMPs • Place 1FDW-53/65 in manual and close. • Place 1HD-37/52 in DUMP. • Place 1A/1B FDWP SEAL INJECTION PUMP switch to START. • Start 1A/1B FDWP AUXILIARY OIL PUMP. **WHEN** Rx power is < 80%, **THEN** stop the 1E1/1E2 HTR DRN PUMPs
	SRO	SGTR Tab Cont. • **WHEN** both of the following exist: o Reactor power is ≈ 15% FP o Unit auxiliaries have been transferred o **THEN** continue in this procedure. • Depress turbine TRIP pushbutton. • Verify all TURBINE STOP VALVES closed. • Open the following: o PCB 20 o PCB 21 • Perform the following: o Open the Generator Field Breaker. o Position EXCITATION switch to OFF. • Verify TBVs controlling SG pressure as expected. • Reduce Rx power to ≤ 5% FP.
		Event is complete when reactor power has been reduced by 5-15% or when directed by the lead examiner.

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

Event Description: **1A2 RCP Trips; Reactor fails to trip: (C, OATC, SRO)**
Quick Stike: 1A2 RCP OFF

Time	Position	Applicant's Actions or Behavior
		Plant response: • 1SA1/A1, B1, C1, D1 (RP CHANNEL A, B ,C ,D TRIP) • 1SA1/B7, B7, C7, D7 (RP CHANNEL A, B, C, D RCP/FLUX TRIP) • 1SA2/A-3 (RC LOOP A FLOW LOW) • 1SA1/A-5 (RC TOTAL FLOW LOW) **Crew response:**
	OATC/SRO	Crew recognizes that the reactor should have tripped but did not. OATC to SRO "Reactor Should Have Tripped" SRO directs the OATC to perform Immediate Manual Actions (IMAs) • OATC depresses the Rx TRIP pushbutton. **(CT-24) (within 30 seconds of reactor trip conditions)** **NOTE: Reactor will trip when the pushbutton is depressed.** • Verify reactor power < 5% FP and decreasing. • Depress turbine TRIP pushbutton. • Verify all turbine stop valves closed. • Verify RCP seal injection available.
	BOP/SRO	SRO directs the BOP to perform a Symptoms Check: • Verify reactor power < 5% FP and decreasing • Verify All SCMs > 0°F • Verify no loss of heat transfer • Verify no excessive heat transfer • Inform SRO that a SGTR does exist.
	SRO	Transfers to EOP Subsequent Actions Performs Parallel Actions page
		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.: **9** Page 1 of 7

Event Description: **Blackout: (M, ALL)**
Timer #9

Time	Position	Applicant's Actions or Behavior
		Plant response: • KHU #2 Emergency Lockout • CT-1 Lockout • MFBs will de-energize **Crew response:**

	OATC/SRO	• Perform Immediate Manual Actions (IMAs)
		• Depress REACTOR TRIP pushbutton.
		• Verify reactor power < 5% FP and decreasing.
		• Depress turbine TRIP pushbutton.
		• Verify all turbine stop valves closed.
		• Verify RCP seal injection available.
		• **IF** CC is unavailable, **THEN** immediately perform the following:
		  o Stop all RCPs.
		  o Notify CR SRO to initiate AP/25 (Standby Shutdown Facility Emergency Operating Procedure).

	BOP	AP/25
		• Obtain the following items:
		  • Vital area access key ring
		  • Flashlight
		• Proceed to the SSF.
		NOTE: BOP will be stopped before leaving the control room and informed that Unit 2 RO will perform SSF actions.

	OATC/BOP	Perform Symptom Check
		• Power Range NIs < 5% decreasing
		• All SCMs > 0°F
		• Loss of Main and Emergency FDW (including unsuccessful manual initiation of EFDW); **TDEWFP will be available**
		• Uncontrolled Main steam line(s) pressure decrease
		• SGTR
		  • CSAE Offgas alarms
		  • Process monitor alarms (RIA-40, 59, 60)
		  • Area monitor alarms (RIA-16/17)

Op-Test No.: _____ Scenario No.: **1** Event No.: **9** Page 2 of 7

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

Time	Position	Applicant's Actions or Behavior
	OATC	**Crew response:** Rule 3 (Loss of Main Feedwater (only)) • **IAAT NO** SGs can be fed with FDW (Main/CBP/Emergency), **AND** any of the following exist: o RCS pressure reaches 2300 psig **OR** o NDT limit __ Pzr level reaches 375" [340" acc] o **THEN PERFORM** Rule 4 (Initiation of HPI Forced Cooling). • Start EFDW pumps to feed all intact SGs (**TDEFWP**) • Verify any SCM ≤ 0°F; RNO- If overcooling or exceeding Rule 7 limits, **THEN** throttle EFDW as necessary. • Initiate Encl. 5.9, Extended EFW Operation o Make up to the UST o Start TDEFWP BEARING OIL COOLING PUMP
	SRO	SRO will transfer to EOP Subsequent Actions and transfer to the BLACKOUT tab from the Parallel Actions Page • Notify plant staff Emergency Dose limits are in affect. • Direct an RO to announce plant conditions using the plant page and notify the OSM to reference EP and NSD 202. • SRO will direct the BOP to perform Encl. 5.38 (Restoration of Power)

Op-Test No.: _____ Scenario No.: **1** Event No.: **9** Page 3 of 7

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

Time	Position	Applicant's Actions or Behavior
	SRO	**Crew response:** Blackout Tab • Position the following to OFF: o 1A MD EFDWP o 1B MD EFDWP • Feed and steam available SGs as necessary to stabilize RCS P/T. **NOTE:** Feeding SGs with EFDW is desired above HPI Forced Cooling. Step 6 should be performed prior to re-performing Rule 3. • **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: • 1TC • 1TD • 1TE **THEN** Initiate AP/11 (Recovery from Loss of Power). (SEE NEXT PAGE FOR AP/11 steps) **GO TO** Subsequent Actions Tab SRO will continue in Blackout Tab until power is restored then go back to the above IAAT step, initiate AP/11 and then transfer to the Subsequent Actions tab. SRO will transfer to the SGTR tab from the parallel Actions Page

Op-Test No.: _____ Scenario No.: **1** Event No.: **9** Page 4 of 7

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

Time	Position	Applicant's Actions or Behavior
	OATC/BOP	**Crew response:** RO will perform Encl. 5.38 (Restoration of Power) **(CT-8) (Not met if Encl. 5.38 completed with power NOT restored.)** • Place 1HP-31 in HAND and reduce demand to 0. • Close 1HP-21. • Verify MFB1/2 energized (NOT); GO TO Step 8 • Verify CT-1 indicates ~ 4160 volts (NOT); GO TO Step 18 • Verify both STNDY Busses de-energized • Verify both Keowee units operating (NOT) • Emergency start Keowee units • Notify Keowee Operator to place all Keowee units in Oconee Control. • Ensure one of the following is closed for an operating Keowee unit: o UNIT 1 EMER FDR ACB 3 (restores power) • Verify CT-4 indicates ≈ 4160 volts. • Place the following transfer switches in MAN: o CT4 BUS 1 AUTO/MAN o CT4 BUS 2 AUTO/MAN • Place the following switches in ON: o STBY BUS 1 SYNCHRONIZING o STBY BUS 2 SYNCHRONIZING • Close the following breakers: o SK1 CT4 STBY BUS 1 FEEDER o SK2 CT4 STDY BUS 2 FEEDER • Place the following switches in OFF: o STBY BUS 1 SYNCHRONIZING o STBY BUS 2 SYNCHRONIZING • Verify Standby Bus #1 energized. • Place the following switches in MAN: o MFB1 AUTO/MAN o MFB2 AUTO/MAN o STANDBY 1 AUTO/MAN o STANDBY 2 AUTO/MAN • Open the following breakers: o $N1_1$ MFB1 NORMAL FDR o $N2_1$ MFB2 NORMAL FDR o $E1_1$ MFB1 STARTUP FDR o $E2_1$ MFB2 STARTUP FDR • Close the following breakers: o $S1_1$ STBY BUS 1 TO MFB1 o $S2_1$ STBY BUS 2 TO MFB2

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

Time	Position	Applicant's Actions or Behavior

	OATC/BOP	**Crew response:**
		
		Having just completed Encl. 5.38, the SRO may direct an RO to perform AP/11
		
		<u>AP/11 (Recovery from Loss of Power).</u>
		• 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).
		• Close the following breakers:
		  • 1TC INCOMING FDR BUS 1/2
		  • 1TD INCOMING FDR BUS 1/2
		  • 1TE INCOMING FDR BUS 1/2
		• Verify a 230KV Switchyard Isolation has occurred. (It has NOT)
		• Simultaneously press RESET on both of the following pushbuttons to reset Main Feeder Bus Monitor Panel Load Shed Circuitry:
		  • MFB UNDERVOLTAGE CHANNEL 1/2 RESET
		• Verify all condensate flow has been lost for < 25 minutes and condensate operation is desired. If condensate flow is lost > 25 minutes, place all CBPs to OFF and GO TO Step 4.34
		  o Place all HWP control switches to OFF.
		  o Place all CBP control switches to OFF.
		  o Place 1FDW-53/65 in MANUAL and close.
		  o Place 1C-10 FAIL SWITCH in MANUAL.
		  o Close 1C-10.
		  o Using a plant page, clear TB Basement and TB third floor of non-essential personnel.
		  o Start one HWP
		• Dispatch an operator to "Restore Loads Outside the Control Room".

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

Time	Position	Applicant's Actions or Behavior

	OATC/BOP	**An RO could be performing Encl. 5.5, once power has been restored, as described below.**
		
		Crew response:
		RO will make up to RCS per Encl. 5.5 (Pzr and LDST Level Cont)
		• Utilize the following as necessary to maintain desired Pzr level:
		  • 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.
		NOTE: 1HP 24 and 1HP-25 fail closed.
		• **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.)**
		  • Start 1A LPI PUMP.
		  • Start 1B LPI PUMP.
		  • Open the following:
		  • 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.: **9** Page 7 of 7

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

Time	Position	Applicant's Actions or Behavior

	ALL	**Once power is restored and the SRO has transferred out of the SBO tab to Subsequent Actions, the SRO will transfer to the SGTR tab.**
		
		Crew response:
		SGTR tab
		• 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:
		  o 1HP-24
		  o 1HP-25
		NOTE: 1HP-24 and 1HP-25 fail closed. See previous page for step to align
		• Secure makeup to LDST.
		• Maintain both SG pressures < 950 psig using either of the following: 1) TBVs 2) Dispatch two operators to perform Encl 5.24 (Operation of the ADVs)
		• 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.)**
		  o De-energize all Pzr heaters
		  o Use Pzr spray
		  o Maintain Pzr level 140″ - 180″
		• **IAAT** RCS de-pressurization methods are inadequate in minimizing core SCM,
		  o Cycle PORV as necessary

		When crew takes action to minimize SCM or when directed by the lead examiner, the event is complete.

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 RO FS** Op-Test No.: **1**

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions:
- 100% Reactor Power (SNAP-205)

Turnover:
- SASS in Manual
- AMSAC/DSS bypassed for I&E testing
- 1NI-9 OOS, to be replaced next outage
- "1A" SG AFIS Digital Channel 1 auto-initiate circuit OOS- TS
- "A" Condensate Booster Pump OOS, breaker to be replaced
- 1B MFDWP on Handjack for MGU work; completed; NEO on station at 1B MFDWP
- I&E performing instrument calibrations

Event No.	Malfunction No.	Event Type*	Event Description
0a	Pre-Insert		AMSAC/DSS bypassed
0b	Pre-Insert MNI082		NI-9 OOS
0c	Pre-Insert AOR		"A" AFIS circuit disabled "B" AFIS circuit disabled
0d	Pre-Insert		ES channels 7 and 8 fail to actuate
0e	Pre-Insert		1HP-26 failed closed
0f	Pre-Insert		1A MDEFWP fails to start
1		N, BOP, SRO	Remove/restore 1B MFWP from Hand Jack
2	Override	C, BOP, SRO	Inadvertent ES Channel 4 actuation (TS)
3	Override	C, OATC, SRO	Pressurizer Spray Valve fails open
4	MPI050 MPI080	I, OATC, SRO	RC Loop B Flow Fails LOW Small RCS Leak (TS)
5	MPS400	C, BOP, SRO	RCS Leak, 50 gpm
6		R, OATC, SRO	Manual power reduction due to RCS Leak
7	MSS370, 100	M, ALL	1B Main Steam line break in RB ES Channels 7 & 8 fail to actuate

* (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: **Remove 1B MFWP from Handjack (N, BOP/SRO)**

Time	Position	Applicant's Actions or Behavior
	SRO	Direct BOP to perform OP/1/A/1106/002 B (FWPT Operation), Encl. 4.13, Taking the 1B FDWPT Off Handjack.
	BOP	BOP, use the above procedure Encl. 4.13, and remove the 1B FDWPT from Handjack and restore speed control to the 1B MGU (motor gear unit) Initial Conditions: 1. Motor gear unit (MGU) operable from 1B MAIN FDW PUMP (ICS) station. 2. 1B FDWPT controlled from Motor Speed Changer. 3. Review Limits and Precautions Procedure 1. Remove tag from 1B Main FDWP (ICS) station 2. Run 1B MAIN FDW PUMP (ICS) station to "HSS" (high speed stop) 3. Establish communications with the local NEO 4. Exercise the 1B MGU (ICS) station by running MGU down to the LSS and then back up to HSS; verify smooth operation. 5. Turn FWT 1B HANDJACK switch to "OFF" NOTE: Two successful decreases verifies control with Motor Gear Unit 6. Decrease 1B MAIN FDW PUMP (ICS) until 1B FDWPT controlled by 1B MAIN FDW PUMP (ICS) station 7. Increase 1B FDWPT Motor Speed Changer. 8. Verify 1B FDWPT speed does **NOT** increase. 9. Run 1B FWPT Motor Speed Changer to "HSS". **IF** U1 is in Mode 1 or 2 with 1A FDWPT in auto: 10. Verify 1A MAIN FDW PUMP (ICS) in "AUTO". 11. Place 1B MAIN FDW PUMP (ICS) in "AUTO". 12. Verify ICS adjusts 1B FDWPT speed to balance suction flow.
		Event is complete when the 1B FDWPT (ICS) station is in AUTO, or when directed by the lead examiner the event is completed.

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

Event Description: **Inadvertent ES Channel 4 actuation (TS) (C, BOP/SRO) (Timer #2)**

Time	Position	Applicant's Actions or Behavior
	BOP	**Plant response:** **Note: Activate Timer #3 when BOP is occupied with RZ Module.** Statalarms: • 1SA-1/D-10, ES CHANNEL 4 TRIP Control Board indications: • ES Channel 4 actuated • 1B LPI Pump starts • 1B LPI Train aligns • B and C LPSW Pumps start **Crew response:**
	BOP/SRO	1. Determine ES actuation not valid and inform the SRO. 2. Crew may perform Plant Transient Response. 3. SRO enter AP/42 (Inadvertent ES Actuation) AP/1/A/1700/042 (Inadvertent ES Actuation) actions: • Close 1HP-24 and 1HP-25 (should already be closed) • Ensure AP/42 Encl. 5.1 (Side Board Actions) is in progress (NOTE: Contains no actions for the BOP for ES 4) • Verifies ES 3 or 4 has actuated • Place the affected components in MANUAL: (RZ Module) o ES Channel 4 = LPI-P1B and 1LP-18
	BOP	• Stop the 1B LPI PUMP • Close 1LP-18 4. WHEN ready to restore, THEN continue. ES 4 components will remain in Manual for the rest of the scenario and will require the crew to manually reinitiate them. SRO refers to **TS 3.3.7** (ES Digital Channels). Condition A applies; Declare associated components inoperable within 1 hour. SRO refers to **TS 3.3.6** (ESPS Manual Initiation). Condition A applies; Restore to OPERABLE status within 72 hours.
		Event is complete when ES 4 components are secured or when directed by the lead examiner.

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

Event Description: **PZR Spray Valve Fails OPEN: (C, OATC/SRO) (Timer #3)**

Time	Position	Applicant's Actions or Behavior
	OATC BOP/SRO OATC	**Note: This event will occur during Event 2.** **Note: Activate Timer #3 when BOP is occupied at RZ Module.** **Plant response**: • RCS pressure will decrease • 1SA-2/D-3, RC PRESS HIGH/LOW **Crew response:** 1. Refer to ARG • Verify all Pzr heaters are ON • Verify Pzr Spray valve closed and/or Pzr Spray block valve closed **Note: If the block valve is not closed, the reactor will trip on variable low pressure and ES actuation will occur.** • If the operator identifies 1RC-1 has failed open, he should immediately close the block valve per IMAs of AP/44 • Evaluate reducing or isolating letdown flow • Increase makeup flow as required 2. SRO enters to 1AP/44, Abnormal Pzr Pressure Control 3. __ **IAAT** all of the following conditions exist: __ RC pressure < 2155 psig __ RC pressure decreasing without a corresponding decrease in PZR level __ PZR heaters are on **THEN** close the following: __ 1RC-1 __ 1RC-3 4. Verify Pzr heaters maintaining RCS pressure w/in bands 5. Notify SPOC 6. Ensure TS requirements met 7. WHEN repairs are complete, THEN place 1RC-1 and 1RC-3 in the desired positions. **Note: The PZR spray valve will remain failed for the remainder of the scenario.**
		When RCS pressure decrease has been stopped, or when directed by the lead examiner this event is completed.

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

Event Description: RC Loop B Flow fails LOW: (I, OATC/SRO) Small RCS Leak (TS) (Timer #4)

Time	Position	Applicant's Actions or Behavior
	OATC SRO	**Plant response:** Statalarms: • 1SA-2/A-4, RC Loop B Flow Low • 1SA-2/A-5, RC Total Flow Low • 1SA-1/A-1, RP Channel A Trip • 1SA-1/A-3, RP Channel A Flux/Imb/Flow Trip Control board indications: • RCS Flow meter shows Loop B flow at zero. • RPS Channel A trips. • B S/G FDW Flow instrument shows a reduction in FDW, and the A S/G FDW Flow indicates increasing flow or off-scale High. • DELTA Tc meter indicates a large Delta Temp. • RB normal sump level slowly increasing **Crew response:** • The crew stabilizes using the "Plant Transient Response" process. • Take Diamond and BOTH FDW Masters to MANUAL; stabilizes the unit. • SRO may enter AP/2 (Excessive RCS Leakage) if the increase in RB normal sump rate is observed. (highly unlikely due to size of leak.) The SRO may refer to TS 3.4.13 (RCS Operational Leakage) and determine that Condition A, Reduce leakage to within limits within 4 hours and Condition B, Be in MODE 3 in 12 hours are in affect. This is for an unidentified leak > 1 gpm. • SRO enters to AP/28, ICS Instrument Failures and notifies SPOC. <u>AP/28, ICS Instrument Failures</u> (Case 4E RCS Flow Failure) will: o Ensure DIAMOND and BOTH FDW Masters in MANUAL. o Notify SPOC to select a valid RCS flow input to ICS and investigate and repair the failed RCS flow instrumentation. o Ensure any associated requirements of PT/1/A/0600/001 (Periodic Instrument Surveillance) o **WHEN** notified by SPOC a valid RCS flow input has been restored, **THEN GO TO** Encl 5.1 (Placing ICS in AUTO). **Note: Crew may refer to PT/600/001 (Periodic Instrument Surveillance) and TS 3.3.1 (RPS Instrumentation) due to "A" RPS Channel trip and may choose to place "A" RPS to manual Bypass.**
		Event is complete when the SRO has reached the WHEN step in AP/28 or when directed by the Lead Examiner.

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

Event Description: **RCS Leak: (C, BOP/SRO)**
Timer #5

Time	Position	Applicant's Actions or Behavior
		Plant response: Alarms: • OAC RB Normal Sump Temp HI HI • 1SA-9/A-6 (RB NORMAL SUMP HIGH/LOW) • 1SA-8/B-9 (RM Process Monitor Radiation HIGH) Control Board indications: • PZR and LDST level deceasing • RC makeup flow increasing • RB normal sump level increasing **Crew response:**
	SRO	The SRO may refer to TS 3.4.13 (RCS Operational Leakage) and determine that Condition A, Reduce leakage to within limits within 4 hours and Condition B, Be in MODE 3 in 12 hours are in affect. This is for an unidentified leak > 1 gpm. **Note: SRO may not refer to TS during the scenario due to other events occurring.**

	BOP	SRO enters AP/2 (Excessive RCS Leakage), which will:
		• Initiate makeup to LDST using Encl 5.5 (Pzr and LDST Level Control) of U1 EOP
		  • If desired, makeup to the LDST from 1A BHUT.
		  • Utilize the following as necessary to maintain desired PZR level:
		  • Standby HPI pump
		  • 1HP-26
		  • 1HP-7
		  • 1HP-5
		  1HP-120 setpoint or valve demand

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

Event Description: **RCS Leak: (C, BOP/SRO)**

Time	Position	Applicant's Actions or Behavior
		Crew response: • Place 1HP-14 in NORMAL • Announce AP entry using the PA system. • Initiate Encl 5.1 (Leak Rate Determination). • **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) • Notify the OSM to reference the Emergency Plan and OMP 1-14 (Notifications). • Notify the STA and RP. • Shut down using: • OP/1/A/1102/004 (OPS At Power) Enclosure 4.2 (Power Reduction) • AP/29 (Rapid Unit Shutdown) **Simulator operator**: If the SRO elects to shutdown using Ops At Power, call as the OSM and direct the crew to use AP/29.
		When the SRO has made the decision to shutdown, or when directed by the lead examiner the event is completed.

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

Event Description: **Manual Power Reduction: (R, OATC, SRO)**

Time	Position	Applicant's Actions or Behavior
	SRO BOP	SRO directs shutdown per AP/29 (Rapid Unit Shutdown: • Initiate Encl 5.1 (Support Actions During Rapid Unit Shutdown) • Stop 1A & 1B MSRH DRN PUMP • Place 1FDW-53 and 1FDW-56 in MANUAL and close. • Place 1HD-37 and 1HD-52 in DUMP. • Start the following pumps: ➢ 1A & 1B FDWP Seal Injection Pump ➢ 1A & 1B FDWP Aux Oil Pump • WHEN NI Power ≤ 80%, Secure 1E1 & 1E2 HTR DRN PUMPs Transfer electrical auxiliaries • Place 1TA & 1TB AUTO/MAN transfer switch in 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 • Place MFB1 AUTO/MAN transfer switches in MAN • Place MFB2 AUTO/MAN transfer switches in MAN • Close $E1_1$ MFB1 STARTUP FDR • Verify $N1_1$ MFB1 NORMAL FDR opens • Close $E2_1$ MFB2 STARTUP FDR • Verify $N2_1$ MFB2 NORMAL FDR opens

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

Event Description: **Manual Power Reduction: (R, OATC, SRO)**

Time	Position	Applicant's Actions or Behavior
	SRO	• 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. (**its not**)
	OATC	NOTE: The OATC must be aware of the Pzr Spray Valve failure and use the Spray Block Valve to initiate spray as needed. • Initiate manual power reduction to desired power level. • The OATC will reduce reactor power with the ICS in manual.
	BOP	• Reduce FDW to reduce power • Insert control rods to control Tave. • Shutdown the 1B FDWP.
		When power has been reduce by at least 5% or when directed by the lead evaluator this event is completed.

Op-Test No.: _____ Scenario No.: 2 Event No.: 7 Page 1 of 3

Event Description: **1B Main Steam Line break in RB (M, ALL)**
Timer #7

Time	Position	Applicant's Actions or Behavior
	ALL	**Plant response:** • Statalarm 1SA-02/A-9, MS Press High/Low • "A" and "B" Main Steam (MS) pressure decreases Reactor trips: • "A" MS line pressure stops decreasing • "B" MS line pressure continues to decrease **Crew response:**
	OATC	• The OATC will perform IMAs. ➢ Depress REACTOR TRIP pushbutton ➢ Verify reactor power < 5% FP and decreasing ➢ Depress TURBINE TRIP pushbutton ➢ Verify all turbine stop valves closed ➢ Verify RCP seal injection available • OATC verify IMAs • BOP performs a Symptoms Check
	SRO	SRO refers to "Parallel Actions"; transfers to the Excessive Heat Transfer (EHT) tab:
	OATC	• **IAAT** SCM = 0°F then the OATC will perform **Rule #2 (Loss of SCM)** after receiving concurrence from the SRO. ➢ Trip ALL RCPs within 2 minutes (**CT-1**) ➢ Ensure open 1HP-24 and 1HP-25 ➢ Ensure ALL HPI pumps operating ➢ Ensure open 1HP-26 and 1HP-27 ➢ Verify required HPI flow per header ➢ Verify TBVs available

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

Event Description: **1B Main Steam Line Break in RB (M, ALL)**

Time	Position	Applicant's Actions or Behavior
	BOP	The BOP performs **Rule #5** (Main Steam Line Break) after receiving concurrence from the SRO. • Initiate AFIS 1B SG Digital Channels 1 and 2 • Stop 1B MDEFDW Pump (**CT-17- must be met prior to completing Rule 5**) • Ensure both Main FDW pumps tripped • Isolates all feedwater to the 1B SG (FDW-316, -42, -40) • Start 1 TD EFDW PUMP
	SRO	• Open 1AS-40 while closing 1MS-47 • WHEN overcooling is stopped, adjust steaming of unaffected SG (1A SG) to maintain CETCs constant. **(CT-11- control SG heat removal and/or throttle HPI to prevent the PORV from lifting)**
		CAUTION Thermal shock conditions may develop if HPI is NOT throttled and RCS pressure NOT controlled.
	BOP	• WHEN all of the following exist: Core SCM >0° F, Rx Pwr ≤ 1%, and Pzr Level increasing, THEN perform the following to stabilize RCS P/T: ➢ Throttle HPI ➢ Reduce 1HP-120 setpoint to >100" (180" ACC) ➢ Adjust steaming of unaffected SG (1A SG) to maintain CETCs constant **(CT-11- control SG heat removal and/or throttle HPI to prevent the PORV from lifting)** • Ensure Rule 3 (Loss of Mn & EFW) is in progress or complete
	OATC/BOP	Perform Enclosure 5.1, ES Checklist • (See Attached Checklist)

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

Event Description: **1B Main Steam line break in RB (M, ALL)**

Time	Position	Applicant's Actions or Behavior
	SRO	Excessive Heat Transfer (EHT) tab will: • Ensure Rule 5 (Main Steam Line Break) in progress or complete. • Close 1FDW-41 and 1FDW-44. • Close 1FDW-382, 1MS-26, 1MS-76, 1MS-36, 1MS-84, 1FDW-369. • Throttle HPI per Rule 6 • Verify letdown in service • Feed and steam all intact SGs to stabilize RCS P/T. **(CT-11-control SG heat removal and/or throttle HPI to prevent the PORV from lifting)** • Verify 1MS-24/33 are closed. • Open 1AS-8 • Close 1SSH-1, 1SSH-3, 1SSH-9. • Minimize SCM using the following methods as necessary: (**CT-7**) ➢ De-energize all PZR heaters ➢ Use PZR spray ➢ Throttle HPI ➢ Use PORV • Maintain RCP NPSH. • Initiate Enclose 5.16 (SG Tube-to-Shell Δ T Control) • **GO TO** FCD tab (if one SG is isolated).
	SRO	Forced Cooldown tab • Establish and maintain appropriate level and pressure in available intact SGs.
		When directed by the Lead Examiner the event and scenario is completed.

CRITICAL TASKS

1. CT-17, Isolate Overcooling SG
2. CT-11, Control SG pressure to Maintain RC Temperature Constant.
3. CT-7, Minimize SCM
4. CT-1, Trip All RCPs (only if a loss of SCM (0˚F) occurs)

Facility: **Oconee** Scenario No.: **4 R0 FS** Op-Test No.: **1**

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions:
- 75% Reactor Power EOL (SNAP222)

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. 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
0e	Pre-insert		Block All Reactor Trips, including manual pb
1		N, BOP, SRO	Operability test Keowee Unit 1
2	MPS360	C, OATC, SRO	1HP-31 fails OPEN
3	Updater	C, BOP, SRO	Operating LPSW pump trips, Standby fails to auto start (TS)
4	MCS004	I, OATC, SRO	Controlling Tave fails HIGH
5	MSS200	C, BOP, SRO	Vacuum Leak
6	MCR021 MCR022	C, OATC, SRO	Dropped Control Rod, Manual Power Reduction (TS)
7	MPI300 Override MSS010 MSS020	M, ALL	2nd dropped CR ATWS – UNPP Main FDW Pumps Trip PORV fails OPEN after lifting - AOR

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

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

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

Time	Position	Applicant's Actions or Behavior
	SRO BOP	**Note: This event is run in parallel with event 2.** Direct BOP to perform PT/620/009 (Keowee Hydro Operation) to operability test Unit 1 Keowee Underground power path. <u>PT/620/009 Encl. 13.1, KHU-1 Operability Verification</u> • Verify various Statalarms **<u>NOT</u>** in alarm • Ensure the following: ➢ PERMISSIVE AUTO START light on. ➢ UNIT 1 MASTER SELECTOR switch in "AUTO". ➢ EXCITER MANUAL/AUTO Red AUTO light ON, Green MANUAL light OFF. ➢ EXCITER STOP/START Green STOP light ON, Red START light OFF. • Notify Keowee Operator to perform the following: ➢ On CB2, verify all required PREREQ lights are lit. ➢ Position MASTER TRANSFER switch for KHU-1 to "REMOTE". **Simulator operator: use QUICK STRIKE to place KHU-1 to Remote.** • Ensure UNIT 1 SYNC 230 KV selector in "MAN". • Place **<u>AND</u>** hold UNIT 1 LOCAL MASTER switch to "START" position for >10 seconds until KHU-1 starts. • Verify EXCITER STOP/START Red START light ON, Green STOP light OFF. • Perform the following: • After 60 seconds steady operation, record the following: ➢ KHU-1 OUTPUT VOLTS _____ KV (Oconee Control Room Indication - 2AB3) ➢ KHU-1 digital speed _____ RPM (KHU-1 Control Room Indication - CB-3) **Cue from Keowee C/R Operator: Keowee RPMs = 128.**

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	PT/620/009 (Continued) • Verify CT4 energized by 13.8 KV Underground Power Path: • **IF** both Standby Buses are **NOT** energized, perform the following: ➢ Ensure TS 3.8.1 Condition D has been entered for Underground Power Path. ➢ IF overhead power path is inoperable, ensure TS 3.8.1 Condition I has been entered. • IF Standby Bus 1 NOT energized • 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 • 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	PT/620/009 (Continued)
		• IF SK breakers were cycled, perform the following as desired
		  • 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.
		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.
		• Perform the following concurrently as required:
		  ➢ 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 > 10 seconds.
		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.
		• 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:
		  ➢ Verify acceptance criteria met.
		  ➢ **IF** acceptance Criteria **NOT** met, notify SRO.

		Event is complete when operability test is finished, or when directed by the lead examiner.

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

Event Description: **1HP-31 Fails Open: (C; OATC, SRO)**
Timer #2

Time	Position	Applicant's Actions or Behavior
	OATC/SRO	**Note: This event is run in parallel with event 1.** **Plant response**: 1SA2/B-2 (HP RCP Seal Inlet Header Flow **High**/Low) (42 gpm) **Crew response:** ARG for 1SA2/B-2: High Alarm • Verify high seal flow conditions with individual RCP seal indications • 1HP-31 may have failed open/mid-position. Take manual control of 1HP-31 and throttle to maintain 32 gpm. • IF flow CANNOT be reduced in above manner, adjust 1HP-31 (RCP Seal Flow Control) per OP/1/A/1104/002 (HPI system)
		When flow is reduced manually to ~ 32 gpm or when directed by the lead examiner this event is completed.

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)**
Use Quick Strike to trip 'A' LPSW pump

Time	Position	Applicant's Actions or Behavior
	SRO/BOP	**Plant response:** • 1SA-9/A-9 (LPSW Header A Press Low) • LPSW Header A/B Pressure Low **Crew response:** • Refer to ARG for 1SA-9/A-9 (LPSW Header A/B Press Low) ➢ Refer to AP/24 (Loss of LPSW) AP/24 (Loss of LPSW) • Start all available (NOT previously cavitating) LPSW pumps. (C) • Verify normal LPSW System operation is restored. (Yes)
		NOTE: 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.
	SRO	The SRO should refer to TS: • **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.
		Event is complete when SRO has referred to TS or when directed by the Lead Examiner.

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

Event Description: **Controlling Tave failed HIGH (I, OATC, SRO)**
Timer #4

Time	Position	Applicant's Actions or Behavior
		Plant response: • 1SA-02/A-12, ICS Tracking, will actuate due to neutron and feedwater cross-limits. • Controlling Tave will indicate ≈ 596.4° F. • Actual loop A & B Tave will decrease until operator stops transient. • RCS pressure and temperature will decrease. **Crew response:**
	SRO/OATC	• Statalarms; candidates perform "Plant Transient Response" process to stabilize the plant. ➢ 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: ➢ Refer to AP/28, ICS Instrument Failures ➢ Contact SPOC to repair controlling Tave. **Note: The ICS remains in manual for the rest of scenario.**
	SRO OATC	AP/28 (ICS Instrument Failures) • Verify plant conditions are controlled or stable as indicated by the following: ➢ NI power change < 2% from current NI power indication **AND** thermal power best ≤ pre-transient power level ➢ Tave change < 2°F from current Tave indication ➢ THP/SG Outlet Press. change < 30 psig from current THP/SG Outlet Press. ➢ RCS pressure change < 150 psig from current RCS pressure • **GO TO** the section 4A (RCS Temperature) • Notify SPOC
	BOP	• **PERFORM** an instrumentation surveillance using applicable table in Encl 5.3 (ICS Instrument Surveillances) for the failed instrument.
		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.: **3**	Event No.: **5**	Page 1 of 1
Event Description: **Timer #5**	**Vacuum Leak: (C; BOP, SRO)**		

Time	Position	Applicant's Actions or Behavior
		Plant response: • 1SA-03/A-6, COND VACUUM LOW (25" decreasing) occurs within 5 ≈ minutes • OAC alarm, Main Condenser Vacuum LOW
	BOP	**Crew response:** Refer to the ARG and AP/27, Loss of Condenser Vacuum.
	SRO	**AP/27: Loss of Condenser Vacuum**
	BOP	1. **IAAT** condenser vacuum is ≤ 22" Hg, THEN trip RX. 2. Dispatch operators to perform Encl. 5.1 (Main Vacuum Pump Alignment) and look for vacuum leaks. 3. Start all Main Vacuum Pumps. **Booth Operator: Open V-22, 24, 26, 28, and 30 using MANUAL Valves; THEN wait 3 minutes and call as NEO and report that the MVPs are aligned to the Unit 1 Main Condenser** 4. Ensure 1V-186 is closed. **Booth Operator: per lead examiner direction FIRE TIMER 15 to reset vacuum leak; do not allow the crew to trip the Rx on low (~22" Hg) vacuum** 5. Ensure Stm pressure to Stm Air Eject A, B, C > 255 psig. 6. Verify Stm Seal Hdr Press > 1.5 psig. 7. Start 1D CCW pump. 8. Verify Condensate flow ≥ 2300 gpm. 9. **WHEN** condenser vacuum is stable, **AND** Encl 5.1 (Main Vacuum Pump Alignment) is complete, **THEN EXIT** this procedure. **Cue: (Booth Operator): Once vacuum has been stabilized call the CR as the NEO and report that the vacuum leak has been isolated (1A FWP Pumping trap) and reset the vacuum malfunction. OR reset at the direction of the Lead Examiner.**
		When vacuum has been recovered or when directed by the lead Examiner, the event is complete.

Op-Test No.: _____ Scenario No.: **4** Event No.: **6** Page 1 of 2

Event Description: **Dropped Control Rod, Manual Power Reduction (C, OATC/SRO) (TS) Timer #6**

Time	Position	Applicant's Actions or Behavior
		Plant Response: Stat alarm 1SA2/A10 (CRD GLOBAL TROUBLE) Stat alarm 1SA2/B10 (CRD ASYMMETRIC ROD ALARM) Stat alarm 1SA2/D9 (CRD OUT INHIBIT) **Crew Response**:
	SRO	SRO should enter AP/15 (Dropped or Misaligned Control Rods) <u>AP/15</u> • **IAAT** more than one control rod is dropped or misaligned >6% (> 9″) from the group average, **THEN** trip the Rx. • Verify Rx is critical. • Verify Rx runback to 55% FP in progress. **NOTE: Runback will not be occurring due to ICS in MANUAL.**
	R,OATC	RNO: Initiate power reduction to 55% FP at ≥ 1%/min.
	BOP	• Initiate Encl 5.1 (Control of Plant Equipment During Shutdown). (**See next page**) • Notify SPOC to perform the following: • Investigate cause of dropped or misaligned control rod. • Prepare to reduce the following trip setpoints: ➢ RPS Flux/Flow-Imbalance ➢ RPS High Flux **NOTE: Tech Spec 3.1.4 requires verification of SDM > 1% Δk/k or initiation of boration to achieve SDM within limits within an hour of the misaligned or dropped control rod.** • Verify > 1% SDM with allowance for the inoperable control rod per PT/1/A/1103/015 (Reactivity Balance Calculation). USE COLR curve for 4 RCPs and 1 inoperable rod.

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	**Crew Response**: SRO should refer to TS for the dropped control rod. • 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). 1. Restore Control Rod Alignment OR 2. Verify SDM OR Initiate Boron to restore SDM AND Reduce Thermal Power to ≤ 60% of allowable thermal power AND Reduce nuclear overpower trip setpoints (flux/flow/imb) to ≤ 65.5% of the allowable thermal power AND Verify the potential ejected rod worth is within assumptions of rod ejection analysis. • 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)**		**Timer #7 and #8**

Time	Position	Applicant's Actions or Behavior
		Plant Response: • 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 **Crew Response**:
	ALL	Upon recognizing the second dropped control rod, the crew manually trips the reactor.
		Simulator Operator: Verify timer #8 automatically actuates (or Fire Timer #8) when the reactor trip push button is depressed.
	OATC	• OATC performs IMAs; determines that reactor did not trip and performs Rule 1 (ATWS)
		Rule 1 **(CT-24) (30 seconds to drive control rods or initiate emergency boration)** • Initiate manual control rod insertion to the IN LIMIT. • Notify CR SRO to **GO TO** UNPP tab. • Open the following: ➢ 1HP-24 AND 1HP-25 • Ensure only one of the following operating: ➢ 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: ➢ 1HP-26 AND 1HP-27 • Dispatch one operator to open 600V CRD breakers on the following: ➢ 1X9-5C (U-1 CRD NORM FDR BKR) ➢ 2X1-5B (U-1 CRD ALTERNATE FDR BKR) • **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	**Crew Response**: UNPP tab • Ensure Rule 1 (ATWS / Unanticipated Nuclear Power Production) is in progress or complete. • Verify Main FDW is operating and in AUTO. (In Manual-RNO) ➢ IF Mn FDW is in MANUAL, THEN adjust MFW flow as necessary to control RCS temperature • **IAAT** Main FDW is **NOT** operating, **THEN** perform the following: ➢ Trip the turbine-generator. ➢ Start all available EFDW pumps • **IAAT** all power range NIs are < 5% FP, **THEN** trip the turbine-generator • Verify any wide range NI > 1% FP. • Perform the next three steps only if > 1% FP: • Open the following: ➢ 1RC-4 ➢ 1HP-5 • Maximize letdown. • Secure makeup to LDST. • **WHEN** all wide range NIs are ≤ 1% FP, **AND** decreasing, **THEN** continue. • Adjust SG pressure as necessary to stabilize RCS temperature using either of the following: • 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**) • Verify PORV is closed. RNO: Close the PORV (PORV will not close). • 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	**Crew Response**: Completes a symptom check and then performs Rule 3 (Loss of Main Feedwater) Rule 3 • Verify any EFDW pump operating. (MDEFWPs running) • Verify any SCM ≤ 0°F.
		CAUTION ATWS events may initially require throttling to prevent exceeding pump limits and additional throttling once the Rx is shutdown to prevent overcooling.
		• **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).
	OATC/BOP	Encl 5.9, Extended EFDW Operation • Perform the following as required to maintain UST level > 7.5': ➢ Makeup with demin water. ➢ Place CST pumps in AUTO.
	OATC/BOP	Perform Enclosure 5.1, ES Checklist • (See Attached Checklist) ➢ Contains Step to start Control Room Outside Air Booster Fans **(CT-27) (Implementation of Control Room Habitability)**

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	**Plant Response:** 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 **Crew Response**: The SRO will transfer to the Subsequent Actions tab from the UNPP tab. <u>Subsequent Actions tab</u> • 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: ➢ 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. **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.**

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	**Plant Response:** Loss of Subcooling Margin **Crew Response**: BOP/OATC will perform Rule 2 (Loss of Subcooling Margin). Rule 2 • **IAAT** all the following exist: ➢ Any SCM ≤ 0°F ➢ Rx power ≤ 1% ➢ ≤ 2 minutes elapsed since loss of SCM **THEN** Stop all RCPs. **(CT-1: Trip ALL RCPs within 2 minutes)** • 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 ≤ flow limit. • Select OFF on AFIS HEADER A and B • Establish 300 gpm to 1A and 1B SGs. • **IAAT** any SCM ≤ 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 1RC-4 Fails OPEN (M, ALL)**

Time	Position	Applicant's Actions or Behavior

	SRO
	OATC/BOP
		Plant Response:
		Loss of Subcooling Margin
		Crew Response:
		The SRO will transfer to the LOSCM tab
		
		<u>LOSCM tab</u>
		
		• Verify all of the following exist:
		  • **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:
		  • 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.
		
		NOTE: 1RC-4 will not close.
		• 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**)
		NOTE: RCS makeup flow exceeds normal makeup capability.
		• **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, FDW Flow Control
3. CT-1, Trip All RCPs
4. CT-27, Implementation of Control Room Habitability

Facility: **Oconee** Scenario No.: **5 R0 FS** Op-Test No.: **1**

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions:
- 0.01% below POAH (SNAP 225)

Turnover:
- Unit 1 Startup in progress
- SASS in manual
- CFT pressure low, requires N_2 addition
- Startup procedure at step 2.32

Event No.	Malfunction No.	Event Type*	Event Description
0a	Override		1C HPI Pump fails to start
0b	Pre-insert MPS350		1A RBCU fails to receive ES signal
1	Override	N, BOP, SRO	Pressurize "A" CFT with N_2 1N-298 (N_2 Fill CFT 1A), fails OPEN (TS)
2		R, OATC, SRO	Increase power to 3% and place ICS in AUTO
3	MPI150	I, OATC, SRO	PZR "A" RTD Fails LOW (TS)
4	MPS120 Override	C, BOP, SRO	1A HPI Pump sheared shaft and standby HPI pump fails to start (TS)
5	MPS247	C, BOP, SRO	1B1 RCP Lower Seal Failure
6	Override	C, OATC, SRO	Continuous Rod Withdrawal
7	MPS400	M, ALL	SBLOCA 1C HPI Pump fails to start requiring rapid RCS C/D due to degraded HPI
8	MPS400	M, ALL	LBLOCA

* (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: **Pressurize "A" CFT; N2 1N-298 fails OPEN (N, BOP/SRO) Timer #1**			

Time	Position	Applicant's Actions or Behavior
	BOP	Crew response: • Refer to OP/1104/001, Enclosure 4.7 (Pressure Makeup To CFTs Using Nitrogen) to adjust CFT pressure. 1. Direct an NEO to open 1N-137 (CFTs Supply) ➢ **Cue: Time compression used to open 1N-137. This is used to speed the opening of the valve. It would take time for the NEO to travel from work control to the Auxiliary Building.** 2. Open 1N-298 (N_2 Fill CFT 1A) **Simulator Operator: When 1N-298 is open, Fire Timer #1 to fail it open.**
	SRO	SRO will refer to **TS 3.6.3** (Containment Isolation) Condition A and B when both nitrogen valves are open (4 hours) 3. Monitor 1A CFT pressure 4. WHEN pressurization of 1A CFT is complete, close 1N-298 5. Determine 1N-298 has failed to close: • Red "open" light lit • CFT pressure continues to increase 6. Inform the SRO. • Direct the NEO to close 1N-137 (CFTs Supply). **Simulator Operator: use manual valves page when directed to close 1N-137.** **Note: If 1N-137 is not closed immediately, CFT pressure will continue to increase, possibly outside of TS limits (575-625 psig).** SRO will refer to **TS 3.6.3** (Containment Isolation) Condition A when only 1 nitrogen valve is open (31 days)
	SRO	7. Verify 1A CFT pressure is stable.
		When CFT pressurization is stopped or when directed by the lead examiner this event is completed.

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

Event Description: **Increase reactor power to 3% and place ICS in AUTO: (R, OATC, SRO)**

Time	Position	Applicant's Actions or Behavior
		Crew response: OP/1/A/1102/001 (Controlling Procedure for Unit Startup) **NOTE:** POAH is normally achieved from 0.05 to 0.15% power on Wide Range Indications. 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.
	SRO/OATC BOP	• 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.
		Event is complete when ICS is placed in AUTO or when directed by the lead examiner.

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

Event Description: **PZR "A" RTD Fails LOW: (I, BOP, SRO) (TS)**
Timer #3

Time	Position	Applicant's Actions or Behavior
		Plant response: Statalarms: • 1SA-2/C-3, RC Pressurizer Level Hi/Low • OAC, RC PZR level 1&3 mismatch • OAC, RC PZR level 2&3 mismatch Board indications: • PZR level 1 and 2 indicates ≈ 133 inches • PZR level 3 indicates ≈ 220 inches and slowly increasing **Crew response:** Refer to the ARG: BOP • Check alternate PZR level indications. • Check for proper Makeup/Letdown flows and adjust to restore proper level. o RO may take 1HP-120 to manual to control PZR level. SRO • Refer to Technical Specification 3.4.9, Pressurizer. • Refer to Technical Specification 3.3.8, PAM Instrumentation. o Condition A applies BOP • Refer to PT/1/A/0600/001 (Periodic Instrument Surveillance). o Select PZR level 3 for level control. • Call SPOC to repair PZR "A" RTD
		This event is complete when PZR level 3 has been selected and 1HP-120 returned to AUTO or when directed by the lead examiner.

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

Event Description: **"1A" HPI Pump sheared shaft and the standby HPI pump fails to auto start: (C; BOP, SRO) TS**

Timer #4

Time	Position	Applicant's Actions or Behavior
		Plant response: Statalarms: • 1SA-2/B-2 (HP RCP Seal Injection Flow High/Low) • 1SA-2/C-2 (HP Injection Pump Disch. Header Pressure High/Low) Board indications: • RC Makeup Flow = ~0 gpm • RCP SI flow = ~0 gpm • 1A HPI Pump amps low = ~10 amps • PZR level will begin to decrease and LDST level will begin to increase.
	BOP	**Crew response:**
	SRO	Refer to ARGs: Refer to AP/14
	BOP	<u>AP/14 (Loss of Normal HPI Makeup and/or RCP Seal Injection)</u> • Announce AP entry • Verify <u>any</u> HPI pump operating (go to RNO) ➢ Close 1HP-5 (Letdown Isolation) ➢ Place 1HP-120 in HAND and closed ➢ Place 1HP-31 in HAND and closed ➢ Attempt to start the Standby HPIP (1B HPIP starts) • <u>Slowly</u> open 1HP-31 in small increments until ≈ 8 gpm/RCP is achieved. • Re-establish normal makeup through 1HP120. • Reduce 1HP-7 demand to 0%. • Close 1HP-6 • Open the following: ➢ 1HP-1 (1A Letdown Cooler Inlet) ➢ 1HP-2 (1B Letdown Cooler Outlet) ➢ 1HP-3 (1A Letdown Cooler Inlet) ➢ 1HP-4 (1B Letdown Cooler Outlet **Simulator operator:** Crew may secure the 1A HPIP and direct NEO to open & rack out the 1A HPIP breaker. (Use Quick Strike to open breaker and remove fuses)

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

Event Description: **"1A" HPI Pump sheared shaft and the standby HPI pump fails to auto start: (C; BOP, SRO) TS**

Time	Position	Applicant's Actions or Behavior
		• Open 1HP-5 • Throttle open 1HP-7 for ≈ 20 gpm letdown flow. • Open 1HP-6 • Adjust 1HP-7 for desired letdown flow. • Place 1HP-31 in AUTO.
	SRO	Refer to Tech Spec 3.5.2 High Pressure Injection • Condition "A" • Required Action: Restore HPI pump to OPERABLE status • Completion Time: 72 hours **Note: Due to sequence of events, SRO may not review the TS during the scenario. Follow-up questions may be required to ensure knowledge of this competency.**
		This event is complete when 1HP-31 is placed in AUTO or when directed by the Lead Examiner.

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

Event Description: **1B1 RCP lower Seal Failure: (C, BOP/SRO)**
Timer #5

Time	Position	Applicant's Actions or Behavior
	BOP SRO SRO BOP	**Plant response:** • 1SA-06/C-5, RC PUMP 1B1 CAVITY PRESS HI/LOW • 1SA-06/C-6, RC PUMP 1B1 SEAL RETURN FLOW HI/LOW **Crew response:** Refer to the ARGs Refer to AP/16 , Abnormal RCP Operations • Notify OSM to request evaluation by RCP Component Engineer. • **IAAT** the failure is identified, **THEN GO TO** the applicable section: 4A Seal Failure • Stop the affected RCP (1B1) • **IAAT** any of the following indicate loss of all RCP seals: ➢ 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: ➢ 1HP-20 ➢ 1HP-21 • Verify 1HP-232 is open • Verify Mode 1 or 2 • Verify three RCPs will remain operating after affected RCP is tripped

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

Event Description: **1B1 RCP lower Seal Failure: (C, BOP/SRO)**

Time	Position	Applicant's Actions or Behavior
		• Verify Rx power is ≤ 70% • Verify FDW masters in Auto • Stop 1B1 RCP • Verify ICS re-ratios feedwater • Initiate Encl 4.3 (Special Instructions for < 4 RCP Operation) of OP/1/A/1102/004 • **IAAT** RCP has been shut down for >30 minutes, THEN close the associated RCP motor cooler inlet/outlet valve (1LPSW-9 & 10)
		When the 1B1 RCP has been secured or when directed by the lead Examiner, the event is complete.

Op-Test No.: _____	**Scenario No.: 5**	**Event No.: 6**	**Page 1 of 1**
Event Description: Continuous Rod Withdrawal: (I, OATC) Timer #6			

Time	Position	Applicant's Actions or Behavior
		Plant response: • Control Rods withdrawing without operator action • NI-5 thru NI-9 indicate increasing reactor power • SURs on Wide Range NIs increasing • OUT light lit on Diamond **Crew response:** • The candidates should utilize the "Plant Transient Response" process to stabilize the plant and recognize that control rods are withdrawing without a valid signal. • Verbalize to the SRO reactor power level and direction of movement. • Place the Diamond and both FDW Masters in MANUAL to stabilize the plant. ➢ The crew should insert control rods and monitor reactor power and wide range startup rate to stabilize the plant
	OATC	
	SRO	• The SRO should: • Refer to SOMP 1-02, Reactivity Management, Attachment 9.1 and discuss a recovery plan • Contact SPOC to investigate the continuous rod withdrawal. **Note: The ICS will remain in manual for the remainder of the scenario.**
		When the plant is stable or when directed by the lead examiner this event is completed.

Op-Test No.: _____ Scenario No.: **5** Event No.: **7** Page 1 of 4

Event Description: **SBLOCA: (M, ALL)**
Timer #7

Time	Position	Applicant's Actions or Behavior
	ALL OATC BOP SRO	**Plant response:** Control board indications: • 1SA-2/D-3, RC PRESS HI/LOW • RCS Pressure and PZR level decreasing • ES 1-6 actuate • Reactor Trip • RCS subcooling margin will indicate 0°F **Crew response:** • Trip the Reactor due to MU being beyond "Normal Makeup Capability" (160 gpm). • The SRO will direct the OATC to perform IMAs and the BOP a symptom check. • OATC will perform IMAs ➢ Depress REACTOR TRIP pushbutton. ➢ Verify reactor power < 5% FP and decreasing. ➢ Depress turbine TRIP pushbutton. ➢ Verify all turbine stop valves closed. ➢ Verify RCP seal injection available. • The BOP will perform a symptom check and will have no symptoms to report. SRO will transfer to the Subsequent Actions Tab. **NOTE: As RCS pressure decreases and Pzr level decreases, the RCS will Saturate.** <u>SA tab</u> • Verify all control rods fully inserted. • Verify Main FDW in operation • Verify Main FDW operating properly • Verify TBVs controlling at ~ 1010 psig

Op-Test No.: _____ Scenario No.: **5** Event No.: **7** Page 2 of 4

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

Time	Position	Applicant's Actions or Behavior
		RCS saturates; obtain SRO concurrence to perform Rule 2
	OATC/BOP	Rule 2, Loss of SCM • **IAAT** all the following exist: ➢ Any SCM ≤ 0°F ➢ Rx power ≤ 1% ➢ ≤ 2 minutes elapsed since loss of SCM **THEN** perform Stop all RCPs **CT-1: Trip ALL RCPs within 2 minutes)** • Open 1HP-24/25 • Start all available HPI pumps. (Only 1B HPIP will be left) • Open 1HP-26/27 • Verify at least two HPI pumps are operating using two diverse indications. (RNO – only one HPIP) • Maximize HPI flow ≤ 475 gpm (including seal injection for A hdr) **(CT-5, Control HPI)** • Dispatch two operators to align ADVs • Select OFF on both Digital Channels on AFIS HEADER A&B • Notify CR SRO to: ➢ Suspend Rule 3 until directed by LOSCM tab ➢ Degraded HPI exists • **EXIT** this rule
	OATC/BOP	Perform Enclosure 5.1, ES Checklist • (See Attached Checklist)

Op-Test No.: _____ Scenario No.: **5** Event No.: **7** Page 3 of 4

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

Time	Position	Applicant's Actions or Behavior
	SRO	SRO will transfer to the LOSCM tab. LOSCM tab • Ensure Rule 2 (Loss of SCM) is in progress or complete. • **IAAT** either of the following exists: ➢ 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. • Verify all of the following exist: ➢ **NO** RCPs operating ➢ HPI flow in both HPI headers ➢ Adequate total HPI flow per LOSCM Tab Figure 1 (Total Required HPI Flow) **(RNO – HPI is inadequate)**
	SRO/BOP/ OATC	• Start both MDEFWPs • Start the TDEFWP • Establish 300 gpm to each of the SGs: ➢ 1A SG ➢ 1B SG • Initiate full depressurization of both SGs utilizing either of the following; ➢ TBVs ➢ ADVs • Initiate feed to all available SGs to the LOSCM setpoint at maximum allowable rate (per Table 3, Emergency FDW Pump and Header Maximum Flow Limits) of Rule 7 (SG Feed Control) **(CT-10, Establish EFDW flow and Fed SGs)** • Trip Both Main FDW Pumps • Ensure Rule 3 (Loss of Main or Emergency FDW) is in progress or complete

Op-Test No.: _____	Scenario No.: **5**	Event No.: **7**	Page 4 of 4
Event Description: **SBLOCA: (M, ALL)**			

Time	Position	Applicant's Actions or Behavior
	SRO/BOP OATC	• Open 1AS-40 while closing 1MS-47 • **GO TO** Step 37 • Close 1RC-4 • **WHEN** all SCMs are > 0°F, **OR** all the following exist: ➢ **NO** RCPs operating ➢ HPI flow in both HPI headers ➢ Adequate total HPI flow per Figure 1 (Total Required HPI Flow) **THEN** maintain SG pressure < RCS pressure utilizing either of the following: ➢ TBVs ➢ ADVs
	OATC/BOP	Rule 3 Loss of Main or Emergency Feedwater • Initiate Encl 5.9 (Extended EFDW Operation) ➢ Perform the following to maintain UST level > 7.5': • Makeup with demin water • Place CST pumps in AUTO • Start TD EFDWP BEARING OIL COOLING PUMP. • Notify CR SRO to set priority based on the NOTE above and EOP activities.
		When the SRO reaches the WHEN step above or when directed by the lead examiner this event is completed.

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

Event Description: **LBLOCA (M, All)**
Timer #8

Time	Position	Applicant's Actions or Behavior
	OATC/BOP	**Plant Response:** RCS pressure decreases rapidly Core and Loop Subcooling Margins indicate '0' or '-0' (flashing) ES Channels 1-8 if not previously actuated will now actuate **Crew response:** • RO performing Encl. 5.1, ES Actuation, must recognize that the IAAT Step 14 will need to be performed and LPI Pumps restarted. (**CT-4, Initiate LPI)** • SRO may direct an RO to perform a Symptoms Check: • RO performs Symptom Check • Crew should recognize LOSCM IAAT Step 6 now exists. LOSCM IAAT Step 6: • **IAAT** either of the following exists: ➢ LPI FLOW TRAIN A plus LPI FLOW TRAIN B ≥ 3400 gpm ➢ Only one LPI header in operation with hdr flow ≥ 2900 gpm **THEN GO TO** LOCA CD tab. LOCA CD tab • Perform the following: ➢ Ensure all RBCUs in low speed. ➢ Open 1LPSW-18. ➢ Open 1LPSW-21. ➢ Open 1LPSW-24. • Initiate Encl 5.35 (Containment Isolation). • Start all RB Aux fans • Dispatch an operator to remove the tags and close the Core Flood Tank Isolation valves • Dispatch a operators to locally isolate the SGs • **WHEN** CETCs are ≤ 400°F, **THEN** continue in this procedure.
		When transfer to LOCA Cooldown tab or when directed by the lead examiner, this event is completed

CRITICAL TASKS

1. CT-1, Trip ALL RCPs
2. CT-10, Establish EFDW flow and Feed SGs
3. CT- 27, Implementation of Control Room Habitability Guidance
4. CT-5, Control HPI
5. CT-4, Initiate LPI