Facility: Clinton Power Station ILT 12-1 NRC Scenario No.: 1 Op-Test No.: 2013301

Examiners: _____ Operators: _____

Initial Conditions:
- Mode 1 at 97% power
- Weather conditions are calm and clear

Turnover:
- Maintain current power

Event No.	Malf. No.	Event Type*	Event Description
1	None	BOP N	Shift to the Emergency Seal Oil Pump (NEW)
2	ROD2821TFIA3	ATC C SRO (TS)	Rod drift OUT (TS)
3	YP_XMFTB_5010	BOP C SRO (TS)	MCR HVAC Supply Fan trip (TS)
4	A04_A01_07_1_TVM Steady (Annunciator 5010-7A)	BOP C SRO	Failure of RAT 'B' cooling
5	MS0ES002AFSP 0% MS0ES002BFSP 0% MS0ES004AFSP 0%	ATC R	Lower Power for Loss of FW Heating
6	A01_A03_01_2_TVM Steady (Annunciator 5002-1B)	ATC C	'A' TDRFP Trouble
7	YARITPLA_1 0.2%	CREW M	Unisolable leak in RCIC, 4 stuck rods will not insert
8	XPXMALSE_253	CREW M	2nd area exceeds Max Safe, perform EOP 3 with a low power ATWS

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

ES-301-4 Quality Checklist Attributes:
Total Malfunctions (5-8): 7
Malfunction(s) after EOP (1-2): E7 & E8
Abnormal Events (2-4): E2, E5, E6, E7
Major Transient(s) /E-Plan entry (1-2): E7
EOPs (1-2): EOP-1, EOP-8
EOP Contingencies (0-2): E-8 (EOP-3)
Critical Tasks (2-3): SC-1.1, SC-1.2, RPV-6.3

ES-301-5 Transient/Event Checklist Attributes:
BOP Normal: E1
ATC Reactivity (1 per set): E5
BOP I/C (4 per set): E3 & E4
ATC I/C (4 per set): E2 & E6
SRO-I I/C (4 per set inc 2 as ATC): E2, E3, E4, E6
SRO Tech Spec (2 per set): E2 & E3
ALL Major Transients (2 per set): E7

Narrative Summary

Event # **Description**

1. **Shift to the Emergency Seal Oil Pump (NEW)**
   The FIN Team leader contacts the MCR and reports that they have found excessive vibration on the Main Seal Oil Pump (MSOP), 1T007P. He recommends taking it out of service and states that it will be out of service for an extended period of time. The BOP starts the Emergency Seal Oil Pump, secures the Main Seal Oil Pump (MSOP), the Seal Oil Vacuum Pump (SOVP), and the Recirculation Seal Oil Pump (RSOP) IAW CPS 3109.01 Generator Seal Oil (SO) Section 8.2.7 Failure of/Maintenance on MSOP and 8.2.1 Operation with Emergency Seal Oil Pump.

2. **Rod drift OUT (TS)**
   Annunciator ROD DRIFT (5006-4G) comes in due to rod 28-21drifting outward. The ATC Operator will take the Immediate Actions and applicable Subsequent Actions as directed by the SRO for an Inadvertent Rod Movement per CPS 4007.02 Inadvertent Rod Movement. Rod 28-21 will drift outward until individually scrammed at the Hydraulic Control Unit (HCU). Technical Specification LCO 3.1.3 Actions C.1 and C.2 will be evaluated requiring full insertion of the inoperable control rod in 3 hours <u>and</u> disarming the associated CRD in 4 hours. Technical Specification LCO 3.1.6 will also be evaluated and found not to apply.

3. **MCR HVAC Supply Fan trip (TS)**
   Annunciator AUTO TRIP PUMP/FAN DIVISION 1 (5050-1A) comes in due to the Train A Control Room Supply Fan (0VC03CA) tripping. The BOP Operator will coordinate with the Equipment Operator to shift Control Room HVAC (VC) to Train B per CPS 3402.01 Section 8.1.7 and CPS 3402.01P001 Control Room HVAC (VC) Train Shifting. Technical Specification LCO 3.7.3 Action A.1 will be evaluated requiring restoration of control room ventilation subsystem to an operable status within 7 days.

4. **Failure of RAT 'B' cooling**
   Annunciator 5010-7A High Temp Res Aux Transf A(B)[C] will be received. The MCR will dispatch an Equipment Operator to check the cooling systems for RATs A, B, and C. The Equipment Operator will report that the cooling systems for RAT 'A' and 'C' are operating normally, and the cooling system for RAT 'B' has 2 fans running with oil temperature at 82°C and winding temperatures indicating 90°C and slowly rising. IAW CPS 3505.01 345 & 138KV Switchyard (SY) Section 8.3.4 Degraded RAT and ERAT Cooling Systems, the SRO will determine that RAT 'B' may remain in operation with temperatures < 95°C. The SRO will direct the BOP to transfer 4160V Bus 1A1, 1B1, and 1C1 to the ERAT to reduce loads on RAT 'B'.

5. **Lower Power for loss of FW Heating**
   The Extraction Steam Valves for High Pressure Feedwater Heaters 6A & 6B, and Low Pressure Feedwater Heater 5A close, causing final feedwater temperature to lower ~ 50°F and power rising to ~ 100% (from 97%). This will require entry into CPS 4005.01 Loss of Feedwater Heating. The loss of feedwater heating will require the ATC to lower reactor power within 15 minutes of the initiating event to at or below the original power level and within the limits of the Stability Control & Power / Flow Operating Map.

6. **TDRFP Trouble**
   Annunciator 5002-1B Trouble RFPT 1A Pump/Turb is received due to active thrust bearing wear. The degraded condition of the thrust bearing will also cause 'A' TDRFP vibrations to rise. The degraded condition of the 1A TDRFP will require tripping of the 'A' TDRFP, which will result in a Reactor Recirculation Flow Control Valve Runback. Off normal procedures CPS 4008.01 Abnormal Coolant Flow, CPS 4100.02 Core Stability Control, and CPS 4002.01 Abnormal RPV Level/Loss of Feedwater At Power will be entered and actions taken to mitigate the event.

7. **Unisolable leak in RCIC , 4 stuck rods will not insert**
   Annunciator 5065-6F Sec. Cnmt. Area High Temp will be received. The BOP will monitor secondary containment temperatures on 1TR-CM326 and 1TR-CM327 and will report rising temperatures in the RCIC Pump Room (1TR-CM326 points 8 and 9). When temperatures exceed max normal values, EOP-8 Secondary Containment Control and CPS 4001.01 Reactor Coolant Leakage will be entered. The SRO will direct the RCIC Steam supply to be isolated, but when isolation is attempted, 1E51-F063 RHR & RCIC Stm Supp Inbd Isol Valve will fail to close and the leak into the secondary containment will continue. The SRO will direct the reactor to be scrammed before temperatures in the RCIC Pump Room exceed max safe values listed in EOP-8 Secondary Containment Control. When the reactor is scrammed, four control rods will fail to insert requiring entry into EOP-1 RPV Control and then transitioning into EOP-1A ATWS RPV Control.
8. **2nd area exceeds Max Safe, perform EOP 3 with a low power ATWS**
   After the reactor is scrammed, the leak into the secondary containment will worsen, causing two areas to exceed max safe values, requiring blowdown per EOP-3 Emergency RPV Depressurization. RPV injection will be terminated and prevented, and then the BOP will initiate ADS and verify that only 5 ADS valves open (7 valves are required). The BOP will open 2 additional SRVs until a total of 7 SRVs are opened. The operating crew will monitor RPV pressure, and recommence RPV injection with only preferred injection sources when RPV pressure reaches 138 psig. The scenario is terminated when reactor power is below 5% and reactor water level is being maintained between -162” and Level 8 (+52”).

CRITICAL TASKS

- SC-1.1, Scram before Max Safe
- SC-1.2, ED when 2 areas >max Safe
- RPV-6.3 Terminate and Prevent HPCS injection

Facility: Clinton Power Station ILT 12-1 NRC Scenario No.: 2 Op-Test No.: 2013301
Examiners: _____ Operators: _____
_____ _____
_____ _____

Initial Conditions: 90% Power
Turnover: Perform Drywell Vacuum Breaker Test, B CY Pump is out of service

Event No.	Malf. No.	Event Type*	Event Description
1	VR1HG011BFP	BOP N SRO (TS)	Drywell Vacuum Breaker Test **(TS/ORM)** (NEW)
2	S_K603B (Override)	ATC C	'A' RR FCV Drifts open
3	YP_XREMT_782 YPXMALSE_91	BOP C	Air system trouble / Shift Compressors
4	A05_A01_A0208_5 (Annunciator)	SRO (TS)	Low DG Air **(TS)**
5		BOP C	Main Turbine Gland Seal Header High Pressure
6	CD01PA	ATC C	Condensate Pump trip
7	A05_A02_A0706_3 (Annunciator)	BOP C	CRD Pump hi seal leakage / pump shift
8	YFFWPPSS_11 YAFWPPDE_9	ATC R	Rapid Plant Shutdown for loss of CY
9	YPXMALSE_511	CREW M	Recirculation Loop Line Break (LOCA)
10	RAT_A_LOCKOUT YPMALSE_69	CREW M	Loss of high pressure injection, TAF Blowdown, restore RPV water level

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

ES-301-4 Quality Checklist Attributes:
Total Malfunctions (5-8):8
Malfunction(s) after EOP (1-2): E10
Abnormal Events (2-4): E2, E3, E6, E8
Major Transient(s) /E-Plan entry (1-2): E9
EOPs (1-2): EOP 1 and EOP 6
EOP Contingencies (0-2): 2, ALC and ED
Critical Tasks (2-3): RPV-1.1, PC-5.1

ES-301-5 Transient/Event Checklist Attributes:
BOP Normal: E1
ATC Reactivity (1 per set): E8
BOP I/C (4 per set): E3, E5, & E7
ATC I/C (4 per set): E2 & E6
SRO-I I/C (4 per set inc 2 as ATC): E2,3,5,6,7
SRO Tech Spec (2 per set): E1 & E4
ALL Major Transients (2 per set): E9

Narrative Summary

Event #	Description

1. **Drywell Vacuum Breaker Test**
   Following shift turnover, the operating crew will perform CPS 9064.01 Drywell Post-LOCA Vacuum Breaker Verification Test. When the BOP depresses the test pushbutton for 1HG010D it will open but fail to reclose. The SRO will enter ITS 3.6.5.6 Drywell Post-LOCA Vacuum Relief System Action A.1 requiring 1HG010D to be reclosed within 4 hours.

2. **RR FCV Drifts Open**
   The 'B' RR Flow Control Valve slowly drifts open causing reactor power to increase, and requiring the ATC to perform an emergency shutdown of the 'B' RR Hydraulic Power Unit to stop further RR FCV movement. The crew will enter and execute CPS 4008.01 Abnormal Reactor Coolant Flow. Reactor power will be restored to pre-transient values using RR Flow and/or control rods. The crew will evaluate core thermal limits by demanding a 3D Monicore Case to ensure core thermal limits are within TS limits.

3. **Air system trouble / Shift Service Air Compressors**
   An Equipment Operator will report that an air leak can be heard in the Radwaste Building (exact location unknown). The BOP will observe rising amps on the operating Service Air Compressor. The crew will enter CPS 4004.01 Instrument Air Loss. The standby air compressor will fail to start automatically on low service air header pressure, requiring the BOP to start the standby Service Air Compressor when he/she observes that the air compressor is operating at maximum load / amps or when Service Air Header pressure decays to 80 psig. Once the standby Service Air Compressor is running, the Equipment Operator will report that the location of the air leak is on the discharge pressure instrument for the original running air compressor. Once the leak has been isolated, the operating crew will secure the malfunctioning air compressor.

4. **Low DG Air (TS)**
   Annunciator 5061-7F OUT OF SERVICE DIESEL GEN 1B comes in due to low Starting Air Pressure (190 psig). The BOP operator will dispatch an Equipment Operator to investigate. No cause will be evident. The BOP operator will direct the Equipment Operator to manually operate the DG 1B Starting Air Compressors to restore Starting Air Receiver pressure. The SRO will evaluate Technical Specification 3.8.3, Action E.1 requiring starting air receiver pressure to be restored to ≥ 200 psig within 48 hours.

5. **Main Turbine Gland Seal Header High Pressure**
   Annunciator 5019-3D High/Low Pressure Steam Seal Header is received due to failure of 1GS-SSFV, Steam Seal Header Pressure Control Valve. The BOP operator will isolate and bypass the failed pressure control valve and manually control Gland Seal header pressure in the proper operating range.

6. **Condensate Pump Trip**
   Annunciator 5014-2B Low Press Cond Pumps Disch Header comes in due to a trip of the 'A' Condensate Pump. The ATC will start the standby Condensate Pump per the ARP. The crew will enter and execute CPS 4002.01 Abnormal RPV Level / Loss of Feedwater At Power to stabilize RPV level. The crew will dispatch an Equipment Operator and/or Maintenance personnel to determine the cause of the trip.

7. **CRD Pump hi seal leakage / pump shift**
   Annunciator 5068-6C, CRD Pump C001B Seal Leakage High is received. The BOP operator will dispatch an Equipment Operator to determine the status of the B CRD Pump Seals. The Equipment Operator will report that the 'B' CRD Pump seals are spraying water on the floor around the pump. The BOP operator will shift to the 'A' CRD Pump per CPS 3304.01 Control Rod Hydraulic & Control (RD) section 8.1.2 Shifting Drive Water Pumps and then shutting 1C11-F017 Cross Connect Valve to isolate the seal leak.

8. **Loss of CY, Rapid Plant Shutdown**
   The scenario starts with the 'B' CY Pump out of service. In this event the shaft shears on the running CY

Pump (0CY01PC). The BOP operator will start the 'A' CY Pump and secure the 'C' CY Pump. However, the 'A' CY pump capacity begins to degrade and annunciator 5014-2B Low Press Cycle Cond Xfer Pump Disch Hdr will be received. Due to the complete loss of CY system pumps, the crew will perform a Rapid Plant Shutdown and scram the reactor per CPS 3208.01 Cycled / Makeup Condensate (CY/MC).

9. **Events 9 / 10 - Recirculation Loop Line Break (LOCA) & Loss of High Pressure Injection**
When the reactor is scrammed in event 7, a Reactor Recirculation Loop line break begins resulting in High DW Pressure initiation of the ECCS systems and Emergency Diesel Generators and a lockout of the 'A' RAT transformer, which will result in a loss of Balance of Plant 4160 VAC and 6900 VAC power. The loss of 4160V Buses 1A and 1B will result in a loss of all injection from the CRD and FW systems. The MCR will enter CPS 4001.01 Reactor Coolant Leakage off-normal and EOP-1 RPV Control. When the HPCS Pump starts, a leak will develop in the HPCS pump discharge line, preventing use of HPCS as an injection source. When RPV lowers to the Top of Active Fuel, the MCR will perform a blowdown per EOP-3 Emergency Depressurization (Blowdown) and then inject at maximum with Low Pressure ECCS systems to restore RPV level.

CRITICAL TASKS

- RPV-1.1 ED at TAF
- PC-5.1 Spray the Primary Containment

Facility: Clinton Power Station ILT 12-1 NRC Scenario No.: 3 Op-Test No.: 2013301
Examiners: _____ Operators: _____
_____ _____
_____ _____

Initial Conditions: At 20% power during Startup
Turnover: Secure the Suppression Pool flush lineup, continue rod withdrawal to raise FCL

Event No.	Malf. No.	Event Type*	Event Description
1	None	BOP N	Secure Suppression Pool Flush
2	None	ATC R	Raise power with Rods to 100% FCL
3	A05_A02_A21S07	ATC C	Rod difficult to Withdraw, Raise DP
4	ROD1625TFIA5	ATC C	Un-coupled rod
5	A04_A18_A01_1	BOP C	TG LO Temp controller failure
6	YP_XMFTB_5041	SRO (TS)	LPCS Room Fan Trip (TS)
7	A11_A02_03_07_TVM (Annunciator)	BOP C	Low flow CW Pump seal water
8	RH0VCE12F028AFP A05_A02_A18DS01_1 A05_A02_A11S09_2 A05_A02_A0408_2_TVM	SRO (TS)	Cont Spray valve breaker trip (TS)
9	YPXMALSE_252 YPXMALSEHOLE YP_XMFTB_4964	CREW M	Steam LOCA, Auto Scram failure, Drywell Hole
10	RH0VCE12F028BFP	CREW M	Containment Spray failure, EOP 3 for PSP

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

ES-301-4 Quality Checklist Attributes:
Total Malfunctions (5-8): 8
Malfunction(s) after EOP (1-2): E10
Abnormal Events (2-4): E5, E7
Major Transient(s) /E-Plan entry (1-2): E9
EOPs (1-2): EOP 6 AND EOP 1
EOP Contingencies (0-2): E10 (EOP 3)
Critical Tasks (2-3): RPV-6.1, PC6.1 / 7.1

ES-301-5 Transient/Event Checklist Attributes:
BOP Normal: E1
ATC Reactivity (1 per set): E2
BOP I/C (4 per set): E5 & E7
ATC I/C (4 per set): E3 & E4
SRO-I I/C (4 per set inc 2 as ATC): E3,4,5, & 7
SRO Tech Spec (2 per set): E6 & E8
ALL Major Transients (2 per set): E9

Narrative Summary

Event #	Description

1. **Event 1 - Secure Suppression Pool Flush**

   The operating crew will begin the scenario by securing RHR 'A' from suppression pool flush IAW CPS 3312.01 Residual Heat Removal (RHR) section 8.2.10 Manual Operation of RHR – Pool to Pool.

2. **Events 2 & 3 - Raise power with Rods to 100% FCL / Rod Difficult to Withdraw**

   The crew will raise Reactor power with Control Rods to achieve 100% Flow Control Line IAW CPS 3005.01 Unit Power Changes. Control rod 16-41 will not withdraw when using normal drive differential pressure. The crew will perform actions for a difficult to withdraw control rod IAW CPS 3304.01 Control Rod Hydraulic & Control (RD) Section 8.3.4 Control Rod Difficult to Withdraw. The crew will raise drive differential pressure in 50 psig increments until control rod 16-41 is successfully withdrawn.

3. **Event 4 - Un-coupled rod**
   When the first in-sequence control rod reaches position 48, the ATC will perform a coupling check IAW CPS 3304.02 Rod Control And Information System (RC&IS) section 8.1.10 Coupling Check by applying a continuous withdraw to the rod at position 48. Annunciator 5006-5G Rod Overtravel will be received, indicating that the control rod has become uncoupled from its drive mechanism. The operating crew will attempt to recouple the control rod IAW the annunciator response procedure. The SRO will evaluate and enter ITS 3.1.3 Condition C until the control rod is successfully recoupled.

4. **Event 5 - Turbine Lube Oil Temp Controller Failure**
   Annunciator HIGH TEMP TURB GEN LUBE OIL (5018-3A) comes in due to a failure in the auto portion of the TURB OIL CLG WTR Controller. The BOP operator will diagnose the problem with the controller, place the controller in MANUAL and coordinate with the ATC Operator to stabilize and restore turbine oil outlet temperature.

5. **Event 6 - LPCS Room Fan Trip**
   Annunciator 5050-1C Not Available VY System Division 1 will be received. The BOP operator will determine that the LPCS Supply Fan 1VY01C has tripped. If the BOP attempts to restart the fan, the fan will fail to start. The crew will monitor LPCS Pump Room temperature and dispatch an Equipment Operator to determine the cause of the trip. The SRO will evaluate and enter ITS 3.5.1 ECCS – Operating Required Action A.1 Restore low pressure ECCS injection/spray subsystem to OPERABLE status within 7 days.

6. **Event 7 - Low flow CW Pump seal water**
   Annunciator 5041-3G LOW FLOW CW PUMP 1C BRG SEAL WATER comes in due to CW Pump 'C' seal water flow less than the setpoint (15 gpm). The BOP operator will dispatch an Equipment Operator to investigate. Seal water flow to Circulating Water (CW) Pump 1C cannot be restored requiring the BOP operator to trip CW Pump 1C per the Annunciator Response Procedure (ARP). Main Condenser Vacuum will not substantially change when CW Pump C is removed from service.

7. **Event 8 – RHR Containment Spray Valve (1E12-F028B) breaker trip**
   Annunciator 5065-8B RHR B Out of Service comes in due to a trip of the breaker for 1E12-F028B RHR B to Cnmt Spray B Shutoff Valve. The operating crew will dispatch an Equipment Operator to investigate the cause of the breaker trip. The SRO will evaluate and enter ITS 3.6.1.7 RHR Containment Spray System Required Action A.1 Restore RHR Containment Spray subsystem to OPERABLE status within 7 days.

8. **Event 9 - Steam LOCA / ATWS**
   The 'D' Main Steam Line will rupture inside the Drywell causing DW pressure to rise. The SRO will enter

CPS 4100.01 Coolant Leakage off-normal and direct the reactor to be scrammed. When the ATC places the mode switch in shutdown, the reactor will fail to scram. The ATC will arm and depress the Manual Scram Pushbuttons and initiate ARI to successfully insert all control rods. The crew will evacuate the containment. The SRO will enter EOP-1A ATWS RPV Control. The SRO will enter EOP-6 Primary Containment Control and will direct the BOP operator to initiate containment spray when Containment pressure reaches the OK to Spray region of EOP-6 Figure O Containment Spray Initiation Limit. When the BOP operator initiates the 'A' loop of Containment Spray, 1E12-F028A will fail to open. When Containment Pressure exceeds EOP-6 Figure N Pressure Suppression Pressure limit, the SRO will direct the crew to perform a reactor blowdown per EOP-3 Emergency Depressurization (Blowdown).

CRITICAL TASKS

- RPV-6.1 EOP Action to Reduce Reactor Power
- PC-6.1/7.1, Emergency Depressurization / Anticipate Emergency Depressurization