Exelon Nuclear

ILT 20-1 NRC Exam

Scenario Number:
NRC Exam Scenario 1

Revision Number: 0

Date: 4/22/21

Developed By:	**Bill Kiser** **Instructor**	**4/22/21** **Date**
Validated By:	_____ **SME or Instructor**	_____ **Date**
Reviewed By:	_____ **Operations Representative**	_____ **Date**
Approved By:	_____ **Training Department**	_____ **Date**

Facility: Clinton Power Station Scenario No.: 1 Operating Test No.: 2022-301

Examiners: _____ Operators: _____
_____ _____
_____ _____

Initial Conditions:
- Mode 1 at ~76% power to support performance of CPS 9031.07 Main Turbine Control Valve Tests on the next shift.
- Thunderstorms are expected in the area within the next hour.
- CY Pump 'B' (0CY01PB) is OOS for maintenance. Not expected back this shift.

Turnover:
- First Priority – Perform CPS 9061.03C012 Week 12 – CM, SF, SM, LD ISOL Valve Operability Checklist sections 8.12.7 (Method B). Position indication testing is NOT required. Do NOT restart SF after the completion of 9061.03C012/D012.
- Maintain power at ~76% power throughout the shift.

Critical Tasks:
- **[CT-1]** Shut SRV prior to Suppression Pool Temperature reaching 110ºF.
- **[CT-2]** TSA-2 Initiate ADS (7 SRVs) within 17.5 minutes of blowdown being required (Rx Level at TAF).
- **[CT-3]** Maximizes ECCS injection by starting the LPCS Pump and opening 1E21-F005 to restore RPV water level above TAF within 10 minutes after RPV level reaches -187".

Event No.	Malf. No.	Event Type*	Event Description
1	None	N-BOP	(NEW) Perform 9061.03C012 Week 12 – SF Valve Operability Checklist
2	A01_A01_02_5_TVM=2	C-ATC	'B' RWCU pump seal plate temperature high
3	A11_A05_S40_2 ON A11_A02_07_4_TVM 2 A_11_A08_DS30_1 OFF	TS-SRO	Loss of Control Power to Suppression Pool Dump Valve (1SM001A)
4	A01_A02_01_8_TVM steady	C-ATC	(NEW) Clogged oil filter Condensate Booster Pump 'A'
5	YPXMALSE_77 to 50	C-BOP	Inadvertent opening of a SRV
6	A05_A01_A0108_3_TVM steady A05_A01_A0108_5_TVM steady	I-BOP TS-SRO	Failure of DG Fuel Oil Transfer Pump 1A to auto start
7	YFFWPPSS_11 YAFWPPDE_9	C-BOP R-ATC	Loss of CY – Rapid Plant Shutdown
8	RAT_B_OVERCURRENT YARIMVFP_2 = 0 ED17B221C1FO YPXMALSE_511 YP_XMFTB_3986	M-All	(NEW) LOCA / RAT trip / E51-F013 Failure / Loss Div 3 4160V Bus / TAF Blowdown
9	YP_XMFTB_4106 lp11acld001fsp=True	C-ATC/BOP	(NEW) LPCS Fails To Auto Start LPCS Injection Valve 1E21F005 Fails to Auto Open at 472 psig RPV pressure

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

NEW – Not used on the previous two (2) NRC exams.

Scenario No.: 1 Operating Test No.: 2022-301

Narrative Summary

Event # **Description**

1. **Perform 9061.03C012 Week 12 – SF Valve Operability Checklist**
   The SRO directs BOP to perform CPS 9061.03C012 Week 12 – SF Valve Operability Checklist section 8.12.7 (Method B).
2. **'B' RWCU pump seal plate temperature high**
   Annunciator 5000-2E CLEANUP PUMP SEAL GLAND PLATE TEMP HI comes in due to RWCU Recirc Pump B (1G33-C001B) developing excessive seal leak. The ATC Operator will secure RWCU pump 'B', throttle F/D bypass valve (1G33-F044) to maintain RT system flow ~ 150 gpm and coordinate field actions per CPS 3303.01 Reactor Water Cleanup (RT) Sections 8.1.3 System/Filter Demin Flow Control and 8.1.4 Removing RWCU Pump from Service.
3. **Loss of Control Power to Suppression Pool Dump Valve (1SM001A)**
   Annunciator 5041-7D NOT AVAILABLE SM SYSTEM DIVISION 1 comes in due to a blown control power fuse deenergizing relay 74-SM1A (1SM001A Bkr Overload relay). The BOP operator will dispatch an Equipment operator to investigate. Technical Specification LCO 3.6.2.4, Action C.1 will be evaluated requiring the restoration of the SPMU subsystem to operable status within 7 days.
4. **Clogged Oil Filter Condensate Booster Pump 'A'**
   Annunciator 5001-1H CLOGGED OIL FILTER CB PUMP 1A will be received. An Equipment Operator will be dispatched to turn the CUNO filter handle several times in an attempt to clear the alarm, but will be unsuccessful. The SRO will direct the ATC to start a non-running Condensate Booster Pump and secure CB Pump 1A per CPS 3104.01 Condensate/Condensate Booster (CD/CB), section 8.2.2 Starting Additional/Shifting Condensate Booster Pumps.
5. **Inadvertent opening of a SRV**
   Annunciators 5066-5B ADS OR SAFETY RELIEF VALVE LEAKING and 5067-8L SRV MONITORING SYSTEM TROUBLE come in due to SRV 1B21-F041G failing ~ 50 % open. The BOP operator will diagnose and determine the problem is with 1B21-F041G. The SRO will direct the BOP operator to sound the containment evacuation alarm and coordinate with the ATC and attempt to close the SRV IAW CPS 4009.01 Inadvertent Opening Safety/Relief Valve. The SRO will enter and execute CPS 4005.01 Loss of Feedwater Heating and direct the ATC to restore and maintain reactor power at or below the original power level. SRV 1B21-F041G will shut when the first fuse is simulated removed for the associated 'A' solenoid at 1H13-P661.
6. **Failure of DG Fuel Oil Transfer Pump 1A to auto start**
   Annunciators 5060-8C LOW LEVEL DG DAY TANK 1A and 5060-8E TROUBLE DIESEL GEN 1A are received. The BOP will report that the Fuel Oil Transfer Pump (FOTP) failed to auto start. The SRO will direct the BOP to manually start the FOTP. The ATC/BOP will dispatch an operator to DG 1A room to determine the cause of the alarm. The Equipment Operator will report that the alarm is due to low fuel level in the Div 1 DG Day Tank; currently at 45% and lowering/rising based on whether the FOTP running. Annunciators will clear approximately 1 minute after the FOTP has started. The SRO will declare Div 1 DG inoperable and take actions for TS 3.8.1 Action B.
7. **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 attempt to scram the reactor per CPS 3208.01 Cycled / Makeup Condensate (CY/MC).
8. **LOCA / RAT trip / E51-F013 Failure / Loss Div 3 4160V Bus / TAF Blowdown**
   When the unit is scrammed in event 7, the Main Generator will trip on reverse power (normal post-scram response). When the Generator trips, a series of malfunctions will result in a loss of all high pressure injection sources to the RPV. A LOCA will then commence, resulting in a loss of RPV inventory and causing DW pressure to increase. The LOCA will escalate, causing RPV level to fall to TAF, requiring an emergency depressurization to be performed (ADS fails to automatically initiate).
9. **LPCS Fails To Auto Start / LPCS Injection Valve 1E21F005 Fails to Auto Open at 472 psig RPV pressure**
   The Low Pressure Core Spray Pump will fail to auto start when DW pressure reaches 1.68 psig and will have to be manually started. In addition, 1E21-F005 LPCS Injection Valve will fail to automatically open at 472 psig RPV pressure, requiring the injection valve to be manually opened to recover RPV level above TAF.

Operator Actions

Event No.(s): 1		**Page** 1 **of** 1
Description: **Perform 9061.03C012 Week 12 – SF Valve Operability Checklist**		
Initiation: Following shift turnover and when directed by the Lead Examiner		
Cues: Directed by SRO		
Time	**Position**	**Applicant's Actions or Behavior**
General Note on Requirements for "Expected Annunciator Response" – OP-AA-103-102 If this evolution was pre-briefed and "Expected Alarms" were reviewed, the following expectations apply: • "Expected alarms" will be flagged • When the annunciator comes in the operator will announce "Expected Alarm" • The annunciator response procedure (ARP) need not be entered since it has already been reviewed in the pre-brief. If a pre-brief was not conducted the operator should perform the following: • When an annunciator comes in the ARP should be referred to. • The annunciator may then be identified as an "Expected Alarm", flagged, and from that point on the ARP need not be referred to.		
Key Parameter Response: 1SF002 valve position indication. Expected Annunciators: 5041-7F NOT AVAILABLE SF SYSTEM DIVISION 2 Automatic Actions: None		
	ATC	• Monitors reactor to ensure operations remain within established bands. ○ Monitors control room panels, notifies the SRO of unusual/unexpected conditions.
	SRO	• Acknowledges reports from ATC/BOP. • Directs actions listed above. • Ensures operations are conducted within the bounds of Tech Specs and IAW Operations expectations, standards and approved procedures. • Enters ORM 2.5.2 Action 3.5.2 when the SF SYS DIV 1/2 IN TEST switch is in TEST. • Exits ORM 2.5.2 Action 3.5.2 when the SF SYS DIV 1/2 IN TEST switch is in NORMAL.

	BOP	• Monitors control room panels, notifies the SRO of unusual/unexpected conditions.
		○ Monitors reactor to ensure operations remain within established bands.
		IAW CPS 9061.03C012 Week 12 – SF Valve Operability Checklist section 8.12.7:
		• On 1H13-P800, places SF SYS DIV 2 IN TEST switch to TEST, and observes:
		  • NOT AVAILABLE SF SYSTEM DIVISION 2 annunciator 5041-7F alarms, unless already in due to plant conditions.
		  • SF DIV 2 MOV'S IN TEST status light energizes.
		• Performs open and close testing of 1SF002; records data on D001.
		• On 1H13-P800, places SF SYS DIV 2 IN TEST switch to NORMAL.
		  • NOT AVAILABLE SF SYSTEM DIVISION 2 annunciator 5041-7F clears or per plant conditions.
		  • SF DIV 2 MOV'S IN TEST status light deenergizes.

Terminus: CPS 9061.03C012 Week 12 – SF Valve Operability Checklist section 8.12.7 complete.		

NOTES:

• Solid bullets are required actions
○ Hollow bullets are actions that may or may not be performed

Operator Actions

Event No.(s): 2		**Page** 1 **of** 1
Description: **'B' RWCU pump seal plate temperature high**		
Initiation: Following Event 1 and upon direction of the Lead Examiner, insert **REMOTE 1**		
Cues: Annunciator 5000-2E Cleanup Pump Seal Gland Plate Temp Hi		
Time	**Position**	**Applicant's Actions or Behavior**
Key Parameter Response: None Expected Annunciators: 5000-2E Cleanup Pump Seal Gland Plate Temp Hi Automatic Actions: None		
	ATC	• Monitors reactor to ensure operations remain within established bands. ○ Monitors control room panels, notifies the SRO of unusual/unexpected conditions. • Reports issue to SRO. • Refers to ARP 5000-2E. ○ Dispatches an Equipment Operator to investigate/support RWCU operation. Per CPS 3303.01, Reactor Water Cleanup (RT) step 8.1.4 and 8.1.3: • Directs Equipment Operator to remove all Filter demins from service. • Throttles open the F/D bypass valve (1G33-F044) to maintain RT system flow 150 – 300 gpm. • Secures RWCU pump 'B'. Throttles F/D bypass valve (1G33-F044) to maintain RT system flow ~ 150 gpm. ○ Places one F/D in service while monitoring RT system flow. ○ Shuts the F/D bypass valve (1G33-F044).
	BOP	• Monitors control room panels, notifies the SRO of unusual/unexpected conditions. ○ Monitors reactor to ensure operations remain within established bands. ○ Dispatches an Equipment operator to investigate/support RWCU operation.
	SRO	• Acknowledges alarm and system status reports from crew members. • Directs actions listed above. • Ensures operations are conducted within the bounds of Tech Specs and IAW Operations expectations, standards and approved procedures. ○ Informs Chemistry of change in RT system status. ○ Informs Shift Manager. ○ Conducts a brief. ○ Contacts Maintenance to investigate.
Terminus: RWCU pump 'B' has been shutdown IAW CPS 3303.01.		

NOTES:

Operator Actions

Event No.(s): 3		**Page** 1 **of** 1
Description: **Loss of Control Power to Suppression Pool Dump Valve 1SM001A**		
Initiation: Following Event 2 and upon direction of the Lead Examiner, insert **REMOTE 2**		
Cues: Annunciator 5041-7D Not Avail SM Sys Division 1		
Time	**Position**	**Applicant's Actions or Behavior**
Key Parameter Response: None Expected Annunciators: 5041-7D Not Avail SM Sys Division 1 Automatic Actions**:** None		
	ATC	• Monitors reactor to ensure operations remain within established bands. ○ Monitors control room panels, notifies the SRO of unusual/unexpected conditions. ○ Directs Equipment Operator to investigate.
	BOP	• Monitors control room panels, notifies the SRO of unusual/unexpected conditions. ○ Monitors reactor to ensure operations remain within established bands. • Reports loss of power to 1SM001A to SRO. • Refers to ARP 5041-7D. ○ Directs Equipment Operator to investigate.

	SRO	• Acknowledges reports from ATC/BOP.
		• Directs actions listed above.
		• Ensures operations are conducted within the bounds of Tech Specs and IAW Operations expectations, standards and approved procedures.
		○ Contacts Maintenance to investigate.
		• Declares SPMU System INOPERABLE:
		  • Applicable LCO - 3.6.2.4
		  • Applicable Condition – C
		  • Required Action and Completion Time – C.1 within 7 days
		○ May direct one-time control power fuse replacement or thermal overload reset for 1SM001A breaker.
		○ Informs Shift Manager.
		○ Conducts a brief.

Terminus: ITS 3.6.2.4 evaluated for loss of control power to Suppression Pool Dump Valve.		

NOTES:

Operator Actions

Event No.(s): 4		**Page** 1 **of** 1
Description: **Clogged oil filter Condensate Booster (CB) Pump 'A'**		
Initiation: Following Event 3 and upon direction of the Lead Examiner, insert **REMOTE 3**		
Cues: Annunciator 5001-1H Clogged Oil Filter CB Pump 1A		
Time	**Position**	**Applicant's Actions or Behavior**
Key Parameter Response: None Expected Annunciators: 5001-1H Clogged Oil Filter CB Pump 1A Automatic Actions: None		
	ATC	• Monitors reactor to ensure operations remain within established bands. ○ Monitors control room panels, notifies the SRO of unusual/unexpected conditions. • Reports issue to SRO. Per CPS 5001-1H, Clogged Oil Filter Condensate Booster Pump 1A: ○ Directs Equipment Operator to turn CUNO filter handle several turns for the 1A CB Pump. Per ARP or CPS 3104.01, Condensate/Condensate Booster (CD/CB) step 8.2.2: ○ Directs Equipment Operator to perform CB Pump 1C prestart checks. • Starts CB Pump 1C. • Secures CB Pump 1A.
	BOP	• Monitors control room panels, notifies the SRO of unusual/unexpected conditions. ○ Monitors reactor to ensure operations remain within established bands ○ Directs Equipment Operator to turn CUNO filter handle several turns for the 1A CB Pump.
	SRO	• Acknowledges reports from ATC/BOP. • Directs actions listed above. • Ensures operations are conducted within the bounds of Tech Specs and IAW Operations expectations, standards and approved procedures. ○ Informs Shift Manager. ○ Conducts a brief. ○ Contacts Maintenance to investigate.
Terminus: CB Pumps shifted.		

NOTES:

Operator Actions

Event No.(s): 5		**Page** 1 **of** 1
Description: **Inadvertent opening of a SRV**		
Initiation: Following Event 4 and upon direction of the Lead Examiner, insert **REMOTE 4**		
Cues: Annunciators 5067-8L SRV Monitoring System Trouble and 5066-5B ADS Or Safety Relief Valve Lifting		
Time	**Position**	**Applicant's Actions or Behavior**
Key Parameter Response: Reactor Power, RPV Level Expected Annunciators: 5067-8L SRV Monitoring System Trouble and 5066-5B ADS Or Safety Relief Valve Lifting Automatic Actions: None		
	ATC	○ Reports issue to SRO. • Monitors reactor to ensure operations remain within established bands. ○ Monitors control room panels, notifies the SRO of unusual/unexpected conditions. Per CPS 4005.01 Loss Of Feedwater Heating • Reduces RR flow with FCV(s) to restore and maintain power at or below the original power level.

[CT-1]	BOP	○ Reports issue to SRO.
		• Monitors control room panels, notifies the SRO of unusual/unexpected conditions.
		○ Monitors reactor to ensure operations remain within established bands.
		Per CPS 4009.01 Inadvertent Opening Safety/Relief Valves:
		• Sounds the containment evacuation alarm.
		• **Shut SRV prior to Suppression Pool Temperature reaching 110ºF:**
		  • (Attempts) to SHUT open SRV (F041G) by placing control switch to OPEN, and then back to OFF (from 1H13-P601 or P642 [V-panel] control switches as necessary).
		  • Removes fuses (4 fuses/2 for each solenoid) for the "A" and "B" solenoids (for F041G) at panels 1H13-P661/P662 [V-panel], using Table 1 for fuse location.

	SRO	• Acknowledges report from ATC/BOP. • Directs actions listed above. • Ensures operations are conducted within the bounds of Tech Specs and IAW Operations expectations, standards and approved procedures. • Enters CPS 4009.01 Inadvertent Opening Safety/Relief Valves and CPS 4005.01 Loss Of Feedwater Heating. ○ May review ITS 3.4.4 Safety/Relief Valves (S/RVs) to verify that the LCO is still met. ○ Informs Shift Manager. ○ Conducts a brief.
Terminus: SRV F041G is SHUT		

NOTES:

Operator Actions

Event No.(s): 6		**Page** 1 **of** 1
Description:	**Failure of DG Fuel Oil Transfer Pump 1A to auto start**	
Initiation: Following Event 5 and upon direction of the Lead Examiner, insert **REMOTE 5**		
Cues: Annunciators 5060-8C LOW LEVEL DG DAY TANK 1A and 5060-8E TROUBLE DIESEL GEN 1A		
Time	**Position**	**Applicant's Actions or Behavior**
Key Parameter Response: DG1A Day Tank level lowering. Expected Annunciators: 5060-8C LOW LEVEL DG DAY TANK 1A and 5060-8E TROUBLE DIESEL GEN 1A Automatic Actions**:** DG1A Fuel Oil Transfer Pump (FOTP) starts on Day Tank low level (failure to auto start)		
	ATC	• Monitors reactor to ensure operations remain within established bands. ○ Monitors control room panels, notifies the SRO of unusual/unexpected conditions. ○ Dispatches Equipment Operator to investigate.
	BOP	• Monitors control room panels, notifies the SRO of unusual/unexpected conditions. ○ Monitors reactor to ensure operations remain within established bands. • Reports issue to SRO. • Refers to the ARP for 5060-8C Low Level DG Day Tank 1A. ○ Dispatches an Equipment Operator to investigate. Per CPS 5060-8C Low Level DG Day Tank 1A: • Determines that the DG1A Fuel Oil Transfer Pump (FOTP) failed to autostart: • Manually starts the DG1A Fuel Oil Transfer Pump (FOTP). ○ Secures FOTP when annunciators 5060-8C and 5060-8E clear, or ○ Allows FOTP to remain running. ○ Performs CPS 9082.01 Offsite Source Power Verification within 1 hour of entering ITS 3.8.1 Condition B.

	SRO	• Acknowledges reports from BOP.
		• Directs actions listed above.
		• Ensures operations are conducted within the bounds of Tech Specs and IAW Operations expectations, standards and approved procedures.
		• Verifies / directs BOP to manually start the DG1A Fuel Oil Transfer Pump (FOTP).
		• Enters ITS 3.8.1 AC Sources – Operating
		  • Applicable Condition: B (due to DG 1A Day Tank level below the low level alarm [B3.8.1 SR 3.8.1.4]).
		  • Required Actions and Completion Times:
		  • B.1 – 1 hour and once per 8 hours thereafter, and
		  • B.2 – 4 hours from discovery of Condition B concurrent with Inoperability of redundant required feature(s), and
		  • B.3.1 OR B.3.2 – 24 hours, and
		  • B.4 – 72 hours from discovery of an inoperable Division 3 DG
		○ Assigns performance of CPS 9082.01 Offsite Source Power Verification to BOP/WEC/extra operator, with order to have it completed within 1 hour of entering ITS 3.8.1 Condition B.
		○ Informs Shift Manager.
		○ Conducts a brief.
		○ Contacts Maintenance to investigate.

Terminus: Annunciators 5060-8C and 5060-8E clear with FOTP running or secured and Technical Specification review complete.		

Operator Actions

Event No.(s): 7		**Page** 1 **of** 2
Description: **Loss of CY – Rapid Plant Shutdown**		
Initiation: Following Event 6 and upon direction of the Lead Examiner, insert **REMOTE 6**		
Cues: Annunciator 5014-2D Low Press Cycle Cond Xfer Pump Disch Hdr		
Time	**Position**	**Applicant's Actions or Behavior**
Key Parameter Response: None Expected Annunciators: CPS 5014-2D Low Press Cycled Cond Xfer Pumps Disch Hdr Automatic Actions**:** None		

	ATC	• Monitors reactor to ensure operations remain within established bands.
		○ Monitors control room panels, notifies the SRO of unusual/unexpected conditions.
		○ For the Rapid Plant Shutdown, evacuates the containment and makes a plant announcement, "Performing a Rapid Plant Shutdown due to loss of CY Pumps".
		• When directed by the SRO, performs a Rapid Plant Shutdown IAW CPS 3005.01 Unit Power Changes by lowering core flow using RR FCVs until core flow is ~ 43 mlbm/hr.
		• Places the mode switch in SHUTDOWN and carries out Scram Choreography by reporting:
		  • Rod status is…
		  • Reactor Power is… and trend
		  • Reactor pressure is… and trend
		  • Reactor level is… and trend
		  • Any EOPs with entry conditions (no values required).
		○ Stops all running condensate pumps 1CD01PA (B) (C) (D).
		• Performs EOP actions as directed by SRO.

	BOP	• Monitors control room panels, notifies the SRO of unusual/unexpected conditions.
		○ Monitors reactor to ensure operations remain within established bands.
		• Reports annunciator 5014-2D Low Press Cycled Cond Xfer Pumps Disch Hdr to the SRO.
		Per 5014-2D Low Press Cycled Cond Xfer Pumps Disch Hdr ARP:
		• Operates CY transfer pumps consistent with system demand to maintain normal header pressure per CPS 3208.01, Cycled/Makeup Condensate (CY/MC)
		○ Operator may go to CPS 3208.01 Section 8.2.2 directly or to 8.3.1 which will then direct him/her to section 8.2.2.
		Per CPS 3208.01, Cycled/Makeup Condensate (CY/MC):
		• Starts the 'A' CY Pump.
		  • Observes an increase in Cyc Cond Xfer Pmp Disch Hdr Pressure followed by a decrease in Cyc Cond Xfer Pmp Disch Hdr Pressure on 1H13-P870-5014.
		  ○ Secures the 'C' CY Pump.
		  • Reports annunciator 5014-2D Low Press Cycled Cond Xfer Pumps Disch Hdr re-flash.
		• Reports loss of CY to the SRO.
		○ For the Rapid Plant Shutdown, evacuates the containment and makes a plant announcement, "Performing a Rapid Plant Shutdown due to loss of CY Pumps".
		• Carries out Scram Choreography by reporting:
		  • Reactor Scram
		  • MDRFP may start
		  • Evacuate the RCIC room
		  • Evacuate the Containment
		  • Determines rod status and reports it to the SRO
		○ Stops all running condensate pumps 1CD01PA (B) (C) (D).
		• Performs EOP actions as directed by SRO.

Event No.(s): 7	Page 2 of 2

Description: **Loss of CY – Rapid Plant Shutdown**

Time	Position	Applicant's Actions or Behavior
	SRO	• Acknowledges reports from ATC/BOP. • Directs actions listed above. • Ensures operations are conducted within the bounds of Tech Specs and IAW Operations standards and approved procedures. • Per CPS 3005.01 Unit Power Changes, directs ATC to perform a Rapid Plant Shutdown or Reactor Scram when it has been determined that CY has been lost. ○ Directs ATC to stop all running condensate pumps 1CD01PA (B) (C) (D). • Enters and executes CPS 4100.01 Reactor Scram. • Carries out Scram Choreography by performing an Update: • Update: • Entering EOP-1 • Entering the Scram Off-Normal • End of Update • Directs applicable EOP actions (EOP-1) to stabilize the plant.

Terminus: Reactor has been scrammed and scram actions are in progress.

NOTES:

Operator Actions

Event No.(s): 8, 9		**Page** 1 **of** 3
Description:	**LOCA / RAT trip / E51-F013 Failure / Loss Div 3 4160V Bus / TAF Blowdown / LPCS Fails To Auto Start / 1E21F005 Fails To Auto Open**	
Initiation: Following Event 7, after GCB 4506 is opened and following a 30 second time delay		
Cues: Multiple annunciators on 1H13-P680, 1H13-P870, and 1H13-P601, rising DW pressure and temperature indications		
Time	**Position**	**Applicant's Actions or Behavior**
Key Parameter Response: Rising DW temperature and pressure, loss of 4160 and 6900 V Non-vital busses. Expected Annunciators: Multiple annunciators on 1H13-P680, 1H13-P870, and 1H13-P601 Automatic Actions**:** ECCS systems and DGs start on high DW pressure (1.68 psig)		
Evaluator Note for Critical Task Performance Mark time that RPV Water Level reaches TAF _____. Mark time that ADS is manually initiated _____. Verify time from RPV Water Level reaching TAF to ADS being initiated is ≤ 17.5 minutes. **Failure to meet this criterion will be considered a Critical Task Failure.**		
	ATC	• Monitors reactor to ensure operations remain within established bands. ○ Monitors control room panels, notifies the SRO of unusual/unexpected conditions. ○ Reports trip of the RAT transformers/loss of non-vital AC power. ○ Reports that the RCIC Injection valve failed to open remotely and manually. • Performs EOP actions as directed by SRO. ○ Perform SLC injection IAW CPS 4411.03 Injection/Flooding Sources. ○ Diagnoses and reports the HPCS loss to the SRO. ○ Reports the LPCS Pump failed to automatically start. ○ Reports failure of ADS to automatically initiate when RPV level reaches Level 1 (-145.5").
[CT-2] **[CT-3]**		Per EOP-1, RPV Control (may be performed by BOP): ○ **When TAF (-159 inches on Wide Range level indicators) is reached, initiates ADS to Blowdown the reactor within 17.5 minutes after RPV level reaches -159" when directed by the SRO.** ○ **Maximizes ECCS injection by starting the LPCS Pump and opening 1E21-F005 to restore RPV water level above TAF within 17.5 minutes after RPV level reaches -187".** • Starts LPCS Pump and opens 1E21-F005 to maximize ECCS injection. • Coordinates with BOP operator to monitor and control RPV level and pressure.

Event No.(s):	8, 9	Page 2 of 3
Description:	**LOCA / RAT trip / E51-F013 Failure / Loss Div 3 4160V Bus / TAF Blowdown / LPCS Fails To Auto Start / 1E21F005 Fails To Auto Open**	

Time	Position	Applicant's Actions or Behavior
	BOP	• Monitors control room panels, notifies the SRO of unusual/unexpected conditions. ○ Monitors reactor to ensure operations remain within established bands. ○ Reports trip of the RAT transformers/loss of non-vital AC power. ○ Reports that the RCIC Injection valve failed to open remotely and manually. • Performs a manual Group 1 Isolation (due to loss of CW). • Performs EOP actions as directed by SRO. ○ Perform SLC injection IAW CPS 4411.03 Injection/Flooding Sources. ○ Starts Containment Spray, as directed by the SRO. ○ If started, secures Containment Spray when RPV water level is ≤ -100 inches WR. ○ Diagnoses and reports the HPCS loss to the SRO. ○ Reports the LPCS Pump failed to automatically start. ○ Reports failure of ADS to automatically initiate when RPV level reaches Level 1 (-145.5"). Per EOP-1, RPV Control (may be performed by ATC): ○ **When TAF (-159 inches on Wide Range level indicators) is reached, initiates ADS to Blowdown the reactor within 17.5 minutes after RPV level reaches -159" when directed by the SRO.** **[CT-2]** **[CT-3]** ○ **Maximizes ECCS injection to restore RPV water level above TAF within 17.5 minutes after RPV level reaches -187".** • Starts LPCS Pump and opens 1E21-F005 to maximize ECCS injection. • Verifies ADS actuation using the following indications: ○ SPDS ○ DCS Display 122 (2H) [Acoustic Monitor Input] ○ DCS Display 186 (7B) ['A' Solenoid Input] ○ 1H13-P601/P642 Solenoid Indicator Lights ○ 1H13-P866, Valve Flow Monitor Control Panel ○ 1H13-P614, ADS Safety Valve Temperature recorder 1B21-R614 ○ Indirect indication via changes in RPV pressure, RPV level, MSL flows & suppression pool temperatures. • Coordinates with ATC operator to monitor and control RPV level and pressure.

Event No.(s):	8, 9	Page 3 of 3
Description:	**LOCA / RAT trip / E51-F013 Failure / Loss Div 3 4160V Bus / TAF Blowdown / LPCS Fails To Auto Start / 1E21F005 Fails To Auto Open**	

Time	Position	Applicant's Actions or Behavior

[CT-2] [CT-3]	SRO	• Acknowledges reports from ATC/BOP.
		• Directs actions listed above.
		• Ensures operations are conducted within the bounds of Tech Specs and IAW Operations expectations, standards and approved procedures.
		• Enters and executes the following off-normal procedures:
		  • CPS 4001.01 Reactor Coolant Leakage
		  • CPS 4001.02 Automatic Isolation
		• Enters and executes EOP-1 RPV Control.
		  o Directs SLC injection IAW CPS 4411.03 Injection/Flooding Sources.
		  o Directs defeating 1E12-F053A(B) isolation logic.
		• Enters and executes EOP-6 Primary Containment Control
		  o Directs defeating WO interlocks per CPS 4410.00C006.
		• Executes EOP-1 RPV Control (Blowdown) when RPV Level reaches TAF.
		• **When TAF (-159 inches on Wide Range level indicators) is reached, directs:**
		  • **initiating ADS to Blowdown the reactor within 17.5 minutes after RPV level reaches -159".**
		  • **maximizing ECCS injection to restore RPV water level above TAF within 17.5 minutes after RPV level reaches -187".**
		  • Starting LPCS Pump and opening 1E21-F005 to maximize ECCS injection.
		• Restore water level to level 3 to level 8.

Terminus: The scenario can be terminated when a blowdown has been initiated, RPV level has been raised above TAF, and containment parameters are being controlled per EOP-6.

NOTES:

Simulator Operator Instructions

Initial Setup

1. Fill out plant status and have Turnover Sheet ready for the crew.
2. Verify daily lamp test completed.
3. Simulator key count: _____ keys.
4. Reset to IC-231 (PW 74123) @ 76**%** Power. If this is the first reset after swapping simulator loads, reset the IC twice.
5. Load the lesson plan for this scenario.
6. Verify the following commands are active:
   - **YARIMVFP_2 0%.** (E51F013 Fail To Position)
   - **A05_A02_A13S63.** Inhibited (ADS A&E Inhibit PB)
   - **A05_A02_A13DS47_1 Off.** (ADS A&E White Light)
   - **A05_A02_A13S64 Inhibited.** (ADS B&F Inhibit PB)
   - **A05_A02_A13DS48_1 Off.** (ADS B&F White Light)
   - **A05_A02_A0508_1_TVM Off.** (5066-8A ADS B Out of Service)
   - **A05_A02_A0608_1_TVM Off.** (5067-8A ADS A Out of Service)
   - **YP_XMFTB_4106.** (LPCS Fail to Auto Start)
   - **LP11ACLD001FSP.** (E21F005 Auto-Open Failure)
   - **ED26BDG1KCFTC.** (E22-S001 DG 1C Bkr Fails to Close)
7. Place simulator in RUN.
8. Verify RCIC Flow Controller is set at 620 gpm.
9. Verify the AR/PR server is running and stabilize AR/PR.
10. Verify Rod Drive pressure is in the expected range of 235-265 psid.
11. Provide pull sheets: **Step 27 / Gang 10C @ position 20**.
12. Make sure Sequence A is selected.
13. Make sure Individual Drive Mode is selected on the OCM.
14. Make sure the FP bell toggle switch on the OG panel (is in the up position).
15. Generate a 3D Case.
16. Make sure SBT data is saved, then clear PPDS history (TQ-CL-201-0117 Step 8.9).
17. Clear PPC history (TQ-CL-201-0117 Step 8.10).
18. Clear AR/PR Service Logs (TQ-CL-201-0117 Step 8.12).
19. Clear the memory on the Honeywell recorders (TQ-CL-201-0117 Step 8.13).
20. Clear the memory on the Yokogawa recorders (TQ-CL-201-0117 Step 8.14).
21. Clear the memory on the OG recorders (TQ-CL-201-0117 Step 8.15).
22. Close any open window(s) on the V-panel.
23. Load PPC PMS environment (on PPC screen #10):
    - Select “Viewer”
    - Select “Load Env…”
    - Select “MCR_Baseline.uall”
    - Select Open.
24. Procedures that are expected to be used during this scenario are:
    - CPS 3104.01 CONDENSATE/CONDENSATE BOOSTER (CD/CB)
    - CPS 3208.01 CYCLED/MAKEUP CONDENSATE (CY/MC)
    - CPS 3303.01 REACTOR WATER CLEANUP (RT)
    - CPS 4001.01 REACTOR COOLANT LEAKAGE
    - CPS 4001.02 AUTOMATIC ISOLATION
    - CPS 4005.01 LOSS OF FEEDWATER HEATING
    - CPS 4008.01 ABNORMAL REACTOR COOLANT FLOW

- CPS 4009.01 INADVERTENT OPENING SAFETY/RELIEF VALVE
- CPS 4100.01 REACTOR SCRAM
- CPS 4200.01 LOSS OF AC POWER
- CPS 4401.01 EOP-1 RPV CONTROL
- CPS 4402.01 EOP-6 PRIMARY CONTAINMENT CONTROL
- CPS 5000.02 ALARM PANEL 5000 ANNUNCIATORS - ROW 2
- CPS 5001.01 ALARM PANEL 5001 ANNUNCIATORS - ROW 1
- CPS 5002.04 ALARM PANEL 5002 ANNUNCIATORS - ROW 4
- CPS 5002.05 ALARM PANEL 5002 ANNUNCIATORS - ROW 5
- CPS 5014.02 ALARM PANEL 5014 ANNUNCIATORS - ROW 2
- CPS 5041.07 ALARM PANEL 5041 ANNUNCIATORS - ROW 7
- CPS 5060.01 ALARM PANEL 5060 ANNUNCIATORS - ROW 1
- CPS 5060.08 ALARM PANEL 5060 ANNUNCIATORS - ROW 8
- CPS 5066.05 ALARM PANEL 5066 ANNUNCIATORS - ROW 5
- CPS 5067.08 ALARM PANEL 5067 ANNUNCIATORS-ROW 8
- CPS 9061.03 CONTAINMENT DRYWELL ISOLATION VALVE THREE-MONTH OPERABILITY
- CPS 9082.01 OFFSITE SOURCE POWER VERIFICATION
    - **Booth Operator – Have one copy of CPS 9082.01 available for each time scenario is run. Supply to MCR as WEC upon request (see Event Triggers and Role Play – Event 5).**
- ORM 2.5 ELECTRICAL POWER SYSTEMS (ORM 2.5.2)
- ITS 3.4 REACTOR COOLANT SYSTEMS (LCOs 3.4.1, 3.4.4)
- ITS 3.8 ELECTRICAL POWER SYSTEMS (LCOs 3.8.1, 3.8.7)

25. Hang OOS tags on: CY Pump ‘B’ (0CY01PB)
26. Identify T/S issues associated with OOS and turnover: None
27. Operating Equipment:
    - CB Pump ‘A’ running
    - RT Pump ‘B’ running
    - SF secured (1SF01 PA/B – stopped & 1SF001/2/4 Shut)
28. Marked up copies:
    - CPS 3005.01 UNIT POWER CHANGES
    - CPS 9061.03 CONTAINMENT/DRYWELL ISOLATION VALVE THREE-MONTH OPERABILITY
    - CPS 9061.03C012 WEEK 12 – CM, SF, SM, LD ISOL VALVE OPERABILITY CHECKLIST
    - CPS 9061.03D012 WEEK 12 – CM, SF, SM, LD ISOL VALVE OPERABILITY DATA SHEET
29. Verify a stopwatch is available.
30. Verify simulator conditions match the turnover.

Event Triggers and Role Play

Event #

1. **Perform 9061.03C012 Week 12 – SF Valve Operability Checklist**
   a. Event Trigger - Following shift turnover.
   b. Role play – Provide Extra Operator for Independent Verifications (on request).

2. **'B' RWCU pump seal plate temperature high (Pull up RT System on PPC)**
   a. Event Trigger - Following Event 1 and when directed by the Lead Examiner, insert **Remote 1** and verify the following command(s):
      (1) **A01_A01_02_5_TMV=2.** (Annunciator 5000-2E, Cleanup Pump Seal Gland Plate Temp Hi)
   b. Role Play
      (1) EO (if requested)**:**
         a) To check RT pump seal temperatures locally – report, "'B' RT pump seal temperature is 285 degrees and rising slowly".
         b) Verify CCW lineup – report, "CCW is lined up to the RT pumps."
         c) Verify 'A' RT pump status/temperature – report, " 'A' RT pump is at 175 degrees and stable"
         d) Trend for "B" RT pump seal temperature – report "rising 1 degree approximately every 5 minutes."
         e) To check for steam in the RT pump room – report, "there is no steam in the room."
         f) To perform local actions to isolate and vent 'B' RT pump - respond that you will go to RP to obtain a Hi Rad Brief.
      (2) Chemistry:
         a) When informed of RT F/D removal from service – acknowledge the report.
         b) If/When asked on preference on final F/D alignment – report, "Chemistry has no preference on which F/D to restore to service.
      (3) Booth Operator (when requested):
         a) To check Div 2 RT Pump Room Temperature indication – report that it reads 86ºF and stable.
         b) To remove RT F/D 'A' from service, **Release - Remove RT F/D 'A' from service**
         c) To remove RT F/D 'B' from service, **Release - Remove RT F/D 'B' from service**
         d) To place RT F/D 'A' in service, **Release - Place RT F/D 'A' back in service**
         e) To place RT F/D 'B' in service, **Release - Place RT F/D 'B' back in service**
         f) To reset RT F/D System Trouble Alarm, **Release – Reset F/D System Trouble Alarm**

3. **Loss of Control Power to Suppression Pool Dump Valve (1SM001A)**
   a. Event Trigger – Following Event 2 and when directed by the Lead Examiner, insert **Remote 2** and verify the following command(s):
      (1) **A11_A05_S40_2 ON.** (SM Div 1 MOV NOT AVAIL Status Light On).
      (2) **A11_A02_07_4_TVM Steady.** (Annunciator 5041-7D, Not Avail SM Sys Division 1).
      (3) **A11_A08_DS30_1 Off.** (1SM001A Green Light Off)
   b. Role play
      (1) EO (when directed to investigate): report "No abnormalities noted locally at the valve. The breaker handle for 1SM001A is not tripped."
      (2) EO (if directed to reset thermal overloads): report "The 1SM001A thermal overloads reset button has been depressed".
      (3) EO (if directed to perform a one-time fuse replacement of control power fuses): report "When the compartment door for 1SM001A was opened, there was a slight acrid odor noted. Recommend allowing Electrical Maintenance to investigate prior to attempting to replace control power fuses".
      (4) Maintenance (if requested): report, "Dispatching personnel to investigate".

4. **Clogged oil filter Condensate Booster Pump 'A' (Pull up Condensate System on PPC)**
   a. Event Trigger - Following Event 3 and when directed by the Lead Examiner, insert **Remote 3** and verify the following command(s):
      (1) **A01_A02_01_8_TVM Steady.** (5001-1H Clogged Oil Filter CB Pump 1A)
   b. Role play
      (1) **Field Operator** (If requested):
         a) (when directed to turn the handle on the CB 1A CUNO Filter) – acknowledge request. Wait ~ one minute and report "I turned the handle on Condensate Booster Pump 1A CUNO Filter several times".
         b) (if asked for CB Pump 'A' oil pressure) – report "13 psig and slowly lowering".
         c) (if asked to verify the position of 1CB011C) – report "1CB011C is locked open".
         d) (when directed to perform startup checks for the standby CB pump) – report "Pre-starts are complete".
         e) (when directed for local indications during prestart checks) – report "Lube oil pressure is > 8 psi and lube oil temperature is >75°F".
         f) (when asked if CB Pump C is operating normally locally) – report "CB Pump C is running normally".

5. **Inadvertent opening of a SRV**
   a. Event Trigger – Following Event 4 and when directed by the Lead Examiner, insert **Remote 4** and verify the following command(s):
      (1) **YPXMALSE_77 to 50** (F041G MS Relief Failure)
   b. Role play – None

6. **Failure of DG Fuel Oil Transfer Pump 1A to auto start (Pull up FOTP control switch)**
   a. Event Trigger - Following Event 5 and when directed by the Lead Examiner, insert **Remote 5** and verify the following command(s):
      (1) **A05_A01_A0108_3_TVM steady.** (5060-8C LOW LEVEL DG DAY TANK 1A)
      (2) **A05_A01_A0108_5_TVM steady.** (5060-8E TROUBLE DIESEL GEN 1A)
   b. Role play
      (1) EO (if directed to determine source of annunciators) – report, "There is a low fuel level in the Div 1 DG Day Tank. It is currently at 45% and lowering/rising (based on whether the FOTP running)."
      (2) EO (if directed to check for fuel leakage) – report, "I've walked down the Div 1 DG Day Tank Room and the Div 1 DG Fuel Oil Storage Tank Room and there is no fuel leakage into either room."
      (3) EO (if asked to check the positions of 1DO007A and 008A) – report, "1DO007A is closed and 1DO008A is locked closed."
      (4) WEC (if CPS 9082.01 Offsite Source Power Verification is requested) – acknowledge the request and deliver a copy of CPS 9082.01 to the MCR.

7. **Loss of CY – Rapid Plant Shutdown**
   a. Event Trigger - Following Event 6 and when directed by the Lead Examiner, insert **Remote 6** and verify the following command(s):
      (1) **YFFWPPSS_11**. (CY Pump C Shaft Shear)
      (2) **YAFWPPDE_9**. (CY Pump A Pumping Efficiency)
   b. Role play
      (1) **Field Operator:**
         a) When directed to check operation of CY Pump 'C' – "The motor is running, but the pump shaft is not turning, and the motor is making noise and vibrating."
         b) When directed to perform CY Pump 'A' prestart checks – "CY Pump 'A' prestart checks are complete". When directed to Shut/verify shut 0CY004A CY Pump 'A' Discharge – "0CY004A is Shut". When directed to slowly open 0CY004A CY Pump 'A' Discharge – "0CY004A is Open".
         c) When directed to check operation of CY Pump 'A' – "CY Pump 'A' discharge pressure indicates 30 psig locally. The pump is not making any unusual noises. There is no evidence of leakage locally."
      (2) **ROC Operator:**
         a) When informed that the CY system has been lost (3208.01 step 8.3.1.5 - acknowledge report.
         b) If directed to check for indications of CY leakage – "There are no indications of increased inleakage in the ROC."
      (3) Maintenance (after 2 minutes from scram announcement) – report to the MCR as IMD.

8. **LOCA / RAT trip / E51-F013 Failure / Loss Div 3 4160V Bus / TAF Blowdown**
   a. Event Trigger – After GCB 4506 is opened and following a 30 second time delay, verify the following command(s):
      (1) **RAT_B_OVERCURRENT.** (RAT B Overcurrent Trip)
      (2) **ED17B221C1FO.** (1ETR4C1 Bkr Tripped)
      (3) **YPXMALSE_511.** (RR03C Lower Plenum Leak)
   b. Role play:
      (1) Field Operator:
         a) (If requested to check the status of Div 3 ERAT feeder breaker) – "The overcurrent relay is tripped".
         b) (If requested to manually open the RCIC injection valve) – "Heading to WEC for a brief".

9. **LPCS Fails To AutoStart / LPCS Injection Valve 1E21F005 Fails to Auto Open at 472 psig RPV pressure**
   a. Event Trigger – None
   b. Role play - None

CT Bases Information

1. **[CT-1]** Shuts Safety Relief Valves (SRVs) before Suppression Pool temperature reaches 110^0F.

   a) This critical task was derived from ITS 3.6.2.1 Suppression Pool Average Temperature and EOP-6 Primary Containment Control. Per B3.6.2.1, Average temperature shall be ≤ 110°F when THERMAL POWER is ≤ 1% RTP. This requirement ensures that the plant will be shut down at > 110°F. The pool is designed to absorb decay heat and sensible heat but could be heated beyond design limits by the steam generated if the reactor is not shut down. Taking mitigating actions to prevent an unnecessary reactor shutdown is therefore critical.

2. **[CT-2]** RPV-1.1/TSA-2 Initiate ADS (7 SRVs) within 17.5 minutes of blowdown being required (Rx Level at TAF).

   a) This critical task was derived from OP-CL-102-106 Operator Response Time Master List at CPS and applies during Medium LOCA associated inventory loss rate events, requiring depressurization of the reactor after ADS fails to initiate for any reason. In this scenario, ADS automatic initiation is defeated and a medium sized leak in the lower RPV plenum is initiated (1-2% magnitude). A task is essential to safety if its improper performance or omission by an operator will result in direct adverse consequences or significant degradation in the mitigative capability of the plant. In this instance, depressurization of the reactor is required to allow low pressure ECCS systems to restore RPV water level above TAF and is therefore critical. The 17.5-minute time boundary is based on the CPS Master List of Time Sensitive Actions (TSA 2) which requires ADS initiation within 17.5 minutes after a blowdown is required.

3. **[CT-3]** Maximizes ECCS injection by starting the LPCS Pump and opening 1E21-F005 to restore RPV water level above TAF within 10 minutes after RPV level reaches -187".

   a) Although limited low pressure injection will commence as soon as RPV pressure drops below the shutoff head for each of the affected systems, the magnitude of the leak is such that RPV water level will not recover above TAF if Low Pressure Core Spray (LPCS) is not manually initiated. OP-CL-101-111-1001, Strategies for Successful Transient Mitigation, states that available injection sources (RHR, LPCS, HPCS, RCIC, CD/CB/FW) must be maximized in EOP-1 with RPV level below TAF, regardless of RPV pressure.

   b) This critical task was derived from the EOP-SAG Technical Bases which states that following the blowdown, injection into the RPV is maximized to restore RPV water level above TAF. This critical task applies when there are no automatic actions that will restore reactor water level above top of active fuel and failure to perform the task will result in a loss of core cooling via core submergence. The barrier criteria of -187" is selected because EOP-1 directs exiting all EOP flowcharts and entering all SAG flowcharts if RPV level cannot be maintained above -187" (the Adequate Core Conditions specified in EOP-1) in anticipation of core geometry changes. The time limit of 10 minutes was agreed upon between the NRC Chief Examiner and the facility and is considered adequate for a competent operator to complete the task. A task is essential to safety if its improper performance or omission by an operator will result in direct adverse consequences or significant degradation in the mitigative capability of the plant. In this instance, challenging fuel integrity with inadequate cooling would result in a fuel rod perforation. An action that mitigates the event and restores adequate core cooling via submergence is therefore critical.

Turnover

1. The plant is in Mode 1, operating at ~ 76% Rated Thermal Power (RTP).
   a. Control rods - **Step 27 / Gang 10C @ position 20**.

2. Status of Tagged Out Equipment

   - CY Pump 'B' (0CY01PB) is OOS for maintenance. Not expected back this shift.

3. Today Day Shift

4. Weather Conditions

   - Thunderstorms are expected in the area within the next hour.

5. Thermal Limit Problems or concerns

   - None

6. LCO's in effect

   - None

7. Surveillances in progress

   - CPS 9061.03C012/D012 – Week 12 – SF Valve Operability Checklist

8. Previous Shift Evolutions completed

   - SF System was secured to support performance of CPS 9061.03C012/D012.

9. Evolutions planned for the shift

   - First Priority – Perform CPS 9061.03C012 Week 12 – CM, SF, SM, LD ISOL Valve Operability Checklist section 8.12.7 (Method B). Position indication testing is NOT required. Do NOT restart SF after the completion of 9061.03C012/D012.
   - Maintain power at ~76% RTP throughout the shift.

10. Risk Levels

    - Green
    - Protected Equipment: None

Exelon Nuclear

ILT 20-1 NRC Exam

Scenario Number:
NRC Exam Scenario 2

Revision Number: 0

Date: 5/04/21

Developed By:	**Bill Kiser**	**5/04/21**
	Instructor	**Date**
Validated By:		
	SME or Instructor	**Date**
Reviewed By:		
	Operations Representative	**Date**
Approved By:		
	Training Department	**Date**

Facility: Clinton Power Station Scenario No.: 2 Operating Test No.: 2022-301

Examiners: _____ Operators: _____
_____ _____
_____ _____

Initial Conditions:
- Mode 2 at ~7%
- Weather conditions are calm and clear.

Turnover:
- Power ascension is in progress. CPS 3002.01 Heatup and Pressurization is complete up to and including step 8.7.2. CPS 3004.01 Turbine Startup and Generator Synchronization is completed up to and including step 5.2.
- Priorities for the shift are as follows:
  - First Priority – Cross-tie 480V Buses 1L & 1M with 1L supplying per CPS 3502.01 480 VAC Distribution to support maintenance on 1M.
  - Complete the remaining steps of CPS 3002.01 Heatup and Pressurization, including the following milestones:
    - Power ascension to 10%.
    - Transition to Mode 1.

Critical Tasks:
- **[CT-1]** ATC inserts a manual scram before area temperature reaches max safe in any one area.
- **[CT-2]** Enters and executes blowdown in EOP-1 within 15 minutes of 1TR-CM326 point 12 and 1TR-CM327 point 14 exceeding 140ºF. (CT-2 can also be satisfied by anticipating blowdown and opening bypass valves per EOP-1.)

Event No.	Malf. No.	Event Type*	Event Description
1	None	N-BOP	Cross-tie 480V Buses 1L & 1M with 1L supplying
2	None	R-ATC	Raise power with rods
3	LS06_MALF	C-ATC	Control Rod Reed Switch Stuck Open
4	YP_XMFTB_4901 Failed	C-ATC	Stuck IRM F Detector
5	YP_XMFTB_4053	TS-SRO	(NEW) NSPS Bus 1A Inverter Trip
6	A05_A02_A0203_5_TVM Steady	C-BOP TS-SRO	(NEW) RCIC Suppression Pool Level Transmitter Failure - High
7	A11_A02_03_7_TVM 2	C-BOP	(NEW) Clogged CW Pump 1C TW Supply Strainer
8	YP_XMFTB_5082	M-All	RPV Instrument Line Leak
9	CAM1PR006(A/B/C/D) TV_VALUE1 = 21-24 mr A11_A03_01_4_TVM 4 A11_A03_02_3_TVM 4 A18_A03_S11 = 1 A18_A03_S10 = 1 A12_A01_07_6_TVM 2 A12_A02_07_6_TVM 2	C-BOP	Radiation Monitor fails to isolate VF / Startup VG

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

NEW – Not used on the previous two (2) NRC exams.

Scenario No.: 2 Operating Test No.: 2022-301

Narrative Summary

Event # **Description**

10. **Cross-tie 480V Buses 1L & 1M with 1L supplying**
    Following shift turnover, the SRO will direct the BOP Operator to cross-tie 480V Buses 1L & 1M with 1L supplying per CPS 3502.01 480 VAC Distribution section 8.1.4 Transferring a 480V Bus: Paralleling Method.
11. **Raise power with rods to enter Mode 1**
    The crew will continue the power ascension to 10% by withdrawing control rods in accordance with Step 8.7.3 of CPS 3002.01 Heatup and Pressurization.
12. **Control Rod Reed Switch Stuck Open**
    Annunciator During the attempted withdrawal of the control rod 24-25, a rod position reed switch fails (stuck open) in one channel of the two channel position probe. The ATC will determine which channel is inaccurate and enter substitute position data IAW CPS 3304.02 Rod Control and Information System (RC&IS) Section 8.2.4 Entering Substitute Data. Once substitute position data has been substituted for the control rod with the failed reed switch, the crew will continue the power ascension.
13. **Stuck IRM F Detector**
    When the ATC operator attempts to withdraw IRM detectors IAW CPS 3306.01 Source/Intermediate Range Monitors (SRM/IRM), the IRM F detector IN light will remain illuminated. The ATC Operator will inform the SRO, review CPS 3306.01 section 8.2.1 Stuck SRM/IRM Detector and recommends attempting to free the detector by driving it in the opposite direction. This action frees the stuck detector and allows all IRM detectors to be withdrawn when attempted the second time.
14. **NSPS Bus 1A Inverter Trip**
    The Div 1 NSPS Inverter DC input breaker will trip resulting in transfer of Div 1 NSPS power supply to the 480V / 120V transformer alternate supply. The SRO will evaluate and enter ITS 3.8.7 Inverters – Operating Required Action A.1 Restore Div 1 inverter to OPERABLE status within 7 days.
15. **RCIC Suppression Pool Level Transmitter Failure - High**
    Annunciator 5063-3E Suppression Pool Water Level High is received. The crew will recognize that the RCIC suction source failed to automatically shift to the Suppression Pool. The SRO will direct the BOP to transfer RCIC suction to the Suppression Pool IAW CPS 3310.01 Reactor Core Isolation Cooling (RI) section 8.1.9.2 Shifting RCIC Suction to Suppression Pool. The SRO will enter ITS LCO 3.3.5.3 RCIC System Instrumentation A.1, D.1. and (D.2.1 or D.2.2).
16. **Clogged CW Pump 1C TW Supply Strainer**
    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. The BOP/ATC operator(s) will closely monitor main condenser vacuum (may enter Loss of Vacuum off-normal) while securing CW Pump 1C and starting CW Pump.
17. **RPV Instrument Line leak**
    An RPV instrument line will break resulting in a partial loss of RPV instrumentation, a steam leak in the secondary containment and EOP-8 entry. Secondary containment temperatures will rise requiring a reactor scram. Two areas in secondary containment will exceed Maximum Safe temperature requiring blowdown. The crew may Anticipate Blowdown using bypass valves prior to two areas reaching max safe.
18. **Radiation Monitor fails to isolate VF / Startup VG**
    Due to the RPV instrument line leak in the secondary containment, the VF exhaust radiation monitors trend up to the trip isolation set point but fail to actuate VF system isolation and start of VG. Per EOP-8, if either action did not occur automatically, it should be initiated manually (by BOP operator). High VF exhaust radiation is an indication of a break into the secondary containment and high radiation levels may limit access to the secondary containment. VF operation is the preferred method of maintaining a negative secondary containment pressure under emergency conditions since the effluent is processed and discharged through an elevated release point, mitigating the radioactive release and allowing operator access to the secondary containment.

Operator Actions

Event No.(s): 1		**Page** 1 **of** 1
Description: **Cross-tie 480V Buses 1L & 1M with 1L supplying**		
Initiation: Following shift turnover		
Cues: Directed by SRO		
Time	**Position**	**Applicant's Actions or Behavior**
General Note on Requirements for "Expected Annunciator Response" – OP-AA-103-102 If this evolution was pre-briefed and "Expected Alarms" were reviewed, the following expectations apply: • "Expected alarms" may be flagged • When the annunciator comes in the operator will announce "Expected Alarm" • The annunciator response procedure (ARP) need not be entered since it has already been reviewed in the pre-brief. If a pre-brief was not conducted the operator should perform the following: • When an annunciator comes in the ARP should be referred to. • The annunciator may then be identified as an "Expected Alarm", flagged, and from that point on the ARP need not be referred to.		
Key Parameter Response: None Expected Annunciators: None Automatic Actions: None		
	ATC	• Monitors reactor to ensure operations remain within established bands. ○ Monitors control room panels, notifies the SRO of unusual/unexpected conditions. ○ Makes plant announcement for bus shift
	BOP	• Monitors control room panels, notifies the SRO of unusual/unexpected conditions. ○ Monitors reactor to ensure operations remain within established bands. ○ Makes plant announcement for bus shift Per CPS 3502.01 480V Distribution, Step 8.1.4: ○ Verifies that both 6.9KV buses are supplied from the same source. • Closes the 480V Unit Sub 1L to 1M Tie Breaker 1AP24E. • Opens the 480V Unit Sub 1M Main Breaker 1AP25E. (May refer to CPS 3502.01 Att. 1 for circuit breaker EINs)
	SRO	• Acknowledges reports from ATC/BOP. • Directs actions listed above. • Ensures operations are conducted within the bounds of Tech Specs and IAW Operations expectations, standards and approved procedures.
Terminus: Unit Subs 1L & 1M are cross tied with the Unit Sub 1M main feeder open.		

NOTES:

• Solid bullets are required actions
○ Hollow bullets are actions that may or may not be performed

Operator Actions

Event No.(s): 2		**Page** 1 **of** 1
Description: **Raise power with Rods to enter Mode 1**		
Initiation: Upon direction of the SRO		
Cues: None		
Time	**Position**	**Applicant's Actions or Behavior**
Key Parameter Response: Reactor power, Rod drive parameters (flow, dP), control rod position, BPV position Expected Annunciators: None Automatic Actions: None		

	ATC	• Per CPS 3304.02 Rod Control and Information System (RC&IS), NF-CL-721-1002 Control Rod Move Sheets, and CPS 3002.01 Heatup and Pressurization section 8.7.3:
		  • Raise reactor power to ~ 10% using control rod withdrawal when directed by SRO.
		• Monitors the following items listed below:
		  • RCIS status - Low Power Alarm Point (LPAP), High Power Setpoint (HPSP), Rod Blocks
		  • Bypass Valve (BPV) position
		  • Power - Average Power Range Monitor (APRM), Local Power Range Monitor (LPRM), Generator Load
		  • Actual plant response compared to expected response
		• Monitors reactor to ensure operations remain within established bands.
		○ Monitors control room panels, notifies the SRO of unusual/unexpected conditions.
		• Performs coupling checks for each rod withdrawn to position 48, if applicable.
		• Verifies Intermediate Range Monitor (IRM)/APRM overlap by verifying all operable APRMs read between 5% and 12% with all operable IRMs on scale.
		• Places Reactor Mode Switch (RMS) in RUN.
		• Verifies 5004-1G, 5004-2G, 5005-1G, and 5005-2G Div 1 (4, 2, 3) MSL A (D, B, C) CL Scram Byp / Not in Run annunciators reset.

	BOP	• Monitors control room panels, notifies the SRO of unusual/unexpected conditions. ○ Monitors reactor to ensure operations remain within established bands.
	SRO	• Acknowledges reports from ATC/BOP. • Directs actions listed above. • Ensures operations are conducted within the bounds of Tech Specs and IAW Operations expectations, standards and approved procedures. • Positions himself/herself in proximity of the reactor operator, typically the location from which EOP actions are directed (OP-AA-300). ○ Informs Shift Manager. ○ Conducts a brief.
Terminus: Clearly observable plant response from change in power level.		

NOTES:

Operator Actions

Event No.(s): 3		**Page** 1 **of** 1
Description: **Control Rod Reed Switch Stuck Open**		
Initiation: During Event 1 and following selection of control rod 24-25, insert **REMOTE 1**.		
Cues: Annunciator 5006-2H Rod Out Block; Data Fault light on the OCM		
Time	**Position**	**Applicant's Actions or Behavior**
Key Parameter Response: Control rod position flashes between 'Blank' and current position for the affected control rod. Expected Annunciators: 5006-2H Rod Out Block Automatic Actions**:** Rod withdraw block		
	ATC	• Monitors reactor to ensure operations remain within established bands ○ Monitors control room panels and notifies the SRO of any unusual or unexpected conditions. • Reports issue to SRO. • Refers to ARP. Per CPS 3304.02 Rod Control And Information System (RC&IS), step 8.2.2 Position Data Faults: • Determines channel 2 is faulted by selecting "single channel" with the DATAMODE push-button and alternately selecting CHAN 1 DATA and CHAN 2 DATA using the DATA SOURCE push-button. • Proceeds to section 8.2.4. Per CPS 3304.02 Rod Control And Information System (RC&IS), step 8.2.4 Entering Substitute Data: • Selects/verifies individual drive mode using DRIVE MODE psuh-button as needed. • Depresses the SUBST POSITION push-button. • Verifies: – No other gang member of the rod having the defective reed switch is presently using substitute data. – Data from the other channel is not substitute data (i.e., affected control rod is not identified when SUBST POSITION push-button is depressed). – RAW DATA is not selected. • Selects the rod with the defective reed switch. • Ensures that the rod is at the position at which the defective reed switch exists (control rod Channel 1 indicates current rod position). • Depresses the ENT SUBST push-button located in the PATTERN CONTROL section of the OCM. • Verifies that the data has been entered by depressing the SUBST POSITION push-button. All rods with substitute data are indicated.
	BOP	○ Monitors reactor to ensure operations remain within established bands. • Monitors control room panels, notifies the SRO of unusual/unexpected conditions.
	SRO	• Acknowledges reports from ATC/BOP. • Directs actions listed above. • Ensures operations are conducted within the bounds of Tech Specs and IAW Operations expectations, standards and approved procedures. ○ Informs Shift Manager. ○ Conducts a brief. • Directs continuing power ascension.
Terminus: Substitute position data has been entered for the affected control rod.		

NOTES:

Operator Actions

Event No.(s): 4		**Page** 1 **of** 1
Description: **Stuck IRM F Detector**		
Initiation: During Event 1 and when the ATC attempts to withdraw IRM detectors		
Cues: IRM F detector IN light will remain illuminated		
Time	**Position**	**Applicant's Actions or Behavior**
Key Parameter Response: IRM F detector fails to withdraw Expected Annunciators: None Automatic Actions**:** None		
		• Monitors reactor to ensure operations remain within established bands ○ Monitors control room panels, notifies the SRO of unusual/unexpected conditions. • Reports issue to the SRO. • Per CPS 3306.01 Source/Intermediate Range Monitors (SRM/IRM), section 8.1.2 Withdrawing SRM/IRM Detectors: • Depresses the POWER ON push-button. • Verifies the POWER ON lamp illuminates. • Verifies each RETRACT PERMIT lamp is illuminated. • Depresses each IRM select pushbutton. • Depresses the DRIVE OUT push-button. • Verifies the DRIVE OUT & DRIVING OUT lamps illuminate. • Determines IRM F is not withdrawing with the other IRMs and reports same to SRO. (May deselect IRM F at this time.) • When the IRM detectors reach the full-out position, verifies the DRIVING OUT lamp extinguishes and the DETECTORS OUT lamps are illuminated. • Depresses the DRIVE OUT push-button. • Verifies the DRIVE OUT & DRIVING OUT lamps extinguish. • Depresses IRM select pushbutton for each fully withdrawn IRM. • Verifies each fully withdrawn IRM SELECT lamp extinguishes. NOTE: The following two steps may be delayed until all other IRMs have been withdrawn. • Depresses the POWER ON push-button. • Verifies the POWER ON lamp extinguishes. Per CPS 3306.01 Source/Intermediate Range Monitors (SRM/IRM), step 8.2.1 Stuck SRM/IRM Detector: • Stabilizes reactor power • Attempts to free the IRM F detector by depressing the Drive In PB. • Verifies power to the IRM F detector drive motor. • Withdraws IRM F detector by depressing the Drive Out PB. ○ Resumes with the reactor startup when directed by the SRO.
	BOP	• Monitors control room panels, notifies the SRO of unusual/unexpected conditions. ○ Monitors reactor to ensure operations remain within established bands.
	SRO	• Acknowledges reports from ATC/BOP. • Directs actions listed above. • Ensures operations are conducted within the bounds of Tech Specs and IAW Operations expectations, standards, and approved procedures. ○ Informs the Shift Manager. ○ Conducts a brief.
Terminus: IRM F detector withdrawn.		

NOTES:

Operator Actions

Event No.(s): 5		**Page** 1 **of** 1
Description: **NSPS Bus 1A Inverter Trip**		
Initiation: Following Event 4 and upon direction of the Lead Examiner, insert **REMOTE 2**		
Cues: Annunciators 5060-1E TRIP 125V DC MCC 1A BREAKER, 5002-4N NSPS INV SOURCE XFR ALT SOURCE and 5002-5N NSPS INV TROUBLE		
Time	**Position**	**Applicant's Actions or Behavior**
Key Parameter Response: None Expected Annunciators: 5060-1E, 5002-4N, and 5002-5N Automatic Actions**:** Div 1 NSPS Inverter static switch will transfer to bypass		
	ATC	• Monitors reactor to ensure operations remain within established bands. ○ Monitors control room panels, notifies the SRO of unusual/unexpected conditions. • Reports annunciators to SRO. • Refers to ARPs. Per ARP Procedure for 5002-4N and 5N: ○ Dispatches equipment operator to NSPS inverters to determine which inverter is alarming. ○ Notifies maintenance of the NSPS Inverter normal (DC) input breaker trip and transfer to alternate source.
	BOP	• Monitors control room panels, notifies the SRO of unusual/unexpected conditions. ○ Monitors reactor to ensure operations remain within established bands. ○ Reports annunciator 5060-1E in alarm to SRO. • Per ARP 5060-1E, determines NSPS Inverter 1A Fd breaker has tripped by reviewing computer points DC-BC601, 602, 603, and 606. ○ Dispatches equipment operator to Div 1 NSPS inverter. ○ Notifies maintenance of the NSPS Inverter normal (DC) input breaker trip and transfer to alternate source.
	SRO	• Acknowledges reports from ATC/BOP. • Directs actions listed above. • Ensures operations are conducted within the bounds of Tech Specs and IAW Operations expectations, standards and approved procedures. • Evaluates and enters ITS 3.8.7 Inverters – Operating, required action A.1 Restore Division 1 inverter to OPERABLE status within 7 days. ○ Informs Shift Manager. ○ Conducts a brief.
Terminus: ITS 3.8.7 evaluated.		

NOTES:

Operator Actions

Event No.(s): 6		**Page** 1 **of** 1
Description:	**RCIC Suppression Pool Level Transmitter Failure - High**	
Initiation: Following Event 5 and upon direction of the Lead Examiner, insert **REMOTE 3.**		
Cues: 5063-3E Suppression Pool Water Level High		
Time	**Position**	**Applicant's Actions or Behavior**
Key Parameter Response: Suppression Pool Water Level Expected Annunciators: 5063-3E Suppression Pool Water Level High Automatic Actions: 1E51-F031, RCIC Suppr Pool Suction Valve OPENS, 1E51-F010, RCIC Suction From RCIC Storage Tank Valve CLOSES **(Both automatic actions fail to occur)**		
	ATC	• Monitors reactor to ensure operations remain within established bands. ○ Monitors control room panels, notifies the SRO of unusual/unexpected conditions.

	BOP	• Monitors control room panels, notifies the SRO of unusual/unexpected conditions.
		○ Monitors reactor to ensure operations remain within established bands.
		• Reports issue to the SRO.
		• Refers to the ARP for 5063-3E Suppression Pool Water Level High.
		○ Determines that automatic actions to transfer Reactor Core Isolation Cooling (RCIC) suction to the suppression pool (SP) failed to occur.
		○ MOV Test Prep Switch (RCIC Div 1) may be taken to TEST prior to the operation of 1E51-F031 & 1E51-F010 motor-operated valves.
		• When directed, transfers RCIC suction to the SP IAW CPS 3310.01 Reactor Core Isolation Cooling (RI) section 8.1.9.2 Shifting RCIC Suction to Suppression Pool.
		  • Verifies shut 1E51-F022, RCIC Pmp First Test Valve To Stor Tank.
		  • Verifies shut 1E51-F059, RCIC Pmp Second Test Valve To Stor Tank.
		  • Opens 1E51-F031, RCIC Suppr Pool Suction Valve.
		  • Verifies 1E51-F010, RCIC Storage Tank Suction Valve shuts.
		○ If Test Prep Switch (RCIC Div 1) was placed in TEST, it should be taken back to NORMAL as soon as practical following the completion of the evolution.

	SRO	• Acknowledges reports from ATC/BOP. • Directs actions listed above. • Ensures operations are conducted within the bounds of Tech Specs and IAW Operations expectations, standards, and approved procedures. ○ Determines that automatic actions to transfer RCIC suction to the suppression pool failed to occur. • Evaluates and enters ITS 3.3.5.3 Reactor Core Isolation Cooling (RCIC) System Instrumentation, RA A.1, D.1, AND D.2.1 or D.2.2 for one or more channels inoperable • Directs BOP to transfer RCIC suction to the SP IAW CPS 3310.01 Reactor Core Isolation Cooling (RI) section 8.1.9.2 Shifting RCIC Suction to Suppression Pool. ○ Contacts Maintenance to investigate failure of RCIC suction shift to SP. ○ Informs the Shift Manager. ○ Conducts a brief. ○ If MOV Test Prep Switch (RCIC Div 1) was placed in TEST, enters ORM 2.5.2 Action 3.5.2 to take Test Prep Switch back to NORMAL as soon as practical but no later than 8 hours. ○ When MOV Test Prep Switch (RCIC Div 1) is taken back to NORMAL at the completion of the evolution, exits ORM 2.5.2 Action 3.5.2.
Terminus: RCIC suction shifted to the SP. ITS 3.3.5.2 evaluated.		

NOTES:

Operator Actions

Event No.(s): 7		**Page** 1 **of** 1
Description: **Clogged CW Pump 1C TW Supply Strainer**		
Initiation: Following Event 6 and upon direction of the Lead Examiner, insert **REMOTE 4**		
Cues: Annunciator 5041-3G, Low Flow CW Pump 1C Brg Seal Water		
Time	**Position**	**Applicant's Actions or Behavior**
Key Parameter Response: None Expected Annunciators: 5041-3G, Low Flow CW Pump 1C Brg Seal Water Automatic Actions**:** None		
	ATC	• Monitors reactor to ensure operations remain within established bands. ○ Monitors control room panels, notifies the SRO of unusual/unexpected conditions. ○ Performs Plant Announcements. ○ Dispatches Equipment Operator to investigate CW Pump 1C Bearing Seal Water flow issue. ○ Monitors CW pump bearing temperatures (computer points CW-BA027, CW-BA028, and CW-BA029) (may be performed by BOP). ○ Dispatches Equipment Operator to investigate RPS Inverter 'A' Trouble alarm (received when CW Pump 1A is started). ○ Directs an Equipment Operator to reset the trouble alarm on RPS Inverter 'A'.
	BOP	• Monitors control room panels, notifies the SRO of unusual/unexpected conditions. ○ Monitors reactor to ensure operations remain within established bands. • Reports issue to SRO. • Refers to ARP 5041-3G. ○ Performs Plant Announcements. ○ Dispatches Equipment Operator to investigate CW Pump 1C Bearing Seal Water flow issue. Per 5041-3G Low Flow CW Pump 1C Brg Seal Water ARP: • Directs Equipment Operator to flush CW Pump 1C TW supply strainer 1TW01MC. ○ Monitors CW pump bearing temperatures (computer points CW-BA027, CW-BA028, and CW-BA029) (may be performed by ATC). • Starts standby CW Pump (1A) (*may be performed after tripping 1C CW Pump*). • Trips 1C CW Pump (*may be performed before starting 1A CW Pump*). ○ Dispatches Equipment Operator to investigate RPS Inverter 'A' Trouble alarm (received when CW Pump 1A is started). ○ Directs an Equipment Operator to reset the trouble alarm on RPS Inverter 'A'. ○ Notifies chemistry of CW pump shift.
	SRO	• Acknowledges report from BOP. • Directs actions listed above. • Ensures operations are conducted within the bounds of Tech Specs and IAW Operations expectations, standards and approved procedures. ○ May enter CPS 4004.02, Loss of Vacuum. (Vacuum should not substantially change). ○ Contacts Maintenance to investigate. ○ Informs Shift Manager. ○ Conducts a brief.
Terminus: CW Pump 1C has been tripped, CW Pump 1A is started.		

NOTES:

Operator Actions

Event No.(s): 8		**Page** 1 **of** 2
Description: **RPV Instrument Line leak**		
Initiation: Following Event 7 and upon direction of the Lead Examiner, insert **REMOTE 5.**		
Cues: Multiple Annunciators		
Time	**Position**	**Applicant's Actions or Behavior**
Key Parameter Response: Rising temperature on 1TR-CM327 Secondary Containment Temperature Recorder Point 14 (Aux Bldg Gas Cont Boundary). Expected Annunciators: Multiple Annunciators Automatic Actions: None		
[CT-1]	ATC	• Monitors reactor to ensure operations remain within established bands. ○ Monitors control room panels, notifies the SRO of unusual/unexpected conditions. ○ Checks Power to Flow map. • Reports EOP-8 entry when 1TR-CM327 secondary containment area temperature recorder point 14 reaches 104ºF. • Makes plant announcement to evacuate affected areas of Secondary Containment. • Performs EOP-8 actions as directed by SRO • Attempts to locate and isolate the source of the leak. • **[CT-1] Initiates a manual reactor scram when directed by the SRO and before 1TR-CM326 point 12 or 1TR-CM327 point 14 reaches 140ºF.** • Carries out Scram Choreography by reporting the following: - Mode Switch in shutdown, power is… - Rod status is… - Reactor power is … and trend - Reactor pressure is … and trend - Reactor water level is … and trend - Any EOPs with entry conditions (no values required). • Performs EOP-1 actions as directed by the SRO. • Restores and holds RPV water level Level 3-Level 8 with Preferred Injection Systems. • Ensures Turbine Bypass Valves are controlling RPV pressure as directed by SRO. ○ Coordinates with BOP to monitor and control RPV level and pressure. ○ Identifies affected RPV level and pressure instruments.
	BOP	○ Monitors control room panels, notifies the SRO of unusual/unexpected conditions. ○ Monitors reactor to ensure operations remain within established bands. ○ Checks Power to Flow map. ○ Reports EOP-8 entry when 1TR-CM327 secondary containment area temperature recorder point 14 reaches 104ºF. ○ Makes plant announcement to evacuate affected areas of Secondary Containment. ○ Performs EOP-8 actions as directed by SRO • Attempts to locate and isolate the source of the leak. ○ Monitors secondary containment temperatures on 1H13-P678 recorders 1TR-CM326/327 (May be performed by Work Execution Center Supervisor). ○ Reports secondary containment temperature parameters with trends at SRO direction. ○ Reports to SRO when one area is above Max Safe temperature. ○ Performs scram choreography actions. • Announces: ▪ Reactor Scram ▪ Motor Driven Reactor Feed Pump may start ▪ Evacuate the RCIC room ▪ Evacuate the Containment ▪ Determines rod status and reports shutdown criteria met to SRO.

		○ Performs EOP-1 actions as directed by the SRO. ○ Restores and holds RPV water level Level 3-Level 8 with Preferred Injection Systems. ○ Ensures Turbine Bypass Valves are controlling RPV pressure as directed by SRO. ○ Coordinates with ATC to monitor and control RPV level and pressure. ○ Identifies affected RPV level and pressure instruments.

Operator Actions

Event No.(s): 8		**Page** 2 **of** 2
Description: **RPV Instrument Line leak**		
Time	**Position**	**Applicant's Actions or Behavior**
[CT-2] **[CT-2]**	ATC/BOP	○ **[CT-2]** If directed by SRO, Anticipates Blowdown per EOP-1 by fully opening all six Turbine Bypass Valves. • **[CT-2]** Initiates ADS (Blowdown) if/when directed by the SRO. • If initiated, verifies ADS actuation using the following indications: ○ SPDS ○ DCS Display 122 (2H) [Acoustic Monitor Input] ○ DCS Display 186 (7B) ['A' Solenoid Input] ○ 1H13-P601/P642 Solenoid Indicator Lights ○ 1H13-P866, Valve Flow Monitor Control Panel ○ 1H13-P614, ADS Safety Valve Temperature recorder 1B21-R614 ○ Indirect indication via changes in RPV pressure, RPV level, MSL flows & suppression pool temperatures.
[CT-1] **[CT-2]**	SRO	• Acknowledges reports from ATC/BOP. • Directs actions listed above. • Ensures operations are conducted within the bounds of Tech Specs and IAW Operations expectations, standards and approved procedures. • Enters and executes CPS 4001.01 Reactor Coolant Leakage. • Enters and executes EOP-8 Secondary Containment Control. • **[CT-1] Directs a reactor scram before 1TR-CM326 point 12 or 1TR-CM327 point 14 reaches 140ºF.** • Carries out Scram Choreography by performing an Update: - Update - Entering EOP-1 - Entering the Scram Off-Normal - End of Update • Enters and executes EOP-1 RPV Control. • Enters and concurrently executes CPS 4100.01 Reactor Scram. ○ Directs reducing RPV pressure to 500-600 psig to lower the driving head of the leak. • **[CT-2] Executes Blowdown within 15 minutes of 1TR-CM326 point 12 and 1TR-CM327 point 14 exceeding 140ºF**. (CT-3 can also be satisfied by anticipating blowdown per EOP-1.) ○ Time 1TR-CM326 point 12 and 1TR-CM327 point 14 exceeds 140ºF _____ ○ Time ADS initiated _____ ○ Time interval NOT longer than 15 minutes YES / NO
Terminus: When either a blowdown has been initiated and RPV level is being maintained between Level 3 and Level 8 or when Secondary Containment temperatures are lowering and all rods are inserted.		

NOTES:

Operator Actions

Event No.(s): 9		**Page** 1 **of** 1
Description: **Radiation Monitor fails to isolate VF / Startup VG**		
Initiation: Triggered by RPV Instrument Line leak (Remote 5) and following a 2 minute, 33 second time delay		
Cues: Annunciators 5050-7F, 5052-7F and AR/PR 1RIX-PR006B-D monitor alarms		
Time	**Position**	**Applicant's Actions or Behavior**
Key Parameter Response: 1RIX-PR006B-D Fuel Bldg Exhaust Rad Monitors Expected Annunciators: 5050-7F / 5052-7F High Rad Initiation SGTS Div 1 / 2 Automatic Actions**:** None		
	ATC	• Monitors reactor to ensure operations remain within established bands ○ Monitors control room panels, notifies the SRO of unusual/unexpected conditions. ○ Reports EOP-8 entry condition.

	BOP	• Monitors control room panels, notifies the SRO of unusual/unexpected conditions.
		○ Monitors reactor to ensure operations remain within established bands
		○ Reports EOP-8 entry condition.
		Performs actions directed by SRO, 5050-7F/5052-7F (High Rad Initiation SGTS Div 1 / 2) ARPs and CPS 3404.01 Fuel Building HVAC (VF):
		• Verifies alarming condition of 1RIX-PR006B-D Fuel Bldg Exhaust Rad Monitors.
		• Places VG in service per CPS 3404.01H001 Placing Standby Gas Treatment into Service:
		  • Stops Fuel Building Ventilation (VF) supply and exhaust fans.
		  • Isolates VF by closing 1VF04Y/9Y AND 1VF06Y/7Y.
		  • Performs startup of one Standby Gas (VG) train.

	SRO	• Acknowledges report from ATC/BOP. • Directs actions listed above. • Ensures operations are conducted within the bounds of Tech Specs and IAW Operations expectations, standards and approved procedures. ○ Informs Shift Manager.
Terminus: One VG train started and VF system shutdown and isolated.		

NOTES:

Simulator Operator Instructions

Initial Setup

1. Fill out plant status and have Turnover Sheet ready for the crew.
2. Verify daily lamp test completed.
3. Simulator key count: _____ keys.
4. Reset to **IC-232** (PW 74123) @ **7% Power**. If this is the first reset after swapping simulator loads, reset the IC twice.
5. Load the lesson plan for this scenario.
6. Verify the following commands are active:
   - YP_XMFTB_4901 (IRM F Drive Motor Failure)
7. Place simulator in RUN.
8. Verify RCIC Flow Controller is set at 620 gpm.
9. Verify the AR/PR server is running and stabilize AR/PR.
10. Verify Rod Drive pressure is in the expected range of 235-265 psid.
11. Provide pull sheets: **Step 14** is in progress - **Gang 7A** is at **Position 8**.
12. Make sure Sequence A is selected.
13. Make sure Individual Drive Mode is selected.
14. Make sure the FP bell toggle switch on the OG panel (is in the up position).
15. Make sure SBT data is saved, then clear PPDS history (TQ-CL-201-0117 Step 8.9).
16. Clear PPC history (TQ-CL-201-0117 Step 8.10).
17. Clear AR/PR Service Logs (TQ-CL-201-0117 Step 8.12).
18. Clear the memory on the Honeywell recorders (TQ-CL-201-0117 Step 8.13).
19. Clear the memory on the Yokogawa recorders (TQ-CL-201-0117 Step 8.14).
20. Clear the memory on the OG recorders (TQ-CL-201-0117 Step 8.15).
21. Close any open window(s) on the V-panel.
22. Load PPC PMS environment (on PPC screen #10):
    - Select “Viewer”
    - Select “Load Env…”
    - Select “MCR_Baseline.uall”
    - Select Open.
23. Procedures that are expected to be used during this scenario are:
    - CPS 3004.01 TURBINE STARTUP AND GENERATOR SYNCHRONIZATION
    - CPS 3105.02 MAIN EHC HYDRAULIC POWER UNIT (EH)
    - CPS 3302.01 REACTOR RECIRCULATION (RR)
    - CPS 3302.01H001 RR LOOP PUMP SHUTDOWN AND ISOLATION HARD CARD
    - CPS 3304.02 ROD CONTROL AND INFORMATION SYSTEM (RC&IS)
    - CPS 3315.03 RADIATION MONITORING (AR-PR)
    - CPS 3317.01 FUEL POOL COOLING AND CLEANUP (FC)
    - CPS 3404.01 FUEL BUILDING HVAC (VF)
    - CPS 3404.01H001 PLACING STANDBY GAS TREATMENT INTO SERVICE HARDCARD
    - CPS 4001.01 REACTOR COOLANT LEAKAGE
    - CPS 4005.01 LOSS OF FEEDWATER HEATING
    - CPS 4006.02 LOSS OF DECAY HEAT REMOVAL IN REACTOR VESSEL POOL/SPENT FUEL POOL
    - CPS 4008.01 ABNORMAL REACTOR COOLANT FLOW
    - CPS 4009.01 INADVERTENT OPENING SAFETY RELIEF VALVE

- CPS 4100.01 REACTOR SCRAM
- CPS 4100.02 CORE STABILITY CONTROL
- CPS 4401.01 EOP-1 RPV CONTROL
- CPS 4406.01 EOP-8 SECONDARY CONTAINMENT CONTROL
- CPS 5000.01 ALARM PANEL 5000 ANNUNCIATORS-ROW 1
- CPS 5000.02 ALARM PANEL 5000 ANNUNCIATORS-ROW 2
- CPS 5003.01 ALARM PANEL 5003 ANNUNCIATORS-ROW 1
- CPS 5006.03 ALARM PANEL 5006 ANNUNCIATORS-ROW 3
- CPS 5017.03 ALARM PANEL 5017 ANNUNCIATORS-ROW 3
- CPS 5040.01 ALARM PANEL 5040 ANNUNCIATORS-ROW 1
- CPS 5040.07 ALARM PANEL 5040 ANNUNCIATORS-ROW 7
- CPS 5050.07 ALARM PANEL 5050 ANNUNCIATORS-ROW 7
- CPS 5052.07 ALARM PANEL 5052 ANNUNCIATORS-ROW 7
- CPS 5066.05 ALARM PANEL 5066 ANNUNCIATORS-ROW 5
- CPS 5067.08 ALARM PANEL 5067 ANNUNCIATORS-ROW 8
- CPS 5140.63 AR PR ANNUNCIATOR – FUEL BUILDING EXHAUST 1RIX-PR006 A,B,C,D
- ITS 3.2 POWER DISTRIBUTION LIMITS (LCO 3.2.1, 3.2.2 and 3.2.3)
- ITS 3.3 INSTRUMENTATION (LCO 3.3.6.2)
- ITS 3.4 REACTOR COOLANT SYSTEM (LCO 3.4.1 and 3.4.4)

24. Hang OOS tags on: None
25. Identify T/S issues associated with OOS and turnover: None
26. Operating Equipment:
    - Ensure CW Pump ‘C’ is in operation.
27. Marked up copies:
    - CPS 3002.01 HEATUP AND PRESSURIZATION
    - CPS 3004.01 Turbine Startup And Generator Synchronization
28. Verify simulator conditions match the turnover.

Event Triggers and Role Play

Event #

10. **Cross tie 480V Buses 1L & 1M with 1L supplying**
    a. Event Trigger – None
    b. Role play – None

11. **Raise power with Rods to enter Mode 1 (Bring up OD-7 in booth)**
    a. Event Trigger – None
    b. Role play
        (1) If RE and/or Rod Verifier are requested – report to the MCR as the RE and/or Rod Verifier.
        (2) If Plant Manager and Ops Department Head approval to enter Mode 1 requested (CPS 3002.01 step 8.7.4.1) – notify CRS that approval to enter Mode 1 has been granted.
        (3) If NRC SRI notified of impending change to Mode 1 (CPS 3002.01 step 8.7.4.1.1) – acknowledge the notification.
        (4) Chemistry (if requested to verify chemistry requirements for Reactor Water and Condensate System for Mode 1 are within specifications) (CPS 3002.01 step 8.7.4.3) – report, "Chemistry requirements for Reactor Water and Condensate System for Mode 1 are within specifications".
        (5) Chemistry (when directed to perform CPS 3002.01 step 8.7.8 to perform reactor coolant and HVAC stack samples), acknowledge the report.

12. **Control Rod Reed Switch Stuck Open**
    a. Event Trigger – During Event 2 and following selection of control rod 24-25 (Sequence Step Number 14), insert **Remote 1.** and verify the following command(s):
        (1) **LS06_MALF.** (RC&IS FAILURE OF SINGLE OPEN REED SWITCH - CH 2).
        (2) Role play - None

13. **Stuck IRM F Detector (Bring up IRM/APRM Overlap Display in booth)**
    a. Event Trigger – During Event 2 and when the ATC attempts to withdraw IRM detectors (verify YP_XMFTB_4901 is deleted when the Drive In / Driving In pushbutton is depressed).
    b. Role play
        (1) Maintenance (if requested): respond "Dispatching personnel to investigate."

14. **NSPS Bus 1A Inverter Trip**
    a. Event Trigger - Following Event 4 and when directed by the Lead Examiner, insert **Remote 2** and verify the following command(s):
        (1) YP_XMFTB_4053
    b. Role play :
        (1) Equipment Operator (if asked to determine which NSPS Inverter is alarming):
            a) Acknowledge the order.
            b) Wait 1 minutes and report, "The DC Input breaker for Div 1 NSPS Inverter on DC MCC 1A Ckt 2A is tripped."
        (2) Maintenance (if requested): respond "Dispatching personnel to investigate."

15. **RCIC Suppression Pool Level Transmitter Failure - High**
    a. Event Trigger - Following Event 5 and when directed by the Lead Examiner, insert **Remote 3** and verify the following command(s):
        (1) **A05_A02_A0203_5_TVM Steady.** (5063-3E Suppression Pool Water Level High)
    b. Role play (If requested)
        (1) Maintenance (when directed to investigate failure of RCIC suction to transfer) – report "The IMD shop will not be able to complete repairs for ~ 2 days. We recommend shifting RCIC suction to the Suppression Pool".
        (2) IMD / WEC / Booth (when asked what E51-N636A and 636E are reading) – report "1E51-N636A is reading -8.50" and the trip 1 LED is lit. 1E51-N636E is reading normally with no trip LEDs lit."
        (3) EO (when directed to support RCIC suction shift) – report "I have been briefed and I'm standing by to manually close 1E51-F010 or 31 at your direction".

16. **Clogged CW Pump 1C TW Supply Strainer**
    a. Event Trigger - Following Event 6 and when directed by the Lead Examiner, insert **Remote 4** and verify the following command(s):
        (1) **A11_A02_03_7_TVM2**. (Annunciator 5041-3G, Low Flow CW Pump 1C Brg Seal Water)
    b. Role play
        (1) EO (when directed to):
            a) Check CW Pump 1C Seal Water Flow locally – report "CW Pump 1C Seal Water flow is 0 gpm locally."
            b) Check CW Pump 1A and/or 1B Seal Water Flow locally – report "Seal water flow is normal".
            c) Flush the CW Pump 1C TW Supply Strainer 1TW 01MC using 1TW605C Strainer Flush Valve – report "I have completed flushing 1TW01MC. CW Pump 1C Seal Water flow is still 0 gpm locally."
            d) Check operation of the Filtered Water Pumps – report "Filtered Water Pumps are operating normally."
            e) Stop CW Pump Discharge Header – SI Injection {Carrier Water] by performing CPS 3209.01 section 8.2.2 – acknowledge the order.
            f) Stop CW Pump Suction Bay – NaOCL Injection by performing CPS 3209.01 section 8.2.1 – acknowledge the order.
            g) Verify CW Pump 1C Discharge Valve limit switch position locally – report "1CW001C is closed."
            h) Verify CW Pump 1C shaft has stopped rotating – report "CW Pump 1C shaft is not rotating."
            i) Align [SI] and NaOCl Injection to CW Pump 1A – acknowledge the order.
            j) Check RPS Solenoid Inverter 'A' trouble – report "RPS 'A' has a "Out of Sync" lamp lit. RPS 'A' AC Output Frequency is 60 Hz and AC Voltage is 120 VAC.
            k) Reset RPS Solenoid Inverter 'A' trouble – acknowledge request, release "**Reset RPS Inverter A**", verify inserted **YP_XREMT_35 = RESET** (RP103-RST RPS SOL INV A TRB ALM) and report "RPS 'A' is reset".

17. **RPV Instrument Line leak**
    a. Event Trigger - Following Event 7 and when directed by the Lead Examiner, insert **Remote 5** and verify the following command(s):
        (1) **YP_XMFTB_5082.** (Reference leg leak in Gas Control Boundary)
    b. Role play:
        (1) Maintenance (after 2 minutes from scram announcement) – report to the MCR as IMD.
        (2) WEC (if asked to determine which FP XL-3 points in alarm) – report, "Multiple AB 737E and 762E points are in alarm.
        (3) WEC (if directed) – report to MCR to monitor/report secondary containment temperatures.

18. **Radiation Monitor fails to isolate VF / Startup VG**

a. Event Trigger – After **Remote 5** is actuated and following a 2 minute, 33 second time delay, verify the following command(s):

(1) **CAM1PR006(A/B/C/D)TV_VALUE1=20 mr – 24 mr.** (PR006A/B/C/D = 20 mr – 24 mr)

(2) **A11_A03_01_4_TVM Off.** (Annunciator 5042-1D HVAC Rad Monitor Trip Bypass Div 1)

(3) **A11_A03_02_3_TVM Off.** (Annunciator 5042-2C HVAC Rad Monitor Trip Bypass Div 2)

(4) **A18_A03_S10 Fuel Bldg.** (CNMT HVAC Isolation Valve Rad Interlock)

(5) **A18_A03_S11 Fuel Bldg.** (CNMT HVAC Isolation Valve Rad Interlock)

(6) **A12_A01_07_6_TVM2.** (Annunciator 5050-7F, Hi Rad Initiation SGTS Div 1)

(7) **A12_A02_07_6_TVM2.** (Annunciator 5052-7F, Hi Rad Initiation SGTS Div 2)

b. Role play

(1) EO (If directed to S/D VF locally):

a) Wait 3 minutes then release – ‘Shutdown VF locally’.

b) Report “VF is shutdown locally”.

CT Bases Information

4. **[CT-1]** ATC inserts a manual scram before area temperature reaches max safe in any one area.

   a) This critical task was derived from the EOP Technical Bases, and applies when secondary containment temperatures are approaching max safe values. A task is essential to safety if its improper performance or omission by an operator will result in direct adverse consequences or significant degradation in the mitigative capability of the plant. In this instance, the scram reduces the rate of energy production and thus the heat input, radioactivity release, and break flow into the secondary containment. An action that mitigates the event and precludes heat input, radioactivity release, and break flow into the secondary containment is therefore critical.

5. **[CT-2]** Enters and executes blowdown in EOP-1 within 15 minutes of 1TR-CM326 point 12 and 1TR-CM327 point 14 exceeding 140ºF. (CT-1 can also be satisfied by anticipating blowdown and opening bypass valves in EOP-1.)

   a) This critical task was derived from the EOP Technical Bases and applies when secondary containment temperatures exceed max safe values. The time limit of 15 minutes was agreed upon between the NRC Chief Examiner and the facility and is considered adequate for a competent operator to complete the task when blowdown parameters are exceeded. A task is essential to safety if its improper performance or omission by an operator will result in direct adverse consequences or significant degradation in the mitigative capability of the plant. In this instance, the blowdown is required because parameters above the maximum safe operating values in two separate areas is indicative of a wide-spread problem posing a direct and immediate threat to secondary containment, equipment in the secondary containment, and safe operation of the plant. An action that mitigates the event and precludes heat input, radioactivity release, and break flow into the secondary containment is therefore critical.

b) Turnover

11. The plant is in Mode 2, operating at ~ 7% power.
    a. CPS 3002.01 Heatup and Pressurization is complete up to and including step 8.7.2.
        1) Prerequisites to perform shell warming are in progress. An extra RO has been assigned to monitor parameters associated with this evolution.
    b. CPS 3004.01 Turbine Startup and Generator Synchronization is completed up to and including step 5.2.
    c. Control rods – Step 13 is complete. Step 14 / Gang 7A @ position 8.
    d. Transient annunciator response for feedwater heater level is authorized.

12. Status of Tagged Out Equipment

    - None

13. Today Day Shift

14. Weather Conditions

    - Calm and clear.

15. Thermal Limit Problems or concerns

    - Power ascension to 10% IAW CPS 3002.01 Heatup and Pressurization.
    - RE requests use of individual rod, single notch rod motion.
    - RE and Rod Verifier are available on request.

16. LCO's in effect

    - None

17. Surveillances in progress

    - None

18. Previous Shift Evolutions completed

    - None

19. Evolutions planned for the shift

    - First Priority – Cross-tie 480V Buses 1L & 1M with 1L supplying per CPS 3502.01 480 VAC Distribution.
    - Complete the remaining steps of CPS 3002.01 Heatup and Pressurization, including the following milestones:
        - Power ascension to 10%.
        - Transition to Mode 1.

20. Risk Levels

    - Green
    - Protected Equipment: None

Exelon Nuclear

ILT 20-1 NRC Exam

Scenario Number:
NRC Exam Scenario 3

Revision Number: 0

Date: 4/22/21

Developed By:	**Bill Kiser** **Instructor**	**4/22/21** **Date**
Validated By:	_____ **SME or Instructor**	_____ **Date**
Reviewed By:	_____ **Operations Representative**	_____ **Date**
Approved By:	_____ **Training Department**	_____ **Date**

Facility: Clinton Power Station Scenario No.: 3 Operating Test No.: 2022-301

Examiners: _____ Operators: _____
_____ _____
_____ _____

Initial Conditions:
- Mode 1 at ~90% power.
- Weather conditions are calm and clear.
- CCW Pump 'A' (1CC01PA) is OOS for maintenance. Not expected back this shift.
- HPCS Suction is aligned to the Suppression Pool.

Turnover:
- Priorities for the shift are as follows:
  - First Priority – Shift HPCS Suction to the RCIC Storage Tank IAW CPS 3309.01 High Pressure Core Spray (HPCS) section 8.1.7.2 Shifting HPCS Suction to RCIC Storage Tank and then perform CPS 9051.02 HPCS Valve Operability Test.
  - Maintain power at ~90% power throughout the shift.

Critical Tasks:
- **[CT-1]** Close inboard and/or outboard Main Steam Isolation Valves prior to RPV pressure reaching 380psig to prevent exceeding RPV cooldown rate.
- **[CT-2]** Manually inject with HPCS prior to Reactor Water Level reaching TAF.

Event No.	Malf. No.	Event Type*	Event Description
1	HP17FSREM04REMIN Pulled	N-BOP TS-SRO	(NEW) Swap HPCS Suction to RCIC Storage Tank, Perform HPCS Valve Operability Test, Suppression Pool Suction Valve (1E22-F015) fails closed
2	N/A	R-ATC	EPR for Grid Load Reduction
3	YFFWPPSS_13	C-BOP	(NEW) MC Pump 'B' coupling failure
4	S_K603A 4 OPEN SLOW	C-ATC	'A' RR Flow Control Valve (FCV) drifts Open
5	A01_A08_A01_1	I-ATC	Hotwell Overflow Controller Failure
6	ed_ek20=true	C-BOP TS-SRO	Trip of ERAT SVC
7	YP_XMFTB_4063 YPXMALSE_588 100% RAT_B_Differential A02_A05_02_11_TVM	M-All	Generator Trip / Turbine Trip / Bypass Valve 1 sticks open / RAT Failure after MSIVs closed / LOCA
8	YPXMALSE_510 0.1% YP_XMFTB_4101 YFRIPPSS hp10con45fsp=True	C-BOP	RCIC failure / HPCS Pump fails to auto start / HPCS Injection Valve fails to auto open

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

NEW – Not used on the previous two (2) NRC exams.

Scenario No.: 3 Operating Test No.: 2022-301

Narrative Summary

Event # **Description**

19. **Swap HPCS Suction to RCIC Storage Tank, Perform HPCS Valve Operability Test, Suppression Pool Suction Valve (1E22-F015) fails closed**
    The scenario begins with the HPCS Pump suction aligned to the Suppression Pool IAW CPS 3309.01 High Pressure Core Spray (HPCS). The BOP operator will be directed to swap HPCS Suction back to the RCIC Storage Tank IAW CPS 3309.01 High Pressure Core Spray (HPCS) section 8.1.7.2 Shifting HPCS Suction to RCIC Storage Tank. When this task has been completed, the BOP operator will be directed to perform CPS 9051.02 HPCS Valve Operability Test. During performance of CPS 9051.02, when the control switch for 1E22-F015 HPCS Suppr Pool Suction Valve is positioned to open, annunciator 5062-8E HPCS OUT OF SERVICE comes in due to trip of the circuit breaker for 1E22-F015 HPCS Suppr Pool Suction Valve. CPS 3309.01 High Pressure Core Spray (HPCS) NOTE for section 8.1.7 states in part," Per ITS LCO 3.5.1/2, HPCS must be capable of taking a suction from the Suppression Pool." The SRO will declare HPCS INOPERABLE and enter T.S. 3.5.1 Required Actions B.1 Verify by administrative means RCIC System is OPERABLE when RCIC is required to be OPERABLE, and B.2 Restore HPCS System to OPERABLE status within 14 days. The SRO will also declare 1E22-F015 INOPERABLE and enter T.S. 3.6.1.3 Primary Containment Isolation Valves (PCIVs) Required Action A.1 Isolate the affected penetration flow path (4 hours) and A.2 Verify the affected penetration flow path is isolated (once per 31 days).
20. **EPR for Grid Load Reduction**
    The Transmission System Operator (TSO) will call the MCR and direct CPS to lower Generator output by 80 MWe to mitigate degraded grid conditions. IAW OP-CL-108-107-1002 Degraded Grid Actions, the SRO will direct performance of an Emergency Power Reduction. The ATC will lower power by 80 MWe within 15 minutes of the TSO request.
21. **MC Pump 'B' coupling failure**
    Annunciator LOW PRESS MAKE-UP COND XFER PUMPS DISCH HDR (5014-2C) comes in due to the Make-Up Condensate Transfer Pump 1B (0MC01PB) shaft shear. The BOP Operator will dispatch an Equipment operator to investigate. Upon the report of a shaft shear, the BOP operator will stop the failed pump and start the standby pump per CPS 3208.01 Cycled/Makeup Condensate Section 8.1.1.
22. **'A' RR Flow Control Valve (FCV) drifts Open**
    The 'A' RR Flow Control Valve slowly drifts open causing reactor power to rise and requires the ATC to perform an emergency shutdown of the 'A' RR Hydraulic Power Unit to stop further RR FCV movement. The crew will enter and execute CPS 4008.01 Abnormal Reactor Coolant Flow. The crew will evaluate core thermal limits by demanding a 3D Monicore Case to ensure core thermal limits are within TS limits. The crew will also evaluate RR loop flow mismatch to ensure operation within ITS 3.4.1 Recirculation Loops Operating limits.
23. **Hotwell overflow controller failure**
    Annunciator 5014-4B Not Fully Closed Cdsr Emerg O/Flow Vlv 1CD020 is received and lowering hotwell level will be observed. The ATC will diagnose the failure of the Hotwell Overflow to CY Cond Storage Tank 1LC-CD057A controller and will take manual control per CPS 3104.01 Condensate / Condensate Booster (CD/CB) section 8.6.2 Abnormal Condenser Hotwell Level LOW Level.
24. **Trip of ERAT SVC**
    Annunciator 5011-8E ERAT SVC TRIP comes in due to a trip of the ERAT Static VAR Compensator for unknown reasons. The ARP will direct the BOP/ATC to dispatch an Equipment Operator to investigate, the BOP to place the ERAT SVC control switch to OFF and to transfer the 1A1 bus to the RAT. The SRO will enter CPS 4200.01 Loss Of AC Power, ensure/make necessary notifications to the Power Team and TSO (Ameren) and will declare the 138KV Offsite Source inoperable and take actions for TS 3.8.1.
25. **Generator Trip / Turbine Trip / Bypass Valve 1 sticks open / RAT Failure after MSIVs closed**
    The Main Generator will trip resulting in a Turbine trip and reactor scram. The Steam Bypass Valves will initially open as expected following the Main Turbine trip, but #1 Bypass Valve will remain open causing RPV pressure to decrease. The crew will diagnose the failure of the Bypass Valves to control Reactor pressure and will shut the MSIVs to prevent exceeding the 100°F/hr cooldown rate limitation and to prevent flooding the MSLs with feedwater. Shutting the MSIVs will eliminate the RFPTs as a high pressure injection source. A RAT trip will occur due to a fault when the MSIVs are closed (not related), resulting in a loss of BOP power and eliminating the FW/CD/CB system as a feed source. Finally, an unisolable RCS leak occurs in the DW, causing DW pressure to exceed 1.68 psig.
26. **RCIC failure / HPCS Pump fails to auto start / HPCS Injection Valve fails to auto open**
    The RCIC pump shaft will fail if automatically or manually initiated. The HPCS Pump will fail to automatically start and 1E22F004 HPCS Injection Valve will fail to automatically open, requiring the MCR to manually start the HPCS Pump and open the injection valve for inventory control and to avoid the necessity for performing a blowdown when RPV level reaches TAF.

Operator Actions

Event No.(s): 1		**Page** 1 **of** 2
Description:	**Swap HPCS Suction to RCIC Storage Tank, Perform HPCS Valve Operability Test, Suppression Pool Suction Valve (1E22-F015) fails closed**	
Initiation: Following shift turnover		
Cues: Directed by SRO		
Time	**Position**	**Applicant's Actions or Behavior**
General Note on Requirements for "Expected Annunciator Response" – OP-AA-103-102 If this evolution was pre-briefed and "Expected Alarms" were reviewed, the following expectations apply: • "Expected alarms" may be flagged • When the annunciator comes in the operator will announce "Expected Alarm" • The annunciator response procedure (ARP) need not be entered since it has already been reviewed in the pre-brief. If a pre-brief was not conducted the operator should perform the following: • When an annunciator comes in the ARP should be referred to. • The annunciator may then be identified as an "Expected Alarm", flagged, and from that point on the ARP need not be referred to.		
Key Parameter Response: 1E22-F015 indicating lights, HPCS Power Loss amber light Expected Annunciators: 5062-8E HPCS Out of Service Automatic Actions: None		
	ATC	• Monitors reactor to ensure operations remain within established bands o Monitors control room panels, notifies the SRO of any unusual or unexpected conditions. o Directs an Equipment Operator to investigate failure of 1E22-F015.
	BOP	• Monitors control room panels, notifies the SRO of unusual/unexpected conditions. o Monitors reactor to ensure operations remain within established bands. CPS 3309.01 High Pressure Core Spray (HPCS) section 8.1.7.2 Shifting HPCS Suction to RCIC Storage Tank o Places HPCS MOV TEST PREP switch in TEST. o Verifies HPCS MOVS IN TEST status light energizes. • Shuts 1E22-F015 HPCS Suppr Pool Suction Valve. • Opens 1E22-F001, HPCS Storage Tank Suction Valve. o Restore HPCS MOV TEST PREP switch to NORM. o Verifies HPCS MOVS IN TEST status light deenergizes. o Documents MOV Test Prep Switch manipulation in the Short Duration Time Clock Log. CPS 9051.02, HPCS Valve Operability Test • Places HPCS Out Of Service switch in INOP. • Verifies HPCS OUT OF SERVICE status light energizes. • Verifies HPCS OUT OF SERVICE annunciator (5062-8E) actuates. • Places HPCS MOV TEST PREP switch in TEST. • Verifies HPCS MOVS IN TEST status light energizes. • Places the control switch for 1E22-F015 HPCS Suppression Pool Suction Valve to open. • Recognizes that 1E22-F015 position indicating lights extinguish when the valve control switch was taken to open. • Reports issue to the SRO. o Restores HPCS MOV TEST PREP switch to NORM. o Verifies HPCS MOVS IN TEST status light deenergizes. o Documents MOV Test Prep Switch manipulation in the Short Duration Time Clock Log. o Directs an Equipment Operator to investigate failure and verify 1E22-F015 position.

Event No.(s): 1		Page 2 of 2
Description:	**Swap HPCS Suction to RCIC Storage Tank, Perform HPCS Valve Operability Test, Suppression Pool Suction Valve (1E22-F015) fails closed**	
Time	**Position**	**Applicant's Actions or Behavior**

	SRO	• Acknowledges reports from ATC/BOP.
		• Directs actions listed above.
		• Ensures operations are conducted within the bounds of Tech Specs and IAW Operations standards and approved procedures.
		• Evaluates and enters ORM 2.5.2 Motor Operated Valves Thermal Overload Protection, if HPCS Test Prep switch is placed in TEST. Exits ORM 2.5.2 Motor Operated Valves Thermal Overload Protection, when HPCS Test Prep switch is placed back in NORMAL.
		• Declares HPCS INOPERABLE and enters ITS 3.5.1 RA B.1 (Verify by administrative means RCIC is OPERABLE when RCIC is required to be OPERABLE within 1 hour) and B.2 (Restore HPCS System to OPERABLE status within 14 days) at the following two times:
		  • When shifting HPCS Suction to the RCIC Storage Tank until 1E22-F001 HPCS Storage Tank Suction Valve is open (CPS 3309.01 step 8.1.7.2.2).
		  • When 1E22-F015 HPCS Suppr Pool Suction Valve fails to open per CPS 9051.02 step 8.1.2.
		• Declares 1E22-F015 INOPERABLE and enters ITS 3.6.1.3 Action A.1 (4 hours) and A.2 (once per 31 days).
		o Directs BOP to verify closed 1E22-F015 HPCS Suppr Pool Suction Valve.
		o Informs the Shift Manager.
		o Conducts a brief.
		o Contacts Maintenance to investigate.

Terminus: HPCS Suction aligned to the RCIC Storage Tank. ITS 3.5.1 and 3.6.1.3 evaluated. ORM 2.5.2 evaluated.		

NOTES:

• Solid bullets are required actions
o Hollow bullets are actions that may or may not be performed

Operator Actions

Event No.(s): 2		**Page** 1 **of** 1
Description: **EPR for Grid Load Reduction**		
Initiation: Following Event 1 and upon direction of the Lead Examiner		
Cues: Contact MCR as Transmission System Operator and direct CPS to lower Generator output by 80 Mwe.		
Time	**Position**	**Applicant's Actions or Behavior**
Key Parameter Response: Reactor Power, Generator MWe, RR Flow Expected Annunciators: None Automatic Actions: None		
	ATC	• Monitors reactor to ensure operations remain within established bands. ○ Monitors control room panels, notifies the SRO of unusual/unexpected conditions. CPS 3005.01 Unit Power Changes, Section 8.2: ○ Makes an announcement that the plant is performing a power reduction at the request of the Transmission System Operator. • Lowers Reactor Power ~ 80 MWe by reducing Reactor Recirc flow, CRAM rods or reverse rod sequence. ○ Monitors Generator output. ○ Reports when Generator output has been lowered by ~ 80 MWe.
	BOP	• Monitors control room panels, notifies the SRO of unusual/unexpected conditions. ○ Makes an announcement that the plant is performing a power reduction at the request of the Transmission System Operator. ○ Monitors Generator output. ○ Reports when Generator output has been lowered by ~ 80 MWe.
	SRO	• Acknowledges reports from ATC/BOP. • Directs actions listed above. • Ensures operations are conducted within the bounds of Tech Specs and IAW Operations expectations, standards and approved procedures. • Supervises the power reduction. ○ Reports to TSO when power reduction is complete. ○ Notifies RE, SM, MISO, Power Team, and RP of the power reduction.
Terminus: Clearly observable plant response from change in power level.		

NOTES:

Operator Actions

Event No.(s): 3		**Page** 1 **of** 1
Description: **MC Pump 'B' coupling failure**		
Initiation: Following Event 2 and upon direction of the Lead Examiner, insert **REMOTE 1**		
Cues: Annunciator 5014-2C Low Pressure Make-Up Cond Xfer Pumps Disch Hdr		
Time	**Position**	**Applicant's Actions or Behavior**
Key Parameter Response: MU Cond Xfer Pmp Disch Pressure Expected Annunciators: 5014-2C Low Pressure Make-Up Cond Xfer Pumps Disch Hdr Automatic Actions**:** None		
	ATC	• Monitors reactor to ensure operations remain within established bands. ○ Monitors control room panels, notifies the SRO of unusual/unexpected conditions. ○ Dispatches Equipment Operator to investigate.
	BOP	• Reports issue to SRO. • Monitors control room panels, notifies the SRO of unusual/unexpected conditions. ○ Monitors reactor to ensure operations remain within established bands. ○ Dispatches Equipment Operator to investigate. ○ Reviews ARP 5014-2C. • Refers to procedure CPS 3208.01 Cycled / Makeup Condensate (CY/MC). Per CPS 3208.01, Step 8.1.1: • Directs Equipment Operator to shut discharge valve 0MC006A. • Starts MC Pump 'A'. • Directs Equipment Operator to open discharge valve 0MC006A. ○ Secures MC Pump 'B' (may place pump CS in PTL)
	SRO	• Acknowledges reports from ATC/BOP. • Directs actions listed above. • Ensures operations are conducted within the bounds of Tech Specs and IAW Operations expectations, standards and approved procedures. ○ Informs Shift Manager. ○ Conducts a brief. ○ Contacts Maintenance to investigate.
Terminus: MC Pump 'A' started.		

NOTES:

Operator Actions

Event No.(s): 4		**Page** 1 **of** 1
Description:	**'A' RR Flow Control Valve (FCV) drifts Open**	
Initiation: Following Event 3 and upon direction of the Lead Examiner, insert **REMOTE 2**		
Cues: Rising Reactor Power		
Time	**Position**	**Applicant's Actions or Behavior**
Key Parameter Response: Rising Reactor Power, RR 'A' FCV position Expected Annunciators: None Automatic Actions**:** None		
	ATC	• Monitors reactor to ensure operations remain within established bands. ○ Monitors control room panels, notifies the SRO of unusual/unexpected conditions. ○ Notifies the SRO that Reactor Power is rising. ○ Notifies the SRO that the 'A' RR FCV is drifting open. • Arms and depresses the HPU 'A' Shutdown Switch. • Verifies the 'A' RR FCV stops opening. ○ Reports RR Loop Flow mismatch. ○ Verifies operation within CPS 3005.01 Unit Power Changes Figure 1, CPS Stability Control & Power/Flow Operating Map limits. ○ Dispatches an Equipment Operator to investigate for abnormalities at the 'A' RR HPU. ○ Monitors RR Pump 'A' Seal Parameters.
	BOP	• Monitors control room panels, notifies the SRO of unusual/unexpected conditions. ○ Monitors reactor to ensure operations remain within established bands. ○ Notifies the SRO that the 'A' RR FCV is drifting open. ○ Verifies operation within CPS 3005.01 Unit Power Changes Figure 1, CPS Stability Control & Power/Flow Operating Map limits. ○ Contacts the Reactor Engineer. ○ Dispatches an Equipment Operator to investigate for abnormalities at the 'A' RR HPU. ○ Demands a 3D Monicore Case.
	SRO	• Acknowledges reports from ATC/BOP. • Directs actions listed above. • Ensures operations are conducted within the bounds of Tech Specs and IAW Operations standards and approved procedures. • Enters and executes CPS 4008.01 Abnormal Reactor Coolant Flow. • Evaluates ITS 3.4.1 Recirculation Loops Operating and enters ITS 3.4.1 A.1 if loop flow mismatch exceeds 5% of rated core flow (4.225×10^6 lbm/hr) when operating at ≥ 70% rated core flow. ○ Informs RE, SM, and TSO ○ Contacts Maintenance to investigate. ○ Conducts a brief.
Terminus: RR 'A' FCV motion stopped, CPS 4008.01 Abnormal Reactor Coolant Flow entered.		

NOTES:

Operator Actions

Event No.(s): 5		**Page** 1 **of** 1
Description: **Hotwell Overflow Controller Failure**		
Initiation: Following Event 4 and upon direction of the Lead Examiner, insert **REMOTE 3**		
Cues: Lowering hotwell level and Annunciators 5014-4B Not Fully Closed Condenser Emergency Overflow Valve 1CD020		
Time	**Position**	**Applicant's Actions or Behavior**
Key Parameter Response: None Expected Annunciators: 5014-4B Not Fully Closed Condenser Emergency Overflow Valve 1CD020 Automatic Actions**:** None		

	ATC	• Monitors reactor to ensure operations remain within established bands
		o Monitors control room panels, notifies the SRO of unusual/unexpected conditions.
		o Reports issue to SRO.
		o Diagnoses failure of the 1LC-CD057A controller automatic function.
		Per CPS 3104.01, Condensate/Condensate Booster, Sections 8.6.2/8.3.2:
		• Manually controls Hotwell level between 36 and 55 inches as follows:
		  • Places Condenser Overflow Controller 1LC-CD057A in MANUAL
		  • Controls Hotwell level between 36 and 55 inches.

	BOP	• Monitors control room panels, notifies the SRO of unusual/unexpected conditions. o Monitors reactor to ensure operations remain within established bands. • Communicates annunciator 5014-4B in alarm. o References ARPs, and ensures that the ATC Operator is taking actions per CPS 3104.01, Condensate/Condensate Booster (CD/CB).
	SRO	• Acknowledges reports from ATC/BOP. • Directs actions listed above. • Ensures operations are conducted within the bounds of Tech Specs and IAW Operations expectations, standards and approved procedures. o Informs Shift Manager. o Conducts a brief. o Contacts Maintenance to investigate 1LC-CD057A controller failure.
Terminus: 1LC-CD057A in manual; hotwell level restored to normal band (36-55 inches).		

NOTES:

Operator Actions

Event No.(s): 6		**Page** 1 **of** 2
Description: **Trip of ERAT SVC**		
Initiation: Following Event 5 and upon direction of the Lead Examiner, insert **REMOTE 4**		
Cues: Annunciator 5011-8E ERAT SVC Trip		
Time	**Position**	**Applicant's Actions or Behavior**
Key Parameter Response: ERAT SVC Output VARS will go to 0 Expected Annunciators: 5011-8E ERAT SVC Trip Automatic Actions**:** ERAT SVC Breakers 0AP103E and 0AP104E will trip.		
	ATC	• Monitors reactor to ensure operations remain within established bands. o Monitors control room panels, notifies the SRO of unusual/unexpected conditions. o Dispatches an Equipment Operator to the ERAT SVC Building to investigate. o Recognizes that the ERAT SVC has tripped and reports condition to the SRO.

	BOP	• Monitors control room panels, notifies the SRO of unusual/unexpected conditions.
		o Monitors reactor to ensure operations remain within established bands.
		o Dispatches an Equipment Operator to the ERAT SVC Building to investigate.
		o Recognizes that the ERAT SVC has tripped and reports condition to the SRO.
		
		Per CPS 5011-8E ERAT SVC Trip ARP:
		• Places the ERAT SVC control switch to OFF, and then releases.
		• Verifies ERAT SVC Bkr 0AP103E and 0AP104E is open (green light on, red light off).
		• Transfers 4160V Bus 1A1 to RAT 'B' IAW CPS 3501.01 High Voltage Auxiliary Power System when directed by the SRO.
		
		Per CPS 3501.01 High Voltage Auxiliary Power System section 8.1.8 Transferring a 6900V or 4160V Bus TO or FROM its Reserve {Main} Source (this may also be accomplished following actions of CPS 3501.01H002 Loss of ERAT SVC Actions Hard Card):
		
		• At 1H13-P877-5060, places the 4160V Bus 1A1 Bus Mn Bkr Sync keylock switch to the ON position.
		• Verifies 4160V Bus 1A1 voltage 4084 – 4300 VAC.
		• Verifies 4160V Bus 1A1 synchroscope is steady at ~ the 12 o'clock position.
		• Closes the Mn Bkr, and prior to releasing the switch to the AUTO position, verifies:
		  • Closed indication on the Main breaker, and
		  • A load shift is indicated on the bus load meters.
		• Places the Reserve Feed Breaker in OPEN, and resets annunciator 5060-1B Auto Trip Breaker.
		• At 1H13-P877-5060, places the 4160V Bus 1A1 Bus Mn Bkr Sync keylock switch to the OFF position.
		
		o Performs CPS 9082.01 Offsite Source Power Verification within 1 hour of entering ITS 3.8.1 Condition A.

Event No.(s): 6		Page 2 of 2
Description: **Trip of ERAT SVC**		
Time	**Position**	**Applicant's Actions or Behavior**
	SRO	• Acknowledges reports from ATC/BOP. • Directs actions listed above. • Ensures operations are conducted within the bounds of Tech Specs and IAW Operations expectations, standards and approved procedures. • Enters and executes CPS 4200.01 Loss of AC Power. ○ Notifies CMO Group to perform thermography on Circuit Switcher 4538. ○ Notifies TSO & Power Team of the loss of the ERAT SVC. • Enters ITS 3.8.1 AC Sources – Operating Required Actions A.1 and A.2. ○ Informs the Shift Manager. ○ Conducts a brief. ○ Contacts Maintenance to investigate.
Terminus: 4060V Bus 1A1 transferred to RAT 'B' and Technical Specification review complete.		

NOTES:

Operator Actions

Event No.(s): 7, 8		**Page** 1 **of** 3
Description:	**Generator trip / Turbine trip / Bypass Valve 1 sticks open / RAT failure after MSIVs closed / LOCA / HPCS Pump fails to auto start / RCIC failure / HPCS Injection Valve fails to auto open**	
Initiation: Following Event 6 and upon direction of the Lead Examiner, insert **REMOTE 5**		
Cues: Generator Trip and Scram alarms		
Time	**Position**	**Applicant's Actions or Behavior**
Key Parameter Response: Turbine / Generator trip. Turbine Bypass Valve (TBV) #1 sticks open. RAT 'A' trips on differential overcurrent resulting in a loss of non-class 1E 6.9 / 4.16KV Bus power. DW Pressure exceeds 1.68 psig. Expected Annunciators: Multiple Automatic Actions: Reactor Scram. 4160V Bus 1A1, 1B1, and 1C1 will automatically transfer to the ERAT. Auto start of all divisional ESF Systems (ECCS, DGs, VG, SX). CRVICS Group 2, 7, 8, 10, 11, 12, 15, 16, 17, 19, and 20 isolation.		

	ATC	• Monitors reactor to ensure operations remain within established bands.
		○ Monitors control room panels, notifies the SRO of unusual/unexpected conditions.
		○ Reports issues to SRO.
		• Places reactor mode switch in Shutdown when the reactor automatically scrams.
		• Carries out Scram Choreography by reporting the following:
		  • Mode Switch in Shutdown, Power is…
		  • Rod status is…
		  • Reactor Power is… and trend
		  • Reactor pressure is… and trend
		  • Reactor level is… and trend
		  • Any EOPs with entry conditions
		Per CPS 4100.01, Reactor Scram
		• Turns Mode Switch to SHUTDOWN
		  1) Verifies reactor power is lowering
		  2) Verifies SHUTDOWN CRITERIA met
		• IF RPV level is rising with 2 feed pumps operating, THEN Secures/verifies secured 1 feed pump and controls RPV water level Level 3 to Level 8.
		• Verifies Turbine and Generator trip when required
		• Performs EOP actions as directed by SRO.
		○ Reports EOP entry conditions.
		• Coordinates with BOP to monitor and control RPV level and pressure.
		○ Diagnoses RPV depressurization (BPV #1 fails to close).
		○ Directs EO to secure the Steam Bypass EHC skid.
		[CT-1] ○ **[CT-1] Shuts inboard and/or outboard Main Steam Isolation Valves prior to RPV Pressure reaching 380#.**
		○ Diagnoses the MDRFP trip and loss of CD/CB when the RAT trips.
		○ Attempts to inject with RCIC if directed by the SRO.
		○ Diagnoses the reactor coolant leakage into the DW.
		[CT-2] ○ **[CT-2] Manually starts the HPCS pump and opens 1E22-F004 when the pump fails to automatically start and before RPV water level reaches -160" WR (TAF).**	

Event No.(s):	7, 8	Page 2 of 3
Description:	**Generator trip / Turbine trip / Bypass Valve 1 sticks open / RAT failure after MSIVs closed / LOCA / HPCS Pump fails to auto start / RCIC failure / HPCS Injection Valve fails to auto open**	

Time	Position	Applicant's Actions or Behavior
	BOP	• Monitors control room panels, notifies the SRO of unusual/unexpected conditions. o Monitors reactor to ensure operations remain within established bands. o Reports issues to SRO. • Carries out Scram Choreography by: • Making an Announcement • Reactor Scram • MDRFP may start • Evacuate the RCIC room • Evacuate the Containment • Determines Rod status and reports to the CRS o Verifies needed auto actions (isolations, ECCS systems start, Div 1, 2, and 3 DGs start). o Reports EOP entry conditions. • Performs EOP actions as directed by SRO. o Diagnoses RPV depressurization (BPV #1 fails to close). o Directs EO to secure the Steam Bypass EHC skid.
[CT-1]		o **[CT-1] Shuts inboard and/or outboard Main Steam Isolation Valves prior to RPV Pressure reaching 380#.** o Diagnoses the MDRFP trip and loss of CD/CB when the RAT trips. o Initiates Recirc Pump Auxiliary Seal Injection Pump Operation per CPS 3304.01 Control Rod Hydraulic & Control (RD). o Shuts 1B21-F065A & B RPV Inlet Valves (Feedwater Header Isolation Valves). o Attempts to inject with RCIC if directed by the SRO. o Diagnoses the LOCA into the DW.
[CT-2]		o **[CT-2] Manually starts the HPCS pump and opens 1E22-F004 when the pump fails to automatically start and before RPV water level reaches -160" WR (TAF).**

Event No.(s):	7, 8	Page 3 of 3
Description:	**Generator trip / Turbine trip / Bypass Valve 1 sticks open / RAT failure after MSIVs closed / LOCA / HPCS Pump fails to auto start / RCIC failure / HPCS Injection Valve fails to auto open**	

Time	Position	Applicant's Actions or Behavior

	SRO	• Acknowledges reports from ATC/BOP.
		• Directs actions listed above.
		• Ensures operations are conducted IAW Operations expectations, standards and approved procedures.
		
		Enters and executes CPS 4100.01 Reactor Scram
		• Carries out Scram Choreography by performing an Update:
		  • Entering EOP-1.
		  • Entering Scram Off-Normal.
		  • End of Update.
		
		Enters and executes EOP-1 RPV Control
		• Directs entry into EOP-1 RPV Control and verifies performance of the following actions:
		  • Mode Switch to SHUTDOWN
		  • Shutdown criteria verified
		  • Establishes a RPV water level band between Level 3 and Level 8.
		  • Directs ATC / BOP to verify needed automatic actions (isolations, ECCS start, DG start)
		
		• Directs securing the Steam Bypass EHC system.
		[CT-1] • **[CT-1] Directs closing inboard and/or outboard Main Steam Isolation Valves prior to RPV Pressure reaching 380#.**
		• Directs entry into CPS 4200.01 Loss of AC Power (RAT failure).
		o Directs injection with RCIC to maintain RPV water level band.
		o Directs minimizing cooldown loads IAW 4100.01 Appendix B.
		• Directs entry into CPS 4001.01 Reactor Coolant Leakage (LOCA).
		• Directs (re)entry into EOP-1 RPV Control / entry into EOP-6 Primary Containment Control.
		[CT-2] • **[CT-2] Directs or verifies manually starting the HPCS pump/opening 1E22-F004 when the pump fails to automatically start and before RPV water level reaches -160" WR (TAF).**
		
		o Informs Shift Manager.
		o Contacts Maintenance to investigate.
		o Conducts a brief.

Terminus: The scenario can be terminated when the MSIVs have been closed to terminate the cooldown and HPCS is maintaining RPV level above TAF.

NOTES:

Simulator Operator Instructions

Initial Setup

31. Fill out plant status and have Turnover Sheet ready for the crew.
32. Verify daily lamp test completed.
33. Simulator key count: _____ keys.
34. Reset to **IC-234 (PW 74123)** @ 90**%** Power. If this is the first reset after swapping simulator loads, reset the IC twice.
35. Load the lesson plan for this scenario.
36. Verify the following commands are active:
    - **YP_XREMT_739.** (Defeat Group 1 Interlocks)
    - **YP_XMFTB_4101.** (HPCS Fail To Auto Start)
    - **YFRIPPSS.** (RCIC Pump Sheared Shaft)
    - **hp10con45fsp = true.** (E22F004 Auto-Open Failure)
37. Place simulator in RUN.
38. Verify RCIC Flow Controller is set at 620 gpm.
39. Verify the AR/PR server is running and stabilize AR/PR.
40. Verify Rod Drive pressure is in the expected range of 235-265 psid.
41. Provide pull sheets: **Step 29** is current - **Gang 9A** is at **Position 14**.
42. Make sure Sequence A is selected.
43. Make sure Individual Drive Mode is selected on the OCM.
44. Make sure the FP bell toggle switch on the OG panel (is in the up position).
45. Generate a 3D Case.
46. Make sure SBT data is saved, then clear PPDS history (TQ-CL-201-0117 Step 8.9).
47. Clear PPC history (TQ-CL-201-0117 Step 8.10).
48. Clear AR/PR Service Logs (TQ-CL-201-0117 Step 8.12).
49. Clear the memory on the Honeywell recorders (TQ-CL-201-0117 Step 8.13).
50. Clear the memory on the Yokogawa recorders (TQ-CL-201-0117 Step 8.14).
51. Clear the memory on the OG recorders (TQ-CL-201-0117 Step 8.15).
52. Close any open window(s) on the V-panel.
53. Load PPC PMS environment (on PPC screen #10):
    - Select “Viewer”
    - Select “Load Env…”
    - Select “MCR_Baseline.uall”
    - Select Open.
54. Procedures that are expected to be used during this scenario are:

- CPS 3005.01 UNIT POWER CHANGES
- CPS 3104.01 CONDENSATE / CONDENSATE BOOST (CD/CB)
- CPS 3208.01 CYCLED / MAKEUP CONDENSATE (CY/MC)
- CPS 3309.01 HIGH PRESSURE CORE SPRAY (HPCS)
- CPS 3501.01 HIGH VOLTAGE AUXILIARY POWER SYSTEM
- CPS 3317.01 FUEL POOL COOLING AND CLEANUP (FC)
- CPS 3319.01 STANDBY GAS TREATMENT (VG)
- CPS 4008.01 ABNORMAL REACTOR COOLANT FLOW
- CPS 4100.01 REACTOR SCRAM
- CPS 4200.01 LOSS OF AC POWER
- CPS 4401.01 EOP-1 RPV CONTROL
- CPS 4402.01 EOP-6 PRIMARY CONTAINMENT CONTROL
- CPS 5011.08 ALARM PANEL 5011 ANNUNCIATORS - ROW 8

- CPS 5014.02 ALARM PANEL 5014 ANNUNCIATORS - ROW 2
- CPS 5014.04 ALARM PANEL 5014 ANNUNCIATORS - ROW 4
- CPS 5062.08 ALARM PANEL 5062 ANNUNCIATORS - ROW 8
- CPS 9082.01 OFFSITE SOURCE POWER VERIFICATION (3 Copies with Booth Communicator)
- ITS 3.5 ECCS AND RCIC SYSTEM (LCO 3.5.1)
- ITS 3.6 CONTAINMENT SYSTEMS (LCO 3.6.1.3)
- ITS 3.8 ELECTRICAL POWER SYSTEMS (LCO 3.8.1)
- ORM 2.5 ELECTRICAL POWER SYSTEMS (ORM 2.5.2)

55. Hang OOS tags on: CCW Pump ‘A’ (1CC01PA)
56. Identify T/S issues associated with OOS and turnover: None
57. Operating Equipment:
    - Ensure MC Pump ‘B’ is operating.
    - HPCS suction aligned to SP.
58. Marked up copies:
    - CPS 9051.02 HPCS VALVE OPERABILITY TEST
    - CPS 9051.02D001 HPCS VALVE OPERABILITY Data Sheet
59. Verify simulator conditions match the turnover.

Event Triggers and Role Play

Event #

19. **Swap HPCS Suction to RCIC Storage Tank, Perform HPCS Valve Operability Test, Suppression Pool Suction Valve (1E22-F015) fails closed**
    a. Event Trigger - Following shift turnover and when directed by the SRO.
    b. Role play (If requested)
        (1) EO (if requested to support the HPCS Suction Shift per 3309.01 step 4.11) – report "I am standing by."
        (2) EO (when asked to investigate 1E22-F015, HPCS Suppression Pool Suction Valve) – report "The breaker for 1E22-F015 is tripped, 1E22-F015 is shut".
        (3) EO (if asked to perform breaker reset): wait 1 minute and report, "breaker for 1E22-F015 will not reset".
        (4) Maintenance (when asked to investigate failure of 1E22-F015, HPCS Suppression Pool Suction Valve) – report "dispatching personnel to investigate".

20. **EPR for Grid Load Reduction**
    a. Event Trigger – Following event 1 and when directed by the Lead Examiner, the Transmission System Operator will contact the MCR.
    b. Role play:
        (1) Ameren Dispatcher (TSO) – direct SRO to "lower Generator output by 80 MWe to mitigate a degraded grid condition".

21. **MC Pump 'B' coupling failure**
    a. Event Trigger - Following Event 2 and when directed by the Lead Examiner, insert **Remote 1** and verify the following command(s):
        (1) **YFFWPPSS_13.** (MC Pump B Sheared Shaft)
    b. Role play
        (1) EO (when directed to report status of MC Pump 'B'): report, "The coupling has failed on MC Pump 'B'".
        (2) EO (when directed to shut the discharge valve on MC Pump 'A'): report, "The discharge valve for MC Pump 'A' is shut."
        (3) EO (when directed to open the discharge valve on MC Pump 'A'): report, "The discharge valve for MC Pump 'A' is open."

22. **'A' RR Flow Control Valve (FCV) drifts Open (Pull up FCV A controller)**
    a. Event Trigger - Following Event 3 and when directed by the Lead Examiner, insert **Remote 2** and verify the following command(s):
        (1) **S_K603A 2 OPEN SLOW.** (Recirc Loop Flow Controller B33-K603A).
    b. Role play
        (1) RE (when contacted about the FCV failure) – "I am on my way to the MCR."
        (2) EO (when dispatched to the RR HPU to investigate) – "The 'A' RR HPU looks normal locally. There are no oil leaks on the skid."
        (3) Booth Operator (if FANUC LEDs are checked) – "The LEDs are normal".
        (4) Booth Operator (if the MCR requests the 'A' RR HPU restarted):
            a) Release **YP_XREMT_676 Start Up** (Restart RR HPU A)' and then report that the 'A' RR HPU has been restarted.

23. **Hotwell Overflow Controller Failure**
    a. Event Trigger - Following Event 4 and when directed by the Lead Examiner, insert **Remote 3** and verify the following command(s):
        (1) **A01_A08_A01_1.** (Overflow to CY Cond Stg Tank 1LC-CD057A)
    b. Role play
        (1) EO (when directed to investigate 1CD045) – report "no abnormalities noted".
        (2) Maintenance (when directed to investigate 1LC-CD057B controller failure) – report "dispatching personnel to investigate".

24. **Trip of ERAT SVC**
    a. Event Trigger - Following Event 5 and when directed by the Lead Examiner, insert **Remote 4** and verify the following command:
        (1) **ed_ek20=true.** (Trip ERAT SVC on overcurrent)
    b. Role play
        (1) EO (when directed to investigate ERAT SVC trip): "The ERAT SVC Lockout Relays are tripped and the Thyristor Switched Capacitor (TSC) Overcurrent LED is lit. The ERAT SVC Cooling System is operating normally."
        (2) WEC (if asked to make required notifications to the Power Team and TSO of the loss of the ERAT SVC) – "I will make the required notifications".
        (3) Maintenance/Engineering (if requested to investigate failure of the ERAT SVC) – "I will brief and dispatch personnel to investigate".
        (4) WEC (if CPS 9082.01 Offsite Source Power Verification is requested) – acknowledge the request and deliver a copy of CPS 9082.01 to the MCR.

25. **Generator Trip / Turbine Trip / Bypass Valve 1 sticks open / RAT Failure after MSIVs closed / LOCA**
    a. Event Trigger - Following Event 6 and when directed by the Lead Examiner, insert **Remote 5** and verify the following command(s):
        (1) **YP_XMFTB_4063.** (Generator Trip)
        (2) **YPXMALSE_588 100%.** (#1 BPV Fail To Position)
        (3) **A02_A05_02_11_TVM.** (5006-2L HPU Trouble)
        (4) **RAT_B_Differential.** (RAT B Differential Trip)
        (5) **YPXMALSE_510 0.1%.** (RR B Suction Line Leak)
    b. Role play:
        (1) Maintenance (after 2 minutes from scram announcement) – report to the MCR as IMD.
        (2) EO (when directed to secure the Steam Bypass EHC skid) – acknowledge the order and report; "the Steam Bypass EHC skid is secured".

26. **RCIC failure / HPCS Pump fails to auto start / HPCS Injection Valve fails to auto open**
    a. Event Trigger – None
    b. Role play (If requested):
        (1) EO (investigate RCIC pump failure) – Report, "The RCIC pump shaft appears to be damaged".
        (2) Maintenance (investigate RCIC pump failure) – Report, "I will brief and dispatch personnel to investigate".

CT Bases Information

1. **[CT-1]** Close inboard and/or outboard Main Steam Isolation Valves prior to RPV pressure reaching 380psig to prevent exceeding RPV cooldown rate.

    a) The critical task was derived from ITS 3.4.11 RCS P/T Limits. Per B3.4.11, the consequence of violating the LCO limits is that the RCS has been operated under conditions that can result in brittle failure of the RCPB, possibly leading to a nonisolable leak or loss of coolant accident. Taking mitigating actions to prevent exceeding the cooldown rate limitation is therefore critical. In this case, these mitigating actions are accomplished by closing the inboard and/or outboard Main Steam Isolation Valves prior to RPV Pressure reaching 380#.

2. **[CT-2]** Manually inject with HPCS prior to Reactor Water Level reaching TAF.

    a) This critical task was derived from the EOP-SAG Technical Bases and applies when there are no automatic actions that will maintain reactor water level above top of active fuel and failure to perform the task will result in either an automatic or manual depressurization. A task is essential to safety if its improper performance or omission by an operator will result in direct adverse consequences or significant degradation in the mitigative capability of the plant. In this instance, challenging the plant with an unnecessary blowdown would result in an unnecessary transient and risks associated with that transient. An action that mitigates the event and precludes blowdown is therefore critical. For this scenario, manual injection with HPCS is the only viable method of maintaining water level above TAF.

Turnover

21. The plant is in Mode 1, operating at ~ 90% Rated Thermal Power (RTP).
    a. Control rods - Step 29 / Gang 9A @ position 14.

22. Status of Tagged Out Equipment

    - CCW Pump 'A' (1CC01PA) is OOS for maintenance. Not expected back this shift.

23. Today Day Shift

24. Weather Conditions

    - Calm and clear.

25. Thermal Limit Problems or concerns

    - None

26. LCO's in effect

    - None

27. Surveillances in progress

    - None

28. Previous Shift Evolutions completed

    - HPCS Suction is aligned to the Suppression Pool.

29. Evolutions planned for the shift

    - First Priority – Shift HPCS Suction to the RCIC Storage Tank IAW CPS 3309.01 High Pressure Core Spray (HPCS) section 8.1.7.2 Shifting HPCS Suction to RCIC Storage Tank and then perform CPS 9051.02 HPCS Valve Operability Test.
    - Maintain power at 90% RTP throughout the shift.

30. Risk Levels

    - Green
    - Protected Equipment: None