Facility: Perry **Scenario No.: 2 - 93 %** **Op-Test No.: 2021-1**

Examiners: _____ **Operators:** _____ **(SRO)**
_____ _____ **(ATC)**
_____ _____ **(BOP)**

Initial Conditions: Mode 1 EOC, 93% RTP, RCIC Isolated, RPV head flange inner seal failed, Winter Weather Advisory In effect.

Turnover: Plant is at 93% power. RCIC was isolated last shift due to a steam leak on the E51-F045 valve. APRM D is INOP and bypassed for SVI-C51-T0033D calibration which is in progress. Rx vessel head flange inner seal indicates failed. eSOMS Narrative Log is down. PSA Risk is Green and the Grid Risk is Normal.

Planned Activities: Perform Main Turbine Control Valve PMT. Contact Maintenance Supervisor to observe line fittings. When contacted by SCC, raise Rx power to 100% IAW reactivity plan and IOI-3. Return APRM D to service this shift. Make any Narrative Log entries on your note pads.

Critical Tasks:
1. Commence cooldown to decrease leak rate into DW
2. Inhibit ADS to prevent an uncontrolled depressurization

Event No.	Malf. No.	Event Type*	Event Description
1		N-BOP/SRO	Perform Main Turbine Control Valve PMT
2		C-ATC/SRO TS/SRO	APRM H Flow Card fails to 45% (Tech Spec)
3		C-BOP/ SRO R-ATC/SRO	Earthquake Exceeds OBE; Initiate Normal Shutdown; Start all ESW loops
4		C-BOP/SRO TS/SRO	CST Level Inst failure; HPCS Suppression Pool Suction Valve fails to shut on auto suction shift (Tech Spec)
5		C-ATC/BOP/ SRO	(2nd) Earthquake; RFPT B bearing oil line Break/Trip of RFPT B
6		C-ATC/SRO	RPV Head Outer seal fails; insert Manual Reactor Scram (Reactor coolant leak to DW)
7		M-All	(3rd) Earthquake; CW expansion joint rupture; loss of CW/loss of vacuum; Turbine Trip; RFPT A Trips (No high pressure injection except CRD & SLC)
8		C-BOP/SRO	Inadvertent ADS initiation – Inhibit ADS

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

Scenario Event Summary

NRC SCENARIO 2

The Crew will take the watch with the plant at 93% Rated Thermal Power (RTP) with RCIC isolated last shift due to a steam leak on the F045 valve. . Direction will be to raise power to 100% using Reactor Recirc flow following performance of the Main Turbine Control Valve PMT.

The US will direct the Balance of Plant (BOP) operator to perform partial SVI-N31- T1153, Main Turbine Control Valve Exercise Test for PMT of TCV #1 (event 1).

When SVI-N31-T1153 is complete, or at the Lead Evaluator discretion, fail APRM H at 45%. The crew will identify the failed APRM H and request the status of APRM D calibration (completed SAT). The US will declare APRM D Operable and direct the ATC operator to return APRM D to service and bypass APRM H IAW SOI-C51, then reset the ½ scram IAW SOI-C71 (event 2).

At the Lead Evaluator's cue, the SEISMIC ALARM P969 annunciator alarm(s) will be received (along with an announcement to the crew that ground motion was felt), and the US will enter ONI-D51, Earthquake. When the US determines that OBE levels have been exceeded, the BOP operator is directed to start all ESW loops IAW SOI-P45/49, and the ATC operator to commence power reduction IAW IOI-0003/4 (event 3).

At the Lead Evaluator's cue, initiate the Condensate Storage Tank level instrument failure. The BOP operator announces receipt of the HPCS SUPR POOL SUCT VLV OPEN CST/SUPR PL LVL alarm and that the CST Suction Valve, E22-F001 failed to shut. The BOP will close F001 valve. The US will declare HPCS CST instrument Inoperable and enter TS 3.3.5.1 Cond A1 immediately then Cond D.2.2 (in 24 hours). (event 4).

At the Lead Evaluator's cue, provide an announcement to the crew that (for the 2nd time) ground motion was felt. When the ATC operator reports a trip of the B RFPT due to low oil pressure, the US will enter ONI- C34, and ONI-C51.and direct the crew to take actions to secure the B RFPT Turning Gear IAW SOI-N27 (event 5).

Following completion of the ONI- C34 required actions, or at the Lead Evaluator's cue, when the BOP reports rising DW Temperature and Pressure, and multiple annunciator alarms that indicate leakage in the DW, the US will enter EOP-02 on rising DW pressure/temperature and ONI-C71-1, Reactor Scram, direct the ATC operator to insert a Manual reactor scram, and enter EOP-01 as necessary (event 6).

At the Lead Evaluator's cue, provide an announcement to the crew that ground motion was felt again (for the 3rd time). The US will re-enter ONI-D51, and when the BOP operator reports receipt of annunciator alarm TURBINE BLDG BASEMENT WATER LEVEL HIGH, the US will direct the BOP operator to trip all Circ Water pumps and will enter ONI-N62, Loss of Condenser Vacuum. The US enters EOP-02, Primary Containment Control, on high Drywell pressure (from Event 6). (event 7).

At the Lead Evaluator's cue, initiate the inadvertent ADS initiation. The crew will analyze plant conditions and determine initiation of ADS is inadvertent. The US will Enter ONI-E12-1, Inadvertent Initiation Of ECCS/RCIC and perform Immediate Actions of delaying then inhibiting ADS. (event 8).

At the Lead Evaluator's discretion, and once the crew has successfully completed the cooldown and restored RPV level control using low pressure systems, the scenario may be terminated.

Facility: Perry **Scenario No.: 3 - 90%** **Op-Test No.: 2021-1**

Examiners: _____ **Operators:** _____ **(SRO)**
_____ _____ **(ATC)**
_____ _____ **(BOP)**

Turnover: Power was lowered last shift to 90% for Surveillance testing, which is now complete. Condensate booster pump C is OOS for oil leak repair. Rx vessel head flange inner seal indicates failed. eSOMS Narrative Log is down. PSA Risk is Green and Grid Risk is Normal

Planned Activities: Shift TBCC pumps A/B to B/C running. Then raise Rx power to 100% IAW reactivity plan and IOI-3. Make any Narrative Log entries on your note pads.

Critical Tasks:

1. With Reactor Scram required and > 4% power, Initiate SLC W/I 2 minutes of failure to Scram
2. With Reactor Scram required and reactor not shutdown, Inhibit ADS
3. During an ATWS requiring lowering of RPV level, Terminate and Prevent Injection from ECCSand Feedwater
4. Initiate Containment spray prior to exceeding containment pressure/temperature limits
5. Terminate Containment Spray prior to negative pressure in containment

Event No.	Malf. No.	Event Type*	Event Description
1		N-BOP/SRO	Shift TBCC Pumps
2		R-ATC/SRO	Raise Rx Power to 100%
3		I-ATC/SRO TS-SRO	RPV Level transmitter C34-N004B fails upscale. Bypass Transmitter Evaluate ORM 6.2.13
4		C-BOP/SRO TS-SRO	M17-F020 Opens - requires closing M17-F025 and declaring the vacuum breaker INOP Evaluate TS 3.6.1.11
5		C-ATC/SRO	Condensate Booster Pump B trips. Scram on lowering HST level. (Auto scram failed)
6		M-ALL	ATWS with SDV leak - Enter EOP-01 → EOP-01-05 Enter EOP-02
7		C-BOP/SRO	RHR C pump fails to auto start on T&P. Manually start RHR C pump
8		C-ATC/SRO	Gang Rod Drive Mode fails. Insert rods in Individual Drive Mode
9		C-BOP/SRO	Containment Spray A fails. Initiate Containment Spray B

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

Narrative Summary – Scenario #3 – 90% Rx Power

IC The crew takes the shift with Rx power @ 90%. Power was lowered last shift for surveillance testing, which is now complete. The crew is directed to shift TBCC pumps to equalize run time then raise Rx power to 100%. Condensate booster pump C is OOS for oil leak repair.

Event

1. The US will direct the BOP to shift TBCC pumps from A/B to B/C.
2. The US will direct the ATC to commence raising Rx power with flow to 100%. The Lead Evaluator will cue the next event when satisfied with the power change.
3. At the Lead Evaluators cue, the failure of the RPV level transmitter will be inserted. The crew will identify the failed transmitter and bypass it IAW the ARI and SOI-C34. The US will evaluate Tech Specs and Enter ORM 6.2.13 Action B
4. At the Lead Evaluators cue, the failure of the containment vacuum breaker will be inserted. The crew will identify that check valve has failed open and close the MOV IAW the ARI and TS RA. The US will evaluate Tech Specs and Enter 3.6.1.11 Condition A.1
5. At the Lead Evaluators cue, the failure of the B Condensate Booster Pump will be inserted. The crew will identify that Hot Surge Tank level is lowering. The US will direct a scram at or prior to 60" in the HST. The ATC will insert a manual Rx scram.
6. The scram will result in an ATWS >4% power. The US will enter EOP-01 and transition to EOP-01-05. SLC will S/D the Rx. Also, upon the scram, a crack in the SDV cause containment temperature and pressure to rise. The US will enter EOP-02 and direct Containment spray.
7. When directed to T&P ECCS, the RHR C pump will not auto-start and must be manually started.
8. When the RO commences manual rod insertion, the Rod Gang Mode will fail and the RO must use Single Rod Mode to insert control rods.
9. When the crew attempts to spray containment Loop A will fail and the crew must spray with Loop B.

EOPs:	ABNORMALs:
EOP-01	ARI-H13-P680-03
EOP-01-05	ARI-H13-P800-02
EOP-02	ONI-C71-1

Critical Tasks:

1. Initiate SLC W/I 2 minutes of scram.
2. Inhibit ADS.
3. Spray Containment prior to exceeding containment temperature or pressure limits.
4. Terminate Containment Spray prior to reaching negative pressure in Containment.

Facility: Perry **Scenario No.: 4 - 80%** **Op-Test No.: 2021-1**

Examiners: _____ **Operators:** _____ **(SRO)**
_____ _____ **(ATC)**
_____ _____ **(BOP)**

Turnover: Power was lowered to 80% yesterday per SCC request. RHR B is in Suppression Pool Cooling mode following RCIC SVI. TS have been evaluated. MSL Rad Monitor D17-N003B is OOS for repair. Parts are expected in 2 days. The annunciator sliding links have been opened. Control Complex Chill Water pump C is OOS for leak. C41-C001B OOS for motor replacement. Rx vessel head flange inner seal indicates failed. eSOMS Narrative Log is down. PSA Risk is Green and Grid Risk is Normal.

Planned Activities: Remove RHR B from SP Cooling mode and place in standby. When contacted by SCC, commence Rx power increase to 100% IAW reactivity plan and IOI-3. IAW the reactivity plan, hold power at 90% so the Rx Engineer can run a case. Make any Narrative Log entries on your note pads.

Critical Tasks:

1. With Reactor Scram required and reactor not shutdown, Insert control rods to reduce power
2. With a primary system discharging into secondary containment, commence cooldown within limits to terminate steam leak.
3. Control RPV level above L1 using a restored high pressure injection source, HPCS or feedwater.
4. Inhibit ADS to prevent an uncontrolled depressurization. (potential)

Event No.	Malf. No.	Event Type*	Event Description
1		N-BOP/SRO	Shutdown RHR B to standby
2		R-ATC/SRO	Commence Rx Power increase to 100%
3		C-ATC/SRO TS-SRO	Recirc FCV A fails and continues to open with no demand. Lockup FCV A. enter ONI-C51.Evaluate TS 3.4.1
4		C-BOP/SRO	Service Water Pump D trips. Enter ONI-P41 & shift SW pumps.
5		C-BOP/SRO TS-SRO	AEGT fan A has low flow. Start AEGT Fan B. Evaluate TS 3.6.4.3
6		M-ALL	Steam leak in RCIC Pump room - Enter EOP-03
7		C-BOP/SRO	RCIC isolation valves E51-F063 & F064 fail to auto isolate. Manually isolate RCIC valves.
8		M-All	RCIC failed to fully isolate. Enter EOP-01 & Scram Rx prior to EOP-3 Max Safe Limit
9		C-ATC/SRO	ATWS<4% enter EOP-01-05.
10		C-BOP/SRO	Motor Feed pump fails due to loss of oil. Use HPCS or restart RFPT to control level

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

Narrative Summary – Scenario #4 – 80% Rx Power

IC The crew takes the shift with Rx power @ 80%. Power was lowered yesterday per SCC request. RHR B is operating in SP Cooling following a RCIC surveillance. The crew is directed shutdown RHR B to standby then continue Rx power restoration to 100%. SLC B pump is OOS for bearing replacement. MSL Rad Monitor D17-N003B is OOS for repair. Control Complex Chill Water pump C is OOS for leak.

Event

1. The US will direct the BOP to shutdown RHR B to standby. After shutdown to standby, the US will declare RHR B Operable per TS 3.5.1
2. The US will direct the ATC to commence raising Rx power with flow to 100%. The next event will automatically initiate after a 5% power change or the Lead Evaluator will cue the next event when satisfied with the power change.
3. At the Lead Evaluators cue, the failure of the A Rx Recirc FCV will be inserted. The crew will identify the A FCV is opening with no demand and shutdown A HPU IAW the ARI and ONI-C51. The US will enter ONI-C51 and evaluate Tech Specs and Enter 3.4.1 Action B
4. At the Lead Evaluators cue, the failure of the D Service Water Pump will be inserted. The crew will enter ONI-P41 and shift (start the standby pump) SW Pumps.
5. At the Lead Evaluators cue, the failure of the ECC B temperature controller will be inserted. The crew will identify that the temperature controller is not controlling in auto and take manual control of temperature controller. The US will evaluate TS 3.7.10.
6. At the Lead Evaluators cue, the steam leak in the RCIC will be inserted. The crew will enter EOP-03.
7. The RCIC auto isolation will fail and attempt to isolate the leak by shutting E51-F063 & E51-F064.
8. RCIC will fail to fully isolate and the crew will enter EOP-01 and insert a manual Rx scram prior to exceeding EOP-03 Max Safe Limit for RCIC room temperature.
9. The manual Rx scram will result in an ATWS <4% The US will enter EOP-01-5. SLC will shutdown the Rx and the crew will manually insert control rods.
10. Following the scram, the motor feed pump will fail and the crew will restart a RFPT or use HPCS to maintain RPV level.

EOPs:	ABNORMALs:
EOP-01	ONI-C51
EOP-01-5	ARI-H13-P601-17-B6
EOP-03	ONI-P41
	ONI-C71-1

Critical Tasks:

1. Insert a manual Rx scram prior to exceed Max Safe Limit.
2. Inhibit ADS.
3. Insert control rods to allow cooldown to commence.
4. Determines that HPCS failed to Auto start at L2, and manually start HPCS to recover RPV level.

Facility: Perry **Scenario No.: 5 - 77%** **Op-Test No.: 2021-1**

Examiners: _____ **Operators:** _____ **(SRO)**
_____ _____ **(ATC)**
_____ _____ **(BOP)**

Turnover: Power is 77% and is being lowered for upcoming CRD HCU replacements next shift. MSL Rad Monitor D17-N003B is OOS for repair. Parts are expected in 2 days. HPCS was taken OOS yesterday for breaker maintenance. Expected to return tomorrow. SLC A pump is OOS for motor replacement. Rx vessel head flange inner seal indicates failed. eSOMS Narrative Log is down. PSA Risk is Green and Grid Risk is Normal.

Planned Activities: Lower Rx power to 72% IAW reactivity plan and IOI-3 to support CRD HCU replacements next shift. (Rx Engineering will provide an Evolution Specific Reactivity Plan for the CRD HCU replacements.) Shift Stator Water Cooling pumps for upcoming maintenance. Make any Narrative Log entries on your note pads.

Critical Tasks:

1. W/I 20 minutes of CRD pump failure insert Rx scram or restore CRD Drive water pressure
2. Lower RPV pressure to allow injection with LPCS to preclude ED on lowering RPV level or ED if cannot maintain RPV level > -25".
3. If ED is performed and RPV level <TAF, restore RPV level >TAF with low pressure ECCS.

Event No.	Malf. No.	Event Type*	Event Description
1		R-ATC/SRO	Lower Rx Power to 72% with Recirc flow
2		N-BOP/SRO	Shift Stator Water Cooling Pumps A→B running
3		C-ATC/SRO	RFBP A trips. Manually start RFBP B. Enter ONI-C51
4		I-BOP/SRO TS-SRO	Control Room Rad monitor gas channel fails High. Override 2nd train off. Evaluate TS 3.3.7.1
5		C-BOP/SRO TS-SRO	CRD Pump A trips on OC. Enter ONI-C11-1 & Shift CRD pumps. Evaluate TS 3.1.5
6		M-ALL	Inadvertent RCIC initiation. MT & RFPTs trip and Rx scram Enter EOP-01
7		C-BOP/SRO	ECC A pump fails to auto start on RCIC start.
8		C-BOP/SRO	RCIC injection valve fails to open. Trip RCIC to prevent running on min flow.
9		C-All	Motor Feed pump shaft breaks. Enter EOP-01-1. Anticipate ED on lowering RPV level.
10		C-ATC/SRO	Generator Output Breaker S610 fails to auto trip.
11		C-All	(Conditional) ED if unable to maintain RPV level > -25" with LPCS. Enter EOP-02.

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

Narrative Summary – Scenario #5 – 77% Rx Power

IC The crew takes the shift with Rx power @ 77%. Power decrease is in progress to support CRD HCU replacements. The crew is directed to continue power decrease to 72%, and then shift Stator Water Pumps for upcoming maintenance. SLC pump A is out of service for motor replacement. MSL Rad Monitor D17-N003B is OOS for repair. Parts are expected in 2 days. HPCS was taken OOS yesterday for breaker maintenance. Expected to return tomorrow. Rx vessel head flange inner seal indicates failed.

Event

1. The US will direct the ATC to commence lowering Rx power with flow to 72%.
2. The US will direct the BOP to shift Stator Water Pumps.
3. At the Lead Evaluators cue, the failure of the A RFBP will be inserted. The crew will identify the standby RFBP failed to auto start and start it IAW the ARI and LPCSN27. The crew will enter LPCSC51 for the power change associated with the RPV level change.
4. At the Lead Evaluators cue, the failure of the Control Room Rad Monitor Gas Channel will be inserted. The crew will identify the failed Rad Monitor. The US will evaluate Tech Specs and Enter 3.3.7.1 Condition C. The crew will return 1 train of CR HVAC to standby.
5. At the Lead Evaluators cue, the failure of CRD A pump will be inserted. The crew will enter ONI-C11-1 and start B CRD pump. The US will evaluate Tech Specs and Enter 3.1.5 Conditions A & C and direct a scram if drive pressure is not restored within 20 minutes.
6. At the Lead Evaluators cue, the inadvertent RCIC initiation will be inserted causing the main turbine and RFPT to trip and a Rx scram. The crew will enter EOP-01 and LPCSC71-1.
7. ECC A pump will fail to auto start on RCIC initiation. The crew will start the ECC A pump.
8. RCIC Injection Valve fails to open. The crew trips the RCIC turbine to prevent running on minimum flow.
9. The motor feed pump trips and all HP injection is lost. The crew will enter EOP-01-1. The crew lowers RPV pressure by Anticipating ED to preclude ED and allow LPCS to restore level.
10. The main generator output breaker S610 fails to auto trip on main turbine trip and the crew trips the breaker
11. If the crew is unable to maintain RPV level > -25", the crew will ED per EOP-01-5 and enter EOP-02. (Contingency)

<u>EOPs:</u>
EOP-01
EOP-01-01
EOP-01-5 (if ED is required)
EOP-02 (if exceed 95 °F in SP)

<u>ABNORMALs:</u>
ARI-H13-P680-03-D1
ARI-H13-P680-08-A1
ONI-C11-1
ONI-C51
ONI-C71-1

<u>Critical Tasks:</u>

1. W/I 20 minutes of CRD pump failure insert Rx scram or restore CRD Drive water pressure
2. Anticipate Ed to preclude ED on lowering RPV level or ED if cannot maintain RPV level > -25".
3. If ED is performed and RPV level is below TAF, restore RPV level >TAF with low pressure systems (Contingency)