

Facility: Perry Scenario No.: 2 - 100 % Op-Test No.: **2021-1**

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

Initial Conditions: Mode 1 EOC, 100% RTP, RCIC Isolated, RPV head flange inner seal failed, Winter Weather Advisory In effect.

Turnover: Plant is at 100% 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: Reduce Rx power to approx. 93% IAW reactivity plan and IOI-3 to perform Main Turbine Control Valve PMT. 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		R-ATC/SRO	Reduce power to 93% with RR Flow
2		N-BOP/SRO	Perform Main Turbine Control Valve PMT
3		C-ATC/SRO TS/SRO	APRM H Flow Card fails to 50% (Tech Spec)
4		C-ATC/BOP/ SRO	Earthquake Exceeds OBE; Initiate Normal Shutdown; Start all ESW loops
5		C-BOP/SRO TS/SRO	CST Level Inst failure; HPCS Suppression Pool Suction Valve fails to shut on auto suction shift (Tech Spec)
6		C-ATC/BOP/ SRO	(2 nd) Earthquake; RFPT B bearing oil line Break/Trip of RFPT B
7		C-ATC/SRO	RPV Head Outer seal fails; insert Manual Reactor Scram (Reactor coolant leak to DW)
8		M-All	(3 rd) Earthquake; CW expansion joint rupture; loss of CW/loss of vacuum; Turbine Trip; RFPT A Trips (No high pressure injection except CRD & SLC)
9		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 100% Rated Thermal Power (RTP) with RCIC isolated last shift due to a steam leak on the F045 valve. . Direction will be to reduce power to 93% using Reactor Recirc flow to permit performance of the Main Turbine **Control Valve PMT**.

The Unit Supervisor (US) will direct the At the Controls (ATC) operator to reduce power to 93% using Reactor Recirc flow, IAW IOI-0003, Attachment 3, Power Maneuvering (event 1).

When Reactor Power is ~ 93%, 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 2).

When SVI-N31-T1153 is complete, or at the Lead Evaluator discretion, fail APRM H at 50%. 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 3).

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 4).

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 5).

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 6).

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 7).

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 7). (event 8).

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 9).

Scenario Event Summary

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

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Event Description: N/A - Driver Instructions

Cue:

Time	Position	Applicant's Actions or Behavior
Driver	Driver	<p><u>Simulator Setup:</u></p> <p>Reset Simulator to IC 107</p> <p>Load Schedule File: NRC 2021-SCEN-2.sch</p> <p>Verify Schedule File: NRC 2021-SCEN-2 Setup.sch loads</p> <p>Verify Schedule File: NRC 2021-SCEN-2 Event8.sch is in Exam folder</p> <p>Verify Schedule File: NRC 2021-SCEN-2 Seismic1.sch is in Exam folder</p> <p>Verify Schedule File: NRC 2021-SCEN-2 Seismic2.sch is in Exam folder</p> <p>Verify Event File: NRC 2021-SCEN-2.evt loads</p> <p>Obtain pictures of E22-N0654C for P625 Trip Units.</p> <p>Remove Requal IOI-3 and Rod Book from horseshoe.</p> <p>Markup Crew Sheet to show who is supporting xxx.</p> <p>Add SYM STATUS placard with “1N62-F601 100% open”</p> <p>Adjust white o-rings</p>
Driver	Driver	<p><u>Verify Initial Conditions:</u></p> <p>Reactor Power 100%. A2 Training.SEQ Pull Sheets, Rods @ Step 63.</p> <p>IOI-3 Step 4.6 is complete.</p> <p>Place yellow switch cap on E51-F063, F064, & F076</p> <p>RCIC in secured status.</p> <p>APRM D in Bypass</p> <p>Green Risk.</p>

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 Event Description: N/A - Driver Instructions

Cue:

Time	Position	Applicant's Actions or Behavior
Driver	Driver	<p><u>Initial Conditions:</u></p> <p>Plant is at 100% 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.</p> <p><u>Turnover: Planned activities:</u></p> <p>Lower, power to 93% per the Reactivity Plan and IOI-3 Power Maneuvering, to perform PMT on Main Turbine Control Valve #1. Return APRM D to service after calibration is complete. Make any Narrative Log entries on your note pads.</p>

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Event Description: 1 - Reduce power to 93% with Rx Recirc Flow			
Cue: From Turnover			
Time	Position	Applicant's Actions or Behavior	
	Driver	Role-play as SCC, RP, and Chemistry for power change notifications.	
	SRO	Direct ATC to lower reactor power to 93% IAW the Reactivity Plan and IOI-3, Power Maneuvering, Attachment 3. Provide oversight	
	Evaluator	It is expected that the ATC will use Recirc Flow to lower power. ATC should maintain Loop Flow mismatch <5% (observable on overhead screen) Target power is 3495 MWT (93%)	
	ATC	Notify RP and Chemistry of intended power change	
	ATC	Perform SOI-B33, Reactor Recirculation System Section 7.7, Rcirc Flow Control in Loop Manual 7.7.1 Confirm RCIRC LOOP FLOW CONTROL is in MAN. 1B33K603A 7.7.2 Confirm RCIRC LOOP FLOW CONTROL is in MAN. 1B33K603B 7.7.3 Adjust the following as required for the desired Recirc Flow while maintaining recirculation loop flow mismatch within limits: <ul style="list-style-type: none"> • RCIRC LOOP FLOW CONTROL 1B33K603A • RCIRC LOOP FLOW CONTROL 1B33K603B 7.7.4 When Rcirc Flow Control valves are full open, 1B33K603A/ 1B33K603B then verify that the RCIRC LOOP FLOW CONTROL is not in saturation (approximately 0%/SEC) by monitoring the ICS point RECIRC FCV VEL CONT OUTPUT. B33 EA015/ B33 EA016	

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Event Description: 2 - Perform Main Turbine Control Valve Exercise

Cue: From Turnover

Time	Position	Applicant's Actions or Behavior
	Driver	Crew will be provided with a marked-up copy of SVI-N31-T1153 with the Prereqs completed.
	SRO	Direct BOP to perform partial SVI-N31-T1153 for PMT of Control Valve #1.
	BOP	<p>Performs SVI-N31-T1153, Main Turbine Control Valve Testing for CV #1:</p> <p>5.1 <u>Surveillance Test</u></p> <ol style="list-style-type: none"> Obtain the Reactor Operator's "Authorization to Start Test" signature on Test Cover Sheet. <p>5.1.1 <u>Control Valve - 1 Cycle Test</u></p> <ol style="list-style-type: none"> Record Control Valve No. 1 initial position from indicator 1N32-R706A. Verify reactor power $\geq 70\%$ and $\leq 93\%$ or N/A this step if in Mode 2, 3, 4 or 5. Depress and hold CV-1 TEST button. Verify CV-1 goes fast closed by observing position meter 1N32-R706A, closing rate increasing as valve approaches closed position. Release test button and observe that CV-1 returns to its approximate initial position. Verify reset 1/2 scram A/C (1C71-S5C). Allow the plant to stabilize. Record test result of CV-1. Test Acceptable YES NO
	BOP	<p>5.2 <u>Plant/System Restoration</u></p> <ol style="list-style-type: none"> Complete System Restoration Checklist, Attachment 1, using the methods of Independent Verification.
	BOP	Completes system restoration checklist, the Data Package Cover Sheet, and submits it to the SRO.

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Event Description: 3 - APRM H Flow Card fails to 50%

Cue: ARI-H13-P680-06 E5 & C4

Time	Position	Applicant's Actions or Behavior
	Driver	<ul style="list-style-type: none"> When directed, initiate Event 3. Role play as an I&C as directed. When contacted regarding when APRM D SVI will be finished, reply will be ready to remove APRM D from bypass in a few more minutes and record as-left readings and you will bring paperwork to control room. After SRO evaluates TS, request ATC remove APRM D from bypass per step 39 and provide SRO with SVI.
	ATC	Announce unexpected alarms and give stability report.
	ATC	Announce APRM D/H UPSC INOP/TRIP OPRM D/H TRIP & ROD BLOCK APRM UPSCALE alarms. Walkdown H13-P680 and determine that APRM H failed and informs SRO Reviews ARI for possible cause and actions to perform: <ul style="list-style-type: none"> ROD BLOCK APRM UPSCALE 4.5 When the condition has cleared, then reset the half scram.
	SRO	Directs BOP to investigate back panel indications for APRM H.
	Evaluator	Candidate may place APRM H Meter Function Switch in FLOW position to obtain flow value
	BOP	Investigates P672 and observes Thermal Power Trip light illuminated. Reports findings to SRO.
	SRO	Contact I&C to determine status of APRM D SVI. Review SVI and sign operability for APRM D. Direct ATC to remove APRM D from bypass and bypass APRM H. Direct ATC to reset ½ scram after bypassing APRM H.
	ATC/BOP	Removes APRM D from bypass IAW SOI-C51(APRM): <ul style="list-style-type: none"> 7.5 <u>Restoring an APRM Channel From Bypass</u> 7.5.3 Depress the TRIP RESET button on the affected channel's display meter at the APRM's Power Range Neutron Mon Panel to reset any sealed in alarms. 7.5.4 Place the NEUTRON MONITOR BYPASS, APRM joystick on 1H13-P680, in the NEUTRAL position for the APRM Channel being restored to service. 1C51B-S6 CH D

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Event Description: 3 - APRM H Flow Card fails to 50%

Cue: ARI-H13-P680-06 E5 & C4

Time	Position	Applicant's Actions or Behavior
	ATC/BOP	Bypasses APRM H IAW SOI-C51(APRM): 7.4 <u>Bypassing an APRM Channel</u> 7.4.1 Refer to Technical Specification Table 3.3.1.1-1 Item 2 for applicability. 7.4.3 Place the NEUTRON MONITOR BYPASS, APRM joystick on 1H13-P680, in the BYPASS position for the APRM Channel being bypassed. 1C51B-S6 CH H 7.4.4 Confirm that the APRM Bypass status light comes on at the selected APRM's Power Range Neutron Mon Panel. 1H13-P672
	ATC	Resets half scram IAW SOI-C71: 7.4 <u>Reset RPS</u> 7.4.1 Verify the following: <ul style="list-style-type: none"> • The conditions which caused the full or half scram have cleared. • There is reasonable assurance that another scram signal will not be generated. 7.4.4 Momentarily depress the appropriate RPS division pushbuttons on P680: RPS B 1C71A-S5D
	ATC	Inform SRO that APRM D was removed from bypass, APRM H was bypassed and the half scram was reset.
	Evaluator	During the period when APRM D is Inop and bypassed and APRM H is Inop due to the flow card failure, LCO 3.3.1.1 is not met.
	SRO	Evaluate Technical Specifications <u>TS 3.3.1.1 Action</u> A.1 Place channel in. trip. – 12 hours OR A.2 Place associated trip system in trip. – 12 hours D.1 Enter the Condition referenced in Table 3.3.1.1-1 for the channel. – Immediately G.1 Be in MODE 2. – 6 hours <u>TS 3.3.1.3 Action</u> A.1 Place channel in trip. – 30 days

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Event Description: 4 - Earthquake Exceeds OBE; Initiate Normal Shutdown; Start all ESW loops

Cue: ARI-H13-P680-08-C3

Time	Position	Applicant's Actions or Behavior
	Driver	<ul style="list-style-type: none"> When directed, initiate Event 4. Then, call the control room as the Security Shift Supervisor and report that several Officers reported they felt an earthquake. Role play as directed. If asked about ERROR OR TROUBLE LEDs on local panel H51-P021 – respond that none are illuminated. If asked about TRIGGER LEDs on local panel H51-P021 – respond that all are illuminated. Five minutes after earthquake, after being directed to local panel H51-P021, report CAV light is illuminated.
	ATC	Announce multiple unexpected alarms and give stability report.
	ATC	Announce SEISMIC ALARM P969 & multiple equipment vibration alarms. Reviews ARI H13-P680-8-C3 for possible cause and actions to perform: 4.1 If personnel on site felt an earthquake, then go to ONI-D51 Earthquake. 4.2 Report indications from local panel H51-P021 to the Control Room. Directs NLO to report to H51-P021 and report indications.
	Evaluator	The OBE ALARM light will illuminate 5 minutes after the earthquake. Startup of ESW pumps is performed after the light illuminates.
	BOP	Walks down P969 and observe seismic TRIGGER ALARM light illuminated and inform SRO.
	SRO	Enters ONI-D51, Earthquake. Directs BOP to perform ONI-D51 Supplemental Actions
	BOP	Performs ONI-D51 Supplemental Actions: 4.1 Determine magnitude of the earthquake in accordance with Section 1.0 Parameters from indications received at the following: (Direct NLO to investigate Seismic Instrument Panel, H51-P021 at IBO/02 599'.)

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Event Description: 4 - Earthquake Exceeds OBE; Initiate Normal Shutdown; Start all ESW loops

Cue: ARI-H13-P680-08-C3

Time	Position	Applicant's Actions or Behavior
	BOP	<p>4.5 IF indications exist that OBE levels have been exceeded, then perform the following concurrently:</p> <p>4.5.1 Perform the following:</p> <ul style="list-style-type: none"> • Refer to Attachment 2, Inside Actions and perform the required actions. • Refer to Attachment 1, Safe Shutdown Buildings/Areas Inspection and inspect Safe Shutdown Buildings/Areas to ensure that Safe Shutdown capability is maintained. <p>Refer to Attachment 3, Outside Actions and perform the required actions. (Direct NLOs to perform Attachments 1, 2, & 3)</p>
	BOP	<p>4.5.2 Refer to SOI-P45/49 and perform the following:</p> <ul style="list-style-type: none"> • ESW Loop A (B) Manual Startup from Standby Readiness. • HPCS ESW Loop Manual Startup from Standby Readiness <p>(BOP starts all loops of ESW and ESW Pump House ventilation)</p>
	ATC/BOP	<p>4.5.3 Evaluate the following plant parameters to determine the extent of any plant damage:</p> <ul style="list-style-type: none"> • Control rod positions • Reactor power and water level • Feedwater flow and Steam flow • Generator load • Condenser vacuum • Turbine vibration and bearing temperatures • Sump alarms and pump-out rates. • Off-Gas flow rates • Airborne, Process and Area • Radiation Monitors
	BOP	<p>4.5.5 IF Cumulative Absolute Velocity (CAV) has been exceeded, then perform a normal reactor shutdown in accordance with IOI-3, Power Changes and IOI-4, Shutdown.</p> <p>(BOP monitors P969 and informs crew when OBE ALARM light illuminates)</p>
	SRO	<p>Directs crew to commence a normal reactor shutdown in accordance with IOI-3 starting at Section 4.7</p>
	ATC	<p>Commences lowering Rx power with Recirc Flow to 58 Mlbm/hr. then insert control rods.</p>

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 Event Description: 5 - CST Level Inst failure; HPCS Suppression Pool Suction Valve fails to shut on auto suction shift
 Cue: ARI-H13-P601-16 G5

Time	Position	Applicant's Actions or Behavior
	Driver	<ul style="list-style-type: none"> Place picture of E22-N654C on P625 prior to initiating this event. <u>After</u> Rx power is lowered to < 85% (3194 MWT) and when directed, initiate Event 5. Role play as directed.
	ATC	Announce unexpected alarm and give stability report.
	BOP	<p>Announce HPCS SUPR POOL SUCT VLV OPEN CST/SUPR PL LVL alarm.</p> <p>Reviews ARI H13-P601-0016-G5 for:</p> <p>CAUSE OF ALARM</p> <p>1.1 Suppression pool level >18.4 ft. as sensed by 1E22-N055C(G) or CST level <98,000 gallons as sensed by 1E22-N054C(G).</p> <p>AUTOMATIC ACTION</p> <p>2.1 HPCS Pump suction shifts from CST to suppression pool as follows:</p> <ul style="list-style-type: none"> HPCS SUPR POOL SUCTION VALVE, 1E22-F015, opens HPCS CST SUCTION VALVE, 1E22-F001, closes.
	Evaluator	NOP-OP-1002 4.10.3 step 5 states “If automatic actions fail to occur when required, it is the responsibility of the operator to take manual actions to perform the system or component function. Pump or component auto start failures are examples where operators are expected to take manual action.”
	BOP	Informs SRO that E22-F001 failed to automatically close and takes valve to close.
	BOP	Walks down back panel P625 and observes trip unit E22-N654C is pegged low with TRIP and GROSS FAIL lights illuminated and reports this to the SRO.
	Evaluator	Per TS Bases, CST Suction valve not required for Operability of HPCS. No entry for TS 3.5.1.
	SRO	<p>Evaluate Technical Specifications</p> <p><u>TS 3.3.5.1 Action</u></p> <p>A.1 Enter the Condition referenced in Table 3.3.5.1-1 for the channel. – Immediately</p> <p>D.2.2 Align the HPCS pump suction to the suppression pool – 24 hours</p>

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 Event Description: 6 - 2nd) Earthquake; RFPT B bearing oil line Break/Trip of RFPT B
 Cue: ARI-H13-P680-03-A4 & D2 and ARI-H13-P870-08-D1

Time	Position	Applicant's Actions or Behavior
	Driver	<ul style="list-style-type: none"> When directed, initiate Event 6 (after power <85%). Role play as directed. If asked to investigate at RFPT, report an oil line in the sump broke.
	Evaluator	If Recirc flow not previously lowered to 58 MLbM, a power change will occur.
	ATC	Announce multiple unexpected alarms and give stability report.
	ATC	Announce RFP B BRG OIL PRESS LO & multiple equipment vibration alarms. Announce RFPT B trip and Flow Control Valve Runback and entry conditions for ONI-C34 and ONI-C51
	SRO	Announce entry into ONI-C34, Feedwater Flow Malfunction and ONI-C51, Unplanned Change in Reactor Power or Reactivity. Direct crew to perform applicable ONI-C34 SUPPLEMENTAL ACTIONS. Direct ATC to monitor for power oscillations and scram the Rx if oscillations are observed. Works way through C51-4 IWE leg.
	ATC/BOP	Performs and directs applicable ONI-C34 SUPPLEMENTAL ACTIONS. 4.2.5 If the tripped Reactor Feed Pump will be shutdown, then refer to SOI-C34 and perform Reactor Feed Pump Shutdown from 1100 rpm. 4.2.6 If the RFPT trip was due to a loss of lube oil, then refer to SOI-N27 and perform Reactor Feed Pump Turbine Turning Gear Shutdown.
	ATC	Monitors for power oscillations.
	SRO	Directs BOP to perform ONI-SPI G-4, Power Verification.
	BOP	Performs ONI-SPI-G4 to verify thermal limits have not been exceeded.
	SRO	Answers NO to ONI-C51 question, "Has an unplanned Reactor Power rise occurred" Answers NO to question, "Is nuclear instrumentation failed" Waits in HOLD box to exit.
	SRO	Works way through C51-12 IWE Leg. Directs ATC to confirm Jet Pumps are operating within established limits.
	ATC	Reviews SPDS to confirm Jet Pumps are operating within established limits and informs SRO.
	SRO	Works way down to Hold Box, "When Recirc Flow mismatch exceeds Tech Spec limits THEN proceed".

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Event Description: 7 - RPV Head Outer seal fails; insert Manual Reactor Scram

Cue: [ARI-H13-P601-20-E3 & F3](#) and [P601-21-D5 & F5](#)

Time	Position	Applicant's Actions or Behavior
	Driver	<ul style="list-style-type: none"> When directed, initiate Event 7. Role play as directed.
	ATC	Announce multiple unexpected alarms and give stability report.
	ATC	Announce unexpected P601 alarm and give stability report.
	BOP	Announce multiple alarms indicating a leak in the DW .
	SRO	<p>Directs crew to monitor DW pressure and temperature.</p> <p>Directs BOP to monitor DW Unidentified Leak rate.</p> <p>Directs ATC to insert a Rx scram at 1 psig in DW IAW Margins and Limits Hardcard.</p> <p>Enters EOP-02 on rising DW Temperature.</p> <p>Directs BOP to maximize DW cooling.</p>
	BOP	<p>Monitors DW Unidentified Leak rate.</p> <p>Starts additional DW fans to maximize DW cooling.</p>
	ATC	<p>Inserts a manual Rx scram at 1.0 psig in DW or sooner if directed by SRO.</p> <p>Commence Reactor Scram Hardcard actions</p> <ol style="list-style-type: none"> Verify the following actions completed: <ul style="list-style-type: none"> Mode Switch Locked in Shutdown (Note power once scram signal inserted) RPS Initiated, if all control rods are not fully inserted ARI Initiated, if RPS failed to Scram the reactor If Reactor Power is above 4% OR unknown, then perform the following: Stabilize Reactor level using Feedwater / RCIC / HPCS
	Evaluator	Step 2 of the scram Hardcard is N/A.
	ATC	<ol style="list-style-type: none"> Stabilize Reactor pressure using Turbine / Turbine Bypass valves / SRV's Perform crew update with the following information: <ul style="list-style-type: none"> "The Mode Switch is locked in shutdown", (RPS and ARI initiated if required) Reactor Power is _____% ↑ ↔ ↓ Reactor Pressure is _____psig ↑ ↔ ↓ Reactor Level is _____ inches ↑ ↔ ↓

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Event Description: 7 - RPV Head Outer seal fails; insert Manual Reactor Scram

Cue: [ARI-H13-P601-20-E3 & F3](#) and [P601-21-D5 & F5](#)

Time	Position	Applicant's Actions or Behavior
	ATC	<ul style="list-style-type: none"> • EOP-01 Entry IS IS NOT met • IF MSIVs are closed, THEN a Time Critical Operator Action for Suppression Pool Cooling is applicable. Time: _____.
	Evaluator	<p>The Motor Feed Pump will trip shortly after the scram and the remaining RFPT may trip on L8 from the swell after the scram. The RFPT can be restarted for level control if needed. However, the next event will trip the RFPT on low vacuum.</p> <p>The ATC should also announce that all control rods are inserted.</p> <p>The stub bus supplying the CRD pump will trip after the scram.</p>
	SRO	<p>Enters ONI-C71-1, Reactor Scram.</p> <p>Enters ONI-C11-1 on CRD pump trip.</p>

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Event Description: 8 - (3rd) Earthquake; CW expansion joint rupture; loss of CW/loss of vacuum; Turbine Trip; RFPT A Trips

Cue: ARI-H13-P870-03-H1

Time	Position	Applicant's Actions or Behavior																												
	Driver	<ul style="list-style-type: none"> When directed, initiate Event 8. Role play as directed. If asked to investigate water level report water is about 3½ feet deep 																												
	ATC	Announce P870 alarm.																												
	BOP	Announce TURBINE BLDG BASEMENT WATER LEVEL HIGH alarm. Dispatch NLO to investigate. Reviews ARI H13-P870-03-H1 for Actions: 4.0 SUBSEQUENT OPERATOR ACTION 4.1 Confirm high level using computer point 1N71BC011.																												
	BOP	Informs SRO of need to stop Cric Pumps and to isolate the condensers,																												
	SRO	Directs BOP to perform ONI-C71 Subsequent Operator Action																												
	BOP	Performs ARI-H13-P870-03-H1 Subsequent Operator Action 4.3 Stop all Circulating Water Pumps. 4.4 Close the following valves to isolate the Main and Auxiliary Condensers: <table border="0" style="margin-left: 40px;"> <tr><td>• LP CNDR A INLET VLV</td><td>1N71-F030A</td></tr> <tr><td>• LP CNDR B INLET VLV</td><td>1N71-F030B</td></tr> <tr><td>• LP CNDR C INLET VLV</td><td>1N71-F030C</td></tr> <tr><td>• LP CNDR D INLET VLV</td><td>1N71-F030D</td></tr> <tr><td>• HP CNDR A OUTLET VLV</td><td>1N71-F140A</td></tr> <tr><td>• HP CNDR B OUTLET VLV</td><td>1N71-F140B</td></tr> <tr><td>• HP CNDR C OUTLET VLV</td><td>1N71-F140C</td></tr> <tr><td>• HP CNDR D OUTLET VLV</td><td>1N71-F140D</td></tr> <tr><td>• AUX CNDR A INLET VLV</td><td>1N71-F150A</td></tr> <tr><td>• AUX CNDR B INLET VLV</td><td>1N71-F150B</td></tr> <tr><td>• AUX CNDR A OUTLET VLV</td><td>1N71-F210A</td></tr> <tr><td>• AUX CNDR B OUTLET VLV</td><td>1N71-F210B</td></tr> </table> 4.5 Isolate Cooling Tower Makeup as follows: 4.5.1 Close the following valves: <table border="0" style="margin-left: 40px;"> <tr><td>• SW TO CLG TOWER INBD ISOL VLV</td><td>P41-F420</td></tr> <tr><td>• SW TO CLG TOWER OTBD ISOL VLV</td><td>P41-F430</td></tr> </table>	• LP CNDR A INLET VLV	1N71-F030A	• LP CNDR B INLET VLV	1N71-F030B	• LP CNDR C INLET VLV	1N71-F030C	• LP CNDR D INLET VLV	1N71-F030D	• HP CNDR A OUTLET VLV	1N71-F140A	• HP CNDR B OUTLET VLV	1N71-F140B	• HP CNDR C OUTLET VLV	1N71-F140C	• HP CNDR D OUTLET VLV	1N71-F140D	• AUX CNDR A INLET VLV	1N71-F150A	• AUX CNDR B INLET VLV	1N71-F150B	• AUX CNDR A OUTLET VLV	1N71-F210A	• AUX CNDR B OUTLET VLV	1N71-F210B	• SW TO CLG TOWER INBD ISOL VLV	P41-F420	• SW TO CLG TOWER OTBD ISOL VLV	P41-F430
• LP CNDR A INLET VLV	1N71-F030A																													
• LP CNDR B INLET VLV	1N71-F030B																													
• LP CNDR C INLET VLV	1N71-F030C																													
• LP CNDR D INLET VLV	1N71-F030D																													
• HP CNDR A OUTLET VLV	1N71-F140A																													
• HP CNDR B OUTLET VLV	1N71-F140B																													
• HP CNDR C OUTLET VLV	1N71-F140C																													
• HP CNDR D OUTLET VLV	1N71-F140D																													
• AUX CNDR A INLET VLV	1N71-F150A																													
• AUX CNDR B INLET VLV	1N71-F150B																													
• AUX CNDR A OUTLET VLV	1N71-F210A																													
• AUX CNDR B OUTLET VLV	1N71-F210B																													
• SW TO CLG TOWER INBD ISOL VLV	P41-F420																													
• SW TO CLG TOWER OTBD ISOL VLV	P41-F430																													

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Event Description: 8 - (3rd) Earthquake; CW expansion joint rupture; loss of CW/loss of vacuum; Turbine Trip; RFPT A Trips

Cue: ARI-H13-P870-03-H1

Time	Position	Applicant's Actions or Behavior

Time	Position	Applicant's Actions or Behavior
Op-Test No.: 2021-01		Scenario No.: 2 – 100%
Event Description: 8 - (3rd) Earthquake; CW expansion joint rupture; loss of CW/loss of vacuum; Turbine Trip; RFPT A Trips		Page 15 of 20
Cue: ARI-H13-P870-03-H1		
	Evaluator	It takes ~12 minutes to reach 1.68 psig in DW following initiation of Event 7.
	SRO	Enter EOP-01, RPV Control on 1.68 psig DW pressure or from ONI-C71-1 Step 4.4. Answers YES to Decision Diamonds, “Are APRMs downscale” and “Is the Reactor shutdown by control rods” Enters Level Control leg: Direct BOP to verify Actuators and Isolations for L3 and L2. Direct BOP to lineup injection systems IAW: EOP-SPI 6.5, LPCS Injection EOP-SPI 6.1, RHR A Injection EOP-SPI 6.2, RHR B Injection EOP-SPI 6.3, RHR C Injection
	BOP	Commences lining up low pressure injection systems. Informs SRO when injection systems are lined up
	SRO	Continue EOP-01, RPV Control actions. Answers YES to Decision Diamond, “Can RPV level be restored and maintained 130 in. to 219 in.” and loops back around. Enters Pressure Control leg: Works way down to “DEPRESSURIZE the RPV” step. Directs ATC/BOP to use SRVs to depressurize the RPV while maintaining <100 °F per hour cooldown rate. (Critical Task 1) Directs ATC/BOP to monitor for low-pressure injection. Directs ATC/BOP to startup RHR A/B in Suppression Pool Cooling.
	Evaluator	Cooldown rate of <100 °F/hr. based on 936 psig at scram is RPV press. >362 psig.
	ATC/BOP	Open SRV(s) to establish a cooldown rate < 100 °F/hour. (Critical Task 1) Slows depressurization near 450 psig and monitors for LPCS injection. Stabilize RPV level using LPCS. Maintains RPV pressure stable to not exceed 100 °F/hour cooldown rate. Starts RHR A/B in SP Cooling
	SRO	Enter EOP-02, Primary Containment Control based 1.68 psig DW pressure. Directs BOP to maximize DW cooling.
	BOP	Maximizes DW Cooling, performs EOP-SPI 2.1 Bypass of NCC Isolation.

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Event Description: 9 - Inadvertent ADS Initiation

Cue: ARI-H13-P601-19-D8, E8, & E9

Time	Position	Applicant's Actions or Behavior
	Driver	<ul style="list-style-type: none"> When directed, initiate Event 9. Role play as directed.
	ATC	Announce ADS A TIME DELAY LOGIC TIMER RUNNING alarm. Confirm RPV level > L1 and announce entry into ONI-E12-1
	SRO	Announce entry into ONI-E12-1, INADVERTENT INITIATION OF ECCS/RCIC
	ATC	Announce intention to perform Immediate Action and obtain permission from SRO.
	SRO	Grant permission to ATC to perform override of ADS. (Critical Task 2)
	ATC	<p>Overrides ADS inadvertent initiation: (Critical Task 2)</p> <p>3.1 IF permissives for ADS initiation were met AND the ADS SRVs are closed, THEN MOMENTARILY DEPRESS the following pushbuttons on P601:</p> <ul style="list-style-type: none"> ADS A LOGIC SEAL IN RESET. 1B21C-S13A ADS B LOGIC SEAL IN RESET. 1B21C-S13B <p>3.2 IF required to prevent an ADS initiation, THEN PLACE affected channel ADS LOGIC INHIBIT switch to INHIBIT. 1B21-S34A</p>

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Event Description: Scenario Termination Criteria

Cue:

Time	Position	Applicant's Actions or Behavior
		1. Reactor depressurized to not exceed 100 °F/hour cooldown rate.
		2. Injects to maintain level >L1.
		3. Lead Examiner's discretion

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Event Description: Critical Task #1

Cue:

Time	Position	Applicant's Actions or Behavior
		<p>With a primary system discharging into the containment or drywell, and the reactor not critical, commence a pressure reduction as required to maintain, ≤ 100 °F/hr. cooldown rate limit.</p> <ol style="list-style-type: none"> 1. Safety Significance: Reducing release rate from high energy sources can preclude failure of containment and subsequent radiation release to the public. 2. Cues: Procedural compliance. RPV pressure trend Cooldown rate. 3. Measured by: Operator manually starts cooldown using available pressure control systems. 4. Feedback: Reactor pressure trend.

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Event Description: Critical Task #2

Cue:

Time	Position	Applicant's Actions or Behavior
		<p>To prevent an uncontrolled RPV depressurization, inhibit ADS.</p> <ol style="list-style-type: none"> 1. Safety Significance: <ul style="list-style-type: none"> Precludes possible vessel damage due exceeding 100 °F/hr. cooldown rate. 2. Cues: <ul style="list-style-type: none"> Procedural compliance. 3. Measured by: <ul style="list-style-type: none"> ADS logic inhibited prior to an automatic initiation. 4. Feedback: <ul style="list-style-type: none"> RPV pressure trend. RPV level trend. ADS "ADS OUT OF SERVICE" annunciator status.

Facility: Perry

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Examiners: _____

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

Turnover: Power was lowered last shift 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. 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.

Critical Tasks:

1. Initiate SLC W/I 2 minutes of Scram
2. Inhibit ADS
3. Terminate injection
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:

EOP-01

EOP-01-05

EOP-02

ABNORMALs:

ARI-H13-P680-03

ARI-H13-P800-02

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.

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Event Description: N/A - Driver Instructions

Cue:

Time	Position	
Driver	Driver	<p><u>Simulator Setup:</u></p> <p>Reset Simulator to IC 108</p> <p>Load Schedule File: NRC 2021-SCEN-3.sch</p> <p>Verify Schedule File: NRC 2021-SCEN-3 Setup.sch loads</p> <p>Load File: NRC 2021-SCEN-3.evt</p> <p>Load the ATWS rod position patch file RaysHiATWS.dat from PSIMA computer in the computer room as follows:</p> <p style="padding-left: 40px;">Login using RYAN – password = “ryan_2008”</p> <p style="padding-left: 40px;">On the executive window:</p> <ol style="list-style-type: none"> 1. Place simulator in FREEZE 2. Click on the Run Patch (pumpkin) icon 3. Double click on the RaysHiATWS.dat file 4. Click on the Messages icon – check for error messages in the popup window 5. Close the Messages popup window if no error messages 6. Place the simulator in RUN <p>Obtain pictures of P868 & P869 Trip Units.</p> <p>Remove Requal IOI-3 and Rod Book from horseshoe.</p> <p>Markup Crew Sheet to show who is supporting xxx.</p> <p>Add SYM STATUS placard with “1N62-F601 100% open”</p>
Driver	Driver	<p><u>Verify Initial Conditions:</u></p> <p>Reactor Power 90%. A2 Training.SEQ Pull Sheets, Rods @ Step 63</p> <p>IOI-3 Attachment 3 is in progress.</p> <p>Place yellow switch cap on CBP pump C & CBP C Oil pump.</p> <p>Green Risk.</p>

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Event Description: N/A - Driver Instructions

Cue:

Time	Position	
Driver	Driver	<p><u>Initial Conditions:</u></p> <p>Power was lowered last shift 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. PSA Risk is Green and Grid Risk is Normal</p> <p><u>Turnover:</u> Planned activities;</p> <p>Shift TBCC pumps A/B to B/C running. Then raise Rx power to 100% IAW reactivity plan and IOI-3.</p>

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Event Description: 1 - Shift TBCC Pumps

Cue: From Turnover

Time	Position	Applicant's Actions or Behavior
	Driver	1. Role play as an NLO as directed.
	Evaluator	BOP should observe TBCC pump discharge pressures before and after starting on-coming pump and wait for report from NLO regarding satisfactory pump start prior to stopping offgoing pump.
	SRO	Direct BOP to shift TBCC pumps from A/B to B/C running IAW SOI-P44, Turbine Building Closed Cooling System. Provide oversight .
	BOP	Perform SOI-P44 Section 7.2 to shift TBCC pumps. 7.2.1 TAKE the oncoming TBCC PUMP to START. 1P44-C001C 7.2.2 TAKE the offgoing TBCC PUMP to STOP. 1P44-C001A

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 Event Description: 2 - Raise Rx Power to 100%

Cue: From Turnover

Time	Position	Applicant's Actions or Behavior
	Driver	Role-play as SCC and contact Control Room SRO to request raising power to 100%.
	SRO	Direct ATC to raise reactor power to 100% IAW the Reactivity Plan and IOI-3, Power Maneuvering, Attachment 3. Provide oversight
	Evaluator	It is expected that the ATC will use Recirc Flow to raise power. ATC should maintain Loop Flow mismatch <5% (observable on overhead screen) Target power is 3758 MWT (100%)
	ATC	Notify RP and Chemistry of intended power change
	ATC	Perform SOI-B33, Reactor Recirculation System Section 7.7, Rcirc Flow Control in Loop Manual 7.7.1 Confirm RCIRC LOOP FLOW CONTROL is in MAN. 1B33K603A 7.7.2 Confirm RCIRC LOOP FLOW CONTROL is in MAN. 1B33K603B 7.7.3 Adjust the following as required for the desired Recirc Flow while maintaining recirculation loop flow mismatch within limits: <ul style="list-style-type: none"> • RCIRC LOOP FLOW CONTROL 1B33K603A • RCIRC LOOP FLOW CONTROL 1B33K603B 7.7.4 When Rcirc Flow Control valves are full open, 1B33K603A/ 1B33K603B then verify that the RCIRC LOOP FLOW CONTROL is not in saturation (approximately 0%/SEC) by monitoring the ICS point RECIRC FCV VEL CONT OUTPUT. B33 EA015/ B33 EA016
	ATC	Report to SRO that Reactor power has been raised to 100% power using Rx Recirc flow.
	SRO	Report to SCC that power is at 100%

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Event Description: 3 - RPV Level transmitter C34-N004B fails upscale. Bypass Transmitter Evaluate ORM 6.2.13

Cue: ARI-H13-P680-03-C5, B6, & A8

Time	Position	Applicant's Actions or Behavior
	Driver	<ul style="list-style-type: none"> When directed, initiate Event 3. Role play as an I&C as directed. As I&C tech, if contacted, respond that you will write CR and Notification.
	ATC	Announce unexpected alarms and give stability report.
	ATC	Announce RX LEVEL CHANNEL ERROR HI, MAIN TURB & FEEDPUMP TRIP RCIC/L8, & FWCS PROCESS TROUBLE alarms. Walkdown H13-P680 and determine that feedwater RPV level channel B failed upscale. Informs SRO that B channel of RPV level input to DFWCS failed upscale.
	ATC	<p>Review ARI and RFB pump parameters: ARI-H13-P680-03-C5</p> <p><u>Subsequent Operator Action</u></p> <p>4.1 SELECT the red flashing PROCESS button on any 1H13-P680 DFWCS workstation.</p> <p>4.2 SELECT the NEW ALARMS button within the current alarm display.</p> <p>4.3 REFER TO ARI-H13-P680-DFW, Digital Feedwater Control System Alarms for Operator Actions.</p> <p>ARI-H13-P680-DFW</p> <p>C34:DEV_B_M</p> <p>SETPOINT: - Channel B level measurement deviates from the median by more than 8".</p> <p>AUTOMATIC ACTION: - None</p> <p>OPERATOR ACTIONS: Evaluate entry into ONI-C34 and Bypass Level Channel B per SOI-C34, Bypassing/Unbypassing Transmitters.</p>
	ATC	Inform SRO of need to bypass failed channel to obtain positive control of failed channel.
	SRO	Direct ATC to bypass failed level channel IAW SOI-C34, Feedwater Control System

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Event Description: 3 - RPV Level transmitter C34-N004B fails upscale. Bypass Transmitter
Evaluate ORM 6.2.13

Cue: ARI-H13-P680-03-C5, B6, & A8

Time	Position	Applicant's Actions or Behavior
	ATC	<p>Performs SOI-C34, Feedwater Control System Section 7.12 Bypassing/Unbypassing Transmitters</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p style="text-align: center;">NOTES</p> <ul style="list-style-type: none"> If the controlling RPV level transmitter is bypassed/unbypassed, it may cause a RPV level transient. It is NOT possible to bypass all transmitters for any input. <p style="margin-left: 20px;">7.12.1 SELECT the transmitter to be bypassed/unbypassed.</p> <p style="margin-left: 20px;">7.12.2 SELECT the bypass/online button.</p> </div>
	ATC	Informs SRO that failed level transmitter C34-N004B has been bypassed
	SRO	<p>Evaluate Technical Specifications / Operations Requirements Manual <u>ORM 6.2.13 Feedwater/Main Turbine Trip System Action</u></p> <p>b. With the number of OPERABLE channels one less than required by the Minimum OPERABLE Channels per trip system requirement, RESTORE the inoperable channel to OPERABLE status within 7 days or be in at least MODE 2 within the next 6 hours.</p>

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Event Description: 4 - M17-F020 Opens - requires closing M17-F025 and declaring the vacuum breaker
INOP Evaluate TS 3.6.1.11

Cue: ARI-H13-P800-02-A3

Time	Position	Applicant's Actions or Behavior				
	Driver	<ul style="list-style-type: none"> Verify pictures are placed on P868 & P869 prior to initiating next event. When directed, initiate Event 4. Role play as an NLO as directed. 				
	ATC	Announce unexpected P800 alarm and give stability report				
	BOP	Investigate P800 alarm and announce CNTMT VAC RLF CHECK VLV 2A NOT CLOSED alarm. Walkdown P800 and determine M17-F020 vacuum breaker is open. Reviews ARI and determines there are no Automatic or Immediate Operator Actions for this annunciator.				
	SRO	Direct BOP to perform Subsequent Operator Actions for this alarm.				
	Evaluator	The BOP should find no abnormal vacuum conditions and close M17-F025				
	BOP	Perform Subsequent Operator Actions for ARI: ARI-H13-P800-02-A3 4.1 DETERMINE whether the check valve should be open by checking containment/atmosphere differential pressure indicators on 1H13-P868 and on 1H13-P869. 4.2 REFER TO SOI-G41(FPCC) and VERIFY appropriate CNTMT POOLS SUPP HDR FLOW. 4.3 <table border="1" style="display: inline-table; vertical-align: top;"> <tr> <td>The check valve is open</td> <td rowspan="3" style="vertical-align: middle; padding-left: 10px;">1M17-F025</td> </tr> <tr> <td>There is a no vacuum condition inside the Containment</td> </tr> <tr> <td>THEN CLOSE CNTMT VAC RLF MOV ISOL VALVE</td> </tr> </table>	The check valve is open	1M17-F025	There is a no vacuum condition inside the Containment	THEN CLOSE CNTMT VAC RLF MOV ISOL VALVE
The check valve is open	1M17-F025					
There is a no vacuum condition inside the Containment						
THEN CLOSE CNTMT VAC RLF MOV ISOL VALVE						
	BOP	Report closure of M17-F025 and reference to Tech Spec 3.6.1.11 from ARI				
	SRO	Evaluate Technical Specifications <u>TS 3.6.1.11 Action</u> A.1 Close the associated motor operated isolation valve. – 4 hours				

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Event Description: 5 - Condensate Booster Pump B trips. Scram on lowering HST level. (Auto scram failed)

Cue: ARI-H13-P680-02-B6

Time	Position	Applicant's Actions or Behavior
	Driver	<ul style="list-style-type: none"> When directed, initiate Event 5. Role play as an NLO as directed.
	ATC	Announce unexpected alarm and give stability report.
	ATC	Announce CBP B TRIP alarm. Walkdown H13-P680 and determine that Condensate Booster Pump B tripped. Informs SRO that B CBP tripped and Hot Surge Tank level is lowering.
	SRO	Refers to the Margins And Limits Hardcard and directs ATC to insert a manual Rx scram if HST level lowers to 60 inches.
	Evaluator	If the operator attempts to lower Rx power with flow, the FCV will stop moving almost immediately. If the operator attempts to take manual control of the HST level control valves, he will be limited by the 353-amp limit.
	ATC	Review ARI and HST level trend. ARI-H13-P680-02-B6 <u>Subsequent Operator Action</u> 4.1 IF the turbine has NOT tripped, THEN start the standby CBP. 4.2 MONITOR HOT SURGE TANK LEVEL & CNDS TO HTR 4 FLOW. 4.3 IF required, THEN REDUCE reactor power to stabilize Hot Surge Tank level. 4.4 MAINTAIN motor current <353 amps.
	ATC	Inform SRO of continued lowering trend on HST level.
	Evaluator	SRO should prepare the crew and direct a manual Rx scram prior to reaching 60 inches in the HST and certainly before the RFBP trip setpoint of 48 inches. The auto trip of the RFBPs has been disabled.
	SRO	Update the crew that a Rx scram will be inserted and ONI-C71-1 will be entered. If time permits, direct crew to make Plant announcement and notifications. Direct ATC to insert a manual Rx scram.
	ATC	Inserts a manual Rx scram by locking the Mode Switch in SHUTDOWN. Observes all control rods did not insert and Arms & Depresses RPS pushbuttons. Observes all control rods did not insert and Arms and Depresses ARI pushbuttons.

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Event Description: 6 - ATWS with SDV leak - Enter EOP-01 → EOP-01-05 Enter EOP-02

Cue: Rx power, Containment pressure and temperature

Time	Position	Applicant's Actions or Behavior
	ATC	<p>Commence Reactor Scram Hardcard actions</p> <ol style="list-style-type: none"> 1. VERIFY the following actions completed: <ul style="list-style-type: none"> • Mode Switch Locked in Shutdown (Note power once scram signal inserted) • RPS Initiated, if all control rods are not fully inserted • ARI Initiated, if RPS failed to Scram the reactor 2. IF Reactor Power is above 4% OR unknown, THEN PERFORM the following: <ol style="list-style-type: none"> a) PERFORM crew update with the following information: <p style="margin-left: 40px;">“Commencing ATWS ACTIONS”.</p> b) GO TO the following and execute concurrently (with US concurrence): <ul style="list-style-type: none"> • P680 ATWS ACTIONS Hardcard • P601 ATWS ACTIONS Hardcard
	SRO	Acknowledges commencing ATWS actions.
	ATC	<p>Performs P680 ATWS Actions Hardcard</p> <p>1.0 LOWER RPV water level to preclude periodic neutron flux oscillations as follows:</p> <ul style="list-style-type: none"> • IF any Main Steam Line is OPEN, THEN DIRECT EOP-SPI 2.3, Bypass MSIVS Interlocks <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p style="text-align: center;">NOTE</p> <p>Once Terminate and Prevent is directed, ALL Actions for each system should be completed, UNLESS RPV Level lowers Below 100 inches AND the system is required for RPV injection.</p> </div> <ul style="list-style-type: none"> • IF RPV water level can be determined to be above 100 inches, THEN TERMINATE and PREVENT Feedwater UNTIL RPV water level drops below 100 inches. (Critical Task 3) <p>2.0 WHEN RPV Level can be determined to be below 100 inches, THEN INJECT SLOWLY to restore and maintain RPV Level -25 to 100 inches (40 to 80 inches nominal) using available Feedwater OR ECCS.</p>
	Evaluator	ATC will direct BOP to perform EOP-SPI 2.3
	ATC	Establish and maintain a level band of 40 to 80 inches.

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Event Description: 6 - ATWS with SDV leak - Enter EOP-01 → EOP-01-05 Enter EOP-02

Cue: Rx power, Containment pressure and temperature

Time	Position	Applicant's Actions or Behavior
	BOP	<p>Performs P601 ATWS Actions Hardcard</p> <ol style="list-style-type: none"> 1. IF RPV water level can be determined to be above 100 inches, THEN TERMINATE and PREVENT HPCS (Critical Task 3) 2. PERFORM the following: <ul style="list-style-type: none"> • INITIATE SLC (Critical Task 1) • INHIBIT ADS (Critical Task 2) 3. PREVENT Low Pressure ECCS (Division 1 and Division 2) 4. IF the MSIVs are CLOSED OR using SRVs for pressure control, THEN PERFORM the following: (<i>NOTE: this step is N/A for this scenario</i>) 5. NOTIFY the ATC RO that P601 ATWS Actions are Complete.
	Evaluator	Go to page 13 for failure of RHR C pump to auto start on ECCS Prevention.
	BOP	<p>Perform EOP-SPI 2.3, Bypass MSIVS Low Level Interlocks by actuating 4 keylock switches on the back panels and verifying Instrument Air is available to the Drywell.</p> <p>Informs ATC when EOP-SPI 2.3 is complete.</p>
	ATC	<p>Continues P680 ATWS Actions Hardcard</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p style="text-align: center;">NOTE</p> <p>Step 4.0 through 7.0 can be performed in any order in parallel with Step 3.0 when time permits.</p> </div> <ol style="list-style-type: none"> 3.0 WHEN notified that all P601 ATWS ACTIONS are complete, THEN PERFORM a “Crew Update” with the following information: <ul style="list-style-type: none"> • “The Mode Switch is locked in shutdown, RPS and ARI were initiated” • Reactor Power is <u> (>4%) </u> ↑ ↔ ↓ • Reactor Pressure is _____ psig ↑ ↔ ↓ • Reactor Level is _____ inches ↑ ↔ ↓ • MSIVs are OPEN / CLOSED • ATWS Actions are complete <p>Time: _____.</p>
	SRO	<p>Acknowledge plant conditions.</p> <p>Enter EOP-01, RPV Control.</p> <p>Works way through flowchart to Decision Diamond, “Is the Reactor shutdown by control rods”, answers NO and is directed to EOP-01-5.</p>

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Event Description: 6 - ATWS with SDV leak - Enter EOP-01 → EOP-01-05 Enter EOP-02

Cue: Rx power, Containment pressure and temperature

Time	Position	Applicant's Actions or Behavior
	ATC	Continues P680 ATWS Actions Hardcard 4.0 INSERT Nuclear Instruments (SRMs / IRMs). 5.0 PLACE APRM/IRM recorders in IRM (Leave A or E in APRM for digital display) 6.0 VERIFY HST LVL CV MANUAL CONTROL, N21-S19 in OFF. 7.0 WHEN generator load is reduced to less than 90 MWe, THEN PERFORM the following: a) TRIP the main turbine by depressing the TURBINE TRIP push-button. b) VERIFY the following have occurred: <ul style="list-style-type: none"> • MAIN STOP Valves are Shut • CONTROL Valves are Shut • COMBINED INTERMEDIATE Valves are Shut • GEN BRKR S-610-PY-TIE and S-611-PY-TIE is Open • GEN FIELD BREAKER is Open • EXCITER FIELD BREAKER is Open
	SRO	Transition to EOP-01-5, ATWS RPV Control Enters Level Control leg: Direct BOP to verify Actuators and Isolations for L3, L2 and possibly 1.68 psig. Direct BOP to perform EOP-SPI 2.5, Bypass of LOCA Interlocks. Direct ATC to maintain RPV level band of 40 to 80 inches (nominal) or -25 to 100 inches (maximum) (Critical Task 3) Will enter EOP-02, Primary Containment Control to initiate H2 control actions. Waits in Decision Diamond until Hot Shutdown Weight Boron has been injected.
	SRO	Enters EOP-02 and directs BOP to startup H2 analyzers and H2 igniters.
	BOP	Performs Actuators and Isolations Hardcard. Performs EOP-SPI 2.5. Starts H2 analyzers and H2 igniters
	ATC	Maintains RPV level in directed band.

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Event Description: 6 - ATWS with SDV leak - Enter EOP-01 → EOP-01-05 Enter EOP-02

Cue: Rx power, Containment pressure and temperature

Time	Position	Applicant's Actions or Behavior
	SRO	Enters Pressure Control leg: Direct ATC to maintain pressure band of 800 to 1000 psig (nominal) or lower if required.
	ATC	Maintains RPV pressure in directed band. Informs SRO of lowering RPV pressure and performs Pressure Control Hardcard actions.
	SRO	Enters Power Control leg: Verifies Recirc Pumps are tripped. Directs ATC to perform EOP-SPI 1.1 through 1.7 to insert control rods. Directs crew to monitor boron injection and verify RWCU isolation.
	Evaluator	Go to page 14 for failure of Gang Mode rod insertion.
	ATC/BOP	Coordinate to perform EOP-SPI 1.2 and/or 1.3 to insert control rods Monitors SLC injection and verifies RWCU isolation.
	Crew	Observe and announce rising Containment Temperature and pressure.
	Evaluator	Depending of timing of observing leak in Containment, SRO may reenter EOP-02 on DW temperature or DW pressure.
	SRO	Reenter EOP-02 on rising Containment temperature. Directs BOP to monitor and control Containment parameters. Directs BOP to operate all available Containment cooling and bypass CVCW isolations IAW EOP-SPI 2.2.
	BOP	Operates all available Containment cooling fans, bypasses CVCW isolations IAW EOP-SPI 2.2, and directs NLO to restart a Containment Vessel chiller.
	SRO	Determines that Containment temperature will exceed 185 °F, and that Containment Spray is Required. Directs BOP to initiate Containment Spray IAW EOP-SPI 3.1 and to terminate Spray at 0.5 psig. (Critical Tasks 4 & 5)
	Evaluator	Go to page 15 for Containment Spray actions.

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Event Description: 7 - RHR C pump fails to auto start on T&P. Manually start RHR C pump

Cue: Horseshoe Actuations Hardcard

Time	Position	Applicant's Actions or Behavior
	BOP	<p>Prevents ECCS IAW ECCS Prevention Hardcard:</p> <p>RHR B / RHR C PREVENTION</p> <p>1.0 IF LPCI B and LPCI C initiation signal is NOT present, THEN PERFORM the following:</p> <p>a. IF time permits, THEN VERIFY the following keylocks are in BYPASS:</p> <ul style="list-style-type: none"> • AT H13-P877 Division 2 section, BUS XH12 LOCA BYPASS keylock switch • AT H13-P882, NCC LOCA BYPASS keylock switch <p>b. IF RPV Pressure is below 350 psig OR 2nd Operator is available, THEN HOLD the LPCI B INJECTION VALVE in CLOSE, UNTIL the valve is “overridden” closed. E12-F042B</p> <p>c. HOLD the LPCI C INJECTION VALVE in CLOSE, UNTIL the valve is “overridden” closed. E12-F042C</p> <p>d. ARM AND DEPRESS LPCI B & C MANUAL INITIATION pushbutton to obtain white LPCI B & C SEAL IN RESET light.</p> <p>2.0 VERIFY the following:</p> <ul style="list-style-type: none"> • LPCI B INJECTION VALVE is “overridden” CLOSED E12-F042B • SHUTDOWN COOLING B TO FDW SHUTOFF is CLOSED E12-F053B • LPCI C INJECTION VALVE is “overridden” CLOSED E12-F042C
	Evaluator	The operator should use STAR to identify that the RHR C pump failed to auto start and manually start the pump.

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Event Description: 8 - Gang Rod Drive Mode fails. Insert rods in Individual Drive Mode

Cue: Inability to drive rods in Gang Mode

Time	Position	Applicant's Actions or Behavior
	Driver	<ul style="list-style-type: none"> • Role play as an I&C as directed. • If contacted as I&C to troubleshoot Drive Mode Pushbutton, respond that you will get some tools and M&TE and be back.
	ATC	<p>Perform control rod insertion IAW EOP-SPI 1.3.</p> <p>1.0 WHEN any CRD Pump is running, THEN PERFORM the following concurrently with the remainder of this procedure:</p> <p>1.1 AT H13-P680, PERFORM the following to Insert all control rods to position 00:</p> <ul style="list-style-type: none"> • DEPRESS AND HOLD the IN TIMER SKIP pushbutton. • SELECT Control Rods as required. <p>4.0 VERIFY the following keylock switches in BYPASS:</p> <ul style="list-style-type: none"> • AT H13-P629, LO POWER SET PT DIV 1 BYPASS C11A-S4 • AT H13-P618, LO POWER SET PT DIV 2 BYPASS C11A-S3
	Evaluator	<p>The operator would normally select gang insertion mode to expeditiously shutdown the Rx. However, the Gang Rod Drive Mode is failed and the operator can only drive rods in Single Mode.</p> <p>The ATC may review SOI-C11(RC&IS) to verify proper operation.</p>
	ATC	<p>Review SOI-C11(RC&IS) for In Timer Skip Function.</p> <p>7.8 Continuous or Notch Insertion for a Single Rod or Gang Using the In Timer Skip Function</p> <p>7.8.1 SELECT the single rod OR rod gang.</p> <p>7.8.2 DEPRESS AND HOLD the IN TIMER SKIP.</p> <p>7.8.3 OBSERVE the following:</p> <ul style="list-style-type: none"> • The IN light comes on. • The RDM is updating rod OR gang positions. • Expected changes occur in

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Event Description: 9 - Containment Spray A fails. Initiate Containment Spray B

Cue: Containment pressure/temperature continue to rise

Time	Position	Applicant's Actions or Behavior
	BOP	<p>Initiates Containment Spray IAW EOP-SPI 3.1</p> <p>2.0 RHR Containment Spray Loop A is NOT lined up to vent Containment Containment Spray A loop is available THEN INITIATE Containment Spray A Loop as follows:</p> <p>2.1 IF Drywell Pressure is less than 1.68 psig, THEN AT H13-P629, PLACE CNTMT SPRAY A HI DW PRESS BYP keylock switch in BYPASS.</p> <p>2.2 CONFIRM Containment Pressure is above 0.8 psig.</p> <p>2.3 ARM AND DEPRESS CNTMT SPRAY A MANUAL INITIATION pushbutton.</p> <p>2.4 VERIFY RHR PUMP A is running.</p> <p>2.5 IF ESW PUMP A is available, THEN VERIFY ESW PUMP A is running.</p> <p>2.6 IF ECC PUMP A is available, THEN VERIFY ECC PUMP A is running.</p> <p>2.7 VERIFY the following valves are OPEN:</p> <ul style="list-style-type: none"> • CNTMT SPRAY A FIRST SHUTOFF E12-F028A • CNTMT SPRAY A SECOND SHUTOFF E12-F537A
	BOP	<p>Observes Containment Spray valves failed to open. Reports this to the SRO and proceeds to initiate Containment Spray B.</p>
	BOP	<p>Initiates Containment Spray B IAW EOP-SPI 3.1. (Critical Task # 4)</p> <p>3.0 RHR Containment Spray Loop B is NOT lined up to vent Containment Containment Spray A loop is NOT initiated Additional Containment Spray is required Containment Spray B loop is available THEN INITIATE Containment Spray B Loop as follows:</p> <p>3.1 IF Drywell Pressure is less than 1.68 psig, THEN AT H13-P629, PLACE CNTMT SPRAY B HI DW PRESS BYP keylock switch in BYPASS.</p> <p>3.2 CONFIRM Containment Pressure is above 0.8 psig.</p> <p>3.3 ARM AND DEPRESS CNTMT SPRAY B MANUAL INITIATION pushbutton for at least 35 seconds.</p> <p>3.4 VERIFY RHR PUMP B is running.</p> <p>3.5 IF ESW PUMP B is available, THEN VERIFY ESW PUMP B is running.</p> <p>3.6 IF ECC PUMP B is available, THEN VERIFY ECC PUMP B is running.</p>

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Event Description: 9 - Containment Spray A fails. Initiate Containment Spray B

Cue: Containment pressure/temperature continue to rise

Time	Position	Applicant's Actions or Behavior
		<p>3.7 VERIFY the following valves are OPEN:</p> <ul style="list-style-type: none"> • CNTMT SPRAY B FIRST SHUTOFF E12-F028B • CNTMT SPRAY B SECOND SHUTOFF E12-F537B <p>3.7.1 VERIFY the following valves are CLOSED:</p> <ul style="list-style-type: none"> • RHR B TEST VALVE TO SUPR POOL E12-F024B • SHUTDOWN COOLING B TO FDW SHUTOFF E12-F053B • RHR B HX'S BYPASS VALVE (10 Minutes) E12-F048B <p>3.8 TAKE LPCI B INJECTION VALVE control switch to CLOSE.</p> <p>3.9 IF desired to maintain continuous Containment Spray operation AND Containment pressure is below 8.0 psig, THEN PERFORM the following:</p>
	Evaluator	Continuous Containment Spray operation is not desired nor required.
	BOP	Updates the crew that Containment Spray B is operating properly and monitors for lowering Containment temperature and pressure.
	BOP	<p>Terminate containment Spray IAW EOP-SPI 3.1 prior to negative pressure in Containment (Critical Task # 5)</p> <p>1.0 IF Containment Spray(s) have been initiated:</p> <ul style="list-style-type: none"> • Containment pressure CANNOT be maintained greater than 0 psig, or • Desired to terminate Containment Spray operations, <p>THEN TERMINATE RHR Containment Spray as follows:</p> <p>1.2 IF Containment Spray B Loop is in service, THEN TERMINATE Containment Spray B Loop as follows:</p> <p>1.2.1 TAKE LPCI B INJECTION VALVE control switch to CLOSE.</p> <p>1.2.2 VERIFY CNTMT SPRAY B MANUAL INITIATION pushbutton collar in DISARM.</p> <p>1.2.3 DEPRESS CNTMT SPRAY B SEAL IN RESET pushbutton to reset the Containment Spray initiation logic.</p> <p>1.2.4 CLOSE CNTMT SPRAY B SECOND SHUTOFF.</p> <p>1.2.5 IF Combustible Gas Mixing System B is NOT running, THEN CLOSE CNTMT SPRAY B FIRST SHUTOFF.</p>
	BOP	Updates the crew that Containment Spray B has been terminated and monitors for increasing Containment temperature and pressure.

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Event Description: Scenario Termination Criteria

Cue:

Time	Position	Applicant's Actions or Behavior
		1. Reactor is subcritical.
		2. Containment temperature and pressure are being controlled.
		3. Lead Examiner's discretion

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Event Description: Critical Task #1

Cue:

Time	Position	Applicant's Actions or Behavior
		<p>With a reactor scram required and the reactor not shutdown, initiate action to reduce power by injecting boron if > 4% power.</p> <ol style="list-style-type: none"> 1. Safety Significance: <ul style="list-style-type: none"> Precludes core damage due to an uncontrolled reactivity addition. 2. Cues: <ul style="list-style-type: none"> Procedural compliance. 3. Measured by: <ul style="list-style-type: none"> Observation - If operating per the REACTOR SCRAM HARDCARD and RO determines that Rx power >4%. AND RO places SLC A and B Pump control switches in ON, when directed by the P601 ATWS ACTIONS HARDCARD. 4. Feedback: <ul style="list-style-type: none"> Reactor Power trend. Control Rod indications. SLC tank level.

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Event Description: Critical Task #2

Cue:

Time	Position	Applicant's Actions or Behavior
		<p>With reactor scram required and the reactor not shutdown, to prevent an uncontrolled RPV depressurization and subsequent power excursion, inhibit ADS.</p> <ol style="list-style-type: none"> 1. Safety Significance: <ul style="list-style-type: none"> Precludes core damage due to an uncontrolled reactivity addition. 2. Cues: <ul style="list-style-type: none"> Procedural compliance. 3. Measured by: <ul style="list-style-type: none"> ADS logic inhibited prior to an automatic initiation. 4. Feedback: <ul style="list-style-type: none"> RPV pressure trend. RPV level trend. ADS "ADS OUT OF SERVICE" annunciator status.

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Event Description: Critical Task #3

Cue:

Time	Position	Applicant's Actions or Behavior
		<p>During an ATWS, when conditions are met to deliberately lower RPV level; Terminate and Prevent injection into the RPV from ECCS and Feedwater until conditions are met to reestablish injection.</p> <p>1. Safety Significance: Precludes loss of primary containment integrity and uncontrolled release of radioactivity into the environment. Failure to stop RPV injection flow would delay the reduction in core inlet subcooling, thus increasing the potential for flux oscillations.</p> <p>2. Cues: Procedural compliance.</p> <p>3. Measured by: Observation - With Emergency Depressurization not required and >4% power, injection systems are terminated and prevented until RPV level <100 inches.</p> <p>4. Feedback: Injection system flow rates into RPV.</p>

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Event Description: Critical Task #4

Cue:

Time	Position	Applicant's Actions or Behavior
		<p>With Containment pressure exceeding 0.8 psig and prior to reaching the Pressure Suppression Pressure (15 psig), initiate Containment Spray.</p> <ol style="list-style-type: none"> 1. Safety Significance: <ul style="list-style-type: none"> Precludes degradation of a fission product barrier. 2. Cues: <ul style="list-style-type: none"> Containment pressure increase. <p>Procedural compliance.</p> <ol style="list-style-type: none"> 3. Measured by: <ul style="list-style-type: none"> Observation - When above 0.8 psig, Containment Spray is manually initiated prior to reaching the Pressure Suppression Pressure (15 psig). 4. Feedback: <ul style="list-style-type: none"> Containment pressure. "CONTAINMENT SPRAY START SIGNAL RECEIVED" annunciator status. Containment Spray flowrate.

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Event Description: Critical Task #5

Cue:

Time	Position	Applicant's Actions or Behavior
		<p>With Containment pressure decreasing due to Containment Spray operation, before containment pressure lowers below 0 psig, terminate Containment Spray.</p> <ol style="list-style-type: none"> 1. Safety Significance: <ul style="list-style-type: none"> Precludes degradation of a fission product barrier. 2. Cues: <ul style="list-style-type: none"> Containment pressure decreasing due to Containment Spray operation. Procedural compliance. 3. Measured by: <ul style="list-style-type: none"> Observation - Containment Spray terminated before containment pressure lowers to - 0.1 psig on validated SPDS (less than 0 psig if SPDS not available) and the first Containment Vacuum Breaker Check Valve opens. 4. Feedback: <ul style="list-style-type: none"> Containment pressure. Containment Spray flowrate. Containment Spray valve status.

Facility: Perry

Scenario No.: 4 - 80%

Op-Test No.: 2021-1

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

Turnover: Power was lowered 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. 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.](#)

Critical Tasks:

1. Insert control rods to allow cooldown to commence
2. Commence cooldown to terminate steam leak.
3. Control RPV level above L1 using HPCS or feedwater.
4. Inhibit ADS (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:

EOP-01

EOP-01-5

EOP-03

ABNORMALs:

ONI-C51

ARI-H13-P601-17-B6

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.

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Event Description: N/A - Driver Instructions

Cue:

Time	Position	
Driver	Driver	<p><u>Simulator Setup:</u></p> <p>Reset Simulator to IC 109</p> <p>Load Schedule File: NRC 2021-SCEN-4.sch</p> <p>Verify Event File: NRC 2021-SCEN-4.evt loads</p> <p>Load the ATWS rod position patch file RaysLoATWS.dat from PSIMA computer in the computer room as follows:</p> <p style="padding-left: 40px;">Login using RYAN – password = “ryan_2008”</p> <p style="padding-left: 40px;">On the executive window:</p> <ol style="list-style-type: none"> 1. Place simulator in FREEZE 2. Click on the Run Patch (pumpkin) icon 3. Double click on the RaysLoATWS.dat file 4. Click on the Messages icon – check for error messages in the popup window 5. Close the Messages popup window if no error messages 6. Place the simulator in RUN <p>Obtain pictures of xxx and xxx Trip Units.</p> <p>Remove Requal IOI-3 and Rod Book from horseshoe.</p> <p>Markup Crew Sheet to show who is supporting RHR shutdown.</p> <p>Add SYM STATUS placard with “1N62-F601 100% open”</p> <p>Add SYM STATUS placard below ESW B with “CCCW B is running”</p>
Driver	Driver	<p><u>Verify Initial Conditions:</u></p> <p>Reactor Power 80%. A2 Training.SEQ Pull Sheets, Rods @ Step 63.</p> <p>IOI-3 Attachment 3.</p> <p>Place yellow switch cap on C41-C001B, P47-C001C & P47-B001C.</p> <p>Green Risk.</p>

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Event Description: N/A - Driver Instructions

Cue:

Time	Position	
Driver	Driver	<p><u>Initial Conditions:</u></p> <p>Power was lowered 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. SLC B Pump OOS for motor replacement. Rx vessel head flange inner seal indicates failed. PSA Risk is Green and Grid Risk is Normal.</p> <p><u>Turnover:</u> Planned activities;</p> <p>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.</p>

Op-Test No.: 2021-01		Scenario No.: 4 – 80%	Page 3 of 25
Event Description: 1 - Shutdown RHR B to standby			
Cue: From Turnover			
Time	Position	Applicant's Actions or Behavior	
	Driver	Role play as an NLO as directed.	
	SRO	Direct BOP to shutdown RHR B to standby IAW SOI-E12, Residual Heat Removal System. Provide oversight .	
	Evaluator	SOI-E12 Steps 6.2.1 and 6.2.6 are N/A	
	BOP	<p>Perform SOI-E12 Section 6.2 to shutdown RHR B pump.</p> <p>6.2 Suppression Pool Cooling/Test Mode Shutdown to Standby Readiness for RHR A(B)</p> <p>6.2.1 IF the associated Combustible Gas Mixing System is running, THEN REFER TO SOI-M51/56 and SHUTDOWN the Combustible Gas Mixing System.</p> <p>6.2.2 IF the Offgoing RHR TEST VALVE TO SUPR POOL is open, THEN PERFORM the following: 1E12-F024B</p> <p>6.2.2.a THROTTLE the following as needed to adjust the Offgoing RHR PUMP FLOW 6000-6500 gpm:</p> <p>RHR HX'S OUTLET VALVE. 1E12- F003B</p> <p>RHR HX'S BYPASS VALVE. 1E12- F048B</p> <p>6.2.2.b TAKE the Offgoing RHR TEST VALVE TO SUPR POOL to CLOSE. 1E12-F024B</p> <p>6.2.2.c WHEN time permits, THEN RECORD the closing of RHR TEST VALVE TO SUPR POOL in the Plant Narrative Log.</p> <p>6.2.2.d WHEN RHR PUMP FLOW is less than 1650 gpm, THEN VERIFY the RHR PUMP MIN FLOW VALVE opens. 1E12-F064B</p> <p>6.2.2.e VERIFY the RHR TEST VALVE TO SUPR POOL is closed. 1E12-F024B</p> <p>6.2.3 HOLD the RHR HX'S BYPASS VALVE in OPEN, UNTIL open. 1E12-F048B</p> <p>6.2.4 HOLD the RHR HX'S OUTLET VALVE in OPEN, UNTIL open. 1E12-F003B</p> <p>6.2.5 RECORD appropriate Maintenance Rule status in Plant Narrative Log.</p> <p>6.2.6 IF the associated Water Leg Pump is NOT available . . .</p>	

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Event Description: 1 - Shutdown RHR B to standby

Cue: From Turnover

Time	Position	Applicant's Actions or Behavior
		<p>6.2.7 TAKE the RHR Pump to STOP. 1E12-C002B</p> <p>6.2.8 REFER TO the applicable SOI and PLACE the following in the desired mode for plant conditions:</p> <ul style="list-style-type: none"> • SOI-P42 - Emergency Closed Cooling System. • SOI-P45/49 - Emergency Service Water System. <p>6.2.9 PERFORM independent verification of the required components.</p>
	Evaluator	Per step 6.2.8, ESW and ECC B will remain running to support Control Complex Chiller B operation.
	BOP	Request ATC to perform IV. Report to SRO that RHR B loop is in standby.
	SRO	Evaluate Tech Specs. Review IV form and declare RHR B Operable per TS 3.5.1.

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 Event Description: 2 - Commence Rx Power increase to 100%
 Cue: From Turnover

Time	Position	Applicant's Actions or Behavior
	Driver	Role-play as SCC and contact Control Room SRO to request raising power to 100%. Role-play as NLO, SCC, RP, Chemistry, and Reactor Engineer as directed.
	SRO	Direct ATC to raise reactor power to 100% IAW the Reactivity Plan and IOI-3, Power Maneuvering, Attachment 3. Provide oversight
	Evaluator	It is expected that the ATC will use Recirc Flow to raise power. ATC should maintain Loop Flow mismatch <5% (observable on overhead screen) Event 3 (next page) will initiate automatically when FCV is > 35.5% open. Loop Flow mismatch will be >5% when FCV A is locked up.
	ATC	Notify RP and Chemistry of intended power change
	ATC	Perform SOI-B33, Reactor Recirculation System Section 7.7, Rcirc Flow Control in Loop Manual 7.7.1 Confirm RCIRC LOOP FLOW CONTROL is in MAN. 1B33K603A 7.7.2 Confirm RCIRC LOOP FLOW CONTROL is in MAN. 1B33K603B 7.7.3 Adjust the following as required for the desired Recirc Flow while maintaining recirculation loop flow mismatch within limits: <ul style="list-style-type: none"> • RCIRC LOOP FLOW CONTROL 1B33K603A • RCIRC LOOP FLOW CONTROL 1B33K603B 7.7.4 When Rcirc Flow Control valves are full open, 1B33K603A/ 1B33K603B then verify that the RCIRC LOOP FLOW CONTROL is not in saturation (approximately 0%/SEC) by monitoring the ICS point RECIRC FCV VEL CONT OUTPUT. B33 EA015/ B33 EA016
	ATC	Inform SCC of power increase hold.

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Event Description: 3 - Recirc FCV A fails and continues to open with no demand. Lockup FCV A. enter ONI-C51. Evaluate TS 3.4.1

Cue: Rx power increasing with no operator action

Time	Position	Applicant's Actions or Behavior
	Driver	When FCV A > 35.5% open, Event 3 will automatically insert. Role-play as NLO, SCC, RP, Chemistry, and Reactor Engineer as directed.
	ATC	Inform SRO that FCV A is continuing to open with no operator action and will be locking up FCV A. Locks up FCV A by arming and depressing A HPU Shutdown Pushbutton. Informs SRO of ONI-C51 Entry Condition.
	SRO	Enters ONI-C51, Unplanned Change in Reactor Power or Reactivity and works through the flowchart.
	SRO	Verifies ONI-C51 Immediate Actions are complete. Directs BOP to verify A HPU A is shutdown IAW SOI-B33.
	BOP	Performs SOI-B33 Sect 7.20 to verify A HPU is shutdown. 7.20 HPU Emergency Shutdown 7.20.1 DURING HPU Shutdown: <ul style="list-style-type: none"> • PERIODICALLY MONITOR FCV position. • CONFIRM the JP LOOP FLOW MISMATCH remains within the Technical Specification limits. 7.20.2 ARM AND DEPRESS the offgoing HPU SHUTDOWN button. B33-S109A 7.20.3 CONFIRM the following on 1H13-P614, NSSS Recorder Panel. <ul style="list-style-type: none"> • The HPU Subloop 1 MAINTENANCE light comes on. • The HPU Subloop 2 MAINTENANCE light comes on. • The Lead HPU Subloop OPERATIONAL light goes off. • The Lead HPU Subloop PUMP MTR RUN/FAN MTR RUN light goes off. • The Lead HPU Subloop PUMP MTR STOP/FAN MTR STOP light comes on. • The Standby HPU Subloop READY light goes off. 7.20.4 CONFIRM the following annunciators alarm for the offgoing HPU: <ul style="list-style-type: none"> • FCV REDNT SUB LOOP INOP. FCV A • FCV HPU INOP. FCV A • FCV MOTION INHIBITED. FCV A
	Evaluator	The remaining SOI-B33 steps are N/A

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Event Description: 3 - Recirc FCV A fails and continues to open with no demand. Lockup FCV A. enter ONI-C51. Evaluate TS 3.4.1

Cue: Rx power increasing with no operator action

Time	Position	Applicant's Actions or Behavior
	SRO	Direct ATC to monitor for power oscillations and scram the Rx if oscillations are observed. Works way through C51-4 IWE leg.
	ATC	Monitors for power oscillations.
	SRO	Directs BOP to perform ONI-SPI G-4, Power Verification.
	BOP	Performs ONI-SPI-G-4 to verify thermal limits have not been exceeded.
	SRO	Answers YES to question, "Has an unplanned Reactor Power rise occurred" Directs ATC to lower power with B FCV.
	ATC	Lowers Rx power with B FCV to value prior to A FCV movement. (~85%) Informs SRO when power reduction is complete.
	Evaluator	No further actions in this leg of ONI-C51 are applicable.
	SRO	Works way through C51-12 IWE Leg. Directs ATC to confirm Jet Pumps are operating within established limits.
	ATC	Reviews SPDS to confirm Jet Pumps are operating within established limits and informs SRO.
	SRO	Works way down to Hold Box, "When Recirc Flow mismatch exceeds Tech Spec limits THEN proceed". Directs BOP to perform ONI- SPI G-2, Single Pump Operation. Refers to Tech Spec 3.4.1 and determines mismatch exceeds TS limits.
	BOP	Performs ONI-SPI G-2 to record loop parameters,
	SRO	Determines that Single Loop Operation is required within 2 hours.
	SRO	Evaluate Technical Specifications <u>TS 3.4.1 Action</u> A.1 Declare the recirculation loop with lower flow to be "not in operation." - 2 hours B.1 Reduce thermal power to ≤ 2500 MWt. - 1 hour
	Evaluator	Action B.1 not entered until Action A.1 is complete.

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 Event Description: 4 - Service Water Pump D trips. Enter ONI-P41 & shift SW pumps
 Cue: ARI-H13-P680-08-B4 & ARI-H13-P970-B8

Time	Position	Applicant's Actions or Behavior
	Driver	<ul style="list-style-type: none"> When directed, initiate Event 4. Role play as an NLO and Chemistry as directed. If asked SW Pump seal flow is 2.0 gpm If asked to investigate the pump, report no abnormal conditions apparent. If asked to investigate the breaker, report breaker XH2101 50G relay (ground) is tripped
	ATC	Announce unexpected P970 alarm and give stability report
	BOP	<p>Investigate P970 alarm and announce SW PUMP DISCH HEADER PRESSURE LOW alarm. Walkdown P970 and determine that Service Water Pump D is not running.</p> <p>Reviews ARI and determines there are no Automatic or Immediate Operator Actions for this annunciator.</p> <p>Reviews ARI Subsequent Operator Action and performs the following:</p> <ul style="list-style-type: none"> Informs crew of ONI-P41 entry condition Adjusts P41-F400 to clear low pressure alarm Dispatch operators.
	SRO	<p>Enters ONI-P41, Loss Of Service Water.</p> <p>Directs BOP to perform starting additional Service water pumps IAW SOI-P40/41.</p>
	BOP	<p>Starts Service Water Pump C IAW SOI-P40/41 sect 4.2.</p> <p>4.2.1 IF Operations personnel are available to verify seal water flow, THEN PERFORM the following:</p> <p>4.2.1.a THROTTLE, as necessary, the SW Pump Lube Water Supply valve to maintain the oncoming Service Water Pump seal flow between 1.0 and 3.0 gpm.</p> <p>4.2.2 TAKE the oncoming SW PUMP DISCH VLV to OPEN. P41-F040C</p> <p>4.2.3 WHEN the blue light comes on, THEN PRESS the STOP button.</p> <p>4.2.4 TAKE the oncoming SW PUMP to START. P41-C001C</p> <p>4.2.5 WHEN the oncoming SW PUMP AMPS stabilize, THEN TAKE the SW PUMP DISCH VLV to OPEN. P41-F040AC</p> <p>4.2.6 WHILE the SW PUMP DISCH VLV is opening, THROTTLE the NCC HX SW BYPASS VLV to maintain pump discharge pressure 55 to 60 psig. P41-F400</p>

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Event Description: 4 - Service Water Pump D trips. Enter ONI-P41 & shift SW pumps

Cue: ARI-H13-P680-08-B4 & ARI-H13-P970-B8

Time	Position	Applicant's Actions or Behavior
		4.2.7 DIRECT Chemistry to place the Service Water Chlorination and Dechlorination System in operation in accordance with SOI-P48/84B.
	BOP	Report completion of SW pump start.
	Evaluator	May do SOI-P40/41 sect 6.2 to S/D tripped pump.

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Event Description: 5 - AEGT fan A has low flow. Start AEGT Fan B. Evaluate TS 3.6.4.3

Cue: ARI-H13-P800-01-A1

Time	Position	Applicant's Actions or Behavior
	Driver	<ul style="list-style-type: none"> When directed, initiate Event 5. Role play as an NLO and Chemistry as directed. Review ARI-H13-P800-01-A1 for in-field activities. If asked, flow is 1550 CFM and fan is making loud noise.
	ATC	Announce unexpected P800 alarm and give stability report
	BOP	<p>Investigate P800 alarm and announce ANNULUS EXH FAN A FLOW LOW alarm. Walkdown P800 and report annulus ΔP degrading trend.</p> <p>Reviews ARI for Cause Of Alarm and determines that AEGT Fan B should auto start if AEGT Fan A flow is low enough and there no Immediate Operator Actions for this annunciator.</p> <p>Reviews ARI Subsequent Operator Action and informs SRO that shifting AEGT fans is required:</p> <p>4.1 Refer to SOI-M15 and shift operating trains from A to B.</p>
	SRO	Directs BOP to shift AEGT fans from A to B.
	BOP	<p>Performs SOI-M15 Sect 7.1 to shift operating trains.</p> <p>7.1.1 IF Backup DW Purge is in operation, THEN NOTIFY the Chemistry Unit to sample in accordance with REC-0104.</p> <p>7.1.2 TAKE the oncoming AEGT FAN to START. 1M15-C001B</p> <p>7.1.3 WHEN 1 to 2 minutes have elapsed since starting the oncoming AEGT FAN, THEN CONFIRM annulus pressure is maintained between 0.75” and 1.0” H2O vacuum.</p> <ul style="list-style-type: none"> ANNULUS DIFF PRESSURE RECORDER 1M15-R016A ANNULUS DIFF PRESSURE RECORDER 1M15-R016B <p>7.1.4 CONFIRM the oncoming ANNULUS EXH FAN FLOW LOW annunciator window is reset. 1H13-P800-1 D1</p> <p>7.1.5 TAKE the offgoing AEGT FAN in STOP. 1M15-C001A.</p>

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Event Description: 5 - **AEGT fan A has low flow. Start AEGT Fan B. Evaluate TS 3.6.4.3**

Cue: ARI-H13-P800-01-A1

Time	Position	Applicant's Actions or Behavior
		<p>7.1.6 WHEN 1 to 2 minutes have elapsed since stopping the offgoing AEGT FAN, THEN CONFIRM Annulus pressure is maintained between 0.75” and 1.0” H2O vacuum on ANNULUS DIFF PRESSURE RECORDER. 1M15-R016A 1M15-R016B</p> <p>7.1.7 CONFIRM the following for the offgoing AEGT train:</p> <ul style="list-style-type: none"> • AEGT RCIRC DAMPER closes. 1M15-F070A 1M15-F070B • AEGT EXH DAMPER opens. 1M15-F080A 1M15-F080B <p>7.1.8 PERFORM independent verification of the required components.</p> <p>Informs SRO when AEGT fan shift is complete</p>
	SRO	<p>Evaluate Tech Specs</p> <p><u>TS 3.6.4.3 Actions</u></p> <p>A.1 Restore AEGT subsystem to OPERABLE status. – 7 days</p>

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Event Description: 6 - Steam leak in RCIC Pump room - Enter EOP-03

Cue: ARI-H13-P601-21-E2 & D2

Time	Position	Applicant's Actions or Behavior
	Driver	<ul style="list-style-type: none"> When directed, initiate Event 6. If asked, fire protection sprinklers are spraying in RCIC room. If directed to start RCIC room cooler, wait appropriate amount of time and initiate Event 26 and inform control room. If directed to terminate Fire sprinklers in RCIC room, wait appropriate amount of time and initiate Event 25.
	Evaluator	It takes ~ 1 min 30 seconds for first alarm after event is inserted.
	ATC	Announce unexpected P601 alarm and give stability report
	BOP	<p>Investigate P601 alarm and announce RCIC ROOM AMB TEMP HIGH P632 alarm.</p> <p>Walkdown P632 and report value of RCIC room temperature and rising trend.</p> <p>Reviews ARI for Cause Of Alarm and determines that RCIC will isolate if temperature exceeds 143 °F.</p> <p>When annunciator RCIC ISOL RCIC ROOM AMB TEMP HIGH alarms, announce entry condition for EOP-03.</p>
	SRO	<p>Enter EOP-03</p> <p>Directs BOP to monitor and control Secondary Containment Parameters.</p> <p>Directs BOP to verify RCIC room cooler is operating.</p>
	BOP	Contact NLO to start RCIC room cooler IAW SOI-M39, ECCS Pump Rooms Cooling System
	SRO	Directs BOP to isolate RCIC.
	Evaluator	Continue on next page.

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Event Description: 7 - RCIC isolation valves E51-F063 & F064 fail to auto isolate. Manually isolate RCIC valves			
Cue: ARI-H13-P601-21-D2			
Time	Position	Applicant's Actions or Behavior	
	Driver	If directed to investigate MCC buckets wait several minutes then report: E51-F063 – EF1D07-XN – found burnt control power transformer. E51-F064 – EF1A07-U – found 3 blown mainline fuses.	
	SRO	Directs isolation of RCIC per EOP-03.	
	Evaluator	One of the RCIC containment isolation valves will fail upon taking it to CLOSE. The other RCIC containment isolation valve will fail when partially closed.	
	BOP	Observes P601 and identifies that RCIC failed to automatically isolate. Inform SRO of failure of RCIC to isolate and attempt to close E51-F063 and E51-F064. Inform SRO of RCIC valve failures. Dispatch NLOs to investigate valve failures.	
	SRO	Determines isolation of RCIC was not successful and transitions to EOP-01 and directs a Rx scram prior to exceeding Max Safe Temperature in RCIC room.	

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Event Description: 8 - RCIC failed to fully isolate. Enter EOP-01 & Scram Rx prior to EOP-3 Max Safe Limit

Cue: Loss of power to RCIC valves

Time	Position	Applicant's Actions or Behavior
	SRO	Enters EOP-1 and directs ATC to insert a Rx scram prior to exceeding Max Safe Temperature in RCIC room.
	ATC	Inserts a manual Rx scram by locking the Mode Switch in SHUTDOWN. (Critical Task 1) Observes all control rods did not insert and Arms & Depresses RPS pushbuttons. Observes all control rods did not insert and Arms and Depresses ARI pushbuttons.
	ATC	Commence Reactor Scram Hardcard actions 1. VERIFY the following actions completed: <ul style="list-style-type: none"> • Mode Switch Locked in Shutdown (Note power once scram signal inserted) • RPS Initiated, if all control rods are not fully inserted • ARI Initiated, if RPS failed to Scram the reactor 2. IF Reactor Power is above 4% OR unknown, THEN PERFORM the following: 3. STABILIZE Reactor level using Feedwater / RCIC / HPCS
	Evaluator	Step 2 of the scram Hardcard is N/A.
	ATC	4. STABILIZE Reactor pressure using Turbine / Turbine Bypass valves / SRV's 5. PERFORM crew update with the following information: <ul style="list-style-type: none"> • “The Mode Switch is locked in shutdown”, (RPS and ARI initiated if required) • Reactor Power is _____ (~1%) _____ ↑ ↔ ↓ • Reactor Pressure is _____ psig ↑ ↔ ↓ • Reactor Level is _____ inches ↑ ↔ ↓ • EOP-01 Entry IS / IS NOT met • IF MSIVs are closed, THEN a Time Critical Operator Action for Suppression Pool Cooling is applicable. Time: _____.
	SRO	Continues EOP-01 actions. Answers NO to “Is the Reactor shutdown by control rods” and transitions to EOP-01-5.

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Event Description: 9 - ATWS<4% enter EOP-01-05

Cue: Rx Power indication

Time	Position	Applicant's Actions or Behavior
	SRO	<p>Transition to EOP-01-5, ATWS RPV Control</p> <p>Enters Level Control leg:</p> <p>Directs BOP to Inhibit ADS (Potential Critical Task)</p> <p>Direct BOP to verify Actuators and Isolations for L3 and possibly L2.</p> <p>Direct BOP to perform EOP-SPI 2.5, Bypass of LOCA Interlocks.</p> <p>Direct ATC to maintain RPV level band of 178 to 219 inches (nominal) or -25 to 219 inches (maximum)</p> <p>Will enter EOP-02, Primary Containment Control to initiate H2 control actions.</p> <p>Loops from Decision Diamond "Is Hot Shutdown Weight Boron injected back to IWE step.</p>
	Evaluator	Depending on timing, Rx may be subcritical and US will transition to ONI-C71-1, Rx Scram vs. transitioning to EOP-01-5
	SRO	Enters EOP-02 and directs BOP to startup H2 analyzers and H2 igniters.
	BOP	<p>Inhibits ADS (Potential Critical Task)</p> <p>Performs Actuators and Isolations Hardcard.</p> <p>Performs EOP-SPI 2.5.</p> <p>Starts H2 analyzers and H2 igniters</p>
	Evaluator	<p>When the ATC trips the RFPTs per the Feedwater Hardcard, the Motor Feed Pump will develop low oil pressure and trip. See Event 10 for level recovery actions.</p> <p>Inhibiting ADS becomes a Critical Task if RPV level cannot be maintained > L1 with FW or HPCS)</p>
	ATC	Determines RPV level is lowering and will need to restart a RFPT or use HPCS.
	SRO	<p>Enters Pressure Control leg:</p> <p>Direct ATC to maintain pressure band of 800 to 1000 psig (nominal) or 350 to 1065 psig max.</p> <p>Waits in Hold box until reactor is not critical to depressurize.</p>
	ATC	<p>Maintains RPV pressure in directed band.</p> <p>Informs SRO of lowering RPV pressure and performs Pressure Control Hardcard actions.</p>
	SRO	<p>Enters Power Control leg:</p> <p>Directs ATC to perform EOP-SPI 1.1 through 1.7 to insert control rods. (Critical Task 1)</p>

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Event Description: 9 - ATWS<4% enter EOP-01-05

Cue: Rx Power indication

Time	Position	Applicant's Actions or Behavior
		Waits in Hold box until control rods are inserted.

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 Event Description: 10- Motor Feed pump fails due to loss of oil. Use HPCS to control level
 Cue: RI-H13-P680-0003-D8, A1, & A2

Time	Position	Applicant's Actions or Behavior
	ATC	Determines no feedwater pumps are operating and restarts a RFPT IAW ONI-C34 or injects with HPCS IAW EOP-SPI 6.4. (Critical Task 3)
	Evaluator	The RFPT will provide more stable level control than HPCS.
	BOP	<p>Inject with HPCS IAW EOP-SPI 6.4, HPCS Injection</p> <p>1.0 IF the HPCS pump is in Standby Readiness AND the Reactor is shutdown, THEN PERFORM the following:</p> <p>1.1 IF HPCS ESW PUMP is available, THEN VERIFY HPCS ESW PUMP is RUNNING. 1P45-C002</p> <p>1.2 VERIFY HPCS PUMP is RUNNING. 1E22-C001</p> <p>1.3 OPERATE HPCS INJECTION VALVE. 1E22-F004</p> <p>1.4 IF finer control of RPV injection is desired, THEN GO TO Step 3.0.</p> <p>3.0 IF finer control of RPV injection is desired, THEN PERFORM the following:</p> <p>3.1 VERIFY HPCS LOGIC BYPASS E22-F023 keylockswitch in BYPASS. 1E22AS25</p> <p>3.2 IF HPCS INJECTION VALVE is CLOSED, THEN THROTTLE HPCS TEST VALVE TO SUPR POOL to obtain HPCS Pump flow of 4800-5000 gpm. 1E22-F023</p> <p>3.3 PERFORM the following to establish desired RPV level:</p> <ul style="list-style-type: none"> • OPERATE HPCS INJECTION VALVE. 1E22-F004 • THROTTLE HPCS TEST VALVE TO SUPR POOL. 1E22-F023
		<p>Restart RFPT IAW ONI-C34, Feedwater Flow Malfunction,</p> <p>4.4 Reactor Feed Pump Quick Restart</p> <p>4.4.2 VERIFY the following steamline drain control switches in OPEN on 1H13-P870.</p> <ul style="list-style-type: none"> • RFPT HP STOP BELOW SEAT DRAIN 1N22-F240A / 1N22-F240B • RFPT HP STOP ABOVE SEAT DRAIN 1N22-F245A / 1N22-F245B • RFPT FIRST STAGE DRAIN 1N22-F260A / 1N22-F260B • RFPT LP STOP BELOW SEAT DRAIN 1N22-F250A / 1N22-F250B • RFPT LP STOP ABOVE SEAT DRAIN 1N22-F255A / 1N22-F255B <p>4.4.3 VERIFY the cause of the trip has been corrected.</p> <p>4.4.4 IF any of the REACTOR HI LEVEL TRIP RESET amber lights are lit, THEN DEPRESS the applicable REACTOR HI LEVEL TRIP RESET pushbutton.</p>

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Event Description: 10- Motor Feed pump fails due to loss of oil. Use HPCS to control level

Cue: RI-H13-P680-0003-D8, A1, & A2

Time	Position	Applicant's Actions or Behavior
		<p>4.4.5 TURN the RFPT MANUAL SPEED CONTROL fully counterclockwise.</p> <p>4.4.6 CONFIRM At least one RFBP is operating.</p> <p>4.4.7 VERIFY BYPASSED one of the RFP Suction Flow transmitters for the on-coming RFP:</p> <p>4.4.8 DEPRESS the RFPT RESET pushbutton. 1N27-S25 / 1N27-S29</p> <p>4.4.9 TRANSFER the affected RFPT(s) to the Manual Speed Control Dial.</p> <p>4.4.10 PERFORM the following concurrently.</p> <ul style="list-style-type: none"> • INCREASE RFP speed to set RFP Discharge pressure 25-100 psig below Reactor Pressure using the RFPT MANUAL SPEED CONTROL. 1N27-R425A/B • HOLD RFPT DISCH VALVE control switch in OPEN, UNTIL the valve is fully open. 1N27-F100A/B <p>4.4.11 ADJUST turbine speed to maintain desired RPV level using the RFPT MANUAL SPEED CONTROL. 1N27-R425A/B</p> <p>4.4.12 CONTROL RPV level using the manual flow controller. C34-R601A/B</p> <p>4.4.13 WHEN time permits, THEN PERFORM the following:</p>

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Event Description: Scenario Termination Criteria

Cue:

Time	Position	Applicant's Actions or Behavior
		1. Reactor not critical.
		2. RPV level is being maintained > L1
		3. Cooldown commenced with cooldown rate < 100 °F hour
		4. Lead Examiner's discretion

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Event Description: Critical Task #1

Cue:

Time	Position	Applicant's Actions or Behavior
		<p>With a reactor scram required and the reactor not shutdown, initiate action to reduce power by inserting control rods.</p> <ol style="list-style-type: none"> 1. Safety Significance: <ul style="list-style-type: none"> Shutting down reactor allows for depressurization which can reduce release rate from an unisolable primary system leak. 2. Cues: <ul style="list-style-type: none"> Procedural compliance. 3. Measured by: <ul style="list-style-type: none"> Observation - If operating per the REACTOR SCRAM HARDCARD and RO determines that Rx is not shutdown (Rx power > Range 3 on IRMs) AND Control Rod insertion commenced in accordance with Section 1.0 of EOP-SPIs. 4. Feedback: <ul style="list-style-type: none"> Reactor Power trend. Control Rod indications.

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Event Description: Critical Task #2

Cue:

Time	Position	Applicant's Actions or Behavior
		<p>With a primary system discharging into the secondary containment, and the reactor not critical, commence a pressure reduction as required to maintain, $\leq 100^{\circ}\text{F}/\text{Hr}$. cooldown rate limit.</p> <ol style="list-style-type: none"> 1. Safety Significance: Reducing release rate from high energy sources can preclude failure of secondary containment and subsequent radiation release to the public. 2. Cues: Procedural compliance. RPV pressure trend Cooldown rate. 3. Measured by: Operator manually starts cooldown using available pressure control systems. 4. Feedback: Reactor pressure trend.

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Event Description: Critical Task #3

Cue:

Time	Position	Applicant's Actions or Behavior
		<p>Prior to Reactor Level lowering to ADS automatic initiation setpoint (RPV Level 1), restore high-pressure injection source to control Reactor Level.</p> <ol style="list-style-type: none"> 1. Safety Significance: <ul style="list-style-type: none"> With the Main Condenser is available as a heat sink for depressurization of the Reactor, initiation of ADS will unnecessarily increase the energy released to the primary containment. 2. Cues: <ul style="list-style-type: none"> Procedural compliance. Reactor Level trend. 3. Measured by: <ul style="list-style-type: none"> Observation - Reactor Level maintained greater than 16.5". Observation – ADS valves do not open on low reactor level. 4. Feedback: <ul style="list-style-type: none"> Reactor level trend HPCS Pump status Reactor Feedwater Pump status

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Event Description: Critical Task #4 (Potential)

Cue:

Time	Position	Applicant's Actions or Behavior
		<p>With reactor scram required and the reactor not shutdown, to prevent an uncontrolled RPV depressurization and subsequent power excursion, inhibit ADS.</p> <ol style="list-style-type: none"> 1. Safety Significance: <ul style="list-style-type: none"> Precludes core damage due to an uncontrolled reactivity addition. 2. Cues: <ul style="list-style-type: none"> Procedural compliance. 3. Measured by: <ul style="list-style-type: none"> ADS logic inhibited prior to an automatic initiation. 4. Feedback: <ul style="list-style-type: none"> RPV pressure trend. RPV level trend. ADS "ADS OUT OF SERVICE" annunciator status.

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. 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](#)..

Critical Tasks:

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”.

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 2 nd 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-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 B 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.

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 SOI-N27. The crew will enter ONI-C51 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 B 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 ONI-C71-1.
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. If the crew is unable to maintain RPV level > -25", the crew will ED per EOP-01-5 and enter EOP-02. (Contingency)

EOPs:

EOP-01

EOP-01-01

EOP-01-5 (if ED is required)

EOP-02 (if exceed 95 °F in SP)

ABNORMALs:

ARI-H13-P680-03-D1

ARI-H13-P680-08-A1

ONI-C11-1

ONI-C51

ONI-C71-1

Critical Tasks:

W/I 20 minutes of CRD pump failure insert Rx scram or restore CRD Drive water pressure

Anticipate Ed to preclude ED on lowering RPV level or ED if cannot maintain RPV level > -25".

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Event Description: N/A - Driver Instructions

Cue:

Time	Position	
Driver	Driver	<p><u>Simulator Setup:</u></p> <p>Reset Simulator to IC 110</p> <p>Load Schedule File: NRC 2021-SCEN-5.sch</p> <p>Verify Schedule File: NRC 2021-SCEN-5 Setup.sch loads</p> <p>Verify Schedule File: NRC Infotag.sch loads</p> <p>Verify Event File: NRC 2021-SCEN-5.evt loads</p>
Driver	Driver	<p><u>Verify Initial Conditions:</u></p> <p>Reactor Power 77%. A2 Training.SEQ Pull Sheets, Rods @ Step 61</p> <p>IOI-3 Step 4.6 is in progress.</p> <p>Place yellow switch cap on SLC B pump, HPCS pump & injection valve.</p> <p>Markup crew sheet for Stator Water Cooling pump shift support</p> <p>Green Risk.</p>
Driver	Driver	<p><u>Initial Conditions:</u></p> <p>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 B pump is OOS for motor replacement. PSA Risk is Green and Grid Risk is Normal.</p> <p><u>Turnover:</u> Planned activities.</p> <p>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.</p>

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Event Description: 1 - Lower Rx Power to 72% with Recirc flow			
Cue: From Turnover			
Time	Position	Applicant's Actions or Behavior	
	Driver	Role play as directed.	
	Evaluator	It is expected that the ATC will use Recirculation flow to lower power. ATC should maintain Recirc Loop flow mismatch < 5%. Target Rx power is 2705 MWT.	
	ATC	Notify RP and Chemistry of the intended power change.	
	ATC	<p>Perform SOI-B33, Reactor Recirculation System Section 7.7, Rcirc Flow Control in Loop Manual</p> <p>7.7.1 Confirm RCIRC LOOP FLOW CONTROL is in MAN. 1B33K603A</p> <p>7.7.2 Confirm RCIRC LOOP FLOW CONTROL is in MAN. 1B33K603B</p> <p>7.7.3 Adjust the following as required for the desired Recirc Flow while maintaining recirculation loop flow mismatch within limits:</p> <ul style="list-style-type: none"> • RCIRC LOOP FLOW CONTROL 1B33K603A • RCIRC LOOP FLOW CONTROL 1B33K603B <p>7.7.4 When Rcirc Flow Control valves are full open, 1B33K603A/ 1B33K603B then verify that the RCIRC LOOP FLOW CONTROL is not in saturation (approximately 0%/SEC) by monitoring the ICS point RECIRC FCV VEL CONT OUTPUT. B33 EA015/ B33 EA016</p>	
	ATC	Report to SRO that Reactor power has been lowered to 72% power by lowering Rx Recirc flow.	
	SRO	Report to SCC that power is at 72%	

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Event Description: 2 - Shift Stator Water Cooling Pumps A→B running

Cue: From Turnover

Time	Position	Applicant's Actions or Behavior
	Driver	<ul style="list-style-type: none"> • Role play as NLO as directed. • When directed to depress the TEST pushbutton, initiate Event 2, report start. • When directed to report deionizer flow, report flow is 100 gpm • Acknowledge local alarms in Xtreme View.
	SRO	Direct BOP to perform shift of Stator Water Cooling Pumps IAW SOI-N43. Provide oversight .
	BOP	Performs shift of Stator Water Cooling Pumps per SOI-N43, Stator Water Cooling System. 7.3 Shifting Running Stator Cooling Pumps 7.3.1 PLACE the oncoming STATOR COOLING PUMP in ON. 1N43-C001B 7.3.2 PLACE the offgoing STATOR COOLING PUMP in OFF. 1N43-C001A 7.3.3 PLACE the offgoing STATOR COOLING PUMP in STBY. 1N43-C001A 7.3.4 IF desired to check the standby STATOR COOLING PUMP pickup feature, THEN PERFORM the following: 7.3.4.a DEPRESS the STATOR COOLANT PUMP TEST pushbutton at 1H51-P176. 7.3.4.b VERIFY the standby pump starts. 7.3.4.c RELEASE the STATOR COOLANT PUMP TEST pushbutton. 7.3.4.d PLACE the offgoing STATOR COOLING PUMP control switch in OFF. 1N43-C001A 7.3.4.e PLACE the standby STATOR COOLING PUMP control switch in STBY. 1N43-C001A
	BOP	Direct NLO to perform Step 7.3.5 7.3.5 ADJUST Deionizer Inlet Valve to achieve a flow through the Deionizer of approximately 100 gpm.
	BOP	Inform SRO when pump shift is complete.

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Event Description: 3 - RFBP A trips. Manually start RFBP B. Enter ONI-C51

Cue: ARI-H13-P680-03-D1 & C2

Time	Position	Applicant's Actions or Behavior												
	Driver	When directed initiate Event 3 . Role play as NLO as directed. If asked to investigate at the pump, no apparent problems at the pump. If asked to investigate at the breaker, breaker H1106 50G relay (ground) is tripped.												
	Evaluator	Crew may need to enter ONI-C51 based on power changed caused by RPV level change if there is much of a delay between the pump trip and manually starting the S/B pump. There are no significant actions in ONI-C51												
	ATC	Announce unexpected alarms and give stability report.												
	ATC	Announce RFBP A TRIP and RFBP B FAIL TO START alarms. Walkdown P680 and determine that RFBP A tripped and RFBP B failed to auto start Informs SRO that RFBP A tripped and RFBP B failed to auto start and starts RFBP B.												
	Evaluator	NOP-OP-1002 4.10.3 step 5 states “If automatic actions fail to occur when required, it is the responsibility of the operator to take manual actions to perform the system or component function. Pump or component auto start failures are examples where operators are expected to take manual action.”												
	ATC	Review ARI and RFB pump parameters: ARI-H13-P680-03-B9 <u>Automatic Action</u> Standby RFBP A (B, C, D), 1N27-C001A, (B, C, D) starts ARI-H13-P680-03-E3 <u>Subsequent Operator Action</u> <table border="1" data-bbox="446 1444 1528 1675"> <tr> <td>4.1</td> <td>MONITOR Suction and Discharge pressures for all operating RFBPs.</td> <td></td> </tr> <tr> <td></td> <td>The RFBP C pressures are low</td> <td></td> </tr> <tr> <td></td> <td>The other RFBPs are NOT affected</td> <td></td> </tr> <tr> <td></td> <td>THEN REFER TO SOI-N27 and SHIFT RFBPs in operation</td> <td></td> </tr> </table>	4.1	MONITOR Suction and Discharge pressures for all operating RFBPs.			The RFBP C pressures are low			The other RFBPs are NOT affected			THEN REFER TO SOI-N27 and SHIFT RFBPs in operation	
4.1	MONITOR Suction and Discharge pressures for all operating RFBPs.													
	The RFBP C pressures are low													
	The other RFBPs are NOT affected													
	THEN REFER TO SOI-N27 and SHIFT RFBPs in operation													
	ATC	Follow-up with SOI-N27 RFBP shift actions.												
	ATC	Direct NLO to walkdown RFB pumps and breakers to look for problems with RFB Pump A.												

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 Event Description: 4 - Control Room Rad monitor gas channel fails High. Override 2nd train off.
 Evaluate TS 3.3.7.1
 Cue: ARI-H13-P680-08-A1 & ARI-H13-P904-02-B3 & E3

Time	Position	Applicant's Actions or Behavior
	Driver	<ul style="list-style-type: none"> When directed initiate Event 4. Role play as directed When contacted as RP to perform RPI-0506 actions, inform operator that the detector has failed.
	ATC	Announce unexpected P902 and P904 alarms and give stability report.
	BOP	<p>Walkdown P902 & P904 and determines that both trains of Control Room HVAC are operating in Emergency Recirc and the Control Room rad monitor gas channel is reading upscale.</p> <p>Informs SRO of findings.</p> <p>Reviews ARI-H13-P680-08-A1</p> <p>2.0 AUTOMATIC ACTION</p> <p>2.1 Any Automatic Actions are listed in ONI-D17, High Radiation Levels Within Plant.</p> <p>Reviews ONI-D17 for Automatic Actions.</p> <p>2.0 AUTOMATIC ACTIONS</p> <p>2.3 Additional automatic actions are listed by monitor in Attachment 1, Additional Automatic Actions.</p> <p>ATTACHMENT 1 - ADDITIONAL AUTOMATIC ACTIONS</p> <p>7. CR AIRBORNE GAS HIGH (D17-D776) Both trains of Control Room HVAC and Emergency Recirculation System (M25/26) initiate in Emergency Recirculation</p> <p>Continues review of ARI-H13-P680-08-A1</p> <p>4.2 DIRECT Radiation Protection to initiate actions in accordance with RPI-0506, Response to Area Radiation Monitor Alarms, Airborne Radiation Monitor Alarms, and Radioactive Spills.</p> <p>4.3 IF a HIGH alarm is received, THEN REFER TO ONI-D17, High Radiation Levels Within Plant.</p>
	BOP	<p>Directs RP to perform RPI-0506 actions.</p> <p>Informs SRO of ONI-D17 entry condition.</p>
	Evaluator	If SRO receives report from RP of failed detector prior to report from BOP of entry condition to ONI-D17, the SRO may not enter ONI-D17.
	SRO	<p>Enters ONI-D17, High Radiation Levels Within Plant</p> <p>When informed by RP of detector failure, exit ONI-D17</p>

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Event Description: 4 - Control Room Rad monitor gas channel fails High. Override 2nd train off.
Evaluate TS 3.3.7.1

Cue: ARI-H13-P680-08-A1 & ARI-H13-P904-02-B3 & E3

Time	Position	Applicant's Actions or Behavior			
	BOP	Reviews ARI-H13-P904-02-B3 (&E3) for Subsequent Operator Action. 4.1 REFER TO SOI-M25/26 and PERFORM Auto Initiation of Emergency Recirculation. Inform SRO of Subsequent Operator Action.			
	SRO	Direct BOP to verify proper operation of CR HVAC IAW SOI-M25/26.			
	BOP	Performs SOI-M25/26, Control Room HVAC And Emergency Recirculating System Section 4.5 Auto Initiation of Emergency Recirculation. 4.5.1 PLACE both of the following in EMERG RCIRC: <ul style="list-style-type: none"> • CONT RM HVAC TRAIN A MODE SELECT M25-S7 • CONT RM HVAC TRAIN B MODE SELECT M25-S8 4.5.2 CONFIRM components are in the proper configuration in accordance with the appropriate attachment: <ul style="list-style-type: none"> • Configuration with Both Trains in Operation (Attachment 7) 4.5.3 PLACE both of the following in ON. <ul style="list-style-type: none"> • CONT RM HVAC TRAIN A CONT M25-S5 • CONT RM HVAC TRAIN B CONT M25-S6 4.5.4 <table border="1" data-bbox="544 1234 1079 1430"> <tr> <td data-bbox="544 1234 1079 1289">Both trains are in operation</td> </tr> <tr> <td data-bbox="544 1289 1079 1344">Time permits</td> </tr> <tr> <td data-bbox="544 1344 1079 1430">OVERRIDE one operating train per the following:</td> </tr> </table> 4.5.4.a TAKE the offgoing CONT RM EMG RCIRC ELEC HTG CONT to STOP. M26-D001A 4.5.4.b CONFIRM one of the following Override lights comes on: <ul style="list-style-type: none"> • HI RAD 4.5.4.c WHEN 2 minutes have elapsed since stopping the CONT RM EMG RCIRC ELEC HTG, THEN TAKE the offgoing CONT RM HVAC TRAIN CONT to STOP. M25-S5	Both trains are in operation	Time permits	OVERRIDE one operating train per the following:
Both trains are in operation					
Time permits					
OVERRIDE one operating train per the following:					
	BOP	Inform SRO when 1 train of CR HVAC is shutdown			

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Event Description: 4 - Control Room Rad monitor gas channel fails High. Override 2nd train off.
Evaluate TS 3.3.7.1

Cue: ARI-H13-P680-08-A1 & ARI-H13-P904-02-B3 & E3

Time	Position	Applicant's Actions or Behavior
	SRO	Evaluate Tech Specs <u>TS 3.3.7.1 Actions</u> A.1 Enter the Condition referenced in Table 3.3.7.1-1 for the channel. – Immediately C.1 Provide alternate method of control room radiation monitoring. – 24 hours AND C.2 Restore the inoperable monitor to an OPERABLE status. – 7 days

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Event Description: 5 - CRD Pump A trips on OC. Enter ONI-C11-1 & Shift CRD pumps.
Evaluate TS 3.1.5

Cue: ARI-H13-P601-22-C3

Time	Position	Applicant's Actions or Behavior
	Driver	<ul style="list-style-type: none"> When directed initiate Event 5. Role play as NLO as directed. If asked to acknowledge CRD MECH TEMP HI alarm, wait about 5 minutes then initiate Event 25. If crew fails to recover CRD pump and will insert a manual Rx scram, Event 6 will need to be inserted.
	Evaluator	<p>The CRD pump will automatically trip after about a minute if the operator delays tripping it.</p> <p>It takes about 1 minute for first accumulator fault after pump trip.</p>
	ATC	Announce unexpected P601 alarm and give stability report.
	BOP	<p>Walkdown P601 and determine that CRD A pump amps are pegged high.</p> <p>Inform SRO of need to trip CRD A pump and trips the pump.</p> <p>Inform crew of ONI-C11-1, Inability To Move Control Rods entry condition.</p>
	SRO	<p>Enter ONI-C11-1</p> <p style="padding-left: 40px;">4.2 IF a CRD Pump is NOT operating, THEN REFER TO SOI-C11 (CRDH) and PERFORM CRD Pump Trip Recovery.</p> <p>Directs BOP to perform Supplemental Action to perform CRD Pump Trip Recovery.</p> <p>After accumulator faults are received direct ATC to insert a manual Rx scram in 18 minutes if CRD Charging Water pressure is not recovered. (Critical Task 1)</p> <p>Evaluate Tech Specs</p>
	BOP	<p>Performs pump trip recovery IAW SOI-C11(CRDH)</p> <p>7.6 CRD Pump Trip Recovery</p> <p>7.6.1 IF any of the following conditions exist,</p> <ul style="list-style-type: none"> CRDH system has been shutdown for greater than 2 hours SCRAM signal was NOT reset promptly <p>THEN GO TO Startup to Full Operation and RESTART the pump and purge panels.</p> <p>7.6.2 CLOSE the following purge panel fill valves (concurrently with the remainder of this section):</p> <p>7.6.3 TAKE the tripped CRD PUMP to STOP. 1C11-C001A</p> <p>7.6.4 TAKE the oncoming CRD AUX OIL PUMP to START. 1C11-C002B</p> <p>7.6.5 CONFIRM the CRD PUMP TRIP OIL PRESS LOW alarm clears.</p>

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Event Description: 5 - CRD Pump A trips on OC. Enter ONI-C11-1 & Shift CRD pumps. Evaluate TS 3.1.5			
Cue: ARI-H13-P601-22-C3			
Time	Position	Applicant's Actions or Behavior	
		7.6.6 PLACE the CRD HYDRAULICS FLOW CONTROL in Manual. 1C11-R600	
		7.6.7 LOWER the CRD HYDRAULICS FLOW CONTROL output to 0%.	
		7.6.8 CONFIRM CRD FLOW CONTROL VALVE indicates closed. 1C11-F002A	
		7.6.9 TAKE the oncoming CRD PUMP to START. 1C11-C001B	
		7.6.10 WHEN CRD HYDRAULICS FLOW CONTROL indicates less than tapeset, THEN PROCEED. 1C11-R600	
		7.6.11 SLOWLY THROTTLE the in-service CRD FLOW CONTROL VALVE UNTIL flow is restored on the CRD HYDRAULICS FLOW CONTROL. 1C11-F002A	
		7.6.12 PLACE the CRD HYDRAULICS FLOW CONTROL in AUTO. 1C11-R600	
		7.6.13 IF the tripped CRD Pump will NOT be re-started, THEN PERFORM the following:	
		7.6.13.a TAKE the tripped CRD PUMP to STOP. 1C11-C001A	
		7.6.13.b TAKE the CRD AUX OIL PUMP to STOP. 1C11-C002A	
		7.6.14 PERFORM independent verification of required components.	
	BOP	Requests ATC to perform IV Directs NLO to perform Steps 7.6.15 through 7.6.18 Informs SRO that CRD B pump has restored Charging Water pressure. (Critical Task 1)	
	ATC	If CRD Charging Water pressure has not been restored within 18 minutes, insert a manual Rx scram. (Critical Task 1) Inform SRO when all accumulator faults have reset.	

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Event Description: 5 - CRD Pump A trips on OC. Enter ONI-C11-1 & Shift CRD pumps.
Evaluate TS 3.1.5

Cue: ARI-H13-P601-22-C3

Time	Position	Applicant's Actions or Behavior
	SRO	Evaluate Technical Specifications <u>TS 3.1.5 Action</u> A1 Declare the associated control rod scram time slow. – 8 hours OR A1 Declare the associated control rod inoperable. – 8 hours B.1 Restore charging water header pressure to ≥ 1520 psig – 20 minutes from discovery of Condition B concurrent with charging water header pressure < 1520 psig. – AND B2.1 Declare the associated control rod scram time slow. – 1 hour OR A1 Declare the associated control rod inoperable. – 1 hour D.1 Place the reactor mode switch in the shutdown position. – Immediately

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Event Description: 6 - Inadvertent RCIC initiation. MT & RFPTs trip and Rx scram Enter EOP-01

Cue:

Time	Position	Applicant's Actions or Behavior
	Driver	When directed initiate Event 6 . Role play as NLO as directed.
	Evaluator	Automatic RPS scram has been disabled. Rx will automatically scram on Redundant Reactivity Control System – High pressure (1083 psig) for EOP-01 Entry Condition.
	ATC	Announce multiple unexpected alarms and Rx scram. Commence Reactor Scram Hardcard actions <ol style="list-style-type: none"> VERIFY the following actions completed: <ul style="list-style-type: none"> Mode Switch Locked in Shutdown (Note power once scram signal inserted) RPS Initiated, if all control rods are not fully inserted ARI Initiated, if RPS failed to Scram the reactor IF Reactor Power is above 4% OR unknown, THEN PERFORM the following: STABILIZE Reactor level using Feedwater / RCIC / HPCS
	Evaluator	Step 2 of the Reactor Scram Hardcard is N/A.
	ATC	Directs BOP to initiate RCIC. Reports Motor Feed Pump has no discharge pressure.
	ATC	<ol style="list-style-type: none"> STABILIZE Reactor pressure using Turbine / Turbine Bypass valves / SRV's PERFORM crew update with the following information: <ul style="list-style-type: none"> "The Mode Switch is locked in shutdown", (RPS and ARI initiated if required) Reactor Power is _____ % ↑ ↔ ↓ Reactor Pressure is _____ psig ↑ ↔ ↓ Reactor Level is _____ inches ↑ ↔ ↓ EOP-01 Entry IS / IS NOT met IF MSIVs are closed, THEN a Time Critical Operator Action for Suppression Pool Cooling is applicable. <p>Time: _____.</p>

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Event Description: 6 - Inadvertent RCIC initiation. MT & RFPTs trip and Rx scram Enter EOP-01

Cue:

Time	Position	Applicant's Actions or Behavior
	SRO	<p>Enters EOP-01, RPV Control</p> <p>Answers YES to Decision Diamonds, “Are APRMs downscale” and “Is the Reactor shutdown by control rods”</p> <p>Enters Level Control leg:</p> <p>Direct BOP to verify Actuators and Isolations for L3 and L2.</p> <p>Direct BOP to lineup injection systems IAW:</p> <ul style="list-style-type: none"> EOP-SPI 6.5, LPCS Injection EOP-SPI 6.1, RHR A Injection EOP-SPI 6.2, RHR B Injection EOP-SPI 6.3, RHR C Injection
	BOP	<p>Commences lining up low pressure injection systems.</p> <p>Informs SRO when injection systems are lined up</p>
	SRO	<p>Continue EOP-01, RPV Control actions.</p> <p>Answers NO to Decision Diamond, “Can RPV level be restored and maintained 130 in. to 219 in.”</p> <p>Answers YES to Decision Diamond, “Can two or more ECCS/Feedwater sources be lined up”</p> <p>Makes determination that RPV level cannot be maintained above 16.5 in. and proceeds through Hold Box.</p> <p>Determines that AED is required before RPV level lowers to 16.5 inches or ED is required before RPV level lowers to -25 inches.</p> <p>Enters EOP-02 and directs BOP to startup H2 analyzers and H2 igniters.</p>
	Evaluator	Continue on Event 9 for AED or ED.

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Event Description: 7 - ECC A pump fails to auto start on RCIC start

Cue:

Time	Position	Applicant's Actions or Behavior
	Driver	Role play as NLO as directed.
	Evaluator	BOP has multiple opportunities to discover ECC A failure to start: 1 Upon RCIC initiation – check status 2 When verifying Isolations and Actuators per hardcard 3 When performing EOP-SPI 6.1 & 6.5
	BOP	Verify automatic start up ECC A IAW SOI-P42, Emergency Closed Cooling System. 4.3 ECC Automatic Startup from RCIC Initiation 4.3.1 VERIFY ECC Pump A starts. 1P42-C001A 4.3.2 VERIFY at least one of the following is running: <ul style="list-style-type: none"> • ECC PUMP AREA VENTILATION FAN A M28-B001A • ECC PUMP AREA VENTILATION FAN B M28-B001B 4.3.3 WHEN time permits, THEN PERFORM the following: 4.3.3.a NOTIFY Chemistry to sample as required.
	BOP	Inform SRO that ECC A pump failed to auto start and it was manually started.

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Event Description: 8 - RCIC injection valve fails to open. Trip RCIC to prevent running on min flow

Cue: ARI-H13-P601-21-C5

Time	Position	Applicant's Actions or Behavior
	Evaluator	RCIC Minimum Flow Valve does not have the capacity to provide Min Flow protection to the RCIC pump.
	BOP	<p>Observe RCIC Injection Valve has lost power and no flow is indicated on the RCIC Flow Controller and inform the SRO.</p> <p>From SOI-E51, Reactor Core Isolation Cooling System, Precautions And Limitations:</p> <p>2.12 RCIC MIN FLOW VALVE 1E51-F019, is intended to provide flow during turbine startups and shutdowns only and should not be relied on to provide minimum flow during normal turbine operation.</p>
	SRO	Direct BOP to trip RCIC turbine.
	BOP	Trip RCIC turbine using RCIC turbine trip pushbutton.

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Event Description: 9 - Motor Feed pump shaft breaks. Lower RPV pressure to allow LPCS to inject

Cue:

Time	Position	Applicant's Actions or Behavior
	Driver	When asked, inform control room that coupling on Motor Feed Pump has broken.
	ATC	Dispatch NLO to investigate MFP problem Inform crew of MFP coupling problem.
	Evaluator	If AED is commenced with RPV level is > 30 inches, AED will be successful and preclude need to ED. Crew may elect to Emergency Depressurize rather than AED. In this case, the ED Critical Task-2 will be evaluated rather than the AED Critical Task-2 . The auto ADS initiation has been disabled. Additionally, ED may cause RPV water level to go below TAF which would require evaluation of Critical Task 3 If crew fails to commence AED action, nine minutes after the scram an SRV will fail open causing additional loss of inventory. Depending on timing, this may require crew to Emergency Depressurize.
	SRO	Enters Pressure Control leg: Enters Anticipate ED IWE and directs BOP to perform EOP-SPI 2.3 to bypass MSIV interlocks. Directs ATC to “USE Main Turbine Bypass Valves to rapidly depressurize the RPV as needed to preclude Emergency Depressurization” and “EXCEED Cool down rate as required” (Critical Task 2) Directs ATC/BOP to monitor for low-pressure injection.
	ATC	Operates the BPV Jack to open Bypass Valves (Critical Task 2)
	ATC/BOP	Monitor for low-pressure injection. Inform SRO when injection has commenced.
	Evaluator	Crew should have ability to lower RPV pressure enough to obtain injection from LPCS, then stabilize RPV pressure and control LPCS injection.
	SRO	Determines that RPV level can be stabilized/recovered with low-pressure injection systems and determines that AED is no longer required and proceeds to “stabilize RPV pressure” step. Directs ATC to stabilize RPV pressure to establish a cooldown rate < 100 °F/ hour. Directs ATC to establish an RPV level band of 178 to 260 inches.
	ATC	Operates BPV Jack to stabilize RPV pressure. Controls low-pressure injection to raise Rx water level.

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Event Description: 10- (Conditional) ED if unable to maintain RPV level > -25" with LPCS

Cue:

Time	Position	Applicant's Actions or Behavior
	SRO	From the EOP-01 Level Control Leg Makes determination that Emergency Depressurization is Required before RPV level lowers to -25 inches and transitions to EOP-01-2, Emergency RPV Depressurization.
	SRO	Enters EOP-01-2, Emergency RPV Depressurization. Answers NO to Decision Diamond, "Has Drywell Pressure exceeded 1.68 psig". Directs ATC/BOP to open all ADS valves. (Contingency Critical Task-2)
	ATC/BOP	Opens all ADS valves. (Contingency Critical Task-2) Inform SRO that 8 ADS valves are open.
	SRO	Answers YES to Decision Diamond, "Are 6 or more SRVs Open". Directs crew to maintain RPV pressure <30 psig. Directs ATC to establish RPV level band of 178 to 260 inches.
	ATC	Controls low-pressure injection to raise Rx water level. (Contingency Critical Task 3)

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Event Description: Scenario Termination Criteria

Cue:

Time	Position	Applicant's Actions or Behavior
		1. Reactor shutdown.
		2. RPV pressure lowered to allow low-pressure injection to recover RPV level.

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Event Description: Critical Task #1

Cue:

Time	Position	Applicant's Actions or Behavior
		<p>Within 20 minutes of 2nd accumulator fault with at least one accumulator associated with a withdrawn control rod and CRD Charging Water Header Pressure < 1600 psig, crew places REACTOR MODE SWITCH in SHUTDOWN</p> <p>OR</p> <p>Restores CRD Charging Water Header Pressure > 1600 psig.</p> <ol style="list-style-type: none"> 1. Safety Significance: <ul style="list-style-type: none"> Prevent violation of facility license condition (T.S. 3.1.5). 2. Cues: <ul style="list-style-type: none"> Procedural compliance. HCU accumulator alarms. 3. Measured by: <ul style="list-style-type: none"> With all the following present: 2 accumulators INOP, at least one inoperable accumulator is associated with a withdrawn control rod, RPV pressure > 600 psig, CRD charging pressure < 1520 psig, and 20 minutes elapsed, immediately places the REACTOR MODE SWITCH in SHUTDOWN. <p>OR</p> <ul style="list-style-type: none"> With all the following present: 2 accumulators INOP, at least one inoperable accumulator is associated with a withdrawn control rod, RPV pressure > 600 psig, CRD charging pressure < 1520 psig, a CRD pump is started and CRD Charging Water Header Pressure is restored > 1600 psig within 20 minutes. 4. Feedback: <ul style="list-style-type: none"> Reactor Power trend. Control Rod indication. CRD Charging Water Header Pressure indication

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Event Description: Critical Task #2

Cue:

Time	Position	Applicant's Actions or Behavior
		<p>With reactor shutdown and reflood systems available, reduce RPV pressure to allow for restoration of RPV level by low pressure injection.</p> <ol style="list-style-type: none"> 1. Safety Significance: Maintain adequate core cooling; prevent degradation of fission product barrier. 2. Cues: Procedural compliance (ED required, ED Anticipated, controlled cooldown, use of 5-5-2 LPCS injection strategy) Water level trend. 3. Measured by: Observation: <ul style="list-style-type: none"> ED Anticipated Bypass Valve Jack used to reduce RPV pressure without regard to cooldown rate. ED Required At least 6 SRVs opened prior to RPV level dropping below -25". 4. Feedback: RPV pressure trend. Bypass Valve / SRV position indications.

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Event Description: Critical Task #3

Cue:

Time	Position	Applicant's Actions or Behavior
		<p>With RPV pressure below the Shutoff Head of the available injections system(s), operate available Low-Pressure ECCS injection system(s) to restore and maintain RPV water level above T.A.F. (0 inches).</p> <ol style="list-style-type: none"> 1. Safety Significance: Maintaining adequate core cooling. 2. Cues: Procedural compliance. Pressure below low pressure ECCS system(s) shutoff head. 3. Measured by: Operator manually starts <u>or</u> initiates at least one low pressure ECCS system and injects into the RPV to restore and maintain water level above 0 inches. 4. Feedback: Reactor water level trend. Reactor pressure trend.

