

Facility: Perry Scenario No.: 2Op-Test No.: 2003-301

Examiners: _____

Operators: _____

Initial Conditions: The plant is operating at 100% power. RHR A is in secured status for preventive maintenance on the pump breaker. RHR A was declared inoperable five hours ago per Tech. Spec.3.5.1, Action A; 3.6.1.7, Action A; and 3.6.2.3, Action A; 3.6.3.3, Action A; PLCO 3.4.9. The OPRMs are functional but are inoperable per Tech. Spec. 3.3.1.3. Required Action A.3 has been implemented. HPCS System operation is scheduled to support flow rate testing. Control rods are at step 79, all rods out. IOI-3, Section 4.5, Step 35.

Turnover: 1. BOP operator place HPCS in full flow test mode to the suppression pool. The RSE is standing by to take flow measurements locally. Suppression Pool water is Transfer Quality and a HPCS system flush at the completion of the test is not required. HPCS ESW and HPCS Pump Room Cooler are in operation. 2. Maintain 100% power.

Event No.	Malf. No.	Event Type*	Event Description
1		N (BOP) N (SRO)	Start HPCS in Full Flow Test Mode to the Suppression Pool (TS 3.5.1. B and C)
2	CP03: 1E22C0001 100%	C (BOP) C (SRO)	HPCS Pump Flow Degradation/Shutdown HPCS (2 minute ramp)
3	AD01N	C (BOP) C (SRO) R (RO) R(SRO)	ADS/SRV B21-F047H Cycling (TS 3.5.1.E, F and H / TS 3.0.3) Lower reactor power < 90% using Recirc flow
4	PT02: 1C34N0004A 17%	I (RO) I (SRO)	Reactor Narrow Range Level Transmitter C34-N004A Offset High (3 minute ramp) (ORM 6.2.1.3)
5	RF FW66 TH12B	C (RO) C (SRO)	RFPT A Spurious Trip / Reactor Recirculation FCV B Runback Failure (TS 3.4.1)
6	ED06I TC05 10%		Loss of 480Vac Bus F-1-E Turbine Control EHC leak / Main Turbine trip and reactor scram
7	RD15 SL01A SL01B	M (All)	ATWS (failure of RPS and ARI to automatically shutdown the reactor) SLC Squib Valves Fail to Fire (includes indicating lamp overrides to support failure mode)
8	CB01: 1N27C0001A CB01: 1N27C0001B CB01: 1N27C0001C CB01: 1N27C0001D	C	Loss of All Feedwater Capability (all RFBPs trip)
9		M (All)	RPV Emergency Depressurization / Inject with low pressure ECCS to maintain adequate core cooling

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

Time	Position	Applicant's Actions or Behavior
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Event Description: Start HPCS in Full Flow Test Mode to the Suppression Pool		
	SRO	Direct BOP to place HPCS in Full Flow Test per SOI-E22A, Section 7.4
		Declares HPCS inoperable due to operation in a secondary mode (SOI-E22A P&L # 17)
		- References Tech Spec 3.5.1.B & C (verifies RCIC is OPERABLE)
	BOP	Places HPCS in Full Flow Test
		- Directs RO to record Maint Rule status in Plant Narrative Log
		- Places HPCS OUT OF SERVICE Switch in INOP
		Expected Alarm H13-P601-16 (D4), HPCS OUT OF SERVICE
		- Notify HP that a Suppression Pool evolution will be conducted
		- Verifies HPCS ESW loop in operation
		- Verifies HPCS Pump Room Cooling in operation
		- Notifies SRO HPCS suction shift to the Supp Pool is required
		- Performs SOI-E22, Section 5.2 as SRO directs
		Note: CST Suction automatically closes when Supp Pool Suction Valve opens. No expected alarms
		- Opens HPCS Supp Pool Suction Valve, 1E22-F015
		- Verifies HPCS CST Suction Valve, 1E22-F001 closes
		- Place HPCS Pump control switch to start:
		Observes rising pump discharge pressure
		Observes rising pump amps
		Expected Alarm, H13-P601-16 (A5), HPCS PUMP START SIGNAL RECEIVED
		Observes HPCS Min Flow Valve opens
		- Hold HPCS Test Valve to Supp Pool, 1E22-F023 in open:
		Flow approximately 6900 gpm on E22-R603 with Test Valve fully open
		E22-R616, Pump Amps, approximately 320 amps

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Event Description: HPCS Pump Flow Degradation/Shutdown HPCS		
Time	Position	Applicant's Actions or Behavior
	BOP	E22-R601, Discharge Press, approximately 300 psig
		- Verifies HPCS Min Flow Valve closes when flow is > 725 gpm
	BOP	Responds to unexpected alarm H13-P601-16 (H5), HPCS
		WATER LEG PUMP DISCH PRESS LO
		Determines HPCS Pump flow is degrading
		Notify SRO that HPCS Pump flow is degraded, as indicated by
		discharge press slowly going to 0 psig / flow going to 0 gpm
	SRO	Note: SRO may direct BOP to immediately shutdown HPCS
	SRO	Acknowledge report of degraded HPCS Pump flow
		Directs BOP to shutdown HPCS per SOI-E22A, Section 7.4
	SRO/BOP/RO	Requests Maintenance and Responsible System Engineer (RSE)
		assistance to support troubleshooting
	SRO/BOP/RO	NLO at HPCS Pump reports HPCS Pump is extremely noisy
	SRO	Directs BOP to Shutdown HPCS to Standby Readiness in
		accordance with SOI-E22A, Section 7.4.
		Notifies Operations Management of HPCS inoperability
		Directs BOP to place HPCS in Secured Status in accordance
		with SOI-E22A, Section 6.2
		Note: May confer with Shift Manager prior to directing
		HPCS be placed in secured status

Time	Position	Applicant's Actions or Behavior
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Event Description: HPCS Pump Flow Degradation/Shutdown HPCS		
	BOP	Inform SRO a Procedure Deviation is required because flow cannot be lowered to 500 to 600 gpm. (flow indicates 0 gpm)
	SRO	Authorizes a Procedure Deviation as required Note: May consult with Shift Manager prior to authorizing
	BOP	Shutdown HPCS per SOI-E22A, Section 7.4 - Hold HPCS Test Valve to Supp Pool, 1E22-F023 to Close and verify valve fully closed: Alarm H13-P601-16 (H5), HPCS WATER LEG PUMP DISCH PRESS LO clears when 1E22-F023 is closed - Take HPCS Pump control switch to Stop: Alarm, H13-P601-16 (A5), HPCS PUMP START SIGNAL RECEIVED clears
		Note: Candidate may check the Suppression Pool Level instruments on backpanel H13-P625. If requested, inform candidate that the Suppression Pool Level instruments indicate normal.
		Places HPCS in Secured Status using SOI-E22A, Section 6.2 as directed Note: Placing HPCS in shutdown instead of secured status will not affect the scenario outcome.

Time	Position	Applicant's Actions or Behavior
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Event Description: ADS/SRV B21-F047H Cycling/Lower reactor power to <90% using Recirc flow		
	BOP/RO	Reports unexpected alarms and consults ARIs:
		H13-P601-19: (A7), SRV OPEN
		H13-P601-19: (B7), SRV OPEN SIGNAL RECEIVED
		H13-P680-7: (B8), SRV LEAKAGE
	RO	Monitors RPV level, pressure, and power
	BOP	Informs SRO/RO that ADS/SRV 1B21-F047H is cycling
	BOP	May check SRV tailpipe temperatures on H13-P614 to determine which SRV is cycling
	SRO	Enters ONI-B21-1, SRV Inadvertent Opening/Stuck Open
		- Directs RO/BOP to initiate evacuation of Containment
		- Directs RO to reduce reactor power using recirc flow to $\leq 90\%$
		Note: Must reduce power to < 90% prior to attempting
		To close the SRV
		- Directs BOP to attempt to close the SRV by placing <u>both</u> of its control switches from AUTO to OFF
		- Coordinates with RO/BOP to complete applicable Supplemental Actions
		- Directs BOP to de-energize the SRV solenoids by removing the applicable control power fuses
	RO/BOP	Notifies SCC, Chem and HP of intent to lower reactor power (may occur after power reduction has begun)
	SRO	Provides SRO oversight for power reduction

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Event Description: ADS/SRV B21-F047H Cycling/Lower reactor power to <90% using Recirc flow

Time	Position	Applicant's Actions or Behavior
	RO	Decreases reactor power to < 90% using Recirc Loop Flow Control
		Maintain Recirc loop flows matched within 10%
	BOP	Places both SRV control switches to Off:
		Expected Alarm, H13-P601-19: (E7), SRV DIV 1/2
		SWITCH IN OFF and
		Informs SRO/RO that SRV control switches are in Off
		Informs SRO/RO that SRV is still cycling open
	SRO/BOP	Refer to ONI-B21-1 Attachment 1 and Attachment 2 to determine
		SRV fuses that must be pulled
	BOP	Removes SRV control power fuses inside panel H13-P628
		and in H13-P631
		Informs SRO/RO that SRV control power fuses are removed
		Expect Alarms: H13-P601-19 (G9) (G11), ADS OUT OF SERVICE
	SRO	References Tech Specs for a single, inoperable ADS SRV
		- LCO 3.5.1, Enters Condition E, F, and H
		- Enters LCO 3.0.3, due to ADS Valve and HPCS inoperable
	SRO	Notifies OPS Management and NRC Resident of ONI entry
		and reason for entry, and of the various LCO entries and required
		TS 3.0.3 shutdown. Requests RSE and I&C assistance in the
		Control Room to support troubleshooting
		Review IOI-3 for power reduction
		Contacts Rx Engineer for power reduction recommendations
		Begin preparations for required plant (TS 3.0.3) shutdown

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Event Description: Reactor Narrow Range Level Transmitter C34-N004A Offset High		
Time	Position	Applicant's Actions or Behavior
		Crew must be allowed to return both RFPTs to the MLC before tripping RFPT A in Event 5
	RO/BOP/SRO	Recognizes abnormal water level indication
		Refers to RPV Level Validation Screen on SPDS as necessary
	RO/BOP/SRO	Requests I&C and Responsible System Engineer assistance in the Control Room to support troubleshooting
	RO	Responds to and reports Alarm H13-P680-3 (B6), RX LEVEL CHANNEL ERROR HI
	BOP	Supports RO by attending to alarm(s) and consulting ARI-H13-P680-3 (B6) and other ARIs as required
	SRO	Enters ONI-C34, Feedwater Flow Control Malfunction.
		- Directs RO to take manual control of RFPTs and maintain RPV level 192 to 200 inches (201" required for Level Program)
		- After crew determines Rx Level Transmitter C34N004A has failed, directs RO to select NR Level Channel B
		* Crew can place RFPTs back on MLC when NR Level Channel B is selected and level is returned to normal
	SRO	- Directs RO to shift both RFPTs from their Manual Speed Control Dial to the MLC per SOI-C34, Sections 4.5, 4.9, and 4.10
		Note: The Shift Manager may need to direct the US to have the RO perform the C34 shift.

Time	Position	Applicant's Actions or Behavior
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Event Description: Reactor Narrow Range Level Transmitter C34-N004A Offset High		
	RO	As directed, takes manual control of feedwater and maintains level
		As directed, selects NR Level Channel B
	SRO	Directs RO to shift both RFPTs from their Manual Speed Control
		Dial to the Master Level Controller (MLC) per SOI-C34
	RO	Transfers RFPT A(B) from the Manual Speed Control Dial to
		Manual Flow Control per SOI-C34, Section 4.5
		- Uses the RFP A(B) Flow Control, 1C34-R601A(B), manual
		pushbutton, to null the RFP DEV METER A(B), R426A(B)
		- Takes RFPT A(B) GOV MODE Cont, 1N27-S50(S52) to
		AUTO
	RO	Transfers RFPT A(B) from Manual Flow Control to Master Rx Level
		Control per SOI-C34, Section 4.9
		- Uses the MASTER RX LEVEL CONTROL, 1C34-R600,
		tapeset to null the controller deviation
		- Places RFP A(B) on Master Level Control by placing
		RFP A(B) FLOW CONTROL, 1C34-R601A(B), in AUTO
		Note: Alarm H13-P680-3 (A8), MAIN TURB & FEEDPUMP TRIP
		RCIC/L8 may occur as normal RPV water level is restored due to
		the failure of NR Channel A

Time	Position	Applicant's Actions or Behavior
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Event Description: RFPT A Spurious Trip / Reactor Recirculation FCV B Runback Failure		
	RO	Observes the loss of RFPT A
		Informs SRO/BOP of RFPT A trip
		Verifies expected automatic plant response
		- Starts or verifies auto start of MFP
		- Verifies Reactor Recirculation Flow Control Valves will runback
		to 48% loop flow position
		Informs SRO/BOP of failure of FCV B to runback
		Takes immediate actions per ONI-N27
		- If required, reduce reactor power by reducing recirculation flow
		and/or inserting Cram Rods in accordance with FTI-B02
		to maintain steam flow and feed flow balanced and reactor water
		level within the normal operating range of 192 to 200 inches
	BOP	Assists RO by reviewing ARIs for annunciators received:
		ARI-H13-P680-3 (A9), RX LEVEL HI/LO L7/L4
		ARI-H13-P680-3 (D6), RFPT A TRIP
		ARI-H13-P680-4 (B4), RCIRC A FCV RUNBACK
	SRO	Enters ONI-N27, Feedwater Pump Trip
		- Verifies MFP auto started and shifted to the Master Level
		Controller
		- Directs RO to maintain RPV level 192-200"
		- May direct RFPT A shutdown using SOI-N27 Section 6.6,
		Shutdown to 1100 rpm and Section 6.7, Shutdown from 1100 rpm

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Event Description: RFPT A Spurious Trip / Reactor Recirculation FCV B Runback Failure		
Time	Position	Applicant's Actions or Behavior
	SRO	Enters ONI-C51, Unplanned Change in Reactor Power or
		Reactivity and references Section 4.2, Reactor
		Recirculation Flow Control Malfunction
	RO/BOP	Complete ONI immediate and supplemental actions as directed
		Shutdown RFPT A using SOI-N27 if directed
	BOP/SRO	Contact Maintenance and Responsible System Engineer
		Directs NLO investigate RFPT A trip
	RO	Informs SRO that there is a > 5% loop flow mismatch
		Determines Reactor Recirculation FCV B failed to automatically
		runback and informs SRO.
		(Note: RO may manually runback Recirc FCV B)
	SRO	References Tech Specs for a Recirc loop flow mismatch
		- LCO 3.4.1 (Recirc Loops Operating) - Enters Condition A
		*Reactor Engineering should be notified of the loop flow mismatch
	SRO	Notifies OPS Management and NRC Resident of ONI entry and
		reason for entry and of entry into Tech Spec LCOs
		Reviews IOI-3 for power decrease
	SRO/BOP/RO	Notifies Chemistry, HP, and SCC of power change

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Event Description: Loss of 480Vac Bus F-1-E. Turbine Control EHC leak / Main Turbine trip and reactor scram.

Time	Position	Applicant's Actions or Behavior
	SRO/BOP/RO	Recognize and report Alarms H13-P870-1 (E4), 480 VOLT BUS
		UNDERVOLTAGE and H13-P870-1 (E6), BUS F-1-E
		BREAKER TRIP
	SRO	Enters ONI-R23-2, Loss of Non-Essential 480 Volt Bus
		Refers to Plant Data Book for list of affected loads (PDB-H0017):
		CVCW deenergized
	RO/BOP	Walk down panels and assess plant status:
		Acknowledge and report alarm H13-P870-9 (G2), EHC STBY
		PUMP START-HEADER PRESSURE LOW; refer to ARI
		Determines EHC Pump B tripped; EHC Pump A auto started
		Note: EHC Pump B breaker remained closed when
		Bus F-1-E deenergized
	RO/BOP	Acknowledge alarm H13-P870-9 (F2), EHC SYSTEM
		RESERVOIR HI/LO; refer to ARI and inform SRO
	SRO	Directs reactor scram or enters and direct actions of IOI-14,
		Fast Unload and Trip of Turbine

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Event Description: ATWS/ SLC Squib Valves Fail to Fire

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes incomplete scram and APRMs not downscale and informs SRO/BOP
	SRO	Directs RO/BOP actions per PEI-B13, RPV Control (Non-ATWS)
		- Arms and depresses all RPS Manual Scram PBs
		- Places the Reactor Mode Switch in SHUTDOWN
		- Starts Hydrogen Analyzers
		- Verifies ARI Initiated
	RO/BOP	Executes PEI-B13, RPV Control (Non-ATWS) actions per SRO direction
	SRO	Determines reactor is still NOT shutdown under all conditions without boron
	SRO	Exits PEI-B13, RPV Control (Non-ATWS) and enters PEI-B13, RPV Control (ATWS)
		- Directs initiation of Standby Liquid Control and ADS inhibited
		- Directs RO to runback Recirc FCVs to minimum position, then trip Recirc Pumps
		- Directs RO to use PEI-SPI 1.3 to insert Control Rods
		- Directs BOP/RO to terminate/ prevent injection of inside the shroud systems using PEI-SPI 5.1 (HPCS Injection Prevention) & 5.2 (LPCS & LPCI Injection Prevention) (DGs will auto start)
		- Directs RO/BOP to line up at least two outside the shroud injection systems using PEI-SPI 6.2 (LPCI B Outside the Shroud) & 6.3 (LPCS Runout Injection)
		Note: RHR A is in secured status so PEI-SPI 6.1 is not performed

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Event Description: ATWS/ SLC Squib Valves Fail to Fire

Time	Position	Applicant's Actions or Behavior
	SRO (cont.)	PEI-B13, RPV Control (ATWS) actions:
		- Directs actions to maintain MSIVs open per PEI-SPI 2.3 and 2.8
		- Directs RPV level stabilized in a band of – 25 to +100"
		- Directs pressure band of 800 to 1000 psig
		Note: RFPTs may trip on L8 following scram. When L8 is
		reset, water level should be stabilized above L2
		* HPCS may be in secured status
		* Crew should be able to maintain RPV level > -25 inches until
		loss of feedwater capability. RCIC will auto start at L2 (+130")
		* Crew should maintain RPV level > Level 1 (+16.5 inches) to
		maintain MSIVs open
	RO	Runback Recirc FCVs to minimum position, trips Recirc Pumps
		Insert Control Rods using PEI-SPI 1.3, Manual Insertion
	BOP	Starts Hydrogen Analyzers
		Initiates SLC, reports squib valve failures to SRO/RO
		Inhibits ADS
		Aligns for outside the shroud injection using PEI-SPI 6.2 (bypasses
		E12-F053B) and PEI-SPI 6.3 (bypasses E21-F012)
		Bypasses MSIV L1 per PEI-SPI 2.3 and IA Isolations per
		PEI-SPI 2.8
		Performs terminate/prevent actions per PEI-SPI 5.1 (HPCS
		Injection Prevention) & 5.2 (LPCS & LPCI Injection Prevention)
		Maintains reactor pressure band directed by SRO

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Event Description: ATWS/ SLC Squib Valves Fail to Fire

Time	Position	Applicant's Actions or Behavior
	SRO	Directs Alternate Boron Injection per PEI-SPI 1.8
	BOP	Coordinates Alternate Boron Injection per PEI-SPI 1.8
	BOP/RO	Maintain level band directed by SRO using Condensate and
		Feedwater, CRD, and RCIC
	SRO/BOP/RO	Monitor for power > 4% and RPV level > 0" and Supr Pool Temp
		> 110°F and any SRV open or Drywell pressure > 1.68 psig
	SRO	If ALL above monitored conditions are met, direct terminate and
		prevent all injection into the RPV except boron and CRD
	BOP/RO	As directed, terminate and prevent injection per
		PEI-SPI 5.1, 5.2, and 5.3
		Depress RCIC Turbine Remote Trip pushbutton
	SRO	When power < 4% or RPV level drops to 0" or all SRVs
		remain closed and Drywell pressure < 1.68 psig, direct RPV level
		band between -25" and the level to which RPV was lowered
	BOP/RO	Maintain level band directed by SRO using Condensate and
		Feedwater, CRD, and RCIC

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Event Description: Loss of All Feedwater Capability

Time	Position	Applicant's Actions or Behavior
	RO/BOP	Report loss of all RFBPs and all Reactor Feed Pumps
	RO/BOP	Monitor and trend reactor water level (decreasing)
	SRO	If not already running, directs RCIC initiation if permitted
	SRO	Note: SRO may direct BOP to perform PEI-SPI 2.5, Bypass of RCIC Isolations and Suction Transfer
	BOP/RO	As directed, start and maximize injection with RCIC
	BOP/RO	Maintains reactor water level in the band specified by the SRO
		Using RCIC
	BOP/RO	Notifies SRO of RPV level approach to -25"
		Note: If the crew is able to quickly lower reactor power by inserting control rods, then RCIC may be able to maintain reactor water level > -25 inches and ED would not be required
	SRO	Determines RPV level cannot be maintained > -25"
		PEI-B13, Emergency Depressurization is entered and executed concurrently with PEI-B13, RPV Control (ATWS)

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Event Description: RPV emergency depressurization / Inject with low pressure ECCS to maintain adequate core cooling		
Time	Position	Applicant's Actions or Behavior
		Note: This Event will be a contingency Event. If the SRO determines that reactor water level cannot be maintained > -25 inches, then ED will be required
	SRO	Directs BOP/RO actions per PEI-B13, Emergency Depressurization
		- Directs terminate and prevent all injection except boron and CRD
		* Must hold here until all injection into the RPV has been terminated (except boron and CRD)
	BOP/RO	As directed, terminate and prevent injection per PEI-SPI 5.3
		Depress RCIC Turbine Remote Trip pushbutton
	SRO	Verifies eight or more SRVs are <u>not</u> open
		Verifies Suppression Pool level is > 5.25 feet
		Directs all ADS valves opened to rapidly depressurize the RPV
	BOP/RO	When directed, open all ADS valves
		Determine one ADS/SRV not open and report to SRO
	SRO	Confirms all ADS valves are NOT open
		Directs additional SRVs be opened to obtain 8 SRVs open
	BOP/RO	Monitor and trend reactor pressure
		*Must hold here until RPV pressure is less than MARFP

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Event Description: RPV Emergency Depressurization / Inject with low pressure ECCS to maintain adequate core cooling.

Time	Position	Applicant's Actions or Behavior
	SRO	As soon as RPV pressure is < MARFP, direct injection with
		outside the shroud systems to restore and maintain
		RPV level > -25"
		* LPCI A unavailable for injection outside the shroud
	BOP/RO	Injects into the RPV to systems to restore and maintain RPV level
		using outside the shroud injection systems as directed
		* Must hold here until the reactor is shutdown under all conditions
		without boron

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Event Description: Critical Task #3		
Time	Position	Applicant's Actions or Behavior
		Note: This is a contingent critical task
		Critical Task #3 – When RPV water level cannot be maintained
		> -25" and the reactor is at pressure, initiate Emergency
		Depressurization
		1. Safety Significance:
		- Maintain adequate core cooling
		2. Cues:
		- Procedural compliance
		- Level lowering without adequate high pressure
		injection available
		3. Measured by:
		- Observation – at least 5 SRVs open prior to
		re-establishing injection after terminate and prevent
		actions are completed
		4. Feedback:
		- Reactor pressure trend
		- Suppression Pool temperature trend

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Event Description: Critical Task #4		
Time	Position	Applicant's Actions or Behavior
		Note: This is a contingent critical task
		Critical Task #4 – During an ATWS with Emergency
		Depressurization required, terminate and prevent injection, with the exception of SLC and CRD, into the RPV until reactor pressure is below MARFP
		1. Safety Significance:
		- Prevention of fuel damage due to uncontrolled feeding
		2. Cues:
		- Procedural compliance
		3. Measured by:
		- Observation – no injection into the RPV except for SLC and CRD prior to reaching the MARFP that causes a reactor short period alarm or power increase to APRM upscale alarms
		4. Feedback:
		- Reactor power trend, power spikes, reactor short period alarms

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Event Description: Critical Task #5

Time	Position	Applicant's Actions or Behavior
		Note: This is a contingent critical task
		Critical Task #5 – When RPV water level cannot be maintained during an ATWS, when RPV pressure is below the MARFP, slowly increase and control injection into the RPV to restore and maintain RPV level > -25"
		1. Safety Significance:
		- Establish adequate core cooling
		2. Cues:
		- RPV pressure trend
		- Procedural compliance
		3. Measured by:
		- RPV level is established and controlled above -25"
		4. Feedback:
		- Lack of power excursion
		- Lack of Hydrogen generation
		- RPV level and pressure indications

Facility: Perry Scenario No.: 3 Op Test No.: 2003 301

Examiners: _____

Operators: _____

Initial Conditions: Reactor startup is in progress with the plant at 5% of rated power. The OPRMs are functional but are inoperable per Tech. Spec. 3.3.1.3 (PLCO). Control Rods at step 48, Gangs 40 and 39 at position 08. IOI-1, Section 4.9, Step 1. Service Water Pump C is tagged out for motor refurbishment.

Turnover: 1. Continue plant startup. Withdraw control rods to 10% power, then transfer the Reactor Mode Switch to RUN, and continue power ascension. All required MODE change paperwork has been reviewed and approved.
 2. BOP operator shift NCC Pumps from A and B running, to A and C running.

Event No.	Malf. No.	Event Type*	Event Description
1		N (BOP) N (SRO)	Shift NCC Pumps from A and B running, to A and C running
2	RD01:R1043 8%	R (RO) R(SRO) C (RO) C (SRO)	Increase reactor power to 10% using control rods Control rod 10-43 stuck at position 8
3	NM02H 100%	I (RO) I (SRO)	IRM H Failure Upscale (TS 3.3.1.1 and ORM 6.2.3)
4	RD17A 50% RD05R5443 RD05R2215	C (BOP) C (SRO)	CRDH Pump A trip due to loss of lube oil / perform CRD Pump trip recovery Accumulator fault HCU 54-43 (TS 3.1.5) (1 minute time delay) Accumulator fault HCU 22-15 (TS 3.1.5) (2 minute time delay)
5	CP02: OP41C001B	C (BOP) C (SRO)	Service Water Pump B trip due to shaft seizure
6	bat or/seismic_2 TH02A / TH02B 100% MV08: OP43F0215	M (All)	Seismic Event Recirc Loop pipe rupture and reactor scram (TH02A - 6 minute time delay & 5 minute ramp) (TH02B - 8 minute time delay & 5 minute ramp) NCC Drywell Isolation Valve, P43-F215, fails closed
7	bat ms/losslevel2	C	Loss of all RPV level indication Emergency Depressurization / RPV Flooding to restore and maintain adequate core cooling

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

Event Description: Shift NCC Pumps from A and B running, to A and C running

Time	Position	Applicant's Actions or Behavior
	SRO	Direct BOP to place NCC Pump C in service and secure
		NCC Pump B per SOI-P43
	BOP	Shift NCC Pumps per SOI-P43, Section 5.1
		- Directs NLO to throttle NCC Pump C Discharge Vlv, P43-F513C,
		to 10% open
		- Take NCC Pump C control switch to START
		Observes P43-R352, Pump Amps
		Observes P43-R026C, Discharge Pressure
		- Directs NLO to open NCC Pump C Discharge Vlv, P43-F513C
		Observes P43-R352, change in pump amps
		Observes P43-R026C, change in discharge pressure
		- Verify header pressure has stabilized between 94 and 123 psig
		- Directs NLO to throttle NCC Pump B Discharge Vlv closed until it
		Is 2% open
		- <u>Immediately</u> take NCC Pump B control switch to STOP
		- Directs NLO to open NCC Pump B Discharge Vlv, P43-F513A
		- Directs NLO to verify proper discharge check valve operation by
		confirming no reverse pump rotation
	BOP	Verify NCC System parameters in accordance with SOI-P43
		Section 5.0

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Event Description: Increase reactor power to 10% using control rods/ Control rod 10-43 stuck at position 8

Time	Position	Applicant's Actions or Behavior
	SRO	Conduct reactivity brief
		Provides SRO oversight for power ascension
	RO	Withdraw control rods as directed in accordance with the approved rod withdrawal sequence
	RO	Recognize Control Rod 10-43 will not move and inform SRO
	SRO	Acknowledge report of immovable Control Rod 10-43
		Enter and execute SOI-C11 (RCIS), Section 7.9.2:
		- Directs RO to raise CRDH drive water differential pressure in 50 psid increments until control rod motion is achieved
	RO	Raise CRDH drive water d/p as directed, attempts Control Rod motion
		Reports Control Rod movement to SRO
	SRO	Directs RO to return CRDH drive water d/p to normal band
		Directs RO to continue power increase to 10% with control rods
		Note: Initiate Event 3 during the power increase after rod 10-43 has been moved. Crew will then return to Event 2 to complete the power increase.
		Note: Initiate Event 4 after power has been increased to 10%.

Op-Test No.: <u>2003-301</u> Scenario No.: <u>3</u> Event No.: <u>3</u> Page <u>1</u> of <u>1</u>		
Event Description: IRM H Failure Upscale		
Time	Position	Applicant's Actions or Behavior
	RO	Recognizes and reports IRM H failure upscale
		Recognizes and report RPS half-scam
		Recognizes and reports control rod withdrawal block
		Closely monitors remaining IRMs
	BOP	Assists RO by consulting ARIs:
		- ARI-H13-P680-6 (E3), IRM UPSCALE TRIP/INOP
		- ARI-H13-P680-6 (C2), ROD BLOCK IRM UPSCALE
		- ARI-H13-P680-5 (B9), ½ SCRAM B/D
		- ARI-H13-P680-5 (B7), RPS NEUTRON MON TRIP
		- ARI-H13-P680-5 (E10), ROD WITHDRAWAL BLOCK
	SRO	Acknowledge report of IRM failure, ½ scram, and rod block
		Suspends Control Rod withdrawal
		Directs IRM back panel indications checked
	SRO	May enter ONI-C51 if he believes power or reactivity has changed
	SRO/BOP	Requests I&C and Responsible System Engineer assistance in the
		Control Room to support troubleshooting
	SRO	Consults Tech Spec 3.3.1.1 and ORM 6.2.3
		Direct RO to bypass IRM H and reset ½ scram
		Notifies Operations Management of IRM failure and actions taken
	RO	Bypass IRM H per SOI-C51 (IRM), Section 7.1
		Reset half-scam B/D per SOI-C71, Section 7.3
		Observes IRM, Rod Block, and RPS alarms clear

Op-Test No.: <u>2003-301</u> Scenario No.: <u>3</u> Event No.: <u>4</u> Page <u>1</u> of <u>3</u>		
Event Description: CRDH Pump A trip due to loss of lube oil / perform CRD Pump trip recovery		
Time	Position	Applicant's Actions or Behavior
	BOP	Responds to, reports, and references ARIs for the following alarms:
		H13-P601-22 (C3), CRD SYS CHARGING WATER
		PRESSURE LOW
		H13-P601-22 (D2), CRD PUMP AUTO TRIP
		H13-P601-22 (F2), CRD PUMP A TRIP OIL PRESS LOW
		H13-P877-1 (G3), Bus XH11 BREAKER TRIP
		Recognizes and reports CRDH Pump A trip/ Aux Oil Pump running
	RO/BOP	Dispatches NLOs to CRDH Pump A and breaker to investigate
	RO/BOP/SRO	Receives report from NLO of a lube oil leak on CRDH Pump A
	SRO	May enter ONI-ZZZ-5, Spills and Unauthorized Discharges
	BOP	Recognizes Aux Oil Pump is running and may request permission to immediately secure the Aux Oil Pump due to the lube oil leak
	BOP/RO/SRO	Requests Maintenance and Responsible System Engineer assistance in the Control Room to support troubleshooting
	BOP	Responds to, reports, and references ARIs for alarm
		H13-P601-22 (A3) CRD MECHANISM TEMP HIGH
	SRO	Acknowledges CRDH Pump trip and receipt of unexpected alarms
		Enters ONI-C11-1, Inability to Move Control Rods
		- Directs plant parameters maintained as steady as possible
		- Directs CRD Pump trip recovery per SOI-C11 (CRDH)

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Event Description: CRDH Pump A trip due to loss of lube oil / perform CRD Pump trip recovery

Time	Position	Applicant's Actions or Behavior
	SRO (cont.)	- Directs RO to monitor for HCU accumulator fault alarms
	RO	Observes and reports accumulator fault on HCU 54-43
		Observes and reports accumulator fault on HCU 22-15
	SRO	Acknowledges accumulator faults on HCU 54-43 and HCU 22-15
		Acknowledges that a CRD Pump must be started within 20 minutes
		or the reactor must be shutdown
		Declares control rod accumulators for rods 54-43 and 22-15
		inoperable – References LCO 3.1.5 (Control Rod Scram
		Accumulators). Enters Action B
	BOP	Performs CRD Pump trip recovery per SOI-C11 (CRDH)
		- Take CRD Aux Oil Pump B, 1C11-C002B to Start
		- Place CRD Hydraulics Flow Control, 1C11-R600, in Manual
		- Using CRD Hydraulics Flow Control, 1C11-R600, fully close
		Flow Control Valve, 1C11-F002B
		- Take CRD PUMP B, 1C11-C001B, to Start and observes:
		increasing amps for CRD Pump B
		- CHARGING WATER LOW PRESSURE alarm clears
		- Slowly throttle open CRD Flow Control Valve until flow is
		returned to the pre-transient setting on CRD Hydraulics
		Flow Control, 1C11-R600
		Places CRD Hydraulics Flow Control, 1C11-R600, in Auto

Op-Test No.: <u>2003-301</u> Scenario No.: <u>3</u> Event No.: <u>5</u> Page <u>1</u> of <u>2</u>		
Event Description: Service Water Pump B trip due to shaft seizure		
Time	Position	Applicant's Actions or Behavior
	BOP	Responds to, reports, and references ARIs for alarms:
		H13-P970-1 (B8), SW PUMP DISCH HEADER PRESSURE
		LOW
		H13-P877-2 (G3), BUS XH12 BREAKER TRIP
		Recognizes and reports Service Water Pump B trip
	BOP/RO	Dispatches NLOs to Service Water Pump B and pump breaker
	BOP/RO/SRO	Requests Maintenance and Responsible System Engineer
		assistance in the Control Room to support troubleshooting
	SRO	Acknowledges report of Service Water Pump B trip
		Enters ONI-P41, Loss of Service Water
		- Directs BOP to start the standby Service Water Pump
		per SOI-P40/41, Section 5.1
		Notifies OPS Management and NRC Resident of ONI entry
		and reason for entry
		Directs BOP to complete shutdown of the Service Water Pump B
		per SOI-P40/41, Section 6.2

Op-Test No.: <u>2003-301</u> Scenario No.: <u>3</u> Event No.: <u>5</u> Page <u>2</u> of <u>2</u>		
Event Description: Service Water Pump B trip due to shaft seizure		
Time	Position	Applicant's Actions or Behavior
	BOP	Start standby Service Water Pump per SOI-P40/41 Section 5.1,
		Note: It would also be acceptable for the BOP to use SOI-P40/41, Sections 4.1 and 6.1, to restore the Service Water System.
		Shifting Service Water Pumps
		- Take SW Pump Discharge Valve control switch to Open and
		press the Stop button when the blue light comes on
		- Take SW Pump control switch to START
		- When SW Pump amps stabilize, take Discharge Valve control
		switch to Open
		- Throttle NCC HX SW Bypass Valve, P41-F400, as necessary to
		maintain discharge pressure of all operating SW Pumps at
		55-60 psig
		- Notify Chemistry to place the Service Water Chlorination System
		in operation per SOI-P48
	BOP	Complete shutdown of Service Water Pump B per SOI-P40/41,
		Section 6.2:
		- Take SW Pump Discharge valve control switch to Close and
		press the Stop button when the blue light comes on
		- Take Discharge Valve control switch to Close
		(Note: Section 6.2 may <u>not</u> be performed to facilitate
		troubleshooting of Service Water Pump B trip)

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Event Description: Seismic Event/Recirc Loop pipe rupture and reactor scram/NCC Drywell Isolation Valve, P43-F215, fails closed

Time	Position	Applicant's Actions or Behavior
	BOP/RO	Check and monitor major plant variables
	BOP	Checks panel H13-P969, informs SRO amber and red lights are on Starts all ESW Pumps, as directed by the SRO Contacts NLOs to secure Plant Underdrain Pumps
	BOP	Responds to, reports, and references ARI for alarm: H13-P601-18 (C1) DW UNIDENTIFIED RATE OF CHANGE HIGH
	BOP/RO	Report rising Drywell pressure
	RO/BOP	Monitor and trend rising Drywell pressure
	SRO	Due to rising Drywell pressure orders Rx scram, enters ONI-C71-1 * If not manually scrammed, reactor automatically scrams at 1.68 psig (a LOCA signal also occurs at 1.68 psig)
	RO	If directed, arms and depresses RPS Manual Scram Pushbuttons prior to 1.68 psig Drywell pressure
	SRO	Enters PEI-B13, RPV Control (Non-ATWS) due to RPV < L3 and Drywell pressure > 1.68 psig and enters PEI-T23, Containment Control due to Drywell pressure > 1.68 psig

Op-Test No.: <u>2003-301</u> Scenario No.: <u>3</u> Event No.: <u>6</u> Page <u>3</u> of <u>4</u>		
Event Description: Seismic Event/Recirc Loop pipe rupture and reactor scram/NCC Drywell Isolation Valve, P43-F215, fails closed		
Time	Position	Applicant's Actions or Behavior
	SRO	Directs PEI-B13, RPV Control (Non-ATWS)
		- Verifies reactor is scrammed
		- Confirms Reactor Mode Switch is in SHUTDOWN
		- Start Hydrogen Analyzers
		- Verifies reactor shutdown under all condition without boron
		- Verifies SRMs and IRMs inserted
		- Directs pressure control band (to be determined by SRO)
	SRO	RPV Level Control
		- Restores and maintains RPV level between 185 and
		215 inches
		* Feedwater - available
		* CRD - available
		* RCIC – available
		* HPCS – available
		RPV Pressure Control
		- Confirms no SRVs are cycling
		- Attempt to maintain RPV pressure band using Bypass Valves
		- Override low pressure ECCS Pumps per PEI-SPI 5.2
		*Condensate and Feedwater will restore RPV level to 185 to 215”
	RO/BOP	Executes PEI-B13, RPV Control (Non-ATWS) actions per SRO
		direction

Op-Test No.: 2003-301 Scenario No.: 3 Event No.: 6 Page 4 of 4

Event Description: Seismic Event/Recirc Loop pipe rupture and reactor scram/NCC Drywell Isolation Valve, P43-F215, fails closed

Time	Position	Applicant's Actions or Behavior
	SRO	Directs actions per PEI-T23, Containment Control, when Drywell pressure reaches 1.68 psig
		Drywell Temperature Control
		- Operates all available DW cooling
		- Restores NCC to the DW per PEI-SPI 2.1
		Drywell & Containment Pressure Control
		- Maintains Containment pressure below PSP
		Containment Temperature Control
		- Operates all available Containment cooling
		- Restores CVCW System per PEI-SPI 2.2
		- Maintains Containment average temperature less than 185°F
		Suppression Pool Level Control
		- Restores and maintains SP level between 17.8 and 18.5 ft
		Suppression Pool Temperature Control
		- Maintains both SP average temperature and RPV pressure below HCL
	RO/BOP	Executes PEI-T23 actions per SRO direction
		Reports P43-F215, NCC Containment Return Inboard Isolation Valve will NOT open (P43-F215 is failed closed)

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Event Description: Loss of all RPV level indication/Emergency Depressurization/RPV Flooding to restore and maintain adequate core cooling

Time	Position	Applicant's Actions or Behavior
		Note: Loss of RPV level will be triggered when DW temp is 212°F, or if the SRO decides that Emergency Depressurization is "Anticipated".
	BOP/RO	Recognizes loss of all level indication and informs the SRO
	SRO	Determines that RPV level cannot be determined and transitions to PEI-B13, RPV Flooding
		- Verifies all Control Rods inserted
		- Verifies Suppression Pool level greater than 5.25 feet
		- Directs eight (8) ADS SRVs to be opened
	RO/BOP	Open eight (8) ADS SRVs, when directed
	SRO	Directs actions to isolate the reactor vessel
	RO/BOP	Closes MSIV's, MSL drains and RCIC steam valves, when directed
	SRO	Directs RO/BOP to inject to establish RPV pressure 60 psig greater than Containment pressure and at least five (5) SRVs open
	RO/BOP	Operates designated systems and injects to vessel when directed: RFBPs (PEI-SPI 2.7) or HPCS (PEI-SPI 2.4) are available and low pressure ECCS Systems are available

Examiners: _____

Operators: _____

Initial Conditions: The plant is operating at 80% power. RHR A is in secured status for preventive maintenance on the pump breaker. RHR A was declared inoperable five hours ago per Tech. Spec.3.5.1, Action A; 3.6.1.7, Action A; and 3.6.2.3, Action A; 3.6.3.3, Action A; PLCO 3.4.9. The OPRMs are functional but are inoperable per Tech. Spec. 3.3.1.3. Required Action A.3 has been implemented. Performing a normal plant shutdown per IOI-3, Section 4.6 step 3. IOI-3, Section 4.6, steps 1, 2, 4 and 7 are completed. Control rods are at step 62, position 36.

Turnover: BOP operator shift AEGTS trains from A to B running. Continue the plant shutdown by reducing power using Recirculation Flow to 58 Mlbm/hr. Hold power there for Reactor Engineering.

Event No.	Malf. No.	Event Type*	Event Description
1		N (BOP) N (SRO)	Shift AEGTS trains from A to B
2		R (RO) R(SRO)	Reduce Reactor Power using Recirculation Flow
3	CN02: 1P44R0450 0%	I (BOP) I (SRO)	RFPT A Lube Oil Temp controller failure in Auto mode
4	NM04D 125%	I (RO) I (SRO)	APRM D failure upscale (TS 3.3.1.1.A and ORM 6.2.1.B)
5	CN03:1C34R0 601B 20%	I (RO) I (SRO)	Reactor Feed Pump B controller oscillations (1 minute ramp)
6	CP02: 1P44C0001A SW03 10%	C(BOP) C(SRO)	TBCC Pump A trip (start standby TBCC Pump) TBCC System Process Piping Leakage (2 minute time delay and 5 minute ramp) Fast Reactor Shutdown required
7	TH28 1% PC01A 0% CB04: 1E12C0002B	M (All) C	MSL Break in Drywell DW-CNTMT Bypass Leakage (to be modified in Event #8) RHR Pump B fails to auto start on Drywell high pressure (required for Containment Spray mode)
8	CB01: 1E12C0002B	C	RHR Pump B trips when flow is aligned to containment spray RPV emergency depressurization to control Containment pressure

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

Event Description: Shift AEGTS trains from A to B

Time	Position	Applicant's Actions or Behavior
	SRO	Direct BOP to shift AEGTS trains from A to B per SOI-M15
		NOTE: During this evolution, the following expected alarms are received:
		- H13-P800-1(A2), ANNULUS DIFF PRESS A LOW
		- H13-P800-1(D1), ANNULUS EXH FAN B FLOW LOW
	BOP	Shift AEGTS trains from A to B per SOI-M15, Section 5.1
		- Confirms Backup Drywell Purge is <u>not</u> in operation by verifying valves M51-F090 and F110 are closed on panel H13-P800.
		- De-energizes AEGT ELEC HT COIL A, 1M15-D001A, by taking its control switch to STOP
		- After 5 minutes, start the standby AEGT FAN B, 1M15-C001B, by placing the control switch in ON
		- Energizes AEGT ELEC HT COIL B, 1M15-D001B, by taking its control switch to START
		- Allows 1 to 2 minutes for the Train B dampers to reposition
		Checks ANNULUS DIFF PRESSURE RECORDERS, 1M15-R016A and 1M15-R016B, for proper annulus pressure
		- Confirms ANNULUS EXH FAN B FLOW LOW annunciator, window 1H13-P800-1 (D1), is reset

Op-Test No.: <u>2003-301</u> Scenario No.: <u>4</u> Event No.: <u>3</u> Page <u>1</u> of <u>1</u>		
Event Description: RFPT A Lube Oil Temp controller failure in Auto mode		
Time	Position	Applicant's Actions or Behavior
	BOP	Respond to, report, and reference ARI for Alarm H13-P870-8 (A2), RFPT A LUBE OIL CLR OUTLET TEMP HIGH
	BOP	Determine RFPT LUBE OIL TEMP CONTROL A, 1P44-R450 has failed in Auto mode
	SRO	Acknowledge alarm report and RFPT A Lube Oil Temperature Controller failure in the Auto mode
	RO/BOP	May report, respond, and reference ARI for Alarm H13-P680-7 (B14), RFPT A VIB/TEMP P823
	BOP	Place the RFPT LUBE OIL TEMP CONTROL A, 1P44-R450, in Manual and increase cooling water flow Inform SRO that 1P44-R450 has been placed in Manual and cooling water flow has been increased to RFPT Lube Oil Cooler
	SRO	In accordance with Operations Expectations: - Assign BOP operator as clear "owner" to closely monitor RFPT Lube Oil temperature - Consider placing an Information Tag on RFPT A LUBE OIL TEMP CONTROL, 1P44-R450
	BOP	Closely monitor RFPT A Lube Oil temperature
	BOP/RO	Request I&C and Responsible System Engineer assistance to support troubleshooting

Op-Test No.: <u>2003-301</u> Scenario No.: <u>4</u> Event No.: <u>4</u> Page <u>1</u> of <u>1</u>		
Event Description: APRM D failure upscale		
Time	Position	Applicant's Actions or Behavior
	RO	Recognizes and reports APRM D failure upscale
		Recognizes and report RPS half-scam
		Recognizes and reports control rod withdrawal block
		Closely monitors remaining APRMs
	BOP	Assists RO by consulting ARIs:
		- ARI-H13-P680-6 (E5), APRM D/H TRIP/INOP OPRM D/H TRIP
		- ARI-H13-P680-5 (B9), ½ SCRAM B/D
		- ARI-H13-P680-5 (B7), RPS NEUTRON MON TRIP
		- ARI-H13-P680-5 (E10), ROD WITHDRAWAL BLOCK
		- ARI-H13-P680-6 (C4), ROD BLOCK APRM UPSCALE
	SRO	Acknowledge report of APRM failure, half-scam, and rod block
		Directs APRM back panel indications checked
	SRO/BOP	Requests I&C and Responsible System Engineer assistance in the Control Room to support troubleshooting
	SRO	Consults Tech Spec 3.3.1.1 and ORM 6.2.1
		Directs RO to bypass APRM D and reset half-scam
		Notifies Operations Management of APRM failure & actions taken
	RO	Bypass APRM D per SOI-C51 (APRM), Section 7.1
		Reset half-scam B/D per SOI-C71, Section 7.3
		Observes APRM, Rod Block, and RPS alarms clear

Op-Test No.: <u>2003-301</u> Scenario No.: <u>4</u> Event No.: <u>5</u> Page <u>1</u> of <u>2</u>		
Event Description: Reactor Feed Pump B controller oscillations		
Time	Position	Applicant's Actions or Behavior
	RO	Reports Feed Flow / Steam Flow mismatch
		Reports reactor water level oscillations
		Reports RX LEVEL HI/LO L7/L4 alarm (H13-P680-3 (A9))
	BOP	Supports RO by consulting ARI-H13-P680-3 (A9)
	SRO	Acknowledges receipt of unexpected alarm
		Enters ONI-C34 due to malfunction of feedwater level control
		- Directs RO to transfer control of the affected RFPT(s) to the Manual Speed Control Dial and maintain reactor water level 192 to 200 inches
		- Directs RO to place RFP A(B) FLOW CONTROL for the affected RFPT(s) to Manual
		- Coordinates with RO/BOP to complete applicable Supplemental Actions
	RO	Transfers control of the affected RFPT(s) to the Manual Speed Control Dial and maintains reactor water level 192 to 200 inches
	RO/BOP	Requests Responsible System Engineer and I&C assistance in the Control Room to support troubleshooting
	SRO	Notifies OPS Management and NRC Resident of ONI-C34 entry and reason for entry

Op-Test No.: <u>2003-301</u> Scenario No.: <u>4</u> Event No.: <u>5</u> Page <u>2</u> of <u>2</u>		
Event Description: Reactor Feed Pump B controller oscillations		
Time	Position	Applicant's Actions or Behavior
	SRO	Evaluates feedwater level control options
	SRO	Note: If only RFPT B is transferred to the Manual Speed Control Dial, then the following actions will be NA
	SRO	Directs RO to transfer RFPT A (B) from the Manual Speed Control Dial to the Startup Level Control per SOI-C34, Section 4.6, or to the Master Level Control per SOI-C34, Sections 4.5 and 4.9
		- Provides SRO oversight during feedwater level control shift
		* After the shift, one RFPT will be on either the SULC or the MLC and the other RFPT will be base loaded
	SRO	Directs BOP to monitor reactor power and reactor pressure during the feedwater level control shift
	BOP	Monitors reactor power and reactor pressure
	RO	Transfers either RFPT A (B) from the Manual Speed Control Dial to the Startup Level Control or to the Master Level Control
		- Verifies RFPT B (A) is being controlled by RFPT B (A)
		Manual Speed Control Dial

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Event Description: TBCC Pump A trip/TBCC System Process Piping Leakage/Fast Reactor Shutdown required

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes and reports TBCC Pump A trip
		Responds to alarm. Consults ARI-H13-P870-1 (B6)
	BOP	Dispatches NLOs to TBCC Pump A and pump breaker
	BOP/RO/SRO	Requests Maintenance assistance to support troubleshooting
	SRO	Acknowledges report TBCC Pump A trip
		Enters ONI-P44, Loss of Turbine Building Closed Cooling
		- Directs BOP to start the standby TBCC pump
		per SOI-P44
		Notifies OPS Management of ONI entry and reason for entry
	BOP	Starts standby TBCC Pump per SOI-P44, Section 4.2.
		- Directs NLO to throttle closed standby TBCC Pump discharge valve to 20% open
		- Takes standby TBCC Pump control switch to start
		- Directs NLO to fully open standby TBCC Pump discharge valve
		May direct NLO to reset overcurrent trip
	BOP	Responds to, reports, and references ARIs for alarms:
		- ARI-H13-P870-2 (H2), TBCC SURGE TANK LEVEL LOW
		- ARI-H13-P870-2 (H4), TBCC PUMP SUCTION FLOW LOW
		May dispatch NLO to open the manual bypass valve around the auto makeup valve in order to fill the TBCC surge tank
	BOP/RO	Receives report bypass valve is open and surge tank level is continuing to decrease

Op-Test No.: 2003-301 Scenario No.: 4 Event No.: 6 Page 2 of 2

Event Description: TBCC Pump A trip/TBCC System Process Piping Leakage/Fast Reactor Shutdown required

Time	Position	Applicant's Actions or Behavior
	BOP/RO	Recognizes and reports loss of TBCC
	SRO	Acknowledges report of loss of TBCC
		Re-enters ONI-P44, Loss of Turbine Building Closed Cooling
		- Orders fast reactor shutdown, enters ONI-C71-1, Rx Scram
		* Will also enter PEI-B13, RPV Control (Non-ATWS) due to < L3
		PEI-B13 RPV Control actions are described in Event 7
		- Directs ONI-C71-1 Supplemental Actions
		- Directs ONI-P44 Supplemental Actions as time permits
		* Any component or system served by the TBCC System
		that reaches its temperature limit shall be placed in
		the secured status per its applicable SOI
	SRO/BOP/RO	May direct NLO to walkdown TBCC System
	SRO/BOP/RO	If NLO was directed to perform system walkdown, receives report
		of water in Turbine Building at Elevation 605
	RO	Respond to, report, and reference ARIs for Alarms:
		H13-P680-9 (D1), ISOPHASE BUS CLG TRBL
		H13-P680-7 (B11), GENERATOR TEMP P811
		H13-P680-7 (D 9), H2 SEAL/STATOR CLG TRBL
	RO/BOP	Carry out ONI-C71-1 actions as SRO directs
	RO/BOP	Carry out ONI-P44 actions as SRO directs

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Event Description: MSL Break in Drywell/DW-CNTMT Bypass Leakage/RHR Pump B fails to auto start on Drywell high pressure

Time	Position	Applicant's Actions or Behavior
	SRO/RO/BOP	Recognize rising Drywell Pressure condition
	SRO	Enters PEI-B13 RPV Control (Non-ATWS) due to < L3, high RPV press, and Drywell pressure > 1.68 psig.
		Enters PEI-T23, Containment Control due to Drywell pressure > 1.68 psig
	SRO	Directs PEI-B13, RPV Control (Non-ATWS)
		- Verifies reactor is scrammed
		- Confirms Reactor Mode Switch is in SHUTDOWN
		- Start Hydrogen Analyzers
		- Verifies reactor shutdown under all condition without boron
		- Verifies SRMs and IRMs inserted
		- Directs pressure control 800 to 1000 psig using Bypass Valves/SRVs
		RPV Pressure Control
		- Stabilizes RPV pressure 800 to 1000 psig
		Note: As Containment pressure rises, SRO may direct a reduced RPV pressure band, or direct the RPV be rapidly depressurized to the Main Condenser using Main Turbine Bypass Valves

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Event Description MSL Break in Drywell/DW-CNTMT Bypass Leakage/RHR Pump B fails to auto start on Drywell high pressure

Time	Position	Applicant's Actions or Behavior
	SRO (Cont.)	RPV Level Control
		- Restores and maintains RPV level between 185 and 215 inches
		* CRD - available
		* RCIC – available
		* HPCS – available
		* Reactor Feedwater Booster Pumps and Motor Feed Pump
		Should be unavailable for level control due to loss of TBCC
	RO/BOP	Executes PEI-B13, RPV Control (Non-ATWS) actions per SRO
		direction
	RO/BOP	Verifies automatic plant response is as expected
	BOP	Recognizes failure of RHR Pump B to auto start on high Drywell
		pressure and manually starts RHR Pump B
	BOP	When conditions allow, informs SRO of failure of RHR Pump B
		to auto start and subsequent manual start
	SRO	Acknowledges failure of RHR Pump B to auto start
	SRO	Directs actions per PEI-T23, Containment Control, when Drywell
		press reaches 1.68 psig (described in Event 8)

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Event Description: RHR Pump B trips when flow is aligned to containment spray/RPV emergency depressurization to control Containment pressure

Time	Position	Applicant's Actions or Behavior
	SRO	Directs actions per PEI-T23, Containment Control, when Drywell
		pressure reaches 1.68 psig
		Drywell and Containment Temperature Control
		- Operates all available DW cooling
		- Restores NCC to the DW per PEI-SPI 2.1
		- Operates all available Containment cooling
		- Restores CVCW System per PEI-SPI 2.2
		- Attempts to maintain Cont. average temperature less than 185°F
		Drywell & Containment Pressure Control
		- Attempts to maintain Containment pressure below PSP
		- Directs RHR Loop B in the Containment Spray Mode when
		Containment pressure exceeds 2.25 psig per PEI-SPI 3.1
		Suppression Pool Level Control
		- Restores and maintains SP level between 17.8 and 18.5 ft
		Suppression Pool Temperature Control
		- Maintains both SP average temperature and RPV pressure
		below HCL
	RO/BOP	Executes PEI-T23 actions per SRO direction
		Recognizes RHR Pump B trips when flow is aligned to
		Spray Containment and immediately informs SRO

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Event Description: RHR Pump B trips when flow is aligned to containment spray/RPV emergency depressurization to control Containment pressure

Time	Position	Applicant's Actions or Behavior
	SRO	Prior to exceeding the Pressure Suppression Pressure (PSP),
		exits PEI-B13, RPV Control (Non-ATWS), RPV Pressure Leg and
		enters PEI-B13, Emergency Depressurization
	SRO	Executes PEI-B13, RPV Control (Non-ATWS), RPV Level Control
		Leg concurrently with PEI-B13, Emergency Depressurization
	SRO	Directs RO/BOP actions per PEI-B13, Emergency Depressurization
		- Confirms that the reactor is shutdown under all
		conditions without boron
		- Verifies Drywell pressure is > 1.68 psig
		- Verifies no low pressure ECCS are required for adequate
		core cooling
		- Prevents injection from LPCS and LPCI
		- Verifies eight or more SRVs are not open
		- Verifies Suppression Pool level is > 5.25 ft
		- Opens all ADS valves to rapidly depressurize the RPV
		* Crew should continue to restore and maintain RPV level 185-215"
		using available injection systems during Emergency
		Depressurization
	RO/BOP	Executes PEI-B13, Emergency Depressurization actions per SRO
		direction

Examiners:

Operators:

Initial Conditions: The plant is operating at 45% power. SLC Pump A is Red Tagged OOS for a coupling alignment. SLC A was declared inoperable per Tech Spec 3.1.7, Condition A, 24 hours ago. SPCU is operating through the SPCU Demineralizer, returning via RHR A. SOI-G42, Sections 4.1 and 5.1 were performed. The OPRMs are functional but are inoperable per Tech Spec 3.3.1.3. Required Action A.3 has been implemented. Performing a normal plant startup per IOI-3, Section 4.5, step 8. IOI-3, steps 4.5.13 and 4.5.15 have been performed. Control Rods are at step 71, position 36

Turnover: Secure from SPCU operations per SOI-G42. Continue the plant startup per IOI-3. Withdraw control rods to 50% power and hold for Reactor Engineering.

Event No.	Malf. No.	Event Type*	Event Description
1		N(BOP) N(SRO)	SPCU Pump Shutdown from the Normal SPCU to Suppression Pool Return Line
2		R(RO) R(SRO)	Withdraw Control Rods to increase reactor power to 50%
3	RD02R5431	C(RO) C(SRO)	Uncoupled Control Rod 54-31 (TS 3.1.3)
4	MC04A	C(BOP) C(SRO)	Cirw Pump A Suction Chamber Low Level / Cirw Pump A shutdown
5	MS11	C(BOP) C(SRO)	Steam Seal Header Pressure Control Valve failure closed / Manual control of Steam Seal Header pressure
6	MV08, MV03 0P43F0400	C	Loss of NCC Cooling Water flow to Drywell loads (P43-F400 fails closed)
7	RY02:1C71 K14A, C, E, G	I(RO) I(SRO)	Failure of RPS to shutdown the reactor / Manual initiation of ARI
8	RD15	M(All)	ATWS – 50%
9	MS05A,B,C,D,E, F,G,H MV03:1B21F001 6,19	C	MSIV closure / Loss of Main Condenser

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

Appendix D

Operator Actions

Form ES-D-2

Op-Test No.: 2003-301 Scenario No.: 5 Event No.: 1 Page 1 of 2

Event Description: SPCU Pump Shutdown from the Normal SPCU to Suppression Pool Return Line

Time	Position	Applicant's Actions or Behavior
	SRO	Directs BOP to shutdown the SPCU System in accordance with SOI-G42, Section 6.1.
	BOP	Shutdown SPCU System per SOI-G42, Section 6.1
		- Establishes communications between the Control Room and the operator at SPCU Pump Discharge to Return Header 1G42-F511
		- Confirms SPCU DEMIN OUTLET ISOL, 1G42-F080, is open
		- Performs the following to remove the demineralizer from service:
		- Transfers system flow to short cycle recirc by concurrently performing the following:
		Directs NLO to throttle open SPCU Pump Discharge to Return Header, 1G42-F511, to 1 ¼ turns open
		Throttles closed SPCU PUMP DISCH TO SPCU DEMIN, 1G42-F070, on 1H13-P870, until closed
		- Directs NLO to throttle SPCU Pump Discharge to Return Header, 1G42-F511, as necessary to obtain a flowrate of 950 to 1000 gpm as read on SPCU PUMP DISCH FLOW, G42-R053, on 1H13-P870
		- Directs the Radwaste Operator to perform Removing the Suppression Pool Demineralizer from Service per RWI-G42
		- Takes SPCU DEMIN OUTLET ISOL, 1G42-F080, control switch on P870 to CLOSE
		- Verifies SPCU Pump Discharge to Return Header, 1G42-F511, is throttled to obtain a flowrate of 950 to 1000 gpm as read on SPCU PUMP DISCH FLOW, G42-R053, on 1H13-P870
		Note: The SPCU Pump, 1G42-C001, must be deenergized as soon as 1E12-F610 closes to avoid prolonged operation at shutoff head
		- Takes SPCU TO RHR FIRST OTBD ISOL, 1E12-F610, on P870 to CLOSE

		- Takes SPCU PUMP, 1G42-C001, control switch on P870 to STOP

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Event Description: Withdraw Control Rods to increase reactor power to 50%

Time	Position	Applicant's Actions or Behavior
	SRO	SRO continues the plant startup per IOI-3, Section 4.5, Step 8
		Note: The following alarm is expected to occur (and clear) several times during this Event due to the 4 notch rod withdrawal limit above the LPSP: H13-P680-5 (E10), ROD WITHDRAWAL BLOCK
		Note: The following alarm is expected to occur (and clear) during this event due to increasing reactor power and Condensate System flow: H13-P870-4 (A3), CONDENSATE F/D DIFF PRESS HI
		Note: Event #3 for an uncoupled Control Rod will occur during this power increase from 45% to 50%. When Event #3 is completed, then the crew will return here to complete Event #2
	RO/BOP	Notifies SCC, Chem and HP of intent to raise reactor power
	SRO	Conducts reactivity brief
		Provides SRO oversight for power ascension from 45% to 50% power
		Directs RO to withdraw Control Rods in order to raise reactor power to 50% in accordance with the approved rod withdrawal sequence
		Note: SRO may contact Reactor Engineering to verify thermal limits should remain within limits during this power increase
	RO	Withdraws control rods as directed in accordance with the approved rod withdrawal sequence and SOI-C11(RCIS), Section 5.2
	SRO	May perform additional steps in IOI-3, Section 4.5 to support power increase

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Event Description: Uncoupled Control Rod 54-31

Time	Position	Applicant's Actions or Behavior
	RO	Responds to, reports, and references ARI for Alarm H13-P680-5 (D9), ROD OVERTRAVEL
	RO	Depresses ROD UNCOUPLED pushbutton and determines that Control Rod 54-31 is uncoupled by observing the red LED on the Rod Status Display
	RO	Informs SRO that the uncoupled Control Rod is 54-31
	SRO	Acknowledges alarm report
	SRO	Enters ONI-C11-2, Uncoupled Control Rod
		- Directs RO to stop control rod withdrawal
	RO	Stops control rod withdrawal
	SRO	Coordinates applicable Supplemental Actions
		- Notifies a Reactor Engineer
		- Directs Reactor Engineer to determine if any local/gross power limits have been exceeded
		- Declares Control Rod 54-31 inoperable
		References Tech Specs for an uncoupled control rod
		LCO 3.1.3 (Control Rod OPERABILITY) – enters Condition C
		Note: Control Rod 54-31 is not required to be bypassed before an attempt at recoupling can be performed
		- Obtains recoupling guidance from the Reactor Engineer
		Note: Reactor Engineer will direct Control Rod 54-31 be inserted to position 46 during the recoupling attempt

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Event Description: Uncoupled Control Rod 54-31

Time	Position	Applicant's Actions or Behavior
	SRO (Cont)	- Directs RO to attempt to recouple Control Rod 54-31 by inserting the Control Rod to position 46
	RO	Selects Control Rod 54-31 in the Individual Drive mode
		- Inserts Control Rod 54-31 to position 46
		- Reports ROD OVERTRAVEL alarm has cleared
	SRO	Acknowledges alarm clearance report
		- Directs RO to verify Control Rod 54-31 is recoupled
	RO	Verifies Control Rod 54-31 is recoupled as follows: Note: There will be no noticeable changes in flux levels
		- De-selects then re-selects and fully withdraws Control Rod 54-31
		- Verifies that the Control Rod position changes as the Control Rod is withdrawn
		- Performs a coupling check on the Control Rod at position 48
	RO	Informs the SRO that Control Rod 54-31 has been successfully recoupled
	SRO	Declares Control Rod 54-31 OPERABLE and exits LCO 3.1.3
	SRO	Exits ONI-C11-2, Uncoupled Control Rod
	SRO	Notifies OPS Management and NRC Resident of ONI entry, reason for entry, and ONI exit

		Note: Crew returns to Event #2 to complete the power increase

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Event Description: Cirw Pump A Suction Chamber Low Level / Cirw Pump A shutdown

Time	Position	Applicant's Actions or Behavior
	BOP	Responds to, reports, and references ARI for Alarm H13-P870-3 (E1), CIRW PUMP SUCT CHAMBER LEVEL LOW
	SRO	Acknowledges alarm report
	BOP	Determines alarm is not caused by low cooling tower basin level by observing COOLING TOWER BASIN LEVEL, 1P41-R415
		Note: Cooling tower basin level will actually increase due to the suction chamber blockage
	BOP	Monitors all operating Cirw Pump discharge pressures and motor currents for fluctuations
	BOP/RO	Monitors Circulating Water Process Computer Screen to determine that Cirw Pump A is affected by the low level
	BOP/RO	Monitors Main Condenser vacuum for degradation
		Note: Crew is not expected to enter ONI-N62, Loss of Main Condenser Vacuum, because vacuum degradation is minimal
		Note: BOP will not have time to attempt to clean the affected suction chamber screen before fluctuations are observed for Cirw Pump A
	BOP	Observes fluctuations in the discharge pressure and motor current for Cirw Pump A. Informs SRO
	SRO	Directs BOP to shutdown Cirw Pump A

	BOP	Takes Cirw Pump A control switch to STOP and then releases the control switch
		- Confirms Cirw Pump A Discharge Valve, 1N71-F020A, auto closes

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Event Description: Steam Seal Header Pressure Control Valve failure closed / Manual control of Steam Seal Header pressure

Time	Position	Applicant's Actions or Behavior
		<p>Note: This Event will result in a significant increase in Off-Gas System flowrate due to the short-term loss of steam seals. The following alarms are expected to occur and will automatically clear after normal steam seal header pressure is re-established:</p> <p>H13-P604 (A2), OG PRE-TREAT PRCS RAD RCDR P600 H13-P845 (A3), PREFILTER DIFF PRESS HI H13-P845 (B3), MOISTURE SEP OUTLET TEMP HI H13-P845 (D1), RECOMBINER A/B TEMP HIGH/LO H13-P845 (D5), AFTER FILTER FLOW HI HI H13-P845 (E5), AFTER FILTER FLOW HI/LO H13-P845 (F1), PREHEATER A/B INLET PRESS HI H13-P845 (F5), AFTER FILTER DIFF PRESS HI H13-P870-7 (C2), STEAM SEAL EXHAUST SYS VACUUM LOW</p>
		<p>Note: The following alarms are expected to occur and will clear after normal Steam Seal Header pressure is re-established and Operator action(s) are performed:</p> <p>H13-P845 (B8), HOLDUP LINE DRN LOOP SEAL LEVEL LOW H13-P845 (D8), COOLER CNDR DRN LOOP SEAL LEVEL LOW H13-P870-7 (G2), SJAЕ B INTERCONDENSER LEVEL HI/LO</p>
	BOP	Reports, responds to, and references ARI for Alarm H13-P870-7 (C1), STEAM SEAL HEADER PRESSURE LOW
	SRO	Acknowledges alarm report
		<p>Note: There is no valve position indication for Steam Seal Header Press Control Valve, 1N33-F070, on H13-P870</p>
	BOP	Determines that Steam Seal Header Pressure Control Vlv, 1N33-F070, has malfunctioned (failed closed)
	BOP/RO	Monitors Main Condenser vacuum for degradation

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Event Description: Steam Seal Header Pressure Control Valve failure closed / Manual control of Steam Seal Header pressure

Time	Position	Applicant's Actions or Behavior
	SRO	Directs BOP to manually control Steam Seal Header pressure in accordance with SOI-N33, Section 7.3
		Note: Since Steam Seal Header pressure is at 0 psig, the BOP will not be able to procedurally comply with Steps 1, 2, and 3 of SOI-N33, Section 7.3
	BOP	Manual Control of Steam Seal Header Pressure per SOI-N33, Section 7.3
		- Informs SRO that he will need a procedure deviation for SOI-N33, Section 7.3, Steps 1, 2, and 3
	SRO	Grants procedure deviation
	BOP (Cont)	- Throttles closed ST SEAL EVAP TO HDR SUPPLY VLV, 1N33-F065
		- Throttles open ST SEAL EVAP TO HDR SUPPLY BYPASS, 1N33-F075, to obtain 4 to 6 psig on STEAM SEAL EVAPORATOR HDR PRESS, 1N33-R083, on P870
		- Throttles ST SEAL EVAP TO HDR SUPPLY BYPASS, 1N33-F075, as necessary to maintain Steam Seal Header pressure at 3 to 5 psig
	BOP/RO	Requests Maintenance and Responsible System Engineer assistance to support troubleshooting
		Note: This Event will cause Main Condenser vacuum to

		slowly degrade. Therefore, the crew may enter ONI-N62, Loss of Main Condenser Vacuum but it is not required in order to correct the Steam Seal problem

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Op-Test No.: ~~2003-301~~ Scenario No.: 5 Event No.: 6 Page 1 of 3

Event Description: Loss of NCC Cooling Water flow to Drywell loads (P43-F400 fails closed)

Time	Position	Applicant's Actions or Behavior
		Note: It is expected that the crew will enter ONI-P43, Loss of NCC, perform a fast reactor shutdown, and then trip the Recirc Pumps
		Note: The ARIs will direct that the Recirc Pumps either be tripped or shutdown. This would then require the crew to enter ONI-C51, Unplanned Change in Reactor Power or Reactivity, and perform a manual reactor scram due to the Reactor Mode Switch being in RUN with no Recirc Pumps in operation
		Note: The following alarms will occur on panel 1H13-P680-4 due to the loss of NCC to the Drywell and will require entry into ONI-P43: C1 – RCIRC A SEAL CLR FLOW LO C10 – RCIRC B SEAL CLR FLOW LO D1 – RCIRC A UPPER BRG FLOW LO D2 – RCIRC A MOTOR CLR FLOW LO D8 – RCIRC A/B TEMP HI D10 – RCIRC B UPPER BRG FLOW LO D11 – RCIRC B MOTOR CLR FLOW LO E1 – RCIRC A LOWER BRG FLOW LO E7 – NCC UNIT 1 HDR FLOW LO E10 – RCIRC B LOWER BRG FLOW LO
	RO	Reports, responds to, and references various ARIs for Recirc Pump related alarms on panel 1H13-P680-4
	BOP	Reports, responds to, and references ARI for Alarm H13-P601-18 (A3), NS4 INBD ISOLATION OUT OF SERVICE
	BOP	Confirms NCC DW RETURN INBD DW ISOL, 1P43-F400, has lost position indication
		- Dispatches NLO to EF1C07, Compt PP to check fuses.

	SRO	Acknowledges RO and BOP alarm reports

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Event Description: Loss of NCC Cooling Water flow to Drywell loads (P43-F400 fails closed)

Time	Position	Applicant's Actions or Behavior
		Note: The following additional alarms will occur on panel H13-P601 and H13-P800 due to rising Drywell pressure as a result of the loss of drywell cooling: H13-P601-17 (E1), SUPR POOL LEVEL B HI/LO H13-P601-17 (E4), CNTMT / DW DIFF PRESS B HIGH H13-P601-20 (D4), CNTMT / DW DIFF PRESS A HIGH H13-P601-20 (E2), SUPR POOL LEVEL A HI/LO H13-P800-3 (F4), DW RECORDER TEMPERATURE HIGH/LOW
	BOP	Monitors Recirc Pump temperatures on RCIRC PUMP/MOTORS TEMP MONITORING RECORDER, 1B33-R601, on 1H13-P614
	SRO	Enters ONI-P43, Loss of Nuclear Closed Cooling <ul style="list-style-type: none"> - Determines a complete loss of NCC has occurred - Directs the RO to perform a fast reactor shutdown
		Note: The reactor is shutdown due to the loss of cooling to the Recirc Pump bearings
	RO	Performs a fast reactor shutdown as follows: <ul style="list-style-type: none"> - Closes both RCIRC Loop A & B Flow Control Valves, 1B33-F060A & B, until core flow has been decreased to 58 Mlbm/hr Note: this step may not be performed since core flow is already approximately 58 Mlbm/hr
		<ul style="list-style-type: none"> - Arms and depresses the RPS MANUAL SCRAM CH A, B, C & D PBs
		Note: The failure of RPS to shutdown the reactor is continued in Event # 7
	SRO	Coordinates with RO/BOP to complete applicable ONI-P43

		Supplemental Actions

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Event Description: ATWS

Time	Position	Applicant's Actions or Behavior
	SRO	Determines reactor is still NOT shutdown under all conditions without boron
		Note: The SRO will execute all 3 legs of PEI-B13, RPV Control (ATWS) concurrently
	SRO	Exits PEI-B13, RPV Control (Non-ATWS) and enters PEI-B13, RPV Control (ATWS)
		RPV Power Control
		- Confirms Turbine Generator is online
		- Confirms RFPTs are operating
		- Runback Recirc FCVs to minimum position
		- Trips Recirc Pumps
		- Performs the following steps concurrently:
		Inserts Control Rods using PEI-SPI 1.3
		Injects boron into the RPV using SLC A
		Inhibits ADS
	RO/BOP	Executes PEI-B13, RPV Control (ATWS), RPV Power Control actions per SRO direction
	SRO	RPV Level Control
		- Verifies all initiations and isolations occurred
		- Inhibits ADS (if not previously performed)
		- Terminates and prevents injection into the RPV for:
		HPCS Injection Prevention per PEI-SPI 5.1
		LPCS and LPCI Injection Prevention per PEI-SPI 5.2
		- Prepares the following for injection:
		LPCI A Outside the Shroud Injection per PEI-SPI 6.1
		LPCI B Outside the Shroud Injection per PEI-SPI 6.2

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Event Description: ATWS

Time	Position	Applicant's Actions or Behavior
	SRO (Cont)	Note: The MSIVs may fail closed prior to the performance of the next step. MSIV closure is discussed in Event #9
		- Confirms any Main Steam Line is open
		- Maintains the MSIVs open:
		Bypasses MSIV Low Level Isolation per PEI-SPI 2.3
		Bypasses Instrument Air Isolation per PEI-SPI 2.8
		- Determines Emergency Depressurization is not required
		Note: The crew should be able to maintain RPV level > -25 inches using RCIC and the MFP
		- Determines that except for boron and CRD, termination and prevention of all injection into the RPV is not required at this time
		Note: The Suppression Pool will slowly heatup due to the isolation of the MSIVs. However, Suppression Pool will be less than 110 °F at this time
		- Determines reactor power is greater than 4%
		- Maintains RPV level -25 in. to +100 in.
		Note: SRO will set the RPV level band (typically 50 in. to 100 in. initially in order to maintain the MSIVs open (MSIVs close at 16.5 in.))
		Note: As RPV level is lowered, RCIC will initiate at 130 inches (and cause the RFPTs to trip). HPCS will also initiate at 130 inches unless it was previously overridden
		- Injects slowly into the RPV using RCIC and the MFP
		Note: as previously stated, the RO should be able to maintain RPV level > -25 inches such that Emergency Depressurization will not be required
	RO/BOP	Executes PEI-B13, RPV Control (ATWS), RPV Level Control actions per SRO direction
		Note: The RO is expected to report when APRM downscale indications occur (4% reactor power). This

		will determine the upper limit for a new RPV level band

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Op-Test No.: ~~2003-301~~ Scenario No.: 5 Event No.: 9 Page 1 of 3

Event Description: MSIV closure / Loss of Main Condenser

Time	Position	Applicant's Actions or Behavior
	BOP/RO	Observes MSIV closure and cycling SRVs. Informs SRO
		Note: MSIVs will not be re-opened for the remainder of this scenario
	BOP/RO	Places all MSIV control switches in CLOSE
	SRO	Acknowledges closure of the MSIVs and cycling of SRVs
	SRO (Cont)	RPV Pressure Control
		- Determines RPV level can be determined
		- Determines Drywell pressure is < 1.68 psig
		- Determines Emergency Depressurization is not required at this time
		Note: HCL is not expected to be exceeded during this Event
		- Determines SRVs are cycling
		Opens SRVs manually to initially decrease RPV pressure to less than or equal to 900 psig
		- Determines that Suppression Pool temperature can be maintained below HCL
		Note: Based on plant priorities and time constraints, the next step may not be performed as determined by the SRO
		- Determines that boron is required and any Main Steam Line is closed
		Determines the Main Condenser is available
		Determines there is no indication of a steam line break
		Opens MSIVs as follows:

		Bypasses MSIV Low Level Isolation per PEI-SPI 2.3
		Bypasses Instrument Air Isolation per PEI-SPI 2.8
		- Stabilizes RPV pressure to less than 1000 psig
		Establishes a RPV pressure band of 700 to 900 psig using SRVs

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Event Description: MSIV closure / Loss of Main Condenser

Time	Position	Applicant's Actions or Behavior
	SRO (Cont)	- Determines the reactor is not shutdown under all conditions with boron
		Note: A controlled depressurization of the RPV is not allowed until the reactor is shutdown under all conditions with boron
		Note: From this point on, the SRO may change the RPV pressure band as required to maintain RPV pressure below HCL
	RO/BOP	Executes PEI-B13, RPV Control (ATWS), RPV Pressure Control actions per SRO direction
		Note: From this point on, the SRO may change the RPV pressure band as required to maintain RPV pressure below HCL
	SRO	Directs actions per PEI-T23, Containment Control, when Suppression Pool temperature reaches 95 °F
		Suppression Pool Temperature Control
		Note: Due to plant priorities, the next step may not be completed until manpower resources are available
		- Operates all available Suppression Pool cooling
		- Maintains both SP average temperature and RPV pressure below HCL
		Note: HCL is not expected to be exceeded during this Event
		Suppression Pool Level Control
		- Restores and maintains SP level between 17.8 and 18.5 ft
		Drywell Temperature Control

		- Operates all available DW cooling
		Drywell & Containment Pressure Control
		- Maintains Containment pressure below PSP

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Event Description: Critical Task #1

Time	Position	Applicant's Actions or Behavior
		Critical Task #1 – With a reactor scram required and the reactor not
		shutdown, initiate action to reduce power by injecting boron (prior
		to 110 °F Suppression Pool temp) and/or inserting control rods
		1. Safety Significance:
		- Shutting down the reactor can preclude failure of
		Containment or equipment necessary for the safe
		shutdown of the plant
		- Incorrect reactivity control
		2. Cues:
		- Suppression Pool temperature monitoring
		- Procedural compliance
		3. Measured by:
		- SLC Pump control switches taken to ON prior to
		110 °F in the Suppression Pool by SPDS <u>and</u> control
		rod insertion before the end of the scenario
		4. Feedback:
		- Reactor power trend
		- Rod position indications

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Event Description: Critical Task #2

Time	Position	Applicant's Actions or Behavior
		Critical Task #2 – With a reactor scram required and the reactor
		not shutdown, to prevent an uncontrolled RPV depressurization
		and subsequent power excursion, inhibit ADS
		1. Safety Significance:
		- Precludes core damage due to an uncontrolled reactivity addition
		2. Cues:
		- Procedural compliance
		3. Measured by:
		- ADS logic inhibited prior to an automatic initiation of
		the ADS System unless all required injection
		systems are terminated and prevented
		4. Feedback:
		- RPV pressure and level trends
		- ADS “Out of Service” annunciator status

