Facility: Perry **Scenario No.: 1** **Op-Test No.: 2007-01**

Examiners: _____ Operators:_____

_____ _____

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Initial Conditions: Completed repairs of Reactor Recirc FCV HPU leak in Drywell. Power ascension in progress at 9%, IOI-3 step 4.3.6, and 4.3.10.d, rods at step 28 gangs 40/39 at 8. Turbine is at 1800 RPM. SVI M56-T5417 is in progress, along with fuel moves in FHB to comply with NRC B.5.B. FHB integrity is established. Severe Thunderstorm watch is in affect for Lake County. OPRM's are Inoperable. Division 1 igniters Inoperable for SVI-M56-T5417, maintenance at step 5.1.1.30.

Turnover: Raise power with rods per IOI-3 and synch the Generator.

Event No.	Malf. No.	Event Type*	Event Description
1		R	Withdraw Rods to get at least 1.5 bypass valves open
2		N	Synch the Generator
3	trg 1, imf 1e31n040a	I	RWCU Pump room instrument fails high, TS 3.3.6.1
4	mv05:1g33f 004	C	G33F0004 Fails to Auto Isolate, Operator isolates TS 3.6.1.3
5	rf tc06	C	High Vibrations Main Turbine Bearing, Turbine fails to trip. Operator trips Main Turbine.
6	cb03:1n514 mcs	C	Generator Field Breaker Fails to open, Operator opens Field Breaker
7	trg 29 batch nrc-2007-08b1	C/N	FHB Bridge Brake Failure, Damaged Spent Fuel Bundle. Enter PEI-D17, PEI-N11, ONI-D17, ONI-J11-2.
8	ior m40a lite on	C	M40 Supply fan fails to Trip on High Radiation, Operator stops fan.
9	trg 10	I	Loss of RFBP's on hot surge tank level instrument failure. No Feedwater
10	ry02 div 2 rp03 ari	M	PEI-B13 ATWS, Failure of RPS B and ARI to Scram, Pull Scram Fuses PEI-SPI-1.1 or insert rods per PEI-SPI 1.3.
11	sl05	C	SLC Pipe Break, SLC will not inject discharge pressure less than Reactor Pressure. Direct PEI-SPI 1.8 Alternate Boron Injection
12	bs01:692b/f, rc03 5 min.	I	RCIC Level 2 instrument failure, Ops arms and depresses. RCIC will trip 5 minutes after injection. High Pressure injection not available.
13	cb04:hpcs pump	C	HPCS Pump will not start automatically, start with switch.
14		M	Emergency Depressurize on Level, PEI-B13 ED. If all rods insert can restore level with HPCS and ED is not required.

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

Op-Test No.: 2007-01 **Scenario No.: 1** **Page 1 of 23**

Event Description: Raise Reactor Power and Synch Generator.

Time	Position	Applicant's Actions or Behavior
	SRO	IOI-3 step 4.3.6 has power increased until bypass valve 2 is at least 50% open. Directs RO to withdraw rods to meet desired power level.
	ATC	Withdraws Rods per US direction, Should withdraw gangs 40, 39, 42 and 41
	SRO	When at desired power directs BOP operator to synch generator.
	BOP	Synchs generator per IOI-3 step 4.3.10.d to 4.3.27
	NRC	Recommend after step 4.3.27 is complete to insert **trigger 1,** Leak Detection instrument failure.

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Event Description: RWCU Pump RM A instrument Failure High.

Time	Position	Applicant's Actions or Behavior
	Crew	RWCU Pump Rm A high temperature. ARI-1H13P680-1 C5
	BOP	Investigates Division 1 numac module to determine temperature**, 350 failed instrument. All other temps are normal. E31N040A is failed**
	ATC/BOP	Verify RWCU Trips and isolates, **1G33F0004 fails to isolate in auto**
	BOP	Closes 1G33F0004 with switch at back panel.
	SRO	Tech Specs 3.3.6.1.4.d for instrument and 3.6.1.3 for CTMT penetration. ORM 6.3.1 chemistry informed.
	SRO	4 hours to close and deactivate 1G33F0004, per TS3.6.1.3. TS for 3.3.6.1.4.d is met, place in trip in 24 hours.
	BOP/ATC	May dispatch NLO to deactivate G33 valve. Contact Chemistry to inform of loss of RWCU Filter Demins.
	NRC	**When Ready can move on to trigger 20, Main Turbine High Vibration**

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Event Description: Main Turbine High Vibration

Time	Position	Applicant's Actions or Behavior
	ATC	Report high vibrations on Main Turbine, trips Main Turbine
	SRO	Enter ONI-N32, concurs with Main Turbine Trip
	ATC	Verifies immediate actions of ONI-N32 complete. Recognize failure of Generator Field Breaker to trip. Trips Generator Field Breaker.
	SRO	Direct BOP to confirm positive air assisted check valves are closed.
	BOP	Verify PACV's valves closed
	SRO	Direct ATC to verify oil pumps start.
	ATC	Verify oil pumps start per ONI-N32 step 4.8, monitor Main turbine vibration.
	NRC	When ready initiate trigger 29, for Fuel Bundle Drop and Damage in FHB.

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Event Description: Damaged Fuel Bundle PEI-N11.

Time	Position	Applicant's Actions or Behavior
	Driver	**Call Control Room as FHB Supervisor and report Bundle drop due to brake failure on bridge. Bundle damaged, FHB evacuated and all personnel are standing by in IB with Health Physics.**
	BOP/ATC	Investigates numerous radiation monitor alarms, informs SRO that PEI-N11 is required. PEI-N11 entry on FHB Vent Exhaust Gas and FHB Area Radiation.
	SRO	Enters PEI-N11, Area radiation levels are greater than entry condition.
	SRO	Directs BOP operator to verify status of IB, Aux and FHB fans.
	BOP	Dispatches operator to verify IB and Aux Building Fans. Determines that **FHB supply fan failed to trip. Trips fan** and notifies Unit supervisor.
	Driver	After check of Fans inform Control Room that Aux Bldg HVAC is operating normally and IB Supply Fan is tripped , Exhaust Fans are normal.
	SRO	Proceeds thru Radiation Level Stop sign, answers NO to primary system discharging. Waits at stop sign for Two Max Safes to shutdown Reactor.
	Driver	After Radiation levels increases have timed out insert **trigger 30** to begin slow decrease of radiation levels.

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Event Description: Damaged Fuel Bundle ONI-D17.

Time	Position	Applicant's Actions or Behavior
	SRO	Enter ONI-D17 and ONI-J11-2.
	BOP/ATC	Perform Immediate actions, Make Plant Announcement to Evacuate Affected Areas.
	BOP/ATC	Contact Chemistry and Health Physics, When Chemistry is contacted inform them of alarms on Unit 1 Plant Vent.
	SRO	ONI-D17 step 4.6, verify Containment Vessel and Drywell Purge Shutdown. System is shutdown. System is not Operating.
	SRO/ATC	ONI-D17 step 4.8 notifies security shift supervisor that security plan compensatory actions are required due to high alarm on FHB gas channel.
	NRC	When ready move on to **trigger 10, loss of Feedwater**

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Event Description: Damaged Fuel Bundle ONI-J11-2.

Time	Position	Applicant's Actions or Behavior
	ATC/BOP	ONI-J11-2 Immediate action Make announcement to evacuate affected area.
	SRO	ONI-J11-2 Evaluate PEI-D17 for entry per step 4.2.1
	ATC/BOP	Continue to monitor plant Radiation Levels.
	SRO	ONI-J11-2 step 4.2.9 directs BOP to place a second G41 Filter Demin in service.
	BOP	Commences SOI-G41 section 7.4, directs an NLO to commence precoat of the filter demin.
	NRC	When ready move on to **trigger 10, loss of Feedwater**

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Event Description: Damaged Fuel Bundle PEI-D17.

Time	Position	Applicant's Actions or Behavior
	SRO	ONI-J11-2 Evaluate PEI-D17 for entry per step 4.2.1
	SRO	Enter PEI-D17, Answer to all questions is no waits at Stop sign for ALERT Radiation levels to clear.
	ATC/BOP	Continue to monitor plant Radiation Levels.
	NRC	When ready move on to **trigger 10, loss of Feedwater**

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Event Description: Loss of Feedwater, NON ATWS chart.

Time	Position	Applicant's Actions or Behavior
	ATC	Hot Surge Tank Level Low Alarm, Hot Surge Tank Level Instrument Fails Low. Recognizes loss of RFBP's and Feedwater loss, Scrams the Reactor
	SRO	Concurs with Reactor Scram or directs Reactor Scram.
	ATC	Scram hard card actions, Mode Switch to shutdown, initiate RPS and ARI.
	Crew	Enter PEI B13 NON ATWS on Level 3 and power
	SRO	PEI-B13 Non ATWS actions, Verifies RPS, ARI and Mode switch in Shutdown and directs Hydrogen Analyzers started.
	BOP	Starts Hydrogen Analyzers per Hard Card.
	SRO	Directs Stabilize Level and Pressure
	SRO	All rods inserted transition back to NON-ATWS, direct SLC pumps shutdown.
	BOP/ATC	Shutdown SLC Pumps
	SRO	Directs a level band of 185 to 215 inches using HPCS
	ATC/BOP	Restore level to band using HPCS. **Critical Task for all rods in.**

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Event Description: ATWS Power Leg

Time	Position	Applicant's Actions or Behavior
	SRO	Enter PEI-B13 ATWS, Power Leg Actions directs Turbine Trip and Trip of Recirc pumps.
	ATC	Trips Turbine by depressing Turbine trip pushbutton and Trips Recirc Pumps by opening the 1 and 2 breakers for Recirc pumps.
	SRO	Directs BOP to Inhibit ADS and Inject SLC
	BOP/ATC	Injects SLC and Inhibits ADS. Inform SRO that **SLC is not injecting low discharge pressure.** Direct PEI-SPI 1.8 Alternate Boron Injection. ADS Inhibited **Critical Task**
	SRO	Directs ATC to insert rods per PEI-SPI section 1
	ATC	Should Recognize that only had a half scram and need to **pull division 2 scram fuses. Per PEI-SPI 1.1.** If not will commence PEI-SPI 1.3 Rod Insertion**.**
	BOP	Pull Division 2 Scram Fuses upon request from ATC. **Rod Insertion Critical Task** either PEI-SPI 1.1 or 1.3.
	SRO	Insert Rods top priority, if rods are inserted can use HPCS to restore level.
	SRO	If all rods are inserted, Exit ATWS to Non ATWS. Terminate Boron in override step on ATWS chart.

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Event Description: ATWS Level Leg

Time	Position	Applicant's Actions or Behavior
	SRO	PEI-B13 ATWS Level Control, Directs Terminate 5.1 and 5.2, directs preps per 6.1 and 6.2, and directs 2.3 and 2.8 to maintain MSIV's open.
	BOP/ATC	Perform Terminate and Prevent per 5.1 and 5.2.
	BOP/ATC	Recognize HPCS Pump failure to Auto Start. Start Pump with switch. HPCS prevented from injecting **Critical Task.**
	BOP	Completes 6.1, 6.2, 2.3, 2.8 and Bypasses Low Power Setpoint for Rods per PEI-SPI-1.3
	SRO	Answer No to 4-question override and power is above 4%, Orders Level Band of 50 to 100 inches.
	SRO	Stops at step for level restored and maintained greater than minus 25 inches.
	ATC	Recognize **that RCIC failed to Auto start at Level 2 and start RCIC**.
	NRC	Operator may start RCIC prior to level 2.
	ATC/BOP	Recognize RCIC trip. Report no high pressure injection available.
	SRO	Briefs Crew on level limit before minus 25 inches when ED will be required.
	SRO	If all rods are inserted, Exit ATWS to Non ATWS. Restore Level using HPCS.

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Event Description: ATWS Pressure Control

Time	Position	Applicant's Actions or Behavior
	ATC	Pressure maintained in band with bypass valves.
	SRO	Directs Pressure Band of 800 to 1000 psig.

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Event Description: PEI-T23

Time	Position	Applicant's Actions or Behavior
	SRO	Enter PEI T23, Enter all legs.
	SRO	Direct BOP to operate all available Drywell Cooling and perform PEI-SPI 2.1

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Event Description: Level One, enter M51/56

Time	Position	Applicant's Actions or Behavior
	Crew	Enters PEI-M51/56 on Level 1
	SRO	Works down flowchart and directs H2 igniters started
	BOP	Starts H2 igniters

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Event Description: Emergency Depressurization

Time	Position	Applicant's Actions or Behavior
	SRO	Briefs Crew on level limit before minus 25 inches when ED will be required.
	Crew	At established level transition to PEI-B13 Emergency Depressurization.
	SRO	Verifies Terminate and Prevent 5.1, 5.2, and 5.3 is completed and orders 8 ADS Valves open**. Terminate and Prevent prior to ED contingent Critical Task if not shutdown.**
	SRO	Direct Emergency Depressurization, if level cannot be restored and maintained greater than minus 25 inches. contingent **Critical Task**
	BOP/ATC	Opens 8 ADS Valves
	NRC	If all rods insert level can be restored using HPCS and ED will not be required.

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Event Description: Level Control after Emergency Depressurization

Time	Position	Applicant's Actions or Behavior
	SRO	After ED, enter the Level Leg at **X, orders to** commence injection at 140 psig if 8 SRV's were opened or commence injection at 600 psig if no SRV's are open.
	ATC/BOP	Restores level slowly while monitoring SRM's with outside shroud injection with RHR A and /or RHR B through the E12F053A/B. RHR injection pressure is less than 300 psig. **Injection after MSCP Critical Task**
	SRO	If all rods are inserted, Exit ATWS to Non ATWS. Restore Level using HPCS.

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Event Description: Scenario Termination Criteria

Time	Position	Applicant's Actions or Behavior
		1. All Control Rods are fully inserted or are being inserted
		2. RPV level is being maintained between 185 and 215 inches using HPCS if all RODS are inserted **or**
		RPV level is being maintained in the band directed by the SRO by Low Pressure ECCS systems if E.D. was performed and all RODS are not in.
		3. MSIV's are being operated to maintain RPV pressure either:
		- within a band as determined by the SRO, or
		- the RPV has been Emergency Depressurized

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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 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
		2. Cues:
		- Procedural compliance
		3. Measured by:
		- Control Rod insertion before the end of the scenario
		4. Feedback:
		- Reactor power trend

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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
		- RPV pressure and level trends
		- RPV pressure and level trends
		- ADS "Out of Service" annunciator status

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Event Description: Critical Task 3

Time	Position	Applicant's Actions or Behavior
		Critical Task 3 – During an ATWS terminate and prevent injection from HPCS
		1. Safety Significance:
		- Prevention of fuel damage due to uncontrolled feeding
		2. Cues:
		- Procedural compliance
		3. Measured by:
		- Observation – no injection into the RPV from HPCS
		4. Feedback:
		- Reactor power trend, power spikes, reactor short period alarms

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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 – When all RODS are inserted restore Reactor Vessel level to 185 to 215 inches using HPCS.
		1. Safety Significance:
		- Maintain adequate core cooling
		2. Cues:
		- Procedural compliance
		- Level lowering with adequate high pressure injection available
		3. Measured by:
		-Establish injection after terminate and prevent actions were completed.
		4. Feedback:
		- Reactor level trend
		- Reactor pressure trend

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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 restored and 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 6

Time	Position	Applicant's Actions or Behavior
		Note: This is a contingent critical task
		Critical Task 6 – During an ATWS with Emergency Depressurization required
		terminate and prevent injection, with the exception of RCIC, SLC and CRD,
		into the RPV until reactor pressure is below MSCP.
		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 RCIC,
		SLC and CRD prior to reaching the MSCP.
		4. Feedback:
		- Reactor power trend, power spikes, reactor short period alarms

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Event Description: Critical Task 7

Time	Position	Applicant's Actions or Behavior
		Note: This is a contingent critical task
		Critical Task 7 – When RPV water level cannot be maintained
		during an ATWS, when RPV pressure is below the MSCP, 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
		- RPV level and pressure indications

Facility: Perry **Scenario No.: 2** **Op-Test No.: 2007-01**

Examiners: _____ Operators:_____

_____ _____

_____ _____

Initial Conditions: Reactor Power 37%, power ascension in progress IOI-3 4.5.4.h. Rods at step 57 gang 44 at 12. Division 2 DG is in secured status with work complete. Circulating Water Pump C is OOS. Fuel moves in progress for NRC B.5.B concerns. Chemistry investigating possible tube leak in train D. SVI-R45-T2002 in progress. OPRM's are Operable. SVI-R10-T5227 is due in 6 hours for Division 2 DG.

Turnover: Align systems to support a Div 2 DG maintenance run, start ESW B and shift M25/26. Continue power ascension shift reactor recirc to fast speed and raise core flow to 58 mlbm/hr.

Event No.	Malf. No.	Event Type *	Event Description
1		R	Shift Reactor Recirc Pumps to fast and raise flow to 58 mlbm/hr.
2		N	Start ESW B and Shift M25/26 to Emergency Recirculation.
3	pt01:1e31n0018b, 350	I	RHR B E31 instrument failure, TS 3.3.6.1
4	mv06:1e51f063	C	1E51F063 fails, loose indication, need to isolate penetration with E51F064, TS 3.6.1.3 and 3.5.3.
5		N	Report of Informational Airplane threat from NRC, ONI-P56-3
6	trg 10, batch nrc-2007-b33	C	Reactor Recirc pump B vibration and seal failure. Trip B pump and isolate B reactor recirc loop. ONI-C51 and insert cram rods if in immediate exit region.
7	rd16 at 20%	M	Scram Reactor on rising Drywell pressure (NON-ATWS). SDV rupture, Containment Pressure increases.
8	fw08c	C	Motor Feed Pump Failure, loss of oil. HPCS or RFPT's are level control.
9	mv04:1e22f004	C	E22F004 fails to auto open, If level 8 is exceeded on scram E22F004 will not open unless level 8 is reset.
10	mv06:1e12f0028a	C	1E12F0028A fails to open for containment spray.
11	tf01:2s11 and 1s11	M	Loss of Offsite power, ONI-R10, DG picks up Div 1 and Div 3 bus. RHR B not available for Containment Spray
12		M	Emergency Depressurize prior to exceeding PSP

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

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Event Description: Shift Reactor Recirc to Fast, Start ESW B, and Shift M25/26 to Emergency Recirc.

Time	Position	Applicant's Actions or Behavior
	SRO	IOI-3 step 4.5.3.h, Transfer Reactor Recirc Pumps to Fast and 4.5.3.i increase core flow as directed by Reactor Engineering.
	ATC	Shift Reactor Recirculation Pumps to fast speed, SOI-B33 section 7.5 and raise flow to 58 mlbm/hr
	Driver	Reactor Engineer recommends bypassing the power interlock per 7.5.7.
	Driver	Remote functions TH 6, 7, 8, and 9 for bypassing interlocks.
	BOP	Shift M25/26 to Emergency Recirc SOI M25/26 section 7.5.
	BOP	Start ESW B Pump SOI-P45 section 4.2
	NRC	Initiate trigger 1 when ready, Leak detection instrument failure.

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Event Description: Leak Detection Instrument Failure

	Position	Applicant's Actions or Behavior
	Crew	**1E31N018B instrument failure**, fails high on Division 2 NUMAC at 350.
	BOPATC	Investigate Div 2 Numac A6-4 failed high at 350 degrees, ARI's 1H13P601-20-D5, 601-21 C5,
	BOP/ATC	Verify isolations from failed instrument E12F037B, F009, F053B, F060A, F060B, and F049 all closed prior to signal. E12F073B, E51F076 and E51F063 close.
	BOP/ATC	**1E51F063 failed to close and lost power,** RCIC out of service**.** Close 1E51F064
	SRO	Tech Spec 3.3.6.1.3.h for failed instrument, 3.6.1.3 for penetration and 3.5.3 for RCIC. Close and deactivate 1E51F064 within 4 hours. Verify HPCS within 1 hour.
	BOP	Closes 1E51F064 and dispatches NLO to open disconnect.
	Driver	**E51F063 EF1D07-XN, blown fuse.**
	NRC	Move on to next event when ready, NRC phone call airplane threat

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Event Description: ONI-P56-3

Time	Position	Applicant's Actions or Behavior
	Driver	Contact Control Room as NRC an issue an informational airplane threat for midwest nuclear plants
	SRO	Informational aircraft received from the NRC, enter ONI-P56-3.
	SRO	Perform immediate action attachment 4, notify NRC
	BOP/ATC	Perform immediate action attachment 3, plant announcement.
	SRO	Direct isolation of G33 containment penetrations.
	BOP	Isolate G33 valves at P881 and P882 and verify RWCU pumps trip. 4.1.2-4.1.5
	SRO	Suspend Fuel handling in FHB step 4.1.7
	SRO	Direct BOP to verify M21, M23/24 and M25/26 in Emergency Recirc and to shutdown M27.
	BOP	Dispatch operator to shift M21, M23/24 and to shutdown M27. M25/26 is already in Emergency recirc.
	Driver	For Plane Threat all personnel evacuate site, no support organizations.
	NRC	When ready move on to trigger 10, Recirc Pump B seal leak and high vibrations.

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Event Description: Reactor Recirculation Pump B Problems

Time	Position	Applicant's Actions or Behavior
	ATC	Reactor Recirculation Pump B alarms, Refer to ARI's and establish the need to trip Reactor Recirc pump B. ARI's 1H13P680-4 C11, E11 and Seal Leakage alarms.
	ATC	ARI E11 high vibrations, attempt reset of alarm. high vibration alarm resets.
	ATC	ARI C11 trip Reactor Recirc Pump, informs US that he needs to trip B pump.
	ATC	Trips B Recirc pump
	SRO	Enters ONI-C51 for Unplanned Power Change
	ATC	Reports Seal problems to US and monitors Drywell pressure.
	BOP	Confirms Drywell unidentified leakage is pegged high on recorder 1E31R618.

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Event Description: Reactor Recirculation Pump B

Time	Position	Applicant's Actions or Behavior
	ATC	Establish that both RR Pump seals are or have failed.
	SRO	Direct isolation of RR Loop B per SOI-B33 section 7.18
	ATC	Isolate RR Loop B per SOI-B33 section 7.18.
	Driver	For shutdown of seal purge you are in CTMT and you close 1C11F026B.

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Event Description: ONI-C51

Time	Position	Applicant's Actions or Behavior
	SRO	ONI-C51, No immediate actions apply, directs ATC to monitor for Power Oscillations.
	ATC	Monitors for power oscillations.
	SRO	**IS Power in Either**: Power may be in immediate exit region or close may direct Cram rods to less than 35% power.
	ATC	If directed insert Cram Rods
	SRO	Answers NO to questions and is in far right of ONI-C51 chart. Directs ATC/BOP to perform ONI-SPI-G2.
	ATC/BOP	Perform ONI-SPI-G2, stabilizes running loop pump parameters and if not ordered this will isolate Recirc Loop B.
	ATC/BOP	Continue to monitor Drywell pressure and perform directed actions of ONI-C51.
	SRO	Establish Drywell pressure limit for Scram.

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Event Description: Reactor Scram on high drywell pressure.

Time	Position	Applicant's Actions or Behavior
	ATC	Scram the Reactor and Place the Mode Switch in shutdown. Perform Scram Hard Card actions. Mode switch to Shutdown **Critical Task**
	SRO	Direct ATC to Stabilize Level and Pressure.
	SRO	Confirm Mode Switch in Shutdown and order IRM's and SRM's inserted and Hydrogen Analyzers started.
	ATC	Stabilizes Level with Feed and Pressure with bypass valves. Insert nuclear instruments.
	BOP	Start Hydrogen Analyzers.

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Event Description: Non ATWS Pressure Leg

Time	Position	Applicant's Actions or Behavior
	SRO	Pressure Band issued from 500 to 1000 psig.
	ATC	Bypass valves maintain pressure.
	SRO	Once Containment Pressure is noticed, can reduce pressure band to lower driving head of leak. Pressure Band should not be lowered less than 400 psig to avoid exceeding cool down rate.
	ATC	Upon Loss of Off-Site Power transition pressure control to SRV's and maintain pressure band.

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Event Description: Non ATWS Level Leg

Time	Position	Applicant's Actions or Behavior
	SRO	Directs Level Band of 185 to 215 inches using Feedwater.
	ATC	Motor Feed Pump fails to start due to loss of oil, notifies US that Motor Feed Pump is not Available.
	ATC	Controls Reactor Level with RFPT's or HPCS. Due to Low power at time of scram Reactor pressure will continue to lower, if RFPT's are not taken to pots and discharge pressure reduced they will overfeed to level 8.
	ATC	If pumps tripped on level 8 during initial scram will have to perform quick restart or use HPCS.
	ATC	HPCS is available for level control, at **level 2 1E22F004 will not auto open**.
	ATC	If Level 8 was exceeded 1E22F004 will not open unless operator resets level 8 on HPCS.
	ATC	Maintain level, when pressure control transfer to SRV's request wider band. Maintain Level above **zero** inches through out scenario. **Critical Task.**

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Event Description: Containment Pressure Problem

Time	Position	Applicant's Actions or Behavior
	Crew	Recognize steady increase in Containment pressure. PEI-T23 Entry
	SRO	Enter all legs of PEI-T23, Containment Pressure is priority leg. Direct Containment sprays at 2.3 psig and secure spray at .5 psig.
	SRO	Direct all available Drywell Cooling and PEI-SPI 2.1
	BOP	Start all available Drywell Cooling and perform PEI-SPI 2.1.
	SRO	Direct all Containment Cooling Started and PEI-SPI 2.2
	BOP	Starts all Containment Cooling Fans.
	BOP	Initiate Containment Spray A and B loop at 2.3 psig. The A loop of containment spray fails and RHR B is not available on loss of power. Attempt to initiate spray **Critical Task.**
	Crew	Upon loss of off site power, no Containment Spray available
	SRO	Without Containment Spray will establish a containment pressure limit to **Emergency depressurize based on PSP,** around 3.0 psig. ED prior to exceeding PSP **Critical Task.**

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Event Description: Loss of Off-Site Power

Time	Position	Applicant's Actions or Behavior
	Crew	Loss of Offsite Power, enter ONI-R10
	ATC	Establish pressure control on SRV's in previous band and now level control is on HPCS.
	BOP	Verify Div 1 and Div 3 DG energize buses. Verify automatic actions.
	SRO	Work through ONI-R10 chart and establish electrical priorities and reactor priorities. **Top priority shall be Containment pressure**. No Containment Spray ED prior to PSP.
	SRO	Give ONI-SPI H1 to security, has BOP contact SCC per ONI-SPI H2
	BOP	Contact SCC
	SRO	Directs ONI-SPI D7
	BOP	Perform ONI-SPI D7 steps 1.1, 1.2, 1.4, 1.6 and directs step 1.3.
	SRO	Low Pressure ECCS is Available.

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Event Description: Emergency Depressurize

Time	Position	Applicant's Actions or Behavior
	SRO	Enter PEI-B13 Emergency Depressurization.
	SRO	Drywell Pressure greater than 1.68 and No Low Pressure ECCS is required for adequate core cooling. Terminate Prevent Division 1 LPCS and RHR A
	SRO	Direct ATC to ED, Open 8 ADS valves
	ATC	Opens 8 ADS valves. Emergency Depressurize prior to PSP **Critical Task**
	ATC	Maintain Reactor Level during Emergency Depressurization.

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Event Description: Scenario Termination Criteria

Time	Position	Applicant's Actions or Behavior
		1. Control Rods are fully inserted
		2. The reactor has been emergency depressurized prior to PSP
		3. Feedwater or ECCS Systems are being used to maintain RPV level 185 to 215 inches.
		4. Containment and Drywell parameters are being restored per PEI-T23, Containment Control

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Event Description: Critical Task 1

Time	Position	Applicant's Actions or Behavior
		Critical Task 1 – Upon initiating a Reactor Scram place the MODE Switch in Shutdown
		1. Safety Significance:
		- Precludes pressure control on SRV's and additional Containment challenges.
		2. Cues:
		- MSIV's remain open when RPV pressure lowers to 800 psig.
		- Procedural compliance
		3. Measured by:
		- Observation – Mode Switch in Shutdown
		- Observation – MSIV's open with RPV pressure less than 800 psig
		4. Feedback:
		- Pressure Control on Bypass valves.

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Event Description: Critical Task 2

Time	Position	Applicant's Actions or Behavior
		Critical Task 2 – With Containment pressure exceeding 2.25 psig,
		and prior to exceeding the Pressure Suppression Pressure, attempt
		to initiate Containment Spray
		1. Safety Significance:
		- Precludes an unrequired Emergency Depressurization
		2. Cues:
		- Containment pressure increase
		- Procedural compliance
		3. Measured by:
		- Observation – With Containment pressure at least
		2.25 psig, Containment Spray is manually initiated
		prior to exceeding the Pressure Suppression
		Pressure
		4. Feedback:
		- "Containment Spray Start Signal Received" alarm status

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Event Description: Critical Task 3

Time	Position	Applicant's Actions or Behavior
		Critical Task 3 – When Containment pressure cannot be maintained below the
		Pressure Suppression Pressure, initiate Emergency depressurization of the
		RPV prior to exceeding PSP.
		1. Safety Significance:
		- Precludes degradation of a fission product barrier
		2. Cues:
		- Increasing Containment pressure
		- Procedural compliance
		3. Measured by:
		- Observation – At least 5 SRVs must be open prior to
		exceeding the Pressure Suppression Pressure
		4. Feedback:
		- RPV pressure decreasing
		- SRV status indications

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Event Description: Critical Task 4

Time	Position	Applicant's Actions or Behavior
		Critical Task 4 – RPV Level Maintained greater than top of active fuel (0 inches).
		1. Safety Significance:
		- Maintain adequate core cooling
		2. Cues:
		- Procedural compliance
		- Level lowering with adequate high pressure injection available
		3. Measured by:
		-Establishing injection with HPCS or Feedwater.
		4. Feedback:
		- Reactor level trend

Facility: Perry **Scenario No.: 3** **Op-Test No.: 2007-01**

Examiners: _____ Operators:_____

_____ _____

_____ _____

Initial Conditions: Reactor Power 56%, power ascension in progress IOI-3, 4.5.21. Rods at step 56 gang 48 at 24. P43 B is OOS for Oil change. P41B is OOS for Seal Line blockage. P47C is OOS, work is complete and package with Shift Engineer. SVI-E31-T083A prereqs in progress. RFPT A has a small oil leak. Severe Thunderstorm watch is in affect until 1800. Feedwater leak on B FW venturi is degrading, Team Inc investigating sealing. OPRM's are Operable.

Turnover: Shut RFPT A down per SOI-N27 section 7.39 for oil leak repair. Continue Power Ascension with rods to 62% power and hold for IOI-3 actions.

Event No.	Malf. No.	Event Type*	Event Description
1		R	Withdraw control rods to 62% power, ensure load line is greater than 75%
2		N	Shutdown RFPT A.
3	cb01:p41d trg 1	C/N	Trip of Service Water Pump D, ONI-P41, Start Service Water Pump C
4	nm04a to 125%, trg 2	I	APRM A fails upscale, AFDL in Control. Lock up FCV's. TS 3.3.1.1 and 3.4.1.
5		R	Load line 75% and flow less than 42 mlbm/hr insert cram rods per ONI-C51
6	trg 3, cu04 aux leak, cu05 stm tunnel leak	M	RWCU Leak, G33F0004 and G33F001 fail to isolate, Scram on primary system discharge per PEI-N11. ATWS on scram, Level Feed, Pressure Bypass until MSIV's close on steam tunnel temperature.
7	ior in timer skip off	C	Insert Rods Per PEI-SPI 1.3, In Timer Skip fails, insert with insert button.
8	ior e22f004 auto	C	HPCS Injection valve fails to close, stop HPCS pump to prevent injection.
9		M	Emergency Depressurize two Max safe Temperatures.
10	ior 41e and 47h auto	C	Two ADS SRV's fail to open. Open two additional SRV's.

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

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Event Description: Shutdown RFPT A, and withdraw rods to 62% power

Time	Position	Applicant's Actions or Behavior
	SRO	If necessary, then withdraw control rods to increase reactor power to the desired loadline.
	ATC	Withdraw control rods to 62% power. Complete step 56 and 57 in middle of life pull sheets. Completion of step 57 will be above 75% load line.
	SRO	During power ascension will direct IOI-3 steps 4.5.24 and 4.5.25, these are field actions by NLO's.
	SRO	When greater than 71% load line directs BOP to perform step 4.5.27
	BOP	Step 4.5.27 places Hi-PWR-Lo-PWR switch to Hi PWR.
	BOP	Complete shutdown of RFPT A per SOI-N27 section 7.39. Performs step 1 through 7 and waits at step 8 for RFPT to go on gear.
	NRC	when ready proceed to next event service water pump trip trigger 1

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Event Description: Service Water D Pump Trip

Time	Position	Applicant's Actions or Behavior
	BOP	Investigate P970 alarms and report trip of Service water D pump.
	SRO	Enter ONI-P41, direct start of Standby Service Water Pump C
	BOP	Start standby P41C Pump per SOI-P41.
	NRC	When Ready initiate trigger 2, APRM A upscale and AFDL in Control

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Event Description: APRM A Upscale, ONI-C51

Time	Position	Applicant's Actions or Behavior
	ATC	**APRM A fails upscale,** AFDL in control immediate actions to Lock RR FCV's. per ARI P680-E9, Core flow will be less than 42 mlbm/hr.
	SRO	Concur with HPU shutdown, Enter ONI-C51 for unplanned power change.
	ATC	Immediate actions of ONI-C51, Loadline >75% and flow <42 mlbm/hr, **insert cram rods** to 35% power. Insert Cram Rods perform step 57 and possibly step 56.
	SRO	Direct Cram rods per ONI-C51 Flowchart if failed to recognize immediate action.
	BOP	Support ATC with annuciator response Half scram, Failed APRM A and others.
	SRO	Direct monitoring for Power Oscillation
	ATC	Monitor for Power Oscillation.
	SRO	Nuclear instrumentation is failed, direct BOP to bypass APRM A and reset half scram. Evaluate Tech Spec 3.3.1.1 and ORM 6.2.1
	BOP	Bypass APRM A and reset half scram.
	NRC	APRM A backpanel light **ON**

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Event Description: APRM A Upscale, ONI-C51

Time	Position	Applicant's Actions or Behavior
	SRO	Nuclear instrumentation is failed, direct BOP to bypass APRM A and reset half scram. Evaluate Tech Spec 3.3.1.1 and ORM 6.2.1
	BOP	Bypass APRM A and reset half scram.
	SRO	Tech Spec entry for 3.3.1.1 and ORM 6.2.1 is not required still have minimum channels. PLCO required.
	SRO	Directs BOP to restart HPU's
	BOP	Commences restart of HPU's per SOI-B33 section 4.2 and 4.3. **Note HPU Restart is not required for scenario.**
	SRO	Works through middle column of ONI-C51 decision diamonds. Evaluates additional ONI's for entry and references IOI-3 actions needed for power change.
	NRC	When ready initiate trigger 3, RWCU leak.

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Event Description: RWCU Leak

Time	Position	Applicant's Actions or Behavior
	Crew	**High Temperature RWCU Pump Room.**
	BOP	Monitor Temperatures on NUMAC, report PEI-N11 Entry condition
	BOP/ATC	**1G33F0004 and 1G33F0001 fail to isolate.**
	SRO	Enter PEI-N11, direct BOP to verify IB, AUX, Steam Tunnel and FHB HVAC
	BOP	Dispatches NLO to verify IB, AUX, and Steam Tunnel HVAC, checks FHB HVAC
	SRO	PEI-N11, proceeds thru stop sign for any temperature greater than entry condition. Primary system is discharging, enters PEI-B13 and scrams reactor. **Critical Task Reactor Scram on Primary system discharge.**
	SRO	Stops and directs monitoring for two MAX safe temperatures.

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Event Description: Reactor Scram

Time	Position	Applicant's Actions or Behavior
	SRO	Directs Reactor Scram
	ATC	Scram the reactor and perform scram hard card actions. **ATWS on Scram.** Mode switch to shutdown RPS and ARI initiated.
	SRO	Verify RPS, ARI and Mode Switch to shutdown. Direct ATC to stabilize level and pressure. Direct BOP to start Hydrogen Analyzers.
	ATC	Stabilize level and pressure. Level on Feedwater and Pressure on Bypass.
	BOP	Start Hydrogen Analyzers.
	BOP/SRO	Continue to monitor PEI-N11 temperatures for two Max Safes.

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Event Description: ATWS Power Leg

Time	Position	Applicant's Actions or Behavior
	SRO	Turbine greater than 90 MW, Power above 4%, Recirc pumps in slow speed, FCV's are locked up, directs ATC to trip Recirc Pumps.
	ATC	Trips Recirc Pumps
	SRO	Direct BOP to inject SLC and inhibit ADS.
	BOP	Inhibit ADS **Critical Task.** Inject Boron prior to 110 in pool **Critical Task**
	SRO	Direct Rod Insertion per PEI-SPI section 1
	ATC	Inserts Control Rods per PEI-SPI 1.3. **In Timer Skip is failed** will insert rods with insert pushbutton. **Critical Task**
	ATC	Inserts IRM's and SRM's when power is less than 4%.

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Event Description: ATWS Level Leg

Time	Position	Applicant's Actions or Behavior
	SRO	Directs Terminate and Prevent per 5.1 and 5.2. directs preps per 6.1 and 6.2, and directs MSIV open per 2.3 and 2.8. Directs bypass of low power setpoint.
	BOP/ATC	Terminate and Prevent per 5.1 and 5.2. **Terminate HPCS Critical Task, 1E22F004 will fail to terminate stops pump.**
	BOP	Preps per 6.1 and 6.2, maintains MSIV's open per 2.3 and 2.8 and bypasses low power setpoint.
	SRO	Answer No to 4 question override, Power above 4%. Directs a Level Band of 50 to 100 inches.
	ATC	Terminates Feedwater injection until level in band of 50 to 100 inches. Once in band maintains level band with feedwater.
	ATC/BOP	Verifies RCIC operation at Level 2 or RCIC trip due to high room temperature.
	BOP/SRO	Continue to monitor PEI-N11 temperatures for two Max Safes. 284 in RWCU Room and 310 in Steam Tunnel.

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Event Description: ATWS Pressure Leg

Time	Position	Applicant's Actions or Behavior
	SRO	Pressure Band of 800 to 1000 psig.
	ATC	Maintain pressure with Bypass valves.
	SRO	When MSIV's isolate, SRV Cycling answer remains No, Below HCL is Yes and Boron required and MSIV closed is Yes. MSIV's can not be opened pressure band should remain 800 to 1000.
	ATC	Maintain 800 to 1000 on SRV's.
	BOP/SRO	Continue to monitor PEI-N11 temperatures for two Max Safes. 284 in RWCU Room and 310 in Steam Tunnel.

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Event Description: MSIV Isolation

Time	Position	Applicant's Actions or Behavior
	ATC/BOP	MSIV isolation on High Temperature in Steam Tunnel.
	BOP	Monitor NUMAC for Steam Tunnel Temperature
	ATC	Pressure Control on SRV's 800 to 1000.
	ATC	If pressure exceeds 1083, Feedwater control will not be available for 30 seconds. FWRB red box on digital screen. Yellow light illuminates near bottom of 680 when control is available. Restores Reactor Level with Feedwater 50 to 100 if FWRB occurred. **Critical Task to restore level**.
	SRO	Second area with temperature problem. Two Max Safes exceeded ED required.
	BOP	Monitor NUMAC's
	SRO	ATWS Pressure Leg for actions. Can not open MSIV's, Pressure Band on SRV's 800 to 1000.
	BOP/SRO	Continue to monitor PEI-N11 temperatures for two Max Safes. 284 in RWCU Room and 310 in Steam Tunnel.

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Event Description: PEI-T23

Time	Position	Applicant's Actions or Behavior
	SRO	Enter PEI T23 on Drywell Temperature or Suppression Pool Temperature. Enter all legs.
	SRO	Direct BOP to operate all available Drywell Cooling and perform PEI-SPI 2.1.
	BOP	Starts all Drywell Cooling Fans and performs PEI-SPI 2.1.
	SRO	Suppression Pool Temperature greater than 95. Direct BOP to establish pool cooling with RHR A and/or B.
	BOP	Establish Suppression Pool Cooling.

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Event Description: Emergency Depressurization

Time	Position	Applicant's Actions or Behavior
	BOP	Two Max Safes exceeded, ED required. 284 in RWCU Room and 310 in Steam Tunnel.
	SRO	Enter PEI-B13 ED
	SRO	Terminate prevent verification and terminate prevent feedwater PEI-SPI 5.3. Terminate Prevent PEI-SPI 5.1, 5.2 and 5.3 complete prior to ED **Critical Task**
	ATC	Terminate prevent feedwater.
	SRO	Direct 8 SRV's open. Emergency Depressurization **Critical Task**
	BOP	**Two ADS SRV's fail to open**, open additional SRV's to obtain 8.
	SRO	Restore level 50 – 100 when MSCP is reached at 140 psig. Restore level after MSCP is reached **Critical Task**.
	ATC/BOP	Restore level 50 – 100" with feedwater.

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Event Description: Level One, enter M51/56

Time	Position	Applicant's Actions or Behavior
	Crew	Enters PEI-M51/56 on Level 1
	SRO	Works down flowchart and directs H2 igniters started
	BOP	Starts H2 igniters

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Event Description: Scenario Termination Criteria

Time	Position	Applicant's Actions or Behavior
		1. Control Rods are being inserted and SLC is injecting.
		2. RPV level is being restored and maintained in the directed band using:
		- Feedwater or Low Pressure ECCS
		3. SRVs have been opened to Emergency Depressurized the RPV.

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Event Description: Critical Task 1

Time	Position	Applicant's Actions or Behavior
		Critical Task #1 – Per PEI-N11, Containment Leakage Control, with a primary system discharging into the area the Reactor is scrammed.
		1. Safety Significance:
		- Take manual action that would prevent a challenge to
		plant safety by shutting down the reactor and
		stabilizing plant parameters.
		2. Cues
		- Rising Temperatures
		- Failed isolation valves
		3. Measured by:
		- The operator inserts a manual reactor scram.
		4. Feedback:
		- Ability to stabilize plant parameters post scram using
		normal level and pressure control systems.

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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, initiate action to reduce power by 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
		2. Cues:
		- Procedural compliance
		3. Measured by:
		- Control Rod insertion before the end of the scenario
		4. Feedback:
		- Reactor power trend

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Event Description: Critical Task 3

Time	Position	Applicant's Actions or Behavior
		Critical Task 3 – 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

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Event Description: Critical Task 4

Time	Position	Applicant's Actions or Behavior
		Critical Task 4 – During an ATWS with power greater than 4%, Standby Liquid Control is initiated prior to 110 degrees in suppression pool.
		1. Safety Significance:
		- Additional method to shutdown Reactor
		- Must inject prior to BITT
		2. Cues:
		- Procedural compliance
		3. Measured by:
		- Observation – Standby Liquid Control pumps started.
		-Observation - Discharge pressure above RPV pressure.
		-Observation – Suppression pool temperature.
		4. Feedback:
		- Reactor power trend

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Event Description: Critical Task 5

Time	Position	Applicant's Actions or Behavior
		Critical Task 5 – Restore and maintain RPV level greater than top of active fuel or zero inches.
		1. Safety Significance:
		- Maintain adequate core cooling
		2. Cues:
		- Procedural compliance
		- Level lowering with adequate high pressure injection available
		3. Measured by:
		- Injection established after directed level band is reached.
		4. Feedback:
		- Reactor level trend

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Event Description: Critical Task 6

Time	Position	Applicant's Actions or Behavior
		Critical Task 6 – When two or more areas are greater than there Maximum Safe
		Operating Conditions value, initiate Emergency Depressurization
		1. Safety Significance:
		- Preclude failure of equipment necessary for the safe
		shutdown of the plant
		2. Cues:
		- Procedural compliance
		- Two or more areas greater than there Maximum Safe Operating Conditions value.
		3. Measured by:
		- Observation – at least 5 SRVs open.
		4. Feedback:
		- Reactor pressure trend
		- Suppression Pool temperature trend

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Event Description: Critical Task 7

Time	Position	Applicant's Actions or Behavior
		Critical Task 7 – During an ATWS with Emergency Depressurization required
		terminate and prevent injection, with the exception of RCIC, SLC and CRD, into
		the RPV until reactor pressure is below MSCP.
		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 RCIC,
		SLC and CRD prior to reaching the MSCP.
		4. Feedback:
		- Reactor power trend, power spikes, reactor short period alarms.

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Event Description: Critical Task 8

Time	Position	Applicant's Actions or Behavior
		Critical Task 8 – During an ATWS, when RPV pressure is below the MSCP,
		increase and control injection into the RPV to restore and maintain RPV level
		to the directed level band.
		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"
		3. Measured by:
		- RPV level is being restored and maintained in the directed band.
		4. Feedback:
		- Lack of power excursion
		- RPV level and pressure indications

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Event Description: Critical Task 9

Time	Position	Applicant's Actions or Behavior
		Critical Task 9 – During an ATWS terminate and prevent injection from HPCS
		1. Safety Significance:
		- Prevention of fuel damage due to uncontrolled feeding
		2. Cues:
		- Procedural compliance
		3. Measured by:
		- Observation – no injection into the RPV from HPCS
		4. Feedback:
		- Reactor power trend, power spikes, reactor short period alarms

Facility: Perry **Scenario No.: 4** **Op-Test No.: 2007-01**

Examiners: _____ Operators:_____

_____ _____

_____ _____

Initial Conditions: Reactor Power 80%, Operating per IOI-3 attachment 3 power increase to 100%. RFPT B has been returned to service. LH-2-A Transformer is out of service and EH21 outage is in progress, scheduled to complete later today. Chemistry investigating possible tube leak on D train. Team Inc investigating possible seal injection for degrading leak on FW B venturi. OPRM's are Inoperable.

Turnover: Shutdown Motor Feed Pump to Standby and continue power ascension with flow to 100%. SVI-C61-T1104 is in progress.

Event No.	Malf. No.	Event Type*	Event Description
1		N	Shutdown Motor Feed Pump to standby
2		R	Raise Reactor Power with flow
3	trg 1, rd13a, 22-31, 34-03, 50-31, rd05	C/N	CRD suction filter clog, CRD pump trip, ONI-C11-1, 3 accumulator faults 20 minutes to restore TS 3.1.5
4	pt01:1c34n004b, trg 2	I	C34N004B fails upscale, Bypass instrument, ORM 6.2.13
5	trg 5, mc01a, rd15 atws	M/R	Vacuum Leak, Reactor Scram, ATWS, MSIV's A, B and D isolate on degrading vacuum.
6	ms01c/g	C	MSIV Line C fails to isolate, inboard valve will isolate with switch.
7	ior arm to disarm	C	Terminate/Prevent for HPCS fails, will need to perform at level 2 initiation.
8	ior 1e12f042c	C	LPCI C injection valve will fail to override. Must secure RHR C pump.
9		M	Emergency Depressurize on HCL

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

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Event Description: Power Ascension and Shutdown Motor Feed Pump to Standby

Time	Position	Applicant's Actions or Behavior
	BOP	Shutdown Motor Feed Pump to Standby, SOI-N27 section 6.1.
	Driver	Remote Function FW72 for Motor Feed pump casing warmup valves.
	SRO	IOI-3 Attachment 3 Power Maneuvering, step 1.8.3 raise power with flow.
	ATC	Raise Power with flow.
	NRC	When ready initiate trigger 1, control rod drive pump trip

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Event Description: CRD Pump Trip

Time	Position	Applicant's Actions or Behavior
	BOP	CRD suction filter DP high, ARI H13-P601-22-H3, shift per SOI-C11(CRDH)
	BOP	**CRD Pump Trip**
	BOP	Dispatch NLO and direct NLO to Shift Suction filters or bypass filters
	SRO	Enter ONI-C11-1 on CRD Pump Trip, directs pump trip recovery SOI-C11, 7.6
	ATC	Reports Accumulator Faults, dispatch operator to check HCU pressure.
	BOP	After suction filter shift or bypass valve open, can recover either CRD A or B, if fail to wait for new filters pump will trip upon start.
	SRO	TS 3.1.5 or ONI-C11-1, upon second accumulator fault, start 20 minute clock for mode switch to shutdown. Per step 4.2 on second accumulator fault.
	ATC	Reports the 3 accumulator faults and marks time. 20 minute clock starts on second fault.
	BOP	Recovers CRD Pump per SOI-C11 section 7.6.
	ATC	Report accumulator faults reset
	Driver	Reset accumulator faults on CRD pump start.
	NRC	when ready trigger 2 can be initiated at any time, Feedwater level instrument fails.

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Event Description: C34N004B Fails Upscale (Feedwater Level)

Time	Position	Applicant's Actions or Behavior
	ATC	Report **C34N004B instrument failure high**, ARI's 680-3 A8, B6 and C5. Refer to SOI-C34 to attachment 3 for actions.
	SRO	ORM 6.2.13, 7 days to restore, Direct bypass of failed instrument.
	ATC	Bypass instrument per SOI-C34 section 7.9
	NRC	when ready initiate trigger 5, vacuum leak.

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Event Description: Loss of Vacuum

Time	Position	Applicant's Actions or Behavior
	ATC/BOP	High Off Gas flowrates, respond to a number H13P845 alarms.
	BOP	Report Off Gas Flow is high and rising steadily. It will go to high peg on recorder, N64R620 both pens.
	ATC	Reports degrading vacuum
	SRO	Enter ONI-N62
	SRO	Direct Power Reduction.
	ATC	Reduce power with flow to 58 mlbm/hr or as directed by Unit Supervisor.
	SRO	Vacuum continues to degrade, direct **scram reactor** prior to turbine trip at 8.1"
	NRC	at 8.1" turbine trips, at 11.5" RFPT's trip, at 20" bypass valves shut, at 21.5" MSIV's close.

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Event Description: Reactor Scram

Time	Position	Applicant's Actions or Behavior
	ATC	Scram Reactor, Arm and Depress RPS. Scram Hardcard Actions Mode Switch to shutdown, and initiate ARI. Reports actions taken and Reactor Power.
	SRO	Direct Level and pressure stabilized. Enter PEI-B13 Non ATWS and ATWS.
	SRO	Verifies Mode Switch in Shutdown and ARI, Directs Hydrogen Analyzers started.
	BOP	Start Hydrogen Analyzers.
	ATC	Stabilize Level with Feedwater and Pressure on Bypass

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Event Description: ATWS Power Leg

Time	Position	Applicant's Actions or Behavior
	SRO	Turbine Load greater than 90 MW, Power greater than 4%, FCV's to minimum, Trip Reactor recirc pumps.
	ATC	Verifies FCV's at minimum, trips RR pumps.
	SRO	Directs SLC injection and ADS inhibited.
	BOP	Inhibits ADS **Critical Task,** Inject SLC prior to 110 in suppression pool **Critical Task**
	SRO	Direct ATC to insert rods per PEI-SPI section 1.
	ATC	Inserts Rods per PEI-SPI 1.3. **Critical Task**
	ATC	When power is less than 4%, insert IRM's and SRM's.

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Event Description: ATWS Level Leg

Time	Position	Applicant's Actions or Behavior
	SRO	Directs terminate and prevent per PEI-SPI 5.1 and 5.2. Directs injection preps per 6.1 and 6.2.
	BOP/ATC	Terminate and prevent per PEI-SPI 5.1 and 5.2. **HPCS Fails to terminate and prevent. with arm and depress.**
	BOP/ATC	1E12F042C fails to override closed. Stop RHR C Pump to terminate and prevent RHR C.
	SRO	Direct HPCS be terminated if it injects.
	SRO	MSIV's if open directs PEI-SPI 2.3 and 2.8, if closed answers NO.
	BOP/ATC	When level 2 is reached terminates HPCS injection. **Critical Task**
	SRO	Four question override answer **IF NO**, Direct a Level Band of 50 to 100 inches.
	ATC	Stops injecting with Feedwater until level is in band of 50 to 100 inches.

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Event Description: ATWS Pressure Leg

Time	Position	Applicant's Actions or Behavior
	SRO	Directs a pressure band of 800 to 1000, on bypass valves.
	ATC	Maintains Pressure in Band on bypass, bypass valves will close at 20" vacuum.
	SRO	When bypass valves are lost direct 800 to 1000 on SRV's.
	ATC	Maintain Pressure in directed band.
	Crew	**MSIV C Line Fails to Isolate**
	BOP/ATC	Isolates MSIV C Inboard Valve, **Critical Task**
	SRO	With pressure control on SRV's, will eventually answer no to question can suppression pool temperature be maintained less than HCL. Directs Pressure be maintained less than HCL.
	BOP/ATC	Maintain pressure less than HCL. **Critical Task**

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Event Description: T23 Containment Control

Time	Position	Applicant's Actions or Behavior
	SRO	Enters on Suppression Pool Temperature or Drywell Temperature.
	SRO	Directs Suppression Pool Cooling RHR A and B.
	BOP	Place RHR A and B in Pool Cooling.
	SRO	Directs all available Drywell cooling fans started and PEI-SPI 2.1.
	BOP	Starts all Drywell fans and performs PEI-SPI 2.1.
	SRO	Will eventually answer no to can Reactor Pressure and Pool Temperature be maintained less than HCL. Enter PEI-B13 Emergency Depressurization.

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Event Description: Bypass Valves Close on Vacuum

Time	Position	Applicant's Actions or Behavior
	ATC/BOP	Bypass Valves close on vacuum of 20"
	ATC/BOP	Pressure Control on SRV's 800 to 1000.
	ATC	If pressure exceeds 1083, Feedwater control will not be available for 30 seconds. FWRB red box on digital screen. Yellow light illuminates near bottom of 680 when control is available. Restores Reactor Level with Feedwater if FWRB occurred. **Critical Task to restore level**.
	SRO	ATWS Pressure Leg for actions. Can not open MSIV's, Pressure Band on SRV's 800 to 1000.

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Event Description: ATWS Level Leg, Four Question Override YES

Time	Position	Applicant's Actions or Behavior
	SRO	When power is >4%, Level is above 0", Suppression Pool Temp is >110, and an SRV is open. Direct Feedwater terminated and prevented per PEI-SPI 5.3
	ATC	Terminate and Prevent Feedwater per 5.3
	SRO	When power is less than 4% or level reaches 0", establish a level band of –25" to level to which level was lowered.
	ATC	Maintain new level band with feedwater.

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Event Description: Emergency Depressurization

Time	Position	Applicant's Actions or Behavior
	SRO	Enter PEI-B13 ED on HCL.
	SRO	Direct Terminate and Prevent feedwater PEI-SPI 5.3. Verify terminate and prevent PEI-SPI 5.1, 5.2 and 5.3.
	BOP/ATC	Verify Terminate and Prevent complete. **Critical Task**
	SRO	Direct 8 SRV's opened prior to exceeding HCL. **Critical Task**
	BOP	Opens 8 SRV's.

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Event Description: ATWS Level Leg after Emergency Depressurization

Time	Position	Applicant's Actions or Behavior
	SRO	Enter Level Leg at X, following Emergency Depressurization.
	SRO	Direct Level be restored and maintained greater than minus 25 inches using feedwater, and / or LPCI A and B outside the shroud once pressure is less than MSCP at 140 psig.
	ATC	Restores and maintains level greater than minus 25 inches after MSCP. **Critical Task**

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Event Description: Level One, enter M51/56

Time	Position	Applicant's Actions or Behavior
	Crew	Enters PEI-M51/56 on Level 1
	SRO	Works down flowchart and directs H2 igniters started
	BOP	Starts H2 igniters

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Event Description: Scenario Termination Criteria

Time	Position	Applicant's Actions or Behavior
		1. Control Rods are being inserted and SLC is injecting
		2. RPV level is being restored and maintained in the directed band using:
		- Feedwater or Low Pressure ECCS
		3. SRVs have maintained pressure less than HCL.
		4. SRV's have been opened to Emergency Depressurize the RPV, prior to exceeding HCL.

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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 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
		2. Cues:
		- Procedural compliance
		3. Measured by:
		- Control Rod insertion before the end of the scenario
		4. Feedback:
		- Reactor power trend

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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

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Event Description: Critical Task 3

Time	Position	Applicant's Actions or Behavior
		Critical Task 3 – During an ATWS with power greater than 4%, Standby Liquid Control is initiated prior to 110 degrees in suppression pool.
		1. Safety Significance:
		- Additional method to shutdown Reactor
		- Must inject prior to BITT
		2. Cues:
		- Procedural compliance
		3. Measured by:
		- Observation – Standby Liquid Control pumps started.
		-Observation - Discharge pressure above RPV pressure.
		-Observation – Suppression pool temperature.
		4. Feedback:
		- Reactor power trend

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Event Description: Critical Task 4

Time	Position	Applicant's Actions or Behavior
		Critical Task 4 – During an ATWS terminate and prevent injection from HPCS
		1. Safety Significance:
		- Prevention of fuel damage due to uncontrolled feeding
		2. Cues:
		- Procedural compliance
		3. Measured by:
		- Observation – no injection into the RPV from HPCS
		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
		Critical Task 5 – Restore and maintain RPV level greater than top of active fuel or zero inches.
		1. Safety Significance:
		- Maintain adequate core cooling
		2. Cues:
		- Procedural compliance
		- Level lowering with adequate high pressure injection available
		3. Measured by:
		- Injection established after directed level band is reached.
		4. Feedback:
		- Reactor level trend

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Event Description: Critical Task 6

Time	Position	Applicant's Actions or Behavior
		Critical Task 6 – Maintain RPV pressure and Suppression Pool temperature less than HCL, If RPV pressure and Suppression Pool temperature cannot be
		maintained below the Heat Capacity Limit (HCL), then initiate Emergency
		Depressurization prior to exceeding HCL.
		1. Safety Significance:
		- Precludes failure of Containment
		2. Cues:
		- Procedural compliance
		3. Measured by:
		3. Measured by:
		- At least 5 SRVs are open before HCL is exceeded
		4. Feedback:
		- RPV pressure trend
		- SRV open status indications
		- Suppression Pool temperature rate of increase
		- Reactor pressure trend
		- Suppression Pool temperature trend

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Event Description: Critical Task 7

Time	Position	Applicant's Actions or Behavior
		Critical Task 7 – During an ATWS with Emergency Depressurization required
		terminate and prevent injection, with the exception of RCIC, SLC and CRD, into
		the RPV until reactor pressure is below MSCP.
		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 RCIC,
		SLC and CRD prior to reaching the MSCP.
		4. Feedback:
		- Reactor power trend, power spikes, reactor short period alarms.

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Event Description: Critical Task 8

Time	Position	Applicant's Actions or Behavior
		Critical Task 8 – During an ATWS, when RPV pressure is below the MSCP,
		increase and control injection into the RPV to restore and maintain RPV level
		to the directed level band.
		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"
		3. Measured by:
		- RPV level is being restored and maintained in the directed band.
		4. Feedback:
		- Lack of power excursion
		- RPV level and pressure indications

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Event Description: Critical Task 9

Time	Position	Applicant's Actions or Behavior
		Critical Task 9 – During an ATWS, when RPV pressure is below the MSCP,
		increase and control injection into the RPV to restore and maintain RPV level
		to the directed level band.
		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"
		3. Measured by:
		- RPV level is being restored and maintained in the directed band.
		4. Feedback:
		- Lack of power excursion
		- RPV level and pressure indications

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Event Description: Critical Task 10

Time	Position	Applicant's Actions or Behavior
		Critical Task 10 – Failure of a Main Steam Line automatic isolation, take action
		to manually isolate the Main Steam Line.
		1. Safety Significance:
		- Take action to restore a fission product barrier
		2. Cues:
		- Valve position indication shows Main Steam Line is not isolated
		- Procedural compliance
		3. Measured by:
		- Inboard MSIV 1B21F0022C is taken to close
		4. Feedback:
		- 1B21F0022C indicates closed