

Scenario Outline

ES-D-1

Simulation Facility Peach Bottom

Scenario No.

#1

Op Test No.

Examiners

Operators

CRS

PRO

URO

Scenario Summary

The scenario begins with the reactor at 100% power with the 'A' Loop Residual Heat Removal (RHR) out of service. During the turnover, the crew is directed to swap TBCCW pumps for inspection of a noisy bearing on the 'A' TBCCW pump. Following the swap of TBCCW, an 'A' RPS/PCIS drywell pressure instrument trips upscale resulting in a 'A' Half-scam. The Crew will investigate, evaluate Tech Specs and perform GP-25, Installation of Trips/Isolations to Satisfy Tech Spec/TRM Requirements.

After the Tech Spec determination, the running TBCCW pump trips and results in entry to ON-118, Loss of TBCCW. The standby TBCCW pump will not start and the crew must lower power to prevent overheating of the Isophase Bus.

Once power is lowered, a steam leak develops in the drywell requiring entry into OT-101, High Drywell Pressure. The crew will take actions for the rising drywell pressure and will manually scram the reactor. A failed 'B' RPS channel will result in an ATWS. The crew will enter T-101, RPV Control and Alternate Rod Insertion (ARI) will be successful.

With all rods in and the ATWS terminated, the crew will continue to take OT-101 actions. The crew will enter T-101 and T-102, Primary Containment Control, when the drywell reaches 2 psig. The crew will spray the torus but a failed drywell spray valve will prevent drywell sprays and drywell temperature will continue to rise, approaching the blowdown limit. The crew will either perform a depressurization to the Main Condenser or a T-112, Emergency Blowdown. The scenario may be terminated when the RPV depressurization is performed.

Initial Condition IC-120, 100% power

Turnover: See Attached "Shift Turnover" Sheet

Event No.	Malfunction No.	Event Type*	Event Description
1		N PRO CRS	Swap of TBCCW pumps.
2		I URO PRO CRS	Failed 'A' RPS Drywell pressure instrument (Tech Spec).
3		C PRO CRS	Trip of TBCCW pump results in Loss of TBCCW.
4		R URO CRS	Power reduction in response to Loss of TBCCW.
5		M URO PRO CRS	Steam leak in the drywell.
6		I URO CRS	RPS 'B' fails to trip resulting in an ATWS (ARI is successful)
7		C PRO CRS	DW Spray Valve fails to open during alignment for containment sprays.

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

SHIFT TURNOVER

PLANT CONDITIONS:

- Unit 2 is operating at 100% rated power.
- A routine Diesel Fuel Oil delivery is expected this shift.

INOPERABLE EQUIPMENT/LCOs:

- 'A' Loop of RHR is out of service and drained for work on the MO-10-154A Outboard Injection Valve bonnet. Unit 2 is 2 days into a 7 day Tech Spec Action, LCO 3.5.1 TSA A.1 is in effect.

SCHEDULED EVOLUTIONS:

- Perform SO 34.6.A-2, Placing the Standby Turbine Building Closed Cooling Water System Pump in Service.

SURVEILLANCES DUE THIS SHIFT:

None

ACTIVE CLEARANCES:

'A' Loop RHR is blocked.

GENERAL INFORMATION:

Predictive Maintenance reports a noisy bearing on the 'A' TBCCW pump motor and has requested a swap to the 'B' TBCCW pump to install instrumentation on the 'A' pump. When the crew has the shift, perform SO 34.6.A-2, Placing the Standby Turbine Building Closed Cooling Water System Pump in Service.

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Event No.: 1

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Event Description: Swap of TBCCW pumps.**Cause:** None**Automatic Actions:** None**Effects:** None**Time****Position****Applicant's Actions Or Behavior**

CRS

Direct the PRO to perform SO 34.6.A-2 "Placing the Standby Turbine Building Closed Cooling Water System Pump in Service."

PRO

Perform SO 34.6.A-2 "Placing the Standby Turbine Building Closed Cooling Water System Pump in Service."

- Review SO procedure, including prerequisites and precautions.
- Contact the Equipment Operator to perform SO 34.6.A-2 Step 4.1 to vent the 'B' TBCCW pump and verify it ready for start.
- PRO starts the 'B' TBCCW pump and informs the EO.
- PRO stops the 'A' TBCCW pump and places it in AUTO.
- PRO informs the CRS of the pump swap and contacts Maintenance.

URO

Monitors plant parameters and assists as directed.

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Event No.: 2

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Event Description: Failed 'A' RPS Drywell Pressure instrument (Tech Spec).**Cause:** Electronic upscale failure of Drywell Pressure Rosemount trip unit (PIS-2-5-12A)

Automatic Actions:

- "Drywell High Pressure" alarm (210 F-1)
- "RPS/PCIS Instruments Gross Failure" alarm (210 D-4)
- " 'A' Channel Reactor Auto Scram" alarm (211 B-1)
- Half PCIS isolation Groups II and III (but NO alarms)

Effects: Half scram and half PCIS isolation, Tech Spec instrumentationTimePositionApplicant's Actions Or Behavior

URO/PRO Recognize half scram, inform CRS.

URO Recognize High Drywell Pressure RPS Trip has occurred.

- Verify automatic actions for half scram (and PCIS isolations).
- Determine actual Drywell Pressure.
- Recognize instrument failure.
- Inform CS.

CRS (May refer to T-102 and OT-101 for high drywell pressure but No actions are required since instrument failure.)

Direct troubleshooting in accordance with the Gross Failure alarm ARC.

Refer to TS 3.3.1.1 and 3.3.6.1.

- Declare pressure instrument Inoperable.
- Requires placing the A1 RPS channel in trip within 12 hours.
- Also must place the 'A' PCIS trip system in trip within 24 hours.
- Initiate GP-25 Appendixes 1 and 5 to install redundant RPS/PCIS Trips.

PRO Install Trip on "A1" RPS channel as directed by the CRS using the GP-25 Appendix 1:

- Complete the required Appendix.
- Inform URO that a redundant scram will be inserted.
- Insert a key and place the 'A1' Test Keylock Switch to the "Test" position.

Note: Appendix 5 for PCIS is required to be simulated. The next event will occur before the crew can direct the GP-25 PCIS Appendix 5.

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Event No.: 3

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Event Description: Trip of TBCCW pump results in loss of TBCCW**Cause:** Overcurrent trip of 'B' TBCCW pump, 'A' Pump fails to start**Automatic Actions:** "Turb Bldg Cooling Water Supply Lo Press" alarm (217 C-5)**Effects:** Loss of TBCCW cooling to Isophase Bus, CRD pumps, Air Compressors and Condensate pumps.

<u>Time</u>	<u>Position</u>	<u>Applicant's Actions Or Behavior</u>
	PRO	Recognizes the TBCCW Low pressure alarm and tripped pump, informs the CRS and announce entry into Loss of TBCCW (ON-118).
	CRS	Enters and directs actions IAW ON-118 Loss of TBCCW. <ul style="list-style-type: none"> - Directs URO to reduce power to below 18000 amps using GP-9. - Directs PRO to ensure RBCCW swapover to air compressors and CRD pumps. - Direct personnel to determine loss of TBCCW pumps. - Ensure plant stabilized after the power reduction.
	URO	URO actions for downpower are detailed in Event 4.
	PRO	Performs ON-118 actions: <ul style="list-style-type: none"> - Directs EO to investigate tripped TBCCW pumps. - Directs EO to verify RBCCW swapover to TBCCW. - Monitors plant component temperatures. - Assists the URO during the downpower. - Directs EO to reset air compressor trips (as applicable).

Note: Air compressors may trip if loaded during the loss of TBCCW prior to the swapover. The subsequent loss of Instrument Air header pressure may result in entry to ON-119, Loss of Instrument Air. The compressors may be restored provided they are reset locally.

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Event No.: 4

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Event Description: Power reduction in response to Loss of TBCCW.

Cause: Loss of cooling to Isophase Bus requires downpower.

Automatic Actions: "Isophase Bus Loss of Cooling" (206 F-4) alarms after 10 min TD

Effects: Fast power reduction.

<u>Time</u>	<u>Position</u>	<u>Applicant's Actions Or Behavior</u>
	CRS	Directs URO to reduce power IAW GP-9 "Fast Power Reduction" to lower generator amps below 18,000 to prevent overheating of the Isophase Bus (ON-118).
	URO	Reduces power with Reactor Recirc flow and control rods using GP-9. <ul style="list-style-type: none"> • Monitors reactor parameters during the power reduction.
	PRO	<ul style="list-style-type: none"> • Informs Power Systems Director of the power reduction. • Monitors plant parameters and assists the URO as necessary.
	URO/PRO	<p>When power is reduced below 18000 amps, the CRS may direct a reactor feedpump placed in standby to prevent level control problems at the lower feedflow.</p> <ul style="list-style-type: none"> • Places a RFP in Standby in accordance with SO 6D.2.A-2 Reactor Feedpump Shutdown. Step 4.2 to rapidly shutdown the RFP is permitted in this condition: <ul style="list-style-type: none"> – Opens the RFP Recirc valve – Closes the RFP check valve – Place the RFP M/A in Manual – Close the RFP Discharge valve

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Event No.: 5

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Event Description: Steam Leak in the Drywell.**Cause:** Steam leak from main steam line in the drywell.**Automatic Actions:** "Drywell Hi-Lo Press" alarms (210 F-2, 225 A-4)**Effects:** Rising drywell pressure indicated. Manual scram at 1.2 psig or auto scram at 2 psig with isolations, HPCI and diesel starts.

<u>Time</u>	<u>Position</u>	<u>Applicant's Actions Or Behavior</u>
	URO/PRO	Recognize Drywell High Pressure alarms <ul style="list-style-type: none"> • Recognize that Drywell pressure is going up and announce entry into OT-101 for High Drywell Pressure. • Trend the Drywell Pressure Increase
	CRS	Enter/direct actions in accordance with OT-101, High Drywell Pressure: <ul style="list-style-type: none"> • Verify that the URO/PRO have taken their Immediate Operator Actions. • Directs actions to monitor components e.g., RRP seals. • Directs the crew that at 1.2 psig DW pressure, house loads will be transferred and a GP-4 "Manual scram" will be performed. • Directs the crew to vent the drywell to SGTS. • Directs crew to isolate and restore systems IAW OT-101 to stop the source of the leak. OT-101 systems include: RWCU, HPCI and RCIC.
	URO/PRO	Perform OT-101 actions as directed: <ul style="list-style-type: none"> • Verify that inerting is not in progress. • Maximize Drywell Cooling. • Vent the drywell to SGTS IAW SO 7B.3.A-2. • Isolate plant systems to include RWCU, HPCI, RCIC IAW OT-101. • Monitor drywell pressure and plant parameters.

Note: Scram actions will be delayed upon discovery of the ATWS but should be performed when control rods insert with ARI.

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Event No.: 6

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Event Description: RPS 'B' fails to trip resulting in an ATWS (ARI is successful).**Cause:** RPS Logic Channels B1, B2, B3 fail to de-energize**Automatic Actions:** "B Channel Reactor Auto Scram" (211 C-1) and "B Channel Reactor Manual Scram" (211 E-1) are NOT received.**Effects:** All RPS "B" channel automatic and manual scram signals fail to initiate.

<u>Time</u>	<u>Position</u>	<u>Applicant's Actions Or Behavior</u>
	CRS	Directs and/or ensures a GP-4 Manual Scram when drywell pressure reaches 1.2 psig.
	URO	Performs GP-4 Manual Scram actions: <ul style="list-style-type: none"> • Places the Mode Switch to Shutdown. • Recognize electrical ATWS • Report that control rods are not inserting and the APRMs are NOT downscale. • Attempts manual scram with pushbuttons.
	CRS	Direct T-101 "RPV Control" and may direct RC/Q T-200s to insert rods: <ul style="list-style-type: none"> • Directs initiation of Alternate Rod Insertion (ARI). • Enters T-117 "Level/Power Control" • May direct T-220 "Driving Control Rods During a Failure to Scram" • May direct T-213 "SCRAM Solenoid Deenergization" • May direct T-214 "Isolating and Venting the Scram Air Header"
CT	URO	Initiates ARI and performs Scram Actions when control rods insert: <ul style="list-style-type: none"> • Verify Rods inserting • Manually control the Reactor Feed Water System to control Reactor Level • Verify APRMs are downscale and report to the CRS. • Verify all control rods inserted and report to the CRS.
	PRO	Transfer House Loads and performs scram actions when control rods insert with ARI: <ul style="list-style-type: none"> • Manually transfers House Loads. • Trip the turbine at 50 Mwe. • Verify the Generator Lockout. • Verify all isolations. • Restore Instrument Nitrogen to the DW when directed by the CRS.
	CRS	Determines the ATWS is terminated and exits T-117 and continues to direct actions IAW T-101

Note: Steam leak severity is automatically increased when the Mode Switch is placed to Shutdown.

Op Test No.: Scenario No.: # 1

Event No.: 7

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Event Description: Drywell Spray valve fails to open during alignment for containment sprays.

Cause: Failed control switch prevents spray valve operation from the control room.

Automatic Actions: 2 psig isolations, HPCI auto start, emergency diesel starts.

Effects: Drywell pressure continues to rise above 2 psig and requires the crew to either rapidly depressurize or perform an Emergency Blowdown when drywell temperature reaches 281°F.

<u>Time</u>	<u>Position</u>	<u>Applicant's Actions Or Behavior</u>
	URO/PRO	Recognize and respond to 2 psig drywell pressure and announce entry into T-101 and T-102: <ul style="list-style-type: none"> • Recognize and verify Group isolations. • Recognize and verify Diesel Generator starts and cooling water. • Recognize and respond to HPCI auto start. • Trend and report containment parameters.
	CRS	Recognize and respond to 2 psig drywell pressure and announce entry into T-101 and T-102: <ul style="list-style-type: none"> • Verify adequate level and may direct either a HPCI shutdown or isolation.
	PRO	Performs a shutdown or isolation of HPCI as directed by the CRS.
	CRS	Directs T-102 actions: <ul style="list-style-type: none"> • Directs Torus sprays IAW T-203 using 'B' Loop RHR • Directs T-223 actions to restore drywell ventilation. • Trends containment parameters specifically drywell pressure and bulk average temperature.
	PRO	Perform Torus Sprays IAW T-203 and informs the CRS.
	URO/PRO	Recognize and report Containment parameters: <ul style="list-style-type: none"> • Bulk Drywell temperature at 145°F and entry into T-102.
	CRS	Continues to monitor containment and prepares to spray the drywell: <ul style="list-style-type: none"> • Re-enters T-102 on Bulk Avg temp. • Directs Recirc pumps stopped. • Directs Drywell ventilation secured (if running per T-223). • Directs the PRO to spray the drywell IAW T-204.

Op Test No.: Scenario No.: # 1

Event No.: 7 (continued)

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Event Description: Drywell Spray valve fails to open during alignment for containment sprays.

<u>Time</u>	<u>Position</u>	<u>Applicant's Actions Or Behavior</u>
	CRS	Continues T-101 Actions: <ul style="list-style-type: none"> • Directs RPV level controlled +5 to +35 inches • Directs the URO to perform a depressurization <100°F/hr.
	URO	Performs a reactor depressurization <100°F/hr and maintains RPV level. Additional feedwater will be required to keep up with the steam leak.
	URO/PRO	Trend and report containment parameters.
	CRS	Directs URO/PRO to perform T-223 to Bypass and restore drywell ventilation.
	URO/PRO	Performs T-223: <ul style="list-style-type: none"> • Directs EO to place drywell fans in slow. • Verifies T-223 requirements. <p>Note: The CRS may at his discretion determine that the blowdown limit is being approached "BEFORE" drywell temperature reaches 281°F and may direct a rapid depressurization to the main condenser (permitted by T-101 RC/P-12). However, an Emergency Blowdown is required to be directed when drywell temperature exceeds 281°F. The RC/P-12 step may avoid the blowdown.</p>
	CRS	Directs the URO/PRO to perform a rapid depressurization to the main condenser IAW T-101 RC/P-12 without regard for cooldown rate limits.
	URO/PRO	Performs a rapid depressurization to the main condenser using Turbine Bypass Valves.
CT	CRS	When Drywell temperature reaches 281°F, CRS directs a T-112 Emergency Blowdown.
CT	PRO	Performs a Emergency Blowdown by opening all ADS valves.

Op Test No.:

Scenario No.: # 1

Event No.: 7 (continued)

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TERMINATION CRITERIA:

Scenario may be terminated when a plant depressurization has been performed. Note that either a T-101 Rapid Depressurization or a T-112 Emergency Blowdown may be directed.

POST SCENARIO EMERGENCY CLASSIFICATION:

ERP-101 Reactor Power Table 2.2 - ALERT

ERP-101 Fission Product Barrier Table 3.2 - ALERT

Scenario Outline

ES-D-1

Simulation Facility	Peach Bottom	Scenario No.	#2	Op Test No.
Examiners	_____	Operators	_____	CRS
	_____		_____	PRO
	_____		_____	URO
Scenario Summary	<p>The scenario begins with the reactor at 75% power with power ascension in progress. The 'A' TBCCW pump is out of service for motor repair. The crew is directed to place the third Reactor Feedwater Pump in service and continue to raise power to 90% with reactor recirculation flow.</p> <p>When reactivity manipulation is observed, an EHC logic problem causes pressure set to drift resulting in a high pressure condition. Once the crew takes actions to restore pressure and the CRS has evaluated Tech Specs, the 'G' Safety Relief Valve opens.</p> <p>When the RO maximizes torus cooling, the 'A' RHR full flow test valve fails to open and torus conditions continue to degrade resulting in T-102, Primary Containment Control when 95°F is reached. When torus temperature cannot be maintained below 105°F, an attempt to scram the reactor will discover an electrical ATWS. The Crew will enter T-101, RPV Control and T-117, Level Power Control to intentionally lower reactor level. When level is lowered, the PCIS logic will fail to isolate the Reactor Water Cleanup system on low level and must be manually isolated.</p> <p>After Standby Liquid Control is injecting and level/ power are controlled, the ATWS will be terminated by T-213, Scram Solenoid Deenergization. The scenario may be terminated after all control rods are verified inserted.</p>			
Initial Condition	IC-121, 75% power			
Turnover:	See Attached "Shift Turnover" Sheet			
Event No.	Malfunction No.	Event Type*	Event Description	
1		N URO PRO CRS	Place the third Reactor Feedwater Pump in service.	
2		R URO CRS	Raise reactor power with Reactor Recirculation Flow.	
3		I URO PRO CRS	EHC logic failure causes reactor pressure to rise (Tech Spec).	
4		C URO PRO CRS	Safety Relief Valve fails open.	
5		C PRO CRS	'A' RHR Full Flow Test Valve fails to open.	
6		M URO PRO CRS	Electrical ATWS.	
7		I URO PRO CRS	PCIS logic fails to isolate Reactor Water Cleanup.	

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

SHIFT TURNOVER

PLANT CONDITIONS:

- Unit 2 at 75% Power following a load drop.
- GP-5 Power Operations has been completed through Step 5.3.23.

INOPERABLE EQUIPMENT/LCOs:

- 'A' TBCCW pump OOS.

SCHEDULED EVOLUTIONS:

- Place the 'A' Reactor Feedpump in service IAW SO 6C.1.C-2, Conditions Met to start at Step 4.4.
- Begin power ascension to 90% at 10 Mwe /min using Recirc flow IAW GP-5.

SURVEILLANCES DUE THIS SHIFT:

None

ACTIVE CLEARANCES:

- 'A' TBCCW pump.

GENERAL INFORMATION:

- A load drop to 65% power was performed earlier this shift to perform a rod pattern adjustment, repair of a MSDT 2F Drain Valve controller and replace a circuit card in the 'A' Reactor Feedwater Pump Woodward Governor 501 Controller. All retests are complete.
- The 'A' RFP is in standby and ready to be returned to service.
- Once feedwater is restored, power ascension may be performed at 10 MWe/min using Recirc. Control rods are at the 100% pattern. Reactor Engineering predictor has determined that all thermal limits will remain within admin limits and no preconditioning limits are in effect.
- Power will be raised to 90% power and held there for 4 hours to allow for the Xenon transient. RE will run new predictors at that time. Power will be subsequently raised to 100% using Recirc and Xenon with a contingency rod pattern adjustment at 95% based on the predictors.

Operator Actions

ES-D-2

Op Test No.: Scenario No.: # 2

Event No.: 1

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Event Description: Place the third Reactor Feedwater Pump in service.

Cause: None

Automatic Actions: None

Effects: None

Time	Position	Applicant's Actions Or Behavior
	CRS	Reviews GP-5 Power Operations and directs: <ul style="list-style-type: none">Place the "A" Reactor Feed Pump in service IAW SO 6C.1.C-2 with Conditions Met to start at Step 4.4.
	URO PRO	Place the "A" Reactor Feed Pump (RFP) in service using SO 6C.1.C-2 starting at Step 4.4: <ul style="list-style-type: none">Raise "A" RFP Discharge Pressure to greater than reactor pressure.Slowly stroke open the RFP Discharge Valve while monitoring RPV LevelPlace the "A" RFP in AutomaticClose the "A" RFP Min Flow Valve
	URO PRO	Monitor plant parameters/assist as directed. Report to the CRS when the RFP is in service.

Op Test No.: Scenario No.: # 2

Event No.: 2

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Event Description: Raise reactor power with Reactor Recirculation flow.

Cause: None

Automatic Actions: None

Effects: Reactor Power is raised

Time	Position	Applicant's Actions Or Behavior
	CRS	Directs power ascension IAW GP-5 "Power Operations" <ul style="list-style-type: none">• Directs power raised with Recirc flow IAW SO2A.1.D-2, "Normal Operation of Recirc"• Directs power be raised to 90% power at 10Mwe/min.
	URO	Raises power as directed with Recirc flow: <ul style="list-style-type: none">• Raises power with Recirc flow IAW SO2A.1.D-2, "Normal Operation of Recirc"• Monitors plant parameters during power ascension.
	PRO	Assists in the power ascension: <ul style="list-style-type: none">• Contacts the Power Team Dispatcher.• Assists the URO during power ascension.• Maintains the Generator voltage regulator balanced.

Op Test No.: Scenario No.: # 2

Event No.: 3

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Event Description: EHC Logic failure causes Reactor Pressure to rise (Tech Spec)

Cause: Failed EHC Press Set Raise pushbutton causes pressure to rise.

Automatic Actions: "Reactor High Pressure" alarm (210 G-2)

Effects: Reactor high pressure stops at 1055 psig just above the alarm setpoint and will not continue to a scram.

Time	Position	Applicant's Actions Or Behavior
	URO/PRO	<p>Recognizes Reactor High Pressure alarm, informs the CRS and announces entry into the High Pressure OT (OT-102).</p> <ul style="list-style-type: none"> • Performs Immediate Actions to reduce power if pressure is observed to be rising. RO will not lower power if pressure is observed to have stabilized. • Trends and reports RPV pressure.
	CRS	<p>Reviews and directs OT-102 Actions:</p> <ul style="list-style-type: none"> • May direct a GP-9 Fast Power Reduction to stop the pressure rise. • Monitors plant parameters to stabilize the plant. • Contacts plant personnel for troubleshooting and repair. • Reviews Tech Specs to assure compliance with Tech Spec 2.0 and 3. for >1053 psig and recognizes TSA to reduce pressure within 2 hours.
	URO/PRO	<p>Perform actions as directed IAW OT-102:</p> <ul style="list-style-type: none"> • May perform GP-9 Fast Power Reduction. • Diagnose EHC Panel to determine cause and may identify Press Setpoint is above normal.

PRO

Op Test No.: Scenario No.: #2 Event No.: 4

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Event Description: Safety Relief Valve 'B' inadvertently fails open.

Cause: Mechanical drift of relief valve setpoint.

Automatic Actions: Alarms 210 D-2, "SAFETY RELIEF VALVE OPEN" and 227 B-4, "BLOWDOWN RELIEF VALVES HI TEMP".

Effects: Loss of Generator Load, steamflow/feedflow mismatch, heat input to the primary containment. SRV will later close when pressure lowers to 800 psig.

Time	Position	Applicant's Actions Or Behavior
	URO/PRO	Recognize, report, and take actions IAW ARC 210 D-2, "Safety Relief Valve Open", and ARC 227 B-4, "Blowdown Relief Valves Hi Temp".
	CRS	Enter/direct actions IAW OT-114: <ul style="list-style-type: none"> • Lead crew in confirming an SRV is open. • Direct RHR be placed in Torus Cooling. • Direct attempts to close the 'B' SRV.
	URO/PRO	Confirm that the 'B' SRV is open IAW OT-114.
	PRO	Place RHR in Torus Cooling IAW RRC 10.1-2, "RHR System Torus Cooling During a Plant Event", when directed by the CRS and monitor Torus temperature.
	PRO	Cycle the 'B' SRV control switch when directed by the CRS.
	URO	Perform (or continue) a Fast Power Reduction IAW GP-9-2 when directed by the CRS (may already be performed IAW OT-102).
	URO/PRO	Coordinate removal of fuses by Equipment Operators and monitor valve status during attempts to close the 'B' SRV. Communicate to the CRS that the 'B' SRV has NOT closed.
	CRS	Declare the SRV Inoperable AND verify compliance with Tech Spec 3.4.3. (Since adequate SRVs available, this Tech Spec call will likely be delayed due to the transient condition)

Op Test No.: Scenario No. #2

Event No.: 5

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Event Description: 'A' RHR Full Flow Test Valve Fails to Open**Cause:** MCC valve bucket trips on magnetics**Initial Automatic Actions:** MO-10-34A fails to open**Effects:** One loop of RHR cannot keep up with the heat input of a fully open SRV and torus temp rises quickly. This condition will require a manual scram.

Time	Position	Applicant's Actions Or Behavior
	PRO	Recognizes MO-10-34A tripped on magnetics after opening and informs the CRS.
	CRS	Recognizes one loop of Torus cooling and directs Torus Cooling maximized (if not already at maximum).
	URO/PRO	Monitor and trend torus temperature and level, inform the CRS and announce T-102 entry when: <ul style="list-style-type: none"> • 95°F torus temp SPOTMOS. • 14.9 feet torus level "Torus Water Level Out of Normal Range " alarm
CT	CRS	Continues to direct OT-114 actions and T-102 Actions: <ul style="list-style-type: none"> • CRS briefs the crew on degraded conditions and identifies when a manual reactor scram is required. • GP-4 will be directed when torus temperature reaches 105°F and the SRV still open.

Op Test No.: Scenario No.: #2

Event No.: 6

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Event Description: Anticipated Transient Without Scram**Cause:** Scram Condition With Power Above 4% or Unknown.**Automatic Actions:** None.**Effects:** Requires the crew to take actions to terminate the ATWS, as well as enter T-117 Level/Power Control.

Time	Position	Applicant's Actions Or Behavior
CT	CRS	Direct T-101, RC/Q ATWS actions: <ul style="list-style-type: none"> • Initiation of ARI. • Trip Recirc pumps at least 10 seconds apart. • T-213, "Deenergize Scram Solenoids". • T-214, "Vent Scram Air Header". • T-220, "Drive Rods". • Enter T-117, "Level/Power Control". • Directs initiation of Standby Liquid Control on high torus temperature.
	URO	Performs T-101, RC/Q actions when directed: <ul style="list-style-type: none"> • Initiates ARI. Report to the CRS that it was not successful. • Trips Recirc pumps at least 10 seconds apart. • Direct an Equipment Operator to perform T-213. Attempts URO portion of T-213. Reports to the CRS that it was not successful. • Direct an Equipment Operator to perform T-214. • Performs T-220 to insert control rods. • Monitors and trends Torus temperature and manually initiates Standby Liquid Control.
	CRS	Direct T-117 actions: <ul style="list-style-type: none"> • Inhibit ADS. • T-221, "Bypass the MSIV –160 inch Isolation". • Lower RPV level to below –60 inches by terminating and preventing RPV injection using T-240 except for RCIC.
	PRO	Performs T-117 actions when directed: <ul style="list-style-type: none"> • Inhibits ADS. • Directs Equipment Operator to perform T-221. • Performs T-240 except for RCIC. Controls RPV level below –60" and within the specific RPV level band directed by the CRS.
	CRS	Directs T-117 actions as containment conditions degrade and directs PRO to perform T-240 again to lower level to T-240 Figure 2 conditions.

Op Test No.: Scenario No.: #2

Event No.: 6 (continued)

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Event Description: Anticipated Transient Without Scram**Cause:** Scram Condition With Power Above 4% or Unknown.**Automatic Actions:** None.**Effects:** Requires the crew to take actions to terminate the ATWS, as well as enter T-117 Level/Power Control.

Time	Position	Applicant's Actions Or Behavior
	PRO	Performs T-240 again to meet Figure 2 requirements and RPV level is lowered and injection restored when any of the following are reached: <ul style="list-style-type: none"> - RPV level reaches -172 inches or - Reactor power drops below 4% or - All SRVs remain closed and Drywell pressure drops below 2 psig.
CT		<ul style="list-style-type: none"> • Controls level in new band based on plant power conditions.
	URO/PRO	Continue to perform T-101 and T-117 Actions: Stabilize RPV pressure in band Stabilize RPV level in band
	URO	Recognizes "Scram Valve Pilot Air Header Press Lo" (211 D-2) alarm and/or control rods inserting due to T-214 and informs the CRS.
	URO	Verifies all control rods inserted and informs the CRS.
	CRS	Determines the ATWS is terminated, exits T-117 Level /Power Control and enters T-101 RC/L: <ul style="list-style-type: none"> • Directs PRO to restore level to +5 to +35 inches. • Directs restoration actions.

Op Test No.: Scenario No.: # 2

Event No.: 7

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Event Description: PCIS Logic Fails to isolate Reactor Water Cleanup

Cause: PCIS Logic failure

Automatic Actions: Auto isolation does not occur.

Effects: A failure of RWCU to isolate can degrade the ATWS condition and affect boron concentration. The RWCU system can be manually isolated.

Time	Position	Applicant's Actions Or Behavior
	URO/PRO	<p>Recognize RWCU fails to isolate. (This failure to isolate can be identified in two plant conditions. The first when level is intentionally lowered to below 1 inch. The second when Standby Liquid is initiated.)</p> <p>Upon recognizing a failure to isolate, the RO should:</p> <ul style="list-style-type: none">• Manually isolate the RWCU valves.• Ensure a complete isolation.• Inform the CRS as conditions permit.

TERMINATION CRITERIA:

The scenario may be terminated after all control rods have been inserted and the ATWS is terminated.

POST SCENARIO EMERGENCY CLASSIFICATION:

ERP-101 Reactor Power Table 2.2 - Site Area Emergency

Scenario Outline

ES-D-1

Simulation Facility Peach Bottom

Scenario No.

#3

Op Test No.

Examiners

Operators

CRS

PRO

URO

Scenario Summary

The scenario begins with the reactor at 100% with 'A' TBCCW pump out of service for motor repair. The turnover directs the crew to perform a fast start of the E-1 Diesel for the semi-annual surveillance. When the diesel is started, the field flash fails and the Diesel is declared inoperable.

After the Tech Spec determination, turbine vibration occurs due to turbine blade failures. Condenser is breached and air in-leakage results in lowering condenser vacuum. The crew takes actions in accordance with OT-106, Loss of Condenser Vacuum and reduces power in accordance with GP-9, Fast Power Reduction. A reactor scram and loss of Main Turbine and all Reactor Feedwater Pumps will result from the low condenser vacuum. The low reactor level will also cause automatic HPCI and RCIC starts.

A steam leak develops in HPCI and the crew will enter T-103, Secondary Containment Control. HPCI isolation logic fails and HPCI cannot be manually isolated. As Reactor Building conditions degrade, the crew will perform a T-112, Emergency Depressurization when max safe temperatures are exceeded in two areas. When ADS valves are opened, the 'K' SRV fails to open and an additional SRV is required to be opened. The scenario may be terminated after the emergency blowdown is in progress.

Initial Condition IC-14, 100% power

Turnover: See Attached "Shift Turnover" Sheet

Event No.	Malfunction No.	Event Type*	Event Description
1		N PRO CRS	Diesel start for surveillance testing.
2		I PRO CRS	Diesel field fails to flash and is declared inoperable (Tech Spec).
3		C URO PRO CRS	Turbine vibration due to turbine blade failures.
4		M URO PRO CRS	Air inleakage and lowering condenser vacuum.
5		R URO CRS	Fast power reduction due to lowering condenser vacuum.
6		M URO PRO CRS	HPCI steam leak in the Reactor Building.
7		I URO PRO CRS	HPCI isolation logic failure.
8		C URO PRO CRS	ADS SRV fails to open on Emergency Blowdown.

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

SHIFT TURNOVER

PLANT CONDITIONS:

- Unit 2 at 100% rated power operation.

INOPERABLE EQUIPMENT/LCOs:

- 'A' TBCCW pump is OOS for motor replacement.

SCHEDULED EVOLUTIONS:

NONE

SURVEILLANCES DUE THIS SHIFT:

- ST-O-052-412-2 "E2 Diesel Generator Fast Start and Full Load Test"

ACTIVE CLEARANCES:

- 'A' TBCCW

GENERAL INFORMATION:

- Preparations are in progress to perform the semi-annual diesel surveillance ST-O-052-412-2 on the E2 Diesel Generator. Equipment Operators are standing by and conditions are met to Fast Start the E2 Diesel Generator.
- SO 52A.1.B Diesel Generator Operations Section 4.3 has been completed up to Step 4.3.1 and pre-start checks have been completed.

Operator Actions

ES-D-2

Op Test No.: Scenario No.: # 3

Event No.: 1

Page 1 of 9

Event Description: Diesel Start for surveillance testing.

Cause: None

Automatic Actions: "E2 Diesel Running" alarms (002 G-4)
"E2 Diesel Gen Trouble" alarms (002 G-5)

Effects: Diesel is manually started for the surveillance test.

<u>Time</u>	<u>Position</u>	<u>Applicant's Actions Or Behavior</u>
	PRO	Verifies conditions met to "Fast Start" the E2 Diesel Generator IAW SO 52A.1.B. <ul style="list-style-type: none">• Reviews the ST-O-052-412-2.• Reviews the SO 52A.1.B which is completed up to Step 4.3.1.• Contacts Equipment Operators that are standing by in the E2 Diesel.
	URO	Assists the PRO as required. Monitors plant parameters.
	PRO	Performs SO 52A.1.B Step 4.3.2 as follows: <ul style="list-style-type: none">• Starts the Diesel Generator<ul style="list-style-type: none">– Places Auto/Manual Switch to Manual and simultaneously places the Diesel Start switch to Start• Verifies Diesel prelube for 3 minutes.• Monitors the diesel start.

Op Test No.: Scenario No.: # 3

Event No.: 2

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Event Description: Diesel Field fails to Flash and is declared inoperable (Tech Spec)**Cause:** None**Automatic Actions:** "E2 Diesel Gen Trouble" alarms (002 G-5)**Effects:** Diesel is running with no output voltage or frequency.**Time****Position****Applicant's Actions Or Behavior**

PRO

Recognizes the Diesel Generator Trouble alarm (002 G-5) and directs the EO to investigate.

- PRO observes no voltage or frequency on the E2 Diesel Generator.
- EO reports "Generator Loss of Field" alarm (OBC097 F-5) and no DC field volts or AC volts or frequency is observed on the generator panel. (This local ARC directs the diesel to be shutdown.)
- PRO informs the CRS.
- PRO verifies ESW auto starts.

CRS

Declares the E2 Diesel Inoperable.

- Reviews the ST and Tech Specs
- Enters TSA 3.8.1.B
- Directs TSA actions to include:
 - SBO Operability Test
 - SR 3.8.1.1
 - Offsite breaker alignment check ST-O-054-951
 - Verifies redundant required features are Operable
 - Evaluate for Common Mode failure
- Contacts plant personnel (e.g., Engineering Duty Manager) and management.

PRO

With CRS direction/concurrence, the PRO will perform a shutdown of the E2 Diesel Generator IAW SO 52A.1.B

Op Test No.: Scenario No.: # 3

Event No.: 3

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Event Description: Turbine Vibration due to Blade Failures.**Cause:** Blade failure causes bearing vibration and loss of condenser vacuum.**Automatic Actions:** "Turbine Vibration / Thrust High" alarms (205 A-2)**Effects:** Vibration and condenser vacuum problem requires a power reduction.**Time****Position****Applicant's Actions Or Behavior**

- | | |
|---------|---|
| URO/PRO | Recognize the High Vibration alarm |
| | <ul style="list-style-type: none"> • Monitors vibration on "Zeefax" Data Acquisition System and recorder VR-2657. • Monitors and trends the high vibration on the #3 LP Turbine. • Review the alarm response card and report to the CRS. • Directs an EO to investigate the turbine with an HP. • Monitors bearing and lube oil temperatures |
| CRS | Evaluates the turbine vibration.
Directs a generator load reduction IAW GP-9 Fast Power Reduction. |
| URO | Assists the PRO and monitors plant parameters. |
| | Note: See Event 5 for details on the power reduction. |

Op Test No.: Scenario No.: #3

Event No.: 4

Page 4 of 9

Event Description: Air In-leakage and lowering condenser vacuum**Cause:** Blade exiting the LP Turbine causes a breach

Automatic Actions:

- "Condenser Low Vacuum" alarm (206 D-2)
- "Condensate Filter Demin Trouble" alarm (203 A-2)
- "Condenser Low Vac" alarms (203 B-2, C-2, D-2)
- Reactor scram @23" Hg vac
- Main Turbine and RFP turbines trip @ 20" Hg vac

Effects: Vacuum drops due to rising Offgas flow requires a Fast Power Reduction.

<u>Time</u>	<u>Position</u>	<u>Applicant's Actions Or Behavior</u>
	URO/PRO	Recognize the lowering condenser vacuum, reports to the CRS and announces entry into Low Vacuum OT procedure (OT-106). <ul style="list-style-type: none"> • Recognize, report, and take actions IAW ARC 206 D-2 "Condenser Lo Vacuum"
	URO	Reduces reactor power IAW GP-9-2 "Fast Reactor Power Reduction" until vacuum stops dropping. (Power reduction may already be in progress due to high turbine vibration) <p>Note: See Event 5 for details on the power reduction.</p>
	CRS	Enter/direct actions IAW OT-106 "Condenser Low Vacuum" <ul style="list-style-type: none"> • Direct a SCRAM if condenser vacuum cannot be maintained or restored above 24" Hg vac and enter T-100 "SCRAM"
	PRO	Recognize, report, and take actions IAW ARC 203 B-2, or C-2, or D-2 "A Condenser Lo Vac" (or B or C) <ul style="list-style-type: none"> • Monitor and trend lowering main condenser vacuum. • Relay report of a condenser breach to the CRS.

Op Test No.: Scenario No. #3

Event No.: 5

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Event Description: Fast Power Reduction due to lowering Condenser Vacuum**Cause:** High turbine vibration and/or lowering condenser vacuum**Automatic Actions:** None**Effects:** Power reduction reduces the turbine vibration and mitigates the lowering condenser vacuum.

<u>Time</u>	<u>Position</u>	<u>Applicant's Actions Or Behavior</u>
	CRS	Directs the URO to perform a GP-9 "Fast Power Reduction."
	URO	Performs power reduction using Recirc flow and control rods IAW GP-9 "Fast Power Reduction".
	PRO	Assists in the power reduction <ul style="list-style-type: none"> • Monitor Reactor Feed Pump Flows during the power drop and remove a Reactor Feed Pump from service, if required. • Maintain the Generator Auto-Manual Voltage Regulator • Notify the Power System Director of the power change.
	CRS	Direct a Reactor Scram at 24" Hg vac and enters T-100. <ul style="list-style-type: none"> • Anticipate loss of the condenser (Bypass Valves close at 7" Hg vac) • Directs reactor pressure control <1050 psig to HPCI, RCIC, SRVs. • Directs level control with HPCI and/or RCIC.
	URO	<ul style="list-style-type: none"> • Places the Reactor Mode switch to Shutdown. • Verify control rods are inserting. • Verify that APRMs are downscale. • Establish and maintain RPV with feedwater. • Verify all control rods inserted. • Verify RPV pressure, trend and status of EHC.
	CRS	Direct URO to control level between +5 and +35 inches with HPCI, RCIC due to the loss of RFPs on vacuum.
	PRO	Performs Scram Actions: <ul style="list-style-type: none"> • Transfer 13 KV House Loads. • Trip Main Turbine at <50 Mwe and verify the generator lockout. • Verify PCIS isolations and SGTS initiation. • Verify Scram Discharge Vents and Drains are closed. • Verify Hydrogen Water Chemistry is isolated. • Verify Recirc pumps have runback to 30%. • Monitor Instrument Air header pressure and drywell pressure. • Restore Drywell Instrument N2 when directed by the CRS.

Op Test No.: Scenario No. #3

Event No.: 5 (continued)

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Event Description: Fast Power Reduction due to lowering Condenser Vacuum

Cause: High turbine vibration and/or lowering condenser vacuum

Automatic Actions: None

Effects: Power reduction reduces the turbine vibration and mitigates the lowering condenser vacuum.

<u>Time</u>	<u>Position</u>	<u>Applicant's Actions Or Behavior</u>
	URO/PRO	<ul style="list-style-type: none"> Recognize closure of the Main Turbine Bypass Valves at 7" Hg vac. Recognize Main Condenser Vacuum at 5'Hg vac and inform the CRS.
	PRO	Stabilize reactor pressure below 1050 psig.
	PRO	Monitor and report the Torus water temperature rise and places Torus Cooling in service as directed by the CRS.
	CRS	Directs the MSIVs to be closed when vacuum reaches 5 inches.
	URO/PRO	<ul style="list-style-type: none"> Closes the MSIVs. Control RPV level with HPCI, RCIC as necessary. Control RPV pressure with HPCI, RCIC and SRVs.

Op Test No.: Scenario No.: #3

Event No.: 6

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Event Description: HPCI Steam leak in the Reactor Building**Cause:** Crack in steam line in the HPCI supply pipe to the HPCI turbine.**Automatic Actions:** "High Area Temp" alarms (210 J-3)
HPCI Pump Room fire panel alarm (007 C-6B)
HPCI Pump Room CO2 discharge alarm (007 C-6A)**Effects:** Temperatures rise initially in the HPCI Equipment Room and spread throughout RB 91'6 Elevation including the Torus Room. Fire alarms are received and the HPCI CO2 system will actuate. Reactor Building High Differential Pressure including additional alarms may be observed as the severity of the leak rises.

<u>Time</u>	<u>Position</u>	<u>Applicant's Actions Or Behavior</u>
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Note: If the crew does not start HPCI based on RPV level /pressure conditions, the malfunction may be started at any time as directed by the Lead Examiner.

URO/PRO		Recognize and report a Potential T-103 Entry on High Temperature Verify which temperature point is alarming and confirm T-103 Entry and inform the CRS.
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URO/PRO		Monitor and trend Reactor Building conditions.
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CRS		Enter and execute T-103, Secondary Containment Control. Direct a GP-15 "Local Evacuation" of the Reactor Building
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CRS		Determine that a primary system is discharging into the Reactor Building. Enter T-101 "RPV Control" from T-103.
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Op Test No.: Scenario No.: # 3

Event No.: 7

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Event Description: HPCI Isolation Logic failure

Cause: Relay failures prevent a Group IV isolation on either High Flow or steam leak detection.

Automatic Actions: "HPCI Steam Line High Flow" alarm (221 C-1)

Effects: Operators attempt a manual isolation and the valves will not close. Reactor Building conditions degrade requiring a RPV depressurization.

<u>Time</u>	<u>Position</u>	<u>Applicant's Actions Or Behavior</u>
	URO/PRO	<ul style="list-style-type: none"> Recognize "HPCI Steam Line High Flow" alarm and/or excessively high temperatures in the HPCI room. Recognize HPCI has not automatically isolated and report to the CRS. Attempts to manually close the HPCI isolation valves.
	CRS	<ul style="list-style-type: none"> Recognize "HPCI Steam Line High Flow" alarm and/or excessively high temperatures in the HPCI room. Directs the URO/PRO to manually close the HPCI isolation valves.
	URO/PRO	<ul style="list-style-type: none"> Monitor and trend degrading Reactor Building conditions and temperatures. Monitor additional areas exceeding the Action levels. Direct EO to investigate the MCC breaker(s) for the failed isolation valves. Direct plant support personnel to troubleshoot and repair isolation valve failure.
	CRS	<ul style="list-style-type: none"> Recognizes temperatures in additional T-103 areas continue to rise. Continues T-101 actions and directs the URO/PRO to begin a RPV depressurization <100°F using SRVs.
CT	CRS	<p>Recognize two or more areas above the Action level and a primary system breach is in progress.</p> <p>Directs T-112 Emergency Blowdown actions.</p> <p>Directs the URO/PRO to open all ADS valves.</p>

Op Test No.: Scenario No.: #3

Event No.: 8

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Event Description: ADS SRV fails to open on Emergency Blowdown

Cause: ADS solenoid failure.

Automatic Actions: None

Effects: Only 4 ADS valves will initially open and operator action is required to open an additional SRV to accomplish the Blowdown as designed.

<u>Time</u>	<u>Position</u>	<u>Applicant's Actions Or Behavior</u>
CT	PRO	Opens all ADS valves as directed by T-112. Recognizes that the 'G' ADS Safety Relief Valve failed to open and reports to the CRS.
	CRS	Reviews T-112 steps and directs an additional SRV opened to achieve 5 open SRVs.
	URO/PRO	Opens an additional non-ADS SRV, verifies 5 open SRVs and informs the CRS.

TERMINATION CRITERIA:

The scenario may be terminated after the Emergency Blowdown is initiated to depressurize the RPV.

POST SCENARIO EMERGENCY CLASSIFICATION:

ERP-101 Fission Product Barrier Table 3.2 - Site Area Emergency