Draft Submittal
(Pink Paper)

SIMULATOR SCENARIOS

ST. LUCIE MARCH/APRIL 2006-301 EXAM

05000335/2006301 AND 05000389/2006301

MARCH 20 - 29, 2006 AND APRIL 6, 2006

4/24/06

Facility: St. Lucie Date of Exam: 03/20/2006 Scenario Numbers: 1/2/3/4 Operating Test No.: NRC

	QUALITATIVE ATTRIBUTES	Initials a	Initials b*	Initials c#
1.	The initial conditions are realistic, in that some equipment and/or instrumentation may be out of service, but it does not cue the operators into expected events.			
2.	The scenarios consist mostly of related events.			
3.	Each event description consists of • the point in the scenario when it is to be initiated • the malfunction(s) that are entered to initiate the event • the symptoms/cues that will be visible to the crew • the expected operator actions (by shift position) • the event termination point (if applicable)			
4.	No more than one non-mechanistic failure (e.g., pipe break) is incorporated into the scenario without a credible preceding incident such as a seismic event.			
5.	The events are valid with regard to physics and thermodynamics.			
6.	Sequencing and timing of events is reasonable, and allows the examination team to obtain complete evaluation results commensurate with the scenario objectives.			
7.	If time compression techniques are used, the scenario summary clearly so indicates. Operators have sufficient time to carry out expected activities without undue time constraints.			
8.	The simulator modeling is not altered.			
9.	The scenarios have been validated. Pursuant to 10 CFR 55.46(d), any open simulator performance deficiencies or deviations from the referenced plant have been evaluated to ensure that functional fidelity is maintained while running the planned scenarios.			
10.	Every operator will be evaluated using at least one new or significantly modified scenario. All other scenarios have been altered in accordance with Section D.5 of ES-301.			
11.	All individual operator competencies can be evaluated, as verified using Form ES-301-6 (submit the form along with the simulator scenarios).			
12.	Each applicant will be significantly involved in the minimum number of transients and events specified on Form ES-301-5 (submit the form with the simulator scenarios).			
13.	The level of difficulty is appropriate to support licensing decisions for each crew position.			

	Target Quantitative Attributes (Per Scenario; See Section D.5.d)	Actual Attributes (Scenario) 1	2	3	4	-	-	-
1.	Total malfunctions (5-8)	7	8	7	6			
2.	Malfunctions after EOP entry (1-2)	3	2	3	2			
3.	Abnormal events (2-4)	3	3	3	3			
4.	Major transients (1-2)	2	1	2	1			
5.	EOPs entered/requiring substantive actions (1-2)	1	2	1	2			
6.	EOP contingencies requiring substantive actions (0-2)	1	0	1	0			
7.	Critical tasks (2-3)	2	3	3	3			

Facility: St. Lucie 1 & 2		Date of Exam: 03/202006								Operating Test No.: NRC												
APPLICANT	EVENT TYPE	Scenarios												TOTAL	MINIMUM		
		1			2			3			4						
		CREW POSITION			CREW POSITION			CREW POSITION			CREW POSITION						
		SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP		R	I	U
SROI-1	RX								4					1	1	1	0
	NOR	1					3							2	1	1	1
	I/C	2,3, 4					1,6, 8		2,5, 8,9					10	4	4	2
	MAJ	6					5		6					3	2	2	1
	TS	3,5												2	0	2	2
SROI-2	RX		1											1	1	1	0
	NOR				3					4				2	1	1	1
	I/C		2,4, 7		1,2, 4					3,7				8	4	4	2
	MAJ		6		5					6				3	2	2	1
	TS				1,3									2	0	2	2
SROI-3	RX					3								1	1	1	0
	NOR			1				4						2	1	1	1
	I/C			3,8, 9		2,4, 7		2,3, 5						9	4	4	2
	MAJ			6		5		6						3	2	2	1
	TS							1,2						2	0	2	2
SROI-4	RX											1		1	1	1	0
	NOR	1					3							2	1	1	1
	I/C	2,3, 4					1,6, 8					2,4, 7		9	4	4	2
	MAJ	6					5					5		3	2	2	1
	TS	3,5												2	0	2	2
SROI-5	RX		1											1	1	1	0
	NOR				3								1	2	1	1	1
	I/C		2,4, 7		1,2, 4								3,6	8	4	4	2
	MAJ		6		5								5	3	2	2	1
	TS				1,3									2	0	2	2
SROI-6	RX					3								1	1	1	0
	NOR			1							1			2	1	1	1
	I/C			3,8, 9		2,4, 7					2,3, 4			9	4	4	2
	MAJ			6		5					5			3	2	2	1
	TS										2,4			2	0	2	2

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Facility: St. Lucie 1 & 2																		
APPLICANT	EVENT TYPE	Scenarios												TOTAL	MINIMUM			
		1			2			3			4							
		CREW POSITION			CREW POSITION			CREW POSITION			CREW POSITION							
		SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP		R	I	U	
SROI-7	RX											1		1	1	1	0	
	NOR	1								4				2	1	1	1	
	I/C	2,3, 4								3,7		2,4, 7		8	4	4	2	
	MAJ	6								6		5		3	2	2	1	
	TS	3,5												2	0	2	2	
SROI-8	RX		1											1	1	1	0	
	NOR							4					1	2	1	1	1	
	I/C		2,4, 7					2,3, 5					3,6	8	4	4	2	
	MAJ		6					6					5	3	2	2	1	
	TS							1,2						2	0	2	2	
SROI-9	RX								4					1	1	1	0	
	NOR			1							1			2	1	1	1	
	I/C			3,8, 9					2,5, 8,9		2,3, 4			10	4	4	2	
	MAJ			6					6		5			3	2	2	1	
	TS										2,4			2	0	2	2	
SROI-10	RX								4					1	1	1	0	
	NOR				3									1	1	1	1	
	I/C				1,2, 4				2,5, 8,9					7	4	4	2	
	MAJ				5				6					2	2	2	1	
	TS				1,3									2	0	2	2	
SROI-11	RX					3								1	1	1	0	
	NOR							4						1	1	1	1	
	I/C					2,4, 7		2,3, 5						6	4	4	2	
	MAJ					5		6						2	2	2	1	
	TS							1,2						2	0	2	2	

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Instructions:

1. Circle the applicant level and enter the operating test number and Form ES-D-1 event numbers for each event type; TS are not applicable for RO applicants. ROs must service in both the "at-the-controls (ATC)" and "balance-of-plant (BOP)" positions; Instant SROs must do one scenario, including at least two instrument or component (I/C) malfunctions and one major transient, in the ATC position.

2. Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.5.d) but must be significant per Section C.2.a of Appendix D. (*) Reactivity and normal evolutions may be replaced with additional instrument or component malfunctions on a 1-for-1 basis.

3. Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirements specified for the applicant's license level in the right-hand columns.

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Facility:	St. Lucie	Scenario No.:	1	Op Test No.:	NRC
Examiners:	_____	Operators:	_____		
	_____		_____		
	_____		_____		

Initial Conditions:	100% power, MOL (IC-1). 2A LPSI Pump is OOS due to failed surveillance, 2A AFW Pump is OOS for motor repair and 2C charging pump is OOS for maintenance.
Turnover:	The 2B Heater Drain Pump is being carefully monitored by a predictive maintenance team due to a noisy bearing. Reduce power to 90% at 5 MW/min using 2-ONP-22.01, Rapid Downpower, to facilitate removal of the pump from service.
Critical Tasks:	• Manually establish adequate HPSI flow. • Restore feedwater using the Main Feedwater System.

Event No.	Malf. No.	Event Type*	Event Description
1		N-BOP, SRO R-RO	Reduce power.
2		C-RO, SRO	Boric Acid Control Valve (FCV-2210Y) fails closed.
3		C-BOP, SRO TS-SRO	Failure of HVS-2C, containment fan cooler.
4		I-RO, SRO	PZR Level Channel (LT1110X) fails high.
5		TS-SRO	Containment pressure transmitter (PTS-07-2B) fails at 3 psig.
6		M-ALL	Small Break LOCA with Loss of Feedwater.
7		C-RO	SIAS Train A does not automatically actuate. Manual actuation required.
8		C-BOP	2C AFW Pump bearing failure.
9		C-BOP	Loss of Bus 2B3 on SIAS (spurious lockout trip), 2B EDG fails to load on Bus 2B3.

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

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St. Lucie 2006 NRC Scenario #1

The crew will assume the shift at 100% power with instructions to reduce power due to a noisy bearing on the 2B Heater Drain Pump.

At approximately 95% power, the Boric Acid Control Valve fails closed causing the crew to use the emergency boration path as an alternate boric acid source in accordance with 2-ONP-22.01, Boron Concentration Control.

When the plant is stable, the 2C containment fan cooler will trip, requiring a start of the 2D containment fan cooler. The SRO will refer to the Technical Specifications for the appropriate action statement.

When Tech Specs have been addressed, the controlling Pressurizer level transmitter fails high. The crew must diagnose the problem and swap level control to the alternate level transmitter in accordance with ONP 2-0120035, Pressurizer Pressure and Level. The SRO will refer to Tech Specs for the appropriate action statement.

When Tech Specs have been addressed, a Containment pressure transmitter fails at 3 psig. The crew verifies other channels are normal and bypasses / trips the appropriate signals. The SRO will refer to Tech Specs for the appropriate action statement.

When Tech Specs have been addressed, a PZR leak increases to a small break LOCA (greater than Charging Pump capacity).

The Train A automatic SIAS signal fails, requiring the crew to manually actuate Train A SIAS.

Train B 4160V Vital Bus (2B3) trips on SIAS due to a hard lockout. 2B EDG will not load.

2C AFW Pump fails 2 minutes after pump start requiring the crew to find an alternate feed supply using Functional Recovery Procedures.

The scenario may be terminated when feedwater has been restored using Main Feedwater.

EOP flow path: EOP-01, EOP-15

Op Test No.: 1	Scenario # 1	Event # 1	Page 3 of 24
Event Description:	Reduce Power		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		**EXECUTE NRC Scenario #1 setup.** **ENSURE Control Board Tags Hung for 2A LPSI, 2A AFW, 2C Charging pump.** **ENSURE procedures in progress are on the SRO desk.**
Indications Available: • **Alarm G-44: 2A AFW PUMP BKR FAILURE/CS STOP/SS ISOL** • **Alarm R-38: 2A LPSI PUMP BKR FAILURE/CS STOP/SS ISOL**		
NOTE:		**The crew turnover brief directed a power reduction to 90% to support removal of 2B Heater Drain Pump from service. The pump has high vibration and predictive maintenance personnel are monitoring a slow degradation of pump conditions.**
	SRO	INITIATE a rapid shutdown using 2-ONP-22.01, Rapid Downpower.
NOTE:		**Crew may start second charging pump to assist with power reduction.**
	RO	BEGIN boration as follows:
		• START either Boric Acid Pump 2A or 2B.
		• PLACE FCV-2210Y control switch in AUTO.
		• OPEN V2525, Boron Load Control Valve.
		• ADJUST FRC-2210Y to the desired flowrate.
		• IF desired to maximize the boric acid flow rate, THEN CLOSE the running BAM pump recirc valve.
		• MAINTAIN VCT pressure less than or equal to 30 psig by opening and closing V2513, VCT Vent, as needed.

Op Test No.: 1 Scenario # 1 Event # 1 Page 4 of 24

Event Description: Reduce Power

Time	Position	Applicant's Actions or Behavior
		• IF necessary to maintain the desired VCT level, THEN DIVERT the letdown flow to the Waste Management System by placing V2500, VCT Divert Valve, in the WMS position.
	RO	INSERT the Lead CEA Group approximately 6 inches to initially lower RCS temperature.
	BOP	PERFORM the following:
		• PROGRAM the turbine DEH for the desired load reduction rate.
		• SET DEMAND / REF to desired power level.
	BOP	WHEN a T_{avg} decrease is noted, THEN DEPRESS the GO pushbutton on the turbine DEH control panel.
	RO	CONTROL Axial Shape Index with CEAs in accordance with 0-NOP-100.02, Axial Shape Index Control, or as directed by the SM / US.
	CREW	MAINTAIN T_{avg} within 6.6°F of T_{ref} using the following:
		• RCS Boration Rate
		• CEA Position
		• Turbine Load
		After completing a 5% power reduction, at the Lead Evaluator's direction PROCEED to Event 2.

Op Test No.: 1	Scenario # 1	Event # 2	Page 5 of 24
Event Description:	Boric Acid Control Valve Fails (FCV-2210Y) Fails CLOSED		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		**WHEN directed EXECUTE Event 2, Boric Acid Control Valve Fails CLOSED.**
Indications Available: • **FCV-2210Y, Boric Acid, GREEN CLOSED position light.** • **Alarm N-40: Boric Acid Flow High/Low (IF in AUTO)** • **Makeup flow indicates zero.**		
	RO	• DETECTS desired boration NOT in progress.
		• VERIFIES valve lineup.
		• RECOGNIZES FCV-2210Y is FAILED CLOSED.
		• REPORTS condition to crew.
	SRO	• DIRECTS entry into 2-ONP-02.01, Boron Concentration Control.
		• DETERMINES Step 9 is the applicable recovery action.
	BOP	STOP turbine load reduction (temporary hold)
	RO	IF FCV-2210Y, Boric Acid Valve fails to OPEN when a power reduction is required, THEN PERFORM the following:
		• START either Boric Acid pump
NOTE:		**Opening V2514 causes an expected alarm M-42, "Emergency Borate V2514 OPEN".**
		• OPEN V2514
		• PLACE Makeup Mode Selector switch in MANUAL.
		• CYCLE the Boric Acid pump as necessary to control boric acid addition rate and the rate of power reduction.
		• MONITOR for any abnormal change in Tave.

Op Test No.: 1	Scenario # 1	Event # 2	Page 6 of 24
Event Description:	Boric Acid Control Valve Fails (FCV-2210Y) Fails CLOSED		

Time	Position	Applicant's Actions or Behavior
Booth Operator:		**When the crew sends operator to investigate, REPORT that there is no obvious reason for the valve being closed, solenoid seems to be de-energized, air is vented off the valve.**
		WHEN the desired boration is complete and at the direction of the Lead Evaluator, PROCEED to Event 3.

Op Test No.: 1	Scenario # 1	Event # 3	Page 7 of 24
Event Description:	Failure of HVS-2C, Containment Fan Cooler		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		**WHEN directed EXECUTE Event 3, Failure of 2C Containment Fan Cooler (HVS-2C).**
Indications Available: • **Alarm T-12: CNTMT FAN CLR HVS-1C OVRLD/TRIP** • **Loss of breaker position indication on Heating and Ventilation panel .**		
NOTE:		**If containment air temperature exceeds 120F, Operator action is required to reduce temperature to <120F within 45 minutes or be in Hot Standby within 5 hours.**
	CREW	ENSURE plant operating parameters are stable.
	BOP	Identify tripped fan and report conditions; refer to alarm response procedure.
	SRO	DIRECT entry into 2-ONP-25.01.
	BOP	START the standby Containment Fan Cooler (HVS-2D)
		• Place 2D control switch to START and verify operation
		• Place 2C control switch in STOP (Crew may wait for initial local investigation prior to repositioning switch)
	BOP	Check Containment air temperature less than or equal to 120F
	SRO	Verify Operability of tripped Containment Fan Cooler:
		• Dispatch operator to perform Appendix D, Containment Cooling Fan Local Breaker Operations.
Booth Operator:		**When the crew sends operator to perform Appendix D, wait approximately 5 minutes and REPORT to the crew that the breaker for fan HVS-2C is tripped and smells of burned insulation, and all others are in normal position.**

Op Test No.: 1	Scenario # 1	Event # 3	Page 8 of 24
Event Description:	Failure of HVS-2C, Containment Fan Cooler		

Time	Position	Applicant's Actions or Behavior
NOTE:		**Crew may implement OP 1250020, Valve, Breaker, Motor and Instrument Instructions (allowing for one attempt reclosure of breaker for HVS-2C in emergency).**
	SRO	EVALUATE Technical Specifications:
		• LCO 3.6.2.1 is applicable
		• Restore within 7 days.
		WHEN the standby fan HVS-2D has been successfully started, the associated Technical Specifications have been identified, and at the Lead Evaluator's direction PROCEED to Event 4.

Op Test No.: 1 Scenario # 1 Event # 4 Page 9 of 24

Event Description: PZR Level Channel (LT1110X) Fails HIGH

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		**WHEN directed EXECUTE Event 4, PZR level channel (LT1110X) fails HIGH.**
Indications Available: • **Alarm H-17: PZR CHANNEL X LEVEL HIGH/LOW** • **Alarm LA-5: PZR CHANNEL X LEVEL HIGH** • **Alarm M-5: LETDOWN PRESS HIGH/LOW.**		
	RO	• RECOGNIZES cause of alarm condition is LT1110X FAILED HIGH.
		• REPORTS condition to crew.
	SRO	• DIRECTS entry into 2-ONP-0120035, Pressurizer Pressure and Level.
		• DETERMINES that Step 2 is the applicable step.
NOTE:		**Crew may take actions to identify and swap to operable channel to stabilize plant prior to reaching procedural direction in ONP.**
	RO	VERIFY selected RRS channel is operating properly.
	RO	ENSURE the backup charging pump unaffected and letdown flow is increasing.
	RO	VERIFY level anomaly is NOT caused by a large rate of change in T-avg.
	RO	VERIFY "Letdown Isol. Valves", V-2515, V-2516, and V-2522 are OPEN.
	RO	VERIFY selected pressurizer level control valve (LCV-2110P / LCV-2110Q) is operating properly.

Op Test No.: 1 Scenario # 1 Event # 4 Page 10 of 24

Event Description: PZR Level Channel (LT1110X) Fails HIGH

Time	Position	Applicant's Actions or Behavior
	RO	VERIFY selected letdown pressure control valve (PCV-2201P / PCV-2201Q) is operating properly.
	RO/BOP	VERIFY pressurizer level indicating controllers (selected and non-selected) are operating properly and power is available to pressurizer heaters.
	RO/BOP	IF either level control channel has failed, THEN shift to the operable channel (shift to LT1110Y; may have been previously performed).
	RO	VERIFY that PZR level trends back to reference level.
	SRO	EVALUATE Technical Specifications:
		• LCO 3.3.3.5 and 3.3.3.6 are applicable.
		• RESTORE operability within 30 and 7 days, respectively
NOTE:		**If RCS pressure decreases to less than 2225 psig, the DNB Parameter LCO will also be applicable.**
		WHEN plant conditions have stabilized, Tech Spec LCOs identified, and at the direction of the Lead Evaluator, PROCEED to Event 5.

Op Test No.: 1	Scenario # 1	Event # 5	Page 11 of 24
Event Description:	Containment Pressure Transmitter (PTS-07-2B) Fails at 3 PSIG		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		**WHEN directed EXECUTE Event 5, Containment Pressure Transmitter (PTS-07-2B) FAILS at +3 psig.**
Indications Available:		
• **Alarm P-23:**		**CONTAINMENT PRESSURE HIGH CIS CHANNEL PRE-TRIP.**
• **Alarm L-5:**		**CONTAINMENT PRESSURE HIGH CHANNEL TRIP.**
NOTE:		**This failure is a transmitter "offset," so it will trend with changes in containment pressure, but 3 psig high. Operator must use redundant channels for subsequent assessments.**
	RO	RECOGNIZES cause of alarm is pressure transmitter (PTS-07-2B) FAILED at 3 psig. REPORTS condition to the crew.
	SRO	• DIRECTS ENTRY into 2-ONP-99.01, Loss of Tech Spec Instrumentation.
		• DETERMINES the applicable step is Step 4.3.2.E.
	BOP	BYPASS the following channels affected by the failed Containment Pressure instrument:
		• Hi Cntmt Press RPS trip unit (key 109)
		• Cont Press SIAS (key 127)
		• Cntmt Press CIS (key 129)
		• Cntmt Press CSAS (key 128)
	SRO	EVALUATE Technical Specifications:
		• LCOs 3.3.1 (RPS) and 3.3.2 (ESF) are applicable
		• PLACE the channel in bypass/trip within one (1) hour.

Op Test No.: 1 Scenario # 1 Event # 5 Page 12 of 24

Event Description: Containment Pressure Transmitter (PTS-07-2B) Fails at 3 PSIG

Time	Position	Applicant's Actions or Behavior
		WHEN the failed channel has been bypassed and at the direction of the Lead Evaluator, PROCEED to Events 6, 7, 8, & 9.

Op Test No.: 1 Scenario # 1 Event # 6, 7, 8, 9 Page 13 of 24

Event Description: Small Break LOCA with Loss of Feedwater; SIAS Train A Does NOT Automatically Actuate, Manual Actuation Required; 2C AFW Pump Bearing Failure; Loss of Bus 2B3 on SIAS (Spurious Lockout Trip), 2B EDG Fails to Load on Bus 2B3

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		**When directed, EXECUTE Event 6/7/8/9, SBLOCA with loss of auxiliary feedwater.**
Indications Available: • **Alarm H-18: PZR CHANNEL Y LEVEL HIGH/LOW** • **Alarm N-46: RX CAVITY LEAKAGE HIGH**		
NOTE:		**Leakage will ramp to just greater than charging capacity. Crew will initially take the following actions for inventory control (ONP), only to the point of electing to trip the reactor.**
	CREW	RECOGNIZE lowering PZR pressure and level.
	RO	ENSURE all available charging pumps in service.
	SRO	DIRECT isolation of Letdown.
	RO	ISOLATE Letdown.
		• Closes Letdown Isolation Valves V-2515, V-2516, V-2522.
	RO	DETERMINE PZR level continues to decrease.
	SRO	• DIRECT a Reactor trip.
		• DIRECT the crew to perform actions of 2-EOP-01, Standard Post Trip Actions.
	RO/BOP	TRIP the Reactor and ENTER 2-EOP-01.
NOTE:		**Crew may take corrective actions during Standard Post Trip Actions prior to reporting status.**

Op Test No.: 1 Scenario # 1 Event # 6, 7, 8, 9 Page 14 of 24

Event Description: Small Break LOCA with Loss of Feedwater; SIAS Train A Does NOT Automatically Actuate, Manual Actuation Required; 2C AFW Pump Bearing Failure; Loss of Bus 2B3 on SIAS (Spurious Lockout Trip), 2B EDG Fails to Load on Bus 2B3

Time	Position	Applicant's Actions or Behavior
	CREW	ANNOUNCE Reactor Trip via PA system.
	RO	DETERMINE Reactivity Control acceptance criteria complete:
		• VERIFY Reactor power is lowering.
		• VERIFY Startup Rate is negative.
		• VERIFY a maximum of ONE CEA is NOT fully inserted.
	BOP	DETERMINE Maintenance of Vital Auxiliaries acceptance criteria complete:
		• VERIFY the Turbine is tripped by ALL GV's and TVs indicate CLOSED.
		• WHEN the Turbine is TRIPPED, THEN VERIFY the Main Generator breakers are OPEN:
		• 8W49, Generator No. 2 East Breaker
		• 8W52, Generator No. 2 Mid Breaker
		• FB 2, Exciter Supply Breaker
NOTE:	**Malfunction "Bus 2B3 lockout" occurs on SIAS (during EOP-01). This may require reverification of Vital bus status.**	
	BOP	VERIFY ALL Vital and Non-Vital AC buses transfer from Auxiliary to Start-up Transformers (2B3 will not be energized following SIAS).
		(WHEN Bus 2B3 is de-energized) ENSURE BOTH of the following:
		• The associated 2B EDG has STARTED.
		• The associated 2B EDG output breaker is CLOSED. (NO)

Op Test No.: 1 Scenario # 1 Event # 6, 7, 8, 9 Page 15 of 24

Event Description: Small Break LOCA with Loss of Feedwater; SIAS Train A Does NOT Automatically Actuate, Manual Actuation Required; 2C AFW Pump Bearing Failure; Loss of Bus 2B3 on SIAS (Spurious Lockout Trip), 2B EDG Fails to Load on Bus 2B3

Time	Position	Applicant's Actions or Behavior
	BOP	VERIFY ALL Vital and Non-Vital DC Buses are ENERGIZED.
	RO	DETERMINE RCS Inventory Control acceptance criteria complete:
		• VERIFY BOTH of the following conditions exist:
		• Pressurizer level between 10 and 68%.
		• Pressurizer level trending to between 30 and 35%. (NO)
NOTE:	**Actions for inventory control may have been taken earlier prior to trip.**	
	RO	RESTORE and MAINTAIN Pressurizer level between 30 and 35% by performing ANY of the following:
		• ENSURE proper operation of the Pressurizer Level Control System.
		• Manually CONTROL Charging and Letdown.
	RO	DETERMINE RCS Pressure Control acceptance criteria complete:
		• VERIFY Pressurizer pressure is between 1800 and 2300 psia. (NO)
	RO	IF Pressurizer pressure is less than 1736 psia, THEN ENSURE ALL of the following:
CRITICAL STEP		• SIAS has ACTUATED. (NO; Train A must be MANUALLY actuated)
		• CIAS has ACTUATED.
		• ONE RCP in EACH loop is stopped.
	RO	VERIFY Pressurizer pressure is trending to between 2225 and 2275 psia. (NO)

Op Test No.: 1	Scenario # 1	Event # 6, 7, 8, 9	Page 16 of 24
Event Description:	Small Break LOCA with Loss of Feedwater; SIAS Train A Does NOT Automatically Actuate, Manual Actuation Required; 2C AFW Pump Bearing Failure; Loss of Bus 2B3 on SIAS (Spurious Lockout Trip), 2B EDG Fails to Load on Bus 2B3		

Time	Position	Applicant's Actions or Behavior
	RO	ATTEMPT to RESTORE and MAINTAIN Pressurizer pressure between 2225 and 2275 psia by performing ANY of the following:
		• ENSURE proper operation of the Pressurizer Pressure Control System.
		• MANUALLY OPERATE heaters and spray.
	RO	VERIFY RCS subcooling is at least 20°.
NOTE:	**Following action may be performed in anticipation or upon loss of subcooling.**	
	RO	IF RCS subcooling is less than 20°F or RCP(s) exhibit cavitation, THEN STOP ALL RCPs.
	BOP	COMMENCE a cooldown, not to exceed 100°F in ANY one hour to regain subcooling.
NOTE:	**Cooldown should be using SBCS (5% valve).**	
	RO	DETERMINE Core Heat Removal acceptance criteria are met:
		• VERIFY at least ONE RCP is RUNNING and supplied with CCW. (may have been tripped based upon subcooling)
		• VERIFY Loop ΔT is less than 10°F. (NO)
NOTE:	**The 2C AFW pump trips on bearing failure 2 minutes after AFAS actuation. This results in total loss of SG feed.**	

Op Test No.: 1 Scenario # 1 Event # 6, 7, 8, 9 Page 17 of 24

Event Description: Small Break LOCA with Loss of Feedwater; SIAS Train A Does NOT Automatically Actuate, Manual Actuation Required; 2C AFW Pump Bearing Failure; Loss of Bus 2B3 on SIAS (Spurious Lockout Trip), 2B EDG Fails to Load on Bus 2B3

Time	Position	Applicant's Actions or Behavior
	BOP	DETERMINE RCS Heat Removal acceptance criteria complete:
		• VERIFY at least ONE S/G has BOTH of the following conditions:
		• S/G level is between 20 and 90% NR.
		• Feedwater is available AND level is being restored to between 60 and 70% NR.
	BOP	EVALUATE the availability of Main Feedwater. (NOT Available)
	BOP	EVALUATE status of Auxiliary Feedwater system. (NONE available 2 minutes after AFAS actuation)
Booth Operator:		**When the crew sends operators to investigate the 2C AFW pump problem, REPORT to the crew that the shaft is NOT turning and the pump's bearing cap is EXTREMELY hot.**
NOTE:		**RCS Tavg and SG pressure are controlled by cooldown in progress to restore subcooling.**
	BOP	VERIFY RCS T_{avg} is between 525 and 535°F.
	BOP	VERIFY S/G pressure is between 835 and 915 psig (850 and 930 psia).
	BOP	ENSURE the FOUR MSR TCV Block Valves are CLOSED.
	BOP	ENSURE the MSR Warmup Valves are CLOSED.
	BOP	ENSURE MV-08-814, Spillover Bypass Valve, is CLOSED.

Op Test No.: 1 Scenario # 1 Event # 6, 7, 8, 9 Page 18 of 24

Event Description: Small Break LOCA with Loss of Feedwater; SIAS Train A Does NOT Automatically Actuate, Manual Actuation Required; 2C AFW Pump Bearing Failure; Loss of Bus 2B3 on SIAS (Spurious Lockout Trip), 2B EDG Fails to Load on Bus 2B3

Time	Position	Applicant's Actions or Behavior
	RO	DETERMINE Containment Conditions acceptance criteria are met:
		• VERIFY Containment pressure is less than 2 psig.
	RO	IF Containment pressure is at least 3.5 psig, THEN ENSURE ALL of the following conditions exist: (NO)
		• SIAS has ACTUATED.
		• CIAS has ACTUATED.
		• MSIS has ACTUATED.
		• ALL available Containment Fan Coolers are RUNNING.
		IF Containment pressure is at least 5.4 psig, THEN ENSURE BOTH of the following conditions exist: (NO)
		• CSAS has ACTUATED.
		• EACH Containment Spray header flow is at least 2700 gpm.
	RO	VERIFY ALL Containment Radiation Monitor alarmed or rising trends:
		• CIS Radiation Monitors
		• Containment Atmospheric Monitors
	RO	VERIFY Containment radiation is greater than 10R/hr. (NO)
	RO	VERIFY Containment temperature is less than 120°F.
	RO/BOP	ENSURE ALL available Containment Fan Coolers are RUNNING. (YES)

Op Test No.: 1 Scenario # 1 Event # 6, 7, 8, 9 Page 19 of 24

Event Description: Small Break LOCA with Loss of Feedwater; SIAS Train A Does NOT Automatically Actuate, Manual Actuation Required; 2C AFW Pump Bearing Failure; Loss of Bus 2B3 on SIAS (Spurious Lockout Trip), 2B EDG Fails to Load on Bus 2B3

Time	Position	Applicant's Actions or Behavior
	RO/BOP	VERIFY NO secondary plant radiation alarms or rising trends:
		• Condenser Air Ejector Monitor
		• S/G Blowdown Monitors
		• Main Steamline Monitors
	BOP	DIRECT a field operator to perform Secondary Plant Post Trip actions. REFER TO Appendix X, Secondary Plant Post Trip Actions, Section 1.
	SRO	DIAGNOSE the event, REFER TO Chart 1, Diagnostic Flow Chart.
	SRO	DIRECT the crew to enter 2-EOP-15, Functional Recovery, due to indication of LOCA and loss of feedwater.
	CREW	IMPLEMENT the actions of 2-EOP-15.
	SRO	OPEN the Place keeper and NOTE the time of EOP entry.
	RO	VERIFY CCW to the RCPs.
	RO	REFER to Appendix J, Restoration of CCW and CBO to the RCPs.
	RO/SRO	IF CCW is lost for greater than 30 minutes, THEN PERFORM BOTH of the following:
		• ENSURE CCW to the RCPs will remain isolated by PLACING the FOUR Containment CCW To/From RC Pump valves to CLOSE.
		• ENSURE RCP controlled bleedoff will remain isolated by PLACING the TWO RCP Bleedoff valves to CLOSE.

Op Test No.: 1 Scenario # 1 Event # 6, 7, 8, 9 Page 20 of 24

Event Description: Small Break LOCA with Loss of Feedwater; SIAS Train A Does NOT Automatically Actuate, Manual Actuation Required; 2C AFW Pump Bearing Failure; Loss of Bus 2B3 on SIAS (Spurious Lockout Trip), 2B EDG Fails to Load on Bus 2B3

Time	Position	Applicant's Actions or Behavior
	SRO/RO	SAMPLE BOTH S/Gs for activity and boron. REFER to Appendix A, Sampling Steam Generators.
	BOP	PLACE BOTH Hydrogen Analyzers in service. REFER to Appendix L, Placing Hydrogen Analyzer in Service.
	BOP	STABILIZE the Secondary Plant AS NECESSARY. REFER to Appendix X, Secondary Plant Post trip Actions, Section 2.
NOTE:	**A surrogate STA is available to perform Safety Function Status checks, as directed.**	
	SRO	DIRECT the STA to PERFORM the Safety Function Status Checks every 15 minutes. REFER to Attachment 1, Safety Function Status Check Sheet.
	SRO	IDENTIFY the success paths to be used to satisfy each safety function. REFER to Attachment 3, Functional Recovery Success Paths.
		• DETERMINES that all safety functions are met except RCS and Core Heat Removal.
	SRO	PERFORM instructions for a success path MOST LIKELY to be met for safety functions that are NOT met by ANY success path:
		• The SRO DIRECTS entry into instructions for Success Path HR-2.
	RO	IF ANY of the following conditions exist,
		• RCS pressure is less than 1736 psia
		• Containment pressure is greater than 3.5 psig

Op Test No.: 1 Scenario # 1 Event # 6, 7, 8, 9 Page 21 of 24

Event Description: Small Break LOCA with Loss of Feedwater; SIAS Train A Does NOT Automatically Actuate, Manual Actuation Required; 2C AFW Pump Bearing Failure; Loss of Bus 2B3 on SIAS (Spurious Lockout Trip), 2B EDG Fails to Load on Bus 2B3

Time	Position	Applicant's Actions or Behavior
		THEN ENSURE SIAS has ACTUATED.
NOTE:		**If not done earlier, crew must manually actuate A train SIAS.**
CRITICAL STEP	RO	MANUALLY INITIATE TRAIN A SIAS. REFER to Table 1, Safety Injection Actuation Signal.
		• ENSURE ALL available SI Pumps are RUNNING.
		• VERIFY adequate SI flow. REFER to Figure 2, Safety Injection Flow vs. RCS Pressure.
		• ENSURE ALL available Charging Pumps are RUNNING.
	RO	IF Safety Injection flow is inadequate due to high RCS pressure, THEN DEPRESSURIZE the RCS:
		• CONTROL RCS temperature.
		• CONTROL pressurizer heaters and main or auxiliary spray.
		• OPERATE the PORVs or Pressurizer Vents AS NECESSARY.
NOTE:		**Cooldown rates up to 100°F in ANY 1 hour period are permitted to regain or maintain minimum subcooling.**
	RO	COOLDOWN the RCS using SBCS. COOLDOWN not to exceed 50°F in ANY 1 hour period.
	RO	BORATE the RCS until Shutdown Margin is greater than the value required by the COLR. REFER TO 2-NOP-02.24, Boron Concentration Control.
	RO	VERIFY natural circulation flow in at least ONE loop by ALL of the following:
		• Loop ΔT (T_{HOT} minus T_{COLD}) less than 50°F

Op Test No.: 1 Scenario # 1 Event # 6, 7, 8, 9 Page 22 of 24

Event Description: Small Break LOCA with Loss of Feedwater; SIAS Train A Does NOT Automatically Actuate, Manual Actuation Required; 2C AFW Pump Bearing Failure; Loss of Bus 2B3 on SIAS (Spurious Lockout Trip), 2B EDG Fails to Load on Bus 2B3

Time	Position	Applicant's Actions or Behavior
		• Hot leg temperature constant or lowering
		• Cold leg temperature constant or lowering
		• RCS subcooling is greater than minimum subcooling, based on Rep CET temperature.
		• NO abnormal difference (greater than 20°F) between T_{HOT} and Rep CET temperature.
	RO	IF single phase natural circulation can NOT be maintained, THEN ENSURE ALL of the following conditions exist,
		• ALL available Charging pumps are RUNNING
		• SI flow is within the SI flow delivery curve. REFER TO Figure 2. Safety Injection Flow Vs. RCS Pressure
		• At least ONE S/G is available for RCS heat removal with level being restored to or maintained between 60 and 70% NR
		• Rep CET temperature is less than 22°F superheated.
	RO	AS the RCS cooldown and depressurization proceed, PERFORM the following:
		• IF MSIS is NOT present, THEN BLOCK automatic initiation of MSIS.
	CREW	DETERMINE NO ESD present.
	CREW	DETERMINE NO SGTR present.
	CREW	DETERMINE that a TLOF has occurred as indicated by ANY of the following:
		• Lowering steam generator water level, low level alarm, Reactor Trip on low water level

Op Test No.: 1 Scenario # 1 Event # 6, 7, 8, 9 Page 23 of 24

Event Description: Small Break LOCA with Loss of Feedwater; SIAS Train A Does NOT Automatically Actuate, Manual Actuation Required; 2C AFW Pump Bearing Failure; Loss of Bus 2B3 on SIAS (Spurious Lockout Trip), 2B EDG Fails to Load on Bus 2B3

Time	Position	Applicant's Actions or Behavior
		• Rising steam generator pressure before the reactor trip, followed by a lowering and stabilizing trend
		• Rising pressurizer level and pressure before the reactor trip, followed by a lowering and stabilizing trend
		• AFAS generated on low steam generator water level
		• Low main feedwater pump flow, suction pressure, main feedwater pump trip alarm
	RO	CONSERVE inventory in BOTH S/Gs by performing ALL of the following:
		• CLOSE Blowdown isolation valves.
		• CLOSE Blowdown sample valves.
CAUTION:		**Initial feedwater flow should be controlled to less than 150 gpm if using Aux Feed and as low as possible if using Main Feed or condensate for the first 5 minutes, for water hammer and thermal shock concerns.**
	CREW	ATTEMPT to RESTORE Auxiliary Feedwater to at least ONE S/G.
CRITICAL STEP	BOP	RESTORE Main Feedwater to at least ONE S/G as follows:
		• ENSURE MSIS is RESET. REFER to Appendix P, Restoration of Components Actuated by ESFAS.
		• ENSURE ONLY ONE Condensate Pump is RUNNING.
		• ENSURE ONLY ONE Main Feedwater Pump is RUNNING, with the control switch in RECIRC.
		• ENSURE BOTH 15% Bypass Valve Controllers are in MANUAL with MINIMUM output.
		• DEPRESS BOTH pushbuttons to RESET the 15% Bypass Valves.

Op Test No.: 1	Scenario # 1	Event # 6, 7, 8, 9	Page 24 of 24
Event Description:	Small Break LOCA with Loss of Feedwater; SIAS Train A Does NOT Automatically Actuate, Manual Actuation Required; 2C AFW Pump Bearing Failure; Loss of Bus 2B3 on SIAS (Spurious Lockout Trip), 2B EDG Fails to Load on Bus 2B3		

Time	Position	Applicant's Actions or Behavior
		• ENSURE the MFIVs in EACH intact feedwater header are OPEN.
		• IF AFAS has closed the MFIVs, THEN OVERRIDE and open the valves.
		• FEED the intact S/G by use of ANY of the following flowpaths:
		• 15% Bypass Valve
		• 100% Bypass Valve
		• Main Feed Regulating and associated Block Valve
	BOP	LIMIT initial feedwater flow rate to approximately 150 gpm.
	BOP	WHEN ANY of the following conditions exist,
		• Feed flow has been supplied for 5 minutes
		• S/G water level has risen
		THEN CONTROL feedwater flow rate to restore and maintain S/G level 60 to 70% NR.
		WHEN stable Main Feedwater flow has been restored, TERMINATE the scenario.

Facility:	St. Lucie	Scenario No.:	2	Op Test No.:	NRC
Examiners:		Operators:			
Initial Conditions:	45% power, MOL (IC-15). 2A LPSI Pump is OOS due to failed surveillance, 2A AFW and 2B MFW Pumps are out of service for repair.				
Turnover:	Maintain current plant conditions.				
Critical Tasks:	• Manually close the Main Steam Isolation Valves. • Isolate 2B ADV and use backup ADV for cooldown. • Restore AFW flow to one steam generator.				

Event No.	Malf. No.	Event Type*	Event Description
1		C-BOP, SRO TS-SRO	2B CCW Pump breaker trip.
2		C-RO, SRO	In-service PORV (V1474) leakage.
3		N-BOP, SRO R-RO TS-SRO	Loss of Oil on the 2C AFW Pump requires manual plant shutdown.
4		I-RO, SRO	RRS T_h instrument (TE1111X) fails high.
5		M-ALL	Loss of Offsite Power / Total Loss of Feedwater.
6		C-BOP	Automatic and manual Turbine trip failure.
7		C-RO	2B SG ADV fails open when used for cooldown.
8		C-BOP	2B AFW Pump becomes steam bound on AFAS actuation.

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

DRAFT

St. Lucie 2006 NRC #2

The crew will assume the shift at 45% power due to 2B MFW Pump repairs, with instructions to maintain current plant conditions.

2B CCW Pump trips on breaker fault. The crew must align and start the 2C CCW Pump (and eventually the 2AB buses) in accordance with 2-ONP-0310030, Component Cooling Water. The SRO will refer to Technical Specifications for the appropriate action statement.

When Tech Specs have been addressed, the in-service PORV begins leaking causing the crew to diagnose the failure, isolate the PORV by closing the block valve, and place the backup PORV in service in accordance with 2-ONP-0120036, Pressurizer Relief/Safety Valve.

When the plant is stable, a field report states that there is a large oil leak on the 2C AFW Pump. Breach in the system is unrecoverable. The crew must recognize the 2C AFW Pump is inoperable and refer to Tech Specs for the appropriate action statement. The crew must initiate the required plant shutdown.

During the power reduction, the controlling Reactor Regulating System T_h instrument (TE1111X) fails high causing PZR reference level to be high and forcing PZR level to increase. The crew must diagnose the event and swap to the alternate RRS channel in accordance with 2-ONP-0120035, Pressurizer Pressure and Level.

When the PZR level has been restored to program, a loss of offsite power (LOOP) trips the Reactor and initiates a total loss of feedwater event. With 2A AFW out-of-service, the 2B AFW Pump becomes steam bound upon starting. A steam leak near the Turbine exacerbates the loss of SG water inventory.

The automatic and manual Turbine trips upon Reactor trip fail, requiring the crew to manually close the Main Steam Isolation Valves.

The 2B SG Atmospheric Dump Valve (on RTGB) fails full open when used for plant temperature control. The crew must isolate the ADV and use the alternate ADV for temperature control.

The scenario may be terminated when AFW flow is restored by venting the 2B AFW.

EOP flow path: EOP-01, EOP-06

Op Test No.: 1	Scenario # 2	Event # 1	Page 3 of 19
Event Description:	2B CCW Pump Breaker Trip		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		**EXECUTE NRC Scenario #2 file to setup initial conditions.** **ENSURE Control Board Tags are hung on 2A LPSI pump, 2A AFW pump, and 2B MFW pump.** **ENSURE procedures in progress are on the SRO desk.**
Indications Available at 45% power: • **Alarm G44:** **2A AFW Pump Breaker Failure / CS Stop / SS Isol** • **Alarm R38:** **2A LPSI Pump Breaker Failure / CS Stop / SS Isol** • **Alarm G11:** **2B FW Pump Flow Low / BRG Oil LP / CP INTLK Trip**		
Booth Operator Instructions:		**WHEN directed, EXECUTE, Event 1, 2B CCW Pump Trip.**
Indications Available: • **Alarm S2:** **2B CCW HDR Flow HIGH / LOW** • **Alarm S-15:** **Fuel Pool HX CCW Flow HIGH / LOW** • **Alarms J-11,15,27,31:** **RCP cooling water low flow (1 for each pump)** • **2B CCW Pump tripped indication**		
	RO	RECOGNIZE that 2B CCW pump has tripped.
	RO	REPORT the condition to the crew and REFER to Annunciator Response Procedure.
	SRO	DIRECT crew entry into ONP-2-0310030, Component Cooling Water – Off Normal Operation.
	SRO	DETERMINE that Step 5.3.B, Loss of the 2B CCW Pump is the appropriate recovery step.

Op Test No.: 1 Scenario # 2 Event # 1 Page 4 of 19

Event Description: 2B CCW Pump Breaker Trip

Time	Position	Applicant's Actions or Behavior
	RO	CLOSE:
		• MV-14-1, 2C CCW Pump Discharge to A Header
		AND
		• MV-14-3, 2C CCW Pump Suction from A Header.
NOTE:		**Alarm S-26; 2C CCW PUMP HDR VALVES / AB BUS MISALIGNMENT is an expected alarm for this condition.**
	RO	OPEN:
		• MV-14-2, 2C CCW Pump Discharge to B Header
		AND
		• MV-14-4, 2C CCW Pump Suction from B Header
	RO	• START the 2C CCW Pump
		• VERIFY the pressures and flows return to normal.
	RO	PLACE the 2B CCW pump control switch in the PULL-TO-LOCK position.
	SRO	IF the 2AB AC and DC Buses are not powered from the B side, then consult Tech Spec 3.7.3 and consider stopping the 2C CCW Pump long enough to shift the 2AB 4160V Bus power supply to the 2B3 Bus. (Refer to 2-NOP-52.02, Transfer of 2AB Buses and Components, for AC and 2-0960020, 125V DC Class 1E Power System Normal Operation, for DC.)
NOTE:		**Crew may initiate action for realignment of the 2AB bus, but completion is not necessary for this scenario, due to time restriction.**

Op Test No.: 1 Scenario # 2 Event # 1 Page 5 of 19

Event Description: 2B CCW Pump Breaker Trip

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**If the SRO directs the NPO to investigate the cause of the pump trip wait 3 minutes and report the following: 2B CCW pump motor is hot to the touch and smells like burned insulation.**
	SRO	EVALUATE Technical Specifications:
		• LCO 3.7.3 is applicable
		• Swap 2AB bus power to the B-train within 2 hours.
		When Technical Specifications are addressed, or at the Lead Evaluator's direction, PROCEED to Event 2.

Op Test No.: 1	Scenario # 2	Event # 2	Page 6 of 19
Event Description:	In-servie PORV (V1474) leakage		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		**When directed, EXECUTE Event 2, PORV Leak.**
Indications Available: • **Increasing PORV tail pipe temperature, the following alarm will occur approximately 5 minutes after the leak starts:** • **Alarm H-16 QUENCH TANK PRESS HIGH**		
	RO	• RECOGNIZE the rise in V1474 tailpipe temperature, and indication of leakage on the acoustic monitor system.
		• REPORT the condition to the crew. • REFER to Annunciator Response Procedures.
	SRO	DIRECT crew entry into ONP-2-0120036, Pressurizer Relief / Safety Valve.
	SRO	DETERMINE that ONP Step 1, Relief Valve Failure or Leakage is the applicable recovery step.
	RO	IF PORV shows signs of leakage as indicated by either tailpipe temperature greater than 210°F or tailpipe temperature greater than 190°F and other parameters indicate leakage (i.e., Quench Tank or acoustic parameters), THEN PERFORM the following as necessary:
		• IF V-1474 indicates flow, then CLOSE PORV block valve V-1476 and verify temperature decrease on TAI-1110.
	RO	PLACE the alternate PORV in service by OPENING V-1477 (Block valve for PORV V-1475).
		When the alternate PORV has been placed in service, or at the Lead Evaluator's direction, PROCEED to Event 3.

Op Test No.: 1 Scenario # 2 Event # 3 Page 7 of 19

Event Description: Loss of Oil on the 2C AFW Pump Requires Manual Plant Shutdown

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		**When directed, CALL the SRO to initiate Event 3, 2C AFW Oil Leak.** **The NPO reports: There is a large oil leak on the 2C AFW pump. The Watch Engineer believes that the break area is located such that it is not possible to regain oil system integrity.**
	SRO	DIRECT the crew to CLOSE the steam supply valve to the 2C AFW pump (MV-08-03).
	BOP	CLOSE MV-08-03.
	SRO	EVALUATE Technical Specifications:
		• LCO 3.7.1.2 is applicable.
		• Be in at least Hot Standby within 6 hours.
	SRO	• DIRECT the crew to prepare for a shutdown to Hot Standby conditions.
		• REPORT to the Shift Manager the need to shutdown the Unit within 6 hours.
BOOTH OPERATOR:		**If recommendation or direction is requested, as Shift Manager, recommend that the crew begin the shutdown now, because the repair will take several days. Rate should be 5MW/minute.**
	SRO	DIRECT the crew to perform a plant shutdown, using 2-ONP-22.01, Rapid Downpower.
	RO	BEGIN boration as follows:
		• START either Boric Acid Pump 2A or 2B.
		• PLACE FCV-2210Y control switch in AUTO.
		• OPEN V2525, Boron Load Control Valve.
		• ADJUST FRC-2210Y to the desired flowrate.

Op Test No.: 1 Scenario # 2 Event # 3 Page 8 of 19

Event Description: Loss of Oil on the 2C AFW Pump Requires Manual Plant Shutdown

Time	Position	Applicant's Actions or Behavior
		• IF desired to maximize the boric acid flow rate, THEN CLOSE the running BAM pump recirc valve.
		• MAINTAIN VCT pressure less than or equal to 30 psig by opening and closing V2513, VCT Vent, as needed.
		• IF necessary to maintain the desired VCT level, THEN DIVERT the letdown flow to the Waste Management System by placing V2500, VCT Divert Valve, in the WMS position.
	RO	INSERT the Lead CEA Group approximately 6 inches to initially lower RCS temperature.
	BOP	PERFORM the following:
		• PROGRAM the turbine DEH for the desired load reduction rate.
		• SET DEMAND / REF to desired power level.
	BOP	WHEN a T_{avg} decrease is noted, THEN DEPRESS the GO pushbutton on the turbine DEH control panel.
	RO	CONTROL Axial Shape Index with CEAs in accordance with 0-NOP-100.02, Axial Shape Index Control, or as directed by the SM / US.
	CREW	MAINTAIN T_{avg} within 6.6°F of T_{ref} using the following:
		• RCS Boration Rate
		• CEA Position
		• Turbine Load
		When power level is lowered 5%, or at Lead Evaluator's discretion, PROCEED to Event 4.

Op Test No.: 1	Scenario # 2	Event # 4	Page 9 of 19
Event Description:	RRS T_h Instrument (TE1111X) Fails HIGH		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		**When directed, EXECUTE, Event 4, RRS T_h Instrument Fails HIGH.**
Indications Available: • **Alarm H-5: 2A HOT LEG TEMP HIGH** • **Alarm M-5: LETDOWN PRESS HIGH / LOW** • **Alarm H-18: PZR CHANNEL Y LEVEL HIGH / LOW** • **Alarm K-17: REACTOR T-AVG / T-REF TEMP HIGH** • **Alarm K-18: AUTO WITHDRAWAL PROHIBIT** • **Alarm H-17: PZR CHANNEL X LEVEL HIGH**		
	RO	• DETERMINE that TE1111X has FAILED HIGH.
		• REPORT the condition to the crew.
		• REFER to Annunciator Response Procedures.
	SRO	• DIRECT the crew to enter ONP-2-0120035, Pressurizer Pressure and Level.
		• DETERMINE that ONP Step 2, Abnormal Pressurizer Level Condition, is the applicable recovery step.
	RO	VERIFY selected RRS channel is operating properly.
	RO	IF the selected RRS channel has failed, THEN shift to the operable channel. (TIA-1121X)
	SRO/RO	CONFIRM PZR level is trending to program level and exit procedure or continue with other ONP steps.
		When pressurizer level is returned to program, or at Lead Evaluator direction, PROCEED to Events 5, 6, 7 & 8.

Op Test No.: 1	Scenario # 2	Event # 5, 6, 7, & 8	Page 10 of 19
Event Description:	Loss of Offsite Power/Total Loss of Feedwater; Automatic and Manual Turbine Trip Failure; 2B SG ADV Fails OPEN When Used for Cooldown; 2B AFW Pump Becomes Steam Bound on AFAS Actuation		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		**When directed, EXECUTE Events 5, 6, 7, & 8 LOOP / TLOF.**
Indications Available: • **Reactor tripped.** • **Loss of off-site power.**		
	CREW	RECOGNIZE reactor trip and loss of offsite power.
	SRO	DIRECT crew entry into 2-EOP-01, Standard Post Trip Actions.
	RO/BOP	CONDUCT initial review of post trip safety functions.
NOTE:		**Crew may take corrective actions during Standard Post Trip Actions prior to reporting status.**
	BOP	RECOGNIZE turbine is not tripped and take contingency actions.
	RO	DETERMINE Reactivity Control acceptance criteria complete:
		• VERIFY Reactor power is lowering.
		• VERIFY Startup Rate is negative.
		• VERIFY a maximum of ONE CEA is NOT fully inserted.
	BOP	DETERMINE Maintenance of Vital Auxiliaries acceptance criteria are met:
		• VERIFY the Turbine is tripped by ALL GV's and TVs indicate CLOSED. (NO)
	BOP	PERFORM ALL of the following:
		• Manually TRIP the Turbine. (will not trip)

Op Test No.: 1 Scenario # 2 Event # 5, 6, 7, & 8 Page 11 of 19

Event Description: Loss of Offsite Power/Total Loss of Feedwater; Automatic and Manual Turbine Trip Failure; 2B SG ADV Fails OPEN When Used for Cooldown; 2B AFW Pump Becomes Steam Bound on AFAS Actuation

Time	Position	Applicant's Actions or Behavior
		• VERIFY Turbine First Stage pressure indicates is 0 psig. (NO)
		• VERIFY Turbine speed is LOWERING. (NO)
BOOTH OPERATOR:		**DO NOT respond to call for NPO to locally trip the turbine.**
	BOP	IF the Turbine is NOT tripped, THEN PERFORM the following AS NECESSARY to isolate steam to the turbine:
		• Locally TRIP the Turbine.
CRITICAL TASK		• CLOSE BOTH MSIVs.
	BOP	WHEN the Turbine is TRIPPED, THEN VERIFY the Main Generator breakers are OPEN:
		• 8W49, Generator No. 2 East Breaker
		• 8W52, Generator No. 2 Mid Breaker
		• FB 2, Exciter Supply Breaker
	BOP	VERIFY ALL Vital and Non-Vital AC buses transfer from Auxiliary to Start-up Transformers and are ENERGIZED. (Energized from EDGs)
	BOP	VERIFY ALL Vital and Non-Vital DC Buses are ENERGIZED.
	RO	DETERMINE RCS Inventory Control acceptance criteria complete:
		• VERIFY BOTH of the following conditions exist:
		• Pressurizer level is between 10 and 68%.
		• Pressurizer level is trending to between 30 and 35%.

Op Test No.: 1	Scenario # 2	Event # 5, 6, 7, & 8	Page 12 of 19
Event Description:	Loss of Offsite Power/Total Loss of Feedwater; Automatic and Manual Turbine Trip Failure; 2B SG ADV Fails OPEN When Used for Cooldown; 2B AFW Pump Becomes Steam Bound on AFAS Actuation		

Time	Position	Applicant's Actions or Behavior
	RO	RESTORE and MAINTAIN Pressurizer level between 30 and 35% by performing ANY of the following:
		• ENSURE proper operation of the Pressurizer Level Control System.
		• Manually CONTROL Charging and Letdown.
	RO	DETERMINE RCS Pressure Control acceptance criteria complete:
		• VERIFY Pressurizer pressure is between 1800 and 2300 psia.
		• VERIFY Pressurizer pressure is trending to between 2225 and 2275 psia.
		• VERIFY RCS subcooling is at least 20°F.
	RO	DETERMINE Core Heat Removal acceptance criteria complete:
		• VERIFY RCP is RUNNING and supplied with CCW. (NO)
		• VERIFY Loop ΔT is less than 10°F. (NO, Natural Circulation developing)
	BOP	DETERMINE RCS Heat Removal acceptance criteria complete:
		• VERIFY S/G has BOTH of the following conditions:
		• S/G level is between 20 and 90% NR. (NO)
		• Feedwater is available AND level is being restored to between 60 and 70% NR. (NO)
NOTE:	**AFW is lost at AFAS actuation.**	
	BOP	VERIFY Main Feedwater flow is available. (NO)

Op Test No.: 1 Scenario # 2 Event # 5, 6, 7, & 8 Page 13 of 19

Event Description: Loss of Offsite Power/Total Loss of Feedwater; Automatic and Manual Turbine Trip Failure; 2B SG ADV Fails OPEN When Used for Cooldown; 2B AFW Pump Becomes Steam Bound on AFAS Actuation

Time	Position	Applicant's Actions or Behavior
	BOP	VERIFY Auxiliary Feedwater flow after AFAS actuation. (NO)
NOTE:		**2B AFW will be running and will remain running for a significant duration with this form of steam binding, requiring action to stop the pump to preserve it.**
	BOP	VERIFY RCS T_{avg} is between 525 and 535°F.
	BOP	IF RCS T_{avg} is less than 525°F, THEN CONFIRM S/G steam and feed rates are NOT excessive:
		• ENSURE feed flow is NOT excessive.
		• ENSURE ADVs are restoring RCS T_{avg} to between 525°F and 535°F.
	RO	IF T_{cold} is approaching or less than 500°F, THEN PERFORM both of the following:
		• ENSURE at least one RCP is stopped.
		• INITIATE Emergency Boration to achieve adequate SDM.
NOTE:		**2B S/G ADV fails OPEN when cooldown is initiated.**
	BOP	VERIFY S/G pressure is between 835 and 915 psig (850 and 930 psia).
NOTE:		**2B S/G ADV should be ISOLATED at this time if a cooldown was initiated prior to this step.**
	BOP	IF S/G pressure is less than 835 psig (850 psia), THEN ISOLATE steam lines from the S/G:
		• ENSURE SBCS valves are CLOSED.

Op Test No.: 1 Scenario # 2 Event # 5, 6, 7, & 8 Page 14 of 19

Event Description: Loss of Offsite Power/Total Loss of Feedwater; Automatic and Manual Turbine Trip Failure; 2B SG ADV Fails OPEN When Used for Cooldown; 2B AFW Pump Becomes Steam Bound on AFAS Actuation

Time	Position	Applicant's Actions or Behavior
CRITICAL TASK		• ENSURE ADVs are CLOSED. (NO; Must use key 82 to close block valve)
	BOP	CLOSE ALL TCVs using the MSR Reheat control Panel.
	RO	DETERMINE Containment Conditions acceptance criteria complete:
		• VERIFY Containment pressure is less than 2 psig.
		• VERIFY NO Containment Radiation Monitor alarms or rising trends:
		• VERIFY Containment temperature is less than 120°F.
	RO/BOP	VERIFY NO secondary plant radiation alarms or rising trends:
	BOP	DIRECT a field operator to perform Secondary Plant Post Trip actions. REFER TO Appendix X, Secondary Plant Post Trip Actions, Section 1.
	SRO	WHEN ALL safety function acceptance criteria have been EVALUATED, THEN PERFORM BOTH of the following:
		• DIAGNOSE the event, REFER TO Chart 1, Diagnostic Flow Chart. TLOF with LOOP.
		• DIRECT the crew to enter 2-EOP-06, Total Loss of Feedwater.
	CREW	IMPLEMENT the actions required by 2-EOP-06, Total Loss of Feedwater (TLOF).
	SRO	DIRECT the STA to VERIFY Safety Function Status Check acceptance criteria are satisfied every 15 minutes.
	SRO	OPEN the Place keeper and NOTE the time of EOP entry.

Op Test No.: 1 Scenario # 2 Event # 5, 6, 7, & 8 Page 15 of 19

Event Description: Loss of Offsite Power/Total Loss of Feedwater; Automatic and Manual Turbine Trip Failure; 2B SG ADV Fails OPEN When Used for Cooldown; 2B AFW Pump Becomes Steam Bound on AFAS Actuation

Time	Position	Applicant's Actions or Behavior
	SRO	DIRECT HP to perform secondary surveys.
	RO	COMMENCE RCS depressurization to between 1800 and 1850 psia.
NOTE:	**The crew must use Auxiliary Spray using keys 76 and 77.**	
	RO	MAINTAIN Pressurizer level between 10 and 68%.
	BOP	• ENSURE 2AB 480V Load Center is aligned to an energized bus.
		• DISPATCH an operator to restore Instrument Air. REFER to Appendix H, Operation of the 2A and 2B Instrument Air Compressors.
BOOTH OPERATOR:	**Wait 10 minutes, then perform instrument air restoration steps and report completion to the crew.**	
	SRO	VERIFY CCW to the RCPs. (NO)
NOTE:	**Loss of Instrument Air on Loss of Offsite Power will result in NO CCW to the RCPs.**	
	RO	IF Loop has isolated CCW to the RCPs, THEN RESTORE CCW. REFER to Appendix J, Restoration of CCW and CBO to the RCPs.
		IF CCW is lost for greater than 30 minutes, THEN PERFORM BOTH of the following:
		• ENSURE CCW to the RCPs will remain isolated by PLACING the FOUR Containment CCW TO/FROM RC Pump valves to CLOSE.

Op Test No.: 1 Scenario # 2 Event # 5, 6, 7, & 8 Page 16 of 19

Event Description: Loss of Offsite Power/Total Loss of Feedwater; Automatic and Manual Turbine Trip Failure; 2B SG ADV Fails OPEN When Used for Cooldown; 2B AFW Pump Becomes Steam Bound on AFAS Actuation

Time	Position	Applicant's Actions or Behavior
		• ENSURE RCP controlled bleedoff will remain isolated by PLACING the TWO RCP Bleedoff valves to CLOSE.
NOTE:		**Instrument air will not be available for 10 minutes. Appendix J steps are included at the end of this scenario.**
	RO	CONSERVE inventory in BOTH S/Gs by performing ALL of the following:
		• CLOSE Blowdown isolation valves.
		• CLOSE Blowdown sample valves.
NOTE:		**Restoration actions for AFW flow will not be successful early in the event.**
	RO	ENSURE MSIVs are CLOSED.
	BOP	STABILIZE the Secondary Plant. REFER to Appendix X, Secondary Plant Post Trip Actions, Section 2.
		• Bearing Oil Pump and Seal Oil Backup Pump RUNNING.
		• When the turbine reaches 600 rpm, THEN Bearing Oil Lift Pump RUNNING.
		• ENSURE ONLY ONE Turbine Cooling Water Pump is RUNNING.
		• VERIFY Turbine Generator Bearing Oil temperature between 110 to 120°F.
		• WHEN Turbine speed reaches ZERO rpm, THEN VERIFY the turning gear automatically ENGAGES.
		• PLACE Boron Dilution Alarm System in Operation.
		• ENERGIZE BOTH channels of Startup Nuclear Instrumentation to place the Boron Dilution Alarm System in operation.

Op Test No.: 1 Scenario # 2 Event # 5, 6, 7, & 8 Page 17 of 19

Event Description: Loss of Offsite Power/Total Loss of Feedwater; Automatic and Manual Turbine Trip Failure; 2B SG ADV Fails OPEN When Used for Cooldown; 2B AFW Pump Becomes Steam Bound on AFAS Actuation

Time	Position	Applicant's Actions or Behavior
		• VERIFY BOTH Boron Dilution alarm System Channels are operating.
	RO	VERIFY adequate RCS heat removal with at least ONE S/G by observing BOTH of the following:
		• At least ONE S/G has a level of at least 15% WR.
		• RCS T_{COLD} is stable or lowering.
BOOTH OPERATOR:		**Provided the crew has dispatched workers to investigate AFW pump problems, report as the watch engineer report that the 2B AFW pump problem is steam binding of the pump.**
BOOTH OPERATOR:		**5 minutes after the SRO directs venting the 2B AFW pump, clear the AFW pump malfunction and report completion of venting procedure.**
CRITICAL TASK	RO/BOP	When the 2B AFW pump breaker is swapped, manually START/ALIGN 2B AFW pump.
		• LIMIT initial feedwater flow rate to approximately 150 gpm.
		• WHEN EITHER of the following conditions exist,
		• Feed flow has been supplied for 5 minutes
		• S/G water level has risen
		• THEN CONTROL feedwater flow rate to restore and maintain S/G level 60 to 70% NR.
	RO	STABILIZE and CONTROL RCS T_{COLD} less than 535°F using ADVs.
NOTE:		**Instrument Air must be restored prior to restoration of Letdown:**

Op Test No.: 1 Scenario # 2 Event # 5, 6, 7, & 8 Page 18 of 19

Event Description: Loss of Offsite Power/Total Loss of Feedwater; Automatic and Manual Turbine Trip Failure; 2B SG ADV Fails OPEN When Used for Cooldown; 2B AFW Pump Becomes Steam Bound on AFAS Actuation

Time	Position	Applicant's Actions or Behavior
		RESTORE Letdown. REFER to 2-ONP-02.03, Charging and Letdown.
		• IF SIAS has isolated Letdown, THEN REFER to Appendix P, Restoration of Components Actuated by ESFAS.
		WHEN AFW flow has been restored and RCS temperature is controlled, TERMINATE the scenario.
NOTE:		**THE FOLLOWING STEPS WILL BE COMPLETED WHEN INSTRUMENT AIR IS RESTORED. THESE FINAL TWO PAGES SHOULD BE USED BY THE EVALUATOR AS AN ATTACHMENT TO BE REFERRED SIMULTANEOUS TO OTHER ACTIONS.**
	RO	ENSURE Instrument Air Containment is available by PLACING HCV-18-1 to CLOSE / OVERRIDE and then to OPEN.
NOTE:		• **HCV-14-9 (HCV-14-10) will open 5 seconds after HCV-14-8A (HCV-14-8B) starts to open.** • **When SIAS is present, placing the control switch in CLOSE and then OVERRIDE will open the CCW "N" header valves, until SIAS is reset.** • **Under SIAS conditions the CCW "N" header should only be aligned to safeguards signals are still present.**
	RO	ALIGN the CCW "N" header by performing ONE of the following:
		• IF the "A" CCW header is available, THEN ENSURE BOTH of the following valves are OPEN:
		HCV-14-8A, "N" Hdr. Isol. Discharge
		HCV-14-9, "N" Hdr. Isol Suction
		• IF the "B" CCW header is available, THEN ENSURE BOTH of the following valves are OPEN:
		HCV-14-8B, "N" Hdr. Isol. Discharge

Op Test No.: 1	Scenario # 2	Event # 5, 6, 7, & 8	Page 19 of 19
Event Description:	Loss of Offsite Power/Total Loss of Feedwater; Automatic and Manual Turbine Trip Failure; 2B SG ADV Fails OPEN When Used for Cooldown; 2B AFW Pump Becomes Steam Bound on AFAS Actuation		

Time	Position	Applicant's Actions or Behavior
		HCV-14-10, "N" Hdr. Isol. Suction
	RO	ALIGN CCW to / from the RCPs by OPENING ALL of the following valves:
		HCV-14-1, CCW to RC Pump
		HCV-14-2, CCW from RC Pump
		HCV-14-7, CCW to RC Pump
		HCV-14-6, CCW from RC Pump
CAUTION:	**RCP Seal Cooler isolation valves automatically close on high Seal Cooler outlet temperature of 200°F. Maintaining the control switch in the OPEN position will override this function. CCW radiation monitors should be closely monitored for indication of RCS to CCW leakage should conditions warrant the valve(s) to be maintained in the open position. Consideration should be given to returning the control switch(es) to the AUTO position once the valves have been opened.**	
	RO	ENSURE ALL RCP Seal Cooler Isolation valves are OPEN:
		HCV-14-11-A1, CCW From 2A1 RCP Seal Cooler
		HCV-14-11-A2, CCW From 2A2 RCP Seal Cooler
		HCV-14-11-B1, CCW From 2B1 RCP Seal Cooler
		HCV-14-11-B2, CCW From 2B2 RCP Seal Cooler
	RO	VERIFY RCP CCW related alarms are CLEAR or have been evaluated and dispositioned.

Facility:	St. Lucie	Scenario No.: 3	Op Test No.: NRC
Examiners:		Operators:	
Initial Conditions:	45% power, MOL (IC-15), 2A LPSI Pump is OOS due to failed surveillance, 2A AFW Pump and 2B Main Feed Pump are OOS for pump repair.		
Turnover:	Maintain current plant conditions until 2B main feed pump is repaired, and then increase to full power.		
Critical Tasks:	• Manually isolate 2B Steam Generator. • Establish adequate Containment Spray flow. • Cooldown and depressurize to minimize tube rupture flow.		

Event No.	Malf. No.	Event Type*	Event Description
1		TS-SRO	RCS loop (SG) flow instrument (PDT1111D) fails low.
2		C-RO, SRO TS-SRO	PZR Heater breaker 2B3 opens causing loss of 4 heater groups.
3		C-RO, SRO	Letdown Backpressure Control Valve fails closed.
4		C-BOP, SRO	CEDM Fan (HVE-21A) fails.
5		N-BOP, SRO R-RO	Rapid Downpower required due to no CEDM Fans operating.
6		M-ALL	SGTR/ESDE inside Containment (2B SG).
7		C-BOP	Train B MSIS fails to isolate 2B SG.
8		C-RO	2A Containment Spray Pump fails to start on CSAS.
9		C-RO	Containment Spray Control Valve (FCV-07-1B) will not open.

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

DRAFT

St. Lucie 2006 NRC #3

The crew will assume the shift at 45% power with instructions to maintain current plant conditions until such time as the 2B Main Feedwater Pump is repaired (expected return this shift).

The RCS Loop 2A Channel D flow instrument (PDT-1111D) fails low causing a low flow indication and half trip signal (also appears on PDI-1101D on the RTGB). The crew must diagnose the problem and bypass the trip signal in accordance with 2-ONP-99-01, Loss of Tech Spec Instrumentation. The SRO will refer to Technical Specifications for the appropriate action statement.

When Tech Specs have been addressed, the 2B3 PZR heater breaker fails open causing the loss of 4 groups of PZR heaters. The crew must diagnose the event and respond by taking manual action to restore stable RCS pressure in accordance with ONP 2-0120035, Pressurizer Pressure and Level. The SRO will refer to Tech Specs for the appropriate action statement.

Once Tech Specs have been addressed, the Letdown Backpressure Control Valve fails closed. The crew must swap to the backup control valve in accordance with 2-ONP-02.03, Charging and Letdown. After placing the backup control valve in service, the running CEDM Fan (HVE-21A) fails. When the crew starts the backup fan, its shaft shears. With no CEDM fans running, the crew must initiate a rapid down power in accordance with 2-ONP-25.01, Loss of RCB Ventilation, and 22.01, Rapid Downpower.

During the downpower, a large steam line break occurs inside containment (2B Main Steam header). A 200 gpm tube rupture in 2B Steam Generator also ramps in over 5 minutes.

The Train B MSIS automatic signal fails, requiring the crew to manually initiate MSIS to close the 2B SG isolation valves.

There is no Containment Spray flow because 2A CS Pump does not automatically start on CSAS and the Train B Containment Spray Flow Control Valve (FCV-07-1B) will not open. The crew must start 2A CS Pump manually to restore spray flow.

The scenario may be terminated when 2B SG is isolated, and the RCS is cooled down and depressurized to minimize the tube rupture flow.

EOP flow path: EOP-01, EOP-15

Op Test No.: 1	Scenario # 3	Event # 1	Page 3 of 28
Event Description:	RCS Loop (SG) Flow Instrument (PDT1111D) Fails LOW		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		**EXECUTE NRC Scenario #3 file to setup initial conditions.** **ENSURE that PDT-1111D output is not selected for display on PDI-1101D on RTGB-203.** **ENSURE Control Board Tags are hung on 2A LPSI pump and 2A AFW pump and 2B MFW pump.** **ENSURE procedures in progress are on the SRO desk.**
Indications Available at 45% power: **Alarm G44:** **2A AFW PUMP BREAKER FAILURE / CS STOP / SS ISOL** **Alarm R38:** **2A LPSI PUMP BREAKER FAILURE / CS STOP / SS ISOL** **Alarm G11:** **2B FW PUMP FLOW LOW / BRG OIL LP / CP INTLK TRIP**		
BOOTH OPERATOR:		**When directed, EXECUTE Event 1, RCS Flow Instrument (PDT 1111D) Fails LOW.**
Indications Available: **Alarm L-10:** **REACTOR COOLANT FLOW LOW CHANNEL TRIP.** **Alarm L-18:** **REACTOR COOLANT FLOW LOW CHANNEL PRE-TRIP.** **SG 2A1 dP (PDI-1101D) indicates 0**		
	RO	• DETERMINE that RCS flow instrument differential pressure transmitter PDT-1111D has failed LOW.
		• REPORT condition to the crew.
		• REFER to Annunciator Response Procedures.
NOTE:		**PDT-1111D indicates on PDI-1101D on RTGB-204.**

Op Test No.: 1 Scenario # 3 Event # 1 Page 4 of 28

Event Description: RCS Loop (SG) Flow Instrument (PDT1111D) Fails LOW

Time	Position	Applicant's Actions or Behavior
	SRO	EVALUATE Technical Specifications in accordance with 2-ONP-99.01, Loss of Tech Spec Instrumentation.
		• LCO 3.3.1, item 14, action 2A is applicable.
		• Bypass or TRIP the inoperable channel within 1 hour.
	BOP	BYPASS the affected RPS channel using key 103.
		When the Technical Specifications have been addressed, or at Lead Evaluator's direction, PROCEED to Event 2.

Op Test No.: 1	Scenario # 3	Event # 2	Page 5 of 28
Event Description:	PZR Heater Breaker 2B3 Opens Causing Loss of 4 Heater Groups		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		**When directed, EXECUTE Event 2, PZR Heater Breaker 2B3 Fails OPEN.**
Indications Available:		
Alarm H-29:		**PZR PROPORTIONAL HTR LOW LEVEL TRIP / INTLK**
Alarm H-30:		**PZR BACKUP HTR LOW LEVEL TRIP / SS ISOL / INTLK**
Alarm A-9:		**PZR HTR XFMR 2B3 TROUBLE**
Four Pressurizer heater groups are deenergized.		
	RO	• DIAGNOSE that half the PZR heaters have lost power.
		• REPORT condition to the crew.
		• REFER to Annunciator Response Procedures.
NOTE:		**ONP 2-0120035 actions are to address pressure changes induced by control malfunctions. RCS pressure will respond a small amount and stabilize, so the crew may follow ARP guidance to address breaker trip prior to assessing need for ONP entry.**
	SRO	• DIRECT crew entry into ONP 2-0120035. Pressurizer Pressure and Level.
		• DETERMINE that ONP Step 1.A, Abnormal Pressurizer Pressure Condition, is the appropriate recovery step.
	RO	VERIFY pressurizer spray, proportional and back-up heaters are operating properly in automatic. (NO)
	RO	• MANUALLY adjust PIC-1100X as necessary to stabilize RCS pressure and re-establish forced spray.
	SRO	Dispatch personnel to investigate cause of tripped breaker

Op Test No.: 1	Scenario # 3	Event # 2	Page 6 of 28
Event Description:	PZR Heater Breaker 2B3 Opens Causing Loss of 4 Heater Groups		

Time	Position	Applicant's Actions or Behavior
	SRO	EVALUATE Technical Specifications.
		• LCO 3.4.3 is applicable.
		• Restore PZR heaters within 72 hours.
		When the Technical Specifications are addressed, and at the direction of the Lead Evaluator, PROCEED to Event 3.

Op Test No.: 1	Scenario # 3	Event # 3	Page 7 of 28
Event Description:	Letdown Backpressure Control Valve Fails CLOSED		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		**When directed, EXECUTE Event 3, Letdown Pressure Control Valve Fails CLOSED.**
Indications Available: **Alarm M-5:** **LETDOWN PRESS HIGH / LOW** **Pressure Control Valve PCV-2201P valve position indication: FULL CLOSED.**		
	RO	• RECOGNIZE abnormal PCV 2201P position for existing high backpressure condition.
		• REPORT abnormal condition to the crew.
	SRO	• DIRECT crew entry into 2-ONP-02.03, Charging and Letdown.
		• REVIEW 2-ONP-02.03 Steps 1 – 12 and DETERMINE that Step 13 is applicable step for recovery action.
	RO	VERIFY the output of PIC-2201, pressure, may NOT be responding as expected for current plant conditions.
BOOTH OPERATOR:		**When the crew calls the SNPO to investigate, report that the "in-service" PCV is closed with significant air leakage.**
	RO	• PLACE PIC-2201 to MANUAL.
		• ADJUST letdown pressure to a value consistent with current plant conditions.
	RO	VERIFY the selected pressure control valve is responding as expected to PIC-2201 output. (NO)
	RO	PLACE the Alternate letdown Pressure control valve in service in accordance with 2-NOP-02.02, Charging and Letdown.
		• Have the SNPO:
		• OPEN V2349, PCV-2201Q Downstream Isolation.

Op Test No.: 1 Scenario # 3 Event # 3 Page 8 of 28

Event Description: Letdown Backpressure Control Valve Fails CLOSED

Time	Position	Applicant's Actions or Behavior
		• OPEN V2347, PCV-2201Q Upstream Isolation.
BOOTH OPERATOR:		**When the crew calls the SNPO to open PCV isolation valve V2349 and V2347, open the valve and report back to the crew.**
	RO	• SLOWLY REDUCE PIC-2201, Pressure setpoint to 250 psig.
		• PLACE HIC-1110 in MANUAL by performing the following:
		• BALANCE HIC-1110 MANUAL to AUTO controller output signals by previewing and using the MANUAL control knob to match the manual and auto controller output signals.
		• PLACE HIC-1110 to MANUAL.
		• ADJUST HIC-1110 for minimum flow.
		• PLACE Pressure Control Valve selector switch to BOTH.
		• VERIFY Letdown flow raises, as indicated on FIA-2202, Flow.
		• PLACE Pressure Control Valve selector switch to PCV-2201Q.
		• PLACE HIC-1110 in AUTO by performing the following:
		• BALANCE HIC-1110, Level, controller AUTO to MANUAL output signals, using the BIAS control knob while previewing the AUTO signal.
		• PLACE HIC-1110, Level controller to AUTO
		• ADJUST HIC-1110, Level, for a value consistent with current plant conditions.
		• SLOWLY RAISE PIC-2201, Pressure, setpoint to 430 psig.
	RO	HAVE the SNPO:
		• CLOSE V2348, PCV-2201P Upstream Isolation.
		• CLOSE V2350, PCV-2201P Downstream Isolation.

Op Test No.: 1	Scenario # 3	Event # 3	Page 9 of 28
Event Description:	Letdown Backpressure Control Valve Fails CLOSED		

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**When the crew calls the SNPO to close PCV isolation valves V2348 and V2350, close the valves and report back to the crew.**
	RO	ENSURE Pressurizer Level is being maintained at a value consistent with current plant conditions.
		When plant conditions have stabilized, or at the Lead Evaluator's direction, PROCEED to Events 4, & 5.

Op Test No.: 1	Scenario # 3	Event # 4 & 5	Page 10 of 28
Event Description:	CEDM Fan (HVE-21A) FAILS; Rapid Downpower Required Due to NO CEDM Fans Operating		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		**When directed, EXECUTE Event 4 & 5, CEDM Fan FAILS/Rapid Down Power.**
Indications Available:		
Alarm X-8:		**CEDM COOLING HVE-21A FLOW LOW / OVRLD / TRIP**
Alarm X-14:		**CEDM COOLING HVE-21B FLOW LOW / OVRLD / TRIP**
Alarm X-2:		**CEDM COOLING AIR TEMP HIGH (INTERMITTENT)**
	BOP	• RECOGNIZE that fan HVE-21A has failed and backup fan HVE-21B has not started.
		• REPORT condition to the crew.
		• REFER to Annunciator Response Procedure.
	SRO	• DIRECT crew entry into 2-ONP-25.01, Loss of RCB Cooling Fans.
		• DETERMINE that ONP Step 6.1, Loss of CEDM Cooling Fan is the applicable response step.
NOTE:		**On a low flow condition from the running CEDM Cooling Fan, the standby fan should automatically start, only if the fan motor continues to run.**
	BOP	VERIFY standby CEDM Cooling Fan automatically starts. (NO)
	BOP	ATTEMPT one start of the standby fan. (Crew may elect not to attempt restart of tripped fan until investigated)
NOTE:		**When HVE-21B starts, its shaft shears leaving the motor running with minimum current, and eventual alarms**
BOOTH OPERATOR:		**When contacted to perform Appendix A of 2-ONP-25.01, report that HVE-21A breaker has indications of overload on 2 phases. The HVE-21B breaker and fuses are normal.**

Op Test No.: 1 Scenario # 3 Event # 4 & 5 Page 11 of 28

Event Description: CEDM Fan (HVE-21A) FAILS; Rapid Downpower Required Due to NO CEDM Fans Operating

Time	Position	Applicant's Actions or Behavior
	BOP	• IF the standby fan does NOT start, THEN PERFORM Appendix A, CEDM Cooling Fan Local Breaker Operations.
		• ATTEMPT one start of any available CEDM Cooling Fan.
	SRO	INITIATE a rapid shutdown using 2-ONP-22.01, Rapid Downpower.
	RO	BEGIN boration as follows:
		• START either Boric Acid Pump 2A or 2B.
		• PLACE FCV-2210Y control switch in AUTO.
		• OPEN V2525, Boron Load Control Valve.
		• ADJUST FRC-2210Y to the desired flowrate.
		• IF desired to maximize the boric acid flow rate, THEN CLOSE the running BAM pump recirc valve.
		• MAINTAIN VCT pressure less than or equal to 30 psig by opening and closing V2513, VCT Vent, as needed.
		• IF necessary to maintain the desired VCT level, THEN DIVERT the letdown flow to the Waste Management System by placing V2500, VCT Divert Valve, in the WMS position.
	RO	INSERT the Lead CEA Group approximately 6 inches to initially lower RCS temperature.
	BOP	PERFORM the following:
		• PROGRAM the turbine DEH for the desired load reduction rate.
		• SET DEMAND / REF to desired power level.
	BOP	WHEN a T_{avg} decrease is noted, THEN DEPRESS the GO pushbutton on the turbine DEH control panel.

Op Test No.: 1	Scenario # 3	Event # 4 & 5	Page 12 of 28
Event Description:	CEDM Fan (HVE-21A) FAILS; Rapid Downpower Required Due to NO CEDM Fans Operating		

Time	Position	Applicant's Actions or Behavior
	RO	CONTROL Axial Shape Index with CEAs in accordance with 0-NOP-100.02, Axial Shape Index Control, or as directed by the SM / US.
	CREW	MAINTAIN T_{avg} within 6.6°F of T_{ref} using the following:
		• RCS Boration Rate
		• CEA Position
		• Turbine Load
	BOP	At less than 40% power, secure one running condensate pump
		When power has been reduced by 5%, or at the Lead Evaluator's direction, PROCEED to Events 6, 7, 8 & 9.

Op Test No.: 1	Scenario # 3	Event # 6, 7, 8, & 9	Page 13 of 28
Event Description:	SGTR/ESDE Inside Containment (2B SG); Train B MSIS Fails to Isolate 2B SG; 2A Containment Spray Pump FAILS to Start on CSAS; Containment Spray Control Valve (FCV-07-1B) will NOT Open		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		**When directed, EXECUTE Events 6, 7, 8, & 9, ESD / SGTR / MSIS Failure / 2A CS Pump Fails / FCV-07-1B Fails Closed.**
Indications Available:		
Alarm P23:		**CNTMT PRESS HIGH CIS CHANNEL PRETRIP**
Alarm L13:		**CNTMT PRESS HIGH CHANNEL TRIP**
Alarm L5:		**CNTMT PRESS HIGH CHANNEL PRETRIP**
Containment temperature and pressure indicators rising.		
Reactor Cavity Leakage increasing		
Reactor power indications rising.		
	RO/SRO	RECOGNIZE abnormal transient in progress.
		• DETERMINE uncontrolled rise in containment pressure nearing reactor trip setpoint.
		• REPORT condition to the crew.
	SRO	DIRECT the crew to trip the Reactor and enter 2-EOP-01, Standard Post Trip Actions.
	RO/BOP	• TRIP the Reactor.
		• CONDUCT initial review of post trip safety functions.
NOTE:		**The crew may take corrective actions during Standard Post Trip Actions prior to reporting status.**
	RO	DETERMINE Reactivity Control acceptance criteria complete:
		• VERIFY Reactor power is lowering. (YES)
		• VERIFY Startup Rate is negative. (YES)
		• VERIFY a maximum of ONE CEA is NOT fully inserted. (YES)

Op Test No.: 1	Scenario # 3	Event # 6, 7, 8, & 9	Page 14 of 28
Event Description:	SGTR/ESDE Inside Containment (2B SG); Train B MSIS Fails to Isolate 2B SG; 2A Containment Spray Pump FAILS to Start on CSAS; Containment Spray Control Valve (FCV-07-1B) will NOT Open		

Time	Position	Applicant's Actions or Behavior
NOTE:		**The crew may INITIATE Emergency Boration to achieve adequate SDM, due to uncontrolled cooldown of the RCS.**
	BOP	DETERMINE Maintenance of Vital Auxiliaries acceptance criteria complete.
		• VERIFY the Turbine is tripped by ALL GV's and TVs indicate CLOSED. (YES)
		• WHEN the Turbine is TRIPPED, THEN VERIFY the Main Generator breakers are OPEN: (YES)
		• 8W49, Generator No. 2 East Breaker
		• 8W52, Generator No. 2 Mid Breaker
		• FB 2, Exciter Supply Breaker
	BOP	VERIFY ALL Vital and Non-Vital AC buses transfer from Auxiliary to Start-up Transformers and are ENERGIZED. (YES)
	BOP	VERIFY ALL Vital and Non-Vital DC Buses are ENERGIZED. (YES)
	RO	DETERMINE RCS Inventory Control acceptance criteria complete: (NO)
		• VERIFY BOTH of the following conditions exist:
		• Pressurizer level is between 10 and 68%, (decreasing)
		• Pressurizer level is trending to between 30 and 35%. (NO)
	RO	RESTORE and MAINTAIN Pressurizer level between 30 and 35% by performing ANY of the following:
		• ENSURE proper operation of the Pressurizer Level Control System.
		• MANUALLY CONTROL Charging and Letdown.

Op Test No.: 1 Scenario # 3 Event # 6, 7, 8, & 9 Page 15 of 28

Event Description: SGTR/ESDE Inside Containment (2B SG); Train B MSIS Fails to Isolate 2B SG; 2A Containment Spray Pump FAILS to Start on CSAS; Containment Spray Control Valve (FCV-07-1B) will NOT Open

Time	Position	Applicant's Actions or Behavior
		• START third charging pump.
	RO	DETERMINE RCS Pressure Control acceptance criteria complete: (NO)
		• VERIFY Pressurizer pressure is between 1800 and 2300 psia.
		• VERIFY Pressurizer pressure is trending to between 2225 and 2275 psia. (NO)
	RO	WHEN Pressurizer pressure is less than 1736 psia, THEN ENSURE ALL of the following:
		• SIAS has ACTUATED.
		• CIAS has ACTUATED.
		• One RCP in each loop is stopped..
	RO	VERIFY RCS subcooling is at least 20° (YES).
	RO	DETERMINE Core Heat Removal acceptance criteria complete:
		• VERIFY at least ONE RCP is RUNNING and supplied with CCW.
		• VERIFY Loop ΔT is less than 10°F.
	BOP	DETERMINE RCS Heat Removal acceptance criteria complete:
		• VERIFY at least ONE S/G has BOTH of the following conditions:
		• S/G level is between 20 and 90% NR.
		• Feedwater is available AND level is being restored to between 60 and 70% NR. (NO)
		• Control AFW flow to restore S/G level to between 60 and 70% NR. (When AFAS is actuated)

Op Test No.: 1	Scenario # 3	Event # 6, 7, 8, & 9	Page 16 of 28
Event Description:	SGTR/ESDE Inside Containment (2B SG); Train B MSIS Fails to Isolate 2B SG; 2A Containment Spray Pump FAILS to Start on CSAS; Containment Spray Control Valve (FCV-07-1B) will NOT Open		

Time	Position	Applicant's Actions or Behavior
NOTE:	**BOP should throttle back feed flow to 2B S/G due to rising level caused by the tube rupture.**	
	BOP	VERIFY RCS T_{avg} is between 525 and 535°F. (NO; Excessive cooldown from ESD event)
	BOP	IF RCS T_{avg} is less than 525°F, THEN CONFIRM S/G steam and feed rates are NOT excessive:
		• ENSURE feed flow is NOT excessive.
		• ENSURE SBCS or ADVs are restoring RCS T_{avg} to between 525°F and 535°F.
	RO	IF T_{COLD} is approaching or less than 500°F, THEN PERFORM BOTH of the following:
		• ENSURE at least ONE RCP is STOPPED.
		• INITIATE Emergency boration to achieve adequate SDM.
NOTE:	**If not started earlier, safety injection will be emergency borating at this time.**	
	BOP	VERIFY S/G pressure is between 835 and 915 psig (850 and 930 psia). (NO)
NOTE:	**SBCS and ADVs cannot be used to reduce 2A S/G pressure due to uncontrolled cooldown in progress.**	
	BOP	IF 2B S/G pressure is less than 835 psig (850 psia), THEN ISOLATE steam lines from the 2B S/G:
		• ENSURE SBCS valves are CLOSED.
		• ENSURE ADVs are CLOSED.

Op Test No.: 1	Scenario # 3	Event # 6, 7, 8, & 9	Page 17 of 28
Event Description:	SGTR/ESDE Inside Containment (2B SG); Train B MSIS Fails to Isolate 2B SG; 2A Containment Spray Pump FAILS to Start on CSAS; Containment Spray Control Valve (FCV-07-1B) will NOT Open		

Time	Position	Applicant's Actions or Behavior
	RO/BOP	IF 2B S/G pressure is less than 735 psig (750 psia), THEN CLOSE the MSIVs.
NOTE:	**The crew must RECOGNIZE, if not earlier, that MSIS isolation of the 2B S/G did not occur, and take manual action to close valves.**	
CRITICAL TASK	RO	Manually ISOLATE 2B S/G MSIS isolation valves by initiating MSIS, or closing individual valves.
	BOP	• ENSURE the FOUR MSR TCV Block Valves are CLOSED.
		• ENSURE the MSR Warmup Valves are CLOSED.
		• If maintaining vacuum is desired, THEN ENSURE MV-08-814, Spillover Bypass Valve, is CLOSED.
	RO	DETERMINE Containment Conditions acceptance criteria complete:
		• VERIFY Containment pressure is less than 2 psig. (NO)
	RO	WHEN Containment pressure is at least 3.5 psig, THEN ENSURE ALL of the following conditions exist:
		• SIAS has ACTUATED.
		• CIAS has ACTUATED.
		• MSIS has ACTUATED.
	RO/BOP	• ALL available Containment Fan Coolers are RUNNING.
	RO	IF Containment pressure is at least 5.4 psig, THEN ENSURE BOTH of the following conditions exist:
		• CSAS has ACTUATED.
		• EACH Containment Spray header flow is at least 2700 gpm. (NO Flow on the B header)

Op Test No.: 1 Scenario # 3 Event # 6, 7, 8, & 9 Page 18 of 28

Event Description: SGTR/ESDE Inside Containment (2B SG); Train B MSIS Fails to Isolate 2B SG; 2A Containment Spray Pump FAILS to Start on CSAS; Containment Spray Control Valve (FCV-07-1B) will NOT Open

Time	Position	Applicant's Actions or Behavior
CRITICAL TASK	RO	• MANUALLY START 2A CS pump.
		• ATTEMPT to OPEN FCV-07-1B. (Will not open)
	RO	VERIFY NO Containment Radiation Monitor alarms or rising trends: (NO)
	RO	VERIFY Containment temperature is less than 120°F. (NO)
	RO/BOP	ENSURE ALL available Containment Fan Coolers are RUNNING.
	RO/BOP	VERIFY there ARE secondary plant radiation alarms or rising trends:
		• Condenser Air Ejector Monitor (YES)
		• Main Steamline Monitors
	BOP	DIRECT a field operator to perform Secondary Plant Post Trip actions. REFER TO Appendix X, Secondary Plant Post Trip Actions, Section 1.
		WHEN ALL safety function acceptance criteria have been EVALUATED, THEN PERFORM BOTH of the following:
	SRO	• DIAGNOSE the event, REFER TO Chart 1, Diagnostic Flow Chart.
		• DETERMINE that the event in progress is an ESD with indications of a tube rupture.
		• DIRECT the crew to enter EOP-15, Functional Recovery, due to multiple events in progress.
	CREW	PERFORMS the actions required by EOP-15.

Op Test No.: 1 Scenario # 3 Event # 6, 7, 8, & 9 Page 19 of 28

Event Description: SGTR/ESDE Inside Containment (2B SG); Train B MSIS Fails to Isolate 2B SG; 2A Containment Spray Pump FAILS to Start on CSAS; Containment Spray Control Valve (FCV-07-1B) will NOT Open

Time	Position	Applicant's Actions or Behavior
	SRO	OPEN the Placekeeper and NOTE the time of EOP entry.
	RO	When ANY of the following conditions exist,
		• 2A or 2B AFW Pump is the ONLY source of Feedwater
		• RCS pressure is less than 1736 psia.
		• RCS Temperature is less than 500F
		THEN STOP ONE RCP in EACH loop.
	RO	VERIFY CCW to the RCPs. (NO)
	RO	IF SIAS has isolated CCW to the RCPs, THEN RESTORE CCW using the following Appendix J steps.
	RO	ENSURE Instrument Air to Containment is available by PLACING HCV-18-1 to CLOSE / OVERRIDE and then to OPEN.
	RO	ALIGN the CCW "N" header by performing ONE of the following:
		• IF the "A" CCW header is available, THEN ENSURE BOTH of the following valves are OPEN:
		HCV-14-8A, "N" Hdr. Isol. Discharge
		HCV-14-9, "N" Hdr. Isol. Suction
		• IF the "B" CCW header is available, THEN ENSURE BOTH of the following valves are OPEN:
		HCV-14-8B, "N" Hdr. Isol. Discharge
		HCV-14-10, "N" Hdr. Isol. Suction

Op Test No.: 1 Scenario # 3 Event # 6, 7, 8, & 9 Page 20 of 28

Event Description: SGTR/ESDE Inside Containment (2B SG); Train B MSIS Fails to Isolate 2B SG; 2A Containment Spray Pump FAILS to Start on CSAS; Containment Spray Control Valve (FCV-07-1B) will NOT Open

Time	Position	Applicant's Actions or Behavior
	RO	ALIGN CCW to / from the RCPs by OPENING ALL of the following valves:
		HCV-14-1, CCW to RC PUMP
		HCV-14-2, CCW from RC PUMP
		HCV-14-7, CCW to RC PUMP
		HCV-14-6, CCW from RC PUMP
	RO	IF CIAS has isolated controlled bleedoff flow to the VCT, THEN OPEN V2507, RCP Bleedoff Relief Stop Vlv.
	RO	ENSURE ALL RCP Seal Cooler Isolation valves are OPEN:
		HCV-14-11-A1, CCW from 2A1 RCP Seal Cooler
		HCV-14-11-A2, CCW from 2A2 RCP Seal Cooler
		HCV-14-11-B1, CCW from 2B1 RCP Seal Cooler
		HCV-14-11-B2, CCW from 2B2 RCP Seal Cooler
	RO	VERIFY RCP CCW related alarms are CLEAR or have been evaluated and dispositioned.
	RO	IF RCPs are RUNNING, THEN VERIFY RCP operating limits are satisfied. REFER to Table 13, RCP Operating Limits.
	BOP	SAMPLE BOTH S/Gs for activity and boron. REFER to Appendix A, Sampling Steam Generators.
CAUTION:		**Under SIAS conditions the CCW "N" header should only be aligned to ONE essential header. This will maintain train separation while safeguards signals are still present.**

Op Test No.: 1	Scenario # 3	Event # 6, 7, 8, & 9	Page 21 of 28
Event Description:	SGTR/ESDE Inside Containment (2B SG); Train B MSIS Fails to Isolate 2B SG; 2A Containment Spray Pump FAILS to Start on CSAS; Containment Spray Control Valve (FCV-07-1B) will NOT Open		

Time	Position	Applicant's Actions or Behavior
NOTE:		• **HCV-14-9 (HCV-10) will open 5 seconds after HCV-14-8A (HCV-14-8B) starts to open.** • **When SIAS is present, placing the control switches in CLOSE and then OVERRIDE will open the CCW "N" header valves, until SIAS is reset.**
	RO	• IF SIAS has closed the "N" Header valves, THEN RESTORE flow from "A" CCW Header by PLACING the control switches for the desired train to CLOSE and then to OVERRIDE:
		HCV-14-8A
		HCV-14-9
		• IF CIAS or high radiation has closed the SGBD Sample Valves, THEN OPEN FCV-23-7 and FCV-23-9 by PLACING the control switch to CLOSE / OVERRIDE and then to OPEN.
		• DIRECT Chemistry to perform S/G samples for activity and boron.
	BOP	PLACE BOTH Hydrogen Analyzers in service by performing Appendix L, Placing Hydrogen Analyzer in Service:
BOOTH OPERATOR:		**5 minutes after the crew requests S/G chemistry samples, REPORT that 2B S/G has both activity and boron while 2A S/G does not.**
	BOP	STABILIZE the Secondary Plant AS NECESSARY. PERFORM Appendix X, Secondary plant Post trip Actions, Section 2. (energizing source range NIs)
	SRO	DIRECT the STA to PERFORM the Safety Function Status Checks every 15 minutes. REFER to Attachment 1, Safety Function Status Check Sheet.

Op Test No.: 1 Scenario # 3 Event # 6, 7, 8, & 9 Page 22 of 28

Event Description: SGTR/ESDE Inside Containment (2B SG); Train B MSIS Fails to Isolate 2B SG; 2A Containment Spray Pump FAILS to Start on CSAS; Containment Spray Control Valve (FCV-07-1B) will NOT Open

Time	Position	Applicant's Actions or Behavior
	SRO	IDENTIFY the success paths to be used to satisfy each safety function. REFER to Attachment 3, Functional Recovery Success Paths.
	SRO	DETERMINE that:
		• Containment Isolation is NOT met due to tube rupture.
		• RCS Inventory is met by safety injection, and RCS and Core Heat are met by S/G with SIAS.
	SRO	PERFORM ALL of the following in the order listed:
		• CI-1, Containment Isolation
		• IC-2, Safety Injection
		• HR-2, S/G with SIAS
		• CTPC-3, Containment Spray
	SRO	DIRECT the crew to enter functional recovery success path CI-1, Containment Isolation.
	RO	ENSURE BOTH the following:
		• ENSURE CIAS has ACTUATED.
		• IF Containment pressure is greater than 3.5 psig, THEN ENSURE MSIS has ACTUATED.
	BOP	ENSURE ALL available Emergency Containment HVAC systems are RUNNING:
		• At least ONE train of SBVS
		• At least ONE train of Containment Coolers

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Event Description: SGTR/ESDE Inside Containment (2B SG); Train B MSIS Fails to Isolate 2B SG; 2A Containment Spray Pump FAILS to Start on CSAS; Containment Spray Control Valve (FCV-07-1B) will NOT Open

Time	Position	Applicant's Actions or Behavior
		CAUTION: If there is a conflict between isolating a S/G with indications of S/G tube leakage or isolating a S/G with an unisolable steam leak, THEN the S/G with the ESD should be isolated. At least ONE S/G must be available for heat removal.
	CREW	IF a SGTR has occurred as indicated by ANY of the following,
		• S/G activity
		• Main steam piping radiation
		• S/G level change when NOT feeding
		• S/G Blowdown activity
		• ONE S/G level rising faster than the other with feed and steaming rates being essentially the same for BOTH
		• Feed flow mismatch between S/Gs.
		• Steam flow vs. feed flow mismatch in a S/G PRIOR to the trip.
		THEN IDENTIFY and ISOLATE the MOST affected S/G. REFER to Heat Removal Success Path HR-1 or HR-2, and RETURN to this success path when the MOST affected S/G is ISOLATED.
	SRO	DIRECT the crew to isolate the affected 2B S/G in accordance with Steps 9 – 12 of HR-2.
	CREW	IF an ESD has occurred as indicated by ANY of the following:
		• High steam flow from S/G
		• Lowering S/G pressure
		• Lowering S/G level
		• Lowering RCS cold leg temperature
		• Lowering Pressurizer pressure
		• Lowering Pressurizer level
		THEN DETERMINE the MOST affected steam generator is 2B S/G.

Op Test No.: 1	Scenario # 3	Event # 6, 7, 8, & 9	Page 24 of 28
Event Description:	SGTR/ESDE Inside Containment (2B SG); Train B MSIS Fails to Isolate 2B SG; 2A Containment Spray Pump FAILS to Start on CSAS; Containment Spray Control Valve (FCV-07-1B) will NOT Open		

Time	Position	Applicant's Actions or Behavior
	BOP	IF MSIS has NOT isolated the leak, THEN ISOLATE the MOST affected S/G. REFER to Appendix R, Steam Generator Isolation as follows:
		• ENSURE HCV-08-1B, Main Steam Header "B" Isolation Valve (MSIV), is CLOSED.
		• ENSURE MV-08-1B, MSIV Header "B" Bypass Valve, is CLOSED.
		• ENSURE HCV-09-2A, Main Feedwater Header "B" Isolation Valve, is CLOSED.
		• ENSURE HCV-09-2B, Main Feedwater Header "B" Isolation Valve, is CLOSED.
		• ENSURE FCV-23-5, 2B SG Blowdown, is CLOSED.
		• ENSURE FCV-23-6, 2B SG Blowdown is CLOSED.
		• ENSURE MV-08-19B, 2B S/G Atmos Dump Valve, is CLOSED.
		• CLOSE MV-08-17, 2B S/G ADV Isol.
		• PLACE the control switch for auxiliary feed, Pump 2B, in STOP.
		• ENSURE MV-09-10, Pump 2B Disch to SG 2B Valve, is CLOSED.
		• ENSURE MV-09-12, Pump 2C to SG 2B, is CLOSED.
		• PLACE MV-08-12, SG 2B Stm to AFW PP 2C, in CLOSE.
		• ENSURE MV-08-18B, 2B S/G Atmos Dump Vlv, is CLOSED.
		• CLOSE MV-08-16, 2B S/G ADV Isol.
		• HAVE the NPO PERFORM the following LOCAL operations:
		• UNLOCK and CLOSE V09158, 2C AFW Pump to 2B S/G Isolation.
		• UNLOCK and CLOSE V09136, 2B AFW Pump to 2B S/G Isolation.

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Event Description: SGTR/ESDE Inside Containment (2B SG); Train B MSIS Fails to Isolate 2B SG; 2A Containment Spray Pump FAILS to Start on CSAS; Containment Spray Control Valve (FCV-07-1B) will NOT Open

Time	Position	Applicant's Actions or Behavior
		• CLOSE SE-08-1, Main Steam to 2C AFW Pump Warm-up Valve Solenoid.
BOOTH OPERATOR:		**When the crew directs the NPO to close valves V09158, V09136, and SE-08-1, CLOSE the valves and REPORT completion to the crew.**
	CREW	VERIFY the 2B S/G is isolated by observing ALL of the following:
		• S/G pressures
		• S/G levels
		• RCS cold leg temperatures
	SRO	DIRECT the crew to return to success path CI-1 at Step 3.
	RO	VERIFY NO RCS leakage into the CCW system:
		• Absence of CCW Surge Tank high level alarm (Annunciator LB-10).
		• ENSURE sample flow to the CCW radiation monitors and NO indication of activity.
	SRO	VERIFY CI-1 (Automatic/Manual Isolation) is satisfied by:
		Condition 2:
		• IF ANY secondary plant activity monitor alarms or has an unexplained rise, THEN the MOST affected SG is ISOLATED.
		• CIAS is ACTUATED.
	SRO	DIRECT the crew to enter functional recovery success path IC-2, Safety Injection.

Op Test No.: 1	Scenario # 3	Event # 6, 7, 8, & 9	Page 26 of 28
Event Description:	SGTR/ESDE Inside Containment (2B SG); Train B MSIS Fails to Isolate 2B SG; 2A Containment Spray Pump FAILS to Start on CSAS; Containment Spray Control Valve (FCV-07-1B) will NOT Open		

Time	Position	Applicant's Actions or Behavior
	RO	IF ANY of the following conditions exist:
		• RCS pressure is les than 1736 psia
		• Containment pressure is greater than 3.5 psig
		THEN ENSURE SIAS has ACTUATED.
	RO	• ENSURE ALL available SI Pumps are RUNNING.
		• VERIFY adequate SI flow. REFER to Figure 2, Safety Injection Flow vs. RCS Pressure.
		• ENSURE ALL available Charging Pumps are RUNNING.
	RO	IF HPSI pumps are operating, and ALL of the following conditions are satisfied,
		• RCS subcooling is greater than or equal to minimum subcooling
		• Pressurizer level is at least 30% and NOT lowering.
		• At least ONE S/G is available for RCS heat removal with level being restored to or maintained between 60 and 70% NR
		• Reactor Vessel level is greater than the top of the Hot Leg Nozzles (sensors 4 through 8 covered) or NO abnormal differences (greater than 20°F) between T_{HOT} and Rep CET temperature
		THEN THROTTLE SI flow. REFER to Appendix S, Safety Injection Throttling and Restoration.
	RO	IF RCS pressure is greater than 200 psia and controlled, THEN PERFORM ALL of the following:
		• STOP the LPSI pumps.
		• CLOSE the LPSI injection valves.
		• PLACE LPSI Pump handswitches in AUTO.

Op Test No.: 1	Scenario # 3	Event # 6, 7, 8, & 9	Page 27 of 28
Event Description:	SGTR/ESDE Inside Containment (2B SG); Train B MSIS Fails to Isolate 2B SG; 2A Containment Spray Pump FAILS to Start on CSAS; Containment Spray Control Valve (FCV-07-1B) will NOT Open		

Time	Position	Applicant's Actions or Behavior
	SRO	VERIFY IC-2 is satisfied by ALL of the following:
		• IF RAS has NOT occurred, THEN ALL available Charging pumps are operating and SI flow is adequate. REFER to Figure 2, SI Flow vs. RCS Pressure
		OR
		• HPSI Throttle criteria are met
		• Reactor Vessel level is greater than the top of the active fuel (sensors 7 and 8 covered) or Rep CET temperature NOT greater than 22°F superheated
	SRO	DIRECT the crew to enter functional recovery success path HR-2, S/G with SIAS.
	RO	IF SIAS is present, THEN PERFORM ALL of the following:
		• ENSURE ALL available SI Pumps are RUNNING.
		• VERIFY adequate SI flow. REFER to Figure 2, Safety Injection Flow vs. RCS Pressure.
		• ENSURE ALL available Charging Pumps are RUNNING.
NOTE:	**The crew will not be initially controlling the cooldown on this event due to injection and break flow; however, action should not be taken to increase cooling.**	
	RO	IF at least ONE Vital 4.16 bus is energized, THEN PERFORM the following:
		• COOLDOWN the RCS to T_{HOT} less than 510°F using ADVs.
		• IF RCPs are operating THEN COOLDOWN not to exceed 100°F in ANY 1 hour period.
CRITICAL TASK	RO	PERFORM a controlled RCS depressurization as follows:
		• MAINTAIN RCS pressure within ALL the following criteria (listed in order of priority):

Op Test No.: 1 Scenario # 3 Event # 6, 7, 8, & 9 Page 28 of 28

Event Description: SGTR/ESDE Inside Containment (2B SG); Train B MSIS Fails to Isolate 2B SG; 2A Containment Spray Pump FAILS to Start on CSAS; Containment Spray Control Valve (FCV-07-1B) will NOT Open

Time	Position	Applicant's Actions or Behavior
		• Within the limits of Figure 1A or 1B, RCS Pressure Temperature.
		• Less than 930 psia.
		• Above the minimum pressure for RCP operation
		• Approximately equal to the most affected S/G pressure (within 50 psia).
		• OPERATE Main or Auxiliary Pressurizer spray. (Aux)
		• IF HPSI throttle criteria are met, THEN THROTTLE SI flow. REFER to Appendix S, Safety Injection Throttling and Restoration.
	BOP	MAINTAIN the ISOLATED S/G pressure less than 915 psig (930 psia) by ANY of the following:
		• Manual operation of the MSIV Bypass valve. (If condenser vacuum exists).
		• Manual operation of the associated ADV.
		• Local operation of the associated ADV.
		When 2B S/G has been isolated, and controlled RCS depressurization is in progress TERMINATE the scenario.

Facility:	St. Lucie	Scenario No.:	4	Op Test No.:	NRC
Examiners:	_____	Operators:	_____		
	_____		_____		
	_____		_____		

Initial Conditions:	100% power, MOL (IC-1). 2A LPSI Pump is OOS due to failed surveillance and 2A AFW Pump is OOS for motor repair.
Turnover:	Reduce power to 85% due to Main Turbine Generator vibration. Maintain 100% power ESI.
Critical Tasks:	• Manually trip the Reactor Coolant Pumps on loss of subcooling. • Initiate cooldown to restore subcooling. • Establish adequate injection flow.

Event No.	Malf. No.	Event Type*	Event Description
1		N-BOP, SRO R-RO	Reduce power to 85%.
2		C-RO, SRO TS-SRO	CEA 57 becomes stuck.
3		I-RO, SRO TS-SRO	PZR pressure instrument (PT1100X) fails high.
4		I-BOP, SRO	2B Steam Generator feed flow channel (FT9021) fails high.
5		M-ALL	LOCA.
6		C-BOP	Load Center 2A5 trips affecting various ECCS valves.
7		C-RO	Train A CSAS does not automatically actuate and B HPSI pump does not automatically start on SIAS.

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

DRAFT

St. Lucie 2006 NRC #4

The crew will assume the shift at 100% power with instructions to reduce power to 85% to investigate Main Turbine Generator vibration.

When the power reduction has reached approximately 95%, CEA 57 in the controlling rod group sticks at its current height. The crew must stop the power reduction and determine that the CEA is *inoperable* in accordance with 2-ONP-00110030, CEA Off-Normal Operation. The SRO will refer to Technical Specifications for the appropriate action statement.

When plant conditions have stabilized, the controlling PZR Pressure Channel (PT1100X) fails high causing the spray valves to open. The crew must diagnose the problem and swap to the alternate control channel and ensure that PZR pressure control is restored in accordance with 2-ONP-0120035, Pressurizer Pressure and Level. The SRO will refer to Technical Specifications for the appropriate action statement.

When the actions of 2-ONP-0120035 have been completed, the 2B SG Feedwater Flow Control transmitter (FT-9021) fails high. The crew must diagnose the lowering SG level and take manual control of 2B SG level in accordance with 2-ONP-0700030, Main Feedwater.

When the actions of 2-ONP-0700030 have been completed, a LOCA occurs.

During the event, the Train A CSAS signally does not automatically actuate requiring manual CSAS actuation. The B HPSI pump does not automatically start on SIAS and must be manually started.

480V Load Center 2A5 de-energizes on the Reactor trip, causing loss of various emergency loads. The crew must diagnose this failure and restore power to establish A Train ECCS flow.

The scenario may be terminated when ECCS flow paths are restored and ECCS termination assessment is reached.

EOP flow path: EOP-01, EOP-03

Op Test No.: 1	Scenario # 4	Event # 1	Page 3 of 19
Event Description:	Reduce Power to 85%		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		**EXECUTE NRC Scenario #4 file to setup initial conditions.** **ENSURE Control Board Tags are hung on 2A LPSI pump and 2A AFW pump.** **ENSURE procedures in progress are on the SRO desk, 2-ONP-22.02 signed off.**
Indications Available at 100% power: • **Alarm G-44:** **2A AFW PUMP BKR FAILURE / CS STOP / SS ISOL** • **Alarm R-38:** **2A LPSI PUMP BKR FAILURE / CS STOP / SS ISOL** • **Alarm D-15:** **TURBINE VIBRATION ABNORMAL**		
	SRO	DIRECT the crew to make preparation to reduce power to 85%, using 2-ONOP-22.01, Rapid Downpower.
	RO	BEGIN boration as follows:
		• START either Boric Acid Pump 2A or 2B.
		• PLACE FCV-2210Y control switch in AUTO.
		• OPEN V2525, Boron Load Control Valve.
		• ADJUST FRC-2210Y to the desired flowrate.
		• IF desired to maximize the boric acid flow rate, THEN CLOSE the running BAM pump recirc valve.
		• MAINTAIN VCT pressure less than or equal to 30 psig by opening and closing V2513, VCT Vent, as needed.
		• IF necessary to maintain the desired VCT level, THEN DIVERT the letdown flow to the Waste Management System by placing V2500, VCT Divert Valve, in the WMS position.
	RO	INSERT the Lead CEA Group approximately 6 inches to initially lower RCS temperature.

Op Test No.: 1 Scenario # 4 Event # 1 Page 4 of 19

Event Description: Reduce Power to 85%

Time	Position	Applicant's Actions or Behavior
	BOP	PERFORM the following:
		• PROGRAM the turbine DEH for the desired load reduction rate.
		• SET DEMAND / REF to desired power level.
	BOP	WHEN a T_{avg} decrease is noted, THEN DEPRESS the GO pushbutton on the turbine DEH control panel.
	RO	CONTROL Axial Shape Index with CEAs in accordance with 0-NOP-100.02, Axial Shape Index Control, or as directed by the SM / US.
	CREW	MAINTAIN T_{avg} within 6.6°F of T_{ref} using the following:
		• RCS Boration Rate
		• CEA Position
		• Turbine Load
		When power has been reduced 5% or at the Lead Evaluator's direction, PROCEED to Event 2.

Op Test No.: 1	Scenario # 4	Event # 2	Page 5 of 19
Event Description:	PZR Pressure Instrument (PT1100X) Fails HIGH		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		**When DIRECTED, Adjust the malfunction to stick CEA-57 at its present height, and EXECUTE Event 2, CEA-57 Stuck at (current height).**
Indications Available: **If the operator does not stop CEA motion based on visual deviation of rod position indication, the following alarms will be received:** • **Alarm K-11: CEA MOTION INHIBIT** • **Alarm K-30: CEA POSITION DEVIATION MOTION BLOCK. (ADS)**		
	RO	• RECOGNIZE the growing deviation of CEA-57 from its group rod height.
		• REPORT the condition to the crew.
		• PLACE the CEDMCS panel in OFF.
		• REFER to Annunciator Response Procedures.
	SRO	DIRECT the crew to enter ONP 2-0110030, CEA Off-Normal Operation and Realignment.
	RO	SECURE any boration in progress.
	BOP	PLACE the turbine on HOLD; then adjust turbine load to match T-ref with T-avg.
	SRO	DIRECT the crew to complete Appendix A, CEA Investigation for Operability.
CAUTION:		**Reactor Power shall NOT be increased above the stable power level established following the CEA(s) misalignment.**
		For the affected CEA(s), perform the following to determine operability:

Op Test No.: 1 Scenario # 4 Event # 2 Page 6 of 19

Event Description: PZR Pressure Instrument (PT1100X) Fails HIGH

Time	Position	Applicant's Actions or Behavior
		• Place the mode select switch in the manual individual mode.
		• Select the affected CEA on the individual CEA selection switches.
		• Select the group of the affected CEA on the group select switch.
		• IF CEA motion inhibit is present, THEN:
		• Depress and hold the CEA motion inhibit bypass pushbutton.
		• Depress then release the bypass enable pushbutton.
CAUTION:		**Do NOT exceed ± 10 inches of the original position without permission from the US.**
		• Attempt to insert and withdraw the affected CEA and verify CEA-57 does NOT move.
	RO	IF the CEA(s) does NOT operate (move), THEN CHECK the status of the CEDM coil power supply panels in the cable spreading room:
BOOTH OPERATOR:		**When the crew sends operators/I&C to investigate the problem, REPORT that the ACTM toggle switch will not reset and I&C estimates the repair will take 5 hours. (If asked, at this time there is no evidence to show it is not trippable)**
	RO	CONTACT the I&C Dept. for assistance and notify them of the problem and any abnormalities found.
		• CHECK the CEDMCS and CEA drive system for alarms that might indicate the CEA problem.
		• Withdraw and insert the CEA(s) in manual individual or manual group at the direction of I&C to support troubleshooting.

Op Test No.: 1 Scenario # 4 Event # 2 Page 7 of 19

Event Description: PZR Pressure Instrument (PT1100X) Fails HIGH

Time	Position	Applicant's Actions or Behavior
	RO/SRO	DETERMINE that CEA-57 is inoperable.
	SRO	• IMPLEMENT Appendix B, One or More CEAs Inoperable.
		• EVALUATE Technical Specifications.
		LCO's 3.1.3.1 and 3.1.1.1 are applicable. (3.1.1.1 if untrippable)
		Verify adequate shutdown margin within 1 hour. (if delclared untrippable); Operation may continue if trippable
NOTE:		**If the crew resumes the power reduction reactor power must be adjusted using boration, rather than CEAs.**
		When the Technical Specifications have been addressed, or at the Lead Evaluator's direction, PROCEED to Event 3.

Op Test No.: 1 Scenario # 4 Event # 3 Page 8 of 19

Event Description: PZR Pressure Instrument (PT1100X) Fails HIGH

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		**When directed, EXECUTE Event 3, PZR Pressure Instrument (PT1100X) Fails High.**
Indications Available: • **Alarm H59: PZR CHANNEL X PRESS HIGH / LOW** • **Alarm H30: PZR BACKUP HTR LOW LEVEL TRIP / SS ISOL / INTLK** **PZR Pressure Indications low with spray valves OPEN.**		
	RO	• RECOGNIZE that the cause of the abnormal condition is PT1100X failed HIGH.
		• REPORT the condition to the crew.
		• REFER to Annunciator Response Procedure.
	SRO	• DIRECT crew to enter ONP 2-0120035, Pressurizer Pressure and Level.
		• DETERMINE that the applicable recovery step is ONP Step 1A.
	RO	VERIFY pressurizer spray proportional and back-up heaters are operating properly in automatic. (NO)
	RO	IF selected pressure channel has failed, THEN shift to the operable pressure channel. (PIC-1100Y)
	RO	VERIFY spray valves close and PZR pressure is returning to program.
	RO	AFTER selecting the operable channel, RESET heater control switches on RTGB 203.
	SRO	EVALUATE Technical Specifications:
		• Refer to TS 3.2.5, DNB-related parameters.

Op Test No.: 1	Scenario # 4	Event # 3	Page 9 of 19
Event Description:	PZR Pressure Instrument (PT1100X) Fails HIGH		

Time	Position	Applicant's Actions or Behavior
		• REFER to COLR Table 3.2-2 to VERIFY PZR Pressure within limits.
		When the Technical Specifications have been addressed, PROCEED to Events 4.

Op Test No.: 1	Scenario # 4	Event # 4	Page 10 of 19
Event Description:	Pressurizer Pressure Instrument Fails HIGH		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		**When directed, EXECUTE Event 4, 2B S/G Feed Flow XMTR (FT9021) Fails HIGH.**
Indications Available: **2B S/G level indication rising, feed flow recorder upscale.** **If the crew does not recognize the condition promptly, the following alarm occurs:** • **Alarm G-9: 2B S/G LEVEL HIGH/LOW**		
	BOP	• RECOGNIZE the cause of rising 2B S/G level is high steam flow indication on FI9021.
		• REPORT the condition to the crew.
		• PLACE the 2B S/G feed control valve in manual and RESTORE normal level.
		• REFER to Annunciator Response Procedures, if applicable.
	SRO	• DIRECT the crew to enter ONP 2-0700030, Main Feedwater.
		• DETERMINE that Step 4.A is the applicable recovery step, which has already been performed.
		When steam generator level is back on program, or at the Lead Evaluator's direction PROCEED to Events 5, 6, & 7.
		If the crew is not aggressive with recovery, Reactor may trip, in which case immediately PROCEED to Events 5, 6, 7.

Op Test No.: 1	Scenario # 4	Event # 5, 6, 7	Page 11 of 19
Event Description:	LOCA; Load Center 2A5 Trips Affecting Various ECCS Valves; Train A CSAS Does Not Automatically Actuate and B HPSI Pump Does Not Automatically Start on SIAS		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		**When directed, EXECUTE Events 5, 6, & 7, LOCA / A Train CSAS Fails / LC 2A5 TRIPS.**
Indications Available: • **Reactor / Turbine Trip.** • **Safety Injection Actuation.**		
	CREW	RECOGNIZE plant trip event in progress.
	SRO	DIRECT the crew, to enter 2-EOP-01, Standard Post Trip Actions.
	RO/BOP	CONDUCT initial review of post trip safety functions.
NOTE:		**The crew may take corrective actions during Standard Post Trip Actions prior to reporting status.**
	RO	DETERMINE Reactivity Control acceptance criteria complete:
		• VERIFY Reactor power is lowering.
		• VERIFY Startup rate is NEGATIVE.
		• VERIFY a maximum of ONE CEA is NOT fully inserted.
	BOP	DETERMINE Maintenance of Vital Auxiliaries acceptance criteria complete.
		• VERIFY the Turbine is tripped by ALL GV's and TVs indicate CLOSED.
		• WHEN the Turbine is TRIPPED, THEN VERIFY the Main Generator breakers are OPEN:
		• 8W49, Generator No. 2 East Breaker
		• 8W52, Generator No. 2 Mid Breaker
		• FB 2, Exciter Supply Breaker

Op Test No.: 1 Scenario # 4 Event # 5, 6, 7 Page 12 of 19

Event Description: LOCA; Load Center 2A5 Trips Affecting Various ECCS Valves; Train A CSAS Does Not Automatically Actuate and B HPSI Pump Does Not Automatically Start on SIAS

Time	Position	Applicant's Actions or Behavior
	BOP	VERIFY ALL Vital and Non-Vital AC buses transfer from Auxiliary to Start-up Transformers and are ENERGIZED.
NOTE:		**The crew may identify the failure of Load Center 2A5 at this time and attempt to re-energize.**
	BOP	VERIFY ALL Vital and Non-Vital DC Buses are ENERGIZED.
	RO	DETERMINE RCS Inventory Control acceptance criteria complete: (NO)
		• VERIFY BOTH of the following conditions exist:
		• Pressurizer level is between 10 and 68%. (NO)
		• Pressurizer level is trending to between 30 and 35%. (NO)
	RO	RESTORE and MAINTAIN Pressurizer level between 30 and 35% by performing ANY of the following:
		• ENSURE proper operation of the Pressurizer Level Control System.
		• Manually CONTROL Charging and Letdown.
		• START third charging pump.
	RO	DETERMINE RCS Pressure Control acceptance criteria complete:
		• VERIFY Pressurizer pressure is NOT between 1800 and 2300 psia. (NO)
	RO	IF Pressurizer pressure is less than 1736 psia, THEN ENSURE ALL of the following:
		• SIAS has ACTUATED.

Op Test No.: 1 Scenario # 4 Event # 5, 6, 7 Page 13 of 19

Event Description: LOCA; Load Center 2A5 Trips Affecting Various ECCS Valves; Train A CSAS Does Not Automatically Actuate and B HPSI Pump Does Not Automatically Start on SIAS

Time	Position	Applicant's Actions or Behavior
		• CIAS has ACTUATED.
		• ONE RCP in EACH loop is stopped.
	RO	VERIFY Pressurizer pressure is trending to between 2225 and 2275 psia. (NO)
	RO	VERIFY RCS subcooling is at least 20°. (NO)
CRITICAL TASK	RO	STOP ALL RCPs.
CRITICAL TASK	RO	COMMENCE a cooldown, not to exceed 100°F in ANY one hour to regain subcooling.
	RO	DETERMINE Core Heat Removal acceptance criteria complete:
		• VERIFY at least ONE RCP is RUNNING and supplied with CCW. (NO)
	RO	• VERIFY Loop ΔT is less than 10°F. (NO)
	BOP	DETERMINE RCS Heat Removal acceptance criteria complete:
		• VERIFY at least ONE S/G has BOTH of the following conditions:
		• S/G level is between 20 and 90% NR.
		• Feedwater is available AND level is being restored to between 60 and 70% NR.
	BOP	PERFORM BOTH of the following:
		• ENSURE Auxiliary Feedwater flow after AFAS actuation.

Op Test No.: 1 Scenario # 4 Event # 5, 6, 7 Page 14 of 19

Event Description: LOCA; Load Center 2A5 Trips Affecting Various ECCS Valves; Train A CSAS Does Not Automatically Actuate and B HPSI Pump Does Not Automatically Start on SIAS

Time	Position	Applicant's Actions or Behavior
		• CONTROL AFW flow to restore S/G level to between 60 and 70% NR.
	BOP	VERIFY RCS T_{avg} is between 525 and 535°F.
	BOP	VERIFY S/G pressure is between 835 and 915 psig (850 and 930 psia).
	BOP	• ENSURE the FOUR MSR TCV Block Valves are CLOSED.
		• ENSURE the MSR Warmup Valves are CLOSED.
		• If maintaining vacuum is desired, THEN ENSURE MV-08-814, Spillover Bypass Valve, is CLOSED.
	RO	DETERMINE Containment Conditions acceptance criteria complete: (NO)
		• VERIFY Containment pressure is less than 2 psig. (NO)
NOTE:	**The crew should investigate loss of power to various safety related valves at this time, if Load Center 2A5 has not been re-energized previously.**	
	RO	IF Containment pressure is at least 3.5 psig, THEN ENSURE ALL of the following conditions exist:
		• SIAS has ACTUATED.
		• CIAS has ACTUATED.
		• MSIS has ACTUATED.
	RO/BOP	• ALL available Containment Fan Coolers are RUNNING.

Op Test No.: 1 Scenario # 4 Event # 5, 6, 7 Page 15 of 19

Event Description: LOCA; Load Center 2A5 Trips Affecting Various ECCS Valves; Train A CSAS Does Not Automatically Actuate and B HPSI Pump Does Not Automatically Start on SIAS

Time	Position	Applicant's Actions or Behavior
	RO	IF Containment pressure is at least 5.4 psig, THEN ENSURE BOTH of the following conditions exist:
		• CSAS has ACTUATED. (NO) Must manually actuate A Train CSAS.
		• EACH Containment Spray header flow is at least 2700 gpm. (Train A initially 0 flow)
	RO	VERIFY there are Containment Radiation Monitor alarms and rising trends:
		• CIS Radiation Monitors
		• Containment Atmospheric Monitors
	RO	VERIFY Containment temperature is less than 120°F. (NO)
	RO/BOP	ENSURE ALL available Containment Fan Coolers are RUNNING. (2B fan is OFF unless the crew has energized Load Center 2A5)
	RO/BOP	VERIFY NO secondary plant radiation alarms or rising trends. (NO)
	BOP	DIRECT a field operator to perform Secondary Plant Post Trip actions. REFER TO Appendix X, Secondary Plant Post Trip Actions, Section 1.
		WHEN ALL safety function acceptance criteria have been EVALUATED, THEN PERFORM BOTH of the following:
	SRO	• DIAGNOSE the event, (REFER TO Chart 1, Diagnostic Flow Chart) as a LOCA.
		Direct the crew to enter EOP-03, Loss of Coolant Accident.

Op Test No.: 1	Scenario # 4	Event # 5, 6, 7	Page 16 of 19
Event Description:	LOCA; Load Center 2A5 Trips Affecting Various ECCS Valves; Train A CSAS Does Not Automatically Actuate and B HPSI Pump Does Not Automatically Start on SIAS		

Time	Position	Applicant's Actions or Behavior
	SRO	Have the STA VERIFY Safety Function Status Check acceptance criteria are satisfied every 15 minutes.
	SRO	OPEN the Placekeeper and NOTE the time of EOP entry.
	RO	SAMPLE S/Gs. REFER to Appendix A, Sampling Steam Generators.
	RO	IF ANY of the following conditions exist,
		• RCS pressure is less than 1736 psia
		• Containment pressure is greater than 3.5 psig
		THEN ENSURE SIAS has ACTUATED.
NOTE:	**The crew must have recognized the loss of power to multiple safety injection path valves and determined the cause to be loss of Load Center 2A5.**	
CRITICAL STEP	RO/BOP	MANUALLY START/ALIGN SIAS components. REFER to Table 1, Safety Injection Actuation Signal.
		• START 2B HPSI pump to establish B Train injection, OR
		• RE-ENERGIZE Load Center 2A5 to allow for A Train injection.
	RO	IF SIAS is present, THEN PERFORM ALL of the following:
		• ENSURE ALL available SI Pumps are RUNNING.
		• VERIFY adequate SI flow. REFER to FIGURE 2, Safety Injection Flow vs. RCS Pressure.
		• ENSURE ALL available Charging Pumps are RUNNING.
	RO	VERIFY CCW to the RCPs. (NO)

Op Test No.: 1 Scenario # 4 Event # 5, 6, 7 Page 17 of 19

Event Description: LOCA; Load Center 2A5 Trips Affecting Various ECCS Valves; Train A CSAS Does Not Automatically Actuate and B HPSI Pump Does Not Automatically Start on SIAS

Time	Position	Applicant's Actions or Behavior
	RO	IF a SIAS or CIAS has isolated CCW to the RCPs, THEN RESTORE CCW, using the following Appendix J steps:
	RO	ENSURE Instrument Air to Containment is available by PLACING HCV-18-1 to CLOSE / OVERRIDE and then to OPEN.
	RO	ALIGN the CCW "N" header by performing ONE of the following:
		• IF the "A" CCW header is available, THEN ENSURE BOTH of the following valves are OPEN:
		HCV-14-8A, "N" Hdr. Isol. Discharge
		HCV-14-9, "N" Hdr. Isol. Suction
		• IF the "B" CCW header is available, THEN ENSURE BOTH of the following valves are OPEN:
		HCV-14-8B, "N" Hdr. Isol. Discharge
		HCV-14-10, "N" Hdr. Isol. Suction
	RO	ALIGN CCW to / from the RCPs by OPENING ALL of the following valves:
		HCV-14-1, CCW to RC PUMP
		HCV-14-2, CCW from RC PUMP
		HCV-14-7, CCW to RC PUMP
		HCV-14-6, CCW from RC PUMP
	RO	IF CIAS has isolated controlled bleedoff flow to the VCT, THEN OPEN V2507, RCP Bleedoff Relief Stop Vlv.
	RO	ENSURE ALL RCP Seal Cooler Isolation valves are OPEN:
		HCV-14-11-A1, CCW from 2A1 RCP Seal Cooler
		HCV-14-11-A2, CCW from 2A2 RCP Seal Cooler

Op Test No.: 1 Scenario # 4 Event # 5, 6, 7 Page 18 of 19

Event Description: LOCA; Load Center 2A5 Trips Affecting Various ECCS Valves; Train A CSAS Does Not Automatically Actuate and B HPSI Pump Does Not Automatically Start on SIAS

Time	Position	Applicant's Actions or Behavior
		HCV-14-11-B1, CCW from 2B1 RCP Seal Cooler
		HCV-14-11-B2, CCW from 2B2 RCP Seal Cooler
	RO	VERIFY RCP CCW related alarms are CLEAR or have been evaluated and dispositioned.
	RO	ISOLATE the LOCA by performing ALL of the following:
		• IF RCS pressure is les than 2300 psia, THEN VERIFY BOTH PORVs are CLOSED.
		• ENSURE Letdown is ISOLATED.
		• ENSURE ALL SIX RCS sample valves are CLOSED.
		• VERIFY NO RCS leakage into the CCW system:
		• Absence of CCW Surge Tank high level alarm (Annunciator LB-10).
		• ENSURE sample flow to the CCW radiation monitors and NO indication of activity.
		• VERIFY LOCA is NOT occurring outside of containment:
		• NO unexplained RAB radiation monitors in alarm.
		• NO unexplained RAB sump level alarms (Annunciators LA-2, LA-8, LB-2 and LB-8).
	BOP	PLACE Hydrogen Analyzers in service. REFER to Appendix L, Placing Hydrogen Analyzer in Service.
	RO	IF ANY of the following conditions exist,
		• Containment pressure is greater than 3.5 psig
		• Containment radiation is greater than 10 R/hr
		• SIAS is ACTUATED
		THEN PERFORM ALL of the following:
		• ENSURE BOTH of the following:

Op Test No.: 1	Scenario # 4	Event # 5, 6, 7	Page 19 of 19
Event Description:	LOCA; Load Center 2A5 Trips Affecting Various ECCS Valves; Train A CSAS Does Not Automatically Actuate and B HPSI Pump Does Not Automatically Start on SIAS		

Time	Position	Applicant's Actions or Behavior
		• ENSURE CIAS has ACTUATED.
		• IF Containment pressure is greater than 3.5 psig, THEN ENSURE MSIS has ACTUATED.
		• ENSURE ALL available Emergency Containment HVAC systems are RUNNING:
		• At least ONE train of SBVS
		• At least ONE train of Containment Fan Coolers
NOTE:		**Containment spray component malfunctions should have been addressed and corrected by earlier steps.**
	RO	IF Containment pressure is greater than 5.4 psig, THEN ENSURE BOTH of the following:
		• CSAS has ACTUATED. (YES)
		• Containment Spray flow is at least 2700 gpm from EACH header. (YES)
	BOP	STABILIZE the Secondary Plant. REFER to Appendix X, Secondary Plant Post Trip Actions, Section 2.
	RO	COOLDOWN the RCS using ADVs.
		• IF RCPs are NOT operating, THEN COOLDOWN not to exceed 50°F in ANY 1 hour period. REFER to ONP 2-0120039, Natural Circulation Cooldown.
		When safety injection and containment spray are functioning and the RCS cooldown is controlled, TERMINATE the scenario.

Facility:	St. Lucie		Scenario No.:	5	Op Test No.: NRC
Examiners:			Operators:		
Initial Conditions:	Reactor Critical at 5xE-4%, MOL (IC-4).				
Turnover:	Continue startup to 2-3% power.				
Critical Tasks:	• Manually trip the Reactor, when required. • Reset 2C AFW Pump or transition to E15. • Restore power to a Vital Bus from a Unit 1 source.				

Event No.	Malf. No.	Event Type*	Event Description
1		N-BOP, SRO R-RO	Continue plant startup to 2 – 3 % power.
2		C-RO, SRO TS-SRO	Dropped CEA #69.
3		TS-SRO	Refueling Water Tank level instrument (LT-07-2C) fails low.
4		C-BOP, SRO	Loss of the Train A 4160V Vital Bus (2A3).
5		C-RO, SRO	2A1 RCP Breaker opens initiating an ATWS requiring manual Reactor trip.
6		M-ALL	Loss of Offsite Power / Station Blackout.
7		C-RO	2C AFW Pump overspeed trip.
8		C-BOP	Both Emergency Diesel Generators fail, requiring action to restore power from Unit 1.

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

DRAFT

St. Lucie 2006 NRC #5

The crew will assume the shift with a Reactor startup in progress at 5 E-4% power. The crew is instructed that all preparations have been completed for power ascension to 2 – 3% power.

After reaching the POAH, the next CEA movement (triggered on examiner cue) will cause a drop of CEA #69. The crew must stop the CEA withdrawal, and troubleshoot the failure in accordance with 2-ONP-0110030, CEA Off-Normal Operation. The SRO will refer to Technical Specifications for the appropriate action statement. The crew will identify actions to recover the CEA to within the required tolerance for operation.

When Tech Specs have been addressed and the time to realign the CEA has been identified, the Channel C Refueling Water Tank Level transmitter fails low. The SRO will refer to Tech Specs for the appropriate action statement in accordance with 2-ONP-99.01, Loss of Tech Spec Instrumentation.

When Tech Specs have been addressed, the normal supply breaker to the Train A 4160V Vital Bus fails open and the 2A EDG breaker fails to automatically close due to a bus differential current lockout. The crew must diagnose the event and locally reset the lockout relay. Plant restoration will be in accordance with 2-ONP-47.01, Loss of Safety-Related AC Bus.

When the 2A3 bus has been re-energized, the 2A1 Reactor Coolant Pump breaker trips causing a low RCS Flow Reactor trip signal. The automatic Reactor trip fails requiring the crew to manually trip the Reactor.

A Loss of Offsite Power occurs upon Reactor trip. The 2B EDG does not start and the 2A EDG trips on overspeed causing a Station Blackout event.

During the recovery, 2C AFW Pump trips on overspeed. The crew should recognize this condition and reset the overspeed trip.

The scenario may be terminated when a vital 4160V bus is re-energized from Unit 1 and AFW is restored.

EOP flow path: EOP-01, EOP-10

Op Test No.: 1	Scenario # 5	Event # 1	Page 3 of 24
Event Description:	Continue Plant Startup to 2 – 3% Power		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		**EXECUTE NRC Scenario #5 file to setup initial conditions.** **ENSURE Control Boards aligned for startup conditions.** **ENSURE procedures in progress are on the SRO desk.**
Indications Available at $5xE^{-4}$% power: **Alarm L-23: CEA LONG TERM STEADY STATE INSERTION LIMIT** **Alarm L-41: STARTUP RATE TRIP IN SERVICE** **Alarm K-6: CEA AUTO MOTION LOW POWER PROHIBIT** **Alarm G-12(13): AFW TO 2A(2B) S/G VALVE MOTOR OVRLD / AFAS OVRD** **Alarm D-19: DEH DC SUPPLY TROUBLE** **Other miscellaneous low power alarm indications.**		
	SRO	DIRECT the crew to continue the reactor/plant startup IAW 2-GOP-302, Reactor Plant Startup – Mode 3 to Mode 2.
	RO	RAISE Reactor power at a sustained startup rate of less than .5 DPM.
	BOP	MAINTAIN S/G water levels using AFW Pumps.
NOTE:		**If necessary, remain at low power until ASI is favorable for power escalation.**
	RO	• STABILIZE Reactor power at 2% to 4% as indicted on the higher reading of RPS Nuclear or Delta-T power.
		• VERIFY Linear Range Nuclear Instruments respond and that channel readings are in agreement.

Op Test No.: 1	Scenario # 5	Event # 1	Page 4 of 24
Event Description:	Continue Plant Startup to 2 – 3% Power		

Time	Position	Applicant's Actions or Behavior
	SRO	DIRECT the crew to continue the plant start-up in accordance with 2-GOP-201, Reactor Plant Startup Mode 2 to Mode 1.
		When reactor power is greater than 1%, or at the Lead Evaluator's direction, PROCEED to Event 2.

Op Test No.: 1	Scenario # 5	Event # 2	Page 5 of 24
Event Description:	Dropped CEA #69		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		**When directed, EXECUTE Event 2, Dropped CEA.**
Indications Available: **Alarm K-35:** **DROPPED CEA** **Alarm K-22:** **CEA POSITION DEVIATION WARNING** **Alarm K-30:** **CEA POSITION DEVIATION MOTION BLOCK**		
	RO	• RECOGNIZE CEA 69 has slipped to the bottom of the core.
		• REPORT condition to the crew.
		• PLACE CEDMCS panel in OFF.
		• REFER to Annunciator Response Procedures.
	SRO	• DIRECT the crew to enter ONP 2-0110030 CEA Off-Normal Operation and Realignment.
		• DETERMINE that ONP Appendix F, One Dropped CEA, is the appropriate recovery action.
	RO	• MAINTAIN reactor power at or below, but NOT to exceed 2% power.
		• DETERMINE from symptoms and CEA position indications, the operability of the CEA.
		• PLACE the mode select switch in the manual individual mode.
		• SELECT the affected CEA (69) on the individual CEA selection switches.
		• SELECT the group (5) of the affected CEA on the group select switch.
		• IF CEA motion inhibit is present, THEN:
		• Depress and hold the CEA motion inhibit bypass pushbutton.
		• Depress then release the bypass enable pushbutton.

Op Test No.: 1 Scenario # 5 Event # 2 Page 6 of 24

Event Description: Dropped CEA #69

Time	Position	Applicant's Actions or Behavior
		• IF the CEA was dropped, THEN first withdraw the affected CEA until core mimic CEA bottom light and lower electrical limit lights both deenergize.
		• INSERT and withdraw the affected CEA and check for smooth operation and normal indications.
	SRO	• DETERMINE that CEA-69 is operable.
		• DIRECT the crew to recover the CEA using Appendix I, Realignment of One Dropped CEA.
		• Technical Specification LCO 3.1.3.1 applies
	SRO/RO	• IF in Modes 1 and 2, refer to plant curve book and obtain the most recent F^{T}_{R} value. This value, when interpreted on the Technical Specification COLR Fig. 3.1-1a, will indicate the amount of time to restore the CEA within 7 inches of all other CEAs in its group.
		• DETERMINE that the CEA must be realigned within 40 (+/- 3) minutes
	RO	REALIGN the CEA (per Appendix I) to within 7 inches of all other CEAs in its group.
		• THE CEA should be recovered by a slow, smooth withdrawal using small increments of movement. Preferably, the movement increments should be three steps (2 ¼") or less. The period of time for recovering the CEA should be at least 10 minutes, but within the time allowed by Tech Specs.
		• Reactor power shall be maintained at or below 2% power, by boration, if necessary, while withdrawing the dropped CEA
		• Realign the dropped CEA by performing the following:
		• Place the mode select switch in manual individual mode.

Op Test No.: 1	Scenario # 5	Event # 2	Page 7 of 24
Event Description:	Dropped CEA #69		

Time	Position	Applicant's Actions or Behavior
		• Select the dropped CEA (69) on the individual CEA selection switches.
		• Select the group (5) of the dropped CEA on the group select switch.
		• Depress and hold the CEA motion inhibit bypass pushbutton.
		• Depress then release the bypass enable pushbutton.
		• Withdraw the affected CEA and check for smooth operation and normal indication.
		When the CEA is recovered or at the direction of the Lead Evaluator, PROCEED to Event 3

Op Test No.: 1	Scenario # 5	Event # 3	Page 8 of 24
Event Description:	Refueling Water Tank Level Instrument (LT-07-2C) Fails LOW		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		**When directed, EXECUTE Event 3, RWT Level Instrument (LT-07-2C) Fails LOW.**
Indications Available: **Alarm S-19:** **RWT LEVEL RAS CHANNEL TRIP** **Alarm Q-2:** **ENGINEERED SAFEGUARDS ATI FAULT**		
	RO	• RECOGNIZE the abnormal condition is caused by failure of LT-07-2C LOW.
		• REPORT condition to the crew.
	SRO	EVALUATE Technical Specifications using 2-ONP-99.01, Loss of Tech Spec Instrumentation.
		• LCO 3.3.2 is applicable.
		• Bypass / trip the affected channel within 1 hour.
	BOP	BYPASS LT-07-02C using keys 131 and 114 (door access).
		When the Technical Specifications have been addressed, or at the Lead Evaluator's direction, PROCEED to Event 4.

Op Test No.: 1	Scenario # 5	Event # 4	Page 9 of 24
Event Description:	Loss of the Train A 4160V Vital Bus (2A3)		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		**When directed, EXECUTE Event 4, Loss of Vital Bus 2A3.**
Indications Available: **Alarm B-46: 4.16KV EMERG SWGR 2A3 UV / UV TEST** **Alarm B-14: 4.16KV SWGR 2A3 Δ CURRENT TRIP** **Various additional alarms due to loss of Bus 2A3** **Loss of power to various Train A equipment.** **Loss of CEA position indication**		
	BOP	• DETERMINE that bus 2A3 has tripped on differential current.
		• REPORT the condition to the crew.
		• REFER to Annunciator Response Procedures.
	RO	SECURE charging pumps and RETURN control switches to AUTO.
NOTE:		**The crew may use 2-ONP-0120035 in parallel to restore Pressurizer Pressure Control.**
	SRO	• DIRECT the crew to enter 2-ONP-47.01, Loss of a Safety Related AC Bus.
		• DETERMINES that Appendix A, Restoration of 2A3 4160V Bus, has the appropriate recovery steps.
		• DIRECTS the crew to implement Appendix A.
	RO	• WITH less than two CCW pumps running, monitor RCP bearing and seal temperatures closely. (Only one running)
		• ISOLATE N header supply and return valves from the A CCW Train, if necessary, to increase cooling to the RCPs.
		• HCV-14-8A
		• HCV-14-9

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Event Description: Loss of the Train A 4160V Vital Bus (2A3)

Time	Position	Applicant's Actions or Behavior
	BOP	ENSURE ICW pump does NOT start on a depressurized header. Perform the following if required.
		• Place the 2A ICW pump (or 2C, if aligned to the A train) switch in the PULL TO LOCK position.
		AND
		• Locally throttle 2A ICW pump (or 2C, if aligned to the A train) discharge valve approximately 10 turns open.
BOOTH OPERATOR:		• **When the crew sends a SNPO to throttle the 2A ICW pump discharge valve, throttle the valve and REPORT back to the crew.** • **When the crew sends a SNPO to investigate the status of vital bus 2A3, REPORT back to the crew that the differential current relay is tripped, scaffolding crew admits having jarring with poles, but all other indications are NORMAL. (intent is to allow for reset)**
	BOP	IF a differential current lockout has occurred, (Annunciators B-14), then dispatch an operator to the switchgear to check for any relay indications or other apparent problems. (ΔCurrent Relay located on 2A CCW pump breaker cubicle).
CAUTION:		**Resetting the differential current lockout relay will IMMEDIATELY result in the diesel output breaker closing and the diesel loading onto the bus.**
	SRO/BOP	IF no apparent damage exists, ONE attempt may be made to reset the lockout.
BOOTH OPERATOR:		**When the crew directs a NPO to reset the differential current lockout relay, reset the relay and REPORT completion to the crew.**
	BOP	VERIFY Bus 2A3 is energized from the 2A DG.

Op Test No.: 1 Scenario # 5 Event # 4 Page 11 of 24

Event Description: Loss of the Train A 4160V Vital Bus (2A3)

Time	Position	Applicant's Actions or Behavior
	BOP	IF the diesel generator is loaded on the bus and the bus can be powered from an auxiliary / startup transformer, perform the following if desired:
		• Ensure breakers to be closed are first green flagged.
		• Close breaker 2-20109 2A2 to 2A3 tie breaker.
NOTE:		**The EDG Governor Control Amber light must be lit to ensure the EDG governor motor operated potentiometer is set to 60 cycles PRIOR to selecting the sync plug to position TIE-2A3.**
		• Ensure amber light is lit on the diesel generator governor control.
CAUTION:		**Potential for diesel generator trip exists. Prior to closing the bus tie breaker, verify there are no diesel generator trips locked in (Annunciators B-26).**
		• Place the synchronize plug in the TIE 2A3 position and match voltages using the DG voltage control.
		• With the DG governor control, make the synchroscope go slow in the COUNTER-CLOCKWISE direction.
		• Close breaker 2-20209 2A3/2A2 just before the needle on the synchroscope passes through the 12 o'clock position. Immediately go to raise on the diesel governor control and hold it there until the Diesel has stabilized (to prevent reverse power trip).
		• Unload 2A diesel generator to 100KW and open 2A diesel generator output breaker.
		• Stop 2A diesel generator and verify proper restart conditions by amber light indications on voltage regulator and governor controls.
		• Remove the sync plugs.

Op Test No.: 1	Scenario # 5	Event # 4	Page 12 of 24
Event Description:	Loss of the Train A 4160V Vital Bus (2A3)		

Time	Position	Applicant's Actions or Behavior
NOTE:		**System restoration (ICW, CCW and charging letdown) will be addressed, as necessary, in Events 5, 6, 7, and 8.**
		When 2A3 has been re-energized, or at the Lead Evaluator's direction, PROCEED to Events 5, 6, 7, and 8.

Op Test No.: 1	Scenario # 5	Event # 5, 6, 7, & 8	Page 13 of 24
Event Description:	2A1 RCP Breaker Opens Initiating an ATWS Requiring Manual Reactor Trip; Loss of Offsite Power/Station Blackout; 2C AFW Pump Overspeed Trip; Both Emergency diesel Generators Fail, Requiring Action to Restore Power From Unit 1		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		**When directed, EXECUTE Evens 5, 6, 7, and 8, 2A1 RCP Breaker Opens; ATWS Requiring Manual Reactor Trip; Loss of Offsite Power / Station Blackout; 2C AFW Pump Overspeed Trip; Emergency /Diesel Generators FAIL.**
Indications Available: **Alarm L-10: REACTOR COOLANT FLOW LOW CHANNEL TRIP** **Alarm L-18: REACTOR COOLANT FLOW LOW CHANNEL PRE-TRIP** **2A1 RCP Breaker is OPEN.**		
CRITICAL TASK	RO/SRO	• RECOGNIZE a valid trip signal has occurred with NO reactor trip.
		• MANUALLY TRIP the Reactor.
NOTE:		**A loss of offsite power occurs on the plant trip, and both DG's will fail, resulting in SBO**
	SRO	• DIRECT the crew to enter 2-EOP-01, Standard Post Trip Actions.
	RO/BOP	CONDUCT initial review of Post Trip Safety Functions.
NOTE:		**The crew may take corrective actions during Standard Post Trip Actions prior to reporting status.**
	RO	DETERMINE Reactivity Control acceptance criteria complete:
		• VERIFY Reactor power is lowering.
		• VERIFY Startup Rate is negative.
		• VERIFY a maximum of ONE CEA is NOT fully inserted.

Op Test No.: 1 Scenario # 5 Event # 5, 6, 7, & 8 Page 14 of 24

Event Description: 2A1 RCP Breaker Opens Initiating an ATWS Requiring Manual Reactor Trip; Loss of Offsite Power/Station Blackout; 2C AFW Pump Overspeed Trip; Both Emergency diesel Generators Fail, Requiring Action to Restore Power From Unit 1

Time	Position	Applicant's Actions or Behavior
	BOP	DETERMINE Maintenance of Vital Auxiliaries acceptance criteria complete.
		• VERIFY the Turbine is tripped by ALL GV's and TVs indicate CLOSED.
		• WHEN the Turbine is TRIPPED, THEN VERIFY the Main Generator breakers are OPEN:
		• 8W49, Generator No. 2 East Breaker
		• 8W52, Generator No. 2 Mid Breaker
		• FB 2, Exciter Supply Breaker
	BOP	VERIFY ALL Vital and Non-Vital AC buses transfer from Auxiliary to Startup Transformers, and are ENERGIZED. (NO)
	BOP	IF EITHER Vital 4.16 KV Bus is NOT powered from offsite, RECOGNIZE that:
		• The associated EDG has STARTED. (NO)
		• The associated EDG output breaker is CLOSED. (NO)
	BOP	IF ANY 6.9 KV or non-vital 4.16 KV bus is NOT powered from offsite, THEN INITIATE action to RESTORE power to the bus.
	BOP	IF NO Vital 4.16 kV buses are energized, THEN PERFORM ALL the following:
		• CONTACT UNIT 1 to determine power availability.
		• NOTIFY Unit 1 to PERFORM Appendix W, Supplying Unit 2 with AC Power using SBO Crosstie.
BOOTH OPERATOR:		**When the crew calls Unit 1 to perform Appendix W, complete the lineup, acknowledge the availability of Unit 1 power. BOTH UNIT 1 EDGs ARE RUNNING.**

Op Test No.: 1 Scenario # 5 Event # 5, 6, 7, & 8 Page 15 of 24

Event Description: 2A1 RCP Breaker Opens Initiating an ATWS Requiring Manual Reactor Trip; Loss of Offsite Power/Station Blackout; 2C AFW Pump Overspeed Trip; Both Emergency diesel Generators Fail, Requiring Action to Restore Power From Unit 1

Time	Position	Applicant's Actions or Behavior
		• PERFORM Appendix V, Receiving AC Power from Unit 1 using SBO Crosstie.
	BOP	VERIFY ALL Vital and Non-Vital DC Buses are ENERGIZED.
		The following steps implement Appendix V.
		• SELECT Train A to use to receive AC power from Unit 1 (based on Appendix R considerations).
		• PERFORM Table 7, Vital Power Breaker Configuration / Station Blackout.
		• OPEN and / or GREEN FLAG the following breakers:
		• Auxiliary Transformer 2A (6.9 KV) 2-30101
		• S.U. Transformer 2A (6.9 KV) 2-30102
		• Auxiliary Transformer 2A (4.16 KV) 2-20101
		• S.U. Transformer 2A (4.16 KV) 2-20102
		• 4.16 KV Bus Tie 2A2-2A3 2-20109
		• Station Service Transformer 2A1 2-20110
		• 480V Bus 2A1 Feeder 2-40103
		• 4.16 KV Bus Tie 2A3-2A2 2-20209
		• 480V Bus 2A5 Feeder 2-40361
		• PRZR Heater Transformer 2A3 2-20204
		• DG 2A 4.16KV Breaker 2-20211
		• 4.16 KV Bus Tie 2A3-2AB 2-20208
		• Station Service Transformer 2A5 2-20210
		• 480V 2A2 Feeder 2-40219
		• 480V Bus Tie 2A2-2AB 2-40220
		• 4.16 KV Bus Ties 2AB-2A3 2-20505
		• Station Service Transformer 2A2 2-20213

Op Test No.: 1	Scenario # 5	Event # 5, 6, 7, & 8	Page 16 of 24
Event Description:	2A1 RCP Breaker Opens Initiating an ATWS Requiring Manual Reactor Trip; Loss of Offsite Power/Station Blackout; 2C AFW Pump Overspeed Trip; Both Emergency diesel Generators Fail, Requiring Action to Restore Power From Unit 1		

Time	Position	Applicant's Actions or Behavior	
		• 480V Bus Tie 2AB-2A2	2-40702
		• 4.16 KB Bus Tie 2AB-2B3	2-20504
		• 480V Bus Tie 2AB-2B2	2-40706
		• Auxiliary Transformer 2B (6.9 KV)	2-30201
		• S.U. Transformer (6.9 KV)	2-30202
		• Auxiliary Transformer 2B (4.16 KV)	2-20301
		• S.U. Transformer 2B (4.16 KV)	2-20302
		• 4.16 KV Bus Tie 2B2-2B3	2-20309
		• Station Service Transformer 2B1	2-20310
		• 480V Bus 2B1 Feeder	2-40419
		• 480 Bus tie 2B1-2A1	2-40420
		• 4.16 KV Bus Tie 2B3-2B2	2-20411
		• 480V Bus Feeder 2B5	2-40653
		• PRZR Heater Transformer 2B3	2-20403
		• DG 2B 4.16 KV Breaker	2-20401
		• 4.16 KV Bus Tie 2B3-2AB	2-20409
		• Station Service Transformer 2B2/2B5	2-20402
		• 480V 2B2 Feeder	2-40503
		• 480V Bus Tie 2B2-2AB	2-40504
		• DISPATCH an operator to locally PLACE the 2A EDG Output Breaker NORMAL / ISOLATE switch in ISOLATE.	
BOOTH OPERATOR:		**When the crew sends a NPO to isolate the 2A DG output breaker, ISOLATE the breaker and REPORT completion to the crew.**	

Op Test No.: 1 Scenario # 5 Event # 5, 6, 7, & 8 Page 17 of 24

Event Description: 2A1 RCP Breaker Opens Initiating an ATWS Requiring Manual Reactor Trip; Loss of Offsite Power/Station Blackout; 2C AFW Pump Overspeed Trip; Both Emergency diesel Generators Fail, Requiring Action to Restore Power From Unit 1

Time	Position	Applicant's Actions or Behavior
		• PLACE the following CCW Pumps in PULL TO LOCK:
		• 2C CCW Pump
		• 2A CCW Pump
		• PLACE the 2A Containment Spray Pump in STOP.
		• PLACE the following Safety Injection Pumps in STOP:
		• 2A HPSI Pump
		• 2A LPSI Pump
		• PLACE the following Charging Pumps in STOP:
		• 2C Charging Pump
		• 2A Charging Pump
		• PLACE ALL RCP Oil lift Pumps in OFF.
		• PLACE the 2A motor driven AFW Pump in STOP.
		• PLACE the following ICW Pumps in PULL TO LOCK:
		• 2C ICW Pump
		• 2A ICW Pump
		• PLACE ALL Containment Fan Coolers in STOP.
		• ENSURE further attempts to restore power to the selected train from a Unit 2 source are suspended while Unit to Unit crosstie efforts are in progress.
		• ***WAIT for Unit 1 power availability prior to continuing with Section 2.***
		2-EOP-01 Steps Continue.
	RO	DETERMINE RCS Inventory Control acceptance criteria complete:
		• VERIFY BOTH of the following conditions exist:
		• Pressurizer level is between 10 and 68%.

Op Test No.: 1	Scenario # 5	Event # 5, 6, 7, & 8	Page 18 of 24
Event Description:	2A1 RCP Breaker Opens Initiating an ATWS Requiring Manual Reactor Trip; Loss of Offsite Power/Station Blackout; 2C AFW Pump Overspeed Trip; Both Emergency diesel Generators Fail, Requiring Action to Restore Power From Unit 1		

Time	Position	Applicant's Actions or Behavior
		• Pressurizer level is NOT trending to between 30 and 35%.
	RO	DETERMINE RCS Pressure Control acceptance criteria complete:
		• VERIFY Pressurizer pressure is between 1800 and 2300 psia.
		• VERIFY Pressurizer pressure is trending to between 2225 and 2275 psia.
		• VERIFY RCS subcooling is NOT at least 20°.
	RO	IF RCS subcooling is less than 20°F, COMMENCE a cooldown, not to exceed 100°F in ANY one hour to regain subcooling.
	RO	DETERMINE Core Heat Removal acceptance criteria complete:
		• VERIFY NO RCPs are RUNNING NOR supplied with CCW.
		• VERIFY Loop ΔT is less than 10°F. (NO)
	RO/BOP	DETERMINE RCS Heat Removal acceptance criteria complete:
	RO/BOP	• VERIFY at least ONE S/G has BOTH of the following conditions:
		• S/G level is between 20 and 90% NR.
		• Feedwater is available AND level is being restored to between 60 and 70% NR. (AFW 2C only)
	RO/BOP	PERFORM BOTH of the following:
		• ENSURE Auxiliary Feedwater flow after AFAS actuation.

Op Test No.: 1	Scenario # 5	Event # 5, 6, 7, & 8	Page 19 of 24
Event Description:	2A1 RCP Breaker Opens Initiating an ATWS Requiring Manual Reactor Trip; Loss of Offsite Power/Station Blackout; 2C AFW Pump Overspeed Trip; Both Emergency diesel Generators Fail, Requiring Action to Restore Power From Unit 1		

Time	Position	Applicant's Actions or Behavior
		• CONTROL AFW flow to restore S/G level to between 60 and 70% NR.
BOOTH OPERATOR:		**EXECUTE Event 7, 2C AFW Pump Overspeed, AFTER CREW ENTERS 2-EOP-10.**
	RO/BOP	VERIFY RCS T_{avg} is NOT between 525 and 535°F.
	RO/BOP	IF RCS T_{avg} is greater than 535°F, THEN CONFIRM that at least ONE S/G is removing RCS heat:
		• ENSURE feedwater is being restored to at least ONE S/G.
		• ENSURE ADVs are restoring RCS T_{avg} to between 525 and 535°F.
	RO/BOP	VERIFY S/G pressure is NOT between 835 and 915 psig (850 and 930 psia).
	RO/BOP	IF S/G pressure is greater than 915 psig (930 psia), THEN ENSURE the ADVs are restoring S/G pressure to less than 915 psig (930 psia).
	RO/BOP	CLOSE ALL TCVs using the MSR Reheat control Panel.
	RO	DETERMINE Containment Conditions acceptance criteria complete:
		• VERIFY Containment pressure is less than 2 psig.
		• VERIFY NO Containment Radiation Monitor alarms or rising trends:
	RO	• VERIFY Containment temperature is less than 120°F.

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Event Description: 2A1 RCP Breaker Opens Initiating an ATWS Requiring Manual Reactor Trip; Loss of Offsite Power/Station Blackout; 2C AFW Pump Overspeed Trip; Both Emergency diesel Generators Fail, Requiring Action to Restore Power From Unit 1

Time	Position	Applicant's Actions or Behavior
	RO/BOP	• VERIFY NO secondary plant radiation alarms or rising trends prior to the trip.
	RO/BOP	DIRECT a field operator to perform Secondary Plant Post Trip actions. REFER TO Appendix X, Secondary Plant Post Trip Actions, Section 1.
	SRO	WHEN ALL safety function acceptance criteria have been EVALUATED, THEN PERFORM BOTH of the following:
		• DIAGNOSE the event, REFER TO Chart 1, Diagnostic Flow Chart. (Station Blackout.)
		DIRECT the crew to enter 2-EOP-10, Station Blackout.
BOOTH OPERATOR:		**When the crew dispatches personnel to investigate the DG failures, REPORT to the crew that 2A DG has no starting air pressure, and 2B DG tripped on low oil pressure.**
	SRO	DIRECT the STA to verify SBO Safety Function Status Check acceptance criteria are satisfied every 15 minutes.
	SRO	OPEN the Placekeeper and NOTE the time of EOP entry.
	RO	PERFORM ALL of the following to protect the Secondary Plant:
		• ENSURE MSIVS are CLOSED.
		• ENSURE SGBD is ISOLATED.
		• ENSURE S/G Sampling is ISOLATED.
	BOP	STABILIZE the Secondary Plant. REFER to Appendix X, Secondary Plant Post Trip Actions, Section 2.

Op Test No.: 1	Scenario # 5	Event # 5, 6, 7, & 8	Page 21 of 24
Event Description:	2A1 RCP Breaker Opens Initiating an ATWS Requiring Manual Reactor Trip; Loss of Offsite Power/Station Blackout; 2C AFW Pump Overspeed Trip; Both Emergency diesel Generators Fail, Requiring Action to Restore Power From Unit 1		

Time	Position	Applicant's Actions or Behavior
NOTE:		**Appendix X will not be a priority until power is restored.**
	RO	PERFORM ALL of the following:
		• ENSURE Letdown is ISOLATED.
		• ENSURE RCP Controlled Bleedoff is ISOLATED.
		• ENSURE ALL SIX RCS sample valves are CLOSED.
	RO	ENSURE RCS T_{COLD} is less than 535°F and controlled by operation of ADVs.
	RO/BOP	RECOGNIZE NO S/G has level being restored to or maintained between 60 and 70% NR.
BOOTH OPERATOR:		**Provided the crew has sent operators to investigate the 2C AFW pump overspeed event, REPORT, to the crew that the pump tripped on electric overspeed. All pump conditions appear normal.**
	RO/BOP	IF 2C AFW Pump is tripped on overspeed, then ATTEMPT a restart. REFER to 2-ONP-09.02, Auxiliary Feedwater.
CRITICAL TASK	RO	IF 2C AFW pump tripped due to electrical overspeed trip, then PERFORM the following:
		• CLOSE MV-08-12, SG 2B Stm to AFW Pp 2C.
		• CLOSE MV-08-13, SG 2A Stm to AFW Pp 2C.
		• VERIFY pump has stopped rotating.
		• PERFORM the following to re-latch and open MV-08-03, 2C Pump, on RTGB-202:
		• PLACE MV-08-03, 2C Pump Key 78, key-switch to CLOSE.

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Event Description: 2A1 RCP Breaker Opens Initiating an ATWS Requiring Manual Reactor Trip; Loss of Offsite Power/Station Blackout; 2C AFW Pump Overspeed Trip; Both Emergency diesel Generators Fail, Requiring Action to Restore Power From Unit 1

Time	Position	Applicant's Actions or Behavior
		• RETURN MV-08-3, 2C Pump Key 78, key-switch to OPEN.
		• WAIT 3 minutes after pumps stops rotating (or use alternate local action).
		• ENSURE MV-09-11, Pump 2C to S/G 2A is CLOSED.
		• ENSURE MV-09-12, Pump 2C to S/G 2B is CLOSED.
		• OPEN MV-08-12, SG 2B Stm to AFW Pp 2C.
		• OPEN MV-08-13, SG 2A Stm to AFW Pp 2C.
		• To restore flow to the 2A S/G, THROTTLE MV-09-11, Pump 2C to S/G 2A to establish desired flowrate.
		• To restore flow to the 2B S/G, THROTTLE MV-09-12, Pump 2C to S/G 2B to establish desired flowrate.
BOOTH OPERATOR:		**When Appendix V is complete and 2C AFW pump is reset, complete Appendix W actions and REPORT availability of Unit 1 power to Unit 2 with two DGs running.**
	BOP	**To restore power from Unit 1**, PERFORM the following:
		• IF Unit 1 has at least ONE energized vital 4.16 KV bus, then ENSURE Unit 1 has completed Section 1 of Appendix W.
		• CROSSTIE AB 4.16 KV busses from Unit 1 to Unit 2. REFER to Appendix V, SBO Crosstie From Unit 1 to Unit 2; Section 2.
CRITICAL TASK	BOP	CROSSTIE Unit 1 to Unit 2 as follows:
		• WHEN Unit 1 is ready to supply power to Unit 2, then PERFORM ALL of the following:
		• CLOSE the Unit 2 SBO crosstie breaker, 2AB 4.16 KV BUS SBO TIE (20501).
		• REQUEST Unit 1 close their SBO crosstie breaker, 4160V SWGR 1AB UNIT X-TIE BKR (1-20501).

Op Test No.: 1	Scenario # 5	Event # 5, 6, 7, & 8	Page 23 of 24
Event Description:	2A1 RCP Breaker Opens Initiating an ATWS Requiring Manual Reactor Trip; Loss of Offsite Power/Station Blackout; 2C AFW Pump Overspeed Trip; Both Emergency diesel Generators Fail, Requiring Action to Restore Power From Unit 1		

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**When the crew directs Unit 1 to supply power to the SBO cross-tie, CLOSE the breaker, REPORT completion to the crew, and RESPOND to subsequent requests regarding DG loading that the DG loading is satisfactory.**
		• VERIFY the 2AB 4.16 KV bus has power restored.
		• ALIGN the 2A Vital 4.16 KV bus to the 2AB 4.16 KV bus by CLOSING the TWO crosstie breakers:
		• 2AB-2A3 (20505)____
		• 2A3-2AB (20208)____
	BOP	• VERIFY the 2A Vital 4.16KV bus has power restored.
		• VERIFY with Unit 1 the crosstied EDG is carrying less than or equal to 2500 KW (350 amps).
		• RESTORE power to the 2A vital 480V Load Centers by CLOSING the associated supply breakers:
		• STATION SERVICE XFMR 2A2 (20212)
		• 480V 2A2 FEEDER (40219)
		• 480V STATION SERVICE XFMR 2A5 (20210)____
		• 480V 2A5 FEEDER (40361)____
		• VERIFY with Unit 1 that the crosstied EDG is operating satisfactorily.
	RO	• START Charging Pumps AS NECESSARY to maintain Inventory Control safety function.
		• RESTORE power to the 2AB 480V Load Center by CLOSING the TWO crosstie breakers:
		• 480 V BUS TIE 2A2-2AB (40220)____
		• 480 V BUS TIE 2AB-2A2 (40702)____
NOTE:		**The crew will REFER to system operating procedures for proper CCW and ICW system restoration.**

Op Test No.: 1	Scenario # 5	Event # 5, 6, 7, & 8	Page 24 of 24
Event Description:	2A1 RCP Breaker Opens Initiating an ATWS Requiring Manual Reactor Trip; Loss of Offsite Power/Station Blackout; 2C AFW Pump Overspeed Trip; Both Emergency diesel Generators Fail, Requiring Action to Restore Power From Unit 1		

Time	Position	Applicant's Actions or Behavior
	RO	• START a CCW Pump.
	RO	• START an ICW Pump.
	RO	• START a motor driven AFW Pump AS NECESSARY to maintain RCS Heat Removal safety function.
	RO/BOP	• START additional equipment as EDG load capacity permits. Do NOT exceed 3730 KW (530 amps) on the Unit 1 EDG.
		When 2C AFW pump has been restarted and is feeding S/Gs, and Unit 1 power is supplying Unit 2 loads, TERMINATE the scenario.