Facility: **SALEM 1 & 2** Scenario No.: **NRC #1** Op-Test No.: **HOTEL**

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions: **90% Rated Thermal Power, MOL, Equilibrium Conditions**

Turnover: **Unit 2 is at 90% power with the following equipment is out of service: 2A EDG taken OOS 4 hours ago for injector maintenance, 21 RHR Pump taken OOS 4 hours ago for coupling alignment. Maintenance on both components expected to be completed 8 hours from now. All required surveillances are complete. Weather conditions are normal. Unit 1 is at 100% power. Hope Creek is in a refueling outage. Shift orders are to raise power to 100% at 10% per hour.**

Event No.	Malf. No.	Event Type*	Event Description
1	----------	N CRS/PO R RO	Raise Reactor Power
2	SW0215A SW0339E	C CRS/PO	21 SW Pump Trip With Failure of 25 Service Water Pump to Auto Start
3	PR0016A	I CRS/RO	Pressurizer Pressure Channel I Fails Low (TS CRS)
4	VC0173A	----------	21 Cntmt Fan Coil Unit Trip (TS CRS)
5	CN0086	C ALL	Decreasing Condenser Vacuum
6	BF0105A&B RP0059A&B RP0058 PR0020A	M ALL	Mn Feed Pumps Trip on High Exh Hood Pressure, ATWT, Pzr Safety 2PR3 Fails Open
7	RP318G5	C CRS/PO	23 Aux Building Exhaust Fan Fails to Start on SEC
			Terminate after SI flow reduction evaluation in LOCA-1

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

SIMULATOR SETUP

INITIAL CONDITIONS	
1.	Initialize simulator to IC-191, 90% power, MOL, C_B 869 ppm
2.	Clearance tag 2A EDG
3.	Clearance tag 21 RHR Pump
4.	Pzr Press and Level Ch I selected for control and recorder
5.	21 Cntmt Fan Coil Unit running in high speed

EVENT TRIGGERS	
6.	PZR Safety Valve 2PR3 fails open when turbine governor valve 22MS29 is <15% open (MONP100<0.15)

MALFUNCTION SUMMARY

No	Description	Delay	Ramp	Remote / Event	Initial Value	Final Value
1.	AN0253, SER 253 Fails: G29 Priming Tank	No	No	No/No	0	1
2.	RP0059A, Failure of Man Rx Trip	No	No	No/No	NA	True
3.	RP0059B, Failure of Man Si/Rx Trip	No	No	No/No	NA	True
4.	RP0058, Failure of Auto Rx Trip[1]	No	No	No/No	NA	True
5.	RP318G5, 23 AB Exh Fn Fails to Start on SEC	No	No	No/No	NA	True
6.	SW0339E, 23 SW Pump Press SW Fails Hi	No	No	No/No	NA	True
7.	SW0215A, 21 SW Pump Trip	No	No	1/No	NA	True
8.	PR0016A, Pzr Press Ch I (PT455) Fails Low	No	No	2/No	NA	1700
9.	VC0173A, 21 Cntmt Fan Coil Unit Trip	No	No	3/No	True	True
10.	CN0086, Loss of Main Condenser Vacuum[2]	No	00:03:00	4/No	0	50
11.	BF0105A, 21 Stm Gen Feed Pump Trip	No	No	5/No	0	3
12.	BF0105B, 22 Stm Gen Feed Pump Trip	00:00:07	No	5/No	0	3
13.	PR0020A, Pzr Safety Valve 2PR3 Fails Open	No	No	No/6	NA	True

REMOTE FUNCTION SUMMARY						
No	**Description**	**Delay**	**Ramp**	**Remote / Event**	**Initial Value**	**Final Value**
1.	RH26D, 21 RHR Pump Bkr Control Pwr	No	No	No/No	Off	Off
2.	RH27D, 21 RHR Pump Rack Out	No	No	No/No	Tagged	Tagged
3.	DG10A, 2A Diesel Gen Locked Out	No	No	No/No	Yes	Yes
4.	DG11D, 2A DG Bkr Control Power	No	No	No/No	Off	Off
5.	DG12D, 2A DG Bkr Rack Out	No	No	No/No	Tagged	Tagged
6.	RP07D, 21 MG Set Motor Bkr	No	No	7/No	Start	Stop
7.	RP08D, 22 MG Set Motor Bkr	00:00:10	No	7/No	Start	Stop
8.	PR34D, PORV Stop Valve 2PR6 Tagged	No	No	8/No	Untagged	Tagged
9.	CT191D, 21 CFCU 125 VDC Breaker	No	No	9/No	On	Off

I/O OVERRIDE SUMMARY						
No	**Description**	**Delay**	**Ramp**	**Remote / Event**	**Initial Value**	**Final Value**
1.	B440, OVDI RTB A Trip Switch	No	No	No/No	Off	Off
2.	B441, OVDI RTB B Trip Switch	No	No	No/No	Off	Off
3.	C310, 2E6D Pressure Heater Bus 480V Open Switch	No	No	No/No	Off	Off
4.	C510, 2G6D Pressure Heater Bus 480V Open Switch	No	No	No/No	Off	Off

SIMULATOR OPERATOR NOTES	
1.	Open Reactor Trip Breakers 3 minutes after directed by crew. Delete overrides on RBs, then B440, B441, RTB "A" and "B" open switch to ON. Also, open following breakers: **RT-7**, RP07D 21 Rod Drive MG Set Motor Breaker **RT-7**, RP08D 22 Rod Drive MG Set Motor Breaker
2.	Once the crew has reduced reactor power by approximately 10% on decreasing vacuum, change RT-4 Final Value = 100, Ramp = 00:00:00
3.	If requested, turn power off to 2PR6 using Remote Function PR34D, PORV Stop Valve toggled to Tagged on RT-8

4.	Collect trend data on the following for evaluators: • Reactor Power • Turbine Generator Load (MW) • Condenser Vacuum • Pressurizer pressure (not Ch 1 / PT455) • SG NR level (all SGs) • SG WR level (all SGs)

Op-Test No.: 1 Scenario No.: 1 Event No.: 1

Event Description: **Unit is at 90% power. Shift orders are to raise power to 100% at 10% per hour.**

Time	Position	Applicant's Actions or Behavior
	CRS	Directs activities associated with power increase - rod motion - dilution - turbine loading
	RO	Adds positive reactivity - rod motion - dilution (Procedure S2.OP-SO.CVC-0006(Q))
	PO	Coordinates with RO to initiate power increase - operate turbine controls to establish loading rate (Procedure S2.OP-SO.TRB-0001(Q)
	CRS	Makes necessary notifications - load dispatcher - operations management

SIMULATOR OPERATOR:

1. Use RT-1 to trigger next event (21 SW Pump Trip) on cue from lead examiner.

Op-Test No.: 1 Scenario No.: 1 Event No.: 2 Event Description: **21 SW Pump Trip With Failure of 25 SW Pump to Auto Start**		
Time	Position	Applicant's Actions or Behavior
	PO	Observes alarms associated with 21 SW Pump trip (OHA B-13, B-14).
	PO	Determines that 25 SW Pump has failed to auto start. Recommends manually starting an idle pump.
	CRS	Directs manual start of 25 SW Pump. May enter AB.SW-0001. May order the start of another idle pump.
	PO	Manually starts 25 SW Pump or other idle pump as directed by CRS.
	CRS	Initiates maintenance / troubleshooting activities

SIMULATOR OPERATOR:

1. Use RT-2 to trigger next event (Pzr Press Channel Failure) on cue from lead examiner.

Op-Test No.: 1 Scenario No.: 1 Event No.: 3 Event Description: **Pressurizer Pressure Channel I Fails Low**		
Time	Position	Applicant's Actions or Behavior
	RO	Responds to alarms (D-16, E-12, E-28).
	RO	Identifies failure of Pzr Press Ch I
	RO	Places Pzr Press Master Controller in MANUAL, adjusts demand to current pressure.
	CRS	Implements AB.PZR-0001. Directs RO to - adjust Master Controller output to value obtained from Attachment 1 - select alternate pressure control channel - return Master Controller to AUTO
	RO	Selects alternate pressure channel for pressure control
	RO	Places Master Controller in AUTO
	CRS	Directs removal of the failed Pressurizer Pressure Channel from service IAW S2.OP-SO.RPS-0003(Q), Placing Pressurizer Channel In Tripped Condition
	CRS	Refers to TS. Enters TSAS 3.3.1.1. Action 6 and 3.3.2.1b. Action19 for failed channel. Enters TSAS 3.4.5b for PORV 2PR1 not operable in AUTO.
	CRS/RO	Close 2PR6 PORV Stop Valve
	CRS/RO	Direct NEO to open breaker for power to 2PR6 PORV Stop Valve

SIMULATOR OPERATOR:
1. Use RT-8 to open power breaker for 2PR6 PORV Stop Valve when requested by crew.
2. Use RT-3 to trigger next event (21 Containment Fan Coil Unit Trip) on cue from lead examiner.

Op-Test No.: 1	Scenario No.: 1	Event No.: 4
Event Description: **21 Containment Fan Coil Unit Trip**		

Time	Position	Applicant's Actions or Behavior
	CRS/RO/PO	Recognize indications of problem
	PO	Refers to S2.OP-AR.ZZ-0011(Q), for Low Air Flow console alarm
	PO	**NOTIFY** the SM/CRS to refer to Technical Specifications
	PO	Refers to S2.OP-SO.CBV(Q), to start the standby CFCU (#25)
	CRS	Enters TS 3.6.2.3 Action a (7 day LCO)

SIMULATOR OPERATOR:

1. When dispatched as NEO, report back odor of burnt insulation. Appears all 21 CFCU breakers affected.
2. If directed to rack out breakers, request assistance from maintenance electricians because of apparent damage to breaker cubicles.
3. Use RT-9 to open 21 CFCU 125 VDC breaker.
4. Use RT-4 to trigger next event (decreasing vacuum) on cue from lead examiner.

Op-Test No.: 1	Scenario No.: 1	Event No.: 5
Event Description: **Decreasing Condenser Vacuum**		

Time	Position	Applicant's Actions or Behavior
	CRS/RO/PO	Recognize indications of decreasing vacuum: - loss of generator megawatts - high dissolved oxygen alarm - rise in condenser backpressure - Alarm OHA G-5, CNDSR VAC LO - Alarm OHA G-13, CNDSR VAC LO-LO
	CRS	Implements S2.OP-AB.COND-0001(Q), Loss of Condenser Vacuum. Directs actions IAW procedure - initiates Attachment 1, Continuous Action Summary - dispatches operators to look for source of problem per Attachment 2 - directs start of all available condenser vacuum pumps - directs load reduction at $\leq$ 5% per min to attempt to stabilize condenser press - when required (backpressure > limit in Att 4), initiate rapid load reduction - implement S2.OP-AB.LOAD-0001(Q), Rapid Load Reduction - when necessary, orders manual reactor and turbine trips
	PO	Performs actions as directed to address decreasing vacuum: - dispatches operators to look for source of problem per Attachment 2 - starts all available condenser vacuum pumps - performs turbine load reduction
	RO	Performs actions as directed to address decreasing vacuum: - dispatches operators to look for source of problem per Attachment 2 - coordinates with PO to reduce turbine and reactor power - maintains Tavg on program - energizes pressurizer heaters - initiates boration

SIMULATOR OPERATOR:

1. Increase severity of vacuum leak to 100% with no ramp after crew has reduced reactor power $\geq$10% or at discretion of lead examiner.
2. Use RT-5 to trigger next event (trip of main feed pumps) after increasing size of vacuum leak.

Op-Test No.: 1 Scenario No.: 1 Event No.: 6

Event Description: **Both Main Feed Pumps Trip, ATWT, Pzr Safety 2PR3 Fails Open**

Time	Position	Applicant's Actions or Behavior
	CRS	Recognizes both main feed pumps tripped. Orders manual reactor trip.
	RO	Performs initial actions of EOP-TRIP-1 1. MANUAL Reactor Trip: · First Handle to Trip. · Second Handle to Trip. · RTBs to open. · E6D and G6D to open. 2. Trip not confirmed. 3. MANUAL Turbine Trip. 4. Initiate Control Rod Insertion.
	CRS	Transitions to EOP-FRSM-1
		CRITICAL TASK #1 **Manually trip the main turbine within 30 seconds of diagnosis of ATWT conditions.**
	PO	Verifies AFW flow >44E4 lbm/hr
	RO	Starts 21 and 22 Charging Pumps
	RO	Verifies BIT flow and SJ1, 2, 4, 5, 12, 13 open
	RO	Verifies CV40, 41, 68 &69 closed
	RO	Verifies >100 charging flow
	CRS/PO	Dispatches NEO to open RTBs and Rod Drive MG Set Breakers
	CRS/PO	Dispatches NEO to close WR70 and151s
	CRS/PO	Verifies SI component actuation IAW APPX-3.
	RO	Verifies all PRNIs < 5% Verifies IR startup rate negative
	CRS	Directs chemistry to sample RCS Directs STA/Rx Eng to perform SDM calculation
	CRS	Returns to EOP-TRIP-1
	CRS/RO/PO	Verify immediate actions of EOP-TRIP-1
	RO	Closes 2CV139 & 2CV140 with RCS pressure <1500 psig
		CRITICAL TASK #2 **With RCS Pressure less than 1350 psig and BIT flow established, secure RCPs prior to exiting EOP-TRIP-1 the second time.**
	RO	Stops all RCPs with RCS pressure <1350 psig
	CRS/RO/PO	Verifies equipment alignment per EOP-TRIP-1

Op-Test No.: 1	Scenario No.: 1	Event No.: 6	
Event Description: **Both Main Feed Pumps Trip, ATWT, Pzr Safety 2PR3 Fails Open**			
	CRS/RO/PO	Performs diagnostic activities including: • LOSC • SGTR • LOCA Determines 2PR3 is stuck open	
	CRS	Transitions to EOP-LOCA-1 (based on containment sump level ≥46 or elevated/increasing containment radiation levels) Performs faulted SG evaluation Performs ruptured SG evaluation	
	RO/PO	Resets SI, Phase A, Phase B, opens 21 and 22 CA330, and resets each SEC and resets 230V Control Centers	
	PO	Stops RHR Pumps	
	CRS/RO/PO	Performs SI flow reduction evaluation	
	CRS	Transitions to EOP-LOCA-2	
		***NOTE:* Terminate scenario on lead examiner's direction after crew has determined that SI flow cannot be reduced.**	

SIMULATOR OPERATOR:

1. Open Reactor Trip Breakers 3 minutes after directed by crew. Delete overrides on RBs, then B440, B441, RTB "A" and "B" open switch to ON. Also, open following breakers:
   RT-7, RP07D 21 Rod Drive MG Set Motor Breaker
   RT-7, RP08D 22 Rod Drive MG Set Motor Breaker

Op-Test No.: 1	Scenario No.: 1	Event No.: 7
Event Description: **23 Aux Building Exhaust Fan Fails to Start on SEC**		
Time	Position	Applicant's Actions or Behavior
	CRS	Directs PO to perform EOP-APPX-3
	PO	Determines 23 AB Exh Fan did not start
	RO	Blocks SI to SEC using CMC switches on rear panel
	PO	Resets 'C' SEC
	PO	Starts 23 AB Exhaust Fan
		NOTE: **Terminate scenario on lead examiner's direction after crew has determined that SI flow cannot be reduced.**

ANTICIPATED EMERGENCY CLASSIFICATION FOR THIS SEQUENCE OF EVENTS:
Site Area Emergency (5.1.3)

NRC #1

MODE: 1 POWER: 90% RCS BORON: 869 Mwe: 1070

SHUTDOWN SAFETY SYSTEM STATUS (5, 6 & DEFUELED):

NA

REACTIVITY PARAMETERS

4000 MWD/MTU, Zenon burning out slowly at 8 pcm/hr

MOST LIMITING LCO AND DATE/TIME OF EXPIRATION:
2A Diesel Generator was C/T 4 hours ago for injector maintenance. 3.8.1.1 b action b is in effect, the next Line surveillance is due in 6 hours.
21 RHR Pump was C/T 4 hours ago for a coupling alignment. 3.5.2 c, action a. Maintenance on both components expected to be completed 8 hours from now.

EVOLUTIONS/PROCEDURES/SURVEILLANCES IN PROGRESS:
Raise Power to 100% at 10%/hr. Reactivity Plan recommends 2500 gal of primary water for 10% power increase, rods to be withdrawn as required for temperature control to All Rods Out position.

ABNORMAL PLANT CONFIGURATIONS:

CONTROL ROOM:

PRIMARY:

SECONDARY:
Heating steam is aligned to unit 1.

RADWASTE:

No discharges in progress

CIRCULATING WATER/SERVICE WATER:

Facility: **SALEM 1 & 2** Scenario No.: **NRC #2** Op-Test No.: **HOTEL**

Examiners: _____ Operators: _____

Initial Conditions: **100% Rated Thermal Power, BOL, Equilibrium Conditions**

Turnover: **Unit 2 is at 100% power. Unit 1 and Hope Creek are also at 100% power. Solar magnetic disturbances have been occurring. Current SMD K3. 22 AFW Pump was taken OOS 2 hours ago for motor bearing replacement. AFW pump maintenance is expected to be complete 6 hours from now. All required surveillances are complete. The crew is directed to maintain 100% power.**

Event No.	Malf. No.	Event Type*	Event Description
1	NI0193A	I CRS/RO	PRNIS Channel N41 Fails High (TS CRS)
2	CF81 (OVDI)	C CRS/PO	24MS10 Relief Fails Open (Pressure Setpoint Decrease)
3	DA033D (RF)	----------	Failure of RTB Shunt Trip Capability (TS CRS)
4	TU0081G	N CRS/PO R RO	Main Turbine Governor Valve 23MS29 Fails Closed
5	VL0447 RP0058 RP0069 RP0073 RP0279A&B	C ALL	SG Fdwtr Control 22BF19 Fails Closed, Turbine Fails To Trip, Auto MSLIS Fails to Actuate
6	EL0144 AF0183	M ALL	Loss of 2A 4KV Vital Bus and 23 AFW Pump Trip
			Terminate when feed flow re-established to a SG

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

SIMULATOR SETUP

INITIAL CONDITIONS	
1.	Initialize simulator to IC-192, 100% power, BOL, C_B 1145 ppm
2.	Clearance tag 22 AFW Pump

EVENT TRIGGERS	
6.	2A 4KV Bus Deenergizes on Reactor Trip (Control Bank C < 5 steps)

MALFUNCTION SUMMARY

No	Description	Delay	Ramp	Remote / Event	Initial Value	Final Value
1.	AN0253, SER 253 Fails: G29 Priming Tank	No	No	No/No	0	1
2.	RP0058, Failure of Auto Rx Trip	No	No	No/No	NA	True
3.	RP0069, Main Turbine Interface Valve Failure	No	No	No/No	NA	True
4.	RP0073, Mn Turbine Trip Failures (Various)	No	No	No/No	0	4
5.	RP0279A, Auto MSLIS Fails to Actuate - Trn A	No	No	No/No	NA	True
6.	RP0279B, Auto MSLIS Fails to Actuate - Trn B	No	No	No/No	NA	True
7.	NI0193A, PR Ch N41 Fails High	No	No	1/No	0	200
8.	TU0081G, 23MS29 Turb Cntrl Vlv Fails Cls	No	No	4/No	NA	True
9.	VL0447, 22BF19 Fails Closed[3]	No	00:02:00	5/No	NA	0
10.	EL0144, Loss of 2A 4160V Vital Bus	No	No	No/6	NA	True
11.	AF0183, 23 Aux FW Pmp Overspeed Trip[1]	No	No	7/No	NA	True

REMOTE FUNCTION SUMMARY

No	Description	Delay	Ramp	Remote / Event	Initial Value	Final Value
1.	AF25D, 22 AFW Pump Bkr Control Power	No	No	No/No	Off	Off
2.	AF26D, 22 AFW Pump Rack Out	No	No	No/No	Tagged	Tagged
3.	DA033D, 2AADC Bkr #14 Rx Trip Bkr	No	No	3/No	Closed	Open

I/O OVERRIDE SUMMARY

No	Description	Delay	Ramp	Remote / Event	Initial Value	Final Value
2.	CF18 OVDI, 24MS10 Press Setpt Decrease	No	No	2/No	Off	On

SIMULATOR OPERATOR NOTES	
1.	Trip 23 AFW Pump after PO throttles AFW (after immediate actions of EOP-TRIP-1).
2.	After being dispatched to investigate closure of Main Turbine Governor Valve, NEO reports EHC fluid leak on 23MS29 valve actuator.
3.	Insert Malf VL0447, 22BF19 Fails Closed (RT-5), after condensate pump stopped during rapid power reduction or at lead examiner's discretion.
4.	Collect trend data on the following for evaluators: • Reactor power • Turbine Generator load (MW) • 21, 22, 23, 24 SG NR level • 21, 22, 23, 24 SG WR level

Op-Test No.: 1	Scenario No.: 2	Event No.: 1
Event Description: **PR NIS Channel N41 Fails High**		

Time	Position	Applicant's Actions or Behavior
	CRS/RO	Observe indications of channel failure - numerous alarms on OHA-E - control rods stepping in - PR NIS N41 indicating full scale high - PCS AFD alarms
	RO	Determines PR NIS Channel has failed high. Places ROD BANK SELECTOR SWITCH in MANUAL after obtaining CRS concurrence.
	RO	Identifies failed channel. Informs CRS.
	CRS	Refers to S2.OP-SO.RPS-0001(Q), Nuclear Instrumentation Channel Trip/Restoration to review actions for removing failed channel from service. May also enter AB.NIS or AB.ROD-0003.
	CRS	Notifies I/C Maintenance
	CRS	Reviews TS. Enters LCO 3.3.1.1 Actions 2 and 6
	CRS/PO	Coordinate to remove channel from service 1. DETECTOR CURRENT COMPARATOR, UPPER SECTION to PRN41 2. Verify CHANNEL DEFEAT lamp lit and OHA E-38 clears (alarm already cleared - specific NIS failure used does not cause this alarm) 3. DETECTOR CURRENT COMPARATOR, LOWER SECTION to PRN41 4. Verify CHANNEL DEFEAT lamp lit and OHA E-46 cleared (alarm already cleared - specific NIS failure used does not cause this alarm) 5. POWER MISMATCH BYPASS to BYPASS PR N41 6. ROD STOP BYPASS to BYPASS PR N41 7. Verify 2RP4-OVERPOWER ROD STOP MANUAL BYPASS, CH 1 lit 8. Verify OHA E-31 clear 9. COMPARATOR CHANNEL DEFEAT to N41 10. Verify COMPARATOR DEFEAT lit and OHA E-39 clear 11. At Control Rack No. 26, AXIAL FLUX DIFF MONITOR INPUT TEST SWITCH 1 to TEST 12. Contact I/C to position bistable test switches 13. Remove both AC control power fuses from N41 drawer front
	CRS/RO/PO	Reduce turbine load, if needed to restore Tavg to program
	CRS/RO	If desired, return ROD BANK SELECTOR SWITCH to AUTO

SIMULATOR OPERATOR:

1. If I/C directed to position bistable test switches, report that technician will be available to assist in approximately 1 hour.
2. Use RT-2 to trigger next event (MS10 fails open) after rods are returned to AUTO.

Op-Test No.: 1	Scenario No.: 2	Event No.: 2
Event Description: **24MS10 Relief Fails Open (Pressure Setpoint Decrease)**		

Time	Position	Applicant's Actions or Behavior
	CRS/RO/PO	Observe changing plant parameters (temperature, power, steam pressure) and identify 24MS10 is open.
	RO	Reports Tavg lowering, Pzr Press Lo E-28 alarm, B/U Htrs energize in Auto alarm
	PO	Attempts to determine reason for excess steam flow
	CRS	Enters AB.STM-0001(Q), Excessive Steam Flow. Initiates Attachment 1 CAS.
	PO	Reports turbine electro-hydraulic control working correctly
	CRS	Directs RO and PO to prepare for load reduction NOTE: 24MS10 failure may be diagnose and valve closed prior to any load reduction.
	PO	Takes manual control, closes 24MS10.
	CRS	Initiates action to repair controller.

SIMULATOR OPERATOR:

3. Use RT-3 to trigger next event (Loss of Shunt Trip Capability) at discretion of lead examiner.

Op-Test No.: 1 Scenario No.: 2 Event No.: 3 Event Description: **Failure of RTB Shunt Trip Capability (TS CRS)**		
Time	Position	Applicant's Actions or Behavior
	RO	Observes console alarm. Refers to S2.SO-AR.ZZ-0012(Q), 2CC2 Console Alarm Procedure.
	CRS	Determines that shunt trip capability (not UV trip capability) is affected.
		Refers to TS. Enters TS LCO 3.3.1.1 Action 14 (not Action 1).
	CRS	Initiates actions to repair RTB.

SIMULATOR OPERATOR:

4. Use RT-4 to trigger next event (23MS29 fails closed) at discretion of lead examiner.

Op-Test No.: 1	Scenario No.: 2	Event No.: 4
Event Description: **Main Turbine Governor Valve 23MS29 Fails Closed**		

Time	Position	Applicant's Actions or Behavior
	CRS/RO/PO	Observe indications of valve closure: – Megawatt load will drop rapidly as remaining governor valves open until limited by valve position limiter (VPL) – Console Alarm Tavg/Tref dev as Tavg rises. – Steam Dumps will open to attempt to control Tavg – Pressurizer pressure and level will rise due to change in Tavg, sprays open to control pressure
	PO	Determines that 23MS29 has closed. Informs CRS. Dispatches NEO to investigate.
	CRS	Refers to Precautions and Limitations of S2.OP-SO.TRB-0001(Q), Turbine Generator Startup Operations. Determines need to reduce power to ≤ 30% at 5% per minute. Implements S2.OP-AB.LOAD-0001(Q), Rapid Load Reduction NOTE: CRS may direct >5% per min load reduction until functioning governor valves are off of open limit.
	RO	Initiates power reduction using rods and boration. Energizes pressurizer heaters. Maintains rods above Rod Insertion Limit.
	PO	Initiates turbine load reduction.
	CRS	Dispatches maintenance to investigate problem with governor valve.
	CRS	Notifies electric system operator and operations management.
	PO	Stops one condensate pump at ~75% power.

SIMULATOR OPERATOR:

5. After being dispatched to investigate closure of Main Turbine Governor Valve, NEO reports EHC fluid leak on 23MS29 valve actuator.
6. Use RT-5 to trigger next event (22BF19 closes) after condensate pump is stopped or at discretion of lead examiner.

Op-Test No.: 1 Scenario No.: 2 Event No.: 5

Event Description: **SG Fdwtr Control 22BF19 Fails Closed, Turbine Fails To Trip**

Time	Position	Applicant's Actions or Behavior
	PO	Responds to feedwater alarms and/or notes changes in BF19 position.
	PO	Determines 22BF19 is closed, attempts to open in MANUAL, reports that it will not open.
	CRS	Orders a manual reactor trip.
	RO	Manually trips reactor
	RO	Attempts to trip turbine. Determines turbine trip not functioning.
		CRITICAL TASK #1 **Initiates MSLI before completion of reading of first 4 steps of EOP-TRIP-1.**
	RO	Determines MSLI required. Manually initiates MSLIS
	CRS	Implements EOP-TRIP-1

SIMULATOR OPERATOR:

7. 2A 4KV Bus will automatically de-energize on event trigger when Control Bank C < 5 steps.

Op-Test No.: 1 Scenario No.: 2 Event No.: 6

Event Description: **Loss of 2A 4KV Vital Bus and 23 AFW Pump Trip**

Time	Position	Applicant's Actions or Behavior
	CRS	Performs initial actions of EOP-TRIP-1 - Trip Reactor (had to manually trip) - Is Reactor Trip Confirmed - Trip Turbine (turbine would not trip, MSIVs closed) - Is ANY 4 KV Vital Bus energized (2A de-energized) - Is SI Actuated (SI will actuate because of failure of turbine trip)
	RO	Reports reactor tripped manually, 2 rods not fully inserted
	RO	Reports turbine not tripped, MSIVs closed
	PO	Reports 2A 4KV Bus de-energized, 21 EDG running unloaded
	CRS	NOTE: Mn generator output bkrs do not auto open because turbine fails to trip. CRS may order opening of mn gen output bkrs 1-9 and 9-10
	CRS	Makes page announcement - reactor trip
	CRS	Notifies SM of need to implement Emergency Classification Guide
	PO	Controls AFW flow to maintain >22E04 lb/hr **NOTE: Use RT-7 to trigger trip of 23 AFW pump after PO throttles AFW (after immediate actions of EOP-TRIP-1).**
	RO	Verifies RCPs running, Tavg trending to 547°F, trip breakers open
	PO	PO reports loss of flow on 23 AFW Pump.
	CRS	Dispatches NEO to close 21SW20 (2A bus component)
	CRS	Requests assistance from WCC to perform AB.4KV-0001 and investigate loss of 2A 4KV Bus
	CRS	Directs RO to start 22 SWGR Exh Fan NOTE: Fan appears to be running - bkr is closed but bus is de-energized
	RO	Reports only 1 CCW pump running.
	CRS	Dispatches NEO to close CC37 and CC38
	CRS	Directs transition to FRHS-1 when SG level <9% with AFW flow <22E04 lb/hr
	CRS/RO/PO	Verify RCS pressure > intact SG pressure
	CRS	Reviews Bleed and Feed initiation criteria with crew
	RO	Stops all reactor coolant pumps
	PO	Verifies condensate system in operation
	PO	Reports SGFP not available due to MSLI
	RO	Initiates SI

Op-Test No.: 1 Scenario No.: 2 Event No.: 6

Event Description: **Loss of 2A 4KV Vital Bus and 23 AFW Pump Trip**

Time	Position	Applicant's Actions or Behavior
	CRS	Directs SI Verification per EOP-APPX-3
	RO	Resets SI Resets Phase A Isolation Resets Phase B Isolation Opens 21CA330 and 22CA330 Resets each SEC Resets 230V Control Centers
	RO	Stops running RHR and SI pumps. Stops either 21 or 22 Charging Pump
	CRS	Determines SG to be depressurized.
	PO	Fully opens selected MS10
	CRS	Directs NEO to open selected BF40 or BF19
	PO	Opens selected BF13
	PO	Opens 21CN48 and 22CN48
	PO	Closes 21CN32 and 22CN32
	PO	Reports observed level increase in selected SG and/or CET temperatures lowering
		CRITICAL TASK #2 **Establish condensate flow into at least one SG.**
		NOTE: **Terminate scenario on lead examiner's direction after condensate flow has been established.**

SIMULATOR OPERATOR:

1. 2A 4KV Bus will automatically de-energize on event trigger when Control Bank C < 5 steps.
2. Use RT-7 to trigger trip of 23 AFW pump after PO throttles AFW (after immediate actions of EOP-TRIP-1).

ANTICIPATED EMERGENCY CLASSIFICATION FOR THIS SEQUENCE OF EVENTS:

- **Site Area Emergency (3.1.1.b AND 3.2.1.b)**

  OR

- **Site Area Emergency (8.1.3.c)**

NRC #2

MODE: 1 POWER: 100% RCS BORON: 1145 ppm Mwe: 1190

SHUTDOWN SAFETY SYSTEM STATUS (5, 6 & DEFUELED):

NA

REACTIVITY PARAMETERS

4000 MWD/MTU

MOST LIMITING LCO AND DATE/TIME OF EXPIRATION:
22 AFW Pump was C/T 2 hours ago for motor bearing replacement, 3.7.1.2 a, action a. Maintenance is expected to complete 6 hours from now.

EVOLUTIONS/PROCEDURES/SURVEILLANCES IN PROGRESS:
Orders to shift to maintain 100% power.

ABNORMAL PLANT CONFIGURATIONS:

CONTROL ROOM:

Solar Magnetic Disturbances have been occurring, currently there is an SMD K-3 in effect until 2300 tonight.

PRIMARY:

SECONDARY:

Heating steam is aligned to unit 1.

RADWASTE:

No discharges in progress

CIRCULATING WATER/SERVICE WATER:

Facility: **SALEM 1 & 2** Scenario No.: **NRC #3** Op-Test No.: **HOTEL**

Examiners: _____ Operators: _____

Initial Conditions: **3% Rated Thermal Power, MOL**

Turnover: **Unit 2 is at 3% power, recovering from a 7 day forced outage to repair body to bonnet leak on Pzr Spray Bypass Valve 2PS4. Mode change is approved. Weather conditions are normal. Unit 1 and Hope Creek are at 100% power. Shift orders are to raise power in preparation for placing the main turbine in service. Procedure in use: IOP-3 at Step 5.4.14.**

Event No.	Malf. No.	Event Type*	Event Description
1	----------	N CRS/PO R RO	**Raise Reactor Power**
2	**PR0017A**	I CRS/RO	**Pressurizer Level Channel I (LT459) Fails Low (TS CRS)**
3	**SG0078A**	C ALL	**21 SG Tube Leak (5 gpm) (TS CRS)**
4	**BF0105A**	C CRS/PO	**21 Main Feed Pump Trip**
5	**RC0012C**	C CRS/RO	**23 RCP High Vibration**
6	**SG0078A** **EL0134**	M ALL	**SGTR with Loss of Offsite Power**
7	**SJ0184A**	C CRS/PO	**21 SI Pump Fails to Auto Start**
			Terminate scenario when depressurization criteria met (SGTR-1 Table F)

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

SIMULATOR SETUP

INITIAL CONDITIONS	
1.	Initialize simulator to 3% power IC-193

EVENT TRIGGERS	
1.	None

MALFUNCTION SUMMARY

No	Description	Delay	Ramp	Remote / Event	Initial Value	Final Value
1.	AN0253, SER 253 Fails: G29 Priming Tank	No	No	No/No	0	1
2.	PR0017A, Pzr Lvl Ch I (LT459) Failure	No	No	1/No	NA	0
3.	SG0078A, 21 SG Tube Leak	No	No	2No	0	5
4.	BF0105A, 21 Main Feed Pump Trip	No	No	3/No	0	3
5.	RC0012C, 23 RCP High Vibration	No	00:02:00	4/No	0	30
6.	EL0134, Loss of Offsite Power[1]	No	No	5/No	NA	True
7.	SJ0184A, 21 SI Pp Fails to Start on SEC	No	No	No/No	NA	True

REMOTE FUNCTION SUMMARY

No	Description	Delay	Ramp	Remote / Event	Initial Value	Final Value
1.	None					

I/O OVERRIDE SUMMARY

No	Description	Delay	Ramp	Remote / Event	Initial Value	Final Value
1.	None					

SIMULATOR OPERATOR NOTES	
1.	After 23 RCP High Vibration, ramp the severity of the SG tube leak from 5 gpm to 650 gpm over 3 minutes, then initiate the loss of offsite power.
2.	Collect trend data on the following for evaluators: • 21 and 22 SG pressure • Pzr pressure • 21 and 22 SG NR level • Highest CET temperature • NI power
3.	If contacted on SG tube leak, SM informs CRS that extra NCO will perform rad monitor plotting IAW Continuous Action Summary Steps 3 and 4 of S2.SO-AB.SG-0001(Q).

Op-Test No.: 1 Scenario No.: 3 Event No.: 1 Event Description: **Raise Reactor Power**		
Time	Position	Applicant's Actions or Behavior
	CRS	Directs activities associated with power increase IAW S2.OP-IO.ZZ-0003(Q), Hot Standby to Minimum Load: - rod motion - dilution
	CRS	Initiates Turbine Generator Startup Operations
	RO	Adds positive reactivity - rod motion - dilution
	PO	Places MS10s in AUTO with setpoint 1010 to 1020 psig

SIMULATOR OPERATOR:
1. *Use RT-1 to trigger next event (Pzr Level Channel Fails Low) on cue from lead examiner.*

Op-Test No.: 1 Scenario No.: 3 Event No.: 2

Event Description: **Pressurizer Level Channel I (LT459) Fails Low**

Time	Position	Applicant's Actions or Behavior
	RO	Observes OHA. Identifies that Pzr Lvl Ch I has failed low.
	CRS/RO	Refers to Alarm Response Procedure for OHA E-36.
	RO	***Takes manual control of charging,*** minimizes charging flow ***(maintains pzr level on pgrm IAW AB.CVC Attachment 1).*** ***NOTE:*** *From Attachment 1, Target Pzr Level = 1.1875 * (Tavg - 547) + 22*
	RO	***Selects an operable channel for control, alarm, and recorder.***
	RO	***Restores pressurizer heaters, as desired.***
	CRS	***Directs restoration of letdown*** IAW S2.OP-SO.CVC-0001(Q), Charging, Letdown and Seal Injection ***NOTE:*** CRS may go directly to AB.CVC-0001(Q), Loss of Charging. Steps that are duplicated in AB are shown here in ***bold italics.***
	RO	Prepares for letdown restoration: 2. Ensures letdown orifice isolations closed (2CV3, 4, 5) 3. Ensures 2CC71 in AUTO 4. ***Opens 2CV7, Ltdn Hx Inlet Vlv*** 5. Places 2CV18 in MANUAL CLOSE 6. Opens 2C18 until CLOSE (INC PRESS) p/b extinguishes 7. ***Opens 2CV2 (and 2CV277), Ltdn Line Isol Vlv(s)*** 8. ***Places 2CV2 and 2CV277 (Ltdn Line Isol Vlvs) in AUTO*** 9. ***Places 23 Charging Pump in MANUAL and ADJUSTS chg flow 85-90 gpm*** 10. Adjusts 2CV71, as necessary, to maintain 6-12 gpm per pump, not to exceed 40 gpm total RCP seal injection flow
	RO	Restore letdown: 1. ***Simultaneously*** ***- Opens 75 gpm letdown orifice isolation (2CV4 or 2CV5)*** - Adjusts 2CV71 for 6 to 12 gpm per pump ***- Adjusts 2CV18 to maintain letdown pressure at 300 psig*** 2. ***Ensures Master Lvl Controller in AUTO*** ***3. Ensures pzr level within normal band, places 23 Chg pump in AUTO*** ***4. Adjusts 2CV18 as necessary and places in AUTO***
	CRS	***Contacts I&C to place pressurizer channel in tripped condition (IAW S2.OP-SO.RPS-0003(Q), Placing Pressurizer Channel in Tripped Condition.)***
	CRS	Enters TS LCO 3.3.1.1 Action 6. May review post accident monitoring TS (only 2 channels required).

SIMULATOR OPERATOR:

1. Use RT-2 to trigger next event (SG Tube Leak) after normal letdown has been restored on cue from lead examiner.

Op-Test No.: 1 Scenario No.: 3 Event No.: 3

Event Description: **21 SG Tube Leak (5 gpm)**

Time	Position	Applicant's Actions or Behavior
	PO	Reports increasing activity in cond offgas (R15) and 21 SG B/D Sample (R19A)
	CRS	Refers to AB.RAD-0001(Q), Abnormal Radiation ***NOTE:*** May go directly to AB.SG-0001(Q), Steam Generator Tube Leak
	CRS	Announces increasing activity on 21 SG
	CRS	Notifies SM to refer to Emergency Classification Guide
	CRS	Refers to AB.SG-0001(Q), Steam Generator Tube Leak
	CRS	Reviews Attachment 1, CAS.
	RO	Verifies pressurizer level stable
	RO/PO	Identifies 21 SG as affected SG
	PO	Sets 21MS10 to 1045 psig
	PO	Closes 21GB4, 21MS18, 21MS7
	CRS	Dispatches NEO to close 21MS45, 23 AFW Pump Turbine Steam Supply
	CRS	Dispatches operators to align SGBD and sampling
	CRS	Directs chemistry to sample and determine leak rate
	RO	Calculates RCS leak rate
	CRS	Makes notifications
	CRS	Enters TS LCO 3.4.7.2.c. Action b. for greater than 1 gpm total SG tube leakage and greater than 500 gpd tube leakage in single SG (4 hrs to fix or next 6 hours to Hot Standby)

SIMULATOR OPERATOR:

2. If contacted, SM informs CRS that extra NCO will perform rad monitor plotting IAW Continuous Action Summary Steps 3 and 4 of S2.SO-AB.SG-0001(Q).
3. Use RT-3 to trigger next event (Main Feed Pump Trip) on cue from lead examiner after approximate leak rate determined.

Op-Test No.: 1	Scenario No.: 3	Event No.: 4
Event Description: **21 Main Feed Pump Trip**		

Time	Position	Applicant's Actions or Behavior
	CRS	Recognizes trip of the operating main feedwater pump. Enters S2.OP-AB.CN-0001(Q), Main Feedwater / Condensate System Abnormality..
	CRS	Verifies reactor power < P-10 setpoint. Proceeds to Step 3.14.
	CRS	Directs RO to reduce power to <5%.
	PO	4. Sets SG Inlet Vlv demand to 0% (Vlvs 21 through 24AF21) 5. Starts 21 and 22 AFW pumps 6. Controls 21 through 24AF21 to maintain SG levels within ±5% of program level (~35% NR level)

SIMULATOR OPERATOR:

7. Use RT-4 to trigger next event RCP High Vibration) on after SG level control established or following plant stabilization post-trip on cue from lead examiner.

Op-Test No.: 1	Scenario No.: 3	Event No.: 5
Event Description: **23 RCP High Vibration**		

Time	Position	Applicant's Actions or Behavior
	RO	Observes OHA D-36 RCP VIB HI alarm. Refers to S2.OP-AR.ZZ-0004(Q), Overhead Annunciators Window D.
	PO	Checks vibration levels behind Panel 2RP4. Determiness vibration level on 23 RCP motor flange > 5 mils.
	CRS	Implements S2.OP-AB.RCP-0001(Q), Reactor Coolant Pump Abnormality. Initiates Attachment 1, Continuous Action Summary.
	CRS	Directs manual reactor trip and stop of 23 RCP after reactor trip confirmed. ***NOTE:* If reactor already tripped, then CRS will direct stopping #23 RCP.**

SIMULATOR OPERATOR:
1. Increase SG tube leak from 5 gpm to 650 gpm over 1 minute after 23 RCP stopped.
2. Use RT-5 to trigger next event (Loss of Offsite Power) when SI manually initiated or at discretion of lead examiner.

Op-Test No.: 1 Scenario No.: 3 Event No.: 6

Event Description: **SGTR with Loss of Offsite Power**

Time	Position	Applicant's Actions or Behavior
	RO/PO	Observe indications of increased rate of 21 SG tube leakage. Informs CRS.
	CRS	Directs manual SI actuation. Makes page announcement. Transitions to EOP-TRIP-1.
	CRS/RO/PO	Perform immediate actions of EOP-TRIP-1.
	CRS	Directs PO to perform APPX-1 to restart CCW pump.
	CRS	Confirms operability of 4KV vital buses following loss of offsite power, remains in EOP-TRIP-1.
	PO	Blocks and resets SECs
	RO	Verifies no RCPs running and Tavg <547. (Step 21)
	PO	Throttles AFW to maintain SG NR levels 9-35% (Step 21)
	PO	Initiates MSL Isolation on loops 21 through 24 (Step 21)
		CRITICAL TASK #1 Isolate AFW to the ruptured SG within 10 minutes of initiation of Safety Injection signal.
	PO	Isolates AFW to 21 SG
	CRS	Determines 21 SG level increasing in an uncontrolled manner. Transitions to EOP-SGTR-1 (From Step 27 of EOP-TRIP-1)
	PO	Verify valves closed on ruptured SG (Step 4) • MS167 MS Stop • MS18 MS Bypass • MS7 MS Drain • GB4 SG Outlet
	PO	Stops feeding 21 SG (Step 6). ***NOTE:*** CRS may direct tripping 23 AFW Pump until stm isolated from 21 SG
	PO	Resets SI, Phase A, Phase B, SECs, and opens cntmt control air isolation valves (21CA330 and 22CS330). Resets 230V Control Centers (Step 10).
	CRS	Determines target cooldown CET temperature from Table D.
	PO	Cooldowns at max rate using intact SG MS10 valves. Stops cooldown at target temperature.
	PO	Depressurizes RCS using PORV
		NOTE: **Terminate scenario when depress criteria met (SGTR-1Table F) or at discretion of lead examiner.**

Op-Test No.: 1	Scenario No.: 3	Event No.: 7
Event Description: 21 SI Pump Fails to Auto Start		

Time	Position	Applicant's Actions or Behavior
	PO	Determines 21 SI Pump failed to start.
	CRS	Directs PO to reset SEC and start 21 SI Pump
	PO	Resets 'A' SEC
	PO	Manually starts 21 SI Pump.
	PO	Informs CRS.
		NOTE: **Terminate scenario when depress criteria met (SGTR-1Table F) or at discretion of lead examiner.**

ANTICIPATED EMERGENCY CLASSIFICATION FOR THIS SEQUENCE OF EVENTS:
Alert (5.2.3.a)

NRC #3

MODE: 2 POWER: 3% RCS BORON: Mwe: 0

SHUTDOWN SAFETY SYSTEM STATUS (5, 6 & DEFUELED):

NA

REACTIVITY PARAMETERS

4000 MWD/MTU

Reactivity plan for power increase recommends using rod withdrawal to control Tavg during power increase to 18%. Detailed reactivity plan for power increase after turbine sync being developed by Rx engineering

MOST LIMITING LCO AND DATE/TIME OF EXPIRATION:

None

EVOLUTIONS/PROCEDURES/SURVEILLANCES IN PROGRESS:
Plant is recovering from a 7 day forced outage to repair a body to bonnet leak on2PS4. Currently at step 5.4.14 in IOP-3 awaiting Chemistry Department samples. All mode change signoffs are completed.

ABNORMAL PLANT CONFIGURATIONS:

CONTROL ROOM:

PRIMARY:

SECONDARY:

Heating steam is aligned to unit 1.

RADWASTE:

No discharges in progress

CIRCULATING WATER/SERVICE WATER: