Scenario No.: 3

Target Quantitative Attributes per Scenario (NRC Form ES-D-1)

Facility: _____Salem_____ Scenario No.: ____ESG-3_____ Op-Test No.: __20-01 NRC__

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions: IC-242: Unit 2 is at 93% power, MOL; 2A EDG is running unloaded for maintenance run. The following equipment is out of service: 21 AFW Pump C/T for oil bubbler replacement and 21 Containment Spray pump for lube.

Turnover: The crew is directed to continue power ascension to 98% power at 10% per hour IAW S2.OP-IO.ZZ-0004 by use of dilution, control rods and turbine load control.

Critical Tasks:

1. Manually actuate main steamline isolation before a Red path to either subcriticality or the integrity CFST or transition to LOSC-2
2. Establish feed flow to one SG before RCS bleed and feed is required

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	ATC (R) BOP (N) CRS (N)	Power ascension to 98% at 10% per hour IAW IOP-4
2	RD0316A	BOP (C) CRS (C)	21 CRDM Vent Fan damper fails closed.
3	PR0017A	ATC (I) CRS (I,TS)	PZR Level Controlling Channel fails high.
4	BF0109A	ALL (C)	21CN22 Low Pressure FWH Inlet fails closed.
5	EL0161	CRS (TS)	2A EDG emergency trip.
6	RC0006C RC43CX RC43CY	ATC (C) CRS (C)	23 RCP Motor Oil Level low.
7	RP0279A RP0279B RP0073 RP0069 AF0353C	ALL (M)	-Main Turbine fails to trip by all means from the control room. **(CT-1)** -Main Steam Line Isolation fails to Auto actuate. (Expect Auto Safety Injection – No SGFPs available and No Steam Dumps are available) -23 AFW Pump fails to Auto start
8	AF0181B AF0183	ALL (C)	-22 AFW Pump trips -23 AFW Pump trips during EOP-TRIP-1 (Loss of All AFW flow, CFST Heat Sink Red Path) **(CT-2)**
		ABs	AR.ZZ-11 → AB.CVC-1 → AB.CN-1 → AR.ZZ-13
		EOPs	TRIP-1 → FRHS-1

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

Scenario No.: 3

Target Quantitative Attributes per Scenario (See Section D.5.d)	Actual Attributes	Event No.
1. Total malfunctions (5-8)	7	2-8
2. Malfunctions after EOP entry (1-2)	1	8
3. Abnormal events (2-4)	4	2,3,4,6
4. Major transients (1-2)	1	7
5. EOPs entered/requiring substantive actions (1-2)	0	----- (*)
6. Entry into a contingency EOP with substantive actions (≥ 1 per scenario set)	1	8 (FRHS-1)
7. Preidentified critical tasks (≥2)	2	7,8
8. Tech Specs exercised (≥ 2)	2	3,5

(*) NUREG-1021, Appendix D, Section C.2.f, *"EOPs Used,"* states *"Moreover, the primary scram response procedure that serves as the entry point for the EOPs is **not** counted."* An Attribute Value of "0" for Table Item 5 was determined to be acceptable by the Chief Examiner on the basis that (a) Scenario #3 is a complex scenario that exercises Contingency EOP Procedure FRHS-1 for the Loss of Secondary Heat Sink, (b) FRHS-1 requires the use of alternate decision paths and prioritization of actions within the EOP to mitigate a CSFST Heat Sink Red Path condition, and (c) FRHS-1 has measurable actions that must be taken by the crew.

I. OBJECTIVES

A. Given the order, the crew will commence a power ascension IAW S2.OP-IO.ZZ-0004.

B. Given an indication of 21 CRDM Vent Fan damper failure, the crew will take corrective actions IAW S2.OP-AR.ZZ-0011 and stop 21 CRDM vent fan and start the standby fan..

C. Given an indication of loss of a PZR Level Controlling channel, th crew will take corrective actions IAW S2.OP-AB.CVC-0001. CRS will exercise Tech Specs.

D. Given an indication of 21CN22 LP FW Heater inlet valve closure, the crew will take corrective actions IAW S2.OP-AR.ZZ-0013 and S2.OPAB.CN-0001. The crew will perform a load reduction IAW station procedures.

E. Given indication of 2A EDG emergency tripping, the CRS will exercise Tech Specs.

F. Given indication of a loss of oil level in 22 RCP, the crew will take immedaite actions IAW S2.OP-AB.RCP-0001 to trip the reactor and stop 22 RCP.

G. Given the order or indications of a reactor trip, perform actions as the nuclear control operator to RESPOND to the reactor trip in accordance with the approved station procedures.

H. Given indication of a reactor trip, DIRECT the response to the reactor trip in accordance with the approved station procedures.

I. Given the order or indications of a safety injection perform actions as the nuclear control operator to RESPOND to the safety injection in accordance with the approved station procedures.

J. Given indication of a safety injection DIRECT the response to the safety injection in accordance with the approved station procedures.

K. Given the order or indications of a loss of secondary heat sink, perform actions as the nuclear control operator to RESPOND to the loss of heat sink in accordance with the approved station procedures.

L. Given indication of a loss of secondary heat sink, DIRECT the response to the heat sink loss in accordance with the approved station procedures.

M. Given the order or indications of a loss of secondary heat sink, PERFORM actions as the shift technical advisor for a loss of heat sink IAW approved station procedures.

N. During performance of emergency operating procedures, monitor the critical safety function status trees in accordance the EOP in effect.

II. MAJOR EVENTS

1. Power ascension to 100% at 10%/hour.
2. 21 CRDM Vent Fan damper fails closed
3. PZR Level controlling channel fails high
4. 21CN22 FWH Inlet valve fails closed
5. 2A EDG emergency trip
6. 23 RCP motor oil level low
7. Main turbine fails to trip by all means in the control room
8. Loss of all AFW flow and recovery by initiating Condensate flow using MS10.

III. SCENARIO SUMMARY

1. The crew will continue the power ascension to raise reactor power to 98% at 10% per hour. The reactivity plan calls for performing a dilution first, before raising turbine load. After the crew commences the power ascension, Event #2 will be entered.

2. 21 CRDM vent fan discharge damper will fail closed. The crew will receive console alarm for sequence not complete. The crew will take actions as directed in the Alarm Response Procedure to stop 21 CRDM vent fan and start 23 CRDM vent fan. Once the standby fan is started, Event #3 can be entered.

3. The controlling PZR level channel will fail high. The crew will respond per S2.OP-AB.CVC-0001, Loss of Charging, and take manual control of charging to raise charging flow. The crew will select an operable control channel. The CRS will evaluate Tech Specs and enter 3.3.1.1 action 6. After Tech Specs has been evaluated, Event #4 will be entered.

4. 21CN22 low pressure feedwater heater inlet valve will fail closed. The crew will respond per S2.OP-AB.CN-0001, Main Feedwater/Condensate System Abnormality, to reduce turbine load to less than 1098 MWe per Attachment 2 (about a 2-3% downpower is required), and may take actions to bypass the condensate polisher depending on SGFP suction pressure. After the crew completed the load reduction, Event #5 will be entered.

5. 2A EDG will emergency trip. The crew will receive console alarm for 2A EDG tripping. No impact to plant operations. The CRS will evaluate Tech Specs and enter TS 3.8.1.1 action b. The CRS will direct performance of an 1 hour line surveillance to comply with TS action. After the CRS evaluates Tech Specs, Event #6 will be entered.

6. 23 RCP motor bearing oil level OHA will actuate and the crew will recognize elevated motor bearing temperatures in excess of S2.OP-AB.RCP-0001, RCP Abnormality, trip criteria of 175 °F, requiring the crew to manually trip the reactor and stop 23 RCP. During immediate actions of EOP-TRIP-1, Reactor Trip or Safety Injection, the RO will recognize that the main turbine failed to Auto trip following the Rx trip (MLSI will fail to automatically actuate). All attempts to trip the turbine

from the control room will fail. The crew will take the action to actuate Fast Closure of the MSIVs (CT#1). Due to the turbine failing to trip, a Safety Injection signal is expected which will trip both SGFPs and setup conditions for condensate flow recovery in EOP-FRHS-1, Response to Loss of Secondary Heat Sink. 23 AFW pump will fail to Auto start. The PO will manually start 23 AFW pump.

7. During EOP-TRIP-1, 22 AFW Pump will trip on overcurrent, the 23 AFW pump will trip on overspeed, and a CFST Heat Sink Red path will exist. The CRS will transition to EOP-FRHS-1. The crew will take actions to depressurize one SG using a SG Atmospheric Dump valve (MS10) and feed one SG using condensate feed flow. The scenario can be terminated when SG Wide Range level is rising or CETs are lowering (CT#2).

8. The Lead Examiner may terminate the scenario after condensate flow has been established and/or WR level is rising.

A. INITIAL CONDITIONS

____ **IC-242**

PREP FOR TRAINING (i.e. computer setpoints, procedures, bezel covers ,tagged equipment)

Initial	Description
	• VC1and VC4 C/T
	• RCPs (SELF CHECK)
	• RTBs (SELF CHECK)
	• MS167s (SELF CHECK)
	• 500 KV SWYD (SELF CHECK)
	• SGFP Trip (SELF CHECK)
	• 21 CV PP (SELF CHECK)
	• **2A EDG running unloaded for maintenance run**
	• **21 CS Pump C/T**
	• **21 AFW Pump C/T**
	• **Suggested Protected Equipment:** ▪ **None**
	• Complete Attachment 2 “Simulator Ready-for-Training/Examination Checklist.”

Note: Tables with blue headings may be populated by external program, do not change column name without consulting Simulator Support group

EVENT TRIGGERS:

Initial	ET #	Description	
	1	EVENT ACTION:	MONP254 < 10. //CONT ROD BANK C < 10 (RX TRIP)
		COMMAND:	
		PURPOSE:	<update as needed>

MALFUNCTIONS:

SELF-CHECK	Description	Delay Time	Initial Value	Ramp Time	Trigger	Severity
_____ 01	EL0161 2A EMERG DIESEL GENERATOR TRIP	N/A	N/A	N/A	RT-4	
_____ 02	RD0316A 21 CONTROL ROD DRIVE VENT FAN DAMPER FAILS CLOSED	N/A	N/A	N/A	RT-1	
_____ 03	PR0017A PZR LEVEL CH I (LT459) FAILS H/L	N/A	N/A	N/A	RT-2	100
_____ 04	RP0073 MN TURB. TRIP FAILURES (VARIOUS)	N/A	N/A	N/A	N/A	ALL ABOVE (20/AST,20-2/AST,20-ET) FAIL
_____ 05	RP0069 MN TURBINE TRIP (INT. VLV) FAIL	N/A	N/A	N/A	N/A	
_____ 06	RP0279A AUTO MSLIS FAILS TO ACT, TRN A	N/A	N/A	N/A	N/A	
_____ 07	RP0279B AUTO MSLIS FAILS TO ACT, TRN B	N/A	N/A	N/A	N/A	
_____ 08	AF0181B 22 AUX FEEDWATER PUMP TRIP	N/A	N/A	N/A	RT-6	
_____ 09	AF0353C 23 AFP FAILURE TO AUTO START ON ANY (ALL) SIGNALS	N/A	N/A	N/A	N/A	
_____ 10	AF0183 23 AUX FW PMP OVERSPEED TRIP	N/A	N/A	N/A	RT-6	
_____ 11	BF0109A 22A FW HTR LSHH FAILS CLOSED	N/A	N/A	N/A	RT-3	
_____ 12	RC0006C RC PUMP #23 LOSS OF LUBE OIL	N/A	N/A	00:05:00	RT-5	

REMOTES:

SELF-CHECK	Description	Delay Time	Initial Value	Ramp Time	Trigger	Condition
_____ 01	AF20D 21 AFW PUMP BKR CONTROL POWER	N/A	N/A	N/A	N/A	OFF
_____ 02	AF21D 21 AF PUMP RACK OUT	N/A	N/A	N/A	N/A	TAGGED

_____ 03	AF25D 22 AFW PUMP BKR CONTROL POWER	N/A	N/A	N/A	RT-10	OFF
_____ 04	CS01D 21 CS PUMP BKR CONTROL POWER	N/A	N/A	N/A	N/A	OFF
_____ 05	CS02D 21 CS PUMP RACK OUT	N/A	N/A	N/A	N/A	TAGGED
_____ 06	RC43CX 23 RCP NOMINAL MOTOR x Vibration Reading	00:00:10	.5	00:04:00	RT-5	4.5
_____ 07	RC43CY 23 RCP NOMINAL MOTOR y Vibration Reading	00:00:10	.5	00:04:00	RT-5	4.5

OVERRIDES:

SELF-CHECK	**Description**	**Delay Time**	**Initial Value**	**Ramp Time**	**Trigger**	**Condition/ Severity**
_____ 01	CB04 B2 LO QCB04FB3 2A DIESEL GEN-LOCAL MANUAL	N/A	N/A	N/A	N/A	ON
_____ 02	CB04 B1 LO QCB04DW3 2A DIESEL GEN-AUTO	N/A	N/A	N/A	N/A	OFF

OTHER CONDITIONS:

	Description

SEQUENCE OF EVENTS

a. State shift job assignments.

b. Hold a shift briefing, detailing instruction to the shift: (provide crew members a copy of the shift turnover sheet).

c. Inform the crew “The simulator is running. You may commence panel walkdowns at this time. SM please inform me when your crew is ready to assume the shift”.

d. Allow sufficient time for panel walk-downs. When informed by the SM that the crew is ready to assume the shift, ensure the simulator is cleared of unauthorized personnel.

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
1. Power Ascension to 98%			
	CRS briefs crew on power ascension to 98% at 10%/hour IAW S2.OP-IO.ZZ-0004, Power Operation.		
	RO briefs reactivity plan for power ascension.		
	PO briefs turbine load control plan.		
	RO initiates dilution IAW S2.OP-SO.CVC-0006 or uses control rods.		
	PO initiates turbine load control IAW S2.OP-SO.TRB-0001, Turbine Generator Startup Operation.		
	RO monitors Tavg and control rods for proper response.		
Proceed to next event by direction from Lead Examiner.			
2. 21 CRDM Vent Fan Damper Fails Closed:			
Simulator Operator: Insert **RT-1** by direction from Lead Evaluator. **RD0316A, 21 CRDM Vent Fan Damper Fails Closed**			
	PO announces console alarm for 21 CRDM Vent Fan Low Flow		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	PO refers to ARP for 2CC1.		
	PO reports that the sequence complete light for 21 CRDM Fan is not illuminated.		
	CRS directs PO to start standby CRDM Vent Fan IAW ARP for 2CC1.		
	PO stops 21 CRDM Fan		
	PO starts 23 CRDM Fan		
	PO reports 23 CRDM Fan in service.		
Proceed to next event at Lead Examiner's direction.			
3. PZR Level Controlling Channel Fails High:			
Simulator Operator: Insert **RT-2** on direction from Lead Evaluator. **PR0017A, PZR Level CH I fails H/L Value = 100**			
	RO reports unexpected alarms OHA E-4 PZR LVL HI, E-20, PZR HTR ON LVL HI.		
	PO refers to 2CC1 ARP		
	RO reports PZR Level Channel I has failed high.		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	RO reports charging flow has lowered.		
	RO places Master Flow Control in Manual and raises charging flow to restore PZR level to program.		
	CRS enters S2.OP-AB.CVC-0001		
	PO initiates Attachment 1 CAS.		
	RO reports charging pump is running and no signs of cavitation.		
	RO reports that a PZR level controlling channel has failed high.		
	CRS directs RO to take manual control of charging (if not already performed)		
	RO selects operable Channel 3 for control and an operable Channel 2 or 3 for recorder.		
	RO reports letdown in service.		
	CRS directs PO to review S2.OP-RPS-0003 to remove the failed channel from service. (**No action by PO**)		
TS evaluation #1:			
	CRS enters: • **TS 3.3.1.1 action 6 (72 hours to place the channel in the tripped condition)**		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
Proceed to next event after Tech Specs has been evaluated or by direction from Lead Examiner.			
4. 21CN22 FWH Inlet Valve Fails Closed:			
Simulator Operator: Insert **RT-3** at direction from Lead Examiner. **BF0109A, 22A FW HTR LSHH Fails CLosed.**			
	PO reports unexpected alarm is OHA G-22, FW HTR IN VLV TRIP & LVL HI.		
	PO referes to OHA Alarm Response Procedure. • ARP directs depressing STOP VALVE CLOSED on 2CC2 panel stop valve extraction control bezel • **PO depresses STOP VALVE CLOSED**		
	PO reports 21CN22 is closed.		
Role Play: IF NEO is dispatched to investigate, THEN state the following, “21CN22 looks closed and I see no other abnormal issues”.			
	CRS enters S2.OP-AB.CN-0001.		
	PO initiates Attachment 1 CAS.		
	PO reports a SGFP did not trip.		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	PO reports a Condensate Pump did not trip.		
	PO reports OHA G-7 ADFCS ALTERNATE ACTION not in alarm.		
	CRS reviews Attachment 2 for load limitations for isolated FW heaters.		
	PO reports SGFP suct pressure, and if less than 320 psig, takes CAS actions to open 21-23 CN108's		
	CRS determines that a load reduction is required to 1098 MWe.		
	RO briefs reactivity plan for load reduction.		
	PO briefs turbine load control plan for load reduction.		
	CRS directs load reduction to lower MWe below 1098 MWe.		
	RO uses control rods or initiaites boration		
	PO initiates load reduction.		
Proceed to next event by direction from Lead Examiner.			
5. 2A EDG Emergency Trips:			
Simulator Operator: Insert **RT-4** at direction from Lead Examiner. **EL0161, 2A EDG Trip**			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	PO reports console alarm for 2A EDG Emergency Trip		
Role Play: Field operator reports he emergency tripped the 2A EDG due to an oil leak on the filter housing. The leak has stopped and is contained. Maintenance request the EDG be tagged out to repair.			
TS evaluation #2:			
	CRS enters: • **TS 3.8.1.1 action b.1 (1 hour line surveillance) and action b.4 (72 hours to restore EDG to Operable status)**		
	CRS directs an operator to perform the 1 hour line surveillance. This could be delegated to the WCC supervisor to perform.		
Role Play: IF requested for assistance in line surveillance, state the WCC NCO will perform the line surveillance.			
Proceed to next event by direction from Lead Examiner.			
6. 23 RCP Motor Oil Level Low:			
Simulator Operator: Insert **RT-5** at direction from Lead Examiner. **RC0006C, RC Pump #23 Loss of Lube Oil**			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	RO reports OHA alarm for 23 RCP low oil level.		
	RO reports motor bearing temperatures and vibrations rising for 23 RCP.		
	CRS enters S2.OP-AB.RCP-0001.		
	PO initiates Attachment 1 CAS.		
	PO reports either of the following limits have been exceeded: 1. Motor bearing temp > 175 °F 2. Motor vibrations > 5 mils		
	CRS directs RO to trip the reactor and stops 23 RCP IAW Attachment 2.		
	RO trips the reactor and stops 23 RCP		
	RO performs immediate actions of 2-EOP-TRIP-1		
7. Main Turbine Fails to Auto Trip, MSLI fails to Auto actuate, <u>AND</u> 23 AFW pump fails to AUTO start (Major Transient):			
	RO reports that Main Turbine failed to Auto trip.		
	RO reports Main Turbine failed to manually trip using Pistol Grip switch AND console pushbutton.		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
Critical Task #1 (CT-12): Manually actuate MSLI before a RED path to either subcriticality or the integrity CFST, or transition to EOP-LOSC-2, Uncontrolled Depressurization of All Steam Generators. **SAT _____ UNSAT _____**			
	Critical Task #1 - RO isolates turbine by manually initiating MSLI using Fast Close pushbuttons on 2CC2.		
Examiner's Note: IF the crew isolates the main turbine by actuating MSLI, this action meets CT #1.			
	RO reports SI Auto actuated and manually backs up SI signal.		
	CRS enters 2-EOP-TRIP-1, Reactor Trip or Safety Injection.		
	CRS directs PO to throttle AFW flow to no less than 22E4 lbm/hr.		
Simulator Operator: MONITOR SG NR levels. IF any SG NR levels recovers to 6-7 %, **THEN** insert **RT-6** to trip 22 & 23 AFW Pump. This will ensure that a valid			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
Heat Sink Red path exists prior to Step 17 in EOP-TRIP-1.			
	PO reports 22 AFW Pump running and 23 AFW Pump failed to start.		
	PO manually starts 23 AFW Pump		
	CRS and RO review immediate actions.		
	PO reports SEC loading not complete for B bus.		
	PO reports all available equipment started.		
	RO reports Containment Spray actuation not required.		
	RO reports 2 CCW Pumps running and both CCW HX are in Auto.		
	RO reports 2CC131 is open.		
	PO reports all Safeguard Valves are in their safeguards position per Table E.		
	RO reports CAV is in Accident Pressurize Mode and not in Maintenance Mode.		
	RO reports two SWGR supply fans and one exhaust fan is running.		
Proceed to next event when **ECCS Flow Evaluation** is in progress:			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	RO reports expected ECCS flow for plant conditions.		
8. 22 AFW pump trips <u>AND</u> 23 AFW Pump trips (loss of all AFW flow):			
Simulator Operator: Insert **<u>RT-6</u>** during ECCS flow evaluation steps in TRIP-1. **AF0183, 23 AFW Pump trips**			
	PO reports that 22 and 23 AFW Pump tripped.		
Role Play: If requested to why 23 AFW Pump trip, then report that ***investigation is underway and no obvious signs why it tripped, but the trip linkage looks bent.***			
Simulator Operator: If directed to remove control power for 22 AFW Pump breaker then insert **<u>RT-10</u>**. AF25D, 22 AFW breaker control power. Location: 64 ft. Switchgear A Bus			
Role Play: IF directed to determine why 22 AFW Pump tripped, then after 2-3 minutes report the following: ***the overcurrent relay flag is up for 22 AFW Pump.***			
Note: RCS pressure will be low due to the MT failure to trip.			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	PO reports NO AFW flow		
	PO reports no SG NR levels are > 9% (15% adverse)		
	PO reports total AFW flow is less than 22E4 lbm/hr.		
	CRS transitions to 2-EOP-FRHS-1, Response to Loss of Secondary Heat Sink.		
	PO reports operator action was not cause of AFW flow <22E4 lbm/hr.		
	RO reports RCS pressure is > SG pressure.		
	RO reports RCS Thots > 350°.		
	CRS reads Bleed and Feed criteria. (3 WR levels < 20% (25% Adverse))		
	PO closes all GB4s.		
	RO closes all SS94's.		
	PO reports no AFW flow.		
	CRS dispatches operators to investigate loss of AFW pumps.		
	RO stops all RCPs.		
	PO reports Condensate System is in service.		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
Examiner's Note: Both SGFPs tripped due to Auto SI actuation following MT failure to trip.			
	PO reports NO SGFPs are available (SI actuation)		
	CRS directs MSPI (mitigating systems performance index) AFW Pump to be started.		
Role Play: When directed to start MSPI AFW pump, then after 1-2 minutes report the following: ***the MSPI Diesel started but tripped on overspeed***.			
	RO reports SI has actuated (Auto initiated following Rx Trip)		
	PO verifies SI valve alignment IAW 2-EOP-APPX-3, SI Verification.		
	RO resets SI, Phase A, and Phase B isolation		
	RO opens both CA330s		
	RO resets all SECs and 230V control centers.		
EOP-FRHS-1 Condensate Recovery steps start here:			
	Crew selects only **ONE** SG for depressurization to < 575 psig.		
Depressurize SGs using MS10's (Atmospheric Steam Line Dump			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
Valves):			
	PO reports steam dumps are NOT available (Note: IF MSLI performed earlier, then steam dumps will not be available.		
	RO initiates MSLI on all Loops.		
	PO fully opens SELECTED SG MS10 relief valve.		
Critical Task #2 (CT-43): Establish feedwater flow into at least one SG before Bleed and Feed is required. **SAT:_____ UNSAT:_____** **Steps that are bolded and shaded are necessary to complete the critical task.**			
	Critical Task #2 - CRS dispatches operator to open the selected SG BF40 or BF19 valve (120 ft. elev. TGA).		
Simulator Operator: Use the following REMOTES to operate the 22 or 24 SG BF40 or BF19s. **22 BF19: BF02A** **24 BF19: BF04A** **22 BF40: BF06A** **24 BF40: BF08A**			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
Set Ramp Time = 03:00 mins **Set Desired Value = 100 for Fully Open or see below:** **Notify control room when selected valve is OPEN**.			
Examiner's Note: During scenario validation using MS10s to lower SG pressures to inject with main condensate took considerable time (**approx. 10 mins**). Condensate flow was established when SG pressure is around 600 psi.			
	Critical Task #2 - PO opens the selected SG BF13.		
	PO reports that Release selected for selected BF22		
	Critical Task #2 - PO opens 21 and 22 CN48 (SGFP Bypass valves).		
	Critical Task #2 - PO closes 21 and 22 CN32 (SGFP suction valves).		
Examiner's Note: At this point the crew may wait at Step 18.5 of EOP-FRHS-1 until feedflow is achieved or continue on until the EOP directs you back to beginning of EOP until feed flow is achieved.			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
Examiner's Note: The crew should verify indication of condensate flow AND SG WR level is rising when determining if Condensate Flow is established. During validation it took approx. **6 mins** to see WR rising when condensate flow was established at 5-6 %.			
Examiner's Note: As the crew is waiting for feed flow to be established, you can expect the PZR PORVs to be cycling as the RCS heats up.			
	Critical Task #2 - PO reports that feed flow is established to selected SG by observing SG Wide Range Level rising or CETs are lowering.		
Critical Task #2 (CT-43): Establish feedwater flow into at least one SG before Bleed and Feed is required. **SAT:_____ UNSAT:_____** **Steps that are bolded and shaded are necessary to complete the critical task.**			
	CRS directs PO to maintain selected SG pressure to < 575 psig.		
	Crew reports that Bleed and Feed has NOT been initiated and transitions to procedure in effect (2-EOP-TRIP-1)		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
The scenario may be terminated after the crew has established condensate flow or by direction from Lead Examiner.			

B. SCENARIO REFERENCES

A. Alarm Response Procedures (Various)
B. Technical Specifications
C. Emergency Plan (ECG)
D. OP-AA-101-111-1003, Use of Procedures
E. S2.OP-IO.ZZ-0004, Power Operation
F. S2.OP-AB.CVC-0001, Loss of Charging
G. S2.OP-AB.CN-0001, Main Feedwater/Condensate System Abnormality
H. S2.OP-AB.RCP-0001, RCP Abnormality
I. S2.OP-AR.ZZ-0011, 2CC1 Alarm Response Procedure
J. S2.OP-AR.ZZ-0013, 2CC2 Alarm Response Procedure
K. 2-EOP-TRIP-1, Reactor Trip or Safety Injection
L. 2-EOP-FRHS-1, Response to Loss of Secondary Heat Sink

ATTACHMENT 1 (NRC-3)
UNIT TWO PLANT STATUS
TODAY

MODE: 1 POWER: 93% RCS BORON: 778 MWe 1130

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

REACTIVITY PARAMETERS

- Rx Plan: To raise Rx power to 98% in preparation for calorimetric at 10%/hour add 1000 gallons of water along with withdrawing control rods to maintain Tavg on program. Reactor Engineering directs the crew to perform a dilution first. Fuel is conditioned no rod withdrawal limitations apply.

MOST LIMITING LCO AND DATE/TIME OF EXPIRATION:

1. 21 AFW Pump TS.3.7.1.2 action a, 68 hours remaiin
2. 21 CS Pump TS 3.6.2.1, 60 hours remain

EVOLUTIONS/PROCEDURES/SURVEILLANCES IN PROGRESS:

- Continue power ascension to 98% at 10%/hour IAW S2.OP-IO.ZZ-0004, Power Operation
- Engineering is monitoring BF19s vibrations during startup
- 2A EDG running in Manual unloaded for 1 hour maintenance run. Field operator and maintenance on station to observe the EDG run. Trouble Alarm is expected for the diesel day tank levels when an diesel engine is running.

ABNORMAL PLANT CONFIGURATIONS:

CONTROL ROOM:

Unit 1 and Hope Creek at 100% power.
No penalty minutes in the last 24 hrs.

PRIMARY:

- 21 AFW Pump C/T for oil bubbler replacement.
- 21 CS Pump C/T for lube.

SECONDARY:

- Blowdown 35K per loop to 23 condenser / flashtank
- Polisher in service

RADWASTE:

No discharges in progress

CIRCULATING WATER/SERVICE WATER:

None

ATTACHMENT 2

SIMULATOR READY FOR TRAINING CHECKLIST

____ 1. Verify simulator is in “TRAIN” Load
____ 2. Simulator is in RUN
____ 3. Overhead Annunciator Horns ON
____ 4. All required computer terminals in operation
____ 5. Simulator clocks synchronized
____ 6. All tagged equipment properly secured and documented
____ 7. TSAS Status Board up-to-date
____ 8. Shift manning sheet available
____ 9. Procedures in progress open and signed-off to proper step
____ 10. All OHA lamps operating (OHA Test) and burned out lamps replaced
____ 11. Required chart recorders advanced and ON (proper paper installed)
12. All printers have adequate paper AND functional ribbon
____ 13. Required procedures clean
____ 14. Multiple color procedure pens available
____ 15. Required keys available
____ 16. Simulator cleared of unauthorized material/personnel
____ 17. All charts advanced to clean traces and chart recorders are on.
____ 18. Rod step counters correct (channel check) and reset as necessary
____ 19. Exam security set for simulator
____ 20. Ensure a current RCS Leak Rate Worksheet is placed by Aux Alarm Typewriter
____ with Baseline Data filled out
____ 21. Shift logs available if required
____ 22. Recording Media available (if applicable)
____ 23. Ensure ECG classification is correct
____ 24. Reference verification performed with required documents available
____ 25. Verify phones disconnected from plant after drill.
____ 26. Verify EGC paperwork is marked “Training Use Only” and is current revision.
____ 27. Ensure sufficient copies of ECG paperwork are available.

ATTACHMENT 3

CRITICAL TASK METHODOLOGY

In reviewing each proposed CT, the examination team assesses the task to ensure, that it is essential to safety. A task is essential to safety if, in the judgment of the examination team, the improper performance or omission of this task by a licensee will result in direct adverse consequences or in significant degradation in the mitigative capability of the plant.
The examination team determines if an automatically actuated plant system would have been required to mitigate the consequences of an individual's incorrect performance. If incorrect performance of a task by an individual necessitates the crew taking compensatory action that would complicate the event mitigation strategy, the task is safety significant.

I. Examples of CTs involving essential safety actions include those for which operation or correct performance prevents...

- degradation of any barrier to fission product release
- degraded emergency core cooling system (ECCS) or emergency power capacity
- a violation of a safety limit
- a violation of the facility license condition
- incorrect reactivity control (such as failure to initiate Emergency Boration or Standby Liquid Control, or manually insert control rods)
- a significant reduction of safety margin beyond that irreparably introduced by the scenario

II. Examples of CTs involving essential safety actions include those for which a crew demonstrates the ability to...

- effectively direct or manipulate engineered safety feature (ESF) controls that would prevent any condition described in the previous paragraph.
- recognize a failure or an incorrect automatic actuation of an ESF system or component.
- take one or more actions that would prevent a challenge to plant safety.
- prevent inappropriate actions that create a challenge to plant safety (such as an unintentional Reactor Protection System (RPS) or ESF actuation.

ATTACHMENT 4

SIMULATOR SCENARIO REVIEW CHECKLIST

SCENARIO IDENTIFIER: 20-01 NRC Scenario #3 REVIEWER: R. Chan

Initials		Qualitative Attributes
RC	1.	The scenario has clearly stated objectives in the scenario.
RC	2.	The initial conditions are realistic, in that some equipment and/or instrumentation may be out of service, but it does not cue crew into expected events.
RC	3.	The scenario consists mostly of related events.
RC	4.	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
RC	5.	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.
RC	6.	The events are valid with regard to physics and thermodynamics.
RC	7.	Sequencing/timing of events is reasonable, and allows for the examination team to obtain complete evaluation results commensurate with the scenario objectives.
RC	8.	The simulator modeling is not altered.
RC	9.	All crew competencies can be evaluated.
RC	10.	The scenario has been validated.
NA	11.	If the sampling plan indicates that the scenario was used for training during the requalification cycle, evaluate the need to modify or replace the scenario.
RC	12.	ESG-PSA Evaluation Form is completed for the scenario at the applicable facility.

ATTACHMENT 5

ESG CRITICAL TASKS

20-01 NRC Scenario 3

Critical Tasks:

CT-1 (CT-12) - Manually actuate main steamline isolation before a Red path to either subcriticality or the integrity CFST, or transition to LOSC-2, Uncontrolled Depressurization of All Steam Generators.

SAFETY SIGNIFICANCE -- Failure to close the MSIVs under the postulated plant conditions causes challenges to CSFs beyond those irreparably introduced by the postulated conditions. Additionally, such an omission constitutes a failure by the crew to "demonstrate (the ability to) recognize a failure or an incorrect automatic actuation of an ESF system or component," and to "take one or more actions that would prevent a challenge to plant safety."

In the typical FSAR, the analysis for a large steamline break assumes steamline isolation within a short time frame, on the order of seconds. The analysis typically assumes a steam system piping failure in which a single SG blows down completely. That is, the analysis assumes a fault that can be isolated from all but one SG.

However, in the plant conditions postulated for this critical task, the break is located downstream of the MSIVs. Thus, closure of all MSIVs would terminate all uncontrolled blowdown. In this case, there is no reason for even a single SG to completely depressurize. If the crew allows all MSIVs to remain open, then all SGs depressurize uncontrollably and unnecessarily.

Uncontrolled depressurization of all SGs causes an excessive rate of RCS cooldown, well beyond the conditions typically analyzed in the FSAR. The excessive cooldown rate creates large thermal stresses in the reactor pressure vessel and causes rapid insertion of a large amount of positive reactivity.

Thus, failure to close the MSIVs under the postulated conditions can result in challenges to the following CSFs:

- Integrity
- Subcriticality

Cues:

- [Indication that main steamline isolation is required][6]

AND

- Indication that main steamline isolation has not actuated automatically

– MSIVs indicate open
– Indication of uncontrolled depressurization of all SGs

Measurable Performance Standard:

Manually actuate main steamline isolation before a Red path to either subcriticality or the integrity CFST, or transition to LOSC-2, Uncontrolled Depressurization of All Steam Generators.

- MSIVs undergo fast-closure.This can be accomplished by the Fast Closure pushbuttons on 2CC2 or using the Loops 21-24 MSLI on 2CC1 Safeguards bezels.

Feedback:

- Steam flow indication from all SGs decreases to zero
- All SGs stop depressurizing
- RCS cooldown stops
- MSIVs indicate closed

CT-2 (CT-43) - Establish feed flow to one SG before RCS bleed and feed is required

SAFETY SIGNIFICANCE -- Failure to establish feedwater flow to any SG results in the crew's having to rely upon the lower-priority action of establishing RCS bleed and feed to minimize core uncovery. This constitutes incorrect performance that fails to prevent "degradation of any barrier to fission product release."

The analyses presented in the ERG Background Document for FR-H.1 demonstrate that a complete loss of heat sink occurs when the SG inventories deplete (dry out). Unless some form of SG inventory is restored, the SG dryout deteriorates primary-to-secondary heat transfer, allowing core decay heat to increase the RCS temperature and pressure. The increasing RCS pressure automatically forces the pressurizer PORVs to open, which creates a small-break LOCA and simultaneously degrades the RCS fission-product barrier. As long as the RCS pressure remains high, the flow out the PORVs exceeds the ECCS flow into the RCS, which depletes RCS inventory. Eventually the core starts to uncover, degrading the core cooling CSF. Once the core is uncovered, fuel temperatures increase rapidly until severe fuel damage occurs, unless some form of core cooling is restored. Fuel over-heating constitutes severe degradation of a fission-product barrier (fuel matrix/clad).

Establishing feedwater flow into the SGs offers the most effective recovery action to restore the heat sink. The introduction of feedwater flow immediately restores SG inventory and re-establishes primary-to-secondary heat transfer, decreasing RCS pressure and cooling the core. The RCS pressure decrease then precludes the opening of the PORVs and degradation of the RCS barrier.

Cues:

- Extreme (RED path) challenge to the heat sink CSF

AND

- Indication that RCS pressure remains above the pressure of all SGs

AND

- Indication that RCS temperature is above the temperature for placing the RHR system in service

AND

- Indication and/or annunciation that no AFW flow is available after repeated attempts to establish

AND

- [Indication that RCS bleed and feed is not required][4]

Measurable Performance Standard:

Establish feed flow to one SG before RCS bleed and feed is required.

Feedback:

- Indication of feedwater flow into at least one SG
- Indication of increasing water level in at least one SG

ATTACHMENT 6

ESG-PSA RELATIONSHIP EVALUATION

EVENTS LEADING TO CORE DAMAGE

Y/N	Event	Y/N	Event
N	TRANSIENTS with PCS Unavailable	N	Loss of Service Water
N	Steam Generator Tube Rupture	N	Loss of CCW
N	Loss of Offsite Power	N	Loss of Control Air
N	Loss of Switchgear and Pen Area Ventilation	N	Station Black Out
N	LOCA		

COMPONENT/TRAIN/SYSTEM UNAVAILABILITY THAT INCREASES CORE DAMAGE FREQUENCY

Y/N	COMPONENT, SYSTEM, OR TRAIN	Y/N	COMPONENT, SYSTEM, OR TRAIN
N	Containment Sump Strainers	N	Gas Turbine
N	SSWS Valves to Turbine Generator Area	N	Any Diesel Generator
N	RHR Suction Line valves from Hot Leg	**Y**	Auxiliary Feed Pump
N	CVCS Letdown line Control and Isolation Valves	N	SBO Air Compressor

OPERATOR ACTIONS IMPORTANT IN PREVENTING CORE DAMAGE

Y/N	OPERATOR ACTION
N	Restore AC power during SBO
N	Connect to gas turbine
N	Trip Reactor and RCPs after loss of component cooling system
N	Re-align RHR system for re-circulation
N	Un-isolate the available CCW Heat Exchanger
N	Isolate the CVCS letdown path and transfer charging suction to RWST
N	Cooldown the RCS and depressurize the system
N	Isolate the affected Steam Generator that has the tube rupture(s)
N	Early depressurize the RCS
N	Initiate feed and bleed

SIMULATOR
EXAMINATION SCENARIO GUIDE

SCENARIO TITLE: NRC-4 [IOP-3, AB.PZR-1, AR.ZZ-10, AB.CW-1, AB.SG-1, TRIP-1, SGTR-1]

SCENARIO NUMBER: 20-01 NRC ESG-4

EFFECTIVE DATE: See Approval Dates

EXPECTED DURATION: 70 minutes

REVISION NUMBER: 04

PROGRAM:

[ ] **L.O. REQUAL**

[X] **INITIAL LICENSE**

[ ] **STA**

[ ] **OTHER** _____

Revision Summary:

New issue for 16-01 ILOT NRC exam.
Rev. 01**:** Incorporated NRC comments from Prep week. Added Tech Spec LCO times. Added clarification that CT#2 is broken down into two parts.
Rev. 02: Modified for 19-01 ILOT NRC exam.
Rev. 03 Incorporated NRC comments from working mtg on 2-14-20. Deleted Loss of Off-site Power to reduce cooldown time in SGTR-1 using steam dumps. Added comments from NRC Prep Week 6-17-20.
Rev. 04 (last used 19-01 NRC) Used for 20-01 NRC exam. Modified to include malfunctions not used on the previous two NC exams which include; 23A CW traveling screen high DP, 21 CFCU failure to start, PZR spray valve 2PS3 fails to close during depressurization.

PREPARED BY:	R. Chan	1-30-22
	Lead Regulatory Exam Author	**Date**
APPROVED BY:	M. Wadusky (signature on file)	2-10-22
	Operations Training Manager	**Date**
APPROVED BY:	W. Hargrave	1-30-22
	Facility Representative	**Date**

SCAN OF SIGNED SCENARIO COVER SHEET