

Form 3.3-1 Scenario Outline

Facility:	Salem	Scenario #:	2
Scenario Source:	20-01 ESG-2	Op. Test #:	21-01
Examiners:	_____	Applicants/	_____
	_____	Operators:	_____
	_____		_____

Initial Conditions: Salem Unit 2 is at 100% power MOL

Turnover: The crew is directed to reduce power to 95% power at 10% per hour IAW S2.OP-IO.ZZ-0004 using boration, control rods and turbine load control in preparation for removing 21 Heater drain pump from service. The 21 Service Water pump is C/T for maintenance.

Critical Tasks:

1. Isolate faulted Steam Generator prior to exiting LOSC-1
2. Terminate safety injection before transition out of TRIP-3

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	ATC(R) BOP(R) CRS(N)	Load reduction to 95% at 10%/hr IAW IOP-4 for heater drain pump removal from service
2	PR0017A	ATC (I,MC) CRS (I,TS)	Pressurizer level control channel fails high
3	N/A	ATC(N) CRS(N)	21 RCP standpipe level low
4	SW0215C SW0339F	BOP (C,MC) CRS (C,TS)	23 SW pump trips and 26 SW pump fails to start.
5	CN0017	ALL(C)	23 Condensate pump trips
6	MS0088Ar	ALL(C)	Steam leak inside containment
7	MS0088Ar	ALL(M)	Steam leak worsens requiring Rx Trip & MSLI (CT-1 and CT-2)
8	RP0279A or B	ATC(I,MC) CRS(I)	Train initially selected for MSLI fails to manually actuate other train will actuate MSLI
		ABs	AB.CVC-1 → ARP → AB.SW-1 → AB.CN-1 → AB.LOAD-1 →AB.STM-1
		EOPs	TRIP-1 → LOSC-1 → TRIP-3

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS)Tech Spec, (MC)Manual Control

I. OBJECTIVES

- A. Given the order or indications of a charging system malfunction, PERFORM actions as the nuclear control operator to RESPOND to the loss or malfunction of the charging system in accordance with the approved station procedures.
- B. Given indication of a loss or malfunction of the Charging system DIRECT corrective action for a Charging System malfunction in accordance with the approved station procedures.
- C. Given indication of a loss of a SW Pump, PERFORM actions as the nuclear control operator to RESPOND to the malfunction in accordance with approved station procedures.
- D. Given indication of a loss of a SW Pump, DIRECT corrective action for a SW System malfunction in accordance with the approved station procedures.
- E. Given indication of a loss of a Condensate Pump, PERFORM actions as the nuclear control operator to RESPOND to the malfunction in accordance with approved station procedures
- F. Given indication of a loss or malfunction of the Condensate system DIRECT corrective action for a Condensate System malfunction in accordance with the approved station procedures
- 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. During performance of emergency operating procedures, monitor the critical safety function status trees in accordance the EOP in effect.

II. MAJOR EVENTS

1. PZR Level channel I fails high (2LT-459)
2. 21 RCP standpipe level Low
3. 23 SW Pump trips and 26 SW Pump fails to auto start
4. 23 Condensate Pump trips
5. 21 Steam Line break (inside containment)
6. MSLI fails on first train actuated
7. Isolate faulted SG
8. Terminate SI

III. SCENARIO SUMMARY

- A. The crew will receive the unit at 100% power MOL. 21 SW Pump is C/T for pump repack.
- B. The crew will perform a load reduction to 95% in preparation for removing 21 Heater Drain pump from service for planned maintenance.
- C. Following the down power 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.
- D. After Tech Specs have been evaluated 21 RCP standpipe level low will alarm, operators will take actions to makeup to the standpipe IAW **S2.OP-AR.ZZ-0011**, Control Console 2CC1 alarm response. Alarm will clear once actions are taken to align flow and complete the makeup to the standpipe.
- E. The 23 SW pump will trip and the standby SW pump in Auto (26 SW Pump) will fail to auto start. The crew will manually start 26 SW pump to restore SW header pressure. The CRS may enter **S2.OP-AB.SW-0001**, Loss of SW Header Pressure, but the only action is to start a SW pump. The CRS will evaluate Tech Specs with 21 SW pump C/T and the trip of 23 SW pump and enter TS 3.7.4 for an inoperable SW loop.
- F. After Tech Specs are evaluated, the 23 condensate pump will trip. The CRS will enter **S2.OP-AB.CN-0001**, Main Feedwater/Condensate System Abnormality, and take actions to bypass the condensate polisher and initiate a turbine load reduction to 1080 MWe per Attachment 2. The crew performs load reduction IAW **S2.OP-AB.LOAD-0001**, Rapid Load Reduction.
- G. After the turbine load reduction is complete, there will be a steam leak inside containment on 21 steamline upstream of the orifice. Operators will observe reactor power rising and containment pressure and temperatures begin to rise. The crew will diagnose a steam leak inside containment

and enter **S2.OP-AB.STM-0001**, Excessive steam flow. Actions will need to be taken to maintain power less than 75% limit in place from tripped condensate pump.

- H. Once actions have been discussed about an additional downpower then the larger leakrate will be entered requiring the unit to be tripped and MS isolation to be completed. The crew will trip the reactor and enter **2-EOP-TRIP-1**, Reactor Trip or Safety Injection. The crew will initiate MSLI for faulted SG, the first train of main steam isolation selected will fail to actuate, the crew must actuate the other train.
- I. Following the MSLI, the crew will recognize that 21 SG is the faulted SG and isolate AFW flow by closing 21AF21 and 21AF11 [**Critical Task #1, this includes a time critical action to isolate AFW flow to the faulted SG by closing the AF21 and AF11 \leq 10 minutes**]. The crew will transition to **2-EOP-LOSC-1**, Loss of Secondary Coolant.
- J. Once all actions are completed to isolate the faulted SG the crew will transition to **2-EOP-TRIP-3**, Safety injection termination to terminate safety injection [**Critical Task #2**].
- K. In **EOP-TRIP-3**, Safety Injection Termination, the crew will terminate SI by stopping ECCS pumps, isolating BIT flow and placing normal letdown in service.
- L. The scenario may be terminated when the crew places normal letdown in service or at direction by Lead Examiner.

M. INITIAL CONDITIONS

_____ IC-241

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

<i>Initial</i>	Description
_____	VC1and VC4 C/T
_____	RCPs (SELF CHECK)
_____	RTBs (SELF CHECK)
_____	MS167s (SELF CHECK)
_____	500 KV SWYD (SELF CHECK)
_____	SGFP Trip (SELF CHECK)
_____	23 CV PP (SELF CHECK)
_____	21 SW Pump C/T
_____	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
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1	EVENT ACTION: COMMAND: PURPOSE:	kaj02pnh //21WR62 21 RCP STANDPIPE SUPPLY DMF RC009A <update as needed>
2	EVENT ACTION: COMMAND: PURPOSE:	ka505ava //TRAIN "A" - LOOP 21 MAINSTEAM IS DOR ka705ava <update as needed>
3	EVENT ACTION: COMMAND: PURPOSE:	ka705ava //TRAIN "B" - LOOP 21 MAINSTEAM IS DOR ka505ava <update as needed>
4	EVENT ACTION: COMMAND: PURPOSE:	ka505dva //TRAIN "A" - LOOP 22 MAINSTEAM IS DOR ka705dva <update as needed>
5	EVENT ACTION: COMMAND: PURPOSE:	ka705dva //TRAIN "B" - LOOP 22 MAINSTEAM IS DOR ka505dva <update as needed>
6	EVENT ACTION: COMMAND: PURPOSE:	ka505hva //TRAIN "A" - LOOP 23 MAINSTEAM IS DOR ka705hva <update as needed>
7	EVENT ACTION: COMMAND: PURPOSE:	ka705hva //TRAIN "B" - LOOP 23 MAINSTEAM IS DOR ka505hva <update as needed>
8	EVENT ACTION: COMMAND: PURPOSE:	ka505lva //TRAIN "A" - LOOP 24 MAINSTEAM IS DOR ka705lva <update as needed>
9	EVENT ACTION: COMMAND: PURPOSE:	ka705lva //TRAIN "B" - LOOP 24 MAINSTEAM IS DOR ka505lva <update as needed>
10	EVENT ACTION: COMMAND: PURPOSE:	et_array(2).and.ET_array(3) //Event trigger DMF MS0092E <update as needed>
11	EVENT ACTION: COMMAND: PURPOSE:	et_array(4).and.et_array(5) //Event trigger DMF MS0092F <update as needed>
12	EVENT ACTION: COMMAND: PURPOSE:	et_array(6).and.et_array(7) //Event trigger DMF MS0092G <update as needed>
13	EVENT ACTION: COMMAND: PURPOSE:	et_array(8).and.et_array(9) //Event trigger DMF MS0092H <update as needed>

MALFUNCTIONS:

SELF-CHECK	Description	Delay Time	Initial Value	Ramp Time	Trigger	Severity
01	PR0017A PZR LEVEL CH I (LT459) FAILS H/L	N/A	N/A	N/A	RT-1	100
02	RC009A 21 RC PUMP - #3 SEAL FAILS - w/ DEGRADATION	N/A	N/A	N/A	RT-2	100
03	SW0339F 26 SW PUMP- Press SW Fails H/L	N/A	N/A	N/A	N/A	PRESS SW FAIL HI
04	SW0215C 23 SERVICE WATER PUMP TRIP	N/A	N/A	N/A	RT-3	
05	CN0117C 23 CONDENSATE PUMP TRIP	N/A	N/A	N/A	RT-4	
06	MS0088Ar 21 Main Steam Line Leak Inside Cont BEFORE orifice	N/A	N/A	N/A	RT-5	1
07	RP0279A AUTO MSLIS FAILS TO ACT, TRN A	N/A	N/A	N/A	N/A	
08	RP0279B AUTO MSLIS FAILS TO ACT, TRN B	N/A	N/A	N/A	N/A	
09	MS0092E 21MS167 FAILS OPEN	N/A	N/A	N/A	N/A	
10	MS0092F 22MS167 FAILS OPEN	N/A	N/A	N/A	N/A	
11	MS0092G 23MS167 FAILS OPEN	N/A	N/A	N/A	N/A	
12	MS0092H 24MS167 FAILS OPEN	N/A	N/A	N/A	N/A	

REMOTES:

SELF-CHECK	Description	Delay Time	Initial Value	Ramp Time	Trigger	Condition
01	SW32D 23 SW PUMP BKR CONTROL POWER	00:00:15	N/A	N/A	RT-9	OFF
02	SW31D 23 SW PUMP RACK OUT	N/A	N/A	N/A	RT-9	TAGGED
03	MS05A 21MS45 21 STM GEN STM SUP-23 AFP	N/A	100	00:01:00	RT-11	0

OVERRIDES:

SELF-CHECK	Description	Delay Time	Initial Value	Ramp Time	Trigger	Condition/Severity
01	CG01 F DI KCG01TC1 21MS167 21 SG STOP VALVE CLOSE	N/A	N/A	N/A	N/A	OFF
02	CG02 F DI KCG02TC1 22MS167 22 SG STOP VALVE CLOSE	N/A	N/A	N/A	N/A	OFF
03	CG03 F DI KCG03TC1 23MS167 23 SG STOP VALVE CLOSE	N/A	N/A	N/A	N/A	OFF
04	CG04 F DI KCG04TC1 24MS167 24 SG STOP VALVE CLOSE	N/A	N/A	N/A	N/A	OFF
05	BD12 B DI KBD12DC1 21MS167 HYDRAULIC CLOSE	N/A	N/A	N/A	N/A	OFF
06	BE12 B DI KBE12DC1 22MS167 HYDRAULIC CLOSE	N/A	N/A	N/A	N/A	OFF
07	BM12 B DI KBM12DC1 23MS167 HYDRAULIC CLOSE	N/A	N/A	N/A	N/A	OFF

_____08	BN12 B DI KBN12DC1 24MS167 HYDRAULIC CLOSE	N/A	N/A	N/A	N/A	OFF
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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
<p data-bbox="113 305 575 365">1. Load Reduction to Remove 21 Heater Drain Pump from Service:</p> <p data-bbox="113 407 533 537">Note: Crew will use reactivity plan and should determine approx. 85 gals of boron to be added</p> <p data-bbox="113 578 558 672">RO will most likely use boration “hard card” Attachment 3 of S2.OP-SO.CVC-0006</p> <p data-bbox="113 995 562 1125">PO will most likely use Routine Load Reduction “hard card” Attachment 3 of S2.OP-SO.TRB-0002</p>	<p data-bbox="613 407 1251 435">Crew briefs reactivity plan to reduce load to 95%.</p> <p data-bbox="613 578 1308 951">RO initiates a boration and/or inserts control rods.</p> <ul data-bbox="688 613 1308 951" style="list-style-type: none"> • PRESS Make up mode STOP • ADJUST 2CV172 boric acid flow setpoint to desired value • SET boric acid flow register to desired gallons • PRESS Makeup control mode BORATE pushbutton • PRESS Makeup control mode START • ENSURE boric acid flow register indicates flow <p data-bbox="613 995 1283 1304">PO initiates a turbine load reduction to 95%.</p> <ul data-bbox="663 1031 1283 1304" style="list-style-type: none"> • ENSURE Main Turb data display on Plant computer • ADJUST turbine ramp rate for TIP control to 10%/hr • ADJUST setter to 89% • Select GO • ENSURE setter – actual and Reference displays are updating 		
<p data-bbox="113 1349 562 1438">Proceed on to next event following load reduction or as directed by Lead Examiner.</p>	<p data-bbox="613 1349 1209 1406">RO monitors Tavg and control rods for proper response.</p>		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
<p>2. Pressurizer Level CH 1 fails high:</p>			
<p>Simulator Operator: Insert RT-1 at direction from Lead Examiner.</p> <p>PR0017A, PZR LEVEL CH I (LT459) fails H/L Value = 100</p>			
	<p>RO reports unexpected alarms OHA E-4 PZR LVL HI, E-20, PZR HTR ON LVL HI.</p>		
	<p>PO refers to 2CC1 ARP</p>		
	<p>RO reports PZR Level Channel I has failed high.</p>		
	<p>RO reports charging flow has lowered.</p>		
	<p>RO places Master Flow Control in Manual and raises charging flow to restore PZR level to program.</p>		
	<p>CRS enters S2.OP-AB.CVC-0001</p>		
	<p>PO initiates Attachment 1 CAS.</p>		
	<p>RO reports charging pump is running and no signs of cavitation.</p>		
	<p>RO reports that a PZR level controlling channel has failed high.</p>		
	<p>CRS directs RO to take manual control of charging</p>		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	(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:		
	<ul style="list-style-type: none"> • TS 3.3.1.1 action 6 (72 hours to place the channel in the tripped condition) 		

Proceed to next event after Tech Specs has been evaluated or by direction from Lead Examiner.

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
3. 21 RCP standpipe level low			
<p>Simulator Operator: Insert RT-2 on direction from Lead Examiner. This will insert the following malfunction:</p> <p>RC009A 21 RC PUMP - #3 SEAL FAILS - w/ DEGRADATION Value = 100</p>	<p>Crew reports unexpected console alarm, 21 RCP Standpipe level low.</p>		
<p>Simulator Operator: Verify ET-1 is true when 21 WR62 is opened, this will delete MALF RC009A</p>	<p>Crew refers to alarm response and makes up to standpipe and monitors for leakage IAW S2.OP-AR.ZZ-0011.</p> <ul style="list-style-type: none"> • RO VERIFIES Seal Water Leakoff alarm is clear • START 21 or 22 Primary Water Pump • OPEN 2WR80 PW to Contmt Stop Valve • OPEN 21WR62 Standpipe Supply Valve • LOG RCP standpipe Fill <p>When low level clears and high level alarms:</p> <ul style="list-style-type: none"> • STOP Primary Water Pump • CLOSE 2WR80 PW to Contmt Stop Valve • CLOSE 21WR62 Standpipe Supply Valve 		
	<p>Crew will monitor parameters and possibly initiate a Reactor coolant leakrate surveillance procedure.</p>		
<p>Proceed to next event when direction by Lead Examiner.</p>			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
<p>4. 23 SW Pump trips and 26 SW fails to Auto start:</p>			
<p>Simulator Operator: Enter RT-3 on direction from Lead Examiner.</p> <p>SW0215C, 23 SW pump trips SW0339F, 26 SW pressure switch fails high</p>			
	<p>RO reports unexpected OHA alarms for:</p> <ul style="list-style-type: none"> • B-13, 21 SW HDR PRESS LO • B-14, 22 SW HDR PRESS LO • B-15, TURB AREA SW HDR PRESS LO 		
<p>Examiner's Note: Crew does not have to enter S2.OP-AB.SW-0001 since the only action that the AB requires is to start standby SW Pump.</p>	<p>RO reports 23 SW Pump tripped and 26 SW Pump in Auto failed to start.</p>		
	<p>RO starts 26 SW pump.</p>		
	<p>RO reports low SW pressure alarms are cleared.</p>		
	<p>CRS enters S2.OP-AB.SW-0001, Loss of SW Header Pressure</p>		
	<p>PO initiates Attachment 1 CAS</p>		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	PO reports no indication of SW Bay leak.		
	PO starts SW Pumps to maintain header pressure between 95-150 psi.		
	PO reports all SW OHA alarms are cleared.		
	PO reports no indication of leak or valve malfunction on the turbine header.		
<p>Role Play: IF an operator is dispatched to investigate the trip of 23 SW Pump, then report back in 2 minutes the following: “the 4KV breaker for 23 SW Pump is open and no relay flags are up”, if dispatched to SW report no abnormalities locally at the pump after 4 minutes.</p>			
<p>Insert RT-9 to tag SW pump if requested</p>			
TS evaluation #2:			
	<p>CRS enters:</p> <ul style="list-style-type: none"> TS 3.7.4 (72 hours). This is due to having 21 and 23 SW Pumps inoperable in one bay resulting in only one operable SW loop (refer to S2.OP-SO.SW-0005 Attachment 2) 		
<p>Proceed to next event at Lead Examiner direction.</p>			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
5. 23 Condensate Pump trips:			
Simulator Operator: Insert RT-4 by direction from Lead Examiner. CN0117C, 23 condensate pump trips			
	PO reports 23 Condensate Pump tripped.		
	CRS enters S2.OP-AB.CN-0001, Main Feedwater/Condensate Abnormality.		
	PO initiates Attachment 1 CAS		
	PO reports SGFP did not trip		
	PO reports 23 Condensate Pump tripped.		
Role Play: IF an operator is dispatched, then report the following after 1-2 minutes; <i>“23 Condensate Pump breaker is open and the overcurrent relay flag is up”</i> .			
	PO reports SGFP suction pressure is less than 320 psig.		
	PO opens 21-23 CN108's (Polisher Bypass valves)		
	PO reports 2CN47 is not open.		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
<p>Boration should be approx. 17gal/%power at a rate commensurate with selected power reduction rate</p>	<p>CRS evaluates plant conditions IAW Attachment 2 section 4.0</p>		
	<p>CRS determines that a load reduction to 85% Rx power at $\leq 5\%/min$ is required.</p>		
	<p>CRS brief load reduction and Reactivity plan.</p>		
	<p>RO initiates boration IAW S2.OP-SO.CVC-0006, Boration Concentration Control.</p> <ul style="list-style-type: none"> • PRESS Make up mode STOP • ADJUST 2CV172 boric acid flow setpoint to desired value • SET boric acid flow register to desired gallons • PRESS Makeup control mode BORATE pushbutton • PRESS Makeup control mode START • ENSURE boric acid flow register indicates flow 		
	<p>PO initiates load reduction using turbine load control IAW S2.OP-SO.TRB-0002, Turbine-Generator Shutdown Operations</p> <ul style="list-style-type: none"> • ENSURE Main Turb data display on Plant computer • ADJUST turbine ramp rate for TIP control to desired %/minute • ADJUST setter to 85% • Select GO <p>ENSURE setter – actual and Reference displays are updating</p>		
<p>CRS enters S2.OP-AB.LOAD-0001, Rapid Load Reduction.</p>			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
Proceed to next event after the load reduction is complete or at Lead Examiner's direction.	PO initiates Attachment 1 CAS		
	RO maintains Tavg on program IAW Attachment 3		
	CRS directs WCC to transfer heating steam to Unit 1 IAW SC.OP-SO.HS-0001.		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
<p>6. 21 SG Steam Line Break (inside containment):</p>			
<p>Simulator Operator: Insert RT-5 by direction from Lead Examiner.</p> <p>MS0088Ar 21 Main Steam Line Leak Inside Cont BEFORE orifice Value = 1</p>			
	<p>RO reports unexpected alarms for C-38 CFCU LK DET HI, CONT PRESS HI, and then shortly after C-30 for CFCU LK DET HI-HI.</p>		
	<p>PO determines no rise in CNTMT radiation and that leak is inside containment based on rising containment pressure.</p>		
	<p>RO reports C-2 CNTMT SUMP PUMP START</p>		
<p>Evaluator's Note: Around this time Cntmt Pressure is <u>rising quickly</u> and Rx power is slowly rising.</p>			
	<p>CRS enters S2.OP.AB.STM-0001, Excessive Steam Flow.</p>		
	<p>CRS directs initiation of Attachment 1 of S2.OP-AB.STM-0001.</p>		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
<p>Evaluator's Note: It will be apparent quickly that a unit shutdown will not be performed before a Rx trip is required based on rising containment pressure.</p>	PO verifies EHC system operating correctly, and MS10s and Steam Dumps are closed.		
	PO reports no SG Safety Valve is open or leaking		
	RO reports Rx Power is not stable.		
	RO reports normal cntmt radiation levels AND the following alarms and indications: <ul style="list-style-type: none"> ▪ Rising Cntmt pressure ▪ OHA C-38 CFCU LK DET HI ▪ OHA C-30 CFCU Lk DET HI-HI ▪ OHA C-2 CNTMT SUMP START 		
	RO places all CFCUs in SLOW speed		
	RO reports steam leak in containment is not isolable		
	CRS determines a Unit shutdown is required and plans rate and reactivity management strategy.		
RO calculates boration required.			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
<p>7. Unisolable steam leak inside containment (Initiate Rx Trip, MSLI and SI):</p>			
	<p>CRS determines need to implement CAS of AB.STM-1 based on CNTMT Pressure rising towards Auto SI (4 psig)</p>		
	<p>RO Trips the Rx and confirms Rx is Tripped</p>		
	<p>RO manually initiates MSLI.</p>		
<p>Simulator Operator: Once 21 MS167 is closed then modify <u>MALF MS0088Ar to 20%</u>.</p>			
<p>Record time when steam leak is modified to steam break:</p> <p>Time: _____; _____; _____</p>			
	<p>RO verifies steam leak is not isolated</p>		
	<p>RO initiates SI.</p>		
	<p>RO reports steam leak is on 21 SG.</p>		
	<p>PO throttles AFW flow to no less than 22E4 lbm/hr.</p>		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
<p>Critical Task # 1 (CT-17): Isolate feed and steam flow to faulted SG before transition out of EOP-LOSC-1, Loss of Secondary Coolant. This CT also includes a time critical action for isolating AFW feedflow to the ruptured SG by closing the respective AF21 and AF11 \leq 10 minutes.</p> <p>SAT _____ UNSAT _____</p> <p>This CT is comprised of 2 parts; isolate feed flow (Part 1) and then steam flow (Part 2) later in EOP-LOSC-1.</p>			
	<p>Critical Task #1 Part 1 - PO closes 21AF21 and 21AF11 to isolate faulted 21 SG.</p>		
<p>Record time AFW valves are closed:</p> <p>Time: _____ : _____ : _____</p>			
	<p>RO reports SEC loading is not complete for B vital bus, but that all available equipment started.</p>		
	<p>PO reports 21 and 22 AFW pumps are operating.</p>		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	RO reports 21 and 22 CA330s are closed.		
	RO reports containment pressure has NOT remained less than 15 psig.		
	PO reports main steam line isolation requirements were met and MSLI previously initiated.		
	PO reports all 4KV vital busses are energized.		
	RO reports CAV is in Accident Pressurized mode.		
	RO reports correct switchgear room ventilation operation.		
	RO reports 2 CCW pumps are running.		
	RO reports both CCW HXs are in Auto.		
	RO reports correct ECCS pump alignment and expected flows for RCS conditions.		
Examiner's Note: PO should have lowered AFW flow to as close to 22E4 lbm/hr as possible.			
	PO reports AFW flow is >22E4 lbm/hr.		
	RO reports all RCPs are stopped because of phase B actuation.		
	RO reports Tavg is not stable and is rising.		
	RO reports Tavg is trending to 547 F.		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	RO reports both PZR PORVs are closed and block valves are open.		
	PO reports 21 SG pressure is lowering in an uncontrolled manner or completely depressurized.		
	RO reports that MSLI was previously initiated.		
	CRS transitions to 2-EOP-LOSC-1, Loss of Secondary Coolant.		
	RO reports MSLI has been initiated.		
	PO reports all valves in Table A are closed.		
	PO reports 21 SG pressure is dropping in an uncontrolled manner.		
	PO reports that all SGs pressures are NOT dropping in an uncontrolled manner OR completely depressurized.		
	Critical Task #1 - PO closes or verifies closed the following valves: 21BF13, 21BF19, 21BF40, 21MS7, 21MS10, 21MS18, 21MS167, and 21GB4 [Critical Task #2, Part 2 complete]		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
<p>Critical Task #1, Part 2 (CT-17): Isolate feed and steam flow to faulted SG before transition out of EOP-LOSC-1, Loss of Secondary Coolant.</p> <p>SAT _____ UNSAT _____</p>			
<p>Simulator Operator: Insert RT-11 to close 21MS45.</p> <p>MS05A 21 STM GEN SUP-23 AFP Final = 0 Ramp = 1 min</p>	<p>PO reports that 21 SG is faulted.</p> <p>PO reports that both 21 and 23 SGs are NOT faulted.</p> <p>CRS dispatches operator to close 21MS45.</p>		
	<p>RO resets Phase A.</p> <p>RO opens 21 and 22 CA330s.</p> <p>RO resets SG sample isolation bypass.</p> <p>RO opens 21 thru 24 SS94's.</p> <p>CRS directs Chemistry to sample 21-24 SGs for activity.</p>		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
<p>8. SI Termination EOP-TRIP-3:</p>			
	CRS transitions to EOP-TRIP-3, SI Termination.		
	RO resets SI & SEC, Phase A, and Phase B		
<p>Critical Task-2, (CT-48): Terminate ECCS flow before transition out of EOP-TRIP-3.</p> <p>SAT _____ UNSAT _____</p> <p>Shaded steps are required to satisfy CT</p>			
	RO Stops all but one Charging Pump [Critical Task-2, Part 1]		
<p>Critical Task-2, Part 1 (CT-48): Secure all but 1 charging Pump before transition out of EOP-TRIP-3</p> <p>SAT _____ UNSAT _____</p> <p>Shaded steps are required to satisfy CT</p>			
	RO reports RCS pressure is stable or rising.		
	RO reports Charging pump suction is aligned to RWST.		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
<p>Critical Task-2, Part 2 (CT-48): Isolate the BIT by closing 2SJ4 and 2SJ5 or 2SJ12 and 2SJ13</p> <p>SAT _____ UNSAT _____</p> <p>Shaded steps are required to satisfy CT</p>	RO opens 2CV139 and 2CV140		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
Critical Task-2, Part 3 (CT-48): Secure SI Pumps before transition out of EOP-TRIP-3 SAT _____ UNSAT _____ Shaded steps are required to satisfy CT			
	RO reports both RHR pump suction aligned to RWST.		
Critical Task-2, Part 4 (CT-48): Secure RHR Pumps before transition out of EOP-TRIP-3 SAT _____ UNSAT _____ Shaded steps are required to satisfy CT	RO stops 21 and 22 RHR pumps [Critical Task 2, Part 4]		
Scenario may be terminated when CT-2 is completed or by direction from Lead Examiner.			

N. SCENARIO REFERENCES

- A. Alarm Response Procedures (Various)
- B. Technical Specifications
- C. Emergency Plan (ECG)
- D. OP-AA-101-111-1003, Use of Procedures
- E. 2-EOP-TRIP-1, Rx Trip or Safety Injection
- F. 2-EOP-LOSC-1, Loss of Secondary Coolant
- G. 2-EOP-TRIP-3, SI Termination
- H. S2.OP-AB.SW-0001, Loss of SW Header Pressure
- I. S2.OP-AB.CVC-0001, Loss of Charging
- J. S2.OP-SO.CN-0001, Main Feedwater/Condensate System Abnormality
- K. S2.OP-AB.LOAD-0001, Rapid Load Reduction
- L. S2.OP-IO.ZZ-0004, Power Operation
- M. S2.OP-AR.ZZ-0011, Control Console 2CC1

MODE: 1 POWER: 100% RCS BORON: 802 MWe 1220

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

NA

REACTIVITY PARAMETERS

MOST LIMITING LCO AND DATE/TIME OF EXPIRATION:

EVOLUTIONS/PROCEDURES/SURVEILLANCES IN PROGRESS:

1. Load reduction to 95% to support removal of 21 Heater Drain Pump

ABNORMAL PLANT CONFIGURATIONS:

CONTROL ROOM:

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

PRIMARY:

SECONDARY:

- Polisher in service
- Blowdown 35K per loop to 23 Condenser

RADWASTE:

No discharges in progress

CIRCULATING WATER/SERVICE WATER:

- 21 SW Pump C/T for pump repack.

- ___ 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. All printers have adequate paper AND functional ribbon
- ___ 12. Required procedures clean
- ___ 13. Multiple color procedure pens available
- ___ 14. Required keys available
- ___ 15. Simulator cleared of unauthorized material/personnel
- ___ 16. All charts advanced to clean traces and chart recorders are on.
- ___ 17. Rod step counters correct (channel check) and reset as necessary
- ___ 18. Exam security set for simulator
- ___ 19. Ensure a current RCS Leak Rate Worksheet is placed by Aux Alarm Typewriter
with Baseline Data filled out
- ___ 20. Recording Media available (if applicable)
- ___ 21. Ensure ECG classification is correct
- ___ 22. Reference verification performed with required documents available
- ___ 23. Verify phones disconnected from plant after drill.
- ___ 24. Ensure ECG related paperwork is marked "For Training Use Only".

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).

SCENARIO IDENTIFIER: 21-01 NRC Scenario 2 REVIEWER: K. Hantho

Initials Qualitative Attributes

- | | | |
|-----|-----|---|
| K | 1. | The scenario has clearly stated objectives in the scenario. |
| K | 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. |
| K | 3. | The scenario consists mostly of related events. |
| K | 4. | Each event description consists of: <ul style="list-style-type: none">• 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 |
| K | 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. |
| K | 6. | The events are valid with regard to physics and thermodynamics. |
| K | 7. | Sequencing/timing of events is reasonable, and allows for the examination team to obtain complete evaluation results commensurate with the scenario objectives. |
| K | 8. | The simulator modeling is not altered. |
| K | 9. | All crew competencies can be evaluated. |
| K | 10. | The scenario has been validated. |
| N/A | 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. |
| K | 12. | ESG-PSA Evaluation Form is completed for the scenario at the applicable facility. |

21-01 NRC Scenario 2

Critical Tasks:

CT-1 (CT-17)

Isolate the faulted SG before transition out of LOSC-1 (this CT includes time critical operator action time for isolating AFW flow to faulted SG \leq 10 minutes per OP-SA-102-106-F1)

Safety Significance

Failure to isolate a faulted SG that can be isolated causes challenges to CSFs beyond those irreparably introduced by the postulated conditions. Also, depending upon the plant conditions, it could constitute a failure by the crew to “demonstrate the ability to recognize a failure or an incorrect automatic actuation of an ESF system or component.”

Failure to isolate a faulted SG can result in challenges to the following CSFs:

- Integrity
- Subcriticality
- Containment (if the break is inside containment)

Cues:

- Both of the following:
 - Indication of uncontrolled depressurization of multiple SGsAND
 - Valve position or flow rate indication that:
 - Main steamline isolation has not actuated
 - Feedline isolation has not actuatedOR
 - Both of the following:
 - Steam pressure and flow rate indications that make it possible to identify a single SG as faultedAND
 - Valve position and flow rate indication that AFW continues to be delivered to the faulted SG

Measurable Performance Indicator

Manipulation of controls as required to isolate the faulted SG

- MSIVs indicate closed
- Indication of feedline isolation
 - Feedwater control valves indicate closed (**respective AF21 and AF11 are closed \leq 10 minutes**)
 - Feedline isolation valves indicate closed
 - Main feed pumps indicate tripped
- Indication that AFW flow to the faulted SG is stopped
 - AFW flow control valves for faulted SG indicate closed

Feedback

- Any depressurization of intact SGs stops
- Steam flow indication from faulted SG decreases to zero
- RCS cooldown stops
- Main feedwater flow rate indication of zero

- AFW flow rate indication to faulted SG of zero

CT-2 (CT-48)

Critical Task

Terminate ECCS flow before transition out of TRIP-3

Safety Significance

Failure to terminate ECCS flow when SI termination criteria are met causes the PRZR to fill and RCS pressure to increase. Additionally, the unnecessary continuation of ECCS flow needlessly aggravates the thermal stress on the reactor vessel. This constitutes an incorrect performance that causes a "significant reduction of safety margin beyond that irreparably introduced by the scenario."

Cues:

- Indication and/or annunciation of an extreme (RED path) or severe (ORANGE path) challenge to the integrity CSF

AND

- Indication and/or annunciation of reactor trip and SI

AND

- Indication and/or annunciation that SI termination criteria are met

Measurable Performance Indicator

Manipulation of controls as necessary to terminate ECCS flow

- Breaker position lamps for all but one charging/SI pump indicate open

AND

- Breaker position lamps for all high-head ECCS pumps indicate open

AND

- Breaker position lamps for all low-head ECCS pumps indicate open

AND

- Valve position lamps for BIT isolation valves indicate closed

Feedback

- Indication of charging/SI ECCS flow rate through BIT decreasing or zero
- Indication of high-head ECCS flow rate decreasing or zero
- Indication of low-head ECCS flow rate decreasing or zero

ATTACHMENT 6**ESG-PSA RELATIONSHIP EVALUATION****EVENTS LEADING TO CORE DAMAGE**

<u>Y/N</u>	<u>Event</u>	<u>Y/N</u>	<u>Event</u>
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

<u>Y/N</u>	<u>COMPONENT, SYSTEM, OR TRAIN</u>	<u>Y/N</u>	<u>COMPONENT, SYSTEM, OR TRAIN</u>
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	N	Auxiliary Feed Pump
N	CVCS Letdown line Control and Isolation Valves	N	SBO Air Compressor

OPERATOR ACTIONS IMPORTANT IN PREVENTING CORE DAMAGE

<u>Y/N</u>	<u>OPERATOR ACTION</u>
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-3 [AR.ZZ-11, AB.CVC-1, AB.PZR-1, AB.TRB-1, TRIP-1, FRSM-1 using BAT pumps, TRIP-2]
SCENARIO NUMBER: 21-01 NRC ESG-3
EFFECTIVE DATE: See Approval Below
EXPECTED DURATION: 60 minutes
REVISION NUMBER: 0
PROGRAM: L.O. REQUAL
 INITIAL LICENSE
 STA
 OTHER _____

Revision Summary:
❖ Rev. 0

PREPARED BY:	K. Hantho _____ Lead Regulatory Exam Author	9-16-22 _____ Date
APPROVED BY:	M. Wadusky _____ Operations Training Manager or designee	_____ Date
APPROVED BY:	M. Winkelspecht _____ Facility Representative	_____ Date

SCAN OF SIGNED SCENARIO COVER SHEET

