SIMULATOR
EXAMINATION SCENARIO GUIDE

SCENARIO TITLE:	16-01 ESG-1 [AB.PZR-1, AB.SW-3, AB.RCP-1, TRIP-1, TRIP-2, SGTR-1]
SCENARIO NUMBER:	16-01 ESG-1
EFFECTIVE DATE:	See Approval Dates
EXPECTED DURATION:	90 minutes
REVISION NUMBER:	01
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.

PREPARED BY:	R. Chan **Lead Regulatory Exam Author**	12-14-17 **Date**
APPROVED BY:	McHugh **Operations Training Manager**	12/15/17 **Date**
APPROVED BY:	MYERS **Facility Representative**	12/17/17 **Date**

SCAN OF SIGNED SCENARIO COVER SHEET

I. OBJECTIVES

A. Given the order or indications of a pressurizer control system malfunction, perform actions as the nuclear control operator to RESPOND to the malfunction in accordance with S1/S2.OP-S2.OP-AB.PZR-0001.

B. Given indication of a pressurizer control system malfunction, DIRECT the response to the malfunction in accordance with S2.OP-AB.PZR-0001.

C. Given the order or indications of a SW Bay leak, perform actions as the nuclear control operator to RESPOND to the malfunction, IAW approved station procedures.

D. Given the order or indications of a SW Bay leak, DIRECT the response to the malfunction IAW approved station procedures.

E. Given the failure of affecting a Reactor Coolant Pump, perform actions as the nuclear control operator to RESPOND to the failure IAW S1/S2.OP-AB.RCP-0001.

F. Given the failure of affecting a Reactor Coolant Pump, DIRECT the response to the failure IAW S1/S2.OP-AB.RCP-0001.

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 2-EOP-TRIP-1.

H. Given indication of a reactor trip, DIRECT the response to the reactor trip in accordance with 2-EOP-TRIP-1.

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 steam generator tube rupture, perform actions as the nuclear control operator to RESPOND to the tube rupture in accordance with the approved station procedures.

L. Given the order or indications of a steam generator tube rupture, DIRECT the response to the tube rupture in accordance with the approved station procedures.

II. MAJOR EVENTS

A. Power Ascension

B. Controlling PZR Pressure Channel fails high

C. #2 SW bay leak

D. 22 RCP #1 seal degradation and seal failure

E. 24 SG Tube Rupture

III. SCENARIO SUMMARY

A. The crew will take the watch with the unit stable at 3% reactor power during a plant startup, BOL. 21 SGFP is in service and 22 SGFP is standby. Steam dumps are in Main Steam Pressure Control, Automatic, set at 1000 psig. 23 Charging pump is C/T to troubleshoot flow oscillations with the fluid drive. The crew will be instructed to raise power to 10% and enter Mode 1.

B. The crew will initiate power ascension to 10%, and enter Mode 1, using Main Steam Dumps and control rods IAW **S2.OP-IO.ZZ-0003**, Hot Standby to Minimum Load and S2.OP-SO.MS-0002, Steam Dump System Operation, Attachments 3 or 4.

C. After the crew enters Mode 1 (about 6% Rx power), the controlling PZR Pressure channel will fail high, deenergizing PZR heaters and causing both PZR Spray valves to fully open. The crew will respond IAW **S2.OP-AB.PZR-0001**, Pressurizer Pressure Malfunction, to establish manual control of PZR pressure control and restore pressure to normal, transfer to an operable channel, and remove the failed channel from service. The CRS will evaluate Tech Specs. **[Tech Specs exercised]**

D. After the Pressurizer Pressure channel failure has been addressed, a service water (SW) leak in #2 SW bay will occur. The crew will respond IAW **S2.OP-AB.SW-0003**, Service Water Bay Leak. The crew will split the SW headers, stop all SW pumps in #2 Bay and isolate the leak. The CRS will evaluate Tech Specs. **[Tech Specs exercised]**

E. After the SW Bay leak is addressed, 22 RCP #1 seal will degrade indicated by an increase seal leak-off flow. The crew will respond IAW **S2.OP-AB.RCP-0001**, Reactor Coolant Pump Abnormality. The crew will evaluate the seal degradation and determine a course of action which will include an orderly unit shutdown.

F. After the crew determines a course of action to address the seal degradation, the #1 seal will fail resulting in the crew initiating the CAS of S2.OP-AB.RCP-0001 and Attachment 2 for stopping RCPs. The crew will trip the Rx, confirm the trip, stop 22 RCP, and then within 3-5 minutes close 22CV104 **[CT#1].**

G. The crew will perform immediate actions in **EOP-TRIP-1**, Reactor Trip or Safety Injection, and then transition to **EOP-TRIP-2**, Reactor Trip Response, based on no SI required.

H. Shortly after transition to EOP-TRIP-2, 24 SG will rupture (650 gpm) and the crew will manually initiate SI and **return to EOP-TRIP-1**. While in EOP-TRIP-1, the crew will identify that a FW isolation valve (**24BF13), did not close on SI / Phase A signal** and will take manual actions to close 24BF13 from the control room.

I. The crew will identify that 24 SG has a tube rupture based on SG narrow range levels rising, and several radiation montors in alarm, and transition to **EOP-SGTR-1**, Steam Generator Tube Rupture.

J. While in EOP-SGTR-1, the crew will isolate feed and steam flow to the ruptured 24 SG and initiate a RCS cooldown using steam dumps to the target temperature IAW Table B, Required RCS Cooldown Temeprature. The crew will stop the cooldown when the hottest CETs are less than the required RCS cooldown temperature **[CT#2].** Note: the crew may have initiated MSLI while in EOP-TRIP-2 based on RCS temperatures not being controlled. If so, the crew will cooldown the RCS using intact MS10's.

K. The scenario will be terminated after the hottest CETs are less than the RCS cooldown temperature and the cooldown is stopped.

IV. INITIAL CONDITIONS

____ IC-233

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

Initial	Description
____ 1	VC1and VC4 C/T
____ 2	RCPs (SELF CHECK)
____ 3	RTBs (SELF CHECK)
____ 4	MS167s (SELF CHECK)
____ 5	500 KV SWYD (SELF CHECK)
____ 6	SGFP Trip (SELF CHECK)
____ 7	23 CV PP (SELF CHECK)
____ 8	**21 SGFP is in service**
____ 9	**23 Charging pump is C/T**
___ 10	**IOP-3 open and complete up to step 4.3.18, Power Operation. Attachment 4 is marked up.**
___ 11	**Steam Dumps are in MS Pressure Mode and Auto, and S2.OP-SO.MS-0002 is open and marked up to step 5.4.1**
___ 12	**Rod control in manual.**
___ 13	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:	KBN12TCY //24BF13 FW INLET STOP VALVE CLOSE
		COMMAND:	DMF VL0026
		PURPOSE:	<update as needed>

MALFUNCTIONS:

SELF-CHECK	Description	Delay Time	Initial Value	Ramp Time	Trigger	Severity
_____ 01	PR0016A PZR PRESS CH I (PT455) FAILS H/L	N/A	N/A	N/A	RT-1	2500
_____ 02	SW0216A 21 SW HDR LEAK IN SW STRUCTURE	N/A	0	00:03:00	RT-2	8000
_____ 03	RC007B 22 RC PUMP - #1 SEAL FAILS - w/ DEGRADATION	N/A	0	00:01:00	RT-3	0.75
_____ 04	SG0078D 24 STEAM GENERATOR TUBE RUPTURE	N/A	N/A	N/A	RT-4	650
_____ 05	VL0026 24BF13 Fails to Position (0-100%)	N/A	N/A	N/A	N/A	100

REMOTES:

SELF-CHECK	Description	Delay Time	Initial Value	Ramp Time	Trigger	Condition
_____ 01	RC05A RCS SYSTEM , BORON CONC RESET	N/A	N/A	N/A	N/A	1827
_____ 02	AF01D 23 AUX FP TRIP RESET	N/A	N/A	N/A	N/A	RESET
_____ 03	CV52D 23 CHG PUMP BKR CONTROL POWER	N/A	N/A	N/A	N/A	OFF
_____ 04	CV53D 23 CHG PUMP RACK OUT	N/A	N/A	N/A	N/A	TAGGED
_____ 05	PR34D PORV STOP VALVE 2PR6 TAGGED	N/A	N/A	N/A	RT-10	TAGGED
_____ 06	SW23D 21 SW PUMP BKR CONTROL POWER	N/A	N/A	N/A	RT-11	OFF
_____ 07	SW27D 22 SW PUMP BKR CONTROL POWER	00:00:10	N/A	N/A	RT-11	OFF
_____ 08	SW32D 23 SW PUMP BKR CONTROL POWER	00:00:20	N/A	N/A	RT-11	OFF
_____ 09	MT02D MAIN TURB TURNING GEAR ENGAGE	N/A	N/A	N/A	N/A	ENGAGE

OVERRIDES:

SELF-CHECK	Description	Delay Time	Initial Value	Ramp Time	Trigger	Condition/ Severity

OTHER CONDITIONS:

	Description
____	1. None

V. 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. CRS please inform me when your crew is ready to assume the shift".

D. Allow sufficient time for panel walk-downs. When informed by the CRS 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			
Evaluator's Note: The crew will be using S2.OP-IO.ZZ-0003, Hot Standby to Minimum Load, to perform the power ascension. Step 4.3.16 provides guidance on raising reactor power using Steam Dumps IAW S2.OP-SO.MS-0002. The crew can use Attachments 3 or 4 of S2.OP-SO.MS-0002 to operate Steam Dumps. The intent is for the crew to enter Mode 1, ≈ 6% Rx power, THEN; proceed to next event.			
Evaluator's Note: Console alarm **RC LOOPS Tavg – Tref DEVIATION** will be in at the time the crew takes the watch. The crew will be provided instructions during turnover that verification of Tavg is 541 F once per 30 minutes until alarm is reset in Control Room Narrative Log is being performed by the extra NCO. This alarm will clear during the power ascension into Mode 1.			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	CRS directs power ascension using Main Steam Dumps in MS Pressure Control and control rods.		
Evaluator's Note: The CRS will direct the crew in the order in which to raise Rx power by withdrawing control rods or raising steam dump demand first.			
	PO raises steam dump demand IAW S2.OP-SO.MS-0002, section 5.4 using Attachments 3 or 4.		
	RO withdraws control rods at the specified increments to maintain Tave on program.		
Evaluator's Note: Program Tavg at 10% Rx power is about 549 F. During simulator runs, Steam Dump pressure setting was about 982 psig for a Rx Power of 5.4%.			
	RO announces when NIS indicates 5% Reactor Power and RECORDs time of Mode 1 entry in Control Room Narrative Log.		
Simulator Operator: When Rx Power is about 6%, THEN, continue to next event by direction from Lead evaluator.			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
2. Controlling PZR pressure channel fails HIGH			
Simulator Operator: Insert **RT-1** on direction from Lead Evaluator. **MALF: MALF: PR0016A PZR Press CH I (PT-455) fails H/L Final Value: 2500**			
	RO announces unexpected OHA alarms D-8 RC Press HI, and E-42 2PR1 ½ Trip.		
	RO determines actual pressure is not high and reports spray valves open and recommends placing Master Pressure Controller in manual.		
	CRS directs RO to place Master Pressure Controller in manual.		
	RO takes manual control of Master Pressure Controller and lowers demand (increase pressure) to close spray valves.		
	CRS enters S2.OP-AB.PZR-0001, Pressurizer Pressure Malfunction.		
	At anytime the CRS may direct the power ascension to be placed on hold.		
	CRS directs initiation of AB.PZR-0001 CAS.		
	CRS gives band for control of PZR pressure.		
	RO identifies PZR Pressure Channel I failed high.		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	CRS verifies that Master Pressure Controller (MPC) is in Manual.		
	RO adjusts MPC demand signal to be consistent with Attachment 2 to restore pressure to program.		
	RO selects Channel III for control.		
	RO matches MPC demand to current pressure and returns MPC to AUTO.		
Evaluator's Note: The requirement to close PZR PORV Block Valve (2PR6) and remove control power is required to be performed within one hour to comply with TS 3.4.5 action b.			
	RO closes 2PR6 and places 2PR1 in Manual.		
	CRS directs WCC to remove control power from 2PR6.		
Simulator Operator: Insert **RT-10** 2 minutes after being directed to remove power from 2PR6. **REMOTE: PR34D PORV Stop Valve 2PR6 tagged**			
	CRS directs PO to initiate removing failed channel from service and contact I&C for support IAW S2.OP-SO.RPS-0003.		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
Evaluator's Note: Crew may wait for I&C support before performing any actions in S2.OP-SO.RPS-0003. The steps provided below are a few steps that could be performed by the crew in the control room as directed by the CRS; the rest needs I&C support.			
Steps from S2.OP-SO.RPS-0003, Placing PZR Pressure Channel in Tripped Condition:			
	PO checks that tripping associated bistables will NOT result in an ESF or RPS actuation.		
	PO verifies that Channel III is selected for Master Pressure Control.		
	PO selects PZR Pressure recorder to channel II (III) (IV).		
	PO selects Reactor Coolant Temperature, Differential Temperature Recorder to Loop 22 (23) (24).		
	CRS enters TSAS; 3.3.1.1 action 6 (6 hour LCO), 3.3.2.1.b action 19 (6 hour LCO), 3.4.5 action b (1 hour LCO), and 3.2.5 (DNB - 2 hour LCO).		
Proceed to next event after CRS evaluates Tech Specs or by direction from Lead Evaluator.			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
3. #2 SW Bay Leak			
Simulator Operator: Insert **RT-2** on direction from Lead Evaluator. **MALF: SW0216A, 21 SW LEAK IN SW STRUCTURE** **Ramp 3 min** **Final Value = 8,000**			
Evaluator's Note: The first OHA will annunciate ~1 minute after the leak is inserted.			
	RO announces unexpected OHA alarm B-29, followed shortly by OHA B-13 and B-14.		
	OHA B-29, 22-23 SW PMP SUMP AREA LVL HI, directs entry into S2.OP-AB.SW-0003, IF OHA B-13, 21 SW HDR PRESS LO, is alarming.		
	Crew dispatches NEO to investigate leak in SW bay.		
	RO either starts a SW pump based on lowering SW header pressure, or announces the auto start of 25 SW pump when it occurs, and the clearing of the low SW header pressures alarms.		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
Evaluator's Note: OHA B-29 ARP also directs initiation of S2.OP-AB.ZZ-0002, Flooding. The CRS can initiate this procedure after the SW Bay leak is addressed in AB.SW-0003.			
	CRS enters S2.OP-AB.SW-0003, SW Bay Leak, per ARP direction or enters S2.OP-AB.SW-001, Loss of SW Header Pressure, which directs transition to S2.OP-AB.SW-003.		
	PO initiates the CAS of AB.SW-0003.		
	RO reports both SW Bays are in service and dispatches NEO to investigate #2 SW Bay alarms.		
	PO monitors Main Turbine and SGFP temps on SPDS and Plant Computer per CAS.		
Role Play: Report the following after steps to open the Tie Valves (SW23's) are complete; report as NEO that there is a large leak in #2 SW bay, you can't identify where it is coming from due to the spray. The water level in the bay is approx. 2.5 ft. and rising slowly. (SW pumps are considered disabled at 2 ft. in the Bay per AB.ZZ-0002 Attach 7)			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	Crew splits SW Bays by opening nuclear header cross over MOVs 21SW23 and 22SW23, and closing SW bay cross connect valves 21SW17 and 22SW17.		
	Crew determines the SW leak is in #2 Bay.		
	RO/PO starts all available Bay 4 pumps (24, 25, 26).		
	RO/PO stops all Bay 2 pumps (21, 22, 23)		
	CRS sends NEO to open control power bkrs for 21-23 SW pumps.		
Simulator Operator: 2 minutes after being directed to de-energize control power to 21-23 SW pumps, call for a First Check, then insert **RT-11**: REMOTES: SW23D, SW27D, SW32D for 21, 22, and 23 SW Pump BKR Control Power with delays of 0, 10, and 20 seconds. Call control room after last remote is active and report control power breakers have been opened for 21, 22 and 23 SW pumps.			
	Crew isolates 2 SW Bay by closing 21SW22 and 21SW20.		
	PO reports that SW is available to the Diesel Generators through 22SW21, DG COOLERS.		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	PO reports that SW is being supplied through 23SW20, TURB AREA.		
Role Play: Once 2 SW Bay is isolated, NEO (if contacted) reports that the leak appears to have stopped, and level is slowly lowering in bay. IF asked about water level, THEN, report that the water level is > 2 Feet and lowering slowly.			
	PO reports the leak is isolated.		
	CRS evlautes Tech Specs and ECG.		
	CRS enters TS 3.7.4 (72 hour LCO) due to having only one operable SW loop.		
Proceed to next event after Tech Spec has been evaluated or by direction from Lead Evaluator.			
	PO initiates action to remove one CCHX from service IAW CAS item 4.0.		
	CRS enters S2.OP-AB.ZZ-002, Flooding, due to flooding in #2 Bay.		
Evalautor's Note: Flooding procedure may not be entered due to pace of scenario.			
	CRS contacts maintenance to assist in leak		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	identification and dewatering.		
4. 22 RCP #1 Seal Degradation and Seal Failure			
Simulator Operator: Insert RT-3 on direction from Lead Evaluator. **MALF: RC007B 22 RC Pump #1 Seal Fails – w/degradation.** **Initial Value: 0.00** **Final Value: 0.75** **Ramp: 1 minutes** The malfunction final value is slightly above the alarm setpoint, so the seal leakoff will stabilize as soon as the alarm is received.			
	RO either identifies rising leakoff flow or announces unexpected console alarm for 22 RCP Seal Leakoff Flow Hi-Lo.		
	RO reports 22 RCP seal leakoff flow and trend, and that it is now stable ≈ 5.2 gpm.		
	CRS enters S2.OP-AB.RCP-0001, Reactor Coolant Pump Abnormality.		
	CRS directs initiation of AB.RCP-0001 CAS.		
	RO uses P-250 computer to check 22 RCP conditions and monitors and compares RCP parameters using Attachment 3 to identify affected RCP.		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	CRS determines CCW water supply is not causing RCP abnormal condition.		
	RO reports all RCP winding temperatures are normal and stable.		
	RO reports Seal Injection is not causing RCP abnormal condition based on Seal Injection Flow is > 6 gpm and seal leakoff flow is >5 gpm and stable.		
	CRS evaluates seal leakoff flow status at Step 3.6.		
	CRS determines an orderly unit shutdown is required and the requirement to stop 22 RCP within 8 hours.		
	Crew commences unit shutdown. CRS directs RO to manually inserting control rods (enters Mode 2).		
Evaluator's Note: <u>IF</u> crew does not initiate a unit shutdown based on stable seal leakoff flows, **THEN** by Lead Evaluators direction; Simulator Operator perform Role Play as Operations Director to direct the CRS to initiate a Reactor Shutdown.			
Proceed to next event after unit shutdown commenced or by direction from Lead Evaluator.			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
Simulator Operator: When CRS has determined a course of action at Step 3.6, THEN **MODIFY MALF RC007B from 0.75 to 1.0 with a 1 minute ramp.**			
	RO reports 22 RCP seal leakoff is rising.		
Evaluator's Note: When fully ramped in, the MALF will cause 22 RCP seal leakoff to be >6 gpm. This is indicated by a console reading of "+OVER" on the hi range seal leakoff recorder.			
	CRS determines 22 RCP seal leakoff flow >6 gpm meets the Attachment 1 CAS and initiates Attachment 2, Stopping Reactor Coolant Pumps.		
	CRS briefs Rx trip actions to be performed.		
	CRS identifies the requirement to close 22CV104 within 3-5 minutes after stopping 22 RCP and assigns to RO.		
	RO trips the Rx.		
	RO confirms the Rx Trip.		
	RO stops 22 RCP and starts the timer for closing 22CV104. **[Critical Task #1- Part 1]**		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	RO closes 22CV104 within 3-5 minutes [Critical Task #1 – Part 2]		
CT#1 (Site Specific): Stop 22 RCP and close 22CV104 within 3-5 minutes after stopping 22 RCP in EOP-TRIP-1. This CT is broken down into two Parts. **SAT_____ UNSAT_____** **Mark times below:** **22 RCP Stopped:____:____:____** **22CV104 Closed:____:____:____**			
	RO performs immediate actions of EOP-TRIP-1		
	CRS enters EOP-TRIP-1 and directs RO and PO to implement the CAS.		
	CRS and RO perform immediate action steps of EOP-TRIP-1 and then transition to EOP-TRIP-2 based on no SI required.		
	CRS enters EOP-TRIP-2.		
Evaluator's Note: CFSTs are in effect when transition out of EOP-			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
TRIP-1 occurs. STA will report to control room 10 minutes after being summoned via page to monitor CFSTs.			
	CRS directs RO and PO to implement the CAS of EOP-TRIP-2.		
Evaluator's Note: At this point, the SGs are being feed from main feedwater so there will be no AFW pumps in service until directed by CRS or requested by PO to start them.			
	PO reports NO AFW flow.		
	CRS directs starting 21 thru 23 AFW pumps as necessary. **Note**: It is preferred to start both motor driven AFW pumps first, but the CRS may direct AFW strategy with input from with crew.		
	PO opens 21 thru 24 AF21 (for motor diven pumps) or 21 thru 24 AF11 (for turbine driven) depending on which AFW pumps have been started.		
	PO stops 21 and 22 SGFPs.		
Proceed to next event **after CT#1 is ensured and the crew stops both SGFPs** or by direction from Lead Evaluator.			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	PO lowers 23 AFW pump to minimum speed.		
	PO maintains AFW flow > 22 E4 lbm/hr until one SG NR level is > 9%, then maintain NR levels between 19-33%.		
Evaluator's Note: Depending on the pace of the crew, the crew may determine that RCS temperature is not being controlled (step 5.2) and initiate Main Steam Line Isolation. The impact on the crew doing this would be the unavailability of steam dumps in SGTR-1 and the use of MS10s to cooldown. During validation, this alternate path did not impact the successful outcome for the crew to perform RCS cooldown in SGTR-1.			
5. 24 SG Tube Rupture			
Simulator Operator: Insert **RT-4** for 24 SG Tube Rupture of 650 gpm following stopping both SGFPs. **MALF: SG0078D 24 SGTR** **Final = 650** **No ramp**			
	RO reports unexpected OHA A-6, RMS TRBL, and reports 2R53D and 2R15 in alarm, followed later by 2R41 and 2R19D in alarm.		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	RO reports rapidly lowering RCS pressure and/or level.		
	CRS directs RO to initiate SI and return to EOP-TRIP-1.		
	RO initiates SI and performs immediate actions of EOP-TRIP-1		
	CRS re-enters EOP-TRIP-1.		
	CRS performs immediate actions of EOP-TRIP-1.		
	CRS directs RO and PO to implement the CAS.		
	RO reports that SEC loading is NOT complete for energized vital buses.		
	RO reports that NO available equipment failed to start.		
	PO reports that 21 and 22 AFW pumps are running.		
	If the ruptured SG is known at this point, the PO may request to close the 24AF21 and 24AF11 to isolate feed flow to the ruptured SG.		
	RO reports that not all valve groups are in safeguards positions. **Reports that 24BF13 failed to close.**		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
Simulator Operator: Ensure **ET-1** is TRUE when operator depresses the close PB for 24BF13.			
	PO closes 24BF13 from console.		
	RO reports that containment pressure has remained less than 15 psig.		
	PO reports that 2RP4 does NOT indicate high steam flow coincident with low steam pressure or low-low Tavg.		
	PO reports all 4KV vital buses are energized.		
	RO reports control room ventilation is in Accident Pressurized mode.		
	RO reports 2 switchgear supply and 1 exhaust fan are running.		
	RO reports 2 CCW pumps running.		
	RO reports ECCS flow as expected for current RCS pressure.		
	PO maintains total AFW flow greater than 22E4 lbm/hr until at least one SG NR level is >9%, then maintains SG NR level 19-33%.		
	RO reports 21, 23, 24 RCPs are running.		
	RO reports RCS Tcolds are stable or tending to 547 F.		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	RO reports both RTBs are open.		
	RO reports both PZR PORVs are closed.		
	RO reports 2PR6 is closed (power removed due to instrument failure) and 2PR7 is open.		
	RO reports 21, 23, 24 RCPs are running (22 RCP stopped previously).		
	RO reports both PZR spray valves are closed.		
	RO reports that RCS pressure is > 1350 psig.		
	RO maintains seal injection flow to all RCPs.		
	PO reports NO SG pressures are dropping in an uncontrolled manner or completely depressurized.		
Evaluator's Note: After stopping 22 RCP, NR levels in 22 SG may be also rising. The crew should recognize that this is due to loss of forced circulation in that RC loop and reduced steaming effect in that SG.			
	RO reports that NR level in 24 SG is rising in an uncontrolled manner.		
	CRS transitions to EOP-SGTR-1, Steam Generator Tube Rupture.		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	PO reports NR levels rising in 24 SG.		
	PO reports 24MS10 is set to 1045 psig and closed.		
	PO closes 24MS167, 24MS18, 24MS7, and 24GB4.		
	PO reports 24MS167, 24MS18, and 24MS7 are closed.		
	PO reports that 21 or 23 SGs are NOT ruptured.		
	CRS dispatches operator to close 24SG 2SS339.		
	PO closes 24AF21 and 24AF11 valves.		
	CRS dispatches operator to shift gland sealing steam to alternate source IAW S2.OP-SO.GS-0001.		
	CRS determines RCS target temperature using Table B (SG press at >1000 psig = 503 F CETs).		
Evaluator' Note: Depending on the pace of the crew during EOP-TRIP-2, the crew may have determined that RCS temperature was not being controlled and initiated MSLI. IF this was peformed, THEN, the crew will report that NO steam dumps are			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
available and cooldown with intact MS10s. During validation using MS10's it took about 6 mins to reach CET of 503 F.			
	PO reports steam dumps are available.		
	PO places steam dumps in manual, adjust demand to 0%, and then place in MS Pressure Control.		
	PO initiates RCS cooldown by adjusting MS Pressure Control to 25% to open steam dumps <u>OR</u> dump steam at maximum rate using intact MS10's. [Critical Task #2 – Part 1]		
CT#2 (CT-19): Control initial RCS cooldown so that transition from EOP-SGTR-1 does not occur. **This CT is broken down into two (2) Parts; establishing RCS cooldown and then maintaining RCS temperature.** **SAT_____ UNSAT_____**			
	CRS continues on in EOP-SGTR-1.		
	RO reports hottest CETs are not less than RCS cooldown target temp.		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	PO maintains AFW flow > 22E4 lbm/hr until one SG NR level is > 9%, then maintain between 19% and 33%.		
	RO reports power is not available to both PZR PORV stop valves (2PR6 power removed due to instrument failure).		
Simulator Operator: IF requested by crew; **DELETE** Remote: PR34D to restore power to 2PR6. Notify CRS when completed.			
	CRS may direct WCC to restore power to 2PR6 at this point or wait until directed later in the procedure.		
	RO reports both PZR PORVs are closed.		
	RO opens 2PR6 stop valve, if power restored.		
	RO resets SI, Phase A, and Phase B isolation.		
	RO opens 21 and 22 CA330s.		
	PO resets each SEC and associated control centers.		
	RO reports RHR suction is aligned to the RWST.		
	RO stops both RHR pumps.		
	RO reports hottest CETs are not less than		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	RCS target temp.		
	Crew waits until hottest CETs are less than RCS target cooldown temp.		
	RO reports hottest CETs less than RCS target cooldown temp.		
	PO stops the cooldown by closing the steam dumps and then placing MS Pressure Control in Auto OR closing intact MS10's and placing in Auto. [Critical Task #2 - Part 2]		
Terminate the scenario when the RCS cooldown is stopped or by direction from Lead Evaluator.			
Following steps are for the RCS depressurization with normal PZR spray:			
	CRS directs PO to dump steam to maintain CET temp. less than required.		
	PO reports ruptured SG pressure is stable or rising.		
	RO reports RCS subcooling is greater than 20 F.		
	RO reports normal PZR spray is available.		
	CRS reviews depressurization termination criteria IAW Table D.		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	RO fully opens both PZR spray valves.		
	RO reports PZR spray is reducing RCS pressure.		
	RO reports when depressurization termination criteria is met IAW Table D.		
	RO closes both PZR spray valves.		

VI. 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-0003, Hot Standby to Minimum Load
F. S2.OP-AB.PZR-0001, Pressurizer Pressure Malfunction
G. S2.OP-SO.MS-0002, Steam Dump System Operation
H. S2.OP-AB.SW-0003, Service bay Leak
I. S2.OP-AB.RCP-0001, Reactor Coolant Pump Abnormality
J. 2-EOP-TRIP-1, Reactor Trip or Safety Injection
K. 2-EOP-TRIP-2, Reactor Trip Response
L. 2-EOP-SGTR-1, Steam Generator Tube Rupture

ATTACHMENT 1
UNIT TWO PLANT STATUS
TODAY

MODE: 2 POWER: 3% RCS BORON: 1648 MWe 0

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

N/A

REACTIVITY PARAMETERS

- Control Bank D at 130 steps.
- Core burnup 500 EFPH.
- Reactor Engineering directs use of control rods and steam dumps to raise power to 10%. No Fuel Conditioning Limits are imposed until 50%.

MOST LIMITING LCO AND DATE/TIME OF EXPIRATION:

None

EVOLUTIONS/PROCEDURES/SURVEILLANCES IN PROGRESS:

- S2.OP-IO.ZZ-0003, Hot Standby to Minimum Load complete up to Section 4.3, step 4.3.18.
- S2.OP-SO.MS-0002, Steam Dump System Operation (5.4.1)
- Monitoring Tavg > 541 F once per 30 minutes due to RC Loop Tavg – Tref Deviaton console alarm in (extra NCO to log).
- Power ascension to 10% using control rods and steam dumps, and enter Mode 1.
- Reactor Engineering is standing by to support power ascension.

ABNORMAL PLANT CONFIGURATIONS:

CONTROL ROOM:

Unit 1 and Hope Creek at 100% power.

PRIMARY:

- 21 Charging pump in service due to 23 Charging pump C/T for troubleshooting of flow oscillations with fluid drive.

SECONDARY:

- On main feedwater using 21 SGFP; 22 SGFP O/S in standby

RADWASTE:

No discharges in progress

CIRCULATING WATER/SERVICE WATER:

ATTACHMENT 1
UNIT TWO PLANT STATUS
TODAY

MODE: 2 POWER: 3% RCS BORON: 1648 MWe 0

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

N/A

REACTIVITY PARAMETERS

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- Core burnup 500 EFPH.
- Reactor Engineering directs use of control rods and steam dumps to raise power to 10%. No Fuel Conditioning Limits are imposed until 50%.

MOST LIMITING LCO AND DATE/TIME OF EXPIRATION:

None

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- S2.OP-IO.ZZ-0003, Hot Standby to Minimum Load complete up to Section 4.3, step 4.3.18.
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- 21 Charging pump in service due to 23 Charging pump C/T for troubleshooting of flow oscillations with fluid drive.

SECONDARY:

- On main feedwater using 21 SGFP; 22 SGFP O/S in standby

RADWASTE:

No discharges in progress

CIRCULATING WATER/SERVICE WATER:

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: 16-01 ESG-1 **REVIEWER:** Scott Dimele

Initials		Qualitative Attributes
SC	1.	The scenario has clearly stated objectives in the scenario.
SC	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.
SC	3.	The scenario consists mostly of related events.
SC	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
SC	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.
SC	6.	The events are valid with regard to physics and thermodynamics.
SC	7.	Sequencing/timing of events is reasonable, and allows for the examination team to obtain complete evaluation results commensurate with the scenario objectives.
SC	8.	The simulator modeling is not altered.
SC	9.	All crew competencies can be evaluated.
SC	10.	The scenario has been validated.
SC	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.
SC	12.	ESG-PSA Evaluation Form is completed for the scenario at the applicable facility.

ATTACHMENT 4

SIMULATOR SCENARIO REVIEW CHECKLIST

Minimum Quantitative Attributes (NUREG 1021, R11, Form ES-301-4)

Malfunction ID	Total Malfunctions	Malfunctions After EOP entry	Abnormal Events	Major Transient	EOPs used	Critical Task	Tech Specs exercised	Contingency EOPs
PR0016A	1		1		TRIP-1 TRIP-2 SGTR-1	2	Yes	No
SW0216A	1		1				Yes	
RC007B	1		1	1				
SG0078D	1	1						
VL0026	1	1						
Total Number of Events	**5**	**2**	**3**	**1**	**3**	**2**	**2**	**0**
Min Number of Events	5	1-2	2-4	1-2	1-2	≥2	2 per set	1 per set
Verified By								

Comments: See NRC-3 for Contigency EOP used (FRSM-1)

ATTACHMENT 5

ESG CRITICAL TASKS

16-01 ESG-1

CT-1 (Site Specific): Stop 22 RCP and close 22CV104 within 3-5 minutes after stopping 22 RCP in EOP-TRIP-1.

- Safety Significance:

  Failure to close the seal leakoff flow valve (CV104) when required could result in damage to the backup #2 seal and loss of RCS inventory. When seal leakoff is greater than 6 gpm the operator must close the associated CV104 within 3-5 minutes. The 3 minutes allows for the RCP to coastdown and enable static conditions for the #2 seal to perform its backup function. The 5 minutes minimizes RCS leakage from the damaged seal to maintain RCS inventory.

- Initiating Cues:

  - Seal leakoff flow indication or console alarm

- Measurable Performance Standard:

  - Seal leakoff valve (CV104) position indicates closed
  - RCP breaker position indicates open

- Performance Feedback:

  - Report from operator that affected RCP is stopped and seal leakoff is isolated.

CT-2 (CT-19): Control initial RCS cooldown so that transition from EOP-SGTR-1 does not occur. Note: This CT is broken down into two (2) parts that include establishing RCS cooldown and then maintaining RCS temperature.

Note to Evaluator: CT numbers in parentheses are the corresponding Westinghouse ERG Rev. 2- based Critical Tasks procedure WCAP-17711-NP

ATTACHMENT 6

ESG-PRA RELATIONSHIP EVALUATION

EVENTS LEADING TO CORE DAMAGE

Y/N	Event	Y/N	Event
N	TRANSIENTS with PCS Unavailable	N	Loss of Service Water
Y	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	N	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
Y	Isolate the affected Steam Generator that has the tube rupture(s)
N	Early depressurize the RCS
N	Initiate feed and bleed

Complete this evaluation form for each ESG.