

SIMULATOR EXAMINATION SCENARIO GUIDE

SCENARIO TITLE: 15-01 NRC ESG-7

SCENARIO NUMBER: 15-01 NRC ESG-7

EFFECTIVE DATE: See Approval Dates

EXPECTED DURATION: 60 minutes

REVISION NUMBER: 01

PROGRAM:

<input type="checkbox"/>	L.O. REQUAL
<input checked="" type="checkbox"/>	INITIAL LICENSE
<input type="checkbox"/>	STA
<input type="checkbox"/>	OTHER _____

Revision Summary

Rev 00, New ESG for 15-01 ILOT NRC exam

Rev 01, 4-6-17. Modified 15-01 ILOT ESG-4 for 2017 NRC retake exam. Deleted malfunctions for loss of 2A 460V bus and BAT pumps. Added malfunctions for leaking PZR PORV and RC Loop RTD failure. Editorial changes made throughout scenario guide, including Attach 4 & 5.

PREPARED BY:	<u>R. Chan</u>	<u>4-11-17</u>
	Lead Regulatory Exam Author	Date
APPROVED BY:	<u>W. Muffley</u>	<u>4-11-17</u>
	Operations Training Manager	Date
APPROVED BY:	<u>M. Brummitt</u>	<u>4-11-17</u>
	Facility Representative	Date

SCAN OF SIGNED SCENARIO COVER SHEET

I. OBJECTIVES

- A. Given the unit at power with the generator synchronized to the grid, the crew will perform a power increase at 10%/hr IAW S2.OP-IO.ZZ-0004.
- B. Given the order or indications of a loss or malfunction of a reactor coolant RTD failure, perform actions as the nuclear control operator to RESPOND to the loss or malfunction in accordance with S2.OP-AB.ROD-0003.
- C. Given indications of a loss or malfunction of a Pressurizer PORV leaking, DIRECT the response to the loss or malfunction in accordance with S2.OP-AB.PZR-0001.
- D. Given a loss or reduction in main turbine lube oil, perform actions as the nuclear control operator to RESPOND to the loss or malfunctioning accordance with S2.OP-AB.TL-0001.
- E. Given a loss or reduction in main turbine lube oil, DIRECT the response to the loss or malfunctioning accordance with S2.OP-AB.TL-0001.
- F. 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.
- G. Given indication of a reactor trip, DIRECT the response to the reactor trip in accordance with 2-EOP-TRIP-1.
- H. Given the order or indications of an anticipated transient without trip (ATWT), complete actions as the nuclear control operator to PERFORM the immediate response to the ATWT in accordance with the approved station procedures.
- I. Given indication of an anticipated transient without trip (ATWT), DIRECT the immediate response to the ATWT in accordance with the approved station procedures.

II. MAJOR EVENTS

1. Raise power
2. PZR PORV 2PR2 Leaking
3. 22 RC Loop RTD Fails High
4. Loss of MTLO
5. ATWT

III. SCENARIO SUMMARY

- A. The crew will take the watch with the unit 76% power, EOL. Power had been reduced to 48% one week ago for repairs on 21 SGFP casing. Both SGFPs are in service and the unit is being returned to full power. A power ascension at 10%/hr is in progress and on hold for shift turnover. The crew is directed to raise power to 89% @10% / hr. **Note:** Terror will be ~0.6°F high when crew assumes the watch.
- B. After assuming the watch, the crew will commence raising power at 10% / hr IAW **S2.OP-IO.ZZ-0004**, Power Operation.
- C. After the power ascension has commenced, the 2PR2 PZR PORV will start leaking. Crew will recognize leaking PORV by lowering PZR pressure and raising temperature on the PORV tailpipe temperature indicator. The crew will take corrective actions IAW **S2.OP-AB.PZR-0001**, Pressurizer Pressure Malfunction, to identify and isolate the leaking PORV. The CRS will identify applicable LCO's.
- D. Following the PZR PORV leak, the 22 RC Loop RTD will fail high causing continuous rod motion in the inward direction. The crew will take corrective actions to place rods in manual to stop rod motion. The crew will enter **S2.OP-AB.ROD-0003**, Continuous Rod Motion, to identify and defeat the failed high RC loop Tavg channel and on direction from the CRS place rod control back to Auto.
- E. After rod control is placed in Auto, a MTLO leak occurs. The leak is contained within the guard piping, so no loss of oil inventory will occur. The crew will enter **S2.OP-AB.TL-0001**, Loss of Main Turbine Lube Oil, and determine a power reduction is directed by the procedure.
- F. The power reduction will be commenced with Rod Control in Auto or Manual. During the power reduction, Main Turbine bearing vibrations will rise, and the crew will be required to trip the Rx based on the turbine vibration problem with Rx power >P-9 (49%).
- G. When the crew attempts to trip the Rx, an **ATWT will occur**. All attempts to trip the Rx from the control room fail. The crew will trip the Main Turbine and initiate rod insertion. The CRS enters **2-EOP-FRSM-1**, Response to Nuclear Power Generation.
- H. Shortly after the turbine is tripped, the auto rod speed controller fails to 8 steps per minute. If rod insertion is occurring in auto, the RO will diagnose the failure and insert rods in manual. 23 AFW pump fails to Auto start and 22 AFW pump Pressure Override circuit fails and cannot be bypassed (defeated). An inadvertent FW Isolation signal will also occur isolating all main feedwater and the loss of both SGFPs. With <44E4 lbm/hr AFW flow, the crew is required to start 23 AFW pump. **(Critical Task #1 – Start AFW pumps to establish 44E4 lb/hr AFW flow)**

- I. While in FRSM-1, the crew will initiate Rapid Boration using both available BAT pumps.
(Critical Task #2 – Insert negative reactivity by rods or emergency boration)
- J. After Rapid Boration has been established, the Reactor Trip Breakers will be opened locally by the operator dispatched to do so. The crew will determine the reactor is shutdown, complete FRSM-1, and **return to procedure in effect** (2-EOP-TRIP-1)
- K. The scenario can be terminated after the completion of 2-EOP-FRSM-1 when the crew either continues in 2-EOP-TRIP-1 past Immediate Actions or the transition to 2-EOP-TRIP-2 is made.

IV. INITIAL CONDITIONS

___ IC-232

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	S2.OP-IO.ZZ-0004 open and marked up complete to Step 4.1.21
___ 9	Complete Attachment 2 "Simulator Ready-for-Training/Examination Checklist."

EVENT TRIGGERS:

Initial	ET #	Description
	1	EVENT ACTION: KCK23BT6 //TURBINE TRIP-TRIP COMMAND: PURPOSE: <update as needed>
	2	EVENT ACTION: KCK23BT6 //URBINE TRIP-TRIP COMMAND: DMF TU0083A PURPOSE: <update as needed>
	3	EVENT ACTION: KCK23BT6 //URBINE TRIP-TRIP COMMAND: DMF TU0083B PURPOSE: <update as needed>

MALFUNCTIONS:

SELF-CHECK	Description	Delay Time	Initial Value	Ramp Time	Trigger	Severity
01	PR0018B PZR PORV 2PR2 DEVELOPS LEAK	N/A	N/A	N/A	RT-1	15000
02	RC0014B 22 HOT LEG RTD AVG SUMMATOR FAILS	N/A	N/A	N/A	RT-2	650
03	TU0075 MAIN TURB LOSS OF LUBE OIL	N/A	N/A	N/A	RT-3	90
04	TU0083A MN TURBINE HI VIBRATION - BRG #	N/A	0	00:30:00	RT-3	12
05	TU0083B MN TURBINE HI VIBRATION - BRG #	N/A	0	00:30:00	RT-3	12
06	RP0058 FAILURE OF AUTOMATIC RX TRIP	N/A	N/A	N/A	N/A	
07	RP0059A FAILURE OF MANUAL RX TRIP	N/A	N/A	N/A	N/A	
08	RP0059B FAILURE OF MANUAL SI/RX TRIP	N/A	N/A	N/A	N/A	
09	RP0060A FAILURE OF TRAIN "A" RX TRIP BREAKER TO TRIP	N/A	N/A	N/A	N/A	
10	RP0060B FAILURE OF TRAIN "B" RX TRIP BREAKER TO TRIP	N/A	N/A	N/A	N/A	
11	RD0061 ROD SPEED CONTROL PROGRAM FAILS	N/A	0	00:00:45	ET-1	8
12	AF0182B 22 AFP PRESS OVRD PROT FAILS	N/A	N/A	N/A	N/A	
13	AF0353C 23 AFP FAILURE TO AUTO START ON ANY (ALL) SIGNALS	N/A	N/A	N/A	N/A	
14	RP0247 FALSE FW ISOLATION (K636 Relay)	N/A	N/A	N/A	ET-1	

REMOTES:

SELF-CHECK	Description	Delay Time	Initial Value	Ramp Time	Trigger	Condition
01	RP07D 21 MG SET MOTOR BKR	N/A	N/A	N/A	RT-10	STOP
02	RP08D 22 MG SET MOTOR BKR	N/A	N/A	N/A	RT-10	STOP
03	RP09D 21 MG SET GEN OUTPUT BKR	N/A	N/A	N/A	RT-10	TRIPPED
04	RP10D 22 MG SET GEN OUTPUT BKR	N/A	N/A	N/A	RT-10	TRIPPED
05	RP18D Open MAIN RX TRIP BKR A	00:00:10	N/A	N/A	RT-10	TRIP OPEN
06	RP19D Open MAIN RX TRIP BKR B	00:00:05	N/A	N/A	RT-10	TRIP OPEN

OVERRIDES:

SELF-CHECK	Description	Delay Time	Initial Value	Ramp Time	Trigger	Condition/Severity
01	B511 A DI KB511AZP 22 AUX FEED PUMP-PRESS OVERRIDE DEFEAT	N/A	N/A	N/A	N/A	OFF
02	B440 F DI KB440TTD REACTOR TRIP BREAKER 'A'-TRIP	N/A	N/A	N/A	RT-10	ON
03	B441 F DI KB441TTD REACTOR TRIP BREAKER 'B'-TRIP	N/A	N/A	N/A	RT-10	ON
04	C310 F DI KC310TN0 2E6D PRESSURE HEATER BUS 480V-OPEN	N/A	N/A	N/A	N/A	OFF
05	C510 F DI KC510TN0 2G6D PRESSURE HEATER BUS 480V-OPEN	N/A	N/A	N/A	N/A	OFF

OTHER CONDITIONS:

Description

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			
	CRS briefs RO and PO on power ascension.		
	RO provides reactivity plan for power ascension.		
Note: Manual rod control may be used, but is not expected to be based on temperature error.			
Note: Terr is >0°F and rising.			
	PO initiates a turbine power ascension at 10% per hour.		
Note: The Main Turbine is setup for a SGFP runback when crew takes the watch. PO must change load change rate from 15% per minute to 10% per hour.			
	RO/PO monitor plant response to ensure power ascension is progressing as anticipated.		
	RO either announces expected and actual auto rod movement, or withdraws rods in manual with CRS concurrence to maintain Tavg on program if required.		
Proceed to next event on direction from Lead Evaluator.			
2. PZR PORV 2PR2 leak			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
Simulator Operator: Insert RT-1 on direction from Lead Evaluator. MALF: PR0018B PZR PORV 2PR2 DEVELOPS LEAK SEVERITY : 15,000			
Note: 15,000 lbm/hr = 30 gpm. Note: AB.RC-1 may be entered if PORV leak is not promptly identified, but AB.PZR should be entered when PORV leak is identified.			
	RO reports lowering PZR pressure, or PORV tailpipe temp has risen, or charging flow rising, or lower spray valve demand, or PRT indications of a 2PR2 leak.		
	CRS enters S2.OP-AB.PZR-0001, Pressurizer Pressure Malfunction.		
	CRS directs initiation of Attachment 1 CAS.		
	CRS evaluates stopping the Load Ascension anytime during implementation of S2.OP-AB.PZR-0001.		
	RO reports POPS NOT in service.		
RO reports PZR Pressure Control channel has NOT failed.			
RO reports MPC has NOT failed.			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
Continue to next event on direction from Lead Evaluator.	RO reports a Spray Valve has NOT failed.		
	RO reports a PORV is NOT failed.		
	RO reports PORV tailpipe temp is elevated.		
	RO closes both PORV stop valves.		
	RO reports tailpipe temperatures are lowering.		
	RO opens 2PR6 and reports tailpipe temperatures are still lowering.		
	RO opens 2PR7 and reports tailpipe temperatures are rising.		
	RO closes 2PR7, and reports lowering PORV tailpipe temperature.		
	RO reports that PZR PORV 2PR2 is leaking.		
	CRS enters TSAS 3.4.5 action a for 2PR2.		
3. 22 RC Loop RTD Fails High			
Simulator Operator: Insert RT-2 on direction from Lead Evaluator.			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
MALF: RC0014B, 22 Hot Leg RTD Avg Sum Fail Final Value: 650			
	RO reports control rods inserting at 72 spm, verifies no runback in progress, gains concurrence from CRS and places control rods in manual.		
	CRS enters S2.OP-AB-ROD-0003, Continuous Rod Motion.		
	RO reports rod motion stopped.		
	RO adjusts Rods in manual to control Tavg within 1.5° of program using Att. 1.		
	RO reports rod motion was inward.		
	RO reports NO NI failures.		
	RO reports 22 loop Tavg failed high and NO dilution in progress.		
	RO places Master Flow Controller to manual and adjusts charging flow to return PZR level to program using Att. 2.		
	RO selects Deviation Defeat for Loop 22 DT and Tave.		
	RO selects recorders to channel other than 22 loop.		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	RO returns Master Flow Controller to auto when PZR level is on program.		
	RO reports control rods are above the RIL.		
	RO withdraws control rods to establish Tave within 1.5°F of program.		
	RO verifies Tave within 1.5° program and restores the Rods to Auto.		
	CRS evaluates placing Rod Control to Automatic Control.		
	CRS initiates removing 22 loop RCS temperature channel from service IAW S2.OP-SO.RPS-0002.		
	CRS enters TSAS(s) 3.3.1.1 Action 6, and 3.3.2.1 Action 19*.		
Proceed to next event after Tech Spec call is made at Lead Evaluators direction.			
4. Loss of Main Turbine Lube Oil			
Simulator Operator: Insert RT-3 on direction from Lead Evaluator. MALF: TU0075 Main Turb loss of Lube Oil			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
Final Value: 90 MALF: TU0083A Mn Turb Hi Vibr Final Value: 12 Ramp: 30 minutes MALF: TU0083B Mn Turb Hi Vibr Final Value: 12 Ramp: 30 minutes			
Note: The malfunction will cause oil pressure to lower to the start setpoint for the 2 oil pumps (12 psig), and the auto start will restore header pressure.			
	PO reports auto start of ABOP and HP Seal Oil Backup pump and reports lube oil header pressure rising or stable.		
	CRS enters S2.OP-AB.TL-0001, Loss of Main Turbine Lube Oil.		
	CRS directs initiation of AB.TL CAS.		
	PO reports bearing pressure is NOT below 12 psig.		
	CRS reports that auto start of ABOP or HP Seal Oil BU pump requires a turbine shutdown be performed.		
	PO reports the ABOP and HP Seal Oil Backup pumps have started.		
	PO reports the Main Turbine is latched.		
	PO reports lube oil reservoir level is stable.		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
If dispatched to check local MTLO reservoir level, report after 2 minutes as NEO that MTLO reservoir level is normal and stable.			
	PO initiates monitoring of Main Turbine parameters IAW Attachment 2.		
	CRS briefs required power reduction to 20%.		
	CRS enters S2.OP-AB.LOAD-0001, Rapid Load Reduction, to perform the power reduction.		
	RO calculates boron addition required for power reduction.		
	PO reports rising vibrations on turbine bearings.		
Simulator Operator: PAUSE rising turbine vibration at 6 mils if crew has not taken action to reduce power, then remove pause when power reduction has commenced. Once load reduction is in progress or as direct by Lead Evaluator, MODIFY MALF			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
TU0083A and/or TU0083B <u>Starting Value to 9.0</u> to accelerate the turbine vibrations levels towards Rx Trip criteria (9 mils).			
	CRS direct power reduction at rate <5% per minute.		
	PO initiates turbine load reduction at rate specified by CRS.		
Note: SW Header Low Pressure alarm could be expected due to the leak on the MTLO.			
Note: Since the power reduction will be to <50% where AFD Tech Spec is no longer applicable, AFD concerns should not impede the power reduction.			
	RO maintains Tavg/Tref mismatch at minimum value by ensuring control rod motion initiates when expected.		
	PO monitors SGFP suction pressure to ensure it remains >300 psig.		
	PO monitors condensate pump suction temperatures.		
	CRS briefs contingency actions if turbine vibrations continue to rise.		
	CRS may raise the power reduction rate based on rising vibrations.		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	PO reports unexpected OHA H-35 TSI TRBL.		
	PO continues to keep CRS updated with rising vibration status.		
	CRS determines deteriorating conditions require removing the main turbine from service.		
	CRS directs RO to trip the Rx and perform immediate actions of 2-EOP-TRIP-1, Reactor Trip or Safety Injection.		
5. ATWT			
	RO attempts to trip the reactor with Rx Trip Handle and reports the reactor has NOT tripped.		
	Crew recognizes ATWT.		
	RO continues attempts to trip the reactor by: <ul style="list-style-type: none"> • Using the other Rx Trip Handle • Opening Reactor Trip Breakers • Opening RDMG set power supply breakers 		
	RO reports all attempts to trip the reactor have failed.		
	RO trips the Main Turbine.		
Simulator Operator: Ensure ET-1, ET-2, and ET-3 are true when the			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
turbine is tripped. This inserts the malfunctions for rod control (RD0061) after a 45 second delay, and inadvertent FW Isolation (RP0247), and deletes turbine vibration malfunctions (TU0083A and TU0083B).			
	RO either ensures automatic rod motion occurs or inserts control rods in manual.		
Note: Automatic rod insertion allows for a faster rod speed of 72 spm vs. Manual rod speed of 48 spm.			
	RO reports immediate actions of 2-EOP-TRIP-1 are complete.		
	CRS enters 2-EOP-TRIP-1, Reactor Trip or Safety Injection.		
	RO reports reactor will NOT trip.		
	RO reports Main Turbine is tripped.		
	RO reports rod insertion is occurring.		
	CRS enters 2-EOP-FRSM-1 Response to Nuclear Power Generation.		
	PO starts 21 and 22 AFW pumps running, and reports that 22 AFW pump is NOT providing flow.		
	If attempted, PO reports Pressure Override		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	Defeat has FAILED to actuate for 22 AFW pump.		
	PO reports AFW flow is <44E4 lbm/hr, and STARTS 23 AFW pump.		
CT#1 (CT-51) Start AFW pumps during 2-EOP-FRSM-1, step 2. SAT_____ UNSAT_____			
	RO reports lowering rod speed not consistent with plant conditions, and receives permission to place rods in manual (if not in manual already).		
	RO inserts control rods until RTB's are open.		
CT#2 (CT-52) Insert negative reactivity into the core by inserting control rods or establishing emergency boration to the RCS prior to exiting FRSM-1. SAT_____ UNSAT_____			
Note: CT#2 can be satisfied with control rod insertion OR emergency boration.			
	RO starts the both centrifugal charging pumps.		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	RO reports SI is NOT actuated.		
	RO reports that both Boric Acid pumps are in FAST speed.		
	PO opens 2CV175 and closes 21 and 22CV160 to establish Rapid Boration.		
Simulator Operator: <u>After</u> an operator has been dispatched to locally open RTB breakers <u>AND</u> Rapid Boration flow is established, <u>THEN</u> locally open RTBs by: - Inserting <u>RT-10</u> to deenergize RDMG sets and open RTB breakers.			
	RO reports PZR pressure <2335 psig and both PZR PORVs shut.		
	RO reports 2PR6 is open with power, and 2PR7 is closed due to leaking 2PR2 PORV.		
	PO reports 2VC5 and 2VC6 are shut.		
	RO reports reactor trip breakers remains shut.		
	If not previously performed, crew dispatches an operator to locally open RTBs and RDMG set motor and generator breakers.		
	PO reports MT Stop valves are shut.		
	RO reports indications that RTBs have been opened, and RDMG sets have been		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	deenergized.		
	RO reports all PRNI channels <5% power and IR SUR negative.		
	CRS directs chemistry to sample RCS.		
	CRS directs calculation of SDM.		
	CRS continues boration as required.		
Terminate the scenario when transition back to procedure in effect has been made or decision to complete SDM calculation before leaving FRSM-1 has been made.			

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-0004, Power Operation
- F.** S2.OP-AB.PZR-0001, Pressurizer Pressure Malfunction
- G.** S2.OP-AB.ROD-0003, Continuous Rod Motion
- H.** S2.OP-AB.TL-0001, Loss of Main Turbine Lube Oil
- I.** 2-EOP-TRIP-1, Reactor Trip or Safety Injection
- J.** 2-EOP-FRSM-1, Response to Nuclear Power Generation

**ATTACHMENT 1
UNIT TWO PLANT STATUS
TODAY**

MODE: 1 POWER: 75% RCS BORON: 107 MWe 880

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

NA

REACTIVITY PARAMETERS

- Xenon is Building In at 4 pcm/hr
- Control rods will be withdrawn from 160 to 227 as needed for AFD and temperature control and to establish ARO prior to 100% power.

MOST LIMITING LCO AND DATE/TIME OF EXPIRATION:

EVOLUTIONS/PROCEDURES/SURVEILLANCES IN PROGRESS:

- Raise power to 89% @ 10% per hour IAW S2.OP-IO.ZZ-0004. Step 4.1.20 is complete.

ABNORMAL PLANT CONFIGURATIONS:

CONTROL ROOM:

- Unit 1 and Hope Creek at 100% power.

PRIMARY:

SECONDARY:

- Polisher is in service
- Blowdown to condenser at 35K per loop.

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: 2017 ILOT NRC ESG-7 **REVIEWER:** M Brummitt

Initials Qualitative Attributes

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

ATTACHMENT 4
SIMULATOR SCENARIO REVIEW CHECKLIST

Minimum Quantitative Attributes (NRC Form ES-301-4)

Malfunction ID	Total Malfunctions	Malfunctions After EOP entry	Abnormal Events	Major Transient	EOPs used beyond TRIP-1	Entry into contingency EOP	Critical Task	Tech Specs exercised
PR0018A	1		1		FRSM-1	FRSM-1	2	Yes
RC0014B	1		1					Yes
TU0075 TU0083A TU0083B	1			1				
RP0058 RP0059A RP0059B RP0060A RP0060B RP0247 B440 F DI B441 F DI C310 F DI C510 F DI	1	1						
AF0182B B511 A DI	1	1						
AF0353C	1	1						
RD0061	1	1						
Total Number of Events	7	4	2	1	1	1	2	Yes
Min Number of Events	-	1-2	2-4	1-2	1-2	0-2	2-3	Yes
Verified By	Chan	Chan	Chan	Chan	Chan	Chan	Chan	Chan

Comments:

ATTACHMENT 5
ESG CRITICAL TASKS

2017 ILOT NRC Retake ESG-7

Critical Task #1 (CT-51):

Start AFW pumps to establish at least 44E4lbm/hr AFW flow before completion of FRSM-1 step 2.

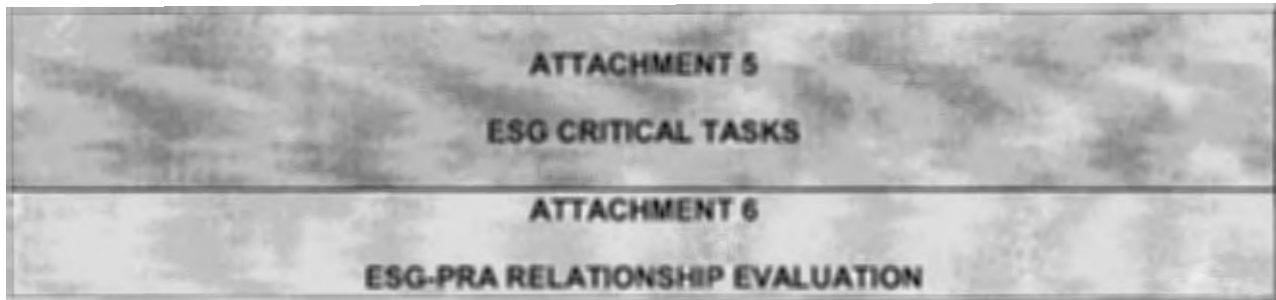
Basis: Failure to start at least the minimum required number of AFW pumps under the postulated plant conditions can lead to violation of the RCS emergency stress limit.

Critical Task #2 (CT-52):

Add negative reactivity from rod insertion or emergency boration.

Basis: Failure to insert negative reactivity, under the postulated plant conditions, results in an unnecessary situation in which the reactor remains critical or returns to a critical condition.

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

**EVENTS LEADING TO CORE DAMAGE**

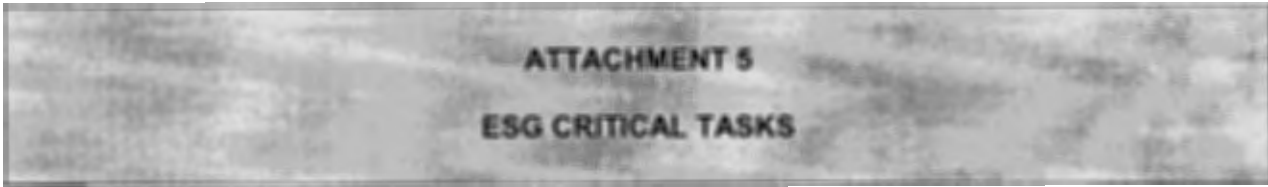
<u>Y/N</u>	<u>Event</u>	<u>Y/N</u>	<u>Event</u>
N	TRANSIENTS with PCS Unavailable	N	Loss of Service Water
N	Steam Generator Tube Rupture	N	Loss of CCW
N	Loss of Offsite Power	N	Loss of Control Air
N	Loss of Switchgear and Pen Area Ventilation	N	Station Black Out
N	LOCA		

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	Y	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

Complete this evaluation form for each ESG.

SIMULATOR EXAMINATION SCENARIO GUIDE

SCENARIO TITLE: 15-01 NRC ESG-8
SCENARIO NUMBER: 15-01 NRC ESG-8
EFFECTIVE DATE: See Approval Below
EXPECTED DURATION: 75 minutes
REVISION NUMBER: 01

PROGRAM:

☐

L.O. REQUAL

☒

INITIAL LICENSE

☐

STA

☐

OTHER _____

Revision Summary

Rev 00, for 2014 Annual Exam

Rev 01, 4-6-17, developed from 2014 Annual ESG-1418 for 2017 NRC retake exam.

Editorial changes made throughout scenario guide.

PREPARED BY: R. Chan
Lead Regulatory Exam Author

4-11-17
Date

APPROVED BY: W. Muffley
Operations Training Manager

4-11-17
Date

APPROVED BY: M. Brummitt
Operations Department

4-11-17
Date

SCAN OF SIGNED SCENARIO COVER SHEET

I. OBJECTIVES

- A. Given indication of a loss or malfunction of the Charging system DIRECT corrective action for a Charging System malfunction in accordance with S1/S2.OP-AB.CVC-0001.
- B. 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 S1/S2.OP-AB.CVC-0001.
- C. Given the order or indications of a fire, as the nuclear control operator PERFORM the control room actions in accordance with S1/S2.OP-AB.FIRE-0001.
- D. Given the order or indications of a fire, DIRECT the control room actions in accordance with S1/S2.OP-AB.FIRE-0001.
- E. 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.
- F. Given indication of a reactor trip, DIRECT the response to the reactor trip in accordance with the approved station procedures
- G. Given the order or indications of a reactor trip, PERFORM actions as the shift technical advisor to RESPOND to the reactor trip in accordance with the approved station procedures.
- H. Given a steam generator tube leak, take corrective action, IAW S2.OP-AB.SG-0001.
- I. Given the order or indications of a steam generator tube leak (SGTL), perform actions as the nuclear control operator to RESPOND to the tube leak in accordance with S1/S2.OP-AB.SG-0001.
- J. Given the order or indications of a steam generator tube leak (SGTL), DIRECT the response to the tube leak, in accordance with S1/S2.OP-AB.SG-0001.
- K. 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.
- L. Given indication of a safety injection DIRECT the response to the safety injection in accordance with the approved station procedures.
- M. Given the order or indications of a safety injection PERFORM actions as the shift technical advisor to RESPOND to the safety injection in accordance with the approved station procedures.
- N. Given the order or indications of a steam generator tube rupture (SGTR), perform actions as the nuclear control operator to RESPOND to the tube rupture in accordance with the approved station procedures.
- O. Given indication of a steam generator tube rupture (SGTR), DIRECT the response to the SGTR in accordance with the approved station procedures.
- P. Given the order or indications of a steam generator tube rupture (SGTR), PERFORM actions as the shift technical advisor for a SGTR, IAW approved station procedures.
- Q. During performance of emergency operating procedures, monitor the critical safety function status trees in accordance the EOP in effect.
- R. During normal, abnormal and/or emergency plant operations, properly classify the event including ECG section and initiating event number.

II. MAJOR EVENTS

1. 23 charging pump trip with letdown isolation failure (2CV4 intermediate position)
2. Loss of 2E 4KV Group bus
3. SGTL/SGTR in 2-EOP-TRIP-2
4. Loss of normal spray capability and 2PR2 fails to close during depressurization in 2-EOP-SGTR-1

III. SCENARIO SUMMARY

- A. The crew will receive the unit at 100% power BOL. Pressurizer Level Channel III failed high last shift, and was removed from service IAW S2.OP-SO.RPS-0003, Placing Pressurizer Channel in tripped condition. 2PR6 is shut with power removed after control circuit problem caused 2PR1 to partially open momentarily yesterday. No active troubleshooting of 2PR1 is in progress.
- B. Shortly after taking the watch, 23 Charging pump trips. The letdown orifice automatic isolation signal occurs with all 3 charging pump breakers open, but the inservice orifice isolation valve 2CV4 does not shut completely and remains 40% open. The crew responds IAW **S2.OP-AB.CVC-0001**, Loss of Charging, to isolate letdown and place 22 Centrifugal Charging pump in service. With normal letdown unavailable, the crew will place Excess Letdown in service. The CRS will identify the Tech Specs.
- C. An electrical fault will occur on the infeed breaker to 2E Group Bus and the bus will deenergize. The Rx will trip on RCS Low Flow due to the loss of 2E Group Bus power (loss of 22 RCP). Crew will enter **2-EOP-TRIP-1**.
- D. With no SI required, the crew will transition to **2-EOP-TRIP-2**, Reactor Trip Response. After stopping both SGFPs in 2-EOP-TRIP-2, a 50 gpm SGTL will occur on 21 SG. With the Rx shutdown and SGBD having isolated on the AFW pump auto start, only the 2R15 condenser air ejector radiation monitor will provide rising radiation indication of a tube leak.
- E. The CRS will initiate **S2.OP-AB.SG-0001**, Steam Generator Tube Leak, while continuing in 2-EOP-TRIP-2. The 21 SG tube will rupture. The crew will identify the ruptured SG and initiate Safety Injection IAW 2-EOP-TRIP-2 CAS. Train B SI will fail to actuate requiring operator to initiate Train A SI. The crew will return to 2-EOP-TRIP-1.
- F. The crew will transition to **2-EOP-SGTR-1**, Steam Generator Tube Rupture, to address the tube rupture. The crew will identify and isolate 21 SG. The crew will perform a cooldown to target temperature. The crew will initiate a RCS depressurization. During the depressurization, if used, the RCP providing driving head for spray flow will trip, and the crew will open a PZR PORV to continue the depressurization. **(Critical Task # 1 – Isolate ruptured SG) and (Critical Task # 2 – Establish and maintain target RCS temperature)**

- G.** The PORV opened to depressurize will fail to close when demanded after the depressurization is complete. The crew will terminate the depressurization by closing the PORV Block valve.
- H.** The scenario will be terminated after the crew addresses the stuck open PZR PORV.

A. INITIAL CONDITIONS

_____ IC-233

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)
	23 CV PP (SELF CHECK)
	PZR level CH. III O/S at 100%
	2PR6 in Manual and Closed with control power off
	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. //CONTROL BANK C GROUP POSITION COMMAND: PURPOSE: <update as needed>

MALFUNCTIONS:

SELF-CHECK	Description	Delay Time	Initial Value	Ramp Time	Trigger	Severity
01	AN0358 SER 358 FAILS - :A20 REACTOR PROT SYS CH III RACK 11,12 OR 13 DOOR OPEN	N/A	N/A	N/A	N/A	SER POINT FAILS/OVRD TO ON
02	AN0356 SER 356 FAILS - :A20 REACTOR PROT SYS CH III INSTRUMENT LOOP IN TEST	N/A	N/A	N/A	N/A	SER POINT FAILS/OVRD TO ON
03	PR0017C PZR LEVEL CH III(LT461)FAILS H/L	N/A	N/A	N/A	N/A	100
04	CV0034 23 CHARGING PUMP TRIP	N/A	N/A	N/A	RT-1	
05	VL0245 2CV4 Fails to Position (0-100%)	N/A	N/A	N/A	RT-1	40
06	EL0141 LOSS OF 2E 4160V GROUP BUS	00:01:00	N/A	N/A	RT-2	
07	RC0003C 23 RC PUMP ELECTRICAL TRIP	N/A	N/A	N/A	ET-1	
08	SG0078A 21 STEAM GENERATOR TUBE RUPTURE	N/A	N/A	N/A	RT-3	50
09	AN3735 AAS 735 FAILS - :21 TGA SUMP LEVEL HIGH	00:03:00	N/A	N/A	RT-10	AAS POINT FAILS/OVRD TO ON
10	AN3736 AAS 736 FAILS - :22 TGA SUMP LEVEL HIGH	00:03:10	N/A	N/A	RT-10	AAS POINT FAILS/OVRD TO ON
11	AN3737 AAS 737 FAILS - :23 TGA SUMP LEVEL HIGH	00:03:25	N/A	N/A	RT-10	AAS POINT FAILS/OVRD TO ON
12	AN3738 AAS 738 FAILS - :24 TGA SUMP LEVEL HIGH	00:03:37	N/A	N/A	RT-10	AAS POINT FAILS/OVRD TO ON
13	AN3739 AAS 739 FAILS - :25 TGA SUMP LEVEL HIGH	00:03:57	N/A	N/A	RT-10	AAS POINT FAILS/OVRD TO ON
14	VL0298 2PR2 Fails to Position (0-100%)	N/A	N/A	N/A	RT-4	100
15	RC0003A 21 RC PUMP ELECTRICAL TRIP	N/A	N/A	N/A	RT-5	

REMOTES:

SELF-CHECK	Description	Delay Time	Initial Value	Ramp Time	Trigger	Condition
01	PR17D PZR HI LVL RX TRP CH 3 LC461A BS	N/A	N/A	N/A	N/A	TRIP

02	PR34D PORV STOP VALVE 2PR6 TAGGED	N/A	N/A	N/A	N/A	TAGGED
03	FP25D FIRE - TURB GEN AREA WEST 100' (33)	N/A	N/A	N/A	RT-2	FIRE

OVERRIDES:

SELF-CHECK	Description	Delay Time	Initial Value	Ramp Time	Trigger	Condition/Severity
01	B312 L AO GB312ALI PRESSURIZER LEVEL CH. III	N/A	N/A	N/A	N/A	100
02	A701 B DI KA701DOA TRAIN 'B' - SI OPERATE KEYSWITCH	N/A	N/A	N/A	N/A	OFF

OTHER CONDITIONS:

Description

None

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>1. 23 Charging pump trip with failure of Letdown Isolation.</p> <p>Simulator Operator: Insert RT-1 on direction from Lead Evaluator.</p> <p>MALF: CV0034 23 CHARGING PUMP TRIP MALF: VL0245 2CV4 Fails to Position (0-100%) Severity: 40</p> <p>Note: Manually closing the 2CV2 and 2CV277 is directed at Step 3.5, but may be performed prior to that to isolate letdown.</p>			
	RO reports 23 charging pump tripped.		
	RO reports 2CV4 is NOT full closed as expected.		
	CRS enters S2.OP-AB.CVC-0001, Loss of Charging.		
	CRS directs initiation of CAS.		
	CRS directs RO to manually shut 2CV4, and RO reports it will NOT shut.		
	CRS dispatches operator to investigate 23 charging pump trip.		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	CRS directs RO to isolate letdown by shutting 2CV2 and 2CV277.		
	CRS may initiate S2.OP-AB.RCP-0001 from CAS item 4.0. (No action will be performed in AB other than monitoring RCP parameters.)		
	RO verifies NO charging pump is running.		
	RO reports NO indication of cavitation prior to 23 charging pump trip.		
	RO reports letdown status, and shuts 2CV2 and 2CV277.		
	RO reports 23 charging pump NOT available.		
Simulator Operator: If CRS directs removal of 23 charging pump control power, use Remote CV52D to OFF.			
	RO reports both centrifugal charging pumps are available.		
	RO reports all RCP seal inlet temps <225°.		
	RO closes 2CV55.		
	RO starts 21 or 22 charging pump and throttles 2CV55 to obtain desired flow.		
	RO maintains 6-12 gpm seal injection to each RCP with maximum of 40 gpm total seal injection flow.		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
<p>Note: There is no direction in AB.CVC-1 to place Excess Letdown in service. The following are the steps for placing Excess Letdown in service if the CRS directs it, otherwise continue to next event.</p> <p>Role Play: If Excess Letdown will be placed in service and the crew directs placing 2CA2015 in bypass to close 2CV55, use Remote CV42A to bypass 2CA2015. Call back for First Check and when valve is in bypass (84' Aux Bldg, Charging Valve Alley)</p> <p>Steps from S2.OP-SO.CVC-0003 for placing Excess Letdown in service</p>	CREW determines normal letdown is NOT available to be placed in service due to failed Containment Isolation Valve 2CV4. (Crew evaluates placing Excess Letdown in service for PZR Level control)		
	CRS enters TSAS 3.6.3 Action 1 for INOPERABLE Containment Isolation Valve.		
	PO verifies 2CC113 open.		
	PO opens 2CC215.		
	PO verifies 2CV132 shut.		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
<p>Proceed to next event after excess letdown is placed in service or after discussion about contingencies for normal letdown not being available.</p> <p>2. Loss of 2E Group Bus/Rx Trip</p>			
	PO determines 2CV134 selected to VCT position.		
	PO opens 2CV278 and 2CV131.		
	PO slowly throttles open 2CV132 while maintaining excess letdown temp <195°F and pressure <150 psig.		
<p>Simulator Operator: Insert RT-2 on direction from Lead Evaluator</p> <p>MALF: EL0141 LOSS OF 2E 4160V GROUP BUS Delay: 60 sec REMOTE: FP25D TURB GEN AREA WEST 100' ELEV (33)</p>			
	RO reports unexpected OHA A-7 FIRE PROT FIRE.		
	PO reports Zone 33 TURB BLDG WEST EL 100 is affected area, dispatches an operator to investigate, and contacts Fire Protection.		
	RO reports the Rx has tripped, and performs Immediate Actions:		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	<ul style="list-style-type: none"> - Manually backs up Rx trip - Confirms the Rx trip. - Backs up Main Turbine trip - Reports all 4KV vital buses are energized. - Reports SI has not actuated and is not required. 		
	CRS enters 2-EOP-TRIP-1, Reactor Trip or Safety Injection.		
Simulator Operator: Ensure ET-1 is true upon the Rx trip. This trips 23 RCP and results in loss of normal spray capability.			
	CRS and RO verify immediate actions complete.		
Role Play: 2 minutes after being dispatched, report as NEO that there is No Fire but you smell a strong acid smell near the E Group Bus cubicle area.			
	Crew contacts Fire Protection and informs them of conditions.		
Role Play: 3 minutes after being contacted by control room, report as Fire Protection operator that you DON'T see any smoke or Fire at the Group Buses but do smell a strong acid smell when you			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
approach the E Group bus cubicles.			
	CRS transitions to 2-EOP-TRIP-2, Reactor Trip Response.		
	PO reports AFW flow is > 22E4 lbm/hr and receives permission to throttle AFW flow to no less than 22E4 lbm/hr, and maintains >22E4 lbm/hr until at least 1 SG NR level >9%, then maintains 19-33%.		
	PO stops 21 and 22 SGFPs.		
4. SGTL			
Simulator Operator: Insert RT-3 after the SGFPs have been stopped. MALF: SG0078A 21 STEAM GENERATOR TUBE RUPTURE Final Value: 50			
	RO reports 21 and 24 RCPs are in service, and RCS temperature is trending to or stable at 547°F.		
	RO reports both RTBs are open.		
	RO reports unexpected OHA A-6 RMS HI RAD OR TRBL.		
	RO reports alarm is for 2R15 Condenser Air ejector.		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
<p>Note: Crew may use S2.OP-SO.SS-0001, section 5.2, for guidance to re-open the SS94's and allow for sample flow through the 2R19 radiation monitors to help identify which SG has the SG tube leak.</p> <p>Note: CRS may continue action of TRIP-2 in parallel with performance of AB.SG.</p>	PO reports 2R15 in alarm and rising.		
	Crew recognizes the R19 SGBD Rad monitors are O/S due to AFW pump auto start isolating blowdown, and R53 N-16 rad monitors are ineffective with Rx S/D.		
	CRS initiates S2.OP-AB.SG-0001, Steam Generator Tube Leak.		
	CRS directs initiation of Att. 1 CAS.		
	CRS dispatches operator to deenergize TGA and CPS area building sump pumps.		
<p>Simulator Operator: Insert RT-10 when directed to deenergize TGA sumps. It has time delay built in.</p>			
	RO reports PZR level and trend. Based on recent Rx trip, PZR level may still be lowering in response to trip.		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
<p>Role Play: Call back after 2-3 minutes as primary chemistry and notify the CRS that chemistry analysis has identified elevated radionuclide activity in 21 SG.</p> <p>Note: The trips of 22 and 23 RCP will have caused their SG NR levels to be above what is expected and will complicate SG tube leak identification. Identification of affected SG may not be made until SS94s are re-opened (allows use of 2R19 radiation monitors).</p> <p>Note: Isolating feed flow is part of CT-1.</p>	RO ensures a centrifugal charging pump is in service.		
	RO adjusts charging flow and estimates leakrate.		
	RO reports PZR level can be maintained stable or rising, and the unit is in Mode 3.		
	CRS directs Chemistry to sample SGs to assist in identifying affected SG.		
	Crew identifies 21 SG as affected SG.		
	PO sets 21MS10 setpoint to 1045 psig.		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
5. SGTR	PO closes/ensures closed 21MS7, 21MS18, and 21GB4.		
	CRS dispatches an operator to shut 21MS45.		
	CRS dispatches operator to align SGBD.		
Simulator Operator: Modify MALF SG0078A to 400 with no ramp or delay.			
	RO reports lowering PZR pressure and level.		
	PO reports 21 SG NR level rising faster.		
	CRS directs initiation of Safety Injection and returns to 2-EOP-TRIP-1.		
	RO initiates SI on Train B and reports it has NOT initiated.		
	RO successfully initiates SI on Train A.		
	RO/CRS verify 2-EOP-TRIP-1 immediate actions complete.		
	PO reports all available equipment started on SECs.		

Note: If Train A is initiated first, this malfunction will not occur.

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	PO reports AFW status.		
	PO reports proper safeguards valve alignments except for 2CV4.		
	PO reports containment pressure normal.		
	RO reports conditions do not warrant MSLI.		
	RO closes charging pump mini flow valves if RCS pressure is <1500 psig and BIT flow is established.		
	RO stops RCPs if RCS pressure lowers to 1350 psig with ECCS flow established.		
	PO reports all 4KV vital buses energized.		
	RO reports Control Room ventilation in AP mode.		
	RO runs correct complement of switchgear supply and exhaust fans.		
	RO reports 2 CCW pumps running.		
	RO reports ECCS flow as expected for current RCS pressure.		
	PO reports at least 1 SG NR level is >9%, then maintains SG NR levels between 19%-33%.		
	RO reports RCP status, and RCS temperature stable at or trending to 547°.		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
<p>Note: With 23 RCP stopped, spray flow will be atypical.</p>	RO reports both RTBs are open.		
	RO reports both PZR PORVs are shut with 2PR6 shut and deenergized and 2PR7 open.		
	RO reports PZR spray status.		
	RO stops RCPs if RCS pressure is <1350 psig and charging flow is at least 100 gpm through the BIT.		
	PO reports no indication of faulted SGs.		
	CRS transitions to 2-EOP-SGTR-1, Steam Generator Tube Rupture.		
	RO maintains seal injection flow to all RCPs.		
	PO reports 21 SG is ruptured, and 21MS10 is set at 1045 psig.		
	PO reports 21MS10 operating as expected for current pressure.		
	PO closes 21MS167, and verifies 21MS7, 21MS18, and 21GB4 are closed.		
<p>Note: These steps complete CT#1</p>			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
CT#1 (CT-18) Isolate feed flow into and steam flow from 21 SG prior to a transition to SGTR-3 being required. SAT _____ UNSAT _____			
	PO reports 21 ruptured.		
	PO reports 23 AFW pump is NOT the only source of AFW.		
	PO trips 23 AFW pump.		
	CRS dispatches operator to close 21MS45, if not previously performed.		
	CRS dispatches operator to close 2SS321 sample valve.		
	PO reports 21 SG is isolated from all intact SGs.		
	PO STOPS AFW flow if 21 SG NR level >9%		
	PO reports 21 SG pressure is >375 psig.		
	CRS determines target temperature from Table B.		

Note: 21 SG NR levels may be off-scale low at this point and the PO may request to feed this SG harder to promptly raise NR levels to 9%.

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
<p>Note: Do NOT restore power to 2PR6 during scenario. IF contacted again about 2PR6, state the breaker went trip free when it was shut.</p>	PO reports steam dumps are available, and places in MS Pressure Control at 25% to perform cooldown.		
	PO stops cooldown and maintains temperature <503 F degrees. Steam Dumps set to Auto to maintain desired CET temps.		
	RO reports 2PR7 PZR PORV Stop valve has power, and both PZR PORVs are shut.		
	CRS dispatches operator to restore power to 2PR6.		
	RO resets SI and Phase A isolation, and reports Phase B isolation reset.		
	RO opens 21 and 22CA330.		
	PO resets each SEC and reports 230V control centers are reset.		
	RO reports NO RHR pump discharge flow.		
	RO stops both RHR pumps.		
	PO reports 21 SG is ruptured and 21MS167 is closed.		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
<p>CT#2 (CT-19) Establish and <u>maintain</u> an RCS temperature so that transition from SGTR does not occur because temperature is too high to maintain minimum subcooling, or so low it causes transition to FRTS or FRSM.</p> <p>SAT UNSAT</p>			
<p>Note: 21 RCP is running (if all RCPs have not been stopped). IF crew decides normal spray is not available due to 23 RCP not running, <u>then go to</u> PORV depressurization actions. During validation spray was determined ineffective with 21 RCP running.</p>	PO reports 21 SG pressure is stable or rising.		
	RO reports subcooling >20 deg.		
	RO reports PZR spray availability.		
	Crew reviews depressurization termination criteria using Table D.		
	RO fully opens both PZR spray valves if normal spray is available.		
	RO reports spray is lowering pressure OR reports pressure is not lowering (if spray appears to be insufficient)		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
Simulator Operator: Insert RT-5 if spray is attempted to be used for pressure reduction after RO reports pressure is (or is not) lowering. MALF: RC0003A, 21 RCP elect trip Final Value: True			
PORV operation step 20 here:			
	RO reports 21 RCP has tripped.		
	CRS returns to step 19 and answers NO.		
	RO closes both spray valves.		
	RO reports 2PR2 is available.		
	Crew reviews depressurization termination criteria using Table E.		
Simulator Operator: When 2PR2 is opened, enter RT-4 to fail open 2PR2. MALF: VL0298 2PR2 Fails to Position (0-100%) Severity: 100			
	RO opens one PORV to depressurize RCS until termination criteria is met.		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
<p>Terminate scenario after the open PORV issue has been addressed.</p>	RO reports termination criteria met and closes 2PR2.		
	RO reports 2PR2 will NOT close.		
	CRS directs RO to close the PORV Block valve.		
	RO reports PORV block valve is closed and RCS pressure is rising.		

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-AB.CVC-0001, Loss of Charging
- F. S2.OP-SO.CVC-0003, Excess Letdown Flow
- G. S2.OP-AB.SG-0001, Steam Generator Tube Leak
- H. 2-EOP-TRIP-1, Rx Trip or Safety Injection
- I. 2-EOP-TRIP-2, Rx Trip Response
- J. 2-EOP-SGTR-1, Steam Generator Tube Rupture

**ATTACHMENT 1
UNIT TWO PLANT STATUS
TODAY**

MODE: 1 POWER: 100% RCS BORON: 1093 MWe 1220

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

NA

REACTIVITY PARAMETERS

MOST LIMITING LCO AND DATE/TIME OF EXPIRATION:

- 3.4.5 action b for 2PR1, 55 hours remain until shutdown required.

EVOLUTIONS/PROCEDURES/SURVEILLANCES IN PROGRESS:

ABNORMAL PLANT CONFIGURATIONS:

CONTROL ROOM:

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

PRIMARY:

- PZR level channel III failed high last shift, removed from service IAW S2.OP-SO.RPS-0003, Placing Pressurizer Channel in Tripped Condition. TSAS 3.3.1.1, act 6, no expiration.
- 2PR6 is shut with power removed after control circuit problem caused 2PR1 to partially open momentarily yesterday. No active troubleshooting of 2PR1 is in progress.

SECONDARY:

- Polisher is in service
- SG Blowdown at 35K per loop to condenser

RADWASTE:

- No discharges in progress

CIRCULATING WATER/SERVICE WATER:

- None

ATTACHMENT 2**SIMULATOR READY FOR TRAINING CHECKLIST**

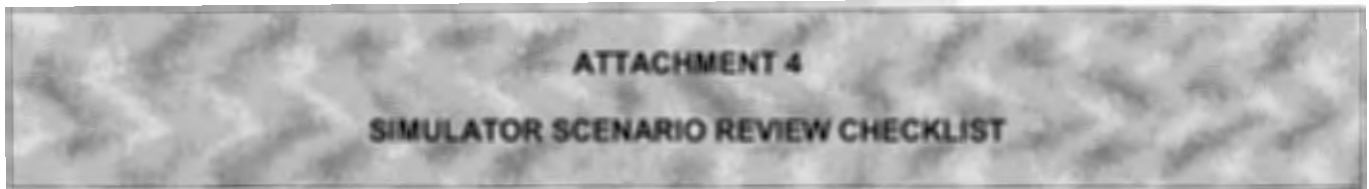
- ___ 1. Verify simulator is in "TRAIN" Load
- ___ 2. Simulator is in RUN
- ___ 3. Overhead Annunciator Horns ON
- ___ 4. All required computer terminals in operation
- ___ 5. Simulator clocks synchronized
- ___ 6. All tagged equipment properly secured and documented
- ___ 7. TSAS Status Board up-to-date
- ___ 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 ECG 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).



Note: This form is used as guidance for the examination team as they conduct their review for the proposed scenarios.

SCENARIO IDENTIFIER: 2017 ILOT NRC ESG-8 **REVIEWER:** M Brummitt

Initials Qualitative Attributes

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

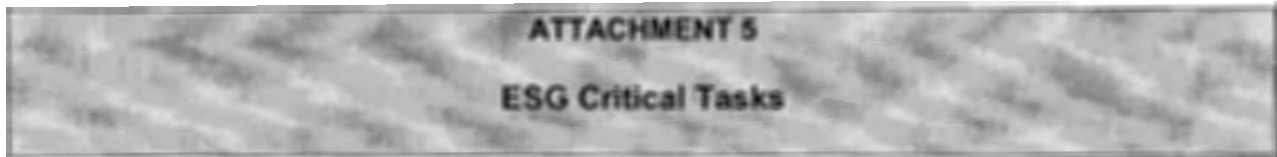
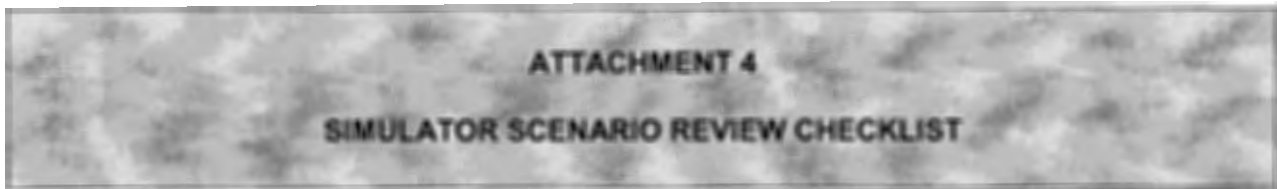
ATTACHMENT 4

SIMULATOR SCENARIO REVIEW CHECKLIST

Minimum Quantitative Attributes (NRC Form ES-301-4)

Malfunction ID	Total Malfunctions	Malfunctions After EOP entry	Abnormal Events	Major Transient	EOPs used beyond TRIP-1	Entry into contingency EOP	Critical Task	Tech Specs exercised
CV0034	1		1		TRIP-2 SGTR-1	None	2	
VL0245	1		1					Yes
EL0141 FP25D	1			1				
RC0003C	1	-	-					
SG0078A	1	1						
A701 B DI	1	1						
VL0298	1	1						
Total Number of Events	7	3	2	1	2	0	2	Yes
Min Number of Events	-	1-2	2-4	1-2	1-2	0-2	2-3	Yes
Verified By	Chan	Chan	Chan	Chan	Chan	Chan	Chan	Chan

Comment



15-01 NRC ESG-8

Critical Task #1 (CT-18):

Isolate feed flow into and steam flow from 21 SG prior to a transition to SGTR-3 being required.

Basis: Failure to isolate the ruptured SG causes a loss of differential pressure between the ruptured SG and the intact SGs. The fact that the crew allows the differential pressure to dissipate and, as a result, are then forced to transition to a contingency ERG constitutes an incorrect performance that "necessitates the crew taking compensating action that would complicate the event mitigation strategy...."

Critical Task #2 (CT-19):

Establish and maintain an RCS temperature so that transition from SGTR does not occur because temperature is too high to maintain minimum subcooling, or so low it causes transition to FRTS or FRSM.

Basis: Failure to establish and maintain the correct RCS temperature during a SGTR leads to a transition from E-3 to a contingency ERG. This failure constitutes an incorrect performance that "necessitates the crew taking compensating action that would complicate the event mitigation strategy...."

ATTACHMENT 4
SIMULATOR SCENARIO REVIEW CHECKLIST

ATTACHMENT 6
ESG-PSA RELATIONSHIP EVALUATION

EVENTS LEADING TO CORE DAMAGEY/N EventN TRANSIENTS with PCS UnavailableY Steam Generator Tube RuptureN Loss of Offsite PowerN Loss of Switchgear and Pen Area VentilationN LOCAY/N EventN Loss of Service WaterN Loss of CCWN Loss of Control AirN Station Black Out**COMPONENT/TRAIN/SYSTEM UNAVAILABILITY THAT INCREASES CORE DAMAGE FREQUENCY**Y/N COMPONENT, SYSTEM, OR TRAINN Containment Sump StrainersN SSWS Valves to Turbine Generator AreaN RHR Suction Line valves from Hot LegY CVCS Letdown line Control and Isolation ValvesY/N COMPONENT, SYSTEM, OR TRAINN Gas TurbineN Any Diesel GeneratorN Auxiliary Feed PumpN SBO Air Compressor**OPERATOR ACTIONS IMPORTANT IN PREVENTING CORE DAMAGE**Y/N OPERATOR ACTIONN Restore AC power during SBON Connect to gas turbineN Trip Reactor and RCPs after loss of component cooling systemN Re-align RHR system for re-circulationN Un-isolate the available CCW Heat ExchangerN Isolate the CVCS letdown path and transfer charging suction to RWSTN Cooldown the RCS and depressurize the systemY Isolate the affected Steam Generator that has the tube rupture(s)N Early depressurize the RCSN Initiate feed and bleed

Complete this evaluation form for each ESG.