

## SIMULATOR EXAMINATION SCENARIO GUIDE

**SCENARIO TITLE:** ESG-3 [AB.COND-1, AB.LOAD-1, TRIP-1, FRSM-1, TRIP-1, TRIP-2]  
**SCENARIO NUMBER:** 17-01 NRC-3  
**EFFECTIVE DATE:** See Approval Below  
**EXPECTED DURATION:** 60 minutes  
**REVISION NUMBER:** 06  
**PROGRAM:**  L.O. REQUAL  
 INITIAL LICENSE  
 STA  
 OTHER \_\_\_\_\_

**REVISION SUMMARY:**

- ❖ Rev. 05 (10-4-18) ESG-1808 modified for use on 17-01 ILOT NRC exam. Modified scenario to change malfunctions/events to ensure overlap requirements are met. Added the following malfunctions; Cntmt Pressure channel fails low, 22 SI Accumulator gas leak, Loss of Main Condenser Vacuum, two dropped rods, and 2PR1 PORV fails open. C/T one charging pump to prevent excessive nuisance alarms for RCP seal leakoff flows oscillating due to VCT filling and seal return relief valve 2CV115 cycling following Rapid Boration.
- ❖ Rev. 06 (12-4-18) Incorporated NRC Prep week comments. Added override for 21 BAT pump C/T, clarified CT#1 to credit rod insertion or rapid boration, added note to ensure all acitons completed for SI accumulator response prior to inserting loss of vacuum event, added role play to direct makeup to SI accumulator event, deleted and reinserted overrides to fix sim issue, added NRC ES-D-1 form to Attach 4.

  
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SCAN OF SIGNED SCENARIO COVER SHEET

## I. OBJECTIVES

- A. Given an instrumentation failure, evaluate for impact to plant operations and Technical Specifications.
- B. Given the unit at power and a loss of condenser vacuum, take corrective action IAW AB.COND-0001.
- C. Given the order or indications of a loss of vacuum, perform actions as the nuclear control operator to RESPOND to the malfunction, IAW approved station procedures.
- D. Given the order or indications of a loss of vacuum, DIRECT the response to the malfunction IAW approved station procedures.
- E. Given an ECCS Accumulator with low pressure, RAISE accumulator pressure in accordance with station procedures.
- 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 the approved station procedures.
- G. Given indication of a reactor trip, DIRECT the response to the reactor trip in accordance with the approved station procedures.
- H. 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.
- I. 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.
- J. Given indication of an anticipated transient without trip (ATWT), DIRECT the immediate response to the ATWT in accordance with the approved station procedures.
- K. Given the order or indications of an anticipated transient without trip (ATWT), PERFORM actions as the shift technical advisor to the ATWT IAW station procedures.
- L. Given indication of an open PZR PORV, take corrective actions IAW AB.PZR-0001 or EOP-TRIP-2 to close the PZR block valve.

## II. MAJOR EVENTS

- A. Containment Pressure Channel I fails low (TS only)
- B. 22 SI Accumulator gas leak (TS)
- C. Loss of Main Condenser vacuum
- D. Power reduction to stabilize vacuum
- E. Two dropped rods and Reactor fails to Trip (ATWT)
- F. 2CV175 Rapid Borate valve fails to open
- G. PZR PORV (2PR1) fails open

## III. SCENARIO SUMMARY

- A. The crew will take the watch at ~89.5% power, MOL, Rods in Auto. 21 Charging pump C/T for oil cooler cleaning, 21A CW C/T for waterbox cleaning, 21 BAT pump C/T for pump seal replacement, 22 vacuum pump C/T for pump replacement.
- B. After taking the watch, the crew will commence power ascension to 100% at 10% per hour IAW **S2.OP-IO.ZZ-0004**, Power Operation. The crew will be directed to use control rods and turbine load control to raise reactor power.
- C. Once the power ascension is in progress, Containment pressure channel 1 fails low. The crew will place the power ascension on hold to address the alarm. The crew will refer to OHA ARP and determine no impact to plant operations. The crew will identify that the channel needs to be removed from service and Tech Specs evaluated. (TS only)
- D. Following the response to the Containment pressure channel failure, 22 SI Accumulator will experience a gas leak inside containment. The crew will respond using Console ARP and the system operating procedure to raise SI accumulator pressure to within specification. The CRS will give an operational band for the operator to maintain accumulator pressure. CRS will evaluate Tech Specs. (TS call)
- E. After the crew addresses the accumulator gas leak, a condenser tube plug will come loose in 21A CW waterbox during waterbox cleaning. The crew will recognize rising condenser backpressure and start all available vacuum pumps to stabilize vacuum. The CRS enters **S2.OP-AB.COND-0001**, Loss of Condenser Vacuum. The crew will commence a load reduction to stabilize backpressure. Once the load reduction has commenced, the missing tube plug will be re-installed and the condenser backpressure will recover.
- F. Following the condenser vacuum event, two control rods will inadvertently drop causing a demand for reactor trip. The reactor will not trip using all attempts from the control room (ATWT) and a rod speed controller issue will only allow rods to insert at 8 spm in Auto. The crew responds by manually inserting rods at 48 spm. The crew will transition to **EOP-FRSM-1**, Response to Nuclear Power Generation, on the ATWT.

- G. In FRSM-1, the crew will initiate Rapid Boration [**Critical Task #1**]. During Rapid Boration, the crew will recognize that the 2CV175 Rapid Boration valve will not open and use the RWST path to Rapid Borate. Following verification of Rapid Boration flow the reactor trip breakers will be locally opened.
- H. Once the reactor is confirmed to be tripped, the crew will transition from FRSM-1 to TRIP-1, then stabilize the plant in EOP-TRIP-2. While in TRIP-2, a PZR PORV (2PR1) fails open. The crew will recognize that a PZR PORV is open and respond by closing the block valve of the failed open PORV [**Critical Task #2**]. The scenario can be terminated when open PZR PORV is isolated.

**IV. INITIAL CONDITIONS**

\_\_\_ IC-258 (11-29-18)

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

<i>Initial</i>	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	<b>21 Charging pump C/T</b>
___ 9	<b>21A CW and 21CW26 C/T (check that DP is set for in service CW pump)</b>
___ 10	<b>21 BAT pump C/T</b>
___ 11	<b>22 Vacuum pump C/T</b>
___ 12	<b>Examination team determine which equipment should be "protected" based on equipment out of service at start of scenario.</b>
___ 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

### MALFUNCTIONS:

SELF-CHECK	Description	Delay Time	Initial Value	Ramp Time	Trigger	Severity
01	VC0311A Containment Presssure CH I (PT948D) FAILS (NR only)	N/A	N/A	N/A	RT-1	55
02	SJ0180B 22 SI ACCUMULATOR GAS LEAK	N/A	5	00:01:14	RT-2	0.1
03	RD050113 (2C4) CONTROL ROD POSITION (ACTUAL) Fails	N/A	N/A	N/A	RT-4	0
04	RD050122 (1C1) CONTROL ROD POSITION (ACTUAL) Fails	N/A	N/A	N/A	RT-4	0
05	RP0058 FAILURE OF AUTOMATIC RX TRIP	N/A	N/A	N/A	N/A	
06	RP0059A FAILURE OF MANUAL RX TRIP	N/A	N/A	N/A	N/A	
07	RP0059B FAILURE OF MANUAL SI/RX TRIP	N/A	N/A	N/A	N/A	
08	RP0060A FAILURE OF TRAIN "A" RX TRIP BREAKER TO TRIP	N/A	N/A	N/A	N/A	
09	RP0060B FAILURE OF TRAIN "B" RX TRIP BREAKER TO TRIP	N/A	N/A	N/A	N/A	
10	RD0061 ROD SPEED CONTROL PROGRAM FAILS	N/A	N/A	N/A	RT-4	8
11	VL0095 2CV175 Fails to Position ( 0-100% )	N/A	N/A	N/A	RT-4	0
12	VL0297 2PR1 Fails to Position ( 0-100% )	N/A	N/A	N/A	RT-5	100
13	CN0086B Loss of 22 main condenser vacuum	N/A	5	00:10:00	RT-3	8

### REMOTES:

SELF-CHECK	Description	Delay Time	Initial Value	Ramp Time	Trigger	Condition
01	CV44D 21 CHG PUMP BKR CONTROL POWER	N/A	N/A	N/A	N/A	OFF
02	CV45D 21 CHG PUMP RACK OUT	N/A	N/A	N/A	N/A	TAGGED
03	CW01A 21A CIRC WATER PUMP CONTROL PWR BKR 2CW2AD	N/A	N/A	N/A	N/A	OFF
04	WD11A 22 GAS DECAY TANK PRESSURE	N/A	N/A	N/A	N/A	20
05	RP18D Open MAIN RX TRIP BKR A	N/A	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
07	RP09D 21 MG SET GEN OUTPUT BKR	N/A	N/A	N/A	RT-11	TRIPPED
08	RP07D 21 MG SET MOTOR BKR	00:00:05	N/A	N/A	RT-11	STOP

09	RP10D 22 MG SET GEN OUTPUT BKR	00:00:10	N/A	N/A	RT-11	TRIPPED
10	RP08D 22 MG SET MOTOR BKR	00:00:15	N/A	N/A	RT-11	STOP

**OVERRIDES:**

SELF-CHECK	Description	Delay Time	Initial Value	Ramp Time	Trigger	Condition/Severity
01	CM01 F LO QCM01TG5 21CW26 21A-CONDEN WATER OUT VALVE CLOSE	N/A	N/A	N/A	N/A	OFF
02	C310 F DI KC310TN0 2E6D PRESSURE HEATER BUS 480V-OPEN	N/A	N/A	N/A	N/A	OFF
03	C510 F DI KC510TN0 2G6D PRESSURE HEATER BUS 480V-OPEN	N/A	N/A	N/A	N/A	OFF
04	B135 E DI KB135PBB 21 BAT PUMP-FAST START	N/A	N/A	N/A	N/A	OFF
05	B135 D DI KB135LBB 21 BAT PUMP-SLOW START	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. 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. Power Ascension to 100% at 10% per hour</p> <p><b>Evaluators Note:</b> The crew may raise turbine load or withdraw control rods in any order as directed by the CRS.</p>			
	<p>Crew discusses reactivity plan for power ascension using control rods and turbine load control</p>		
	<p>RO withdraws control rods in Manual to maintain Tav<sub>g</sub> on program IAW <b>S2.OP-SO.RCS-0001</b>, Rod Control System, Operation or Attachment 4, Manual Control Rod Motion Hard Card.</p>		
	<p>PO raises turbine load using DEHC HMI panel IAW <b>S2.OP-SO.TRB-0001</b>, Turbine-Generator Startup Operations or Attachment 5, Routine Loading of Generator Hard Card.</p>		
	<p>Crew monitors proper response for Tav<sub>g</sub>, reactor power, and rod position during power ascension</p>		
<p>Proceed on to next event after Lead Evaluator has observed the power ascension activities or by direction of Lead Evaluator.</p>			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
<b>2. Containment Pressure Channel 1 fails high (TS only).</b>			
<b>Simulator Operator: Insert <u>RT-1</u> on direction from Lead Evaluator</b>  <b>MALF: VC0311A CNTMT PRESS CH I FAILS</b> <b>Final = 55</b>			
	RO reports unexpected OHA alarms for C-6 "CNTMT PRESS HI-HI" and D-40 "SUBCLG CH A MARGIN LO".		
	RO reports that the Cntmt Pressure Channel 1 console indication has failed high.		
	RO may also report that Subcooling Margin monitor Channel A is reading about- 0.7 and the Adverse button is illuminated on back panel recorder.		
	Crew refers to OHA alarm response procedures (ARP) and determines that the alarm is due to a failed instrument channel and not a valid signal.		
	Crew reviews <b>S2.OP-SO.RPS-0005</b> for placing the channel in the tripped condition.		
<b>Evaluator's Note:</b> Actions to place the channel in the tripped condition requires the operator to perform			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
these actions in the rack room area behind the control room. These racks are <u>NOT</u> installed in the simulator and must be performed by the simulator operator.			
<b>Role Play:</b> <u>IF</u> CRS request support to place the CNTMT PRESS CH I in tripped condition, <b>THEN</b> state that the WCC SRO will brief the 3 <sup>rd</sup> NCO to place the channel in the tripped condition IAW S2.OP-SO.RPS-0005.			
<p><b>TS evaluation #1:</b></p> <p>Proceed to next event after Tech Specs evaluated or at Lead Evaluators direction.</p> <p><b>3. 22 ECCS SI Accumulator gas leak</b></p>			
	<p><b>CRS reviews Tech Spec and enters TSAS 3.3.2.1.b, Action 16 (6 hour LCO)</b>  <b>[Note: Cntmt Spray only, SI not affected. TSAS 3.3.3.7 not applicable per ST.INST-0001 is only for Wide Range].</b></p>		
<b>Simulator Operator:</b> Insert <u>RT-2</u> on direction from Lead Evaluator.			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
<b>MALF: SJ0180B</b> <b>Initial Value: 5</b> <b>Severity: 0.1</b> <b>Ramp: 1:14 mins</b>			
<b>Evaluator's Note:</b> The low pressure console alarm will annunciate just after the ramp is finished.			
	RO reports unexpected 22 Accumulator low pressure alarm.		
<b>Evaluator's Note:</b> The alarm setpoint of 595.5 is also the Tech Spec required gas pressure.			
	PO reports ARP directs restoration of accumulator pressure IAW S2.OP-SO.SJ-0002, Accumulator Operations.		
<b>Role Play:</b> <u>IF</u> the crew takes no action to restore accumulator pressure, <b>THEN</b> , call as SM and state: <b>SM directs restoring accumulator pressure to acceptable band.</b>			
	PO restores 22 Accumulator pressure by opening 2NT32 nitrogen supply valve and 22SJ93 nitrogen supply valve, then closing 22SJ93 and 2NT32 when desired pressure is reached.		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
<p>TS evaluation #2:</p> <p><u>Continue to next event after the crew completes actions to address the accumulator issue</u> or by direction from Lead Evaluator.</p> <p>4. Loss of Main Condenser Vacuum (missing tube plug)</p>	<p>PO reports 22 accumulator pressure is lowering <b>very slowly</b>.</p>		
	<p>CRS assigns operating band for RO to maintain accumulator pressure.</p>		
	<p>CRS contacts WCC to begin actions to investigate leak.</p>		
	<p>CRS recognizes TSAS 3.5.1.d Action a (24 hour LCO) was applicable for the time 22 Accumulator gas pressure was &lt;595.5.</p>		
<p><b>Evaluator's Note:</b> During downpower, the crew may collect penalty deviation minutes for AFD being outside the target band.</p>			
	<p>Crew records AFD penalty deviation minutes <u>IF</u> AFD is outside the target band <u>during downpower</u>. [reference TS 3.2.1 surveillance requirement 4.2.1.2]</p>		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
<p><b>Simulator Operator:</b> Enter <b>RT-3</b> on direction from Lead Evaluator.</p> <p><b>MALF: CN0086B, Loss of 22 Main Condenser Vacuum</b>                      Initial Value: 5                      Final Value: 8                      Ramp: 00:10:00</p> <p>Depending on the pace of the crew, you may have to <b>MODIFY</b> the final value to slow the rate of rise of backpressure to allow for a load reduction.</p> <p>Trend backpressure to monitor rate of raise and any necessary adjustments to MALF CN0086B.</p>			
	PO reports rising condenser backpressure.		
	<b>CRS enters S2.OP-AB.COND-0001, Loss of Condenser Vacuum.</b>		
	CRS assigns responsibility for CAS.		
	CRS sends operators to perform local vacuum checks IAW Attachment 2.		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
<p><b>Role Play:</b> IF required, call back in 5-10 minutes that <i>you've completed the local vacuum checks IAW Attach 2 and all checks are Sat.</i></p>			
	<p>PO reports NO abnormal vacuum pump indications.</p>		
	<p>PO reports normal CW system operation.</p>		
<p><b>Simulator Operator: IMMEDIATELY</b> after the crew starts all available vacuum pumps; <b>MODIFY CN0086B</b> as follows:</p> <p><b>Start = 11</b>  <b>Final = 13</b>  <b>Ramp = 00:10:00 mins</b></p> <p>Depending on when the crew recognizes the rising backpressure, Simulator Operator may have to make several adjustments to achieve a rate of rise that's not too fast or too slow.</p> <p>When vacuum pumps are started, back pressure will recover quickly. Modifying malfunction promptly will ensure that backpressure will continue to rise and ensure crew commences a power reduction to stabilize backpressure.</p>			
<p><b>Start All Vacuum Pumps:</b></p>			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	PO starts all available vacuum pumps, manually opens AR25 valves as required, and reports condenser vacuum stabilizes then continues to degrade.		
<b>Role Play:</b> IF directed to locally check parameters for 25 Vacuum pump, THEN state as necessary: <ul style="list-style-type: none"> <li>◆ Seal water pressure is 15 psig</li> <li>◆ Suction pressure is 29.0" Hg.</li> </ul>			
<b>Load Reduction to stabilize backpressure:</b>	PO reports the Turbine is latched.		
	<b>CRS enters S2.OP-AB.LOAD-0001, Rapid Load Reduction.</b>		
	CRS directs performance of AB.LOAD-0001 CAS.		
	CRS directs a load reduction in an attempt to stabilize condenser backpressure IAW S2.OP-AB.LOAD-0001.		
RO calculates required boron addition required for downpower.			
CRS verifies boron addition calculation.			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	RO commences boration.		
	PO initiates a load reduction at rate specified by the CRS.		
<b>Evaluator's Note:</b> OHA G-3 CNDSR VAC LO and console alarm come in $\approx$ 5" Hg Abs.			
Proceed to next action to delete backpressure <b>MALF when power reduction has commenced</b> or by direction from Lead Evaluator.			
<b>Field report of missing tube plug and backpressure recovery:</b>			
<b>Simulator Operator: DELETE MALF CN0086B</b> and verify that backpressure is recovering.			
<b>Role Play:</b> After malfunction is deleted report <i>as one of the operators cleaning 21A CW waterbox that you heard a loud sucking noise and noticed a missing tube plug in the inlet waterbox. You found the missing plug and have reinserted the plug back into the tube.</i>			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
<p>Proceed to next event at Lead Evaluators direction after evaluating load reduction activities <u>AND</u> backpressure is recovering.</p> <p><b>5. Two Control Rods drop, failure of rod speed controller, and 2CV175 fails to open:</b></p>	PO reports that condenser backpressure is recovering		
	RO energizes all PZR heaters.		
	PO monitors condensate pump suction temperature.		
	RO announces and inserts control rods to maintain Tavg within prescribed band.		
	<p><b>Simulator Operator:</b> Insert <u>RT-4</u> at Lead Evaluator's direction.</p> <p><b>MALF RD050113 Control Rod Position Fails, Final = 0</b></p> <p><b>MALF RD050122 Control Rod Position Fails, Final = 0</b></p> <p><b>MALF RD0061 Rod Speed Controller Program Fails, Final = 8</b></p> <p><b>MALF VL0095 2CV175 fails to position, Final = 0</b></p>		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
<p>6. ATWT</p> <p>Rod speed controller fails at 8 spm in Auto:</p>	<p>RO reports that two (2) control rods fully inserted and a demand for Reactor Trip is present.</p>		
	<p>RO reports that the reactor failed to auto trip and ATWT has occurred.</p>		
	<p>RO reports Rx trip handles <b>did not trip</b> the Rx and crew recognizes an ATWT has occurred.</p>		
	<p>RO reports RTBs will not open.</p>		
	<p>RO reports PZR heater bus breakers will not open.</p>		
	<p>RO trips the Main Turbine.</p>		
	<p>RO reports rod speed only at 8 spm with rods in Auto.</p>		
<p><b>Critical Task #1 (CT-52):</b> Insert negative reactivity into to the core by at least one of the following methods prior to dispatching operators to locally trip the reactor and/or the turbine:</p> <ul style="list-style-type: none"> <li>• De-energize RDMG sets</li> </ul>			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
<ul style="list-style-type: none"> <li>• Insert control rods</li> <li>• Establish Emergency Boration flow to the RCS</li> </ul> <p>SAT _____ UNSAT _____</p>			
<p><b>Operator manually inserts rods:</b></p>			
	<p><b>RO inserts rods in Manual at 48 spm [Critical Task#1]</b></p>		
	<p>RO reports immediate actions of EOP-TRIP-1 are complete.</p>		
	<p>CRS/RO verify the Rx will NOT trip and control rods are being inserted in Manual.</p>		
	<p><b>CRS enters EOP-FRSM-1, Response to Nuclear Power Generation.</b></p>		
	<p>PO starts 21 and 22 AFW pumps.</p>		
	<p>PO reports total AFW flow.</p>		
<p>RO/PO starts 22 Charging pump (21 CV pump is C/T).</p>			
<p>PO reports SI has not actuated.</p>			
<p><b>Rapid Boration:</b></p> <p>PO starts both boric acid pumps in fast speed. (21 BAT pump C/T)</p>			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
<b>2CV175 Rapid Boration Valve fails to open:</b>	PO reports 22 BAT pump is running.		
	PO reports 2CV175 Rapid Borate Stop Valve failed to open.		
	PO reports NO flow is indicated on Rapid Borate flowmeter.		
<b>Rapid Boration using RWST flow path:</b>	<b>PO isolates letdown by closing: 2CV3, 2CV4, 2CV5; 2CV2 and 2CV277; and 2CV7.</b>		
	<b>PO opens 2SJ1 and 2SJ2; and 2SJ4, 2SJ5, 2SJ12, and 2SJ13.</b>		
	<b>PO closes 2CV40 and 2CV41; and 2CV68 and 2CV69.</b>		
	<b>[Rapid Boration is considered complete when all of the above <u>bolded</u> steps are completed correctly]</b>		
<b>Open the RTBs when Rapid Boration has been established or by direction from Lead Evaluator:</b>			
<b>Locally Open Rx Trip breakers:</b>			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
<b>Simulator Operator:</b> Open the RTBs after rapid boration has been established. Use <b>RT-10</b> to open the RTBs and <b>RT-11</b> to open the MG set breakers as directed by the CRS.			
	RO reports PZR pressure is less than 2335 psig.		
	RO reports both PZR PORVs are closed and Block valves open.		
	RO reports 2VC5 and 2VC6 are closed.		
	RO reports RTBs and Rod Drive MG set breakers are open.		
	PO reports all turbine stop valves are closed.		
	RO reports PRNIs indicate < 5%.		
	RO reports IRNI SUR is negative.		
	<b>CRS GOES TO Step 20.</b>		
	CRS directs chemistry to sample the RCS for boron.		
	CRS directs performance of SDM.		

Step 20 begins here:

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	<b>CRS returns to procedure in effect, EOP-TRIP-1.</b>		
	RO performs/verifies immediate actions of EOP-TRIP-1.		
	CRS verifies TRIP-1 immediate actions are complete.		
	RO reports SI is not actuated and not required by 2RP4 or First Out OHA.		
	<b>CRS transitions to EOP-TRIP-2, Reactor Trip Response.</b>		
	RO makes page announcement		
	PO reports total AFW is > 22 E4 lbm/hr and stops both SGFPs.		
	PO lowers 23 AFW speed demand to minimum speed.		
	RO reports all RCPs are running		
	RO reports Tavg is stable or trending to 547 F.		
	RO reports both RTBs are open.		
	RO reports all rods have inserted.		
Proceed to the next event when the crew has stabilized the plant in			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
TRIP-2 or by direction from Lead Evaluators.			
<b>PZR PORV 2PR1 fails open:</b>			
<b>Simulator Operator:</b> Insert <b>RT-5</b> prior to crew performs MCA for checking PZR Pressure Status or by direction from Lead Evaluator.  <b>MALF: VL0297 2PR1 fails to position (0-100%)</b> <b>Final Value: 100</b>			
	RO reports PZR level is > 17%.		
	RO reports charging flow is established.		
	RO maintains charging flow to maintain PZR level at 22%.		
	RO reports no Fire on unit 1.		
	RO reports letdown is not in service.		
	RO reports PZR pressure is > 1765 psig.		
	<b>RO reports unexpected OHA for 2PR1/2 NOT CLSD.</b>		
	RO reports PZR pressure is not stable or trending to 2235 psig.		
	RO reports PZR pressure is not > 2235 psig.		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
<p>Operator recognizes failed open PZR PORV:</p>			
<p><b>Evaluator's Note:</b> The crew may enter S2.OP-AB.PZR-0001 for guidance on isolating 2PR1 or take the action of EOP-TRIP-2 Step 9, PZR PRESSURE STATUS.</p>	<p>RO reports PZR pressure lowering, and identifies 2PR1 failed open.</p>		
	<p>RO reports 2PR1 will NOT close in manual.</p>		
<p><b>Critical Task #2 (CT-10):</b> Close the block valve upstream of the stuck open PZR PORV by the completion of Step 9 of EOP-TRIP-2.</p> <p>SAT _____ UNSAT _____</p>			
<p>Terminate scenario after 2PR6 is closed or at the Lead Evaluator's direction.</p>	<p>RO closes PORV Block valve 2PR6. [Critical Task #2]</p>		

## 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-SO.RCS-0001, Rod Control System Operation
- G. S2.OP-SO.TRB-0001, Turbine-Generator Startup Operations
- H. S2.OP-AB.COND-0001, Loss of Condenser Vacuum
- I. S2.OP-AB.LOAD-0001, Rapid Load Reduction
- J. S2.OP-AB.PZR-0001, Pressurizer Pressure Malfunction
- K. 2-EOP-TRIP-1, Reactor Trip or Safety Injection
- L. 2-EOP-FRSM-1, Response to Nuclear Power Generation.
- M. 2-EOP-TRIP-2, Reactor Trip Response

**ATTACHMENT 1  
UNIT TWO PLANT STATUS  
TODAY**

MODE: 1 POWER: 89.5% RCS BORON: 725 MWe 1060

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

NA

REACTIVITY PARAMETERS

- Control Rods in Auto with D bank at 180 steps.
- Reactor Engineering directs crew to use control rods and turbine load control to raise power.

MOST LIMITING LCO AND DATE/TIME OF EXPIRATION:

- 3.5.2.a action a, 21 Charging pump, 68 hours remain

EVOLUTIONS/PROCEDURES/SURVEILLANCES IN PROGRESS:

- Main Turbine valve testing was completed last shift.
- Crew to commence power ascension to 100% at 10% per hour IAW S2.OP-IO.ZZ-0004 using control rods and turbine load control. The crew is at step 4.1.25, calorimetric was performed last shift and MSR's are in Auto.
- Shift Manager directs power to be raised 1% every 6 minutes at 1%/min ramp rate to comply with 10%/hr ascension.

ABNORMAL PLANT CONFIGURATIONS:

▪

CONTROL ROOM:

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

PRIMARY:

- 21 Charging pump C/T for oil cooler cleaning
- 21 BAT pump C/T for pump seal replacement

SECONDARY:

- 22 Vacuum pump C/T for pump replacement
- Blowdown is service at 35K per loop to 23 condenser / Flashtank
- Polisher in service

RADWASTE:

No discharges in progress

CIRCULATING WATER/SERVICE WATER:

- 21A CW C/T for waterbox cleaning

**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. ECG paperwork is marked "For Training Use Only".

**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:** 17-01 NRC-3

**REVIEWER:**

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**

Scenario No.: **3 (ESG-3)**

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

<p><b>Initial Conditions:</b> IC-258: 89.5% power, MOL; 23 Charging Pump is in service. The following equipment is out of service: 21 Charging pump C/T for oil cooler cleaning, 21A CW pump is C/T for waterbox cleaning, 21 BAT pump C/T for pump seal replacement, 22 vacuum pump C/T for pump replacement.</p> <p><b>Turnover:</b> Main turbine valve testing was completed last shift. Calorimetric was performed SAT and MSR's are in Auto. The crew is directed to continue power ascension to 100% power at 10% per hour IAW S2.OP-IO.ZZ-0004 using control rods and turbine load control.</p> <p><b>Critical Tasks:</b></p> <ol style="list-style-type: none"> <li>1. Insert negative reactivity into the core (see WOG CT-52)</li> <li>2. Close PZR PORV Block valve (see WOG CT-10)</li> </ol>			
Event No.	Malf. No.	Event Type*	Event Description
1	N/A	ALL (R)	Power ascension to 100% at 10% per hour
2	VC0311A	SRO (TS)	Containment Pressure Channel fails high (TS only)
3	SJ0180B	RO (I) SRO (I,TS)	22 SI Accumulator gas leak (TS exercised)
4	CN0086B	ALL (C)	<ul style="list-style-type: none"> <li>Loss of Main Condenser vacuum due to loose tube plug.</li> <li>Unit power reduction to stabilize condenser vacuum</li> </ul>
5	RD050113 RD050122 RP0058 RP0059A RP0059B RP0060A RP0060B	ALL (M)	<ul style="list-style-type: none"> <li>Two dropped control rods requiring manual reactor trip.</li> <li>ATWT event.</li> </ul>
6	RD0061	RO (I) SRO (I)	Rod Control speed controller fails at 8 spm in Auto. Operator can insert rods in Manual at 48 spm.
7	VL0095	PO (I) SRO (I)	2CV175 Rapid Boration valve fails to open in EOP-FRSM-1. Rapid borate via the RWST.
8	VL0297	RO (I) SRO (I)	2PR1 PZR PORV fails open during EOP-TRIP-2. Operators can manually close PZR block valve.
		ABs	AB.COND-1 → AB.LOAD-1
		EOPs	TRIP-1 → FRSM-1 → TRIP-1 → TRIP-2
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Notes: None

**ATTACHMENT 4**  
**SIMULATOR SCENARIO REVIEW CHECKLIST**

Scenario No.: 3 (ESG-3)

Target Quantitative Attributes per Scenario (See Section D.5.d)	Actual Attributes	Event No.
1. Total malfunctions (5-8)	6	-
2. Malfunctions after EOP entry (1-2)	3	6,7,8
3. Abnormal events (2-4)	2	3,4
4. Major transients (1-2)	1	5
5. EOPs entered/requiring substantive actions (1-2)	1	FRSM-1
6. Entry into a contingency EOP with substantive actions (≥ 1 per scenario set)	1	FRSM-1
7. Preidentified critical tasks (≥2)	2	CT-52, CT-10
8. Tech Specs exercised (≥ 2)	2	2,3

ATTACHMENT 5  
ESG CRITICAL TASKS

17-01 NRC-3

**CT-1 (CT-52):**

**Critical Task:** Insert negative reactivity into to the core by at least one of the following methods prior to dispatching operators to locally trip the reactor and/turbine:

- De-energize RDMG sets
- Insert control rods
- Establish Emergency Boration flow to the RCS

**Basis:** See WOG Rev. 2.

**CT-2 (CT-10):**

**Critical Task:** Close the block valve upstream stuck open PZR PORV by the completion of Step 9 of TRIP-2.

**Basis:** See WOG Rev. 2.

**ATTACHMENT 6**

**ESG-PSA RELATIONSHIP EVALUATION**

**EVENTS LEADING TO CORE DAMAGE**

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

**COMPONENT/TRAIN/SYSTEM UNAVAILABILITY THAT INCREASES CORE DAMAGE FREQUENCY**

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

**OPERATOR ACTIONS IMPORTANT IN PREVENTING CORE DAMAGE**

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