

**SIMULATOR
EXAMINATION SCENARIO GUIDE**

SCENARIO TITLE: SGTR w/complications during depressurization

SCENARIO NUMBER: 08-01 NRC Retake ESG-1 (0913)

REVISION NUMBER: 1

EFFECTIVE DATE: Effective on final approval date below

EXPECTED DURATION: 80 minutes

PROGRAM:

L.O. REQUAL

INITIAL LICENSE

STA

OTHER

REVISION SUMMARY:

New issue for 2009 Annual Exam

Rev. 1 7-27-10- Swapped Tavg channel failure to PRNI channel failure. Changed SGFP trip to SGFP malfunction which causes power reduction to be required. Removed 2R19D failure. Added SG NR level channel failure for second Tech Spec call. Added 2A 4KV Vital bus loading on EDG after Rx trip, and 21 AFW pp fails to start. Added 23 AFW pump trips on start. Extended scenario to SI termination and added CT for SI termination.

PREPARED BY: G Gauding 07-27-2010
Lead Regulatory Exam Author Date

APPROVED BY: *Marshall* 8/23/10
Salem Operations Training Date

APPROVED BY: *E. Powell* 8/26/10
Facility Representative Date

I. OBJECTIVES:

- A. Given the unit at power with a failure of a power range nuclear instrument which causes continuous rod motion, take corrective action IAW AB.ROD-0003
- B. Given the order or indications of a rod or rod control system malfunction, perform actions as the nuclear control operator to RESPOND to the malfunction in accordance with the approved station procedures.
- C. Given indication of a rod or rod control system malfunction, DIRECT the response to the malfunction in accordance with the approved station procedures.
- D. Given the order to rapidly reduce load, perform actions as the nuclear control operator to RESPOND to the malfunction in accordance with the approved station procedures
- E. Given indication or order to rapidly reduce load, DIRECT the response to the malfunction, in accordance with the approved 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 safety injection, perform actions as the nuclear control operator to RESPOND to the safety injection in accordance with the approved station procedures.
- I. Given indication of a safety injection, DIRECT the response to the safety injection in accordance with the approved station procedures.
- J. 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.
- K. Given indication of a steam generator tube rupture (SGTR), DIRECT the response to the SGTR in accordance with the approved station procedures.

II. MAJOR EVENTS:

- A. Channel II (N42) PRNI fails high.
- B. 22 SG Channel I Level fails low.
- C. 21 SGFP oil leak requiring power reduction.
- D. 22 SG SGTR.
- E. Loss of RCS Spray capability while performing RCS pressure reduction.
- F. PZR PORV sticks open during RCS depressurization.

III. SCENARIO SUMMARY:

- A. The crew will take turnover with the unit at 100% power, EOL, equilibrium conditions. 2B DG is C/T for governor repairs. 21 SGFP governor has a small oil leak that will be repaired when the unit enters its refueling outage in 3 days. Unit 1 and Hope Creek are at 100% power. Unit 3 is available.
- B. Shortly after the crew takes the watch, Power Range Nuclear Instrument Channel II (N42) fails high resulting in inward rod motion and various alarms. The crew verifies no runback in progress, takes manual control of rods, implements S2.OP-AB.ROD-3, Continuous Rod Motion and S2.OP-AB.NIS-1, Nuclear Instrumentation System Malfunction, and removes the channel from service. The CRS will identify the appropriate Tech Specs.
- C. Once control room actions have been performed to remove PRNI Channel II from service, 22 SG NR Level Channel 1 fails low. The crew will verify that ADFWCS has automatically removed the failed channel from control, and the CRS will identify the appropriate Tech Specs.
- D. A report from the field will come into the control room stating that the governor oil leak on 21 SGFP has gotten worse, and appears it will require shutdown to repair. The crew will initiate a power reduction in preparation for removing SGFP from service.
- E. During the power reduction, a SGTR will ramp in over 10 minutes on 22 SG. The crew should identify the loss of RCS inventory and initiate a manual Reactor Trip and SI.
- F. After the reactor trips, 2H 4KV group bus will de-energize (causes a loss of 21 RCP). 2A 4KV vital bus will also de-energize, and be re-energized from 2A EDG automatically when 2A SEC loads the bus in Mode 1. 21 AFW pump will not start and must be manually started. 23 AFW pump trips during its start.
- G. The crew will cooldown to target temperature in SGTR-1. When performing the RCS depressurization with normal spray, 23 RCP will trip, resulting in no spray flow. The crew will then use a PZR PORV to depressurize. The PORV will stick open when the depressurization is attempted to be terminated, and the crew will isolate the PORV with its block valve.
- H. The scenario may be terminated once the depressurization is terminated by closing the stuck open PZR PORV block valve.

IV. INITIAL CONDITIONS:

_____ Initialize simulator to IC-258, 100%, EOL, C_B 24 ppm

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

Initial	Description
	RH1 and RH2 C/T
	21/22 RH18 C/T
	2VC1 & 2VC4 C/T
	RCPs (SELF CHECK)
	RTBs (SELF CHECK)
	MS167s (SELF CHECK)
	500 KV SWYD (SELF CHECK)
	SGFPs (SELF CHECK)
	23 CV Pump (SELF CHECK)
	2B DG (C/T)
	Complete Attachment 2 "Simulator Ready-for-Training/Examination Checklist."

EVENT TRIGGERS:

Initial	ET #	Description
___ 1	1	MONP254<10 Control Bank C position < 10 steps withdrawn

MALFUNCTION SUMMARY:

Initial	Description	Delay	Ramp	Remote/Event	Init Val	Final Val
___ 1.	NI0193B , PR CH N42 fails HI/LOW	NA	NA	RT-1	N/A	200
___ 2.	SG0095B , 22 SG Lvl Xmtr (529) CH I fails	NA	NA	RT-2	44	0
___ 3.	SG0078B , 22 SG Tube Rupture	NA	10 min	RT-3	0	900
___ 4.	RP318E1 , Aux Feed Pump 21 Fails to start on SEC	NA	NA	NA	True	True
___ 5.	RC0003C , 23 RCP electrically trip	NA	NA	RT-5	False	True
___ 6.	VL0297 , 2PR1 fails to position (0-100%)	NA	NA	RT-7	0	100
___ 7.	VL0298 , 2PR2 fails to position (0-100%)	NA	NA	RT-8	0	100
___ 8.	EL0140 , 2H 4kV Group Bus de-energized	30 sec	NA	ET-1	False	True
___ 9.	AF0183 , 23 AFW pump overspeed trip	60 sec	NA	ET-1	False	True

REMOTE/FIELD FUNCTION SUMMARY:

Initial	Description	Delay	Ramp	Remote/Event	Init Val	Final Val
___ 1.	DG19D , 2B DG Locked Out	N/A	NA	NA	Yes	Yes
___ 2.	DG20D , 2B DG Brkr Control Pwr	N/A	NA	NA	Off	Off
___ 3.	DG21D , 2B DG Brkr Racked Out	N/A	NA	NA	Tagged	Tagged

I/O OVERRIDE SUMMARY:

<i>Initial</i>	Description	Delay	Ramp	Remote/Event	Init Val	Final Val
	C801, 23ASD 2A Vital Bus Feeder-OPEN	30 sec	NA	ET-1	Off	On
	C804, 24ASD 2A Vital Bus Feeder-OPEN	30 sec	NA	ET-1	Off	On

OTHER CONDITIONS:

<i>SELF-CHECK</i>	Description
_____ 1.	None

V. SEQUENCE OF EVENTS:

- State shift job assignments
- Conduct a shift briefing detailing instructions to the shift. Provide CREW members with a copy of the shift turnover sheet.
- Inform the CREW: “The simulator is running. You may commence panel walk-downs at this time. CRS please inform me when your CREW is prepared to assume the watch.”
- Allow sufficient time for panel walk-down. When informed by the CRS the CREW is prepared to assume the watch, ensure the simulator is cleared of all unauthorized personnel.

Evaluator/Instructor Activity	Expected Plant/Candidate Response	Comments
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1. Channel II (N42) Power Range NI N42 fails High

Simulator Operator: Insert **RT-1** at Lead Evaluators direction.
Malf: NI0193B, PR CH N42 fails HI/LOW
Final Value: 120

- RO announces unexpected inward rod movement at 72 spm, verifies no load reject in progress, and with CRS concurrence places rod control in Manual.

- CRS enters S2.OP-AB.NIS-0001 Nuclear Instrumentation System Malfunction based on identification of failed NIS channel, **OR** S2.OP-AB.ROD-0003, Continuous Rod Motion.

Note: AB.ROD-3 steps start here

- CRS verifies Rod Control in manual and rod motion stopped.
- RO announces OHA E-28 PZR HTR ON PRESS LO as expected if inward rod motion causes pressure to lower sufficiently.

Note: Outward rod motion is blocked by the Overpower Rod Block.

- RO monitors and controls Tavg IAW Att. 1.
- CRS verifies rod motion was in the inward direction.
- RO verifies NIS channel N42 has failed high.

Note: AB.NIS-1 steps start here.

- CRS enters S2.OP-AB.NIS-1.
- CRS determines Rod Control in manual and rod motion stopped.
- CRS determines no load change is in progress.

Evaluator/Instructor Activity	Expected Plant/Candidate Response	Comments
	<ul style="list-style-type: none"> • RO reports Power Range Channel II N42 has failed high. • CRS directs PO to remove failed channel from service IAW S2.OP-SO.RPS-1. • PO informs crew prior to taking any action that will cause alarm status change • PO ensures 2NR45 pen 1 recorder is not selected to 2N42. • CRS enters TSAS 3.3.1.1 Actions 2 and 6. • PO places Detector Current Comparator, Upper Section, switch in PRN42 and ensures the Channel Defeat light illuminates and OHA E-38 is clear. • PO places Detector Current Comparator, Lower Section, switch in PRN42 position and verifies Channel Defeat light illuminates and OHA E-46 is clear • PO places Power Mismatch Bypass switch in Bypass PRN42. • PO places Rod Stop Bypass switch in Bypass PRN42 and ensures the overpower rod stop for channel II on 2RP4 is illuminated and OHA E-31 is clear. • PO places Comparator Channel Defeat switch in N42 and ensures the Comparator Defeat lamp illuminates and OHA E-39 is clear. • PO reports to CRS that SO.RPS-001 is complete with the exception of actions required to be taken by I&C technician to trip the associated bistables. 	

Evaluator/Instructor Activity	Expected Plant/Candidate Response	Comments
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Note: CRS may elect to leave rods in manual due to step 3.6 of AB.NIS not being complete until I&C trips bistables. Continue to next event if this is the case.

Proceed to next event on direction from Lead Evaluator.

- CRS directs RO to withdraw control rods to restore Tavg to within +/- 1.5 degrees of Tref.
- RO withdraws control bank D rods in a slow and deliberate manner, and places rod control in Auto when Tavg is within +/- 1.5 degrees of Tref.

2. 22 SG NR level Channel I fails low

Simulator Operator: Insert **RT-2** when rods have been restored to ARO or on direction from Lead Evaluator.

MALF: SG0095B, 22 SG Lvl Xmtr (529) CH I fails
Final Value: 0

- PO reports unexpected OHA G-15 ADFCS Trouble, and 22 SG Console Protection Level Lo-Lo.
- PO reports 22 SG NR level channel I has failed low.
- Crew refers to ARP and determines ADFWCS Median Signal Select automatically removes the failed channel from any control function based on comparison with remaining two channels.
- PO verifies SG level being controlled.
- CRS contacts Maintenance Controls to remove inoperable channel from service.
- CRS enters TSAS 3.3.1.1 Action 6, and 3.3.2.1 Action 19, both of which are 6 hours to restore channel or place in tripped condition.

Proceed to next event on direction from Lead Evaluator.

Evaluator/Instructor Activity	Expected Plant/Candidate Response	Comments
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3. SGFP oil leak/power reduction

Simulator Operator: On direction from the Lead Evaluator, call the control room as Secondary NEO and report that the oil leak on 21 SGFP governor appears to have gotten worse, it is now 1 drop per second. The Maintenance Supervisor at the SGFP recommends removing the SGFP from service within the next 30 minutes. Inform the control room that you can still easily refill the reservoir when needed to maintain reservoir level with the oil that is staged at the feed pump.

Note: IF the CRS decides to trip 21 SGFP instead of reducing power, and allowing the automatic Main Turbine runback to occur, THEN the following steps of S2.OP-AB.CN-0001, Main Feedwater/Condensate System Abnormality will be performed. Otherwise go to steps for the power reduction on next page.

- CRS briefs crew on power reduction to remove 21 SGFP from service.
- CRS briefs crew on actions which will be performed when 21 SGFP is manually tripped. (AB.CN steps)
- CRS enters S2.OP-AB.CN-0001.
- PO trips 21 SGFP, and verifies Main Turbine automatic runback is initiated.
- RO either verifies control rods automatically inserting or inserts control rods in manual to control Tav_g.

Evaluator/Instructor Activity	Expected Plant/Candidate Response	Comments
	<ul style="list-style-type: none"> • RO initiates a boration to maintain control rods above the RIL and restore AFD. • PO verifies 22 SGFP rises to maintain adequate SG feed flow. • PO ensures open 21-23CN108's, polisher Bypass Valves. • PO ensures 2CN47, 23/24/25 Heater Strings Bypass valve is open, and closes 21-24GB4 and 21-24GB185s. • PO verifies AFP Auto Armed bezel illuminated for 21 SGFP. • PO monitors SG NR level to ensure it is trending to program. • RO maintains Tavg on program with boration and rod control. • RO energizes PZR heaters. 	<p>(AB.CN steps cont)</p> <p>(End AB.CN steps)</p>
<p>Note: Section 5.7 of S2.OP-SO.CN-2, Steam Generator Feed Pump Operation, is used for removing a SGFP from service at power, and requires total Feed Flow to be less than 9.0 E4 lbm/hr.</p>	<ul style="list-style-type: none"> • CRS enters S2.OP-AB.LOAD-1, Rapid Load Reduction to perform the power reduction. • CRS directs monitoring of CAS of AB.LOAD-1. 	<p>(Power reduction steps start here)</p>
<p>Note: 100% power feed flow is ~15 E6 lbm/hr. A power reduction to ~ 60% will be required.</p>	<ul style="list-style-type: none"> • CRS directs RO and PO to perform a load reduction at less than 5% per minute to reduce total feedwater flow to $\leq 9.0 E6$ lbm/hr. • CRS directs RO to maintain Tavg on program during the downpower using boration and rod control. 	

Evaluator/Instructor Activity	Expected Plant/Candidate Response	Comments
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- RO energizes all PZR heaters.
- RO calculates boron addition required for downpower and initiates boration.
- PO initiates turbine load reduction at rate directed by CRS
- RO either ensures automatic rod control is maintaining RCS Tav_g on program, or inserts rods in manual.

Continue to next event on direction of Lead Evaluator after sufficient power reduction observation has been performed.

Evaluator/Instructor Activity	Expected Plant/Candidate Response	Comments
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4. SGTR

Simulator Operator: Insert **RT-3** on direction from Lead Evaluator

MALF: SG0078B, 22 SGTR

Final Value: 900

Ramp: 10 minutes

(Note: This equals a 650 gpm tube rupture at 2235 psig RCS pressure.)

- RO announces OHA A-6, RMS HI RAD OR TRBL as unexpected.

- CREW reports 2R53B, 22 SG N16 Main Steamline radiation monitor in alarm, followed by 2R15, Condenser Air Ejector radiation monitor.

- RO identifies lowering RCS pressure and PZR level.

- CRS enters S2.OP-AB.SG-1, Steam Generator Tube Leak.

- CRS directs the load reduction be placed on hold.

- CRS directs implementation of S2.OP-AB.SG-1 Continuous Action Summary.

- RO reports charging flow is rising, and PZR level is lowering.

Note: The decision on when to trip the Rx will determine how much of this step is actually performed.

- RO transfers to a centrifugal charging pump by:
 - Ensuring Master Flow Control in Auto
 - Closing 2CV55
 - Starting 21 or 22 CVCS pp
 - Adjusting 2CV55 while lowering 23 CVCS pp speed to minimum
 - Stopping 23 CVCS pp
 - Adjusting 2CV55 to control PZR lvl
 - Placing 2CV55 in auto when required

Evaluator/Instructor Activity	Expected Plant/Candidate Response	Comments
	<ul style="list-style-type: none"> When the crew determines that the leak is greater than the capacity of the CVCS makeup system, the CRS will direct the RO to manually trip the Reactor and initiate Safety Injection IAW CAS of AB.SG-1. 	
<p>Simulator Operator: Ensure ET-1 is true 30 seconds after the Rx trip. This will cause 2A 4KV vital bus to load on its 2A EDG, and deenergize 2H 4KV group bus, which will trip 21 RCP.</p> <p>I/Os: C801, 23ASD 2A Vital Bus Feeder-OPEN C801 24CSD 2A Vital Bus Feeder-OPEN</p> <p>Malf: EL0140, 2H 4kV Group Bus de-energized Final Value = True Delay 30 sec.</p>	<ul style="list-style-type: none"> RO manually trips Reactor, confirms Reactor Trip, and manually initiates Safety Injection. 	
<p>Simulator Operator: Record time of Rx trip for CT#4 evaluation. : : Record the time AFW flow is initiated to the SGs for CT#1 evaluation : : : :</p>	<ul style="list-style-type: none"> RO performs Immediate Actions's of EOP-TRIP-1. <ul style="list-style-type: none"> - Verifies reactor trip - Verifies reactor trip confirmation. - Trips Turbine. - Verifies one 4kV Vital Bus energized - Verifies SI initiation 	
<p>Note: The STA will arrive in the control room 10 minutes after the Rx trip announcement is made.</p>	<ul style="list-style-type: none"> PO recommends isolation of AFW to 22 SG based on TRIP-1 CAS. PO requests permission to throttle AFW flow to no less than 22E4 lbm/hr. 	

Evaluator/Instructor Activity	Expected Plant/Candidate Response	Comments
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CT#1 (FSAR)(E-3-B) Isolate AFW to the ruptured SG within 10 minutes of entry into TRIP-1 and subsequently close 22MS167, 22MS18, 22MS7 and 22GB4 in SGTR-1.

____:____:____ AFW flow isolated

SAT _____ UNSAT _____

- PO reports only 22 AFW pump is in service, and AFW flow is being provided to 21 SG.
- PO reports 23 AFW pump trip.
- CRS orders 22AF11 and 22AF21 closed.
- PO closes 22AF11 and 22AF21.

- RO identifies SEC loading is not complete for 2A vital bus, and that 21 AFW pump did not start.

5. 21 AFW pp fails to start on SEC actuation.

- RO blocks and resets 2A SEC. 21 AFW pump starts due to the standing SG lo-lo level signal.
- PO verifies 21 & 22 AFW Pumps running.
- CREW verifies safeguards equipment alignment.
- RO ensures 21 and 22 CA330's are shut.
- RO reports containment pressure has remained < 15 psig.
- PO reports no indication of high steam flow requiring MSLI.

Evaluator/Instructor Activity	Expected Plant/Candidate Response	Comments
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Note: ECG call here would be Alert under 3.2.3.a

- CRS directs SM to implement the ECG.
- PO verifies all Vital Buses are energized.
- RO verifies control room ventilation in accident-pressurized mode, and ensures 2 switchgear room supply fans and one switchgear room exhaust fan are in service.
- RO reports 1 CCW pumps running.
- CRS dispatches operator to shut 2CC37 and 2CC48.
- RO reports RHR is not aligned for Cold Leg Recirc.
- RO reports charging flow is > 100 gpm on SI systems charging flowmeter.
- RO reports RCS pressure and SI pump injection status.
- PO reports total AFW flow is >22E4 lbm/hr OR one SG is >9% NR level, then maintains intact SG NR levels 9-33%.
- RO verifies RCS Tavg trending to 547°F with RCPs running.
- RO verifies reactor trip breakers open.
- RO verifies PZR PORVs closed and associated PORV Stop Valves open.
- RO verifies PZR Spray Valves closed and informs crew 21 RCP is tripped due to loss of H 4KV Group Bus.

Evaluator/Instructor Activity	Expected Plant/Candidate Response	Comments
	<ul style="list-style-type: none"> • RO reports RCS pressure >1350 psig. • RO maintains seal injection flow to all RCPs. • PO reports no SG pressure is dropping or completely depressurized. • CRS directs transition to EOP-SGTR-1 based on uncontrolled rise in NR or WR level on 22 SG. 	
<p>Note: The STA will arrive in the control room 10 minutes after the Rx trip announcement is made</p>	<ul style="list-style-type: none"> • CREW initiates monitoring of CFSTs. • PO reports 22 SG NR or WR level is rising in an uncontrolled manner. • PO sets 22MS10 to 1045 psig, and reports when it opens automatically as the SG pressurizes. 	
<p>See Critical Task #1 to document completion.</p>	<ul style="list-style-type: none"> • PO shuts 22MS167, and verifies 22MS18, 22MS7, and 22GB4 are shut. • CRS verifies 22MS167, 22MS18, and 22MS7 are shut. • PO reports 22 SG is ruptured. • CRS dispatches operator to shut ruptured SG sample valve 2SS327. • CRS verifies ruptured SG isolated from intact SGs. • PO verifies 22 SG NR level is >9%, and ensures AFW flow isolated to 22 SG. • CRS directs AFW flow to remain isolated to 22 SG. • PO reports when 22MS10 opens. 	

Evaluator/Instructor Activity	Expected Plant/Candidate Response	Comments
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Note: 21 SG NR level will be higher, and will steam less than 23 and 24 SGs due to no RCP running in 21 loop.

- RO reports power is available to both PZR PORV stop valves, both PORVs are shut, and both PZR PORV stop valves are open.
- PO reports no SG pressures are dropping uncontrollably or completely depressurized.
- PO maintains intact SG levels 9 to 33% NR.
- RO resets SI and Phase A isolation.
- RO verifies Phase B isolation reset.
- RO opens 21 and 22 CA330.
- PO resets B and C SECs and resets 230V Control Centers.
- RO reports no RHR injection flow, and stops both RHR Pumps.
- PO verifies ruptured SG is identified, isolated, and >375 psig.
- CRS sends an operator to swap gland sealing steam to alternate source.
- CREW determines RCS target temperature based on ruptured SG pressure is 503 deg.
- PO reports 21, 23, and 24 SGs are available for cooldown.
- PO reports Main Steam Dumps are available.

Evaluator/Instructor Activity	Expected Plant/Candidate Response	Comments
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CT#2 E-3-B 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.

SAT **UNSAT**

Note: PO will be steaming 23 and 24 SGs due to 22 SG being isolated and 21 loop having an idle RCP. AFW flow should be raised to these 2 SGs.

Note: 23 RCP is running. **IF** crew decides normal spray is not available due to 21 RCP not running, then go to next page for PORV failure actions.

- PO initiates cooldown to target temperature by:
 - Placing stm dumps in manual.
 - Adjusting valve demand to 0.
 - Depressing MS Pressure Control.
 - Adjusting valve demand to 25%.
 - Depressing Bypass Tavg at 543 deg.

- PO stops cooldown and maintains temperature <503 degrees by placing steam dumps in auto and verifying they operate to maintain temp < 503 deg.

- RO shuts charging pump mini flows when RCS pressure is < 1500 psig.

- PO reports 22 SG pressure is stable or rising.

- RO reports subcooling >20 deg.

- RO reports normal PZR spray is available.

- Crew reviews depress termination criteria.

- RO fully opens both PZR spray valves.

6. 23 RCP Trip

Simulator Operator: Insert **RT-5** after RO reports pressure is lowering.
MALF: RC0003C, 23 RCP elect trip
Final Value: True

- RO reports spray is lowering pressure.
- RO reports 23 RCP has tripped.
- CRS returns to step 17.2 and answers no,

Evaluator/Instructor Activity	Expected Plant/Candidate Response	Comments
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PZR Spray is not reducing RCS pressure.

- RO shuts both spray valves.
- RO reports both PZR PORVs are available.
- Crew reviews depress termination criteria.
- RO opens only ONE PORV.

Simulator Operator: Insert **RT-7** **OR RT-8** as applicable to fail open the PORV which the RO opens.

RT-7 MALF: VL0297, 2PR1
fails 100% open

RT-8 MALF: VL0298 2PR2
fails 100% open

7. PZR PORV fails open

- When conditions in Table F is met, (RCS pressure < 24 SG pressure and PZR lvl > 11%) RO attempts to shut PORV opened for depressurization, and reports valve will not shut.

CT#3 (E-0-M) Close the block valve upstream of the stuck-open PORV by completion of step 23 of SGTR-1.

SAT **UNSAT**

- RO shuts block valve associated with stuck open PORV to isolate PORV, and reports RCS pressure is rising.

Terminate Scenario after evaluation of CT#3 is complete.

VI. Scenario References:

- A. Emergency Plan (ECG)
- B. Technical Specifications
- C. Alarm Response Procedures (Various)
- D. Salem UFSAR
- E. S2.OP-IO.ZZ-0004, Power Operations
- F. S2.OP-SO.RPS-0001, Nuclear Instrumentation Channel Trip/Restoration
- G. S2.OP-AB.ROD-0003, Continuous Rod Motion
- H. S2.OP-AB.NIS-0001, Nuclear Instrumentation System Malfunction
- I. S2.OP-SO.CN-0002, Steam Generator Feed Pump Operation
- J. S2.OP-AB.CN-0001, Main Feedwater/Condensate System Abnormality
- K. S2.OP-AB.LOAD-0001, Rapid Load Reduction
- L. 2-EOP-TRIP-1, Reactor Trip or Safety Injection
- M. 2-EOP-SGTR-1, Steam Generator Tube Rupture

**ATTACHMENT 1
PLANT STATUS
UNIT TWO
TODAY**

MODE: 1 **POWER:** 100% **RCS BORON** 24 **MWe** 1230

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

MOST LIMITING LCO AND DATE/TIME OF EXPIRATION:

3.8.1.1. Action a - 48 hours from now

REACTIVITY PARAMETERS

Core burnup 12,000 EFPD

EVOLUTIONS/PROCEDURES/SURVEILLANCES IN PROGRESS:

Restore 2B EDG to service later this shift.

ABNORMAL PLANT CONFIGURATIONS:

CONTROL ROOM:

Unit 1 and Hope Creek are at 100% power.

No penalty minutes in last 24 hours.

PRIMARY:

2B EDG C/T for governor repair.

SECONDARY:

21 SGFP has a governor oil leak ~ 1 drop every 5 seconds. Secondary NEO is monitoring 1X/hr, and refilling reservoir as needed. Oil leak is scheduled to be repaired during refueling outage which starts in 3 days. Heating steam is aligned to Unit 1.

U3 is available.

Condensate Polishing is in service- full flow.

RADWASTE: None

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)
- ___ 24. Reference verification performed with required documents available
- ___ 25. Verify phones disconnected from plant after drill.

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**

Note: Attach a separate copy of this form to each scenario reviewed. This form is used as guidance for the examination team as they conduct their review for the proposed scenarios.

SCENARIO IDENTIFIER: 08-01 NRC RETAKE ESG-1 REVIEWER: P. Williams

Qualitative Attributes

- PBW 1. The scenario has clearly stated objectives in the scenario.
- PBW 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.
- PBW 3. The scenario consists mostly of related events.
- PBW 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
- PBW 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.
- PBW 6. The events are valid with regard to physics and thermodynamics.
- PBW 7. Sequencing/timing of events is reasonable, and allows for the examination team to obtain complete evaluation results commensurate with the scenario objectives.
- PBW 8. The simulator modeling is not altered.
- PBW 9. All crew competencies can be evaluated.
- PBW 10. The scenario has been validated.
- PBW 11. ESG-PSA Evaluation Form is completed for the scenario at the applicable facility.

**ATTACHMENT 4 (Cont)
SIMULATOR SCENARIO REVIEW CHECKLIST**

Note: The following criteria list scenario traits that are numerical in nature. This page should be completed for each scenario. The ranges listed for each scenario represents a target and are not absolute limitations. Scenarios that do not fit into the ranges listed should be further evaluated to ensure they are appropriate.

Initials	Qualitative Attributes
GSG	8 Total malfunctions inserted: 5-8
GSG	3 Malfunctions that occur after EOP entry: 1-2
GSG	2 Abnormal Events: 2-3
GSG	1 Major Transients: 1-2
GSG	2 EOPs entered/requiring substantive actions: 1-2
GSG	0 EOP Contingency Procedures requiring substantive actions: 0-2
GSG	3 Critical Tasks: 2-3

COMMENTS:

Malfunctions after EOP entry is 3, and add to the scenario being an effective evaluation tool.

The 4 critical tasks are all associated with the natural progression of a SGTR and allow effective evaluation of the entire SGTR event to its conclusion.

**ATTACHMENT 5
ESG CRITICAL TASKS
08-01 NRC RETAKE ESG-1**

CT #1 (FSAR) Isolate AFW to the ruptured SG within 10 minutes of entry into TRIP-1, and
(E-3-B) subsequently close 22MS167, 22MS18, 22MS7 and 22GB4 in SGTR-1.

BASIS: Salem FSAR Accident Analysis for SGTR, Section 15.4.4.2, Analysis, page 15.4-53, states that the evaluation (Reference 72) with respect to operator action time for a faulted SG is applied to the SGTR action time. FSAR Accident Analysis for SG faults assumes operator action will be taken within 10 minutes of AFW initiation to isolate AFW flow to the faulted SG (15.4.8.2.2, page 15-4.109).

CT #2 (E-3-B) Establish and maintain an RCS temperature so that transition from SGTR-1 does not occur because RCS temperature is either too high to maintain minimum required subcooling or too low such that a challenge to Thermal Shock (FRTS) or Subcriticality (FRSM) CFSTs.

BASIS: Failure to establish and maintain the correct RCS temperature during a SGTR leads to a transition from SGTR-1 to a contingency procedure which constitutes an incorrect performance that necessitates the crew taking compensating action which complicates the event mitigation strategy.

CT#3 (E-0-M) Close the block valve upstream of the stuck-open PORV by completion of step 23 of SGTR-1.

BASIS: Failure to close the block valve under the postulated plant conditions constitutes "mis-operation or incorrect crew performance which leads to degradation of any barrier to fission product release.

ATTACHMENT 6

ESG - PSA RELATIONSHIP EVALUATION

**08-01 NRC RETAKE ESG-1
SALEM ESG - PRA RELATIONSHIPS EVALUATION FORM**

EVENTS LEADING TO CORE DAMAGE

<u>Y/N</u>	<u>EVENT</u>	<u>Y/N</u>	<u>EVENT</u>
<u>N</u>	TRANSIENTS with PCS Unavailable	<u>N</u>	Loss of Service Water
<u>Y</u>	Steam Generator Tube Rupture	<u>N</u>	Loss of CCW
<u>N</u>	Loss of Offsite Power	<u>N</u>	Loss of Control Air
<u>N</u>	Loss of Switchgear and Pen Area Ventilation	<u>N</u>	Station Black Out
<u>N</u>	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>
<u>N</u>	Containment Sump Strainers	<u>N</u>	Gas Turbine
<u>N</u>	SSWS Valves to Turbine Generator Area	<u>Y</u>	Any Diesel Generator
<u>N</u>	RHR Suction Line valves from Hot Leg	<u>Y</u>	Auxiliary Feed Pump
<u>N</u>	CVCS Letdown line Control and Isolation Valves	<u>N</u>	SBO Air Compressor

OPERATOR ACTIONS IMPORTANT IN PREVENTING CORE DAMAGE

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

Complete this evaluation form for each ESG.

**SIMULATOR
EXAMINATION SCENARIO GUIDE**

SCENARIO TITLE: Multiple faulted SGs w/ Cont Spray failure

SCENARIO NUMBER: 08-01 NRC Retake ESG-2

REVISION NUMBER: 0

EFFECTIVE DATE: Effective on final approval date below

EXPECTED DURATION: 60 minutes

PROGRAM: L.O. REQUAL
 INITIAL LICENSE
 STA
 OTHER

New issue for 08-01 NRC Retake exam

PREPARED BY:	<u>G Gauding</u> Lead Regulatory Exam Author	<u>07/28/2010</u> Date
APPROVED BY:	<u><i>Marshall</i></u> Salem Operations Training	<u>8/23/10</u> Date
APPROVED BY:	<u><i>E.P. Powell</i></u> Facility Representative	<u>8/26/10</u> Date

I. OBJECTIVES**ENABLING OBJECTIVES**

- A. Given the unit at 70% reactor power, the crew will perform a power increase to 90% at 10%/hr, IAW S2.OP-IO.ZZ-0004(Q).
- 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 the approved station procedures.
- C. Given indication of a loss or malfunction of the Charging system DIRECT corrective action for a Charging System malfunction in accordance with the approved station procedures.
- D. Given the indication of excessive steam flow, perform actions as the nuclear control operator to RESPOND to excessive flow in accordance with the approved station procedures.
- E. Given the indication of excessive steam flow, DIRECT the response to excessive flow in accordance with the approved 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 safety injection, perform actions as the nuclear control operator to RESPOND to the safety injection in accordance with the approved station procedures.
- I. Given indication of a safety injection, DIRECT the response to the safety injection in accordance with the approved station procedures.
- J. Given the order or indications of a multiple steam generator depressurization, perform actions as the nuclear control operator to RESPOND to the generator depressurization in accordance with the approved station procedures.
- K. Given the order or indications of excessive containment pressure, perform actions as the nuclear control operator to RESPOND to the excessive pressure in accordance with the approved station procedures.
- L. Given indication of excessive containment pressure, DIRECT the response to the excessive pressure in accordance with the approved station procedures.

II. MAJOR EVENTS

- A. Power Ascension
- B. CCW pump trip
- C. Controlling PZR Level Channel Fails Hi
- D. Steam Leak on 23 SG
- E. Multiple Faulted SGs and FRCE

III. SCENARIO SUMMARY

- A. The crew will receive the unit at 70% power EOL with all systems in automatic. 21 CFCU will be C/T. The crew will be provided instruction to perform a power increase to 90% power at 10% per hour.
- B. 22 CCW pump will trip. 23 CCW pump will auto start and restore system header pressure. The CRS will enter TSAS 3.7.3 for 2 operable CCW loops.
- C. The controlling PZR level channel will fail high. Charging flow will lower. The crew will establish manual control of PZR level to prevent flashing in the letdown line and remove the failed channel from service.
- D. While continuing the power ascension, a small steam leak will develop on 23 SG. The crew will enter AB.STM-0001 and determine a unit shutdown is required.
- E. Once the crew has determined a shutdown is required the steam leak will worsen. The crew will trip the reactor, recognize an ATWT when the reactor does not initially trip, open the reactor trip breakers, initiate a MSLI, and initiate a safety injection. All MSIVs will fail to shut, and remain full open.
- F. While in TRIP-1 the crew will observe that Phase B/Spray Actuation has failed and manually initiate. Once the crew has transitioned to LOSC-1 the STA will inform the crew that a Purple Path for FRCE-1 is present. While in FRCE-1 the crew will throttle AFW to each SG to 1E4lbm/hr.
- G. The scenario will end when transition out of LOSC-2 has occurred.

IV. INITIAL CONDITIONS

IC-259 on 2010 Exam Thumb Drive

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

Initial	Description
	RH1 and RH2 C/T
	21 & 22RH18s C/T
	VC1 & 4 C/T
	RCPs (SELF CHECK)
	RTBs (SELF CHECK)
	MS167s (SELF CHECK)
	500 KV SWYD (SELF CHECK)
	SGFP (SELF CHECK)
	23 CV Pump (SELF CHECK)
	S2.OP-IO.ZZ-0004, Power Operation, open and marked up to Step 5.1.19
	21 CFCU C/T
	Complete Attachment 2 "Simulator Ready-for-Training/Examination Checklist."

EVENT TRIGGERS:

Initial	ET #	Description
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__1. **Note: ET-1 was used in scenario development but is NOT used in this scenario.**

MALFUNCTION SUMMARY:

Initial	Description	Delay	Ramp	Remote/Event	Init Value	Final Value
__1.	VL0420 21MS167 Fail to position (0-100%)	NA	NA	None	95.1	95.1
__2.	VL0421 22MS167 Fail to position (0-100%)	NA	NA	None	95.1	95.1
__3.	VL0422 23MS167 Fail to position (0-100%)	NA	NA	None	95.1	95.1
__4.	VL0423 24MS167 Fail to position (0-100%)	NA	NA	None	95.1	95.1
__5.	RP0276A Auto Phase B Fails to act Trn A	NA	NA	None	True	True
__6.	RP0276B Auto Phase B Fails to act Trn B	NA	NA	None	True	True
__7.	RP0277A Auto Cnt Spry Fails to act Trn A	NA	NA	None	True	True
__8.	RP0277B Auto Cnt Spry Fails to act Trn B	NA	NA	None	True	True
__9.	MS0088Cr 23 Main Stm Line Leak Inside Cnt	NA	5 min	RT-2	0	1.5
__10.	MS0090Cr 23 Main Stm Line Leak	NA	NA	RT-3	0	80
__11.	PR0017A PZR level CH 1 (LT459) fails HI	NA	NA	RT-6	NA	100
__12.	CC0172B 22 CCW pump trip	NA	NA	RT-1	False	True
__13.	RP0058 Failure of Automatic Rx trip	NA	NA	None	True	True
__14.	RP0059A Failure of Manual Rx trip	NA	NA	None	True	True
__15.	RP0059B , Failure of Manual SI/Rx Trip	NA	NA	None	True	True

REMOTE/FIELD FUNCTION SUMMARY:

<i>Initial</i>	Description	Delay	Ramp	Rem/Event	Init Val	Final Val
__1.	CT191-1D 21CFCU Bkr #1 Low Speed 125VDC	NA	NA	None	off	off
__2.	CT191-2D 21CFCU Bkr #2 High Speed 125VDC	NA	NA	None	off	off
__3.	CT191-3D 21CFCU Bkr #3 High Speed 125VDC	NA	NA	None	off	off
__4.	CT201D 21 CFCU Rack Out	NA	NA	None	tagged	tagged

I/O OVERRIDE SUMMARY:

<i>Initial</i>	Description	Delay	Ramp	Rem/Event	Init Val	Final Val
__1.	None					

OTHER CONDITIONS:

__1.	Ensure PZR Level Channel I is the controlling level channel
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V. SEQUENCE OF EVENTS

- State shift job assignments
- Conduct a shift briefing detailing instructions to the shift. Provide CREW members with a copy of the shift turnover sheet.
- Inform the CREW: “The simulator is running. You may commence panel walk-downs at this time. CRS please inform me when your CREW is prepared to assume the watch.”
- Allow sufficient time for panel walk-down. When informed by the CRS the CREW is prepared to assume the watch, ensure the simulator is cleared of all unauthorized personnel.

Evaluator/Instructor Activity

Expected Plant/Student Response

Comments

1. Power Ascension**Reactivity plan per the turnover sheet**

Note: Rod Control may remain in Auto or placed in manual with CRS approval IAW IOP-4, P&L 3.6

Note: The Main Turbine is initially set up for 15 % per *minute*, the PO must change the ramp rate to 10% per *hour*.

Note: The RO should maintain a log of dilutions to ensure reactivity additions are tracked.

- CRS briefs crew on evolution
- CRS implements S2.OP-IO.ZZ-0004.
- CRS directs PO to commence Turbine load increase at 10%/hour.
- PO sets up Digital EHC (DEHC) console for 10%/hr load increase, and initiates load increase.
- RO initiates a dilution per the reactivity plan provided.
- PO monitors DEHC for proper response of load increase.
- RO monitors Tavg and Delta T and MWe for expected indications of load increase.
- **IF** control rods are placed in manual per CRS direction, **THEN** RO will slowly and deliberately withdraw control rods to maintain Tavg on program.
- **IF** control rods remain in auto, RO announces when rod motion starts and stops.

Proceed to next event on direction from Lead Evaluator.

Evaluator/Instructor Activity

Expected Plant/Student Response

Comments

2. 22 CCW pump trip

Simulator Operator: Insert **RT-1** at Lead Evaluator direction.

MALF: CC0172B 22 CCW pump trip
Final Value: True

Note: The Thermal Barrier Discharge Flow Lo alarm will come in immediately, and stay locked in the longest. During scenario development and validation, OHAs D20-23 RCP BRG CLG WTR FLO LO alarmed on one occasion, but immediately cleared. The standby CCW pump auto start restores header pressure and all alarms will clear.

Note: RO should remain focused on the reactor while positive reactivity is being added.

Note: CRS may order the power ascension placed on hold, but it is not required.

CRS may refer to AB.CC-1, but its actions regarding low header pressure only start the standby pump to restore pressure, which has already automatically occurred.

Proceed to next event after TS is identified on direction from Lead Evaluator.

- RO/PO announces unexpected CC1 bezel alarms:
 - DISCHARGE FLOW LO (Thermal barrier return flow)
 - 21(22) CC HDR PRESSURE LO
- RO/PO reports 22 CCW pump has tripped and 23 CCW pump has auto started.
- RO/PO reports CCW header lo pressure alarm cleared.
- Using ARP for DISCHARGE FLOW LO, PO reports seal injection to all RCPs is 6-12 gpm with total seal injection flow <40 gpm.
- PO reports DISCHARGE FLOW LO is cleared.
- CRS dispatches personnel to check breaker for 22 CCW pump and 22 CCW pump.
- CRS enters TSAS 3.7.3 for less than 2 operable CCW loops.

Evaluator/Instructor Activity

Expected Plant/Student Response

Comments

3. PZR Level Controlling Channel (LT459) Fails Hi

Simulator Operator: Insert **RT-6** at Lead Evaluator direction.

**MALF: PR0017A PZR Level CH 1
(LT459) Fails High
Final Value: 100**

- RO announces the following alarms as unexpected:
 - OHA E-20, PZR HTR ON LVL HI,
 - OHA E-4 PZR LVL HI
 - All RCP Seal Water Flow Lo alarms
- RO reports PZR B/U heaters in Auto have turned on, and charging flow is lowering to ~45 gpm, and diagnoses failure of PZR controlling level channel.
- RO may place Master Flow Controller in manual with CRS concurrence and raise charging flow to prevent flashing in the letdown line prior to AB entry.
- CRS enters S2.OP-AB.CVC-0001, Loss of Charging.
- CRS directs RO/PO to place the load ascension on hold. (if directed)
- PO places the Main Turbine on HOLD (if directed)
- RO secures any dilution in progress. (if directed)
- RO initiates RCS dilution IAW reactivity plan every 15 minutes **IF** power ascension remains in progress.
- CRS directs PO to monitor CAS.
- RO reports 23 charging pump is running.

Note: Note: CRS may order the power ascension placed on hold, but it is not required. Next 3 steps are here if load is stabilized.

Evaluator/Instructor Activity	Expected Plant/Student Response	Comments
<p>Note: RCP seal injection flow will rise as charging flow is increased, and CV71 may have to be adjusted to maintain less than 40 gpm total seal injection flow.</p>	<ul style="list-style-type: none"> • RO reports there is no indication of cavitation. • RO reports PZR Level Channel 1 has failed hi. • RO takes manual control of charging flow if not previously done, and raises charging flow to restore PZR level to program IAW Att. 2. • RO announces RCP seal injection lo flow alarms have cleared as expected when charging flow is raised. • RO selects channel III for control. • RO restores one group of PZR B/U heaters to OFF and AUTO. • RO reports letdown remains in service. • CRS directs RO to restore charging flow controller to auto when PZR level is restored to program. • CRS directs PO to remove PZR level channel I from service IAW S2.OP-SO.RPS-0003. 	
<p>Lead Evaluator may direct continuation to next event once Tech Specs are identified by CRS.</p>	<ul style="list-style-type: none"> • CRS enters TSAS 3.3.1.1 action 6. • PO verifies PZR Level channel III selected for control, Channel II selected for alarm, and ensures PZR level recorder to channel II or III. 	
<p>Continue to next event on direction of Lead Evaluator</p>	<ul style="list-style-type: none"> • PO informs CRS that IC support is required to perform remainder of procedure. 	
<p>Note: CRS may not elect to start</p>	<ul style="list-style-type: none"> • CRS directs RO/PO to recommence 	

Evaluator/Instructor Activity
moving power until channel has been removed from service.

Expected Plant/Student Response
power ascension. (if placed on hold)

Comments

4. Steam Leak in Containment

Simulator Operator: Enter RT-2 at Lead Evaluator direction.
MALF: MS0088Cr 23 Main Stm Line Leak Inside Cnt
Final Value: 1.5
Ramp: 5 min

Notes:

- 1. CFCU leak detection alarm will annunciate ~ 2 minutes 20 seconds after leak insertion.
- 2. Containment pressure will begin rising ~ 3 minutes and 10 seconds after leak insertion.
- 3. Containment pressure will be rising at ~ 1 psig every 6 minutes. (24 minutes until auto SI/Rx trip would occur at 4 psig in containment.)

- RO reports OHA C-38 CFCU LK DET HI, as unexpected.
- PO refers to ARP.
- RO reports CFCU leak detection HI-HI, as unexpected.
- PO determines no rise in CNTMT radiation and that leak is inside containment based on rising containment pressure.
- CRS enters S2.OP.AB.STM-0001, Excessive steam Flow.
- CRS directs the load ascension placed on hold.
- CRS initiates Attachment 1 of S2.OP.AB.STM-0001:
 - 1. Monitors for reactor power rise
 - 2. RCS cooldown
 - 3. Need to initiate MSLI
 - 4.
- PO verifies EHC system operating correctly, and MS10s and Steam Dumps are closed.

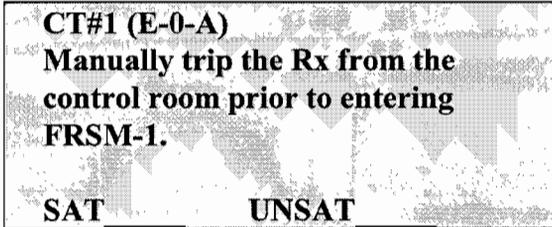
Simulator Operator: Once a rate and plan is determined by the CRS, or CRS briefs CAS Rx trip actions then enter RT-3 PRIOR to crew initiating a Rx trip.
Malf: MS0090Cr 23 Main Stm Line Leak
Final Value: 80

- CRS determines a shutdown is required and plans rate and reactivity management
OR
Determines a Rx trip is required based on CAS.
- RO calculates boration required if downpower is required.

Evaluator/Instructor Activity

Expected Plant/Student Response

Comments



- RO reports demand for a Rx trip and the Rx did NOT trip, and informs CRS of ATWT.
- RO attempts to trip the Rx using the Rx trip handles, and reports the Rx did not trip.
- RO trips the Rx by opening the Reactor Trip Breakers.

Note: 2 paths exist for attempting to initiate a MSLI. AB.SG-1 CAS actions state to:

- Trip the Rx
- Confirm the Rx trip.
- Initiate MSLI
- SI if MSLI is unsuccessful.

OR

If CRS enters TRIP-1 due to automatic Rx trip demand, then MSLI actuation should be directed after the immediate actions are complete using the CAS of AB.SG-1.

- RO reports the Rx trip is confirmed.
- CRS directs RO to initiate MSLI IAW CAS of AB.STM. (May be performed after Immediate Actions of TRIP-1 are performed.)
- RO reports MSLI does not actuate. (if attempted prior to TRIP-1 IA's.)
- CRS directs RO to initiate SI. (if MSLI failure is identified)
- RO initiates SI or backs up auto SI (if performing CAS actions in AB.SG) and continues or performs IAs of TRIP-1
 1. Trips Turbine
 2. Verify Vital AC busses energized
 3. Verify SI actuated

Evaluator/Instructor Activity	Expected Plant/Student Response	Comments
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- CRS/RO verify immediate actions of TRIP-1 are complete by performing verification of immediate action steps.
- After IAs of TRIP-1 completed, CRS directs MSLI if not previously attempted.
- RO reports MSLI is unsuccessful and all MSIVs remain open.
- CREW monitor CAS items after completion of immediate actions
- PO throttles AFW flow to no less than 22E4 lbm/hr with CRS concurrence.
- RO reports SEC loading is not complete for B vital bus, but that all available equipment started.
- PO reports 21 and 22 AFW pumps are operating.
- RO reports safeguards valve alignment SAT.
- RO reports 21 and 22CA330s are shut.
- RO reports containment pressure is > 15 psig, and auto Containment Spray and Phase B isolation have NOT automatically initiated.
- RO manually initiates CS and Phase B, stops RCPs, and verifies Phase B valve alignment.

Note: With all SGs faulted, AFW flow should not be isolated to any SG.

CT#2 (E-0-E)
Manually initiate Phase B and Spray Actuation before transition from Step 11 of 2-EOP-TRIP-1.

SAT _____ UNSAT _____

Evaluator/Instructor Activity	Expected Plant/Student Response	Comments
<p>Role Play: Respond as WCC Supervisor when contacted that you will assemble a team of operators and mechanics and attempt to shut the valves you were directed to shut. If contacted later in scenario about status of getting MS167s shut, state that the team has just been dispatched from the WCC.</p>	<ul style="list-style-type: none"> • RO reports High Steam Flow SI status and failure of MSLI to shut MS167s. • CRS contacts WCC to assist in closing MS167s locally. 	
<p>If CRS dispatches an NEO directly to attempt closure of any MS167, state that you will swing by WCC to pick up a Safety Man.</p>		
<p>Note: Correct ECG classification is an Alert under 5.1.2.A</p>	<ul style="list-style-type: none"> • PO reports all 4KV vital busses are energized. 	
<p>Note: ECG basis document specifically excludes Heat Sink Red Path due to operator action from being used in Table 3 determination of ECG call.</p>	<ul style="list-style-type: none"> • RO reports CAV is in Accident Pressurized mode. • RO reports correct switchgear room ventilation operation. • RO reports 2 CCW pumps are running. • RO reports correct ECCS pump alignment and expected flows for RCS conditions. 	
<p>Note: PO should have lowered AFW flow to as close to 22E4 lbm/hr as possible.</p>	<ul style="list-style-type: none"> • PO reports AFW flow is >22E4 lbm/hr. • RO reports all RCPs are stopped. 	

Evaluator/Instructor Activity	Expected Plant/Student Response	Comments
<p>Note: LOSC-1 and LOSC-2 steps start on page 17</p>	<ul style="list-style-type: none"> • RO reports both reactor trip breakers are open. • RO reports both PZR PORVs are shut and Block valves are open. • PO reports all SG pressures lowering in an uncontrolled manner or completely depressurized. • CRS directs transition to LOSC-1. 	
<p>Note: The STA will arrive in the control room 10 minutes after the Rx trip announcement is made. The STA may be ready as soon as TRIP-1 is exited to report CFST status, but could still be performing verification. Transition should be made as soon as STA reports CFST status.</p>	<ul style="list-style-type: none"> • STA initiates monitoring of CFSTs and reports Red or Purple path on Containment environment. 	
<p>FRCE Steps start here</p>	<ul style="list-style-type: none"> • CRS transitions to FRCE-1. • PO verifies Phase A isolation valve shut and 2VC5 and 2VC6 shut. • RO verifies CS in service, Phase B isolation valves shut, and RCPs stopped. • RO reports MSIVs remain open. 	

Evaluator/Instructor Activity

Expected Plant/Student Response

Comments

CT# 3 (FRCE Basis)
Reduce AFW flow to no less than 1E4 lbm/hr per SG prior to exiting FRCE-1.

Note: This CT may also be performed in LOSC-2, step 5.

SAT UNSAT

- CRS directs PO to minimize AFW to no less than 1E4 lbm/hr per SG.
- CRS transitions to procedure in effect (LOSC-1 or 2)
- STA reports RED path on Heat Sink CSF after PO reduces AFW flow.
- CRS transitions to FRHS-1, verifies it was operator action that lowered AFW flow less than 22E4 lbm/hr, and returns to LOSC-1.
- RO reports MSLI has been initiated and all MS167s remain open.
- PO reports all SG are completely depressurized.
- CRS transitions to LOSC-2.
- PO ensures all valves in Table A are shut, and reports 21-24MS167 remain open.
- CRS dispatches operators to locally shut MS167s one loop at a time if not previously dispatched.
- PO lowers 23 AFW pp speed to minimum, trips then stops 23 AFW pp if not previously performed.
- CRS dispatches an operator to shut 21 and 23MS45s.

LOSC steps start here

Evaluator/Instructor Activity

Expected Plant/Student Response

Comments

Simulator Operator: Delete **MALF VL0421 21MS167 Fails to position (0-100%)** to allow 21MS167 to shut either:

AFTER AFW flow has been reduced, **AND** FRCE is completed, **AND** crew is in LOSC-2.

OR

AFTER AFW flow has been reduced in LOSC-2 **AND** containment pressure is reduced below 15 psig.

Terminate the scenario when the transition to LOSC-1 has been performed.

- RO reports RCS cooldown rate is >100°/hr.
- PO reduces AFW flow to no less than 1E4 lbm/hr to each SG, if not previously performed in FRCE-1.
- PO identifies 21MS167 has shut, and 21 SG pressure is rising.
- CRS transitions to LOSC-1 based on CAS of LOSC-2.

VI. SCENARIO REFERENCES

- A. Alarm Response Procedures (Various)
- B. Technical Specifications
- C. Emergency Plan (ECG)
- D. S2.OP-IO.ZZ-0004, Power Operation
- E. 2-EOP-TRIP-1, Rx Trip or Safety Injection
- F. 2-EOP-LOSC-1, Loss of Secondary Coolant
- G. 2-EOP-LOSC-2, Multiple Steam Generator Depressurization
- H. 2-EOP-FRCE-1, Response to Excessive Containment Pressure
- I. S2.OP-AB.STM-0001, Excessive Steam Flow
- J. S2.OP-AB.LOAD-0001, Rapid Load Reduction

**ATTACHMENT 1
PLANT STATUS
UNIT TWO
TODAY**

MODE: 1 **POWER:** 70% **RCS BORON:** 1285 ppm **MWE** 700

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

N/A

MOST LIMITING LCO AND DATE/TIME OF EXPIRATION:

21 CFCU C/T 3.6.2.3 6 days remaining service water valve work

REACTIVITY PARAMETERS

Core Burnup is 2500 EFPD. Power defect from 70%-100%= 484 pcm.

Control Bank D @ 133 steps

Xenon burning out at 60 pcm/hr.

The Reactor fuel is conditioned to 100%.

Reactivity plan for power increase at 10% / hr is to dilute 150 gal every 10 minutes for a total of 1,800 gal over 2 hours, while withdrawing rods as needed to maintain Tave on program.

EVOLUTIONS/PROCEDURES/SURVEILLANCES IN PROGRESS:

Power ascension to 90% power at 10%/hr. Power was reduced to repair 21 SGFP governor oil leak. Repair of the governor is complete, and both SGFPs are in service. Initial steady state power prior to raising power was 60%, and had been there for 48 hours. Power is currently 70%, and load increase was placed on hold for shift turnover 5 minutes ago. Power ascension being performed iAW S2.OP-IO.ZZ-0004, Power Operation, which is complete up through Step 5.1.19.

ABNORMAL PLANT CONFIGURATIONS:

CONTROL ROOM:

Hope Creek and Salem Unit 1 are at 100% power

PRIMARY:

21 CFCU C/T

SECONDARY:

23 Condensate Pump is O/S IAW IOP-4.

Condensate polishing is in service - full flow.

Heating steam is aligned to Unit 1.

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.

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 (Cont)
SIMULATOR SCENARIO REVIEW CHECKLIST

Note: The following criteria list scenario traits that are numerical in nature. This page should be completed for each scenario. The ranges listed for each scenario represents a target and are not absolute limitations. Scenarios that do not fit into the ranges listed should be further evaluated to ensure they are appropriate.

Initial		Qualitative Attributes
GSG	6	Total malfunctions inserted: 5-8
GSG	1	Malfunctions that occur after EOP entry: 1-2
GSG	2	Abnormal Events: 2-3
GSG	1	Major Transients: 1-2
GSG	1	EOPs entered/requiring substantive actions: 1-2
GSG	2	EOP Contingency Procedures requiring substantive actions: 0-2
GSG	3	Critical Tasks: 2-3

COMMENTS:

**ATTACHMENT 5
ESG CRITICAL TASKS
08-01 NRC Retake ESG-2 Rev. 0**

CT#1 (E-0-A) Manually trip the Rx from the control room prior to entering FRSM-1.

Basis Failure to manually trip the reactor causes a challenge to the subcriticality CSF beyond that irreparably introduced by the postulated conditions. Additionally, it constitutes an “incorrect performance that necessitates the crew taking compensatory action which complicates the event mitigation strategy and demonstrates the inability by the crew to recognize a failure of the automatic actuation of the RPS.

CT#2 (E-0-E) Manually initiate Phase B and Spray Actuation before an extreme challenge (Red Path) develops to the Containment CSF or prior to exiting TRIP-1. (prior to transitioning from step 11 in 2-EOP-TRIP-1)

Basis Failure to actuate the minimum required complement of containment cooling equipment under the postulated conditions constitutes a “demonstrated inability by the crew to recognize a failure/incorrect auto actuation of an EFS system or component.” In this case, the minimum required complement of containment cooling equipment can be manually actuated from the control room. Therefore, failure to manually actuate the minimum required complement of containment cooling equipment also represents a “demonstrated inability by the crew to effectively direct/manipulate ESF controls that would lead to violation of the facility license condition.”

CT#3 (Basis Doc) Reduce AFW to no less than 1E4 lbm/hr per SG prior to exiting FRCE-1.

Basis Failure to control the AFW flow rate to the SGs leads to an unnecessary and avoidable severe challenge to the integrity CSF. Also failure to perform the critical task increases the challenges to the subcriticality and the containment CSFs beyond those irreparably introduced by the postulated plant conditions. Thus, failure to perform the critical task constitutes “demonstrated inability by the crew to take an action or combination of actions that would prevent a challenge to plant safety”

The standard which has been applied to this CT in this scenario encompasses the reason for minimizing AFW flow to 1E4 lbm/hr in FRCE with multiple faulted SGs. The reason this is done is to prevent thermal shock conditions to SG components if the SG was allowed to dry out, and then subsequently have AFW flow reinitiated. This meets the definition given on Attachment 2 of Examples of CTs involving essential safety actions include those for which operation or correct performance prevents...

- degradation of any barrier to fission product release.

Not maintaining verifiable minimum AFW flow (1E4th) when it is possible to do so could result in a SGTR when cold feedwater is subsequently reinitiated.

Note: This action is also performed in LOSC-2, and should be evaluated as SAT if performed in LOSC-2.

ATTACHMENT 6

ESG – PSA RELATIONSHIP EVALUATION

08-01 NRC Retake ESG-2

SALEM ESG - PRA RELATIONSHIPS EVALUATION FORM

EVENTS LEADING TO CORE DAMAGE

<u>Y/N</u>	<u>EVENT</u>	<u>Y/N</u>	<u>EVENT</u>
<u>N</u>	TRANSIENTS with PCS Unavailable	<u>N</u>	Loss of Service Water
<u>N</u>	Steam Generator Tube Rupture	<u>Y</u>	Loss of CCW
<u>N</u>	Loss of Offsite Power	<u>N</u>	Loss of Control Air
<u>N</u>	Loss of Switchgear and Pen Area Ventilation	<u>N</u>	Station Black Out
<u>N</u>	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>
<u>N</u>	Containment Sump Strainers	<u>N</u>	Gas Turbine
<u>N</u>	SSWS Valves to Turbine Generator Area	<u>N</u>	Any Diesel Generator
<u>N</u>	RHR Suction Line valves from Hot Leg	<u>N</u>	Auxiliary Feed Pump
<u>N</u>	CVCS Letdown line Control and Isolation Valves	<u>N</u>	SBO Air Compressor

OPERATOR ACTIONS IMPORTANT IN PREVENTING CORE DAMAGE

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

Complete this evaluation form for each ESG