Facility: Salem Units 1 & 2 **Scenario No.:** 1 **Op Test No.:**

Examiners: _____ **Candidates:** _____ **CRS**

_____ _____ **RO**

_____ _____ **PO**

Objectives: In accordance with plant procedures: (a) begin a normal power reduction to 75% power; (b) respond to a signal output failure on PT-505, Turbine First Stage Pressure transmitter; (c) respond to a pressurizer pressure channel failure; (d) recognize and respond to a letdown heat exchanger tube leak; (e) respond to a main steam isolation valve drifting closed; (f) respond to a tube leak progressing to a tube rupture in 23 SG; (g) enter and properly execute the EOP network; (h) respond to the trip of 21 AFW Pump; (i) respond to a loss of steam dump capability

Initial Conditions: IC-82 at 100% power with 22 AFW Pump OOS for bearing replacement and 21 CFCU OOS for coil leak repairs.

Turnover: The plant is in Mode 1 with power at 100%. 22 AFW Pump is OOS for bearing replacement and 21 CFCU is OOS for coil leak repairs. All other equipment is operating normally and major control systems are in AUTO. Orders for the shift are to reduce power to 75% to remove 22 Condensate Pump from service for seal replacement.

Event No.	Malf. No.	Event Type*	Event Description
1		N CRS N PO R RO	Perform a normal power reduction
2	RD0045	I CRS RO	PT-505, Turbine First Stage Pressure Transmitter, output failure
3	PR0016A	I CRS RO	Pressurizer Pressure Channel I fails high
4	V0030	C CRS RO	Letdown HX Tube leak
5	VL0422C	C CRS PO	Main Steam Isolation Valve, 23MS167 drifts closed
6	SG0078C	M ALL	23 SG Tube Leak/Rupture
7	AF0181B	C CRS PO	21 Aux Feedwater Pump trip
8	MS0093	I CRS PO	Loss of Steam Dump Vacuum permissive

* **(N)**ormal, **(R)**eactivity, **(I)**nstrument, **(C)**omponent, **(M)**ajor

SCENARIO SUMMARY (ECHO-ESG1)

The scenario begins with a normal reduction to 75% power in order to remove 22 Condensate Pump from service. On cue from the Lead Evaluator, the output signal on PT-505, Turbine First Stage Pressure transmitter, fails low. The crew should respond in accordance with (IAW) S2.OP-AB.ROD-0003, Continuous Rod Motion.

After the plant is stable and the investigation into the unwarranted rod motion has been initiated, the controlling pressurizer pressure channel fails high causing actual pressure to lower. The crew should respond IAW S2.OP-AB.PZR-0001, Pressurizer Pressure Malfunction.

When the crew has stabilized the plant following the pressure malfunction, a tube leak will occur in the letdown heat exchanger. The crew should recognize rising level in the CCW Surge Tank and respond IAW S2.OP-AB.CC-0001, Component Cooling Abnormality.

23MS167, 23 SG Main Steam Isolation Valve, will drift off the open seat. The crew should respond IAW the Alarm Response Procedures (ARP's).

When 23MS167 has been re-opened, a SG Tube Leak is initiated and ramps to a tube rupture. The crew should respond IAW S2.OP-AB.SG-0001, Steam Generator Tube Leak.

As the size of the leak progresses, the crew should initiate a manual reactor trip and safety injection and enter EOP-TRIP-0001, Reactor Trip or Safety Injection. A short time after the reactor trip, 21 Auxiliary Feedwater Pump will trip requiring SG's to be fed using 23 AFW Pump. They should transition to EOP-SGTR-0001, Steam Generator Tube Rupture, at the appropriate diagnostic step.

The Steam Dump Vacuum Permissive will be lost after the RCS cooldown is commenced, requiring the remainder to be performed using the unaffected SG MS10's, SG Atmospheric Relief Valves. The scenario can be terminated when RCS temperature reaches the target value or at the discretion of the Lead Evaluator.

SIMULATOR EXAM SCENARIO

SCENARIO TITLE: SGTR

SCENARIO NUMBER: 1

EFFECTIVE DATE: 1/10/00

EXPECTED DURATION: 1.5 Hours

REVISION NUMBER: 0

PROGRAM:

	LO REQUAL
X	**INITIAL LICENSE**
	STA
	OTHER_____

Revision Summary: **Rev 0**

PREPARED BY: Originally signed by: E. Gallagher and _____ **(DATE)**

APPROVED BY: J. C. Lloyd _____ **(TRAINING SUPERVISOR)** 12/20/99 **(DATE)**

APPROVED BY: M. Gwinty and _____ **(TRAINING SUPERVISOR)** _____ **(DATE)**

I. OBJECTIVES

Terminal Objectives

A. Given indication of plant conditions requiring use of the abnormal operating procedures, correctly implement the abnormal operating procedure network to mitigate the event in accordance with approved station procedures.

B. Given indication of plant conditions requiring use of the emergency operating procedures, correctly implement the emergency operating procedure network to mitigate the event in accordance with approved station procedures.

Enabling Objectives

A. Given the unit at 100% power, perform the actions necessary for a controlled power reduction at 30% per hour.

B. Given the indications of a failed Turbine First Stage Pressure Transmitter, PT-505, perform actions as the Nuclear Control Operator to RESPOND to the failed transmitter in accordance with the approved station procedures

C. Given the indications of a failed Pressurizer Pressure instrument, perform actions as the Nuclear Control Operator to RESPOND to the failed pressure instrument in accordance with the approved station procedures.

D. Given the indications of a leak into the CCW System, perform actions as the Nuclear Control Operator to RESPOND to the leak in accordance with the approved station procedures.

E. Given the indications of a Main Steam Isolation Valve (MSIV) drifting closed, perform actions as the Nuclear Control Operator to RESPOND to the drifting MSIV in accordance with the approved station procedures.

F. Given the indications of a Steam Generator Tube Leak and Rupture, DIRECT the response to the tube leak and rupture in accordance with approved station procedures.

G. Given the indications of a Steam Generator Tube Leak and Rupture, perform actions as the Nuclear Control Operator to RESPOND to the tube leak and rupture in accordance with approved station procedures.

H. Given the indications of a failure of 21 AFW Pump, perform actions as the Nuclear Control Operator to RESPOND to failed pump in accordance with the approved station procedures.

I. Given the indications of a loss of Steam Dumps, perform the actions as Nuclear Control Operator to RESPOND to the failed Steam Dumps in accordance with approved Station Procedures.

II. MAJOR EVENTS

A. Perform a normal power reduction

B. Turbine First Stage Pressure, PT-505, Transmitter output failure

C. Pressurizer Pressure Channel I fails high

D. Leak in the Letdown Heat Exchanger

E. Main Steam Isolation Valve, 23MS167 drifts closed

F. 23 SG Tube Leak/Rupture

G. 21 Aux Feedwater Pump trip

H. Loss of Steam Dump Vacuum permissive

III. SCENARIO SUMMARY

A. The scenario begins with a normal reduction to 75% power to allow the removal of 22 Condensate Pump from service for seal replacement. When the power reduction has progressed to the satisfaction of the Examination Team, Turbine First Stage Pressure Transmitter PT-505 output will fail low causing continuous control rod insertion. The crew should respond in accordance with S2.OP-AB.ROD-0003, Continuous Rod Motion.

B. After the plant is stable and the investigation into the unwarranted rod motion has been initiated, the controlling Pressurizer Pressure Channel fails high causing actual pressure to lower. The crew should respond by entering and taking the action of S2.OP-AB.PZR-0001, Pressurizer Pressure Malfunction.

C. While the crew is responding to the pressure malfunction, a leak in the Letdown Heat Exchanger is initiated. The crew should recognize the indications of rising Surge Tank level and enter and take the action of S2.OP-AB.CC-0001, Component Cooling.

D. After the crew has established Excess Letdown Flow, Main Steam Isolation Valve 23MS167 will drift off the open seat. The crew will respond in accordance with the Annunciator Response Procedures.

E. When 23MS167 IS OPEN, a Tube Leak is initiated on 23 SG and is ramped in size to a Tube Rupture. The crew should respond by entering and taking the action of S2.OP-AB.SG-0001, Steam Generator Tube Leak.

F. As the size of the leak progresses, the crew should initiate a manual Reactor Trip and Safety Injection. The crew should enter EOP-TRIP-0001, Reactor Trip or Safety Injection and transition to EOP-SGTR-0001, Steam Generator Tube Rupture. A short time after the Trip, 21 Auxiliary Feedwater Pump will trip requiring SG's to be fed using 23 AFW Pump.

G. When the depressurization using the Steam Dumps is commenced, the Steam Dump Vacuum Permissive will be lost requiring the depressurization to be performed using the MS10s, SG Relief Valves. The scenario may be terminated when RCS pressure is equal to SG pressure or at the discretion of the Lead Examiner.

IV. INITIAL CONDITIONS

IC-194 from exam disk or IC-82, MOL at 100% power with the following conditions:

a. 22 Aux Feedwater Pump C/T for bearing replacement.

b. 21 CFCU C/T to repair a coil leak.

MALFUNCTIONS

	Malfunction	Severity	Delay	Ramp	Description	
____ 1.	VC0173A				21 CFCU Trip	
_____2.	RD0045				PT-505 Transmitter output failure	RT-1
_____3.	PR0016A	2500			PZR Press Ch I, PT455 fails Hi/Lo	RT-2
_____4.	CV0030	45 gpm			Non Regenerative Heat Exchanger Tube Leak	RT-3
_____5.	VL0422	93%			MSIV, 23MS167 drifts closed	RT-4
_____6.	SG0078C	60 gpm		5 min	23 S/G tube Leak	RT-5
_____7.	AF0181A				21 AFW Pump trip	RT-6
_____8.	MS0093				Loss of Steam Dump Vacuum permissive	RT-7

I/O OVERRIDES

	Override/Type	SER Pt.	DI	DO	Condition	Description
____1.	AD02		X		ON	21 CFCU Slow Speed Stop PB ON

REMOTES			
	Remote/Type	**Condition**	**Description**
____1.	AF25D	OFF	22 AFW pp Control Power off
____1.	AF26D	Tagged	22 AFW pp Rack Out

TAGGED EQUIPMENT	
	Description
____1.	22 Aux Feedwater Pump C/T for bearing replacement
____2.	21 CFCU C/T to repair a coil leak..

OTHER:

Provide marked up copy of S2.OP-IO.ZZ-0004

V. SEQUENCE OF EVENTS

A. Designate shift positions.

B. Conduct a shift briefing outlining the shift instructions to the crew. (Provide each crew member with a copy of the Shift Turnover Sheet)

C. Inform the crew " The simulator is running and that board walk-downs should be performed. CRS please inform me when your Crew is ready to assume the shift.".

D. Allow sufficient time for panel walk-downs. When informed by the CRS that the Crew is ready to assume the shift, ensure the simulator is cleared of unauthorized personnel.

Evaluator/Instructor Activity	Expected Plant/Student Response	Comments

1. Power reduction using normal plant procedures.

No malfunction other than those already inserted to start the scenario. The crew will reduce load at 30% per hour until either 75% power is reached or PT-505 fails.

- The **CREW** commences a power reduction IAW Step 5.3 of S2.OP-IO.ZZ-0004, Power Operation.

  - Notify the Systems Operator and the Condensate Polishing Operator of the upcoming load reduction.

NOTE: PO may start a continuous downpower at a faster rate until Valve Position Limiter is Off. This should be done with concurrence of CRS. Once the VPL is off, the load reduction is placed on hold and the rate is adjusted

- The **CRS** establishes a rate of power reduction.

- The **PO** INITIATES a Turbine load reduction with IAW S2.OP-SO.TRB-0002, Turbine Generator Shutdown Operations.

  - INITIATES monitoring the Main Turbine Data display points on the Plant Computer.
  - Uses the REF ∇ and GO pushbuttons to attain desired load.

- The **RO** MAINTAINS T_{AVG}/T_{REF} mismatch at minimum value with Auto Rod motion and Boration.

- The **RO** adjusts RCS Boron concentration to maintain AFD in target band and Rods above Rod Insertion Limits using OP-SO.CVC-0006, Boron Concentration Control.

  - DEPRESS Makeup Control Mode Select STOP Pushbutton.
  - ADJUST 2CV172 Setpoint to the desired value.
  - SET Boric Acid Flow Register to the number of gallons desired.
  - DEPRESS Makeup Control Mode Select BORATE Pushbutton.

- DEPRESS Makeup Control Mode Select START Pushbutton.

- When Boration is complete, depress makeup Control Mode Select STOP Pushbutton.
- ADJUST 2CV172 Setpoint to the pre-boration value.
- DEPRESS Makeup Control Mode Select AUTO Pushbutton.
- DEPRESS Makeup Control Mode Select START Pushbutton.

- The **PO** verifies that SG Feed Pump suction pressure is being maintained >300 psig.

- The **PO** monitors Condenser temperatures using the Plant Computer.

2. Turbine 1st Stage Pressure (PT-505) transmitter output fails low.

When the load reduction has progressed to the satisfaction of the examination team, initiate the failure of PT-505 by inserting RT-1, MALF: RD0045 at a severity of 0.

The crew will be alerted to the failure of PT-505 by the following plant response:

- Control Rods continuously insert at 72 steps per min.
- RC Tave-Tref DEVIATION console alarm.

- The **RO** determines the rod motion to be unwarranted and places Rod Control in Manual:

- Verifies no turbine runback in progress or required.
- Verifies turbine load is not changing.
- Verifies Tave on program.
- Obtains concurrence of CRS
- Places Rod Control in MANUAL.

- The **CREW** enters and takes the action of S2.OP-AB.ROD-0003, Continuous Rod Motion.

Crew may not immediately identify the loss of the output of the PT-505 transmitter as the indication on the console is not affected; only the Tavg/Tref recorder indication is in error.

- The **CREW** identifies the failure of PT-505 as the cause of the transient.

- The **PO** places Steam Dumps in Main Steam Pressure Control Mode.

3 min after requested, call as I&C and inform CREW that the output of PT505 to Rod Control is failed.

- The **CREW** notifies I&C to investigate the failure of PT-505.

- The **CRS** initiates the actions of S2.OP-SO.RPS-0006, Main Turbine Channel Trip/Restoration.

- **The** CRS refers to Technical Specifications Section 3.3.2.1.b, Action 19*.

3. Pressurizer Pressure Channel I fails high.

When the actions to remove PT-505 from service have been initiated, or at the discretion of the lead evaluator, initiate the failure of Pressurizer Pressure Channel I failure by inserting RT-2, MALF: PR0016A at a severity of 2500.

The Crew will be alerted to the malfunction by the following plant response:

- OHA E-28, PZR HTR ON PRESS LO.
- RC PRESSURE DEVIATION HI console alarm on CC2.
- Both Pressurizer Spray valves, PS-1 & 2 full open.
- Actual Pressurizer pressure lowering.

NOTE: If pressure control is not regained in a timely manner, a reactor trip will occur at 1865 psig and a Safety Injection at 1765 psig.

- The **RO** responds to the transient by:
  - Comparing Pressurizer pressure indications with Pressure Controller output and determining Pressure Channel I has failed.
  - Obtaining concurrence of the **CRS**
  - Placing the Master Pressure Controller in MANUAL.
  - Closing both Spray Valves and energizing all Pressurizer heaters by depressing the PRESSURE INCREASE pushbutton.

- The **CRS** enters and initiates actions IAW S2.OP-AB.PZR-0001, Pressurizer Pressure Malfunction.

When Requested: Remote:PR34D 2PR6 c/t

- **CRS** requests 2PR1 closed and in manual, 2PR6 closed with power removed.

- The **CRS** initiates the actions of S2.OP-SO.RPS-0003, Placing Pressurizer Channel in Tripped Condition.

NOTE: If pressure falls below 2205 psig, the LCO for DNB (3.2.5) is also applicable.

- The **CRS** reviews Tech Specs.
  - 3.3.1.1, Action 6
  - 3.3.2.1, Action 19
  - 3.4.5, Action a

- The **CREW** notifies I&C of the failure and requests they investigate.

4. Letdown Heat Exchanger Tube Leak.

When the actions of S2.OP-SO.RPS-0003 have been initiated, or at the discretion of the lead evaluator, initiate Non Regenerative Heat Exchanger Tube Leak by inserting RT-3, malfunction CV0030 at 45 gpm.

The crew will be alerted to the failure by the following plant response:

- CCW Surge Tank level will rise.
- SURGE TANK LEVEL HI/LO console alarm.
- Lower indicated Letdown flow.
- Lowering VCT level with more frequent Auto Makeup.
- Rising radiation on CCW Rad Monitors 2R17A,B.

- The **CREW** should respond IAW the console alarm response procedure.

Note: CRS may decide to enter any of these AB's first, AB-CC-0001 and AB-RAD-0001 will direct entry into AB-RC-0001

- The **CRS** should enter and take action IAW S2.OP-AB.CC-0001, Component Cooling Abnormality, S2.OP-AB.RAD-0001, Abnormal Radiation, when R-17 goes into warning and ultimately S2.OP-AB.RC-0001, Reactor Coolant System Leak.

3 Min after sent call as NEO and inform RO that 2WR114 is closed

- The **RO/PO** should verify 2DR107, Surge Tank Makeup is closed, and send an NEO to insure 2WR114, PW CC Surge TK Valve is closed

- The **RO/PO** should isolate the leakage by performing the following:

  - Isolate Letdown by closing 2CV3, 4 & 5.
  - Dispatching an operator to close LD HX Inlet and Outlet valves CC66 and CC72.

- The **RO/PO** may reduce charging flow to minimum by closing 2CV55, Charging Flow Control Valve.

CRS may request Minimum Stop of 2CV55 to be taken to bypass to allow lower charging flow. When requested Remote:CV42A to 0.

- The **RO/PO** should place excess letdown in service IAW S2.OP-SO.CVC-0003, Excess Letdown Flow:
  - Ensure open 2CC215, EXC LHX Inlet
  - Open 2CC113, EXC LHX Outlet
  - Check Closed 2CV132
  - Select 2CV134 to either
    - FLOW TO RCDT
    - FLOW TO VCT
  - Open 2CV278
  - Open 2CV131
  - Slowly open 2CV132 to warm up the Excess Letdown HX
  - Adjust 2CV132 to obtain maximum flow

5. Main Steam Line Isolation Valve, 23MS167 drifts closed.

When Excess Letdown flow has been established,, or at the discretion of the lead evaluator, insert the closure of 23MS167 by inserting RT-4, MALF: VL0422 at a severity of 93%. AS SOON AS the alarms are received, delete the Malfunction from the summary page to allow the MSIV to be opened.

- The **PO** responds to OHA G-34, 21-24MS167 VALVES NOT FULL OPEN and takes action IAW S2.OP-AR.ZZ-0007.
  - Identifies the drifting valve as 23MS167.
  - Opens the valve using the open pushbutton.

6. 23 S/G Tube Leak.

When 23MS167 has been reopened, initiate the Tube Leak on 23 S/G by inserting RT-5, malfunction SG0078C at 60 gpm, ramped over 5 min.

The Crew will be alerted to the failure by the following plant response:

- OHA A06 RMS TROUBLE.
- Rising level, Warning or Alarm on the following Rad Monitors:
  - R19C, S/G Blowdown.
  - R53A-D, Main Stm Line N16.
  - R15, Cond Air Ejector Monitor.
- Actual Pressurizer level will lower.
- Charging flow will rise.

- The **CRS** should reenter and take the actions of S2.OP-AB.RAD-0001, Abnormal radiation.

- The **CRS** should enter and take the actions of S2.OP-AB.SG-0001, S/G Tube Leak.

- The **CREW** should identify 23 S/G as the affected S/G by:

  - Rising level on 2R19C
  - Rising level on 2R53C

- The **CREW** should notify Chemistry.

- The **CREW** should notify Radiation Protection to survey the Main Steam Lines.

- The **CRS** should notify the Operations Manager and commence a Reactor Shutdown.

7. SG Tube Rupture.

When the decision to shutdown the plant is made, raise the severity of malfunction SG0078C to 600 gpm.

The crew will be alerted to the rupture by the following plant response:

- Pressurizer level lowering rapidly.
- Pressurizer pressure lowering rapidly.
- 23 SG level rising independent of Feed.
- 23BF19 closing.
- Pressurizer low level console alarm.
- OHA E-28 PRZ HTR ON PRESS LOW.

- The **CREW** should recognize the change in leak rate and perform the following actions IAW S2.OP-AB.SG-0001, Steam Generator Tube Leak, Attachment 1, Continuous Action Summary.

  - Initiate a Manual Reactor trip.
  - Verify the Reactor is tripped by observing at least three PR channels indicate < 5% and IR indications lowering with negative SUR.
  - Initiate a Manual Safety Injection.

- The **CREW** should enter and perform the actions of EOP-TRIP-0001, Reactor Trip or Safety Injection.

- The **RO** performs the immediate actions of EOP-TRIP-0001:

  - Trip the reactor.
  - Verify the Reactor is tripped by observing at least three PR channels indicate < 5% and IR indications lowering with negative SUR.
  - Trip the Turbine and verify TSV CLOSED and AST OIL PRESS LOW lights illuminated on RP4.
  - Verify Vital 4KV Bus status by observing bus voltage > 3900 volts.
  - Manually initiate SI.

Critical Step # 1: Sat_____ Unsat____
Isolate Feed Water Flow to the ruptured Steam Generator within 10 min of event.

- The **PO** should isolate Aux Feed Flow to 23 S/G by closing 23AF11 and 23AF21.

- The **PO** should reduce total Aux Feed Flow to $\geq$ 22E4 lbm/hr.

8. 21 Aux Feed Pump Trip.

Five minutes after minimum AFW flow is established, initiate 21AFW Pump trip by inserting RT-6, malfunction AF0181A.

The Crew will be alerted to the failure by the following plant response:

- Console alarm on 2CC2.
- Flashing STOP indication for 21 AFW .
- Pump Flow indication to 24 S/G falls to zero.

If the Control Room requests control power removed from 21 AFW Pump, insert Remote AF25D to OFF.

- The **PO** should respond by feeding 24 S/G with 23 AFW Pump:

  - Raise 23 AFW Pump speed
  - Throttle the AF11s to maintain total AFW Flow $\geq$ 22E4 lbm/hr and then maintain S/G levels 9-33%.

- The **CREW** performs EOP-TRIP-0001 actions and transitions to EOP-SGTR-0001, Steam Generator Tube Rupture at Step 27 when level in 23 S/G is observed rising in an uncontrolled manner.

- The **PO** should set 23MS10, 23 SG Relief Valve, to 1045 psig.

Critical Step # 2: Sat_____ Unsat____
CREW completes isolation of Ruptured SG prior to commensing Cooldown and Depressurization.

- The **PO** closes the following valves:

  - 23MS167, Main Stm Isolation Valve.
  - 23MS18, MSL Warmup Valve.
  - 23MS7, MSL Drain Isolation Valve.
  - 23GB4, S/G Blowdown Isolation Valve.

When Requested: 23ms45 closed Remote: MS06A to 0%

- The **CREW** dispatches an Equipment Operator to:
  - Align Secondary valves.
  - Close 23MS45, 23 AFW Pump Steam Supply from 23 SG.

NOTE: When the CA330s are reopened Excess Letdown will go back in service. RO should recognize this and with concurrence of CRS isolate Excess Letdown.

- The **RO/PO** performs Safeguards Reset actions:
  - Reset SI
  - Reset Phase A Isolation
  - Reset Phase B isolation
  - Open 21&22CA330
  - Reset each SEC
- The **RO** stops 21 & 22 RHR Pumps.

NOTE: The target cooldown temperature should be 503°F

- The **CRS** determines the Required RCS Cooldown Temperature IAW Table D.
- The **PO** initiates an RCS Cooldown:
  - Place Steam Dumps in Manual
  - Adjusts Steam Pressure Demand to 0%
  - Selects MS Press Control
  - Adjusts Steam Press Valve Demand to 25%

9. Loss of Steam Dump Vacuum Permissive.

When the cooldown has been initiated, insert RT-7, malfunction MS0093 to cause a loss of Steam Dump Vacuum Permissive.

The Crew will be alerted to the failure by the following plant response:

- The closure of all Steam Dumps.
- The CNDSR VAC permissive light on RP4 extinguishes.

- The **CREW** responds IAW appropriate steps of EOP-SGTR-1, cooling down using the S/G Atmospheric Relief Valves, 21, 22 & 24 MS10s.

- The **PO** places 21,22 & 24MS10 in manual and fully opens the valves.

Critical Step # 3: Sat_____ Unsat____
Establish and maintain RCS temperature such that transition from 2-EOP-SGTR-1 does not occur.

- The **PO** maintains RCS temperature less than the Target Temperature of_____ °F by throttling the MS10s.

- The **CREW** depressurizes the RCS to Ruptured SG pressure using normal Spray.

When the BIT isolation Valves are closed and with the concurrence of the Examination Team, the scenario may be terminated.

- The **CREW** terminates SI by:
  - Stopping both SI pumps
  - Stopping all BUT one Charging pump
  - Closing BIT isolation Valves SJ4,5,12&13.

After the scenario has been terminated, the CRS should refer to the ECG to Classify the event.

- The **CRS** refers to the ECG and classifies the event:
  - Alert 3.2.3.a

VI. SCENARIO REFERENCES

A. ES-301, Preparing Initial Operating Tests
B. K/A Catalog
C. JTA Listing
D. Technical Specifications
E. S2.OP-IO.ZZ-0004
F. S2.OP-SO.TRB-0002
G. S2.OP-SO.CVC-0006
H. Various Alarm Response Procedures
I. S2.OP-AB.LOAD-0001
J. S2.OP-AB.NIS-0001
K. S2.OP-AB.PZR-0001
L. S2.OP-AB.CC-0001
M. S2.OP-SO.CVC-0003
N. S2.OP-AB.ROD-0003
O. S2.OP-SO.RPS-0001
P. S2.OP-AB.SG-0001
Q. 2-EOP-TRIP-1
R. 2-EOP-SGTR-1
S. ECG

ATTACHMENT 1
UNIT TWO PLANT STATUS TODAY

MODE: 1	POWER: 100%	RCS BORON: 678 ppm	Mwe: 1160

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

REACTIVITY PARAMETERS: Core Burnup 10,500 MWD/MTU

MOST LIMITING LCO AND DATE/TIME OF EXPIRATION:

3.7.2 22 Aux Feedwater Pump out of service for bearing replacement. The 72 hr LCO expires at 2330 tomorrow.

EVOLUTIONS/PROCEDURES/SURVEILLANCES IN PROGRESS:

Power reduction to 75%.

PLANT TURNOVER IS AS FOLLOWS:

- 22 Aux Feedwater Pump out of service for bearing replacement. Maintenance estimates the work will be complete in approximately 14 hours.
- 21 CFCU cleared and tagged for cooling coil leak repair.
- The orders for the shift are to reduce power to 75% at 30%/hr to remove 22 Condensate Pump from service for seal replacement.

ABNORMAL PLANT CONFIGURATIONS: NONE

CONTROL ROOM:

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

PRIMARY: NONE

SECONDARY: Heating Steam is aligned to unit 1.

RADWASTE: No discharges in progress

CIRCULATING WATER/SERVICE WATER:

ATTACHMENT 2
SIMULATOR READY FOR TRAINING CHECKLIST

_____1. Verify simulator is in correct load for training

_____2. All required computer terminals in operation

_____3. Simulator clocks synchronized

_____4. Required chart recorders advanced and ON (proper paper installed)

_____5. Rod step counters correct (channel check)

_____6. All tagged equipment properly secured and documented (TSAS Log filled out)

_____7. DL-10 log up-to-date

_____8. Required procedures clean

_____9. All OHA lamps operating (OHA Test)

_____10. All printers have adequate paper AND functional ribbon

_____11. Procedure pens available

_____12. Procedures in progress open and signed-off to proper step

_____13. Shift manning sheet available

_____14. SPDS reset

_____15. Reference verification performed with required documents available

_____16. Ensure a current RCS Leak Rate Worksheet is placed by Aux Alarm Typewriter with Baseline Data filled out

_____17. Required keys available

_____18. Video Tape (if applicable)

_____19. Ensure ECG Classification is correct – 960502140 CRCA-03

_____20. Reset P-250 Rod Counters

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 mitigate 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.

1. 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

2. 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

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: **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 Initial training Program, evaluate the need to modify or replace the scenario.

ATTACHMENT 5

CT#1 - E-3--A - Isolate Feed Flow to ruptured SG by closing 24AF11 and 21 within 10 mins

CT#2 – Isolation of Ruptured SG prior to commensing Cooldown and Depressurization. (E-3--B)

CT#3 - Establish and maintain RCS temperature such that transition from E-3 does not occur. (E-3--B)

ATTACHMENT 5B
SCENARIO SET EVALUATION

Note: The following criteria list scenario traits that are numerical in nature. A second set of numbers indicates a range to be met for a set of two scenarios. Therefore, to complete this part of the review, the set of scenarios must be available. This page should be completed once per scenario set.

SCENARIO SET CONSISTS OF SCENARIO ESG- AND ESG- _____

Initials	Qualitative Attributes
_____	• Total malfunctions inserted: 4-8/10-14
_____	• Malfunctions that occur after EOP entry: 1-4/3-6
_____	• Abnormal Events: 1-2/2-3
_____	• Major Transients: 1-2/2-3
_____	• EOPs used beyond primary scram response EOP: 1-3/3-5
_____	• EOP Contingency Procedures used: 0-3/1-3
_____	• Approximate scenario run time: 45-60 minutes (One scenario may approach 90 minutes)
_____	• EOP run time: 40-70% of scenario run time
_____	• Crew Critical Tasks: 2-5/5-8
_____	• Technical Specifications are exercised during the test
_____	• Events used in the two scenarios are not repeated
_____	• The scenario sets for the exam week do not contain duplicate scenarios

COMMENTS:

Facility: Salem Units 1 & 2 **Scenario No.:** 2 **Op Test No.:**

Examiners: _____ **Candidates:** _____ **CRS**

_____ _____ **RO**

_____ _____ **PO**

Objectives: In accordance with plant procedures: (a) begin a normal power reduction to 75%; (b) respond to the failure of a VCT Level transmitter; (c) respond to the failure of the PZR Master Pressure Controller; (d) respond to a Service Water leak requiring isolation of one bay; (e) respond to a seal failure on 22 RCP; (f) initiate a manual reactor trip and stop 22 RCP; (g) enter and properly execute the EOP network; (h) recognize a Main Steam Line Break and initiate a manual safety injection; (i) respond to failure of Containment Spray to actuate; (j) take compensatory action for failure of the MSIVs to close

Initial Conditions: IC-84 at 90% power with 22 AFW Pump OOS for bearing replacement and 21 CFCU is OOS for coil leak repairs.

Turnover: The plant is in Mode 1 with power at 90%. 22 AFW Pump is OOS for bearing replacement and 21 CFCU is OOS for coil leak repairs. All other equipment is operating normally and major controls are in AUTO. Orders for the shift are to perform a normal reduction to 75% power in order to remove 22 Condensate Pump from service for seal replacement.

Event No.	Malf. No.	Event Type*	Event Description
1		N CRS N PO R RO	Perform a normal reduction to 75% power
2	CV0037	I CRS RO	LT-112, VCT Level transmitter, fails high
3	PR0016E	I CRS RO	PZR Pressure Master Controller fails
4	SW0216A	C CRS RO	Leak in #2 Service Water Bay
5	RC0007B	C CRS RO	22 RCP Seal Failure
6	MS0090C	M ALL	Main Steam Line Leak/Break in Containment on 22 S/G
7	MS0092B,C	C ALL	MSIVs 22 & 23 MS167 fail open
8	RP0277A,B	C CRS RO	Auto Containment Spray fails to actuate

* **(N)**ormal, **(R)**eactivity, **(I)**nstrument, **(C)**omponent, **(M)**ajor

SCENARIO SUMMARY (ECHO-ESG2)

The crew commences a normal power reduction to 75%. On cue from the Lead Evaluator, VCT level transmitter LT-112 fails high, causing actual VCT level to lower. The crew should respond in accordance with (IAW) Alarm Response Procedures (ARP's) and place the makeup controller in MANUAL.

After the crew has completed the actions for the VCT level problem, the PZR Pressure Master Controler fails. The crew should respond IAW S2.OP-AB.PZR-0001, PZR Pressure Malfunction, and take MANUAL control.

After the crew has stabilized PZR pressure, a leak will occur in a Service Water (SW) Bay. The crew should respond IAW S2.OP-AB.SW-0001, Loss of Service Water Header Pressure, isolating the bay.

After the SW Bay is isolated and the CRS has made the technical specification determination, 22 RCP #1 Seal will fail. The crew should enter S2.OP-AB.RCP-1, RCP Abnormality and initiate a MANUAL reactor trip IAW Attachment 1, due to high seal leakoff flow. 21 RCP should be stopped prior to entering EOP-TRIP-1, Reactor Trip or Safety Injection, and 21CV104 should be closed within a 3-5 minute window thereafter.

After the crew transitions to EOP-TRIP-0002, Reactor Trip Response, a Main Steam Line Break will occur. The crew should initiate a MANUAL safety injection and transition back to EOP-TRIP-0001. Containment Spray fails to actuate at the automatic setpoint and 22 and 23MS167 fail open. The crew should take compensatory action IAW EOP-FRCE-1, Response to Excessive Containment Pressure, and the EOP network.

The crew should transition to EOP-FRTS-0001, Response to Imminent Pressurized Thermal Shock Conditions. The scenario may be terminated when the RCS depressurization is initiated or at the discretion of the Lead Evaluator.

SIMULATOR EXAM SCENARIO

SCENARIO TITLE: LOSC

SCENARIO NUMBER: 2

EFFECTIVE DATE: 1/10/00

EXPECTED DURATION: 1.5 Hours

REVISION NUMBER: 0

PROGRAM:

	LO REQUAL
X	**INITIAL LICENSE**
	STA
	OTHER_____

Revision Summary: **Rev 0**

Originally signed by:

PREPARED BY: E. Gallagher _____ (DATE)

APPROVED BY: J. A. Lloyd _____ 12/20/99 (DATE)
(TRAINING SUPERVISOR)

APPROVED BY: M. Gaertz _____ (DATE)
(TRAINING SUPERVISOR)

I. OBJECTIVES

Terminal Objectives

A. Given indication of plant conditions requiring use of the abnormal operating procedures, correctly implement the abnormal operating procedure network to mitigate the event in accordance with approved station procedures.

B. Given indication of plant conditions requiring use of the emergency operating procedures, correctly implement the emergency operating procedure network to mitigate the event in accordance with approved station procedures.

Enabling Objectives

A. Given the unit at 90% power, perform the actions necessary for a controlled power reduction at 30% per hour.

B. Given the indications of a Volume Control Tank (VCT) level instrument failed high, perform actions as the Nuclear Control Operator to RESPOND to the failed level instrument in accordance with the approved station procedures.

C. Given the indications of a failed Pressurizer Pressure controller, perform actions as the Nuclear Control Operator to RESPOND to the failed pressure controller in accordance with the approved station procedures.

D. Given the indications of a large leak in the #2 Service Water Bay, perform actions as the Nuclear Control Operator to RESPOND to the leak in accordance with the approved station procedures.

E. Given the indications of a Reactor Coolant Pump seal failure, perform actions as the Nuclear Control Operator to RESPOND to the seal failure in accordance with the approved station procedures.

F. Given the indications of a Main Steam Line Break inside Containment, DIRECT the response to the steam break in accordance with approved station procedures.

G. Given the indications of a Main Steam Line Break inside Containment, perform actions as the Nuclear Control Operator to RESPOND to the steam break in accordance with approved station procedures.

H. Given the indications of a failure of MSIVs to close, perform actions as the Nuclear Control Operator to RESPOND to valve failures in accordance with the approved station procedures.

I. Given the indications of a failure of Containment Spray to auto actuate, perform actions as the Nuclear Control Operator to RESPOND to the Containment Spray failure in accordance with the approved station procedures.

II. MAJOR EVENTS

A. Perform a normal power reduction to 75% power

B. LT-112, VCT Level Transmitter, fails high.

C. Pressurizer Master Pressure Controller fails high

D. Leak in #2 Service Water Bay

E. 22 RCP Seal Failure

F. Main Steam Line Leak/Break in Containment on 22 S/G

G. MSIVs 22 & 23MS167 fail open

H. Train A & B Containment Spray fail to auto actuate

III. SCENARIO SUMMARY

A. The scenario begins with a normal reduction to 75% power.

B. After the power reduction has progressed to the satisfaction of the examination team, VCT level transmitter LT-112 will fail high causing actual VCT level to lower. The crew should respond in accordance with the Annunciator Response Procedures restore Letdown flow to the VCT and place Makeup Controls in manual.

C. Once VCT level is stable and the investigation for the LT-112 failure has been initiated, the Pressurizer Master Pressure controller fails high causing actual pressure to lower. The crew should respond by entering and taking the action of S2.OP-AB.PZR-0001, Pressurizer Pressure Malfunction.

D. After pressurizer pressure is restored to normal, a large leak will develop in the #2 Service Water Bay causing a loss of Service Water header pressure. The crew should respond in accordance with the Annunciator Response Procedures and S2.OP-AB.SW-0003.

E. When the service Water Bay is isolated, the #1 Seal for 22 RCP will fail. The crew should enter S2.OP-AB.RCP-0001, RCP Abnormality and initiate a manual Reactor trip IAW Attachment 1, due to high seal leakoff flow. 22 RCP should be stopped prior to entering EOP-TRIP-0001, Reactor Trip or Safety Injection and 21CV104 should be closed within a 3-5 minute window thereafter.

F. The crew should perform the actions of EOP-TRIP-0001 and transition to EOP-TRIP-0002, Reactor Trip Response at EOP-TRIP-0001 step 5.

G. After the crew transitions to EOP-TRIP-0002, a Main Steam Line Break will occur. The crew should initiate Safety Injection and transition to EOP-TRIP-0001. Train A & B Containment Spray will fail to auto actuate when required and when the Main Steam Lines are isolated, 22 and 23MS167 will fail open.

H. The crew should transition to EOP-FRTS-0001, Response to Imminent Pressurized Thermal Shock Conditions or EOP-FRCE-0001, Response to Excessive Containment Pressure depending on extent of cooldown. The scenario may be terminated when the RCS depressurization is initiated or at the discretion of the Lead Examiner.

IV. INITIAL CONDITIONS

IC-195 for ESG Disk or IC-84, EOL at 90% power with the following conditions:

a. 22 Aux Feedwater Pump C/T for bearing replacement.

b. 21 CFCU cleared and tagged for cooling coil leak repair.

MALFUNCTIONS

	Malfunction	Severity	Delay	Ramp	Description	
_____1.	VC0173A				21 CFCU Trip	
_____2.	RP0277A				Auto Cntmnt Spray fails to actuate - Tr A	
_____3.	RP0277B				Auto Cntmnt Spray fails to actuate - Tr B	
_____4.	CV0037	100	0	0	LT-112 Fails High	RT-1
_____5.	PR0016E	100			PZR Master Pres PC455K Fails Hi	RT-2
_____6.	SW0216A	10000	0	30 sec	21 SW HDR Leak in SW Structure	RT-3
_____7.	RC0007B				22 RCP, #1 Seal failure	RT-4
_____8.	MS0090B				MSL Break on 22 SG	RT-5
_____9.	MS0092F				22MS167 Fails Open	
_____10.	MS0092G				23MS167 Fails Open	

I/O OVERRIDES

	Override/Type	SER Pt.	DI	DO	Condition	Description
_____1.	AD02		X		ON	21 CFCU Slow Speed Stop PB to ON

REMOTES			
	Remote/Type	**Condition**	**Description**
____1.	AF25D	OFF	22 AFW pp Control Power off
____2.	AF26D	TAGGED	22 AFW PUMP Rack Out

TAGGED EQUIPMENT	
	Description
____1.	22 Aux Feedwater Pump C/T for bearing replacement.
____2.	21 CFCU C/T for coil Leak Repair.

OTHER:

Provide marked up copy of S2.OP-IO.ZZ-0004

V. SEQUENCE OF EVENTS

A. Designate shift positions.

B. Conduct a shift briefing outlining the shift instructions to the crew. (Provide each crew member with a copy of the Shift Turnover Sheet)

C. Inform the crew " The simulator is running and that board walk-downs should be performed. CRS please inform me when your Crew is ready to assume the shift."

D. Allow sufficient time for panel walk-downs. When informed by the CRS that the Crew is ready to assume the shift, ensure the simulator is cleared of unauthorized personnel.

Evaluator/Instructor Activity	Expected Plant/Student Response	Comments

1. Power reduction using normal plant procedures.

No malfunction other than those already inserted to start the scenario. The crew will reduce load at 30% per hour until either 75% power is reached or the Boric Acid Flow Controller malfunction is observed.

- The **CREW** commences a power reduction IAW Step 5.3 of S2.OP-IO.ZZ-0004, Power Operation.
  - Notify the Systems Operator and the Condensate Polishing Operator of the upcoming load reduction.
- The **CRS** establishes a rate of power reduction.
- The **PO** INITIATES a Turbine load reduction with IAW S2.OP-SO.TRB-0002, Turbine Generator Shutdown Operations.
  - INITIATES monitoring the Main Turbine Data display points on the Plant Computer.
  - Uses the REF ∇ and GO pushbuttons to attain desired load.
- The **RO** MAINTAINS T_{AVG}/T_{REF} mismatch at minimum value with Auto Rod motion and Boration.
- The **RO** adjusts RCS Boron concentration to maintain AFD in target band and Rods above Rod Insertion Limits using OP-SO.CVC-0006, Boron Concentration Control.
  - DEPRESS Makeup Control Mode Select STOP Pushbutton.
  - ADJUST 2CV172 Setpoint to the desired value.
  - SET Boric Acid Flow Register to the number of gallons desired.

- DEPRESS Makeup Control Mode Select BORATE Pushbutton.
- DEPRESS Makeup Control Mode Select START Pushbutton.

- When Boration is complete, depress makeup Control Mode Select STOP Pushbutton.
- ADJUST 2CV172 Setpoint to the pre-boration value.
- DEPRESS Makeup Control Mode Select AUTO Pushbutton.
- DEPRESS Makeup Control Mode Select START Pushbutton.

- The **PO** verifies that SG Feed Pump suction pressure is being maintained >300 psig.

- The **PO** monitors Condenser temperatures using the Plant Computer.

2. VCT Level transmitter, LT-112 fails high.

When power reduction has been completed or at the discretion of the lead evaluator, initiate the failure of LT-112, RT-1, MALF: CV0037 Severity: 100.

Failure of LT-112 high will cause the following plant response:

- VCT HI/LO LEVEL console alarm will actuate due to LT-112 failed high.
- CV35 will full divert to the HUT if in Auto.
- Actual VCT level will begin to lower.
- No auto makeup will occur with LT-112 failed high.

With no operator action, level will continue to drop until charging pumps cavitate.

- Auto swap to RWST will not occur with LT-112 failed high.

- Console level indication for the VCT is fed from LT-112 and will indicate upscale.
- VCT indication is available via the plant computer from LT-114.

NOTE: Alarm response procedure does not give specific guidance for failed instrument.

- The **CREW** refers to the CC2 Console Alarm response Procedure, S2.OP-AR.ZZ-0012.

- The **RO** responds to HI/LO LEVEL alarm:

  - Compares console level with computer indications and determines LT-112 is failed.
  - Manually aligns CV35 to the VCT.
  - Initiates a manual makeup as necessary to maintain VCT level IAW S2.OP-SO.CV-0006.

3. **Pressurizer Master Pressure Controller Fails High.**

When Letdown flow has been restored to the VCT, or at the discretion of the lead evaluator, Initiate failure of Master Pressure Controller by inserting RT-2, MALF: PR0016E.

The Crew will be alerted to the malfunction by the following plant response:

- OHA E-28, PZR HTR ON PRESS LO.
- RC PRESSURE DEVIATION HI console alarm on CC2.
- Both Pressurizer Spray valves, PS-1 & 2 full open.
- Actual Pressurizer pressure lowering.

NOTE: This action is not an immediate action of AB-PZR-001. OP's standards allow operators to take manual corrective action, however RO may wait for direction form the AB.

- The **RO** responds to the transient by:
  - Comparing Pressurizer pressure indications with Pressure Controller output and determining no pressure channel failure.
  - Determining that controller demand is erroneous for current pressure.

- Obtaining concurrence of the **CRS**
- Placing the Master Pressure Controller in MANUAL. Closing both Spray Valves and energizing all Pressurizer heaters by depressing the PRESSURE INCREASE pushbutton.

NOTE: If pressure control is not regained in a timely manner, a reactor trip will occur at 1865 psig and a Safety Injection at 1765 psig.

- The **CRS** enters and initiates actions IAW S2.OP-AB.PZR-0001, Pressurizer Pressure Malfunction.

When Requested to tag 2PR6: Remote:PR34D

- **CRS** requests 2PR1 closed and in manual, 2PR6 closed with power removed.

NOTE: PZR pressure control must remain in manual until repaired.

- The **CREW** notifies I&C of the failure and requests they investigate.

If pressure falls below 2205 psig, the LCO for DNB (3.2.5) is applicable.

- The **CRS** reviews Tech Specs.
  - 3.4.5, Action a

4. Leak in #2 Service Water Bay

Leakage in #2 Service Water Bay will cause the following plant response:

When Pressurizer pressure is restored to normal or at discretion of Lead Evaluator initiate the Leak in #2 Service Water Bay, RT-3, MALF: SW0216A, Severity:10000-gpm, RAMP: 30sec

- OHA B-13 21 SW HDR PRESS LO
- OHA B-14 22 SW HDR PRESS LO
- OHA B-15 TURB AREA SW HDR PRESS LO
- OHA B-29 21-23 SW PMP SUMP AREA LVL HI
- Auto start of standby SW pump if in Auto

Report as Circ Water Operator after 3 min that there is a large leak in #2 bay somewhere in the back of the bay and you can not gain access. The water level is 2 feet up the pump pedestal and rising, recommend securing all 2 bay pumps.

- The **CRS** will enter S2.OP-AB.SW-0003, Service Water Bay Leak.
  - **CRS** sends an operator to #2 bay to investigate the leak.
  - **RO/PO** opens 21 and 22 SW23 Nuc Hdr cross Tie valves.
  - **RO/PO** closes 21 and 22 SW17 Discharge Hdr Cross Tie Valves.
  - **CREW** confirms leak in bay #2
  - **RO/PO** Starts all 4 bay pumps
  - **RO/PO** Stops all 2 bay pumps.

Remote functions: SW23D, SW27D, AND SW32D to OFF

- **CRS** dispatches an operator to de-energize control power for 21,22, and 23 Service Water Pumps.

- The **CREW** completes isolation of the #2 Service Water Bay IAW AB.SW-0003.
  - Closes 21SW22 and 21SW20

When requested to deenergize CFCU's insert MALF for selected CFCU trip and Override stop PB to ON.

- The **CRS** dispatches operators to secure one CC Heat Exchanger and Isolate 2 CFCU's.

- **CRS** refers to Tech Specs and enters 3.7.4 and notifies the **OS** to refer to the ECG.
  - UE 9.7.1 (To be classified at completion of scenario)

5. #1 Seal Failure, 22 RCP.

When #2 Service Water Bay is isolated and CRS has entered appropriate Tech Specs, initiate the seal failure of 22 RCP by inserting RT-4, MALF: RC0007B.

The crew will be alerted to the seal failure by the following plant response:

- Seal Leakoff Flow HI-LO console alarm.
- Standpipe Level HI console alarm.
- Seal Leakoff Flow indication rising towards offscale high.
- Seal Inlet and Outlet temperatures rising.

- The **CREW** responds IAW the appropriate alarm response procedures.

- The **CRS** enters and takes the action of S2.OP-AB.RCP-0001, RCP Abnormality.

- The **CRS** implements ATT. 1 of S2.OP-AB.RCP-0001.

- The **CRS** implements ATT. 2 of S2.OP-AB.RCP-0001 based on high seal leakoff flowrate.

Critical Step #1: Sat_____
Unsat____
RO stops 22 RCP prior to entering 2-EOP-TRIP-1.

- The **RO** performs the actions of ATT. 2 of S2.OP-AB.RCP-0001:
  - Initiates a MANUAL reactor trip.
  - Stops 22 RCP.
  - RO closes 22CV104 within a 3-5 minute window after stopping 22 RCP.

- The **CREW** should enter and perform the actions of EOP-TRIP-0001, Reactor Trip or Safety Injection.

- The **RO** performs the immediate actions of EOP-TRIP-0001:

  - Trip the reactor.
  - Verify the Reactor is tripped by observing at least three PR channels indicate < 5% and IR indications lowering with negative SUR.
  - Trip the Turbine and verify TSV CLOSED and AST OIL PRESS LOW lights illuminated on RP4.
  - Verify Vital 4KV Bus status by observing bus voltage > 3900 volts.
  - Verify no SI required.

- The **PO** should reduce total Aux Feed Flow to ≥ 22E4 lbm/hr.

- The **CRS** should transition to EOP-TRIP-0002, Reactor Trip Response at step 5 of EOP-TRIP-0001.

6. MSL Break Inside Containment.

When the Pressurizer Pressure Status check at Step 9 of EOP-TRIP-2 is complete, initiate the Steam Line Rupture by inserting RT-5, MALF:MS0090B.

The crew will be alerted to the Break by the following plant response:

- Rising Containment pressure.
- SG FLOW HI console alarm.
- CONT PRESSURE HI console alarm.
- OHA C-38 CFCU LEAK DETECTOR HI.
- OHA C-14 CNTMT PRESS HI.
- OHA C-6 CNTMT PRESS HI-HI.

NOTE: Auto Si will occur on High Steam Flow.

- The **CRS** should direct RO to initiate a manual Safety Injection and transition to EOP-TRIP-0001 IAW the CAS of EOP-TRIP -0002.

- The **RO** performs the immediate actions of EOP-TRIP-0001:

  - Trip the reactor.
  - Verify the Reactor is tripped by observing at least three PR channels indicate < 5% and IR indications lowering with negative SUR.
  - Trip the Turbine and verify TSV CLOSED and AST OIL PRESS LOW lights illuminated on RP4.
  - Verify Vital 4KV Bus status by observing bus voltage > 3900 volts.
  - Manually initiate SI.

Critical Step #2: Sat_____ Unsat____
CREW initiates at least 1 Train of Containment Spray before exceeding 47 psig or exiting 2-EOP-TRIP-1

- The **RO** should recognize the failure of Containment Spray to auto actuate and recommend manual initiation of both trains of Containment Spray. CRS directs initiation of Containment Spray

7. 22 & 23 MS167 Fail Open

The malfunctions for failing the MSIVs open (MS0092F, and G) have been pre-inserted.

- The **PO** should initiate a Main Steam Line Isolation by depressing all four LOOP MAIN STEAM LINE ISOLATE buttons.

- The **RO/PO** should recognize the failure of 22 & 23MS167s to close.

- The **PO** may attempt to close 22 & 23MS167 using the Fast and Slow Close pushbuttons.

- The Crew dispatches an operator to attempt to locally close 22 & 23MS167.

- **PO** throttles AFW flow, and maintains >22E4 lbm/hr

Once the transition from EOP-TRIP-1 is made the CREW will implement the CFSTs and transition based on highest priority RED or PURPLE path

- The **CREW** will identify a transition at this point based on CFST status.
  - EOP-FRTS-1 on RED path
  - EOP-FRCE-1 on PURPLE Path

NOTE: Two possible transitions are possible based on the AFW feed rate established by the PO, IF a RED path on Thermal Shock exists at this point the crew should implement EOP-FRTS-0001, if no red path exists the crew should transition to EOP-FRCE-0001 based on a purple path.

- The **CREW** should perform the actions of EOP-TRIP-0001 and transition to EOP-FRCE-1.

IF no TS RED path exists proceed to pg 18

- The **CRS** directs the actions of EOP-FRTS-0001.
- The **PO** should maintain total AFW > 22E4 lbm/hr.

NOTE: CREW may decide to leave 23 AFW pump running as this is only feed source to 21 Steam Generator. Crew would then send an operator to isolate 23MS45.

- The **PO** should remove 23 AFW Pump from service as follows:
  - Lower 23 AFW Pump speed to minimum.
  - Trip 23 AFW Pump.
  - Close 2MS132, AFW Pump Turb Start/Stop Valve.
- The **CREW** should dispatch an Equipment Operator to close 23MS45, Main Steam Supply to 23 AFW Pump.

Critical Step # 3: Sat_____ Unsat____
Crew isolates Feed Flow to faulted SGs prior to exiting 2-EOP-FRTS-1 or 2-EOP-FRCE-1

- The **PO** should close 22 & 23AF11 and 22 & 23AF21.

- The **RO/PO** performs Safeguards Reset actions:
  - Reset SI.
  - Reset Phase A Isolation.
  - Reset Phase B isolation.
  - Open 21&22CA330.
  - Reset each SEC.
  - Reset 230V Control Centers.
- The **RO** stops both RHR Pumps.
- The **RO** stops both SI Pumps.

Critical Step # 4: Sat_____ Unsat____
Terminate SI flow by stopping all but 1 Charging pump before exiting 2_EOP-FRTS-1

- The **RO** stops all but one Charging Pump.
- The **RO** aligns charging for normal operation as follows:
  - Open CV139 & CV140, Charging Pump Miniflow Valves.
  - Close SJ4, SJ5, SJ12 & SJ13, BIT Isolation Valves.
  - Close CV55, Charging Flow Control Valve.
  - Open CV68 & CV69, Charging Discharge Valves.
  - Adjust CV55 to maintain Pressurizer level > 25% (33% adverse).
  - Adjust Seal Injection as required.

The scenario may be terminated when the SI Accumulators are isolated or at the discretion of the Lead Examiner.

- The **RO/PO** isolates SI Accumulators as follows:
  - Remove the Lockouts for 21 thru 24 SJ54 at Panel 2RP4.
  - Close 21 thru 24 SJ54.

After the scenario has been terminated, the CRS should refer to the ECG to Classify the event.

- The **CRS** refers to the ECG and classifies the event:
  - Alert, 3.2.1.a (If RED Path was used)

IF No RED or PURPLE path transition was made to EOP-FRTS-1, then CREW should transition to EOP-FRCE-1

- The **CRS** enters EOP-FRCE-1 based on the PURPLE path (Containment pressure >15 psig
- **RO** initiates Containment Spray and Phase B isolation and stops RCPs if not already accomplished.
- **RO** verifies CFCU operation

Critical Step # 3: Sat_____ Unsat____
Crew isolates Feed Flow to faulted SGs prior to exiting 2-EOP-FRTS-1 or 2-EOP-FRCE-1

- **PO** completes isolation of faulted SGs by closing 22 & 23 AF11 and AF21's

CREW will continue to monitor for RED or PURPLE path on Thermal Shock as RCS re-pressurizes

- **CRS** returns to 2-EOP-LOSC-1 at step 1
- **CREW** performs actions of 2-EOP-LOSC-1.
  - Identify and isolate faulted SGs
  - Stabilize RCS temp by steaming as required.
  - Check for Steam Generator Tube Rupture
- **CRS** transitions to 2-EOP-LOCA-1

- **CREW** resets Safeguards and **CRS** transitions to 2-EOP-TRIP-3
  - RO stops all but 21 or 22 Charging pump.
  - RO isolates BIT Flow and aligns normal Charging Flow.
  - RO stops both SI pumps.

The scenario may be terminated when the SI pumps are stopped or at the discretion of the Lead Examiner.

- **CREW** evaluates for SI reinitiation.

After the scenario has been terminated, the CRS should refer to the ECG to Classify the event.

- The **CRS** refers to the ECG and classifies the event:
  - UE, 3.3.4.a (If RED Path for Thermal Shock not used)

VI. SCENARIO REFERENCES

A. ES-301, Preparing Initial Operating Tests
B. K/A Catalog
C. JTA Listing
D. Technical Specifications
E. S2.OP-IO.ZZ-0004
F. S2.OP-SO.TRB-0002
G. S2.OP-SO.CVC-0006
H. S2.OP-SO.FHV-0001
I. Various Alarm Response Procedures
J. S2.OP-AB.RAD-0001
K. S2.OP-AB.RCP-0001
L. S2.OP-AB.SW-0003
M. 2-EOP-TRIP-0001
N. 2-EOP-TRIP-0002
O. 2-EOP-TRIP-0003
P. 2-EOP-FRTS-0001
Q. 2-EOP-FRCE-0001
R. 2-EOP-LOSC-0001
S. 2-EOP-LOCA-0001
T. ECG

ATTACHMENT 1
UNIT TWO PLANT STATUS TODAY

MODE: 1	POWER: 90%	RCS BORON: 104 ppm	Mwe: 1060

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

REACTIVITY PARAMETERS: Core Burnup 14,000 MWD/MTU

MOST LIMITING LCO AND DATE/TIME OF EXPIRATION:

3.7.2 22 Aux Feedwater Pump out of service for bearing replacement. The 72 hr LCO expires at 2330 tomorrow.

EVOLUTIONS/PROCEDURES/SURVEILLANCES IN PROGRESS:

Power reduction to 75%.

PLANT TURNOVER IS AS FOLLOWS:

- 22 Aux Feedwater Pump out of service for bearing replacement. Maintenance estimates the work will be complete in approximately 14 hours.
- 21 CFCU cleared and tagged for cooling coil leak repair.
- The orders for the shift are to reduce power to 75% to remove 22 Condensate Pump from service for seal replacement.

ABNORMAL PLANT CONFIGURATIONS: NONE

CONTROL ROOM:

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

PRIMARY: NONE

SECONDARY: Heating Steam is aligned to unit 1.

RADWASTE: No discharges in progress

CIRCULATING WATER/SERVICE WATER:

ATTACHMENT 2
SIMULATOR READY FOR TRAINING CHECKLIST

_____1. Verify simulator is in correct load for training

_____2. All required computer terminals in operation

_____3. Simulator clocks synchronized

_____4. Required chart recorders advanced and ON (proper paper installed)

_____5. Rod step counters correct (channel check)

_____6. All tagged equipment properly secured and documented (TSAS Log filled out)

_____7. DL-10 log up-to-date

_____8. Required procedures clean

_____9. All OHA lamps operating (OHA Test)

_____10. All printers have adequate paper AND functional ribbon

_____11. Procedure pens available

_____12. Procedures in progress open and signed-off to proper step

_____13. Shift manning sheet available

_____14. SPDS reset

_____15. Reference verification performed with required documents available

_____16. Ensure a current RCS Leak Rate Worksheet is placed by Aux Alarm Typewriter with Baseline Data filled out

_____17. Required keys available

_____18. Video Tape (if applicable)

_____19. Ensure ECG Classification is correct – 960502140 CRCA-03

_____20. Reset P-250 Rod Counters

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 mitigation 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.

1. 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

2. 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

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: **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 Initial training Program, evaluate the need to modify or replace the scenario.

ATTACHMENT 5

CT#1 –Stop 22 RCP prior to entering EOP-TRIP-0001.

CT#2 – Manually initiate Containment Spray. (E-0--E)

CT#3 – Isolate the faulted SG. (E-2--A)

CT#4 – Terminate Safety Injection Flow. (FR-P.1--A)

ATTACHMENT 5B
SCENARIO SET EVALUATION

Note: The following criteria list scenario traits that are numerical in nature. A second set of numbers indicates a range to be met for a set of two scenarios. Therefore, to complete this part of the review, the set of scenarios must be available. This page should be completed once per scenario set.

SCENARIO SET CONSISTS OF SCENARIO ESG- AND ESG- _____

Initials	Qualitative Attributes
_____	• Total malfunctions inserted: 4-8/10-14
_____	• Malfunctions that occur after EOP entry: 1-4/3-6
_____	• Abnormal Events: 1-2/2-3
_____	• Major Transients: 1-2/2-3
_____	• EOPs used beyond primary scram response EOP: 1-3/3-5
_____	• EOP Contingency Procedures used: 0-3/1-3
_____	• Approximate scenario run time: 45-60 minutes (One scenario may approach 90 minutes)
_____	• EOP run time: 40-70% of scenario run time
_____	• Crew Critical Tasks: 2-5/5-8
_____	• Technical Specifications are exercised during the test
_____	• Events used in the two scenarios are not repeated
_____	• The scenario sets for the exam week do not contain duplicate scenarios

COMMENTS:

Facility: Salem Units 1 & 2 **Scenario No.:** 3 **Op Test No.:**

Examiners: _____ **Candidates:** _____ **CRS**

_____ _____ **RO**

_____ _____ **PO**

Objectives: In accordance with plant procedures: (a) begin a normal power ascension to 100%; (b) respond to the controlling pressurizer level channel failing low; (c) respond to a leaking Pressurizer PORV, PR1; (d) respond to failure of a PRNIS channel; (e) respond to the loss of 4kV CW Bus Section 23 and the trip of the 21B Circulating Water Pump, resulting in a lowering condenser vacuum; (f) manually trip the reactor due to the lowering vacuum; (g) respond to a failure of the reactor to trip; (h) enter and properly execute the EOP network; (i) take compensatory action for failure of a valve in the rapid boration flowpath; (j) respond to a subsequent loss of all AC power

Initial Conditions: IC-85 at 70% power with 22 AFW Pump OOS for bearing replacement and 21 CFCU OOS for coil leak repairs.

Turnover: The plant is in Mode 1 with power at 70%. 22 AFW Pump is OOS for bearing replacement and 21 CFCU is OOS for coil leak repairs. All other equipment is operating normally and major control systems are in AUTO. Orders for the shift are to raise power to 100% at 5% per hour.

Event No.	Malf. No.	Event Type*	Event Description
1		N CRS N PO R RO	Perform a normal ascension to 100% power
2	PR0017	I CRS RO	Controlling Pressurizer Level channel fails low
3	PR0018A	C CRS RO	2PR1, Pressurizer PORV, develops a leak
4	NI0193	I CRS RO	PRNIS Channel fails high
5	EL0053 CW0114F	C CRS PO	Loss of Circulating Water 4kV Bus Section 23 21B CW Pump trip due to screen differential level
6	RP0058 RP0059A	M ALL	Failure of the Reactor to Trip (Auto & Manual)
7	VL0095	C CRS RO	CV175, Rapid Borate Valve, fails closed
8	EL0134 EL0161 EL0146 EL0273B IO2BDD	M ALL	Loss of All AC Power 2A DG Trip 2C 4KV Bus Differential 2B DG Bkr fail to Auto Close 2B DG Bkr Trip upon Closure

* **(N)**ormal, **(R)**eactivity, **(I)**nstrument, **(C)**omponent, **(M)**ajor

SCENARIO SUMMARY (ECHO-ESG3)

The crew starts a normal power ascension to 100%. On cue from the Lead Evaluator, the controlling pressurizer level channel fails low causing actual level to rise. The crew should respond in accordance with (IAW) the Alarm Response Procedures (ARP's) and remove it from service IAW S2.OP-SO.RPS-0003, Placing a Pressurizer Channel in a Tripped Condition.

When pressurizer level control is in AUTO and the technical specification determination made, 2PR1, Pressurizer PORV, develops a leak. The crew should respond IAW S2.OP-AB.PZR-0001, Pressurizer Pressure Malfunction, closing PR6 to isolate the leak.

After PR-1 is isolated and technical specifications have been addressed, a PRNIS channel will fail high, causing rods to step out. The crew should respond IAW S2.OP-AB.ROD-0003, Continuous Rod Motion.

After the PRNIS channel is tripped and rod control has been returned to AUTO, a loss of condenser vacuum will occur when 4kV Bus CW2 de-energizes and 21B Circulating Water Pump trips. The crew should respond IAW S2.OP-AB.COND-0001, Loss of Condenser Vacuum.

As vacuum continues to degrade, the crew should initiate a MANUAL reactor trip and enter EOP-TRIP-1, Reactor Trip or Safety Injection. When the reactor trip is not confirmed, the crew should transition to EOP-FRSM-1, Response to Nuclear Power Generation. During initiation of rapid boration, CV175 fails to open requiring boron injection from the RWST.

After the crew confirms a reactor trip and has returned to EOP-TRIP-1, a Loss of all AC power will occur. The crew should transition to EOP-LOPA-1, Loss of All AC Power. The crew should energize 2B 4KV Vital Bus by manually closing 2B EDG breaker. The scenario may be terminated when either 23 or 24 SW Pump is running or at the discretion of the Lead Examiner.

SIMULATOR EXAM SCENARIO

SCENARIO TITLE: ATWT-LOPA

SCENARIO NUMBER: 3

EFFECTIVE DATE: 1/10/00

EXPECTED DURATION: 1.5 Hours

REVISION NUMBER: 0

PROGRAM:

- [ ] **LO REQUAL**
- [X] **INITIAL LICENSE**
- [ ] **STA**
- [ ] **OTHER**_____

Revision Summary: **Rev 0**

PREPARED BY: _____ 1-18-00
(DATE)

APPROVED BY: _____ 1-18-00
(TRAINING SUPERVISOR) **(DATE)**

APPROVED BY: _____ 1/20/00
(TRAINING SUPERVISOR) **(DATE)**

I. OBJECTIVES

Terminal Objectives

A. Given indication of plant conditions requiring use of the abnormal operating procedures, correctly implement the abnormal operating procedure network to mitigate the event in accordance with approved station procedures.

B. Given indication of plant conditions requiring use of the emergency operating procedures, correctly implement the emergency operating procedure network to mitigate the event in accordance with approved station procedures.

Enabling Objectives

A. Given the unit at 90% power, perform the actions necessary for a normal ascension to 100% power at a rate not to exceed 5% per hour.

B. Given the indications of a failed Pressurizer Level Channel, perform actions as the Nuclear Control Operator to RESPOND to the pressurizer level channel in accordance with the approved station procedures.

C. Given the indications of a leaking Pressurizer PORV, perform actions as the Nuclear Control Operator to RESPOND to the leaking PORV in accordance with the approved station procedures.

D. Given the indications of a failure of a Power Range Nuclear Instrumentation N-44, perform actions as the Nuclear Control Operator to RESPOND to the N-44 failure in accordance with the approved station procedures.

E. Given the indications of a loss of Condenser Vacuum, perform actions as the Nuclear Control Operator to RESPOND to the loss of vacuum in accordance with the approved station procedures.

F. Given the indications of an Anticipated Transient Without Trip event, DIRECT the response to the ATWT in accordance with approved station procedures.

G. Given the indications of an Anticipated Transient Without Trip event, perform actions as the Nuclear Control Operator to RESPOND to the ATWT in accordance with approved station procedures.

H. Given the indications of CV175, Rapid Borate Valve, failing to open, perform actions as the Nuclear Control Operator to RESPOND to the valve failure in accordance with approved station procedures.

I. Given the indications of a Loss of All AC Power, DIRECT the response to the loss of power in accordance with approved station procedures.

J. Given the indications of a Loss of All AC Power, perform actions as the Nuclear Control Operator to RESPOND to loss of power in accordance with the approved station procedures.

II. MAJOR EVENTS

A. Perform a normal ascension to 100% power

B. Controlling Pressurizer Level channel fails low

C. Pressurizer PORV, PR-1 develops a leak

D. Power Range NIS fails high

E. Loss of Circulating Water 4kV Bus 23 and trip of 23B CW Pump trip due to screen differential level

F. Failure of the Reactor to Trip (Auto & Manual)

G. Rapid Borate Valve CV-175 fails closed

H. Loss of All AC Power

III. SCENARIO SUMMARY

A. The scenario begins with a normal ascension to 100% power. When the power ascension has progressed to the satisfaction of the Examination Team, the controlling Pressurizer Level Channel, LT-459 will fail low causing Charging Flow and actual Pressurizer level to rise. The crew should respond in accordance with the Annunciator Response Procedures and S2.OP-SO.RPS-0003, Placing the Pressurizer Level Channel in Tripped Condition.

B. When pressurizer level control and letdown are restored, Pressurizer PORV, PR-1 will develop a leak. The crew should respond by entering S2.OP-AB.PZR-0001, Pressurizer Pressure Malfunction and closing PR-6 to isolate PR-1.

C. After PR-1 is isolated and Technical Specifications have been addressed, a Power Range NIS fails high causing Control Rods to insert at 72 steps per minute. The crew should respond by entering and taking the actions of S2.OP-AB.NIS-0001, Nuclear Instrumentation Channel Malfunctions.

D. After the rods are in manual and the RCS temperature is returned to normal, a loss of Condenser vacuum will occur when 4kV Bus CW23 is de-energized causing a loss of 21A, 22A and 23A Circulating Water Pumps, 23B Circulating Water Pump subsequently trips due to high screen differential level. The crew should respond in accordance with S2.OP-AB.CW-0001, Circulating Water System Malfunction.

E. As vacuum continues to degrade, the crew should initiate a manual Reactor Trip and enter EOP-TRIP-0001, Reactor Trip or Safety Injection. When it is determined that the Reactor does not trip, the crew should transition to EOP-FRSM-0001, Response to Nuclear Power Generation.

F. While initiating a Rapid Boration, CV-175 fails to open requiring boron injection from the RWST via the BIT. When the crew completes the first pass through EOP-FRSM-0001 and loops back to step 2, a Loss of all AC power will occur. The crew should complete the actions of FRSM-0001 and transition to EOP-LOPA-0001, Loss of All AC Power.

G. The crew should energize the 2B 4kV Bus by manually closing the breaker for the 2B DG in accordance with EOP-LOPA-0001. The scenario may be terminated when the 2B 4kV Bus is energized and either the 23 or 24 Service Water Pump is running or at the discretion of the Lead Examiner.

IV. INITIAL CONDITIONS

IC-196 or IC-84, EOL at 90% power with the following conditions:

a. 22 Aux Feedwater Pump C/T for bearing replacement.

b. 21 CFCU C/T to repair a coil leak.

MALFUNCTIONS

	Malfunction	Severity	Delay	Ramp	Description	
_____1.	VL0095	0			2CV175 Fails Closed	
_____2.	VC0173A				21 CFCU Trip	
_____3.	RP0058				Failure of automatic Reactor trip	
_____4.	RP0059A				Failure of manual Reactor trip	
_____5.	RP0059B				Failure of manual Reactor trip/SI	
_____6.	PR0017A	0			PZR Level Ch 1 Lt-459 Fails low	RT-1
_____7.	PR0018A	210,000		10 min	PZR PORV 2PR1 Develops a Leak	RT-2
_____8.	NI0193D	200			PR Ch N44 Fails Hi	RT-3
_____9.	CN0086	50		2min	Loss of Cond Vac	RT-4
_____10.	EL0060				CW Bus Auto Swap fails	RT-4
_____11.	EL0053				Loss of 23 Circulating Water Bus	RT-4
_____12.	CW0114F				23B Circulating Water Pump Trip	RT-5
_____13.	EL0134				Loss of all 500KV Off-site Power	RT-6
_____14.	EL0161				2A DG Trip	RT-6
_____15.	EL0273B				2B DG Breaker fail to auto close	RT-6
_____16.	EL0146				Loss of 2C 4kV Vital Bus	RT-6

I/O OVERRIDES

	Override/Type	SER Pt.	DI	DO	Condition	Description
____1.	CD02 2BDD		X		OFF	2B Diesel Gen/Bkr Close
____2.	B440 Rx Trip Bkr A		X		OFF	2A Rx Trip Bkr Open Switch
____3.	B441 Rx Trip Bkr B		X		OFF	2B Rx Trip Bkr Open Switch
____4.	C310 2E6D		X		OFF	2E6D Bkr Open Switch
____5.	C510 2G6D		X		OFF	2G6D Bkr Open Switch
____6.	AD02 21 CFCU		X		ON	21 CFCU Low Speed Stop Switch

REMOTES

	Remote/Type	Condition	Description
____1.	AF25D	OFF	22 AFW pp Control Power off
____2.	AF0026D	Tagged	22 AFW pp Rack Out

TAGGED EQUIPMENT

	Description
____1.	22 Aux Feedwater Pump C/T for bearing replacement
____2.	21 CFCU C/T for coil Leak Repair.

OTHER:

Provide marked up copy of S2.OP-IO.ZZ-0004

V. SEQUENCE OF EVENTS

A. Designate shift positions.

B. Conduct a shift briefing outlining the shift instructions to the crew. (Provide each crew member with a copy of the Shift Turnover Sheet)

C. Inform the crew " The simulator is running and that board walk-downs should be performed. CRS please inform me when your Crew is ready to assume the shift."

D. Allow sufficient time for panel walk-downs. When informed by the CRS that the Crew is ready to assume the shift, ensure the simulator is cleared of unauthorized personnel.

Evaluator/Instructor Activity	Expected Plant/Student Response	Comments

1. Power ascension using normal plant procedures.

No malfunctions other than those already inserted to start the scenario. Due to a fuel defect, the crew will rais load at a maximum of 5% per hr until either 100% power is reached or PZR Level channel fails

- The **CREW** commences a power ascension IAW Step 5.1 of S2.OP-IO.ZZ-0004, Power Operation.
  - Notify the Systems Operator and the Condensate Polishing Operator of the upcoming power ascension.

- The **PO** raises Turbine load IAW S2.OP-SO.TRB-0001, Turbine Generator Startup Operations.
  - Initiates monitoring the Main Turbine Data display points on the Plant Computer.
  - Monitor Turbine parameters IAW S2.OP-SO.TRB-0001, Att. 2.
  - Uses the REF ▲ and GO pushbuttons to attain desired load.
  - Monitor condenser ΔT Limits.

- The **RO** maintains AFD within the target band using Auto Rod motion and Dilution.

- The **RO** Maintains T_{AVG}/T_{REF} mismatch at minimum value with Rod motion and dilution.

- The **RO** adjusts RCS Boron concentration to maintain T_{AVG} and AFD using Boron Concentration Control, S2.OP-SO.CVC-0006.
  - DEPRESS Makeup Control Mode Select STOP Pushbutton.
  - SET Primary Water Flow Register to the number of gallons desired.

- DEPRESS Makeup Control Mode Select DILUTE or alternate DILUTE Pushbutton.
- DEPRESS Makeup Control Mode Select START Pushbutton.

- When dilution is complete, depress Makeup Control Mode Select STOP Pushbutton.
- DEPRESS Makeup Control Mode Select AUTO Pushbutton.
- DEPRESS Makeup Control Mode Select START Pushbutton.

2. LT-459, Pressurizer Level fails low.

When the power ascention has progressed to the satisfaction of the examination team, initiate the failure of the PZR level channel by inserrting RT-1: PR0017A: PZR Level Ch 1 Lt-459 Fails low

The failure of LT-459 low causes the following plant response:

- Indicated level will fail low causing charging flow to rise to compensate.
- Actual Pressurizer level will begin to rise.
- OHA E-36, PZR HTR OFF LVL LO
- All Pressurizer Heaters de-energize
- Letdown isolates

- The **CREW** responds to the alarms IAW the appropriate Alarm Response Procedures.

- The **RO** compares Pressurizer level channels and determines Channel I to be failed.

- The **RO** gains concurrence of the **CRS** and places the Pressurizer Master Flow Controller in Manual and minimizes Charging Flow.

- The **RO** selects Pressurizer Level Channel III for Control.

- The **RO** restores Pressurizer heaters.

- The **RO/PO** Restores Letdown IAW S2.OP-SO.CVC-0001, Charging, Letdown and Seal Injection.

  - Open 2CV2, LTDWN LINE ISOL V.
  - Open 2CV277, LTDWN LINE ISOL V
  - Place 2CV2, LTDWN LINE ISOL V in AUTO.
  - Place 2CV277, LTDWN LINE ISOL V in AUTO.
  - Open 2CV7, LTDWN HX INLET V.
  - Place 2CV18 in MANUAL CLOSE.
  - Open 2CV18 until CLOSE (INC PRESS) pushbutton extinguishes.
  - Ensure Charging flow is 85-90 gpm.
  - Adjust 2CV71, to maintain 6-12 gpm
  - Open 2CV4, 75 GPM ORIFICE.
  - Adjust 2CV18, to maintain Letdown pressure approximately 300 psig
  - Ensure Master Flow Controller in AUTO.
  - Place 2CV55 in AUTO.
  - Adjust 2CV18, to maintain letdown pressure approximately 300 psig and place in AUTO.

- The **CRS** reviews Tech Specs and enters LCO 3.3.1.1 action 6.

- The **CRS** initiates the actions of S2.OP-SO.RPS-0003, Placing Pressurizer Level Channel I in the tripped condition.

- The **RO** restores Pressurizer Level to the program band IAW S2.OP-AR.ZZ-0005, Overhead Annunciators Window E-36.

3. PR-1 develops a leak.

When PZR Level is stable and Tech Specs have been reviewed, or at the direction of the examination team, initiate the leak of PR-1 by inserting RT-2, MALF: PR0018A at a severity of 210,000 lbm/hr. on a ramp of 10 min.

The crew will be alerted to the failure by the following plant response:

- RCS pressure begins to lower.
- Relief valve tailpipe temperature begins to rise.

- The **RO** should respond by checking some or all of the following:
  - Pressurizer Tailpipe temperatures.
  - Pressurizer heater status.
  - Pressurizer Spray Valves PS-1 & PS-2 status.
  - Pressurizer level status.
  - RCS Temperature.

- The **CRS** enters and initiates actions IAW S2.OP-AB.PZR-0001, Pressurizer Pressure Malfunction.

Step will only be accomplished if CREW decides PORV is failed, once leaking PORV is isolated with block valve unaffected PORV should be returned to AUTO.

- The **RO** should place PR-1 & PR-2 in MANUAL.

- The **RO** should close PR-6 & PR-7, PORV Isolation Valves and monitor tailpipe temperature.

- The **RO** should open PR-6 after tailpipe temperature lowers and monitor tailpipe temperature.

- The **RO** should close PR-6 when temperature is observed to be rising.

- The **RO** should open PR-7 after pressure stabilizes and monitor tailpipe temperature.

- The **CRS** should refer to Tech Spec
  - 3.4.5.
  - 3.2.5.

4. N44 Fails High

After Tech Specs have been reviewed, Insert RT-3: MALF:NI:0193D

The **CREW** will be alerted to the failure by rods driving in, and several OHA alarms including E-15, E-31, E-39 and E-47.

- The **RO** should:
  - verify no runback is in progress and rod motion is not required
  - gain concurrence of **CRS** and place rods in manual

Note: CRS may first direct entry into AB.ROD-003 for inadvertent rod motion, this procedure will direct entry into AB.NIS

- **CRS** Enters S2.OP-AB.NIS-0001

- **RO** identifies the failed channel as N-44

Note: Outward rod motion is blocked until channel is removed from service

- **CRS** initiates removal of channel from service IAW S2.OP-SO.RPS-0001.

- **CRS** refers to Tech Specs and enters:
  - 3.3.1.1act 2 and 6

5. Loss of 23 Circ Water Bus.

After Tech Specs have been reviewed, or at the discretion of the lead evaluator, de-energize the 23 Circ Water Bus by inserting RT-4: MALF:EL0053:EL0060: CN0086,Sev:50,Ramp:2 min

The **CREW** will be alerted to the failure by the following plant response:

- OHA K-2, 4KV CIRC WATER BUS DIFF/OVRLD.
- OHA K-34, 4KV CW BUS UNDERVOLT.
- Lowering Condenser vacuum.

- The **RO/PO** should respond IAW the appropriate alarm response procedures.

- The **CRS** should enter and initiate the actions of S2.OP-AB.CW-0001, Circulating Water System Malfunction.

- The **CRS** should initiate Attachment 1, Continuous Action Summary.

- The **CREW** should initiate a load reduction at a rate of < 5%/min. as necessary to maintain backpressure limits IAW Attachment 1.

The PO INITIATES a Turbine load reduction with IAW S2.OP-SO.TRB-0002, Turbine Generator Shutdown Operations.

Uses the REF ∇ and GO pushbuttons to attain desired load.

- The **RO** maintains T_{avg} and AFD using Boration and automatic rod insertion.

NOTE: The Boration should be estimated using appropriate reactivity plan

- The RO initiates a boration IAW S2.OP-SO.CVC-0006, Boron Concentration Control.

6. 23B CW Pump trip.

After the load reduction has been commenced, initiate the trip of 23B CW Pump by inserting RT-5:MALF: CW0114F.

The crew will be alerted to the trip by:

- CC3 console Group alarm.
- Flashing EMERGENCY TRIP button.

NOTE: The crew may enter S2.OP-AB.LOAD-0001, Rapid Load Reduction to reduce load at > 5%/min.

- The **CREW** should raise the rate of power reduction as necessary to maintain vacuum and backpressure limits.

Note: IF CRS does not order a Reactor Trip Modify MALF:CN0086 to Sev: 100 Ramp: 1 min

- As backpressure continues to degrade the **CRS** should decide to TRIP the Reactor

7. Failure of the Reactor to trip.

NOTE: The malfunctions for this event (RP0058,RP0059A and RP0059B) were pre-inserted at the beginning of the scenario.

- The **RO** initiates a manual Reactor Trip, identifies the failure to trip and performs the immediate actions of EOP-TRIP-0001, Reactor Trip or Safety Injection:
  - Trip the reactor using both Trip Switches.
  - Depress the Reactor Trip Breaker OPEN pushbuttons.
  - Opens 460 V breakers 2E6D and 2G6D.
  - Verifies the Reactor is not tripped.
  - Trip the Turbine and verify TSV CLOSED and AST OIL PRESS LOW lights illuminated on RP4.
  - Initiates Control Rod insertion.

Critical Step # 1: Sat _____
Unsat ____
Ro Trips the Turbine within 60 seconds of Reactor Trip Demand

- The **CRS** enters and directs the actions of EOP-TRIP-0001, Reactor Trip or Safety Injection.

The CRS should immediately dispatch an operator to open all Rx Trip and MG set breakers. When boration Flow is established delete OR: B440,B441 and Malf :RP0058,RP0059A, RP0059B and use override to open trip breakers use remotes RP07,08,09,10D to open MG set Breakers.

- The **CRS** transitions to EOP-FRSM-0001, Response to Nuclear Power Generation at step 2.2 of EOP-TRIP-0001.

- The **PO** should establish AFW flow > 44E4 lbm/hr.

- The **RO** starts the second Centrifugal Charging Pump and adjusts CV71 to RCP Seal Injection flow $\leq$ 40 gpm.

8. Rapid Borate Valve, CV-175 fails to open.

NOTE: The malfunction to fail CV-175, Rapid Borate Valve closed (VL0095) was pre-inserted. CREW may decide to leave cv160's open to protect pump since 2CV175 will not open.

- The **RO/PO** initiates Rapid Boration as follows:
  - Starts 21 & 22 Boric Acid transfer Pumps in fast speed.
  - Attempts to open CV175, Rapid Borate Stop Valve.
  - Closes 21 and 22 CV160

- The **RO/PO** isolates letdown by closing:
  - CV3, CV4 & CV5, Orifice Isolations.
  - CV2 & CV277, Letdown Isolations.
  - CV7, Letdown Isolation.

Critical Step # 2: Sat _____ Unsat ____
CREW initiates boration flow prior to exiting 2-EOP-FRSM-1

- The **RO/PO** aligns a flowpath to the Boron Injection Tank by opening:
  - SJ1 & SJ2, RWST to Charging Pump.
  - SJ12 & SJ13, BIT Outlet.
  - SJ4 & SJ5, BIT Inlet.
- The **RO/PO** Isolates the normal charging flowpath by closing:
  - CV40 & CV41, Discharge Stop Valve.
  - CV68 & CV69, Charging Discharge Valves.

NOTE: The crew may stop both Boric Acid pumps to prevent pump damage.

9. Loss of All AC Power.

After the Boration Flowpath has been aligned through the BIT, initiate the Loss of All AC Power by inserting RT-6 with the following malfunctions:

- EL0134, Loss of All AC Power
- EL0161, 2A DG Trip
- EL0146, 2C 4KV Bus Differential
- EL0273B, 2B DG Bkr fail to Auto Close

Override 2BDD, 2B DG Bkr Trip CLOSE PB OFF

The loss of power will cause all control rods to fully insert if not already locally tripped.

- The **CREW** should recognize the Loss of All AC Power and transition to EOP-LOPA-0001.

When requested to de-energize the SECs, insert the following remote functions AFTER a 3 min delay:

- **DG01D, A SEC, OFF**
- **DG02D, B SEC, OFF**
- **DG03D, C SEC, OFF**

- The **CREW** should send an Equipment Operator to de-energize all SECs.

- The **PO** should initiate Blackout Coping Actions IAW S2.OP-AB.LOOP-0001, Loss of Off-site Power, Attachment 1, Part A.

- The **CREW** should recognize the 2B DG Breaker did not auto close and attempt to close the breaker manually.

- The **RO/PO** Closes the 2B DG Bkr. 2BDD:
  - Press the Mimic Bus 2B DG BKR 2BDD pushbutton.
  - Verify 2B MIMIC BUS INTERLOCK CLOSE SELECTION light is illuminated.
  - Press 2B BREAKER CLOSE pushbutton.

- The **CREW** should recognize when the 2B DG Breaker will not close that two DGs are running without Service Water and stop both DGs IAW EOP-LOPA-0001 CAS.

Critical Step #3: Sat_____ Unsat_____
Crew stops any Diesel not supplied with Service water before Diesel overheating

- The **PO** stops the 2B & 2C Diesels.

- The **CREW** should send Equipment Operators to close 2SW26, Service Water to Turbine Building Isolation.

When SI Actuation and Reset actions have been initiated, clear the Override on 2B D/G Bkr to allow closure of the breaker.

THEN:

Report to the Control Room as an Equipment Operator that investigation revealed the 2B DG Breaker was not racked in properly. The breaker has been racked in and Electricians at the breaker recommend a re-closure attempt.

- The **RO/PO** initiates Safety Injection
- The **RO/PO** closes:
  - Phase A Isolation valves (Table D)
  - Containment Isolation valves (Table E)
- The **RO/PO** starts the 2B DG

NOTE: The Mimic Bus Pushbutton may have been previously been selected.

- The **RO/PO** Closes the 2B DG Bkr 2BDD:
  - Press the Mimic Bus 2B DG BKR 2BDD pushbutton.
  - Verify 2B MIMIC BUS INTERLOCK CLOSE SELECTION light is illuminated.
  - Press 2B BREAKER CLOSE pushbutton and verify bus voltage is > 3900 volts.

Critical Step # 4: Sat _____
Unsat ____
Start one Service Water Pump on the energized bus before any Diesel overheating occurs.

- The **RO/PO** should:
  - Start either 23 or 24 Service Water Pump.
  - Close 21SW20, Turbine Area SW Stop Valve.

When the 2B 4 KV Bus has been energized, Service Water is restored and with the concurrence of the Examination Team, the scenario may be terminated.

After the scenario has been terminated, the CRS should refer to the ECG to Classify the event.

- The CRS refers to the ECG and classifies the event:
  - SAE - 5.1.3
  - SAE - 7.1.3 After 15 min.

VI. SCENARIO REFERENCES

A. ES-301, Preparing Initial Operating Tests
B. K/A Catalog
C. JTA Listing
D. Technical Specifications
E. S2.OP-IO.ZZ-0004
F. S2.OP-SO.CVC-0006
G. S2.OP-SO.TRB-0001
H. S2.OP-SO.TRB-0002
I. S2.OP-SO.RPS-0001
J. S2.OP-SO.RPS-0003
K. Various Alarm Response Procedures
L. S2.OP-AB.CW-0001
M. S2.OP-AB.NIS-0001
N. S2.OP-AB.LOOP-0001
O. S2.OP-AB.PZR-0001
P. S2.OP-AB.ROD-0003
Q. 2-EOP-TRIP-0001
R. 2-EOP-FRSM-0002
S. 2-EOP-LOPA-1
T. ECG

ATTACHMENT 1
UNIT TWO PLANT STATUS TODAY

MODE: 1	POWER: 90%	RCS BORON: 103 ppm	Mwe: 1060

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

REACTIVITY PARAMETERS: Core Burnup 17,500 MWD/MTU

MOST LIMITING LCO AND DATE/TIME OF EXPIRATION:

3.7.2 22 Aux Feedwater Pump out of service for bearing replacement. The 72 hr LCO expires at 2330 tomorrow.

EVOLUTIONS/PROCEDURES/SURVEILLANCES IN PROGRESS:

Power ascension to 100%.

PLANT TURNOVER IS AS FOLLOWS:

- Power was reduced three days ago at the request of the ESO following an extended run at full power.
- 22 Aux Feedwater Pump out of service for bearing replacement. Maintenance estimates the work will be complete in approximately 14 hours.
- 21 CFCU cleared and tagged for cooling coil leak repair.
- The orders for the shift are to raise power to 100% at a rate not to exceed 5%/hr. due to a fuel defect.

ABNORMAL PLANT CONFIGURATIONS: NONE

CONTROL ROOM:

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

PRIMARY: NONE

SECONDARY: Heating Steam is aligned to unit 1.

RADWASTE: No discharges in progress

CIRCULATING WATER/SERVICE WATER:

ATTACHMENT 2
SIMULATOR READY FOR TRAINING CHECKLIST

_____1. Verify simulator is in correct load for training

_____2. All required computer terminals in operation

_____3. Simulator clocks synchronized

_____4. Required chart recorders advanced and ON (proper paper installed)

_____5. Rod step counters correct (channel check)

_____6. All tagged equipment properly secured and documented (TSAS Log filled out)

_____7. DL-10 log up-to-date

_____8. Required procedures clean

_____9. All OHA lamps operating (OHA Test)

_____10. All printers have adequate paper AND functional ribbon

_____11. Procedure pens available

_____12. Procedures in progress open and signed-off to proper step

_____13. Shift manning sheet available

_____14. SPDS reset

_____15. Reference verification performed with required documents available

_____16. Ensure a current RCS Leak Rate Worksheet is placed by Aux Alarm Typewriter with Baseline Data filled out

_____17. Required keys available

_____18. Video Tape (if applicable)

_____19. Ensure ECG Classification is correct – 960502140 CRCA-03

_____20. Reset P-250 Rod Counters

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 judgement 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.

1. 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

2. 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

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:	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 Initial training Program, evaluate the need to modify or replace the scenario.

ATTACHMENT 5

CT#1 – Initiate a Turbine Trip within 60 seconds of the failure of the Reactor toTrip. (FR-S.1--A)

CT#2 – Establish an Emergency Boration flowpath. (FR-S.1--C)

CT#3 – Stop all DGs not supplied with Service Water. (E-2--A)

CT#4 – Start Service Water Pumps after energizing a 4kV Bus to supply the running DG. (ECA-0.0--F)

ATTACHMENT 5B
SCENARIO SET EVALUATION

Note: The following criteria list scenario traits that are numerical in nature. A second set of numbers indicates a range to be met for a set of two scenarios. Therefore, to complete this part of the review, the set of scenarios must be available. This page should be completed once per scenario set.

SCENARIO SET CONSISTS OF SCENARIO ESG- AND ESG-

Initials	Qualitative Attributes
_____	• Total malfunctions inserted: 4-8/10-14
_____	• Malfunctions that occur after EOP entry: 1-4/3-6
_____	• Abnormal Events: 1-2/2-3
_____	• Major Transients: 1-2/2-3
_____	• EOPs used beyond primary scram response EOP: 1-3/3-5
_____	• EOP Contingency Procedures used: 0-3/1-3
_____	• Approximate scenario run time: 45-60 minutes (One scenario may approach 90 minutes)
_____	• EOP run time: 40-70% of scenario run time
_____	• Crew Critical Tasks: 2-5/5-8
_____	• Technical Specifications are exercised during the test
_____	• Events used in the two scenarios are not repeated
_____	• The scenario sets for the exam week do not contain duplicate scenarios

COMMENTS:

Facility: Salem Units 1 & 2 **Scenario No.:** 4 **Op Test No.:**

Examiners: _____ **Candidates:** _____ **CRS**

_____ _____ **RO**

_____ _____ **PO**

Objectives: In accordance with plant procedures: (a) begin a normal power ascension to 100 %; (b) respond to RCS loop 23 T_{cold} failing high; (c) respond to a SG Atmospheric Relief Valve failing open; (d) respond to a SGFP trip; (e) respond to a SGFP discharge pipe break; (f) enter and properly execute the EOP network; (g) respond to a trip of 23 AFW Pump and the subsequent loss of 21 AFW Pump when 2A 4KV Vital Bus de-energizes; (h) isolate the SGFP discharge pipe break and feed one or more SG's via a Condensate Pump; (i) energize the SRNIS detectors

Initial Conditions: IC-84 at 90% power with 22 AFW Pump OOS for bearing replacement and 21 CFCU OOS for coil leak repairs.

Turnover: The plant is in Mode 1 with power at 90%. 22 AFW Pump is OOS for bearing replacement and 21 CFCU is OOS for coil leak repairs. All other equipment is operating normally and major control systems are in AUTO. Orders for the shift are to perform a normal power ascension to 100%, at 5% per hour.

Event No.	Malf. No.	Event Type*	Event Description
1		N CRS N PO R RO	Perform a normal ascension to 100% power.
2	RC0015C	I CRS RO	23 Loop T_{cold} fails High
3	SG0129B	C CRS PO	22MS10 setpoint fails low
4	BF0105B	C ALL	22 SGFP trip
5	CN0117 BF0106	M All	22 and 23 Condensate Pump trip 21 SGFP Discharge Line break
6	AF0183	C CRS PO	23 Aux Feedwater Pump overspeed trip
7	EL0144	C All	Loss of 2A 4160V Vital Bus
8	NI0195D	I CRS RO	Under-compensated IRNIS Channel (N-36)

* **(N)**ormal, **(R)**eactivity, **(I)**nstrument, **(C)**omponent, **(M)**ajor

SCENARIO SUMMARY (ECHO-ESG4)

The crew begins a normal power ascension to 100%. On cue from the Lead Evaluator, RCS Loop 23 T_{cold} fails high causing continuous control rod insertion. The crew will respond in accordance with (IAW) S2.OP-AB.ROD-0003, Continuous Rod Motion.

When Loop 23 T_{ave} has been removed from service IAW S2.OP-SO.RPS-0002, Placing RCS Temperature Channel in Tripped Condition, 21MS10, 21 SG Atmospheric Relief Valve will fail open. The crew should respond IAW S2.OP-AB.STM-0001, Excessive Steam Flow, closing the affected MS10 in MANUAL.

After 21MS10 has been closed, 22 SGFP will trip. The crew should respond by entering and taking the actions of S2.OP-AB.CN-0001, Main Feedwater/Condensate System Abnormality.

After the plant has been stabilized, 22 and 23 Condensate Pumps will trip coincident with the rupture of the 21 SGFP discharge line, upstream of the pump discharge valve. The PO should note the lowering SG levels, then trip the reactor and enter EOP-TRIP-1, Reactor Trip or Safety Injection.

Following the reactor trip, 23 Auxiliary Feedwater (AFW) Pump trips on overspeed, leaving only 21 AFW Pump available to feed the steam generators. While still in EOP-TRIP-1, a loss of the 2A 4KV Vital Bus will occur resulting in the loss of 21 AFW Pump. The crew should transition to EOP-FRHS-1, Response to Loss of Secondary Heat Sink. If necessary, the crew should initiate RCS Feed&Bleed and continue with the actions of FRHS-1. When the Feed System leak is identified as isolable and is isolated, the crew should establish feed via a condensate pump. During implementation of the EOP's, the RO should note that one IRNIS channel is undercompensated and then manually energize the SRNIS channels. When wide range SG level in the selected S/G is rising or at the discretion of the Lead Evaluator, the scenario may be terminated.

SIMULATOR EXAM SCENARIO

SCENARIO TITLE: FRHS-Feed With Condensate

SCENARIO NUMBER: 4

EFFECTIVE DATE: 1/1/00

EXPECTED DURATION: 1.5 Hours

REVISION NUMBER: 0

PROGRAM:

- [ ] **LO REQUAL**
- [X] **INITIAL LICENSE**
- [ ] **STA**
- [ ] **OTHER**_____

Revision Summary: **Rev 0**

PREPARED BY: _____ 1-18-00
(DATE)

APPROVED BY: _____ 1-18-00
(TRAINING SUPERVISOR) **(DATE)**

APPROVED BY: _____ 1/19/00
(TRAINING SUPERVISOR) **(DATE)**

I. OBJECTIVES

Terminal Objectives

A. Given indication of plant conditions requiring use of the abnormal operating procedures, correctly implement the abnormal operating procedure network to mitigate the event in accordance with approved station procedures.

B. Given indication of plant conditions requiring use of the emergency operating procedures, correctly implement the emergency operating procedure network to mitigate the event in accordance with approved station procedures.

Enabling Objectives

A. Given the unit at 70% power, perform the actions necessary for a normal ascension to 100% power at 5% per hour due to a fuel defect.

B. Given the indications of a failed 23 Loop T_{cold} instrument, perform actions as the Nuclear Control Operator to RESPOND to the failed channel in accordance with the approved station procedures.

C. Given the indications of an atmospheric steam generator relief valve 22MS10 failed open, perform actions as the Nuclear Control Operator to RESPOND to the failed open MS10 in accordance with the approved station procedures.

D. Given the indications of a plant transient caused by the trip of 22 SGFP, perform actions as the Nuclear Control Operator to RESPOND to the SGFP trip in accordance with the approved station procedures.

E. Given the indications of a loss of feed flow with a subsequent trip of 22 and 23 Condensate pump, perform actions as the Nuclear Control Operator to RESPOND to the loss of feed in accordance with the approved station procedures.

F. Given indication of a loss of secondary coolant, DIRECT the response to the coolant loss in accordance with approved station procedures.

G. Given the indications of a loss of secondary coolant, perform actions as the Nuclear Control Operator to RESPOND to the coolant loss in accordance with approved station procedures.

H. Given the indications of a loss of 23 Aux Feedwater (AFW) Pump, perform actions as the Nuclear Control Operator to RESPOND to the pump loss in accordance with the approved station procedures.

I. Given indication of a loss of the 2A 4kV Bus and Loss of Heat Sink, DIRECT the response to the loss of heat sink in accordance with approved station procedures.

J. Given indications of a loss of the 2A 4kV Bus and Loss of Heat Sink, perform actions as the Nuclear Control Operator to RESPOND to the loss of heat sink in accordance with approved station procedures.

K. Given the failure of the Source Range to reenergize perform actions as the Nuclear Control Operator and RESPOND IAW approved station procedures to energize source range instrumentation.

II. MAJOR EVENTS

A. Perform a normal ascension to 100 % power

B. 23 Loop T_{cold} fails high

C. 22MS10 fails open.

D. 22 SGFP trip

E. 21 SGFP Discharge Line break and subsequent trip of both Condensate Pumps

F. Overspeed trip of 23 Aux Feedwater Pump during the Reactor Trip transient

G. Loss of the 2A 4kV Bus resulting in a Loss of Secondary Heat Sink

H. Under-compensated IR NIS Channel (N-36)

III. SCENARIO SUMMARY

A. The crew will assume the watch at 70% power with directions to perform an ascension to 100% power. All controls are aligned for normal operation and all systems are operating normally EXCEPT:

22 Aux Feedwater Pump C/T for bearing replacement. The Maintenance Supervisor anticipates the work to be completed in approximately fourteen (14) hours.

21 CFCU is C/T to repair coil leak.

B. When the power ascension has progressed to the satisfaction of the Examination Team, 23 Loop T_{cold} will fail high causing continuous control rod insertion to occur. The Crew will enter and take the actions of S2.OP-AB.ROD-0003, Continuous Rod Motion.

C. When 23 Loop T_{avg} removal from service has been initiated and Tech Specs reviewed, 22MS10 will fail open causing RCS temperature to lower and Reactor Power to rise. The Crew should respond by entering and performing the actions of S2.OP-AB.STM-0001, Excessive Steam Flow, and closing the 22MS10.

D. After the Crew has stabilized reactor power, 22 SGFP will trip. The crew should respond by entering and taking the actions of S2.OP-AB.CN-0001, Main Feedwater/Condensate System Abnormality.

E. After the plant has been stabilized, 21 SGFP discharge line will rupture just upstream of the pump discharge valve with a subsequent trip of 22 and 23 Condensate Pumps. The Crew is expected to determine SG Levels are lowering, Trip the Reactor and enter EOP-TRIP-0001, Reactor Trip or Safety Injection.

F. During the Reactor Trip, 23 Aux Feedwater Pump will trip on overspeed leaving only 21 Aux Feedwater Pump available to feed the Steam Generators. The crew should continue performing the actions of EOP-TRIP-0001.

G. A loss of the 2A 4KV Vital Bus will occur resulting in the loss of 21 Aux Feedwater Pump. The Crew is expected to recognize the loss of all Aux Feed and transition to EOP-FRHS-0001, Response to Loss of Secondary Heat Sink, at the transition to EOP-TRIP-2.

H. When required by EOP-FRHS-0001, the crew will initiate Feed & Bleed and continue with the actions of EOP-FRHS-0001. When the Feed System leak is identified to be in a location that is isolable, the crew should choose and establish feed flow to one S/G establish using the one remaining Condensate Pump. The scenario may be terminated when Wide Range level in the selected S/G is rising or at the discretion of the Lead Examiner.

IV. INITIAL CONDITIONS

IC-197 from ESG disk, or IC-85 MOL at 70% power with the following conditions:

a. 22 Aux Feedwater Pump C/T for bearing replacement.

b. 21 CFCU C/T to repair a coil leak.

c. 21 Condensate Pump removed from service per IOP-4

MALFUNCTIONS

	Malfunction	Severity	Delay	Ramp	Description	
____1.	VC0173A				21 CFCU Trip	
____2.	AF0183				23 Aux Feedwater Pump overspeed trip	
____3.	NI0195D				IR CH N36 Compensating Volts Lo	
____4.	RC0015C	630			23 Loop T_{cold} fails High	(RT-1)
____5.	BF105B	2	0	0	22 SGFP Trip	(RT-3)
____6.	CN0117B	0	1min	0	22 Condensate Pump Trip	(RT-4)
____7.	CN0177C	0	1.5min		23 Condensate Pump Trip	(RT-4)
____8.	BF0106	12000	0	1min	FW Common Discharge HDR Leak	(RT-4)
____9.	CA0221				#2 Station Air Compressor Trip	(RT-4)
____10.	EL0144	0	0	0	Loss of 2A 4160V Vital Bus	(RT-5)

V. SEQUENCE OF EVENTS

A. Designate shift positions.

B. Conduct a shift briefing outlining the shift instructions to the crew. (Provide each crew member with a copy of the Shift Turnover Sheet)

C. Inform the crew " The simulator is running and that board walk-downs should be performed. CRS please inform me when your Crew is ready to assume the shift.".

D. Allow sufficient time for panel walk-downs. When informed by the CRS that the Crew is ready to assume the shift, ensure the simulator is cleared of unauthorized personnel.

Evaluator/Instructor Activity	Expected Plant/Student Response	Comments

1. Power ascension using normal plant procedures

No malfunctions other than those already inserted to start the scenario. The crew will raise load at a maximum of 5% per hr (Due to a fuel defect)until either 100% power is reached or 23 Loop T_{cold} fails.

- The **CREW** commences a power ascension IAW Step 5.1 of S2.OP-IO.ZZ-0004, Power Operation.
  - Notify the Systems Operator and the Condensate Polishing Operator of the upcoming power ascension.

- The **PO** raises Turbine load IAW S2.OP-SO.TRB-0001, Turbine Generator Startup Operations.
  - Initiates monitoring the Main Turbine
  - Data display points on the Plant Computer.
  - Monitor Turbine parameters IAW
  - S2.OP-SO.TRB-0001, Attachment 2.
  - Uses the REF ▲ and GO pushbuttons to attain desired load.
  - Monitor condenser ΔT Limits.

- The **RO** maintains AFD within the target band using Auto Rod motion and Dilution.

- The **RO** Maintains T_{AVG}/T_{REF} mismatch at minimum value with Rod motion and dilution.

Evaluator/Instructor Activity	Expected Plant/Student Response	Comments

NOTE: CREW should discuss reactivity plan for power ascension using rods and dilution. CREW may decide to start power ascension with rods.

- The **RO** adjusts RCS Boron concentration to maintain Tavg and AFD using Boron S2.OP-SO.CVC-0006Concentration Control:
  - DEPRESS Makeup Control Mode Select STOP Pushbutton.
  - SET Primary Water Flow Register to the number of gallons desired.
  - DEPRESS Makeup Control Mode Select DILUTE or Alternate DILUTE Pushbutton.
  - DEPRESS Makeup Control Mode Select START Pushbutton.
  - When dilution is complete, depress Makeup Control Mode Select STOP Pushbutton.
  - DEPRESS Makeup Control Mode Select AUTO Pushbutton.
  - DEPRESS Makeup Control Mode Select START Pushbutton.

2. 23 Loop T_{cold} fails high.

When the power ascension has progressed to the satisfaction of the Examination Team, initiate the failure of 23 Loop T_{cold} by inserting RT-1, MALF: RC0015C severity 630.

- Crew responds to rod motion and alarms.
- The **RO** determines the rod motion to be unwarranted:
  - Verifies no turbine runback in progress or required.
  - Verifies turbine load is not changing.
  - Verifies T_{ave} on program.
  - Gains concurrence of **CRS**
  - Places Rod Control in MANUAL.
- The **CRS** enters S2.OP-AB.ROD-0003.
- The **RO** controls T_{avg} within 1.5°F of target using manual Rod Control.

Evaluator/Instructor Activity	Expected Plant/Student Response	Comments

- The **RO** identifies Loop 23 T_{avg} failure.
- The **RO** places Charging Flow Master Controller in MANUAL.
- The **RO** defeats Loop 23 T_{ave} and selects recorder to a valid loop.
- The **RO** defeats Loop 23 Delta-T and selects recorder to a valid loop.
- The **RO** verifies the T_{ave}/T_{ref} mismatch is less than 1°F and places Rod Control in AUTO.
- The **RO** matches PZR level to setpoint and returns Charging Flow Master Controller to AUTO.
- The **CRS** initiates S2.OP-SO.RPS-0002, Placing RCS Temperature Channel in Tripped Condition and refers to Tech Specs.
  - 3.3.1.1 act 6
  - 3.3.2.1 act 19*
  - possibly DNB 3.2.5

3. 22MS10 Fails Open.

When Tech Specs have been reviewed and Rod Control has been returned to AUTO, or at the discretion of the Lead Examiner, initiate the failure of 22MS10 by inserting RT-2, OR: CF14, 22MS10 Decrease Setpoint Bezel: ON.

- The Crew will be alerted to the failure by a phone call from security and the following plant response:
  - RCS temp will begin to lower causing Rods to withdraw in Auto.
  - Reactor Power will rise.

Call as Security and notify CRS that steam is blowing from a pipe on top of the Outer Penetration.

- The **RO/PO** should determine that 22MS10 has an open indication.

Evaluator/Instructor Activity	Expected Plant/Student Response	Comments
CRS may request an equipment operator to go to the turbine deck to check for steam flow from relief valve tail pipes. If requested wait 2 min and report steam is blowing from 22MS10.	• The **CRS** should enter and take the actions of S2.OP-AB.STM-0001, Excessive Steam Flow	
	• The **PO** should take manual control of 22MS10 and close the valve.	
	• The **CREW** stabilizes reactor power and restores Tavg to program.	
5. 22 SGFP Trip.	The Crew will be alerted to the SGFP problem by the following plant response:	
When the 22MS10 is closed and reactor power and temperature are stable, initiate the trip of 22 SGFP by inserting RT-3, MALF: BF105B.	- TURB THRUST BEARING OIL PRESSURE HI console alarm	
	• The **CREW** responds to the plant alarms IAW the appropriate Alarm Response Procedures.	
	- Dispatch an Equipment Operator to investigate the SGFP alarms.	
NOTE: The SGFP trip will occur approximately 1 minute after the malfunction is initiated.	• The **RO/PO** identifies the loss of 22 SGFP and performs Immediate Actions by verifying:	
	- Main Turbine Automatic Runback - Rods are in AUTO. - Polisher Bypass Valves, CN108s, open. - 23/24/25 Heater Strings Bypass Valve, 2CN47, opens.	

Evaluator/Instructor Activity	Expected Plant/Student Response	Comments

- The **CRS** implements S2.OP-AB.CN-0001, Main Feedwater/Condensate System Abnormality.

NOTE: The amount of Boration should be estimated using the reactivity plan for current plant conditions.

- The **RO** initiates a boration to:
  - Maintains Tave on program.
  - Maintain AFD and Rod Insertion Limits.
- The **RO** initiates a boration by:
  - Setting the Boric Acid counter for the amount of boron to be injected.
  - Depressing makeup controls STOP.
  - Depressing BORATE.
  - Depressing START.
- The **PO** depresses the TURBINE TRIP button for 22 SGFP and verifies the AFP AUTO ARMED Bezel is illuminated.
- The **PO** monitors 21 SGFP for proper operation and SG levels are being controlled.
- The **PO** Verifies 2CN47, 23/24/25 Heater Strings Bypass valve is open.

6. 21 SGFP Disch Line Break, Trip Of #2 SAC, and 22 & 23 Condensate Pump trip.

When plant conditions have stabilized, or at the direction of the evaluation team, initiate the Feed Line break and trip of theCondensate Pumps by inserting RT-4,MALFS: BF0106, Severity:12k gpm, RAMP: 1min, CA0221, CN0117B, Delay 1min, CN0117C, Delay 1.5min.

The Crew will be alerted to the failures by the following plant response:

- CC-1 console alarm Compr 2 Trouble.
- Flashing Stop PB for 2 SAC
- Station Air pressure will lower then recover.

Evaluator/Instructor Activity	Expected Plant/Student Response	Comments

Subsequently as feed break size increases:
- Feed Reg Valves will open farther.
- Feed Flow to all S/Gs will lower.
- S/G levels will begin to lower.
- SGFP Speed will rise.
- CC2 Console Alarm due to the Condensate Pump Trip.
- CC2 Console Alarm for SG SP Dev on all 4 SGs.

NOTE: CREW should recognize Air pressure recovering and respond to feed leak as the higher priority. No actions are required for the SAC trip as #1 SAC loads automatically.

- The **CREW** should respond to the Console Alarms IAW the appropriate Alarm response Procedure.

- The **PO** should identify the transient as a loss of Feedwater flow.

NOTE: this is a rapidly moving transient and the CRS may order a Reactor Trip prior to entering any response procedures.

- The **CRS** should enter and take the actions of S2.OP-AB.CN-0001, Feedwater/Condensate System Abnormality.

- The **RO/PO** should identify the lowering S/G levels and recommend a manual Reactor trip.

- The **CRS** should DIRECT the **RO** to initiate a manual Reactor trip

- The **CREW** should enter and take the actions of EOP-TRIP-0001, Reactor Trip or Safety Injection.

Evaluator/Instructor Activity	Expected Plant/Student Response	Comments
	• The **RO** performs the immediate actions of EOP-TRIP-0001: - Trip the reactor. - Verify the Reactor is tripped by observing at least three PR channels indicate < 5% and IR indications lowering with negative SUR. - Trip the Turbine and verify TSV CLOSED and AST OIL PRESS LOW lights illuminated on RP4. - Verify Vital 4KV Bus status by observing bus voltage > 3900 volts. • The **CREW** should transition to EOP-TRIP-2, Reactor Trip Response.	
Immediately after the transition to EOP-TRIP-0002, make a report to the Control Room that there is a major steam release in the Turbine Building near 21 SGFP.	• The **CREW** may respond to the Feed Line rupture by initiating a Main Steam Line Isolation (MSLI), **CREW** may also trip the following secondary pumps in an attempt to isolate the leakage: - 21-23 Heater Drain Pumps. • The **PO** should recognize the trip of 23 Aux Feedwater Pump, establish and maintain total Aux Feed Flow to 21 & 22 S/Gs at $\geq$ 22E4 lbm/hr.	

Evaluator/Instructor Activity	Expected Plant/Student Response	Comments

7. Loss of the 2A 4KV Vital Bus.

When the CRS transitions to EOP-TRIP-0002, initiate the Loss of the 2A 4KV Vital Bus by inserting RT-5, MALF: EL0144.

NOTE: The Crew may not initiate a MSLI since a Feed rupture is already known.

The Crew will be alerted to the failure by the following plant response:

- The 2A 4KV Bus will de-energize.
- 2A D/G will start but its breaker will not close.
- All 4KV load breakers will trip (Not 460V Feeds).
- OHA J-1, 2A 4KV VTL BUS DIFF PROT.
- OHA J-4, 2A DG URGENT TRBL.
- OHA J-17, 2A 4KV BUS UNDRVOLT

- The **CREW** should recognize the loss of 21 Aux Feedwater Pump causing a Loss of Secondary heat Sink and should transition to EOP-FRHS-0001, Response to Loss of Secondary Heat Sink.

Critical Task #1: Sat_____ Unsat_____
Crew Stops All RCPs prior to Steam Generator Dryout

- The **RO** should stop all RCPs.

Initially, the Crew will be in a holding loop between Steps 2 & 22 of EOP-FRHS-0001. When one of the Feed & Bleed criteria is met, the Crew will proceed at Step 23.

- The **RO/PO** should initiate Safety Injection.

Critical Task #2: Sat_____ Unsat_____
CREW establishes vent path (Bleed and Feed) prior to RCS becoming superheated.

- The **RO** opens both Pressurizer PORVs and Stop Valves.

Evaluator/Instructor Activity	Expected Plant/Student Response	Comments
Note: 2A SEC can not be reset with the Bus Deenergized, Crew should send an operator to Deenergize 2A SEC.	• The **CRS** directs EOP-APPX-3, SI Verification be performed.	
	• The **RO** performs Safeguards Reset Actions: - Reset SI. - Reset Phase A Isolation. - Reset Phase B Isolation. - Open 21 & 22CA330, Containment Control Air Isolation Valves. - Reset each SEC. - Reset the 230V Control Centers.	
Once the crew has established Bleed and Feed, delete MALF-BF0106 and report as an Equipment Operator that the rupture is on 21 SGFP discharge upstream of the discharge isolation valve and the pump is now isolated with manual isolation valves.	• The **CREW** should respond by starting a condensate pump and returning to step 20 to establish feed using the condensate system.	
	• The **CREW** should select one S/G and establish feed using Condensate. • The **PO** should depressurize the selected S/G using associated MS10 until pressure is less than 575 psig and wide range level is rising.	

Evaluator/Instructor Activity	Expected Plant/Student Response	Comments

- The **PO** should align the Feedwater flowpath for the selected S/G:
  - Direct an Equipment Operator to open BF19 or BF40, (Performed locally).
  - Open BF13, FW Inlet Stop Valve.
  - Open BF22, Feedwater Stop Check Valve.
  - Open 21 or 22CN48, SGFP Bypass.
  - Close 21 and 22CN32, SGFP Suction Valves.

Critical Task #2: Sat_____ Unsat_____
CREW establishes Feed Water Flow to 1 SG as evidenced by rising WR level or lowering CETs

- The **PO** should coordinate with the EO to establish feed flow to selected SG

8. Failure of Source Ranges to Energize.

Low compensating Voltage on 2N36 is Preinserted and will cause a failure of the Source Range Channels to reenergize automatically.

- The **RO** should recognize the failure of the source ranges to energize when the Intermediate Range indication drops below **P-6** at **7E-11** amps.

NOTE: Intermediate Ranges will lower below P-6 approxamefially 12-15 min after Reactor Trip.

- After being notified by the **RO** that the Source Ranges failed to energize, and that 2N36 appears to be undercompensated the **CRS** directs the **RO** to manually reenergize the Source Ranges.

- **RO** manually energizes Source Ranges by depressing PB on 2CC2.

The scenario may be terminated when Wide Range level in the selected S/G is rising or at the discretion of the Lead Examiner.

Evaluator/Instructor Activity	Expected Plant/Student Response	Comments
After the scenario has been terminated, the CRS should refer to the ECG to Classify the event.	• The **CRS** refers to the ECG and classifies the event: – SAE - 3.1.1.b & 3.2.1.b **OR** – SAE - 8.1.3.C	

ATTACHMENT 1
UNIT TWO PLANT STATUS TODAY

MODE: 1	POWER: 70%	RCS BORON: 756 ppm	Mwe: 800

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

REACTIVITY PARAMETERS: Core Burnup 10,500 MWD/MTU

MOST LIMITING LCO AND DATE/TIME OF EXPIRATION:

3.7.2 22 Aux Feedwater Pump out of service for bearing replacement. The 72 hr LCO expires at 2330 tomorrow.

EVOLUTIONS/PROCEDURES/SURVEILLANCES IN PROGRESS:

Power ascension to 100%.

PLANT TURNOVER IS AS FOLLOWS:

- Power was reduced three days ago at the request of the ESO following an extended run at full power.
- 22 Aux Feedwater Pump out of service for bearing replacement. Maintenance estimates the work will be complete in approximately 14 hours.
- 21 CFCU cleared and tagged for cooling coil leak repair.
- 21 Condensate Pump OOS with Disc Valve Closed per IOP-4
- The orders for the shift are to raise power to 100% at a rate not to exceed 5%/hr. due to a fuel defect.

ABNORMAL PLANT CONFIGURATIONS: NONE

CONTROL ROOM:

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

PRIMARY: NONE

SECONDARY: Heating Steam is aligned to unit 1.

RADWASTE: No discharges in progress

CIRCULATING WATER/SERVICE WATER:

ATTACHMENT 2
SIMULATOR READY FOR TRAINING CHECKLIST

_____1. Verify simulator is in correct load for training

_____2. All required computer terminals in operation

_____3. Simulator clocks synchronized

_____4. Required chart recorders advanced and ON (proper paper installed)

_____5. Rod step counters correct (channel check)

_____6. All tagged equipment properly secured and documented (TSAS Log filled out)

_____7. DL-10 log up-to-date

_____8. Required procedures clean

_____9. All OHA lamps operating (OHA Test)

_____10. All printers have adequate paper AND functional ribbon

_____11. Procedure pens available

_____12. Procedures in progress open and signed-off to proper step

_____13. Shift manning sheet available

_____14. SPDS reset

_____15. Reference verification performed with required documents available

_____16. Ensure a current RCS Leak Rate Worksheet is placed by Aux Alarm Typewriter with Baseline Data filled out

_____17. Required keys available

_____18. Video Tape (if applicable)

_____19. Ensure ECG Classification is correct – 960502140 CRCA-03

_____20. Reset P-250 Rod Counters

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 mitigation 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.

1. 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

2. 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

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: **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 Initial training Program, evaluate the need to modify or replace the scenario.

ATTACHMENT 5

CT#1 – Manually Trip all Reactor Coolant Pumps prior to the establishing Bleed and Feed (FR-H.1--B)

CT#2 – Establish Feed & Bleed before the Pressurizer PORVs auto open. (FR-H.1--B)

CT#3 – Establish Feedwater Flow to 1 SG prior to exiting 2-EOP-FRHS-1. (FR-H.1--B)

ATTACHMENT 5B
SCENARIO SET EVALUATION

Note: The following criteria list scenario traits that are numerical in nature. A second set of numbers indicates a range to be met for a set of two scenarios. Therefore, to complete this part of the review, the set of scenarios must be available. This page should be completed once per scenario set.

SCENARIO SET CONSISTS OF SCENARIO ESG- AND ESG-

Initials	Qualitative Attributes
_____	• Total malfunctions inserted: 4-8/10-14
_____	• Malfunctions that occur after EOP entry: 1-4/3-6
_____	• Abnormal Events: 1-2/2-3
_____	• Major Transients: 1-2/2-3
_____	• EOPs used beyond primary scram response EOP: 1-3/3-5
_____	• EOP Contingency Procedures used: 0-3/1-3
_____	• Approximate scenario run time: 45-60 minutes (One scenario may approach 90 minutes)
_____	• EOP run time: 40-70% of scenario run time
_____	• Crew Critical Tasks: 2-5/5-8
_____	• Technical Specifications are exercised during the test
_____	• Events used in the two scenarios are not repeated
_____	• The scenario sets for the exam week do not contain duplicate scenarios

COMMENTS:

Facility: Salem Units 1 & 2 **Scenario No.:** 5 (SPARE) **Op Test No.:**

Examiners: _____ **Candidates:** _____ **CRS**

_____ _____ **RO**

_____ _____ **PO**

Objectives: In accordance with plant procedures: (a) begin a normal power reduction to 70%; (b) respond to the trip of 21 Charging Pump; (c) TCAF 24 TGV failing closed; (d) recognize and TCAF 21 RCS loop Thot failing as is; (e) respond to a RCS leak that progresses to a SBLOCA; (f) initiate a manual reactor trip and safety injection; (g) enter and properly execute the EOP network; (h) respond to a failure of 2C SEC and trip of 21 SI Pump.

Initial Conditions: 100% power with 22 AFW Pump C/T for bearing replacement and 21 CFCU C/T for coil leak repairs.

Turnover: The plant is in Mode 1 with power at 100%. 22 AFW Pump is OOS for bearing replacement and 21 CFCU is OOS for coil leak repairs. All other equipment is operating normally and major control systems are in AUTO. Orders for the shift are to begin a normal reduction to 70% power, at 5% per hour.

Event No.	Malf. No.	Event Type*	Event Description
1		N CRS N PO R RO	Perform a normal reduction to 70% power
2	CV0208A	C CRS RO	21 Charging Pump trip LT-459
3	TU0081H	C CRS PO RO	24 Turbine Gov. Vlv. fails closed
4	RC0014A	I CRS RO	21 Loop Thot fails as is during power reduction
5	RC0002	C CRS RO PO	RCS Leak inside Containment
6	RC0002 DG03D SJ0062A	M ALL C ALL C ALL	Ramped Small Break LOCA – 1000 gpm 2C Safeguards Equipment Control (SEC) fails to actuate 21 SI Pump Trips

* **(N)**ormal, **(R)**eactivity, **(I)**nstrument, **(C)**omponent, **(M)**ajor

SCENARIO SUMMARY (ECHO-ESG5)

The scenario begins with a normal ascension to 100% power. On cue from the Lead Evaluator, 21 Charging Pump will trip. The crew should start 22 Charging Pump and restore the CVCS charging and letdown lineups IAW system operating procedures.

When charging and letdown have been restored, 24 Turbine Governor Valve will fail closed, necessitating a rapid power reduction. The crew should take corrective actions IAW system and integrated plant operating procedures. During the power reduction 21 RCS Loop Thot instrument will fail as is, requiring the RO to control Tavg with rods in MANUAL.

When the plant has stabilized and the Tavg channel has been removed from service, a Reactor Coolant System leak will develop inside Containment. The crew should recognize changing Containment and Reactor Coolant System parameters and respond IAW S2.OP-AB.RC-0001, Reactor Coolant System Leak.

While the crew is executing S2.OP-AB.RC-0001, a small break LOCA will occur inside Containment. The crew should initiate a manual reactor trip and safety injection and enter EOP-TRIP-0001, Reactor Trip or Safety Injection. 2C Safeguards Equipment Control (SEC) fails to actuate when SI is initiated and 21 SI Pump fails to start. The crew should perform 2C SEC failure actions and start 21 SI Pump, as directed by EOP-TRIP-0001.

The crew should transition to EOP-LOCA-1, Loss of Reactor Coolant, and then to EOP-LOCA-2, Post-LOCA Cooldown and Depressurization. The scenario may be terminated after the transition to EOP-LOCA-2 or at the discretion of the Lead Evaluator.

EXAM SCENARIO

SCENARIO TITLE: SBLOCA

SCENARIO NUMBER: 5

EFFECTIVE DATE: 1/10/00

EXPECTED DURATION: 1.5 Hours

REVISION NUMBER: 0

PROGRAM:

	LO REQUAL
X	**INITIAL LICENSE**
	STA
	OTHER_____

Revision Summary: Rev 0

PREPARED BY: _____ _____
(DATE)

APPROVED BY: _____ _____
(TRAINING SUPERVISOR) **(DATE)**

APPROVED BY: _____ _____
(TRAINING SUPERVISOR) **(DATE)**

I. OBJECTIVES

Terminal Objectives

A. Given indication of plant conditions requiring use of the abnormal operating procedures, correctly implement the abnormal operating procedure network to mitigate the event in accordance with approved station procedures.

B. Given indication of plant conditions requiring use of the emergency operating procedures, correctly implement the emergency operating procedure network to mitigate the event in accordance with approved station procedures.

Enabling Objectives

A. Given the unit at 90% power, perform the actions necessary for a power reduction to 70% power.

B. Given the indications of a Charging Pump trip, perform actions as the Nuclear Control Operator to RESPOND to the tripped Charging Pump in accordance with the approved station procedures.

C. Given the indications of a failed closed turbine governor valve, perform actions as the Nuclear Control Operator to RESPOND to the failed turbine governor valve in accordance with the approved station procedures.

D. Given the indications of a Tavg channel failing as is, during a required downpower, perform actions as the Nuclear Control Operator to RESPOND to the failed channel in accordance with the approved station procedures.

E. Given the indications of a Reactor Coolant System Leak, perform actions as the Nuclear Control Operator to RESPOND to the RCS leak in accordance with the approved station procedures.

F. Given the indications of a Loss of Coolant Accident, DIRECT the response to the coolant loss in accordance with approved station procedures.

G. Given the indications of a Loss of Coolant Accident, perform actions as the Nuclear Control Operator to RESPOND to the coolant loss in accordance with approved station procedures.

H. Given the indications of a failure of the C SEC to initiate, perform actions as the Nuclear Control Operator to RESPOND to the C SEC failure in accordance with the approved station procedures.

II. MAJOR EVENTS

A. Perform a power reduction to 70% power

B. 21 Charging Pump Trips

C. Turbine Governor Valve fails closed

D. Loop 21 Thot fails as is.

E. RCS Leak Into Containment

F. Small Break LOCA (1000 gpm) with a failure of the C SEC to initiate and trip of 21 SI pump

III. SCENARIO SUMMARY

A. The scenario begins with a normal reduction to 70% power to allow the removal of 22 Condensate Pump from service for seal replacement. When the power reduction has progressed to the satisfaction of the Examination Team, 21 Charging Pump will trip. The crew should respond in accordance with the Alarm Response Procedures and start 22 Charging Pump per S2.OP-SO.CV-0002, Charging Pump Operation. Letdown should be restored per S2.OP-SO.CVC-0001, Charging, Letdown and Seal Injection.

B. When 22 Charging Pump has been started, and Letdown restored, Turbine Governor valve #24 will fail closed causing a loss of Megawatts and rise in Tavg. The crew should respond in accordance with S2.OP-SO.TURB-0001, Turbine Generator Startup and start a power reduction of 5%/min.

C. When Tavg rises due to the loss of load, 21 loop Thot will fail as is, this will cause control rods to continue to insert beyond the control band. The crew should respond by entering and taking the actions of S2.OP-AB.ROD-0003, Continuous Rod Motion. 21 loop Tavg should be removed from service IAW S2.OP-SO.RPS-0002, Placing RCS Temperature Channel in Tripped Condition.

D. When the plant has been stabilized, a Reactor Coolant System leak will develop inside Containment. The crew should recognize changing Containment and Reactor Coolant System parameters and respond by entering and taking the actions of S2.OP-AB.RC-0001, Reactor Coolant System Leak.

E. When the actions of S2.OP-AB.RC-0001 have been initiated, a small break LOCA will occur inside Containment. The C Safeguards Equipment Control (SEC) will fail, and 21 SI pump will trip when SI is initiated. The crew should initiate a manual Reactor Trip and Safety Injection and implement EOP-TRIP-0001, Reactor Trip or Safety Injection. When the C SEC fails to initiate, the crew should perform SEC actions as directed by EOP-TRIP-0001.

F. The crew should transition to 2-EOP-LOCA-1, Loss of Reactor Coolant and then to 2-EOP-LOCA-2, Post LOCA Cooldown and Depressurization. The scenario may be terminated after transition to EOP-LOCA-2 or at the discretion of the Lead Examiner.

IV. INITIAL CONDITIONS

IC-191 from Exam Disk or IC-84, EOL at 90% power with the following conditions:

a. 22 Aux Feedwater Pump C/T for bearing replacement.

b. 21 CFCU C/T to repair a coil leak.

MALFUNCTIONS

	Malfunction	Severity	Delay	Ramp	Description	
____1.	VC0173A				21 CFCU Trip	
____2.	SJ0062A				21 SI Pump trips	
____3.	CV0208A				21 Charging Pump Trip	RT-1
____4.	TU0081H				24MS29 Turb Cntrl vlv Fails Cls	RT-2
____5.	RC0014A	As Is	30 sec		21 HL RTD AVG Summator Fails	RT-2
____6.	RC0002	50 gpm		2 min	RCS Leak into Containment	RT-3
____7.	CV0040	5 pins	3 min		Fuel Element Failure	RT-3

I/O OVERRIDES

	Override/Type	SER Pt.	DI	DO	Condition	Description
____1.	AD02		X		ON	21 CFCU Slow Speed Stop PB to ON

REMOTES

	Remote/Type	Condition	Description	
____1.	AF25D	TAGGED	22 AFW Pump Rack Out	
____2.	AF26D	OFF	22 AFW pp Control Power off	
____3.	DG03D	YES	Deenergize "C" SEC Cabinet	(RT-5)

TAGGED EQUIPMENT

	Description
____1.	22 Aux Feedwater Pump C/T for bearing replacement.
____2.	21 CFCU C/T for coil Leak Repair.

OTHER:

Provide marked up copy of S2.OP-IO.ZZ-0004

V. SEQUENCE OF EVENTS

A. Designate shift positions.

B. Conduct a shift briefing outlining the shift instructions to the crew. (Provide each crew member with a copy of the Shift Turnover Sheet)

C. Inform the crew " The simulator is running and that board walk-downs should be performed. CRS please inform me when your Crew is ready to assume the shift.".

D. Allow sufficient time for panel walk-downs. When informed by the CRS that the Crew is ready to assume the shift, ensure the simulator is cleared of unauthorized personnel.

Evaluator/Instructor Activity	Expected Plant/Student Response	Comments

1. Power reduction using normal plant procedures.

No malfunction other than those already inserted to start the scenario. The crew will reduce load at 30% per hour until either 70% power is reached or 24MS29 fails closed.

- The **CREW** commences a power reduction IAW Step 5.3 of S2.OP-IO.ZZ-0004, Power Operation.
  - Notify the Systems Operator and the Condensate Polishing Operator of the upcoming load reduction.

NOTE: PO may start a continuous downpower at a faster rate until Valve Position Limiter is Off. This should be done with concurrence of CRS. Once the VPL is off, the load reduction is placed on hold and the rate is adjusted

- The **CRS** establishes a rate of power reduction.
- The **PO** INITIATES a Turbine load reduction with IAW S2.OP-SO.TRB-0002, Turbine Generator Shutdown Operations.
  - INITIATES monitoring the Main Turbine Data display points on the Plant Computer.
  - Uses the REF ∇ and GO pushbuttons to attain desired load.
- The **RO** MAINTAINS T_{AVG}/T_{REF} mismatch at minimum value with Auto Rod motion and Boration.
- The **RO** adjusts RCS Boron concentration to maintain AFD in target band and Rods above Rod Insertion Limits using OP-SO.CVC-0006, Boron Concentration Control.
  - DEPRESS Makeup Control Mode Select STOP Pushbutton.
  - ADJUST 2CV172 Setpoint to the desired value.
  - SET Boric Acid Flow Register to the number of gallons desired.

Evaluator/Instructor Activity	Expected Plant/Student Response	Comments

- DEPRESS Makeup Control Mode Select BORATE Pushbutton.
- DEPRESS Makeup Control Mode Select START Pushbutton.

- When Boration is complete, depress makeup Control Mode Select STOP Pushbutton.
- ADJUST 2CV172 Setpoint to the pre-boration value.
- DEPRESS Makeup Control Mode Select AUTO Pushbutton.
- DEPRESS Makeup Control Mode Select START Pushbutton.

- The **PO** verifies that SG Feed Pump suction pressure is being maintained >300 psig.

- The **PO** monitors Condenser temperatures using the Plant Computer.

4. 21 Charging Pump trips.

When the power has been lowered 5% or at the discretion of the lead evaluator, initiate the trip of 2 Charging Pump by inserting RT-1, MALF: CV0208A.

The crew will be alerted to the pump trip by the following plant response:

- Charging Pump STOP light flashing.
- Letdown isolates.
- Various Console alarms.

Alarm response procedure will only direct adjusting charging flow, CREW knowledge item to start a charging pump.

- The **CREW** should respond IAW the applicable Alarm Response procedures.

When asked to position 2CV55 to bypass, insert Remote Function CV42A at a value of 0.00.

- The **RO** starts 22 Charging Pump IAW S2.OP-SO.CVC-0002, Charging Pump Operation.

Evaluator/Instructor Activity	Expected Plant/Student Response	Comments

- The **RO/PO** Restores Letdown IAW S2.OP-SO.CVC-0001, Charging, Letdown and Seal Injection.
  - Open 2CV2, LTDWN LINE ISOL V.
  - Open 2CV277, LTDWN LINE ISOL V
  - Place 2CV2, LTDWN LINE ISOL V in AUTO.
  - Place 2CV277, LTDWN LINE ISOL V in AUTO.
  - Open 2CV7, LTDWN HX INLET V.
  - Place 2CV18 in MANUAL CLOSE.
  - Open 2CV18 until CLOSE (INC PRESS) pushbutton extinguishes.
  - Ensure Charging flow is 85-90 gpm.
  - Adjust 2CV71, to maintain 6-12 gpm
  - Open 2CV4, 75 GPM ORIFICE.
  - Adjust 2CV18, to maintain Letdown pressure approximately 300 psig
  - Ensure Master Flow Controller in AUTO.
  - Place 2CV55 in AUTO.
  - Adjust 2CV18, to maintain letdown pressure approximately 300 psig and place in AUTO.

- The **CRS** refers to Technical Specifications Sections:
  - 3.1.2.2
  - 3.1.2.4
  - 3.5.2

Evaluator/Instructor Activity	Expected Plant/Student Response	Comments

2. 24MS29, Turbine Governor Valve fails closed, 21 Loop Tavg fails high.

When Charging and Letdown have been restored, or at the discreation of the lead evaluator, initiate the failure o 24MS29 and Loop21 Tavg by inserting RT-2, MALF: TU0081H, and RC0014A, Delay: 30 sec

The failure of 24MS29 closed causes the following plant response:

- Megawatt load will drop rapidly as remaining governor valves open until limited by valve position limiter (VPL).
- Console Alarm Tavg/Tref dev as Tavg rises.
- Rods drive in to control Tavg
- Pressurizer pressure and level rise due to Tavg change, sprays open to control pressure.

- The **CREW** responds to the alarms IAW the appropriate Alarm Response Procedures.

- The **PO** informs the **CRS** that 24MS29 is failed closed.

Precaution & Limitation of SO.TURB-0001 requires a power reduction to less than 30% @ 5%/min.

- The CREW refers to S2.OP-SO.TURB-0001 and CRS directs load reduction at 5%/min to 30% power IAW AB.LOAD-0001.

NOTE: Control Rods will continue to insert after Tavg is restored to Tref due to the failed Thot channel.

- The **RO** is alerted to the failed Tavg channel by the following plant conditions:
  - Rods will continue to insert as Tavg decreases below Tref.
  - Console alarm RC Loops Tavg Dev.

CRS must prioritize the actions of the turbine failure and AB.ROD-0003

- The **RO** gains concurrence of CRS and takes manual control of rods to restore Tavg to program.

Evaluator/Instructor Activity	Expected Plant/Student Response	Comments
CRS may stop or delay starting the Turbine Load reduction until Tavg is stabilized using manual Rod Control.	• The **CRS** enters and takes actions of AB.ROD-0003. - Place Rods in Manual - Adjust rods to control Tavg - Place Charging in manual and restore level to normal. - Defeat failed channel - Restore Rods to AUTO	
NOTE: Depending on the response of the RO, Rapid Boration may be required to restore Rods above the Rod Insertion Limit. This will be done IAW AB.ROD-003 or the OHA response procedure.	• The **CRS** initiates the actions of S2.OP-SO.RPS-0002, Placing RCS Temperature Channel in Tripped Condition.	
When Rods have been restored to AUTO and load reduction has progressed to the satisfaction of the examination team. Delete MALF: TU0081H, and call as Maintenance inform crew "control box by 24MS29 was bumped and valve reopened, suspect possible loose wire in control circuit."	• The **CRS** stops the load reduction and stabilizes the plant. • The **CRS** refers to Tech Spec - 3.3.1.1 - 3.3.2.1	
NOTE: CREW may decide to trip the Reactor at this point due to questionable turbine valve control. If so proceed to next event. CREW will mitigate subsequent events in the EOP network.		

Evaluator/Instructor Activity	Expected Plant/Student Response	Comments

4. RCS Leak inside Containment

When the plant has been stabilized, or at discretion of evaluation team, initiate the RCS Leak by inserting ET-3, MALF: RC0002, SEV: 50 gpm, RAMP: 2min, CV0040, SEV: 5 pins.

- The **CREW** identifies the leak by one or more of the following indications:
  - 2R11A indication rising
  - PZR level lowering
  - Charging Flow rising
  - A rise in Containment temp and pressure.
  - CFCU Leak Detection OHAs.
- The **CRS** should enter and direct actions IAW S2.OP-AB.RC-0001, RCS Leak.
- The **RO/PO** should reduce letdown flow:
  - Manually control 2CV18 and maintain letdown pressure approximately 300 psig.
  - Open 2CV3, 45-gpm orifice.
  - Close 2CV4 and 2CV5, 75-gpm orifice.
  - Return 2CV18 to Auto.
- The **RO/PO** places two CFCUs in Low speed and two CFCUs in High speed.
- The **CRS** refers to Tech Specs.
  - Operational Leakage (3.4.7.2)
  - Containment Pressure (3.6.1.4)
- The **CREW** determines the leak rate to be > TS limits and begins a plant shutdown.

Evaluator/Instructor Activity	Expected Plant/Student Response	Comments

6. Small Break LOCA.

After the decision has been made to perform a plant shutdown, or at the discretion of the lead evaluator, initiate the SBLOCA by modifying MALF: RC002 to severity: 1000 gpm, Ramp 30 sec.

The crew will be alerted to the LOCA by the following plant response:

- Pressurizer level will lower rapidly.
- RCS pressure will lower rapidly.
- Containment pressure and temperature will rise.
- Charging flow will rise.
- Containment Rad Monitor, 2R11A, 12A,and 12B values will rise
- OHA C-38 CNTMT FAN COIL LK DET HI.
- OHA C-2 CNTMT SUMP PUMP START.
- OHA E-28 PZR HTR ON PRESS LO.
- Pressurizer Backup Heaters On.

IMMEDIATELY after the Reactor is tripped, and prior t SI initiation, insert RT-5 Remote: DG03D, C SEC to off to simulate the failure of C SEC.
Trip of 21 SI pump is pre-inserted.

- The **CREW** should recognize the changing Pressurizer level and initiate a manual Reactor Trip and Safety Injection.

- The **CRS** should enter EOP-TRIP-0001, Reactor Trip or Safety Injection.

IF CREW requests NEO to investigate status of 2C SEC, after 2 min report as NEO that 2C SEC VIB breaker was discovered tripped.

Evaluator/Instructor Activity	Expected Plant/Student Response	Comments
Critical Step # 1: Sat _____ Unsat _____ CREW starts 22 Safety Injection Pump and at least 23 or 25 CFCU.	• The **CREW** should recognize the failure of C SEC and the trip of 21 SI pump manually start C SEC equipment as required, and close 23SW20.	
Critical Step # 2: Sat _____ Unsat _____ Crew isolates Miniflow valves to insure minimum ECCS flow to RCS.	• The **RO** closes CV-139 or CV140, Charging Pump Miniflow Valves as pressure lowers below 1500 psig.	
Critical Step # 3: Sat _____ Unsat _____ CREW trips all RCP's prior to transition from 2-EOP-TRIP-1	• The **RO** should stop all RCPs when pressure lowers below 1350 psig.	
	• The **CREW** should transition to EOP-LOCA-0001, Loss of Reactor Coolant at step 28 of EOP-TRIP-0001.	
	• The **CREW** should perform SI Reset actions as follows: - Reset SI - Reset Phase A Isolation. - Reset Phase B Isolation. - Open 21 & 22 CA330, Containment Control Air Isolation. - Reset the A and B SECs. - Reset the A & B 230 V Control Centers.	
	• The **CREW** should transition to EOP-LOCA-0002, Post LOCA Cooldown and Depressurization at step 18 of EOP-LOCA-0001.	
	• The **CREW** will commence a cooldown at 100 deg/hr to cold shutdown	

Evaluator/Instructor Activity	Expected Plant/Student Response	Comments
	• The **CREW** will depressurize the RCS to restore Pressurizer level.	
The scenario may be terminated after transition to EOP-LOCA-2 or at the discretion of the Lead Examiner.	• The **CREW** will sequentially reduce ECCS pumps while maintaining subcooling.	
After the scenario has been terminated, the CRS should refer to the ECG to classify the event.	• The CRS refers to the ECG and classifies the event: - Alert, 3.2.2.a	

VI. SCENARIO REFERENCES

A. ES-301, Preparing Initial Operating Tests
B. K/A Catalog
C. JTA Listing
D. Technical Specifications
E. S2.OP-IO.ZZ-0004
F. S2.OP-SO.TRB-0001
G. S2.OP-SO.CVC-0001
H. S2.OP-SO.CVC-0002
I. S2.OP-SO.CVC-0006
J. Various Alarm Response Procedures
K. S2.OP-AB.LOAD-0001
L. S2.OP-AB.RC-0001
M. S2.OP-AB.ROD-0003
N. S2.OP-SO.RPS-0003
O. S2.OP-SO.RPS-0006
P. 2-EOP-TRIP-1
Q. 2-EOP-LOCA-1
R. 2-EOP-LOCA-2
S. 2-EOP-APPX-3
T. ECG

ATTACHMENT 1
UNIT TWO PLANT STATUS TODAY

MODE: 1	POWER: 90%	RCS BORON: 103 ppm	Mwe: 1050

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

REACTIVITY PARAMETERS: Core Burnup 17,500 MWD/MTU

MOST LIMITING LCO AND DATE/TIME OF EXPIRATION:

3.7.2 22 Aux Feedwater Pump out of service for bearing replacement. The 72 hr LCO expires at 2330 tomorrow.

EVOLUTIONS/PROCEDURES/SURVEILLANCES IN PROGRESS:

Power reduction to 70%.

PLANT TURNOVER IS AS FOLLOWS:

- Power was reduced three days ago at the request of the ESO following an extended run at full power.
- 22 Aux Feedwater Pump out of service for bearing replacement. Maintenance estimates the work will be complete in approximately 14 hours.
- 21 CFCU cleared and tagged for cooling coil leak repair.
- The orders for the shift are to reduce power at 30%/hr to remove 22 condensate pump from service for seal replacement.

ABNORMAL PLANT CONFIGURATIONS: NONE

CONTROL ROOM:

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

PRIMARY: NONE

SECONDARY: Heating Steam is aligned to unit 1.

RADWASTE: No discharges in progress

CIRCULATING WATER/SERVICE WATER:

ATTACHMENT 2
SIMULATOR READY FOR TRAINING CHECKLIST

_____1. Verify simulator is in correct load for training

_____2. All required computer terminals in operation

_____3. Simulator clocks synchronized

_____4. Required chart recorders advanced and ON (proper paper installed)

_____5. Rod step counters correct (channel check)

_____6. All tagged equipment properly secured and documented (TSAS Log filled out)

_____7. DL-10 log up-to-date

_____8. Required procedures clean

_____9. All OHA lamps operating (OHA Test)

_____10. All printers have adequate paper AND functional ribbon

_____11. Procedure pens available

_____12. Procedures in progress open and signed-off to proper step

_____13. Shift manning sheet available

_____14. SPDS reset

_____15. Reference verification performed with required documents available

_____16. Ensure a current RCS Leak Rate Worksheet is placed by Aux Alarm Typewriter with Baseline Data filled out

_____17. Required keys available

_____18. Video Tape (if applicable)

_____19. Ensure ECG Classification is correct – 960502140 CRCA-03

_____20. Reset P-250 Rod Counters

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 mitigation 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.

1. 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

2. 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

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: 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 Initial training Program, evaluate the need to modify or replace the scenario.

ATTACHMENT 5

CT#1 – Manually actuate at least one train of Safeguards Equipment. (E-0--D)

CT#2 – Close CV-139 and CV140, Charging Pump Miniflow Valves when pressure lowers below 1500 psig.

CT#3 – Stop all RCPs when pressure lowers below 1350 psig.

ATTACHMENT 5B
SCENARIO SET EVALUATION

Note: The following criteria list scenario traits that are numerical in nature. A second set of numbers indicates a range to be met for a set of two scenarios. Therefore, to complete this part of the review, the set of scenarios must be available. This page should be completed once per scenario set.

SCENARIO SET CONSISTS OF SCENARIO ESG- AND ESG- _____

Initials	Qualitative Attributes
_____	• Total malfunctions inserted: 4-8/10-14
_____	• Malfunctions that occur after EOP entry: 1-4/3-6
_____	• Abnormal Events: 1-2/2-3
_____	• Major Transients: 1-2/2-3
_____	• EOPs used beyond primary scram response EOP: 1-3/3-5
_____	• EOP Contingency Procedures used: 0-3/1-3
_____	• Approximate scenario run time: 45-60 minutes (One scenario may approach 90 minutes)
_____	• EOP run time: 40-70% of scenario run time
_____	• Crew Critical Tasks: 2-5/5-8
_____	• Technical Specifications are exercised during the test
_____	• Events used in the two scenarios are not repeated
_____	• The scenario sets for the exam week do not contain duplicate scenarios

COMMENTS: _____